
Glossary/Index

Numerics

100Base TX is a variant of 100Base T; 356
100BaseT (Fast Ethernet); 356
100BaseTX; 364
10Base2 (Thin Ethernet); 356
10Base5 (Thick Ethernet); 356
10BaseT; 354, 364
10BaseT (Twisted-pair Ethernet); 356
1394; 374
1394 buses; 387
1394 TA (IEEE 1394 Trade Association); 377
2D graphics accelerator refers to a special processor that executes display command lists to build and move bit-maps and pixel maps in the video memory; 48
2D refers to 2D graphics accelerator; 324
3D; 48, 80, 368
3D Audio, 3D Sound, or Positional Audio, describes multi-channel audio systems that employ signal processing to enhance or emphasize positional or dimensional effects for simulating reflections, depth and spaciousness, and directionality of sounds; 336
3D graphics acceleration; 387
3D graphics accelerator renders 3D triangles into pixels in the frame buffer, often incorporating texture maps in the process; 48
3D refers to 3D graphics accelerator; 324
3D rendering models; 490
3D Sound; 336
486-compatible (Intel) burst order refers to a round-robin burst order that was used in the 486, where the sequence direction is a function of the even/odd status of the critical quadword; 422
66 MHz PCI; 399

A

Abort cycle; 83, 85, 168, 176
Abort cycle generation; 296

Abort handling; 207
Abort signal (early); 208
Abort signal (late); 208
Abortable operation; 132
Abortable refers to changes that can be speculatively performed and later backed out of (see non-abortable); 73
Abortable state changes; 72, 133
Aborts for mispredicted BRCOND Ops; 277
AC-3; 344
Access check; 172
Access time refers to the combined row and column access intervals of the DRAM; 431
ACPI; 344, 349
ACPI (Advanced Configuration and Power Interface) refers to a specification and language that enables OS power control over installed devices; 346
Action field; 141, 155
Active fault condition; 176
ActiveX; 344
ActiveX refers to time-based APIs used for creation, coordination, and management of synchronized multimedia streaming data; 343
ADC (analog-to-digital converter); 335
Address latch; 142
Address pipelining refers to the assertion of ADS! before the last assertion of BRDY! in the current bus-cycle; 424
ADSL (Asymmetric DSL) refers to a variant of DSL in which the downstream and upstream rates are different; 354
ADSL Forum is a group formed to educate and promote ADSL technology to telephone companies and their suppliers; 355
Advanced Configuration and Power Interface; 325
Advancing OpQuads in the scheduler; 195
AGP; 324, 386, 391, 395, 408
AGP 2x mode; 408

AGP 4x mode; 408

AGP, or Advanced Graphics Port, refers to a special port on the North-Bridge. It permits the high-bandwidth transfer of texture data from the main memory to the display adapter for 3D graphics effects; 49

Alternate handler address; 171

ANSI T1.413-1995 refers to the ANSI Standard for ADSL; 355

API; 342, 343

API, or Application Programming Interface, refers to the collection of routine calls that comprise a system-software facility; 38

Appliance-like operation refers to a PC that is unobtrusive, always ready yet energy efficient, and extremely simple to install, operate, maintain, and upgrade; 344

Application push; ix, x

AppStation Mode refers to a mode in which knowledge users may run any one of multiple management-selected business applications; 349

Arbitration is the process by which a competing process wins access to a resource that is subject to contention; 471

Architectural machine state; 88

Architectural register file ports; 254

Architectural register file refers to the set of registers accessible by the instruction set for storing values associated with operand values, status flags, and other architectural state related information; 88, 93, 302

Architectural register set; 88

Architecture refers to the instruction set, resources, and features of a processor that are visible to software programs running on the processor.; xi

Asynchronous bus refers either to a handshaken bus, or a clockless bus, depending on the context; 383

Asynchronous clocks refers to two clock signals which do not maintain frequency or phase relationships of interest; 383

Asynchronous logic refers to clockless logic; 383

ATA/IDE; 376, 402

Attachments refers to logically separate files embedded within an e-mail message; 362

ATX Power Supply refers to a power supply that is capable of being managed by the platform's BIOS to provide energy savings; 46

