A Bibliography of Publications on Floating-Point Arithmetic

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Introduction

This is a bibliography of material on floating-point arithmetic that I came up with while doing research on a floating-point package of my own. I don't claim it to be anywhere near complete. The material listed is only what I myself possess.

My main interest was in software based, binary floating-point arithmetic on a microprocessor, so you won't find much material about the hardware used in floating-point arithmetic (e.g. adders, carry propagation schemes, higher radix

representation for multiplication and division, etc.) in this list. There is also not too much on non-binary floating-point arithmetic.

For most fields covered in this bibliography, the important or historically relevant articles should be included. There is also some material on integer arithmetic in this list as some of the methods used with integer arithmetic contain interesting ideas that may be useful in the realization of a floating-point arithmetic package.

Also, depending on the type of microprocessor used, one may need to implement integer multiplication and division for use in the floating-point package, so articles about this topic are included as well.

As I am German, there is a bit of material in German in this bibliography. However, English translations are provided for all non-English titles.

Thanks to the people who have helped me with previous versions of this document by sending me papers or additional references:

- Steven Sommars (`sesv@research.bell-labs.com`),
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- K. C. Ng (`kwok.ng@eng.sun.com`),
- Nelson H. F. Beebe (`beebe@math.utah.edu`).

Bibliography entries in the **Books** section are ordered alphabetically by author; ordering is by ascending year in the remaining sections.

Warning: it has yet not been possible to bring this citation list up-to-date with the entries in the BibTeX

Books, hardware oriented

[1722, 282, 1287, 1217, 3117, 3322, 1917, 842, 1165, 1001, 1458, 844, 1344, 7321, 7322, 1558]

Books, software oriented or theory

[1274, 467, 470, 471, 119, 1421, 2399, 909, 1050, 353, 2958, 2440, 2975, 2276, 321, 528, 7175]

Books, machine specific

[2179, 3223, 3119, 2442, 1768, 1904, 2295, 1936, 2477]

Journal Publications, Conference Papers, Technical Reports, Ph.D. Dissertations, Book Contributions, etc.

1 Choice of base, floating point formats

[499, 751, 753, 731, 728, 894, 1142, 1132, 2037, 2273, 2397, 2550, 2777, 2791]

1.1 Precision and Rounding

[434, 559, 746, 848, 882, 897, 965, 1033, 1042, 1046, 1195, 1297, 1436, 1377, 1539, 1730, 2286, 2462, 2535, 2848, 3164, 3287]

1.2 Determination of parameters of floating point arithmetic

[687, 824, 1637, 2279, 2205]

1.3 IEEE standards for floating point arithmetic

[994, 1198, 1224, 1207, 1235, 1197, 1204, 1341, 1327, 1328, 1281, 1301, 1459, 1386, 1410, 1388, 1726, 1825, 1863, 1864, 1861, 2089, 2176, 2345, 2579, 3059]

1.4 Floating point arithmetic, general and implementation issues

[634, 720, 1015, 1036, 1084, 1096, 1095, 1237, 1239, 1211, 1275, 1267, 1476, 1494, 1993, 2013, 2221, 2222, 2378, 2452, 2355, 2534, 2778, 2779, 2707, 2776, 3017]

1.5 Floating point packages

[1288, 1701, 1680, 1774, 1732, 1885, 1850, 1886, 1968, 2082, 2105, 2208, 2304, 2305, 2306, 2485, 2486, 1353]

1.6 Floating point units

[417, 1154, 1321, 1279, 1331, 1355, 1324, 1350, 1271, 1316, 1325, 1499, 1541, 1498, 1534, 1557, 1663, 1577, 1579, 1580, 1681, 1611, 1608, 1616, 1643, 1717, 1619, 1790, 1777, 1717, 1758, 1787, 1719, 1798, 2009, 1971, 1999, 1965, 2018, 1957, 1950, 1951, 2132, 2084, 2157, 2251, 2280, 2313, 2256, 2282, 2257, 2188, 2217, 2326, 2268, 2218, 2293, 2467, 2413, 2414, 2438, 2328, 2449, 2411, 2408, 2320, 2430, 2469, 2369, 2329, 2450, 2334, 2570, 2505, 2525, 2565, 2520, 2497, 2568, 2551, 2542, 2665, 2774, 2737, 2963, 2876, 2946, 3103, 3053, 3194, 3354]

1.7 Test of floating point routines

[501, 1455, 1727, 1871, 1870, 2021, 2022, 1966, 2109, 2475, 2603, 2611, 2679, 2678, 2794, 2773, 2759, 3058]

2 Addition and Subtraction

[376, 1514]

2.1 Floating-point Summation

[326, 346, 363, 362, 571, 640, 678, 832, 1662, 2281, 2358]

2.2 Multiplication

[681, 1247, 1261, 1477, 1544, 1517, 1575, 1602, 1594, 1620, 1677, 1592, 1759]

2.3 Division

[209, 238, 223, 323, 349, 439, 1018, 1065, 1312, 1404, 1568, 1646, 1624, 1607, 1771, 1891, 2016, 1995, 2393, 2783, 2728, 2973, 3022, 7343, 2955]

3 Elementary functions, general

[385, 399, 587, 651, 616, 1123, 1266, 1628, 1657, 1757, 1720, 1718, 1795, 1841, 7262, 1946, 2053, 2158, 2101, 2283, 7281, 2566, 2603, 2553, 3341, 2555, 2524, 2703, 2856, 2667, 2818, 2819, 2696, 3374, 3342]

3.1 Elementary functions, CORDIC and related algorithms

[190, 191, 248, 264, 374, 524, 552, 660, 652, 668, 734, 856, 1069, 1085, 1294, 1452, 1700, 1898, 1709, 1812, 1964, 2163, 2387, 2316, 2547, 2573, 2722, 2816, 3016, 3011, 3134, 3074, 3120]

3.2 Elementary functions, function approximation

[240, 241, 482, 624, 769, 768, 984, 1022, 1163, 2001, 2054, 2616, 2691, 2789, 2790]

3.2.1 Polynomial evaluation

[259, 280, 305, 427, 1062, 1229, 2357]

3.3 Square root, general

[1083, 1188, 1482, 1599, 1652, 2571, 2683]

3.3.1 Square root, bit-oriented, iterative, and table methods of computation

[120, 153, 360, 1023, 1009, 1152, 1354, 1445, 1407, 1373, 1427, 1538, 1826, 1923, 1835, 1888, 1972, 1953, 2036, 1956, 2007, 2048, 2091, 2143, 2183, 2259, 2396, 2583, 2540, 2715, 3044]

3.3.2 Square root, Newton's method

[158, 281, 303, 375, 348, 344, 384, 452, 428, 514, 519, 533, 597, 586, 580, 582, 703, 1329, 1318, 1398, 1584, 2339, 3024, 2953]

3.4 Sine and Cosine

[180, 1069, 1019, 1024, 1177, 1399, 1545, 1667, 1666, 1766, 1854, 1954, 2124, 2235, 2612, 2967, 2964, 2886, 2986, 3080]

3.5 Logarithm

[154, 271, 332, 691, 999, 1113, 1300, 1530, 2110, 2111, 2613, 2741]

3.6 Exponential function

[141, 410, 1184, 1362, 1519, 1749, 1848, 2476, 2614, 3008]

3.7 Arctangent

[143, 160, 207]

3.8 Other transcendental functions

[500, 614, 161, 1025, 366, 276, 361, 2103, 1158, 2866, 3060]

4 Binary-decimal conversion

[189, 173, 222, 476, 577, 685, 1166, 1292, 1293, 1406, 1655, 1710, 2003, 1976, 2515, 2607, 2531, 2862]

5 BCD arithmetic

[675, 727, 778, 779, 780, 781, 782, 783, 784, 1383, 1493, 1706, 1641, 2039, 2652, 2966]

6 Multiple precision arithmetic

[293, 331, 411, 429, 633, 617, 954, 1003, 1100, 1099, 1266, 1351, 1431, 1543, 2811, 2795, 3039, 3230]

7 Conferences on computer arithmetic

[7201, 7211, 7216, 7225, 7228, 7241, 7259, 7260, 7302, 7332, 7340, 7334, 7366]

8 Additional contributions from Nelson H. F. Beebe

[121, 136, 169, 215, 298, 347, 368, 450, 753, 556, 849, 878, 922, 923, 975, 989, 1003, 1008, 1071, 1073, 1100, 1099, 1193, 1164, 1222, 1246, 1265, 1272, 1289, 1389, 1426, 1431, 1460, 1461, 7241, 1715, 1725, 1728, 1742, 1748, 1856, 1862, 1896, 1924, 1980, 2023, 2034, 2063, 2106, 2120, 2128, 2173, 2281, 2282, 2335, 2492, 7314, 2537, 2541, 2554, 2561, 2570, 2611, 2623, 7340, 2746, 2747, 2771, 2775, 2792, 2811, 2864, 2865, 2978, 3058, 3274, 208, 215, 216, 252, 283, 295, 307, 308, 312, 343, 363, 422, 441, 474, 493, 527, 571, 593, 617, 640, 711, 795, 828, 830, 846, 865],[898, 900, 905, 927, 948, 974, 976, 983, 985, 1017, 1064, 1072, 1253, 1284, 1358, 1431, 1438, 1462, 1465, 1560, 1565, 1625, 1639, 1648, 1649, 1704, 1745, 1785, 1789, 1808, 1809, 1814, 1816, 1833, 1844, 1845, 1937, 1969, 2014, 2025, 2100, 2145, 2174, 2190, 2255, 2270, 2285, 2307, 2366, 2377, 2381, 2463, 2487, 2493, 2538, 2585, 2599, 2662, 2672, 2708, 2752, 2803, 2867, 2934, 2940, 2974, 3000, 3008, 3043, 3096, 3104, 3182, 3196, 3199, 3243, 3285, 3332, 7172, 7209, 7217, 7226, 7227, 7252, 7264, 7261, 7307]

Title word cross-reference

#26 [5502].

$((2^n)^m)$ [3805]. $(10^{31} - 1)/9$ [1977]. (2^m) [4360, 4381, 4565, 4574, 4479]. $(2^n + 1)$ [1082, 4798, 3918]. $(2^n - 1)$ [5017]. $(2^n - 1, 2^{n+p}, 2^n + 1)$ [6297]. $(2^n 2^q 1)$ [6100]. $(2^n \pm 1)$ [5529, 4146]. $(2m)$ [4444]. $(2n+3)$ [6555]. $(2n-(2p\pm 1))$ [4860]. $(a \cdot x) \cdot x?$ [6833]. (d, r) [790]. (M, p, k) [5821]. $(\mathcal{R})$ [2914]. (p) [4360, 4444].

$(x+y)*(x-y)$ [6702]. -2 [744, 183, 206, 950, 802]. $-\infty < n < +\infty$ [141, 160]. 0 [5649]. $0 < N < 1$ [161]. $0 \div 0$ [700]. **$1** [3747]. 1 [4997, 4353, 5162, 5650, 3702, 2169]. 1,000,000 [619]. $1/\sqrt{x}$ [5792]. $1/t$ [2178]. 10 [531, 6031]. 116 [4028]. 128 [4866]. 15 [531]. 16 [2510, 4194, 4081]. 17×69 [3053]. 2 [1006, 4311, 2051, 5686, 3235, 4000, 619, 6064, 431, 4353, 5018, 3290, 3466, 1761, 3476, 3146, 3483, 5624, 3498, 531, 322, 3689, 3824, 4460, 3702, 5106, 3368, 4950]. 2,576,980,370,000 [5651]. $22n + 1$ [2150]. 256 [4447]. 27 [434]. $2^(n + 1) + 1\}$ [3977]. $2^{2n+1} - 1$ [6046]. $2^{2n+2} - 1$ [6046]. 2^{2q} [6036]. $2^8 - 1$ [2862]. 2^k [4492, 5005, 5509, 5046, 5054]. $2^k + 1$ [867]. 2^{k-1} [4492]. 2^m [4566]. 2^n [1569, 6046, 3977]. $2^n + 1$ [3977, 4997, 5732, 4470]. $2^{n+1} - 1$ [6545]. 2^{n+k} [6545]. $2^n - (2^{n-2} + 1)$ [5349]. $2^N - 1$ [2993, 4833, 6545, 4223, 3977]. $2^q - 3$ [7049]. $2^q \pm 1$ [6036]. $2^q \pm 3$ [6036]. $2^x p^y \pm 1$ [6264]. 2×2 [5931]. 3 [378, 4999, 4188, 431, 4043, 4212, 4048, 5038, 4883, 322, 6233, 4127, 6629, 4947, 4948]. $3 - j$ [299]. 32 [3993, 4447]. 3×3 [2499]. 4 [3977, 4325, 4669, 2527, 2528, 431, 3435, 5737, 5535, 4392, 4725, 2956, 4081, 4083, 2817, 3007, 1933, 3531, 3536]. **$49.95** [3714]. 5 [6036, 4810]. 54×54 [3490]. $6 - j$ [299]. 64×64 [2284]. 8 [434, 3448, 4081, 3498]. 84 [308]. **$85.00** [4151, 4152]. 88062 [531]. $8k$ [6870]. 8×8 [5106]. $9 - j$ [299]. $<$ [6241]. $>$ [6241]. $[0, 1]$ [5162]. ^{0} [4366]. ^{2} [5750]. ^{4} [2802]. ^{5} [3905]. ^{e} [1160]. $^{\text{th}}$ [1160]. ^{TM} [4636]. $A(N + C)$ [1911]. $a + b$ [3645]. $a+b+c$ [6325]. $AB+CAB+C$ [6983]. $ab+cd$ [6115]. $ab+cd+e$ [7142]. $a \cdot (x \cdot x)$ [6833]. $A \cdot T$ [4074]. $\arctan Z$ [143]. $a \times b + c \times d$ [6325]. β [6356, 7094]. $C + AB^2$ [4290]. $c/\sqrt{(a^2 + b^2)}$ [6306]. CLP(R) [2934]. $\cos^{-1}$ [3134]. $\cos N$ [180]. $\cos x$ [374]. $\cot^{-1} x$ [374]. d [4703, 5512, 3811]. Δ_2^0 [4951]. e [460]. e^n [141]. e^x [410]. ϵ [3479]. η_T [5678]. ηT [5254]. $\exp(x)$ [1362]. $\exp x$ [374]. $f(x) = 0$ [1223]. G_α [810]. GF(2)[x] [5877]. $GF(2^m)$ [4414, 4782, 4397, 6065, 4984, 5440, 4915, 5881]. GF($2n$) [4209]. $GF(p^m)$ [4661]. H [5179]. I^2L [3244]. ∞/∞ [5025]. K [5448, 4311, 5933, 2110, 6019, 6356, 5975]. $k < m$ [6356]. L [4353]. L^2 [5262]. L^∞ [5261, 7013]. l_2 [6075]. $\ln(x)$ [1530]. $\ln x$ [374]. $\log n$ [1229]. $\log Z$ [143]. LU [6821, 6577]. M [4847, 180, 4141, 2632, 2637, 2646, 2924, 5343, 582, 6356]. $M^E \bmod N$ [2782]. $\mathbf{F}_2[X]$ [7093]. $\mathbf{f}_{2^m}$ [4239]. $\mathbf{F}_{5^{5n}}$ [5696]. $\mathbf{F}_{7^{7n}}$ [5696]. $\mathbf{R}^n$ [6935]. $\mathbf{Z}^2$ [4069, 5045]. GF(2) [5317, 1693]. $\text{GF}(2^4)^2$ [6179]. $\text{GF}(2^{4n})$ [3929]. $\text{GF}(2^8)$ [6179]. $\text{GF}(2^{\text{k}})$ [4972, 3776, 4930]. $\text{GF}(2^{\text{m}})$ [5492, 4682, 4990, 3881, 4536, 5151, 3588, 4542, 3892, 5521, 2902, 2903, 3760, 4870, 5317, 5180, 4724, 4395, 5042, 2434, 5441, 4614, 4755, 4916, 5445, 3204, 4290, 4945, 4781, 2314]. $\text{GF}(2^{\text{n}})$ [5004]. GF(p) [2083]. $\text{GF}(\text{p}^{\text{m}})$ [3494]. $\text{GF}(\text{p}_{\text{k}})$ [4657]. $\text{GF}(\text{q}^{\text{n}})$ [4705]. MECIPTI [283]. μ [1427, 4876, 4918, 2315]. μP [1611, 2009]. N [3972, 809, 2339, 2340, 160, 161, 180, 4585, 5078, 4936, 5975, 5698, 4169, 6075, 1295, 3629]. $n^{\text{ième}}$ [1160]. $N_0' = -N_0^{-1} \bmod W$ [4267]. $N \geq 32$ [5866]. $n \log(n)$ [6493]. $n \times n$ [3145]. $O(1)$ [6393]. $O(n)$ [1196, 3438, 1548]. $O(n^2)$ [2783, 2784]. $O(n \log n)$ [6542, 6693]. Ω [4932]. Arccos$x$ [207]. Arcsin$x$ [207]. Arctan$x$ [207]. mod$p$ [1916]. P [6533, 4646, 2061, 1131, 895, 1045, 1636, 7094, 4283, 4632, 3356]. p^k [6710]. π [1631, 2239, 2240, 4611, 268, 5651, 1694, 460]. $p \times p$ [4590, 4734]. q [5794]. $q*m - n$ [1629]. QR [6140]. R [3609, 3067, 1606, 1614, 6436, 5866]. $r = m^k$ [1439]. r^a [4955]. $r^b - 1$ [4955]. $r^c + 1$ [4955]. $\{r^n - 2, r^n - 1, r^n\}$ [5308].

$r \geq 8$ [5866]. s [4887]. sin(**BIG**) [5243]. $\sin^{-1}$ [3134]. $\sin N$ [180]. $\sin x$ [374]. $\sqrt{(a^2 + b^2)}$ [6306]. $\sqrt{(x)}$ [1482]. $\sqrt{(x/d)}$ [3853]. $\sqrt{2}$ [7017]. $\sqrt{x}$ [1308, 452]. $\sqrt{x^2 + y^2}$ [5686]. T [6593]. $\tan^{-1} x$ [374]. $\theta(\log N)$ [2360]. $\times$ [4074, 3923, 4140]. w [4742]. X [1543, 2899]. $x^2 + ny^2$ [3714]. x^n [5999, 3314]. $x \star (1/x) \neq 1$ [3252]. y [4423]. Z [5340].

-2 [1005]. **-adic** [1131, 1045, 1636, 2061, 895]. **-Approximations** [7013, 5261, 5262]. **-ary** [2924, 4141]. **-b** [3490]. **-Bit** [3993, 6870, 308, 5975, 5078]. **-body** [4585, 4936]. **-circulant** [6436]. **-Coordinate** [4423]. **-count** [6593]. **-D** [5686, 4188, 4212, 3290, 6233, 4127, 5106, 3368, 2169]. **-Depth** [3438]. **-Digit** [434]. **-Dimensional** [5512, 2051, 4703]. **-Fold** [5448]. **-Friendly** [5821]. **-function** [5179]. **-gram** [5698]. **-Matrix** [4847]. **-Moduli** [6036, 3977, 4669, 4810]. **-Norms** [6075]. **-Order** [3609]. **-Partition** [6019]. **-Real** [4951]. **-select** [4169]. **-sets** [3067]. **-spaces** [4887]. **-th** [5933, 3811, 5794, 2340]. **-transform** [5340]. **-Vectors** [6075].

.NET [6446, 5081].

/m [4876]. **/spl** [4876].

0.18-CMOS [5788]. **0.4.1rc** [6447]. **0.80pJ** [6581]. **0.80pJ/flop** [6581]. **'00** [7442, 7447, 2546]. **'01** [7456]. **'03** [7485]. **'04** [7494, 7502]. **'07** [7537, 7543, 7545, 7550]. **'08** [7554, 3038, 5388].

1 [217, 3554, 6667, 3419, 2882, 228, 63, 65, 67, 564, 3282, 6700, 4074, 4417, 1164, 5788, 7099, 1934, 3873]. **1-GHz** [6667, 4417, 5788]. **1-Output** [5354]. **1.0** [3874]. **1.24Tflop** [6581]. **1.24Tflop/sW** [6581]. **1.5** [5666]. **10** [5750]. **10-kA** [5750]. **10-kA/cm** [5750]. **10/20** [959]. **100** [2895, 2896]. **100-MFLOPS** [2895, 2896]. **1014** [6776]. **1057** [1982]. **10858** [1747]. **10967** [4371, 5168]. **10967-1** [3282]. **10967-2** [4371]. **10967-3** [5168]. **10th** [7252, 7586, 7334, 7463, 7476, 27, 7233, 2769]. **'11** [7581, 1111, 1392, 1508, 1409, 1313]. **11-bit** [4918]. **11/780** [2037, 1570, 1571, 1804, 1020]. **116** [270]. **1164/WTL** [2034]. **11i** [4933]. **11th** [7454, 7347, 7365, 7366, 3189]. **120B** [1121]. **128-bit** [6347, 4125]. **12th** [7497, 7563, 7208, 7389, 3461, 7549]. **13** [4330, 2092]. **132-Bit** [343]. **13th** [7482, 7224, 7408, 7378, 7536, 3852, 3780, 7606]. **14-Port** [3923]. **144** [2038]. **14th** [7369, 7453, 7484, 7535, 7447, 7433]. **15** [2772]. **15-b** [4462]. **15-bit** [4130]. **15C** [1630]. **15th** [7272, 7543, 7208, 7551, 7455, 7501]. **16-19** [7172]. **16-b** [6482]. **16-Bit** [4541, 6708, 6724, 7109, 6870, 3029, 1261, 1602, 5002, 3082, 1760, 6346, 1477]. **16-bit-** [1611]. **16-bit-Multiplikation** [1477]. **16-by-8-bit** [1646]. **16-Digit** [5374]. **160-ns** [2841]. **160-Word** [3923]. **1620** [255]. **164** [1816]. **167** [3498, 3536]. **16BST** [1818, 1734, 1735, 1737, 1741, 1751, 1764, 1773, 1690]. **16F/400** [918]. **16th** [7526, 7517, 4658, 7481, 7523]. **17** [288, 839]. **17-Bit** [649, 648]. **1788** [6569].

1788-2015 [6089]. **17th** [7588, 7528, 7444, 7518, 7521]. **'18** [7599, 563]. **18-21** [7534]. **18.Mai** [1485]. **18th** [7553, 7542, 7548, 5482]. **18th-Century** [5482]. **1945** [61]. **1947** [7164]. **196** [5694, 5705]. **1962** [7172]. **1965** [7176, 7178]. **1967** [7183, 7185]. **1968** [7188]. **1969** [7186, 7187, 588]. **1971** [7198]. **1972** [7196, 4055]. **1973** [4132, 4133]. **1975** [7205]. **1976** [7206, 7208]. **1977** [7209, 7234, 1653]. **1979** [7214, 7217]. **1980** [7218, 7224, 1526, 7229, 7226]. **1981** [7231, 7236]. **1983** [7252]. **1984** [7261]. **1985** [7278]. **1987** [2089]. **1988** [7281, 7292]. **1989** [7305, 2585]. **1989-01** [2391]. **1989/Taipei** [7305]. **1991** [2641, 7327, 2769]. **1992** [2861, 7390]. **1993** [7358, 7401, 3189]. **1994** [7379]. **1994-12** [3282]. **1995** [7380, 7392, 3461]. **1998** [7418, 7420, 3900]. **1998-12** [3899]. **1999** [7430, 7431, 7436, 7438]. **19th** [7561, 7531]. **1st** [7415].

2 [2180, 6494, 2523, 1735, 64, 66, 68, 4371, 4044, 4583, 6454, 3926, 4901, 529, 2015, 7100, 3520, 4125, 4774, 2827, 3019]. **2-D** [3520]. **2-Digit** [4182]. **2-dimensional** [2994]. **2.0** [3625]. **2.44** [4043, 4212]. **20** [2671, 2405]. **20-MFLOPS** [2406, 2405]. **200-ns** [1486]. **'2000** [7441, 7440, 7441, 7447]. **2001** [7452, 7453, 7455, 4835, 7457, 7463, 7464]. **2002** [7466, 7467, 7469, 7470, 7471, 7478]. **2003** [7481, 7482, 7485, 7486]. **2004** [7493, 7494, 7496, 7502, 7503, 4893]. **2005** [7510, 7511, 7513, 7516, 7522]. **2006** [7525, 7526, 7529, 7533]. **2006Petrozavodsk** [7583]. **2007** [7537, 7539, 7540, 7542, 7545, 7547, 7557, 7552]. **2008** [7553, 7554, 5494, 7556, 6554, 5939, 5940, 6719, 5546, 5771, 5569]. **2009** [7559, 7563, 7566, 7567, 5527]. **2010** [7576, 7577, 7579]. **2011** [7582]. **2013** [7587]. **2015** [7590, 7591]. **2016** [7595]. **2017** [7596]. **2018** [6467]. **2019** [6520, 7601, 7602]. **2020** [6649, 6647, 6648, 6650, 6651, 6653, 6674, 7603, 6699]. **2020s** [6761]. **2021** [6761, 6762, 6763, 6764, 6772, 7607, 6818, 6837]. **2022** [6875, 6876, 6877, 7609, 6904, 6905]. **2023** [7611]. **20th** [7565, 7605, 7584, 7546]. **21-23** [7563]. **2100** [2564]. **21064** [3348]. **210uW** [6417]. **210uW/MHz** [6417]. **21164** [3393]. **21st** [7571, 7499, 7443, 7587, 7560]. **22** [338]. **22-nm** [6667]. **22nd** [7591]. **22nm** [6581]. **23-28** [7530]. **23nd** [7595]. **23rd** [7317, 7574, 7577]. **24** [1128]. **24-26** [7483]. **24-bit** [2370]. **24.und** [7234]. **24732** [5170]. **248GOPS** [6850]. **248GOPS/W** [6850]. **24b** [2467]. **24th** [7596, 7416, 7419, 7473, 7579, 7234]. **25-28** [7442]. **256** [6303]. **25th** [7313, 7429, 7234, 7544, 7600]. **26-28** [7494]. **26th** [7579, 7602]. **27th** [7603, 7576]. **281** [3061]. **286** [3644]. **28nm** [6850]. **28th** [7607, 7424]. **29.95** [3714]. **29th** [7432, 7609]. **2B** [646]. **2DFFT** [1884]. **2nd** [7575, 4587, 7197]. **2Sum** [6155, 6263].

3 [3099, 5168, 6430, 2775, 6129]. **3-ps** [5788]. **30** [2038]. **30-bit** [2427]. **30-MFLOP** [2251]. **30-ns** [3476]. **300** [4212, 1230]. **300-MHz** [4212]. **300MHz** [4043]. **30th** [7611]. **312** [433]. **3171** [2505]. **31st** [7286]. **32** [5124, 2063]. **32-** [6944]. **32-Bit** [3722, 2318, 2187, 2331, 5486, 4813, 3419, 1404, 5014, 1624, 2740, 2412, 2413, 2414, 2415, 6827, 2563, 1997, 2437, 3316, 2575, 3193, 3959, 2490, 3208]. **320** [3102]. **320-MFLOPS** [3103, 3102]. **320C25** [3294]. **32b** [2251]. **33** [2217]. **33rd** [7397, 7448, 7341]. **34** [513]. **34-MFLOP** [2490]. **360**

[418, 419, 505, 384, 392, 393, 682, 440, 481, 1442, 6463, 538]. **3600** [303]. **36th** [7361]. **370** [1946, 2037, 2484]. **37th** [7547]. **390** [4085, 3819, 3820, 4111, 4112]. **39th** [7537, 7554]. **3CT** [3388]. **3DNow** [3926, 4044]. **3DTV** [5777]. **3m** [6371]. **3rd** [7413, 7201, 7519]. **3X** [5446].

4 [3398, 4799]. **4-2** [1168]. **4-bit** [6740]. **4-Input** [5354]. **4-Input/1-Output** [5354]. **4.4ns** [3490]. **40** [2414]. **40-MFLOPS** [2412, 2414]. **40-ns** [649]. **400** [918]. **4000** [498]. **400MHz** [3923]. **400th** [7390]. **4096-Core** [6864, 6748]. **40ns** [648]. **41** [444]. **432** [1857]. **44th** [7533]. **45th** [3767]. **48th** [7516]. **4d** [4680]. **4m** [6371]. **4th** [7211, 7442, 7336, 7464, 7610].

5 [3546, 4154, 6964]. **50** [2329]. **50-Megacycle** [149]. **50-MHz** [2329]. **501** [3784, 3635]. **50th** [7373]. **512** [6379, 7025]. **512-bit** [6890]. **528** [1119, 4026]. **53*53** [3268]. **53nd** [7572]. **54** [339]. **54-b** [2841]. **55-b** [3476]. **5th** [7480, 7562, 7228, 7531, 7387].

6.7-MFLOPS [2448, 2450]. **60** [606, 579, 411]. **600** [3992]. **600-MHz** [3992]. **6000** [3388, 2541, 637, 2566, 2570, 1243, 3370, 718]. **6000/7000** [1037, 1243]. **600MHz** [4085]. **601** [3348]. **603e** [3618]. **60M** [2640]. **60M-flops** [2640]. **64** [4787, 3999, 4174, 4034, 4200, 4201, 6540, 4246, 4121]. **64-active-instruction** [3532]. **64-b** [3644, 2963, 3532]. **64-Bit** [2438, 3923, 7089, 2326, 2329, 5395, 5137, 4996, 3075, 3436, 5162, 2717, 3450, 2405, 2406, 2551, 2410, 2930, 6944, 2774, 2265, 3330, 4934, 2034]. **64-bit-Universal-Floating-Point-ISA-Compute-Engine** [6540]. **6400** [1695]. **64b** [2328]. **65** [625]. **65-nm** [7089]. **65/6600** [625]. **650** [2091]. **651** [2050]. **65nm** [6417]. **6600** [732, 555, 625, 592, 1346]. **6600/7600** [732]. **665** [2205]. **68000** [1885]. **68000-Einplatinenrechner** [2082]. **693** [2811]. **6th** [7527, 4843, 7492, 7241, 7431, 7546, 7409, 7522, 7496].

7-9 [7565]. **70** [5690]. **7000** [1243]. **7094** [398, 473]. **7094-II** [473]. **70th** [5604]. **714** [3058]. **715** [3060, 3672]. **719** [3039]. **722** [3059]. **7289** [7017]. **73** [1030]. **754** [3846, 5578, 2863, 4313, 3401, 6051, 3983, 4519, 5494, 6520, 6903, 3874, 4335, 6795, 4832, 6801, 6802, 1410, 6551, 6815, 6187, 1862, 6554, 2095, 3456, 3621, 5604, 5947, 5331, 4241, 5053, 5189, 6940, 6590, 7082, 7083, 2277, 6467, 6353, 7094, 1680, 4761, 3944, 5644, 2017, 1459, 6741, 7156, 3357, 5564, 5569, 5799, 7117]. **754-1985** [1861, 1862]. **754-2008** [5431, 5494, 6554, 5569]. **754-2019** [6553, 6520]. **754-Posit** [6940]. **754r** [5422, 5127, 5140, 5272, 5495, 5173, 5226, 5172, 5185, 5374]. **7600** [732]. **77** [1191, 4026, 1332]. **780** [2037, 1570, 1571, 1804]. **786** [3948]. **'79** [7214, 7217]. **7th** [7218, 7220, 7525, 7259, 7289, 7530].

8 [1296]. **8-Bit** [3813, 6862, 6996, 1968, 7047, 7071, 6950, 7088, 6478]. **8-to-64** [6581]. **80** [1484]. **80*87** [3020]. **80-bit** [1929]. **80-FLOPS** [2963]. **8000** [3450]. **80287** [1904]. **8080/8085** [1584, 1134, 1220]. **8080A** [1488].

8085A [2392]. **8086/80286** [1936]. **8087** [1630, 1316, 1904]. **8087/80287** [1936, 1904]. **8087/80287/80387** [2295]. **8088/8087** [1734]. **80960** [2247]. **80960KB** [2248]. **80b** [2449]. **80h** [1296]. **80's** [7223]. **814** [4450]. **8231A** [4150]. **826** [6417]. **'83** [7244]. **83S87** [2518]. **'84** [7253]. **842** [5007]. **'85** [7258, 481]. **854** [3408, 3409, 2089, 3480]. **854-1987** [2041, 2089]. **'86** [7265, 7266]. **86**^{TM} [3922]. **871** [5451]. **'88** [7287, 7288, 7291, 2311]. **881** [5510]. **'89** [7299, 7306]. **89/TI** [4463, 4464]. **8s** [766]. **8th** [7311, 7511, 7420, 7273, 5633].

9 [517, 696]. **9-11** [7539]. **9.4** [6850]. **'90** [7309, 7318, 7333, 4306, 3392, 4967, 4968, 2681, 3488, 4450, 3838]. **908** [5662]. **90nm** [4799]. **'91** [7330, 7333, 417, 396]. **'92** [7339, 7342, 7345, 7353, 4463, 4464]. **'93** [7356]. **'94** [7368, 7369, 7378]. **'95** [7385, 3851, 4446, 4758]. **954** [6067]. **'96** [7399, 7403]. **96-bit** [2261]. **97** [3715]. **'98** [7416, 7424, 3969, 7414]. **980A** [1016]. **'99** [7429, 7430, 7431]. **9th** [7302, 7577, 7534, 7236, 2362].

= [2805, 2806, 3350, 7198].

_Imaginary_I [5564].

A-Priori [2103]. **A.K** [4675]. **a.k.a** [5541]. **A/D** [3890, 906, 3350, 4130, 4462, 802]. **A/D-konverter** [3350]. **A1** [1099, 1193]. **Aarhus** [7241, 7241]. **Abacus** [202, 1027, 5545]. **Abbreviating** [7]. **abc}** [4817]. **ABE** [547]. **ABI** [6871]. **Abnormal** [6757, 6040]. **Abotec** [3183]. **Absolute** [3395, 3396, 2765, 2255, 433]. **Abstract** [5586, 4547, 5620, 526, 5337, 5861, 6366, 4844, 2914, 2114, 5862, 4896, 4908, 2988]. **abstraction** [5481, 5839, 1330]. **abstraction-based** [5481]. **Abstracts** [7357, 7448]. **Abu** [408]. **Acadiana** [7420]. **ACBAM** [6962]. **ACBAM-Accuracy-Configurable** [6962]. **Accelerate** [6601, 6296, 4585]. **Accelerated** [6800, 5020, 5493, 5702, 6449, 6984, 7108]. **Accelerating** [5471, 6045, 4805, 3869, 5712, 6914, 6799, 6178, 7042, 7065, 4240, 6716, 6337, 4732, 6342, 5780]. **Acceleration** [6689, 6821, 6203, 6814, 6439]. **Accelerator** [6047, 6773, 6500, 5694, 5706, 7024, 5731, 7045, 6314, 6930, 6333, 2256, 6454, 6720, 7081, 6021, 6959, 4916, 7107, 6977, 6627, 6394, 2269, 7097]. **Accelerators** [6918, 7033, 6563, 7052, 6826, 7073, 6458, 7115, 4777, 6988, 5284, 3504]. **Acceptance** [3488]. **Access** [2146, 5115, 3401, 4588, 4642, 6984]. **Accessibility** [7509]. **Accessible** [6913]. **Account** [3, 5564]. **Accumulate** [6515, 4991, 6416, 6817, 6435, 6726, 6967, 5969, 3827, 6640, 6751, 4511, 6580, 3673]. **Accumulated** [1368, 575, 977]. **Accumulation** [6267, 2057, 1959, 179, 5935, 6194, 5313, 6095, 5552, 4433, 77, 454, 1072, 3709, 5819, 3735, 3760, 5757, 574, 5549, 2768, 95, 5454]. **accumulations** [4240]. **Accumulator** [3863, 4770, 6240, 380, 2698, 1032, 3316, 5789, 5876, 4772]. **Accumulators** [6508, 6335, 371, 1073]. **accuracies** [2605]. **Accuracy** [4650, 217, 6244, 7001, 6885, 1715, 5476, 861, 1015, 4803, 5395, 7130, 6784, 6785, 2679, 5906, 6057, 3241, 5913, 6166, 5280, 5148, 6173, 1841, 227, 228, 7135, 7136, 434, 390, 1290, 1852, 3611, 4556, 4368, 2383, 6426, 1746, 1981, 2545, 1621, 7048, 1984, 5930, 6310,

1628, 2403, 7053, 3120, 753, 5183, 6714, 832, 5188, 3795, 6962, 5786, 3166, 6229, 3680, 165, 6967, 1685, 2021, 2022, 6741, 411, 3528, 6860, 6979, 494, 6752, 6753, 5386, 6990, 5888, 5673, 5818, 1813, 4664, 5904, 6276, 6792, 6062, 6921, 3759, 3096, 1745, 6702, 2549, 2100, 1994, 5182, 5850, 5184, 6448, 3788]. **accuracy** [1756, 5346, 6122, 7090, 1679, 107, 2463, 1689, 1922, 1785, 6364, 2302, 3196, 6477, 3843, 545, 5120, 2053, 1211, 3649, 651, 1353, 2573]. **accuracy-adjustable** [7090]. **accuracy-guaranteed** [5346]. **Accurate** [5580, 5124, 1805, 2651, 2654, 2870, 7129, 1385, 4345, 4531, 4532, 4533, 4685, 4827, 4828, 3740, 4349, 5993, 6168, 6281, 4011, 5285, 2696, 6067, 4700, 4840, 4842, 5291, 2703, 5410, 5517, 5523, 4365, 6552, 6088, 5929, 5603, 5749, 5933, 5934, 3287, 5935, 6194, 230, 2553, 2242, 6931, 6573, 3301, 905, 571, 3471, 640, 5769, 6589, 7262, 4899, 4900, 5071, 6022, 2979, 1536, 5079, 5447, 5448, 5449, 5555, 5634, 5961, 5962, 3682, 3816, 3818, 4927, 5095, 4120, 2611, 6030, 6857, 3022, 598, 5976, 4491, 1795, 5808, 3051, 5258, 3242, 3422, 4686, 4179, 2367, 5516, 6288, 4206, 5928, 1868, 5931, 2736, 3124, 758]. **accurate** [759, 2954, 4739, 2962, 4741, 6120, 4255, 2149, 4454, 5221, 3009, 2843, 5464, 5240, 1095]. **Accurately** [3562, 6513, 2515, 5747, 5039, 2607, 4926, 6514, 6271, 4814, 4815, 5617, 5641]. **ACE** [946, 5112]. **achieved** [3026]. **Achieving** [6039, 5395, 5692, 6284, 1841, 4745, 5869]. **ACL2** [7466, 4272]. **ACL2-2002** [7466]. **ACM** [7281, 7368, 7493, 7494, 7509, 7510, 7524, 7537, 7553, 7554, 7529, 7456, 7472, 2092, 7478, 7495, 2349, 7386, 7333]. **ACM/IEEE** [7524]. **ACM/SIGDA** [7493, 7510]. **ACM/SIGPLAN** [7495]. **Acoustics** [7265, 7331, 7485, 7502]. **Acousto** [1907]. **Acousto-Optic** [1907]. **acquisition** [2504, 2671]. **ACRITH** [1981, 1813, 2545, 1984, 1870, 2105]. **ACRITH-XSC** [2545]. **across** [5331]. **ACSSC** [7557]. **ACT8837** [2341]. **ACTION** [6933]. **Activation** [6673]. **Activations** [6318]. **active** [5777, 3532]. **Activity** [5886]. **Actual** [5324, 6504]. **acyclic** [3211]. **Ada** [7368, 7311, 7347, 1873, 7368, 2324, 2647, 2648, 2872, 2873, 3231, 2508, 2664, 3425, 2355, 2075, 6069, 2529, 7347, 1526, 1750, 2106, 1757, 3641, 2770, 2141, 2814, 1702, 2842, 1484]. **Ada-Europe** [7347]. **Ada83** [3042]. **adaptable** [4337]. **Adaptation** [2875, 4407, 6845]. **adapted** [6003]. **Adapting** [2934, 4026]. **Adaptive** [5831, 6558, 4227, 3115, 1634, 2924, 6713, 6824, 6210, 2451, 1770, 3687, 3688, 3821, 1463, 1550, 6977, 2177, 1948, 1583, 1721, 4812, 4983, 6422, 5163, 2395, 3782, 3914, 1756, 2431, 6110, 2965, 3150, 5785, 3699, 5652]. **ADC** [4361, 2456, 4140, 4954]. **ADCOM** [7543]. **Add** [6497, 5479, 3053, 4667, 4981, 6267, 4328, 5491, 7023, 6169, 5159, 2542, 6696, 5309, 3451, 6432, 3901, 4389, 5327, 5328, 5329, 3126, 5766, 5553, 5631, 5438, 5439, 5078, 6963, 4762, 7110, 6233, 6375, 6639, 6523, 4492, 2333, 4807, 5689, 3057, 3586, 5012, 4032, 5019, 6183, 4561, 5023, 4575, 4877, 4073, 6010, 5056, 4741, 3154, 5640, 4769, 4941, 1705, 4644, 4784]. **add/sub** [3586]. **Addendum** [1231, 763]. **Adder** [6046, 3722, 3975, 4312, 4813, 5490, 4987, 1103, 5274, 2891, 336, 6917, 1125, 5743, 6430, 5750, 754, 3790, 6594, 5954, 6020, 3799, 3662, 6595, 5349, 5350, 4432, 4272, 4922, 5644, 6971, 534, 590, 937, 5370, 5569, 6859, 6475, 6374, 5377, 5572, 133, 5239, 5384, 803, 2187, 4982, 2680, 5989, 3065, 2888, 3259, 5726, 4555, 2906, 3111, 3112, 3113, 3114, 1429, 2753, 5949, 2114, 4885, 5771, 2959,

4253, 2797, 6964, 1168, 5789, 5876, 4624, 5452, 4934, 2484, 5800]. **Adder-Based** [6046, 3111, 3112, 3113, 3114]. **Adder/Subtractor** [5743, 6430, 6859, 4885, 5771]. **Adders** [6039, 4309, 608, 5691, 3054, 4166, 5488, 867, 6796, 6797, 6412, 5720, 2077, 2079, 5601, 5412, 5529, 4223, 5030, 4059, 4384, 6094, 6441, 6205, 6828, 5190, 7072, 7148, 6722, 2002, 6729, 2788, 3811, 4277, 4448, 5374, 4470, 1181, 1192, 1495, 2337, 2666, 3866, 4000, 2731, 1900, 5775, 4743, 4090, 7087, 3335, 7153, 5226, 7156, 2480, 4467, 4775]. **adders/subtractors** [7156]. **Addictive** [1872]. **Adding** [1383, 3398, 2330, 3874]. **Addition** [1361, 6484, 2040, 1087, 804, 1372, 7008, 464, 551, 4323, 4981, 3730, 4165, 4328, 1824, 4988, 1108, 672, 6406, 1394, 5595, 5288, 3078, 1514, 507, 5005, 6175, 1126, 1613, 3440, 5602, 6555, 5312, 744, 4869, 1874, 4385, 4062, 5937, 6100, 4726, 4879, 5044, 1144, 4886, 363, 3145, 1439, 5956, 1444, 5349, 7152, 4095, 922, 923, 3164, 2281, 1676, 2142, 455, 3816, 5084, 6970, 787, 213, 933, 3826, 4120, 3190, 5562, 5230, 6476, 5573, 415, 1706, 377, 5116, 4146, 3227, 4162, 4320, 4807, 3865, 4672, 3573, 4172, 4679, 6409, 2526, 4693, 1513, 1969, 509, 6684, 2901, 3262]. **addition** [4209, 2921, 4875, 2743, 3637, 4240, 1648, 1649, 3649, 2766, 3928, 2266, 3804, 4092, 4261, 2589, 2980, 653, 711, 4923, 927, 3697, 376, 846, 1928, 3196, 3702, 493, 3840, 2633]. **Addition-based** [5005]. **Addition-Related** [5956]. **Addition/Subtraction** [4165, 5937, 4726, 6970, 3865, 4672]. **additional** [3372]. **Additions** [7092, 3616, 3463, 1937]. **Additive** [4527, 5046, 5769, 485, 3598, 1664]. **Additively** [6592]. **Address** [2677]. **Addressable** [5066, 1561]. **adds** [1373, 6107]. **Adelaide** [7433]. **adequate** [2190]. **Adiabatic** [4770]. **adic** [1131, 1045, 1636, 2061, 895]. **Adjustable** [2106, 5559, 7090]. **adjustment** [3739]. **Ado** [2093]. **ADPCM** [3177, 3178]. **ADSP** [2564, 2948]. **ADSP-2100** [2564, 2948]. **Advance** [6820, 4805]. **Advanced** [3851, 4352, 5303, 3450, 7543, 4572, 7277, 7400, 7434, 7445, 7474, 7488, 7505, 3478, 3488, 5553, 7348, 7337, 1541, 2292, 934, 5232, 4477, 1813, 6890, 7527, 2032, 7461, 7520]. **Advances** [7166, 7177, 1221]. **Advancing** [2334]. **Advection** [6886]. **Adversarial** [6813]. **Aerospace** [7479]. **AES** [6767, 6179, 6466]. **af** [1368]. **Affair** [3414]. **affiliated** [7466]. **Affine** [6496, 4593, 6637, 4824, 5264, 4698, 5736, 5339, 5209]. **Affirmative** [3]. **AFIPS** [7170, 7257]. **after** [2015, 3696]. **Afternotes** [3696]. **Again** [6406, 1909]. **Against** [6373, 6315, 4412, 4597, 4599, 4742, 4643]. **Age** [5015]. **aggregation** [5348, 5432]. **aggressive** [4073]. **ago** [6126]. **Ahead** [5225, 803, 606]. **Ahmad** [408]. **ähnliche** [1700]. **AI** [6921, 6925, 6453, 7102, 7104, 7113, 6862, 5903]. **AI-based** [7113]. **AI/ML** [6925]. **Aid** [14, 682, 5067, 1562]. **Aided** [7560, 7386, 7456, 7503, 7335, 7403]. **Aiken** [4132]. **air** [4559]. **Aircraft** [51]. **Airy** [5903]. **Aizu** [7438]. **Aizu-Wakamatsu** [7438]. **al** [408, 408, 408]. **al-Fusul** [408]. **al-Hasan** [408]. **al-Hindi** [408]. **al-Uqlidisi** [408]. **ALA'01** [4835]. **Alabama** [7345]. **Alamos** [2756]. **Alan** [7512, 704]. **Albena** [7332]. **Albuquerque** [7330]. **Alegre** [7539]. **Alessandro** [7437]. **Algebra** [3553, 4510, 1581, 7258, 7370, 4345, 6408, 4835, 7053, 6830, 3488, 7102, 5981, 6266, 2068, 3885, 4708, 6923, 6703, 6704, 5854, 833, 2960]. **Algebraic** [7541, 7214, 5139, 430, 2372, 4193, 7414, 389, 5307, 5748, 3770, 3632, 7399, 4391, 2147, 7490, 1071, 3828, 5220, 7450, 5106, 7353, 7580, 7175, 7181, 7118,

4297, 45, 5260, 1827, 515, 516, 4231, 4390, 3307, 2121, 7217, 5868, 2974, 1679, 5209, 4776, 458]. **Algebraic-integer** [2372]. **Algebraicznych** [458]. **ALGOL** [579, 735, 758, 579, 492, 540, 273, 411]. **algorism** [4681, 1027]. **Algorithm** [1709, 5245, 1710, 1261, 3968, 4963, 6492, 3041, 3224, 3720, 3857, 1807, 3044, 726, 6885, 5254, 1373, 808, 1493, 2050, 5480, 6388, 6660, 6502, 6776, 1099, 1815, 3405, 4980, 3564, 1498, 5695, 3730, 815, 5699, 1821, 2204, 5271, 3991, 2345, 2061, 1018, 1826, 2875, 5145, 2353, 1832, 3074, 4011, 5713, 6414, 1116, 1836, 429, 4022, 4842, 6176, 5518, 3438, 4857, 3608, 3762, 4038, 4557, 4040, 4210, 4211, 6550, 2387, 2722, 1618, 5021, 5735, 5737, 741, 3454, 973, 5531, 2092, 5751, 1631, 1874, 5317, 3295, 2741, 829, 6930, 5941, 6098, 3464, 314, 5322, 5323, 4069, 2427, 5046, 1049, 5616]. **Algorithm** [2108, 570, 2110, 262, 641, 4735, 2116, 6941, 763, 2953, 1650, 1891, 2118, 2260, 5343, 2572, 6212, 6457, 1655, 1898, 4421, 2780, 2966, 4423, 1533, 1662, 2783, 2784, 3667, 6021, 7152, 4907, 5437, 5779, 1158, 2595, 6127, 4913, 924, 2143, 925, 7096, 776, 4620, 1244, 2016, 5645, 6029, 373, 3823, 4122, 3190, 4127, 4458, 5098, 1694, 6234, 457, 4466, 2828, 3525, 2159, 490, 5568, 5794, 5880, 5971, 596, 3706, 1479, 244, 3212, 3538, 5117, 4289, 2636, 1711, 604, 2177, 2042, 4792, 6493, 3556, 3858, 5250, 6387, 3406, 1583, 1721, 4812, 2667, 2668, 3410, 5138, 3235, 2675, 2513, 3989, 3574]. **algorithm** [3419, 5704, 3734, 3422, 3244, 4342, 4343, 3878, 3879, 6281, 3585, 3076, 466, 4692, 4694, 5003, 4017, 3586, 1205, 5296, 4846, 2219, 5837, 5719, 6288, 1972, 3892, 4204, 3264, 3443, 3444, 4209, 2905, 515, 516, 2721, 4041, 3897, 5931, 4718, 5028, 2404, 749, 5753, 2738, 2739, 5176, 2556, 2742, 6712, 5851, 4576, 3466, 4579, 4580, 3634, 3786, 5049, 2943, 2252, 5857, 574, 4889, 762, 578, 1763, 2954, 4892, 5058, 1892, 984, 5428, 6015, 3312, 6349, 2782, 5866, 3151, 5551, 2785, 2973, 1908, 2974, 2454, 4750, 5436, 2135, 2589, 4611, 4756, 4917, 998, 1065, 3343, 3182, 3692, 3520, 1923, 3521, 2608, 294]. **algorithm** [1928, 2817, 3007, 5099, 4773, 5458, 5459, 4286, 3196, 6477, 660, 2489, 3205, 3368, 4780, 5464, 5114, 6035, 3378, 7158, 4952, 6677, 3039, 3557, 2050, 6776, 1193, 2205, 3058, 3059, 3060, 3061, 385, 6067, 1119, 1206, 5007, 5510, 433, 4026, 513, 6421, 565, 2091, 3672, 5451, 270, 2811, 3948, 4450, 5662, 6823]. **algorithm-based** [2252, 3520, 3205, 3368, 3378]. **Algorithmen** [2399, 2235, 2573, 1700, 2306]. **Algorithmes** [4684, 5332, 4351, 2762]. **Algorithmic** [5832, 7530, 3905, 252, 3663, 2802]. **Algorithmics** [7080, 4489, 5094]. **Algorithmique** [5094, 4489]. **Algorithms** [851, 2039, 6646, 4151, 4152, 723, 1806, 3856, 856, 666, 1012, 6884, 7511, 3229, 5391, 5682, 6263, 1266, 1376, 5397, 5399, 1585, 276, 3061, 6272, 3871, 4678, 1106, 5825, 2880, 4529, 4530, 4684, 3249, 4531, 3736, 6064, 1023, 1024, 1025, 1113, 6915, 5408, 3078, 4016, 4183, 6529, 5151, 2073, 2365, 6801, 6802, 5509, 3080, 468, 3746, 737, 824, 878, 6685, 1518, 6074, 5516, 884, 4200, 5161, 2540, 7555, 4208, 4367, 3611, 4556, 3612, 3896, 1520, 1413, 1522, 3280, 4215, 4715, 4716, 3104, 3105, 5742, 2547, 3106, 6193, 6705, 2399, 2235, 4224, 828, 522, 1421, 3907, 7578, 523, 6710, 3117]. **Algorithms** [4567, 3296, 4386, 631, 5849, 5324, 2936, 1529, 4070, 3126, 2939, 3302, 7400, 7520, 1050, 6832, 3643, 1640, 1888, 687, 1641, 691, 1642, 4888, 7278, 7292, 4408, 5055, 4592, 3306, 448, 357, 477, 6720, 361, 3650, 5059, 4414,

2573, 3798, 7076, 4418, 1323, 3801, 3322, 1441, 3805, 1444, 4259, 1445, 1771, 6022, 2795, 3810, 7349, 6024, 6846, 5961, 5962, 7337, 6966, 4618, 775, 2462, 3509, 5355, 926, 7099, 7100, 712, 3690, 374, 4121, 1342, 2609, 2818, 2819, 5792, 5879, 3011, 940, 2830, 3836, 1700, 2306, 5571, 3366, 1474, 3374, 7157, 5116, 5385, 7159, 552, 3215, 1084, 3555, 5471, 5981]. **algorithms** [4506, 4974, 4318, 5134, 6155, 6261, 6778, 6888, 7300, 2670, 2203, 221, 3867, 1961, 420, 3998, 1828, 1200, 2687, 3066, 3423, 4827, 2209, 1837, 3253, 4691, 6919, 3432, 225, 5153, 5156, 6077, 6418, 7327, 4032, 4711, 5729, 6923, 1300, 3276, 5311, 1983, 742, 2924, 4388, 2417, 3122, 4581, 1755, 2428, 3788, 831, 1756, 1883, 1638, 5618, 7434, 7445, 7461, 7474, 7488, 7505, 4075, 2567, 4737, 3137, 2762, 5057, 5192, 2439, 2571, 5194, 5429, 6459, 4086, 5867, 4088, 1443, 1664, 5629, 6219, 2272, 4908, 2458, 4611, 2597, 4098, 3937, 4619, 3172, 3173, 3511, 5357, 2468, 1785, 2024, 5221, 4771, 3006]. **algorithms** [1074, 2829, 3197, 493, 1704, 4945, 5383, 3024, 4953, 2351, 2048, 7278, 7292, 358, 2007, 1062, 1538, 4675]. **Algorithmus** [2048, 385, 2007, 1538]. **Alignment** [5956, 3860, 3924]. **alignments** [1921]. **all-one** [4984]. **Allerton** [7184]. **Alley** [3608]. **allgemeine** [1095, 1211]. **allgemeiner** [1353]. **Allocatable** [3477, 3488]. **Allocation** [6623, 4548, 5753, 4594, 4596, 4467, 3358]. **Alloy** [5860, 6012]. **Almost** [7168, 2285, 5049]. **Alpha** [2991, 3393, 2883, 3514, 3348]. **alphabetical** [101]. **Alps** [6824]. **also** [2967]. **Alternanten** [768]. **Alternate** [4426]. **alternating** [3640]. **Alternative** [1280, 6688, 6566, 6942, 6393, 962, 575, 6353, 4642]. **Alternatives** [4309, 1143, 6450, 3135, 4605, 4721]. **Alto** [7417, 7403]. **ALU** [4303, 5470, 5671, 6417, 2098, 1903, 1660, 5790, 2034, 1799, 2850]. **ALUs** [2170]. **always** [6144]. **am** [1653, 7234, 2615]. **Am25S05** [621]. **Am29000** [2269]. **Am29027** [2269]. **Am29050** [2576]. **Am29C327** [2320]. **Am9511A** [1381]. **Am9511A/Am9512** [1381]. **Am9512** [1271, 1381]. **ambiguity** [4956]. **AMD** [6872, 6532, 4044, 3926, 4086, 3936, 3937, 4100, 4272]. **AMD-K7**^{TM} [4086, 3937]. **AMD5** [3922]. **ameliorating** [1038]. **amélioration** [4318]. **America** [23]. **American** [2041, 7237, 7172, 2861, 31]. **Amherst** [7600]. **Amidst** [6808]. **Among** [1222, 4081]. **amount** [4030]. **Amounts** [3742, 3884, 4012]. **amplifier** [2224]. **Amplifiers** [184]. **Amplifying** [1719]. **Amsterdam** [7540, 7605]. **AN-Codes** [4353]. **AN/UYK** [839]. **AN/UYK-17** [839]. **Anaheim** [7269, 7297, 7325]. **Analog** [463, 111, 4195, 3600, 139, 140, 230, 113, 232, 444, 370, 4101, 132, 150, 4145, 2894, 4855, 4042, 690, 4918, 1688, 3698, 2315]. **Analog-To-Digital** [4145, 4195, 4855, 3698]. **Analogrechenschaltungen** [548]. **analogue** [548, 1064, 3211]. **analogue-to-digital** [3211]. **Analyse** [5700, 40, 7198]. **Analyses** [4358, 3904, 1467, 2820]. **Analysis** [603, 2173, 7219, 152, 4301, 1804, 5128, 7383, 6659, 6496, 4315, 6497, 6262, 3403, 6662, 171, 5695, 5485, 1585, 2337, 2670, 5699, 1589, 2676, 1386, 1018, 6788, 7357, 6163, 3873, 6676, 7021, 6525, 2357, 6412, 7026, 7134, 819, 4847, 7251, 112, 5721, 4851, 5723, 5838, 2900, 3089, 6546, 6547, 126, 4557, 2224, 7604, 4044, 6698, 397, 3281, 7274, 2915, 6190, 2395, 398, 628, 2730, 2918, 743, 1139, 1046, 400, 6319, 6714, 3784, 832, 5764, 6205, 6576, 6828, 2752, 1148, 6340, 4409, 356, 914, 5059, 6113, 5344, 2771, 1899, 764, 837, 4897, 2968,

1057, 1662, 4091, 988, 1156, 1907]. **Analysis** [4910, 5781, 1537, 2801, 706, 6847, 7095, 5873, 5354, 5786, 2463, 4278, 785, 38, 42, 3686, 932, 2996, 3517, 1071, 1342, 2818, 2819, 7173, 5222, 6741, 6366, 7156, 2828, 3837, 6630, 1475, 7236, 216, 5236, 7536, 7198, 2851, 2852, 7160, 412, 2636, 2174, 5467, 1948, 2042, 3555, 496, 1489, 1090, 1190, 1369, 1808, 2184, 2503, 2185, 4310, 5818, 3725, 1583, 1721, 2668, 3410, 6395, 3056, 40, 423, 1828, 2065, 3067, 6281, 2209, 466, 4694, 5003, 4017, 4698, 506, 3432, 3590, 225, 511, 6070, 5833, 5009, 5156, 2377, 2712, 7252, 3602, 2223, 309, 825, 2081, 1745, 3272, 3273, 5736]. **analysis** [5311, 1983, 5738, 7208, 5931, 3286, 473, 3289, 6093, 629, 3290, 748, 1225, 520, 1226, 1227, 4388, 6442, 3781, 1883, 1638, 525, 572, 2252, 4247, 7070, 1648, 1649, 5545, 5058, 5340, 364, 404, 2446, 2121, 2960, 2961, 836, 3149, 985, 2965, 3150, 3808, 4262, 990, 2270, 2272, 369, 1159, 4435, 2592, 2597, 6224, 5965, 3938, 841, 3177, 3178, 3346, 3512, 1066, 5210, 1547, 3351, 3696, 2297, 1925, 376, 3829, 3830, 4459, 1176, 7307, 2831, 3197, 1252, 716, 795, 3013, 5656, 1704, 3842, 1183, 2630, 3845, 6677, 1817, 7335]. **Analysis-Based** [4910]. **Analytic** [3399, 7205, 7205]. **Analytical** [1724, 5718, 191, 16, 5186, 15, 6211, 6455]. **Analytics** [6426]. **Analyzed** [6708, 693, 694, 695, 761]. **Analyzer** [314]. **analyzers** [2376]. **Analyzing** [2388, 6845]. **Anatomy** [3500]. **Anchored** [6508, 6335]. **Ancient** [5815, 6504, 600]. **Andrews** [7450]. **Angeles** [7165]. **Angewandte** [7227, 7226]. **Angle** [2387]. **Angles** [4219]. **angular** [84]. **ANL** [440]. **Ann** [7228, 7362]. **Anniversary** [7373]. **Annotated** [5683, 1236]. **Announcements** [3851]. **Annual** [7218, 7368, 7380, 7426, 7537, 7554, 7326, 7184, 7220, 7311, 7497, 7539, 2074, 7227, 7285, 7317, 7341, 7514, 7376, 7409, 7476, 7535, 7551, 7507, 7448, 7194, 7199, 7451, 7237, 7272, 7196, 7224, 3767, 7333, 7533]. **Annuities** [4268]. **Anomalies** [1870]. **Anomalous** [39]. **ANOVA** [5638]. **ANR** [6405]. **ANSI** [6520, 1861, 1862, 4093]. **ANSI/IEEE** [6520, 1861, 1862]. **Answer** [1354]. **Anti** [51]. **Anti-Aircraft** [51]. **Anticipation** [4445, 5056]. **Anticipator** [5572, 4689, 2541]. **anticipators** [6107]. **anticipatory** [3804, 3697]. **Antikythera** [5919]. **antilogarithmic** [4645, 5487]. **Antitrust** [5364]. **Anton** [5557]. **Antonio** [7333]. **ANTS** [7530]. **ANTS-VII** [7530]. **Anwendungen** [1976]. **Anwendungsgebiete** [1485]. **anwendungsorientierten** [1237]. **Any** [5701, 1223, 6635, 6489, 4514, 4515, 4376]. **Anyway** [6743]. **AOP** [4565, 4870]. **AP** [1121, 7430]. **AP-120B** [1121]. **AP-ASIC** [7430]. **Apache** [5649]. **APL** [700]. **APMathLib** [4491]. **App** [6383]. **Apparatus** [613, 4346, 4010, 6312, 6580, 3860, 4030, 3891, 4033, 3756, 3924, 2122, 3701, 3372]. **APPAs** [7153]. **Appearance** [3894]. **Apple** [4526, 5338, 1162]. **APPLESOFT** [1011, 1086, 1337]. **Applicability** [1709, 6393]. **Application** [5465, 3971, 4306, 6659, 860, 1014, 6497, 3564, 7371, 7384, 7571, 6671, 7357, 40, 6675, 4005, 4338, 4828, 7483, 7528, 3583, 510, 3258, 4208, 6549, 564, 3449, 7331, 7501, 7517, 7542, 7556, 7565, 1135, 6568, 3778, 5045, 3301, 1641, 4592, 4593, 4598, 2575, 2579, 6461, 1237, 6223, 7477, 3684, 1782, 7449, 5792, 1930, 7410, 4936, 2829, 6744, 7523, 7367, 7020, 2639, 5889, 951, 6257, 4310, 2661, 1269, 6919, 4190, 2375, 2709, 7327, 3275, 3276, 2728, 5933, 1227, 4721, 6321, 5946, 2767, 3323, 5957, 2799, 4096, 2598, 3165, 2604,

5094, 108, 3006, 3700, 6368, 1472, 1473, 4487, 2315]. **Application-Oriented** [1237]. **Application-Specific** [6659, 7571, 7483, 7528, 7501, 7542, 7556, 7477, 7449, 7410, 6744, 7523, 7367, 7517, 7565, 7020, 2639, 6368]. **Applications** [6869, 6993, 4959, 6244, 7356, 7381, 7412, 4305, 4502, 1572, 5892, 7526, 7540, 4661, 5390, 7466, 1719, 956, 1958, 6158, 7482, 6669, 6400, 6894, 3579, 3738, 4008, 4348, 5712, 2691, 7026, 6916, 2212, 3430, 6415, 6067, 6807, 306, 1742, 1849, 7037, 558, 5161, 4363, 4365, 6812, 7415, 1301, 1410, 1618, 7207, 7223, 7305, 7564, 1306, 5172, 6820, 7398, 5315, 4380, 2927, 5178, 1140, 5420, 313, 7290, 6570, 6571, 6931, 6574, 7063, 5855, 4587, 1433, 4887, 6341, 6726, 4900, 7378, 2132, 3809, 4432, 5207, 7245, 6465, 1540, 373, 2295, 1554, 6978, 7198, 6640, 4824, 7368, 6990, 1186, 3028]. **applications** [1486, 2318, 5980, 3226, 1491, 4161, 7454, 7300, 5697, 2058, 5902, 2341, 1728, 3424, 3737, 6679, 2690, 6281, 1840, 2371, 5153, 4708, 4032, 5016, 6539, 4206, 5733, 7142, 6001, 6433, 3109, 3457, 749, 2421, 7362, 2938, 7276, 2564, 2948, 317, 4897, 4602, 3154, 2591, 5783, 7233, 5966, 3508, 3518, 2019, 791, 456, 17, 3196, 7352, 1352, 5798, 1705, 5382, 1976, 1701, 7198]. **Applied** [7369, 7246, 549, 1195, 3569, 6414, 1129, 7529, 5016, 7589, 7172, 5354, 7264, 7606, 2047, 2325, 2716, 3620, 7529, 7499, 7586]. **Applying** [2863, 334, 3896, 5340, 5339, 2574]. **Approach** [6768, 6045, 4156, 3399, 4323, 1724, 1104, 5274, 3581, 6526, 7027, 5289, 6530, 5831, 1841, 5717, 737, 6181, 5524, 7315, 7396, 7468, 7585, 6547, 5412, 3896, 5529, 5607, 1138, 7242, 1993, 6942, 1439, 1155, 7319, 4432, 2134, 1451, 3168, 3686, 7116, 6374, 5576, 3383, 3384, 1080, 1185, 2181, 2046, 1270, 962, 5285, 2704, 2928, 635, 3781, 2559, 2255, 6110, 6211, 6455, 2960, 3663, 2592, 5783, 3340, 5356, 3005, 1352, 1939]. **Approaches** [1087, 6745, 3330]. **Approaching** [2187]. **Approved** [6554]. **Approximate** [6644, 6869, 5979, 6146, 6999, 6158, 5496, 156, 6911, 6412, 1125, 7033, 6287, 6294, 6809, 558, 6811, 6192, 3770, 6565, 6928, 6826, 6331, 6451, 6576, 6828, 6936, 691, 6340, 6454, 1651, 6113, 6721, 6948, 7075, 6838, 6954, 6465, 6469, 6732, 7154, 7114, 6857, 6630, 6978, 6981, 6982, 7157, 6985, 7121, 6990, 4161, 283, 3275, 7153, 4126]. **Approximated** [5681, 6892]. **Approximating** [2396, 3314, 2789, 4105, 2986, 3726, 5020, 5302, 3623, 2432, 5199, 3024]. **Approximation** [3965, 6492, 2054, 6783, 5489, 6671, 6673, 1019, 4829, 2691, 428, 624, 6922, 7138, 3451, 3452, 6558, 4224, 6203, 6831, 5075, 321, 528, 4102, 3818, 3684, 3942, 4114, 4120, 5970, 6134, 2616, 5109, 6032, 6637, 1378, 221, 3580, 5501, 5152, 426, 2367, 5153, 3766, 2917, 3108, 6934, 7067, 4247, 7278, 7292, 3144, 984, 3308, 2122, 7091, 1682, 3174, 5208, 5803, 1835, 7216]. **Approximationen** [514]. **Approximations** [1260, 5393, 6390, 7013, 1022, 2070, 2210, 281, 2696, 384, 427, 2899, 470, 471, 119, 3607, 514, 6925, 4385, 2555, 909, 2955, 2001, 1766, 580, 769, 1163, 3816, 3817, 4107, 240, 241, 271, 533, 7115, 168, 597, 3022, 2178, 5261, 5262, 5150, 5504, 251, 3759, 4046, 4047, 689, 4739, 1058, 482, 1454, 3343, 4119, 2843]. **Apps** [6725]. **Apr** [6554]. **April** [7199, 7298, 7494, 7183, 7497, 7382, 7466, 7258, 7529, 7253, 7265, 7345, 7470, 7485, 7532, 7575, 7582, 7587, 7274, 7208, 7433, 7172, 7243, 7402, 7409, 7423, 7476, 7535, 7551, 7205]. **Aptitude** [1700]. **Ara** [6667]. **Arabia** [2869]. **Arabic** [5545, 101, 6952, 408]. **Arb** [6091, 6309]. **arbitraire** [3980, 4490]. **Arbitrarily** [438, 2803, 845, 6703, 6704].

Arbitrary [2053, 4979, 5392, 1102, 963, 429, 5600, 6309, 6559, 2103, 3779, 6200, 6327, 6448, 5057, 3147, 2795, 1775, 4612, 4613, 4439, 651, 589, 933, 4122, 3705, 4490, 4504, 6769, 3980, 4806, 1598, 1731, 6002, 5847, 7069, 1330, 6351, 2144, 2836, 5122]. **Arbitrary-accuracy** [6448]. **Arbitrary-Precision** [6309, 6559, 6200, 6327, 4122, 4490, 6002, 7069, 6351]. **Arbor** [7228, 7362]. **Architect** [4396]. **Architectural** [7298, 4328, 5832, 4709, 1418, 5953, 2310]. **Architecture** [7218, 6872, 3964, 4787, 5580, 2497, 5124, 6379, 7220, 4963, 6149, 1370, 2659, 1817, 1101, 5266, 6159, 1821, 4678, 5140, 5494, 1020, 2883, 6275, 4991, 7132, 6916, 4182, 1971, 6177, 5154, 1518, 4360, 6289, 2714, 4034, 3606, 7315, 7396, 7468, 7585, 3266, 3267, 2385, 2225, 4369, 5309, 1857, 1217, 3101, 3278, 5165, 7316, 7331, 7470, 4215, 4715, 4716, 6305, 6430, 6435, 5751, 2097, 2922, 3625, 4226, 4566, 1423, 4569, 4571, 6096, 5322, 6197, 1313, 1882, 4238, 3303, 6342, 6348, 2955, 7377, 4251, 6838, 6951, 3322, 7319, 5958, 6021, 4266, 4907, 5435, 6961, 6731, 6127, 994, 4615, 2999, 7295, 1680, 6605, 4444]. **Architecture** [6970, 2809, 2991, 3514, 6739, 2154, 5224, 5368, 1468, 5794, 5971, 1470, 3367, 3369, 6240, 7119, 6748, 6864, 4782, 6750, 1084, 4498, 6489, 2642, 4792, 3393, 1811, 5822, 2667, 3235, 3057, 4174, 4682, 2353, 2066, 7248, 2373, 7034, 4852, 7035, 1973, 3600, 5526, 2226, 7196, 4717, 2728, 5415, 2232, 2233, 2401, 2402, 2408, 2552, 4228, 2742, 2418, 2419, 3910, 2247, 3782, 2426, 4883, 3918, 1761, 4884, 2565, 2760, 2761, 2258, 5428, 5625, 5067, 2576, 3664, 481, 2271, 4270, 3673, 6221, 2593, 2594, 1063, 7233, 5080, 2287, 5791, 3521, 936, 1340, 4769, 4773, 1789, 2301, 3204, 1705, 2167, 6035, 3381]. **Architecture** [4862, 2112, 2254, 7425]. **Architectures** [7440, 7123, 5810, 6147, 5474, 3975, 7511, 4661, 5678, 3050, 4327, 7571, 4990, 7483, 7528, 6170, 6799, 6072, 3757, 4201, 5735, 2388, 7457, 7501, 7517, 7542, 7556, 7565, 5737, 5742, 4565, 4723, 6324, 2936, 3126, 2939, 7400, 7520, 1656, 6728, 3805, 4089, 5439, 7349, 6600, 7337, 7477, 4111, 6606, 7099, 7100, 5645, 2990, 2152, 5968, 7449, 7410, 6857, 7523, 4477, 6139, 1949, 2650, 7539, 2195, 6054, 4676, 2360, 6919, 4870, 4073, 7434, 7445, 7461, 7474, 7488, 7505, 3137, 2762, 3929, 4257, 3154, 2267, 5203, 4915, 2468, 2997, 2998, 2820, 4941, 4781, 2845, 2846]. **Arcsin** [161]. **Arctan** [160, 652]. **Arctangent** [1631, 3284]. **Area** [3711, 7000, 3049, 5897, 3237, 3238, 2516, 7019, 6275, 5711, 6179, 2079, 6305, 4219, 4381, 4074, 6579, 2002, 6728, 5070, 7084, 1668, 6466, 6355, 2148, 2152, 3519, 3693, 3694, 4286, 6857, 6630, 6375, 6865, 6750, 3386, 3400, 4555, 3293, 3123, 4075, 2767, 1900, 3665, 7519]. **Area-Constrained** [7000]. **Area-Efficient** [5711, 2079, 5070, 2152, 6750, 6305, 4286, 3293, 3665]. **Area-Optimal** [6179]. **Area-Optimized** [6857]. **Area-Time** [6275, 2002, 6728, 1668, 2148, 2516, 1900]. **Area/Performance** [3519]. **Arenaire** [5193]. **Argument** [5479, 3430, 3477, 2964, 3517, 3261, 4730]. **Arguments** [5299, 2103, 2111, 2964, 1177]. **Ariane** [3546, 4154, 3784, 3635]. **arifmetiki** [2327, 1246]. **ARITH** [7481, 7455, 7596, 7603, 7518, 7607, 7609, 7611, 7521, 7595, 7591, 7602, 6649, 6647, 6648, 6650, 6651, 6653, 6761, 6762, 6763, 6764, 6875, 6876, 6877, 6772, 6674, 6818, 6837, 6904, 6905]. **ARITH-15** [7455]. **ARITH-16** [7481]. **ARITH-17** [7518, 7521]. **ARITH-26** [7602]. **ARITH9** [2362]. **Arithmazium** [2236]. **Arithmetic** [7599, 2635, 1709, 6992,

851, 852, 1006, 1081, 1082, 1187, 1259, 1564, 6645, 2039, 4493, 5807, 3027, 7393, 3967, 6483, 5886, 1010, 1713, 2641, 3715, 3851, 4653, 5127, 5248, 5249, 5469, 5667, 6383, 6488, 5811, 3553, 3554, 3716, 3971, 4299, 378, 4300, 3717, 3855, 4304, 169, 245, 298, 1804, 4790, 7340, 546, 722, 854, 219, 547, 723, 855, 1366, 1572, 1806, 3719, 4791, 2322, 3856, 4969, 7481, 4971, 4972, 5129, 6045, 805, 1367, 1012, 1368, 1809, 1091, 6494, 6659, 6884, 2647, 3397, 5474, 1576, 6495, 6496, 7004, 7125, 3048, 2328, 4794, 4661, 3978, 860]. **Arithmetic** [1014, 4316, 5476, 331, 1094, 1095, 2049, 2655, 2870, 5896, 6660, 6774, 6775, 7008, 5135, 3052, 1718, 5684, 6264, 6503, 6051, 729, 810, 862, 1098, 1099, 1100, 1193, 1265, 3981, 5685, 1376, 4322, 2872, 196, 7015, 7561, 5687, 6506, 7214, 2335, 6665, 7455, 7596, 4326, 1195, 23, 2199, 171, 2055, 2056, 1722, 5485, 3566, 2202, 6396, 613, 7018, 669, 1822, 670, 868, 1382, 1587, 1383, 6399, 1384, 6784, 6785, 2060, 1273, 6400, 731, 1503, 1726, 1825, 2345, 2677, 3059, 1387, 1591, 2061, 3993, 4170, 4171, 4675, 6272, 1198, 1199, 1275, 1727, 5905, 3999, 5272, 5495, 7603, 2062, 4988]. **Arithmetic** [6518, 4330, 4680, 4989, 6055, 6897, 6898, 6899, 6900, 6901, 6902, 223, 1107, 224, 7428, 5706, 3240, 277, 1276, 1506, 3578, 4336, 6790, 5825, 4993, 5497, 2684, 2208, 5907, 618, 870, 4825, 1507, 4178, 6795, 6062, 6166, 5278, 871, 6524, 3736, 3740, 4349, 3073, 2889, 1968, 5594, 4013, 5407, 4835, 1834, 6413, 1114, 2212, 2362, 7302, 4838, 136, 174, 199, 157, 6918, 6529, 3255, 5830, 4018, 1396, 1279, 6801, 6802, 7029, 963, 1204, 12, 1839, 4188, 4189, 7030, 250, 1738, 5509, 7031, 6531, 282, 510, 3433, 3589, 3079, 1280, 675, 5598, 6069, 5599, 1606, 1124, 4353, 4540, 555]. **Arithmetic** [388, 965, 5512, 5513, 824, 4027, 3749, 5996, 881, 6685, 2534, 2706, 2707, 3594, 4544, 4707, 5836, 5409, 6286, 556, 1129, 1034, 1286, 3889, 5515, 1402, 1287, 4359, 883, 5722, 307, 4854, 2711, 390, 1405, 1850, 4709, 1211, 1290, 3596, 6178, 7037, 4362, 3598, 6180, 6182, 6290, 6291, 6292, 6293, 7601, 7608, 7038, 7610, 1614, 680, 339, 340, 341, 560, 4035, 1036, 1294, 3894, 2904, 2716, 3761, 4553, 6545, 4208, 4367, 6300, 6423, 6548, 6813, 6924, 3764, 4713, 5304, 5412, 1979, 4861, 6301, 1131, 6302, 6426, 1301, 1410, 4560, 1132, 1302, 2087, 4370, 518, 1133, 1217]. **Arithmetic** [1522, 1859, 7259, 1746, 1981, 2545, 3898, 7197, 7201, 7211, 7228, 7241, 1862, 1863, 2088, 7518, 7587, 6089, 6554, 7607, 7609, 7046, 7611, 5170, 5310, 343, 6925, 4150, 1414, 7273, 6303, 5413, 2915, 6556, 1984, 438, 6817, 5748, 5932, 6306, 1626, 3107, 5532, 6309, 1627, 6004, 6193, 6310, 6311, 6705, 6819, 1748, 4049, 3619, 1417, 1987, 2096, 2729, 4221, 4864, 5026, 743, 746, 347, 3771, 5029, 20, 5606, 7332, 887, 4565, 4382, 828, 3775, 2099, 3115, 892, 1873, 6709, 2737, 3461, 7389, 1634, 4229, 5844, 3117, 7433, 4061, 4230, 4567, 1044, 1139, 1425, 1754, 2102, 2416, 7334, 5318, 5319, 7548, 5537, 5612]. **Arithmetic** [5755, 5846, 6005, 3120, 3778, 752, 894, 4063, 895, 1045, 1046, 899, 1310, 1993, 4572, 5420, 5938, 6569, 6822, 5939, 3911, 6320, 902, 1880, 3780, 7408, 6323, 5183, 33, 2106, 4067, 4396, 4578, 6201, 6328, 6573, 233, 287, 351, 5761, 5762, 7058, 7059, 3301, 4070, 2937, 7061, 1142, 4238, 289, 1145, 5764, 6333, 7065, 3302, 6334, 1885, 442, 573, 1886, 6577, 2560, 2940, 2941, 2942, 3470, 3638, 4882, 181, 3639, 7549, 4587, 2752, 2944, 3471, 2561, 5541, 3642, 979, 687, 443, 1762, 1641, 1433, 1642, 3647, 4887, 7068, 6830, 526, 692, 911, 1315, 1889, 4735, 5544,

4592, 447, 4248]. **Arithmetic** [4890, 6941, 5621, 3477, 5425, 4249, 913, 4593, 162, 290, 356, 359, 144, 102, 3479, 5860, 1651, 1055, 6346, 6347, 6590, 6591, 5548, 4738, 7521, 7595, 6209, 6945, 6210, 4414, 1654, 4598, 3147, 2769, 4416, 5626, 5863, 7591, 6456, 6946, 6017, 6835, 6947, 7074, 7076, 145, 1656, 915, 6018, 6727, 1658, 1901, 479, 3485, 3657, 765, 5197, 3658, 3803, 6953, 6954, 2968, 1155, 2125, 2126, 3322, 4424, 1441, 1661, 2127, 7085, 6960, 3805, 1059, 1325, 1905, 2128, 4259, 6123, 6596, 4263, 121, 5433, 2, 7401, 6959, 702, 2134, 6840, 6841, 2791, 4268, 209, 3495, 6599, 2795, 5205]. **Arithmetic** [1447, 4434, 5207, 3934, 1672, 1673, 4609, 483, 583, 584, 1448, 6731, 5444, 1238, 2140, 1240, 1161, 4612, 4613, 122, 73, 6467, 370, 1451, 6128, 708, 6601, 6026, 924, 6847, 6027, 267, 4440, 1913, 5634, 6356, 7094, 1540, 4101, 7154, 408, 3504, 775, 322, 3506, 6605, 6849, 1683, 4446, 1455, 3509, 3510, 4106, 4275, 4921, 5082, 5083, 2147, 7584, 1917, 2289, 7155, 1685, 4763, 6850, 6968, 1245, 2148, 6734, 6851, 7107, 187, 1919, 588, 5558, 928, 929, 269, 212, 5790, 1780, 19, 22, 931, 1457, 1687, 2811, 3948, 4766, 5648, 2293, 6853, 3823, 5211, 6737, 6854, 1001, 1458, 2813]. **Arithmetic** [790, 6972, 6973, 5212, 5213, 4626, 713, 657, 934, 935, 1459, 1460, 5559, 4629, 6975, 4122, 845, 534, 1171, 1172, 1343, 1344, 1345, 1692, 1926, 7321, 7322, 3189, 7365, 7366, 7592, 7593, 7594, 7602, 4283, 2475, 2476, 2613, 2614, 3008, 794, 1552, 1695, 1932, 1933, 7600, 4933, 411, 593, 3354, 4465, 457, 941, 1075, 1174, 4936, 490, 594, 715, 3526, 6744, 7115, 7323, 1699, 5567, 3528, 5229, 5461, 5372, 6372, 1556, 5105, 5570, 3838, 4939, 2304, 2305, 2306, 2485, 2486, 6745, 944, 149, 1470, 1702, 4472, 3365, 5233, 5655, 6637, 1179, 1180, 1558, 1474]. **Arithmetic** [1475, 413, 3960, 3705, 3018, 3841, 1077, 4478, 1003, 273, 6747, 6983, 4139, 4480, 2844, 1004, 4483, 800, 1359, 1707, 950, 1940, 1941, 2171, 3708, 1360, 2853, 4782, 7122, 5708, 6791, 7020, 4824, 6793, 6627, 4634, 6370, 1353, 1469, 4786, 3964, 5804, 663, 6991, 1186, 1565, 5977, 7538, 6242, 3713, 3850, 5466, 3543, 721, 1484, 4151, 4152, 4498, 6997, 1802, 1803, 2500, 2863, 328, 1571, 4306, 1805, 299, 6043, 6385, 2867, 3043, 605, 1088, 2045, 1808, 2184, 2503, 2185, 2646, 5473, 2648, 5130, 5675, 4973, 5252, 5253, 2329, 1373, 2188, 2189, 1578, 1813, 6259, 6260]. **arithmetic** [2190, 2652, 3051, 1814, 3980, 4318, 4512, 4662, 4800, 4801, 5256, 5820, 6261, 7007, 300, 2051, 3861, 5136, 5585, 6266, 7010, 7011, 3862, 301, 2873, 5822, 4324, 5481, 5482, 7129, 6510, 2336, 2511, 6268, 2201, 1500, 5264, 6395, 2670, 4670, 5265, 610, 4672, 3867, 4168, 3413, 4519, 3570, 3057, 3989, 5986, 382, 383, 2343, 2344, 1590, 4520, 4676, 1105, 1962, 1505, 1593, 2207, 6401, 4679, 4001, 1963, 2064, 2349, 6403, 5707, 3877, 4337, 6278, 5402, 424, 4340, 4341, 2065, 2689, 3423, 4007, 5146, 5499, 5828, 4831, 3068, 465, 5149, 3071, 6912, 2523, 4179, 3881, 3882, 2068, 503]. **arithmetic** [2356, 5406, 1395, 2360, 3885, 5505, 1510, 1511, 1736, 2892, 3886, 4015, 735, 4538, 1027, 4696, 4698, 1028, 506, 4699, 1970, 736, 3257, 509, 2216, 4352, 6804, 3590, 468, 1030, 5294, 337, 4703, 4542, 4705, 3593, 622, 880, 1031, 2705, 5997, 1740, 284, 1844, 4851, 5410, 5999, 6076, 6077, 6418, 178, 308, 679, 2712, 1851, 6296, 6419, 6420, 1291, 3756, 5016, 1214, 1975, 1215, 1296, 1297, 1298, 4554, 4209, 5927, 5162, 5525, 4039, 3763, 3446, 1299, 4559, 6695, 6000, 437, 515, 516, 565, 2909, 6427, 6552, 6697, 7043, 7044, 7141, 1216, 2724, 5736, 2390, 2391, 1864, 1747, 3282].

arithmetic [4371, 5168, 5169, 5171, 5527, 6699, 4561, 5311, 5738, 1134, 1220, 1867, 2392, 2229, 6431, 1868, 3285, 3617, 6308, 1303, 6002, 1985, 6703, 6704, 3109, 2095, 2548, 3456, 3621, 3622, 4220, 4222, 4867, 3289, 6093, 629, 2239, 2240, 4225, 3291, 3626, 7275, 5314, 258, 1420, 4870, 7144, 630, 2242, 520, 2740, 2926, 1228, 1635, 2244, 2556, 5611, 6821, 6439, 1047, 1426, 7460, 5756, 636, 5940, 2421, 2745, 5321, 3913, 5850, 5184, 7145, 5325, 2425, 2934, 3914, 6006, 4235, 4878, 5615, 5946, 1, 4581, 3124, 4402, 4583, 5330, 5423, 5540, 5854, 352, 4584, 4585, 3787, 3788, 637, 525, 572, 2429, 1758, 5331]. **arithmetic** [5948, 1639, 3130, 6580, 1051, 1996, 2757, 234, 1314, 7147, 1761, 2947, 641, 688, 3645, 689, 575, 2255, 4886, 5620, 576, 6585, 6110, 2762, 5191, 5057, 448, 7172, 357, 358, 477, 762, 833, 982, 1053, 1054, 5192, 6718, 3794, 6719, 3144, 2436, 6012, 319, 696, 5545, 5338, 5339, 3651, 5547, 6944, 1320, 2000, 5624, 5344, 3311, 6016, 1765, 2574, 4418, 7150, 5864, 5775, 985, 4741, 2264, 3150, 5, 1154, 6952, 1233, 2452, 4744, 3323, 581, 5198, 4088, 4904, 2578, 1443, 1664, 5868, 4258, 5073, 3155, 4260, 5629, 699, 3806, 3807, 3808, 4093, 4262, 4747]. **arithmetic** [2581, 2582, 5351, 701, 990, 3809, 2584, 2273, 2585, 3332, 838, 3334, 1330, 4912, 1536, 2982, 3673, 3674, 5352, 839, 5443, 210, 5076, 6025, 4438, 2983, 3336, 1243, 2012, 1678, 6602, 5636, 5637, 6226, 2144, 6965, 4616, 4617, 5639, 5873, 5785, 998, 3505, 3938, 3338, 2287, 2985, 4758, 3344, 3508, 3345, 2464, 3172, 3173, 4761, 2465, 4449, 3685, 7106, 3181, 5208, 5967, 2149, 6608, 3687, 3821, 3512, 5209, 5358, 2017, 3513, 2602, 2151, 28, 2604, 4119, 3516, 1000, 4450, 1067, 1068, 1782, 2019, 2020, 1170, 3826, 5215, 2815, 3002, 656, 1461, 108, 4454, 4928, 4455, 1462, 2025]. **arithmetic** [4456, 324, 4931, 456, 5651, 6976, 1465, 2156, 2300, 3009, 1249, 3010, 847, 5652, 3355, 1347, 4131, 4287, 535, 2829, 1348, 2479, 3197, 6368, 3955, 4467, 3702, 540, 2303, 3703, 4468, 4469, 5795, 3200, 2164, 2622, 4776, 5107, 3364, 3959, 4475, 5379, 5657, 5797, 2491, 1472, 1473, 2624, 3015, 5111, 2035, 2625, 295, 1939, 4636, 1357, 1561, 5381, 5237, 948, 2630, 4141, 2845, 5801, 599, 798, 1358, 194, 4484, 2495, 6987, 7158, 4489, 4490, 5121, 4821, 5143, 5591, 2351, 6237, 4940, 2041, 1008, 3852, 1189, 1365, 4658, 1494, 3985, 1388, 1115, 6535, 1860, 6553, 1861, 2089, 2911, 2399, 3768]. **Arithmetic** [4060, 751, 975, 4236, 2124, 5431, 921, 1675, 3162, 1246, 1701, 1476, 5740, 21, 44, 5884, 5885]. **Arithmetic-Based** [6496]. **Arithmetic-Centered** [6791]. **Arithmetic-Friendly** [6545]. **Arithmetic-Geometric** [1718, 3639, 3980]. **arithmetic-level** [5198]. **Arithmetic-Modular** [4353]. **Arithmetic-Type** [483, 5264]. **Arithmetic/Logic** [2199]. **Arithmetic/Logical** [3027]. **Arithmetical** [6, 46, 513, 5849, 5941, 6098, 6338, 197, 4356, 401]. **Arithmetick** [3, 43]. **arithmético** [3980]. **arithmético-géométrique** [3980]. **Arithmetics** [6386, 195, 6789, 5510, 4365, 6708, 5768, 4589, 3931, 2979, 6603, 215, 1258, 1942, 1090, 1190, 1369, 4310, 6787, 5498, 5007, 4206, 830, 898, 756, 760, 1437, 2585, 5783, 1781]. **Arithmeticus** [2]. **Arithmetik** [1095, 894, 405, 1469, 1007, 1008, 1494, 2082, 751, 752, 2940, 2941, 1001, 2304, 2305, 2306, 2485, 2486, 1476]. **arithmetikk** [646]. **Arithmetikroutinen** [1701]. **Arithmétique** [5820, 4878, 2004, 702, 4490, 4318, 6266, 3413, 4351, 5332, 5191, 108, 4489, 4512, 990]. **arithmétiques** [4801, 5413, 4236, 2762]. **Arithmetische** [2399].

arithmetischen [1886]. **arithmometer** [146]. **Arithmos** [4332]. **aritmética** [4600]. **aritmetikk** [1740]. **AritPIM** [7058]. **Arizona** [7223]. **ARM** [5263, 6672, 6786, 6893, 6579, 6631, 5796, 3359]. **ARMv8** [6332, 6631, 6612]. **ARMv8-A** [6631, 6612]. **Army** [7246]. **ARPREC** [4504]. **Arrangement** [198, 2330]. **Array** [852, 1486, 1573, 665, 726, 808, 730, 7371, 7384, 3055, 3412, 1384, 1588, 1596, 1391, 1121, 1604, 823, 5022, 1218, 5737, 2393, 1418, 3296, 829, 6451, 6936, 3636, 1432, 638, 639, 686, 1434, 3139, 649, 1238, 2140, 1676, 6962, 1778, 939, 2830, 7367, 1182, 1940, 2499, 2181, 2650, 1492, 3411, 2207, 2685, 2881, 2354, 3892, 4714, 2419, 4397, 3786, 4403, 3127, 2000, 2451, 2970, 648, 2284, 3518, 1698, 1560]. **Array-Like** [852]. **Arrays** [7493, 7510, 1187, 1824, 871, 5992, 3255, 7030, 2710, 1136, 6196, 4066, 2936, 6008, 3128, 3469, 979, 3477, 644, 1665, 2134, 2800, 5648, 7478, 6393, 2694, 2409, 3129, 3488, 3520, 4290, 3205, 3368]. **Arrondi** [5421, 5094]. **Arsenal** [273]. **arsenide** [3234]. **Art** [7274, 6587, 2276, 2978, 6129, 1179, 7208]. **Article** [1484]. **Articles** [53]. **Artificial** [6544, 43, 6836, 6746]. **artificially** [5703]. **ary** [2924, 4141]. **As-if** [5534]. **ASAP** [7483, 7528, 7517, 7523, 7571, 7542, 7565]. **Asia** [7430]. **Asian** [7375]. **ASIC** [7339, 7464, 7522, 5146, 7359, 7430, 5530, 3187, 3023]. **ASICON** [7522]. **ASICs** [7430, 3859]. **Asilomar** [7283, 7301, 7312, 7407, 7255, 3780, 7408, 7422, 7435, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 7350, 7391]. **Ask** [5364]. **AskConstants** [6363]. **Aspect** [855, 421, 4067]. **Aspects** [3414, 4369, 1237, 2366, 481, 1886]. **Aspekte** [1237, 1886]. **Aspen** [7381]. **ASPLOS** [7298]. **ASPLOS-III** [7298]. **Assembler** [4463]. **Assembly** [1508, 1401, 3294, 3461, 3527, 3020, 1734, 2824]. **Asserting** [4547]. **Assertion** [6381, 6464]. **Assertion-Based** [6381, 6464]. **Assertions** [3402, 3745]. **Assessing** [6669, 6173, 3919, 4076]. **Assessment** [7406, 2920, 6103]. **Assessments** [4865]. **ASSETS** [7509]. **assignment** [2574]. **Assimilations** [287]. **Assistance** [4216, 4732]. **Assistant** [7068, 5132, 5960]. **Assisted** [3653, 6138, 1706, 4141, 4143, 4642]. **Associate** [1905]. **Associated** [5695, 106, 4418, 2974]. **Association** [7237, 1332]. **Associative** [2880, 6406, 6095, 2128, 3667, 1683, 4629, 2287, 2985]. **Assurance** [7268]. **ASTC** [6355]. **Astronom** [1322, 1167, 1467]. **Astronomer** [1167]. **Astronomical** [5630]. **Astronomy** [7037]. **Astrophysics** [7174]. **Asymmetric** [5269, 6526, 5037, 4415, 5643]. **asymptotic** [4978, 3582, 819, 2014]. **Asymptotically** [6306, 5241, 6658]. **Asynchronous** [1376, 5644, 5875, 3435, 3317, 4625]. **AT&T** [2218, 3097]. **AT-based** [2271]. **Atan2** [6059]. **Atanasoff** [4055, 5647]. **Atari** [2069]. **Athens** [7200]. **Athlon** [4272]. **Atkin** [5176]. **Atlanta** [7369, 7311, 7604, 7279]. **Atlantic** [7183, 7190, 7172]. **Atlas** [379, 383]. **atmosphere** [2708]. **ATOM** [3351]. **atomic** [6754]. **Atrubin** [969]. **attached** [1816]. **Attack** [6149, 6638]. **Attacks** [6871, 6154, 4412, 4597, 4599, 4742, 5824]. **Attainable** [728, 5584]. **Attempt** [469]. **Attention** [4650]. **attenuation** [736]. **attributable** [4154]. **attribute** [5502]. **attributes** [2842]. **Auctions** [5008]. **Audio** [2927, 3890, 978]. **Auditorium** [7417]. **AUGMENT** [1265, 1098, 1107]. **Augmented** [5686, 730, 823, 6467, 6774]. **Augmenting** [2729, 2138]. **August** [7194, 7237, 7383, 7526, 7540, 7395, 7454, 7541, 7467, 7572, 7597, 7484, 7191,

7373, 7414, 7417, 7419, 7430, 7516, 7564, 7473, 7400, 7445, 7461, 7488, 7505, 7520, 7293, 7188, 7378, 7231, 7506, 7490, 7450, 7352, 7536, 4055]. **Ausführung** [1886]. **Ausgabefunktionen** [2486]. **Aussage** [768]. **Austin** [7418, 7458, 7587]. **Australia** [7225, 7433]. **Australian** [7289]. **Austria** [7258]. **Auswahl** [1237]. **Auswertungsalgorithmen** [1062]. **Authentication** [4794]. **Author** [4497, 4652, 5247, 5468, 6245, 6758, 6873, 773, 6613]. **Auto** [6535, 4195, 7120]. **Auto-Ranging** [4195]. **Auto-tuning** [6535, 7120]. **Autocode** [379, 383]. **autocorrelation** [3882]. **autogeneration** [5451]. **Automata** [4809, 5268, 5490, 4018, 4571, 7173, 2888, 256]. **Automatable** [6051]. **Automated** [6244, 6070, 4731, 6222, 5648, 6933]. **Automatic** [1481, 2864, 5895, 5390, 105, 381, 668, 5701, 1728, 7357, 6675, 6896, 99, 4826, 3583, 1509, 112, 7327, 625, 86, 5023, 4388, 4393, 5850, 6102, 6714, 120, 94, 983, 365, 5773, 3657, 5346, 2133, 4609, 706, 6223, 4098, 187, 1071, 6364, 167, 5372, 5570, 6634, 4941, 1562, 552, 7355, 296, 329, 6276, 283, 92, 679, 2726, 4065, 364, 3183, 147, 6984, 35, 57, 7512, 7327, 69]. **Automatically** [6122, 6326, 6445]. **Automatics** [1554]. **Automating** [6285, 4539]. **Automation** [7359, 7397, 7513, 5421, 17]. **automatique** [17]. **automatisation** [5421]. **Automotive** [3995, 7239]. **Autonomous** [6400, 5752]. **Autoscale** [1551]. **AUTOSCALER** [4232]. **aux** [40, 108]. **Available** [617, 4319, 1497, 2807]. **Average** [6048, 6388, 5031, 2562, 4459]. **Averaging** [1589]. **avionics** [2664]. **Avoid** [4960, 5918]. **avoidance** [956]. **avoided** [4674]. **Avoiding** [4500, 3136, 5952, 7155, 3575, 1128]. **Avoids** [6023]. **AVR** [6086]. **Avril** [7413]. **AVX** [6379, 7025]. **AVX-512** [6379, 7025]. **AVX2** [6821]. **AVX512** [7093]. **Aware** [7005, 6498, 6999, 7039, 6713]. **AWGN** [5186]. **Axiomatic** [3168, 635]. **Axiomatisierung** [2699]. **Axiomatization** [1762, 2699, 2700]. **Axiomatizations** [1942, 2585]. **axis** [7145]. **AxOMaP** [7154]. **AXP** [3514]. **AxRMs** [6981].