Avoiding deadlock; 298

B

Backbone; 354

Backbone refers to a link, which may couple, ring, or span, major metropolitan areas; 365

Back-buffer refers to a frame buffer in a two frame buffer implementation into which display frames are rendered; 48

Back-side caches use a dedicated bus, separate from the processor local bus; 45

BARs (Base Address Registers) refers to programmable registers that define memory or I/O windows in PCI Bus bridges; 401

Base; 78

Basic PC refers to a metacategory defined to include the Consumer PC, Office PC, Mobile, and Workstation subcategories; 323

Baud refers to a measure of effective signal changes per second. The band rate may be greater than the bit per second rate due to the use of signal encoding techniques; 403

Behavioral (functional) simulation; 23

Benchmarks (see workloads); 4

BHT (see branch history table); 106

BIOS; 346, 382

Bitline refers to a column/data line. The column address selects a particular bitline for coupling to the I/O; 430

Bitmap display refers to a display subsystem that permits the definition of window boundaries and other screen graphics with resolution that is conceptually the same as the pixel resolution of the display; 331

Block size; 370

Boundary-scan test access port; 97

Branch condition; 107

Branch direction; 105

Branch history table; 106

Branch prediction; 108

Branch resolution logic; 135, 227, 258

Branch resolving unit; 77, 105, 107

Branch target address; 105

BRCOND Op; 155, 227

BRCOND Op resolution logic; 265

BRI (Basic Rate Interface) is the most common type of ISDN, consisting of two independent 64-Kbps (56-Kbps in some places) "B" channels for data and a "D" channel for control; 352

Bridge chips act to couple all of the other motherboard components together. Bridge chips historically have been collectively referred to as the chipset, core logic, or

- system logic of the motherboard; 39
 - Bridge/Controller crossing transfer decode schemes; 479
 - BrOp-related abort; 88
 - BRU (see branch resolving unit); 77
 - BRU pipeline (also called the BrOp pipeline); 162, 174
 - BSR (subroutine branch Op); 155
 - BTC (branch target cache); 106
 - Built-in self-test (BIST); 97
 - Burst; 388, 392
 - Burst bus transaction; 72
 - Burst read cycle; 112
 - Burst transfers; 434
 - Burst transfers consist of contiguous data transfers sent without their associated address information; 393
 - Burst-mode transfer refers to bus transactions having a lead-off transfer followed by a burst transfer; 393
 - Bus — Socket 7; 410
 - Bus bridges selectively couple two buses for crossing transfers; 393
 - Bus cycle; 70
 - Bus features for multimedia applications; 388
 - Bus protocol refers to the method the bus uses to communicate address, data, command, and status information between source and destination devices; 383
 - Bus-cycle pipelining refers to the overlapping of adjacent bus cycles; 424
 - Bus-cycle timing refers to the number of clock cycles for a particular transaction type; 383
 - Bus-mastering; 371
 - Bus-mastering peripherals are initialized by the processor and then autonomously carry out transfers, primarily between a peripheral device and memory, permitting the processor to carry out another task while the bus-master transfer is on-going; 388
 - Byte addressing; 443
- C**
- Cable modems use specially conditioned segments of the existing cable TV infrastructure to provide bidirectional high-bandwidth communication channels for Internet connectivity; 352
 - Cable Television Laboratories, Inc.; 353
 - CableLabs (Cable Television Laboratories, Inc.) is a research and development consortium of cable television system operators; 353
 - Cache; 324
 - Cache prefetching; 112
 - Cache-line refers to the fundamental entry-size around which a cache is organized; 421
 - Cache-line replacement; 112
 - CardBus; 402
 - CardBus is an PCI Bus variation that is used in laptops as a second expansion bus dedicated to removable PC Cards. The CardBus is bridged to a standard PCI Bus for non-CardBus peripherals; 395
 - CAS! (column-address strobes) refers to control signals used to latch the column addresses within the DRAM for accessing the internal rectangular storage matrix.; 430
 - cc-dep (see cc-dependent RegOp); 151
 - cc-dependent RegOp; 263
 - Cell placement; 33
 - Characterizing cell timing; 29
 - Chip input/output design; 31
 - CIM (Common Interface Model) refers to an object-oriented version of DMI that permits cross-platform interoperable management over intranets and the Internet; 348
 - Circuit level model; 26
 - Circuit level simulation; 26
 - Clearing byte marks; 280, 281
 - Clients refers to platforms that connect to a server to make use of the server's resources; 362
 - Clock cycle; 131
 - Clock distribution; 31
 - Clocked buses include a clock signal among the bus signals to provide a reference for the sequential logic associated with the bus interfaces at both the source and destination; 383
 - Cloned LdOps; 172
 - Cloned StOps; 174
 - CLUT, or Color Look Up Table, is a hardware colormap used to convert pseudocolor pixel data to the desired true-color pixel data; 51
 - CMOS Memory; 381, 382
 - CMOS Memory is a PC platform component that holds key system-hardware configuration-parameters. A backup battery powers it; 40
 - Code dependent RegOp; 259
 - Code fragment; 72, 83
 - Codec is a hardware device, subsystem, or signal processing software that combines both a Coder and Decoder. More broadly, a codec is a standard for implementing digital audio or video; 335
 - Coding refers to mapping the continuous voltage levels of