B [340, 341, 262, 6482, 6502, 3268, 3644, 3476, 2963, 2447, 3490, 2284, 4462, 2841, 3532, 3412, 3600, 993, 2671]. **B-factory** [3600]. **B-Spline** [3412]. **B.S.T.J.** [1515]. **B5500** [302]. **BaBar** [3600]. **Babbage** [16, 60, 235, 3666]. **Babuska** [579]. **Babuskasche** [579]. **Babylonian** [4080]. **Back** [2501, 5416, 6472, 3183]. **back-of-the-envelope** [3183]. **Backward** [3402, 6788, 3067, 3745, 6070]. **Bad** [4160, 3875, 6452, 7262, 6521, 4154, 4004, 4285]. **balance** [2195]. **Balanced** [5679, 2751, 5265]. **balancing** [3211]. **baleful** [3620]. **Ballistic** [71]. **Balls** [6236]. **Baltimore** [7310, 7509, 7444, 7472]. **Band** [2631]. **Bandwidth** [6889, 6367, 1397, 5925, 4406]. **Bangalore** [7546, 7577]. **Bangladesh** [7563]. **banking** [2015]. **banks** [3845]. **Barrel** [4605]. **Barrett** [6414, 5608, 7096]. **barycentric** [6339]. **Base** [851, 1006, 378, 4308, 499, 815, 332, 3738, 4008, 6526, 6798, 885, 1035, 5518, 4364, 2904, 744, 347, 2110, 445, 475, 577, 765, 919, 775, 776, 322, 933, 3953, 7116, 6635, 950, 4809, 5901, 5697, 4701, 2720, 5857, 757, 5768, 5625, 5, 6356, 7094, 2466, 5791, 148, 5235, 4950, 3160]. **Base-** [1006, 2110, 6356, 7094]. **base-2** [757]. **Base-Prime** [6798]. **Based** [1563, 5886, 6381, 5810, 3391, 2862, 7001, 3392, 6045, 6046, 3044, 6659, 5982, 6496, 7125, 4509, 6503, 5821, 2199, 6891, 611, 5823, 6159, 220, 2059, 6893, 6275,

6402, 3579, 3736, 5711, 6280, 5831, 6533, 6920, 6805, 6177, 5835, 5924, 4545, 6074, 4709, 6689, 6690, 5725, 6295, 2715, 4203, 3894, 6811, 5731, 5412, 4040, 6085, 5529, 5602, 1631, 5608, 6709, 6929, 2555, 4571, 6930, 5180, 5038, 7062, 1143, 5616, 6333, 6828, 6936, 4074, 6716, 3796, 2572, 4079, 7073, 6836, 6118, 4421, 7152, 7089, 4095, 5779, 2134, 4910, 6464, 6844, 5632, 7097, 6360, 6607, 6850, 712, 6734, 5645, 5359, 2813, 1694, 4933]. **Based** [6977, 5793, 6367, 7115, 5377, 5881, 6980, 6982, 3960, 3374, 6983, 1004, 6750, 5118, 5827, 6523, 4289, 4957, 4649, 5670, 3555, 6257, 6387, 3859, 6773, 4163, 5481, 4671, 6673, 4677, 3998, 4523, 5704, 5707, 4830, 6911, 4535, 5501, 4832, 3882, 2888, 2209, 4698, 4187, 5005, 6806, 5296, 6921, 5997, 5409, 4852, 6422, 3763, 3446, 4559, 5163, 5733, 4560, 4042, 2392, 1523, 2230, 5415, 5751, 3111, 3112, 3113, 3114, 2246, 2419, 2422, 3300, 5854, 4072, 3787, 2939, 5765, 2252, 4242, 4243, 4244, 4405, 4406, 4588, 4884, 4075, 4245, 2431, 5767, 5335, 5190, 7278, 7292, 364, 5061, 4739, 6723, 3313]. **based** [6727, 6954, 3664, 2970, 2267, 183, 206, 5778, 2271, 4267, 4269, 4610, 1537, 1774, 1162, 2983, 772, 4757, 4917, 5784, 5965, 7154, 4449, 7106, 3512, 2017, 5791, 1000, 6852, 1921, 3520, 4624, 6973, 3522, 3699, 4284, 4773, 1347, 2826, 3834, 7113, 5370, 5371, 2482, 4475, 5797, 3205, 3368, 4142, 4143, 4482, 4640, 4641, 6479, 2845, 6984, 3378, 2315, 1943, 6645, 7052]. **Basel** [7323, 2585]. **Bases** [5472, 6770, 6883, 549, 550, 6157, 6170, 5290, 4574, 5621, 6111, 531, 598, 5142, 4039, 2226, 3806, 4752, 5641, 3182, 3362, 3963]. **Basic** [3553, 5814, 6386, 1267, 1501, 513, 6311, 4389, 634, 5040, 3642, 1147, 290, 6946, 2141, 1162, 6027, 5113, 1194, 5756, 756, 2815, 3002, 4929, 1086, 1011, 2588, 1337, 2600, 1092, 4510, 1728, 4468]. **Basics** [2501, 4158]. **Basis** [5688, 2879, 5993, 6065, 5151, 4702, 751, 752, 894, 4067, 6348, 4420, 5200, 3812, 4271, 4437, 4754, 6600, 485, 1702, 5115, 600, 4682, 3588, 3602, 3908, 4724, 3789, 1897, 4896, 4254, 146, 4753, 4755, 4914, 4915, 5077, 4457, 2489, 4637]. **Basiserweiterung** [3160]. **Basiswahl** [751, 752, 894]. **batch** [6473]. **batches** [6643]. **Bath** [3461, 7389]. **Battle** [3747]. **Baugh** [5566]. **Baule** [7218, 7220]. **Bayesian** [6932, 7057]. **BC** [7360, 1102, 3071]. **BCD** [6162, 2003, 1710, 859, 1493, 6274, 5274, 5415, 4049, 521, 1641, 1655, 2003, 778, 779, 780, 781, 782, 783, 784, 1166, 5101, 1789, 5225, 5226, 5569, 6031, 5374]. **BCD-based** [5415]. **BCD-floating-point** [1789]. **BDDs** [5130]. **Be** [989, 3035, 4674, 2076, 1297, 2548, 890, 6452, 5]. **Beach** [7426, 7493, 7510, 7579]. **Beamforming** [3115, 2422, 2451]. **Beating** [6291, 6292]. **Beauty** [7314, 1943]. **Because** [6513, 6527]. **bedingte** [548]. **Bedot** [7041]. **beefs** [2220]. **been** [7017]. **Before** [6590, 5482, 32, 1833, 2015, 96]. **Begründung** [975]. **behave** [5983]. **Behavior** [4960, 4347, 881, 5883, 6679, 6803, 880, 6011]. **Behavioral** [3886, 4307, 4015]. **behaviour** [2599, 2620]. **Behind** [5598, 3437]. **Behrooz** [4151, 4152]. **Beijing** [7467, 7473]. **Being** [2577]. **Beispiel** [2615]. **Beispielen** [2734]. **Beitr** [801]. **Belfast** [7454, 7570]. **Belgium** [7556, 7352]. **beliebige** [2103]. **beliebigen** [2053]. **beliebiger** [651]. **Bell** [2690, 75, 98, 5738]. **bench** [3513]. **Benchmark** [6163, 1741, 1871, 1751, 1764, 1773, 1690, 4525, 1734, 1735, 1737, 3578]. **Benchmarks** [2676, 2238, 3035, 3620]. **Benefit** [6642, 1491]. **Benefits** [6781, 6782, 5053, 5189, 2492, 1484]. **Benford** [5267, 5579, 3712, 5676,

5677, 5583, 1097, 5279, 5508, 4849, 5008, 4546, 5164, 5037, 5179, 4234, 1446, 4431, 5442, 5782, 2285, 2286, 785, 717, 1471, 661]. **Benutzerhandbuch** [1469]. **Berechnung** [1812, 1095, 385, 2100, 586, 651, 1628, 1795]. **beregner** [1329]. **berekenen** [492]. **Berger** [3636, 2429, 3127]. **Bergman** [4626]. **Berichtigung** [894, 358]. **Berkeley** [1379, 2109, 2250]. **Berlin** [7214, 7249, 7530, 7463]. **Berlin/Wendisch** [7214]. **Berlin/Wendisch-Rietz** [7214]. **Bernstein** [5603, 6582, 6354]. **Bertinoro** [7527]. **Beschreibung** [2615]. **Besieged** [5026]. **besonderer** [1700]. **Bessel** [5523]. **Best** [5918, 2691, 514, 580, 2281, 599, 3388, 6929, 482]. **Bestehens** [1653, 7234]. **bester** [514]. **Bestimmung** [514]. **Beta** [4463, 4464, 4929]. **Betriebssystems** [587]. **Better** [6353, 7109, 2194, 4235]. **Between** [3973, 5905, 5175, 4069, 5045, 7231, 585, 3677, 598, 4800, 5899, 6156, 5139, 4175, 4831, 5278, 5151, 674, 3756, 3765, 3312, 4419, 208, 3814, 6033, 3245]. **Beyer** [531]. **Beyond** [1725, 6180, 6290, 2225, 1893, 1442, 3202, 5655, 5582, 2045, 4752]. **BF16** [6957, 6631]. **Bfloat** [6847]. **bfloat16** [6544, 6423, 6743, 6429, 6561, 6792, 6612, 6631, 6636, 6507]. **Bhubaneswar** [7534]. **Bi** [1169, 1000]. **Bi-Imaginary** [1169, 1000]. **Bialystok** [7606]. **Biased** [1839, 6469]. **Bibliography** [5676, 1432, 928, 595, 5164, 705, 991, 1236]. **BiCGstab** [3516]. **BiCMOS** [3600, 3268]. **BID** [5100, 7156]. **BIDEC** [155]. **Biennial** [7236, 7252]. **Bifurcation** [3669]. **Big** [6399, 6528, 1518, 6178, 3894, 5427, 6125, 6453, 5620]. **BigDecimal}** [4816, 4630]. **BigNum** [5212, 5213]. **bilinear** [1664]. **billing** [5418]. **Billion** [3747, 6736]. **Bimodular** [5941]. **Binaire** [1]. **binäre** [3341]. **binären** [801]. **binärer** [1976]. **Binary** [5465, 5664, 1081, 1259, 1361, 6995, 6996, 2862, 5814, 1087, 5891, 665, 1012, 859, 2868, 1372, 6152, 5680, 5984, 809, 551, 3053, 6156, 196, 5688, 170, 730, 610, 611, 1103, 1383, 1273, 2345, 3059, 332, 1198, 1727, 3999, 5272, 5495, 155, 224, 6162, 1108, 1830, 5274, 173, 2687, 5916, 504, 174, 3078, 5289, 5290, 507, 673, 5006, 1280, 431, 1606, 3747, 4541, 2531, 623, 1400, 1843, 5409, 5924, 2537, 1406, 1613, 4856, 1614, 558, 342, 3755, 5727, 86, 5522, 5524, 6543, 1976, 5304, 2391, 1861, 1862, 1863, 2088, 7046, 7047, 5310, 973, 5531, 6306, 4050, 4218, 3287, 3768, 5173]. **Binary** [2741, 286, 2104, 6098, 260, 5538, 233, 287, 5047, 1145, 6576, 181, 261, 3473, 262, 2111, 639, 686, 691, 1644, 4409, 263, 447, 693, 694, 761, 265, 102, 266, 5066, 1056, 645, 121, 988, 1156, 2787, 1235, 368, 34, 920, 1535, 584, 210, 370, 123, 586, 185, 267, 7094, 531, 239, 1680, 486, 3341, 372, 1166, 4111, 4447, 7105, 96, 843, 1781, 714, 1459, 1460, 6975, 2155, 5100, 189, 167, 939, 5369, 5370, 5371, 5563, 5793, 6375, 659, 415, 244, 6983, 3844, 1940, 3212, 552, 1710, 1711, 6489, 6257, 6148, 953, 2045, 2646, 2652, 90, 5585, 7010, 7011]. **binary** [4324, 3727, 6393, 4810, 2196, 6510, 5697, 1962, 6411, 5920, 5292, 225, 5514, 1292, 1293, 3095, 1300, 1864, 4373, 3286, 3621, 5604, 2921, 2732, 2924, 2556, 2418, 1230, 5853, 1, 4238, 1429, 1758, 234, 402, 3132, 4590, 4734, 695, 833, 3920, 5625, 1233, 6460, 2785, 3674, 6221, 4914, 1678, 5965, 2598, 2017, 5791, 2468, 6972, 1461, 1928, 3701, 5654, 5795, 6632, 3360, 3361, 2836, 3372, 5380, 5383, 801, 4644, 4784, 4785, 6868]. **Binary-BCD** [1166]. **Binary-Coded** [1606, 1614]. **Binary-Coded-Decimal** [5173, 1145]. **Binary-Decimal** [2531]. **Binary-Integer** [5100]. **binary-residue** [3920, 3360, 3361]. **Binary-Ternary** [5465, 5664, 6152]. **Binary-**

to-Decimal [2862, 5984, 155, 224, 1406, 261]. **Binary-to-Multidigit** [5066]. **Binary/Decimal** [6375]. **Binary128** [5734, 5840, 6201, 6328]. **binary64** [7043, 7044, 7141, 5899, 6201, 6328, 6214]. **Bindings** [3851]. **BinFPE** [6931]. **Biography** [4279, 5647]. **biological** [5352]. **Biologically** [7559]. **Biology** [7285]. **biometric** [6394]. **Biophysically** [5976]. **biopolitics** [6867]. **Biot** [7098]. **Bipartite** [4965, 5417, 3507, 3818, 4105]. **bipolar** [2947]. **biquad** [1879]. **Biquinary** [811]. **Biresidue** [583]. **Birmingham** [7345, 7274]. **Birthday** [7314, 5604, 7390]. **bis** [61, 7390]. **Bisection** [3248, 6575, 3704, 3247, 3423]. **bisection-like** [3423]. **BIST** [4775]. **BIT** [217, 228, 3722, 3053, 5688, 4985, 1196, 5492, 3993, 4990, 2881, 1600, 6065, 4541, 1609, 6534, 4360, 5521, 2902, 5303, 7041, 3279, 343, 5166, 2093, 4565, 6708, 2102, 2416, 4574, 5758, 4395, 6199, 5046, 570, 4594, 2438, 4598, 3923, 6724, 2964, 5200, 7089, 649, 5441, 4754, 2011, 3813, 4438, 5078, 5445, 2985, 7109, 1548, 1780, 1549, 5649, 1787, 2299, 2483, 3202, 6862, 1557, 3207, 4637, 2856, 6870, 3029, 1261, 6996, 2318, 5980, 4789, 2326, 2329, 2187, 2189, 2331, 4800, 2193, 5481, 6890, 5395, 1955, 5137, 4984, 5486, 4813, 3419, 4682, 4177, 4996, 1968, 1602, 3075, 5002, 5004]. **bit** [2370, 4845, 3082, 4028, 4706, 3593, 1404, 1611, 3436, 308, 4548, 5014, 6540, 5162, 2717, 6814, 3450, 7047, 1624, 2405, 2406, 2551, 3908, 2410, 2740, 2412, 2413, 2414, 2415, 2244, 2556, 2930, 4724, 5183, 5184, 5042, 2427, 6827, 5948, 6581, 1760, 2562, 2563, 1997, 4590, 4734, 1646, 7071, 2437, 5861, 6346, 6347, 6944, 2261, 2774, 3316, 2265, 6950, 2575, 5346, 1443, 4261, 3330, 1908, 7088, 648, 5440, 3673, 4915, 4918, 7097, 4919, 2471, 4455, 6740, 4125, 3193, 1929, 3010, 4130, 4934, 3959, 2490, 6478, 1477, 2034, 1256, 1705, 2840, 3208, 3962, 3963, 5975, 2314, 1943]. **bit-complexity** [1443]. **bit-flip** [5948]. **Bit-Level** [6065, 2881, 4594, 7097, 4800, 5861]. **Bit-Manipulations** [6199]. **bit-map** [3202]. **Bit-Parallel** [5492, 5521, 4395, 5200, 5441, 5445, 5166, 2985, 4637, 4984, 5004, 3908, 5042, 3673, 3962, 3963]. **Bit-Pipelined** [2416, 2244, 2556]. **bit-reproducible** [5980]. **Bit-Sequential** [1196, 2011, 1548, 1780, 1549, 2189, 2471]. **Bit-Serial** [4985, 1609, 4360, 5521, 4565, 2102, 5046, 4598, 2902, 3279, 2193, 3593, 4919, 3010, 1705, 2314]. **bit-slice** [1955, 1256]. **Bit-Sliced** [5688, 4438]. **bit-true** [6814]. **bit-vector** [5481]. **Bit-Width** [5758, 4845, 5346]. **Bits** [4958, 4159, 431, 434, 2563, 5953, 6357, 1943]. **bitwise** [6104, 6955]. **Bivariate** [5746, 6168, 5421]. **bivariées** [5421]. **BKM** [3041, 3224]. **Black** [5936]. **Blackfin** [4653]. **blame** [6224]. **BLAS** [4510, 6037, 6142, 6151, 6271, 5914, 5990, 6165, 6406, 6906, 6907, 6087, 6088, 6700, 6701, 4582, 6342, 5862, 5776, 4937, 5796, 6627]. **BLAS1** [6568]. **BLAST** [4204, 4205, 4952]. **Bledy** [458]. **Blending** [5105]. **blew** [6736]. **Blinn** [3724]. **BLIS** [6858]. **BLITZEN** [2506]. **Block** [7001, 3395, 6497, 3988, 4847, 4229, 1226, 6099, 3796, 7081, 2294, 1788, 3035, 4812, 4983, 2666, 2522, 4017, 1205, 3109, 3458, 3624, 4872, 1227, 4892, 5058, 581, 2274, 4096, 1066, 2491, 1939]. **Block-Floating-Point** [4229, 3458, 3624, 4872, 581]. **Block-Level** [7001]. **Blocked** [6167]. **Blocklength** [2634]. **Blocks** [6311, 6946, 7087, 6360, 6981, 5384, 6985, 5040, 981, 5843]. **blood** [2338, 2512]. **Bloomington** [7387]. **Blue** [3747, 4986, 4999, 5050]. **BlueGene** [4792]. **BlueGene/L** [4792]. **blur** [2310].

BN [669]. **BNS** [2418]. **Board** [3546, 5706, 2082, 2315, 3635]. **boards** [1998]. **body** [4585, 4936]. **Boltzmann** [4629]. **Bombelli** [3935]. **Bonas** [7349]. **Book** [3714, 4151, 4152, 21, 4675, 510, 554, 389, 340, 341, 44, 1653, 1322, 1672, 996, 531, 372, 272, 2481, 908, 2477]. **Books** [6551, 6815]. **Bookshelf** [4587]. **Boolean** [7004, 2661, 335, 354, 997, 790]. **Boost** [3974, 2530, 6921, 2008]. **Boosting** [4078, 4413]. **boot** [3503]. **Booth** [3386, 1261, 4833, 7138, 6192, 6331, 3473, 3930, 4604, 7152, 6962, 925, 6630, 4293]. **Borel** [4809]. **Borland** [2220]. **Borneo** [3874, 4334]. **Borrow** [144, 2890]. **borrow-save** [2890]. **Boston** [7194, 7298, 7494, 7185, 7221, 7284, 7344, 7565, 7267, 7449]. **both** [6268, 981]. **Boulder** [7231]. **Bound** [952, 5701, 6312, 4069, 3652, 3675, 5444, 2989, 4660, 3726, 4554, 5186, 2806, 2988, 4148, 2821]. **Boundary** [5539, 3669]. **Bounded** [3967, 5594, 3331, 2136, 5130, 5406]. **Bounding** [6886, 5587, 3470, 3638, 3913, 3924]. **Bounds** [6484, 5979, 3395, 3396, 7014, 7027, 7133, 4024, 6084, 5932, 6306, 6311, 3777, 3298, 4391, 6336, 6582, 6206, 6946, 3656, 4084, 479, 6022, 6354, 586, 6223, 6603, 849, 4473, 799, 5242, 7392, 5981, 4506, 5675, 3045, 1949, 5259, 4818, 4819, 5590, 5144, 6919, 7039, 6001, 6191, 6307, 6433, 3909, 5854, 1639, 365, 6349, 4746, 5443, 1335, 6227, 4765, 2025, 7111, 942, 5119]. **Box** [6466, 6767]. **Box/Inverse** [6466]. **Br** [7226]. **Brahmagupta** [2404]. **Brains** [5015]. **Branch** [2093, 3790, 3675]. **Branch-and-Bound** [3675]. **Branching** [6717, 3675]. **Brazil** [7539, 7579]. **Breakdown** [7155]. **breakdowns** [6532]. **Breaking** [5267]. **Breakthroughs** [6862]. **Breckenridge** [7327]. **Breisgau** [7432]. **Brent** [5884, 5885, 1098, 1265]. **Bresenham** [4611]. **Brickell** [2219]. **Bridge** [5438]. **Bridging** [4800, 5450, 6368]. **Brief** [5024, 6867]. **Briefs** [1515, 3747]. **Briefwechsel** [4859]. **Briggs** [5808]. **Brightening** [6849]. **Brighton** [7303]. **Bring** [3747]. **Bringing** [6862, 5423]. **Brings** [6631, 1997]. **British** [7380, 7554, 7373]. **broadband** [4244, 4588]. **Broadmoor** [7224]. **Broken** [6962]. **Brook** [7206, 7287]. **Brousentsov** [4626]. **Brouwer** [5869]. **Bruijn** [2821]. **Bruijn-Newman** [2821]. **Brussels** [7352]. **Bubbles** [1077]. **Buch** [2477]. **Buchbesprechungen** [908]. **Buchholz** [272]. **bucks** [6453]. **Bug** [3718, 3721, 6154, 3560, 3415, 3732, 3870, 3743, 3437, 6345, 3500]. **Bugs** [4587, 6736]. **Build** [2077, 6121, 7512]. **Building** [3848, 547, 4347, 7498, 7239, 6311, 5843, 6946, 5202, 6981, 6985, 5040, 3351]. **Built** [304, 4029, 3753, 2253, 3934]. **Built-In** [304, 4029, 3753, 2253, 3934]. **Bulgaria** [7383, 7332]. **bulk** [6955]. **bulk-bitwise** [6955]. **Bunka** [7582]. **Bureau** [7164]. **Burroughs** [1124]. **burst** [5163]. **burst-by-burst** [5163]. **bursty** [4243]. **bus** [2499, 4403]. **bus-connected** [2499]. **Business** [7314, 4214, 5026]. **Business-Oriented** [4214]. **butterfly** [1761, 1723]. **Byte** [6498]. **Byte-Aware** [6498].

C [4961, 340, 341, 3119, 2764, 3143, 372, 930, 6998, 3847, 6768, 2331, 5683, 5896, 5898, 5136, 4667, 6505, 3864, 6516, 3989, 3990, 5141, 5273, 6063, 7029, 6531, 1128, 3754, 3447, 5169, 5170, 5171, 5527, 5032, 3116, 3119, 5847, 4232, 5614, 4399, 2561, 4416, 6213, 3488, 7200, 4093, 2975, 3158, 2276, 2978, 2455, 2588, 5440, 4439, 7095, 5966, 3165, 2600, 5451, 2288, 6735, 3349, 2823, 4463, 3524, 7296, 3838, 1796, 7405]. **C-MOS** [1796]. **C-testable** [5440]. **C-XSC**

[3116, 5847]. **C.** [5482]. **C/C** [6768, 6063, 5451, 3838]. **C2** [2398]. **C99** [5564]. **C9X** [4591]. **CA** [7385, 7487, 7566, 7461, 7520, 7211, 7286, 7403, 7269, 7354, 7439]. **cache** [3347, 3398]. **caches** [3487, 3661]. **CAD** [3081]. **CADAC** [1387, 1591]. **Cadence** [4493]. **CADNA** [3413, 3569, 5414, 5614, 5356]. **CADNA_C** [5614]. **Cairo** [7508]. **calc.exe** [6504]. **Calcolo** [3935]. **Calcul** [3980, 6266, 4236, 2806, 4489, 5121]. **calculate** [1329, 1255]. **Calculated** [3889, 7017]. **calculates** [1848]. **Calculating** [7164, 154, 5010, 6685, 6312, 30, 25, 1757, 1318, 6126, 77, 296, 4, 40, 1598, 1731, 3460, 50, 2436, 2782, 95, 492, 35, 29, 124]. **Calculation** [5979, 6146, 327, 5254, 2657, 4011, 281, 384, 431, 5718, 3893, 626, 1631, 94, 2953, 2765, 6017, 207, 920, 1535, 709, 268, 6736, 1694, 5794, 299, 6504, 40, 6680, 2693, 283, 391, 6422, 4561, 2239, 2240, 4871, 1988, 4236, 6211, 6455, 452, 34, 3935, 107, 4619, 2604, 5651, 3196, 2487, 4489]. **Calculations** [4157, 381, 4816, 5497, 3425, 1608, 6075, 3778, 2140, 3705, 1562, 3220, 6510, 5918, 1854, 2389, 1765, 3503, 2144, 460, 35, 6628]. **Calculator** [1481, 2871, 1102, 61, 1509, 1023, 1024, 1025, 1113, 86, 1041, 1223, 1307, 4383, 94, 3793, 1151, 115, 121, 6128, 1682, 926, 1546, 269, 932, 1338, 3523, 70, 5103, 6260, 118, 159, 100, 1137, 3460, 1531, 1052, 6114, 235, 3666, 1167, 104, 3183, 108, 124, 57, 1567, 69, 1645, 134]. **Calculators** [727, 1022, 4383, 4285, 3467, 107]. **calculer** [29, 40, 108]. **calculs** [40, 3157]. **calculus** [7147]. **Calgary** [7574]. **calibrating** [4855]. **Calif** [7297]. **California** [7440, 7493, 7510, 7537, 7356, 7283, 7301, 7312, 7302, 7196, 7329, 7386, 7417, 7471, 7590, 7255, 3780, 7408, 7445, 7488, 7462, 7475, 7557, 7244, 7595, 7337, 7350, 7391, 7478, 7325, 7497, 7382, 7407, 7165, 7254, 7456, 7544, 7422, 7435, 7446, 7489, 7569, 7598, 7402, 7409, 7423, 7476, 7535, 7551, 7477]. **Call** [5248, 5249, 5469, 5667]. **Call-for-Papers** [5469]. **called** [5]. **calls** [1191]. **CalmRISC32** [4374]. **calorimeter** [3600]. **Cambridge** [7306, 7318, 7343, 7336]. **CAML** [2950]. **Can** [5579, 4345, 1041, 1137, 2550, 2971, 3389, 5126, 4674, 2076, 1297, 3109, 3622, 6452]. **Canada** [7380, 7554, 7237, 7412, 7239, 7331, 7502, 7542, 7421, 3189, 7541]. **Canadian** [7574]. **Cancellation** [5903, 4333, 995, 3939, 6405, 5942, 2971, 3938]. **Cancun** [7562]. **Canonic** [3579]. **Canonical** [1549, 2924, 3908, 5382]. **Can't** [6527]. **Cantilever** [3769]. **capabilities** [1847, 2745]. **Capability** [1566, 2872, 6938, 6939, 1373, 2945, 1997]. **Cape** [7518, 7521]. **CAPI** [6397]. **Carathéodory** [7200]. **Card** [94, 1546, 104]. **Card-Programmed** [1546, 104]. **Cardinality** [5991]. **Cards** [4709]. **Care** [3083]. **Carefully** [6421, 3707]. **Carlo** [7165, 5904, 6062, 6166, 6068, 3807, 3808, 4093, 4262, 4263, 5376, 5801]. **CARM** [7108]. **Carnegie** [7205]. **Carnegie-Mellon** [7205]. **Carriers** [150]. **Carry** [378, 6999, 4323, 5691, 3730, 4166, 4813, 3573, 4529, 4530, 6164, 336, 5288, 3078, 1125, 2077, 5741, 6188, 754, 233, 287, 144, 3145, 2002, 3331, 2788, 5780, 4922, 5225, 5239, 803, 2337, 2666, 2881, 4344, 2526, 4693, 2731, 1900, 5080, 1168, 5789, 5876, 2480, 4467]. **Carry-aware** [6999]. **carry-free** [5080]. **carry-look-ahead** [803]. **Carry-Lookahead** [4166, 2002, 2666, 1900]. **carry-propagate** [2526]. **Carry-Propagation** [378, 233]. **Carry-Save** [4529, 4530, 6164, 336, 5288, 3145, 2788, 3573, 2881, 4344, 4693, 1168, 5789, 5876]. **carry-save-adders** [4467]. **Carry-Select** [5764]. **Carry-Skip** [2077, 2337, 2666, 2731, 2480].

Carry-Storage [287]. **carrying** [762, 1054]. **cas** [5094]. **Cascade** [367, 478, 2905, 2407, 2336]. **cascade-correlation** [2905]. **Cascaded** [3464]. **cascades** [1781]. **Cascading** [371, 1779]. **CASCON'98** [7421]. **Case** [4300, 5478, 6687, 3777, 1439, 3491, 4272, 1453, 2809, 934, 4453, 7113, 6137, 3366, 6140, 3227, 4527, 4696, 7042, 3909, 5613, 6011, 6732, 4459, 6368, 3377]. **Cases** [3426, 2357, 5299, 4398, 4729, 5185, 5422, 5943, 4409, 4628, 5096, 5243, 6509, 4712, 3456, 4728, 4590, 4734, 4768, 5094]. **Casting** [6053, 7056, 2835]. **Castle** [7555]. **Catastrophic** [4333]. **Categorial** [7214]. **Cauchy** [3631]. **caused** [1756, 701]. **Causes** [6359, 6470, 3357, 1703]. **Causing** [5985]. **CAV** [7560]. **Caveats** [5702, 5493]. **CCD** [1527, 2114]. **CCECE** [7574]. **CD** [7448]. **CD-ROM** [7448]. **CDC** [625, 303, 732, 555, 637, 1243, 1346, 718]. **CDC-3600** [303]. **CDMA** [5163, 4242, 4243, 4244, 4405, 4406, 4588, 4884, 4142]. **Ce.** [2082]. **celebrate** [5604]. **Celebration** [7550]. **CELEFUNT** [3058]. **céleste** [40]. **celestial** [40]. **Cell** [5691, 2895, 4028, 7331, 2393, 2915, 3184, 5577, 2680, 3741, 2896, 2728, 3284, 2419, 2753, 3187, 5062, 5072]. **Cells** [6644, 3437]. **Cellular** [5268, 5490, 1596, 2888, 4018, 1218, 4571, 638, 686, 939, 3411, 5418, 2586]. **Cent** [334, 165]. **Center** [7310, 7524, 720, 7260, 7397, 7443, 7515, 7567, 7582, 7242, 7209]. **Centered** [6791]. **central** [3152, 3153]. **Centre** [7599, 7331, 7485, 7401, 7198]. **centric** [7567]. **centuries** [1160]. **Century** [7499, 7373, 4036, 7443, 27, 31, 5482, 1322, 931]. **CEQRNS** [3518]. **CERN** [625]. **Certain** [13, 1812, 812, 734, 5008, 83, 3138, 366, 4426, 4427, 589, 552, 1269, 466, 1397, 225, 1868, 3456, 5177, 3169, 2617, 2618, 2619, 1704]. **Certificate** [6108]. **Certification** [5590, 5792, 595, 5258, 5421, 5191, 539]. **Certified** [5489, 6336, 6582, 5773, 6354, 4818, 4819, 5336]. **Certifying** [5477, 5403, 5709]. **CFloat16** [6997]. **CFloat8** [6997]. **CFT77** [2425]. **CG** [3644, 3795, 2620]. **CG-Like** [3795]. **CG-S** [2620]. **CGO** [7487]. **Château** [7349]. **chain** [2249, 3707, 5235]. **Chained** [6963]. **Chains** [5677, 6188, 3331, 5780, 3839, 6409, 620, 3958]. **Chaitin** [4932]. **Challenge** [4389, 409]. **Challenges** [7326, 7416, 7374, 6101, 5570, 5892, 7546]. **chance** [3481]. **changes** [1703, 3014]. **Changing** [6795, 7326]. **Channel** [6518, 4412, 4597, 4599, 4742, 4674, 2246]. **Channels** [6870, 6738, 2636, 6315, 3782, 5186, 4242, 4243, 4640]. **Chaos** [6513, 6527, 6536, 3710, 6514, 2578]. **Chaotic** [6501, 2162, 7054, 6033]. **Chapter** [1617]. **Character** [1769, 1906, 6489]. **Characteristic** [5129, 5254, 5678, 5977]. **Characteristics** [3728, 615, 731, 504, 396, 1637, 2279, 1844, 5738, 1883, 2024]. **Characterization** [3712, 1703]. **characterizations** [3311]. **Characters** [878]. **Charge** [4988, 3211, 4679, 4954]. **Charge-balancing** [3211]. **charge-integrating** [4954]. **CHARGOGGAGGOGGMANCHAUGAGOGGCHAUBUNAGUNGAMAUG** [876]. **Charles** [21, 235, 3666]. **Chasing** [3747]. **chasm** [5844]. **Chebyshev** [514, 6256, 116, 624, 6427, 6552, 5749, 2107, 5616, 689, 1057, 1058, 2616, 2165, 1078]. **Check** [811, 6053, 3636, 6223, 166, 2051, 3127, 700, 5356]. **Checked** [4035, 413, 3922, 3936, 3937, 4100]. **checker** [1714]. **Checkers** [1626, 6108, 2230, 2264, 2584]. **Checking** [3568, 6166, 5732, 1626, 2094, 5763, 121, 483, 6963, 937, 5389, 3575, 6062, 229, 1524, 2230, 2264]. **Checksum** [2972, 3520]. **chemistry** [3620]. **Chen** [930]. **Chengdu** [7575]. **Chester** [7266]. **Chi** [2118, 2260].

Chicago [7210, 7207, 7172]. **child** [4867]. **child-engineering** [4867]. **Children** [7498]. **China** [7467, 7575, 7464, 7522, 5693]. **Chinese** [4649, 5498, 2538, 2409, 401, 600]. **Chip** [1271, 2062, 1965, 1403, 1294, 3271, 1884, 6454, 1777, 2018, 6742, 4466, 2028, 4480, 3359, 2640, 3220, 3389, 2509, 1957, 2876, 2877, 2878, 2522, 2698, 3600, 2408, 1761, 2257, 2767, 2263, 4919, 1929, 1796, 2168, 3842, 4954, 2351]. **Chip-Set** [1403, 2522]. **Chiplet** [6748, 6864]. **Chips** [6383, 1834, 7582, 6453, 1331, 2857, 2530, 7417, 2138, 2030, 1799]. **Chisel** [6852]. **Chisel-based** [6852]. **Choice** [499, 170, 1520, 751, 752, 894, 1237, 283, 5102]. **Choices** [3406, 3822]. **Cholesky** [2352, 3337, 6140]. **Choose** [6272]. **Choosing** [5177, 3822]. **Chopping** [6256]. **Chromatic** [7021]. **CIC** [3888]. **CICG** [7443]. **CIFM** [5224]. **cifre** [137, 138]. **Ciminiera** [5887]. **Cincinnati** [7516]. **Cipher** [3796, 6257]. **Ciphers** [5921]. **Circuit** [7184, 378, 3583, 733, 876, 3438, 2086, 7303, 6558, 2100, 1880, 3476, 4598, 6457, 6593, 698, 5360, 1171, 6855, 5973, 5239, 5975, 2330, 3565, 3731, 4000, 4175, 4689, 3068, 3882, 1032, 2536, 4042, 1869, 2938, 5949, 3791, 3654, 3323, 5216, 5454, 292, 3209, 3210]. **Circuitry** [1994, 2420, 133]. **Circuits** [1361, 5807, 3967, 7441, 724, 2055, 3568, 1273, 7572, 5594, 3078, 4188, 250, 4357, 7429, 7416, 7222, 7286, 7304, 7329, 7344, 7361, 7431, 7443, 7515, 7516, 7532, 7545, 7567, 5750, 3771, 3459, 7255, 5051, 1640, 1888, 443, 3475, 4248, 4890, 1650, 478, 2781, 5444, 2596, 38, 42, 5558, 2813, 4124, 7203, 6235, 5372, 5570, 3363, 1180, 3960, 7354, 7157, 7308, 7379, 7404, 7439, 5118, 4324, 1586, 3570, 5146, 3881, 5406, 2894, 4542, 4705, 6000, 4225, 3293, 3906, 5844, 3468, 2253, 2947, 2763, 4595, 4596, 1233, 3665, 2786, 5443, 1168, 5358, 3000, 790, 3949, 4467]. **circulant** [6436]. **Circular** [4153, 4964, 2727, 4456]. **Cirencester** [7496]. **CIRM** [7401]. **City** [7183, 7190, 7178, 7172, 7438]. **Civic** [7260]. **CIVP** [5368]. **Claims** [6474]. **Clara** [7356, 7595]. **Clarification** [2038]. **CLARINET** [6734, 7106]. **Clarity** [4713]. **Class** [5492, 4990, 3581, 1601, 737, 5524, 3609, 1138, 3296, 4395, 4400, 265, 5349, 3931, 1911, 164, 2803, 3683, 374, 191, 552, 3714, 2203, 5150, 5504, 2903, 3088, 229, 3116, 3908, 527, 130, 163, 3345, 5967, 3962, 4639]. **Classes** [1424, 5042]. **Classical** [6306, 5009]. **Classification** [4564]. **classifier** [2835]. **Claude** [3180]. **Clean** [1374, 1387]. **Cleaning** [4834]. **Clenshaw** [4506, 1057]. **Cleve** [3481, 3651, 6013, 6014, 6345, 6346, 6347, 6590, 6591]. **Climate** [6566, 6708, 6352, 6485, 6585]. **Clipper**^{TM} [2385]. **Clock** [3825, 4163, 6066, 3358]. **clocked** [3192]. **Clockgating** [5553]. **Clocking** [875]. **Close** [6562, 7012, 6363]. **Closed** [2899, 2125, 5550]. **closest** [4666]. **Closing** [4937]. **Closure** [3967, 2560]. **Cloud** [6636]. **Clouds** [6629]. **CLP** [2914]. **CLT** [5579]. **Cluster** [7079, 2186, 5753, 2451]. **Clusters** [6229]. **cm** [5750]. **cmath** [6768]. **CMOS** [3711, 5666, 2329, 5691, 3054, 3728, 2665, 2337, 3868, 4175, 2876, 2877, 2878, 1834, 2894, 3082, 2384, 4042, 3102, 3103, 3630, 2251, 3486, 3490, 7089, 2980, 4918, 4102, 3819, 3820, 5788, 4124, 4462, 3354, 3355, 1794, 2490, 3206, 2840, 2841, 4140, 5116]. **CNC** [5797]. **CNIT** [7339]. **CNN** [7019, 6826, 7097]. **Co** [3717, 1577, 6160, 6589, 2438, 2004, 7102, 1944, 1945, 6041, 3855, 3859, 3421, 6010, 3010, 6984, 7296]. **Co-Design** [6589]. **co-designed** [6010]. **Co-optimization** [7102]. **Co-processeur** [2004]. **Co-Processor** [1577, 2438, 1944, 1945, 6041, 3859, 3421, 3010, 6984]. **Co-**

Transformation [6160]. **Co-Transformations** [3717, 3855]. **Coarse** [4569, 4466]. **Coarse-Grain** [4569, 4466]. **COBOL** [4214, 258]. **Cod** [7518, 7521]. **Code** [1364, 1806, 1575, 7125, 6505, 6052, 5701, 3990, 6678, 1407, 5728, 7487, 2551, 1872, 181, 1641, 3304, 5773, 1556, 5883, 718, 5389, 6504, 2058, 2523, 6070, 6284, 6692, 1620, 5850, 6585, 6364, 4142]. **codebreaker** [7512]. **Coded** [723, 6162, 1606, 1614, 5173, 1145, 3302, 1489, 5163, 4227]. **Coder** [3730, 3177, 3178, 3522, 3699]. **coders** [2376]. **Codes** [1366, 1572, 806, 1091, 196, 811, 812, 6781, 6782, 5588, 669, 6162, 6274, 6410, 1606, 4353, 176, 388, 1614, 1145, 583, 1449, 1911, 2140, 2142, 1919, 6031, 944, 1264, 5473, 2051, 229, 5305, 5306, 1415, 1416, 1523, 3122, 4237, 5186, 2429, 2264, 2584, 5356, 4481, 4482, 2633]. **Codesign** [7033, 6933, 6021]. **codesigned** [4872]. **codeword** [872]. **Coding** [172, 3868, 4369, 201, 6450, 6575, 6715, 6935, 5868, 187, 5104, 4298, 2058, 63, 64, 65, 66, 67, 68, 4873, 5035, 2928, 3781, 4072, 7401, 3005, 2307]. **Codings** [5178, 4974]. **Coefficient** [4477, 2057, 3288, 896, 3150, 2851]. **Coefficients** [3061, 1022, 4355, 2177, 5703, 3882, 4853, 7143, 4580, 2463, 1253]. **Cohesive** [1965]. **Coimbatore** [7559]. **COIN** [147]. **coins** [5]. **Collected** [7167, 7168, 7169, 7171, 7173, 7174, 3180]. **Collection** [5915]. **College** [7197, 7278, 7292, 3696]. **Collision** [5139, 6093]. **Colloquium** [7383, 7316]. **Colorado** [7455, 7528, 7327, 7224, 7505, 7231, 7400, 7434]. **Colossus** [1061]. **Colour** [3505, 3334]. **Columbia** [7380, 7554, 7373]. **Column** [4315, 3530, 4780]. **Combatting** [1430]. **Combination** [5128, 4725, 6489, 2723]. **Combinational** [857, 2986, 594, 6235, 2716, 5949]. **Combinatorial** [4269, 1350, 3424]. **Combinatoric** [741]. **combine** [2008]. **Combined** [4494, 4541, 3107, 3465, 5774, 6466, 4274, 4759, 3950, 3951, 5097, 5224, 5368, 5563, 6375, 4474, 5882, 4137, 3853, 5822, 5514, 4064, 4083]. **Combines** [999]. **Combining** [5477, 6451, 2955, 6963, 6848, 2363, 3791]. **combustion** [2849]. **Come** [60]. **Comeback** [6410]. **commands** [3071]. **Comment** [463, 4026, 6073, 3098, 3270, 647, 1248, 536, 658]. **Comments** [1006, 1013, 808, 5819, 1270, 671, 819, 823, 1979, 2911, 3292, 829, 440, 5852, 441, 979, 1149, 6946, 3804, 3665, 1770, 773, 1548, 930, 2471, 792, 214, 544]. **commerce** [3747]. **Commercial** [6172, 4268, 22, 520]. **commercially** [2807]. **committed** [5102]. **Committee** [6250, 6252, 6762, 6764, 6875, 6877, 7187, 6837, 6617, 6620, 6905, 539]. **Committees** [6246, 6647, 6648]. **Common** [2642, 561, 3893, 6118, 3676, 532, 786, 3421, 5326, 4411, 6473, 5383, 1784, 3429, 3957, 2844]. **commonmultiplicand** [6473, 5383]. **commonality** [3305]. **Communication** [5981, 7527, 7342, 4434, 5207, 2685, 2223, 4559, 4243, 4244, 4407, 4143, 4640, 4641]. **Communications** [7360, 7504, 4610, 2234, 7543]. **Community** [5843, 7498]. **Commutative** [3164]. **Como** [7273, 7437]. **Compact** [1070, 6977]. **Compaction** [5780]. **companies** [6453]. **Companion** [7589]. **Comparative** [3272, 6741, 3069, 2209]. **Comparator** [4494, 5137, 5361, 5097, 5219]. **Comparator/Selector** [4494]. **Compare** [5579, 5206]. **Compared** [3993, 344]. **Comparing** [3994, 3591, 3106, 6947, 3931, 5219, 5361]. **Comparison** [2037, 1482, 1483, 1087, 5899, 6156, 6895, 5278, 2523, 3427, 4016, 4183, 879, 966, 678, 1408, 6187, 5744, 3901, 891, 289, 831, 2947, 443, 5862, 182, 4081, 5345, 1440, 1660,

2275, 4445, 3519, 6737, 5359, 1553, 6786, 4175, 4831, 6909, 2887, 3070, 4841, 4853, 3763, 3446, 2226, 748, 1225, 3912, 2015, 5087, 2024, 541, 542]. **Comparisons** [4159]. **Compatible** [2911, 888, 1758, 6844, 1464, 5428, 2581, 2582, 2277, 5357]. **Compatibles** [773, 2295, 792]. **COMPCON** [7196, 7254, 7385]. **Compensated** [6919, 5011, 5159, 5323, 5324, 6778, 5012, 6077, 6418, 7035]. **Compensation** [1766, 2732, 6364, 2494]. **compensés** [5332]. **Competence** [488]. **Competes** [6160]. **Competition** [4316]. **competitive** [2920]. **Compilation** [6050, 3488, 4609, 4792, 5987]. **Compile** [5386, 147, 6624]. **Compile-Interpreter** [147]. **Compile-Time** [6624, 5386]. **Compiler** [6998, 3851, 3854, 5896, 5824, 5988, 6277, 2215, 1849, 4106, 2290, 187, 5100, 1191, 2331, 2658, 1496, 2523, 6692, 3447, 2425, 637, 4732, 2277, 4109, 2823, 2621]. **compiler-induced** [6692]. **Compilers** [7440, 3974, 7484, 6846, 6974, 6574]. **Compiling** [708]. **Complement** [1573, 726, 808, 1829, 176, 621, 879, 4194, 1218, 1874, 829, 6569, 5758, 1428, 912, 144, 915, 3811, 123, 4274, 1247, 5097, 5366, 4474, 1002, 4137, 4974, 4802, 3235, 2347, 3582, 3446, 1415, 1416, 4247, 2598, 5967, 789, 5380]. **Complementary** [631, 6634, 5250]. **complements** [5383]. **Complete** [5891, 1762, 3365, 3205, 134, 1469]. **Completely** [5037]. **Completes** [1786]. **Complex** [3539, 3716, 3971, 3717, 4655, 5470, 5671, 5672, 3041, 3224, 2866, 5817, 1013, 2053, 6157, 7130, 3863, 3058, 2875, 1276, 1506, 1596, 3736, 5500, 4690, 4836, 4837, 5286, 5287, 4018, 5510, 433, 1852, 6295, 3092, 3274, 5930, 1303, 2093, 2729, 2098, 3292, 2103, 1877, 1990, 6573, 4070, 3639, 4592, 1893, 5862, 3489, 368, 4265, 5959, 1332, 924, 5642, 2150, 3948, 6854, 1924, 2023, 6739, 3828, 1933, 3197, 5564, 6371, 5882, 6032, 3531, 273, 949, 5242, 6643, 3714, 3855, 4301, 1262, 5675, 6387, 5259, 7129, 4168, 382, 4176, 5593, 5501, 2356, 2692, 5505, 4839, 2214, 5007, 4701, 4853, 4202]. **complex** [5168, 4373, 6191, 6307, 6308, 1989, 1991, 1992, 2246, 2418, 2421, 2745, 5424, 1996, 2114, 2006, 4909, 5646, 2992, 1000, 1782, 5088, 3187, 188, 4456, 5107, 3959, 5574, 5656, 4944, 2625, 2838, 5381, 5119, 5168, 270]. **complex-arithmetic** [1996, 5107]. **Complex-Number** [3863, 3531]. **complexities** [1664]. **Complexity** [5807, 855, 4002, 5275, 4345, 4533, 5289, 5290, 6416, 5524, 6709, 3632, 5848, 4400, 4251, 3927, 2129, 5959, 4754, 5445, 5354, 3690, 5659, 2850, 5977, 863, 955, 2661, 4984, 4686, 3881, 4536, 5150, 5504, 4542, 2903, 4720, 3908, 4724, 5042, 2938, 5765, 2432, 834, 3664, 1443, 3930, 1908, 4755, 4915, 5077, 4930, 7205, 5460, 5567, 3962, 3963, 4945, 3026]. **Compliance** [7082, 4087, 5799, 7117, 5331, 3936, 3937]. **Compliant** [6383, 3578, 3744, 3650, 4278, 5104, 4519, 4184, 4563, 4253, 3316, 3941]. **complying** [3846]. **Component** [5750, 5648, 716, 795, 576]. **Component-wise** [716, 795]. **Components** [505, 1518, 4553, 1245, 5778, 5221, 5232]. **Componentwise** [5930]. **Composite** [432, 6179, 3764, 4440, 5794, 4254, 3664, 4088, 4748]. **Composite-Field** [6179]. **Composition** [5333, 3152, 3153]. **Compostela** [7481]. **Compound** [1859, 1441]. **Comprehensive** [5898]. **Compressed** [6008]. **Compression** [4315, 612, 6525, 5831, 5315, 7062, 5187, 5630, 3678, 6367, 1801, 6509, 3330, 3700, 3530]. **Compression/Decompression** [3678]. **Compressor** [5483, 5398, 2763]. **Compressors** [2059, 1282, 6287, 6113]. **Comprising** [5766]. **COMPSAC** [7210]. **Comput** [1484, 1296]. **Computable**

[4977, 4603, 5158, 4580, 3311]. **Computation** [7219, 4496, 7369, 7164, 3853, 4969, 805, 2651, 6258, 7004, 153, 1812, 861, 1015, 1095, 5480, 1718, 1815, 1267, 1268, 1377, 7541, 3407, 668, 2339, 4165, 6668, 5489, 5986, 615, 1104, 332, 6518, 4816, 1390, 4005, 156, 4345, 4531, 4533, 961, 5148, 6280, 4009, 3740, 4349, 1601, 7133, 2215, 6530, 3430, 4187, 385, 554, 6071, 1285, 7414, 1289, 1742, 6181, 7137, 3087, 5520, 4034, 5523, 4363, 6083, 2383, 4040, 4560, 1132, 1412, 2545, 5742, 3453, 4053, 2237, 4864, 4865, 5416, 3770, 7332, 3775, 1873, 2735, 141, 160, 161, 180, 5536, 5845, 2741, 1989, 2929, 975, 7242, 1311]. **Computation** [7399, 5758, 904, 6448, 5855, 524, 2940, 2941, 143, 1050, 759, 2566, 6108, 3142, 6589, 449, 4894, 1902, 1534, 1327, 4433, 4607, 4907, 7179, 7180, 2278, 7231, 5445, 586, 651, 7233, 5964, 186, 3939, 842, 1684, 1916, 7490, 999, 410, 790, 3001, 713, 844, 5649, 2816, 1073, 214, 7450, 3837, 5568, 1351, 5106, 6637, 413, 7580, 216, 5974, 4144, 7121, 6242, 3040, 4504, 5816, 5892, 3227, 4975, 1813, 3980, 2191, 1017, 1194, 7214, 3864, 2340, 3865, 4672, 4168, 6670, 1963, 3242, 3422, 6792, 4686, 4827, 4179, 3882, 2359, 76, 5150, 5504, 4019, 2366, 7250, 251, 7373, 4704, 1209]. **computation** [1284, 1210, 100, 1745, 1300, 827, 1216, 5931, 6003, 2548, 7275, 2100, 2736, 5610, 4390, 7362, 6574, 5048, 1639, 6343, 365, 1897, 5065, 2121, 7217, 4422, 987, 1328, 4750, 1536, 4611, 3163, 1242, 1334, 5966, 211, 3340, 2290, 2292, 5089, 5090, 4451, 4452, 4627, 131, 5560, 5102, 2829, 2482, 3200, 6033, 1472, 1473, 543, 2627, 545, 1938, 2641, 2656, 1628, 2573, 7552, 7353, 1795, 996]. **Computational** [7380, 7426, 7451, 6485, 855, 807, 3569, 3414, 4828, 5290, 3079, 390, 2394, 5532, 5314, 3632, 1143, 834, 1656, 2968, 1539, 4920, 3690, 7552, 5974, 7127, 3862, 1501, 4332, 4687, 4699, 3590, 7373, 2916, 576, 7205, 7405, 7605]. **Computationally** [3632, 3194]. **Computations** [3539, 4495, 3225, 5131, 6050, 5395, 3567, 3734, 873, 1026, 1029, 4193, 4547, 5721, 6544, 1133, 1413, 3613, 4562, 3904, 5842, 6005, 3777, 895, 1045, 6711, 905, 1431, 6588, 7262, 5548, 5780, 2979, 4910, 6024, 2146, 4622, 5086, 6610, 5365, 849, 1349, 3374, 4296, 5471, 4662, 5901, 6161, 6794, 2068, 3885, 2694, 3745, 3891, 7398, 3909, 5847, 4231, 1141, 635, 5182, 5944, 757, 5341, 5342, 5426, 5547, 7232, 4917, 3945, 5217, 2625]. **Compute** [5897, 6388, 6540, 2989, 5998, 6955, 1908, 4270, 2806, 2988, 3182]. **Compute-Bound** [2989, 2806, 2988]. **Computed** [2812, 2270]. **Computer** [7218, 7170, 7176, 7183, 7185, 7186, 7190, 1564, 720, 1008, 7219, 7393, 1010, 7220, 2641, 7339, 3715, 3852, 5248, 5249, 5469, 5667, 5811, 3554, 1363, 327, 7271, 7340, 722, 854, 1189, 1365, 4658, 7481, 2647, 7539, 607, 6261, 6775, 5135, 3052, 7560, 3981, 5685, 7561, 5687, 6506, 7258, 246, 3985, 7455, 7596, 1195, 7370, 248, 7195, 1722, 7527, 7603, 7428, 4337, 7272, 2889, 873, 874, 1026, 1115, 2362, 7302, 136, 174, 4538, 467, 282, 510, 430, 1029, 338, 965, 1126, 7238, 5513, 1516, 2534, 2706, 2707, 3594, 4544, 4707, 5836, 62, 676, 556, 1129, 4708]. **Computer** [390, 1211, 1290, 3891, 253, 6180, 6290, 5015, 1130, 1744, 2539, 3601, 4549, 339, 470, 471, 7315, 7396, 7468, 7585, 436, 6301, 4369, 2388, 1302, 2087, 518, 1217, 7259, 1860, 1982, 7563, 7187, 7196, 7197, 7201, 7207, 7211, 7228, 7240, 7241, 7254, 7266, 7287, 7306, 7318, 7341, 7343, 7386, 7418, 7456, 7458, 7469, 7500, 7503, 7514, 7518, 7544, 7566, 7574, 7575, 7587, 7607, 7609, 7611, 4213, 7273, 344, 6819, 71, 1135, 2237, 4377, 7275, 7332, 2553, 892, 3461, 7389,

567, 141, 160, 161, 180, 3117, 4060, 7433, 4061, 4230, 4567, 7334, 7548, 5537, 286, 899, 975, 1426, 1993, 4572, 5420, 5938, 2744]. **Computer** [3780, 7408, 5038, 1637, 4396, 1313, 2426, 1428, 570, 3470, 3638, 7549, 4587, 2944, 5541, 1762, 1642, 4735, 5544, 447, 4249, 318, 162, 5622, 266, 7521, 7595, 6209, 6945, 5427, 2001, 3653, 4251, 2769, 7591, 643, 7257, 2774, 2963, 6018, 479, 5197, 6953, 2125, 3322, 1440, 2578, 4259, 5629, 121, 7319, 7558, 989, 7378, 129, 3495, 6599, 1673, 1061, 583, 921, 1675, 1240, 6601, 6129, 1913, 6603, 1164, 7295, 3506, 1455, 5082, 2147, 7584, 487, 1917, 1685, 588, 928, 7507, 7425, 1458, 47, 1071, 272, 6975, 7204, 1344, 7321, 7322, 3189, 7365, 7366, 7592, 7593, 7594]. **Computer** [7602, 7112, 2475, 591, 7600, 592, 7205, 941, 1075, 1174, 2160, 7323, 1350, 7508, 3018, 6138, 97, 151, 1559, 718, 5884, 5885, 6479, 494, 602, 1800, 3214, 7020, 552, 1353, 1469, 7538, 98, 3543, 297, 605, 1090, 1190, 2648, 606, 548, 4512, 1016, 6266, 956, 1500, 7512, 960, 1508, 1598, 1731, 1395, 4352, 1030, 1840, 283, 2374, 284, 2380, 3763, 517, 2229, 3620, 2550, 259, 285, 1047, 7460, 3788, 4882, 5767, 354, 576, 696, 2569, 4411, 5428, 2960, 3666, 146, 183, 206, 2585, 1536, 993, 772, 710, 2804, 5647, 6736, 1689, 7403, 2815, 3002, 3003, 4928, 936, 1340, 456]. **computer** [147, 2820, 2622, 2627, 1561, 798, 3381, 1007, 1008, 5820, 498, 3595, 2082, 7335, 1539, 1001, 934, 4151, 4152, 4675, 1672]. **Computer-Aided** [7386, 7456, 7503, 7403]. **Computer-Arithmetik** [1007, 1008]. **Computer-Oriented** [7219]. **Computers** [7509, 135, 7166, 7177, 217, 7270, 7480, 7525, 1572, 1370, 1491, 6501, 5690, 1499, 6513, 1380, 7283, 7301, 7312, 7413, 6527, 2891, 7407, 5510, 4843, 7492, 227, 228, 1287, 6536, 435, 200, 625, 119, 139, 7266, 7287, 7318, 7343, 7360, 7418, 7500, 7255, 6195, 6313, 1423, 4568, 289, 181, 5541, 7422, 7435, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 182, 915, 480, 5433, 7182, 7202, 7230, 122, 123, 530, 1165, 7350, 7391, 1687, 2021, 2022, 7173, 167, 1562, 1805, 6514, 4681, 1508, 249, 732, 5007, 226, 1844, 679, 2381, 1409, 7469, 312, 521, 1141, 3912, 5331, 234, 316, 3151]. **computers** [704, 705, 770, 991, 1236, 7233, 1922, 4282, 80, 3246, 2013]. **Computes** [4069, 1646]. **Computing** [7199, 7411, 7524, 7537, 7554, 7559, 6377, 75, 4788, 218, 7246, 3715, 6486, 6761, 7497, 7271, 45, 7340, 7382, 4505, 6386, 1491, 3723, 6498, 6500, 6048, 105, 1497, 6893, 7512, 5906, 6517, 1827, 6903, 7428, 7562, 4338, 4345, 7484, 3072, 6412, 7372, 2072, 5714, 1841, 5512, 5837, 112, 3750, 2377, 5925, 6079, 340, 341, 342, 6421, 86, 3607, 6810, 6185, 518, 7374, 7442, 7543, 7604, 4212, 7583, 3283, 3285, 5746, 6306, 7586, 4224, 6314, 5318, 5319, 5611, 3631, 7459, 5851, 7145, 6202, 1882, 6331, 1887, 7549, 4587, 3471, 353, 94, 5052, 1434, 5619, 3134, 7261, 693, 694, 761]. **Computing** [5059, 7294, 7550, 366, 6115, 6721, 7080, 3315, 4084, 5954, 6020, 5627, 4424, 6596, 6958, 5434, 3932, 7402, 7409, 7423, 7476, 7535, 7551, 2276, 2978, 1670, 2279, 6601, 5554, 5634, 239, 5641, 2286, 6967, 3682, 1456, 7364, 3828, 4127, 4458, 6135, 2029, 6367, 2303, 190, 6980, 243, 6748, 6864, 5385, 5663, 5908, 7020, 7355, 7393, 7538, 7237, 6489, 4154, 6044, 6260, 58, 1585, 3236, 4523, 4679, 5919, 2213, 2892, 7249, 3257, 387, 4703, 620, 92, 63, 64, 65, 66, 67, 68, 5999, 6076, 4032, 7529, 4202, 4043, 6308, 3116, 5176, 7460, 7057, 4397, 831, 5857, 2952, 7172]. **computing** [695, 364, 4250, 6016, 480, 5778, 1669, 2137, 4617, 3512, 2472, 5362, 5363, 85, 2487, 3959, 3204, 6863, 6984, 274].

Cómputo [4600]. **con** [4600]. **Concept** [2501, 1353, 5834, 2380]. **Conception** [2563]. **Concepts** [3087, 2403, 4824, 1501, 2549, 5081]. **Concerning** [979]. **Concise** [6584, 7080, 6363]. **Concordia** [7203]. **Concurrent** [5474, 1842, 6177, 5727, 2429, 5950, 6348, 1665, 5959, 1853, 1472, 1473]. **Condition** [3790, 4002, 1739, 1038, 4486]. **Conditional** [6402, 1394, 744, 6717, 3488, 213, 5230, 548]. **Conditional-Sum** [744]. **Conditioned** [2803, 2147, 4562, 192, 193]. **Conditions** [1281, 1034, 4062, 1676, 4513, 1127, 6754]. **conducted** [7209]. **Conference** [7199, 7212, 7280, 7281, 7298, 7309, 7440, 7495, 7509, 7524, 7599, 7176, 7183, 7185, 7186, 7190, 7326, 7338, 7184, 7220, 7246, 7311, 7356, 7412, 7441, 7480, 7496, 7525, 7526, 7540, 7406, 7560, 7395, 7453, 7454, 7258, 7214, 7588, 7371, 7384, 7571, 7283, 7301, 7312, 7413, 7482, 7357, 7562, 7483, 7528, 7372, 4835, 7221, 7284, 7407, 7249, 7492, 2377, 7601, 7608, 7610, 7285, 7429, 7416, 7563, 7303, 7196, 7207, 7222, 7239, 7253, 7254, 7260, 7265, 7266, 7286, 7287, 7306, 7318, 7329, 7331, 7342, 7343, 7344, 7359, 7360, 7374, 7386, 7397, 7418, 7419, 7430, 7431, 7442, 7443, 7444, 7456, 7458, 7469, 7472, 7485, 7486]. **Conference** [7500, 7501, 7502, 7504, 7515, 7517, 7531, 7543, 7544, 7546, 7556, 7564, 7565, 7566, 7574, 7575, 7576, 7577, 7604, 7289, 7583, 7274, 7208, 7586, 7346, 7347, 7332, 7255, 7605, 7290, 7376, 7277, 7400, 7278, 7292, 7422, 7435, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 7261, 7533, 7293, 7243, 7244, 7256, 7267, 7534, 7550, 7377, 7257, 7245, 7231, 7579, 7477, 7570, 7438, 588, 7552, 7364, 7350, 7391, 7235, 7448, 7449, 6615, 7464, 7522, 7410, 7296, 7324, 7352, 7523, 7479, 7264, 7367, 7508, 7236, 7269, 7308, 7379, 7404, 7439, 7606, 7194, 7213, 7210, 7272, 7250, 4843, 7252, 7417, 7516, 7542, 7567]. **conference** [7607, 7609, 5604, 7549, 7401, 7447, 7403, 7263, 7297, 7325, 7218, 7170, 7407, 7422, 7435, 7446, 7557, 7569, 7598]. **Confidence** [6853]. **Configurability** [6892]. **Configurable** [7001, 4731, 6961, 4609, 6962, 6856, 6240, 6997, 5491, 4240, 5198, 3959]. **configurations** [4520]. **Conformance** [3038, 5388]. **Conforming** [5374]. **conforms** [4253]. **CoNGA** [7608, 7610, 7599]. **CoNGA'19** [7601]. **Congress** [7559, 7369, 7427, 7467, 7191, 7573, 7225, 7473, 7189, 7378, 7233, 7178, 7188, 7499]. **conjecture** [4817]. **Conjugate** [6914, 5632, 5359, 5192, 4749, 4117, 4118]. **conjugate-pair-moduli** [4118]. **conjunction** [7243, 7256]. **connect** [3323]. **Connected** [3412, 1668, 2499]. **connection** [674, 2658, 2772]. **Connectionist** [3240]. **connectivity** [7444]. **Conquer** [3544, 6082, 4441, 2812, 4098]. **Consecutive** [438]. **Consequences** [892]. **Conservative** [5312]. **Consideration** [1568, 5327, 1060]. **Considerations** [6503, 2532, 1621, 1986, 2435, 4946]. **considered** [5325]. **Considering** [2968]. **Consistencies** [3994]. **Consistent** [6906, 6907, 5835]. **Consisting** [1225]. **Constant** [6143, 6484, 7128, 5701, 5281, 2713, 5307, 4062, 5848, 6196, 6316, 6441, 1881, 3136, 4895, 5064, 3171, 2816, 2836, 4942, 4477, 6523, 4665, 5394, 7010, 7011, 4670, 3739, 7034, 2749, 6211, 6455, 5375, 2821]. **Constant-Current** [2713]. **constant-factor-redundant-CORDIC** [2749]. **Constant-Time** [6143, 7128]. **Constants** [1952, 2657, 4979, 5392, 5399, 5695, 4026, 6550, 3161, 6235, 6369, 3534, 5827, 4806, 7040, 5741, 460, 5826]. **Constrained** [7000, 4203, 689, 5652, 5798]. **Constraint** [5891, 5991, 6148, 4644, 4784]. **Con-**

straints [4958, 5246, 634, 4410, 5130, 4785]. **constructed** [1264]. **Constructing** [5698, 2937, 7064, 4930]. **construction** [2903, 4379, 2757, 4614, 3938]. **Constructions** [4534]. **constructive** [4976, 2558, 4580, 3195]. **Constructively** [2283]. **Consumption** [4503, 3054]. **Contained** [614, 500]. **Containment** [5205]. **Contents** [6654, 6765, 6878, 6253, 6621]. **Context** [6395, 5442, 6128, 7116, 6385]. **Context-enriched** [6395]. **Context-Free** [5442]. **Contiguous** [2453]. **Continental** [7265]. **Continued** [26, 677, 6074, 311, 3773, 1876, 6098, 4401, 442, 573, 1685, 3517, 240, 241, 271, 941, 1075, 1174, 1828, 5413, 5550, 772, 211, 5460, 2622]. **Continued-Fraction** [3517, 271]. **continues** [5413]. **Continuing** [6945]. **continuity** [6608]. **Continuous** [624, 6123, 251, 1868, 4616, 7171]. **Continuous-Digit** [6123]. **Continuum** [7465]. **contrôle** [3157]. **Contractivity** [4552]. **Contras** [5579]. **Contribution** [3371, 5604, 801]. **Contributions** [1727, 1962, 965, 6072, 5868, 990, 2585, 7323]. **Control** [3995, 6682, 3258, 112, 1520, 7503, 3283, 2090, 6560, 6706, 3315, 2968, 51, 5784, 6604, 269, 590, 329, 5473, 423, 5918, 7444, 2928, 364, 1770, 1454, 3347, 3005, 4771, 1463, 1550, 4134, 4288, 1252, 2162, 5376, 414, 545, 1037, 293, 592]. **Controlled** [57, 1481, 6244, 381, 1387, 1591, 4988, 3748, 69, 1437, 4679, 1521, 889, 1879, 4422, 3195, 3015, 2849]. **Controlled-Precision** [1591]. **Controller** [6057, 2968, 1347, 5111, 4949]. **Controllers** [5950, 6623, 3336, 4946]. **Controlling** [2987, 4346]. **Controversial** [6014]. **Convention** [7310, 7524, 7599, 7397, 7485, 7567]. **Conventional** [2418, 2071]. **conventions** [697]. **Convergence** [1568, 6885, 964, 306, 3609, 2722, 5419, 5754, 1184, 3261, 5020, 5302, 4906, 998, 2285, 3516, 2620]. **Convergent** [2177, 3683, 3640]. **convergents** [5413]. **Converging** [3452, 2394, 3511]. **Conversation** [3843]. **Conversion** [2635, 2862, 1364, 859, 3978, 5984, 1958, 5697, 3990, 222, 224, 279, 5282, 885, 1406, 4856, 3755, 86, 1293, 1618, 4050, 202, 347, 5175, 4062, 5939, 260, 685, 261, 6940, 445, 475, 577, 359, 5066, 644, 1906, 647, 2787, 208, 1449, 267, 486, 1166, 933, 189, 538, 1699, 2485, 658, 3844, 598, 601, 802, 5386, 6376, 6480, 1711, 6041, 951, 3226, 3727, 5902, 960, 2071, 2075, 2536, 1035, 1292, 2720, 2230, 2732, 2739, 5940, 2931, 402, 3920, 5625, 5203, 4623, 4925, 5791, 3360, 3361, 2846, 3211, 1976, 2003]. **Conversions** [173, 6408, 505, 2531, 631, 2606, 476, 3326, 3327, 4469]. **Converter** [6046, 3977, 5486, 5823, 155, 5173, 3350, 4130, 4145, 4645, 1714, 1371, 4669, 4810, 5487, 3997, 4677, 4855, 4232, 5853, 690, 4918, 3946, 1688, 3698, 4462, 3211, 2854]. **Converters** [4195, 5310, 906, 5335, 5190, 6738, 3890, 2733, 4256, 4269]. **Converting** [1769, 2588, 2196, 3756, 566, 4917]. **convertor** [2855]. **convertors** [3004]. **converts** [1710, 3390, 1655]. **Convex** [3557, 4011, 2937, 3285, 2398]. **conveyors** [3906, 3468]. **Convolution** [5074, 3160, 2140, 3046, 3047, 2658, 3328, 3329]. **Convolution-Type** [2140]. **Convolutional** [6404, 6416, 6564, 6565, 6928, 6318]. **Convolver** [2161]. **Convolvers** [3063, 1656, 2346, 4601, 2470]. **Cook** [5255, 5660]. **COOL** [7582]. **Cooley** [6662]. **Coonen** [7046]. **cooperation** [7339]. **Coordinate** [4423, 5415, 365]. **Coordinates** [4599, 4209]. **Copley** [7344]. **Coprime** [6537]. **coprocesseur** [2806]. **coprocessing** [2368]. **Coprocessor** [4499, 3397, 6499, 5905, 2062, 2519, 2520, 2221, 2222, 2714, 3606, 1619, 4374, 5752, 2555, 3119, 1999, 1896, 2120,

2262, 2442, 2443, 2450, 7084, 2004, 2280, 2282, 3509, 2989, 1787, 1798, 1717, 1957, 1723, 2686, 2530, 2724, 2227, 2090, 2740, 5947, 2117, 1895, 2444, 2448, 3152, 3153, 6124, 2274, 2593, 2594, 2805, 2806, 2988, 4284, 2157, 2032, 2166, 2849, 3917]. **Coprocessors** [2505, 1608, 2579, 2295, 2697, 2533, 2750, 3508]. **Coprozessoren** [3119, 3119]. **Copyright** [6649, 6874, 6247, 6759, 6614]. **Coq** [5132, 5477, 5682, 6261, 6206, 7068]. **CORDIC** [2573, 3091, 1709, 3391, 3970, 4153, 4964, 2056, 2201, 1964, 173, 3074, 3585, 6176, 5719, 3261, 1294, 3092, 3265, 4040, 4861, 2721, 2387, 2722, 3100, 5751, 3120, 3779, 5038, 2423, 2749, 4070, 2428, 3478, 1898, 2983, 5786, 6029, 2816, 3011, 5568, 5880, 1700, 190, 3538, 2351, 2688, 2547, 3134, 2163]. **CORDIC-Algorithmen** [2573]. **CORDIC-Based** [5038, 2983]. **Core** [4956, 6045, 5154, 6556, 6937, 6938, 6939, 6722, 5963, 6229, 6607, 6625, 6856, 7113, 6978, 6864, 5245, 3727, 4668, 6054, 6921, 5923, 2375, 2709, 4057, 6585, 2458, 5785, 6748, 7161, 6969]. **CORE-MATH** [7161, 6969]. **Cores** [6771, 6887, 6497, 5118, 6803, 6420, 7163, 5591, 5591]. **Core**^{TM} [5533]. **Corfu** [7552]. **Cork** [7568]. **Cornea** [6190, 6115]. **Corner** [7368, 3724, 3481, 3651, 6345, 6346, 6347, 6590, 6591, 6013, 6014]. **Corners** [6609, 3191]. **Corporation** [1037, 1567, 696]. **Correct** [5480, 6388, 5260, 815, 6399, 4684, 5006, 556, 349, 439, 4398, 4729, 3495, 7348, 6228, 1776, 323, 5576, 6144, 6260, 5292, 5421, 5944, 7149, 5868, 2270, 5121, 4821, 5421]. **Correcting** [725, 196, 812, 1614, 1145, 583, 4663, 2417, 2854, 2855]. **Correction** [1566, 1713, 806, 608, 5476, 670, 6164, 508, 1415, 743, 1872, 1754, 894, 901, 6823, 4393, 572, 3636, 702, 1674, 1334, 2142, 3171, 2609, 6234, 3198, 4942, 541, 4291, 797, 3068, 1278, 3626, 2928, 3122, 4065, 4072, 688, 3151, 1785, 2608, 3005, 4482]. **Corrections** [4171, 1174, 6860, 749]. **Correctly** [5391, 6660, 6777, 4806, 4979, 5392, 5686, 6265, 7126, 4340, 4341, 5293, 2531, 6685, 4856, 3755, 6432, 5536, 5845, 4392, 6325, 3783, 4235, 6200, 6327, 3170, 2856, 5978, 6888, 4805, 7010, 7011, 7012, 4817, 4992, 6183, 7043, 7044, 7141, 7142, 2094, 5610, 5611, 3915, 6827, 6934, 4929, 4822, 5276]. **Correctly-Rounded** [6660, 6265, 5536, 7126, 6888, 7010, 7011, 7012, 7043, 7044, 7141, 7142, 5610, 4929]. **Correctly-Rounding** [4856]. **Correctness** [3871, 3998, 1507, 3248, 7053, 4251, 3811, 3247, 3423, 1299, 5613, 6326, 6445, 707, 4100]. **correlated** [760]. **correlation** [2905]. **Correlator** [220, 2338, 2512]. **Correspondence** [382, 3073, 626, 585]. **Corrigenda** [3216]. **Corrigendum** [2706, 1296, 2092, 2260, 2023]. **Corum** [7441]. **Cos** [1766, 2235, 537]. **cosimulation** [5198]. **cosin** [2124]. **Cosine** [4040, 2124, 1069, 2816, 2612, 242, 953, 4020, 4350, 1854, 3272, 3284, 4732, 4255, 4270, 3209, 3210]. **Cosines** [52, 1399]. **Cost** [1366, 1806, 6771, 4165, 4169, 6060, 5280, 4191, 3761, 5734, 5840, 4048, 4864, 6564, 5950, 7075, 6839, 2979, 5631, 655, 6736, 6133, 6626, 944, 6747, 7126, 6912, 1403, 5733, 4863, 2264, 2584, 2138, 3504, 2805, 1067]. **cost-effective** [4863, 2584, 2805]. **Cost-Efficient** [6564]. **Cost/performance** [4169, 4048]. **Costs** [3978, 6139, 1484]. **COSY** [5076]. **Cotes** [5293]. **Cotransformation** [6657, 4501]. **Could** [6530, 3747, 6485]. **Count** [1041, 5126, 1137, 6457, 6593, 2, 6855]. **Counter** [1372, 5412, 3825, 5496, 2763, 320, 6177]. **Counters** [3493, 2130, 5113, 4721, 2836]. **Counting** [3967, 5496, 5380]. **countries** [7378]. **Country** [7329]. **course** [369, 1159,

4435, 488]. **Court** [7436]. **Covariance** [4871, 1241]. **cover** [6249, 6760]. **Coverage** [6383, 6284]. **Cox** [3714, 4226]. **Cox-Rower** [4226]. **CPFloat** [7029]. **CPU** [5666, 1291, 2227, 2241, 3933, 6844, 4125, 4937, 6140]. **CPUs** [6532, 4938]. **CR** [5978, 4992, 5193]. **CR-LIBM** [4992, 5193, 5978]. **Cray** [7313, 2425, 2180, 3398, 2548, 2553, 2460, 1164, 2015]. **Cray-1** [1164]. **Cray-2** [2180, 2015]. **Cray-4** [3398]. **CRC** [6177]. **CRC-Based** [6177]. **CRD** [1369]. **Creating** [6536, 3754, 3280]. **Creation** [5992]. **Credible** [3471]. **Creek** [7544, 7566]. **crisis** [6736, 3842]. **Criteria** [1055]. **Criterion** [334, 428, 416, 426, 5967]. **Critical** [6383, 3017, 6991, 4712, 4261]. **Critique** [419]. **crlibm** [4820]. **CRNS** [5889]. **cross** [6680, 3447]. **cross-compiler** [3447]. **CRT** [4649, 3997, 4677]. **CRT-based** [4677]. **Crunch** [1257]. **Cruncher** [1213]. **crunching** [1189]. **Cryptanalysis** [4643]. **Crypto** [3271]. **CryptoChip** [3271]. **Cryptographic** [6149, 4661, 7128, 6518, 5161, 4363, 5212, 5213, 4904]. **Cryptography** [5465, 4657, 6045, 6773, 6503, 6526, 5598, 6533, 6428, 5180, 4916, 5874, 3179, 6983, 5889, 6787, 4190, 1908, 2977]. **cryptoprotocols** [1908]. **Cryptosystem** [4135, 3006]. **Cryptosystems** [5664, 4203, 4566, 3118, 6338, 4423, 6221]. **Crystal** [3657]. **CS2** [2574]. **CSD** [3245]. **CSI** [7328, 3600]. **CSI/IEEE** [7328]. **c't** [2082]. **c't-KAT-Ce.** [2082]. **Cube** [6435, 49, 2127, 5435, 6638, 799, 1497, 1445, 3935]. **Cubic** [6067, 6868]. **Cubiche** [3935]. **CUDA** [6543, 5936, 5357, 7108]. **CUDA-Accelerated** [7108]. **CUG247** [2289]. **Cultural** [2951]. **Cumberland** [7484]. **Cumulative** [1882]. **Currency** [3742, 3884, 4012, 4415]. **Current** [6147, 5503, 2713, 5763, 3293, 3906, 3912, 3468, 2947, 3665, 6139]. **current-mode** [3293, 3665]. **curriculum** [576]. **Curve** [5465, 5664, 4295, 5810, 4299, 4657, 6533, 4557, 5180, 4412, 4597, 4738, 4423, 4599, 4916, 373, 5250, 7012, 4209, 7144, 2119, 6221]. **Curve-Based** [5180]. **Curve-Fitting** [373]. **Curve25519** [6728]. **Curves** [5387, 5128, 5678, 5405, 5830, 4354, 4362, 4382, 5852, 3138, 4426, 4427, 4603, 3931, 1916, 3823, 4485, 3867, 6787, 6401, 6409, 4540, 6460]. **curvilinear** [3700]. **Custom** [7497, 7382, 6781, 6782, 6678, 1965, 5000, 1849, 4038, 7329, 7344, 6333, 7402, 7409, 7423, 7476, 7535, 7551, 6624, 4538, 2906, 1869, 3512]. **custom-designed** [1869]. **Custom-Precision** [6781, 6782, 6678, 6624]. **Customer** [2827]. **customers** [3389]. **Customisation** [4539]. **Customizable** [6483]. **Customized** [6531, 6689, 6722, 3351]. **Customizing** [5002, 6937, 3503]. **Cuts** [2093]. **Cutting** [6609, 3191]. **CVA6** [6937]. **CVAX** [2257]. **CX** [2518]. **CX-83S87** [2518]. **CXgen** [2680]. **Cycle** [3053, 6589, 988, 1156, 3045, 745]. **Cycle-Accurate** [6589]. **Cycles** [507, 1489, 3442, 3299, 900, 976, 2010, 3015]. **Cyclic** [4353, 5074, 2140, 1004]. **Cylindrical** [5220]. **Cyprus** [7431]. **Czech** [7415, 7532, 7564].

D [3398, 5686, 4999, 4188, 3890, 4043, 4212, 4048, 3290, 5535, 5038, 906, 4883, 5624, 6836, 3689, 3350, 3520, 7111, 6233, 4127, 4130, 4462, 6629, 5106, 3368, 2169, 4947, 4948, 4950, 802]. **D-cache** [3398]. **D-konverter** [3350]. **D-LNS** [4950]. **D.** [742]. **D/A** [906]. **D2.50** [6554]. **Dadda** [5887]. **DAG** [6968, 7101]. **Dagstuhl** [7492, 7555]. **d'algorithmes** [4318]. **Dallas**

[7201, 7333, 7293, 7256]. **Dangerous** [4279]. **Dangers** [3723]. **DAP** [1765]. **Darcy** [4247]. **Dark** [6789, 7020]. **d'arrondi** [990]. **Darstellung** [2615]. **Data** [3038, 5388, 6756, 6243, 6483, 5583, 1376, 5483, 866, 5279, 6525, 5831, 1617, 3087, 6538, 1037, 971, 6426, 5532, 3774, 6929, 893, 2103, 7056, 5327, 5187, 3642, 7278, 1316, 983, 145, 1324, 6958, 6844, 2459, 7104, 592, 1468, 6367, 5104, 6631, 5571, 4472, 5108, 3366, 4651, 1805, 48, 2504, 6260, 2662, 6509, 2671, 3988, 4346, 4535, 5920, 1510, 4849, 2898, 3084, 682, 5333, 5334, 1761, 4405, 4884, 2762, 4595, 4596, 5428, 3797, 1321, 1326, 3330, 2005, 1330, 3347, 2292, 2619, 3700, 1348, 2166, 2688, 293]. **Data-Dependent** [3774]. **Data-Driven** [1376]. **data-objects** [4595, 4596]. **Data-Parallel** [3366]. **data-paths** [4535]. **DataBase** [2827]. **Dataflow** [2040, 4028, 7102, 6984]. **Datapath** [4647, 4323, 4807, 6896, 4553, 2946, 5577, 2326, 2188, 3986, 4516, 4928]. **datapaths** [3753]. **Datatron** [110]. **Datatype** [6544]. **Datatypes** [6659]. **Datenformate** [2103]. **David** [3714]. **Dawn** [5015]. **DBM** [5695]. **DBNS** [3579, 4182, 4053, 5965, 5791]. **DC** [7246, 1151, 7324, 3071]. **DCIS** [7441]. **DCT** [4187, 5311, 5106, 4777, 4484, 3538]. **DCT/IDCT** [3538]. **DDA** [1149, 970]. **DDC** [1687]. **DDFUN90** [4967]. **de-normalized** [4570]. **dead** [3947]. **Deadly** [6452]. **Dealing** [53]. **Debate** [6182]. **Debugging** [6994, 6670, 6269, 682, 4587]. **December** [7310, 7559, 7496, 7511, 7562, 7563, 7486, 7504, 7224, 7421, 7534, 7268]. **Decidability** [5139]. **Deciding** [5839]. **Decimal** [5246, 2039, 5127, 2862, 5814, 5131, 2049, 2652, 6388, 5984, 6156, 2872, 2873, 811, 812, 170, 4326, 32, 5694, 6510, 5137, 612, 866, 5486, 5823, 1383, 1387, 1591, 5140, 5272, 5494, 5495, 155, 4330, 4331, 4524, 4680, 4681, 4989, 6055, 6897, 6898, 6899, 6900, 6901, 6902, 198, 224, 6162, 6274, 5274, 173, 3739, 5283, 502, 4537, 4693, 5001, 5288, 5408, 5506, 5507, 5596, 673, 675, 6175, 2531, 5409, 5924, 5515, 6073, 2537, 1406, 4856, 5926, 3755, 86, 5522, 1292, 1293, 1976, 3898, 5165, 5170, 5310, 5528, 1304, 2231, 4050, 5173, 5751, 1631, 4869, 5030, 5032, 260, 1145, 261]. **Decimal** [94, 403, 6589, 115, 5196, 2966, 2787, 994, 267, 1540, 5872, 842, 1165, 1684, 486, 4921, 5083, 5556, 269, 166, 2606, 534, 5100, 5101, 189, 5370, 5371, 5563, 5793, 3527, 5230, 5373, 5568, 5569, 5653, 5880, 6372, 6859, 6375, 3365, 4943, 5110, 5377, 5378, 5572, 5573, 134, 3844, 5239, 1079, 5467, 6489, 1805, 5585, 5398, 5487, 465, 2705, 5997, 5514, 1291, 5726, 5169, 5171, 5527, 5530, 566, 2239, 2240, 4868, 5333, 5334, 402, 354, 6343, 1160, 1063, 5640, 781, 653, 6972, 5560, 5651, 4934, 7156, 5654, 5795, 2488, 5379, 5657]. **Decimal-Based** [5924, 5793, 5409, 5370, 5371]. **Decimal-Binary** [173, 2531]. **Decimal-Floating-Point** [5165]. **decimal-point** [781]. **Decimal-to-Binary** [155, 4856, 267, 1292, 1293, 402]. **Decimal/Hexadecimal** [2606]. **decimal64** [5771, 5899, 5546, 5422, 5185]. **Décimales** [1160]. **Decimals** [619, 43, 5312, 5538, 268, 1694]. **decimation** [3273]. **decimation-in-time** [3273]. **Decision** [4300, 5548, 4122, 5481, 3614, 4072, 5547, 4925]. **Decisions** [5026, 1978, 1309]. **decNumber** [5141, 5273]. **Decodable** [4353]. **Decoded** [5572]. **Decoder** [7138, 6355, 4125]. **decoders** [4118]. **Decoding** [4503, 7038, 6543, 6709, 570, 4500, 1089, 2360, 4237, 5186, 4901, 2027, 4481]. **Decoding-Free** [7038]. **Decodings** [6947]. **decomposable** [4007]. **Decomposition** [3100, 2393, 3292,

1887, 5334, 5188, 356, 4426, 773, 3683, 2992, 792, 2511, 4852, 6821, 2423, 477, 3345, 5220]. **Decompositions** [5310, 997]. **Decompression** [6908, 3678]. **Decreasing** [4009, 2463]. **decryption** [3572]. **DECSYSTEM** [1401, 959]. **DECsystem-10** [959]. **DECsystem-10/20** [959]. **DECSYSTEM-20** [1401]. **Dedicated** [2989, 2806, 2988]. **Dedication** [5887]. **dedié** [2806]. **Deductive** [5983]. **Deep** [6482, 7123, 6483, 6383, 6511, 6512, 6400, 6671, 6673, 6894, 6895, 6908, 6078, 6538, 7041, 6561, 6318, 6444, 6824, 6714, 7063, 6578, 6829, 6716, 6943, 6592, 6958, 6125, 6959, 6462, 6843, 6846, 6977, 6631, 6640, 6751, 7121, 6672, 6786, 6437, 6713, 6449, 6723, 6950, 6740, 6511, 6723, 7078, 6478]. **Deep-dish** [6125]. **Defect** [7363, 1785, 2826]. **defect-tolerant** [2826]. **Defektberechnung** [2573]. **defense** [2869, 1567, 1645]. **deficiencies** [1737]. **defined** [4984, 5158]. **Defining** [3480]. **Definite** [6642, 283]. **Definiteness** [6223]. **Definition** [2349, 556, 6429, 5035, 5063, 3408, 2371, 748, 1225, 4873, 6225, 17]. **Definitions** [6898, 1554]. **Degeneracies** [3479]. **Degeneracy** [3340]. **Degradation** [5041, 6025]. **Degrades** [3769]. **Degree** [5805, 5679, 4329, 1666, 4786, 5294, 6349, 6361]. **Dekker** [6823, 5134, 6688, 6712, 7159]. **Delaunay** [3689]. **Delay** [3728, 2666, 3570, 3868, 5507, 5997, 7050, 4074, 6729, 4923, 4740, 4743, 3372, 5800]. **Delay-based** [5997]. **Delay-optimized** [4923]. **Delay-power** [3570]. **delayed** [5256, 4240]. **Delays** [2890]. **Delhi** [7328]. **Delight** [5972, 7491, 4587]. **delimited** [5214]. **Delimiting** [3025, 2847]. **deliver** [3202]. **delivers** [2186, 2509]. **Delivery** [7368]. **della** [138]. **Delta** [3571, 3987]. **Delta-sigma** [3571, 3987]. **Demmel** [4842]. **demodulator** [3571]. **Demonstration** [5025, 3565, 88]. **Denmark** [7241]. **denoising** [5704]. **dénominateurs** [5413]. **Denominator** [6017, 5550]. **denominators** [5413]. **Denormal** [6971, 7110, 5890]. **Denormalization** [3831, 4030, 4033]. **Denormalized** [1389, 1207, 5019, 3924, 4113, 4760, 3372]. **Denormals** [6014, 6139]. **Dense** [6951, 5632, 6296, 5961, 5962]. **Densely** [4524, 5173]. **Densely-Packed-Decimal** [5173]. **densities** [2932]. **Density** [4550, 4710, 6443]. **Denver** [7400, 7434, 7505, 7296]. **Department** [7164, 7205]. **Depend** [4355]. **Dependable** [7372]. **dependant** [5800]. **Dependence** [5327, 6026]. **Dependent** [5153, 3774, 5108, 890, 6365]. **depending** [4002]. **Depends** [5974]. **Deployment** [6813]. **Depth** [3967, 5594, 3438, 2781, 5558, 4962, 6504, 5406, 5844, 5358, 6855]. **Depth-3** [5558, 5358]. **deren** [1211, 3119]. **Derivation** [5441, 3000, 3844, 2970]. **derivative** [5603, 5933, 981, 108]. **Derivatives** [373, 6106]. **dérivées** [108]. **Descent** [1716, 2708]. **Describe** [3477]. **Describing** [4037]. **Description** [4826, 4306, 118, 827, 747, 1225, 918]. **Design** [7309, 7495, 663, 6992, 1563, 5466, 5581, 5124, 7124, 7441, 3971, 4302, 546, 547, 4309, 5982, 4312, 48, 2504, 2188, 7008, 6661, 7009, 2333, 3983, 4325, 5263, 4669, 4810, 3565, 6891, 1498, 1722, 3234, 380, 4986, 2338, 2512, 4328, 6158, 5488, 5268, 5490, 4987, 1103, 3868, 7527, 6675, 1729, 3064, 1831, 334, 3065, 7131, 5149, 5500, 7498, 6412, 7026, 2525, 3075, 2212, 4839, 6918, 3744, 1396, 1604, 1124, 5715, 5716, 5922, 3747, 3082, 6072, 4028, 881, 3435, 4194, 1846, 6287, 1402, 1287, 883, 390, 4855, 435, 5724, 1291, 469, 3762, 4038, 6545, 1978, 4559, 5732, 5733, 5022, 5309, 5734]. **Design** [5840, 517, 1217, 7303, 7187,

7266, 7287, 7306, 7318, 7328, 7343, 7359, 7386, 7397, 7418, 7456, 7457, 7458, 7469, 7500, 7503, 7531, 7532, 7544, 7546, 7566, 7577, 1623, 6700, 5529, 1626, 4048, 3286, 7050, 4221, 5750, 5174, 1418, 6927, 1527, 2737, 7578, 4569, 4875, 5613, 4572, 6317, 2104, 902, 5759, 6099, 3123, 4397, 5853, 4582, 5327, 5328, 5329, 7060, 7061, 1143, 1884, 6205, 6331, 6451, 6576, 6828, 6936, 1314, 4242, 5949, 979, 7066, 2563, 3475, 5335, 5190, 2256, 2435, 6342, 6589, 6113, 2570, 2956, 3797, 6457, 6593, 6836, 1439, 5954, 6020, 3316, 3486, 3491, 3658, 3802, 3803, 4744, 5198, 766, 6598, 7558]. **Design** [2584, 2788, 4432, 4605, 5204, 7437, 7348, 5631, 2797, 5438, 4912, 2800, 3335, 4610, 6465, 6222, 1451, 1676, 6962, 6963, 1453, 5872, 3508, 3509, 4921, 4278, 4448, 7506, 1778, 5790, 3515, 1000, 1920, 1458, 4454, 4770, 7204, 5792, 4129, 4460, 4461, 5225, 3010, 592, 2826, 7114, 2028, 5370, 5371, 2478, 2160, 2161, 5653, 6630, 2032, 2305, 6745, 3202, 4635, 3366, 5656, 3206, 796, 3209, 3210, 1561, 1004, 4293, 5239, 5384, 4782, 6749, 6986, 5577, 1480, 2172, 6791, 2688, 3215, 4792, 605, 1717, 2191, 58, 4808, 1500, 2337, 2341, 420, 5989, 2353, 4184, 2698, 4352, 622, 880, 1031, 5997, 2898]. **design** [3084, 2536, 6419, 3763, 2224, 2717, 2543, 2086, 4714, 2723, 1858, 1039, 2398, 4220, 4222, 5606, 3293, 4058, 1633, 2740, 4721, 3782, 3914, 2427, 3787, 3788, 2763, 5057, 696, 2569, 2437, 3310, 2959, 2264, 1154, 3318, 3324, 3325, 2267, 1060, 3665, 772, 4917, 3165, 3504, 3679, 7507, 3822, 7403, 4928, 4128, 3834, 2489, 3530, 4642, 4949, 6035, 4954, 2351, 7513, 1001, 7173]. **Designed** [6482, 1965, 1869, 6010]. **designer** [2822, 1943]. **Designers** [1558, 2138]. **Designing** [5807, 5980, 4335, 5412, 2731, 7154, 2470, 4124, 7115, 5118, 4705, 5834, 2705, 4778]. **Designs** [5408, 5599, 4539, 4850, 5310, 6558, 7151, 4259, 5354, 3170, 3342, 3681, 6855, 5793, 5573, 7157, 3235, 4845, 2434, 5629, 5657, 4945, 4151, 4152]. **Desirable** [615, 1132, 1216]. **DESIRE** [1528]. **Desk** [727, 1102, 86, 1151, 121, 100]. **Desk-Calculator** [121]. **Desperately** [5842]. **Desynchronize** [5800]. **Details** [1812]. **Detect** [5279]. **Detectable** [2155]. **Detecting** [1366, 196, 4849, 6570, 6239, 6754, 6670, 5217, 2488]. **Detection** [5245, 6491, 5893, 6149, 497, 857, 806, 6494, 6884, 5474, 811, 3427, 6177, 3259, 4357, 5727, 1419, 1632, 1872, 6931, 901, 288, 7060, 289, 5950, 5337, 2130, 2972, 1665, 5959, 4434, 3811, 2142, 4445, 4276, 2609, 1171, 6234, 1699, 6372, 944, 945, 5894, 5895, 2193, 1109, 1110, 5920, 1278, 1205, 5155, 2716, 5163, 3275, 257, 5942, 1755, 2429, 2751, 6219, 5087, 3005, 2849, 7158]. **detective** [5325]. **Detector** [5744, 4649, 5745]. **Determinant** [4005, 2874]. **Determinants** [3719, 3879, 5931, 6436, 5432, 1542]. **Determination** [514, 1637, 3492, 1776, 589, 3982, 5738]. **Determine** [3038, 5388, 2205]. **Determining** [1055, 706, 773, 792, 3756, 1430, 2255]. **Determinism** [5597, 6269]. **Deterministic** [5843, 776, 4775, 7039, 6863]. **deterministic-stochastic** [6863]. **Deutschland** [61]. **Develop** [2038]. **Developed** [1732]. **Developers** [6913, 5027, 4464]. **Developing** [859, 2505, 2912, 7086, 7378]. **Development** [7212, 7368, 3558, 3231, 5588, 7247, 1107, 2067, 2756, 3132, 2257, 2141, 5639, 3167, 7204, 5797, 6637, 3535, 1712, 2504, 1819, 61, 3083, 2912, 3143, 235, 5065, 2997, 2998, 274, 1355]. **Developments** [853, 4634, 98, 7428]. **Deviates** [182]. **Device** [13, 3125, 7078, 6861, 6980, 2198, 1703]. **Devices** [4509, 6444, 1245, 7479, 50,

5357, 85, 5796]. **dezimale** [1976]. **Dezimalrechner** [1165]. **DFE** [3319, 3320]. **DFT** [3055, 1823]. **DFU** [5284]. **Dhahran** [2869]. **diagnostic** [4019]. **Diagnostics** [7532, 1525]. **diagonal** [3250, 3251]. **Diagram** [5512, 4703]. **Diagrams** [5412, 4324, 2100]. **Dianostics** [1792]. **Diego** [7537, 7329, 7471, 7445, 7461, 7488, 7520, 7337, 7354]. **Dienste** [124]. **Difference** [3430, 6281, 3666, 4748, 6628, 3666]. **Differences** [5905, 4280, 6677]. **Different** [6659, 438, 6947, 4320, 5904, 5297, 8, 4486]. **différentes** [4320]. **Differential** [860, 1014, 3584, 4844, 7192, 179, 314, 441, 4084, 6793, 1728, 5152, 92, 2376, 5158, 6695, 2742, 365, 4767]. **Differentiation** [3583, 3657, 7327, 2726, 2133]. **differently** [2693]. **Difficult** [1188, 3456]. **Difficulty** [537]. **Dig** [1484]. **Digest** [7316, 7222, 7254, 7286, 7308, 7379, 7404, 7196, 7328, 7386, 7439, 7385]. **Digit** [6378, 4962, 4963, 219, 1366, 462, 2044, 2644, 5692, 3863, 1820, 4328, 4683, 5279, 2891, 6064, 6170, 4691, 4182, 6415, 4188, 386, 555, 434, 5720, 1402, 7139, 3895, 1623, 5602, 4218, 347, 5033, 6094, 5180, 4392, 5322, 4576, 6448, 7061, 524, 7064, 1146, 3128, 4074, 1147, 6208, 162, 5343, 3485, 5345, 1441, 1661, 2580, 6123, 3331, 5435, 1909, 5964, 534, 4127, 5367, 5792, 6234, 490, 594, 5374, 6238, 4471, 3960, 1941, 2171, 2510, 4672, 4168, 957, 6066, 3253, 4697, 5726, 5530, 4376, 4722, 4068, 3129, 319, 3146, 3308, 3309, 3310, 3483, 5625, 5067, 4741, 3155, 4260, 5203, 2453]. **digit** [4914, 2012, 1472, 1473, 5382]. **Digit-by-Digit** [524, 5343, 5435, 3308, 3310]. **Digit-by-Rounding** [5692, 5792]. **Digit-First** [7061]. **Digit-Level** [6170]. **digit-multiplier** [6066]. **Digit-Recurrence** [4963, 5322, 3128, 4127, 4962, 4691, 3253, 3129]. **Digit-Serial** [3863, 4471, 4260, 4914, 1472, 1473]. **Digit-serial-in-serial-out** [4576]. **Digit-Slice** [1402]. **Digital** [135, 7164, 724, 1490, 3395, 3396, 6501, 3403, 248, 6891, 1500, 1722, 6513, 2669, 220, 1273, 1597, 3579, 873, 874, 1026, 1837, 2212, 4838, 125, 1396, 875, 2218, 3258, 338, 621, 1287, 4195, 435, 200, 558, 119, 2723, 7457, 3107, 1305, 1135, 3619, 743, 630, 5937, 1993, 4572, 314, 901, 2422, 142, 7276, 181, 1640, 1888, 2564, 2948, 910, 5335, 1531, 318, 2953, 1055, 182, 1233, 2575, 2968, 2268, 6123, 121, 4434, 7179, 7180, 7182, 7202, 7230, 122, 407, 123, 164, 585, 454, 7506, 5788, 2996, 2293, 1069, 4928, 941, 1075, 1174, 6373, 1558, 243, 97, 151]. **Digital** [1559, 4145, 1360, 1480, 1080, 1185, 2857, 1565, 2317, 98, 1801, 2181, 1089, 3045, 3046, 3047, 3725, 2333, 3232, 2200, 956, 6514, 380, 1270, 2338, 3237, 3238, 422, 4176, 1277, 4344, 3582, 1278, 674, 736, 5834, 92, 284, 1844, 2376, 679, 4855, 3262, 1214, 1975, 3442, 4558, 4559, 1411, 1039, 1221, 1523, 1869, 1985, 1040, 3288, 3458, 3289, 629, 474, 745, 3290, 2407, 312, 521, 1877, 1990, 2245, 2246, 2418, 896, 4232, 1879, 2557, 3299, 900, 976, 978, 525, 572, 684, 316, 690, 114, 1437, 364, 320, 2261, 5067, 453, 985, 581, 146, 183, 206, 1770, 2135, 2274]. **digital** [4096, 1537, 1910, 2010, 704, 705, 770, 991, 1236, 2457, 2592, 2801, 2982, 840, 3336, 130, 163, 4918, 3165, 2984, 3814, 1918, 5967, 2810, 1000, 5647, 1067, 1068, 1688, 1783, 2019, 2020, 2294, 4281, 3192, 1463, 1550, 3698, 1935, 3009, 3835, 2162, 1178, 1797, 541, 542, 3015, 796, 2838, 80, 2494, 2627, 4946, 2630, 2852, 3211, 2853, 3245, 696]. **Digital-Filter** [454]. **digital-signal** [2261]. **digital-to-analog** [1688]. **Digits** [3038, 5388, 550, 811, 1195, 3062, 99, 1603, 1836, 964, 967, 1033, 1129, 5034, 3633, 5955, 237, 4608, 531, 4101,

845, 848, 3531, 3708, 3036, 3222, 3547, 3548, 3549, 3550, 3551, 3552, 91, 137, 3891, 138, 3765, 2239, 2240, 8, 2971, 4616, 5651, 1555, 2488, 4779]. **Dijkstra** [7314]. **Dijon** [7529]. **Dilemma** [6147, 4728]. **Dimensional** [330, 1806, 4348, 5512, 6338, 1150, 1656, 1930, 5106, 6032, 2051, 6680, 4350, 4703, 3641, 5067, 4896, 985, 6217, 2272, 1918, 2994, 4932, 2820, 3700, 3015]. **Diminished** [6555, 4470, 4997]. **diminished-** [4997]. **Diminished-3** [6555]. **Diminished-One** [4470]. **d'implantations** [4320]. **d'intervalles** [5191]. **Diode** [334]. **Diodes** [277, 184]. **Direct** [3395, 2050, 2715, 2955, 1711, 3237, 3238, 3580, 682, 1753, 3299, 6574, 1437, 3150, 3015]. **direct-executing** [1753]. **Direct-Form** [3395, 3299, 1437]. **Directed** [5425, 4094, 4264, 7159, 7487, 5962]. **directional** [3121]. **Directions** [7388, 5253]. **directly** [6489]. **director** [2496]. **DIS** [1747, 3162]. **disasters** [4154, 6452]. **Discovered** [1483, 1553]. **Discovery** [5674]. **Discrete** [4791, 5509, 5046, 1897, 791, 2029, 4939, 2634, 816, 1827, 4020, 4350, 2712, 5854, 5429, 1908, 4270, 3680, 2031, 4776, 3013, 3209, 3210, 6987, 6535]. **Discretely** [174]. **Discriminant** [5480, 5258]. **Discussion** [5686, 9, 10, 58, 545]. **Discussions** [18, 105, 52, 36, 26, 86, 30, 94, 5482]. **dish** [6125]. **disk** [5738]. **displays** [2209]. **Dissecting** [6557]. **Dissipation** [4110, 4164, 4176, 4924]. **Distance** [4011, 4069, 5045, 3932, 3677, 4481]. **Distance-Calculation** [4011]. **Distillation** [3968, 5117, 4897]. **distinctions** [2310]. **Distributed** [1713, 1382, 1587, 7442, 7470, 5855, 590, 5649, 5229, 1360, 2682, 5707, 2916, 1761, 6219, 4282, 1788, 5461, 850, 4475, 2491, 4484]. **distributed-memory** [4282, 5461]. **Distribution** [462, 1368, 964, 55, 1125, 559, 2921, 5179, 2932, 3633, 451, 698, 237, 5442, 777, 2286, 1791, 2160, 491, 4789, 1263, 2712, 6081, 3765, 3463, 4431, 3337, 2014, 1555, 2480, 4779]. **Distributions** [495, 1809, 5413, 4234, 1882, 2145, 848, 5068]. **Distributivity** [1676]. **distribuzione** [138]. **Districts** [5545]. **Dither** [6863]. **Dithering** [3883, 7415, 2628]. **Dive** [6631]. **Diversity** [7550]. **Divide** [3965, 3544, 2052, 5263, 815, 3871, 2350, 5519, 6082, 4215, 4715, 349, 439, 1665, 3498, 4441, 5450, 655, 3519, 3693, 3694, 2812, 323, 5564, 597, 2172, 3389, 4325, 3998, 4174, 2567, 2949, 3499, 4098, 4619, 3023]. **Divide-and-Conquer** [6082]. **Divide-and-Correct** [815, 349, 439, 323]. **Divide/Square** [3519]. **divided** [6677]. **Dividends** [5695]. **Divider** [11, 6392, 1597, 3075, 6558, 4378, 230, 313, 2104, 4082, 5345, 1156, 714, 3950, 1934, 5378, 2034, 6747, 1480, 6391, 2204, 5593, 4839, 4706, 3435, 5514, 2382, 6539, 2902, 4863, 4376, 4719, 5853, 5765, 2945, 2253, 114, 3318, 2981, 2139, 5453, 5574, 2841]. **Dividers** [6644, 5581, 809, 6158, 3449, 6451, 6936, 3636, 2131, 6465, 6732, 4962, 4192, 3127, 2586, 4125, 1934, 5656]. **divides** [1517, 1404, 1624]. **Dividing** [6687]. **Divisibility** [2862]. **Divisible** [438]. **Division** [2638, 7124, 6, 1568, 1569, 853, 7000, 3857, 1367, 858, 5817, 727, 4509, 1812, 7006, 3560, 5984, 729, 3230, 3405, 6663, 6889, 7016, 6157, 1582, 32, 730, 5399, 5695, 815, 5266, 671, 3869, 3991, 1018, 4678, 3062, 3239, 4990, 4005, 3426, 5500, 6064, 7025, 3743, 1603, 1836, 3253, 3254, 4014, 4180, 4690, 2073, 6415, 425, 508, 553, 4022, 432, 1607, 823, 306, 6534, 2710, 6074, 3260, 2381, 1852, 5725, 3757, 7139, 4200, 6082, 5730, 3760, 4366, 3762, 4038, 4210, 5021, 4716, 4045, 3451, 3452, 741, 6305, 344, 5531, 5930, 4051, 3455, 4054, 7051, 3771, 3772, 6562].

Division [257, 4566, 750, 5419, 5609, 5754, 5033, 4386, 286, 349, 568, 569, 632, 1636, 314, 3465, 4725, 5322, 5538, 25, 288, 1312, 1881, 1049, 128, 1755, 2108, 2939, 5856, 7064, 3128, 2430, 2254, 3474, 4888, 3476, 4408, 6109, 2116, 5055, 4409, 264, 763, 3650, 266, 5772, 1894, 2955, 3308, 4078, 4895, 5064, 7076, 236, 4081, 5774, 6214, 5865, 5196, 3659, 3660, 3801, 3802, 2783, 2784, 2129, 4607, 5204, 5437, 3671, 2136, 238, 6842, 6731, 1775, 2596, 650, 3813, 164, 585, 5078, 4097, 239, 776, 186, 165, 5355, 2016, 7099, 7100, 712, 4764, 843, 270, 3822, 323, 5364]. **Division** [1924, 2023, 6739, 5098, 5367, 4129, 4460, 6855, 167, 214, 940, 1175, 2159, 490, 594, 6235, 6369, 2481, 6238, 3012, 3839, 5882, 1002, 544, 244, 2309, 5463, 6139, 3021, 3022, 6638, 5241, 5827, 3846, 664, 2639, 3853, 951, 461, 3556, 1088, 4805, 7010, 7011, 3406, 2510, 5138, 3235, 3411, 4167, 2675, 2513, 3574, 4682, 6278, 2881, 2361, 2363, 2528, 2694, 3077, 4691, 4694, 4695, 5003, 2365, 3586, 3587, 3588, 3432, 2367, 225, 2075, 2704, 5298, 7034, 3892, 3599, 3261, 4197, 4857, 2080, 3443, 3444, 3445, 3448, 3275, 3276, 4041, 3897, 3766, 2094, 4718, 5028, 3110, 3291, 2925, 3910, 401, 4064]. **division** [3123, 4068, 4584, 5424, 5618, 2943, 2112, 2562, 3131, 3791, 4590, 4734, 4736, 4737, 2760, 2761, 3137, 578, 1891, 5623, 6944, 3921, 2766, 2956, 3146, 3309, 3310, 3483, 4413, 3922, 6015, 5952, 2122, 2962, 453, 4083, 3487, 3661, 4086, 4902, 4746, 2973, 4909, 4436, 4756, 130, 163, 3936, 3937, 1065, 780, 3343, 3175, 3176, 3511, 4924, 6736, 3521, 3824, 2473, 2474, 294, 4282, 4283, 1173, 1464, 5223, 1074, 2478, 3958, 4290, 4778, 4943, 4944, 1254, 2168, 2840, 2843, 4945, 4781, 4487, 4294, 1995, 262, 1771, 1477]. **Division-and-accumulation** [3760]. **Division-Free** [5984, 3261]. **Division/Square** [5882, 3853, 4064]. **division/square-root** [3853]. **Divisionless** [222, 211]. **Divisions** [561, 265, 532, 786, 4252, 3204]. **Divisionsalgorithmus** [1771]. **Divisionsverfahren** [1812]. **Divisor** [561, 439, 3931, 532, 786, 544, 461, 4805, 2962, 4746]. **Divisors** [741, 3276]. **DivSqrt** [7040]. **DLFloat** [6482]. **DLLs** [3186]. **DMT** [4789]. **DNA** [4560]. **DNA-based** [4560]. **DNN** [7033, 7081, 6957, 6979, 6980, 6988]. **DNNs** [6893]. **DNS** [5305, 5306]. **Do** [4670, 1417, 4345, 5998, 3437, 3109, 4377, 1329]. **Document** [6213]. **Documentation** [6091, 587]. **Documents** [3851]. **Does** [6049, 2523, 2, 7091]. **Dog** [3561]. **Doing** [1289]. **Dojo** [6997, 7112]. **Dokumentation** [587]. **Dollars** [6736]. **Domain** [5586, 1821, 6809, 7055, 3683, 6980, 2512, 3261, 2395, 3345, 3945, 6858]. **Domains** [5337, 5861, 3345]. **Domestic** [243]. **dominated** [3859]. **Donald** [6129]. **done** [2548]. **données** [2762]. **Don't** [2115]. **Dot** [6047, 6660, 5397, 5490, 3064, 7023, 4850, 6694, 7041, 6559, 6563, 3295, 6314, 7063, 4899, 4900, 5071, 6598, 5968, 6232, 5268, 2879, 3735, 6919, 5736, 2736, 5756, 5946, 5870, 5380, 5464]. **Dot-Product** [6660, 6563, 3295, 7063, 6598]. **dot-products** [5736]. **dots** [7150]. **Double** [4648, 4323, 4807, 5483, 7130, 4673, 303, 4684, 3579, 3738, 4008, 6170, 6413, 3431, 7135, 7136, 6685, 5518, 4208, 4367, 7048, 3453, 5743, 6305, 6311, 5315, 348, 6568, 5539, 4398, 4729, 6007, 5327, 352, 6111, 2436, 362, 363, 5862, 6946, 5195, 4747, 4607, 6023, 6027, 709, 5644, 375, 1934, 1073, 5231, 5974, 6753, 3382, 5978, 4967, 4968, 4970, 5582, 4162, 4320, 4804, 5904, 4682, 4992, 4340, 4341, 2356, 626, 5530, 6821, 5040, 5050, 5951, 696, 6944, 5625, 5952, 1332, 5791, 4929, 5223, 492,

540, 3373, 5235, 2629, 4821, 4822, 5276]. **Double-Base** [3738, 4008, 5518, 5235]. **Double-Based** [3579]. **double-basis** [4682]. **Double-Datapath** [4323, 4807]. **Double-Double** [6568, 4967, 4970]. **double-extended** [4821]. **Double-Length** [709, 626, 540]. **Double-Precision** [5483, 303, 6685, 348, 6007, 5327, 362, 363, 5195, 5644, 375, 3382, 5978, 4992, 696, 6944, 4929, 4822, 5276]. **Double-residue** [5231]. **double-single** [4968]. **Double-Size** [4673]. **Double-Word** [6311, 6946]. **Doubled** [2095, 1431, 1781]. **doubled-mantissa** [1781]. **Doubled-Precision** [1431, 2095]. **Doubledouble** [3861]. **doubles** [6353, 2796]. **d'ouvrages** [1467]. **Down** [2130, 3825]. **Downloadable** [3851]. **DPD** [7156]. **DPU** [7101, 6968]. **Draft** [1198, 4330, 1280, 6554, 5032, 1157, 1235, 1459, 1786, 56, 3201, 2884, 2911, 4217, 1461, 4667, 1822, 3162]. **draw** [529]. **drawing** [2209, 4611]. **Dream** [60]. **Drexel** [7490]. **Drift** [922, 923]. **Driven** [5124, 1376, 6571, 6203, 3810, 2476, 2613, 3008, 2538, 2614, 3379]. **Driverless** [6380]. **Drivers** [3060]. **drives** [6380]. **Driving** [6400, 7254]. **Drum** [134]. **DS** [4243, 4405, 4406, 4142]. **DS-CDMA** [4142]. **DSD** [7457]. **DSFUN90** [4968]. **DSL** [6607]. **DSL-Based** [6607]. **DSP** [5666, 2640, 2318, 3973, 4156, 3859, 2331, 5697, 4671, 3424, 3737, 4348, 2522, 1970, 2370, 4543, 6000, 3614, 3109, 4053, 6820, 4872, 6099, 6197, 6826, 4881, 4075, 2953, 4895, 5064, 6726, 3154, 7087, 4432, 5784, 6360, 3679, 3167, 2467, 3518, 2997, 2998, 2472, 2473, 2474, 2823, 2824, 3193, 4941, 3023, 2315, 5592, 2351]. **DSP-Enabled** [6197, 5592]. **DSP-Oriented** [2953]. **DSP32** [2631]. **DSP32C** [2218]. **DSP48E2** [7151]. **DSP56000** [2294]. **DSP96002** [2441]. **DSPs** [4535, 3893, 2461]. **Dual** [4648, 5470, 4541, 3606, 6305, 3901, 4067, 4726, 5543, 4417, 7099, 7100, 6865, 3228, 5149, 4185, 3588, 2226, 3630, 3791, 2441, 5646, 2489, 3963]. **Dual-Issue** [6865]. **Dual-mode** [6305]. **Dual-Pass** [3901]. **Dual-Path** [4726]. **dual-port** [2441]. **dual-precision** [5149]. **Dual-Purpose** [5470, 7099, 7100]. **dual-rail** [3791]. **Dualmaschinen** [586]. **dualzahlensystem** [1230]. **dubbele** [492, 540]. **Due** [136, 199, 5948, 3149, 4925, 942]. **Duisburg** [7429, 7549]. **Dummy** [3477, 2851]. **d'un** [2004]. **Dundee** [7252, 7236]. **d'une** [702, 108]. **Duo** [5154]. **Duodecimal** [44]. **Duplicate** [6133]. **Durbin** [1200]. **durch** [1835, 2036]. **Durchfuhrung** [35]. **During** [6312, 2708]. **Dutch** [195, 492, 540]. **dyadic** [801]. **Dyadik** [801]. **Dynamic** [6499, 731, 6426, 5942, 2573, 6726, 5239, 6641, 5818, 3862, 4163, 6664, 2671, 4175, 4379, 2742, 3791, 3149, 6632, 4140]. **dynamic-range** [2671]. **Dynamical** [6501, 5055, 6585, 4737]. **Dynamically** [1822, 2205, 3085, 6812]. **Dynamics** [3240, 3653, 5557, 6138, 5816, 7127, 5493, 5702, 5000]. **dynamischer** [2573]. **Dysan** [1680]. **dyscalculia** [5073].

E-commerce [3747]. **E-Graphs** [6896]. **E-mail** [3747]. **E29** [3038, 5388]. **E29-08** [3038, 5388]. **Eagle** [7436]. **EALU** [6991]. **Earliest** [23, 408]. **Early** [1370, 3052, 1380, 3790, 5766, 4268, 1456, 5919, 4999, 4611, 31, 1528]. **Early-Normalizing** [5766]. **earth** [6104, 6365]. **EASIAC** [129]. **easier** [4816]. **Easily** [1604, 1778]. **Easily-Testable** [1604]. **Easy** [5929, 1215, 1296]. **ebaY** [5008]. **ECC** [5901, 6583]. **ECCTD** [7303]. **Echtzeitanwendungen** [3194]. **ECM** [6303, 5244]. **Ecole** [108]. **Econometric** [4077]. **Economic** [652].

Economical [421, 3755, 632]. **Economics** [4268]. **Economizing** [2790]. **Ecosystem** [6589]. **EDCC** [7372]. **EDCC-1** [7372]. **Edge** [6884, 6895, 6725, 6861, 6980, 6713, 2954, 6955, 5777]. **Edge-Device** [6861, 6980]. **Edinburgh** [7453, 7188, 7189, 5633]. **Edited** [272]. **Edition** [4893, 4587]. **Editor** [260, 1956, 428, 5065, 3718, 3721, 421, 199, 426, 348, 285, 3477, 2290, 212, 375, 717]. **Editorial** [6953]. **Editors** [5811, 5687, 6506, 4230, 5537, 6018, 5082]. **EDOC** [7442]. **EDSAC** [105, 87, 1559, 3019, 3841, 88]. **Edsger** [7314]. **education** [6867]. **educational** [4885]. **EDVAC** [72, 56, 3201]. **EDVAC-type** [72]. **Effect** [3398, 967, 1033, 2931, 1676, 2667, 3262, 3620, 2742, 5638, 2617, 2618, 2619, 1252, 1703, 1708, 232]. **Effective** [3541, 6550, 6006, 4401, 2874, 5710, 4029, 4863, 1638, 2584, 2805, 3770]. **Effectiveness** [6831, 6315]. **Effects** [3385, 1801, 6781, 6782, 1393, 6915, 6928, 3142, 4903, 4280, 6233, 1791, 1797, 4478, 3849, 2395, 3458, 1430, 1051, 6339]. **Efficaces** [4684]. **Efficiencies** [2394]. **Efficiency** [6512, 6784, 6785, 5316, 5324, 7157, 4406, 4075, 707]. **Efficient** [6869, 2316, 6037, 6142, 6646, 6378, 6243, 5886, 6881, 7001, 4657, 856, 5130, 5982, 7004, 6885, 4661, 4975, 5684, 5261, 5393, 7013, 3984, 7128, 2196, 5399, 6667, 5696, 613, 866, 3235, 6515, 5488, 5985, 5270, 5492, 1824, 6275, 4684, 4531, 4685, 5911, 6165, 6910, 5711, 4997, 1114, 5001, 6918, 2214, 5830, 6067, 3079, 3080, 5715, 4354, 6805, 6806, 5996, 4357, 4545, 6534, 6075, 2379, 6691, 2077, 2079, 6538, 6082, 4363, 6422, 3092, 5601, 4038, 6297, 7041, 5732, 2387, 3100, 5021, 3613, 6303, 3451, 3452, 3766, 6188, 6092, 6309, 2091, 6703, 6704, 6560, 7050, 6927, 2732, 4381, 6564, 6565, 6568, 3121]. **Efficient** [3297, 4231, 6096, 4574, 5539, 6325, 4066, 4067, 6329, 7061, 5187, 3126, 5856, 1759, 4074, 3643, 3138, 6111, 6342, 4414, 6015, 6835, 5066, 6836, 6458, 5953, 6118, 2002, 5954, 6020, 6728, 2264, 4420, 5070, 4254, 4423, 6956, 3929, 4261, 5200, 5350, 6840, 6841, 4909, 7092, 4271, 4752, 4914, 4440, 5446, 6966, 7096, 4618, 6604, 6360, 1542, 4107, 7101, 7102, 5357, 2148, 7107, 6970, 2152, 5359, 240, 3004, 4770, 2611, 1932, 457, 6235, 7115, 1076, 5566, 6630, 5571, 6375, 5109, 5881, 6861, 6980, 4477, 7119, 6983, 5384, 6865, 5116, 3212, 6639, 6640, 6749, 6750, 6866, 7121, 4146, 6988, 6990, 5665]. **efficient** [3543, 3862, 2667, 3731, 3867, 6271, 3057, 4827, 6409, 6912, 6066, 3590, 1517, 4852, 6419, 4204, 4207, 3448, 6305, 2092, 3293, 2419, 4390, 5321, 3123, 4730, 4405, 5058, 2439, 1900, 4744, 5776, 3665, 7090, 7153, 6351, 3692, 3946, 4118, 4457, 2817, 4286, 7156, 2032, 4948, 6748, 3378, 6987]. **Efficiently** [6995, 5303, 5747, 5039, 4603, 3314, 6361]. **Efficiently-Computable** [4603]. **Effort** [4124, 4394]. **Egypt** [7508]. **Eidetic** [7024]. **Eigensolvers** [5053, 5189]. **Eigenvalue** [1832, 4465, 7181, 3423, 6106, 4131]. **eigenvalues** [6106, 4422]. **Eigenvectors** [2812]. **Eighteenth** [7255, 7203, 31, 2377]. **Eighth** [7381, 7254]. **Eignung** [1700]. **Ein-** [2486]. **Einbettung** [1353]. **einem** [1628]. **einfach** [1771]. **einfacher** [1795]. **Einführung** [3119]. **Einige** [1237]. **Einiger** [836, 385]. **Einplatinenrechner** [2082]. **eins** [548]. **Eisenstein** [3737]. **Eispack** [3098, 3270]. **elastic** [2412, 2414]. **electric** [1703]. **Electrical** [10, 7239, 7574, 2563, 7508, 48, 5925]. **Électrique** [2563]. **Electro** [7221, 7284, 7243, 7267, 7221]. **Electro/80** [7221, 7221]. **Electro/83** [7243]. **Electro/86**

[7267]. **Electro/88** [7284]. **Electrologica** [5613]. **electromagnetic** [3945]. **Electronic** [135, 3545, 727, 136, 5015, 7532, 7388, 140, 141, 160, 161, 180, 94, 1531, 103, 51, 407, 530, 1546, 70, 5103, 7508, 150, 243, 97, 151, 1559, 80, 297, 58, 422, 960, 118, 63, 64, 65, 66, 67, 68, 183, 104, 62, 3595, 1165]. **Electronic/Mechanical** [3545]. **electronically** [2849]. **Electronics** [724, 7239, 7431, 7568, 3600, 274]. **électroniques** [487]. **Electrons** [76]. **Elektronik** [274]. **Elektronische** [1165]. **Element** [547, 883, 518, 1634, 5062, 1656, 3656, 5072, 6861, 6988, 2650, 1816, 2685, 2970, 2267, 839, 3518, 2820]. **élémentaires** [3980, 4684]. **elementaren** [651, 1700]. **elementarer** [385]. **Elementary** [1946, 2316, 5580, 3041, 3224, 856, 2866, 6386, 1715, 1718, 2053, 954, 1266, 4327, 616, 1274, 3058, 1391, 4534, 2355, 734, 4181, 6801, 6802, 385, 1123, 1841, 2703, 1132, 3274, 5934, 6092, 2093, 2553, 399, 2555, 2103, 4398, 4729, 6007, 2109, 2250, 353, 691, 4246, 6206, 913, 6454, 2573, 3655, 3798, 5194, 6721, 2781, 989, 3810, 587, 651, 3170, 3342, 4105, 240, 1342, 2475, 2818, 2819, 2158, 535, 1700, 2165, 3374, 2856, 5709, 552, 1353, 1795, 2038, 1085, 5978, 3980, 863, 955, 4168, 197, 2349, 4992, 3242, 3422, 5277, 1397, 1216, 5168, 5326, 5947, 4584, 6934, 689, 2566, 4733]. **elementary** [1897, 3321, 3169, 3696, 4929, 4771, 660, 3373, 3533, 5120, 4821, 5143, 4684, 4371]. **Elementary-Function** [1715]. **Elements** [1124, 309, 139, 6188, 2148, 3881, 3741, 2356, 4542, 7042, 1040, 5800]. **Elevation** [6516]. **Eleventh** [7380, 7368]. **Elf** [7062]. **elicited** [3943]. **Eliminate** [1207, 1080, 1185, 3387, 1270, 1437]. **Eliminating** [2171, 3891]. **Elimination** [3399, 5723, 5838, 3299, 5865, 5670, 1808, 1814, 2738, 1542, 1462, 1925, 2025]. **Elision** [6448]. **Elizabeth** [7502]. **Elliptic** [5465, 5664, 4295, 5810, 4299, 6384, 4657, 5250, 5678, 6071, 4354, 4557, 4382, 3138, 4412, 4597, 4738, 4423, 4599, 4742, 4426, 4427, 4916, 4443, 4618, 1916, 5646, 3823, 3867, 6787, 4209, 2119, 6460, 6221, 3345, 5235]. **elliptical** [108]. **elliptique** [108]. **ELU** [6673]. **Elusive** [4587, 5443]. **ELXSI** [1695]. **Email** [3488]. **Embedded** [7440, 6286, 6428, 7519, 7531, 7546, 7577, 6925, 6706, 3911, 6099, 6444, 2958, 6724, 5865, 5874, 6991, 6652, 2502, 3859, 6394, 5146, 4881, 4602, 7087, 3934, 5452, 5453, 5455, 5652]. **Embedding** [1028, 1353]. **emerged** [3666]. **Emergence** [6945, 576]. **Emerging** [7443, 6819, 6953, 7507, 7539]. **emphasis** [7487]. **Empirical** [1125, 7279, 5620]. **Empiricism** [6734, 7106]. **Employing** [743, 5543, 6109, 1360, 629, 985, 2495]. **empty** [3437]. **emulate** [3336]. **Emulating** [6774]. **Emulation** [4653, 5391, 3404, 5100, 1191, 5613]. **emulator** [6279]. **Enable** [3488, 4095, 3924]. **Enabled** [6642, 4543, 6197, 6324, 6598, 6606, 6625, 6856, 7106, 5592]. **Enabling** [6805, 6806, 7068]. **Encapsulation** [6567]. **Enclosing** [3706, 1269]. **Enclosure** [7340, 3576, 3669, 4554, 7460, 4422, 5776]. **Encoded** [1806, 4293, 942, 2834, 3198]. **encoder** [2297]. **Encoding** [5272, 5495, 4524, 4680, 6901, 7132, 3292, 6100, 1644, 2459, 1171, 5100, 465, 5446, 2992, 7156, 4487]. **Encodings** [6073, 5926, 4095, 5101]. **Encrypted** [6601]. **Encryption** [6645, 3747, 7065, 6592, 6601, 4440, 7108, 7116, 3276]. **End** [6805, 6806, 6079, 6080, 3966, 1518, 3600, 2315]. **end-points** [3966]. **ENDGame** [6585]. **Endlicher** [836]. **Endomorphism** [5128, 6409]. **Endomorphisms** [4354, 4603]. **enemy** [6353]. **Energy** [6869, 6039, 6378, 5886, 7001, 6667,

6789, 5507, 5715, 6805, 6806, 5996, 6303, 7050, 6835, 6458, 5953, 4743, 6956, 5350, 7090, 4770, 6861, 6980, 7157, 6865, 6988, 3543, 4852, 5925, 6419, 2807]. **Energy-** [6869]. **Energy-delay** [4743]. **Energy-Efficient** [6378, 7001, 6667, 5715, 5996, 6303, 6835, 5953, 6956, 5350, 6861, 6980, 6988, 7090, 4852, 6419]. **Engine** [3050, 4347, 7026, 6799, 5533, 2469, 4, 16, 6504, 2389, 4561, 2167, 7512, 6540, 3666]. **Engineer** [2913, 4735]. **Engineering** [135, 3851, 7588, 7285, 10, 7574, 7575, 2398, 2237, 5416, 5842, 4378, 3784, 3689, 7552, 7508, 7250, 5016, 1621, 4867, 4719, 317]. **engineers** [254, 739, 1974]. **engines** [2849]. **England** [3461, 7389]. **English** [195, 73]. **Enhance** [5395, 1541, 1779]. **Enhanced** [6379, 3851, 5476, 1505, 1593, 4884, 3139, 6971, 7110, 6742, 5265, 3644, 4109]. **Enhancement** [7406, 7056, 4687]. **Enhancements** [4495, 4296]. **Enhancing** [3995, 6426]. **ENIAC** [62, 3595]. **Enough** [4305, 5148, 554, 434]. **enriched** [6395]. **Ensure** [5323]. **entering** [7499]. **Enterprise** [3964, 7442, 3819]. **entwickelt** [1732]. **Entwicklung** [61, 274, 1355]. **Entwicklungslinien** [274]. **Entwurf** [2305, 1001]. **Enumeration** [2164]. **envelope** [3183]. **Environment** [7212, 3558, 1194, 1267, 5588, 3449, 5790, 1712, 4332, 6097, 5778, 3332, 1697]. **Environments** [6871, 1525, 2279, 3763, 5527, 2487]. **Epsilon** [3098, 3270, 3648]. **Epsilon-Inflation** [3648]. **equal** [1921]. **equality** [3236]. **equalizer** [3782, 3914]. **Equals** [2123]. **Equation** [860, 1014, 2050, 5898, 6067, 1223, 204, 205, 4084, 5152, 5158, 1528, 1753, 1241, 108, 3196, 108]. **Equations** [1716, 810, 304, 3584, 7192, 884, 253, 179, 904, 441, 3683, 4136, 3706, 3710, 45, 4310, 1816, 1728, 4844, 92, 6695, 515, 516, 565, 2742, 365, 5348, 947, 4488, 4783, 1253]. **Equatorial** [7464]. **Equipment** [106, 696, 274]. **Equivalence** [6963]. **Equivalent** [904, 1446, 531]. **equivalents** [6972]. **Era** [5714, 5627, 7020, 7494, 7546, 147]. **Erasing** [7062]. **Erasing-Based** [7062]. **Eratosthenes** [3708]. **Erfahrungen** [124]. **erfand** [159]. **Erfinder** [3467, 1322, 1167, 1467]. **Ergebnisse** [2013]. **Ergodic** [7168]. **ergodicity** [4321]. **ERL** [4846]. **Errata** [1388, 231]. **Erratum** [1109, 923, 5458]. **erreurs** [990]. **Error** [603, 1566, 3546, 6492, 327, 723, 1366, 1572, 1806, 6384, 1368, 1809, 2184, 2503, 2185, 725, 806, 1264, 5473, 5675, 807, 3395, 3396, 5474, 4157, 3399, 6886, 6497, 5681, 6262, 3402, 5259, 6662, 7010, 7011, 7014, 196, 811, 812, 1581, 171, 5397, 5485, 3055, 6158, 6516, 5701, 670, 6788, 5906, 6273, 6675, 1963, 6676, 334, 5144, 6525, 3071, 3584, 6281, 6169, 504, 466, 6919, 7134, 6283, 1123, 6068, 6069, 4024, 388, 5718, 4847, 1285, 6807, 882, 2535, 1210, 1289, 1742, 6079, 6080, 1614, 5727, 179, 6547, 5736, 6698, 2915, 5932, 6190, 6306, 6307, 1626, 6311]. **Error** [6312, 628, 3904, 3289, 629, 743, 1872, 519, 6708, 5419, 6568, 2103, 3777, 6321, 903, 1638, 525, 572, 1145, 6331, 3302, 6577, 3470, 3638, 315, 4241, 6336, 6582, 688, 5950, 5858, 6340, 447, 6341, 2765, 2573, 6115, 6946, 643, 1766, 2771, 3656, 5953, 1899, 764, 837, 985, 479, 1057, 1155, 6216, 5347, 2972, 1665, 582, 6022, 5959, 7179, 7180, 1674, 483, 583, 6465, 706, 2142, 6354, 6223, 5870, 6603, 6732, 6359, 1454, 6736, 1071, 1342, 2155, 2818, 2819, 6234, 593, 6366, 7113, 6474, 849, 2828, 3525, 942, 491, 6372, 6978, 6634, 2488, 4776, 5106, 1475, 1704, 216, 797, 3709, 5119]. **Error** [7160, 6990, 2636, 1186, 1565, 7392, 2174, 2175, 2177, 2178, 1948, 2042, 3555, 329, 1489, 1090, 1263, 1190, 1369, 1808, 1810, 4506,

4660, 3227, 1714, 4321, 2193, 2662, 1583, 1721, 816, 2057, 2668, 3410, 3056, 3575, 4002, 1828, 1200, 6794, 2065, 3067, 3068, 732, 1278, 4694, 5003, 4017, 4698, 3745, 6070, 3748, 1209, 1284, 5009, 968, 1845, 5999, 6076, 2712, 6691, 7039, 3602, 229, 1298, 1745, 3272, 5311, 1983, 5738, 2726, 6191, 6308, 1524, 2230, 5414, 474, 3626, 5418, 2732, 3909, 4388, 2928, 3122, 2557, 3913, 3781, 5854, 2107, 4072, 1756, 1883, 977, 684, 907, 2429, 2751, 5948, 1639, 574]. **error** [575, 760, 2255, 4247, 3133, 7070, 3144, 5058, 3481, 364, 365, 2446, 6016, 1438, 2121, 2960, 2961, 836, 2965, 3150, 1234, 5957, 6120, 3151, 5551, 3808, 4262, 482, 990, 2270, 2272, 2590, 1335, 6227, 5638, 6470, 3938, 7098, 711, 3177, 3178, 4765, 5210, 2995, 2605, 4767, 2297, 2024, 1462, 1925, 2025, 2608, 3005, 3829, 3830, 4128, 4459, 6364, 1176, 4134, 4288, 716, 795, 2162, 3014, 3368, 4780, 414, 3707, 1183, 948, 4482, 3845, 2854, 2855, 3378, 7158, 4148, 6677, 3245]. **Error-Bounding** [3470, 3638]. **Error-Checking** [483]. **Error-Coded** [723, 3302]. **Error-Correcting** [1614, 1145, 583]. **Error-Detectable** [2155]. **Error-Detecting** [1366]. **Error-Detection** [2142]. **Error-Free** [6283, 1289, 1742, 6568, 5106, 1963, 1210, 6216, 5347, 4776, 5957, 6120, 5551, 3368]. **error-inducing** [6691]. **Error-Optimized** [6492]. **Error-Resilient** [6807, 6990]. **Error-Tolerant** [6158, 6331, 6978]. **Errors** [812, 865, 5489, 5985, 2352, 278, 7133, 136, 175, 112, 389, 82, 395, 346, 746, 4224, 3295, 4393, 904, 905, 204, 205, 2752, 356, 5337, 2968, 53, 77, 6023, 371, 995, 3939, 1336, 4280, 6131, 6132, 6611, 2609, 4771, 848, 79, 944, 7175, 7118, 326, 5242, 1080, 1185, 2317, 5396, 1270, 1959, 6670, 3733, 423, 4818, 4819, 249, 5917, 3745, 5297, 2377, 2900, 3262, 3089, 394, 6001, 6433, 3624, 4379, 2417, 3463, 6572, 4065, 6009, 6106, 6339, 5549, 3312, 3149, 1058, 1060, 987, 990, 95, 1537, 5869, 3814, 4925, 927, 3945, 4625, 1170, 2296, 4281]. **errors** [1072, 1937, 1252, 6239, 458, 1708, 3537, 2851, 2852, 6754, 2620, 199]. **Erweiterungen** [1936]. **escalator** [1983]. **eServer** [4848, 4621]. **especially** [2420]. **Essais** [17]. **Essays** [3159, 1554, 17]. **ESSCIRC** [7429, 7416]. **Essential** [2225]. **Estimate** [482, 5779, 4786, 7017, 6792]. **Estimates** [1195, 964, 1123, 1129, 2103, 5858, 544, 461, 4002, 6321, 6572, 3133, 3649, 5210, 1462, 1925, 4780, 6628]. **Estimating** [2195, 3054, 5414]. **Estimation** [6644, 327, 3584, 905, 4115, 6131, 6132, 6611, 3089, 5736, 2726, 5854, 1756, 4743, 5870, 2605, 948]. **estimators** [4978, 1060]. **ETAPS** [7466]. **etc** [1630, 6677]. **Étendue** [17]. **ethical** [3842]. **Etruscan** [5545]. **ètude** [990, 2004]. **Euclid** [3892]. **Euclidean** [6421, 3556, 3857, 1093, 4673, 6409, 4703, 5512, 2785, 4127]. **Euro** [7597, 3742, 3884, 4012, 7339, 7395, 7597]. **Euro-Par** [7597, 7395, 7597]. **Euro-Par'96** [7395]. **EUROCAL** [7258]. **EUROMICRO** [7506, 7457, 7419]. **Europe** [7513, 7347, 7463, 7320]. **European** [7258, 4171, 7372, 7429, 7416, 7303, 7359, 7290, 7352, 4170]. **EUROSAM** [7217]. **EUSIPCO** [7290, 7352]. **EUSIPCO-88** [7290]. **EUSIPCO-92** [7352]. **Evading** [922, 923]. **Evaluate** [767, 5314]. **Evaluates** [1307]. **Evaluating** [3719, 5393, 6665, 5287, 427, 1859, 2555, 1057, 2601, 6626, 2165, 6236, 3879, 4998, 6288, 3125]. **Evaluation** [4957, 2037, 1083, 1362, 7124, 6492, 298, 6496, 729, 954, 5821, 248, 5701, 5903, 1384, 2678, 5993, 2524, 280, 734, 873, 874, 1026, 1114, 305, 427, 467, 1123, 737, 7037, 3440, 2719, 3449, 6427, 6697, 6085, 3613, 5746, 5934, 6310, 259,

6568, 400, 440, 1229, 5323, 7060, 5331, 691, 1530, 3136, 3140, 6589, 3920, 4738, 5773, 3313, 764, 837, 917, 6954, 1444, 6350, 1062, 6358, 1543, 1915, 5083, 6137, 1177, 1184, 2856, 4528, 552, 2183, 4506, 4659, 4660, 863, 955, 7012, 7126, 5396, 1819, 2874, 4830, 2886, 3069, 6168, 2211, 1397, 1513, 6804, 4841, 4846, 5516]. **evaluation** [562, 1408, 6552, 682, 7143, 5603, 5749, 5933, 4231, 4390, 5043, 3916, 689, 4732, 448, 477, 3144, 5624, 2773, 3321, 1234, 4255, 1452, 5209, 192, 193, 3373, 3533, 4947, 285]. **Evaluations** [6829]. **Evaluator** [6390, 2113]. **Even** [1950, 6774, 4587, 5881]. **Even-Type** [5881]. **Event** [7359]. **Ever** [6795, 1671]. **Ever-Changing** [6795]. **Every** [6790, 2889, 2706, 2707, 4707, 3018]. **Everybody** [4336]. **Everyone** [3902, 3903]. **Everywhere** [3902, 3903]. **Evils** [6042]. **Evolution** [5900, 5400, 3750, 3793, 6793, 29, 3695, 29]. **Evolutionary** [4598]. **Evolving** [3875, 4004]. **Exa** [7112]. **Exa-Scale** [7112]. **Exact** [3048, 5131, 6047, 4316, 5681, 4322, 6267, 3407, 4816, 4338, 7023, 4013, 3430, 3079, 4359, 6294, 3894, 1131, 4370, 6087, 5748, 1304, 6314, 895, 1045, 6098, 4879, 5044, 5045, 7146, 1529, 2937, 6577, 5548, 3652, 2768, 3655, 4416, 5863, 6358, 3169, 4449, 2622, 4144, 5576, 5662, 4488, 299, 4975, 2653, 5819, 3980, 4513, 5136, 5505, 3590, 3297, 5756, 5757, 5321, 4065, 6006, 5946, 4580, 4581, 5048, 6110, 5547, 3654, 5065, 1765, 6116, 6117, 6608, 4783]. **Exactly** [3342, 4260, 2303]. **examine** [3707]. **Examining** [643]. **Example** [5583, 4333, 4586, 6607, 721, 5134, 1227, 319, 5638]. **Examples** [607, 10, 1775, 827, 2923]. **Exascale** [5906, 5913, 6269, 5989, 6186]. **ExBLAS** [6087, 6088]. **Exception** [3249, 6906, 6907, 7131, 1520, 3274, 4216, 3283, 2919, 6931, 7060, 3315, 2645, 3066, 6683, 7032, 3263, 3899, 3615, 3900, 4217, 1358]. **Exception-Handling** [2919]. **Exceptions** [6994, 2085, 2096, 6570, 6932, 5895, 3401, 1203, 3441, 3603, 2228, 7057]. **Excess** [6100]. **Excess-Modulo** [6100]. **Exchange** [6492, 6783, 6728, 1671]. **execute** [4670]. **executing** [1753, 4113]. **Execution** [6871, 3039, 4374, 5533, 1886, 3940, 7101, 7102, 6865, 1562, 417, 5894, 4019, 6691, 2541, 3630, 2570, 3532, 35]. **Exercise** [5815, 1330]. **Exercises** [4424, 2815, 3002]. **Exhaustive** [6383, 3598]. **Exhibition** [7239, 7485]. **Existence** [438, 5339, 5294, 5158, 7234]. **existing** [6679]. **exit** [3503]. **ExPAN** [6836]. **expanded** [1524]. **Expanding** [2722]. **Expansion** [1821, 6074, 6596, 2626, 977]. **Expansions** [549, 3877, 4005, 4006, 6193, 6582, 6212, 6354, 6131, 6132, 6611, 242, 6161, 6003, 146]. **Experience** [3723, 1654, 124]. **Experiences** [1560]. **experiment** [2068, 2624]. **Experimental** [328, 4505, 6893, 179, 6546, 591, 149, 1638, 7172, 340, 341]. **Experiments** [1161, 6786]. **Expert** [3073, 5264]. **Explaining** [1038, 4431]. **Explains** [5324]. **Explanation** [5579, 5508, 4389, 957, 1]. **Explication** [1]. **Explicit** [6262, 5512, 6436, 6560, 6568, 6604, 1699, 4703]. **Exploit** [4609, 1245]. **exploitation** [4986]. **Exploiting** [3215, 5891, 6148, 6400, 4704, 2416, 5183, 5184, 5328, 3163, 3940, 457, 4292, 3807, 7097]. **Exploration** [6494, 6891, 5488, 6675, 7132, 5922, 7061, 6214, 4921, 4947, 5198]. **Explorations** [6678]. **Exploring** [7131, 6925, 6836, 3822, 5698]. **Explosion** [4154]. **Expm1** [2614, 3008]. **Exponent** [5476, 5760, 5945, 6726, 3025, 2043, 2932, 4881, 3323, 6033, 2847]. **Exponential** [5578, 6265, 248, 1960, 4177, 6280, 6685, 1519, 4198, 3610, 1980, 1749, 6324, 5185, 5422, 6954, 4907, 2476, 2611, 5971, 1184, 3983,

610, 4340, 4341, 4832, 4846, 3758, 201, 7145, 3474, 2782, 4751, 414, 5592]. **exponentially** [2042]. **Exponentials** [668, 1848, 3125, 783]. **Exponentiation** [3979, 6402, 5275, 3736, 6170, 6413, 5717, 5832, 5517, 3438, 3612, 4381, 3776, 6329, 6118, 771, 5353, 3839, 3958, 1479, 5908, 4317, 500, 3878, 5005, 4023, 4233, 6473, 3007, 5381, 5383]. **exponents** [4088, 5218]. **Export** [3747]. **Exposé** [2236]. **Expr** [4144]. **Expressing** [2283]. **Expression** [3136]. **Expressions** [4790, 729, 810, 5701, 3073, 2899, 6206, 6022, 708, 1919, 1556, 1186, 5703, 5590, 6122, 7158]. **ExSdotp** [6887]. **Extant** [408]. **Extended** [2861, 6378, 331, 5289, 5290, 7135, 7136, 7137, 2714, 6297, 2545, 7048, 6193, 6310, 2400, 3778, 7056, 5328, 6212, 3332, 1457, 1003, 721, 1086, 1011, 6161, 1028, 4032, 7042, 3116, 633, 4582, 5862, 4896, 1337, 5218, 2831, 4821]. **extended-precision** [721, 6161, 4032, 633]. **Extended-Range** [1457]. **Extending** [1487, 5252, 617, 3745, 6325, 6112, 1893, 4319]. **Extensible** [6240]. **Extension** [1261, 4300, 3856, 7003, 6887, 2655, 3873, 6526, 1733, 5921, 6920, 7137, 5727, 5169, 5170, 5171, 5527, 3775, 2735, 6930, 765, 919, 6839, 3160, 2275, 4104, 1936, 1470, 7120, 4306, 6672, 5593, 735, 4914, 2466, 4932]. **Extensions** [5128, 4308, 2045, 5484, 6178, 5195, 481, 5958, 3158, 2142, 3524, 7116, 1996, 5107]. **Extent** [1554, 17]. **Extentions** [4593]. **External** [6772, 3477]. **Extra** [2180, 4864, 5144]. **Extra-Precise** [4864, 5144]. **Extracting** [13, 36, 7087, 1445, 5091, 6868]. **Extraction** [727, 158, 49, 638, 686, 5343, 4080, 5971, 3599, 4036, 1160]. **Extractor** [2715]. **Extracts** [2583, 1398]. **Extrapolation** [6568, 3312, 6677]. **extremal** [4590, 4734]. **Extreme** [2481, 2080].

F [5482]. **F00F** [3870]. **F77** [3477]. **F90** [3477]. **Face** [6949]. **Face-off** [6949]. **Facilities** [4178, 827]. **Facility** [2105]. **fact** [3696]. **Factor** [5245, 1823, 2816, 1977, 2749, 1438]. **Factor-2** [5245]. **Factorial** [2904]. **Factorial-Base** [2904]. **factorising** [604]. **Factorization** [6577, 5958, 6021, 2828, 6140, 4712, 2119, 3337, 4765, 5803]. **Factorizations** [7155]. **Factors** [6995, 2072, 6109, 2213]. **factory** [3600]. **fading** [4242, 4640]. **Fail** [6513]. **Failure** [3546, 1523, 3784, 2869, 3635, 3130]. **Fairchild** [403]. **Fairmont** [7502]. **Faithful** [4305, 4511, 5323, 4433, 5447, 5448, 3507, 3815, 4302]. **Faithfully** [5992, 6075, 6085, 6711, 6134]. **Fall** [7176, 7186]. **fallback** [7077]. **Falls** [7484]. **Family** [2497, 4798, 1579, 1580, 2660, 5397, 5400, 1834, 5718, 5720, 4860, 3101, 3278, 4059, 4384, 1643, 3303, 4275, 3823, 5373, 4485, 2502, 5396, 6000, 7276, 2564, 2948, 3353, 3370]. **famous** [6736]. **Fan** [2136]. **Fan-In** [2136]. **Fans** [6854]. **FAQ** [4973, 6897, 6898, 6899, 6900, 6901, 6902]. **FasMath** [2518]. **Fast** [4492, 6645, 6870, 3539, 4295, 4653, 5809, 378, 219, 3856, 5251, 6150, 2183, 7002, 3046, 3047, 5678, 3229, 3860, 2050, 6778, 1718, 6264, 2052, 954, 6662, 5691, 1584, 2339, 2340, 4328, 5489, 1384, 1588, 6671, 6672, 6673, 1019, 3997, 6519, 1595, 1829, 3064, 3242, 2684, 5498, 3244, 5402, 5907, 4529, 4530, 4828, 5912, 3424, 4009, 1832, 6411, 3074, 7025, 2526, 5004, 3429, 4187, 821, 4022, 6071, 1607, 3747, 1843, 1518, 1848, 1613, 557, 2079, 5523, 3893, 5301, 3608, 3761, 5601, 4860, 3610, 3612, 2719, 1300, 6550, 3449, 3276, 4041, 6428, 7143, 6303, 3452, 6188, 310, 5934, 4226]. **Fast** [4380, 2553, 2736, 1422, 3295, 3776, 1636, 3910, 5849, 6714, 1881,

5330, 5540, 1049, 5187, 1886, 2111, 5052, 3140, 4738, 2572, 6211, 6455, 5773, 7077, 6116, 6117, 6728, 5196, 5345, 1153, 919, 3659, 4422, 4599, 4742, 5867, 2783, 2784, 3805, 4088, 6595, 5349, 5074, 3810, 2798, 4610, 4913, 4437, 4753, 1677, 2143, 5449, 5555, 5635, 5871, 4102, 1543, 1166, 4922, 2465, 4448, 6473, 6606, 3179, 2466, 2468, 2606, 2609, 4124, 1693, 2157, 1073, 6031, 6475, 3360, 3361, 6375, 6860, 6979, 850, 325, 2843, 3022, 3373, 3374, 3533, 5235, 2169, 5380, 5381, 6034, 2845, 5975, 4485, 5240, 5241, 2856, 4821]. **Fast** [5276, 4289, 4940, 6376, 803, 3029, 2502, 953, 5819, 1497, 6393, 2057, 6787, 3422, 4830, 2887, 3070, 3879, 4010, 4536, 4021, 4846, 4704, 2219, 1740, 5516, 1972, 6419, 6420, 4205, 3264, 1215, 1296, 4209, 5525, 3272, 1411, 7043, 7044, 7141, 1620, 5311, 3617, 5415, 2100, 2738, 3122, 5757, 4233, 5423, 907, 2754, 4733, 910, 1647, 2954, 3920, 3321, 3663, 4255, 6219, 2272, 2135, 1331, 6220, 7153, 1774, 1062, 3680, 3687, 3821, 2470, 4116, 1921, 3521, 5221, 5560, 3353, 4286, 3955, 5796, 6477, 543, 1184, 1561, 4642, 4294, 4655, 7014, 1385, 2235, 1995, 2259, 1771, 2007, 3676]. **Fast** [654, 1477, 2036, 6035]. **Fast-Direct** [2050]. **Fast-Division** [1049]. **fast-optimaler** [1062]. **Fast-Start** [5052]. **Fast2Sum** [6155, 6263]. **Faster** [6767, 1950, 4673, 3066, 3249, 118, 6413, 5295, 5511, 4354, 5729, 6541, 7140, 6559, 5608, 5754, 6574, 4426, 7093, 1920, 2837, 6136, 6144, 6658, 1491, 6786, 2693, 6107, 3016]. **Fastest** [464, 3035]. **FastRTS** [4631]. **FastTwoSum** [6823, 6712]. **Fault** [5893, 3402, 2207, 4192, 6177, 5728, 3107, 7363, 3328, 3329, 2134, 1171, 2170, 4643, 6991, 6149, 2181, 3046, 3047, 3592, 2716, 4559, 2252, 2969, 3518, 3520, 3205, 3368, 2849, 3378]. **Fault-Masking** [2170]. **Fault-Tolerant** [5728, 2134, 4192, 3328, 3329, 6991, 3046, 3047, 3592, 4559, 3518, 3205]. **faults** [3259]. **Faulty** [6871]. **FCC** [3747]. **FCCM** [7497, 7551, 7476, 7535]. **Fclass** [4564]. **FCT** [7214]. **FD** [6667, 6581]. **FD-SOI** [6667, 6581]. **FDIV** [3575, 3415, 3501]. **FDLIBM** [3148]. **FDTD** [4931]. **Fe** [7447]. **Feasibility** [2524, 1139, 1148, 4617, 2717]. **Feasible** [3632]. **Feature** [255, 5843, 6463, 3202]. **Features** [5053, 5189, 4417, 2863, 3037, 379, 3450, 2400]. **featuring** [7368]. **February** [7493, 7510, 7357, 7222, 7254, 7286, 7420, 7398, 7333, 7507, 7478, 7404, 4132]. **Federal** [108]. **Fédérale** [108]. **Federation** [7191, 7188]. **Feedback** [3053, 738, 5787, 7487, 2557, 114, 3144, 4905, 3537]. **feedback-directed** [7487]. **feedforward** [3056]. **Fehlerabschätzungen** [2103]. **Fehlerschranken** [405, 1335]. **Fehlerschranken-** [405]. **Feigenbaum** [2657]. **FELIN** [2062]. **Fermat** [3714, 6519, 1912, 5227, 2029]. **Few** [4079]. **Fewer** [4187]. **FFT** [1979, 6159, 1959, 6275, 6402, 5713, 6541, 1745, 1226, 1227, 3126, 1761, 910, 3142, 1438, 3149, 5786, 6607, 1692, 1926, 5878, 4459, 1932, 1933, 2156, 1072, 1176, 1251, 1356]. **FFT-Based** [6159, 6275, 6402]. **FFTS** [1066, 4301, 4999, 7059, 6136, 1986]. **FHT** [3273]. **fi** [408]. **fiable** [4236]. **Fibonacci** [4790, 2243, 1428, 3935, 1471, 661]. **fictions** [2777]. **fidelity** [978]. **Field** [7493, 7510, 7497, 5474, 7526, 7540, 5484, 7482, 5915, 6170, 6682, 3255, 5290, 4541, 6179, 4203, 7486, 7564, 6196, 4067, 7065, 3128, 3469, 1656, 5430, 3925, 4420, 7409, 7476, 7535, 7551, 1238, 4440, 5648, 3828, 4283, 5879, 7478, 6983, 3025, 2850, 3714, 5256, 6056, 5499, 5149, 3885, 3888, 2226, 1412, 5166, 4720, 3129, 3664, 3945, 1703, 2489, 3963, 4637, 4638, 2847, 7454].