- samples to a discrete voltage level representable by the fixed bit-width of a digital word; 335
- Color depth is the number of bits assigned per pixel to represent the pixel's color; 51
- Color depth, relates to the number of available colors that can be explicitly specified for a pixel; 49
- Color space, relates to different standard paradigms for specifying color; 49
- Commit stage; 166
- Commitment constraints; 274
- Commitment criterion; 287
- Commitment process; 286
- Committed; 77
- Common Architecture; 399
- Comparative Analysis
- Combined reservation station and reorder buffer; 129
 - Pentium II micro-ops; 124
 - Predecode logic; 118
- Compatibility test suite; 12
- Compatibility testing; 8, 10
- Completion of operand transfer; 240
- Compression refers to reducing file sizes; 350
- Condition code; 107
- Condition code dependent (see cc-dep and cc-dependent); 151
- Configuration register; 99, 102
- Connectivity describes the interconnection of PC platforms, particularly with servers, via data communications and network technologies; 350
- Connectivity refers to the connection of a PC platform to computing, storage, or I/O resources; 495
- Consumer PC refers to a desktop platform targeted at, and optimized for, the consumer market segment; 325
- Consumer segment is the PC market segment centered on providing entertainment or amusement, self-paced education (especially for school-age children), and enhancing personal productivity, while meeting acute cost sensitivities; 328
- Content connotes the type of subject matter that the user chooses to access or manipulate on the platform; 498
- Contention means the simultaneous competition for a system resource, in particular a bus. Such competition results in stalls and increased latencies; 471
- Contention resolution logic; 280
- Continuous numbering of Ops; 281
- Co-simulation describes the situation where two different types of models are simulated together (see co-verification); 27
- Co-verification is a process which attempts to prove the functional equivalence of two representations of a design (see co-simulation); 27
- CPUID instruction; 466
- Critical-item first burst orders retrieve the critical-quadword first; 422
- Critical-item refers to the requested location within a cache line; 422
- Crossing transfer refers to a data transfer carried out over two coupled buses via a bus-bridge; 479
- Crossing-transfers selectively couple the processor bus with the PCI bus; 393
- Cycle time is the access time plus the precharge interval; 431
- Cycle-accurate model; 25
- Cycle-based simulation; 25
- ## D
- DAC (digital-to-analog converter); 335
- Data concentration refers to multi-user access to storage servers via networking technologies, with an emphasis on reducing client storage; 497
- Data Over Cable Service Interface Specifications; 353
- Data staging; 370
- Data -TLB (also called D-TLB); 79
- D-cache; 173
- D-cache TLB; 180
- Debug mode; 97
- Debugging a design; 25
- Decode PC refers to the pointer into the instruction buffer that points to the start of the instruction to be decoded; 122
- Decoder combinations; 126
- Decoder Op format; 143
- Decoder OpQuad; 128, 184
- Decoder OpQuad field notation; 199
- Decoder OpQuad LdOp and StOp format; 143
- Decoder OpQuad LImm Op format; 158
- Decoder OpQuad RegOp format; 150
- Decoder OpQuad SpecOp format; 155
- Decoding of x86 instructions; 123
- Decompression refers to restoring compressed files to original form; 350
- Decoupled decode/execution occurs in a microarchitecture when the decode of instructions takes place independently of the issuing and execution of operations (see decoupled execution/commitment); 77