Field-Oriented [6682]. **Field-Programmable** [7493, 7510, 7497, 7526, 7482, 7486, 7409, 7476, 7535, 7551, 5648, 7478, 5149, 3888, 7454]. **Fields** [3856, 5129, 5484, 5916, 5289, 4360, 5520, 5727, 5524, 4400, 4414, 4894, 6949, 3805, 7152, 1448, 2459, 4444, 1916, 6130, 5977, 2517, 3881, 4542, 2902, 2903, 3088, 3908, 5176, 2434, 4254, 3664, 3929, 4088, 2454, 4914, 3204, 3962, 4639]. **FIFOs** [3192]. **Fifteenth** [7426, 7238, 7172, 3985]. **Fifth** [7462, 7295, 1365]. **Fifty** [7598]. **Fifty-First** [7598]. **Figure** [5900]. **Figures** [55, 54, 1671, 3976]. **File** [3923]. **Files** [2588]. **Filter** [4182, 2953, 1055, 1150, 454, 2996, 4635, 2631, 6791, 4983, 5707, 3593, 3446, 2723, 629, 2246, 2419, 2929, 6009, 5429, 3814, 1067, 1783, 2020, 3959, 4475, 2491, 541, 542, 3015, 5111, 3845]. **filterbank** [5067]. **Filtering** [558, 2376, 1221, 630, 2418, 910, 5652, 5227]. **Filters** [1490, 3395, 3396, 3403, 6891, 4826, 743, 5937, 901, 7085, 6623, 6373, 6745, 1080, 1185, 1565, 2317, 1948, 1489, 7002, 3045, 1811, 3725, 2333, 3862, 3232, 2200, 4164, 4811, 1270, 4176, 1277, 4344, 2353, 3582, 1278, 674, 736, 3888, 1214, 1975, 5927, 4559, 1039, 1523, 1869, 2395, 1985, 3288, 3289, 474, 745, 3290, 2407, 2245, 896, 2557, 3299, 900, 976, 525, 572, 684, 4245, 5336, 1437, 5340, 4419, 985, 2965, 3150, 581, 6217, 4096, 1537, 1910, 2010, 2457, 2592, 2801, 2982, 840, 2984, 1918, 5967, 1068, 5088, 2294, 4281, 1788, 3835, 1797, 1939, 2630, 2495, 2852, 3245]. **FINAC** [136]. **Final** [3145, 3573]. **Financial** [5814, 7055, 4268]. **Find** [6382, 1093, 2899, 5818, 5550]. **Finding** [6995, 3545, 4666, 4329, 561, 2394, 6932, 7057, 4587, 6359, 6470, 6361, 532, 786, 5975, 416, 863, 955, 7143, 4580, 2754, 4456, 1835]. **Fine** [6442, 7079, 3257]. **Fine-Grain** [7079, 3257]. **Fine-grained** [6442]. **Finely** [6533]. **Finely-Pipelined** [6533]. **Fingers** [14, 170]. **Finite** [5129, 5474, 5677, 5484, 3566, 3567, 4534, 5721, 4360, 5520, 4203, 3458, 1635, 1876, 5034, 5612, 4400, 7065, 692, 1315, 1644, 1889, 3142, 449, 4894, 1656, 3656, 5430, 4420, 7152, 1448, 1238, 6026, 4444, 1916, 4478, 4638, 6983, 2850, 5977, 4662, 5256, 1816, 2517, 5499, 3881, 466, 4542, 1210, 2902, 2903, 3088, 2226, 1412, 5166, 1039, 4720, 3908, 5176, 636, 760, 2434, 5192, 836, 3664, 2454, 2602, 3516, 2820, 2489, 3204, 2491, 5111, 3962, 3963, 4637, 4639, 4946, 1754]. **finite-element** [2820]. **Finite-Field** [5474, 5430, 5499]. **Finite-Precision** [4478, 760, 5111]. **Finite-state** [5677]. **FIR** [1811, 4164, 5707, 4826, 2353, 3593, 3446, 2929, 4245, 1150, 4419, 2020, 4128, 3959, 4635, 4475, 3245]. **Fire** [51]. **Firmware** [3796, 1837, 1633, 918]. **Firmware-Oriented** [3796]. **First** [7246, 195, 5279, 7372, 7407, 3895, 7207, 7374, 7430, 567, 7061, 1146, 7598, 3485, 237, 1909, 2595, 73, 19, 22, 56, 3201, 957, 7467, 249, 6921, 7327, 3756, 3765, 7557, 1052, 369, 1159, 4435, 7403, 3192, 2157, 3835, 3015, 7583, 588]. **first-** [3835]. **first-in** [3192]. **first-order** [3015]. **first-out** [3192]. **Fischler** [2481]. **Fisherman** [7487]. **Fists** [170]. **Fitting** [373]. **Five** [5060, 1714, 3437]. **five-moduli** [1714]. **fix** [6382, 6538]. **fixe** [2762]. **Fixed** [2636, 4493, 5666, 3542, 5886, 2042, 1371, 7125, 6660, 2669, 1821, 3056, 6399, 3990, 4816, 960, 7132, 2075, 6807, 3889, 390, 6295, 4202, 3896, 6304, 741, 5744, 5745, 3294, 1139, 3911, 6318, 6444, 4066, 4399, 6008, 911, 1148, 6454, 5786, 7104, 189, 6623, 491, 5566, 6745, 6979, 5658, 7120, 5909, 6059, 6793, 5386, 1263, 1810, 4808, 2668, 5902, 736, 4845, 968, 2712, 5927, 6695, 3272, 3273, 2723, 3276, 5311, 3614, 2395, 1986,

521, 4232, 6202, 684, 981, 2762, 6719, 3144, 3797, 2446, 5429, 2965, 5346, 2274, 3336, 4917, 6226, 5967, 4623, 4925, 3347, 4772, 4128, 147, 1797, 541, 542]. **fixed** [2307, 2628, 6058]. **Fixed-** [2669, 5744, 5745, 5658, 2762]. **Fixed-Integer** [741]. **Fixed-Point** [4493, 5886, 6399, 3889, 6295, 3896, 6304, 3294, 3911, 6444, 4399, 6454, 5786, 7104, 6623, 491, 6745, 6059, 2636, 2042, 7125, 3056, 7132, 2075, 6318, 7120, 5909, 5386, 1810, 5902, 736, 4845, 968, 2712, 5927, 6695, 3272, 3273, 1986, 4232, 6202, 684, 6719, 3144, 2446, 5429, 2965, 3336, 4917, 5967, 4623, 4925, 3347, 4772, 4128, 2628, 6058]. **Fixed-Point-Arithmetic** [6660]. **Fixed-Posit** [6807]. **fixed-precision** [2307]. **Fixed-Rate** [6008]. **Fixed-Size** [1821, 4066]. **Fixed-Slash** [1139, 911, 1148]. **Fixed-Width** [5566, 3797]. **Fixed-Word-Length** [390]. **fixing** [6239]. **flag** [5456]. **flagged** [4982]. **flags** [5217]. **Flap** [5559]. **flash** [5202]. **Flaw** [3416, 3501, 3389, 3346]. **FLECKmarks** [3578]. **flerformat** [1740]. **Flex** [2063]. **Flex/32** [2063]. **FlexBlock** [7081]. **flexibility** [3202]. **Flexible** [5510, 6533, 6805, 6806, 5835, 6304, 4569, 1886, 7081, 698, 4763, 2838, 6751, 4535]. **flexiblen** [1886]. **Flexpoint** [6462]. **Fließkomma** [2304, 2305, 2306, 2485, 2486, 1476]. **Fließkomma-Arithmetik** [2304, 2305, 2306, 2485, 2486, 1476]. **Fließkommapakets** [2305]. **Flight** [3784, 3635]. **flip** [5948]. **Float** [2115, 2455, 5804, 6376, 5157, 5019, 6033, 6538, 3333]. **Float-Fix** [6538]. **float-float** [5157]. **float-point** [6033]. **float-Precision** [3333]. **float-to-string** [6376]. **float.h** [2793, 2587]. **Float16** [6997]. **Float8** [6997]. **FLOATing** [5628, 2041, 4499, 6998, 3964, 2635, 5805, 6992, 2037, 6482, 4647, 4958, 5246, 5806, 6037, 6142, 6646, 5578, 4494, 4648, 3848, 6994, 2174, 2175, 4496, 4959, 217, 417, 3968, 5666, 6243, 6484, 6995, 6757, 6244, 1485, 2858, 2859, 2860, 3030, 3031, 3032, 3033, 3034, 3217, 3218, 3219, 3221, 3545, 4653, 5125, 5127, 6042, 6381, 6383, 6652, 6996, 5668, 5669, 5812, 5813, 1948, 169, 1804, 5891, 6768, 4307, 2322, 4969, 1368, 1809, 3394, 5982, 1013, 3395, 3396, 3975, 4157, 4158, 4159, 1950, 4507, 2328, 4314, 1951, 4794, 6771, 1577, 2505, 2189, 3724, 6498, 5680, 861, 1015]. **Floating** [1095, 2049, 2332, 2655, 2870, 4514, 4515, 5257, 5477, 5682, 5896, 6048, 6049, 6050, 6388, 6774, 7007, 3402, 3403, 7008, 1579, 1580, 3404, 2052, 1719, 6051, 2507, 2053, 728, 2334, 5262, 5899, 6156, 105, 1267, 1268, 1377, 6505, 4323, 4807, 4981, 6392, 6663, 7016, 3562, 6508, 2509, 5483, 247, 6394, 865, 5694, 171, 3233, 3409, 1498, 1499, 5397, 5137, 6667, 2665, 1584, 5586, 2669, 3568, 4328, 5486, 5823, 6892, 1271, 2672, 2673, 2674, 5985, 6053, 6270, 3057, 3990, 1725, 2515, 731, 1197, 1386, 1502, 1503, 1726, 1825, 2206, 2345, 3059, 3993, 6160, 3995, 1198, 1199, 1275, 1388, 1727, 5905]. **Floating** [3871, 3999, 5140, 5272, 5494, 5495, 2875, 4331, 4816, 3417, 3418, 3577, 2063, 2064, 3420, 3734, 6167, 6163, 3578, 3873, 3875, 4336, 6790, 2350, 2519, 2520, 6676, 4005, 4006, 4338, 2208, 4825, 617, 2352, 2885, 3248, 4345, 4531, 4533, 4685, 4828, 5911, 5912, 6060, 6795, 6166, 1965, 5278, 4689, 6911, 5280, 5148, 6525, 3740, 4349, 6913, 6798, 1966, 2067, 502, 6169, 3883, 1733, 1833, 2889, 2891, 1968, 5407, 505, 1395, 1834, 6413, 6682, 4537, 5288, 5506, 3428, 3744, 4016, 4183, 3255, 5507, 1838, 4698, 6172, 2215, 1279, 6801, 6802, 963, 1512, 3429, 1204, 6530, 1514, 4699, 6173, 5597, 4189]. **Floating** [7030, 822, 2217, 6531, 6683, 7032, 5006, 5831, 1280, 2218, 2895, 6285,

4539, 2703, 5715, 2530, 3258, 3747, 227, 228, 1608, 1971, 5512, 824, 878, 4028, 5834, 881, 1285, 6807, 1741, 2374, 2706, 2707, 4707, 966, 5409, 5924, 6286, 6686, 967, 1033, 1403, 1610, 6687, 4358, 4547, 5517, 307, 1611, 308, 678, 2221, 2222, 2378, 1849, 1850, 4195, 7037, 5724, 5725, 2713, 6180, 6290, 6291, 6292, 6809, 7137, 4856, 3753, 970, 392, 393, 3439, 3758, 4035, 4198, 4199, 5160, 5300, 3893, 6540, 3262, 2540, 1036, 1037, 3606, 3091, 6811, 5601, 1616, 1976, 1297, 436]. **Floating** [6694, 4367, 971, 6548, 3447, 5526, 2542, 5731, 1299, 2544, 2718, 2908, 6184, 6696, 6302, 1301, 1410, 5309, 5840, 3896, 1132, 6187, 1619, 5165, 3899, 6553, 1861, 1862, 1863, 2088, 2089, 6554, 7046, 7047, 4217, 5170, 5740, 6699, 3102, 3103, 4212, 3280, 343, 1865, 4216, 5167, 5602, 6090, 2913, 5929, 3104, 3105, 5743, 6305, 5531, 5746, 5748, 5930, 5932, 6306, 6434, 4048, 4374, 3901, 5532, 1304, 1627, 1222, 2397, 6193, 6310, 6705, 255, 6312, 1628, 5935, 6194, 627, 345, 1224, 1308, 1417, 1987, 2236, 2919, 3768, 3902, 3903, 4221, 4375, 4564, 4864, 4865, 5026, 5416, 5842, 4378, 3770, 743, 746, 3290, 7051]. **Floating** [5313, 3291, 1871, 5752, 2551, 6563, 1751, 891, 1042, 258, 2552, 3294, 5535, 828, 4229, 3462, 2413, 2926, 2927, 1139, 5318, 5319, 5846, 4387, 3777, 751, 752, 894, 1988, 4570, 896, 1046, 753, 6095, 5848, 5939, 3298, 6570, 6571, 6931, 6932, 6318, 6319, 4575, 4877, 6711, 6099, 6197, 6322, 6324, 5183, 1637, 6102, 5041, 2106, 350, 2423, 2746, 2748, 2935, 6199, 4578, 4879, 5044, 6200, 6327, 6573, 5761, 5762, 6826, 1529, 441, 5327, 5328, 7060, 7062, 6204, 1142, 6449, 2108, 5187, 6008, 6450, 832, 905, 1431, 571, 5763, 6205, 3302, 2940, 2941, 2251, 2430, 6335, 6579, 2752, 1890, 4893, 2561, 94]. **Floating** [6581, 1760, 640, 687, 2563, 5950, 3646, 980, 6453, 1641, 2759, 7068, 1643, 6207, 3133, 5858, 6831, 4589, 526, 577, 911, 1148, 3792, 5770, 403, 2568, 1149, 4409, 6941, 6341, 1999, 6342, 3478, 3142, 5622, 4410, 7072, 7148, 983, 2259, 5546, 5337, 3795, 450, 6013, 6014, 6345, 6346, 6347, 6590, 6591, 363, 2438, 5548, 1532, 1764, 6210, 642, 1896, 2120, 2262, 2442, 2443, 3147, 5062, 5626, 6212, 6456, 1438, 3923, 1152, 2121, 2771, 7082, 4417, 2449, 2450, 6458, 6594, 6724, 5953, 916, 5069, 5954, 6020, 3799, 5196, 5345, 7081, 3488, 2780, 4087, 3658, 3660, 3662, 3802, 3803]. **Floating** [4086, 5072, 2575, 2968, 2576, 5956, 4424, 2783, 2784, 5431, 7084, 2004, 645, 1059, 1325, 2579, 2268, 4263, 6218, 646, 6730, 1157, 1235, 1327, 5958, 6021, 5630, 2131, 7089, 702, 4266, 4432, 6022, 2272, 2791, 2792, 3158, 2008, 6599, 5553, 838, 2795, 2979, 1773, 6126, 2588, 3161, 4910, 5631, 5438, 5439, 2009, 6463, 6464, 2278, 992, 2982, 2279, 1239, 3676, 922, 923, 6222, 2280, 994, 3164, 2281, 4615, 5632, 2282, 6224, 2803, 5079, 5447, 5448, 5634, 5963, 4272, 6733, 6469, 1541, 6359, 1680, 454, 1681, 6360, 3939, 3940, 5081, 1544, 4103, 2600, 1455, 1776, 4921, 5083, 5355, 2288, 4111, 4278, 4448]. **Floating** [4762, 5084, 5787, 7099, 4622, 5086, 2989, 1686, 7104, 1777, 5644, 5875, 2601, 3688, 4925, 2467, 269, 212, 2151, 2990, 2018, 5790, 1547, 2469, 788, 1687, 2811, 2996, 3184, 3185, 3186, 3349, 3693, 3694, 2293, 5968, 6232, 6971, 7110, 3350, 6131, 6132, 6611, 2021, 2022, 1690, 1691, 3001, 5969, 2607, 4926, 5214, 5215, 5216, 5217, 5452, 5453, 5454, 5455, 5456, 2815, 3002, 844, 1339, 1459, 1460, 1786, 5559, 3950, 3951, 5097, 1341, 2297, 4122, 2026, 5878, 4281, 6233, 3953, 1787, 5561, 2476, 2613, 2614, 3008, 5100, 5101, 1466, 5562, 6741, 1790, 5224, 5368,

3524, 4933, 6134, 6624, 4130, 593]. **Floating** [3354, 4465, 6366, 7113, 6030, 7114, 6474, 1073, 5369, 2028, 3835, 849, 5370, 5563, 2828, 3196, 3525, 2830, 6743, 3357, 6367, 2832, 2833, 1350, 5104, 1076, 5565, 5880, 3703, 1351, 3838, 3199, 6238, 6475, 6476, 2305, 3957, 215, 6375, 1470, 1702, 2623, 1703, 5110, 5233, 5377, 5378, 5572, 5573, 5655, 5658, 6478, 1557, 1355, 1472, 1473, 1474, 1475, 3961, 2034, 5799, 7117, 2035, 3017, 3018, 5973, 216, 3207, 2308, 6240, 2842, 4291, 6139, 134, 1798, 5236, 5974, 2631, 800, 1358, 3025, 1707, 3536, 5384, 5802, 4145, 949, 1942, 6748, 6864, 6865, 5976, 6639, 5117, 5576, 5662, 5118, 5385, 5242]. **Floating** [6641, 5592, 5709, 5908, 4634, 6370, 4289, 1938, 2176, 3382, 5386, 663, 2857, 1944, 1945, 6480, 3966, 1565, 5665, 6242, 3029, 3713, 3850, 5466, 5467, 6040, 6144, 6041, 721, 297, 1486, 2498, 2640, 3035, 3220, 3387, 3388, 3389, 3390, 4498, 6382, 6489, 6490, 6997, 2499, 1086, 1011, 5670, 1801, 2318, 1802, 1803, 1363, 2320, 1570, 1571, 2043, 2321, 4792, 6148, 4155, 1488, 2502, 2867, 3043, 5582, 5894, 2045, 1369, 1808, 2184, 2503, 2185, 5895, 4310, 2047, 2325, 7002, 2649, 3227, 3045, 2326, 4313, 5252, 5253, 1092, 2186, 1371, 2329, 5818, 4797, 2504, 1191]. **floating** [5133, 3860, 2330, 6259, 2331, 2190, 2652, 2653, 3051, 1814, 4318, 4513, 4663, 4800, 4801, 4802, 5134, 5256, 5983, 6261, 3725, 1717, 300, 2191, 667, 5259, 5584, 4321, 3861, 1016, 4805, 5394, 5585, 7010, 7011, 7127, 2192, 1017, 1194, 6391, 5822, 6664, 3232, 4982, 3563, 1816, 2194, 2662, 7129, 6393, 1955, 6509, 1378, 6510, 3408, 6268, 1379, 4812, 4983, 2667, 3234, 380, 1586, 6395, 3864, 4986, 1819, 2058, 2671, 3731, 3866, 5902, 1381, 1723, 2204, 2341, 4519, 5491, 3988, 3989, 5986, 4814, 4815, 3992, 1590, 5493, 5702, 6161, 4172, 2680, 1105, 1962, 3998, 4681, 4526, 422]. **floating** [5496, 3419, 5704, 2348, 2876, 2877, 2878, 3874, 4004, 3243, 6278, 2685, 6279, 5403, 5404, 960, 1277, 2687, 6405, 5989, 5710, 3065, 2884, 3247, 3423, 4532, 4686, 4827, 6165, 6062, 4007, 3067, 249, 4831, 5147, 5277, 4346, 962, 4535, 5593, 6679, 5149, 2522, 5282, 2523, 4996, 2354, 4179, 2888, 5283, 2209, 503, 1734, 1735, 2890, 5995, 4010, 1203, 5285, 5150, 5504, 735, 1117, 5002, 4184, 4185, 6919, 4696, 4697, 5596, 1513, 1969, 2366, 1737, 1970, 820, 509, 3745, 1205, 5292, 1030, 6284, 2896, 2370, 4845, 6684, 4703, 5833, 4704, 283, 3082, 3259, 4706, 4848, 3083, 2532, 622, 880]. **floating** [1031, 1209, 1284, 1740, 3435, 2898, 3084, 1032, 2708, 1844, 5514, 1845, 2536, 1846, 5719, 2376, 4851, 4852, 1847, 5410, 5999, 6076, 6535, 1288, 2377, 252, 178, 3890, 2381, 1851, 4361, 4855, 3891, 2538, 4031, 6691, 6692, 3086, 4032, 5014, 3600, 5839, 7039, 4033, 4550, 4710, 6539, 2900, 2901, 3602, 6422, 3089, 3441, 3603, 1292, 1408, 1214, 1975, 3605, 2223, 3442, 1409, 1298, 3267, 3096, 4039, 2224, 4558, 2906, 2541, 3097, 2717, 5305, 5306, 1745, 2909, 6427, 6552, 6697, 5733, 2086, 5734, 517, 827, 1216, 2389, 5736, 682, 2391, 1219, 1864, 1747, 3282, 3615, 5168, 5169, 5171, 5527, 2227, 2228]. **floating** [4043, 4561, 7143, 3614, 1134, 1220, 1867, 2392, 4717, 5928, 2912, 4563, 5744, 5745, 1625, 3285, 6001, 6191, 6307, 6308, 6433, 201, 2090, 3618, 6002, 6437, 2231, 2917, 3108, 3286, 6003, 2233, 2401, 2402, 2234, 3109, 2094, 2095, 3456, 3621, 3622, 4220, 4222, 5604, 5750, 4719, 2921, 3288, 3458, 3624, 3289, 6093, 629, 474, 745, 2405, 2406, 2407, 2408, 747, 748, 1225, 2241, 2100, 1633, 312, 521, 4871, 4872, 6315, 2740, 1226, 1227, 2412, 2414, 2415, 1752, 1875, 1528, 1753, 5611, 6821,

3630, 3909, 4388, 3121, 3297, 4875, 5613, 2930, 3463, 5320, 830, 898, 974, 1994]. **floating** [4232, 5940, 6097, 4876, 2557, 3299, 900, 976, 2932, 7057, 2247, 2248, 5942, 6442, 6321, 3912, 3913, 5850, 5184, 7145, 6202, 756, 2747, 2934, 3123, 4577, 5853, 6103, 6006, 5946, 4880, 3785, 4402, 4583, 352, 4585, 3916, 6827, 4881, 525, 572, 5617, 1758, 5331, 3637, 5618, 5948, 1639, 5333, 5334, 4240, 6010, 4883, 6580, 2253, 1051, 1996, 1314, 2947, 3644, 574, 641, 758, 759, 402, 689, 690, 575, 6011, 2255, 4885, 1997, 1998, 981, 910, 3132, 1435, 2567, 4590, 4734, 6110, 3135, 2257, 2117, 2762, 5056, 2258, 5336, 3141, 6718, 7071, 1647, 1648, 1649, 696, 2569, 5771, 5861, 3480, 5338, 4892]. **floating** [5058, 5340, 5341, 5342, 5426, 5547, 6944, 2570, 2000, 3922, 5061, 5428, 320, 1895, 2261, 2441, 2444, 2768, 3654, 6016, 2960, 2961, 918, 7078, 2447, 2448, 985, 4253, 3316, 4741, 2265, 3150, 6215, 3317, 3318, 3928, 2452, 3804, 4901, 6955, 3323, 581, 4902, 5346, 5867, 6217, 481, 4255, 3152, 3153, 5347, 5551, 6122, 5868, 986, 4258, 4092, 4261, 5777, 766, 987, 3807, 4093, 7087, 4747, 3330, 6124, 4905, 1328, 2005, 5778, 7088, 2269, 208, 701, 990, 2270, 2974, 2271, 3809, 7090, 2273, 2585, 3332, 527, 7091, 3499, 2274, 7163, 2589, 2797, 2981, 4911, 2277, 3335, 4096, 5781, 6220]. **floating** [2457, 2592, 2801, 2593, 2594, 1774, 2139, 1333, 5076, 6845, 993, 529, 1241, 1242, 1334, 707, 1063, 2983, 1064, 3336, 1678, 484, 4917, 3503, 774, 5960, 5636, 5637, 5870, 6227, 5784, 3936, 3937, 4100, 1337, 4918, 4617, 1914, 3165, 107, 5785, 5640, 6470, 998, 2984, 2463, 3938, 5641, 3679, 3339, 777, 2014, 2285, 2599, 2145, 7098, 4919, 6028, 710, 711, 3176, 3819, 4112, 4761, 5556, 2465, 3941, 4449, 4923, 4924, 5788, 3943, 3685, 2805, 2806, 2987, 2988, 2807, 3346, 3181, 2290, 3687, 3821, 4623, 927, 3182, 3512, 2017, 3513, 1066, 3945, 5210, 4119, 4450, 6736, 3822, 2472]. **floating** [1689, 1922, 3000, 4625, 2294, 1170, 2473, 2474, 4451, 4452, 4627, 5091, 5092, 5093, 5218, 5219, 5360, 5361, 5362, 5363, 1785, 1461, 293, 1462, 2025, 4769, 3697, 4125, 376, 324, 4771, 846, 2823, 2824, 3192, 3193, 5099, 1929, 3698, 147, 1465, 1788, 1931, 2300, 1935, 1789, 3009, 5223, 6364, 3010, 1697, 847, 3353, 4462, 4934, 1072, 3355, 1347, 4131, 4287, 7156, 1792, 3700, 1793, 1698, 1937, 4134, 4288, 2030, 942, 6368, 4937, 4938, 716, 795, 3701, 1794, 2621, 2482, 2484, 4468, 4469, 2032, 5231, 1352, 2835, 2164, 493, 3202, 2487, 850, 3959, 2490, 3013, 4778, 4943, 5232, 5379, 5798]. **floating** [6239, 2491, 1796, 1704, 1356, 1797, 541, 542, 543, 2166, 2307, 5111, 796, 2492, 2493, 1256, 295, 1705, 2167, 3208, 3372, 1939, 1560, 2310, 2494, 1357, 2627, 4138, 1799, 1561, 4946, 5238, 5575, 5800, 948, 2630, 4140, 4292, 4947, 4948, 5801, 599, 798, 2847, 6984, 194, 2849, 2313, 2495, 2851, 2852, 3211, 3845, 7158, 5240, 4953, 4954, 5119, 5121, 4644, 4784, 4785, 2315, 6754, 6989, 5143, 2351, 2688, 1253, 6500, 1732, 3900, 4878, 1885, 3651, 3194, 2304, 2305, 2306, 2485, 2486, 1476, 5591, 996]. **floating-** [5386, 5902]. **Floating-Decimal** [134]. **Floating-Point** [2041, 6998, 3964, 2635, 4647, 4958, 5246, 5806, 5578, 4648, 6994, 4959, 3968, 6484, 6995, 6244, 4653, 5127, 6381, 6383, 6652, 6996, 5668, 5669, 5812, 5813, 5891, 6768, 4969, 3395, 3975, 4157, 4158, 4159, 1950, 4507, 2328, 4794, 6771, 2505, 3724, 5680, 861, 1015, 1095, 2049, 2655, 2870, 5257, 5477, 5682, 5896, 6048, 6049, 6050, 6388, 6774, 3403, 3404, 2052, 6051, 2507, 2053, 728, 2334, 5899, 6156, 1267, 1268, 1377, 4323, 6392, 6663, 7016, 3562, 6508, 5483, 247, 865,

5694, 3233, 3409, 5137, 6667, 2665, 1584, 5586, 2669, 3568, 4328, 5486, 5823, 6892, 1271, 6270, 731, 1386]. **Floating-Point** [1503, 1726, 2345, 3059, 3993, 6160, 3995, 1199, 1275, 1727, 5905, 3871, 3999, 5140, 5272, 5494, 5495, 2875, 4331, 3417, 3418, 3577, 2063, 6167, 6163, 4336, 6790, 2519, 2520, 6676, 4338, 4825, 617, 5911, 5912, 6060, 6795, 6911, 5280, 5148, 6525, 4349, 6913, 1966, 2067, 6169, 3883, 1733, 2889, 2891, 5407, 505, 6682, 4537, 5288, 5506, 3428, 4016, 4183, 1838, 6172, 2215, 1279, 6801, 6802, 1512, 6173, 4189, 7030, 2217, 6531, 5006, 5831, 1280, 2218, 2895, 6285, 4539, 5715, 3747, 1971, 5512, 878, 4028, 881, 1285, 6807, 2706, 2707, 4707, 5409, 5924, 6286, 6686, 1403, 1610]. **Floating-Point** [6687, 4358, 4547, 5517, 307, 2221, 2222, 2378, 1850, 4195, 7037, 5725, 6809, 4856, 970, 392, 393, 5300, 3893, 2540, 6811, 5601, 1976, 971, 6548, 2544, 2718, 2908, 6184, 6302, 1301, 5309, 5840, 3896, 1132, 6187, 1619, 6553, 1861, 1862, 1863, 2088, 2089, 6554, 7046, 5170, 5740, 6699, 3102, 3103, 4212, 343, 5602, 6090, 5929, 5531, 5746, 5748, 5930, 5932, 6306, 6434, 4374, 3901, 5532, 1222, 6193, 6310, 6705, 1628, 5935, 6194, 345, 1224, 1308, 1417, 1987, 2919, 3768, 3902, 3903, 4221, 4375, 4564, 4864, 4865, 5026, 5416, 5842, 4378, 3770, 743, 746, 7051, 5313, 1871, 2551, 6563, 891, 1042]. **Floating-Point** [3294, 5535, 828, 2413, 2927, 5318, 5319, 5846, 3777, 751, 752, 894, 1046, 5939, 3298, 6570, 6571, 6931, 6932, 6319, 6197, 6324, 6102, 5041, 2748, 6199, 4879, 5044, 6200, 6327, 6573, 5761, 5762, 1529, 441, 5327, 5328, 7060, 7062, 2108, 5187, 6008, 832, 905, 1431, 571, 5763, 6205, 3302, 2940, 2941, 2251, 2430, 6335, 2752, 4893, 2561, 6581, 640, 687, 2563, 5950, 6453, 1641, 2759, 7068, 5858, 6831, 4589, 526, 577, 1149, 3478, 5622, 4410, 7072, 7148, 983, 5546, 5337, 2438, 5548, 1764, 6210, 642, 1896, 2120, 2262, 2442, 2443, 3147, 5062, 5626, 6212, 6456, 1152, 2771, 2449]. **Floating-Point** [2450, 6458, 6594, 6724, 916, 5069, 5196, 5345, 2780, 4087, 3660, 3662, 3802, 2968, 5956, 2783, 2784, 5431, 7084, 2004, 645, 1325, 2579, 2268, 6730, 6021, 7089, 702, 4266, 6022, 2791, 2792, 3158, 6599, 5553, 4910, 5631, 5438, 5439, 6464, 2278, 2279, 1239, 3676, 922, 923, 6222, 2280, 994, 3164, 2281, 4615, 2282, 2803, 5079, 5447, 5448, 5634, 5963, 6733, 6469, 1681, 6360, 3940, 1544, 4103, 1455, 1776, 4921, 5083, 5355, 4448, 4762, 5084, 5787, 7099, 5086, 2989, 7104, 5644, 5875, 3688, 2467, 212, 2990, 2811, 2996, 3184, 3185, 3349, 3693, 3694, 2293, 5968, 6232, 6971, 7110, 6131, 6132, 6611]. **Floating-Point** [2021, 3001, 2607, 4926, 1459, 1460, 1786, 5559, 5097, 1341, 5878, 1787, 5561, 2476, 2613, 2614, 3008, 1466, 5562, 6741, 1790, 3524, 4933, 6134, 6624, 4130, 593, 3354, 6366, 6030, 7114, 5369, 2028, 849, 5563, 2828, 3525, 2830, 6743, 3357, 6367, 5880, 3838, 3199, 6238, 6476, 2305, 215, 1470, 1702, 2623, 5110, 5233, 5377, 5378, 5572, 5573, 5658, 1355, 2034, 3018, 216, 3207, 2308, 6240, 5236, 2631, 800, 3025, 1707, 5384, 4145, 6864, 6865, 6639, 5117, 5576, 5662, 5118, 5385, 5242, 6641, 5709, 5908, 4634, 6370, 4499, 6992, 4494, 2174, 2175, 417, 3221, 1948, 4307, 6498, 2332, 7007, 7008]. **Floating-point** [1579, 1580, 1719, 5262, 6505, 4807, 4981, 2509, 6394, 2672, 2673, 2674, 5985, 6053, 1502, 1825, 2206, 2064, 3734, 5278, 4689, 1395, 4698, 2530, 2374, 308, 3753, 5160, 1297, 5526, 1299, 3899, 7047, 4217, 4216, 4048, 3290, 258, 2926, 4570, 896, 6095, 6318, 4575, 4877, 6711, 2423, 6826, 6449, 1760, 3646, 980, 3133, 6941,

6341, 2259, 3923, 2121, 2576, 5630, 2008, 2009, 6224, 3939, 4278, 4925, 2151, 2469, 2297, 2026, 4281, 6233, 7113, 3835, 5370, 3196, 2832, 2833, 1076, 3703, 1351, 6475, 1472, 1473, 1474, 1475, 5974, 6748, 5592, 1938, 2176, 3382, 2857, 3966, 1565, 6242, 5467, 6144, 721]. **floating-point** [1486, 2640, 3035, 3387, 3388, 3389, 4498, 6382, 6489, 2499, 1086, 5670, 1801, 2318, 1802, 1803, 6148, 4155, 2867, 3043, 5582, 5894, 5895, 2325, 7002, 2649, 2326, 4313, 5252, 5253, 2186, 2329, 5818, 4797, 5133, 2331, 2190, 2652, 3051, 1814, 4318, 4800, 4801, 5134, 5983, 6261, 3725, 2191, 5259, 5584, 4321, 1016, 4805, 5394, 5585, 7010, 7011, 2192, 1017, 1194, 6391, 5822, 6664, 3232, 4982, 2194, 7129, 6509, 1378, 3408, 4983, 1586, 6395, 4986, 2058, 2671, 3866, 4519, 3989, 3992, 1590, 5493, 5702, 6161, 1962, 3998, 4681, 5496, 2348, 2876, 2877, 2878, 4004, 6279, 5403]. **floating-point** [5404, 2687, 6405, 5710, 3065, 4532, 4007, 3067, 249, 4831, 5147, 5277, 4346, 962, 4535, 5149, 4996, 2354, 4179, 2888, 5283, 503, 1734, 1735, 5995, 5285, 735, 1117, 4185, 6919, 1969, 1737, 1970, 820, 509, 5292, 1030, 6284, 2896, 2370, 4845, 6684, 4703, 4706, 4848, 3083, 622, 880, 1031, 1209, 1284, 1740, 3435, 2898, 3084, 1844, 5514, 1845, 2536, 1846, 5719, 4851, 4852, 5999, 6076, 6535, 1288, 252, 178, 1851, 4361, 4855, 6691, 6692, 5014, 3600, 5839, 4033, 4550, 4710, 2900, 2901, 3441, 3603, 1408, 1214, 1975, 3442, 3267, 4558, 2541, 5305, 5306, 1745, 6427, 6552, 6697]. **floating-point** [5733, 2086, 5734, 1216, 5736, 2391, 1219, 1864, 1747, 3615, 5169, 5171, 5527, 2227, 2228, 4043, 7143, 1134, 1220, 1867, 4717, 5928, 2912, 5744, 5745, 1625, 6001, 6191, 6307, 6308, 6433, 6002, 2233, 2401, 2402, 3109, 2094, 2095, 3456, 3621, 3622, 4220, 4222, 5604, 5750, 4719, 2921, 3288, 3458, 3289, 629, 474, 745, 2405, 2406, 2407, 2408, 4871, 6315, 2740, 2412, 2414, 2415, 1528, 1753, 5611, 6821, 3630, 3909, 4875, 5613, 3463, 830, 898, 974, 4232, 5940, 6097, 4876, 2557, 3299, 7057, 2247, 2248, 5942, 6442, 6321, 3912, 3913, 5850, 6202, 756, 2747, 2934, 3123, 4577, 6103, 6006, 5946]. **floating-point** [4880, 4402, 4583, 4585, 3916, 4881, 525, 572, 5617, 1758, 5331, 5618, 5948, 1639, 4240, 6010, 4883, 6580, 1051, 1996, 574, 641, 758, 759, 402, 689, 575, 6011, 4885, 1997, 1998, 1435, 6110, 2257, 2117, 2762, 5056, 5336, 1648, 1649, 696, 2569, 5771, 5861, 3480, 5338, 4892, 5058, 5340, 5341, 5342, 5426, 5547, 6944, 2570, 2000, 3922, 5061, 5428, 1895, 2261, 2441, 2444, 2768, 3654, 6016, 2960, 2961, 7078, 2447, 2448, 985, 4253, 4741, 2265, 3150, 6215, 3318, 3928, 6955, 4902, 5346, 5867, 6217, 481, 4255, 3152, 5347, 5551, 5868, 986, 5777, 987, 3807, 4093, 7087, 4747, 4905, 5778, 2269]. **floating-point** [701, 990, 2270, 2974, 3809, 7090, 2273, 2585, 3332, 2589, 2797, 2981, 4911, 4096, 6220, 1333, 5076, 6845, 1241, 1242, 1334, 707, 1063, 2983, 3336, 1678, 4917, 3503, 774, 5960, 5636, 5637, 5870, 6227, 5784, 3936, 1337, 4918, 4617, 1914, 5785, 5640, 998, 2984, 2463, 3938, 5641, 777, 2014, 2285, 4919, 6028, 710, 711, 3176, 3819, 4112, 4761, 5556, 3941, 4449, 4923, 4924, 3943, 3685, 2805, 2806, 2987, 2988, 3181, 2290, 3687, 3821, 4623, 2017, 3945, 4119, 4450, 6736, 3822, 3000, 2294, 1170, 2473, 2474, 4451, 4452, 4627, 5362, 5363, 1785, 1461, 293, 1462, 2025, 4769, 4125, 376]. **floating-point** [4771, 846, 2823, 2824, 3192, 5099, 147, 1465, 1788, 1931, 1935, 3009, 6364, 1697, 3353, 4462, 4934, 3355, 1347, 4287, 1792, 1698, 1937, 4134, 4288, 2030, 942, 6368, 4937, 4938, 716, 795, 2482, 2484, 4468, 4469, 5231, 1352, 2164, 2487,

850, 3959, 4778, 4943, 5232, 5379, 5798, 6239, 1796, 1704, 2307, 5111, 796, 2492, 1256, 295, 3208, 1939, 2310, 1357, 1799, 1561, 4946, 5238, 5575, 5800, 948, 2630, 4140, 4292, 4947, 4948, 5801, 2847, 6984, 2849, 2313, 2495, 2852, 3211, 3845, 7158, 5240, 4953, 4954, 5119, 5121, 4785, 2315, 6754, 6989, 5143, 2688, 5591, 6500, 1732, 3900, 4878, 1885, 3194, 2304]. **Floating-point** [2305, 2306, 2485, 2486, 1476, 996]. **floating-point-number** [5788]. **Floating-point-Pegasus** [350]. **Floating-point-processing** [1611]. **Floating-Point-Roundoff** [454]. **Floating-Point-Routinen** [1732]. **Floating-Slash** [1139, 911, 1148, 2465]. **FLOATP_toolbox** [6718]. **Floats** [2182, 5478, 5747, 6566, 3954, 6353, 6363, 2796]. **FloatX** [6531]. **FLoC** [5633]. **Flocq** [5682, 6775]. **flop** [4250, 503, 6581]. **FloPoCo** [6722, 5591, 6522]. **FLOPS** [6407, 5624, 2963, 2640]. **FLOPS-** [5624]. **Florian** [7086]. **Florida** [7426, 7524, 7553, 7338, 7288, 7470, 7291, 7533, 7550, 7235]. **flotante** [4600]. **flots** [2762]. **flottant** [2806, 5121]. **Flottante** [2563, 2004, 702, 4318, 4801, 4351, 2217, 4878, 5332, 2762, 990]. **Flow** [6849, 5648, 3713, 3850, 2338, 2512, 5918, 1348, 1252]. **FlowFPX** [6994]. **FLPPEG** [350]. **Fluid** [6360, 7127]. **Flux** [3459]. **Fly** [5901, 6164, 3746, 5894, 2071, 2361, 2892, 5019, 4727]. **Flying** [4031]. **Flyttalls** [3350]. **FMA** [5391, 5681, 5716, 5734, 5840, 6817, 5930, 6307, 6325, 5618, 6957]. **FMAC** [3606, 3924]. **FMCAD** [7403]. **FME** [7463]. **Focus** [1231, 1248, 1202, 1048]. **Fold** [5448]. **Fonctionnelle** [2563]. **Fonctions** [4684, 3980, 5421, 5094]. **Forces** [2990]. **Forcing** [5436, 5092]. **Forensic** [5815]. **Foreword** [1010, 6248, 1365, 4658, 3985, 4517, 6674, 1115, 2362, 1860, 6818, 3461, 4060, 3780, 2769, 921, 3189, 6616, 6904]. **Form** [5465, 4295, 952, 3395, 548, 5270, 5271, 1829, 1830, 4847, 2899, 4860, 6330, 5616, 3790, 4423, 4599, 1446, 2150, 6637, 3714, 826, 7142, 5603, 5749, 6436, 3299, 3474, 1437, 5209, 3835, 3015]. **Formal** [6381, 6383, 2047, 2325, 4314, 4662, 4801, 5256, 5257, 5478, 5683, 5897, 6048, 6775, 6051, 7588, 7527, 4700, 4840, 4842, 877, 3083, 4199, 4200, 4711, 4372, 4563, 4378, 5533, 7051, 7053, 4058, 5764, 2755, 6453, 6587, 5865, 2579, 6464, 6223, 4272, 5964, 6963, 4619, 5787, 7403, 7022, 3382, 2046, 4800, 5134, 5820, 5983, 6261, 5023, 4719, 4394, 7463, 3152, 3153, 2493, 7588, 7527]. **Formalisation** [4318]. **Formalization** [4493, 4318, 830, 898, 974, 2944, 577, 6946]. **Formalizaton** [6090]. **Formally** [5479, 5480, 5896, 6388, 7134, 6108, 5336, 6944, 4087, 3495, 4818, 4819, 7069]. **Formally-Proved** [6388]. **Formally-Verified** [5896, 7134]. **Format** [6482, 6494, 6783, 3995, 5272, 5495, 6163, 971, 6696, 6187, 5173, 6438, 6933, 5185, 5422, 2759, 6591, 6730, 3953, 5100, 6743, 5374, 6631, 6238, 6633, 2176, 3976, 667, 4812, 6405, 4535, 4696, 2536, 3756, 521, 6713, 5040, 4892, 320, 5226, 1628, 2259, 3341]. **Formats** [6243, 6996, 5135, 6512, 6686, 6184, 6185, 7047, 4375, 6708, 2927, 6943, 6599, 5081, 2600, 7104, 6737, 6489, 6997, 6950, 2103]. **formel** [6266, 4489]. **formelles** [4801, 5820]. **Forms** [3366, 4955, 1883, 2024, 4486]. **formula** [951]. **Formulae** [5269, 2394, 5060, 5396]. **formulas** [5928]. **Formulated** [1642]. **Formulation** [6188]. **Formulations** [5387, 4767]. **Forslag** [1740]. **Forsythe** [4506]. **Fort** [7470]. **Forth** [7333, 1847, 1752, 1875, 7245, 1996, 1532]. **forthcoming** [5126, 6411]. **FORTRAN** [187, 2861, 6421, 4306, 3039, 1191, 418, 419, 3060,

563, 440, 633, 637, 317, 2952, 916, 2811, 1351, 3851, 2864, 3392, 4967, 4968, 3401, 1093, 1094, 862, 1099, 1100, 1193, 2658, 1505, 1593, 2681, 2063, 4026, 3899, 3900, 4217, 4376, 1751, 446, 3477, 915, 3488, 1332, 4446, 4758, 4109, 4450, 489, 3838, 1003]. **Fortran-90** [3392, 4967, 4968]. **FORTRAN/77** [1191]. **Forty** [7557, 7569]. **Forty-first** [7557]. **Forty-Third** [7569]. **Forum** [2889, 3018]. **Forward** [1925, 1828, 4388, 4256, 4269]. **Forwarding** [3792, 3799, 6606, 4253]. **found** [5841]. **Foundation** [899, 1327, 2778, 2779, 1328]. **Foundations** [6187, 7341, 975, 3647, 692, 1315, 3792, 7080, 798, 7279, 4708, 1047, 7378, 1008]. **Four** [754, 184, 165, 6232, 3421, 2066, 4042, 2232, 5844, 4125]. **Four-Quadrant** [184, 165, 4042]. **Four-Term** [6232]. **Fourier** [4655, 6662, 7014, 3029, 2057, 1827, 3264, 2719, 907, 910, 764, 1057, 2272, 1244, 3680, 1073, 2029, 2031, 3364, 543, 2634, 6987]. **Fourteenth** [7261, 4060]. **Fourth** [7356, 7328, 7504, 7290, 7446, 7279, 7312, 4456, 1189, 1115]. **Fowler** [5010]. **FP** [6405, 5830, 6017, 6598, 7087, 4948]. **FP-ANR** [6405]. **FP-Arithmetic** [5830]. **FP-Enabled** [6598]. **fp16** [6423, 6642, 6420, 6977, 6793]. **FP16-Enabled** [6642]. **FP8** [6943]. **FPC** [5483]. **FPChecker** [6570]. **FPGA** [7493, 7510, 6992, 6993, 5670, 5390, 6394, 5902, 4674, 5146, 5828, 5147, 4535, 4832, 4996, 6681, 6916, 6682, 5002, 5599, 5298, 5719, 7034, 3763, 5526, 5731, 6814, 6302, 6426, 5743, 6431, 5530, 6320, 5759, 6099, 6443, 4577, 4726, 6446, 5761, 5946, 6007, 5424, 6333, 5767, 5335, 5190, 4589, 5546, 5771, 5624, 5061, 6836, 5775, 5780, 4615, 5632, 4917, 5965, 7154, 6360, 6851, 3512, 5791, 6974, 4284, 7478, 6367, 7115, 4937, 6859, 6475, 4475, 5574, 5797, 4476, 4477, 7119, 5118, 4528, 3245]. **FPGA-Based** [5731, 6333, 6836, 5632, 6360, 6367, 7115, 5118, 4832, 3763, 5767, 5335, 5190, 5061, 7154, 5797]. **FPGA-processor** [5902]. **FPGA-Specific** [6974, 5775]. **FPGAs** [7382, 7562, 7402, 7423, 3029, 6999, 5582, 6661, 6780, 7009, 5394, 5712, 6172, 6533, 4851, 4852, 6422, 5601, 6304, 5752, 4875, 6096, 6317, 6440, 6197, 6322, 6324, 3785, 4585, 3916, 5765, 3637, 5770, 6838, 6598, 7087, 4747, 6461, 5354, 6737, 5221, 5457, 5224, 5368, 6134, 7156, 4938, 4778, 5798, 5802, 4953, 5591, 5592, 5909, 6523]. **FPgen** [4647]. **FPL** [7540, 7454, 7564, 7526, 7482, 4610]. **FPL-based** [4610]. **FPLibrary** [5147]. **FPMAC** [5969]. **FPS** [1816, 2223]. **FPS-164** [1816]. **FPT** [7486]. **FPTRP** [345]. **FPU** [3846, 5888, 6771, 5922, 3437, 2742, 5050, 5950, 7086, 5796, 5107]. **FPUs** [5023, 6453]. **FPV** [1966]. **FPX** [7060]. **fractal** [3781, 3202]. **fractals** [2578]. **Fraction** [3387, 6074, 1876, 3517, 240, 271, 189, 3836, 1828, 1846, 4590, 4734, 5550]. **Fraction-Free** [3836]. **fraction-unit** [1846]. **Fractional** [3894, 5955, 4139, 3542, 4552]. **Fractions** [1574, 26, 677, 6098, 4401, 442, 573, 1160, 1685, 241, 941, 1075, 1174, 1710, 5413, 311, 3773, 1655, 772, 3826, 5460, 2622]. **Framework** [4647, 6244, 7004, 4189, 1119, 1206, 6812, 6706, 6933, 6714, 2580, 3331, 6734, 6366, 6858, 5889, 4999, 6723, 3808, 4262, 1908, 7106, 6632, 6863]. **frameworks** [4891]. **France** [7218, 7280, 7220, 7480, 7525, 7466, 7560, 7395, 7588, 7384, 7413, 7597, 7250, 7529, 2769, 7591, 7217, 7401, 7349, 7571, 7334, 7548, 7506]. **Francisco** [7196, 7254, 7286, 7385, 7487, 7244, 7404, 7439]. **fraud** [4849]. **Fraudulent** [5279]. **Fray** [3747]. **Free** [5984, 3730, 6283, 2710, 1289, 1742, 7038, 6568,

2939, 6577, 1055, 1767, 5442, 7097, 1696, 3836, 5106, 3025, 548, 1963, 6278, 1210, 3261, 4872, 5424, 5049, 7147, 1435, 5957, 6120, 6216, 5347, 5551, 5080, 4128, 4776, 4944, 3368, 2847, 6989]. **Freiburg** [7432, 7469, 7226]. **Freie** [7249]. **French** [3980, 4318, 4320, 4512, 4801, 5820, 6266, 3413, 29, 40, 4684, 5413, 5421, 4236, 4878, 1, 2563, 2762, 5191, 2004, 702, 990, 1160, 5094, 108, 17, 4489, 4490, 5121]. **Frequency** [1544, 6373, 2857, 3232, 137, 138, 826, 4868, 4242, 8, 4642]. **frequency-hopped** [4642]. **frequency-sampling** [3232]. **frequency-selective** [4242]. **frequenza** [137]. **FRG** [7262]. **Friedrich** [4859, 1653, 1467]. **Friendly** [5821, 5830, 6538, 6545, 5100]. **Frobenius** [5128, 3867]. **front** [3600, 2315, 6249, 6760]. **front-end** [3600]. **FT** [6991]. **FT-EALU** [6991]. **Fujitsu** [3851]. **Fukuoka** [7538, 7427, 7424]. **Fukuoka-shi** [7427]. **Full** [3111, 3112, 3113, 3114, 6971, 7110, 3846, 4793, 5134, 2906, 4068, 4624, 7448, 3578]. **Fully** [2891, 4189, 5515, 1618, 7049, 5329, 5072, 1661, 6652, 4563, 4885]. **Fully-Pipelined** [5072]. **Function** [2316, 5578, 298, 3973, 6258, 6496, 1715, 5393, 5821, 6390, 248, 3729, 4327, 5903, 6673, 1504, 2678, 2679, 3060, 1019, 4825, 4829, 5915, 733, 2524, 427, 429, 6920, 6685, 5299, 4198, 5523, 3440, 4037, 3610, 6085, 1980, 6304, 6568, 440, 634, 5185, 5422, 6007, 3301, 524, 2109, 2250, 6454, 2780, 989, 5075, 3816, 3818, 2986, 5096, 4120, 2476, 2613, 2614, 3008, 6134, 2158, 2163, 6634, 5109, 6032, 2626, 3374, 2844, 5709, 552, 4956, 5245, 1085, 863, 955, 4666, 7010, 7011, 7012, 7126, 3983, 3727, 4668, 501, 2680, 2687, 4340, 4341, 4830, 5277, 2886, 2887, 3250, 3251, 5995, 1510, 5158, 3758]. **function** [4202, 7043, 7044, 7141, 4046, 4047, 5179, 5043, 3124, 6934, 1760, 4733, 3144, 5193, 3324, 3325, 3156, 1682, 4148, 514]. **Functional** [7281, 1944, 1945, 810, 553, 6546, 396, 2563, 3659, 2597, 1163, 997, 3215, 5152, 2910, 6011]. **Functions** [1946, 4787, 5580, 5124, 1083, 1362, 4961, 855, 6768, 3041, 3224, 856, 2866, 6386, 3974, 4156, 7003, 1812, 861, 1015, 4977, 1718, 2053, 954, 1266, 6265, 7013, 1267, 4667, 6052, 7130, 5700, 276, 1960, 616, 1274, 2345, 3058, 3059, 5589, 2350, 1391, 4684, 335, 2355, 1024, 1025, 1113, 734, 873, 874, 1026, 1114, 4181, 2696, 467, 385, 3080, 1123, 6071, 1841, 7135, 7136, 624, 6688, 680, 4034, 4199, 4201, 3893, 4040, 1132, 3274, 1859, 3613, 7048, 3453, 5748, 5934, 6092, 1628, 2093, 3628, 1527, 2553, 3629, 399, 2101, 2555, 2103, 4391, 6102, 4398, 4729, 1757, 909, 1050, 3639]. **Functions** [3472, 353, 691, 4246, 6206, 7278, 1530, 361, 366, 2440, 2573, 3655, 3798, 6721, 1766, 1657, 3488, 6954, 1902, 2781, 6596, 1666, 1667, 3810, 2455, 1239, 1333, 4913, 6222, 321, 528, 587, 651, 997, 4442, 7095, 6358, 3341, 3170, 3342, 4105, 1545, 6735, 3948, 2021, 2022, 240, 271, 1069, 4121, 2611, 2612, 2818, 2819, 7168, 3191, 5568, 1700, 1177, 2165, 3705, 3707, 6752, 6753, 2856, 4528, 1353, 1795, 2038, 5978, 3980, 5260, 5262, 1194, 2661, 4809, 610, 4168, 197, 4992, 3876, 3421, 3242, 3422, 5828, 2359, 5000, 1397, 251, 4846, 2375, 2709, 6288, 2538, 3261, 1216, 4371, 5168]. **functions** [6700, 201, 5320, 636, 5421, 756, 4235, 5326, 5947, 4584, 3789, 759, 354, 689, 2566, 3134, 4591, 1897, 3311, 5194, 7149, 2773, 3321, 5868, 3155, 2789, 2009, 5443, 1452, 784, 3169, 4450, 1922, 2153, 790, 5094, 4929, 4774, 6135, 660, 3373, 3533, 5120, 4821, 5143, 5592, 5909, 1812, 2486]. **Fundamental** [6513, 975]. **Fundamentals** [7219, 7214]. **Funktionen** [385, 651, 1700, 1628]. **Further** [4683, 966, 5931, 785, 1812, 346]. **Fused**

[6497, 4977, 5479, 7015, 4981, 6267, 4328, 5491, 7023, 5159, 6694, 2542, 6696, 5309, 6817, 6432, 3901, 6563, 4389, 5327, 5328, 5329, 3126, 5766, 6835, 6726, 6951, 4433, 5553, 5631, 5438, 5439, 6731, 4762, 5968, 6232, 5969, 5878, 6233, 6375, 6639, 4492, 4511, 4807, 5689, 5012, 4032, 5019, 5023, 4575, 4877, 4073, 6107, 5056, 4741, 3154, 5640, 4769, 4941]. **Fused-mac** [4977]. **Fused-Multiply-Add** [6432, 5023, 5640]. **Fused-Multiply-Add-Type** [5553]. **Fusion** [3385, 4266, 6485, 6010]. **Fusul** [408]. **Futile** [4865]. **Future** [2322, 5416, 480, 5596]. **Fuzzy** [5579, 4496, 4959, 3749, 1232, 5016, 5314]. **FV** [6658]. **FVG** [1733].

G [801]. **G.** [5604, 801]. **G4** [4526, 3819]. **G5** [4085, 4111, 4112]. **GaAs** [3722, 3419, 3420]. **GAF** [2680]. **Gaffer** [5597]. **Gain** [6137]. **Gal** [4927, 5095]. **Galinhas** [7579]. **Galley** [401]. **gallium** [3234]. **Galois** [4541, 6177, 3139, 4414, 3805, 3929, 4088, 4283]. **Galois-Enhanced** [3139]. **Galois/Counter** [6177]. **Galt** [7253]. **Galveston** [7501]. **Gamble** [4263, 5693]. **Game** [4347, 6291, 6292]. **Games** [5597, 7174]. **GAMM** [7392, 7549, 7340, 7460, 1255]. **GAMM-IMACS** [7460]. **Gamma** [2678, 429, 4450, 606]. **Gaon** [27]. **gap** [4800, 4937]. **GAP9** [6725]. **GAPP** [2738]. **Gappa** [5477, 6775, 5403, 5709]. **Gaps** [6302]. **Gate** [7493, 7510, 3255, 1043, 6196, 3128, 3469, 5648, 7478, 2830, 3129]. **gatefield** [1703]. **Gates** [1779, 5558, 5358]. **gating** [4163, 6066]. **gauge** [2389]. **Gauss** [5670, 5482, 6278, 5291, 1631, 3627, 3139, 1694, 4940]. **Gaussian** [6146, 1808, 1814, 5142, 6170, 5723, 5838, 2738, 6600, 6966, 7096, 1542, 1462, 1925, 2025, 2031]. **gave** [6921]. **GCC** [6719, 6023]. **GCD** [1815, 2714, 3106, 2785]. **GCM** [6177]. **GCR** [5873]. **GDR** [7214]. **Geburtstag** [7390]. **Gem** [5502]. **gems** [2643]. **Genaue** [1095, 4488, 4783]. **genauer** [1795]. **Genauigkeit** [1628, 2100, 1211, 651, 1353]. **Gene** [4986, 4999, 5050]. **Gene/L** [4986, 4999, 5050]. **General** [297, 5583, 1095, 4989, 6055, 6897, 873, 874, 1026, 5717, 5303, 7374, 750, 1906, 4437, 6134, 1468, 2483, 1353, 604, 2502, 301, 2675, 5302, 4885, 2435, 1531, 2436, 2261, 4753, 4292, 2315, 2688, 4940, 1211]. **General-Purpose** [5303, 7374, 6134, 1531, 2502, 2435, 2315]. **generalisation** [2219]. **Generalization** [1503, 5957, 548, 1590, 2799]. **Generalized** [549, 1372, 1960, 6537, 2110, 1887, 2580, 582, 2140, 4115, 5101, 4465, 3704, 816, 6519, 5176, 2929, 3155, 1914, 2598, 4930, 4131, 4644, 4784, 6824]. **Generate** [6682, 2523, 4030]. **generated** [2523, 3463, 4950]. **generates** [1399]. **Generating** [6770, 6883, 4818, 4819, 465, 6687, 2110, 2118, 2260, 182, 7073, 2587, 3832, 597, 1994, 2420, 7070, 5093]. **Generation** [7599, 4647, 2316, 6257, 7125, 5390, 3729, 4327, 5701, 4826, 5001, 2218, 6533, 6180, 6290, 7601, 7608, 7610, 558, 6924, 2542, 7487, 6304, 7049, 344, 5605, 399, 4731, 5619, 4409, 983, 115, 4598, 5773, 2780, 4094, 4264, 5648, 6624, 1556, 1354, 5462, 718, 5236, 2650, 2203, 1728, 4007, 3436, 6691, 6009, 1760, 2567, 3924, 3663, 3156, 3679, 4941, 850, 3370, 2167, 3379, 4644, 4784]. **Generative** [6813, 7041]. **Generator** [6396, 5922, 6430, 6556, 6722, 6851, 3689, 6640, 1085, 953, 2680, 6431, 4880, 3685, 3181, 5591]. **Generators** [5806, 6052, 915, 2788, 6607, 3846, 4492, 3733, 3598]. **Generic** [7001, 4338, 2355, 4370, 4879, 5044, 2141]. **genetic** [5704, 2687]. **Geneva**

[7443]. **Genus** [4362]. **Geograph** [1322, 1167, 1467]. **Geographer** [1167]. **Geometric** [1718, 3407, 4534, 2383, 3639, 3306, 3168, 3688, 3980, 4321, 4057, 4231, 4390, 2745, 5048, 5336, 4418, 3340, 3687, 3821]. **Geometrical** [600]. **géométrique** [3980]. **Geometry** [7380, 7426, 7451, 4828, 3079, 4048, 5532, 5038, 4920, 7171, 3862, 3590, 2436, 7401, 4292]. **Georg** [1052]. **George** [44]. **Georgia** [7369, 7311, 7604, 7279]. **German** [2381, 2100, 548, 61, 2699, 391, 159, 3105, 1137, 3460, 752, 1230, 3467, 908, 2941, 836, 579, 3160, 1335, 107, 777, 654, 1167, 7234, 7390, 124, 801, 4488, 4783, 35, 274, 1469]. **Germany** [7392, 7393, 7340, 7414, 7555, 7530, 7429, 7513, 7460, 7226, 7463, 7378, 5482, 61, 7492, 7432, 7469, 7549, 7584, 7580]. **Gers** [7349]. **Gesamte** [1469]. **Geschichte** [801]. **Gesellschaft** [7227]. **Get** [6453, 2194, 3605, 6351, 2492]. **Gets** [1950, 6746, 5844]. **Getting** [2529, 2750, 4587]. **gewisser** [1812]. **GF** [4283, 3805, 4574, 6533, 4360, 4228, 4381, 4565, 4566, 4382, 2738, 4444, 4479]. **GFLOPS** [4043, 4212]. **Ghz** [5666, 6667, 4417, 5788]. **giant** [118]. **Giants** [1492]. **gigabyte** [6825]. **gigaflops** [2658, 2772]. **Given** [1323, 5550, 7307]. **Givens** [6778, 2710]. **Gives** [5364]. **giving** [2138]. **glasses** [5777]. **glassy** [5493, 5702]. **Gleichungssysteme** [4488, 4783]. **gleitendem** [107]. **Gleitkomma** [894, 2940, 2941, 751, 752, 2615, 1355]. **Gleitkomma-** [2941]. **Gleitkomma-Arithmetik** [894, 751, 752]. **Gleitkomma-Prozessoren** [1355]. **Gleitkomma-Prozessors** [2615]. **Gleitkomma-und** [2940]. **Gleitkommaarithmetik** [1885]. **Gleitkommadarstellung** [777]. **Gleitkommaformat** [1628]. **Gleitkommaprozessor** [1790, 3194]. **Gleitkommarechnern** [2381]. **Gleitkommazahlen** [1095, 1976, 2100, 2259]. **Gleitpunktalgorithmen** [3104, 3105]. **Gleitpunktrastern** [2053]. **glitch** [6736]. **glitches** [3947]. **Global** [3559, 3582, 518, 1218, 7342, 3628, 4593, 3667, 3675, 5904, 5302]. **Globally** [7009, 3683]. **GLOBECOM** [7342]. **GLSVLSI** [7494, 7553]. **GMICRO** [2241]. **GMP** [4508, 5132, 4294, 5241, 5296]. **gmp-based** [5296]. **GMRES** [5007, 5510]. **GNB** [5881]. **GNU** [4854, 3447, 6201, 6328, 4109, 5663]. **Goals** [1717]. **Gödel** [3269]. **Godfather** [1061]. **Godson** [5693]. **Goldschmidt** [4014, 4180, 4694, 5003, 4192, 5609, 5754, 4888, 5204, 5436, 5779]. **Golem** [993]. **Golub** [1893]. **Good** [4305, 4160, 3875, 1841, 2964, 6521, 4004, 6353]. **Gordon** [2690]. **got** [4816]. **GPFP** [2650]. **GPU** [6497, 6053, 6161, 6910, 5713, 6413, 6420, 6812, 6557, 6004, 5936, 6570, 6571, 6931, 7060, 5627]. **GPU-FPX** [7060]. **GPUMixer** [6571]. **GPUMP** [5661]. **GPUs** [6642, 6244, 5673, 5493, 5702, 6171, 6926, 6932, 6203, 7060, 7065, 6337, 5862, 7082, 5434, 7095, 6632, 5799, 7117, 6140, 5661]. **graceful** [6025]. **Gradient** [117, 6914, 5632, 4812, 4983, 5192, 2954]. **Gradual** [4960, 5152, 1122, 5024, 2424, 1436]. **Gradual-Underflow** [4960]. **Grain** [4569, 7079, 4466, 3257]. **grained** [6442]. **gram** [5698, 6812, 603, 5979, 5009, 4780, 7160]. **Grand** [7503]. **Granularity** [6233]. **GRAPE** [5706]. **GRAPE-MP** [5706]. **Graph** [4598, 2661, 3731, 529]. **Graphic** [4561]. **Graphical** [6584, 5073]. **Graphics** [6244, 2643, 5595, 4212, 6701, 5038, 4587, 5622, 2575, 5434, 5157, 5733, 4043, 6700, 2744, 2421, 3130, 4883, 2569, 4947, 4948]. **Graphs** [807, 6896, 1222, 6968, 7102]. **Great** [7494, 7553, 6182, 7420, 7436, 22]. **greater** [3305].

Greatest [5674, 561, 532, 786]. **Greece** [7517, 7552, 7523]. **GreenWaves** [6725]. **Greenwood** [28]. **Grenoble** [7466, 7560, 7597, 7334, 2769]. **grids** [3700]. **Gröbner** [5641, 3182]. **Groebner** [4039]. **Gronwal** [548]. **Gronwall** [548]. **großer** [654]. **Group** [7368, 3851, 6996, 7313, 5503, 7187, 7047, 7333, 1786, 7168, 2480, 2656]. **Grouped** [4116]. **Grouped-moduli** [4116]. **Groups** [3931, 1004]. **Grove** [7381, 7283, 7301, 7312, 7407, 7255, 7422, 7435, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 7350, 7391]. **Growth** [6384, 365]. **gruboi** [2327]. **Grundlagen** [1904, 1007, 1008, 975]. **grundlegende** [3119]. **GSFAP** [5652]. **Guarantee** [1184]. **Guaranteed** [5701, 4993, 3656, 2605, 5346, 4906, 3196, 5240]. **guaranteed-accurate** [5240]. **Guard** [967, 1033, 5034]. **Guarding** [6808]. **Guest** [5065, 6953, 5811, 5687, 6506, 4230, 5537, 6018, 5082]. **Guide** [6872, 6998, 1375, 1275, 1388, 5828, 2225, 7080, 1927, 3833, 4464, 4935, 3359, 6997, 6298, 1867, 1337, 1689, 2026, 2823, 2824, 2825, 4587]. **guidebook** [5228]. **guided** [5902]. **Guidelines** [400]. **guides** [3143, 2298]. **gun** [2496]. **Gustafson** [6182].

H [418, 419, 389, 340, 341, 563, 996]. **H.F.D.** [5179]. **Hacker** [6562, 7491, 5972, 4587]. **Hadamard** [2758]. **Hadoop** [5649]. **Haffmen** [1064]. **Hague** [7483, 7416]. **HAKMEM** [677]. **HAL** [4417]. **halblogarithmischer** [2699]. **Half** [6423, 6549, 5750, 3790, 6345, 6591, 6736, 6643, 7373, 6296, 6419, 1037, 3941, 6346]. **Half-Adder** [3790]. **half-century** [7373]. **half-complex** [6643]. **Half-Precision** [5750, 6345, 6419]. **half-word** [1037]. **Hall** [232]. **Hall-Effect** [232]. **Halstead** [2275]. **halting** [4932]. **halves** [3956]. **Halving** [5128, 5235]. **Hamada** [2718]. **Hamburg** [7378]. **Hamming** [2142, 4618, 5382]. **hamper** [6485]. **Hand** [1022, 3666]. **Handbook** [6258, 1020, 2883, 3256, 353, 5626, 6456, 1469, 1121, 4708, 2822]. **handbooks** [110]. **Handheld** [1307]. **handing** [4217]. **Handle** [5541, 6405]. **Handlers** [4159]. **Handling** [3249, 6906, 6907, 7131, 1203, 2085, 3441, 3603, 1520, 3274, 4216, 3283, 2096, 2919, 4241, 3315, 2645, 5264, 3066, 3263, 3899, 3615, 3900, 1358]. **Hands** [5607, 4872]. **Hands-on** [5607]. **Hannover** [1485]. **Happen** [4160]. **Happened** [5883]. **Hard** [6197, 6324, 4409, 2834, 3198, 5859, 7087]. **Hard-wired** [2834, 3198]. **Hardest** [5943, 6108]. **Hardest-to-Round** [5943, 6108]. **Hardness** [5406, 5594]. **Hardness-Randomness** [5594, 5406]. **Hardware** [6990, 1081, 1259, 6645, 6993, 5581, 6381, 6383, 6767, 4791, 3041, 3224, 6386, 5982, 6887, 5254, 6047, 3979, 6259, 2654, 7008, 3729, 6396, 4165, 615, 6899, 959, 1506, 5275, 5499, 5405, 3076, 1026, 5287, 4537, 5408, 6918, 5830, 3080, 4027, 7033, 3596, 6179, 6538, 4210, 4211, 4369, 5735, 7045, 1622, 6429, 6556, 1040, 6563, 7052, 6314, 3120, 260, 6933, 5852, 4578, 6826, 5046, 5047, 4587, 691, 6940, 4592, 6589, 6720, 916, 2780, 4087, 4259, 7558, 7152, 6461, 7348, 6350, 6464, 6127, 4916, 1452, 4615, 3678, 3170, 3342, 3509, 3681, 3174, 3684, 4760, 7099, 7100, 7102, 7103, 7105, 2808, 6851]. **Hardware** [7107, 6970, 6973, 1069, 4453, 4458, 5098, 1466, 5370, 5371, 5793, 6626, 6369, 7115, 4472, 4777, 5573, 5658, 6862, 3374, 1184, 6747, 6983, 4643, 6035, 6059, 5467, 4151, 4152, 1089, 4317, 4665, 2197, 2336, 2341, 7527, 5990, 4687, 4830, 5277, 1837, 4538, 7248, 4704,

3259, 5157, 1037, 2912, 6703, 6704, 5028, 5606, 4058, 1309, 2736, 4872, 5043, 1758, 4240, 6010, 4739, 5864, 2782, 5198, 5629, 766, 3330, 6221, 4756, 772, 3505, 1244, 1918, 1689, 2817, 3006, 3007, 1464, 1789, 5231, 5657, 1356, 1561, 6058]. **Hardware-accuracy** [6990]. **Hardware-Based** [5982, 3374]. **Hardware-Friendly** [6538]. **Hardware-Oriented** [1026, 5287, 2780, 4739]. **Hardware-Software** [7033]. **hardware/firmware** [1837]. **hardware/microcode** [1309]. **Hardware/Software** [7558, 7102, 6010]. **Hardwired** [2211, 2110]. **Harmful** [2076]. **harmonic** [4418]. **Harnessing** [6420]. **Harrison** [6190, 6115]. **Hartley** [3617]. **Harvard** [7164]. **Hasan** [408]. **Hash** [5051]. **Haskell** [3969, 2910]. **Hastlayer** [6446]. **Haugeland** [742]. **Hauptschriften** [801]. **Having** [436]. **Hawaii** [7377, 7448, 7448]. **hazard** [5837, 5851]. **HC6811C** [3447]. **HDL** [4928]. **Header** [2793]. **Health** [6867, 5356]. **Heap** [5676]. **Heaps** [4355]. **heard** [4654]. **hearing** [5067]. **Heat** [204, 37]. **Heaven** [3709]. **heavily** [2987]. **Held** [7311, 7165, 7392, 7393, 7214, 7210, 4835, 7249, 7327, 7252, 7531, 7546, 7577, 7274, 7208, 7278, 7292, 7261, 7229, 7172, 7226, 7401, 7364, 7205, 7323, 7236, 7279]. **Helical** [5139]. **Helmholtz** [2050]. **Help** [813, 5548, 5547]. **Hénon** [6004]. **Hensel** [1449, 3938, 2633]. **Herbgrind** [6359]. **Herbie** [6382]. **Hermite** [4084]. **Hermite-Obreschkoff** [4084]. **Hermitian** [3199]. **Herrn** [391]. **Herz** [2481]. **Herz-Fischler** [2481]. **Heslington** [7208]. **Hessenberg** [4847]. **heterodyne** [5088]. **Heterogeneity** [6808]. **Heterogeneous** [3723, 5918, 7057, 6105, 5331, 5767, 5778, 3000]. **Heuristics** [6661]. **Hewlett** [2225]. **Hex** [4111, 3390, 2003]. **Hex-BCD-Umwandlung** [2003]. **Hexadecimal** [462, 1628, 2606, 682, 566, 2003]. **Hexadecimal-BCD** [2003]. **hexadezimalen** [1628]. **HFFT** [2050]. **HGCD** [7111]. **HGCD-D** [7111]. **Hida** [4842]. **hidden** [6242]. **hiding** [4651]. **Hierarchical** [6526, 4229, 7116, 7158]. **Hierarchy** [4951]. **High** [7411, 7524, 2635, 852, 1187, 3539, 5580, 5581, 2040, 3970, 4153, 1572, 4155, 2865, 4505, 4969, 5816, 5892, 6043, 1367, 4795, 1577, 6773, 1813, 4317, 5679, 1095, 2050, 6888, 2871, 6390, 6889, 6508, 3563, 5483, 5692, 3729, 4327, 730, 3986, 1586, 3863, 5985, 670, 4813, 6893, 1826, 4521, 3576, 4000, 3239, 6274, 6167, 277, 5707, 1597, 4687, 3425, 3072, 3585, 5595, 5713, 3254, 125, 2073, 1396, 1397, 1512, 3257, 4189, 5714, 6804, 5510, 1841, 823, 4706, 93, 1518, 5720, 6073, 1403, 4361, 200, 340, 341, 5926, 4555, 4714, 5022, 1133, 1746, 1981, 2545, 7604, 2227, 4212, 5742, 3453]. **High** [5743, 5530, 1984, 6192, 6310, 4223, 3623, 683, 5174, 3110, 3772, 3293, 5030, 1043, 5936, 1634, 3118, 6094, 568, 6930, 6095, 6316, 2104, 3465, 5038, 6443, 754, 142, 233, 6446, 7058, 4070, 4584, 1144, 6827, 3788, 570, 1429, 7064, 4239, 6335, 2945, 3471, 234, 1640, 1888, 355, 6338, 6940, 2760, 2763, 1999, 6343, 1055, 4595, 4078, 1654, 7073, 3486, 3658, 5070, 1902, 3492, 4256, 3665, 207, 4606, 4607, 4750, 5075, 5631, 2980, 77, 703, 2456, 6221, 994, 5632, 5872, 486, 653, 4104, 6967, 3817, 4108, 3172, 3173, 3942, 4114, 5084, 1685, 6606, 2807, 6610, 714, 1070, 85, 5457]. **High** [1343, 1926, 1928, 2155, 1930, 4129, 4461, 1697, 939, 6367, 6744, 6371, 5373, 5569, 5653, 5374, 4470, 6979, 6981, 6982, 1178, 1179, 945, 1257, 1182, 1798, 3023, 4945, 5236, 4293, 1360, 2855, 6986, 3538, 1480, 2172, 3246, 74, 3215, 664, 3220, 3853, 1802, 1803, 5980, 4792, 2180, 6044, 1088, 2186, 2188, 4669, 3565,

2336, 1957, 380, 4986, 2512, 2353, 6910, 2522, 6680, 5282, 3077, 2365, 2698, 387, 2367, 5007, 6284, 4704, 4851, 4852, 4032, 6539, 3443, 3444, 2906, 2384, 2390, 2228, 4043, 6189, 1303, 1985, 6703, 6704, 4868, 1992, 4064, 5853, 4880, 978, 2751, 4405, 4588, 4884]. **high** [2947, 5767, 2562, 50, 2949, 3141, 7172, 2569, 4413, 2962, 1154, 3318, 3804, 4743, 2782, 5866, 4090, 4257, 4746, 3156, 5351, 5778, 2584, 4751, 2589, 4911, 2009, 95, 3673, 1063, 1679, 5635, 3175, 3176, 1067, 3000, 5091, 1785, 3697, 1173, 6368, 3358, 5656, 6636, 2624, 2854, 3379, 2688, 2053, 2573]. **High-Accuracy** [1981, 1984, 6310, 6967, 1685, 6979, 1813, 1785, 2053, 2573]. **High-Bandwidth** [6889]. **High-Dimensional** [6338, 6680]. **High-end** [1518]. **high-frequency** [4868]. **High-Level** [1095, 6167, 1512, 4189, 7073, 994, 6744, 4155, 6888, 6446, 4595, 1697, 1063, 6368]. **High-Order** [2050, 3576, 1055, 3172, 3173]. **High-Performance** [7411, 1572, 5692, 3729, 4327, 3863, 4813, 5510, 5022, 4212, 6192, 5070, 5631, 5457, 6367, 5373, 5569, 5653, 6981, 6982, 6804, 4714, 2227, 4584, 6371, 3246, 3215, 5980, 4792, 6044, 4986, 4851, 4852, 4032, 2949, 3318, 4743]. **high-period** [5282]. **High-Precision** [3539, 4969, 4795, 6508, 1133, 3772, 5936, 6335, 5816, 5892, 6043, 6910, 6680, 2624]. **High-Radix** [5581, 3239, 3118, 6094, 4070, 3492, 5084, 4129, 4461, 6986, 4317, 4256, 4606, 4750, 3172, 3173, 2390, 2782, 4090, 4257, 4746, 4751, 3175, 3176, 1173]. **high-rate** [4405, 4884, 2688]. **High-resolution** [4361]. **High-Speed** [852, 1187, 1367, 6773, 5483, 730, 670, 4521, 277, 1597, 125, 6073, 1403, 200, 5926, 5742, 3453, 4223, 683, 5174, 5030, 1043, 1634, 568, 6930, 142, 233, 1144, 570, 4239, 1640, 1888, 355, 1902, 4607, 5075, 77, 703, 4104, 3817, 4108, 3942, 4114, 1685, 714, 2155, 939, 5374, 945, 5236, 4293, 1360, 1480, 2172, 1586, 3585, 4555, 3293, 3788, 1429, 234, 2763, 3665, 2980, 2456, 6221, 85, 1928, 1178, 4945, 2855, 1802, 1803, 2188, 2365, 387, 3443, 3444, 1303, 1985, 1992, 4880, 2751, 4588, 1154, 3804, 2584, 2589, 4911, 2009, 95, 3673, 1067, 3697]. **High-Spped** [1070, 1179]. **High-Throughput** [5580, 5038, 7058, 6606]. **high/variable** [2336]. **Higher** [7381, 461, 546, 853, 5982, 7453, 1582, 2514, 1603, 6544, 2397, 2933, 5543, 2572, 5953, 2142, 1913, 1175, 2030, 544, 3081, 3089, 2917, 3108, 2439, 5085, 3840]. **Higher-Order** [7381, 3089]. **Higher-Precision** [6544]. **Higher-Radix** [1603, 544, 461]. **Highlights** [1042]. **Highly** [4787, 2506, 5493, 5702, 6681, 1842, 4201, 518, 2567, 3955, 2203, 1853, 4748, 1472, 1473]. **Hilfe** [385, 35]. **Hill** [272]. **Hilton** [7368, 7266, 7287, 7304, 7444]. **Hindi** [408]. **hings** [6241]. **Hisab** [408]. **histogram** [5357]. **Historical** [5544, 6128, 530, 3535]. **History** [853, 7394, 91, 21, 6282, 512, 623, 1400, 6551, 6815, 4213, 2726, 4056, 20, 2951, 4268, 2481, 5919, 2080, 6114, 801, 6867, 7234]. **hits** [6707]. **HLS** [6624]. **HMC** [6435]. **HMC-MAC** [6435]. **HMFPCC** [6041]. **HMM** [6627]. **Hobbit** [3097]. **Hochgenaue** [2053, 2573]. **Hogenauer** [3888]. **höheren** [1095]. **HOL** [4493, 5578, 3408, 3409, 3439, 3758, 3759, 4198, 6090]. **HOL95** [7381]. **Hole** [5936, 6717]. **Holiday** [7260]. **Homepage** [4334]. **homogeneous** [1973, 5336]. **Homomorphic** [6645, 7065, 6592, 6601, 7108, 7116]. **Hong** [7485]. **honor** [6468]. **Hood** [5197, 3703]. **hopped** [4642]. **Horizon** [2301]. **Horizontal** [2059, 2551]. **Horner** [4664, 4803, 7129, 2357, 5011, 5012, 5159, 7035, 5323, 5767, 6227]. **Hot** [3868, 4521, 7417, 3570, 3571, 3572, 3987, 4522]. **Hotel**

[7493, 7494, 7196, 7240, 7254, 7265, 7329, 7331, 7343, 7344, 7420, 7444, 7502, 7503, 7504, 7224, 7570, 7464, 7404]. **Hough** [742]. **hour** [3622]. **House** [7210, 7253]. **Householder** [2721]. **Houston** [7238]. **Howard** [4132]. **Howell** [1092]. **HP** [1630, 4402, 4583, 2112, 2254, 4774, 4933]. **HP-15C** [1630]. **HP-UX** [4402, 4583, 4774, 4933]. **HPC** [6781, 6782, 6669, 5712]. **HPR** [6658]. **HSD** [4074]. **HSD-1** [4074]. **HUB** [6184, 6696, 7074, 6238, 6475, 6476, 6633]. **Huffman** [4379]. **Huge** [6527, 2964]. **Hull** [3607, 4037, 3285]. **Hulls** [3557, 2937]. **human** [7567]. **Hundred** [4424, 4177]. **Hungary** [7428]. **Hurts** [3902, 3903, 2548]. **Hvordan** [1329]. **HW** [6499]. **Hyatt** [7306, 7318]. **Hybrid** [5465, 5664, 6041, 1811, 6153, 6162, 6274, 6170, 5728, 7045, 6435, 4053, 5764, 6451, 6936, 4074, 6716, 6583, 6598, 6959, 3331, 6231, 6029, 2300, 4474, 6982, 5802, 4782, 5576, 6990, 5902, 4000, 423, 5733, 2421, 2745, 4247, 1931, 6863]. **Hybrid-Double** [6170]. **Hybrid-mode** [6041]. **Hybrid-Triple** [6170]. **Hyderabad** [7531]. **Hydra** [587, 587]. **Hydrodynamic** [6198]. **Hydrodynamics** [7174]. **Hyper** [4404]. **Hyper-systolic** [4404]. **Hyperbolic** [6671, 4913, 6358, 242, 3261, 201, 784]. **hypercube** [2223]. **Hypercubes** [2893, 2936]. **Hyperelliptic** [4603, 3931, 4485]. **Hypergeometric** [1882]. **HyPoRes** [6583]. **hypot** [6502, 6776]. **hypotenuse** [6778, 4148].

I. [930]. **I/O** [3246]. **i486**^{TM} [2369]. **i7** [5533]. **i860** [2935, 2565, 2410, 3691]. **i860**^{TM} [2469]. **i960** [2502]. **IA** [4787, 5124, 3999, 4174, 4034, 4200, 4201, 4246, 4121]. **IA-32** [5124]. **IA-64** [4787, 3999, 4174, 4034, 4200, 4201, 4246, 4121]. **iAPX** [1857, 1622, 1866, 1468]. **IBM** [2038, 7242, 3964, 1946, 2038, 2037, 417, 3388, 5126, 109, 1370, 4326, 5694, 1101, 418, 419, 2876, 2877, 2878, 5284, 384, 4848, 5013, 563, 2541, 396, 682, 2546, 3277, 255, 1870, 5605, 1309, 6204, 94, 2566, 2570, 6730, 2271, 6463, 4921, 4621, 5556, 104, 1546, 187, 2295, 536, 5107, 5462, 134, 4491]. **IBM/370** [2037]. **ibn** [408]. **Ibrahim** [408]. **IC** [1930]. **ICASSP** [7485, 7502, 7265, 7331]. **ICCAD** [7456]. **ICCD** [7544, 7566, 7266, 7287, 7306, 7318, 7500]. **ICCET** [7575]. **ICCIT** [7563]. **ICCMSE** [7552]. **ICCS** [7605]. **ICECS** [7431, 7431]. **ICEEC'04** [7508]. **Iceland** [7586]. **ICFEM** [7588]. **ICIAM** [7499]. **ICIT** [7534]. **ICMS** [7573]. **ICS** [7447, 2530, 1179]. **ICSPAT** [7356]. **IDCT** [5106, 4777, 3538]. **Idea** [4279]. **Ideal** [2087]. **Idealized** [3769]. **Ideals** [1302]. **ideas** [4844, 7362]. **identical** [5904, 6104]. **Idiosyncracies** [392]. **Idle** [3940]. **IEC** [3899, 5740, 5564, 2911, 1747, 3282, 3900, 4371, 5168, 5169, 5170, 5171, 5527, 6699, 5029]. **IEE** [1484]. **IEEE** [7524, 2041, 7339, 3852, 7497, 7382, 722, 1365, 4658, 7481, 7539, 7561, 3985, 7455, 7596, 7571, 7603, 3578, 7572, 7358, 1115, 1860, 7187, 7196, 7197, 7207, 7254, 7265, 2089, 7360, 7418, 7430, 7431, 7432, 7443, 7456, 7469, 7485, 7486, 7501, 7502, 7503, 7517, 7518, 7532, 7542, 7566, 7567, 7582, 7587, 7590, 6554, 7607, 7609, 7611, 4060, 7433, 7334, 7548, 3780, 2259, 7521, 7595, 7591, 7409, 7423, 7476, 7535, 7551, 921, 1680, 3341, 7477, 7584, 588, 1339, 7602, 7523, 2304, 2305, 2306, 2485, 2486, 7379, 2176, 3382, 3964, 3846, 5578, 7338, 5127, 6383, 6996, 2863, 1570, 1571, 1804, 2045, 3975, 4313]. **IEEE** [1191, 3401, 2655, 6051, 3983, 4982, 3408, 3409, 4519, 1197, 1503, 1590, 2345,

3059, 3871, 3999, 5140, 5272, 5494, 5495, 6520, 3419, 3420, 3874, 3876, 4335, 4178, 2689, 6795, 7483, 7528, 4832, 5503, 3744, 4016, 4183, 4184, 4185, 4695, 6801, 6802, 1512, 4186, 4189, 4351, 2703, 2532, 5298, 2711, 2538, 2085, 7285, 5162, 1410, 6551, 6815, 6187, 6553, 1219, 7222, 7240, 7253, 7260, 1863, 7266, 7286, 7287, 7304, 7306, 7318, 7329, 7343, 5740, 4716, 4372, 4563, 1627, 1308, 2095, 3456, 3621, 3768, 5172, 5604, 5173, 4061, 4875, 6569, 7408, 7376, 5185, 5422, 5947, 6450, 7363, 1758, 5331, 3637, 2430, 2561, 4241, 5053]. **IEEE** [5189, 2259, 5546, 5771, 3480, 3650, 3651, 6590, 2441, 7082, 4253, 3316, 4087, 3659, 4424, 4600, 2579, 4092, 3330, 6218, 2787, 7437, 7402, 3332, 3495, 2798, 4911, 2277, 1675, 6467, 6353, 1678, 7094, 3936, 3937, 3165, 2462, 4761, 3941, 4278, 4448, 4762, 4923, 4924, 5084, 3944, 7570, 1777, 5644, 2017, 7507, 2293, 5364, 1339, 1459, 1461, 7449, 2476, 2613, 2614, 3008, 1466, 5226, 7410, 1697, 7156, 5371, 3357, 5564, 5569, 5374, 2034, 7354, 5799, 7117, 1799, 7308, 7404, 7439]. **IEEE-754** [3846, 5578, 6051, 3983, 4519, 6903, 4832, 1410, 5947, 5053, 5189, 7083, 6467, 7094, 7156, 3357, 5564]. **IEEE-754-2008** [5546, 5771]. **IEEE-754R** [5173]. **IEEE-854** [3408, 3409, 3480]. **IEEE-Format** [2259]. **IEEE-Spezifikationen** [2304, 2305, 2306, 2485, 2486]. **IEEE-TCCA** [7197]. **IEEE/ACM** [7456, 7386]. **IEEE/KCS** [1191]. **IEEE754** [5939, 5940, 6356]. **IEEE754-2008** [5939, 5940]. **if** [6183, 5534, 1055, 2425]. **IFIP** [7583, 7178, 7188, 7378, 7231, 7406, 7191, 7225, 7189]. **IFMA** [6178]. **Ihren** [1137]. **ihres** [1653, 7234]. **II** [4649, 7292, 4649, 1086, 6146, 2643, 3718, 3721, 7394, 4509, 3732, 5593, 2070, 5919, 1024, 1511, 5002, 6176, 93, 2908, 516, 565, 3277, 5738, 7586, 398, 473, 6709, 7605, 4574, 4724, 127, 573, 759, 403, 4076, 448, 361, 3799, 7349, 1162, 5448, 5962, 1337, 7337, 779, 2471, 3005, 4457, 7168, 4469, 193, 4640]. **IIB** [1934]. **III** [7209, 6255, 6622, 7298, 6880, 245, 546, 7282, 2210, 1025, 468, 4901, 481, 3159, 780, 7169]. **IIR** [1537]. **Ill** [4562, 2803, 2147, 1038, 192, 193]. **ill-condition** [1038]. **Ill-Conditioned** [2803, 2147, 4562, 192, 193]. **ILLIAC** [546]. **Illinois** [7210, 7206, 7259, 7172]. **ILUT** [5765]. **ILUT-based** [5765]. **im** [7432, 2259, 1653, 7234, 124]. **IMA** [7278, 7274]. **IMA/SIAM** [7274]. **IMACS** [7369, 7549, 7392, 7369, 7340, 7460, 7233]. **IMACS-GAMM** [7340]. **Image** [6869, 1817, 2895, 6961, 1930, 3522, 4298, 2341, 6672, 5002, 2896, 3284, 1988, 3781, 2569, 3334, 3505, 3699, 3202, 4140]. **Images** [5630]. **Imaginary** [279, 203, 1424, 3931, 1169, 231, 236, 1000]. **Imaging** [7338, 2271]. **Immune** [4643]. **IMP** [918]. **IMP-16F** [918]. **IMP-16F/400** [918]. **Impact** [869, 1197, 1204, 5305, 5306, 5937, 4073, 5877, 5467, 6269, 6845, 5638]. **Impacting** [6819, 6953]. **impacts** [7378]. **imperfection** [3503]. **implantations** [4320]. **Implement** [6184, 7075, 1191]. **Implementable** [2039]. **Implementation** [7309, 7495, 6992, 5578, 6993, 5580, 7124, 5127, 3854, 4965, 4966, 1568, 6767, 1804, 4791, 804, 1807, 2324, 6386, 6884, 1576, 5254, 609, 6891, 1722, 1958, 5699, 1504, 1275, 1388, 5140, 5272, 5495, 4991, 3421, 4825, 4344, 5405, 5500, 3740, 3074, 1968, 2525, 4999, 2363, 6918, 5830, 963, 4350, 1971, 4194, 556, 6534, 5157, 1847, 1211, 1290, 6179, 5519, 625, 6421, 6539, 7555, 3266, 3762, 4038, 4208, 2385, 1979, 6302, 2387, 3100, 1411, 6187, 4044, 6303, 6188, 5743, 5531, 6092, 1627, 2091, 6310, 1306, 742, 5750, 5173, 6820, 2098, 6927, 4382, 5317, 1991, 2245,

5420, 3464, 4392, 2105]. **Implementation** [6099, 6322, 6102, 6325, 5852, 6446, 5761, 6007, 3785, 5046, 3126, 5765, 1759, 1886, 3637, 3469, 6940, 3306, 3141, 1650, 1150, 5624, 3798, 7074, 915, 1657, 4420, 4421, 3319, 3320, 2126, 3322, 5956, 2004, 1325, 2131, 6461, 3495, 4610, 2141, 6127, 5632, 4440, 6964, 4102, 485, 4104, 5084, 7105, 4117, 3822, 1692, 1926, 5878, 4282, 2476, 2613, 2614, 3008, 1932, 1935, 3009, 5224, 6623, 4466, 1251, 2830, 1348, 2831, 6634, 6979, 3369, 6983, 4144, 2631, 1940, 4146, 5709, 1353, 4645, 5665, 5670, 1570, 4793, 1949, 2192, 3984, 4811, 1500, 2512, 2341, 4674, 4522, 4001, 2879, 4177, 5404, 2353, 5499]. **implementation** [5828, 3580, 3880, 4832, 3741, 5283, 3076, 6919, 4020, 1205, 2367, 5296, 3082, 3593, 3435, 5298, 2536, 5719, 7327, 1851, 4855, 2538, 3892, 6422, 4205, 3267, 5927, 4039, 3447, 6700, 6189, 5745, 2090, 2092, 2552, 2738, 2246, 2419, 830, 898, 974, 4876, 5321, 2423, 4068, 3466, 5946, 4582, 2107, 5424, 3129, 4075, 5767, 3645, 5770, 6719, 1763, 2569, 2439, 5193, 5194, 2962, 3318, 4086, 3155, 3326, 3327, 4093, 2274, 2797, 2799, 1678, 5446, 4923, 1168, 2017, 5791, 2468, 1547, 2994, 2020, 2294, 5877, 5651, 1173, 2156, 5226, 847, 4286, 7156, 1176, 2479, 4475, 5574, 2840, 4484, 4487, 2688]. **Implementations** [6143, 5668, 5669, 5812, 5813, 3229, 7128, 6515, 5400, 4684, 6682, 4359, 3754, 3757, 4569, 6446, 3128, 7400, 7520, 4592, 4081, 3801, 1903, 4258, 4095, 5437, 7337, 6604, 3179, 3519, 3693, 3694, 2612, 3526, 4135, 4635, 6747, 3212, 6059, 4684, 1262, 3045, 2661, 4169, 4175, 5403, 3253, 3432, 3446, 2733, 5320, 3299, 6326, 6445, 3634, 3786, 1758, 7434, 7445, 7461, 7474, 7488, 7505, 4096, 2598, 4760, 3822, 5088, 5231, 4941, 3013, 4947, 4294]. **Implemented** [3403, 864, 892, 7094, 6373, 3725, 2057, 1770, 2277, 1463, 1550, 4946]. **Implementierung** [1211, 1759, 1886, 1353]. **Implementing** [6657, 5136, 5585, 3869, 6426, 3274, 2547, 3660, 2464, 5212, 5213, 3827, 2158, 6371, 3529, 1258, 610, 6283, 2559, 2266, 1330]. **implements** [2009]. **implicants** [465]. **Implications** [1512, 2160, 4634, 2820]. **Implicit** [1699, 4881]. **Implicit-Explicit** [1699]. **Importance** [6104]. **important** [3843]. **Imprecise** [3704, 1319, 6121]. **Improbability** [3904]. **Improve** [4365, 5710, 4206, 5182, 5087]. **Improved** [6141, 4501, 6496, 6502, 6776, 1195, 5823, 6517, 198, 5280, 6176, 1129, 7036, 5520, 469, 5018, 4553, 5932, 4382, 5176, 5419, 1312, 4408, 4889, 5623, 5772, 4738, 478, 580, 4427, 3337, 6227, 5210, 166, 5968, 3823, 6854, 4121, 5653, 1706, 2846, 1941, 4672, 3602, 2739, 2589, 2149, 1688, 5215, 4952]. **Improvement** [6669, 5145, 2356, 5507, 6184, 6820, 6338, 3321, 6120, 1662, 6732, 4949, 4318, 5056]. **Improvements** [3541, 1184, 4339, 3237, 3238, 6281, 2006, 3685]. **Improves** [6921, 1611, 1407]. **Improving** [2639, 5673, 6150, 3233, 5265, 6276, 4014, 4180, 5717, 338, 5012, 5159, 1849, 4368, 1745, 5528, 7052, 6320, 6826, 832, 4406, 5188, 4075, 318, 7085, 6355, 6739, 6477, 6860, 2623, 5386, 4163, 2195, 5401, 6122]. **impulse** [1039, 2491, 4642]. **IMS** [2084]. **IMTC** [7444]. **IMTC/2000** [7444]. **In-and-out** [476]. **In-Memory** [7024, 7058]. **In-Order** [4374]. **in-place** [3264]. **In-Situ** [6716]. **Include** [1470]. **Including** [4424, 2532, 3261]. **Inclusion** [3629]. **Inclusions** [4037, 3609, 3631]. **Inclusive** [6962]. **Incomplete** [7155]. **Incompletely** [2371]. **Incorporated** [989]. **Incorporating** [809, 4407]. **Increase** [1288]. **increasing** [7463]. **Increment**

[4767]. **incremental** [2376, 4407]. **incrementation** [958]. **Indefinite** [4280]. **Independent** [2041, 7563, 2089, 6190, 5029, 6109, 3162, 3825, 1786, 412, 1726, 1825, 3282, 4371, 5168, 6189, 758, 4595, 4596, 4468, 4469, 1747]. **Indeterminate** [700]. **Index** [5247, 5468, 6650, 6758, 6873, 1091, 2060, 2560, 2942, 3470, 3638, 2126, 584, 6613, 4497, 4652, 6245, 2343, 2344, 178, 4438, 5208, 942]. **Indexe** [3633]. **India** [7559, 7328, 7577, 7531, 7546, 7534]. **Indian** [5815, 4036]. **Indiana** [7387]. **indicators** [3671]. **Indices** [1872]. **indirect** [3150]. **Indispensable** [4587]. **induced** [6692, 3130]. **inducing** [6691]. **induction** [4225]. **Industrial** [5668, 5669, 5812, 5813, 6011]. **Industry** [5125, 6761, 1715, 5167, 3388]. **Inefficiency** [5383]. **inequality** [548]. **Inexact** [6644, 6205, 5217]. **Infeasibility** [3932]. **Inference** [6482, 6908, 6805, 6806, 6318, 6444, 7079, 6850, 6737, 6751, 6713, 7088]. **Inferno** [3751]. **Infinite** [449, 2288, 2626, 2464, 4932]. **Infinitely** [4045, 5534]. **Infinities** [1122, 5564]. **Inflation** [3648]. **Influence** [1084, 2756, 420, 5917, 4931]. **influences** [622, 1031]. **Informal** [5633]. **Information** [3851, 3231, 302, 7191, 3085, 7563, 3899, 7504, 4217, 5527, 5740, 6699, 1632, 7225, 7534, 7188, 7189, 5630, 7279, 6251, 6664, 7385, 2757, 5966, 5092, 5216, 5452, 5453, 5454, 5455, 5456, 1747, 3282, 3900, 4371, 5168, 7178, 7188, 7378]. **Informed** [6834, 1943]. **Ingénierie** [3157]. **ingenuity** [4411]. **Inherent** [6756, 904, 356, 1661, 4536]. **Inheritable** [3653]. **Inherited** [6356]. **Initial** [4496, 386, 7192, 179, 3451, 3452, 903, 4084, 2364, 2527, 3748, 137, 138, 3766, 3343]. **Initialized** [3477]. **iniziali** [137, 138]. **Injecting** [5806]. **Injection** [5377]. **Injection-Based** [5377]. **Inlining** [4774]. **Inn** [7260]. **Inner** [1384, 3607, 6698, 5932, 5535, 1899, 1453, 1920, 596, 3069, 3111, 3112, 3113, 3114, 1921, 1698, 492, 2625]. **Innocuous** [3431, 6027]. **innovation** [7550]. **innovations** [3202]. **Innovative** [7196]. **Input** [7015, 1196, 1595, 1609, 6534, 7038, 754, 1905, 1548, 538, 2486, 1177, 1357, 1801, 2347, 1277, 1214, 1975, 3442, 6009, 2763, 3326, 3327]. **Input-Output** [538]. **input-scaled** [1214, 1975]. **Input/1** [5354]. **Input/output** [1357, 3326, 3327]. **Inputs** [5985, 1125, 6932, 6691, 4570, 7057]. **Inquiry** [3546, 3635]. **Insecure** [4473]. **insertion** [4902]. **Insight** [7472, 5382]. **Insights** [5178]. **Insignificant** [6014]. **Insomniacs** [5181]. **Inspired** [7559, 5796]. **Instabilities** [701]. **instability** [5894, 6103]. **installation** [2015]. **Instant** [4347]. **Instantaneous** [11, 2224]. **Instead** [6789, 1245, 1879, 6135]. **Instinct** [6872]. **Institut** [7226]. **Institute** [7369]. **Instruction** [6872, 4296, 4495, 6378, 2676, 5593, 5921, 6920, 1850, 2385, 2551, 5317, 5324, 5328, 989, 3933, 5386, 2639, 6489, 1111, 1392, 4346, 6407, 6411, 6169, 6532, 2380, 1851, 4032, 1225, 2269, 7093, 5877, 3532, 4948, 6532]. **Instruction-Level** [5328]. **instruction-set** [5386]. **Instructions** [5666, 5519, 3898, 4044, 1042, 6567, 1759, 6937, 2449, 2450, 6890, 5002, 201, 747, 748, 1225, 2447, 2448, 4741, 3936, 1256, 4292, 4947, 4785]. **instrument** [58, 63, 64, 65, 66, 67, 68]. **Instrumentation** [7444, 1686, 6632]. **Instrumente** [61]. **instruments** [61, 1016, 3193]. **Insurance** [33]. **Integer** [2638, 7124, 7000, 5389, 3044, 6495, 5131, 1952, 3050, 5255, 1815, 5394, 7012, 2335, 1818, 1956, 5399, 6516, 6053, 1822, 6399, 222, 4174, 3872, 224, 2350, 6404, 5907, 1022, 6063, 7025, 3075, 5595, 5713, 2893, 5509, 386, 5511, 4357,

5155, 5409, 5924, 4709, 6178, 6809, 6082, 6542, 6693, 2540, 3608, 3445, 741, 5747, 6562, 5534, 5318, 5319, 5538, 5760, 5945, 5047, 2111, 2112, 2254, 6587, 6593, 6834, 145, 3491, 2124, 3493, 4426, 1906, 7089, 4908, 1670, 2136, 6350, 1775, 2596, 4436, 6222, 2143, 6469, 6966, 7096, 3940, 4276, 7100, 4764, 2150, 589, 5098, 5100, 5224, 5368, 6855]. **Integer** [5370, 5371, 5793, 6235, 6369, 5106, 3365, 1254, 1077, 3534, 5661, 5827, 2183, 4797, 5822, 2661, 2196, 4167, 6519, 5402, 6910, 2209, 821, 3590, 5295, 2704, 2897, 2372, 5296, 6076, 4548, 4712, 6541, 7140, 3095, 5168, 2409, 5611, 4232, 6009, 4240, 2754, 4736, 7069, 5861, 6944, 6015, 6016, 7091, 1669, 6351, 2808, 3692, 5093, 3003, 4455, 4636, 5660, 3282]. **Integer-Division** [6562]. **Integerarithmetik** [2124]. **Integers** [6881, 18, 550, 812, 5270, 5271, 3061, 878, 6687, 5730, 3894, 4380, 3642, 3643, 2115, 1147, 6208, 5772, 1769, 4430, 1668, 4608, 7092, 531, 2016, 3954, 5571, 2309, 3213, 3380, 2324, 1827, 872, 3260, 5617, 5623, 5206, 2031, 4776]. **integrable** [4418]. **Integral** [548, 334, 1350, 283]. **Integral-Ungleichun** [548]. **Integrals** [6071, 1307, 3631, 6680, 1513, 7145]. **integrands** [5162]. **Integrate** [6937]. **Integrated** [5666, 7441, 4789, 724, 3558, 2506, 2055, 7329, 7344, 7545, 1425, 2248, 1880, 1180, 4332, 1032, 2536, 1869, 2427, 2258, 2472]. **Integrated-Circuit** [1880]. **Integrating** [3097, 1434, 5778, 7444, 4954]. **Integration** [6262, 1823, 4013, 625, 82, 4368, 83, 7376, 441, 204, 77, 6738, 937, 4687, 283, 92, 95, 2138, 4119, 194]. **Integrations** [6101, 2590]. **Integrator** [62, 3595]. **Integrity** [4472, 3641]. **INTEL** [1378, 980, 5124, 6379, 5125, 5888, 1488, 1957, 5905, 4678, 5494, 7025, 6532, 3747, 5154, 6178, 6289, 6694, 1857, 4717, 1630, 5843, 2247, 2248, 1316, 5427, 1059, 1324, 2469, 6736, 2295, 5877, 3842, 2313]. **Intellectual** [7254]. **Intelligence** [5714, 6544, 6725, 6746]. **Intel(R)** [4799, 5533]. **Intensive** [1719, 6505, 6341, 3194, 6865]. **Inter** [1081, 6545, 7265]. **Inter-Continental** [7265]. **Inter-Modulo** [6545]. **Inter-relationships** [1081]. **interaction** [5638]. **Interactions** [3973]. **Interactive** [1753, 1151, 984, 7498]. **Interchangeability** [1081]. **interconnected** [5785]. **Interest** [7333, 53]. **Interface** [1098, 1265, 7238, 7558, 2228, 986]. **Interfaces** [3754, 3099, 5527]. **Interfacing** [3192]. **Interim** [6996, 7047]. **Interior** [4478]. **Interior-Point** [4478]. **Interlaced** [6174]. **Interleaved** [1133, 5608, 3301, 6717, 3124]. **interlock** [2195]. **Intermediate** [4958, 5246, 4856, 4074, 4095, 3756, 5040]. **Internal** [3541, 3393, 6073, 5926, 6942, 3686, 3003, 1844, 2565, 2849]. **Internal-Newton-Method** [3541]. **internals** [3176]. **Internation** [7377]. **International** [7280, 7298, 7493, 7509, 7510, 7392, 7393, 2641, 7356, 7381, 3715, 7412, 7496, 7340, 7465, 7383, 4658, 7511, 7526, 7540, 7466, 7560, 7395, 7453, 7454, 7541, 7588, 7371, 7384, 7571, 7482, 7527, 7467, 7357, 7428, 7562, 7572, 7483, 7597, 7484, 7528, 7249, 7191, 7573, 7414, 7608, 7610, 7285, 7555, 7415, 7563, 7196, 7207, 7222, 7239, 7240, 7254, 7265, 7266, 7286, 7287, 7304, 7305, 7306, 7318, 7328, 7331, 7343, 7374, 7386, 7387, 7418, 7431, 7432, 7442, 7443, 7456, 7458, 7469, 7470, 7485, 7486, 7487, 7500, 7501, 7502, 7503, 7504, 7515, 7517, 7531, 7542, 7543, 7544, 7546, 7547, 7556, 7565, 7566, 7567, 7575, 7576, 7577]. **International** [7604, 7586, 7347, 7332, 7605, 7399, 7376, 7473, 7363, 7549, 7292, 7229, 7534, 7188, 7217, 7226, 7463, 7200, 7349, 3162, 5633,

7424, 7477, 7490, 7570, 7438, 7552, 7448, 7449, 7464, 7522, 7600, 7410, 7450, 7478, 7523, 7479, 7367, 7508, 7353, 7580, 7354, 7308, 7379, 7404, 7439, 7606, 7536, 7250, 7530, 7398, 7460, 7401, 7447, 7403, 7440, 7545, 7564, 7425]. **Internet** [3747, 7108]. **Interoperability** [3488]. **Interpolation** [6657, 5484, 3412, 3896, 1140, 1651, 3815, 5358, 5558, 373, 6032, 4786, 6680, 5305, 5306, 6339, 2122, 6349, 6459]. **Interpolator** [4304, 59, 5070, 5075, 4302, 3124]. **Interpolators** [3301]. **Interpretation** [3408, 6366, 3375, 3376]. **Interpreter** [4547, 147]. **Interpretive** [134, 297, 293]. **interrupt** [788]. **Intersections** [6941, 2436]. **INTerval** [4099, 4494, 7005, 3862, 3564, 5264, 5586, 4993, 5497, 5407, 5503, 7031, 556, 1852, 3596, 3607, 4037, 4040, 4861, 3613, 6089, 6309, 1628, 3627, 2103, 7459, 3632, 1310, 6569, 1433, 3647, 404, 7294, 1654, 3652, 6017, 4084, 7226, 3657, 3670, 3810, 5205, 1161, 4612, 4613, 6024, 924, 586, 6226, 3509, 3510, 3681, 4106, 4275, 4115, 3690, 3950, 3951, 4453, 5222, 5105, 799, 1359, 3708, 4634, 5466, 4656, 1269, 5294, 5998, 5158, 4554, 5738, 7398, 5847, 5756, 1639, 5191, 364, 365, 1320, 5550, 5864, 5867, 3332, 5352, 5871, 3344, 3508, 4109, 3345, 5215, 4456, 2035, 5237, 1358, 5143, 7226]. **Interval** [3341]. **Interval-Aware** [7005]. **interval-enhanced** [4109]. **Interval-type** [5264]. **Intervall** [3341]. **Intervallargumente** [2103]. **Intervalle** [2053]. **Intervals** [2053, 6095, 3668, 6853, 5222, 3243, 5995, 1511, 283, 7040, 5362, 5363]. **Interview** [3944, 4055, 3943, 4132, 4133]. **INTLAB** [4099]. **Intra** [6606]. **Intra-Unit** [6606]. **Intractable** [3632]. **IntRepair** [6834]. **Intrinsic** [3973, 3974, 4156]. **Introduction** [1564, 5811, 722, 854, 4512, 5687, 6506, 3742, 3884, 4012, 511, 4843, 4027, 5154, 1401, 435, 41, 1212, 3604, 126, 825, 2081, 6301, 1857, 4230, 5537, 2936, 446, 1317, 5059, 291, 6018, 5082, 656, 936, 1340, 3524, 1558, 7405, 1508, 5016, 5411, 5065, 2137]. **introductory** [2343]. **intrusion** [1205]. **intrusion-detection** [1205]. **Invariant** [3712, 5772, 3260, 5623]. **Invariant-Sum** [3712]. **Invarianten** [3104, 3105]. **Invariants** [1490, 3104, 3105]. **invented** [159, 5647]. **Invention** [4213, 6975, 4411, 1160]. **Inventor** [1167, 6474]. **inventors** [3467]. **Inverse** [1366, 5145, 1025, 4181, 5161, 6550, 3629, 2103, 3464, 5052, 6348, 366, 4607, 6466, 6600, 4273, 4108, 242, 6860, 3705, 6035, 5809, 6684, 3261, 201, 6436, 3457, 4889, 1892, 6211, 6455, 4256, 6477, 2103, 5049]. **Inverse-Square-Root** [3464]. **Inverses** [1112, 5994, 4363, 5054, 3140, 6635, 3204]. **Inversion** [6152, 3564, 4990, 2897, 6294, 4566, 5317, 6710, 5670, 468, 3892, 6191, 5080, 6471, 4290, 4781]. **Inversion/Division** [4566]. **Inversions** [5916]. **invertible** [4550, 4710]. **Inverting** [93, 74]. **Investigating** [6642, 6296]. **Investigation** [6756, 3142, 3945, 328, 2867, 3043, 5549]. **investigations** [772]. **Invisible** [4958]. **Invitation** [1526, 1750]. **Invited** [4844, 4908, 4920, 7499]. **Involved** [6662]. **involving** [5590, 3670, 3671, 5218]. **inwendig** [492]. **IoT** [6805, 6806, 6725]. **IP** [6666, 6607, 6624]. **Ipm** [61, 1509, 61]. **Ipojuca** [7579]. **Ireland** [7454, 7570, 7568]. **iRRAM** [4416]. **Irrational** [549, 2033]. **Irreducible** [5492, 5200, 5166, 4757]. **Irregular** [6850, 6968, 7101, 7102, 7103]. **ISA** [6540, 6887, 7137, 6124]. **ISAAC** [7427, 28]. **ISAs** [6929]. **ISCAS** [7515, 7443]. **ISIC** [7545]. **ISMVL** [7424]. **ISMVL'07** [7547]. **Isn't**

[554, 2554, 3164, 3707]. **ISO** [3899, 2911, 1747, 3900, 5527, 5029, 6719, 2492]. **ISO-Pascal** [2492]. **ISO/IEC** [2911, 1747, 3282, 3900, 4371, 5168, 5169, 5170, 5171, 5527, 6699, 5029]. **ISO/IEC/IEEE** [5740]. **ISO/IEC/TR2** [3899]. **Isogeny** [6503]. **Isogeny-Based** [6503]. **Isolating** [4712, 6692]. **isolation** [6387, 5460, 5237, 2849]. **ISPAN** [7511]. **Israel** [4675]. **ISSAC** [7353, 7414, 7399, 7490, 7450, 7580]. **ISSCC** [7286]. **Issue** [5248, 4835, 4027, 6301, 4374, 4061, 4230, 5082, 6865, 2229, 5065, 6468]. **Issues** [4788, 1804, 3619, 1418, 6719, 3658, 3802, 3932, 6024, 4325, 5951, 3504, 2994, 4117, 4454]. **ISVLSI** [7539, 7514, 7507]. **Italia** [3935]. **Italian** [137, 138, 3935]. **Italy** [7527, 7273, 7363, 7229, 7348, 7367, 7437, 3935]. **Itanium** [4498, 4523, 4678, 4215, 4216, 4715, 4716, 4389, 4402, 4583, 4733, 4774, 4933]. **Itanium-2** [4583]. **Itanium-Based** [4933, 4523]. **Iterated** [242, 1578, 4975, 6076, 6016]. **Iterating** [2116]. **Iteration** [4795, 1112, 5994, 553, 4858, 2110, 580, 3659, 6635, 5110, 5378, 6387, 610, 958, 5738, 6003, 3146, 3483, 2006, 4906, 78, 4943]. **Iterations** [1208, 1283, 2955, 3022, 4202, 5177, 4625, 2843, 947, 1183]. **Iterative** [664, 6141, 330, 665, 1374, 7016, 730, 1385, 1588, 1104, 3871, 278, 871, 281, 823, 158, 883, 969, 2394, 2396, 1420, 6564, 892, 568, 632, 1636, 3464, 5183, 6448, 4237, 639, 6717, 450, 644, 6838, 2129, 703, 6127, 3683, 5787, 5561, 6234, 4465, 7114, 1349, 5794, 5971, 5795, 191, 5660, 2174, 2175, 5144, 249, 7028, 6419, 6420, 3616, 3623, 5184, 4579, 5186, 5061, 4750, 6845, 4756, 2284, 1781, 2817, 4131, 716, 795, 4945, 5114, 4487]. **IV** [418, 419, 563, 1113, 7290, 781, 7171, 7264]. **IX** [7434].

J [2038, 1484, 389, 1296, 7046, 7242, 531]. **J.** [262]. **Jack** [7196, 2875]. **Jacobi** [3740, 5061]. **Jacobian** [4485]. **Jager** [43]. **Jaguar** [5963]. **Jahr** [1653, 7234]. **Jahre** [1230]. **January** [7164, 7327, 7555, 7328, 7531, 7546, 7577, 7336, 7448, 7324]. **JANUS** [2382]. **Japan** [7538, 7427, 7573, 7515, 7582, 7225, 7424, 7438, 7602, 7465, 7265, 7442, 2920]. **Japanese** [3196]. **Java** [7411, 3873, 4630, 5389, 4976, 4816, 3874, 3875, 4004, 6790, 3747, 4543, 3750, 4032, 3902, 3903, 4250, 4265, 4636]. **Java-Enabled** [4543]. **java.math** [4330]. **JavaOne** [7452]. **Java**^{TM} [3876, 4336]. **JBits** [4528]. **Jersey** [7190, 7172]. **Jim** [3724]. **John** [3714, 340, 341, 7271, 5723, 5838, 6182, 3767, 4055, 5647, 7167, 7168, 7169, 7171, 7173, 7174]. **Joho** [7582]. **Join** [2990]. **Joint** [7170, 7176, 7183, 7185, 7186, 7190, 5465, 7504, 7274, 4268, 4618, 5163]. **joint-detection** [5163]. **Jointly** [7164, 7531, 7546, 7577]. **jokes** [4654]. **Jordan** [5670, 6278]. **Jose** [7440, 7386, 7456, 7590, 7477]. **Josef** [7122]. **Josephson** [1515]. **Journeyman** [4157, 4158, 4159, 4160]. **Joys** [6042]. **JPEG2000** [5104]. **JSR** [4330]. **JTC1** [5169, 5170, 5171]. **Julia** [4913, 6602]. **July** [7280, 7281, 7368, 7392, 7369, 7525, 7406, 7560, 7541, 7596, 7384, 7571, 7252, 7530, 7165, 7517, 7542, 7556, 7565, 7568, 7583, 3461, 7389, 7399, 3780, 7408, 7434, 7474, 7278, 7292, 7595, 7257, 7401, 7337, 7477, 7584, 3189, 7365, 7366, 7449, 7410, 7523, 7580, 1526, 4133]. **Jump** [5427]. **Jumps** [3747]. **June** [7368, 7380, 7426, 7451, 7537, 7326, 7339, 7452, 7481, 7560, 7561, 7455, 7313, 7603, 7206, 7483, 7252, 7165, 7259, 7241, 7397, 7518, 7607, 7586, 7347, 7334,

7548, 7605, 7362, 7521, 2769, 7591, 7217, 7401, 7348, 7349, 7245, 7234, 7390, 588, 3189, 7365, 7366, 7602, 7600, 7263, 7236, 7309]. **Juni** [1653, 7234, 7390]. **Just** [5148, 7020, 4816].

K5 [3472, 4100]. **K6** [4044, 3926]. **K6-2** [4044, 3926]. **K7** [3936]. **K7**^{TM} [4086, 3937]. **Kōbe** [7573]. **kA/cm** [5750]. **Kahan** [579, 5480, 6182, 5931, 1662, 3943, 3944, 3843]. **Kalman** [2317, 7085, 2631]. **Kalray** [6303]. **KaratSaber** [7119]. **Karatsuba** [4692, 6690, 6440, 6330, 5616, 5060, 7152, 7119, 4147]. **Karatsuba-Based** [5616]. **Karatsuba-Like** [5060, 6690]. **Karlsruhe** [7460]. **Karpinski** [21]. **KAT** [2082]. **KCS** [1191]. **keel** [6755]. **Keeping** [6755]. **Keio** [7265]. **Kentucky** [7253]. **Kernels** [2989, 2806, 2988]. **Kerr** [5936]. **Key** [5580, 3856, 6428, 1223, 4380, 4566, 6567, 6728, 3805, 5874, 3220, 6257, 4190, 3789, 4088, 2977]. **Key-Exchange** [6728]. **keying** [3132]. **Keynote** [5892, 2677, 5919, 6080, 6810, 6101, 6830, 6126, 6145]. **Kharosthi** [5545]. **Kind** [6921]. **Kingdom** [7303]. **Kingdon** [7406]. **Kit** [2308, 2825]. **Kitab** [408]. **Kleine** [1335]. **Knot** [769]. **Knotenpolynomen** [769]. **Know** [4336, 6790, 2889, 2706, 2707, 4707, 3018, 2]. **Knowledge** [5806]. **Known** [7014, 5918, 832, 4805]. **Knuth** [1506, 6129, 3844]. **Kobe** [7515]. **Koblitz** [5852, 5387, 5128, 5405, 4362]. **Kolloquium** [1485]. **Komma** [107]. **komplexe** [2053, 2103]. **Kong** [7485]. **Können** [1137]. **Konrad** [1380]. **konverter** [3350]. **Konvertierung** [1976]. **Konvertierungsroutinen** [2485]. **Konvolutionssumme** [3160]. **Korea** [7430, 7536]. **Koren** [4675]. **Krivine** [6582, 6354]. **Krylov** [3555, 6919, 4280]. **Kulisch** [1672, 1673]. **Kummer** [6949]. **Kutta** [7134]. **kvadratroden** [1329]. **KY** [7484]. **Kyoto** [7602, 3196].

L [1484, 6779, 1672, 4792, 4986, 4999, 2393, 5050]. **L-U** [2393]. **L.** [24, 1673]. **l.s.d** [2160]. **label** [3035]. **Laboratories** [75, 98, 2756]. **Laboratory** [7164, 3554, 4099, 5112]. **Ladder** [6717, 896, 6460]. **Lafayette** [7357, 7420, 7507]. **Lagrange** [5129]. **Lahey** [3851]. **Lake** [7544, 7566]. **Lakes** [7494, 7553, 7420, 7436]. **lambda** [7147]. **lambda-calculus** [7147]. **Lancaster** [7307]. **Lanczos** [4024, 5192]. **Land** [6333]. **Language** [7309, 7495, 2861, 2635, 1102, 1729, 1390, 4334, 4335, 4336, 1512, 4193, 4355, 1401, 3752, 3269, 827, 2911, 4214, 2729, 5029, 3905, 1044, 1654, 7162, 943, 3969, 6489, 1011, 5698, 1508, 1734, 2910, 5169, 5170, 5171, 5527, 627, 2923, 1528, 1753, 5615, 2581, 2582, 7088, 2137, 2802, 1784, 2824, 1697, 3020, 3282, 4371, 5168, 3162]. **Languages** [7298, 7394, 1204, 4189, 3085, 4377, 4241, 5442, 7231, 994, 3838, 7250, 252, 2220, 3899, 3900, 4217, 5527, 7275, 3305, 1063, 5102, 3371, 1095, 7484]. **LAPACK** [2884, 6906, 6907, 6342]. **LAProof** [7053]. **Large** [7164, 1572, 6883, 859, 6661, 4165, 5492, 5911, 5712, 2893, 2714, 5299, 4203, 1413, 5842, 4378, 6317, 25, 2111, 1531, 3649, 5074, 1668, 6350, 7092, 6352, 6846, 2016, 937, 3704, 1177, 1078, 3213, 3380, 45, 6268, 4672, 3056, 3571, 3987, 6279, 3745, 5296, 2532, 2382, 4719, 2924, 3481, 6116, 6117, 5866, 7088, 1910, 2010, 7233, 654, 3000, 410, 947, 1183]. **Large-Number** [25]. **Large-Scale** [7164, 5712, 1413, 1531, 6846, 3649, 7233]. **l'Arithmétique** [1]. **l'Arrondi** [4684]. **Laser**

[1964, 3258]. **Last** [5480, 2964, 2856]. **Latched** [336]. **latencies** [6532]. **Latency** [7124, 4963, 4964, 3975, 3053, 4981, 6663, 6889, 5716, 5535, 6579, 3662, 5437, 5779, 5645, 6029, 3011, 6986, 4807, 3237, 3238, 6278, 5530, 4724, 4575, 4877, 5056, 5775, 3661, 3928, 3941]. **Latin** [2]. **Lattice** [6045, 5621, 4628, 5096, 2177, 4812, 4983, 5587, 2389, 1983, 1883, 4896, 3150, 4768, 2024, 2495, 3845]. **Lattice-Based** [6045]. **Lattices** [6338]. **Lauderdale** [7470]. **Launches** [6383]. **Law** [39, 1097, 4234, 2286, 5364, 5698, 826, 3765, 4247, 5068, 5869, 2285, 5579, 3712, 5676, 5677, 5267, 5279, 5508, 4849, 5008, 4546, 5164, 5037, 5179, 1446, 5782, 785, 717, 1471, 661]. **Lawrence** [6468]. **Laws** [5037, 5068, 4431, 4355]. **Layer** [7018, 4901]. **layers** [3202]. **Layout** [3449, 1802, 1803, 1192, 1495]. **Lazy** [3048, 3887, 3794, 6110]. **LCAS** [2730, 2918]. **LCPC** [7484]. **lead** [5013]. **Leading** [2541, 5034, 5056, 3804, 2799, 4445, 3697, 5572, 4689, 3891, 6107, 1555, 4779]. **Leading-Zero** [5572, 2541, 3804, 3697]. **leads** [4032]. **Leak** [6329]. **leakproof** [3042]. **Leaks** [6518]. **learn** [3622]. **Learned** [3501]. **learners** [5073]. **Learning** [6482, 6383, 6895, 6916, 6924, 2905, 6561, 6563, 1634, 6444, 6714, 7063, 6943, 6592, 6954, 6462, 6846, 6847, 6977, 6743, 6631, 6640, 7121, 6078, 2907, 6437, 6713, 6449, 6723, 6955, 7090, 7078]. **Least** [603, 2710, 643, 2828, 2177, 1948, 3976, 2024]. **least-mean-squares** [1948]. **Least-Square** [2828]. **Least-Squares** [643, 1948]. **leave** [3947]. **Lebenswerk** [602, 1800]. **Lecture** [4844, 3621, 3768, 4908, 4920, 742, 3767]. **Lectures** [3567, 2690, 3696, 7307, 7527]. **led** [2869]. **LEDA** [3407, 3563]. **Ledley** [262]. **Left** [5022, 4218, 6577, 5543, 1556, 4714, 5031]. **Left-Looking** [6577]. **Left-to-Right** [5022, 4218, 5543, 4714, 5031]. **legacy** [5800]. **Legendre** [5993, 5291, 6697, 1631, 1457, 1694]. **Leibniz** [391, 3467, 801, 391, 1230, 3467, 6114, 96, 6975, 801]. **leibnizsches** [1230]. **leichte** [548]. **leistungsfähiger** [1759]. **LEMA** [5615]. **L'empire** [3597]. **lengte** [540]. **Length** [4165, 174, 1125, 390, 513, 1131, 3142, 709, 6623, 593, 3025, 2043, 6257, 3230, 4672, 5491, 1726, 1825, 674, 626, 6814, 3288, 3458, 521, 4595, 4596, 5428, 3671, 540, 2836, 4946, 2847, 1795]. **lengths** [942]. **Less** [2866, 5837, 5851, 4692, 1620, 5739]. **Lessons** [3501, 3389]. **Let** [3605]. **Letter** [3718, 3721, 1956, 421, 199, 426, 348, 285, 260, 2290, 212, 375, 717, 428, 1687]. **leur** [29]. **leurs** [29]. **Leuven** [7556]. **Level** [7001, 1095, 3568, 2060, 2343, 6167, 6065, 6170, 1512, 4189, 6700, 3107, 7052, 5324, 5328, 2560, 2942, 3470, 3638, 1654, 7073, 2126, 994, 7097, 6744, 6627, 4155, 4800, 6888, 3575, 2344, 2881, 4826, 5710, 2698, 3081, 6925, 6446, 5861, 4594, 4595, 5198, 5077, 1063, 3936, 5208, 4117, 4455, 1697, 2617, 2618, 2619, 6368, 2621, 5796, 4140]. **level-1** [5796]. **Level-Index** [2060, 2560, 2942, 3470, 3638, 2126, 2343, 2344, 5208]. **Leverage** [7254]. **Leveraging** [6544, 7115]. **Levinson** [1200]. **lexically** [1496]. **Lexicographic** [1876, 2459]. **L'Extraction** [1160]. **LIA** [5029, 2882, 3162]. **LIA-1** [2882]. **LibEFT** [6283]. **libm** [6189, 4992, 5193, 5978, 4402, 4583, 4823, 4995, 4933]. **Libmcr** [4929]. **Libraries** [6998, 6781, 6782, 563, 634, 2759, 7022, 5467, 3969, 4057, 6574, 6827]. **Library** [6645, 720, 6258, 4507, 5682, 418, 419, 4338, 5497, 6678, 4688, 6172, 7029, 6531, 5006, 1119, 1120, 1206, 2895, 2703, 4854, 4196, 1981, 6088, 1865, 6701, 6004, 6310, 7053, 440, 4578, 4879, 5044, 6832,

989, 2975, 3333, 3812, 4439, 3502, 7095, 6733, 2288, 2289, 2601, 6735, 2603, 4631, 4933, 2158, 4936, 5658, 1559, 1003, 5661, 4491, 5978, 6652, 5475, 4797, 2664, 6787, 2680, 5141, 5273, 4992, 5147, 5505, 6283, 5292, 2896, 1134, 1220, 1867, 4717, 5414, 6002, 4057, 3116, 633, 756, 5944, 4402, 4583, 5423, 4733, 4591, 7069, 5351, 1774, 6351, 5966, 1689, 4929, 147, 5232, 3707, 4961, 4976, 4667]. **Library** [4893, 4612, 4613, 5628]. **lieu** [2425]. **Life** [33, 4268, 3214, 6398]. **LifeJacket** [6215]. **Lifting** [6295]. **Lifting-Based** [6295]. **Light** [3747, 3758, 4198, 6090]. **Lightweight** [6894, 5921, 7083, 7086, 5822, 3877]. **Like** [852, 903, 3795, 5060, 3925, 3423, 6690, 4219, 5789, 5876, 1782]. **Likelihood** [4903, 4978]. **Limit** [3045, 6513, 745, 900, 976, 2010, 1489, 1491, 6514, 3442, 6707, 3299, 5650, 3015]. **Limit-cycle** [745]. **Limitation** [1623, 5698, 674]. **Limitations** [1661]. **Limited** [4050, 442, 573, 3149, 3042, 5493, 5702, 4691, 6078, 2905, 2907]. **Limiting** [884]. **Limits** [5829]. **Line** [3225, 3399, 2891, 1116, 2072, 2212, 1402, 3265, 7415, 1623, 913, 1533, 1441, 1661, 1447, 4434, 2155, 4129, 4460, 940, 1175, 2159, 2830, 1474, 1475, 1941, 2171, 6236, 2333, 6157, 2209, 2359, 2890, 1736, 2213, 821, 4701, 1612, 2382, 2244, 4875, 2428, 3471, 4592, 2436, 3311, 4260, 4751, 4611, 4924, 2604, 1074, 2478, 2829, 1472, 1473, 1704]. **line-drawing** [4611]. **Linear** [603, 4957, 3553, 4510, 1716, 1393, 4345, 6408, 5921, 430, 4024, 4847, 253, 3894, 6549, 2083, 5307, 4224, 7053, 3296, 895, 1045, 4393, 5183, 4233, 904, 6577, 443, 6830, 5548, 3488, 5074, 2136, 6026, 5782, 6362, 7102, 4115, 4280, 5457, 6623, 3836, 1078, 45, 5981, 4659, 2068, 3885, 6296, 6419, 4552, 6923, 5927, 515, 516, 565, 6703, 6704, 1420, 4065, 5184, 4397, 4403, 5854, 7070, 5547, 5429, 1664, 5348, 5432, 3328, 3329, 3809, 7091, 5961, 5962, 6965, 1542, 3518, 4625, 3196, 3013, 947, 1183, 4488, 4783, 4835]. **Linear-Array** [3296]. **Linear-System** [4957]. **Linear-Time** [4224]. **Linear/Linear** [5921]. **Linearer** [4488, 4783]. **linearization** [1638]. **Linearly** [6892]. **Lines** [274, 6692]. **Ling** [5488, 6917]. **Linger** [3405]. **link** [4407, 3707]. **Linkage** [7378]. **linked** [2574]. **l'Invention** [1160]. **Linz** [7258]. **Liquid** [3657]. **Lisbon** [7482]. **LISP** [7281, 1496, 1741, 1784, 2832, 2833, 1478, 3429, 3676, 3695, 1927, 3957, 2844]. **List** [6651]. **listing** [1890]. **Lists** [6532, 2574]. **Lite** [6951]. **literate** [4306]. **literate-programming** [4306]. **little** [6266]. **Live** [6488]. **Livermore** [2756]. **living** [7567]. **Ljubljana** [7191]. **LLL** [4387, 5621, 5069]. **LLL-Reduction** [4387]. **LLVM** [6215]. **LMS** [1583, 1721, 2668, 3410, 4017, 2395, 1650, 1763, 5058]. **LNS** [4301, 4302, 4303, 4304, 4305, 4500, 4501, 4503, 3865, 4165, 4672, 6160, 3421, 4688, 5147, 5739, 3124, 3301, 4602, 2267, 4950]. **load** [3337]. **Local** [746, 3477, 4520, 5833, 365, 2453]. **locality** [6664]. **Location** [342, 781]. **Log** [6565, 2781, 5652, 1543]. **Log-Depth** [2781]. **Logarithm** [1487, 6882, 275, 332, 5509, 1979, 4211, 1749, 6197, 6324, 5046, 2110, 2111, 6948, 4907, 6222, 4102, 652, 938, 1692, 2611, 2613, 5971, 6861, 6980, 1184, 5808, 2863, 610, 757, 6343, 1908, 4606, 7091, 5093, 5560, 3379, 4822]. **Logarithm-Approximate** [6948]. **Logarithm-Domain** [6980]. **Logarithmic** [6141, 3717, 4502, 4655, 4965, 4966, 5470, 5671, 5672, 6491, 6657, 1809, 248, 5486, 5823, 1960, 3993, 4170, 4171, 5278, 4348, 1113, 5599, 6809, 6564, 519, 5937, 1880, 4726, 4070, 6451, 6936, 5188, 4589, 3484, 7075, 5066, 4425, 582, 6229, 271, 5970, 2299,

2319, 2500, 3855, 4656, 5890, 1808, 2057, 4831, 2699, 2700, 4846, 6703, 6704, 3288, 630, 2744, 5853, 2427, 3474, 575, 5067, 2014, 2297, 1931, 2300, 5376]. **logarithmic-exponential** [3474]. **logarithmischer** [2699]. **Logarithms** [154, 864, 668, 558, 2741, 286, 691, 266, 999, 1300, 6202, 783, 5276]. **Logic** [6992, 1006, 1082, 7381, 857, 1012, 7526, 7540, 2199, 6397, 7482, 867, 304, 1276, 1394, 282, 4353, 339, 7387, 7432, 7547, 7564, 5312, 1527, 6828, 4587, 6596, 4609, 483, 584, 3811, 4272, 7579, 7424, 2986, 4763, 4622, 7107, 5790, 213, 1001, 1458, 2155, 5224, 939, 7479, 950, 5976, 6991, 7454, 4175, 3888, 5839, 4376, 4882, 7150, 3804, 4269, 778, 779, 780, 781, 782, 783, 784, 2020, 3697, 5226, 5102, 3702, 7187, 7167]. **Logic-Based** [6828]. **Logical** [3027, 1103, 1743, 4124, 4962, 58, 2425, 2429, 1664]. **logiciel** [3413]. **LogiCORE** [5238, 5575]. **Logics** [7453]. **Logik** [1001]. **Logistic** [5974]. **Logo** [1773]. **London** [7596, 272, 7268, 43]. **Long** [3405, 4985, 2677, 4709, 5730, 438, 6101, 3642, 3643, 6945, 4430, 845, 4129, 3739, 2698, 4551, 5756, 2590, 2808, 5789, 5876, 5660]. **long-term** [2590]. **longer** [6453]. **Look** [5916, 3889, 1743, 4203, 3440, 5066, 5197, 2126, 4433, 3832, 5225, 803, 2667, 4025, 5525, 6452, 3952, 2157, 4950]. **Look-Ahead** [5225]. **Look-Up** [1743, 4203, 5066, 2126, 4433, 3832, 3440, 2667, 4025, 3952, 4950]. **Lookahead** [4166, 3464, 2002, 5239, 2666, 1900]. **Looking** [6577]. **Lookup** [5509, 4022, 6085, 5036, 4408, 5054, 5769, 2128, 2129, 6358, 3816, 1545, 999, 2818, 2819, 3865, 3437, 4041, 4863, 3326, 3327, 4091, 3156, 2036]. **Lookup-Table-Based** [6085]. **Loop** [3385, 3104, 7028, 5428, 2167, 3105]. **Loops** [3233, 4609]. **LORIA** [7525]. **Losing** [7103]. **Loss** [1514, 5630, 1513, 1969]. **Lossless** [5831, 7059, 7062, 5104, 2307, 3700]. **lossy** [6509]. **Lost** [813, 5841, 6357]. **Lösung** [1599, 4488, 4783]. **Lottery** [7103]. **Louis** [21, 7272]. **Louisiana** [7285, 7420, 7507]. **Louisville** [7253]. **Low** [2857, 4963, 4964, 1366, 1806, 6771, 6887, 6663, 6889, 6267, 609, 4811, 6512, 4984, 4813, 3868, 5270, 5271, 7019, 6278, 5280, 5501, 4015, 6918, 3586, 7029, 6416, 4194, 1403, 3890, 7037, 5724, 7038, 3761, 6548, 5022, 5734, 5840, 4042, 6192, 6558, 7050, 4720, 3908, 5937, 6316, 6933, 5042, 4400, 7060, 4245, 5950, 7075, 4081, 4082, 4083, 6725, 6726, 4896, 4425, 4601, 7086, 4266, 4432, 7437, 5959, 6599, 5631, 6843, 4754, 4755, 4915, 5077, 5445, 4102, 4104, 4922, 7155, 5787, 655, 5645, 6029, 6610, 6133, 5561, 3011, 6977, 944, 6979, 4475, 3962, 6985, 6750, 6986, 4645, 5977]. **low** [5989, 6799, 2903, 5733, 3897, 5530, 7054, 3910, 4724, 5944, 5765, 3791, 5067, 2264, 3664, 5777, 3806, 7087, 2584, 2984, 1067, 5221, 6740, 2621, 3963, 4945]. **Low-Complexity** [5445, 3908, 5042, 3963, 4945]. **Low-Cost** [1366, 1806, 6771, 5280, 3761, 5840, 5950, 7075, 5631, 655, 6133, 944, 1403, 5733, 2264, 2584, 1067]. **Low-dimensional** [4896]. **Low-frequency** [2857]. **Low-Latency** [6889, 5645]. **low-level** [2621]. **Low-Overhead** [7060]. **Low-Power** [4813, 5022, 6192, 6558, 5937, 4081, 4082, 4425, 7086, 7437, 4102, 4104, 4922, 5787, 5561, 6979, 6750, 4811, 4015, 3586, 4083, 4645, 3910, 5067, 5777]. **Low-Precision** [6887, 6512, 7019, 7038, 6726, 6843, 7029, 6933, 7087]. **Low-Weight** [5270, 5271]. **Lower** [1949, 4069, 3652, 5444, 5981, 4554, 5443, 2821]. **LP** [3652]. **LPE** [6861]. **LS** [1883]. **LSA** [4460]. **LSB** [5529]. **LSI** [1189, 1508, 1409, 1325, 1245, 1257]. **LSI-11** [1508, 1409]. **LTI** [6745]. **LU**

[4852]. **Lubbock** [7260]. **LUCAS** [1659, 1471, 661]. **Luigi** [5887]. **Luminy** [7401]. **LWE** [7105, 6983]. **LX** [564]. **LX-1** [564]. **Lyapunov** [6033]. **Lyon** [7480, 7395, 7591]. **LZA** [2541].

M [24, 3268, 4228, 4876, 4918]. **M.I.R.A.C.L.** [2289]. **M68000** [1579, 1580]. **MA** [7494, 7600, 7298, 7185, 7221, 7284, 7565, 7267]. **mac** [4977, 5982, 6515, 6903, 7019, 5834, 6435, 6927, 5949, 6835, 4266, 6967, 4125, 4950, 2323]. **MACHAR** [2205]. **Machin** [4611]. **Machine** [75, 6383, 1569, 153, 2506, 7013, 46, 6893, 2205, 224, 1021, 1507, 6916, 4026, 5010, 884, 342, 4035, 6924, 3098, 3270, 6563, 49, 25, 3139, 6954, 6847, 1453, 1246, 5557, 657, 6743, 943, 1002, 1478, 3705, 296, 45, 420, 422, 92, 1853, 2914, 15, 758, 3649, 5861, 6955, 2153, 656, 108, 1935, 1348, 2835, 2487, 3959, 2658, 2772]. **Machine-Checked** [4035]. **Machine-Efficient** [7013]. **machine-independent** [758]. **Machinery** [105, 86, 94, 7164]. **Machines** [7497, 5814, 7382, 1376, 81, 3746, 7045, 449, 7402, 7409, 7423, 7476, 7535, 7551, 77, 4629, 4320, 29, 40, 637, 72, 6114, 95, 1243, 3512, 124, 493, 35, 586]. **Macintosh** [3223, 2909]. **MacLISP** [835]. **Macro** [4553, 3187]. **Macro-Model** [4553]. **Macrocell** [5263, 3923, 3846]. **Macrocellular** [870]. **macromodule** [774]. **Macros** [1592]. **Macsyma** [963]. **Mactaggart** [2875]. **MAD** [2649]. **made** [3666]. **Madison** [7209]. **Madrid** [7526]. **Magic** [6550, 6211, 6455]. **Magnavox** [2141]. **Magnetic** [1077, 134, 3782]. **Magnification** [2163]. **Magnitude** [1091, 1872, 289, 584, 5359, 2887, 1879, 684, 2484]. **Magnum** [2629]. **mail** [3747]. **main** [379, 801]. **Mainframe** [5462]. **Mainly** [10]. **Mainstream** [3747, 2529]. **Maintaining** [3516]. **Major** [6172, 3822]. **Majority** [4353, 6188, 6828]. **Majority-Logic-Decodable** [4353]. **majors** [2815, 3002]. **Make** [6406, 6006, 5983, 1331, 3707]. **Maker** [4728, 6147]. **makers** [3389]. **Makes** [5427]. **makeup** [3014]. **Making** [4178, 6527, 6913, 7031, 411, 3481]. **Makuhari** [7442]. **malicious** [6242]. **Malo** [7280]. **man** [1329, 3943, 5647]. **management** [3042, 1697]. **Managing** [6341]. **Manchester** [2337]. **Mandarin** [7504]. **Mandelbrot** [5698]. **MANIAC** [127, 245]. **Manifest** [6783]. **Manipulating** [6705, 1239, 2382, 1333]. **Manipulation** [7217, 1071]. **Manipulations** [5303, 6199]. **Manitoba** [2377, 7261]. **Manticore** [7004, 6864]. **Mantissa** [6689, 2286, 1795, 2932, 3323, 4905, 777, 1781, 942]. **mantissas** [2014, 2285, 2599]. **Mantisse** [777]. **Mantissenlänge** [1795]. **Manual** [4499, 1947, 2179, 498, 2659, 302, 1274, 224, 959, 2069, 4702, 69, 3090, 1622, 1865, 1866, 835, 1896, 2120, 2262, 2442, 2443, 2445, 2999, 2991, 3514, 2154, 4463, 1468, 3367, 1478, 1086, 1011, 1092, 1381, 2518, 1134, 1220, 1526, 2117, 2950, 1895, 2441, 2444, 1162]. **Many** [6694, 438, 6563, 6054, 1625, 778, 5240]. **many-core** [6054]. **Many-Term** [6694, 6563]. **Map** [6004, 5974, 3867, 3202]. **MAPLD** [7479]. **Maple** [7362, 5423, 2871, 4978, 5401, 3604, 5351, 6965, 7405]. **MAPM** [4439]. **Mapping** [3050, 589, 5116, 6035]. **Mappings** [445]. **Maps** [3202, 4975]. **March** [1484, 7311, 7357, 7238, 7601, 7608, 7610, 7415, 7223, 7240, 7254, 7260, 7385, 7487, 7513, 7333, 7436, 7533, 7262, 7463, 7437, 7209, 7579, 7364, 7235]. **Mark** [1934]. **Market** [3488, 1997, 3353]. **Marketing** [4220, 4222]. **Markov**

[6242, 5677]. **marks** [2030]. **Marriott** [7436, 7404]. **Marseille** [7217]. **Maryland** [7509, 7197, 7444, 3696, 722, 7197]. **mashinnoi** [1246]. **mask** [4644, 4784]. **Masking** [3399, 2170]. **MasPar** [3554]. **Massachusetts** [7194, 7451, 7306, 7318, 7343, 7344, 7518, 7521, 7449]. **Massey** [3088, 4614]. **Massive** [5810, 6294]. **Massively** [2506, 2891, 4188, 7374, 5607, 3515, 2649, 2650, 3257, 4190, 2985, 4919, 2351, 3246]. **massively-parallel** [2649, 4190, 2985]. **master** [7512]. **Mastrovito** [6330, 4123]. **matched** [910]. **Matching** [2770, 4161]. **Materialiensammlung** [1485]. **Math** [5124, 6379, 6487, 3718, 3721, 1096, 1720, 3732, 3417, 3418, 3577, 554, 2530, 3747, 6921, 2533, 2085, 3093, 3094, 2092, 440, 4399, 6453, 2759, 2256, 4591, 1999, 3142, 5427, 3488, 3333, 2138, 4439, 7095, 2603, 2021, 2022, 5212, 5213, 2295, 3352, 2157, 6030, 3207, 3707, 5475, 2509, 2664, 5000, 2697, 2701, 4717, 6827, 2009, 1331, 1689, 1922, 3208, 7161, 6969]. **Math-who** [3093]. **math.h** [6768, 6326, 6445]. **math.h** [**?**]Bagnara:2021:PAV. **MathCW** [6258]. **Mathemagix** [6237]. **Mathematica** [2899, 2913, 3642, 3643, 5228]. **Mathematical** [720, 4787, 1482, 4961, 5128, 7465, 5674, 5816, 6258, 7013, 4667, 6781, 6782, 6052, 7130, 5700, 1104, 7467, 7247, 81, 4825, 6678, 467, 1029, 1120, 7573, 2703, 4193, 881, 7135, 7136, 4201, 3893, 6187, 7048, 7332, 634, 899, 975, 1047, 7362, 909, 1050, 526, 7229, 7172, 2440, 53, 7182, 7193, 2283, 7154, 1541, 6735, 2481, 6752, 6753, 2856, 4491, 7022, 1712, 4, 496, 6043, 61, 880, 2080, 5320, 5421, 756, 2773, 1452, 3826, 5094, 2815, 3002, 791, 4774, 7465, 7467, 7573, 7209]. **Mathematical-Function** [6258]. **Mathematicians** [7473, 4036]. **Mathematics** [7369, 7246, 7496, 4505, 5815, 7357, 6789, 3743, 2377, 7589, 1630, 4220, 4222, 6569, 7261, 7189, 2141, 7209, 2804, 7264, 2033, 2626, 7606, 719, 2312, 7198, 1378, 1840, 7373, 7499, 3620, 2757, 7172, 4080, 7226, 7351, 1797, 6867, 7373, 340, 341]. **Mathematik** [7227, 7226]. **mathématiques** [5421, 7401, 5094]. **mathematische** [975]. **mathematischen** [3119, 1904]. **Mathematischer** [61]. **MATLAB** [6486, 6298, 4917, 6718, 5559]. **Matrices** [6642, 93, 1213, 5632, 2803, 713, 3199, 74, 6643, 5255, 4665, 1269, 2897, 4202, 6436]. **matriciel** [2806]. **Matrix** [6643, 6038, 6150, 5395, 6397, 4987, 1385, 6167, 6280, 7024, 4847, 6289, 6294, 5524, 3092, 6546, 6083, 6549, 5731, 1413, 1522, 6559, 895, 1045, 6316, 3639, 6337, 356, 2450, 6951, 1659, 2972, 5958, 6021, 1915, 2152, 3352, 1693, 6977, 79, 2482, 6371, 6858, 6137, 5385, 5670, 5673, 2180, 5986, 2516, 4996, 2694, 2214, 4202, 6926, 974, 4403, 4404, 6105, 2113, 477, 2447, 2448, 4741, 4422, 5776, 5867, 5957, 6120, 6216, 1335, 5871, 5966, 2303, 3205, 3368, 414, 3378, 4953, 468, 2449]. **Matrix-Multiplication** [6977]. **Matrix-Multiply** [6397]. **Matrix-Vector** [6038, 2516, 6105]. **Matrixproblemen** [1335]. **Matter** [6789]. **Maui** [7448]. **MAX** [5133]. **Maximal** [1820, 875, 1628, 5105, 5158, 2100, 1795]. **maximaler** [1628, 2100]. **Maximally** [1795]. **Maximization** [117]. **Maximum** [3713, 3850, 861, 1015, 1125, 5718, 1852, 6729, 773, 792, 5975, 6257, 4978, 5999, 6076, 3448, 1994, 6016, 482, 5360]. **maximum-redundancy** [3448]. **Maxwell** [6171]. **May** [7199, 7218, 7553, 7554, 7185, 7190, 7220, 722, 7539, 7527, 4835, 7221, 7284, 7250, 7197, 7228, 7304, 7305, 7329, 7331, 7344, 7387, 7432, 7443, 7444, 7502, 7515, 7547, 7567, 7574, 7576, 7590, 7289, 7273, 7178, 7267, 7226, 7447, 7424, 7264, 7354, 7017, 4061].

MB [2377]. **MC** [2262, 2443]. **MC68000** [2017, 1470]. **MC68000/NS32081** [2017]. **MC68881** [1717, 1719, 1619, 2117, 1895, 1896, 2120, 2442, 2444, 1777]. **MC68881/MC68882** [2117, 2120, 2444, 2442]. **MC68882** [3304, 2117, 2120, 2442, 2444]. **MC8810** [2946]. **MC88100** [2445]. **MCALIB** [6068]. **McClellan** [2107]. **McGee** [372]. **McGraw** [272]. **McGraw-Hill** [272]. **McLaughlin** [6402, 6537]. **McLean** [7368]. **MCM** [3532]. **MCMC** [6333]. **MCU** [6771]. **MD** [7472, 7310]. **Mean** [1718, 431, 5718, 3639, 2481, 1948, 3980, 2080, 3928, 1060]. **Means** [1383, 385, 139, 2573, 269, 2036, 1353, 3966, 4236, 831, 4418, 3826]. **measure** [886, 5, 707, 1255]. **Measurement** [1976, 7415, 7444, 2279, 1701, 2512, 9, 4932, 1703]. **Measurements** [1804, 10, 2338, 4999]. **Measuring** [3578, 3241, 6068, 6184, 3166, 6239]. **mécanique** [40]. **Mechanical** [3545, 5683, 12, 3778, 6128, 4620, 40, 5919]. **mechanically** [4319, 3922, 3936, 3937, 4100]. **mechanically-checked** [3936]. **Mechanics** [7465, 37, 7167, 40, 274]. **Mechanik** [7227, 274]. **Mechanism** [4300, 6567, 48, 1292, 5919]. **Mechanized** [5898]. **Mechanizing** [3771]. **Medford** [7451]. **Media** [3869, 4723, 4731, 5002]. **Medical** [7338]. **Medicine** [7285, 7270]. **medieval** [1027, 6952]. **Medium** [5129, 6092, 755, 6136]. **Medium-Precision** [6092]. **Meeting** [7368, 7313, 7227, 7320, 7237, 3767]. **Meets** [4505, 7074]. **Megacycle** [149, 133]. **megaflops** [4250]. **mehrfacher** [1095]. **mein** [602, 1800]. **Melbourne** [7225, 7533]. **Meliá** [7526]. **Mellon** [7205]. **Melodica** [6816]. **member** [3353]. **Members** [6250, 438]. **Memoing** [3869]. **Memoization** [4959]. **memorandum** [152]. **Memorial** [7417, 7437]. **Memoriam** [6779]. **Memories** [5728, 2767]. **Memory** [864, 3233, 7024, 4203, 6435, 6560, 7058, 3301, 6716, 5197, 4742, 1905, 6604, 2146, 1245, 5887, 2682, 6912, 4876, 3124, 6955, 2015, 4282, 5461, 3529, 2624, 2632]. **Memory-Efficient** [6560, 6604]. **Merged** [1172, 1345]. **Meridien** [7254]. **Meritus** [7504]. **Mersenne** [5684]. **Mesh** [3412, 3454, 4386, 1668, 3689, 4161, 1472, 1473]. **Mesh-Connected** [3412, 1668]. **Mesopotamian** [7067]. **Message** [4794]. **Meßdatenverarbeitung** [1701]. **meßtechnische** [1976]. **messy** [2687]. **Meteorology** [7174]. **Method** [603, 3541, 1569, 804, 1367, 153, 154, 3559, 7006, 2330, 2054, 5393, 5821, 609, 813, 613, 1383, 222, 304, 1965, 6280, 5918, 2357, 4010, 873, 874, 1026, 5287, 36, 425, 508, 6920, 26, 158, 6690, 4033, 3756, 3607, 681, 514, 2387, 6190, 2396, 3287, 5417, 30, 519, 5419, 5609, 5754, 349, 49, 1887, 315, 5052, 1318, 1893, 4597, 366, 6115, 643, 3924, 2122, 4084, 6019, 4599, 4742, 1057, 4427, 1906, 121, 582, 5779, 773, 186, 3684, 4113, 1545, 5359, 4927, 5095, 533, 4120, 792, 6134, 4465, 214, 3701, 3704, 4136, 3372, 2036, 1078, 600, 3535, 6868, 1562]. **method** [5808, 6144, 6489, 4789, 1088, 6056, 5833, 2705, 2708, 1844, 1128, 3261, 5020, 3448, 7042, 7165, 3275, 566, 5314, 401, 3125, 6580, 2754, 4405, 2562, 4891, 2259, 5550, 3312, 2962, 836, 579, 3663, 4261, 4906, 27, 4911, 6842, 1064, 5873, 1542, 6361, 3345, 4623, 4451, 4452, 4627, 5091, 5092, 5093, 5218, 4456, 4930, 3831, 4131, 2826, 3364, 414, 3378, 5869]. **Methodist** [7201]. **Methodologies** [7229, 7348]. **Methodology** [6891, 2212, 4545, 4624]. **Methods** [3965, 218, 7340, 546, 547, 6885, 727, 6262, 1716, 7214, 7588, 117, 817, 870, 1601, 7134, 6415, 427, 1029, 3083, 966, 678, 1289, 1742, 625, 3761,

5302, 3609, 5307, 6085, 7457, 3451, 3452, 6312, 3627, 892, 5608, 4385, 6568, 7459, 439, 1046, 832, 6831, 446, 982, 1053, 3795, 2955, 7294, 2958, 2440, 182, 4079, 1658, 2972, 6350, 7182, 703, 3675, 164, 585, 4445, 1166, 3683, 7552, 2813, 5362, 5363, 323, 2816, 3837, 7323, 1349, 6371, 415, 1706, 4478, 4339, 4994, 5386, 3847, 7392, 4297, 2174, 2175, 3555, 2047, 2325, 863, 955, 7129, 7300, 7527, 6919, 7250]. **methods** [4030, 3891, 254, 739, 1974, 5525, 5738, 2725, 397, 3281, 3623, 5031, 2100, 7460, 2931, 3300, 5333, 2755, 317, 2119, 4739, 7463, 5199, 2270, 2585, 2008, 130, 163, 5636, 5637, 3516, 7403, 3196, 716, 795, 194, 1708, 5660, 1253, 1599, 1165]. **Metric** [32]. **Metrics** [3558]. **Metropolis** [340, 341, 531]. **Metropolitan** [7519]. **Mexico** [7330, 7447, 7562]. **Mflop** [2351, 2251, 2280, 2490]. **Mflops** [2217, 2509, 2665, 2895, 3102, 3103, 2405, 2406, 2412, 2413, 2414, 2415, 2774, 2447, 2448, 2449, 2450, 2469, 2217, 2896]. **MHz** [2328, 2329, 3992, 6417, 4212, 3644, 2438, 3498, 3499, 2467, 3536]. **MI200** [6872]. **Miami** [7426]. **Michigan** [7228, 7362, 7436]. **Micro** [2039, 3389, 2348, 1598, 1731, 7243, 7244, 7256, 7267, 5364, 1249, 1373, 1395, 6532, 1647, 3698, 7317, 7224]. **micro-computer** [1395]. **micro-operation** [6532]. **Micro-optimization** [2348]. **micro-power** [3698]. **micro-programmable** [1647]. **Micro/mini** [1598, 1731]. **Micro/Minicomputers** [2039]. **Microarchitectural** [5280]. **Microarchitecture** [1804, 4799, 2369, 5766, 7112, 1571, 2204, 7317, 4621]. **Microbenchmarking** [6557]. **microcode** [1309, 4100]. **Microcoding** [1256]. **Microcomputer** [1202, 1633, 1759, 2017, 2032]. **Microcomputers** [1083, 1362, 1530, 2966, 1772, 943, 622, 1031, 1528, 1760, 1732, 1700]. **Microcomputing** [2399]. **Microcontroller** [2278, 2183]. **Microcontrollers** [7000, 7078, 5781]. **Microelectronics** [7568, 7576, 7289]. **Micrografx** [3202]. **micropipeline** [3961]. **Microprocessor** [1261, 1482, 2342, 4171, 5705, 1599, 1968, 7248, 2715, 3090, 564, 7223, 5740, 6699, 2411, 2935, 1143, 1997, 2445, 4895, 5064, 2774, 2963, 4085, 3926, 2280, 4104, 5355, 5462, 5708, 3037, 1488, 3393, 4808, 1378, 5014, 1408, 3097, 2391, 3618, 2410, 2930, 2565, 2435, 2437, 4086, 4743, 1774, 1678, 3339, 2807, 3691, 3822, 4125, 1347, 3358, 1943, 4170, 1427]. **Microprocessor-Based** [1143, 1774, 1347, 1943]. **Microprocessors** [1584, 2521, 4191, 6428, 5874, 4538, 980, 1331, 2138]. **Microprogrammable** [887, 1360]. **Microprogrammed** [1030, 1320, 721, 1891, 1356]. **Microprogramming** [7224, 839, 7317]. **Microsecond** [133]. **Microsoft** [2600]. **MicroVAX** [2018]. **Midcon** [7256]. **Midcon/84** [7256]. **Middle** [4857]. **Midpoint** [6309, 5998]. **Midpoints** [5748]. **Midwest** [7572, 7361, 7516, 7203]. **MIEL** [7576]. **might** [2548]. **Migration** [3385, 7083]. **Mikrorechentechnik** [2399]. **Mikrorechner** [1732, 1700]. **Mikrorechnerprozeduren** [1599]. **Mikrorechnersystemen** [1759]. **Milestones** [7046]. **Military** [1499, 7278, 7292, 7479]. **millennium** [7416]. **million** [1486, 3222, 3547, 3548, 3549, 3550, 3551, 3552, 6361]. **Millisecond** [5557]. **Millisecond-Scale** [5557]. **Mills** [3405]. **Milne** [24]. **Milne-Thomson** [24]. **MIMD** [3591]. **MIMO** [6494, 6294, 5744, 5745]. **MIN** [5133]. **MIN/MAX** [5133]. **Mindless** [4865]. **Minefield** [3230]. **Mini** [7243, 7244, 7256, 7267, 1598, 1731, 5944]. **mini-library** [5944]. **Mini/Micro**

[7243, 7244, 7256, 7267]. **Minicomputer** [887]. **Minicomputers** [2039, 1621, 1528]. **MiniFloat** [6887]. **MiniFloat-NN** [6887]. **Minimal** [3295, 360, 5031, 3789, 5550, 7098]. **Minimally** [4683, 265, 6469, 7040]. **Minimax** [5075]. **Minimization** [2317, 870, 1743, 287, 913, 2296, 4173]. **minimize** [2407]. **Minimizing** [6039, 1629, 4379, 3927]. **Minimum** [2178, 1582, 5718, 2161, 6747, 4481, 1565, 3586, 4746, 711, 5360]. **Minimum-distance** [4481]. **Minis** [1518]. **Minneapolis** [588]. **Minnesota** [588]. **Minor** [6736]. **Minus** [6152]. **MIPS** [2660, 2342, 2676, 3256, 3090, 2097, 2922, 2282, 2807, 2629]. **MIPS-R3000** [2660]. **MIPS-X** [2342]. **Miranker** [1672, 1673]. **Mirror** [868, 4626]. **Mirror-symmetrical** [4626]. **Miscalculating** [4219]. **miscalculation** [3437]. **Miscellaneous** [6902]. **MISHA** [2144]. **Mismatch** [6789]. **missile** [2869, 2995]. **Missing** [1213]. **Mississippi** [484]. **Missouri** [7272]. **Mistakes** [6527]. **Mister** [391]. **Mitchell** [6811, 6565, 5188]. **Mitchell-Based** [6811]. **Mitigation** [6708]. **mitigations** [5824, 6315]. **mittels** [2100, 2573, 1353]. **Mixed** [6642, 6497, 5395, 1958, 5488, 6270, 5274, 6404, 6923, 6425, 1618, 6432, 5939, 6830, 6585, 6344, 7079, 6843, 6604, 5457, 7115, 6858, 6140, 6639, 5471, 3226, 1714, 5689, 6420, 2230, 2739, 5940, 2931, 4582, 4247, 5873, 5221, 2492, 2846]. **Mixed-domain** [6858]. **mixed-hybrid** [4247]. **Mixed-Precision** [6642, 6270, 7079, 6604, 5457, 6140, 6639, 6585, 6858, 5689, 6420]. **Mixed-Radix** [1958, 5488, 1618, 6432, 2739, 2846]. **Mixing** [6812]. **ML** [3854, 4702, 6925, 3812]. **MMIX** [6129]. **mobile** [5733, 4244]. **Möbius** [5849]. **Mod** [2646, 6710, 3356, 5502]. **Mode** [6177, 7081, 6041, 5719, 6305, 3293, 4422, 3665, 6226]. **Model** [417, 1268, 1377, 6513, 3568, 5700, 5986, 1123, 176, 4553, 396, 6560, 6706, 5534, 6708, 481, 3933, 6604, 1776, 593, 1186, 6242, 1484, 1016, 1017, 6514, 3575, 5297, 3602, 1298, 4590, 4734, 6585, 3651, 2767, 2604, 5376, 3388, 6585, 2460]. **Modeling** [7465, 4193, 6708, 2942, 5526, 6104, 2772, 6608, 4931]. **Modelling** [7332, 6121, 7113, 5796, 6365]. **Models** [1576, 2535, 7041, 395, 6566, 6729, 6242, 5698, 1502, 506, 2900, 394, 699, 7088, 5076]. **modem** [3132]. **Modems** [3747]. **Modern** [218, 3854, 2647, 5685, 512, 5723, 5838, 6421, 316, 5053, 5189, 6209, 4615, 7552, 2648, 5824, 7512, 6097, 2019, 5884, 5885]. **Modes** [3591, 5172, 5974, 301, 4346, 6934]. **Modification** [5234, 3766, 3952]. **Modifications** [1571, 393, 2595]. **Modified** [5807, 5476, 6267, 813, 4833, 181, 1898, 1057, 925, 5209, 1169, 7160, 1191, 2058, 1959, 3088, 3291, 1992, 2929, 2591, 1000, 2303, 4780, 5381, 4954]. **Modifying** [3280, 6860]. **modpn** [5423]. **Modula** [2523, 1735, 3099, 2775]. **Modula-2** [2523, 1735]. **Modula-3** [3099, 2775]. **Modular** [1082, 6870, 6881, 3720, 4308, 4971, 5472, 5893, 6887, 5390, 6152, 1578, 3979, 2193, 5482, 5266, 6159, 7018, 4673, 5270, 5271, 3422, 5275, 2684, 5907, 5145, 6524, 3885, 6171, 6413, 2695, 4190, 4353, 5923, 6534, 6074, 6922, 6537, 6690, 3438, 5161, 2903, 5301, 3612, 5735, 1218, 5737, 6303, 7049, 3107, 5417, 4381, 5608, 3118, 4571, 4066, 4395, 6329, 289, 3796, 5190, 5621, 6942, 1894, 2572, 6118, 765, 3492, 3806, 5074, 4428, 2788, 6840, 6841, 6127, 4097, 5353, 4273, 6607, 7105, 5645, 845, 1171, 3006, 3190, 5367, 4461, 2837, 4472, 4473, 1479, 6034, 6986, 5385, 6237, 3858, 4317, 6890, 5265, 6403]. **modular** [5402, 3878, 3076, 6804, 4023, 2219, 4207, 4555, 5525, 4039, 4718, 5028,

4228, 4397, 4579, 1314, 7147, 4889, 4891, 5344, 5783, 6473, 2817, 3007, 4773, 5231, 3203, 3840, 5381, 5114, 6987, 4953]. **Modular-Multiplication** [2572]. **modulation** [4227, 4141]. **Modulator** [132, 3987]. **Module** [3851, 1499, 1114, 2694, 2430, 3488, 3167, 4446, 3527, 4311, 2333, 1272, 2363, 2949, 4758, 5797]. **Modules** [1576, 4507, 4578, 3488, 4880, 3336]. **Moduli** [6036, 6046, 3977, 6537, 1743, 4860, 6297, 6545, 5308, 919, 6966, 7096, 5359, 4135, 4473, 3383, 3384, 4955, 1264, 1714, 4669, 4810, 5265, 3997, 4677, 2931, 4749, 1910, 2010, 5087, 4116, 4117, 4118, 2839]. **Modulo** [4646, 4798, 5684, 6264, 809, 669, 867, 5994, 5509, 4709, 5017, 6545, 5732, 5529, 6555, 7049, 1306, 4223, 6100, 5046, 5054, 5349, 2976, 3496, 3497, 1912, 185, 5633, 4764, 4632, 4470, 6635, 1004, 4146, 2637, 3972, 4833, 4997, 5005, 1295, 3918, 1908, 4748, 4616, 2993, 5650, 2632]. **Modulo-** [5529, 6555, 7049, 6100, 5046, 809]. **Modulus** [4051, 2098, 1002, 4492, 1963, 2466, 2303, 2625, 2838]. **modulus/multi** [3324, 3325]. **Möglichkeiten** [1759]. **Molecular** [37, 5557, 5000]. **Møller** [3312]. **moment** [4324]. **Moments** [1791]. **Monica** [7302, 7211]. **Monitoring** [1209, 1284, 1285, 329, 5710]. **monodromy** [5986]. **Monolithic** [1787, 1557, 1178]. **Monotone** [2070, 2210, 2696, 1269]. **Monotonicity** [7072, 7148]. **Monte** [5904, 6062, 6166, 6068, 7165, 3807, 3808, 4093, 4262, 4263, 5376, 5801]. **Monte-Carlo** [5801]. **Monterey** [7493, 7510, 7478]. **Montgomery** [5049, 6870, 4295, 3720, 3858, 4972, 5893, 6385, 3979, 4317, 6779, 5699, 6159, 5271, 6401, 6056, 6275, 6402, 6403, 5145, 3076, 6681, 5151, 4023, 5717, 5832, 7036, 5521, 5727, 5018, 5735, 5737, 3457, 4226, 7144, 5608, 4576, 5042, 4889, 4891, 6949, 6019, 3925, 7151, 4421, 4745, 4423, 4599, 6460, 4904, 4428, 4429, 4267, 7092, 6127, 6468, 4273, 5080, 6471, 6130, 6231, 5645, 4773, 4466, 4473, 5881, 4479, 4639, 6986]. **Montgomery-Based** [5881]. **Montgomery-Form** [4423, 4599]. **Montgomery-Like** [3925]. **Monticello** [7184]. **Montpellier** [7441, 7548]. **Montreal** [7502, 7233, 7203, 7198, 7542]. **MOPS** [6417]. **Morocco** [4835]. **Morphable** [4518]. **MORUS** [6638]. **MOS** [1613, 2104, 2263, 1796]. **Most** [5125, 462, 5167, 7061, 4587, 5326, 2971, 6736]. **Most-Significant** [7061]. **Motion** [5139, 2708]. **Motivations** [4612, 4613]. **Motorola** [2497, 2498, 1408, 3447, 1678, 2157]. **Motors** [6682]. **Moursund** [426, 428]. **Movable** [6479]. **moves** [6755]. **movies** [5753]. **moving** [7347]. **moyenne** [3980]. **Moyens** [4236]. **MP** [3554, 1099, 1193, 1375, 5706, 4854, 2553]. **MP-1** [3554]. **MP/Model** [2460]. **mpc** [5505]. **mpcheck** [5120]. **MPCS** [7374]. **MPEG** [4500, 4502, 4503, 4125]. **MPEG-1** [4500]. **MPEG-2** [4125]. **MPEG1** [4901]. **MPEG1/2** [4901]. **MPFI** [4612, 4613]. **MPFR** [5006, 5292, 4196, 4879, 5044, 6201, 6328, 6832, 4893, 5121, 5663]. **MPFUN** [3864]. **MPFUN2020** [6769]. **MPHELL** [6787]. **MPI** [3851]. **mpmath** [6002]. **MPPA** [6303]. **MPPA-256** [6303]. **MQRNS** [1992]. **MR** [1296]. **MRC** [6046]. **MRI** [4558]. **MRRNS** [2839]. **MS** [2764]. **MS-DOS** [2764]. **MSB** [3485]. **MSB-First** [3485]. **mu** [3268]. **Much** [2093, 5206]. **Mulders** [4551]. **Multi** [1087, 6149, 1577, 5901, 3869, 3063, 5706, 3736, 4348, 1394, 3078, 5923, 513, 2901, 6428, 1422, 5190, 7072, 7148, 7081, 1905, 6730, 7089, 3668, 6355, 6229, 1683, 2287, 2289, 5874, 5562, 3960, 6054, 2354, 6066, 6539, 1879, 2763, 5624, 5067, 3324, 3325, 3193, 5381]. **multi-** [6054]. **Multi-base**

[5901]. **Multi-Core** [6229, 5923]. **Multi-Dimensional** [4348, 5067]. **Multi-Exponentiation** [3736, 5381]. **Multi-fault** [6149]. **multi-FPGA** [5624]. **multi-function** [3324, 3325]. **Multi-Input** [1905, 2763]. **Multi-Intervals** [3668]. **Multi-Length** [513]. **Multi-Media** [3869]. **Multi-Mode** [7081]. **multi-modulus** [3324, 3325]. **multi-modulus/multi-function** [3324, 3325]. **Multi-Operand** [1087, 1394, 1422, 2901, 5190, 1683, 2287, 5562, 6066]. **Multi-output** [6355, 1879]. **Multi-Parallel** [3063]. **multi-port** [3193]. **Multi-Precision** [7089, 2289, 5706, 6428, 5874, 6539]. **multi-purpose** [2354]. **Multi-Term** [7072, 7148]. **Multi-User** [1577]. **Multi-Valued** [3078, 3960]. **multibit** [5866, 2598]. **Multibyte** [6243, 1968]. **multicarrier** [4227, 4242, 4244, 4588]. **Multichip** [3167]. **Multicomputer** [2063, 5229, 5461]. **Multicore** [5699, 7086, 7101, 6140, 5785]. **Multidigit** [5066, 256]. **Multidimensional** [5066, 816, 2997, 2998]. **Multidoubling** [4443]. **Multiformat** [6175, 1740]. **Multifunction** [5070, 4089, 5377]. **Multigrid** [132]. **Multilinear** [5444]. **Multimedia** [4496, 4959, 4502, 5133, 7504, 7519, 4103, 4763]. **MultiModuli** [4955]. **Multinomials** [4957]. **Multioperand** [4309, 5274, 3078, 4869, 5030, 1874, 2128, 2788, 4277]. **Multipartite** [5036, 4339, 4528, 4994]. **Multiparty** [7004]. **Multipath** [4640]. **multiplatform** [3035]. **Multiple** [6483, 1566, 299, 3040, 4973, 1372, 6500, 1095, 862, 863, 954, 955, 1099, 1100, 1193, 1265, 3230, 5903, 382, 383, 4173, 223, 1108, 4529, 4530, 5711, 7025, 5713, 5006, 5291, 5293, 1283, 4854, 437, 5021, 5309, 7387, 7432, 7547, 4562, 6701, 6926, 6004, 1748, 6562, 1872, 1527, 5847, 5848, 6196, 4879, 5044, 1144, 570, 3639, 402, 763, 4596, 2574, 6118, 2783, 2784, 2972, 209, 238, 2458, 3502, 1543, 7424, 1915, 4762, 787, 2811, 3948, 4766, 5212, 5213, 323, 2609, 3005, 4772, 5561, 6234, 457, 2483, 1351, 6137, 3202, 944, 3366, 6140, 5115, 6639, 6751, 6866, 5661, 6370, 3864, 1963, 3877]. **multiple** [4346, 3071, 3886, 4015, 5292, 827, 6700, 2239, 2240, 3293, 6934, 578, 4594, 4595, 6015, 3665, 4267, 2593, 2594, 4450, 2020, 293, 4282, 5099, 5651, 2303, 1352, 5375, 4142, 4642, 1098, 4893]. **multiple-access** [4642]. **Multiple-Bit** [570, 2483]. **Multiple-length** [3230]. **multiple-modulus** [1963]. **Multiple-Precision** [862, 954, 1099, 1100, 1193, 5903, 4529, 4530, 7025, 5006, 5291, 5293, 5021, 5309, 4562, 6701, 1748, 6562, 4879, 5044, 3639, 763, 2783, 2784, 238, 2811, 3948, 4766, 5561, 6639, 6751, 6866, 5661, 299, 4973, 6500, 863, 955, 6926, 6004, 4596, 4772, 5292, 6700, 2239, 2240, 578, 4594, 4595, 6015, 293, 4282, 5099, 5651, 1352]. **multiple-precision-arithmetic** [3071]. **Multiple-Radix** [5711]. **Multiple-Valued** [7387, 7432, 7547, 7424, 1527, 3293, 3665, 2020]. **Multiple/arbitrary** [5847]. **Multiples** [5345, 2868]. **Multiplexed** [970, 1149, 1656, 2245]. **Multiplexor** [4095, 3490]. **Multiplexor-Based** [4095]. **multiplicand** [6473, 5383]. **Multiplication** [1361, 5387, 6870, 4295, 1188, 1261, 6, 7, 14, 5810, 6881, 5128, 3720, 4308, 4972, 5472, 5893, 6150, 665, 3228, 726, 1952, 727, 4509, 4974, 3229, 6773, 808, 5679, 1493, 464, 4979, 5392, 864, 5688, 6157, 814, 5399, 5695, 5484, 5901, 611, 4328, 5699, 6159, 4673, 5270, 5271, 3869, 1106, 2875, 6167, 6275, 5275, 5907, 672, 4829, 5281, 5405, 7024, 6065, 6799, 5595, 5713, 6171, 5001, 5288, 5408, 5506, 125, 2695, 4016, 4183, 2893, 5151, 5290, 819, 507, 4187, 5511, 4354, 176, 5923, 4357,

5924, 967, 1033, 6287, 6073, 4030, 6074, 7036, 5518, 6537, 6690, 6289, 200, 5926]. **Multiplication** [5521, 5727, 469, 4203, 1295, 681, 436, 6546, 4557, 5731, 3612, 5735, 6428, 5737, 5528, 7049, 344, 973, 6559, 4052, 1306, 5417, 683, 256, 4226, 5315, 4380, 6564, 6928, 6707, 5608, 1422, 3118, 4386, 286, 4874, 829, 4571, 6930, 5848, 6196, 6316, 6441, 4574, 6443, 4066, 5852, 6573, 142, 1144, 5616, 570, 6332, 4239, 1759, 2430, 2254, 5188, 639, 355, 263, 264, 3138, 6111, 266, 1893, 4412, 4597, 6113, 6348, 1894, 2572, 6212, 6019, 4420, 7151, 4421, 2966, 1323, 1659, 4423, 4599, 3492, 3493, 4426, 4427, 4603, 5959, 4608, 6350, 703, 6127, 4271, 4437, 123, 1676, 1677, 925]. **Multiplication** [6469, 4443, 4618, 1915, 1544, 5642, 3171, 3681, 4110, 4276, 4759, 4447, 5874, 712, 7105, 1247, 5645, 5558, 787, 2152, 3827, 1070, 6133, 3190, 3832, 5367, 5224, 5368, 167, 939, 6977, 4466, 940, 491, 6371, 6858, 6031, 6859, 2837, 4473, 4944, 1477, 1706, 459, 4476, 5234, 4477, 7119, 6034, 4485, 6750, 5385, 4146, 5242, 5826, 6643, 951, 2180, 6493, 3858, 4657, 5250, 5251, 1263, 1575, 3976, 2868, 5255, 90, 4665, 5259, 4806, 7010, 7011, 2193, 2661, 6890, 5265, 3411, 3573, 2516, 1592, 6519, 5142, 6403, 3244, 5402, 6910, 6409, 4996, 6411, 3076, 2363, 2526, 2694, 4693, 2214, 3587]. **multiplication** [3588, 4021, 821, 4023, 4190, 2075, 4701, 5295, 5296, 620, 2219, 968, 1845, 3260, 6541, 6542, 6693, 7140, 6086, 101, 6926, 3766, 5741, 6307, 4718, 5028, 4720, 5031, 4228, 2243, 2924, 3121, 3297, 4397, 4579, 4403, 2559, 4404, 5424, 6105, 3637, 3918, 2112, 4886, 2434, 4891, 2761, 4745, 5776, 5867, 5957, 6120, 6216, 3494, 2786, 4748, 4428, 2454, 4267, 27, 6221, 4752, 4753, 4915, 7093, 5871, 3937, 779, 654, 3941, 4924, 6130, 6473, 2808, 5358, 5646, 3692, 2468, 3826, 5877, 4126, 1928, 2817, 3006, 3007, 3952, 5099, 4773, 1074, 5795, 3529, 493, 5375, 3203, 3840, 5235, 5380, 5114, 5383]. **multiplication** [3377, 5660, 2633, 3378, 4953, 5119, 7108, 372, 3714]. **Multiplication-Add** [4328]. **Multiplication-free** [4944, 5424]. **multiplication/division** [4718, 5028]. **Multiplication/Division/Square** [2430]. **Multiplications** [4006, 6170, 4850, 6295, 5161, 5307, 3796, 6118, 4742, 6958, 767, 2483, 3534, 5673, 5696, 6076, 4252, 2817]. **Multiplicative** [1012, 4990, 5994, 4363, 5054, 6109, 6348, 6022, 6600, 3519, 6635, 610, 1109, 1110, 4695, 5298, 1612, 3766, 2628, 3026]. **Multiplier** [1563, 6141, 4648, 5581, 1566, 3971, 4304, 330, 463, 7001, 1573, 3976, 4509, 3863, 1196, 6892, 5268, 5490, 5492, 5400, 198, 3420, 6162, 1596, 1831, 6164, 6911, 504, 3075, 6681, 425, 508, 111, 431, 6174, 1515, 4541, 621, 1609, 1843, 4194, 5409, 969, 4360, 5724, 5018, 5524, 4860, 5732, 3271, 139, 5022, 310, 1305, 7050, 140, 5174, 6820, 6927, 1043, 230, 4381, 5609, 3296, 4569, 113, 232, 4723, 6096, 313, 2104, 4400, 6330, 128, 3475, 444, 912, 2437, 5546, 1150, 103, 6593, 6948, 5430, 367, 478, 6838, 698, 5200, 988, 649, 184, 5204, 1668, 1912, 2011, 585, 6962, 5872]. **Multiplier** [5354, 4444, 165, 5355, 3820, 5787, 6606, 5875, 1779, 2150, 1548, 3951, 1549, 4770, 793, 2155, 5561, 1551, 1552, 1696, 4461, 5563, 6857, 6978, 325, 5881, 5659, 3531, 150, 2034, 2169, 4479, 7157, 4293, 3536, 6749, 6866, 6986, 3382, 6990, 803, 5665, 3540, 2637, 2192, 3234, 4984, 3419, 2888, 6066, 4185, 5004, 4186, 674, 3082, 1846, 2382, 2902, 3088, 4207, 3268, 2543, 4714, 1858, 4042, 5530, 3293, 4868, 4570, 4724, 2421, 4233, 4576, 2938, 2751, 2113, 3644, 4885, 2763, 3141, 2959, 2263, 3316, 3490, 3664, 3929, 3665, 4092, 648, 7090, 4614, 5965,

7097, 2598, 2284, 3339, 3176, 2471, 3187, 5214, 4123, 4457]. **multiplier** [1794, 3021, 1799, 4637, 4638, 4639, 2851, 2314]. **Multiplier-Accumulator** [3863, 4770]. **Multiplier-Based** [4509]. **Multiplier-Dividers** [5581]. **multiplier-Free** [7097]. **multiplier/accumulator** [3316]. **Multiplier/Divider** [3075, 2034, 2382]. **Multiplier/shifter** [2437]. **Multiplier/Squarer** [4381, 4233]. **Multiplierless** [6085, 5375]. **Multipliers** [6869, 2316, 3711, 6999, 2044, 5582, 3399, 4798, 5390, 3049, 4315, 6661, 6780, 7009, 3728, 4673, 4518, 2059, 6274, 333, 1595, 1829, 5711, 1600, 5992, 6916, 4181, 5289, 1604, 6533, 5718, 879, 7033, 557, 7138, 5601, 1218, 6192, 3292, 6565, 3774, 5180, 6317, 6440, 5758, 4395, 7146, 6826, 6331, 6576, 6828, 3636, 4074, 6340, 3145, 6722, 1056, 1153, 2131, 5441, 4754, 1676, 6469, 2462, 5786, 4274, 1778, 589, 3515, 1068, 132, 7114, 5566, 5373, 5653, 6630, 4471, 5108, 4635, 4777, 5109, 6981, 6982, 4291, 3374, 2848, 6985, 7121, 6523, 3849, 3386, 2644, 3400, 5394, 2203, 2347, 4833]. **multipliers** [4997, 4536, 4029, 5155, 2903, 2226, 3279, 5166, 3908, 5042, 3127, 3789, 3797, 4254, 3663, 5866, 2577, 4090, 4911, 5440, 7153, 4755, 4914, 5077, 4757, 5085, 2992, 2993, 3949, 4455, 4930, 2834, 3198, 5654, 2489, 3530, 1178, 3962, 3963]. **multiplies** [1517]. **Multiplikation** [1824, 654, 1477]. **Multiplikationsprogramme** [1759]. **Multiply** [6038, 2040, 6497, 5479, 2052, 3053, 4981, 6267, 6397, 6515, 5491, 4991, 876, 6416, 5159, 5019, 2542, 6696, 5309, 3451, 6817, 6432, 6435, 3901, 5317, 4389, 754, 755, 5327, 5328, 5329, 3126, 5766, 6726, 3154, 1665, 5553, 5631, 5438, 5439, 5078, 6963, 6967, 4762, 655, 7110, 5969, 3827, 6233, 5564, 3527, 6375, 6639, 6640, 6751, 2172, 4492, 3387, 4511, 2333, 4807, 5689, 3057, 1594, 1602, 5012, 4032, 4561, 1620, 3616, 5023, 4575, 4877, 4073, 6010, 6107, 2949, 5056, 4741, 3673, 5640, 4769, 4772, 4941, 1705, 3023]. **Multiply-Accumulate** [4991, 6416, 6817, 6726, 6967, 3827, 6640, 6751]. **multiply-accumulator** [4772]. **Multiply-Add** [6497, 5479, 4981, 5491, 2542, 5309, 3451, 3901, 4389, 3126, 5766, 5631, 5438, 5439, 5078, 6963, 4762, 7110, 6233, 6639, 5019, 3154, 2333, 4807, 3057, 4032, 4561, 4575, 4073, 6010, 5056, 4741, 4941]. **Multiply-Add-Fused** [5327, 5328, 5329, 4877, 4769]. **Multiply-Addition** [2040]. **multiply-additions** [3616]. **multiply-adds** [6107]. **Multiply-by-Three** [876]. **multiply/add** [1705]. **Multiplying** [1588, 3527, 3213, 3380, 4692, 3372]. **MultiPosits** [6935]. **Multiprecise** [2335]. **Multiprecision** [6486, 2864, 2865, 3039, 3392, 6667, 4172, 5722, 6082, 6300, 6086, 3617, 6332, 5338, 1775, 3813, 4001, 5505, 6299, 3121, 3297, 4231, 4390, 2113, 5966, 5451, 2465]. **Multiprocessor** [2719, 2146, 1723, 5198, 5798]. **Multiprocessors** [3385, 1859, 2624]. **multiPULPly** [6799]. **multipurpose** [2499]. **Multispeculative** [6164]. **Multistep** [2424]. **MultiTitan** [2066, 2232]. **multivalued** [3244]. **Multivariable** [1140]. **Multivariate** [2925, 3939, 6349, 6459, 3938]. **Munich** [7513, 7580]. **muP** [2530]. **Must** [6453, 3035, 3707]. **MWSCAS** [7572]. **My** [5883, 3214, 6183]. **mystery** [2153].