- Decoupled decode/execution structure; 160
- Decoupled execution/commitment microarchitecture
 - occurs in a microarchitecture when the execution of operations takes place independently of the commitment of the results of these operations (see decoupled decode/execution); 77
- Decoupled execution/commitment structure; 160
- Deep pipeline; 161
- Default handler address; 141, 171
- Defining a processor's instruction set architecture; 13
- Departmental servers are used in organized collections of servers used in divisional or secondary data centers. They support site intranets, project databases, and departmental services such as e-mail and remote access modem connections; 326
- Dependence checks; 225
- Dependencies; 132
- Dependency checking; 225
- Design for Testability (DFT); 9
- Design Notes
 - Abortable, permanent, and non-abortable state changes; 274
 - Address Signals and Address Control in the AMD-640; 458
 - Alternate handler address (see default handler address); 171
 - Architectural register file ports; 254
 - Cache related issues; 73
 - Clearing byte marks 1; 280
 - Clearing byte marks 2; 281
 - Committing and retiring OpQuads; 273
 - Configuration Register Access in the AMD-640; 446
 - Decoder OpQuads, scheduler OpQuads, and OpQuad templates; 141
 - Default handler address (see alternate handler address); 171
 - Definition of a NoOP; 158
 - Difference in BLL and SLL Op; 152
 - Distinguishing Socket 4, 5 and 7 Devices; 413
 - DRAM Type and Size Support in the AMD-640; 460
 - Dual ported; 167
 - Dual ported TLB; 167
 - Enhanced RISC86 microarchitecture; 71
 - Execution of status flag dependent Ops; 131
 - Expanded segment register address space; 148
 - False self-modifying code traps; 136
 - FPU register renaming; 312
 - Independent commitments; 275
 - Indirect register names; 140
 - Interpretation of RegOp type field; 151
 - K6 3D code optimizations; 65
 - L1-Cache design; 111
 - LdOp worst case misaligned access; 172
 - Linearly indexed cache; 79
 - Memory aligned; 80
 - Memory Bank Configurations in the AMD-640; 452
 - Memory Bank Selection for Asynchronous DRAM in the AMD-640; 454
 - Microarchitectural faults and traps; 85
 - Multiple Ops within an OpQuad requiring abort cycle processing; 279
 - Number of MMX registers; 91
 - One memory write per cycle; 286
 - Operand forwarding; 236
 - OpQuad retirement; 296
 - Physically tagged cache; 79
 - Position in the scheduler and program order; 132
 - Register aligned; 80
 - Register bypassing; 236
 - Register size specification; 93
 - RegOp bumping; 247
 - Representation of an invalid Op; 208
 - Restarting the upper portion of the processor; 86
 - Scheduler entries hold register and status flag results; 187
 - SDD and SD2D bits; 101
 - Simplifications and reductions in logic; 259
 - Simultaneously decoding ESC and MMX instructions; 126
 - Sources of Main Memory Traffic; 444
 - State and position are independent; 131
 - StOp worst case misaligned access; 174
 - Store data register value for a StOp; 224
 - System BIOS Memory Detection using the AMD-640; 459
 - Transparency of cloned LdOps; 172
 - Transparency of cloned StOps; 174
 - Unsuccessful predecode; 120
 - Upper limit of memory; 103
 - Using C++ as an HDL; 24
 - Valid source operand bytes for CHKS and WRDR; 153
 - VCC2DET; 418
 - ZEXT8, SEXT8, ZEXT16, and SEXT16 RegOp; 152
- Designed for Windows; 339
- Designed for Windows refers to the Microsoft logo used in