N [340, 341, 6836, 531, 1160, 3095]. **N.** [2471]. **N.A.P** [400]. **N1154** [5169]. **N1161** [5170]. **N1176** [5171]. **Nīlakantha** [4036]. **NaBIC** [7559]. **NAF** [4742]. **Names** [4375, 3488]. **NAN** [6683, 7032, 6398, 5564]. **Nancy**

[7525]. **nano** [7150]. **nano-scale** [7150]. **nanoelectronics** [7546]. **nanometer** [7494]. **Nanosecond** [3433, 3589, 1934, 2187]. **NaNs** [4019, 3670]. **Napa** [7497, 7382, 7402, 7409, 7423, 7476, 7535, 7551]. **Narrow** [3631, 2631]. **Narrow-Band** [2631]. **Narrowing** [3610]. **Nat** [4133]. **National** [2041, 2861, 7311, 2756, 7257, 1951, 5112]. **Native** [6682, 5100]. **Natural** [4056, 6197, 6584, 5698, 8, 3503]. **Naturally** [5008]. **Nature** [7559, 6123, 4546, 4431]. **Navier** [3569, 4136]. **Navy** [7164, 3947]. **Nb** [5750]. **NBSF** [2615]. **NC** [2504]. **NDRAM** [3747]. **Near** [3579, 1606, 1525, 3669, 1062, 6387, 4573, 1943]. **Near-optimal** [1062, 6387]. **near-optimum** [1943]. **Near-Perfect** [1606]. **Nearest** [6774, 6184, 6185, 5755, 5846, 5448, 5554, 5961]. **Nears** [3747]. **nebst** [586]. **Necessary** [4513, 4062, 767, 3523, 4287]. **Need** [1715, 1417, 6957, 5365, 3838, 5925]. **Needed** [1289, 5842, 3488, 3493, 532, 786, 5206]. **Needle** [4219]. **Needle-like** [4219]. **needlessly** [4285]. **needs** [3093, 3094]. **Neergaard** [531]. **Negabinary** [803, 1081, 1259, 1361, 1372]. **Negabinary-Binary** [1259]. **Negative** [851, 815, 424, 279, 1424, 631, 647, 4608, 775, 776, 5366, 148, 658, 601, 4527, 5768, 146]. **Negativo** [3]. **Negativo-Affirmative** [3]. **Negotiating** [2757]. **Nekotorye** [2327]. **Nervana** [6694]. **nescit** [2]. **Net** [3747]. **Netherlands** [7540, 7358, 7416, 7347, 7605, 7483]. **Nets** [6839, 594, 2165]. **Network** [7411, 6869, 7123, 6511, 6894, 6908, 7026, 6538, 6694, 7052, 1634, 4385, 6318, 6716, 6112, 7078, 6836, 6959, 6751, 3713, 3850, 2907, 7090, 5094, 4949]. **Networking** [7524, 7604]. **Networks** [6483, 7511, 7125, 6507, 6512, 6400, 6671, 6673, 1104, 6404, 818, 870, 2891, 7024, 6799, 3427, 6416, 6805, 6806, 6813, 1623, 6564, 6565, 6928, 6824, 6578, 6829, 913, 7079, 6958, 6843, 6850, 7109, 6737, 6612, 2196, 3056, 6672, 6786, 4021, 2716, 3787, 6950, 6740, 3830, 2853, 6478]. **Neue** [1485]. **Neuenahr** [7262]. **Neumann** [7271, 6280, 676, 5723, 5838, 6294, 3767, 567, 7167, 7168, 7169, 7171, 7173, 7174]. **Neural** [6869, 7123, 6483, 7125, 6507, 6511, 6512, 6400, 6671, 6673, 6894, 6404, 6908, 7024, 7026, 6799, 6416, 6805, 6806, 6538, 6694, 7052, 6564, 6565, 6928, 4385, 6318, 6824, 6578, 6829, 6716, 7078, 7079, 6836, 6958, 6959, 6843, 7109, 6612, 6478, 6751, 3056, 6672, 6786, 2907, 6695, 6950, 7090, 3504, 6740, 2853]. **Neuromorphic** [6454]. **Neuroprocessors** [5976]. **Nevada** [7299, 7511, 7176, 7186]. **Never** [5708]. **Neville** [6677]. **New-Generation** [5619]. **Newcomb** [5442]. **Newest** [2310, 3353]. **Newman** [2821]. **News** [3747, 6707, 2629]. **Newton** [3541, 7000, 6387, 4795, 7006, 6777, 813, 3998, 5994, 5293, 4192, 4858, 5020, 6003, 3287, 3291, 519, 5177, 5618, 1318, 2765, 2955, 3308, 452, 5952, 580, 2973, 582, 6842, 6361, 3343, 533, 4131, 4465, 6860, 6635, 4943, 5110, 5378, 3535, 3379, 6677]. **Newtonian** [6789]. **Newtonlike** [1708]. **Next** [7599, 6180, 6290, 7601, 7608, 7610, 6924, 5605, 5462, 2650, 3436, 7416, 2569, 3370]. **Next-Generation** [5605, 5462]. **Nice** [2357]. **Nicholas** [510]. **Nicht** [1812, 159]. **Nicht-Standardfunktionen** [1812]. **NIL** [1330]. **Nimble** [6994]. **Ninth** [7412, 7391, 7436]. **NIOS** [5593, 5002]. **Nis** [7576]. **NJ** [7183]. **NLMS** [4892]. **nm** [5666, 6667, 7089, 6968]. **NN** [6887]. **NNP** [6694]. **NNP-T** [6694]. **No** [1484, 597, 4956, 2038, 1296, 2092, 6453]. **No.95** [7316]. **Nodes** [6805, 6806, 2682, 6339]. **Noise** [1490, 3403, 809, 5835, 2713, 3298, 789, 2996,

3725, 674, 736, 820, 3262, 3602, 2921, 3290, 2407, 1226, 1227, 896, 2557, 2457, 2592, 2801, 840, 2984, 1066, 3834, 2482, 541, 542, 543, 2628, 2630, 2495]. **noise-tolerant** [3834]. **noises** [3835]. **nombres** [6266, 3597, 7198]. **Non** [378, 853, 6789, 5921, 506, 6686, 1286, 6537, 4716, 1632, 3628, 1312, 6330, 4238, 6716, 6457, 3491, 5782, 6234, 191, 5113, 1805, 6257, 1264, 6269, 5703, 4527, 3250, 3251, 5833, 5158, 3891, 2910, 3286, 3634, 3786, 6965, 6363, 2619]. **Non-Analytical** [191]. **Non-binary** [4238, 6257, 3286]. **non-computable** [5158]. **Non-Coprime** [6537]. **non-decimal** [1805]. **non-determinism** [6269]. **non-floats** [6363]. **Non-IEEE** [4716]. **Non-Iterative** [6234]. **Non-Linear** [5921, 5782, 6965]. **Non-Linear/Linear** [5921]. **non-local** [5833]. **non-negative** [4527]. **Non-Newtonian** [6789]. **non-normal** [2619]. **Non-Normalized** [6686]. **non-numeric** [5703]. **Non-Overflow** [1286]. **non-pairwise-prime** [1264]. **Non-Recursive** [6330]. **Non-Redundant** [1632, 3250, 3251]. **Non-Restoring** [6457, 3491, 853, 1312, 3634, 3786]. **non-significant** [3891]. **Non-Smooth** [3628]. **Non-standard** [506]. **non-strict** [2910]. **Non-traditional** [5113]. **Non-Underflow** [1286]. **Non-Volatile** [6716]. **Nonbinary** [1919]. **nonclassical** [2702]. **Nondecimal** [623, 1400]. **Nonlinear** [7003, 6495, 3581, 7133, 738, 3453, 3628, 2953, 3683, 3706, 4478, 3788, 759, 5339, 947]. **nonrectangular** [3345]. **nonrecursive** [2245]. **nonredundant** [3955]. **Nonrestoring** [858, 1582, 671, 638, 650, 1354, 1891, 1065, 3175]. **Nonscalar** [767]. **Nonspeculative** [5726]. **Nonstandard** [1812, 1258]. **Nonsupersingular** [3138]. **Nord** [646]. **Nord-2B** [646]. **Nordsieck** [441]. **Norfolk** [7364]. **Norm** [1093, 4127, 6421]. **Normal** [6995, 1490, 5688, 6170, 5290, 4574, 6588, 5622, 6348, 182, 4420, 4271, 4437, 6600, 5142, 3582, 2226, 3908, 4724, 3789, 4254, 4752, 4753, 4755, 4914, 5077, 4457, 2617, 2618, 2619, 2489]. **normalisée** [4351]. **normality** [5638]. **Normalization** [2061, 967, 1033, 439, 2012, 1941, 2171, 1586, 1833, 4030, 1612, 3701]. **Normalized** [6686, 178, 1235, 1457, 3410, 312, 4570, 477]. **Normalizing** [6286, 3086, 5766]. **Norms** [5686, 5489, 6075]. **normwise** [5917]. **Northcon** [7346]. **Northcon/92** [7346]. **Northeast** [7243, 7267]. **Northeast-83** [7243]. **Northeast-86** [7267]. **Northeast/83** [7243]. **Northern** [7454, 7570]. **Norwegian** [1740]. **Notation** [4683, 6126, 1336, 312, 5545]. **notations** [4802]. **notch** [2965]. **Note** [1006, 3972, 275, 223, 278, 125, 175, 158, 969, 513, 342, 561, 82, 343, 744, 202, 362, 8, 919, 1670, 3811, 708, 712, 1924, 2023, 3017, 2309, 5463, 6139, 4483, 950, 7159, 4321, 116, 2884, 4551, 1975, 1625, 1228, 6712, 6823, 3640, 757, 1669, 3195, 78, 1253]. **Notes** [195, 669, 52, 36, 26, 344, 2394, 4046, 3768, 30, 207, 1670, 742, 3621, 5326, 7149]. **Nothing** [2093, 4056, 6952]. **notice** [6247, 6649, 6759, 6614]. **Notwendigkeit** [405]. **Nov** [7492]. **Novel** [804, 4311, 6673, 6798, 876, 6690, 3273, 2728, 6817, 2108, 6348, 4090, 4257, 2800, 3673, 6731, 4615, 5225, 5226, 5374, 6859, 6034, 4651, 6066, 2943, 5625, 5965, 4769, 4945]. **November** [7299, 7440, 7524, 7176, 7186, 7441, 7588, 7210, 7283, 7301, 7312, 7407, 7285, 7201, 7207, 7288, 7330, 7386, 7472, 7604, 7224, 7255, 7421, 7291, 7422, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 7229, 7244, 7391, 7403, 7269, 7297, 7325, 4893]. **NPB** [6669].

NPL [946]. **NPU** [6980]. **ns** [1486, 3268, 3476, 649, 2840, 2841]. **NS16000** [1643]. **NS16081** [1643]. **NS32000** [1953]. **NS32081** [1971, 2017]. **NS32381** [1951]. **NS32532** [2186, 2227]. **NS32532-NS32580** [2186]. **NS32580** [2186]. **NSA** [1645]. **NSW** [7289]. **NTRU** [4745]. **NTT** [6773, 6930, 6750]. **NTT-Based** [6930, 6750, 6773]. **NTT-Uncoupled** [6750]. **NTTU** [6750]. **NU** [1363]. **Nuclear** [7338]. **Null** [391]. **Nullstellensätze** [4063]. **Number** [5664, 6036, 6870, 7123, 3543, 3716, 1487, 3717, 4502, 4655, 4965, 4966, 5470, 5671, 5672, 6491, 6657, 6882, 219, 855, 3857, 4308, 4971, 6770, 497, 666, 804, 857, 725, 806, 1091, 1576, 7004, 6153, 6049, 5684, 728, 6891, 6511, 1958, 3863, 4985, 612, 220, 1276, 1596, 5825, 5497, 672, 7132, 6524, 3579, 3738, 4008, 4348, 6408, 3883, 1202, 3427, 6282, 3078, 5509, 433, 177, 337, 338, 6921, 6072, 885, 1743, 253, 2078, 5017, 5728, 561, 1213, 1293, 7555, 6424, 5308, 1618, 6187, 6434, 1626, 1135, 1136, 1306, 3770, 202, 347, 1419, 1632, 3459, 5175, 750, 828, 6708, 6929]. **Number** [203, 6438, 1138, 1424, 1876, 5612, 5937, 753, 5849, 5941, 25, 1048, 1231, 4726, 288, 6825, 4070, 5047, 906, 685, 6578, 6829, 7066, 5335, 5190, 4589, 692, 1148, 1889, 4592, 3139, 6942, 2951, 318, 1650, 3484, 5066, 915, 3925, 1153, 919, 3489, 2781, 1440, 3493, 3324, 3325, 4425, 4601, 2580, 4094, 4264, 988, 1156, 767, 1907, 3331, 3160, 3496, 1674, 6842, 1912, 6844, 1540, 5872, 709, 455, 485, 6229, 3341, 1917, 532, 786, 2150, 7109, 1169, 6737, 4626, 4629, 2609, 938, 1248, 5366, 3953, 2475, 2299, 5879, 939, 2029, 1251, 6626, 2833, 2161, 6374, 5655, 3531, 3022, 5115, 797]. **Number** [4643, 598, 3025, 7198, 2634, 3212, 3383, 3384, 4955, 4956, 4492, 1711, 4298, 4651, 3542, 2642, 2319, 3855, 4656, 5890, 4789, 6257, 3556, 6385, 2181, 1089, 1262, 1489, 2045, 2047, 2325, 1264, 3226, 3227, 1811, 1949, 3046, 3047, 1714, 4161, 3859, 5584, 6266, 3982, 3727, 4668, 4669, 4810, 2196, 2200, 4164, 4516, 956, 2057, 4671, 5265, 2338, 2512, 2672, 2673, 2674, 2675, 2513, 3237, 3238, 3570, 3571, 3572, 3987, 4674, 3733, 4522, 6056, 1827, 4176, 5707, 1109, 1110, 4344, 2353, 2887, 3070, 3250, 3251, 3580, 3737, 3880, 3741, 3882, 1278, 4020, 4350, 2699, 2700, 4023, 4190]. **number** [2371, 2704, 2897, 2372, 3888, 3592, 226, 2373, 2375, 2709, 252, 1035, 1210, 2379, 2380, 1292, 5019, 7530, 3443, 3444, 3445, 3446, 2384, 4559, 626, 5163, 5733, 1411, 2723, 3897, 6431, 4373, 1039, 1221, 1303, 1415, 1416, 1523, 1524, 1869, 2230, 1985, 2917, 3108, 2234, 1040, 257, 888, 4227, 2733, 3111, 3112, 3113, 3114, 312, 231, 2417, 2928, 3122, 1877, 1989, 1990, 1991, 1992, 2245, 2246, 2418, 2419, 2929, 2744, 2931, 2421, 2745, 2422, 1230, 3782, 3914, 4072, 4237, 5186, 1755, 2751, 2943, 4242, 4243, 4244, 4405, 4406, 4407, 4588, 4884, 4075, 4245, 5857, 2431, 2114, 575, 5768, 5620]. **number** [1763, 3920, 5065, 5550, 6723, 5067, 7077, 236, 4419, 4740, 2451, 3319, 3320, 2969, 2970, 4090, 4256, 4257, 3155, 3326, 3327, 406, 3328, 3329, 3494, 1770, 1908, 5203, 6219, 4428, 4429, 4749, 2976, 2977, 3497, 3671, 527, 7091, 4269, 2456, 2591, 4270, 1537, 1910, 2010, 2458, 1450, 4436, 529, 4616, 2463, 3938, 5788, 5087, 3685, 1918, 3181, 2149, 5791, 2470, 2810, 2994, 3946, 4116, 4117, 4118, 1000, 1067, 1068, 1688, 1782, 1783, 2019, 2020, 5088, 2997, 2998, 4624, 3004, 188, 2608, 3005, 324, 1463, 1550, 3522, 3699, 1931, 2300, 2027, 5227, 2826, 3834, 1176, 5102]. **number** [3196, 4134, 4288, 2832, 3701, 2031, 3360, 3361, 3362, 5376, 148,

4475, 2838, 2843, 3209, 3210, 3375, 3376, 4141, 4142, 4143, 4481, 4482, 4640, 4641, 4642, 2845, 2846, 2847, 4949, 545, 801, 3026, 2854, 2855, 6868, 4811]. **Number-Theoretic** [4094, 4264]. **Numbers** [7480, 7525, 665, 1013, 4160, 39, 5131, 1493, 1095, 6388, 2507, 551, 5899, 6156, 3562, 6513, 6514, 7413, 4517, 1383, 2515, 6671, 332, 1389, 1108, 1829, 1830, 4338, 156, 6798, 4834, 6528, 673, 1207, 4843, 7492, 55, 878, 1516, 3749, 6687, 54, 3752, 6181, 7038, 2714, 559, 560, 41, 1212, 2540, 6811, 1976, 2544, 2718, 2908, 6185, 6187, 4213, 343, 5929, 6195, 6313, 4568, 7055, 1636, 6095, 260, 1529, 5541, 639, 686, 5858, 6584, 447, 2951, 4410, 2259, 3481, 6013, 115, 6017, 7075, 1152, 2783, 2784, 368, 4608, 1449, 3811, 1239, 6847, 185, 3939, 4920, 2150]. **Numbers** [6609, 2607, 4926, 5365, 3828, 3525, 1699, 3363, 6478, 6746, 1471, 1257, 661, 5975, 949, 1079, 4951, 6793, 5245, 3966, 6144, 3388, 4974, 2330, 3563, 4809, 6393, 5697, 5138, 2672, 2673, 2674, 5904, 4814, 4815, 2347, 5593, 2887, 5282, 3739, 2692, 2693, 2702, 2371, 137, 1404, 2377, 308, 2382, 1615, 6081, 4550, 4710, 5411, 1215, 1296, 138, 6183, 3275, 682, 1624, 256, 2100, 2739, 2924, 4873, 5035, 3463, 5320, 1994, 2932, 6321, 4068, 5617, 6580, 2255, 6207, 3133, 1435, 2950, 1319, 3649, 3482, 3307, 364, 5625, 2768, 3654, 8, 4748, 4265, 4431, 4908, 1333, 1064, 2598]. **numbers** [2145, 654, 711, 4113, 4760, 2804, 4449, 5646, 3187, 6972, 3003, 846, 5458, 5459, 6135, 3955, 850, 4944, 2307, 3372, 5240]. **numeral** [5545]. **Numerals** [877, 5545, 961]. **numerare** [2]. **Numeration** [6993, 1605, 512, 623, 1400, 96, 6973, 2702]. **numeri** [137, 138]. **Numeric** [2645, 1581, 6666, 3434, 893, 1044, 577, 1316, 2952, 2777, 1324, 1326, 1534, 2459, 929, 1687, 1936, 2477, 2508, 5703, 2368, 3756, 3441, 3603, 2750, 1321, 6349, 1663]. **Numerical** [7212, 2173, 5805, 7219, 7392, 4650, 4788, 496, 7465, 6044, 7383, 2867, 3043, 6150, 6885, 3723, 7406, 5478, 5683, 5898, 6262, 1716, 6665, 6512, 5586, 5588, 731, 1197, 6054, 7357, 7206, 1390, 817, 6057, 7021, 3249, 4345, 5913, 5829, 3581, 1601, 4013, 6915, 6803, 1840, 1208, 7192, 622, 1031, 62, 93, 3595, 7251, 3750, 6077, 6418, 2377, 5723, 5838, 6080, 3087, 254, 739, 1974, 82, 4365, 179, 3611, 4556, 126, 4368, 1132, 1520, 83, 1623, 7274, 4562, 398, 1525, 3904, 5027, 4224, 5418, 5936, 2555, 3120, 400, 975, 6198, 6933, 6101, 441, 1756, 204, 205, 1642, 6830, 6831]. **Numerical** [446, 317, 4077, 7261, 6588, 2958, 7080, 4424, 1327, 2276, 2978, 2979, 1237, 7231, 1062, 6024, 6352, 5356, 1342, 7173, 3196, 7307, 3837, 6367, 7323, 4939, 1702, 4136, 947, 1078, 719, 2312, 7198, 4486, 412, 74, 3847, 3215, 1084, 4154, 5981, 4659, 1813, 6269, 6670, 420, 6276, 6279, 6792, 6794, 1730, 3066, 4998, 511, 6070, 3748, 1127, 1739, 5156, 6078, 4206, 309, 6923, 825, 2081, 2905, 1216, 4371, 5168, 397, 3281, 7208, 2400, 473, 4057, 2408, 6713, 5854, 1638, 5542, 6585, 2762, 834, 5340, 5549, 697, 6950, 1328, 2585, 369, 1159, 4435, 2597, 841, 4767, 5089, 5090]. **numerical** [3696, 1252, 3843, 194, 545, 7252, 1855, 769, 7236]. **numerically** [6135]. **numérico** [4600]. **Numerics** [3715, 1947, 2179, 6499, 7428, 6808, 6429, 7459, 7549, 1657, 2776, 6956, 6462, 3028, 7393, 7538, 1957, 7460, 2814, 5220, 5228, 3223]. **Numerik** [1904, 2477]. **Numerik-Prozessoren** [1904]. **numérique** [2805, 7198]. **numériques** [2762]. **Numerische** [769]. **numerischen** [975, 1936]. **numerischer** [1237, 1062]. **Nuprl** [2912]. **NV** [7397, 7257]. **Nvbit**

[6632]. **NVIDIA** [6171, 6803, 7060, 5357, 6632, 5799, 7117, 6557].

O [6925, 3246]. **Oak** [7206]. **Obey** [5677, 661]. **Object** [6345, 3666, 5450, 3202]. **Object-Relational** [5450]. **Objectives** [634]. **objects** [4595, 4596, 3202]. **Obreschkoff** [4084]. **observed** [137]. **Obsolete** [3477]. **Obtaining** [5904, 5183, 5769, 6022, 652, 1844, 5184]. **OCAPI** [2714]. **Occurring** [5008]. **OCP** [7071]. **Oct** [7323]. **Octal** [267]. **October** [7509, 7538, 7338, 7356, 7340, 7465, 7283, 7301, 7358, 7211, 7266, 7287, 7306, 7341, 7343, 7418, 7471, 7500, 7544, 7566, 7346, 7225, 7363, 7435, 7446, 7598, 7550, 7350, 7391, 7464, 7522, 7296, 7367, 7279]. **Octocore** [5619]. **Octonary** [931]. **Octuple** [4526]. **Octuple-precision** [4526]. **Odd** [5391, 1276, 6023, 1919, 4804]. **Odd-Valued** [1276]. **oddification** [4500]. **odds** [2804]. **ODE** [5549]. **odor** [2689]. **OFDM** [5744, 5745]. **Off** [6886, 609, 278, 1112, 7134, 175, 882, 634, 204, 205, 2752, 315, 6338, 1671, 6611, 6366, 3525, 79, 603, 1186, 2174, 6045, 2323, 6262, 865, 1583, 6512, 956, 4002, 423, 1200, 4818, 4819, 6169, 4538, 3748, 5297, 968, 5738, 4048, 5414, 474, 5418, 1309, 1756, 1883, 2255, 3312, 6949, 1060, 2270, 53, 3945, 6131, 6132, 2024, 4128, 1937, 4134, 4288, 1183, 3245]. **offer** [7091]. **Offers** [6383]. **Official** [3851, 6488]. **Offs** [6229, 6990, 2516, 4177, 4744, 3840]. **Ofman** [4692]. **OFP8** [7071]. **often** [3437]. **Ohio** [7516]. **Oja** [3829]. **Okay** [5364]. **Old** [3561, 3280, 6504, 3943]. **Oldenburg** [7392, 7340]. **Olmo** [7273]. **Omnidirectional** [6479]. **Omura** [3088, 4614]. **on-chip** [2767]. **On-Device** [7078]. **on-fly** [5019]. **On-Line** [3225, 3399, 2891, 1116, 2072, 2212, 1402, 3265, 7415, 1623, 1533, 1441, 1661, 1447, 4434, 2155, 4129, 4460, 940, 1175, 2159, 2830, 1474, 1475, 1941, 2171, 6157, 1736, 2213, 4701, 1612, 2428, 3471, 4592, 4751, 4924, 1074, 2333, 2359, 2890, 821, 2382, 2244, 4875, 3311, 4260, 2604, 2478, 2829, 1472, 1473, 1704]. **On-the-Fly** [5901, 6164, 3746, 5894, 2071, 2361, 2892, 4727]. **One** [5579, 5125, 330, 6262, 811, 3868, 4521, 2537, 6551, 6815, 5167, 6934, 144, 915, 4424, 5074, 1777, 5096, 4470, 133, 3547, 3548, 3549, 3550, 3551, 3552, 4984, 3570, 3571, 3572, 3987, 4522, 4350, 391, 3622, 5436, 2799, 6361, 6736]. **One-Dimensional** [330]. **One-Hot** [3868, 4521, 3570, 3571, 3572, 3987]. **One-Megacycle** [133]. **One-Microsecond** [133]. **one-sided}** [5436]. **One-Step** [6262]. **One-Variable** [5096]. **Ones** [3416, 4391]. **OneSpin** [6383]. **Online** [6175, 5732, 2108, 5207, 5662, 3753]. **Only** [864, 1905, 4844, 1868, 2114, 5620, 4908, 3529, 5591]. **Ontario** [7541, 7313, 7331, 7421, 3189, 7365, 7366]. **OPAC** [2805, 2806, 2988, 2989]. **OPEN** [6397, 6487, 6887, 6172, 6286, 5027, 7063, 6938, 6939, 7089, 7295, 6504, 6189]. **Open-Architecture** [7295]. **Open-Source** [6172, 7063, 6938, 6939, 7089]. **OpenCL** [6213]. **OpenFOAM** [7127]. **OpenGL** [3851]. **OpenLibm** [6189]. **OpenVMS** [4498]. **Operand** [1087, 1394, 4836, 5286, 891, 1422, 5188, 6118, 4095, 5780, 5644, 787, 3832, 2837, 5882, 5234, 3406, 6066, 4837, 2901, 3766, 5190, 5866, 1683, 2287, 5091, 5093, 5456, 3952, 5562, 5800]. **operand-dependant** [5800]. **Operand-Optimized** [5644]. **Operands** [723, 1806, 1573, 4690, 1405, 4564, 3302, 6228, 4470, 5572, 2528, 4692, 4186, 1412, 5214, 5219, 5360, 5361]. **Operating** [7298, 2713, 587, 2764, 1703]. **Operation** [247, 3064, 69, 2078, 4370, 106,

472, 972, 4862, 6192, 4389, 6228, 3684, 3827, 6637, 4480, 1486, 4163, 6532, 3644, 3174, 4624, 4769, 3831, 3205, 4644, 4784]. **Operational** [184, 114]. **Operationen** [1886]. **Operations** [5246, 6, 6383, 3553, 5814, 4971, 5129, 5474, 6498, 6774, 6662, 105, 196, 7130, 3233, 2060, 3999, 4988, 2063, 6404, 5911, 136, 199, 157, 6801, 6802, 388, 4850, 4358, 6809, 513, 6811, 5731, 6435, 6312, 1136, 2551, 5755, 1310, 5038, 6325, 1886, 181, 5543, 5425, 290, 6112, 7075, 3660, 3802, 121, 483, 122, 6467, 6027, 485, 7107, 4764, 6973, 5878, 2830, 5573, 5655, 6139, 5977, 1486, 2867, 3043, 2653, 4513, 4663, 4982, 6268, 4670, 6786, 1728, 4174, 4679, 422, 2349, 2348, 3067, 4010, 3586, 2538, 6001, 6433, 5314, 6439, 5613, 974, 6202, 4577, 3916, 2429, 6580]. **operations** [6110, 5861, 4602, 5347, 3326, 3327, 3670, 5781, 6220, 2138, 5076, 3172, 3173, 3000, 5218, 4771, 1249, 5223, 2831, 942, 2621, 3702, 4468, 6239, 3368, 4138, 1799]. **Operator** [4957, 6908, 6925, 4609, 1353, 2987, 4932, 5238, 5575]. **Operator-level** [6925]. **Operatorkonzepts** [1353]. **Operators** [3225, 4509, 2875, 7023, 4688, 3749, 5956, 7154, 7169, 5708, 3846, 5256, 5590, 5147, 4535, 2890, 5157, 6000, 7142, 2954, 7168]. **Opportunities** [6425, 6830]. **opposite** [3227]. **Optic** [1907]. **Optical** [3027, 2199, 2390, 2234, 1650, 6849, 2431]. **Optimal** [6039, 6484, 6999, 3856, 1494, 2049, 6780, 7009, 1269, 1195, 5290, 428, 6684, 620, 1129, 1211, 1290, 6179, 3454, 6306, 4218, 3627, 568, 2743, 6317, 6441, 4574, 3475, 1318, 2765, 452, 3652, 1903, 3326, 3327, 2973, 5630, 1668, 2596, 2984, 3343, 6130, 6362, 3949, 533, 1462, 1790, 6623, 2480, 493, 6637, 5111, 597, 4946, 1353, 4786, 5981, 3226, 6387, 5255, 667, 2204, 426, 6001, 3121, 4724, 1062, 4752, 1064, 2025, 4457, 1789, 4134, 4288, 4467, 6433, 751, 752, 894, 107]. **Optimale** [751, 752, 894, 107]. **optimalen** [1494]. **optimaler** [1211, 1062, 1790, 1353]. **optimisation** [4845]. **Optimised** [4430]. **Optimistic** [5313]. **Optimization** [3559, 6896, 6167, 6678, 7487, 3628, 6316, 6932, 978, 4593, 3491, 4602, 3156, 6839, 6597, 3675, 5786, 3691, 5570, 2666, 2348, 2687, 3886, 4015, 2708, 5014, 6814, 5606, 2407, 7057, 7078, 5346, 3338, 6028, 6230, 7102, 7487]. **Optimizations** [3973, 3434, 4191, 6196, 4615, 4483, 4665, 5775, 6215]. **optimize** [5850, 6364]. **Optimized** [4787, 3711, 6492, 6681, 6916, 5599, 4201, 6563, 6201, 6328, 6107, 2770, 6457, 6593, 7151, 7083, 7084, 5958, 7105, 5644, 6857, 3663, 5776, 4923, 3245]. **Optimizing** [5404, 6171, 509, 2368, 1849, 6289, 6000, 5307, 2558, 5043, 3304, 4898, 5204, 3352, 6855, 4138, 5802, 1496, 4535, 4232, 2823, 4287, 2621]. **Optimum** [852, 3540, 334, 5180, 2161, 2731, 1943]. **Options** [967, 1033, 2138, 2315]. **Optoelectronic** [4188, 6959, 3787]. **Oracle** [6989]. **Oracle-free** [6989]. **orbit** [2590]. **orbits** [7054]. **Order** [2635, 7381, 2050, 7453, 3576, 4829, 93, 3609, 4374, 1644, 1055, 6949, 2968, 3675, 1913, 4103, 4107, 6610, 2996, 74, 3045, 6389, 2353, 249, 3089, 5302, 3623, 1437, 4739, 3806, 6124, 3172, 3173, 5219, 4456, 4281, 3835, 3015, 3532, 2630]. **Ordered** [1260, 5859]. **Ordering** [2281, 3073, 2931]. **Ordinary** [7192, 179, 4084, 5158, 6695, 365]. **ordinateur** [3157]. **Ordinateurs** [487, 4512, 5820, 6266]. **Ordnance** [7164]. **Oregon** [7561, 7603, 7263]. **Organization** [7240, 7558, 6615, 4460, 1508, 1130, 1744, 2539, 3601, 4549, 206]. **organizations** [1853]. **organized** [7191, 7188]. **Organizing** [6837, 6905]. **Orientalist** [1322, 1167, 1467].

orientation [6217]. **Oriented** [7219, 3995, 1026, 5287, 6682, 4214, 3796, 2953, 2780, 1237, 4480, 1996, 4739, 847, 3834]. **origin** [401]. **original** [3976, 3300]. **Origins** [5723, 5838, 7202, 7230, 704, 705, 770, 991, 1236]. **Orlando** [7553, 7338, 7288, 7291, 7550, 7235]. **Orleans** [7326, 7285, 7240]. **Orthogonal** [2146, 373, 4506, 3580, 3880, 4640, 4641]. **Orthogonality** [1525, 2812]. **Orthogonalization** [4387, 5009]. **Orthonormal** [3761]. **OS/360** [563, 505, 440]. **Oscillations** [1055, 1277, 3748, 745, 1437]. **oscillator** [2857]. **Osnovy** [1246]. **OSR** [3987]. **osservati** [137]. **Other** [623, 1400, 1136, 6588, 3660, 3802, 7171, 4220, 4222, 235, 2777, 3326, 3327, 4119, 3202]. **otsenochnoi** [2327]. **Our** [14, 7314, 4728]. **Out-of-Order** [4374, 4103]. **out-of-order-execution** [3532]. **Outer** [3607, 4115]. **outline** [3998, 4641]. **Output** [1196, 1609, 5354, 1548, 538, 2486, 1879, 320, 3326, 3327, 6355, 1357]. **Outputs** [698]. **Over-Redundant** [6064, 3310, 3309, 3824]. **Over-Relaxation** [315]. **over-the-air** [4559]. **Over/Underflow** [345]. **overestimation** [5352]. **Overflow** [3546, 6491, 608, 1106, 6063, 136, 199, 1969, 3587, 7031, 1281, 4357, 1034, 1286, 1872, 3464, 901, 288, 289, 3136, 1055, 3811, 4276, 1696, 6139, 2847, 3025, 548, 1109, 1110, 5152, 5155, 257, 5326, 1430, 6009, 1435, 3814, 6976]. **Overflow-Free** [1696, 548]. **Overflow/Underflow** [3025, 2847, 1435]. **Overflow/Underflow-Free** [3025, 2847, 1435]. **Overflows** [5389, 1126, 5860, 6834, 1128, 6012]. **Overhead** [7060, 3791, 4898, 2841]. **Overlapped** [507, 3498, 2483, 3499, 1934, 2840]. **Overload** [2770]. **Overrelaxation** [1569]. **oversampling** [3571]. **Overscaling** [7001]. **overstates** [5888]. **'Overturned** [2959]. **'Overturned-stairs'** [2959]. **Overview** [722, 963, 1257, 1736, 4717]. **Own** [6291, 6292, 6746]. **Oxford** [4151, 4152, 7406].

P [1484, 6533, 1427, 6817, 1680]. **P-754** [1680]. **P-FMA** [6817]. **P1788** [5503]. **P3109** [6996, 7047]. **P6** [5369]. **p754** [1339, 6554, 1461, 5371]. **P754/D2.50** [6554]. **P854** [1786]. **PA** [7490, 3450, 7222, 3625]. **PA-8000** [3450]. **PA-RISC** [3625]. **PA7100** [3037]. **PaCAL** [6005]. **Pacific** [7283, 7301, 7312, 7407, 7360, 7430, 7504, 7255, 7422, 7435, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 7350, 7391]. **Package** [2865, 331, 862, 1099, 1100, 1193, 1265, 2335, 3058, 3060, 2355, 1966, 2067, 963, 6069, 1870, 6005, 1886, 1532, 2141, 2811, 5559, 1003, 4504, 4967, 4968, 4970, 6769, 301, 1378, 3864, 503, 1409, 521, 3641, 980, 1357, 1561, 1098, 2305]. **Packages** [1107, 3425, 1738, 6586, 1492, 2315]. **Packard** [2225]. **Packed** [1493, 4524, 5173, 7120]. **Packet** [3792, 3799, 4253]. **Packet-Forwarding** [3792, 3799, 4253]. **packing** [4163, 1037]. **PACoGen** [6556]. **Padé** [2616]. **Pafos** [7431]. **Page** [6651, 6879, 6880, 6254, 6255, 6655, 6656, 6766, 6622]. **PageRank** [6689]. **pages** [3714, 4151, 4152]. **Painter** [3202]. **pair** [4042, 4118, 5360, 6627]. **Pair-HMM** [6627]. **Pairing** [5254, 5678, 5830, 4738]. **Pairing-Friendly** [5830]. **Pairs** [891, 5359, 4749, 4117]. **pairwise** [1264]. **Paleo** [5815]. **Paleo-Mathematics** [5815]. **Palletizing** [6479]. **Palmer** [7210]. **Palo** [7417, 7403]. **PAM** [6892]. **Panel** [6761, 4761]. **paper** [930, 214]. **Papers** [7281, 3852, 5248, 5249, 5469, 5667, 7271, 2663, 7283, 7312, 7428, 7187, 7222,

7254, 7286, 7586, 7398, 7255, 7578, 7293, 7202, 7230, 7204, 7606, 7199, 7237, 2066, 7196, 7305, 7317, 7328, 7341, 7385, 7386, 2232, 770, 991, 3180, 7448, 7308, 7404, 7439, 7597, 7484, 7608, 7555, 7583, 344, 207, 7379]. **PAPIA** [1817]. **Par'96** [7395]. **PARA** [7586]. **Paradigm** [7005, 1940, 4253]. **Paradoxes** [2403, 2549]. **Parallel** [3964, 1563, 5387, 6038, 6039, 5810, 3391, 219, 4972, 4309, 726, 4312, 7511, 6885, 3559, 1372, 3400, 808, 2506, 729, 6890, 1817, 7300, 1196, 5699, 3412, 4168, 5268, 4987, 1823, 4674, 5492, 1824, 2059, 6161, 6162, 6274, 333, 3063, 5274, 2880, 2684, 672, 1831, 2885, 3248, 6061, 7484, 6280, 6680, 2891, 6917, 5289, 7249, 425, 508, 4188, 4021, 1515, 1282, 1283, 879, 5923, 1843, 4850, 6073, 5926, 5521, 4365, 2719, 3271, 1618, 4560, 518, 7374, 7470, 5528, 6555, 7586, 5935, 6194, 4223, 2551, 4226, 3774, 5607, 4062, 4874, 829, 4571, 1311, 6323, 6100, 4395, 2936, 4400, 1529, 3786, 4403, 4238]. **Parallel** [2940, 2941, 1887, 144, 7079, 2774, 2963, 916, 6019, 4904, 6595, 6729, 1444, 3667, 5200, 7349, 5441, 6024, 4754, 123, 7232, 4757, 5445, 7233, 3170, 4277, 3683, 3175, 3819, 7438, 2602, 2990, 7364, 1548, 1780, 3515, 714, 5651, 3526, 5373, 5653, 4470, 5654, 3366, 1181, 3706, 2169, 7606, 4139, 4293, 3377, 3212, 2649, 2650, 7395, 1192, 1495, 4984, 2203, 5904, 6054, 2682, 3244, 2884, 3247, 3423, 4536, 6919, 5004, 3257, 4190, 4029, 7035, 2903, 3088, 4206, 3264, 2543, 5166, 3908, 4724, 5042, 1761, 5620, 2567, 2263, 3319, 3320, 3663, 3151, 3664, 4092, 5440, 3673, 7153, 4614, 4915]. **parallel** [4756, 3337, 2985, 4919, 3692, 5791, 2468, 4625, 3949, 4282, 3835, 2302, 7307, 3955, 3962, 3963, 4637, 5464, 4143, 4640, 4641, 2351, 2688, 3246]. **Parallel-array** [3786]. **Parallel-Prefix** [4223, 6729, 4470]. **Parallel-Verarbeitung** [2940, 2941]. **Parallelism** [3978, 869, 1842, 5324, 5328, 4609, 3215, 2229, 2977, 4292]. **Parallelizable** [4597]. **Parallelization** [5313, 4098]. **Parameter** [6159, 6713, 6034, 958]. **Parameterisable** [4577]. **Parameterized** [4507, 6396, 6090, 6817, 4578]. **Parameters** [1267, 2205, 1776, 1194, 1502, 5297]. **Parametric** [3749, 3227, 4694, 5003, 2630]. **parametrisable** [5147]. **Parametrized** [6731]. **Paranoia** [1871]. **parasitic** [1277]. **paraunitary** [3845]. **Pareto** [5068]. **Parhami** [4151, 4152]. **Paris** [7339, 7588, 7413, 7250]. **Park** [7197, 7570, 3696]. **Parkinson** [2496]. **Parliament** [3014]. **parsing** [6825, 7077]. **Part** [3418, 3577, 2222, 5738, 7586, 7605, 5943, 759, 481, 53, 6128, 5962, 1350, 2304, 2305, 2306, 2485, 2486, 7606, 3323, 5081, 5091, 5093, 6897, 6898, 6899, 6900, 6901, 6902, 2525, 63, 64, 65, 66, 67, 68, 3282, 4371, 5168, 3919, 4076, 5447, 5448, 5961, 7099, 7100]. **Partial** [6644, 860, 1014, 3994, 6164, 3584, 5001, 1286, 2083, 7049, 2126, 4430, 6982, 544, 3540, 461, 5398, 3593, 6106, 3663, 4746, 108, 2834, 3198]. **partially** [2868, 4739]. **particle** [5904]. **Particular** [1700]. **Particularly** [136]. **partielles** [108]. **Partition** [1821, 6174, 6019]. **Partitioned** [1413, 1522, 4228, 2287]. **Partitioning** [891, 1318]. **Partnership** [4921]. **Parts** [3545]. **Pascal** [159, 3119, 1353, 1469, 3087, 2734, 2735, 2923, 1690, 1938, 3558, 1728, 676, 159, 2400, 893, 3119, 2137, 2492, 718, 1469]. **Pascal-SC** [1469, 1938, 1728, 2137, 1469]. **PASCAL-XSC** [3087, 2734, 2735, 2923, 3558]. **Paso** [7398]. **Pass** [3901, 3490]. **pass-transistor** [3490]. **passion** [7550]. **passive** [2200]. **Past** [480, 3381]. **Pat** [996]. **Patentees** [5364]. **Path**

[3221, 4726, 6844, 4762, 5969, 4261]. **Pathology** [6501, 6485, 6867]. **Paths** [6929, 3954, 4535, 6186, 3797, 4756]. **Patriot** [2869, 2995]. **pattern** [3335, 2167]. **patterns** [3598]. **Paul** [5884, 5885]. **PBHD** [3731]. **PC** [3397, 2271, 2291, 2295, 2477, 2315]. **PC/AT** [2271]. **PC/AT-based** [2271]. **PC/XT/AT** [2477, 2477]. **PCA** [3830]. **PCs** [1998]. **PD77230** [2315]. **PDE** [1842, 5221]. **PDEs** [3345]. **PDP** [1508, 517, 696, 766]. **PDP-11** [1508]. **PDP-8s** [766]. **PDP-9** [517, 696]. **PDPU** [7063]. **Peak** [2963, 6137, 2509, 6407, 1853, 2405, 2406, 4938]. **Peculiar** [3633]. **PEGASE** [3569]. **Pegasus** [350]. **Pelikan** [7122]. **Pellet** [6387]. **Penalties** [4960]. **Pennsylvania** [7341, 7205]. **PeNSieve** [6723]. **Pentagonal** [560]. **Pentanomials** [5492, 5200, 4757]. **Pentium** [3389, 4654, 3718, 3721, 3560, 3575, 3414, 3415, 3732, 3870, 3743, 3434, 3437, 3481, 3500, 3501, 3346, 6736, 3352, 3188, 3842]. **Pentium4** [4719]. **Pentium(R)** [4799]. **Pentium(R)4** [4378]. **penultimate** [4741]. **PERC** [6742]. **Percentages** [1201, 451]. **PERCIVAL** [6938, 6939]. **Percola** [2265]. **Perfect** [2524, 1606, 2, 7122, 5143]. **Perfectly** [2182, 2606]. **Perfectus** [2]. **Perform** [377, 459, 2694, 4033, 2727]. **Performance** [7411, 7524, 1563, 3711, 3386, 5124, 5467, 2040, 4960, 3037, 1572, 2865, 4505, 1950, 1577, 4320, 1719, 2334, 5395, 5692, 3729, 4327, 6512, 3863, 4672, 4813, 418, 6893, 501, 2678, 3993, 4175, 7019, 2063, 6274, 3578, 3072, 1396, 5714, 5510, 3434, 2369, 4191, 1841, 338, 1849, 563, 2719, 5022, 7604, 4212, 5743, 6192, 6310, 1986, 6820, 6568, 6571, 6443, 5183, 5041, 2746, 2748, 2935, 4243, 6940, 6341, 318, 5862, 2773, 6214, 3486, 3658, 5070, 3933, 5631, 1242, 1334, 6355, 7095, 5965, 6229, 5083, 1779, 3519, 3693, 3694, 5457, 6367, 5373, 5569, 5653, 3957, 6981, 6982, 5799, 1798, 3215, 3220, 3388]. **performance** [5980, 4792, 6044, 2186, 4163, 1957, 4986, 4169, 4000, 5710, 4687, 5917, 2522, 2209, 4999, 4017, 6804, 5007, 2530, 4706, 4851, 4852, 1611, 4032, 1853, 2223, 2384, 3272, 4714, 3450, 2227, 2228, 4043, 5530, 4048, 3912, 5184, 2747, 4584, 5186, 6827, 4073, 4242, 2947, 5767, 2760, 2949, 3141, 2569, 3318, 4743, 5351, 5778, 2008, 2138, 7233, 3504, 2015, 3353, 2030, 4937, 4938, 6371, 6636, 3961, 3023, 3246]. **Performance-Driven** [5124, 6571]. **Performance-Efficiency** [6512]. **Performance-improved** [4672]. **Performance/area** [3386]. **Performance/Error** [6341]. **Performance/Power** [6214]. **Performances** [4320, 5332]. **Performing** [1261, 6268, 5303, 5755, 4010, 6580, 4092, 5218, 5380, 5383]. **performs** [1486, 1602]. **PERI** [6625, 6856]. **perilous** [5325]. **Period** [3825, 5282]. **Periodic** [5299, 7054, 7168, 1177]. **Periodicities** [892]. **periods** [4940]. **Peripheral** [1279, 1418]. **permanent** [3259]. **Permits** [3747]. **permitted** [1758]. **Permutation** [3271, 3787]. **Permutations** [6362]. **Perron** [548, 548]. **Personal** [1023, 1024, 1025, 1113, 3747, 1982, 1223, 1637]. **Perspective** [3978, 3981, 3784, 4396, 4735, 5544, 3660, 6597, 3206, 5283]. **Perspectives** [7583, 7460]. **Perturbation** [2357, 4625, 6572, 3340, 4765]. **Perturbations** [3199]. **Perturbing** [4998]. **Petascale** [5619]. **Pete** [5604, 5604]. **Peter** [6779, 6468]. **Peters** [4675]. **Petri** [6839]. **peu** [6266]. **PFFT** [1713, 1382, 1587]. **PGM** [3271]. **Ph.D.** [7568]. **PHAc** [7107]. **phase** [3132]. **Phenomenon** [3895, 1146, 1909, 957]. **Phi** [6289, 5905]. **Philadelphia**

[7222, 7490]. **Philosophy** [963]. **phone** [5418]. **Photomultiplier** [3394]. **Photoresistive** [463, 444]. **Physical** [6067, 5112]. **Physics** [3566, 6789, 10, 37, 5816, 6043, 3620]. **Pi** [5649, 409]. **Picture** [6125, 3202]. **PID** [6057]. **Piecewise** [6892, 7091]. **Piecewise-Linearly-Approximated** [6892]. **Pilot** [946, 5112]. **PINT** [297]. **pioneer** [5647]. **Pipeline** [871, 1882, 979, 6839, 2165, 3065, 4689, 2100, 2412, 2414, 5624, 4253, 4902, 2351]. **Pipelined** [1713, 4964, 5474, 2328, 2654, 6889, 7016, 3865, 4165, 1382, 1587, 4695, 875, 4188, 6533, 3888, 1423, 2416, 5329, 2253, 5051, 3792, 3799, 3662, 5072, 934, 5221, 4130, 7113, 5566, 3538, 5118, 3382, 4303, 2329, 2195, 3986, 3234, 1586, 3057, 4175, 3882, 5298, 3086, 4033, 2228, 4863, 2244, 2556, 3630, 4403, 4240, 910, 2000, 5428, 4918, 2284, 2987, 3177, 3178, 1783, 4462, 2351, 2762]. **pipelined-loop-compatible** [5428]. **Pipelines** [7030, 5766, 1658, 1901, 2762]. **Pipelinetechnik** [2100]. **Pipelining** [2891, 680, 3486, 5552, 5223, 2727]. **pires** [5094]. **Pisot** [4809]. **Pitfalls** [5134, 554, 131, 5341, 5342, 5426]. **Pittsburgh** [7341, 7205]. **PIU** [6850]. **Pivoting** [2083, 4780]. **Pixel** [5996, 3505, 4140]. **Pixel-Arithmetic** [5996]. **pixel-level** [4140]. **pixels** [3334]. **PL** [563, 6980]. **PL-NPU** [6980]. **PL/I** [563]. **PLA** [2364, 2527]. **Place** [7239, 7344, 6126, 3264]. **placement** [3540]. **Places** [1631]. **plain** [6541]. **Plains** [7309]. **PLAM** [6948]. **Plane** [295]. **planes** [4520]. **planetary** [2590]. **Planning** [246, 63, 64, 65, 66, 67, 68, 272]. **PLAs** [1181]. **Platform** [4653, 5784, 4630]. **platforms** [5198]. **PLAUs** [7075]. **Plaza** [7265]. **pLiner** [6692]. **PLL** [5788]. **PLM** [986]. **plotter** [529]. **plotting** [5209]. **Plovdiv** [7383]. **Plug** [1998]. **Plug-in** [1998]. **Plus** [6152, 5760, 5945, 1766, 4463, 4464]. **Plus-Minus** [6152]. **PLX** [4947, 4948]. **PMNS** [6909, 6912]. **PNCL** [1390]. **PNU** [6666]. **PNU-IP** [6666]. **Pocket** [932]. **Pod** [6955]. **Pod-racing** [6955]. **Point** [2041, 6998, 3964, 2635, 5805, 2037, 6482, 4647, 4958, 5246, 5806, 6037, 6142, 6646, 4493, 5578, 4648, 3848, 6871, 6994, 4496, 4959, 217, 3968, 5666, 6243, 6484, 6995, 6757, 6244, 5886, 1485, 2858, 2859, 2860, 3030, 3031, 3032, 3033, 3034, 3217, 3218, 3219, 3545, 4653, 5125, 5127, 6042, 6381, 6383, 6652, 6996, 5810, 5668, 5669, 5812, 5813, 169, 1804, 5128, 5891, 6768, 2322, 4969, 1368, 1809, 3394, 5982, 1013, 3395, 3396, 3975, 4157, 4158, 4159, 1950, 4507, 2328, 4314, 1951, 4794, 6771, 1577, 2505, 3724, 5680, 861, 1015, 1095, 2049, 2655, 2870, 4514, 4515]. **Point** [5257, 5477, 5682, 5896, 6048, 6049, 6050, 6388, 6660, 6774, 3402, 3403, 3404, 2052, 6051, 2507, 2053, 728, 2334, 5899, 6156, 1267, 1268, 1377, 4323, 6392, 6663, 7016, 3562, 6508, 5483, 247, 865, 5694, 171, 3233, 3409, 1498, 1499, 5397, 5137, 6667, 2665, 1584, 5586, 2669, 3568, 4328, 5486, 5823, 6892, 1271, 6270, 6399, 3990, 1725, 2515, 731, 1197, 1386, 1503, 1726, 2345, 3059, 3993, 6160, 3995, 1198, 1199, 1275, 1388, 1727, 5905, 3871, 3999, 5140, 5272, 5494, 5495, 2875, 4331, 3417, 3418, 3577, 2063, 3420, 6167, 6163, 3578, 3873, 3875, 4336, 6790, 2350, 2519, 2520, 6676, 4005, 4006]. **Point** [4338, 2208, 4825, 617, 2352, 2885, 3248, 4345, 4531, 4533, 4685, 4828, 5911, 5912, 6060, 6795, 6166, 1965, 6911, 5280, 1732, 5148, 6525, 5405, 3740, 4349, 6913, 6798, 1966, 2067, 502, 6169, 3883, 1733, 2889, 2891, 1968, 5407, 505, 1834, 6413, 6917, 6682, 4537, 5288, 5506, 3428, 3744, 4016, 4183, 3255, 5507, 1838,

6172, 2215, 1279, 6801, 6802, 963, 1512, 3429, 1204, 6530, 1514, 6173, 5597, 4189, 7030, 2217, 6531, 5006, 5831, 1280, 2218, 2895, 6285, 4539, 2703, 5715, 4354, 3258, 3747, 227, 228, 1608, 1971, 5512, 824, 878, 4028, 881, 1285, 6807, 1741, 2706, 2707, 4707, 966, 5409]. **Point** [5924, 6286, 6686, 967, 1033, 3889, 1403, 1610, 6687, 4358, 4547, 5517, 307, 678, 2221, 2222, 2378, 1849, 1850, 4195, 7037, 5724, 5725, 2713, 6180, 6290, 6291, 6292, 6295, 6809, 7137, 4856, 342, 970, 392, 393, 3439, 4035, 4198, 4199, 5300, 3893, 6540, 2540, 1036, 3606, 3091, 6811, 5601, 1616, 1976, 436, 6694, 4367, 971, 6548, 2542, 5731, 2544, 2718, 2908, 6184, 6696, 6302, 1301, 1410, 5309, 5840, 3896, 1132, 6187, 1619, 5165, 6553, 1861, 1862, 1863, 2088, 2089, 6554, 7046, 5170, 5740, 6699, 3102, 3103, 4212, 3280, 343, 1865, 5167, 6304, 5602, 6090, 2913, 5929]. **Point** [3104, 3105, 5743, 6305, 5531, 5746, 5748, 5930, 5932, 6306, 6434, 4374, 3901, 5532, 1304, 1627, 1222, 2397, 6193, 6310, 6705, 255, 6312, 1628, 5935, 6194, 345, 1224, 1308, 1417, 1987, 2236, 2919, 3768, 3902, 3903, 4221, 4375, 4564, 4864, 4865, 5026, 5416, 5842, 4378, 3770, 743, 746, 7051, 5313, 1871, 5752, 2551, 6563, 1751, 891, 1042, 5315, 3294, 5535, 4382, 828, 4229, 3462, 2413, 2927, 5318, 5319, 5846, 4387, 3777, 751, 752, 894, 1046, 753, 5848, 5939, 3298, 3911, 6570, 6571, 6931, 6932, 6319, 6099, 6197, 6322, 6324, 5183, 6444, 1637, 6102, 5041, 2106, 2746, 2748, 2935, 5852]. **Point** [6199, 4578, 4879, 5044, 6200, 6327, 6573, 5761, 5762, 4399, 1529, 441, 5327, 5328, 7060, 7062, 6204, 1142, 2108, 5187, 6008, 6450, 832, 905, 1431, 571, 5763, 6205, 3302, 2940, 2941, 2251, 2430, 6335, 6579, 2752, 4893, 2561, 6581, 640, 687, 2563, 5950, 6453, 1641, 2759, 7068, 1643, 5858, 6831, 4589, 526, 577, 3792, 403, 2568, 1149, 4409, 1999, 6342, 3478, 3142, 5622, 4410, 6454, 7072, 7148, 983, 5546, 5337, 3795, 450, 6013, 6014, 6345, 6346, 6347, 6590, 6591, 363, 4412, 4597, 2438, 5548, 1532, 1764, 6210, 642, 1896, 2120, 2262, 2442, 2443, 3147, 5062, 5626, 6212, 6456, 1152]. **Point** [2771, 7082, 4417, 2449, 2450, 6458, 6594, 6724, 5953, 916, 5069, 5954, 6020, 3799, 5196, 5345, 7081, 3488, 2780, 4087, 3658, 3660, 3662, 3802, 3803, 5072, 2575, 2968, 5956, 4424, 2783, 2784, 5431, 7084, 2004, 645, 1059, 1325, 2579, 2268, 4426, 4603, 4263, 6218, 6730, 1157, 1235, 1327, 5958, 6021, 2131, 7089, 702, 4266, 4432, 6022, 2791, 2792, 3158, 3669, 6599, 5553, 2795, 2979, 1773, 2588, 3161, 4910, 5631, 5438, 5439, 6463, 6464, 2278, 992, 2279, 1239, 3676, 922, 923, 6222, 2280, 994, 3164, 2281, 4615, 5632, 2282, 2803, 5079, 5447, 5448, 5634, 5963, 4272, 6733, 6469, 1541, 6359, 1680, 454]. **Point** [1681, 6360, 5786, 3940, 5081, 1544, 4103, 2600, 1455, 1776, 4921, 5083, 5355, 2288, 4111, 4448, 4762, 5084, 5787, 7099, 4622, 5086, 2989, 7104, 1777, 5644, 5875, 2601, 3688, 2467, 269, 212, 2990, 2018, 5790, 1687, 2811, 2996, 3184, 3185, 3186, 3349, 3693, 3694, 2293, 5968, 6232, 6971, 7110, 3350, 6131, 6132, 6611, 2021, 2022, 1690, 3001, 5969, 2607, 4926, 844, 1339, 1459, 1460, 1786, 5559, 3950, 3951, 5097, 1341, 4122, 5878, 3953, 1787, 5561, 2476, 2613, 2614, 3008, 5100, 5101, 1466, 5562, 6741, 1790, 5224, 5368, 6623, 3524, 4933, 6134, 6624, 4130, 593, 3354, 4465, 6366, 6030]. **Point** [7114, 6474, 1073, 5369, 2028, 849, 5563, 2828, 3525, 2830, 6743, 3357, 6367, 1350, 491, 5104, 5880, 6629, 3838, 3199, 6238, 6476, 2305, 3957, 6745, 215, 6375, 1470, 1702, 2623, 5110, 5233, 5377, 5378, 5572, 5573, 5655, 5658, 6478, 1557, 1355, 2034, 5799, 7117, 3017, 3018,

5973, 216, 3207, 2308, 6240, 4291, 6139, 1798, 4478, 5236, 2631, 800, 3025, 1707, 3536, 5384, 5802, 4145, 949, 1942, 6864, 6865, 5976, 6639, 5117, 5576, 5662, 5118, 5385, 5242, 6641, 5709, 5908, 6059, 6793, 4634, 6370, 4289, 2176, 4499, 3382, 5386, 663, 2857, 2636, 1944, 1945, 6480, 6992, 3966, 1565, 4494, 5665, 6242]. **point** [3029, 2174, 2175, 3713, 3850, 5466, 417, 5467, 3542, 6040, 6144, 6041, 721, 297, 1486, 2498, 2640, 3035, 3220, 3221, 3387, 3388, 3389, 3390, 4498, 6382, 6489, 6490, 6997, 2499, 1086, 1011, 1948, 2042, 5670, 1801, 2318, 1802, 1803, 1363, 2320, 1570, 1571, 2043, 2321, 4792, 6148, 4155, 4307, 1488, 2502, 2867, 3043, 5582, 5894, 2045, 1263, 1369, 1808, 2184, 2503, 2185, 1810, 5895, 4310, 2047, 2325, 7002, 2649, 3227, 3045, 2326, 4313, 5252, 5253, 1092, 2186, 1371, 7125, 2329, 5818, 4797, 2504, 1191, 5133, 3860, 2189, 2330, 6259, 6498, 2331, 2190, 2332, 2652]. **point** [2653, 3051, 1814, 4318, 4513, 4663, 4800, 4801, 4802, 5134, 5256, 5983, 6261, 7007, 3725, 7008, 1579, 1580, 1717, 300, 2191, 1719, 667, 5259, 5584, 4321, 3861, 1016, 4805, 5262, 5394, 5585, 7010, 7011, 7127, 2192, 1017, 1194, 6505, 4807, 4981, 6391, 5822, 6664, 3232, 4982, 3563, 2509, 1816, 4808, 2194, 2662, 7129, 6393, 6394, 1955, 6509, 1378, 6510, 3408, 6268, 1379, 4812, 4983, 2667, 3234, 380, 1586, 2668, 6395, 3864, 4986, 1819, 2058, 2671, 3731, 3866, 5902, 1381, 1723, 2204, 2672, 2673, 2674, 5985, 6053, 2341, 3056, 4519, 5491, 3988, 3057, 3989, 5986, 4814, 4815, 3992]. **point** [1502, 1590, 1825, 2206, 5493, 5702, 6161, 4172, 2680, 1105, 1962, 3998, 4681, 4526, 422, 2064, 5496, 3419, 5704, 3734, 2348, 2876, 2877, 2878, 3874, 4004, 3243, 6278, 2685, 6279, 5403, 5404, 960, 1277, 2687, 6405, 5989, 5710, 3065, 2884, 3247, 3423, 4532, 4686, 4827, 6165, 7132, 6062, 4007, 3067, 249, 4831, 5147, 5277, 5278, 4346, 4689, 962, 4535, 5593, 6679, 5149, 2522, 5282, 2523, 4996, 2354, 4179, 2888, 5283, 2209, 503, 1734, 1735, 1833, 2890, 5995, 4010, 1203, 1395, 5285, 5150, 5504, 735, 1117, 5002, 4184, 4185, 6919, 4696, 4697, 5596, 4698, 1513, 1969, 2366, 1737, 4699]. **point** [1970, 736, 820, 509, 822, 3745, 6683, 7032, 1205, 5292, 1030, 2075, 6284, 2896, 2370, 4845, 2530, 6684, 4703, 5833, 4704, 283, 3082, 3259, 4706, 4848, 5834, 3083, 2532, 622, 880, 1031, 1209, 1284, 1740, 3435, 2374, 2898, 3084, 1032, 2708, 1844, 5514, 968, 1845, 2536, 1846, 5719, 2376, 4851, 4852, 1847, 5410, 5999, 6076, 6535, 1288, 1611, 2377, 252, 178, 308, 2712, 3890, 2381, 1851, 4361, 4855, 3891, 2538, 4031, 6691, 6692, 3086, 4032, 3753, 5014, 3600, 5839, 7039, 4033, 4550, 4710, 6539, 3758, 5160, 2900, 2901, 3262, 3602, 4202, 6422, 1037, 3089, 3441, 3603]. **point** [1292, 1408, 5019, 1214, 1975, 3605, 2223, 3442, 1409, 1297, 3267, 3096, 5927, 4039, 2224, 3447, 5526, 4558, 2906, 2541, 3097, 1299, 2717, 5305, 5306, 1745, 6695, 2909, 6427, 6552, 6697, 5733, 3272, 3273, 2086, 5734, 517, 2723, 827, 1216, 2389, 5736, 682, 2391, 3899, 1219, 1864, 7047, 1747, 3282, 3615, 4217, 5168, 5169, 5171, 5527, 2227, 2228, 4043, 4561, 5311, 7143, 3614, 1134, 4216, 1220, 1867, 2392, 4717, 5928, 2912, 4563, 5744, 5745, 1625, 3285, 6001, 6191, 6307, 6308, 6433, 2395, 201, 2090, 4048, 3618, 6002, 6437, 2231, 2917, 3108, 3286, 6003, 2233, 2401, 2402, 2234, 3109, 1986, 627, 2094]. **point** [2095, 3456, 3621, 3622, 4220, 4222, 5604, 5750, 4719, 2921, 3288, 3458, 3624, 3289, 6093, 629, 474, 745, 2405, 2406, 3290, 3291, 2407, 2408, 747, 748, 1225, 258, 5031, 2552, 2241, 2100, 1633, 312, 521, 4871, 4872, 6315, 2740, 1226, 1227, 2412, 2414, 2415, 2926, 1752,

1875, 1528, 1753, 5611, 6821, 3630, 3909, 4388, 3121, 3297, 1988, 4875, 5613, 4570, 896, 2930, 3463, 5320, 830, 898, 974, 1994, 6095, 4232, 5940, 6097, 4876, 2557, 3299, 900, 976, 2932, 7057, 2247, 2248, 6318, 5942, 6442, 4575, 4877, 6321, 6711, 3912, 3913, 5850, 5184, 7145, 6202, 350, 756, 2423, 2747, 2934]. **point** [3123, 4577, 5853, 6103, 6006, 5946, 6826, 4880, 3785, 4402, 4583, 352, 6449, 4585, 3916, 6827, 4881, 525, 572, 684, 5617, 1758, 5331, 3637, 5618, 5948, 1639, 5333, 5334, 4240, 6010, 4883, 6580, 2253, 1890, 1051, 1996, 1314, 1760, 2947, 3644, 574, 641, 758, 759, 402, 3646, 689, 690, 980, 575, 6011, 2255, 4885, 1997, 1998, 981, 910, 3132, 6207, 3133, 1435, 2567, 4590, 4734, 5770, 6110, 3135, 2257, 2117, 6941, 6341, 2762, 5056, 2258, 5336, 3141, 6718, 7071, 1647, 6719, 3144, 1648, 1649, 696, 2569, 2259, 5771, 5861, 3480, 5338, 4892, 5058, 5340, 5341, 5342, 5426, 5547, 6944, 2570]. **point** [2000, 3922, 5061, 5428, 320, 1895, 2261, 2441, 2444, 2446, 2768, 3654, 6016, 1438, 3923, 2121, 2960, 2961, 918, 5628, 7078, 5429, 2447, 2448, 985, 4253, 3316, 4741, 2965, 2265, 3150, 6215, 3317, 3318, 3928, 4086, 2452, 3804, 4901, 6955, 2576, 3323, 581, 4902, 5346, 5867, 6217, 481, 4255, 3152, 3153, 5347, 5551, 6122, 5868, 986, 4258, 4092, 4261, 5777, 766, 987, 3807, 4093, 7087, 4747, 3330, 6124, 4905, 646, 1328, 2005, 5778, 5630, 7088, 2269, 208, 701, 990, 2270, 2974, 2271, 3809, 7090, 2272, 2273, 2585, 3332, 2008, 527, 7091, 3499, 2274, 838, 7163, 2589, 2797, 2981, 4911]. **point** [2009, 2277, 3335, 4096, 5781, 6220, 2457, 2592, 2801, 2982, 2593, 2594, 1774, 2139, 1333, 5076, 6845, 993, 529, 1241, 1242, 1334, 707, 1063, 2983, 1064, 3336, 1678, 484, 4917, 3503, 774, 5960, 6224, 5636, 5637, 5870, 6227, 5784, 3936, 3937, 4100, 1337, 4918, 4617, 1914, 3165, 107, 5785, 5640, 6470, 998, 2984, 2463, 3938, 3939, 5641, 3679, 3339, 777, 2014, 2285, 2599, 2145, 7098, 4919, 6028, 781, 710, 711, 3176, 3819, 4112, 4761, 5556, 3941, 4278, 4449, 4923, 4924, 5788, 3943, 3685, 2805, 2806, 2987, 2988, 2807, 1686, 3346, 3181, 5967, 2290, 3687, 3821, 4623, 4925, 927]. **point** [3347, 3182, 3512, 2017, 3513, 2151, 1066, 3945, 5210, 1547, 2469, 788, 4119, 4450, 6736, 3822, 2472, 1689, 1922, 3000, 4625, 1691, 2294, 1170, 2473, 2474, 4451, 4452, 4627, 5091, 5092, 5093, 5214, 5215, 5216, 5217, 5218, 5219, 5360, 5361, 5362, 5363, 5452, 5453, 5454, 5455, 5456, 2815, 3002, 1785, 1461, 2297, 293, 1462, 2025, 2026, 4769, 3697, 4125, 376, 324, 4281, 4771, 846, 2823, 2824, 3192, 3193, 6233, 5099, 1929, 3698, 4772, 4128, 147, 1465, 1788, 1931, 2300, 1935, 1789, 3009, 5223, 6364, 3010, 1697, 847, 3353, 4462, 4934, 1072, 3355, 1347, 4131, 7113, 4287, 7156, 1792]. **point** [3700, 1793, 3835, 5370, 1698, 1937, 3196, 4134, 4288, 2030, 942, 6368, 2832, 2833, 4937, 4938, 716, 795, 3701, 1076, 5565, 1794, 2621, 2482, 2484, 3703, 4468, 4469, 1351, 2032, 6475, 5231, 1352, 2835, 2164, 493, 2487, 850, 1703, 3959, 2490, 3013, 4778, 4943, 5232, 5379, 5798, 6033, 6239, 2491, 1796, 1472, 1473, 1474, 1475, 1704, 1356, 1797, 541, 542, 543, 3961, 2166, 2307, 5111, 796, 2035, 2492, 2493, 1256, 295, 1705, 2167, 3208, 3372, 1939, 1560, 2310, 2842, 2494, 1357, 2627, 2628, 4138, 5235, 1799, 1561, 4946, 5238, 5575, 5800, 5974, 948, 2630, 4140, 4292, 4947, 4948, 7120]. **point** [5801, 599, 798, 1358, 2847, 6984, 194, 2849, 2313, 6748, 2495, 2851, 2852, 3211, 3845, 7158, 5240, 4953, 4954, 5119, 5121, 4644, 4784, 4785, 2315, 6754, 6989, 5143, 5592, 5909, 6058, 2351, 2688, 1253, 1938, 5591, 6500, 1732, 3900,

4878, 1885, 3194, 2304, 2305, 2306, 2485, 2486, 1476, 996]. **Point-Targeted** [6917]. **Point/Integer** [2350]. **point/logarithmic** [2300]. **Pointers** [3488]. **Points** [2053, 5821, 5748, 3669, 3966, 7012, 3651]. **Poisoning** [6871]. **Poland** [7457, 7606]. **Polar** [6637]. **Polish** [458]. **Pollard** [2119]. **Polyhedra** [4011]. **Polyhedron** [3607, 4037]. **Polymath** [1322]. **Polymorphic** [902]. **Polynomapproximation** [769]. **Polynome** [1062]. **Polynomial** [4646, 4971, 6496, 6773, 3050, 5393, 6390, 5484, 4165, 5270, 5271, 4345, 6524, 5995, 280, 6065, 5151, 819, 427, 884, 3609, 5746, 3292, 5317, 1140, 6930, 1878, 5323, 5616, 4248, 4890, 6942, 477, 5773, 837, 917, 1444, 5200, 769, 4754, 1915, 2150, 373, 271, 4122, 7119, 2634, 4786, 416, 4506, 4660, 3046, 3047, 5255, 4666, 5261, 5396, 6056, 2211, 5150, 5504, 6804, 4841, 3592, 620, 5516, 3759, 562, 5738, 5603, 5749, 5933, 5423, 6934, 2113, 448, 3144, 984, 1234, 3494, 5351, 2006, 482, 4915, 2463, 1454, 5209, 2602, 2810, 2992, 2994, 4128, 4633, 4637, 3375, 3376]. **polynomial** [3026, 1253, 4601]. **Polynomials** [5979, 6492, 4803, 421, 4329, 4009, 5993, 5287, 305, 6179, 1229, 3140, 767, 1457, 241, 2165, 4664, 4984, 5404, 4830, 6411, 6168, 1511, 1127, 1739, 4853, 5410, 1038, 6427, 6552, 6697, 7143, 259, 285, 4580, 1430, 6349, 6459, 2790, 5783, 6361, 192, 193, 4486, 6058, 769, 1062]. **Polyphase** [2346, 4811]. **Polytechnical** [108]. **Polytechnique** [108]. **Pope** [1018]. **Popular** [6743]. **Port** [7266, 3923, 2441, 3193, 1120]. **Portability** [2882, 7206]. **Portable** [2865, 6258, 1093, 3058, 3060, 1021, 1119, 1206, 4439, 4442, 6735, 1702, 6240, 1003, 1359, 4491, 3846, 1712, 5980, 2680, 6189, 981, 4093, 3181]. **Portland** [7561, 7603, 7304, 7611, 7263]. **Porto** [7539, 7579]. **Portugal** [7482]. **PosAx** [6925]. **PosAx-O** [6925]. **Posit** [6993, 6756, 6665, 6666, 6511, 6396, 6669, 6399, 6784, 6785, 6400, 6671, 6673, 6893, 6894, 6903, 7019, 7026, 6916, 6918, 7033, 6807, 6291, 6292, 6293, 6813, 6426, 6925, 6430, 6556, 6817, 7050, 6927, 6822, 7056, 6444, 6713, 6446, 7059, 7063, 6578, 6829, 7066, 6937, 6938, 6939, 6940, 6722, 6835, 6947, 6948, 7073, 7074, 7075, 7076, 6726, 6727, 6838, 6954, 7083, 7085, 6961, 6842, 6843, 6847, 6964, 6605, 6849, 6850, 6968, 6734, 6851, 7107, 6970, 6973, 6741, 6625, 6856, 6626, 6979, 6861, 6980, 6747, 6640, 6749, 6866, 7121, 6988, 6627, 6786, 6921, 6431, 6723, 7106, 6820, 6731, 6742]. **Posit-Based** [6893, 7073, 6980, 6673, 6921]. **Posit/IEEE** [6903]. **Posit/IEEE-754** [6903]. **Posit8** [6908]. **PositGen** [6822]. **Positing** [6479]. **Position** [6153]. **Position-Residues** [6153]. **Positional** [5545]. **PositIV** [6961]. **Positive** [6642, 279, 6915, 1424, 145, 6223, 2309, 711, 846]. **Positive-Integer** [145]. **Positnn** [6843]. **Positron** [6511]. **Posits** [6397, 6921, 6560, 6706, 6566, 6836, 6521, 6670, 6672, 6461, 6824]. **Posit**^{TM} [6960, 7104]. **Possibilities** [1641, 1759]. **Possible** [411, 5326, 2270, 599]. **possibly** [4663]. **Post** [6773, 5835, 6567, 6983, 4995, 509, 7549, 4823]. **post-proceedings** [7549]. **Post-Quantum** [6773, 6983]. **Post-tabular** [5835]. **Post-ultimate** [4995, 4823]. **Postcorrection** [858, 650]. **Postcorrections** [671]. **Posteriori** [3584, 849, 6216, 2025]. **Postscale** [5769]. **Postscaled** [4408]. **Postshifts** [1544]. **Postsmoothing** [2668]. **Potential** [4537, 6419, 3707, 1943]. **Potentially** [4473]. **pour** [4684, 4236, 2762, 5094]. **pow** [5539]. **Power** [4503, 1579, 1580, 3054, 3728, 5488, 4813, 3868, 614, 7019, 6918, 4194, 5724,

4553, 4557, 5022, 6192, 6558, 5937, 6316, 6826, 5856, 6579, 4081, 4082, 4740, 6214, 6725, 5068, 4425, 7086, 4266, 4432, 7437, 5631, 4443, 4102, 6360, 6228, 4104, 4110, 4922, 5787, 241, 3832, 5561, 6977, 5566, 6630, 6979, 5108, 5384, 6985, 6749, 6750, 4645, 4163, 4164, 4811, 3570, 4176, 5989, 6799, 6066, 4015, 4692, 3586, 620, 1288, 3890, 5925, 4197, 4857, 5729, 7043, 7044, 7141, 3897, 2925, 3910, 4245, 3791, 5067, 4083, 4744, 4601, 5777, 4924, 3698, 4287, 2617, 2619, 3202, 4475, 3369]. **Power-Delay** [3728, 4740]. **Power-Efficient** [5488, 6360, 5566, 5384, 6066]. **power-series** [2925]. **POWER2** [3215, 3267, 3347, 3370, 3266]. **Power3**^{TM} [3965]. **POWER6** [5284, 5126]. **POWER7** [5680, 5605]. **Powering** [4433, 4907, 3952, 5971, 4750]. **PowerPC** [5107, 3223, 3266, 3101, 3278, 3618, 3303, 4104, 3348, 3353, 3369]. **Powers** [5994, 819, 5318, 5319, 6635, 4, 1578, 6076, 5611, 6016]. **pp** [217, 1484, 228, 272]. **PPAM** [7606]. **PR** [6736]. **Pracniques** [346, 354]. **Practical** [4300, 1568, 6768, 3723, 3932, 2586, 3383, 3384, 1225, 978, 5065]. **practicality** [3916]. **Practically** [6602, 1543, 6030, 2642]. **Practice** [7581, 3038, 5388, 7555, 7215, 7216, 1673, 2206, 1027, 1426, 5330, 5540, 2452, 6361, 1672]. **practiced** [716, 795]. **Prague** [7415, 7532, 7564]. **Praxis** [7216]. **Pre** [5901, 5717, 3435]. **Pre-computations** [5901]. **Pre-processing** [5717]. **pre-scaling** [3435]. **Precimonious** [5960]. **Precise** [2173, 3847, 2657, 6071, 3610, 4045, 4864, 6584, 3338, 5089, 5090, 4473, 5144, 2228, 6215, 6220, 5458, 5459, 4390, 4231]. **precisie** [492]. **Precision** [6642, 5805, 6992, 6141, 3539, 4648, 6483, 3851, 1487, 3719, 4969, 6496, 4795, 6887, 6497, 6499, 2871, 728, 862, 954, 1098, 1099, 1100, 1193, 1265, 4979, 5392, 5686, 6781, 6782, 6267, 6508, 5483, 5395, 7130, 6512, 3566, 3567, 381, 5700, 6515, 6516, 1102, 6668, 5701, 5903, 6270, 6669, 1589, 303, 1387, 1591, 5906, 223, 7019, 3420, 6404, 4529, 4530, 4684, 6678, 617, 4534, 3425, 6914, 7025, 5595, 5713, 6413, 6172, 963, 429, 7030, 5006, 5291, 5293, 5600, 7135, 7136, 6685, 4358, 4547, 5721, 4854, 884, 6689, 7037, 7038, 7137, 4856, 7039, 6544, 4367, 6423, 6548, 6549, 6425]. **Precision** [10, 2225, 4040, 4210, 4211, 4861, 5021, 5309, 1520, 1856, 1980, 83, 1133, 3280, 343, 7048, 4562, 6701, 3283, 3453, 5743, 6305, 6092, 6309, 6559, 6193, 6310, 1748, 4050, 5750, 3772, 6562, 5936, 348, 5609, 1754, 1876, 5034, 5036, 5612, 3778, 349, 5848, 6197, 6324, 5539, 6714, 2106, 4398, 4729, 4879, 5044, 6200, 6327, 5761, 5762, 6007, 5327, 5329, 6204, 1431, 6333, 3469, 2560, 6716, 3639, 6335, 4893, 2112, 2254, 4246, 6830, 6831, 692, 1315, 1889, 5769, 6112, 6344, 763, 6345, 6346, 6347, 6591, 362, 363, 3147, 5862, 6212, 7079, 6724, 5953, 3315, 6726, 6727, 5195, 1323, 5072]. **Precision** [2783, 2784, 207, 7089, 4607, 209, 6599, 2795, 3333, 238, 6843, 4612, 4613, 706, 771, 4439, 3502, 6026, 6356, 7094, 7095, 6848, 6604, 709, 1543, 1915, 4446, 3509, 4275, 2288, 2289, 7155, 6850, 6968, 5644, 6610, 2811, 3185, 3948, 4766, 5212, 5213, 323, 5559, 4122, 5457, 375, 5561, 189, 1934, 4129, 5368, 6624, 1073, 1351, 6137, 5233, 5655, 5658, 5799, 4478, 1003, 5974, 6140, 7120, 460, 6639, 6751, 6866, 5661, 6752, 6753, 6641, 6136, 6370, 4684, 3382, 721, 5978, 1011, 5471, 299, 3040, 4504, 5816, 5892, 6043, 6769, 5582, 4973, 6500, 3980, 4162, 4319, 4320, 4662, 863, 955, 5584]. **precision** [4806, 7127, 5689, 6664, 3563, 2336, 3864, 1272, 382, 383, 5904, 5493, 5702, 6161, 4173, 4526, 5706, 4992, 3877, 4177, 6279, 4340,

4341, 2065, 1598, 1731, 6910, 5149, 3071, 5918, 6680, 5501, 2068, 3886, 4015, 4691, 735, 4185, 7028, 7029, 3257, 5292, 4704, 6535, 6078, 5925, 4032, 6296, 6419, 6420, 1291, 3756, 6539, 6923, 2905, 7042, 2907, 9, 5305, 5306, 626, 6695, 437, 827, 1521, 2724, 886, 6428, 5736, 6700, 6926, 1868, 6002, 6703, 6704, 6004, 2095, 2239, 2240, 3110, 1420, 7054, 1635, 6821, 2742, 5847, 633, 6442, 6933, 5325, 5853, 5944, 5946, 5947, 3785, 4582, 352, 2938]. **precision** [3637, 402, 760, 4885, 4733, 5542, 6585, 7069, 5057, 2952, 5192, 6718, 6343, 578, 2436, 696, 4594, 4595, 4596, 6944, 6015, 2574, 5628, 7078, 4898, 4746, 7087, 4747, 4267, 1330, 5206, 2277, 1332, 6845, 6351, 1243, 2012, 5960, 6224, 5635, 2144, 5639, 5873, 3165, 6028, 4758, 710, 3344, 3508, 2464, 5874, 3685, 3181, 3687, 3821, 3516, 4450, 293, 5221, 4929, 6740, 4282, 5099, 5651, 4772, 5223, 6365, 4287, 6858, 492, 4468, 4469, 1352, 2487, 5232, 6033, 6239, 2624, 2307, 5111, 2492, 2627, 3373, 3533, 3379, 4490, 5122, 4821, 4822, 5276, 3980, 4320, 5332, 3157, 4490, 297]. **Precision** [1539]. **Precision-** [6356, 7094, 4468, 4469]. **Precision-aware** [7039]. **Precision-Scalable** [6850, 6968]. **precision-specific** [6239]. **precision/range** [4287]. **Precisions** [6812, 6643]. **Precompiler** [1107, 1003, 5451]. **precomputation** [4267]. **Precomputed** [4430]. **preconditioned** [2620]. **Preconditioners** [3627]. **predecessor** [5554]. **Predicates** [3688, 5571, 7002, 4231, 4390, 5336, 3687, 3821]. **Predictable** [3838]. **Prediction** [3391, 1836, 5831, 3636, 3788, 3127, 6585, 2799]. **Prediction-Based** [5831]. **Predictive** [4195, 6560, 6706, 6462, 6604, 5376]. **Predictors** [51, 4128]. **Preface** [722, 3266, 4568, 588]. **Preferences** [1302, 1240]. **Prefix** [4312, 4987, 2885, 6917, 6555, 4223, 1311, 6100, 5764, 6595, 6729, 4470, 4161, 4982, 2884, 4379, 7153]. **Prefix/Carry** [5764]. **Prefix/Carry-Select** [5764]. **prefixed** [5302]. **Prehistory** [4213]. **Preliminary** [58, 5165, 2829, 2166]. **Prenormalization** [4982]. **Prepackaged** [2701]. **Preparation** [72, 97, 151, 1559]. **Preprocessor** [2455, 827]. **Preprocessors** [3488]. **prerogative** [6453]. **Presburger** [4300]. **Prescale** [5769]. **Prescale-Lookup-Postscale** [5769]. **Prescaled** [4736]. **Prescaling** [5500, 3254, 4690, 4836, 5286, 3465, 4078, 5882, 3077, 4837, 2933, 4064, 4413]. **prescribed** [4036]. **Presence** [5991, 5041, 1899, 6729, 2620]. **present** [480, 3381]. **Presentations** [7466, 7234]. **Presented** [7281, 7283, 7312, 7221, 7284, 7255, 7243, 7244, 7256, 7267, 7235, 7269, 7199, 7237, 7428, 7187, 7398, 3696, 7297]. **Preserving** [1644, 6592]. **Press** [4151, 4152]. **Presubstitution** [5025]. **Preuves** [4801, 4351, 4318, 5820]. **Preventing** [5860, 6012]. **Preview** [5843]. **price** [3388]. **price/performance** [3388]. **Prices** [5008]. **Priest** [4897, 5195]. **primarily** [6973]. **PRIME** [7568, 5129, 810, 1823, 6798, 5994, 1306, 6949, 6130, 5803, 2634, 1264, 465, 1438, 1908, 2632, 1689]. **primeneniia** [2327]. **Primer** [1768]. **Primes** [6681, 438, 6519, 6541, 3714]. **primitive** [2835]. **Primitives** [2792, 4691]. **Princesa** [7526]. **Princeton** [7589]. **Principal** [3631, 7204]. **principes** [29]. **Principle** [4626]. **Principled** [3491]. **Principles** [1302, 1217, 106, 472, 972, 4862, 975, 1240, 3369, 3206, 4306, 29, 235, 1246]. **Print** [2607, 4926]. **Printed** [195, 73, 19]. **Printf** [6481, 6480]. **Printing** [6144, 3562, 5617, 1052]. **Priori** [5485, 3576, 3777, 2103, 3909]. **Privacy** [7590, 6592, 6601]. **Privacy-Preserving** [6592]. **Privacy-Protecting** [6601].

private [6093]. **Prize** [2690]. **Probabilistic** [1090, 1190, 1369, 1808, 6788, 2880, 7027, 5724, 6547, 2907, 395, 6698, 3904, 6340, 1648, 1649, 5059, 6850, 7102, 7104, 7160, 2377, 7039, 394, 5549]. **probabilities** [509]. **Probability** [495, 386, 4587, 2752, 5059, 2123, 1791, 1513, 2255, 1054, 4932, 4587]. **Problem** [3055, 1832, 1984, 3656, 4084, 6474, 4936, 7181, 2171, 2869, 3748, 562, 6106, 5859, 6217, 7405]. **Problem-Solving** [1984]. **Problems** [603, 6384, 2508, 3996, 618, 7192, 1844, 2710, 179, 2383, 4562, 5532, 3632, 3669, 1671, 2147, 3690, 4465, 3704, 6382, 5894, 5818, 5482, 118, 63, 64, 65, 66, 67, 68, 2708, 1621, 1868, 1756, 72, 1335, 1679, 4131, 4134, 4288, 1472, 1473, 3246, 4587, 7229]. **Proc** [7184, 1484, 7250, 7189]. **Proc.-E** [1484]. **Procedural** [1802, 1803]. **Procedure** [6045, 83, 5769, 5548, 1152, 3488, 5481, 2407, 758, 5547, 3195, 35]. **Procedures** [4300, 1812, 513, 747, 3477, 3488, 4903, 1237, 2279, 585, 411, 273, 1225, 492, 540]. **Proceedings** [7194, 7212, 7218, 7298, 7299, 7309, 7426, 7440, 7553, 7170, 7164, 7220, 7311, 7356, 7412, 7441, 7340, 7465, 7383, 7427, 7526, 7406, 7453, 7258, 7210, 7313, 7371, 7413, 7482, 7372, 7358, 4835, 7302, 7238, 7414, 7327, 7252, 7601, 7285, 7165, 7259, 7211, 7223, 7228, 7239, 7241, 7266, 7287, 7288, 7306, 7318, 7328, 7329, 7330, 7343, 7344, 7345, 7359, 7361, 7374, 7375, 7419, 7442, 7444, 7456, 7458, 7472, 7500, 7543, 7547, 7604, 7611, 7273, 7274, 7388, 7224, 7332, 7605, 7242, 7290, 7399, 7225, 7376, 7362, 7473, 7363, 7434, 7445, 7474, 7488, 7505, 7421, 7475, 7172, 7262, 7377, 7257, 7463, 7200, 7348, 7349, 7231]. **Proceedings** [7447, 7209, 7320, 7295, 7490, 7552, 7203, 7365, 7366, 7600, 7205, 7324, 7323, 7236, 7580, 7198, 7279, 7494, 7524, 7537, 7554, 7326, 7559, 7392, 7393, 7369, 7237, 7339, 7481, 7539, 7395, 7214, 7455, 7384, 7571, 7467, 7603, 7562, 7483, 7249, 7191, 7529, 7429, 7416, 7253, 7305, 7341, 7397, 7431, 7443, 7469, 7485, 7486, 7501, 7502, 7513, 7516, 7531, 7542, 7546, 7576, 7577, 7289, 7178, 7333, 7433, 7408, 7277, 7549, 7291, 7278, 7292, 7436, 7534, 7550, 7188, 7336, 7226, 7378, 7401, 7437, 7402, 7476, 7535, 5633, 7507, 7403, 7449, 7464, 7522, 7410, 7450, 7263, 7296, 7352, 7508, 7281, 7310, 7380, 7451, 7525]. **Proceedings** [7497, 7382, 7511, 7540, 7560, 7454, 7541, 7561, 7588, 7370, 7272, 7227, 7610, 7207, 7360, 7387, 7418, 7420, 7432, 7457, 7487, 7504, 7517, 7518, 7519, 7532, 7587, 7208, 7389, 7334, 7548, 7400, 7489, 7261, 7216, 7533, 7521, 7409, 7423, 7551, 7579, 7477, 7584, 7506, 7438, 7364, 7448, 7353, 7536, 7368, 7573, 7530, 7515, 7607, 7609, 7347, 7367]. **Procesach** [458]. **Process** [4024, 200, 5750, 6988, 92, 5009, 3503]. **Processes** [278, 264, 77, 652, 79, 191, 7175, 458, 7118, 249, 95, 5352, 711, 846, 1252, 389]. **Processeur** [2217, 2563, 2004]. **Processing** [1709, 6869, 3027, 6993, 7356, 7412, 7496, 1574, 3558, 7282, 6507, 302, 2669, 6894, 4521, 3579, 7026, 5595, 2212, 3429, 883, 1743, 6809, 3087, 6545, 564, 7316, 7265, 7331, 7360, 7471, 7485, 7502, 7504, 3102, 3103, 4212, 4150, 6701, 3107, 6435, 1135, 3619, 2551, 1140, 4723, 7290, 7225, 7400, 7520, 7066, 6337, 5335, 7189, 145, 916, 6951, 2128, 6961, 3676, 7337, 1541, 4763, 6968, 7101, 7438, 2990, 7364, 6610, 3184, 1172, 6861, 7606, 5974, 3220, 2181, 1089, 2650, 7395, 2338, 2341, 3869, 6672, 2685, 4687, 7358, 5002, 7191, 2372, 5717, 5997, 2375, 1611, 3086, 6539, 3262]. **processing** [6422, 5019, 3264, 4043, 6700, 2728, 3284, 1303, 1040, 7178, 3458, 2241, 2926,

1988, 1877, 1990, 1992, 2418, 2930, 4876, 2938, 7276, 7434, 7445, 7461, 7474, 7488, 7505, 2564, 2948, 2569, 7188, 2970, 4602, 3152, 3153, 2267, 7378, 2591, 839, 5785, 5208, 2810, 4116, 3518, 2019, 6612, 3009, 1348, 7307, 7352, 3202, 1796, 1178, 2492, 2838, 1705, 4292, 4949, 2854, 2855, 2688]. **Processing-in** [6435]. **processing-in-memory** [4876]. **processing-in-wire** [5997]. **Processor** [6992, 3965, 1713, 4653, 6488, 3394, 2328, 1951, 1577, 4799, 2049, 6667, 2056, 2665, 1271, 3412, 1822, 1382, 1587, 1823, 1964, 2350, 1391, 3741, 502, 6914, 2525, 1121, 2369, 2218, 2895, 3258, 5154, 1849, 1850, 1294, 1616, 6694, 2385, 4861, 5737, 4216, 1414, 6303, 5744, 6817, 5531, 5747, 4048, 4053, 5533, 5605, 887, 2737, 2413, 7056, 2746, 2748, 4396, 5762, 2251, 6581, 2563, 1434, 5619, 1316, 3478, 2438, 5062, 3923, 1656, 2449, 6725, 1657, 5072, 7083, 2575, 7084, 1324, 2268, 3667, 7086, 7089, 6961, 483, 1238, 3813, 4272, 1541, 1681, 3510, 3682, 6850, 7101, 2469, 1920, 2293, 3188, 1930]. **Processor** [2299, 1936, 3194, 1468, 1350, 5379, 6980, 1182, 2631, 6865, 1360, 2857, 1944, 1945, 3029, 6041, 1486, 2498, 5126, 2499, 2318, 1363, 2320, 3040, 1488, 2502, 3398, 2186, 2329, 3859, 1016, 4163, 1816, 1955, 2201, 2667, 1819, 5902, 1381, 2341, 5491, 1272, 3992, 2207, 2876, 2877, 2878, 3421, 2354, 5002, 822, 2216, 2896, 6921, 5834, 2705, 1740, 1851, 2384, 2717, 2386, 5733, 2086, 1411, 517, 2412, 2414, 2415, 3630, 2745, 2747, 2427, 3787, 2431, 2566, 3132, 2567, 1647, 2000, 2261, 2441, 3313, 2447, 1321, 2265, 2451, 1154, 3323, 4255, 1326, 5777, 766, 2269, 2135, 2274, 2277, 3937, 3165]. **processor** [5785, 2985, 3344, 4621, 5556, 1686, 3346, 1921, 3520, 2472, 1929, 1931, 2300, 1935, 1789, 3010, 2301, 1793, 1698, 2490, 3205, 3368, 796, 1256, 3532, 1560, 2494, 6984, 2351, 2217, 1124, 2583, 1790]. **processor-based** [6984]. **Processor-T** [6694]. **Processors** [4496, 6378, 6761, 547, 3403, 7371, 7384, 7571, 2669, 6894, 5905, 5494, 7483, 7528, 1838, 5923, 5303, 3100, 3101, 3278, 7287, 7306, 7318, 7343, 7418, 7500, 7501, 7517, 7542, 7556, 7565, 3102, 3103, 1418, 2099, 5607, 3120, 895, 1045, 1432, 4731, 3303, 6724, 4089, 6222, 4437, 6846, 4275, 7477, 2990, 1780, 4453, 7449, 7410, 7523, 7367, 1557, 6370, 2649, 1492, 4797, 3725, 6389, 3232, 1586, 5824, 5904, 2682, 3424, 5596, 3442, 7469, 3111, 3112, 3113, 3114, 2242, 4232, 2422, 6105, 4898, 3324, 3325, 6220, 4753, 3192, 1792, 2310, 4292, 2313, 1355]. **produce** [6934, 4741]. **produced** [3193]. **producing** [4260]. **Product** [7368, 806, 6047, 6660, 6267, 5397, 3868, 1384, 3064, 7023, 5001, 4850, 5517, 6688, 4857, 6694, 7041, 7049, 6559, 6563, 5535, 3295, 6314, 7063, 1899, 4899, 4900, 5071, 6598, 1453, 1920, 5968, 6232, 6737, 6982, 2626, 3540, 1486, 5473, 5398, 1959, 3570, 2879, 3069, 3580, 6919, 4030, 4551, 1523, 3111, 3112, 3113, 3114, 3122, 5756, 5946, 3663, 5870, 789, 1921, 3009, 1698, 492, 5238, 5575, 5464]. **Product-Based** [6982]. **Production** [7229, 6846]. **productivity** [7463]. **Products** [1095, 2654, 882, 2535, 558, 6698, 5932, 7146, 4430, 596, 5819, 3735, 100, 5736, 2100, 2736, 1994, 2420, 5757, 3307, 6227, 2834, 3198, 2625]. **Produkte** [1095]. **Profession** [4713]. **Professor** [159]. **Profile** [5902]. **Profile-guided** [5902]. **profiles** [5917]. **Profiling** [6678]. **Program** [3390, 6250, 6762, 6875, 2501, 1093, 5478, 5898, 1507, 6562, 3294, 567, 2554, 5542, 2787, 4921, 6617, 1076, 3844, 5894, 5818, 6664, 3989, 1598, 1731, 283, 1517, 1299, 2720, 7567, 4376, 2239, 2240, 1226, 4232, 6011,

1646, 5191, 3922, 986, 707, 6230, 3351, 293, 1255, 5120]. **Programmable** [7493, 7510, 7497, 7526, 7540, 7482, 3255, 7486, 7564, 6196, 3128, 3469, 7409, 7476, 7535, 7551, 7579, 3184, 5648, 7478, 7479, 5889, 5149, 3888, 2384, 5733, 3129, 1647, 2265, 4950, 7454]. **programmation** [487]. **Programmed** [3263, 94, 1546, 104]. **Programmer** [3981, 3417, 3418, 3577, 6790, 3256, 1866, 889, 3642, 3643, 3143, 2298, 4631, 3359, 2521, 2026]. **Programmer-controlled** [889]. **programmes** [5191]. **Programmiersprachen** [1095]. **Programmierung** [3119, 3119]. **Programming** [7212, 7281, 7298, 7309, 7495, 2861, 2635, 6258, 7394, 7005, 1095, 172, 4336, 157, 4189, 6068, 3591, 4193, 1401, 3269, 3899, 4217, 5527, 6310, 1525, 2729, 4377, 5607, 3119, 1313, 7215, 6452, 4241, 6336, 446, 3305, 2957, 2958, 2775, 3159, 7231, 6129, 7154, 2295, 3188, 3838, 943, 2623, 326, 4478, 494, 6241, 3969, 4306, 1092, 301, 1508, 6284, 2910, 5169, 5170, 5171, 7275, 2408, 2426, 317, 2764, 2574, 1162, 487, 489, 147, 1249, 5102, 3371, 3020, 3377, 7405, 3900]. **Programmpaketes** [1886]. **Programs** [6768, 2864, 3039, 1715, 1374, 5257, 5477, 5683, 6048, 6053, 2678, 2679, 7021, 6913, 6285, 7053, 2440, 643, 5865, 4441, 3168, 4622, 6366, 97, 151, 1559, 6236, 5983, 1594, 6276, 4998, 7028, 5833, 3441, 3603, 3456, 2238, 5614, 2558, 6845, 6028, 5451, 2296, 6364, 6989]. **Progress** [2656, 5048]. **Progressions** [438, 5211]. **progressive** [3522, 3700]. **Project** [3848, 3433, 3589, 400, 2109, 5, 3803, 1453, 7295, 6969, 272, 1346, 1945, 7161, 1379, 1723, 3263, 2086, 2090, 1697, 246]. **Projection** [6629, 6684, 1524]. **Projective** [4382, 4599, 4209]. **PROLOG** [1772]. **Promise** [6810]. **Proof** [4508, 5258, 5898, 4700, 4840, 4842, 556, 4378, 4719, 2554, 7068, 5865, 925, 2483, 3844, 5132, 5134, 5256, 2912, 5613, 2755, 2757, 3922, 5076, 3936, 3937, 4100, 2598, 998, 4294]. **Proofs** [5683, 4993, 6913, 7053, 6832, 3653, 3811, 6223, 6138, 7022, 4162, 4318, 4662, 4801, 5820, 6261, 3998, 4337, 1299, 7335, 707]. **Propagate** [6796, 6797, 2526]. **Propagation** [378, 5891, 5906, 1125, 1285, 395, 903, 233, 204, 205, 3331, 414, 2174, 2175, 6148, 1200, 6683, 7032, 1209, 1284, 394, 1298, 5738, 5741, 5414, 760, 1234]. **Properly** [1856, 892]. **Properties** [725, 4514, 4515, 4802, 2507, 824, 687, 3653, 4425, 2273, 2979, 703, 1911, 2177, 820, 1415, 1416, 2230, 4873, 5035, 641, 3516, 2495]. **Property** [6638, 3997]. **proportion** [6736]. **Proportional** [6577]. **Proposal** [2870, 3051, 4667, 3873, 4825, 1207, 2085, 3764, 3770, 1157, 1235, 2005, 2581, 2582, 4921, 3321, 788, 2492, 1740]. **Proposals** [1386]. **Proposed** [296, 1197, 1503, 1726, 1825, 1198, 1199, 1275, 1388, 1727, 6906, 6907, 2355, 1512, 1204, 1280, 1301, 1410, 1219, 1224, 1308, 4564, 6467, 1459, 1460, 1466, 70, 5103, 2045, 1191, 1590, 1105, 1962, 15, 5, 1918, 1339, 1461]. **proposer** [7046]. **proposes** [6363]. **PROSE** [2133]. **prosessor** [1740]. **prospects** [3246]. **Protected** [1577]. **Protecting** [2140, 6601]. **Proteins** [5557]. **proton** [2807]. **Prototype** [5699, 1390]. **Prototyping** [6851]. **Provably** [6399, 5405, 2070, 2210, 4224, 5852, 6941, 4741]. **Proved** [5391, 6388]. **Proven** [5480, 4822]. **Prover** [7466, 4225]. **provider** [5455]. **Provides** [3851, 4742, 1182, 3388]. **Providing** [5718, 3503, 5360]. **Proving** [7381, 5682, 7453, 3991, 3871, 5294, 6206, 6963, 2332, 3574, 5160, 6326, 6445]. **Prozessor** [1936, 2583]. **Prozessoren** [1904, 1355]. **Prozessors** [2615]. **PRP** [529].

pruning [3300]. **ps** [5788]. **Pseudo** [1812, 422, 962, 264, 115, 129, 6865, 3598, 5305, 5306, 3313]. **Pseudo-Computer** [129]. **Pseudo-Division** [1812]. **Pseudo-Divisionsverfahren** [1812]. **pseudo-exhaustive** [3598]. **Pseudo-operations** [422]. **Pseudo-Random** [115]. **Pseudo-round** [962]. **pseudo-spectral** [5305, 5306]. **Pseudodivision** [652]. **pseudoduplication** [3259]. **Pseudoinverse** [713]. **Pseudorandom** [2848, 4492, 850]. **pseudorandom-number** [4492]. **pseudozero** [4853]. **PSI** [1363]. **psudo** [2015]. **psudo-banking** [2015]. **Public** [3856, 4330, 6428, 4380, 4566, 3805, 5874, 4190, 4088, 2977]. **Public-Key** [3856, 6428, 4380, 4566, 3805, 5874, 4190, 4088]. **publication** [1982, 2546]. **Publications** [5676, 24]. **publicity** [3389]. **Published** [23]. **Publisher** [3202]. **Publisher's** [6251]. **Pulse** [698, 1801]. **Punkte** [2053]. **punto** [4600]. **Purdue** [297]. **Pure** [3876, 7351]. **purely** [2910, 2743]. **Purpose** [5470, 1107, 5303, 7374, 3120, 5762, 6007, 1531, 3159, 4437, 7099, 7100, 6134, 2502, 2354, 2435, 2261, 2265, 4753, 4292, 2315, 2688]. **Putting** [2461]. **PVS** [3409, 4581, 3480]. **PX** [53]. **pyramid** [5382]. **Pyramidal** [1817]. **Pythagorean** [1601, 1652]. **Python** [6002, 6005, 5136]. **Pytorch** [6924].