- Microsoft's logo certification program; 321
- Desktop Management Task Force; 348
- Desktops are typically used predominantly by one person, for one or a few key applications, such as word-processing, database entry or management, or Web browsing; 326
- Detail and simulation; xviii
- Device Bay; 344
- Device Bay refers to an initiative intended to make installation of new peripherals as easy as inserting a game cartridge; 345
- Device driver refers to a low-level software that interfaces device independent I/O routines in the OS to a specific type or specific instance of a peripheral device; 338
- Digital audio refers to music, voice, and sound effects that are at least partially created, transmitted, stored, or received, using PCM techniques; 336
- Digital Signal Processing; 335
- Digital Subscriber Line; 354
- Digitization is the sampling and coding of an analog signal into a digital word; 335
- DIMM, or Dual SIMM, is a popular type of DRAM packaging. DIMMs have 168-pins and support 64-bit wide memory data widths; 44
- Direct Rambus Channel refers to a two-byte wide double-data rate Rambus Channel; 436
- DirectX; 344
- DirectX refers to low-latency and high-performance Win 32 APIs, which give the performance effect of writing direct to hardware, while maintaining register-level independence; 342
- Discrete Monitor Timings (DMT); 410
- Disk cache refers to a cache integral to a hard disk; 370
- Displacement; 78, 115, 148
- Displacement buses; 224, 242
- Displacement operand forwarding; 242
- Display adapter; 388
- Display adapter refers to the PC system component that drives the display. It typically includes video memory, a 2D/3D graphics accelerator, and a video accelerator; 46
- Display stage refers to the 3D graphics pipeline stage wherein pixels are painted to the display. The pixels are generated as a function of the bit maps drawn in the frame buffer by the Rendering Stage; 490
- Distributed DMA; 399
- DMA; 381
- DMI; 348, 349
- DMI (Desktop Management Initiative) defines a very general operating-system-and device-independent means to interface management (control) applications with controllable devices; 348
- DMTF (Desktop Management Task Force) refers to the industry consortium chartered with development, support and maintenance of management standards for PC systems and products, including DMI; 348
- DOCSIS (Data Over Cable Service Interface Specifications) is a family of interoperability certification standards for cable modems that are based on TCP/IP protocols; 353
- Dolby Surround AC-3, or AC-3, refers to Dolby Labs specification for a "5.1" channel PC implementation of Dolby's Surround Sound movie-theater sound technology; 337
- Dolby Surround Digital; 337
- Doubleword refers to a 32-bit object; 420
- DRAM memory relies on charge storage techniques and requires periodic refresh (reading and rewriting) to maintain the integrity of its contents. DRAM is known for high-density storage; 43
- DSL (Digital Subscriber Line); 354
- DSP; 368
- DSP (digital signal processing) is the arbitrary processing (filtering or other manipulation) of signals in the digital domain; 335
- D-TLB; 79, 167
- DWDM (Dense Wave Division Multiplexing) was a precursor to UWDM; 364
- Dynamic field; 185, 196
- Dynamic field DBN; 213
- Dynamic field DestBM; 209
- Dynamic field DestVal; 209
- Dynamic field exec; 209
- Dynamic field OprndMatch_XXsrcY; 212
- Dynamic field state; 130, 205
- Dynamic field StatMod; 211
- Dynamic field StatVal; 212
- Dynamic field storage element operation; 190
- Dynamic fields can be changed as the Op proceeds through the scheduler (see static fields); 185
- ## E
- E1 is a European variant of T1; 366
- Ease-of-use; 368
- ECP (Enhanced Capabilities Port); 403
- EDIF (Electronic Design Interchange Format); 19

Effective data rate; 472

Effective Data Rate provides the real throughput at which a large byte-count data transfer is being accomplished; 472

EISA Bus, or Extended Industry Standard Architecture Bus, is a legacy bus popular in servers. Its use in PC platforms is being phased out; 41

Engineering approach to designing, implementing, testing and fabricating processors; vii

Engineering approach to integrating procesors into various platforms and systems; vii

Enhanced RISC86 microarchitecture; 71

Enhanced User Experience; 368

Enhanced Video Connector; 372

Enterprise Network refers to multiple LANs that can be coupled and interconnected via a variety of techniques to encompass an entire site or multiple sites at a large company; 362