Q [3730]. **Q-Coder** [3730]. **QCA** [5997]. **QD** [4970, 3734]. **QD-algorithm** [3734]. **QL** [998]. **QR** [2423, 6119, 4765]. **Qrd** [2939, 6323]. **Qrd-based** [2939]. **Qtorch** [6924]. **Quad** [4162, 4208, 4367, 6204, 4970, 4320, 4733]. **Quad-Double** [4208, 4367, 4320]. **Quadrant** [184, 165, 4042]. **Quadrate** [3935]. **Quadratic** [4304, 5754, 3139, 5075, 2150, 2029, 3366, 4176, 3580, 2733, 3111, 3112, 3113, 3114, 1877, 1989, 1990, 1991, 1992, 2245, 2246, 2419, 2929, 2422, 6106, 2451, 4270, 1782, 3004, 4811]. **quadratic-like** [1782]. **Quadratic-Polynomial** [2150]. **quadratic-residue** [3004]. **quadratically** [3511]. **Quadrature** [5805, 6146, 5291, 5162, 903, 5293, 6677]. **Quadratwurzel** [586, 2048, 1427, 2007, 1538]. **Quadratwurzel-Algorithmus** [2048, 2007, 1538]. **Quadratwurzelfunktion** [514]. **Quadratwurzeln** [1599]. **Quadrillionth** [5649]. **Quadruple** [4648, 7135, 7136, 7048, 6347, 5862, 6753, 6821, 5947, 5639]. **quadruple-precision** [5947]. **qualified** [3035]. **Qualifying** [4803, 4664]. **Quality** [6869, 7406, 3689, 7268, 1189, 2523, 2725, 6189, 3000, 3371]. **Quality-Efficient** [6869]. **Quantitative** [7315, 7396, 7468, 7585, 1440, 7319, 4278, 3512, 886, 5549]. **Quantities** [13]. **Quantization** [1489, 6824, 2968, 1170, 5106, 2628, 1565, 1801, 3582, 2372, 2373, 2900, 4905, 701, 4925, 789]. **Quantizations** [7115]. **Quantized** [6805, 6806, 7079, 6979]. **Quantum** [6882, 6773, 5268, 5490, 6810, 3459, 6567, 3778, 7061, 6457, 6593, 5954, 6020, 7167, 6855, 5229, 5973, 6983, 7150, 5966, 4932, 5461]. **Quantum-Dot** [5490, 5268]. **quantum-dots** [7150]. **Quarter** [973, 1305]. **Quartic** [6067]. **Quartus** [5778]. **Quasi** [5051, 912, 362, 363, 793, 2962, 2688]. **Quasi-Pipelined** [5051]. **Quasi-Serial** [912, 793]. **quasi-systolic** [2688]. **quasi-unity** [2962]. **quasigroup** [6439]. **quater** [236]. **quater-imaginary** [236]. **Quaternary** [1506, 1596, 4168, 2114]. **Quaternion** [5672, 4306]. **Quaternions** [6705]. **Qubit** [6457]. **Que** [7203]. **Quebec** [7502, 7233]. **Queen**

[7502]. **Queries** [2827]. **Query** [2880]. **Question** [6286, 5027]. **Questions** [18, 6897, 6899, 6900, 6901, 6902, 36, 26, 1127, 1739, 30]. **Queuing** [4587]. **Qui** [2]. **Quick** [5312, 3191, 1337]. **Quickhull** [3557]. **Quickly** [3562, 5617]. **Quire** [7026, 6937, 6938, 6939, 7106]. **quire-enabled** [7106]. **quirk** [2425]. **Quixilica** [7163]. **Quotient** [3062, 4349, 6414, 1603, 1836, 6922, 7064, 5345, 3492, 5964, 3022, 610, 4179, 6281, 4376, 2925, 4722, 1646, 3308, 2012, 3824, 5362, 1934, 2843]. **quotient-difference** [6281]. **quotient-digit** [4376]. **Quotients** [558, 265]. **QuPAT** [5639, 5873].

R [262, 531, 2471, 2386]. **R.O.C.** [7305]. **R/3000** [2386]. **r0p2** [4499]. **R1994** [2089]. **R2000** [2097]. **R3000** [2660, 2807]. **R3010** [2282, 2807]. **R4000** [3090]. **R63** [288]. **R65** [338, 339]. **R65-22** [338]. **R65-54** [339]. **R67** [444]. **R67-41** [444]. **Rabat** [4835]. **racecar** [6380]. **racehorses** [2523]. **racetrack** [6955]. **Racine** [1160]. **racing** [6955]. **radar** [3988]. **Radian** [1667]. **Radical** [6181]. **Radici** [3935]. **Radio** [7037, 4559, 4642]. **Radisson** [7494]. **Radius** [6309]. **Radix** [2041, 5581, 3970, 4153, 1569, 546, 853, 3225, 856, 5982, 4974, 6391, 6392, 6889, 7016, 1582, 5692, 2510, 1958, 5488, 1726, 1825, 3239, 224, 279, 5711, 5500, 6064, 734, 1603, 2364, 2527, 3254, 2073, 1606, 5720, 1614, 5018, 7139, 1618, 1133, 2089, 5737, 5310, 6432, 6190, 6192, 2397, 1424, 3118, 6094, 631, 5939, 5940, 3465, 4392, 4725, 5322, 4070, 6715, 1884, 6331, 7064, 3471, 3476, 1147, 5543, 359, 3309, 4078, 2572, 4081, 5774, 1439, 644, 3800, 5345, 3492, 647, 5435, 3498, 3499, 1775, 2142, 267, 3820, 4447, 5084, 1919, 933, 3824, 1786, 6739, 1933, 1934, 4129, 4460]. **Radix** [4461, 1175, 2159, 6031, 658, 5882, 3531, 544, 3536, 6986, 601, 802, 1005, 3853, 951, 461, 3226, 4311, 1714, 4317, 4325, 2514, 4000, 424, 2528, 3077, 2365, 3586, 3435, 7040, 3448, 2390, 2230, 2917, 3108, 3286, 890, 2739, 2931, 2933, 4064, 3466, 1761, 2439, 2766, 2956, 3146, 3483, 4413, 4083, 2782, 5866, 4090, 4256, 4257, 4746, 4606, 4750, 4751, 2981, 5446, 3172, 3173, 3175, 3176, 5085, 3521, 2817, 3007, 1173, 3840, 5574, 5656, 2846, 1747]. **Radix-** [1569, 2510, 1726, 1825, 6064, 2527, 1606, 1614, 5018, 4392, 4725, 3498, 4447, 1933, 4460, 6031, 3531, 3536, 4311, 4325, 4000, 2528, 3435, 3448, 3466, 1761, 3483, 4083, 2817, 3007]. **Radix-10** [5322]. **Radix-16** [734, 5774, 5882]. **Radix-2** [3225, 856, 4974, 5435, 5866, 3499]. **Radix-4** [5500, 2364, 7139, 6331, 5345, 2159, 3521]. **Radix-64** [6391, 6392, 6889, 7016, 2981]. **Radix-8** [5692, 6192, 3309, 3499, 3820, 5446, 5574]. **radix-dependent** [890]. **Radix-Independent** [2041, 2089, 6190, 1786, 1747]. **Radizierverfahren** [2259, 2036]. **Rail** [2155, 3791]. **RAIVE** [6103]. **RAND** [91, 5364, 1567]. **Random** [386, 6687, 5315, 6005, 6208, 2118, 2260, 115, 915, 4310, 91, 3733, 4007, 5282, 3335, 777, 3685, 3181, 5650]. **Randomization** [6524, 3809]. **Randomized** [6518, 5991, 5059, 4599]. **Randomness** [6377, 2202, 5594, 5406, 3807]. **Range** [2635, 275, 5476, 4980, 6426, 2722, 5742, 6092, 569, 632, 4727, 5066, 589, 1457, 3388, 2671, 3242, 3422, 4342, 4343, 4554, 5331, 3149, 3338, 4287, 4468, 4469, 5231, 4140, 545, 4785]. **Range-Addressable** [5066]. **range-independent** [4468, 4469]. **Range-Reduction** [4980]. **Range-Transformation** [569, 632]. **Ranged** [5534]. **Ranging** [4195]. **rank** [826]. **rank-frequency** [826].

Ranker [6488]. **Ranks** [6488]. **Raphson** [7000, 3998, 5994, 4192, 6003, 3287, 3291, 5177, 5618, 2765, 2955, 3308, 452, 5952, 2973, 6842, 3343, 6860, 6635, 4943, 5110, 5378, 3535]. **Rapid** [3980, 224, 36, 344, 262, 7083, 4748, 1545, 244, 1378]. **rapid-approximation** [1378]. **rapide** [3980]. **Rapidly** [2394]. **Rare** [6958]. **RAS** [4417]. **rask** [1740]. **raster** [2209]. **Rate** [504, 6008, 1056, 698, 1182, 380, 4405, 4884, 3505, 3358, 2688]. **Rates** [875, 4905]. **Ratio** [3233, 4143, 3571, 2080, 2481]. **ration** [1066]. **Rational** [2054, 5393, 6390, 7013, 428, 1405, 1133, 1414, 2917, 3108, 1987, 2555, 1425, 1754, 2102, 2416, 1315, 1889, 4249, 1651, 6017, 580, 3334, 1449, 4913, 241, 2844, 1707, 3966, 221, 426, 251, 6288, 1215, 1296, 1412, 4046, 4047, 1228, 1635, 2244, 2556, 5550, 4908, 3505, 1249, 5458, 5459, 5826]. **Rational/Radix** [1133]. **Rationale** [2355, 5170]. **Rationally** [1839]. **Rationals** [1644, 1598, 1731]. **Ratios** [668]. **ray** [2835]. **Rayleigh** [5186, 4242]. **RC** [498]. **RC-4000** [498]. **RDSP** [4671]. **Re** [3073, 3488, 3916]. **re-evaluation** [3916]. **Re-ordering** [3073]. **Reach** [3416]. **Read** [864, 2515, 1905, 4814, 4815, 3529]. **Read-Only** [864, 1905, 3529]. **Reading** [5929, 48]. **Readings** [607]. **readyreckoner** [31]. **Real** [3027, 7480, 7525, 3716, 3717, 5470, 5671, 330, 7004, 4316, 1096, 2053, 2054, 4322, 6157, 7413, 4517, 1589, 6893, 2678, 5497, 2886, 4013, 5510, 4843, 7492, 1516, 2373, 969, 3751, 6181, 7038, 2078, 3894, 7555, 2544, 2718, 2908, 6185, 564, 4370, 7519, 1628, 4568, 2103, 6098, 447, 2958, 2573, 5862, 5863, 7075, 3931, 6847, 4920, 6739, 4122, 411, 3194, 5102, 5237, 2631, 4951, 6991, 3966, 3855, 4789, 5136, 4809, 2662, 7129, 2664, 2338, 382, 3580, 3880, 3885, 5007, 4701, 4853, 1615, 2238, 636, 5321, 6321, 7145, 6006, 4580, 1430, 2255, 6207, 6110, 5057, 3649, 5065, 6965]. **real** [2804, 6608, 5460, 2622, 1178, 2082, 4144]. **REAL-Arithmetik** [2082]. **Real-Numbers** [6185]. **Real-Time** [3027, 330, 1589, 969, 564, 3194, 2631, 2958, 6991, 2664, 2338, 1178]. **Real/Complex** [3716, 5470, 5671]. **Real/Expr** [4144]. **Realisation** [1237, 2004]. **Realisierung** [1237, 1494]. **Realisierungen** [1485]. **Realistic** [1268, 1377, 1123, 1017]. **Realization** [4018, 250, 1214, 1975, 581, 4096, 4983, 1869, 1985, 1040, 4245, 5058, 1244, 1494]. **Realizations** [454, 2317, 1089, 4871, 3814, 541, 542, 5111, 4946]. **realized** [3232, 3289, 896, 525, 572, 3336, 3845]. **Realizing** [6810]. **RealLib** [5321]. **really** [4670]. **Reals** [6895, 5988, 6277, 6450, 6575, 6715, 4976, 5987, 2558]. **Realtime** [6487]. **reasoning** [6006, 2815, 3002]. **Receiver** [4610, 4558, 3132]. **Receivers** [4434]. **Recently** [4654]. **Rechenanlagen** [107, 1001, 2013]. **Rechenautomat** [61]. **Rechenautomaten** [124, 405, 124]. **Rechengenauigkeit** [107, 1539]. **Rechengeräte** [274]. **Rechengeräte-Entwicklung** [274]. **rechenintensive** [3194]. **Rechenmaschine** [159, 3460, 1167, 1467, 1322]. **Rechenmaschinen** [35, 3467]. **Rechentechnik** [3460]. **recherche** [5094]. **Rechnens** [975]. **Rechner** [1137]. **Rechnerarchitekturen** [1485]. **Rechnerarithmetik** [1211, 1353, 975]. **Rechners** [1469]. **Rechnung** [391]. **Rechnungen** [35]. **Recipes** [2276, 2978]. **Reciprocal** [4963, 6777, 5692, 3241, 4014, 4180, 4716, 4044, 4045, 2393, 2915, 4052, 4392, 4725, 5769, 4607, 5204, 3166, 3507, 3678, 3815, 3817, 3942, 4114, 4458, 5234, 6778, 6888, 4817, 5501, 2367, 4846, 5729, 2728, 3284, 6003, 3474, 3487, 3661, 2604]. **Reciprocals**

[2638, 5692, 5036, 4107, 1961, 4712, 3691]. **Reciprocation** [4181]. **Reciprocity** [1259]. **RECIPROOT** [89]. **reclaims** [5013]. **Recoding** [5901, 5518, 2387, 4218, 3473, 5543, 585, 5250, 2924, 5866, 3930, 2598, 5380]. **recodings** [5085]. **Recognition** [5886, 99, 6394]. **recommendations** [1585]. **recommended** [3876]. **recompilation** [4998]. **Recompiling** [6173]. **ReConFig** [7562]. **Reconfigurable** [3716, 3979, 6397, 1822, 7562, 7470, 3454, 4569, 4592, 6727, 5785, 6605, 4466, 5566, 4471, 5658, 4480, 4782, 5976, 5385, 5908, 7020, 5889, 4161, 4317, 4516, 2216, 4403, 5428, 2267, 4617]. **reconfiguration** [6066, 4559]. **Record** [7283, 7221, 7284, 4149, 7342, 7346, 7255, 7557, 7569, 7243, 7244, 7256, 7267, 6466, 7235, 7269, 7199, 7338, 7213, 7312, 7407, 7417, 7422, 7435, 7446, 7462, 7598, 7350, 7391, 7297, 7325]. **recorded** [3696]. **Recording** [320, 48]. **Records** [7119]. **Recovering** [6198]. **Recovery** [4423]. **rectangles** [7067]. **Rectangular** [6440, 5355, 3374]. **rectilinear** [3067]. **Recurrence** [4963, 7139, 4392, 5322, 3128, 6739, 4127, 6238, 5116, 4962, 3253, 4691, 6427, 6697, 740, 3129, 357, 358]. **Recurrences** [814, 4659, 7070]. **Recurring** [1707]. **Recursion** [7147, 4441]. **Recursion-free** [7147]. **Recursive** [3989, 1831, 2376, 6330, 6340, 5782, 2828, 6981, 6982, 6985, 2177, 1948, 951, 1489, 3045, 2333, 4692, 1846, 1221, 1985, 2245, 896, 2557, 3299, 985, 1910, 1918, 1067, 1783, 1939, 2852]. **Recycled** [5953]. **RedMulE** [6977]. **Reduce** [5609, 1661, 3022, 4394, 365, 5428, 2843, 3378]. **Reduced** [4503, 3975, 3049, 4981, 6515, 6668, 5903, 7030, 1850, 1632, 5535, 5848, 7078, 4901, 5631, 5441, 4618, 4110, 1777, 5659, 2850, 4962, 3400, 2197, 6279, 2380, 1851, 4555, 6695, 4575, 4877, 2938, 4924]. **reduced-area** [4555]. **Reduced-Instruction-Set** [1850, 1851]. **Reduced-Precision** [7030, 6695]. **Reducibility** [1222]. **Reducing** [4164, 5397, 4176, 4683, 5917, 346, 5758, 3146, 3483, 3661, 3928, 3493, 5869, 371, 239, 4287, 326]. **Reduction** [6244, 5479, 4980, 5271, 5911, 3430, 6922, 7138, 5301, 6085, 7049, 5742, 5843, 5608, 6709, 4387, 2557, 3913, 4727, 5621, 6942, 6112, 2964, 1658, 1901, 1666, 1667, 5074, 3496, 5352, 840, 6966, 7096, 6231, 4764, 3517, 4628, 5096, 5659, 4476, 3534, 5118, 6385, 4807, 5398, 5587, 6054, 3242, 3422, 4342, 4343, 3261, 4247, 3144, 4896, 3663, 4749, 2976, 3497, 4767, 4768, 5094, 5231, 3026, 2852, 5094]. **Reductions** [7092, 5133, 4730]. **Redundancy** [546, 854, 855, 4795, 1820, 6515, 4683, 3107, 2416, 166, 3448, 4407]. **Redundant** [5807, 6378, 3391, 3716, 3971, 2319, 2500, 725, 3053, 1103, 4683, 6064, 1278, 5515, 6073, 5926, 5728, 3265, 5412, 5602, 3287, 1632, 6929, 5034, 2104, 4070, 6576, 3473, 5430, 3489, 2580, 6958, 3331, 6844, 1540, 3942, 4114, 5787, 2609, 2155, 2816, 5367, 5880, 6031, 2170, 4482, 797, 4483, 378, 2868, 4984, 3068, 3250, 3251, 2692, 2071, 4696, 4697, 4186, 4705, 7040, 4559, 5163, 1415, 1416, 4227, 2556, 2417, 2928, 2423, 2749, 4068, 4072, 4237, 5186, 2753, 3146, 3309, 3310, 3483, 4904, 2785, 3806, 3163, 2466, 3824, 3005, 1928, 3006, 4638, 4481, 4487]. **Redundant-Digit** [6378, 5602]. **Reed** [6410]. **reelle** [2053, 2103, 2573]. **reellen** [1628]. **reellintervallwertigen** [1628]. **Reference** [6872, 4499, 5127, 498, 2659, 302, 813, 2069, 6421, 1622, 1866, 835, 7162, 2991, 3514, 1927, 4463, 4631, 1468, 1559, 1086, 1011, 1092, 682, 1526, 2923, 2950, 1337, 4929]. **Refinement** [3966, 5183, 450, 7336, 4465, 5372, 5144, 6419, 6420, 1420, 312,

5184, 3308, 1781, 6976, 4131]. **Reflected** [181]. **reflection** [2177]. **Reflections** [3560, 6522]. **Refutation** [2730, 2918]. **Regained** [6357]. **Regards** [136]. **Regency** [7306, 7318]. **regime** [283, 6964]. **Regime-5** [6964]. **Region** [7260]. **Regional** [7533]. **Register** [3142, 3923, 1056, 4272, 2161, 4522, 3936]. **Register-Number-Minimum** [2161]. **Register-Transfer** [4272]. **register-transfer-level** [3936]. **Registers** [738, 3313]. **Regression** [3061, 643]. **Regular** [6913, 1900, 2002, 1192, 1495]. **Regularity** [3677]. **Regularization** [7052]. **regulator** [1241, 1242, 1334]. **Reinventing** [6114]. **rekenen** [540]. **Related** [2678, 4988, 5956, 6607, 5573, 4679, 1127, 1739, 5951, 4450, 84, 3702]. **Relation** [5915, 1631, 740, 6033]. **Relational** [5337, 5450]. **Relations** [4908, 3236, 357, 358]. **Relationship** [5151, 7231, 1853, 3765, 3312]. **Relationships** [1259, 1081]. **Relative** [6273, 1845, 2535, 6306, 5948, 3528, 2178, 2065, 5917, 5999, 6076, 6001, 6308, 6433, 6702, 574, 6016, 987, 707, 2487]. [3119]. **Relaxation** [315]. **Relay** [59, 38, 42, 1338]. **Release** [563, 6091]. **Reliability** [4587, 3919, 4076, 4077, 7294, 7268, 5105, 1730, 2725]. **Reliable** [4495, 7428, 1021, 5927, 3775, 3302, 4893, 6956, 5634, 6137, 6373, 6745, 5663, 4296, 4332, 2879, 2408, 4231, 4390, 4236, 5615, 4454, 3200, 6033, 7555]. **Remainder** [4649, 4796, 3871, 4678, 4215, 4715, 5779, 5482, 4174, 2381, 6574, 4746, 2463, 4468]. **remaindering** [5498, 2409]. **Remainders** [6644, 544, 461, 3146, 3483]. **Remark** [1193, 1206, 6421, 1436, 3672, 3676, 491, 3483]. **Remarkable** [4333]. **Remarks** [249, 335, 346, 765, 846]. **Remedies** [5842]. **Remez** [2595]. **Reminiscences** [3943]. **remote** [2916]. **Removing** [4795, 3479, 6958, 4261]. **Renaissance** [3859]. **rencontres** [7401]. **Rennes** [7571, 7506]. **Reno** [7299]. **repair** [6989]. **Repairing** [6834]. **repeated** [3840]. **Repeatedly** [3996]. **Repetitive** [6958]. **Replacement** [737, 4248, 4890]. **Replacing** [5533, 1652]. **Replay** [4347]. **Replication** [4650, 1575, 2625]. **replications** [2839]. **Reply** [1483, 228, 773, 3804]. **Report** [6996, 2656, 2910, 7047, 3905, 51, 2603, 2021, 2022, 56, 3201, 2074, 3615, 3635, 6104, 2802, 1689, 1922, 1339]. **Reports** [3851, 7581]. **Representable** [4663]. **Representation** [5807, 6756, 5129, 1574, 1013, 3396, 5131, 3404, 170, 866, 4987, 2684, 3883, 673, 2702, 878, 1516, 3749, 6807, 307, 6179, 2078, 4037, 1131, 5529, 6555, 1304, 3287, 1044, 2104, 4074, 6583, 1147, 6584, 447, 6208, 642, 5430, 3800, 4608, 4618, 7104, 929, 7109, 1687, 241, 2155, 3197, 949, 1079, 3542, 3543, 2652, 2662, 4984, 3731, 5704, 6405, 962, 3881, 2890, 4542, 4705, 252, 1615, 1215, 1296, 2231, 4720, 5031, 5182, 1435, 3135, 697, 4904, 7091, 3334, 777, 5210, 3003, 3006, 850, 4638, 5382]. **Representations** [4646, 2037, 219, 855, 5891, 6895, 5711, 1617, 2397, 5034, 5755, 5846, 1428, 685, 6582, 2580, 3331, 6354, 1540, 4629, 5973, 3025, 6148, 2661, 2692, 1967, 872, 2071, 3286, 888, 6827, 6934, 2777, 208, 1914, 2847, 2762]. **Represented** [265]. **Representing** [3085, 5217]. **represents** [5456]. **Reprint** [175]. **ReproBLAS** [6151, 5914]. **Reproducibility** [6885, 5913, 6060, 5829, 4365, 6198, 6024, 6044, 6269, 6054, 4206, 6104]. **Reproducible** [6037, 6038, 6142, 6646, 6151, 6389, 6508, 6271, 5911, 5912, 5914, 5990, 6061, 4347, 6088, 6335, 6119, 6956, 6633, 5980, 6165, 6406]. **Republic** [7415, 7564, 7532]. **Required** [4856, 561, 3288, 5609, 1142, 377, 459, 4746]. **Requirement** [439].

Requirements [1021, 3707]. **Res** [2038]. **Research** [7568, 7242, 6319, 2109, 7348, 7209, 6601, 4483, 7198, 1945, 152, 1723, 5837, 5014, 3263, 2086, 2090, 5851, 7277, 1697]. **réseaux** [5094]. **residual** [1925, 2025]. **Residue** [6036, 6870, 4965, 4966, 6491, 6657, 1364, 1366, 3857, 4308, 4972, 6770, 497, 605, 666, 804, 805, 857, 1367, 1574, 1262, 725, 806, 1091, 1576, 3978, 2199, 4516, 4811, 6891, 1958, 220, 3868, 7132, 6408, 177, 226, 338, 6072, 885, 1405, 1743, 253, 5017, 5728, 229, 4860, 5308, 1618, 1524, 1626, 1135, 1136, 1419, 1632, 1872, 7052, 3459, 750, 828, 3775, 288, 906, 4244, 4588, 2431, 5335, 5190, 3139, 318, 1650, 1765, 919, 2781, 4601, 1905, 2128, 1907, 6959, 2788, 2134, 2977, 3160, 3496, 1674, 584, 1912, 455, 485, 2150, 2019, 5088, 713, 2609, 456]. **Residue** [6234, 1551, 1552, 1696, 1932, 2029, 1251, 4633, 1699, 413, 3960, 4141, 4142, 4642, 5115, 797, 4643, 1940, 2634, 3212, 3383, 3384, 4955, 1711, 4298, 4651, 3542, 2642, 6257, 3556, 6385, 2181, 1088, 1089, 1489, 1264, 3226, 1811, 1949, 3046, 3047, 1714, 4161, 3859, 2051, 3982, 3727, 4669, 4810, 2196, 2200, 4164, 5138, 4671, 5265, 2338, 2512, 2672, 2673, 2674, 2675, 2513, 3237, 3238, 3570, 3571, 3572, 3987, 4674, 4522, 2207, 1827, 1963, 4176, 5707, 1109, 1110, 4344, 2353, 3068, 2887, 3070, 3250, 3251, 3580, 3737, 3880, 3741, 3882, 1278, 4020, 4350, 4023, 4190, 2371, 2704, 2897, 2372]. **residue** [3888, 3592, 2373, 2375, 2709, 679, 1035, 2379, 2380, 3443, 3444, 3445, 3446, 2384, 4559, 5163, 515, 516, 565, 1411, 2723, 3275, 3897, 1039, 1221, 1303, 1415, 1416, 1523, 1869, 2230, 1985, 2234, 1040, 3626, 257, 4227, 2732, 2733, 3111, 3112, 3113, 3114, 2739, 2417, 2928, 3122, 1877, 1989, 1990, 1991, 1992, 2245, 2246, 2418, 2419, 2929, 6439, 2931, 2422, 3782, 3914, 4072, 4237, 5186, 1755, 2751, 2943, 4242, 4243, 4405, 4406, 4407, 4884, 4075, 4245, 688, 1232, 1763, 3920, 4419, 4740, 2451, 3319, 3320, 2969, 2970, 4090, 4256, 4257, 3326, 3327, 3328, 3329, 3494, 1770, 5203, 6219, 4428]. **residue** [4429, 4749, 2976, 3497, 3671, 527, 4269, 2456, 2591, 4270, 1537, 1910, 2010, 2458, 1450, 4436, 5087, 1918, 2149, 2470, 2810, 2994, 3946, 4116, 4117, 4118, 1067, 1068, 1688, 1782, 1783, 2020, 2997, 2998, 4624, 3826, 3004, 2608, 3005, 324, 1463, 1550, 3522, 3699, 1465, 2156, 2027, 5227, 2826, 3834, 1176, 3955, 2031, 2303, 5231, 3360, 3361, 3362, 4475, 2625, 2838, 3209, 3210, 3375, 3376, 4143, 4481, 4482, 4640, 4641, 2845, 2846, 4949, 3026, 2854, 2855, 3324, 3325, 510]. **Residue-Level** [7052]. **residue-number-arithmetic** [1068]. **Residue-number-system-based** [2431]. **residue-to-binary** [4810, 2732]. **Residues** [6153, 5529, 6555, 6100, 185]. **Resilience** [6518]. **Resilient** [6807, 6990]. **Resist** [4557]. **Resistance** [4597]. **Resistant** [6329, 1523]. **Resistor** [645]. **Resistors** [184]. **resizable** [4872]. **Resolution** [5898, 139, 3790, 2770, 4361, 5788, 108]. **Resort** [7510, 7544, 7566]. **Resorts** [7599]. **Resource** [6780, 6317, 6020, 7115, 3358, 5798, 4476, 3042, 4173, 5652, 3245]. **Resource-constrained** [5798, 5652]. **Resource-Efficient** [6020, 7115]. **Resources** [3940]. **Respect** [6518, 1676]. **Response** [3396, 5297, 1250, 3013, 1039, 2491]. **Rest** [2381, 2776]. **Restklassenzahlensystemen** [3160]. **Restoring** [6644, 6158, 6451, 6936, 6457, 3491, 853, 1312, 3634, 3786]. **Restricted** [3488, 4677]. **Result** [4958, 5246, 1582, 7357, 7355, 3146, 3483, 3924]. **Resultant** [3939, 3389]. **Results** [4496, 1483, 4316, 6893, 3074, 6686, 5045, 4079, 121, 2013, 6228,

710, 1553, 4939, 1941, 1805, 3860, 2194, 3570, 5904, 2359, 4844, 4033, 4550, 4710, 5305, 5306, 6934, 3131, 5193, 4260, 1908, 2270, 2974, 5436, 5636, 5637, 5643, 2807, 2829, 1938]. **Retaining** [6312]. **Rethinking** [6437]. **Retrofitting** [1804]. **Retrospective** [4815, 4926]. **Return** [5277, 5316]. **Reusable** [3754, 3641]. **Reveal** [824, 878, 687, 641]. **Revealing** [2153]. **Reverse** [6046, 3977, 3978, 4323, 5203, 6738, 1711, 4669]. **Reverse-Carry** [4323]. **Reversed** [2107, 2249]. **Reversible** [5312, 5173, 5954, 6020, 5224, 5225, 7150, 5226]. **reversion** [2249]. **Review** [1484, 3714, 4151, 4152, 21, 4675, 4330, 510, 389, 340, 341, 44, 262, 1653, 1322, 1672, 996, 531, 372, 2481, 5884, 5885, 98, 5643]. **Reviewer** [6651]. **Reviewers** [6772]. **Reviewing** [6094]. **Reviews** [24, 272, 908]. **Revised** [7597, 7484, 7608, 7555, 7583, 7586, 3905, 7606, 5858, 2802]. **Revision** [3873, 6554, 7071, 6213]. **Revisions** [4761]. **Revisit** [5897]. **Revisited** [3230, 280, 1122, 2378, 4858, 4586, 5069, 4273, 4927, 5095, 6480, 4003, 6086, 7144, 4896]. **Revisiting** [4722, 5183, 5184]. **Revolution** [1534, 1663]. **rewriter** [5920]. **Rewriting** [6848, 5372, 3365]. **REXX** [1729]. **Reykjavík** [7586]. **Rezension** [4859]. **RF2P** [7083]. **Rhine** [7370]. **RHW** [4480]. **Rhyne** [2471]. **Richard** [510, 7550, 5884, 5885]. **Richardson** [385, 385, 6677]. **Richardson-Algorithmus** [385]. **Rietz** [7214]. **Right** [5022, 4218, 3296, 6453, 5543, 655, 3822, 1556, 7020, 5925, 4714, 5031, 2967]. **Right-Shift** [3296]. **right-size** [5925]. **Right-to-Left** [1556]. **Rigorous** [6270, 6676, 4189, 6311, 6714, 6946, 4084, 4442, 5637, 6131, 6132, 6611, 6745, 3710, 5636]. **Rijndael** [4440]. **Rim** [7360, 7504]. **Ring** [3050, 176, 7105, 6983, 1827, 4720, 2031]. **Ring-LWE** [6983]. **Rings** [3800, 7169, 1262, 3580, 2602]. **Ripple** [5691]. **Ripple-Carry** [5691]. **RISC** [6500, 2541, 2546, 2566, 2570, 6992, 6652, 7003, 6771, 6887, 2660, 6667, 4671, 2342, 6786, 6894, 2208, 6800, 6920, 6805, 6806, 2380, 4709, 7137, 5014, 2542, 2225, 2386, 3101, 3277, 3278, 2097, 2922, 3625, 2405, 2406, 6929, 6930, 2930, 7056, 6581, 7066, 6937, 6938, 6939, 3303, 2258, 6589, 2957, 2445, 3923, 7079, 7083, 7084, 3154, 7086, 6124, 7089, 6844, 2280, 6734, 7106, 1547, 2610, 6625, 6856, 6977, 6978, 3370, 2629, 7120, 6984, 6748, 6864, 3359]. **RISC-Based** [4709]. **RISC-V** [6500, 6652, 7003, 6771, 6887, 6667, 6786, 6894, 6800, 6920, 6805, 6806, 7137, 6929, 6930, 7056, 6581, 7066, 6937, 6938, 6939, 6589, 7079, 7084, 7086, 6844, 6734, 6625, 6856, 6978, 7120, 6984, 6748, 6864]. **RISC-V-Based** [7089, 6977, 7106]. **RISC-V3** [6844]. **RISCS** [1547, 2639, 3348]. **Rise** [6300]. **Rising** [6808]. **Risk** [7103]. **RLS** [2636, 2042, 5429]. **RLWE** [6645]. **RLWE-Based** [6645]. **RN** [4974, 4873, 5035, 5178]. **RN-coding** [4873, 5035]. **RN-Codings** [5178, 4974]. **RNC** [7525]. **RNC3** [7413]. **RNC5** [7480]. **RNC'6** [7492]. **RNS** [5834, 6219, 7108, 4956, 5245, 4649, 5810, 3720, 3858, 4793, 5472, 5893, 6045, 6149, 6883, 6152, 4668, 3997, 4521, 4677, 6518, 5707, 4826, 3424, 6909, 3879, 6526, 2360, 4187, 5717, 5832, 4025, 4545, 6537, 3762, 4038, 4207, 4555, 6297, 6545, 3275, 3276, 3897, 7052, 3115, 2418, 6329, 4421, 4089, 6123, 5349, 2800, 4610, 1537, 7097, 5087, 2466, 4118, 5359, 6738, 4283, 1933, 3836, 4775, 7116, 5114, 6034]. **RNS-based** [7052, 5810, 4545, 7097, 4187]. **RNS-to-weighted** [4118]. **Road** [2677]. **Robert** [43]. **Robot** [6479]. **Robust** [5817, 7031, 2940, 6941, 6459, 5350, 6604, 3168,

3688, 3520, 7002, 6787, 3876, 3879, 4832, 4057, 6608, 3687, 3821, 3537, 2941]. **Robuste** [2940, 2941]. **Robustness** [6756, 6263, 2383, 4920, 6155, 5833]. **Rochester** [7245, 4133]. **Rocket** [6742]. **Roessler** [3710]. **Roger** [2481]. **Role** [854, 2882, 7294, 4629]. **roll** [3040]. **roll-up** [3040]. **ROM** [7448, 3241, 5739, 1136, 2245, 2246, 897, 3166, 3507]. **ROM-based** [2246]. **ROM-less** [5739]. **ROM-Rounding** [897]. **Roman** [5545, 961]. **Romanian** [422, 283]. **Romberg** [903, 6677]. **Romberg-Like** [903]. **Rooms** [3461]. **Root** [3965, 1009, 13, 1083, 1483, 3036, 3222, 3547, 3548, 3549, 3550, 3551, 3552, 4963, 952, 1807, 3044, 2651, 153, 275, 4508, 727, 6049, 6777, 6663, 6889, 7016, 5263, 1956, 2339, 2344, 303, 3871, 4678, 3239, 304, 2350, 334, 619, 4014, 4180, 4181, 4836, 5286, 36, 2073, 6415, 384, 433, 1283, 26, 2710, 158, 2899, 5519, 2715, 7139, 3608, 514, 6550, 1856, 4370, 4215, 4715, 4716, 4044, 4045, 3452, 6558, 2091, 4054, 3772, 348, 519, 180, 5033, 3464, 49, 3465, 4392, 5855, 2939, 5856, 7064, 3469, 2430, 1640, 4888, 3476, 6587, 2953, 2765, 5343, 6457, 1152, 5774]. **Root** [5865, 3925, 580, 3491, 1533, 5201, 2007, 582, 4607, 5435, 5437, 3498, 1670, 6731, 1538, 5445, 2143, 586, 5964, 709, 6359, 652, 4620, 3684, 3519, 3693, 3694, 3822, 375, 4458, 1553, 242, 5879, 5794, 5971, 168, 6860, 1354, 5110, 5882, 597, 2626, 5234, 6747, 600, 4147, 2172, 3846, 416, 5809, 3853, 4311, 6387, 5132, 1373, 6778, 3726, 4325, 1497, 1818, 610, 2340, 3235, 3411, 4169, 3998, 958, 1598, 1731, 2361, 2363, 2364, 2527, 2694, 3253, 4691, 4837, 2365, 1972, 1407, 3599, 4197, 4857, 4711, 5729, 4204, 4205, 4036, 3095, 3448, 626, 740, 4042, 5738, 7143, 3766]. **root** [2728, 3284, 2092, 3110, 3291, 3910, 2933, 4064, 4725, 3123, 4068, 3466, 3634, 3785, 3786, 3129, 2945, 2754, 7067, 2432, 3791, 2567, 2760, 2761, 2949, 3137, 2954, 2439, 2766, 3146, 3483, 6211, 6455, 236, 5429, 4083, 4086, 4902, 1329, 2006, 4906, 3499, 1669, 1160, 4611, 3936, 3937, 4100, 6470, 4619, 782, 3174, 3176, 3511, 2473, 2474, 5455, 292, 188, 4282, 1464, 4284, 5223, 4286, 5460, 78, 84, 4468, 6477, 4778, 3023, 5803, 4487, 4952, 4294, 2048, 1835, 6035]. **root-extraction** [4036]. **Root-Finding** [1835]. **Rooting** [1188, 1584, 1116, 1208, 2540, 120, 1888, 360, 703, 3565, 3986, 2514, 4000, 4175, 2894, 3616, 2404, 3906, 3468, 2259, 2571, 4091, 2135, 2036, 3021]. **Roots** [4646, 3539, 5815, 18, 549, 550, 1095, 810, 5686, 5692, 1953, 813, 668, 1826, 3996, 52, 3872, 1599, 1023, 281, 1283, 5520, 3609, 344, 2394, 5746, 2396, 4866, 30, 1427, 638, 686, 2758, 1318, 1652, 4894, 997, 531, 186, 1916, 4107, 4108, 3191, 4632, 214, 2033, 799, 3972, 2183, 6888, 1269, 1497, 5587, 1961, 2683, 4817, 1967, 1398, 4202, 5020, 5302, 4046, 4047, 6308, 3623, 5176, 4231, 4390, 4580, 1430, 1892, 3307, 4080, 5199, 1445, 1908, 5206, 3935, 211, 6361, 3691, 1923, 3356, 3024, 6868, 2583, 24]. **Ropes** [5478]. **Rostock** [7414]. **Rotation** [4153, 2072, 2710, 3761, 3100, 5751, 2213, 5719, 5415]. **Rotation/Vectoring** [4153]. **Rotations** [3740, 6295, 3761, 4289, 6778, 295]. **Rotator** [3391, 2688]. **Rotators** [4605]. **rotten** [2778, 2779]. **Round** [603, 6886, 6262, 6774, 609, 865, 1200, 278, 6169, 7134, 882, 4548, 6184, 6185, 5738, 474, 5755, 5846, 5943, 204, 205, 2752, 315, 6108, 6338, 4409, 6023, 6131, 6132, 6611, 4128, 6366, 1937, 3525, 4134, 4288, 1183, 1186, 2174, 1583, 956, 4002, 423, 4818, 4819, 962, 3748, 5297, 968, 6183, 5414, 5418, 1756, 1883, 2255, 3312, 1060, 2270, 3945, 2024, 2123]. **Round-Off** [6886, 609, 278, 7134, 882, 204, 205, 2752, 315, 6338, 6611, 6366,

3525, 603, 6262, 865, 1200, 6169, 5738, 474, 6131, 6132, 4128, 1937, 4134, 4288, 1183, 1186, 2174, 1583, 956, 4002, 423, 4818, 4819, 3748, 968, 5414, 5418, 1756, 1883, 2255, 3312, 2270, 3945, 2024]. **round-off-errors** [5297]. **Round-to-Nearest** [6184, 6185, 5755, 5846]. **Round-to-Nearest-Ties-to-Even** [6774]. **Round-to-Nearest-Ties-to-Zero** [6774]. **Round-To-Odd** [6023]. **Round-up** [4548]. **Rounded** [2182, 5391, 6660, 6777, 4979, 5392, 6265, 1112, 5992, 6801, 6802, 2531, 6685, 6075, 3755, 6085, 1856, 6432, 5536, 5845, 4392, 6711, 6325, 3783, 6200, 6327, 2937, 451, 3170, 3342, 6134, 1349, 2856, 5978, 6888, 4805, 4806, 7010, 7011, 7012, 7126, 6271, 4817, 4992, 5590, 4340, 4341, 5293, 7043, 7044, 7141, 7142, 2094, 5610, 5611, 635, 3915, 4235, 6827, 6934, 637, 2436, 4739, 4260, 789, 4929, 4822, 5276]. **Rounder** [3792]. **Rounding** [3970, 4305, 6045, 4506, 3227, 807, 5391, 5686, 5692, 5823, 1724, 3061, 3733, 6788, 5703, 5906, 1828, 3243, 4684, 1201, 5991, 3742, 3884, 4012, 6915, 7027, 7133, 3254, 4016, 4183, 3431, 175, 5006, 6068, 4847, 5835, 5009, 4856, 6547, 1983, 4045, 5602, 1986, 3287, 5172, 5751, 3295, 5419, 5609, 7055, 897, 1046, 4573, 3465, 4393, 903, 5539, 2424, 4398, 4729, 4879, 5044, 5045, 904, 1529, 905, 6106, 4415, 5425, 7070, 6720, 4078, 3655, 643, 1899, 3659, 1234, 4903, 4094, 4264, 5437, 5779, 2798, 1671, 53, 3674, 6023, 995, 6027, 6223, 5447, 5448, 2462, 1336, 3511, 927, 212, 4765, 4280, 2606]. **Rounding** [1342, 5792, 1791, 5371, 5793, 79, 3956, 491, 5569, 6476, 5377, 3014, 7175, 7118, 662, 2848, 5576, 1005, 7160, 6677, 6628, 3853, 4789, 2046, 4660, 4511, 4804, 6389, 5260, 3984, 4982, 1586, 3419, 4346, 3582, 1833, 5505, 2361, 2892, 3077, 4695, 4186, 3887, 5292, 5153, 5298, 2377, 1298, 2907, 6695, 2726, 4372, 890, 2732, 3121, 3297, 3463, 1879, 4064, 3913, 4065, 5421, 3300, 5944, 6449, 6934, 977, 1051, 5951, 4247, 6339, 4590, 4734, 6719, 1437, 4413, 5549, 7149, 4422, 1058, 5868, 4092, 4261, 990, 4606, 4751, 4911, 5869, 5554, 5961, 5962, 6226, 5638, 5643, 3169, 2465, 4767, 2296]. **rounding** [5094, 4126, 4931, 5458, 5459, 3195, 2617, 2618, 2619, 1252, 2162, 1352, 3015, 1708, 3537, 4148, 4821, 5910, 2620, 836, 458, 389]. **Rounding-Exact** [1529]. **Rounding-Off** [175, 79, 6045]. **Roundings** [1260, 800, 7159, 3735, 5952, 2453]. **Roundoff** [3555, 6384, 1263, 1368, 1809, 1490, 3403, 3725, 2662, 5396, 816, 3055, 732, 4017, 736, 2712, 82, 3602, 395, 5311, 3769, 4865, 3624, 746, 3298, 907, 6577, 6336, 6582, 3144, 914, 2590, 2457, 6354, 454, 3177, 3178, 2995, 2996, 3830, 593, 848, 491, 3368, 4780, 543, 3709, 2495, 3845, 1080, 1185, 2636, 2317, 2177, 2042, 1810, 4321, 1721, 2057, 1270, 2668, 3410, 3056, 1959, 674, 820, 3262, 3089, 394, 3272, 3273, 2395, 2921, 3290, 4379, 2407, 889, 896, 2557, 3781, 2107, 684, 5058, 2446, 1438, 3149, 2965, 3808, 4262, 2592, 2801, 840, 6225, 2984, 3814, 2605, 4281, 3829, 4459, 1072]. **roundoff** [3835, 2482, 541, 542, 414, 2628, 2630, 2851, 2852, 3378, 3245]. **Roundoff-error** [3144]. **Roundoff-Error-Free** [6577]. **Rounds** [2123]. **Routine** [1009, 1584, 3098, 3270, 345, 348, 375, 537, 1818, 1602, 1398, 1404, 1407, 1624]. **Routinen** [1732]. **Routines** [614, 3060, 1732, 427, 5510, 1984, 1881, 992, 1701, 6627, 1191, 2508, 5007, 1288, 1760, 7098, 2485]. **Routing** [3667, 3540]. **Rower** [4226]. **Royal** [7343, 7278, 7292]. **RPC** [297]. **rpe** [6279]. **RPQ** [1746]. **RPR** [6515]. **RRNS** [6234]. **RS** [3388]. **RS/6000** [3388]. **RSA**

[4793, 3572, 4674, 3276, 4421, 3179, 3006, 4135, 4473, 4643]. **RT** [1982]. **RTL** [4826, 5372]. **RTL-level** [4826]. **Rule** [4803, 1748, 4424, 491, 4664, 2888, 889, 890, 2249, 5767, 3829]. **Rules** [7, 5900, 4587, 3675, 5698, 4036, 2390]. **Ruminations** [4220, 4221, 4222]. **Rump** [4586]. **Run** [5337, 6405]. **Run-Time** [5337, 6405]. **Rundungsfehleranalyse** [836]. **Runge** [7134]. **Runs** [4391]. **runtime** [7487, 6103]. **Russia** [7583]. **Russian** [2867, 2708, 7583, 312, 2255, 1648, 527, 1064, 493, 6868]. **Rust** [6505]. **RV32E** [6652]. **Ryū** [6376, 6480]. **Rye** [7266, 7287]. **ryu** [6481].

S [3964, 510, 44, 742, 262, 4499, 6767, 4085, 6466, 3819, 3820, 4111, 4112, 1934, 2484, 2620]. **S-1** [1934]. **S-Box** [6466, 6767]. **S-Box/Inverse** [6466]. **S/370** [2484]. **S/390** [3964, 4085, 3819, 3820, 4111, 4112]. **Sa** [17]. **Śaṅkara** [4036]. **SA23** [1982, 2546]. **SA23-1057** [1982]. **SA23-2619-00** [2546]. **Saadia** [27]. **Saber** [6930, 7119]. **Sabrewing** [5822]. **Safe** [3042, 2874, 1281, 2487, 6769, 4636, 2013]. **Salute** [7314]. **same** [5738]. **Samos** [7517, 7523]. **sample** [1585, 831]. **sampling** [3232, 3600]. **San** [7440, 7537, 7196, 7254, 7286, 7329, 7385, 7386, 7456, 7471, 7487, 7590, 7333, 7445, 7461, 7488, 7520, 7244, 7337, 7477, 7354, 7404, 7439]. **Sand** [1630]. **Santa** [7356, 7302, 7211, 7595, 7447]. **Santiago** [7481]. **SAS** [7536]. **satellite** [6093]. **Satisfiability** [5633]. **Satisfying** [4234]. **Saturated** [5552]. **Saturating** [4309, 4721, 4274, 4277, 5113, 4139]. **Saturation** [1055, 4276, 4922, 4676]. **Saudi** [2869]. **Savage** [1734, 1735, 1737, 1741, 1751, 1764, 1773, 1690]. **Savart** [7098]. **Save** [4529, 4530, 6164, 336, 5288, 754, 3145, 2788, 3573, 2881, 4344, 2890, 4693, 5925, 1168, 5789, 5876, 4467]. **Saving** [4587]. **SC'06** [7524]. **SC'20** [7604]. **SC2002** [7472]. **SC22** [5169, 5170, 5171]. **Scalable** [6667, 6676, 5920, 4999, 7034, 5018, 5737, 7151, 4902, 6360, 4444, 6850, 6968, 5645, 4461, 4466, 5236, 6986, 4953, 5118, 5385, 6672, 6025, 4773]. **Scalar** [1946, 5387, 4295, 6483, 5128, 2654, 5901, 5518, 4557, 5752, 6111, 4741, 4423, 4599, 4742, 4443, 4618, 4485, 2038, 5250, 5251, 3398, 6409, 2233, 2401, 2402, 2100, 1994, 2420, 6221, 3009, 5235, 6500]. **Scalars** [4618, 4886]. **Scale** [7164, 1823, 5911, 5712, 1413, 7376, 1531, 6352, 6846, 5557, 937, 2816, 7112, 3649, 7150, 7233, 6365]. **scale-dependent** [6365]. **scaleable** [3959]. **Scaled** [4796, 3727, 1214, 1975, 5952]. **Scalers** [6297]. **Scales** [32]. **Scaling** [4668, 3061, 1136, 4749, 657, 2837, 3849, 3853, 548, 2528, 4025, 3435, 2379, 1986, 4909, 2149, 4624, 2608, 3955]. **Scalings** [3970]. **SCAN** [7428, 7549, 7393, 7538, 2641, 3715, 7340, 7323]. **SCAN-1991** [2641]. **SCAN-91** [7340]. **SCAN-95** [7393]. **SCAN-97** [3715]. **SCAN-98** [7428]. **Scanning** [2483]. **SCG'01** [7451]. **Schaltkreisen** [2615]. **Schaltungen** [1165]. **Schaltungsanordnung** [2100]. **scheduling** [2727]. **Scheme** [4957, 7124, 1364, 6886, 611, 2072, 5011, 5159, 7138, 5017, 5602, 3287, 3774, 1422, 897, 4726, 441, 261, 3001, 1070, 6372, 1184, 4298, 2213, 4025, 4029, 5012, 7035, 5305, 5306, 3626, 2412, 2414, 3131, 6227, 4640, 4641, 3379, 4834, 3905, 2802, 4138]. **Schemes** [333, 1595, 5290, 568, 632, 917, 1903, 5956, 5553, 7108, 664, 3543, 3573, 4841, 1408, 1234, 3326, 3327, 4143, 6677]. **Scheutz** [1052]. **Schickard**

[159, 4859, 1653, 1322, 1167, 7234, 7390, 1467, 159, 3460, 4383, 3467, 1167, 7390]. **Schickard-Symposion** [7390]. **Schickards** [3460]. **Schleifen** [3104, 3105]. **Schleifen-Invarianten** [3104, 3105]. **Schmidt** [603, 5009, 4780, 7160]. **schnell** [1771]. **Schnelle** [2235, 1995, 654, 1477]. **schnellen** [2100, 1886]. **Schneller** [2007, 3016]. **Schnelles** [2259, 2036]. **Schönhage** [5296]. **School** [7527, 7307]. **Schools** [591]. **Schranken** [586]. **Schur** [4247, 5348, 5432]. **Science** [7338, 135, 7195, 7272, 7238, 6425, 7341, 5416, 5842, 7605, 4587, 7278, 7292, 7234, 7552, 7205, 7279, 412, 6755, 4699, 576, 317, 2804, 2815, 3002]. **Sciences** [7377, 7448]. **Scientific** [7355, 7393, 7538, 2641, 3715, 7340, 4969, 6500, 6669, 615, 4523, 7428, 5279, 1124, 1285, 1849, 3087, 6426, 2545, 3283, 7586, 2237, 7332, 3775, 1873, 2735, 7459, 7242, 6571, 1142, 7549, 1434, 7262, 7294, 7080, 3315, 2276, 2978, 7233, 7364, 932, 934, 2492, 5471, 1491, 6509, 3236, 6679, 4019, 7250, 1209, 1284, 5837, 1621, 2548, 7275, 3116, 7460, 5851, 4585, 3641, 1536, 2137, 5356, 2472, 3200, 7405]. **Scientist** [4788, 2889, 2706, 2707, 4707, 3018]. **Scientists** [6527, 254, 739, 1974]. **Scilab** [5817, 5639]. **Scope** [6708, 1893]. **scoped** [1496]. **Scotland** [7453, 7252, 7450, 7236, 5633]. **script** [5401, 4214]. **Scripting** [4214]. **Scrutiny** [6562]. **SE** [4630, 2323]. **Search** [1954, 5985, 2880, 6393, 3095, 4728, 3789, 5791, 5094, 7158]. **Searching** [6004, 5096]. **Seattle** [7199, 7572, 7346, 7474]. **Seck** [4859, 1653, 1467]. **Second** [7427, 4829, 2218, 2542, 7332, 5032, 7292, 7422, 3675, 4107, 2996, 1486, 3045, 7395, 7283, 7301, 3756, 7333, 6825, 1437, 4281, 3835, 2630, 722, 7390]. **Second-Generation** [2218, 2542]. **Second-Order** [3675, 2996, 3045, 1437, 4281, 3835, 2630]. **Secondary** [5085]. **secret** [6398, 6636]. **Section** [5249, 5667, 5811, 5687, 6506, 6819, 5537, 6018, 6953, 7237]. **sections** [3835]. **Secure** [6242, 6093, 5855, 4599, 4742, 6220, 4298]. **Securing** [4412]. **Security** [7590]. **See** [5708]. **Seek** [3747]. **SEGGER** [6652]. **Segment** [4387, 4069, 5045, 5621, 2436]. **Segmentation** [6911, 6689, 2924, 4772]. **segmented** [6105]. **Seidel** [3627]. **Seismic** [2772]. **selbsttätigen** [35]. **Select** [5764, 4169]. **Selected** [5472, 7597, 7608, 7317, 7583, 7586, 7578, 1432, 7202, 7230, 2021, 2022, 7606, 770, 991, 1922, 5092]. **Selecting** [2697, 3383, 3384]. **Selection** [7495, 3970, 5823, 6414, 1603, 3254, 1743, 7139, 5751, 5033, 3465, 7064, 4078, 5345, 5964, 3362, 6034, 3853, 6056, 3077, 7040, 4376, 889, 4722, 2956, 4413, 4606, 4751, 2012, 5087, 3824, 1934, 6933]. **Selections** [6402]. **selective** [4242]. **selectively** [5360]. **Selector** [4494, 478]. **Self** [4166, 500, 614, 4026, 3599, 5732, 1626, 2230, 4068, 5763, 3476, 5956, 3682, 937, 7323, 413, 3025, 3986, 3234, 4029, 4855, 3753, 3264, 3791, 1437, 2264, 2584, 2585, 3934, 2139, 2489, 2168, 2840, 2841, 5801, 2847, 4950]. **Self-adapting** [4026]. **Self-Alignment** [5956]. **self-calibrating** [4855]. **Self-Checked** [413]. **Self-Checking** [5732, 1626, 937, 2230, 2264]. **Self-Contained** [614, 500]. **Self-Delimiting** [3025, 2847]. **self-dual** [2489]. **self-generated** [4950]. **self-sorting** [3264]. **self-sustained** [1437]. **self-test** [4029, 3934]. **self-testing** [2584, 2139]. **Self-Timed** [4166, 3476, 4068, 3986, 3234, 3791, 2168, 2841]. **self-timing** [2840]. **Self-Validating** [3682, 7323, 2585, 5801]. **Semantics** [2653, 6051, 3873, 5407, 1525]. **Semi** [2044, 4038, 6102, 6714, 3484, 6634,

5881, 2699, 2700, 981, 4093]. **Semi-Automatic** [6102, 6714, 6634]. **Semi-Custom** [4038]. **Semi-Logarithmic** [3484, 2699, 2700]. **semi-portable** [981, 4093]. **Semi-Systolic** [2044, 5881]. **Semiannual** [7313]. **Semidefinite** [6310, 6336]. **seminal** [235]. **Seminar** [7555, 7229]. **Seminumerical** [522, 1421, 3907, 523]. **send** [1168]. **Sensitive** [5716]. **sensitivities** [2851]. **Sensitivity** [6068, 4310, 736, 896, 1058]. **sensor** [4140]. **Seoul** [7430, 7536]. **Separate** [5766, 144, 3323]. **Sept** [7545]. **September** [7393, 7356, 7381, 7412, 7480, 7465, 7453, 7214, 7482, 7528, 7302, 7249, 7573, 7429, 7303, 7196, 7239, 7318, 7431, 7442, 7457, 7458, 7469, 7501, 7503, 7519, 7564, 7609, 7611, 7332, 7460, 7549, 7261, 7293, 7256, 7378, 7506, 7570, 7438, 7552, 7508, 7606, 7198]. **sequel** [2779]. **Sequence** [57, 1481, 69, 6257, 7067, 2463]. **Sequences** [438, 443, 6128, 5782, 845, 6489, 3826, 3024]. **sequencing** [2987]. **Sequential** [1196, 1600, 3746, 1519, 1749, 443, 2011, 1548, 1780, 1785, 1549, 2189, 4755, 5077, 2471]. **Serbia** [7576]. **Serial** [2044, 608, 549, 3863, 4985, 5268, 1824, 1108, 1595, 1829, 1830, 4990, 6065, 174, 6415, 1609, 1843, 883, 4360, 5521, 4565, 2102, 5180, 4574, 6320, 351, 5046, 912, 6348, 4598, 3485, 843, 793, 3526, 4471, 1077, 2169, 2644, 2193, 2347, 4682, 2685, 3593, 5997, 2902, 3279, 4576, 4260, 4914, 4919, 2292, 3010, 1472, 1473, 1705, 2314]. **serial-data** [2292]. **serial-input** [2347]. **Serial-Parallel** [1824, 1843, 2169]. **Series** [3965, 6256, 2679, 3576, 6280, 6294, 2249, 764, 1057, 6596, 5869, 373, 241, 4506, 116, 1728, 466, 4197, 4857, 5729, 2925, 3640, 7070, 1058, 4619, 3696, 2223, 1037]. **Server** [5605, 3819, 2916]. **servers** [5753, 3964]. **service** [6266, 124]. **services** [5418]. **Servo** [2494]. **ses** [17]. **Sessions** [7221, 7284, 7243, 7244, 7256, 7267, 7235, 7269, 6145, 7297]. **Set** [6872, 6036, 4495, 6378, 6046, 3564, 2676, 4683, 2880, 3425, 6798, 6064, 5921, 5510, 6920, 1403, 1850, 6297, 2385, 5308, 904, 1049, 1676, 411, 5105, 5386, 4296, 6489, 548, 4510, 4669, 2511, 4677, 1111, 1392, 5593, 2522, 6407, 5007, 2380, 1851, 4036, 3309, 4912, 7093, 5087, 1796, 4948]. **set-ups** [548]. **Sets** [1260, 6537, 6545, 891, 1147, 989, 2974, 5205, 4913, 4115, 5211, 7167, 5571, 3383, 3384, 1269, 6509, 5265, 3067, 872, 4849, 4853, 636, 5330, 5540, 3310, 5428, 2453, 5877, 4488]. **Setters** [5364]. **Setun** [5690]. **SEU** [2807]. **Seven** [5060]. **Seven-Term** [5060]. **seventeenth** [7451, 931]. **Seventeenth-Century** [931]. **Seventh** [7509, 7489, 7377, 1860]. **Several** [3106, 1408, 831, 1237]. **severe** [1969]. **Sexagesimal** [6126, 101]. **SFM** [7527]. **SFQ** [5750]. **SFU** [6203]. **SFU-Driven** [6203]. **Shadow** [6792]. **Shallow** [6708, 2786]. **Shanghai** [7464, 7522]. **Shannon** [3180]. **SHARE** [400]. **Shared** [2073, 3613, 3476, 7086, 2365, 4192, 3910, 4068, 4772, 2624]. **Sharing** [111, 6416]. **Sharp** [6191, 6572, 4148]. **Sharpness** [7014]. **sheet** [3040]. **shelf** [4538]. **Sheraton** [7240, 7331]. **shi** [7427]. **Shift** [1106, 818, 431, 738, 1213, 3296, 1056, 655, 6523, 509, 4030, 3132]. **Shift-And-Add** [6523]. **Shifted** [5151, 5200, 4030]. **shifter** [2437]. **Shifters** [2131, 4605]. **Shifting** [1304]. **Shiftrix** [355]. **Shifts** [988, 1156, 3924]. **Ship** [3947]. **Shop** [4157, 4158, 4159, 4160]. **Short** [4646, 3, 5730, 344, 2394, 2927, 5758, 7146, 207, 1670, 3349, 6139, 4551, 3474, 4252, 5775]. **short-latency** [5775]. **Shortcut** [999]. **Shortest** [3954]. **Shorthand** [1336]. **shot** [2629]. **Should** [4336, 6790, 2889, 3083, 2706, 2707, 4707, 890, 3477, 989, 3018].

Shrivenham [7278, 7292]. **shutter** [5777]. **shuttle** [710]. **SIAM** [7327, 1296, 7364, 7274, 3767]. **sic** [4593, 3941]. **sich** [1137]. **Sichere** [2013]. **Side** [6518, 4412, 4597, 4599, 4742, 4674]. **Side-Channel** [6518, 4412, 4597, 4674]. **sided}** [5436]. **Siècles** [1160]. **Sierra** [4463]. **Sieve** [5915, 3925, 5879, 6056]. **SIGACCESS** [7509]. **SIGAda** [7368]. **SIGDA** [7493, 7510]. **SIGForth** [7333]. **sigma** [3571, 3987]. **Sign** [5245, 1487, 497, 857, 3982, 3427, 1979, 2093, 1419, 1632, 2130, 6962, 5448, 938, 1692, 1699, 4649, 2863, 3227, 4202, 3275, 1755, 684, 6219, 5087, 2484]. **sign-magnitude** [684, 2484]. **Sign/Logarithm** [1979, 938, 1692, 2863]. **Signal** [6993, 7356, 3221, 7412, 7496, 3403, 7282, 2669, 4521, 3579, 2212, 2218, 2895, 3258, 564, 7316, 7265, 7331, 7360, 7471, 7485, 7502, 7504, 3107, 3619, 7290, 7400, 7520, 5335, 2575, 2268, 7337, 1066, 3184, 2293, 1172, 7352, 1360, 2857, 2181, 1089, 3725, 3232, 4687, 3882, 7358, 2896, 5834, 2375, 6539, 3262, 3442, 2728, 3284, 1303, 1040, 3458, 2926, 1877, 1990, 1992, 2418, 4232, 2938, 7276, 7434, 7445, 7461, 7474, 7488, 7505, 2564, 2948, 2261, 4602, 2135, 2274, 2591, 839, 3165, 5785, 2810, 4116, 2019, 3192, 3009, 1178, 2838, 1705, 2494, 2688]. **Signal-to-noise** [1066]. **signaling** [4640, 4641]. **Signalling** [5389]. **Signals** [3394, 7283, 7301, 7312, 7407, 1135, 7422, 7435, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 7350, 7391, 3890]. **Signed** [6881, 378, 219, 1366, 665, 1820, 4328, 672, 5720, 5529, 4218, 6094, 4074, 639, 2580, 3331, 2011, 4101, 534, 939, 490, 594, 6857, 3960, 90, 2510, 4672, 4168, 5726, 4068, 3155, 5203, 3674, 2471, 5564, 5382]. **Signed-Digit** [219, 1366, 1820, 4328, 4218, 6094, 4074, 2580, 3331, 490, 594, 3960, 2510, 4672, 4168, 3155, 5203]. **Signed-LSB** [5529]. **Signed-Number** [672]. **Significance** [860, 1014, 1514, 284, 1748, 762, 833, 1054, 794, 1513, 1969, 178, 982, 1053, 788, 2618, 2619, 942]. **Significand** [5569]. **significands** [4030]. **Significant** [3038, 5388, 462, 5900, 55, 555, 54, 347, 7061, 162, 5955, 5630, 237, 848, 3708, 3891, 319, 2971, 1555]. **significant-digit** [319]. **Signs** [3719, 3879]. **SIGNUM** [7212, 539]. **SIGPLAN** [7309, 7495]. **SIKE** [6681, 6800, 6567]. **Silicon** [5316, 7020, 2277]. **SIMD** [4299, 6147, 4792, 5684, 4986, 5706, 4991, 4346, 6804, 3591, 7035, 5734, 5840, 6730, 7092, 5561, 4292, 7120, 6237, 6370]. **Similar** [1700, 943]. **Simple** [858, 4803, 1268, 1377, 1603, 2528, 5508, 2894, 1518, 4547, 4557, 6550, 4560, 5174, 2554, 442, 573, 2766, 6217, 121, 1771, 650, 1453, 1795, 4664, 2683, 118, 5410, 1972, 6106, 2956, 453, 3196]. **Simpler** [4700, 4840]. **Simplification** [2844]. **Simplified** [5017, 5047, 1354, 3918]. **simplify** [4500]. **Simplifying** [3492]. **simulated** [5297, 7054, 760]. **Simulating** [7029, 6548]. **Simulation** [7465, 6501, 5829, 3583, 335, 2891, 5725, 636, 2942, 3657, 7233, 3165, 6360, 5790, 1944, 1945, 3570, 3065, 747, 1225, 1528, 1753, 4394, 5949, 981, 5352, 1450, 1935, 3010, 796, 354]. **Simulation-Based** [5725]. **Simulations** [5936, 6198, 6352, 5557, 6485, 5904, 5493, 5702, 6279, 6814, 4585]. **Simulator** [881, 3280, 1447, 880]. **Simulink** [5784, 3336]. **Simulink-based** [5784]. **Simultaneous** [4295, 6408, 1208, 253, 3609, 6446, 4618, 5251, 5738, 4261, 4456]. **Sin** [2235, 1766, 2124, 537]. **Sin/Cos** [1766, 537]. **Sine** [1954, 1019, 1854, 4040, 2986, 1069, 2816, 2612, 953, 3284, 4732, 2967, 4255, 2124]. **Sine-Cosine** [1069]. **sine/cosine** [953, 3284, 4255]. **sines** [1399]. **Singapore**

[7601, 7608, 7610, 7504, 7599, 7504]. **Single** [6992, 3220, 4304, 3719, 3053, 7130, 1271, 3420, 4829, 6170, 7135, 7136, 2082, 7048, 3901, 2098, 3459, 5036, 5848, 6441, 6197, 6324, 5329, 2938, 5769, 1150, 1656, 5072, 1674, 709, 3954, 6752, 6753, 4968, 1957, 5697, 2876, 2877, 2878, 4346, 2888, 626, 1868, 2928, 2245, 2246, 3785, 3637, 5948, 1761, 4885, 3791, 5625, 2263, 2277, 3685, 3181, 2608, 1929, 3533, 2855]. **Single-** [3901]. **Single-Board** [2082]. **single-channel** [2246]. **single-chip** [2876, 2877, 2878, 1929]. **Single-Multiplier** [4304]. **Single-Precision** [3719, 5329, 5072, 2938, 4885, 3685, 3181]. **single-rail** [3791]. **single-term** [5697]. **Singular** [3740, 4349, 3100, 1887, 4179, 4422]. **singularity** [5162]. **Sink** [6530]. **Sinking** [6641]. **Sinks** [6004]. **SIPE** [5760, 5945, 5944]. **SIPS'02** [7471]. **SiSoftware** [6488]. **Sites** [3851]. **Situ** [6716]. **Six** [5580, 3416, 5060]. **sixteen** [5]. **sixteenth** [4036, 1322]. **sixteenth-century** [4036]. **Sixth** [7184, 7376, 7475, 1675, 7364, 7352, 7199, 7350]. **Size** [6881, 1582, 1821, 4673, 6085, 4066, 6726, 6840, 6841, 5444, 2596, 3825, 3057, 4692, 5925, 5866, 4091]. **Sizes** [5713]. **Skalarprodukten** [2100]. **Skalierung** [548]. **Skewed** [7030]. **skewness** [4978]. **Skills** [3240]. **Skinny** [6119]. **Skip** [4813, 2077, 233, 1049, 4922, 2337, 2666, 2731, 2480]. **Skip-and-Set** [1049]. **skipping** [2562, 2766]. **SLAC** [3600, 1409]. **Slash** [1139, 911, 1148, 1889, 2465]. **Slave** [1951]. **SLEEF** [6735]. **SLI** [3553, 2940, 2941, 3130, 2479, 2831, 3197, 3526]. **SLI-Arithmetik** [2940, 2941]. **Slice** [1402, 1955, 1256]. **Sliced** [5688, 4438]. **Slide** [6438, 3313]. **slide-windowed** [3313]. **slight** [548]. **Slimmer** [7022]. **Slopes** [5586, 4037]. **Slow** [597]. **slowly** [3640]. **Small** [5807, 6771, 4509, 5678, 6260, 6895, 4329, 1022, 4829, 3427, 4181, 4022, 4224, 5760, 5945, 6728, 4742, 4608, 1335, 5211, 6235, 6369, 2839, 5827, 6643, 1492, 6268, 3865, 6912, 3881, 4542, 4041, 4863, 521, 2559, 574, 3481, 4739, 6116, 6117, 1561]. **Small-Characteristic** [5678]. **Small-data** [6260]. **small-order** [4739]. **Smallest** [6017]. **Smart** [7444, 3947, 7567, 4709]. **Smartphone** [5886]. **Smartphone-Based** [5886]. **Smooth** [3628]. **smoother** [5429]. **SMT** [5633, 6965]. **SMURF** [6500]. **snap** [1331, 3848, 3433, 3589, 3803, 2797]. **Snitch** [6865]. **SNOBOL4** [1028]. **Snowbird** [7281]. **Soar** [3747]. **Soars** [3353]. **SOC** [7570]. **SOCC** [7570]. **Social** [4788]. **Society** [7539, 7285, 7196, 7207, 7254, 7514, 7172, 1675, 7507, 7339]. **sociology** [2755, 2757]. **SoCs** [6977]. **Soft** [3917, 4072]. **Soft-decision** [4072]. **Softcore** [6999, 6096, 6857]. **SoftPosit** [6447]. **Software** [7212, 1482, 5127, 2647, 6258, 3558, 2869, 7406, 7588, 3569, 7527, 869, 616, 1197, 1274, 1504, 3995, 7357, 5140, 5272, 5495, 7206, 7247, 5589, 5142, 2882, 4529, 4530, 1021, 881, 7033, 1851, 3754, 4369, 7207, 2725, 4216, 1984, 5531, 2092, 1308, 5027, 1418, 3776, 6933, 6325, 6446, 1431, 4239, 1886, 4587, 4888, 3919, 4076, 4077, 7229, 6589, 914, 7189, 4420, 3330, 7558, 3159, 7193, 7102, 3947, 2612, 5100, 536, 3837, 7268, 4939, 1702, 1359, 7279, 5143, 3964, 6755, 1712, 5467, 2648, 4313, 1819, 3413, 1501, 7467, 1730, 6909, 5995, 7248, 7573, 880, 1409, 4559, 5527, 2727, 5606, 521, 4872]. **software** [756, 6574, 1758, 6010, 6718, 7463, 5198, 7209, 4450, 1689, 5877, 2825, 2479, 3371, 2315]. **Software-Hardware** [6589]. **Software-Oriented** [3995]. **software/hardware** [4872]. **SOI** [6667, 6581]. **Solar** [6101]. **Solid**

[7429, 7416, 7222, 7286, 1327, 2311, 7308, 7379, 7404, 7439, 1328, 6608]. **Solid-State** [7429, 7416, 7222, 7286, 7308, 7379, 7404, 7439]. **Solidity** [6976]. **Sollya** [5588]. **Solomon** [6410]. **SolType** [6976]. **Solution** [603, 2050, 1599, 430, 5512, 884, 179, 2083, 904, 6577, 4084, 3683, 4115, 1078, 45, 1816, 3748, 4703, 562, 1868, 2742, 2248, 5339, 5549, 3809, 5961, 5962, 4767, 108, 947, 5237, 4488, 4783]. **Solutions** [3996, 4329, 3656, 4136, 5467, 3069, 365, 3196]. **Solve** [1223]. **Solved** [6474, 3130]. **Solver** [3569, 6067, 1842, 3668, 5457, 1693, 2682, 6278, 5061, 6965]. **Solvers** [6642, 3628, 4280, 6296, 6419, 6420, 5221]. **solves** [118, 1923]. **Solving** [4958, 5246, 6147, 1716, 1393, 3581, 4847, 2710, 253, 6549, 565, 1984, 5039, 4410, 1679, 3836, 4644, 4784, 4785, 4844, 6695, 515, 516, 5348, 5783, 2302, 7405, 1253]. **Somastuvan** [4036]. **Some** [4305, 3225, 856, 549, 550, 4977, 6775, 4665, 5585, 6662, 812, 671, 333, 1595, 2359, 505, 4181, 2366, 2696, 385, 965, 2535, 1610, 625, 3099, 1984, 5748, 3619, 5178, 3632, 5326, 832, 979, 3131, 4887, 5951, 1764, 3311, 5863, 7149, 3488, 1903, 703, 1161, 3685, 2021, 2022, 2612, 849, 536, 4473, 4339, 301, 3423, 5525, 1621, 749, 4873, 5035, 5182, 689, 2766, 2006, 5643, 1922, 194, 4154, 819]. **Somme** [702]. **Son** [2779, 108]. **sondern** [159]. **Sonesta** [7343]. **Sons** [3714]. **Sony** [2629]. **SORN** [6494, 6659, 6884, 7015, 7045, 6709]. **SORN-Arithmetic** [6709]. **Sorrento** [7229]. **Sorting** [3454, 4021, 2901, 3264, 4949]. **SoRuCom** [7583]. **Sound** [5987, 3610, 6009, 37, 6608]. **Source** [6172, 7063, 6938, 6939, 7089, 2587, 3954, 6504, 6189, 6364]. **source-to-source** [6364]. **Sourced** [6487]. **Sources** [809, 7247, 2307, 3707]. **Southcon** [7235]. **Southcon/82** [7235]. **Southeast** [7533]. **Southeastcon** [7253, 7345]. **Southern** [7201, 7579]. **Southwest** [7256]. **Southwest-84** [7256]. **Southwest/84** [7256]. **Soviet** [7583]. **SP** [7590]. **Space** [3396, 3403, 6891, 6159, 1821, 5488, 6675, 7131, 5289, 5922, 5524, 891, 7061, 6214, 5954, 2996, 3840, 3725, 4536, 6422, 3290, 4871, 3781, 5198, 2457, 710, 4281, 2630]. **Space-Efficient** [5954]. **Space-Time** [1821, 6422]. **Space/time** [3840]. **spacecraft** [2708]. **Spaces** [1310, 1349, 4887]. **Spain** [7481, 7526]. **Spanish** [1844]. **SPARC** [2663, 2676, 3436, 2746, 2747, 2748, 2154, 3367, 2505, 2519, 2520]. **SPARC64** [3532, 5619]. **SPARC64(R)** [4417]. **Sparse** [5395, 6577, 6582, 6951, 6958, 6354, 7102, 5571, 6926, 6105, 6349, 6459, 5351, 3337]. **Sparseness** [6039, 6917]. **Sparsity** [7052, 7097]. **spatial** [2177]. **SPEC** [2676]. **SPECFUN** [3060]. **Special** [5248, 5249, 5667, 5811, 1266, 4667, 5687, 6506, 276, 3060, 1107, 5589, 3426, 4835, 4027, 6301, 7374, 2229, 1416, 6819, 7333, 4061, 4230, 5537, 3120, 6102, 5762, 6007, 361, 5065, 6018, 6953, 6468, 6966, 6228, 5082, 1559, 6145, 7487, 5042, 2265, 4757, 1415]. **Special-Purpose** [7374, 3120, 5762, 6007]. **Specialized** [5557]. **Specific** [6659, 7371, 7384, 7571, 7483, 7528, 5519, 5520, 7501, 7542, 7556, 7477, 6974, 7449, 7410, 6744, 7523, 7367, 2639, 7517, 7565, 5775, 6368, 6239, 7020]. **Specification** [3409, 1105, 4331, 4989, 6900, 2885, 3278, 1873, 3303, 6213, 5864, 2579, 2304, 2305, 2306, 2485, 2486, 1944, 1945, 4162, 4800, 2884, 7071, 3936, 2493, 5238, 5575]. **Specifications** [3038, 5388, 1199, 2724, 6373, 4594, 942]. **specified** [2371]. **spectra** [3826]. **Spectral** [6403, 6831, 5353, 7042, 5305, 5306]. **Spectrum** [1907, 2716, 3149, 4642]. **Speculation** [3062, 3239]. **Speculative**

[6105, 6010, 5230]. **Speech** [7265, 7331, 7485, 7502, 3882, 5163]. **Speed** [852, 1187, 1367, 6773, 5483, 730, 670, 1826, 4521, 277, 1597, 125, 2073, 823, 1608, 6073, 1403, 200, 340, 341, 5926, 5731, 5528, 5742, 3453, 4223, 683, 5174, 5030, 1043, 1634, 568, 6930, 6095, 6569, 2104, 754, 755, 142, 233, 1144, 570, 4239, 1640, 1888, 4246, 355, 1999, 1902, 988, 1156, 4607, 5075, 77, 703, 5872, 1541, 486, 4104, 3817, 4108, 3942, 4114, 1685, 714, 1343, 1926, 2155, 1930, 939, 5374, 4470, 7116, 945, 1257, 7119, 5236, 4293, 1360, 3538, 1480, 2172, 664, 1802, 1803, 2180, 1088, 1491, 2188, 4669, 3986, 1586, 2512, 1592, 5707, 3585]. **speed** [2365, 387, 2367, 3753, 6420, 6539, 3443, 3444, 4555, 2906, 1303, 1985, 3293, 6707, 1992, 5850, 2750, 4880, 3788, 1429, 2751, 2945, 234, 4588, 50, 5859, 2763, 7172, 3924, 2962, 1154, 3663, 3804, 4744, 3665, 3156, 2584, 2589, 2980, 4911, 2009, 95, 2456, 3673, 6221, 2138, 653, 1067, 85, 3697, 4931, 1928, 1178, 4945, 2854, 2855]. **Speed-Up** [5731, 7116]. **Speedcoding** [109]. **Speeding** [1569, 5518, 4362, 4197, 4857, 5315, 2119, 4603, 4443]. **speeds** [1575, 1988, 1891]. **Speedup** [3385, 4537, 4643, 6987]. **speedups** [2808]. **speedy** [3353]. **spell** [3437]. **spending** [6453]. **Spezifikationen** [2304, 2305, 2306, 2485, 2486]. **Sphere** [6709]. **Spheres** [5512, 4703]. **SPIE** [7400, 7434, 7445, 7474, 7488, 7505]. **SpiNNaker** [6454]. **SpiNNaker-2** [6454]. **Spirit** [7080]. **spl** [4876]. **Spline** [3412, 759]. **Split** [6688, 6434, 5969, 7264, 3529, 3021]. **Split-Path** [5969]. **Splitting** [6534, 6120]. **Spoken** [99]. **Sponsored** [7164, 7187]. **Sponsors** [6653, 6763, 6876, 6618]. **Spped** [1070, 1179]. **Sprachbeschreibung** [2734]. **Sprache** [2615]. **spread** [4642]. **spread-spectrum** [4642]. **Spreadsheet** [1764]. **Spring** [7183, 7185, 7190, 5485, 7254, 7320, 7170]. **Springs** [7528, 7224]. **SPRU100A** [4631]. **SPUR** [1944, 1945, 1978, 2090]. **SPW** [4493]. **Spying** [6679]. **SQL** [6586, 7162]. **Square** [3965, 4646, 3539, 1009, 13, 1188, 1083, 1483, 3036, 3222, 3547, 3548, 3549, 3550, 3551, 3552, 4963, 952, 5815, 1807, 3044, 18, 2651, 153, 275, 4508, 727, 549, 550, 6049, 6777, 5686, 6663, 6889, 7016, 5263, 5692, 1953, 813, 1956, 1584, 668, 303, 1826, 3996, 3871, 4678, 3239, 304, 52, 2683, 3872, 2350, 334, 1599, 619, 1023, 1116, 4014, 4180, 4181, 4836, 5286, 36, 281, 2073, 6415, 384, 433, 1208, 1283, 5718, 26, 2710, 1972, 2899, 5519, 2715, 5520, 7139, 2540, 3608, 514, 6550, 1856, 4215, 4715, 4716, 4044, 4045, 3451, 3452, 3616, 24, 3284, 344]. **Square** [2394, 973, 5746, 5747, 6558, 1305, 2091, 2396, 4054, 4866, 30, 3772, 348, 519, 3906, 5033, 3464, 3465, 4392, 4725, 120, 5855, 2939, 3468, 5856, 7064, 3469, 2430, 1640, 1888, 638, 686, 2758, 4888, 3476, 6587, 360, 2953, 2259, 1652, 3307, 2765, 4894, 6457, 1152, 5429, 5774, 5865, 3925, 580, 3491, 1533, 5201, 2007, 4607, 5437, 3498, 1670, 703, 6731, 1538, 5445, 2143, 586, 997, 5964, 531, 709, 186, 652, 4620, 1916, 4107, 4108, 3684, 3519, 3693, 3694, 3822, 375, 4458, 1553, 242, 5879, 3191, 4632, 214, 2828, 3356, 168, 6860, 1354, 5110, 5882, 2033, 597]. **Square** [2626, 5234, 2036, 6747, 799, 600, 6035, 4147, 2172, 3846, 5809, 3972, 4311, 5132, 1373, 6778, 6888, 3726, 4325, 1269, 1497, 3565, 3986, 1818, 610, 3235, 3411, 5587, 4169, 2514, 1961, 3998, 4000, 4175, 4817, 958, 1598, 1731, 1967, 2361, 2363, 2364, 2527, 2694, 3253, 4691, 4837, 2365, 2894, 1398, 1407, 3599, 4197, 4857, 4711, 5729, 4202, 4204, 4205, 5020, 5302, 3095, 3448, 626,

740, 4042, 3766, 2728, 4046, 4047, 6308, 2092, 2404, 3623, 3110, 3291, 5176, 3910, 2933, 4064, 3123, 4068, 3466, 3634, 3785, 3786, 3129, 2945, 2754, 7067, 2432, 3791, 2567, 2760, 2761, 2949, 3137]. **square** [2954, 1892, 2439, 2571, 2766, 3146, 3483, 6211, 6455, 4080, 236, 4083, 4086, 4902, 5199, 1060, 4091, 1329, 1445, 1908, 2006, 4906, 3499, 2135, 1669, 5206, 4611, 3935, 3936, 3937, 4100, 211, 4619, 782, 3174, 3176, 3511, 3691, 1923, 2473, 2474, 5455, 292, 188, 4282, 1464, 4284, 5223, 4286, 78, 84, 4468, 6477, 4778, 3021, 3023, 3024, 5803, 4487, 4952, 4294, 6868, 2048, 1427]. **Square-Root** [4963, 153, 3239, 2073, 1283, 4392, 1640, 1152, 2007, 6731, 3693, 3694, 168, 600, 1972, 3284, 4725, 5429, 3853, 1407, 3599, 4204, 4205, 3448, 4042, 2728, 3910, 4068, 2954, 4906, 4611, 4284, 78, 84, 4952, 2048]. **Square-Root-X** [1483, 1553]. **Square-Rooting** [1584, 1208, 1888, 703, 3906, 3468, 2259, 2036, 4175, 2894, 4091, 2135, 3021]. **square-roots** [3972, 1892]. **Squared** [334]. **Squarer** [334, 4381, 6597, 4479, 4233, 4637, 4639]. **Squarers** [4985, 132, 4474, 4942, 5109, 4137, 3279]. **Squares** [603, 1830, 2710, 4866, 4874, 686, 643, 1677, 4759, 2177, 1948, 100, 292, 2024]. **Squaring** [611, 5269, 1519, 5017, 5521, 1749, 4571, 5543, 6348, 4430, 3213, 3380, 2344, 2894, 4397, 211, 6130]. **Squaw** [7544, 7566]. **Squeezing** [6549]. **SQUID** [2713]. **SRT** [3483, 3406, 4325, 3574, 3991, 3757, 3448, 3455, 4376, 3771, 4722, 5033, 7064, 3131, 4737, 5055, 3137, 3146, 3927, 4097, 5964, 1934, 2840]. **SRTEST** [4376]. **SSEC** [1531]. **St** [7280, 7272, 7450]. **ST100** [4895, 5064]. **ST231** [5531, 5747]. **Stabilität** [1062]. **Stabilitätsatzes** [548]. **Stability** [6150, 1716, 6665, 3569, 1112, 1208, 4365, 3611, 4556, 7085, 2979, 1062, 5967, 1078, 496, 548, 3582, 4206, 1756, 1638, 834, 2597, 947]. **Stabilized** [103]. **Stabilizing** [4905]. **Stable** [5037, 1229, 2616, 889, 890]. **Stack** [1034, 1286]. **Stacked** [6233]. **Stacking** [6233]. **stage** [5989]. **Stages** [4187, 3498, 3499, 1934, 2840]. **Staggered** [5476, 3510]. **stairs'** [2959]. **Stairway** [3709]. **Standard** [2041, 2861, 3038, 5388, 3969, 3975, 1950, 1812, 1715, 2655, 2334, 4667, 5691, 3409, 1197, 1386, 1503, 1726, 1825, 2345, 3059, 1198, 1199, 1275, 1388, 1727, 3999, 3420, 6163, 6795, 2355, 1733, 5407, 5503, 1512, 1204, 1280, 2703, 4028, 3764, 1301, 1410, 6551, 6815, 6553, 1861, 1862, 1863, 2088, 2089, 6089, 6554, 7046, 24, 1628, 1224, 1308, 1417, 2095, 3621, 3768, 4564, 5604, 3488, 5431, 6960, 1059, 6218, 1157, 1235, 4442, 7095, 3341, 1777, 6735, 1339, 1459, 1460, 1341, 1466, 2028, 1470, 1181, 5577, 3846, 1570, 2045, 1191, 3408, 4519, 1590, 2680, 1105, 1962, 3741, 506, 2226, 1219, 1864, 1996, 6719]. **standard** [3480, 2581, 2582, 2277, 1678, 4761, 2017, 1461, 4931, 3371, 4961, 6383, 4189, 4702, 3651, 2579, 2975, 3162, 3812, 5364]. **Standard-** [1628]. **Standard-Cell** [5691, 5577, 2680]. **Standardfunktionen** [1812, 2053, 2103, 2573, 587, 3341, 1353, 1795, 1812]. **Standardization** [5700, 4825, 5320, 3488, 4634, 2814]. **Standardized** [4375]. **Standards** [5125, 2677, 5167, 3944, 6741, 2304, 1502, 2206, 1758, 3477]. **Standpoint** [390]. **Stanford** [7417, 7277]. **STAP** [5770]. **Start** [5052]. **Starting** [281, 384, 2765, 580, 3684, 533, 597, 5177, 452, 3174]. **starts** [1663]. **State** [7581, 3396, 3403, 7429, 7416, 7222, 7223, 7286, 7274, 3781, 6587, 2996, 1179, 7308, 7379, 7404, 7439, 3537, 5677, 3725, 7208, 3290, 4871, 2457, 1242, 1334, 2605, 4281, 2311, 2630]. **State-of-the-Art** [6587]. **State-**

Space [3403, 2996, 3781, 3725, 3290, 4871, 4281, 2630]. **Statement** [3385]. **States** [7224, 7611]. **Static** [4813, 731, 4522, 6911, 3590, 4358, 5156, 5721, 4881, 4910, 3686, 4175, 5753, 3791, 5340, 7536]. **statistic** [4143]. **Statistical** [4788, 550, 3061, 225, 54, 3896, 1227, 753, 905, 3919, 4076, 3346, 4623, 593, 7237, 2670, 138, 1226, 3300, 987, 3808, 4262]. **statistici** [138]. **Statistics** [720, 418, 7238, 563, 4587, 1810, 5401, 3089, 291, 2617, 2618, 2619]. **Status** [5503, 3768, 2603, 3621, 6104, 772, 5092, 5216, 5452, 5453, 5454, 5455, 5456]. **Std** [2041, 6520, 6554]. **Steady** [6945]. **Steamboat** [7528]. **Steering** [6252, 6764, 6877, 6620]. **Stein** [1018]. **Stencil** [6610]. **Stengle** [6582, 6354]. **Step** [6262, 6777, 1076, 92, 3111, 3112, 3113, 3114, 1698]. **step-by-step** [92]. **Steps** [4353, 5863, 283, 2766]. **Stepwise** [5372]. **Sterbenz** [996]. **Stewart** [5604]. **Sticky** [4159, 3735, 4261]. **sticky-bit** [4261]. **still** [2190]. **stingy** [2577]. **Stinks** [2711]. **STOC** [7537, 7554]. **Stochastic** [2174, 4791, 6788, 6915, 7027, 7133, 5835, 5722, 6535, 6695, 4886, 4887, 6720, 6596, 2270, 6028, 6230, 6967, 6853, 4939, 4786, 6389, 4519, 6077, 6418, 2900, 5854, 6449, 5429, 2599, 3200, 6863, 3413]. **Stochastically** [6801, 6802]. **stochastique** [3413]. **Stock** [3633, 1671]. **Stocks** [4268]. **STOIC** [1686]. **Stokes** [3569, 3656, 4136]. **stopping** [416]. **Storage** [866, 5513, 7604, 287, 144, 5925, 3347]. **Storage-Efficient** [866]. **Stored** [2501, 3078, 5602]. **Stored-Carry** [3078]. **Stories** [5015]. **story** [5325]. **Strader** [2471]. **Straight** [6236, 6380]. **Straight-Line** [6236]. **Strasbourg** [7384]. **Strassen** [5713, 5296]. **Strategies** [6320, 3475, 4163]. **Strategy** [6425]. **Strawman** [4680]. **Stream** [6727, 6850, 6257]. **Stream-Based** [6850, 6727]. **Streamed** [6362]. **streaming** [5785]. **streamlined** [2269]. **streamlines** [1796]. **Streams** [6367, 5662]. **Strength** [4764, 3534]. **Stretch** [246, 272]. **Strict** [2025, 2910]. **strikes** [6472]. **string** [6376, 4161, 627, 1890]. **Strings** [1769, 833]. **Strong** [3747, 3677]. **Strongly** [2937]. **Structural** [481]. **Structurally** [2200]. **Structure** [248, 672, 733, 1842, 883, 6007, 6128, 2813, 4471, 5571, 4207, 2929, 1141, 406, 4756, 1918, 3845, 1385]. **Structured** [2055, 1965, 7215, 4767]. **Structures** [852, 607, 859, 2656, 4521, 5509, 1413, 6323, 5054, 1439, 1660, 1451, 6607, 2996, 1251, 5265, 4007, 4555, 896, 3488, 2984, 791, 2304]. **struggle** [7512]. **strukturelle** [2615]. **Strukturen** [2304]. **Studies** [7251, 179, 841, 794, 6140, 822]. **Study** [4300, 550, 5478, 6781, 6782, 6269, 3569, 505, 5832, 1125, 176, 6687, 6561, 1042, 753, 144, 3491, 4272, 1453, 7104, 2809, 934, 7113, 2827, 3366, 3227, 300, 3232, 2670, 562, 3442, 7042, 2717, 1225, 5613, 760, 6011, 5620, 1908, 710, 324, 6368, 194, 3377, 2004]. **Stupid** [6049]. **Sub** [3433, 3589, 3586, 2386, 627]. **sub-language** [627]. **Sub-Nanosecond** [3433, 3589]. **Subcommittee** [7187]. **subdivision** [6387]. **Sublinear** [5281, 5405, 5852]. **Subnormal** [6757, 5041, 6040]. **Subprograms** [4510, 634]. **Subquadratic** [5289, 5290, 5524, 4930]. **Subroutine** [154, 2205, 1120, 1981, 1848, 539]. **Subroutines** [720, 5862, 2283, 1559, 501, 484, 147, 1599]. **Subsets** [3488]. **subspace** [3555, 6919, 3829]. **Substitution** [2199, 2390]. **subsystem** [2341, 2569]. **Subtracting** [3996]. **Subtraction** [804, 4514, 4515, 7008, 4165, 5595, 1514, 5937, 4726, 5049, 1439, 2142, 455, 6970, 4501, 3865, 4672, 1513, 1969, 3826]. **Subtraction-free** [5049].

subtractions [3463]. **Subtractive** [3650, 3519, 2473, 2474, 3466]. **Subtractor** [5743, 6430, 5225, 6859, 4885, 5771]. **subtractors** [7156]. **Subtyping** [4356]. **Subword** [4850, 4874]. **Subword-Parallel** [4850, 4874]. **Succeeding** [3488]. **Success** [3648]. **Successful** [5125, 5167]. **Successive** [1835, 315]. **successor** [5554]. **Such** [6601]. **Suck** [6536]. **Suddenly** [6743]. **Sufficient** [4062, 4513]. **Suggestion** [953, 4860, 310, 714, 325]. **suggestions** [5585, 1996]. **Suisse** [108]. **Suitability** [6929]. **Suitable** [6188, 5317, 7104, 5670, 3264, 2418, 689]. **Suite** [6163, 6822, 2109, 2250, 7076, 3456]. **Suits** [6725]. **sukzessive** [1835]. **Sulla** [137, 138]. **Sum** [3712, 6796, 6797, 1394, 3430, 744, 4874, 2123, 4899, 4900, 5071, 702, 3160, 4759, 213, 6737, 3525, 6372, 945, 5587, 6105, 4748, 292, 2123]. **Sum-of-Squares** [4874]. **summability** [3364]. **Summand** [1144]. **Summary** [53, 2261]. **Summation** [6037, 6142, 6646, 3968, 6885, 6508, 609, 865, 4685, 4828, 5912, 6061, 2358, 3428, 4700, 4840, 4842, 966, 678, 4224, 749, 6200, 6327, 1529, 571, 6335, 640, 3646, 2255, 1319, 6112, 836, 5195, 1662, 5079, 5447, 5448, 5449, 5555, 1076, 6633, 659, 5117, 5576, 5662, 2197, 2198, 116, 4532, 6165, 5285, 1117, 6919, 3593, 5837, 6077, 7039, 3096, 1625, 3906, 6321, 5851, 3468, 3640, 758, 759, 5859, 3654, 6116, 6117, 579, 3151, 5551, 2270, 1064, 5635, 5870, 1352]. **Summations** [3795, 6792, 6572, 5347, 6368]. **Summen** [1095, 2100, 836]. **Summer** [7368, 7362, 7307, 7263]. **Summierungsverfahren** [579]. **Summing** [373, 466]. **Sums** [5979, 6146, 1095, 5391, 6265, 1601, 5536, 5845, 832, 1652, 451, 4161, 100, 4379, 2100, 5610, 1994, 2420, 574, 836, 5206, 2014, 2599, 5650, 5240]. **Sumsets** [5211]. **Sun** [2026]. **sunity** [5182]. **super** [2197, 2198]. **superaccumulators** [6116, 6117]. **Superblock** [5397]. **Supercalculators** [2291]. **supercomputer** [3220, 2650, 2690, 4999, 5013, 1973, 5202]. **Supercomputers** [2322, 2809, 1491, 6121]. **Supercomputing** [7280, 7299, 7524, 7288, 7330, 2756, 7291, 7447, 7300, 6186, 2410, 6472, 2920]. **Supercomputing-Japan** [2920]. **Superefficient** [1594]. **superelliptic** [4540]. **superhighway** [7385]. **Supermicro** [1849]. **Superscalar** [3102, 3103, 2748, 3923, 4103, 3001, 4453, 3992, 3436, 2746, 2747, 3339]. **Superset** [3977, 4810]. **Supersingular** [5678]. **supplement** [6129]. **supplementary** [991]. **Support** [7298, 6998, 6481, 6379, 3851, 6771, 2654, 6667, 2345, 3059, 3875, 4335, 5280, 2215, 4709, 3596, 5734, 5840, 7045, 398, 2237, 1044, 5047, 1643, 5953, 7081, 7089, 994, 4106, 6971, 7110, 5561, 5100, 6639, 3964, 1571, 6259, 3874, 4004, 5990, 5169, 5171, 5527, 4717, 473, 3155, 1063, 5556, 2290, 5215, 5379]. **supported** [6652, 6658]. **Supporters** [6619]. **Supporting** [7004, 5896, 4189, 4111, 6858, 6821]. **Supports** [1654]. **Suppression** [3015, 1277]. **Supremum** [5489]. **Surd** [13]. **sure** [2285, 3707]. **Surface** [3412, 5209]. **surprising** [6504]. **surreal** [6602, 6602]. **surveillance** [545]. **Survey** [1010, 2654, 6668, 965, 4359, 628, 3632, 756, 1051, 2571, 530, 1180, 243, 7157, 719, 2312, 2343, 4058, 4908, 5657]. **Surveyor** [2889, 3018]. **Survival** [4234, 2308]. **Sussex** [7303]. **sustainable** [4937]. **sustained** [1853, 1437]. **SVD** [2056, 2201, 2749, 2829]. **SVE** [6786, 6893]. **Svoboda** [3921]. **sW** [6581]. **Sweden** [7419]. **Swiss** [108]. **switch** [2947]. **Switching** [733, 38, 42]. **Switzerland** [108, 7443, 7399, 1456, 7410]. **SWT** [1689]. **Sydney** [7289]. **Sylvester** [4310].

Symbol [6494, 403]. **Symbolic** [4297, 7541, 2199, 3734, 4345, 4019, 4193, 7414, 7399, 2771, 7217, 7490, 38, 42, 6131, 6132, 6611, 7450, 7353, 7580, 3575, 620, 6691, 2390, 2121, 2961, 6349, 1542, 4489, 7217]. **Symbolic-Algebraic** [4193]. **symbolically** [4844]. **Symbolics** [1927]. **Symbolics-Lisp** [1927]. **Symbols** [2951, 299]. **Symmetric** [6642, 1832, 5934, 1419, 750, 828, 4385, 2942, 5053, 5189, 5643, 3816, 3818, 4105, 4280, 4120, 5208]. **symmetrical** [4626]. **symmetrically** [2840]. **symmetries** [4527]. **symmetrizer** [2303]. **Symplectic** [4119, 4765]. **Symposia** [7425]. **Symposion** [1653, 7234, 7390]. **Symposium** [7199, 7218, 7368, 7380, 7426, 7451, 7493, 7494, 7510, 7537, 7554, 7392, 7393, 7338, 7220, 2641, 3715, 3852, 7497, 7340, 7382, 722, 1189, 1365, 7465, 4658, 7481, 7539, 7511, 7541, 7561, 3985, 7455, 7596, 7603, 7428, 7572, 1115, 2362, 7302, 7373, 7238, 7414, 7529, 7165, 7259, 1860, 7197, 7201, 7211, 7223, 7228, 7241, 7304, 7305, 7328, 7341, 7361, 7375, 7387, 7420, 7432, 7443, 7457, 7470, 7487, 7503, 7514, 7515, 7516, 7518, 7545, 7547, 7567, 7587, 7590, 7607, 7609, 7611, 7273, 3461, 7389, 4060, 7433, 7334, 7548, 7399, 3780, 7408, 7362, 7549, 7436, 7216, 7172, 7262, 7521, 7595, 2769, 7591, 7217, 7226, 7463, 7200]. **Symposium** [7402, 7409, 7423, 7476, 7535, 7551, 921, 1675, 7295, 7424, 7584, 7234, 7390, 7490, 7507, 7203, 3189, 7365, 7366, 7602, 7600, 7205, 7450, 7478, 7353, 7580, 7354, 7536, 7279, 7553, 7530, 7317, 7460, 7209, 7198, 7164, 7242]. **Symposiumsbericht** [7216]. **Synapses** [6716]. **sync** [5777]. **Synchronization** [4545]. **Synchronous** [239, 322, 3825, 1935, 2836, 4642]. **Synergistic** [5062, 5072]. **Syntactically** [5444]. **Syntax** [1525]. **Synthesis** [7440, 1565, 7008, 4676, 6167, 5146, 879, 3449, 4598, 7073, 2152, 6744, 5973, 5113, 5577, 4155, 4307, 3983, 3237, 3238, 3886, 4015, 3081, 4595, 6364, 6368, 5798, 6989]. **Synthesis-time** [7008]. **Synthesisable** [5263]. **synthesizable** [4885]. **Synthesized** [5578]. **Synthesizing** [5928, 2203]. **System** [4957, 5664, 2038, 6036, 6993, 417, 7184, 2318, 1487, 4655, 4965, 4966, 5470, 5671, 5672, 6491, 6657, 245, 109, 3392, 4971, 6770, 1574, 1576, 6153, 4514, 4515, 1719, 246, 32, 6891, 6511, 220, 5705, 2877, 5825, 5710, 6524, 3579, 3738, 4008, 4348, 6408, 2069, 1202, 3078, 5509, 3258, 177, 6072, 624, 1743, 253, 970, 5017, 469, 5728, 5308, 1133, 396, 1746, 2546, 3277, 7503, 3107, 1135, 398, 2237, 1419, 1632, 3459, 750, 828, 203, 5937, 634, 6101, 3784, 1048, 1231, 4726, 4070, 5047, 6578, 6829, 7066, 1434, 6583, 5335, 5190, 4589, 1149, 3139, 6942, 290, 359, 1650, 4598]. **System** [7377, 5066, 2771, 3486, 3660, 2781, 4425, 1325, 1907, 6959, 368, 587, 1164, 5872, 455, 485, 2146, 5556, 7506, 2150, 2603, 7448, 6973, 4626, 4451, 4452, 4627, 5091, 5092, 5093, 5218, 272, 938, 1248, 5366, 3953, 2299, 1251, 6626, 6374, 3365, 6746, 3706, 134, 2844, 5115, 4643, 1707, 2634, 1711, 4298, 4651, 3542, 297, 3035, 2642, 4656, 5890, 2043, 2321, 6257, 6385, 2181, 1089, 1262, 1489, 2047, 2325, 3228, 1949, 3046, 3047, 1714, 4161, 3859, 2504, 2869, 6261, 3727, 4669, 4810, 2196, 4164, 4516, 4811, 3408, 2057, 4671, 5265, 2338, 2512, 2671, 1723, 2513, 3237, 3238, 3570]. **system** [3571, 3572, 3987, 2682, 423, 4176, 2878, 5707, 1109, 1110, 4344, 2353, 2887, 3070, 3250, 3251, 3580, 3737, 3880, 4697, 4020, 4350, 4023, 4190, 2371, 2897, 2372, 3888, 2373, 2375, 1847, 2379, 2380, 6296, 3600, 562, 3443, 3444, 2384, 5163, 2909, 5733, 1411, 3897, 5527, 2392, 101,

2912, 6189, 4373, 1523, 1524, 1985, 2234, 1040, 473, 4227, 5418, 2733, 231, 4872, 1528, 3122, 1992, 2245, 2418, 2929, 4876, 2421, 2745, 2422, 1230, 3782, 3914, 4403, 4072, 4237, 5186, 978, 6104, 2943, 4242, 4243, 4244, 4405, 4406, 4588, 4884, 4075, 4245, 5857, 2431, 981, 3143, 1763, 5624, 6723, 5067, 2961]. **system** [236, 4419, 4740, 5, 3319, 3320, 2970, 4090, 4256, 4257, 183, 206, 4428, 4749, 527, 2456, 2591, 4270, 1537, 1910, 2010, 4436, 1241, 2144, 4616, 4919, 4113, 5087, 1918, 2149, 5791, 2810, 2994, 3946, 4117, 1000, 1688, 1782, 1783, 2019, 2020, 5088, 2997, 2998, 4624, 3351, 5215, 5456, 324, 3831, 4932, 3522, 3699, 1931, 2300, 2027, 5227, 2826, 3834, 1176, 716, 795, 2032, 3362, 5376, 4475, 5797, 2838, 3209, 3210, 3375, 3376, 4141, 4142, 4143, 4481, 4482, 4640, 4641, 4642, 2845, 2846, 2632, 4949, 801, 3026, 6868, 481, 1946, 1101, 418, 419, 2876, 384, 392, 393]. **System** [2541, 472, 682, 972, 2105, 2566, 2570, 1442, 3324, 3325, 4601, 187, 6365, 538, 3370, 4641]. **system-based** [4588, 4884]. **system-definition** [2371]. **System-Level** [3107, 5710]. **System/360** [417, 396, 481, 418, 419, 384, 392, 393, 682, 1442, 538, 472]. **System/370** [2038, 1746, 1946, 1101, 972, 2105]. **System/390** [2877, 2878, 2876]. **System/6000** [2546, 3277, 2541, 2566, 2570, 3370]. **Systematic** [5992, 82, 5412, 5186, 1439, 2970, 3324, 3325, 4911, 1451, 2997, 2998, 3383, 3384, 5839, 2562, 2592]. **Systematizations** [5482]. **Systeme** [1936]. **Systemen** [1237]. **Systems** [7298, 7440, 1081, 6870, 7123, 1485, 7441, 3716, 3717, 4502, 6882, 3857, 4308, 497, 666, 804, 857, 725, 806, 1091, 1577, 1372, 4316, 6501, 728, 3231, 302, 7571, 1820, 7283, 7301, 7312, 5699, 7527, 3995, 2519, 2520, 7572, 1393, 5911, 7132, 7483, 3581, 7528, 3073, 6282, 7407, 875, 1204, 430, 1605, 4024, 877, 4847, 512, 6286, 4545, 885, 179, 6549, 2083, 6184, 5307, 1522, 972, 7187, 7240, 7304, 7305, 7361, 7374, 7431, 7443, 7457, 7471, 7501, 7515, 7516, 7517, 7519, 7531, 7532, 7542, 7546, 7556, 7565, 7567, 7577, 5740, 6699, 1865, 4562, 683, 744, 3628, 5175, 7255, 6929, 1138, 1424, 1876]. **Systems** [5612, 753, 5849, 5941, 3911, 5039, 5183, 288, 1143, 5764, 7363, 6577, 5335, 7422, 7435, 7446, 7462, 7475, 7489, 7557, 7569, 7598, 1148, 1889, 5055, 4248, 4890, 4249, 2958, 3484, 6836, 2775, 919, 3489, 2968, 3322, 1440, 2580, 3331, 3160, 3496, 5207, 1674, 6844, 407, 6846, 7233, 7295, 3506, 7477, 3683, 1917, 2148, 3686, 4115, 7350, 7391, 4280, 1169, 2609, 7203, 7449, 2610, 7410, 4933, 2029, 3836, 7523, 5372, 1558, 243, 3206, 7354, 3017, 1078, 797, 3212, 5385, 1005, 3383, 3384, 4955, 6991, 2042, 2319, 3855, 4789, 45, 1488, 3556, 2183, 1264, 2646, 1811, 2332, 5584, 3982]. **systems** [1816, 6394, 2200, 956, 5264, 2672, 2673, 2674, 2675, 4674, 4522, 4523, 1827, 5146, 3741, 1837, 1278, 7248, 387, 2699, 2700, 4190, 2702, 2704, 3592, 226, 337, 2532, 5297, 2374, 2709, 4708, 1035, 1210, 3445, 4559, 2723, 2391, 1867, 1039, 1415, 1416, 2917, 3108, 3458, 3624, 257, 1420, 3111, 3112, 3113, 3114, 7054, 2417, 2928, 1877, 1989, 1990, 1991, 2246, 2419, 2744, 2931, 5184, 1755, 4882, 4244, 4407, 575, 5768, 4737, 1317, 2764, 5338, 1891, 5339, 3920, 5429, 4418, 697, 2451, 2969, 5346, 5348, 5432, 3155, 406, 3328, 3329, 3494, 4905, 1770, 5203, 6219, 4429, 3809, 2976]. **systems** [2977, 3497, 3671, 4269, 3934, 2138, 2458, 1450, 1242, 1334, 5783, 5961, 5962, 4617, 5785, 1542, 2470, 4116, 4118, 7507, 4767, 5362, 5363, 3004, 2608, 3005, 1463, 1550, 5652, 2826, 3834, 2302, 4134, 4288, 4633, 2162, 2031, 3360, 3361, 148,

3013, 6033, 1560, 947, 1183, 4142, 4783, 1943, 1253, 2053, 1759, 1237, 1936, 801]. **Systolic** [2044, 5474, 1815, 2197, 2198, 3055, 5266, 2517, 4990, 2695, 7030, 2710, 3892, 2083, 2393, 4566, 2409, 3296, 4066, 4395, 3139, 7151, 2130, 2134, 2800, 1915, 3184, 1698, 2161, 3203, 5881, 2169, 1940, 2181, 2207, 4682, 2685, 2881, 3068, 2694, 2902, 1858, 4228, 2419, 2743, 4724, 4233, 4397, 4576, 5042, 4404, 2000, 2970, 2267, 2468, 3518, 2031, 3204, 4290, 4945, 4781, 2314, 2688]. **Szabo** [510]. **Szeged** [7428].

T [6694, 930, 6241, 2223, 6457, 6855]. **T-count** [6457, 6855]. **T-depth** [6855]. **T-Series** [2223]. **T.** [930, 2471]. **T4** [6557]. **T800** [3083, 2084]. **T9000** [2737]. **Tabellenzugriff** [2036]. **Table** [6253, 6654, 6765, 6878, 5821, 1582, 52, 4830, 4022, 2538, 1743, 4203, 3440, 6085, 24, 4385, 5036, 4408, 5054, 4079, 2126, 2128, 2129, 4433, 3810, 3678, 3816, 1545, 999, 4120, 3832, 6621, 2476, 2613, 2614, 2818, 2819, 3008, 1706, 2036, 3379, 4339, 4994, 5827, 6523, 2667, 5501, 3437, 4041, 101, 4863, 2956, 4739, 3326, 3327, 4091, 3156, 3952, 6147, 4728]. **Table-assisted** [1706]. **Table-Based** [5821, 4203, 4079, 5827, 6523, 4830, 4739]. **Table-Driven** [3810, 2476, 2613, 3008, 2538, 2614]. **Table-Lookup** [2818, 2819, 3156]. **Tables** [1720, 3241, 54, 7064, 5066, 3927, 5964, 6358, 3166, 3507, 3815, 3818, 4105, 4927, 5095, 4528, 3865, 6532, 2559, 410, 4950]. **tabular** [5835]. **tackles** [1970]. **Tackling** [6302]. **tactics** [3221]. **Tagged** [6794]. **Tahoe** [7544, 7566]. **Tails** [5936]. **Taipei** [7305, 7503, 7567]. **Taiwan** [7305, 7567, 7503]. **take** [3389]. **Taken** [10]. **Takes** [3416, 2323]. **Taking** [18, 6049, 3972, 188, 5564]. **Tale** [3481, 3348, 3482]. **Talk** [6080, 6101, 6126, 5604]. **talks** [6145, 7499]. **Tall** [6119]. **Tall-Skinny** [6119]. **Tampa** [7524]. **Tanaka** [510]. **Tang** [6190, 6115]. **Tangent** [6671, 6322, 5052, 1158]. **Tapered** [7008, 642, 2321, 5152]. **Tapia** [7550, 7550]. **Tar** [7196]. **Target** [3779]. **Targeted** [6917]. **Targeting** [6627]. **targets** [3353]. **Task** [1459, 1461, 1339]. **Taub** [340, 341]. **Taylor** [2679, 1728, 3576, 977, 5076, 5869, 4620, 5208, 6131, 6132, 6611]. **TC** [4366, 4061]. **TC2** [7231, 7406]. **TC2/WG** [7406]. **TCCA** [7197]. **TDC** [5788]. **Teaching** [2647, 2033, 2626, 1712, 2648, 4699]. **Tech.** [1484]. **Technical** [4499, 3851, 2663, 7187, 7222, 7223, 7286, 3615, 7379, 7305, 7386, 4250, 2261, 918, 7308, 7404, 7439, 344, 207]. **Technik** [124]. **Technique** [1261, 224, 617, 6967, 190, 4651, 4319, 90, 3070, 2727, 3291, 2732, 2100, 3460, 2436, 453, 4743, 5087, 2149, 5791, 3530]. **Techniques** [329, 3991, 3583, 3754, 1985, 569, 233, 351, 2563, 2433, 5066, 1901, 1661, 2800, 370, 709, 3678, 2812, 5792, 167, 2029, 1089, 2191, 3727, 5264, 3574, 6419, 5014, 626, 437, 2086, 1221, 2234, 5606, 2422, 4394, 3300, 5050, 2252, 4240, 2764, 3920, 3150, 2969, 3674, 487, 3360, 3361, 5143]. **techniques/floating** [2234]. **Technologies** [6517, 1613, 7254, 7539, 7385, 7443, 7567]. **Technology** [3849, 7369, 7311, 7356, 7412, 4799, 1982, 2546, 3277, 7563, 7305, 7444, 7486, 7575, 7388, 7534, 3926, 1903, 1660, 7378, 3159, 2311, 3244, 2384, 3899, 7546, 1747, 3282, 3900, 4217, 4371, 5168, 5527, 5740, 6699, 2757, 2263, 2266, 2277, 124, 456, 3192, 3193, 6997, 510]. **Teeth** [1213]. **Teil** [2082, 2304, 2305, 2306, 2485, 2486]. **telco** [4525]. **Telecommunications** [7342]. **teleoperator** [822].

Telephone [75]. **Telephony** [3747]. **Tempe** [7223]. **temporal** [6664]. **Ten** [843, 2658, 6921, 4125]. **ten-thousandfold** [6921]. **Tend** [661]. **Tensor** [6497, 6727, 6803, 6420, 5209]. **TensorFlow** [6951]. **Tenth** [7478]. **Terabytes** [7472]. **Teraflop** [5759]. **Term** [6694, 6563, 6101, 7072, 7148, 5060, 6232, 5372, 3365, 5697, 6427, 6697, 2590]. **Termination** [1374, 4622, 5086]. **Terms** [241, 4663, 5703, 1625]. **Ternary** [5465, 5664, 1012, 6152, 5690, 5825, 5010, 738, 6441, 4626, 3244, 465]. **Terry** [44]. **Tesla** [6997, 7112]. **Test** [3038, 5388, 4647, 5806, 5579, 4961, 549, 4803, 5700, 2679, 3058, 3060, 394, 7375, 7513, 3455, 2105, 5539, 2109, 2250, 2563, 983, 4094, 4264, 5441, 2279, 1455, 2813, 5236, 6387, 4313, 4664, 5401, 4029, 3598, 3753, 2720, 4376, 4394, 5339, 4912, 3934, 2807, 3513, 3520, 2617, 2618, 2619, 4143, 5120, 4644, 4784, 5910]. **Testability** [5236]. **Testable** [1604, 1778, 2543, 3797, 5440, 3335, 2139]. **Testbase** [2720]. **Testing** [5806, 7014, 1504, 881, 5533, 2787, 2475, 2611, 7268, 4135, 3707, 501, 5283, 880, 3456, 5320, 4582, 2253, 2433, 2584, 2139, 5638, 2814, 5216, 4468, 4469]. **Tests** [395, 1984, 6586, 1764, 5201, 3300, 3000, 3205, 3368]. **Tetrahedron** [4377]. **Texas** [7238, 7201, 7260, 7418, 7587, 7398, 7333, 7256, 1016, 7501, 7333, 3193]. **Textbook** [3851]. **TH** [6289, 2340, 5933, 5343, 582, 3811, 5794, 2339, 180]. **Their** [1259, 135, 4507, 3749, 5937, 909, 913, 6461, 1676, 3690, 2818, 2819, 4634, 3389, 6401, 29, 1967, 625, 3262, 5527, 2394, 1883, 707, 4278, 2468, 373, 791, 2024, 3006, 5226, 3196]. **them** [6183]. **Theorem** [4649, 7381, 7466, 7453, 3991, 475, 4424, 6963, 4620, 548, 2332, 3574, 5160, 5650]. **Theorems** [4730]. **Theoretic** [1306, 692, 1153, 4094, 4264, 1262, 1989, 1991, 5227]. **Theoretical** [6407, 179, 748, 4389, 3932, 1554, 1225, 17]. **Theorie** [7216, 6266, 7198]. **Theories** [7290, 2275, 5633, 7352]. **théorique** [17]. **Theory** [7199, 7537, 7554, 5581, 7184, 4966, 7271, 3738, 4008, 1027, 338, 1126, 41, 1212, 4035, 7555, 7415, 7303, 5420, 7215, 526, 7216, 318, 5622, 2452, 1672, 1673, 2994, 2475, 7167, 7168, 7173, 7198, 3028, 3714, 6266, 7214, 956, 2511, 2204, 2206, 1840, 7327, 5411, 7530, 4372, 2928, 3122, 1426, 5330, 5540, 3645, 291, 987, 7401, 1908, 3005, 1173, 7174]. **there** [6504, 3481]. **therefor** [5333]. **Thereof** [6312]. **Things** [4160, 7108]. **Third** [7298, 7340, 7383, 4364, 7375, 7435, 7569, 3679, 243, 7573, 7333, 7466, 7608, 921, 7479]. **Thirteenth** [7510]. **Thirty** [7407, 7422, 7435, 7446, 7462, 7475, 7489]. **Thirty-Fifth** [7462]. **Thirty-First** [7407]. **Thirty-Fourth** [7446]. **Thirty-Second** [7422]. **Thirty-Seventh** [7489]. **Thirty-Third** [7435]. **Thomas** [7242, 5010]. **Thomson** [24]. **thousandfold** [6921]. **thread** [6769]. **thread-safe** [6769]. **Threading** [5843]. **threads** [3488]. **threats** [4674]. **Three** [7, 5254, 811, 7015, 4016, 4183, 876, 6297, 6186, 919, 1908, 4611, 185, 4103, 2155, 1930, 2820, 5977, 6427, 6697, 2, 3700]. **Three-dimensional** [2820, 3700]. **Three-Input** [7015]. **Three-Moduli** [6297]. **Three-Rail** [2155]. **three-term** [6427, 6697]. **Three-Way** [4103]. **Threshold** [250, 1043, 6729, 5704, 3702]. **thresholding** [3505]. **Throughput** [5580, 6390, 6316, 6320, 5038, 7058, 5632, 6606, 1182, 3565, 3353]. **throughputs** [6532]. **Thumb** [4424]. **Thyrite** [113]. **TI** [934, 3192, 4463, 4464]. **TI-89** [4463, 4464]. **TI-89/TI-92** [4463, 4464]. **TI-92** [4463, 4464]. **Tick** [3016]. **tidal** [3389]. **Ties** [6774]. **Tight** [6311, 6206, 6946, 5776, 4746, 5792, 3726, 3707]. **til** [1740, 646]. **Tiling**

[2055]. **Time** [3027, 6143, 6484, 330, 3226, 464, 7128, 1821, 1589, 6275, 4345, 111, 431, 969, 2537, 564, 7519, 4224, 4062, 1229, 5758, 128, 6577, 4587, 5337, 2002, 6728, 1668, 2136, 239, 165, 2148, 3827, 6624, 3011, 3194, 2161, 377, 459, 2170, 2631, 5386, 6991, 2636, 1486, 2042, 606, 7008, 2664, 4670, 2338, 2512, 5824, 2516, 6405, 2886, 3739, 4192, 2373, 5837, 6542, 6693, 6422, 3273, 5851, 3146, 3483, 2958, 1900, 3945, 6736, 6364, 2836, 3840, 6033, 1178, 4949]. **Time-Division** [128, 165]. **time-domain** [3945]. **Time-Optimum** [2161]. **Time-Redundant** [2170]. **Time-Sharing** [111]. **time-varying** [2636, 2042]. **Timed** [4166, 3476, 6839, 3986, 3234, 3599, 4068, 3791, 2168, 2841]. **timer** [5777]. **Times** [790, 1491]. **Timing** [6757, 3933, 7113, 6040, 6315, 2840]. **Tiny** [6865, 5917, 6771]. **Tiny-FPU** [6771]. **TinyML** [6933]. **Titan** [2809]. **Title** [6879, 6880, 6254, 6255, 6655, 6656, 6766, 6622]. **TM** [4104]. **TMR** [4192]. **TMS** [3294]. **TMS320** [7276, 2274, 2823, 2824]. **TMS32010** [2151]. **TMS32020** [2064]. **TMS320C30** [3132, 2268]. **TMS320C3x** [3833, 4935]. **TMS320C60000** [4167]. **TMS320C67x** [4631]. **TMS34082** [2822, 2825]. **TMS390C602A** [2519, 2520]. **Today** [1245, 1491, 3666, 3193]. **Todd** [340, 341]. **Toeplitz** [5524]. **together** [586]. **Tokyo** [7265, 7225, 7486]. **Tolerance** [3402, 3607, 4037, 5419, 7363, 2207, 3745, 2252, 3520, 3378]. **Tolerant** [6158, 6675, 5728, 3107, 6331, 2134, 6465, 6978, 6991, 2181, 3046, 3047, 4192, 3592, 4559, 2969, 3328, 3329, 3518, 2826, 3834, 3205, 3368]. **Tolerating** [6516]. **Tomography** [1343]. **Tompkins** [340, 341]. **tonal** [5]. **Tool** [1107, 4826, 5278, 5389, 1813, 4831, 5756, 7060, 1638, 2825, 4468, 4469]. **Toolbox** [6486, 3417, 3418, 3577, 6083, 2913, 4587, 5639]. **toolkit** [2912]. **Tools** [6994, 6775, 6668, 7250, 7457, 6624, 6744, 4019, 2725, 3351, 2824, 4587]. **toolset** [4337]. **Toom** [5255, 5660]. **Toom'n'Half** [5679]. **ToonTalk** [4867]. **Top** [6488]. **Topics** [53, 7171]. **topological** [5294]. **Topologies** [5350, 6374]. **Topology** [5975]. **TOPS** [7079]. **TOPS/W** [7079]. **Toronto** [7237, 7412, 7313, 7239, 7331, 7421]. **Total** [5219]. **totally** [2264]. **Tour** [3230]. **Tower** [4834]. **Towers** [7331, 7444]. **Town** [7266, 7287, 7329]. **TPHOLs** [7453]. **TPUs** [6636]. **TR** [3900, 5527, 5170]. **TR2** [3899]. **tracer** [6395, 5777]. **Traces** [3546]. **tracing** [6794]. **Tracking** [3258, 6641, 4017, 4019, 6683, 7032, 4881]. **Trade** [6512, 1610, 4048, 634, 6229, 3245, 6990, 2516, 4177, 1309, 4744, 3840]. **Trade-Off** [634, 6512, 4048, 3245, 1309]. **Trade-Offs** [6229, 6990, 2516, 4177, 4744, 3840]. **Tradeoff** [6341, 3814, 4169]. **Tradeoffs** [5594, 3120, 4419, 3693, 3694, 4635, 4778, 3386, 1717, 5406, 2437, 4740]. **Trading** [7019]. **Traditional** [5113, 4419]. **Trailing** [1195, 964, 1129, 3419]. **Trailing-1** [3419]. **Training** [6482, 6887, 7019, 6404, 6813, 6561, 6578, 6829, 6716, 6344, 7081, 6957, 7088, 6843, 7109, 6478, 6861, 6980, 6862, 6751, 6740]. **Trans** [2092]. **Transactions** [7246]. **transceiver** [5163]. **Transcendental** [2696, 385, 4034, 2101, 524, 3472, 1657, 4121, 5568, 7012, 4929]. **Transcendental-Function** [524]. **Transcendentals** [5522, 3783, 3915, 5122]. **Transcription** [812, 6182]. **Transfer** [4272, 2005, 3936]. **Transform** [2719, 1244, 1073, 2029, 3029, 1827, 4020, 4350, 3264, 3272, 2395, 2107, 3474, 1998, 5340, 2272, 4912, 4270, 3680, 2031, 3364, 543, 3209, 3210, 6987, 6662, 7014]. **Transformation**

[6160, 6057, 3896, 6568, 569, 632, 84, 6629, 5115, 6276, 5850, 5542, 5957, 6216]. **Transformations** [3717, 275, 3894, 3092, 3265, 3100, 3855, 7028, 6283, 4552, 365]. **Transformer** [1878]. **Transforms** [6917, 1306, 1153, 2634, 1262, 816, 2057, 3580, 3880, 3617, 1989, 1991, 907, 910, 5227, 4941, 4776, 4655]. **Transistor** [2411, 3490, 1703]. **Transistorized** [313, 165]. **transition** [2888]. **Transitions** [3427]. **translate** [4561]. **Translation** [2864, 3039, 666]. **Translator** [3294, 187]. **translators** [2632]. **Transmission** [1779, 4405, 4884, 6114, 3522, 3700]. **Transparent** [6203]. **Transport** [4988, 4679]. **Transposition** [812]. **Transprecision** [6903, 6581]. **Transputer** [2084, 2737, 3083]. **transversal** [2419]. **transzendenter** [385]. **Trap** [4159, 345, 3357]. **traps** [5217]. **Treating** [3628]. **Treatment** [1281, 205, 5058, 5352]. **Tree** [5412, 4433, 3268, 1928]. **Trees** [4796, 6917, 2936, 3540, 5398, 3593, 4379, 2959]. **Trench** [1200]. **Trends** [6819, 6953, 4938, 7507, 4937]. **Treviso** [19]. **tria** [2]. **Trial** [1894]. **Triangle** [5897, 4219, 6941, 3190, 3689]. **Triangular** [5039, 184, 1983, 5330, 5540, 2302]. **Triangularization** [1385, 2517]. **Triangularizations** [2972]. **Triangulator** [3689]. **Tribonacci** [6436]. **Trick** [3561]. **Tricks** [3724, 1610]. **Tridiagonal** [5053, 5189, 2682, 998]. **Trig** [2455, 3191, 784]. **Trigger** [6932, 7057]. **Trigonometric** [5821, 1024, 1025, 3080, 6920, 4199, 139, 1666, 1667, 6358, 1545, 3517, 190, 2886, 2538, 201, 5909]. **Trimming** [1964]. **Trinomial** [4972]. **Trinomials** [6330, 5445, 5004, 5166, 4123]. **Triple** [6170, 6529, 343, 5862, 5697, 6821, 5040, 5857]. **triple-base** [5857]. **triple-double** [5040]. **Triple-Precision** [343]. **Triple-Word** [6529]. **Triplex** [579, 1094, 579]. **Triplex-ALGOL** [579, 579]. **trivariate** [5209]. **trivial** [3163]. **TRON** [2408, 7295]. **True** [1573, 60, 6814]. **Truncated** [6780, 2061, 6280, 5992, 5718, 6564, 7146, 5207, 3171, 4110, 5970, 4126, 4635, 4777, 4942, 5109, 4291, 4476, 2848, 4666, 7140]. **Truncation** [346, 3774, 371, 326, 1005, 3406, 423, 3582, 1879, 684, 6628]. **trust** [2550]. **Trusted** [6871, 1297]. **Truth** [1743, 3437, 4713]. **Truth-Table** [1743]. **TSAM** [111]. **Tschebyscheff** [514]. **Tschebyscheff-** [514]. **TSQRT** [3561]. **Tube** [3394, 50]. **Tubingen** [7390, 1653, 7584, 7234, 159]. **Tübinger** [159, 7390]. **Tukey** [6662]. **Tunable** [6458, 6594, 6028, 5088]. **Tung** [3921]. **Tuning** [6664, 6270, 6571, 5960, 6848, 7028, 6535, 6224, 7120]. **Tunnel** [277]. **Turbo** [3119, 3119]. **turbulence** [5305, 5306]. **Turin** [7348]. **Turing** [6557, 7512, 1855, 704]. **Turku** [5545]. **Turns** [6452]. **Tutorial** [5024, 4744, 6490, 6407, 4049, 4051, 4052, 1162]. **TVM** [7120]. **Twelfth** [7493]. **Twenty** [7283, 7301, 7312, 7254, 7377, 7350, 7391]. **Twenty-eighth** [7254]. **Twenty-fourth** [7312]. **Twenty-Ninth** [7391]. **Twenty-second** [7283, 7301]. **Twenty-Seventh** [7377]. **Twenty-sixth** [7350]. **Twin** [5804]. **Twin-float** [5804]. **Two** [3036, 3222, 1087, 1806, 1573, 726, 808, 811, 7018, 221, 3867, 332, 1604, 621, 879, 4194, 884, 4362, 7038, 6550, 1218, 1874, 631, 829, 5758, 3300, 1756, 912, 1150, 3481, 1656, 4095, 3669, 53, 123, 1914, 1166, 4274, 5558, 3348, 5359, 5097, 5366, 5649, 168, 5106, 4474, 6032, 1002, 4137, 3976, 4974, 4802, 2347, 3582, 4692, 3763, 3446, 3482, 5067, 985, 6217, 2272, 5206, 5638, 2598, 1918, 5967, 5358, 789, 4117, 5219, 3015, 3024]. **two-digit** [5067]. **Two-Dimensional** [1806, 1150, 1656, 5106, 6032, 985, 6217, 2272, 1918, 3015].

Two-Input [7038]. **Two-Layer** [7018]. **two-level** [4117]. **Two-Point** [3669]. **Two-Way** [631, 5638]. **Two's** [1829, 1247]. **Two's-Complement** [1829, 1247]. **TX** [7458, 7293]. **Type** [6146, 6659, 3973, 6499, 3085, 6538, 106, 255, 6709, 893, 7056, 4574, 2770, 5553, 483, 2140, 589, 3349, 5881, 5264, 5920, 6436, 4724, 3131, 72, 5550, 108, 4457, 6494, 6430, 6446]. **Type-2** [6494]. **Type-2-Based** [6659]. **Type-3** [6430]. **Typed** [3085]. **Types** [5032, 3642, 3186, 3042, 1510, 4356, 2898, 3084, 2777, 6976]. **Tyson** [7368].

U [1673, 2393]. **U.S.** [3633, 6472]. **U880** [1886]. **überlauffreie** [548]. **UCBTEST** [3456]. **Ugly** [3875, 6521, 4004]. **UK** [7453, 7454, 7596, 7570, 7268]. **ulfjack** [6481]. **ulfjack/ryu** [6481]. **Ulp** [5769, 5063, 4148]. **ulps** [7010, 7011, 6273]. **Ulrich** [1672]. **ultimate** [4823, 4995]. **Ultimately** [5449, 5555]. **Ultra** [2040, 5989, 6799, 1510, 1511, 6725, 6595, 6740, 1343, 6977, 6748, 6990, 4642]. **Ultra-arithmetic** [1510, 1511]. **Ultra-efficient** [6748, 6990]. **Ultra-Fast** [6595]. **Ultra-High-Speed** [1343]. **Ultra-Low** [6725, 6740]. **Ultra-Low-Power** [6977, 5989, 6799]. **ultra-wideband** [4642]. **Ultraefficient** [6864]. **ultrasonic** [2338, 2512]. **ultrasonics** [1782]. **UltraSPARC** [3436]. **ultrawide** [4140]. **UMFS** [484]. **Umwandlung** [2003]. **un-normalized** [477]. **Unabridged** [5891]. **Unambiguous** [5442]. **Unary** [5941, 1902, 6967]. **Unbalanced** [5679, 5660]. **Unbiased** [5278, 6333, 6476, 4831, 3195]. **Unbiasedness** [6892]. **Uncertain** [5532, 6241]. **Uncertainty** [3686, 6637, 5264]. **Unconstrained** [4593, 6284]. **Uncoupled** [6750]. **Uncovered** [5541]. **Undebuggability** [5842]. **Undebuggable** [5416]. **Undefined** [5883]. **Under-** [6491]. **under/overflow** [5326]. **Underflow** [4960, 1389, 4003, 1393, 1730, 1122, 1281, 1034, 1286, 2076, 345, 5024, 1436, 1899, 6139, 1969, 3587, 5152, 1430, 3130, 4931]. **Underflow-Free** [3025, 1435, 2847]. **underflow-induced** [3130]. **underflowing** [4663, 5703]. **underflows** [1128]. **Understand** [6527]. **Understandable** [935]. **Understanding** [6063]. **uneven** [4431]. **Ungleichun** [548]. **UniCalc** [3668]. **Unicode** [5545]. **Unidirectional** [4990, 944, 4682]. **Unified** [5580, 1085, 4153, 5682, 6903, 737, 4360, 5018, 7040, 7139, 5529, 1138, 893, 1044, 1651, 3331, 994, 4444, 6240, 4660, 3235, 3411, 6787, 3261, 2233, 2401, 2402, 1063, 1352, 660, 6585, 929]. **unifies** [3651]. **Uniform** [2054, 1106, 818, 4007, 4366, 6019, 698]. **Uniformly** [2328, 850]. **Unifying** [4845, 2580, 5201]. **Unit** [6992, 6871, 4314, 6887, 6498, 5680, 2052, 3053, 6663, 6889, 4326, 6666, 2199, 3568, 4328, 6397, 6894, 1387, 1591, 3993, 6903, 277, 4991, 5500, 3075, 5595, 6918, 432, 5715, 1971, 4028, 1402, 1403, 390, 5309, 5734, 5840, 518, 3102, 3103, 4212, 4150, 3451, 4048, 2551, 5535, 1044, 1425, 1754, 2102, 4874, 902, 5322, 5538, 3301, 5327, 5328, 5329, 7063, 5856, 6581, 7066, 5950, 2256, 403, 2568, 5062, 4417, 5774, 6724, 6726, 6727, 5072, 6730, 6021, 5963, 4103, 1455, 4111, 4763, 6606, 6968, 7101, 5790, 5968, 6232, 934, 3354, 5369, 5371, 6375, 149, 5377, 5882, 5974, 6640, 6751, 2172, 663, 6991, 417]. **unit** [3853, 1802, 1803, 4792, 2502, 2649, 2326, 4325, 4808, 4986, 610, 4519, 5491, 3057, 4832, 4706, 4848, 5834, 3083, 1846, 1611, 5019, 3267, 2541, 3097, 1858, 4043, 4561, 4563, 3618, 2405, 2406, 3291, 2241, 1635, 2244, 4875, 2930, 4876,

4064, 3123, 3124, 6449, 4881, 1314, 5949, 3791, 2258, 3141, 696, 2570, 2956, 3308, 7150, 3317, 3152, 3153, 838, 839, 993, 2983, 2012, 6225, 3504, 5640, 4919, 3819, 4112, 2807, 5217, 5219, 5361, 1465, 3355, 2478, 1348, 5565, 5801, 929]. **Unit-ALU** [5790]. **Unitary** [3265]. **United** [7406, 7303, 7611, 7224]. **Units** [5668, 5669, 5812, 5813, 546, 7016, 3869, 7019, 3744, 5507, 1396, 1606, 6416, 824, 1287, 6809, 6545, 6546, 6701, 3901, 4572, 1880, 233, 287, 5763, 4249, 913, 144, 6835, 7074, 7075, 6214, 3658, 3803, 2131, 5204, 5553, 4609, 370, 4615, 322, 5786, 6229, 4759, 4278, 6233, 457, 5234, 5236, 4139, 1004, 5802, 1480, 5908, 5466, 5473, 2189, 3984, 5989, 4346, 5149, 4184, 3257, 5997, 3086, 6700, 2736, 3914, 4073, 5056, 3310, 4902, 4258, 6025, 5785, 3347, 1000]. **unity** [2962]. **Univariate** [6206, 5421]. **univariées** [5421]. **Universal** [6489, 4300, 547, 872, 1738, 6069, 1290, 3752, 1615, 6540, 4213, 6431, 6450, 6575, 6935, 6956, 5777, 4912, 1538]. **Universe** [6528]. **Universeller** [1538]. **Universitat** [1653, 7249, 7226, 7234]. **University** [7326, 7164, 4151, 4152, 722, 7541, 7414, 7252, 7259, 7563, 7303, 7201, 7223, 7228, 7241, 7417, 7430, 7486, 7289, 7274, 7208, 7362, 7261, 7209, 4921, 7234, 7490, 108, 7203, 7205, 7450, 7264, 7198, 484, 3696]. **UNIX** [2603, 3071]. **unknown** [6349]. **Unleashed** [5925]. **Unlimited** [411, 3261]. **unmodified** [6679]. **Unnormalized** [169, 298, 290, 356, 359, 328, 2184, 2503, 2185, 468, 448, 357, 358]. **unprecedented** [1943]. **UNRAU** [929]. **Unraveled** [4333]. **Unrestricted** [4305, 1266, 1961, 448]. **Unrolling** [4441]. **Unsafe** [6053, 4636]. **unscaled** [3727]. **Unsigned** [6053, 6558, 6936, 5078, 4274, 4474, 4137, 3542, 2324, 1624]. **Unsolved** [618]. **unsung** [5604]. **Unum** [6042, 6386, 6494, 6659, 6500, 6417, 6079, 6182, 6302, 6430, 6446, 6210, 6259, 6498, 6499, 6187, 6709]. **Unum-Type-II-Based** [6709]. **Unums** [6353]. **unveils** [2498]. **Unwinding** [6424]. **Up/Down** [2130, 3825]. **Updated** [4933, 4510]. **Updating** [5125, 5167, 3150]. **upon** [3620, 2134]. **upper** [5186, 4746]. **ups** [548]. **Upwind** [6886]. **Uqlidisi** [408]. **Urbana** [7259]. **URR** [1615, 3323]. **US$35** [3388]. **US$50** [3388]. **US4338675** [1326]. **USA** [7493, 7494, 7510, 7537, 7553, 7511, 7603, 7484, 7528, 7471, 7587, 7590, 7595, 7231, 7447, 7478, 7298, 7451, 7509, 7524, 7338, 7369, 7356, 7561, 7272, 7302, 7211, 7222, 7286, 7385, 7444, 7472, 7518, 3780, 7408, 7445, 7461, 7474, 7488, 7505, 7520, 7293, 7521, 7257, 7490, 7364, 7403, 7600, 7263, 7324]. **Use** [720, 135, 546, 805, 4507, 6509, 2679, 4178, 4348, 3747, 5600, 881, 7037, 1620, 3280, 202, 4383, 2927, 4578, 146, 3668, 370, 2142, 1677, 941, 1075, 1174, 5108, 3017, 1559, 4786, 2356, 880, 252, 679, 1409, 5738, 1039, 5614, 1639, 4885, 50, 2954, 364, 6211, 6455, 8, 772, 410, 6365, 1698, 3194]. **used** [27, 2306]. **Useful** [3566, 3099, 7142, 891, 5365, 2642, 3202]. **USENIX** [7324]. **User** [6998, 1577, 1375, 7313, 3090, 1996, 1896, 2120, 2262, 2442, 2443, 2445, 3503, 3833, 4935, 1469, 2518, 1134, 1220, 1867, 2433, 2117, 1895, 2441, 2444, 1689, 2823, 2824, 2825, 847]. **User-oriented** [1996, 847]. **User-to-User** [3503]. **Users** [7342]. **uses** [1521, 778]. **Using** [3038, 5388, 6642, 6644, 1361, 2638, 1261, 6243, 3716, 4299, 4655, 6657, 5128, 3719, 5129, 1573, 1012, 5474, 6258, 6499, 5391, 6774, 864, 4323, 5395, 6511, 5397, 5399, 5695, 5484, 3568, 4328, 6397, 1821, 3569, 1823, 5271, 1385, 3991, 6671, 3576, 5272, 5495, 224, 6162, 6274, 277,

4336, 4993, 5907, 1022, 5279, 5712, 6408, 7025, 6065, 6170, 5713, 6413, 4181, 7028, 5290, 425, 508, 431, 5717, 338, 2899, 1849, 6178, 6179, 253, 558, 5524, 4206, 4365, 6184, 1131, 3274, 5310, 3451, 5312, 973, 6558, 6193, 1136, 3287, 5750, 5173, 4225, 3292, 3459, 6927, 1527, 4381, 4382, 3115, 5317, 141]. **Using** [160, 161, 180, 6567, 113, 286, 895, 1045, 6441, 2104, 7056, 4574, 754, 4394, 6446, 6826, 7059, 4581, 4070, 2937, 4585, 6575, 570, 6578, 6829, 181, 6336, 6582, 5188, 7066, 4888, 3476, 5621, 1999, 913, 318, 356, 3142, 2953, 1650, 266, 1055, 1150, 6348, 5548, 6212, 5066, 1656, 5430, 3657, 3486, 2781, 2968, 2126, 6596, 2972, 3667, 5200, 988, 1156, 184, 4430, 2788, 4433, 5075, 3160, 3498, 703, 2278, 584, 1775, 6127, 1161, 4437, 6600, 6354, 3502, 371, 267, 186, 4620, 3176, 6850, 1919, 2150, 4766, 713, 5096, 6739, 1071, 4122, 132, 2155, 1933, 4460, 1073, 214]. **Using** [2029, 1251, 2828, 594, 5372, 5568, 6031, 7116, 944, 4635, 4777, 5109, 5110, 5378, 6032, 6981, 3531, 150, 133, 1181, 544, 1257, 4477, 5113, 3022, 3374, 7119, 6638, 6985, 3538, 5118, 6988, 5709, 1795, 6990, 3847, 5245, 4492, 1565, 5578, 6993, 3029, 4298, 4651, 5886, 461, 4972, 3042, 5250, 2181, 1811, 3046, 3047, 5132, 2868, 5256, 4978, 7127, 6664, 4324, 6890, 3727, 4668, 4982, 4164, 6268, 4984, 4672, 3867, 4168, 4519, 3237, 3238, 3571, 3572, 3987, 3574, 2344, 6672, 5493, 5702, 2680, 3997, 4677, 4000, 6519, 6896, 1827, 1963, 3419, 4176, 2349, 5142, 3578, 5707, 6404, 5498, 2685]. **using** [3244, 5402, 5403, 2687, 4007, 2353, 6916, 6066, 3886, 4015, 4350, 4021, 5294, 4192, 3888, 4849, 3593, 7033, 3260, 2712, 2538, 4712, 5160, 2900, 6541, 1214, 1975, 4209, 5162, 4039, 2905, 2384, 626, 515, 516, 565, 2226, 1411, 5736, 1412, 2390, 4042, 1621, 1868, 3617, 1524, 1985, 6003, 6004, 6560, 6706, 1040, 3291, 4720, 3293, 630, 3906, 6709, 2740, 1877, 1989, 1990, 1991, 2245, 2929, 2744, 1879, 4724, 3782, 4068, 3124, 684, 3468, 2429, 1757, 5618, 1761, 4405, 4407, 5949, 3474, 2564, 2948, 981, 3134, 6110, 2763, 7070, 2436, 5547, 6944, 6115, 6017, 6722, 2121, 2960, 2122, 7150, 6116]. **using** [6117, 3319, 3320, 3490, 3663, 581, 5198, 5776, 4904, 4601, 3665, 3156, 3328, 3329, 3494, 3806, 6839, 1770, 6959, 7088, 3499, 2135, 2277, 2456, 4270, 6842, 4753, 7093, 6224, 5636, 5637, 5962, 7154, 5873, 3165, 709, 3505, 6360, 4619, 3338, 1918, 1168, 5967, 2466, 5791, 2992, 1067, 2020, 2997, 2998, 2294, 4928, 5220, 4283, 1463, 1550, 4772, 5367, 1935, 6624, 5652, 1347, 5227, 1176, 5460, 2031, 2303, 5654, 5795, 4776, 5106, 3839, 3840, 3958, 3959, 2489, 4943, 413, 5111, 2167, 2840, 2494, 2843, 3021, 5235, 3209, 3210, 3963, 4637, 4638, 5381, 5237, 4640, 4641, 4949, 5239, 194, 7405, 5803, 2851, 3211]. **using** [4821]. **UT** [7381]. **Utah** [7281]. **utilisant** [4351]. **Utilising** [2634]. **utilities** [1819]. **Utilization** [2676, 5710, 3245]. **utilize** [2971]. **Utilizing** [1905, 2901, 1356]. **UX** [4402, 4583, 4774, 4933]. **UYK-17** [839].

V [6500, 4055, 6124, 839, 6652, 7003, 6771, 6887, 6667, 6786, 6894, 6800, 6920, 6805, 6806, 7137, 2386, 6929, 6930, 7056, 7362, 6581, 7066, 6937, 6938, 6939, 6589, 7079, 7084, 7086, 7089, 6844, 782, 6734, 7106, 7173, 6625, 6856, 6977, 6978, 7120, 6984, 6748, 6864]. **V/sub** [2386]. **v1.0** [6487]. **v1.4.0** [4630]. **v2** [4933]. **V3** [6844]. **v3.0** [5238]. **v5** [6279]. **v5.0** [5575]. **Vāriyar** [4036]. **VA** [7364]. **Vaclav** [7122]. **vacuum** [50]. **Vail** [7455]. **Valid**

[4514, 4515]. **validate** [4581]. **Validated** [3848, 3715, 7428, 5589, 3064, 3735, 7459, 7549, 7393, 7538, 4319, 4337, 5516, 7460, 5076, 5220]. **Validating** [3576, 3682, 7323, 4939, 2585, 5801]. **Validation** [3028, 1966, 2067, 5533, 2563, 4910, 6077, 6418, 5332, 6216, 2035]. **Validity** [5420, 5938]. **Valley** [7497, 7382, 7402, 7409, 7423]. **Value** [4163, 3740, 4349, 433, 7192, 179, 3100, 5602, 3631, 3779, 1887, 4084, 3669, 6126, 4786, 4179, 3748, 2973]. **Value-based** [4163]. **Valued** [1276, 3078, 7387, 7432, 7547, 1628, 7424, 3960, 3293, 1527, 3665, 4616, 2020]. **Values** [1573, 4037, 5041, 2765, 3652, 6228, 6268, 4818, 4819, 3756, 5177, 452, 4422, 5092, 5219, 5361]. **VAMP** [4314]. **Vancouver** [7380, 7373]. **vanilla** [6541]. **variability** [6692]. **Variable** [7124, 3851, 6499, 248, 6914, 174, 6172, 7137, 4040, 4210, 4211, 4861, 1131, 1856, 1980, 3280, 349, 5325, 5761, 5762, 6715, 3469, 6591, 5628, 6724, 6726, 6727, 3662, 988, 1156, 4095, 5437, 5779, 771, 1243, 4446, 4758, 3509, 4275, 5096, 6739, 5368, 4942, 5658, 4291, 3025, 2043, 2336, 2337, 1272, 5920, 735, 1291, 2724, 1420, 5946, 6718, 5428, 2012, 3165, 777, 3344, 3508, 5232, 2847]. **Variable-Correction** [4291]. **Variable-Length** [1131, 3025, 2043, 5428, 2847]. **Variable-Precision** [6499, 6172, 4210, 4211, 4861, 5761, 5762, 3469, 6727, 771, 3509, 4275, 5325, 2724, 1420, 5946, 3344, 3508]. **Variable-Radix** [6715]. **Variables** [5586, 3629, 6005, 6717, 3477, 2118, 2260, 3488]. **Varian** [1030]. **Varian-73** [1030]. **Variance** [7027, 7133, 4978, 1585, 2255, 789]. **variances** [831]. **Variant** [6414, 6652, 4692, 4636]. **Variants** [6914]. **Variations** [6729]. **variety** [2138]. **Various** [549, 550, 728, 6434, 531, 5584, 760, 2315]. **Varying** [3185, 593, 2636, 2042, 2065]. **Västerås** [7419]. **VAX** [2037, 1570, 1571, 1804, 2659, 1111, 1020, 1392, 1313, 2426, 1327, 1328, 1466]. **VAX-11** [2037, 1570, 1571, 1804, 1111, 1020, 1392, 1313]. **VAX-11/780** [2037, 1570, 1571, 1804, 1020]. **Vector** [4499, 1946, 6038, 3385, 6379, 3220, 3397, 7003, 1093, 2655, 2870, 6667, 4001, 6903, 4991, 971, 7045, 4212, 5752, 5535, 2099, 6930, 1884, 5062, 2450, 6724, 1658, 1901, 7089, 2146, 4104, 2152, 3001, 4127, 3354, 2038, 3398, 3859, 3051, 5481, 6890, 6672, 2516, 2682, 2373, 1973, 1853, 3264, 4043, 6926, 2233, 2401, 2402, 3906, 2242, 3468, 6105, 3313, 2447, 2448, 2472, 4772, 3355, 2032, 2449]. **Vector-Arithmetic** [3354, 3355]. **Vector-Processing** [4212]. **Vector-Radix** [1884]. **Vector-Reduction** [1901]. **Vector/Matrix** [2450, 2447, 2448, 2449]. **Vector/Scalar** [5752, 2233, 2401, 2402]. **Vector/SIMD** [4991]. **Vectoring** [3970, 4153, 3779, 4289]. **vectorizable** [6393]. **Vectorization** [6243, 2239, 2240, 5050, 5133, 6103]. **Vectorized** [7003, 7008, 6893, 6735, 6411, 5796]. **Vectorizing** [6786]. **Vectors** [6075, 5622, 5441, 2692, 6919, 4912]. **Vedic** [5872]. **Vegas** [7176, 7186, 7511, 7397, 7257]. **Veldhoven** [7358]. **Veltkamp** [5134, 7159]. **Veltkamp/Dekker** [5134, 7159]. **Vendors** [3747]. **Venice** [7363, 7367]. **venue** [7303]. **Verallgemeinerung** [548]. **Verarbeitung** [2940, 2941]. **Verfahren** [514, 2100, 836, 1237, 1599, 1165, 35]. **Verificarlo** [6062, 6166]. **Verification** [4647, 4958, 6381, 6383, 6768, 4314, 5257, 5478, 5683, 6048, 7560, 4324, 7128, 3568, 3866, 7357, 733, 6285, 4027, 5519, 5725, 3439, 4198, 4199, 4200, 5300, 4378, 5533, 7051, 3771, 6822, 3466, 6011, 2256, 6587, 6588, 3650, 4414, 5863, 2579, 6464, 6026, 4097, 5636, 5637, 4272, 5964, 6963, 4620, 5787,

4455, 5372, 6373, 4136, 3710, 3382, 7355, 4297, 5983, 3731, 7527, 5995, 3758, 4711, 5160, 4372, 4563, 5023, 4719, 4058, 4394, 6453, 3152, 3153, 4912, 4619]. **Verified** [3559, 5479, 5896, 6050, 5497, 4009, 7134, 4024, 3607, 6108, 6635, 7069, 6944, 6351, 1938]. **Verifying** [5578, 6143, 6495, 3574, 3991, 3759, 6199, 6215, 4087, 6261, 4225, 5341, 5342, 5426]. **Verilog** [4928]. **VeriTracer** [6395]. **verlassen** [1137]. **VERROU** [6173]. **vers** [5121]. **versa** [2196, 402]. **versatile** [6787]. **Version** [6998, 5891, 3747, 1741, 563, 2910, 6447, 441, 6213, 3148, 2999, 7101, 4463, 4464, 3367, 6658, 548, 2911, 5614, 2764, 3143]. **Versions** [3851]. **Versus** [6423, 2796, 3734, 4538, 5745, 4220, 4222, 2418, 6949, 6523, 6628]. **Verteilung** [777]. **vertex** [5733]. **Vertices** [5512]. **verwendeten** [2306]. **Very** [3970, 4153, 6883, 5476, 4165, 3077, 3254, 387, 1517, 5757, 3465, 4064, 2954, 4078, 3853, 3865, 4672, 1625, 5944, 3481, 4413, 5660]. **Very-High** [3970, 4153, 3254, 3465, 4413]. **VFloat** [5658, 5628]. **VFP11** [5263]. **VFP9** [4499]. **VFP9-S** [4499]. **VHDL** [4826, 4688, 5147, 3763, 2740, 4885, 5778, 5790]. **VI** [7358, 7400, 7579, 783, 7174, 7352]. **Via** [5288, 1208, 5078, 1191, 5587, 6516, 4679, 4988, 2684, 3066, 3249, 465, 3580, 5150, 5504, 4693, 5507, 509, 6284, 6691, 5522, 3095, 6555, 5746, 6557, 4379, 7052, 2100, 6932, 7057, 6100, 6006, 6577, 6342, 6592, 1766, 4422, 5347, 5074, 5783, 6608, 6371, 4489, 6754, 6532]. **vice** [2196, 402]. **Victoria** [7554, 7360]. **Video** [495, 6961, 5227, 5753]. **View** [3389, 3240, 1651, 2521, 3381]. **VII** [7530, 784]. **VIIIfx** [5619]. **Villa** [7273]. **VIP** [6381, 6464]. **Virginia** [7368]. **Virgule** [2563, 2004, 702, 4801, 2217, 2762, 990]. **Virtex** [4509, 4778]. **Virtex-II** [4509]. **virtual** [7607, 7609]. **Visibility** [3488]. **Vision** [6479]. **Visual** [3143]. **visualization** [2909]. **vital** [1491]. **VLIW** [5666, 5491, 5762, 5947, 6007, 4073]. **VLSI** [7494, 7553, 7539, 7358, 7305, 7418, 7420, 7469, 7514, 7531, 7546, 7577, 7436, 4645, 1563, 1711, 2637, 2642, 1807, 3397, 1576, 1811, 1949, 3978, 2052, 2191, 7282, 2192, 2661, 5691, 2196, 2203, 1821, 2204, 5400, 2354, 3074, 7358, 1838, 1604, 4545, 2714, 2079, 4038, 2384, 2226, 1858, 1413, 1522, 7316, 7266, 7287, 7306, 7318, 7328, 7331, 7343, 7500, 2728, 3619, 4718, 2405, 2406, 2408, 2419, 3782, 3914, 3634, 3788, 2751, 7363, 7277, 2430, 2113, 2434, 2760, 2761, 2949, 3137, 1317, 2762, 3486, 1903, 2266, 4743, 4744, 1660, 1534, 1663, 2267, 3326, 3327, 2131, 2274, 1668, 7349, 2800, 1912, 1453, 4102]. **VLSI** [1777, 2148, 1778, 7507, 2152, 2020, 2473, 2474, 1928, 1552, 1792, 1698, 3206, 4782, 4146]. **VMX** [5284]. **voice** [2058]. **Vol** [1484, 5812, 5813, 63, 64, 65, 66, 67, 68, 7276, 7189, 7377]. **Volatile** [6716]. **Volta** [7437]. **Voltage** [7001, 478, 6729, 4042]. **Volume** [5831, 3277, 4377, 4497, 7167, 7168, 7169, 7171, 7173, 7174]. **volumes** [6129]. **voor** [492, 540]. **Voronoi** [4703, 5512]. **vortex** [3040]. **Vorträge** [1653, 7234]. **VPCLMULQDQ** [6411, 7093]. **VPFPAP** [5762]. **VPMADD** [6567]. **VRML** [3747]. **vs** [6182, 6444, 322, 4938].

W [7314, 5604, 1672, 1673, 531, 372, 801, 458, 7079, 6850]. **W.** [742]. **WADAS** [7368]. **Wafer** [1823, 7376]. **Waiting** [1245]. **Wakamatsu** [7438]. **wall** [6380]. **Wallace** [5659]. **Wallis** [1484]. **Wanted** [6169]. **Warn** [6527]. **Warsaw** [7457]. **was** [606]. **Washing** [2794]. **Washington** [7199, 7368,

7246, 7346, 7474, 7324, 7572]. **wastewater** [5352]. **watchers** [2794]. **Water** [6708, 3947]. **Waterloo** [7541]. **Watson** [7242]. **Wave** [5898, 205, 3486, 3389, 1277, 1879, 840]. **Waveguide** [1650]. **wavelet** [4776]. **wavelets** [3700]. **Waves** [184]. **Way** [2077, 631, 6588, 4103, 4998, 3503, 5638]. **Ways** [6434]. **weak** [3707]. **weakly** [3963]. **Weather** [6566, 6708, 5297, 6585]. **WEID** [6732]. **Weierstrass** [3705]. **Weight** [5270, 5271, 6416, 4618, 5031, 7145, 3300, 5, 5382]. **Weight-Sharing** [6416]. **weighted** [1711, 3946, 4118]. **Weights** [6318, 6422]. **Weil** [4738]. **Weitek** [2326]. **Weiteres** [1812]. **well** [1943]. **well-informed** [1943]. **Wellington** [7570]. **Wendisch-Rietz** [7214]. **Werner** [272]. **Wescon** [7269, 7297, 7325, 7213]. **Wescon/86** [7269]. **Wescon/88** [7297]. **Wescon/90** [7325]. **West** [7244, 6599]. **West-83** [7244]. **Westin** [7344]. **WFTA** [2296]. **WG** [7583, 7406]. **WG14** [5169, 5170, 5171]. **Wharf** [7487]. **whether** [2094]. **which** [4030]. **while** [5395, 2138]. **Whilhelm** [1467]. **White** [7309]. **who** [3093, 3094, 2, 5647]. **Whose** [2554, 6017, 5158, 5550, 6349]. **WhyMP** [7069]. **Wide** [5476, 4028, 2759, 6393, 4706, 5331]. **Wideband** [1907, 4642]. **wider** [5844]. **Width** [5758, 4742, 5566, 4845, 3797, 5346, 1943]. **Width-** [4742]. **Wiener** [5429]. **Wigner** [2712]. **Wild** [6599]. **Wiley** [3714]. **Wilhelm** [159, 1653, 7234, 7390, 4859, 3460, 1167, 7390, 1322]. **Wilkinson** [389, 5986, 6586]. **Will** [3747, 6183, 5708, 1191]. **Willard** [1672]. **William** [7234, 6182, 159, 3943, 3944, 3843]. **Wilson** [262]. **Win** [4263]. **windowed** [2042, 3313]. **Windows** [3186, 2764, 3143, 3503]. **Windsor** [3189, 7365, 7366]. **Winnipeg** [2377]. **Winograd** [3142, 1244, 596]. **Winter** [7324]. **wire** [5997]. **Wired** [261, 2834, 3198]. **Wired-In** [261]. **wireless** [4883, 4588]. **Wiring** [1165]. **Wisconsin** [7209]. **Wise** [7108, 716, 795]. **Wisely** [6272]. **Wissenschaftsgeschichte** [7234, 1653]. **Within** [411, 6385, 3945, 5456, 6858]. **Without** [7006, 729, 1106, 6173, 2221, 2222, 5161, 4054, 4864, 1894, 5630, 186, 933, 5222, 214, 4511, 5901, 3573, 6402, 4998, 2364, 2526, 2527, 4051, 3145, 7077, 4267, 5217, 3525, 3372]. **Witt** [3405]. **Wizard** [5778]. **Wizard-based** [5778]. **wongldiff** [4998]. **Wooley** [5566]. **Word** [6881, 3568, 4165, 3575, 1726, 1825, 174, 6529, 390, 6311, 6946, 3923, 6840, 6841, 7108, 5645, 6623, 4672, 674, 1037, 6814, 3288, 3458, 521, 5077, 4946]. **Word-Based** [5645]. **Word-Length** [4165, 6623, 4672, 6814]. **Word-length-independent** [1726, 1825]. **Word-Level** [3568, 3575, 5077]. **Word-Wise** [7108]. **Wordlengths** [5074]. **Words** [2951]. **Work** [6577, 2138, 2461]. **Working** [7368, 3851, 6996, 7406, 5503, 513, 7047, 7231, 1786, 2884]. **Workloads** [7101, 7103, 6865]. **workmen** [4411]. **Works** [7167, 7168, 7169, 7171, 7173, 7174]. **Workshop** [7411, 7381, 7466, 7370, 7206, 7484, 7327, 7415, 7240, 7470, 7471, 7519, 7532, 7362, 7363, 7336, 7437, 7348, 7349, 5633, 7358, 7187, 7317, 7224, 7398]. **Workshops** [7597, 7333]. **Workstation** [2719, 3388, 1988, 2271, 2026, 3353]. **workstations** [1998]. **World** [7599, 7559, 7369, 1096, 6795, 7378, 7233, 7326, 4031, 6299]. **Worst** [5299, 3777, 4398, 4729, 5185, 5422, 6732, 4628, 4768, 5096, 4459, 6137, 5243, 3909, 4728, 5094]. **Worst-Case** [3777, 6137, 6732]. **would** [1491]. **Writing** [3876, 2693, 5929]. **writings** [235, 801]. **Written** [1630]. **WSI** [2826, 3834]. **WTL** [2034, 2166]. **WTL3170** [2505]. **WTL3170/3171** [2505]. **Wuppertal**

[7393]. **Würzburg** [7227]. **Wurzeln** [1095, 2583]. **Wurzelziehen** [1835].

X [7445, 6776, 5539, 5063, 1483, 2342, 2460, 1553]. **X-MP** [2460]. **X-MP/Model** [2460]. **X2** [3202]. **x200** [6289]. **X3.198** [2861]. **X8** [5613, 587]. **x86** [5824, 4898, 6220, 5963, 5355, 5787, 6139]. **x86-64** [6139]. **XB** [839]. **XB-1** [839]. **Xeon** [5905, 6289, 5905]. **XI** [7461, 1160]. **XII** [7474, 1160]. **XIII** [7488]. **Xilinx** [6999, 6096]. **XIV** [7582, 7505]. **Xlinx** [3029]. **XMX** [3796]. **XpulpNN** [6805, 6806]. **XR** [4322]. **XSC** [3558, 3087, 2545, 2734, 2735, 2923, 3116, 5847]. **XScale** [4717]. **XT** [2477, 2477]. **XV** [7441, 7520]. **Xvpfloat** [7137]. **XXX** [2345].

Y-MP [2553]. **Yamaguchi** [7465]. **YBC** [7017]. **Year** [7388]. **Years** [7495, 1456, 7234, 5244, 6522, 6504, 1230, 6126, 7425]. **Yielding** [265, 3881, 4542]. **yields** [3862, 3590]. **Yokohama** [7582]. **Yonsei** [7430]. **York** [3714, 4151, 4152, 7266, 7287, 7519, 7208, 7178, 7243, 7309]. **Ypsilanti** [7436]. **Yugoslavia** [7191]. **Yun** [7089].

Z [1119, 1206, 4862]. **z/Architecture** [4862]. **z10** [5556, 5462]. **z13** [6204]. **z15** [6730]. **Z4** [1338, 108, 124]. **Z80** [1427, 1592, 1594, 1602, 1427]. **Z8000** [1288]. **Z8070** [1616, 1681]. **z9** [5283]. **z900** [4326, 4621]. **z990** [4808, 4848]. **Zahlen** [654, 801]. **Zahlen-systems** [801]. **Zahlenformat** [3341]. **Zahlensysteme** [2699]. **Zandvoort** [7347]. **Zaokragleń** [458]. **zEnterprise** [5694, 5705]. **zEnterprise-196** [5694]. **Zero** [6774, 307, 4056, 6952, 2130, 4445, 4279, 5572, 945, 6139, 863, 955, 1277, 391, 3442, 2541, 4573, 6107, 3791, 5056, 3146, 3483, 3804, 3697, 2841]. **zero-finding** [863, 955]. **zero-input** [1277, 3442]. **zero-overhead** [3791, 2841]. **Zero-Sum** [945]. **Zeros** [5979, 1122, 4391, 3706, 4689, 5294, 5410, 1038, 5738, 2006, 4456, 5564, 192, 193]. **ZFP** [6525]. **zieht** [2583]. **Zilog** [1616, 1681]. **Zimmermann** [5884, 5885]. **zip** [1799]. **Zipf** [5676, 5698, 4355, 826, 3765, 5068, 4431, 2275]. **ZipfAllocation** [5753]. **Ziv** [5910]. **ZKCM** [5966]. **Zoned** [675]. **Zufallsgröße** [777]. **zum** [1485, 7390]. **Zur** [836, 1812, 1599, 514, 2100, 1886, 801, 35, 274, 2699, 2381, 777]. **Zurich** [7399, 108, 7410, 108]. **Zuse** [124, 1380, 124]. **Zuse-calculator** [124]. **Zuse-Rechenautomaten** [124]. **Zweites** [7390].

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1. Table 5 (page 124):

insert `k <-- 0` after assertion, and also delete `k <-- 0` from Table 6.

2. Table 9 (page 125):
   for `-1:USER!("");`
   substitute `-1:USER!("0");`
   and delete the comment.
3. Table 10 (page 125):
   for `fill(-k, "0")`
   substitute `fill(-k-1, "0")`

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- branch and bound algorithms for global optimization,
- constraint propagation,
- solution sets of linear systems,
- hardware and software systems for interval computations, and
- fuzzy logic.

Actual applications described in the book include:

- economic input-output models,
- quality control in manufacturing design,
- a computer-assisted proof in quantum mechanics,
- medical expert systems,
- and others.

A realistic view of interval computations is taken: the articles indicate when and how overestimation and other challenges can be overcome. An introductory chapter explains the content of the papers in terminology accessible to mathematically literate graduate students. The style of the individual, refereed contributions has been made uniform and understandable, and there is an extensive book-wide index. Audience: Valuable to students and researchers interested in automatic result verification. Detailed information, including contents, contributors, and an order form can be found:

- on Kluwer homepage `http://www.wkap.nl`, or
- on the Interval Computations homepage `http://cs.utep.edu/interval-comp/main.html`, in the "Books" section.

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The main aim is to produce a usably efficient implementation, which can be easily interfaced with existing C++ code. This contrasts with previous implementations in functional languages (Haskell, Miranda etc.), which, although theoretically important, seem to be rather too slow for real use.

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- branch and bound algorithms for global optimization,
- constraint propagation,
- solution sets of linear systems,
- hardware and software systems for interval computations, and
- fuzzy logic.

Actual applications described in the book include:

- economic input-output models,
- quality control in manufacturing design,
- a computer-assisted proof in quantum mechanics,
- medical expert systems,
- and others.

A realistic view of interval computations is taken: the articles indicate when and how overestimation and other challenges can be overcome. An introductory chapter explains the content of the papers in terminology accessible to mathematically literate graduate students. The style of

the individual, refereed contributions has been made uniform and understandable, and there is an extensive book-wide index. Audience: Valuable to students and researchers interested in automatic result verification. Detailed information, including contents, contributors, and an order form can be found:

- on Kluwer homepage `http://www.wkap.nl`, or
- on the Interval Computations homepage `http://cs.utep.edu/interval-comp/main.html`, in the "Books" section.

The information on the Interval Computations homepage is basically a mirror image of the Kluwer one (the only difference is that the fonts are fancier).

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Kraemer:2001:SCV

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