Enterprise Segment refers to the PC market segment that focuses on networking a client-server galaxy managed and linked via a large routing and switching network to logically integrate resources and provide distributed and remote computing service; 328

Enterprise servers are designed for use in the principal data centers of large enterprises. They support corporate intranets, large transactional databases, and other applications requiring centralized processing or control; 327

Entertainment PC refers to the ultimate PC for audio/visual and game enthusiasts, with the best graphics, video, and audio of any platform class; 327

Environment substitution; 138, 140

Environment substitution logic; 184

EPP (Enhanced Parallel Port); 403

Ethernet refers to a Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol to allow many networked computers to share a single network cable; 356

EVC; 375

EVC (Enhanced Video Connector) refers to a hybrid combination of USB and IEEE 1394 for connecting monitors with the system unit; 372

Event-driven simulator; 25

Exception decoder; 123

Execution pipelines; 158

Explicit register renaming; 304

Extended Data Out (EDO) DRAM; 431

Extended ISA Bus; 382

F

Fast Ethernet; 358

Fast Ethernet refers to a 100 Mbps Ethernet extension; 356

Fault; 83, 168, 175

Fault and trap handling; 169

Fault control; 98

Fault ID register; 170

Fault Op commitment; 292

Fault PC register; 99

Fax-modems are modems supporting common fax standards; 350

File Transfer Protocol; 366

Flash EPROM, or Flash Electrically Programmable Read Only Memory, is the nonvolatile memory PC platform component used to store the system BIOS. The device can be reprogrammed by the PC platform with BIOS revisions; 40

Flexible motherboard refers to a Socket 7 motherboard capable of being configured for either split-plane or unified-plane processors; 418

FM Synthesis emulates musical instruments and generates sound effects by artful combination and control of many analog oscillators, mixers, and special wave-shaping analog signal processing circuits; 336

Footprint refers to the amount of furniture-top surface area required by a PC; 374

Force leading NoOps logic; 140

FPM (Fast Page Mode) DRAM; 431

FPU (floating-point unit); 77, 82

Fractional speed bus refers to a bus that supports core clock multiplication controls, such that the core can operate at fractional multiples greater than the bus speed; 419

Frame buffer refers to that portion of the video memory used to compose images for subsequent display; 47

Front-buffer refers to the frame buffer in a two frame buffer implementation from which the display is refreshed; 48

Front-side caches are placed on the processor's local bus; 45

FTP (File Transfer Protocol) is a TCP/IP-compliant sub-protocol for file transfer; 366

Full-custom design; 21

Full-custom macro blocks; 30

Functional simulator; 9

Functional testing (also called behavioral testing); 8

G

Gate level model; 26
 Gate level simulation; 26
 Gate-level simulator; 9
 General control; 96
 General purpose register; 89
 Geometry stage; 488
 Ghost cards are single cards that appear at multiple bus/
 device/function coordinates; 401
 Gigabit Ethernet; 365
 Gigabit Ethernet refers to a 1000 Mbps Ethernet
 extension; 356
 Global control logic; 136, 228, 253
 Golden representation; 22
 Graphical User Interface; 330
 Graphics adapter (see display adapter); 408
 GUI (Graphical User Interface) is a user interface typified
 by the use of on-screen menus and icons to represent
 programs, program controls, and data objects.
 Controls and objects are activated by a button-press
 while using a hand-held pointer; 330

H

Handshakes refers to additional status signals frequently
 included among bus signals to pace the progress of
 transfers over the bus; 383
 Hardware Compatibility List; 322
 Hardware Compatibility Tests; 322, 347
 Hardware decoders; 139
 Hardware emulation; 26
 Hardware-software co-design; 2
 Hardware-system co-design; 2
 HCL (Hardware Compatibility List); 322
 HCT (Hardware Compatibility Tests); 322
 HID; 350
 HID (Human Interface Device); 342
 High performance pipeline; 161
 High-color is a 16-bit display adapter color mode that
 achieves very good quality images, but less than
 photographic quality; 51
 Historical Comments
 Bit-mapped graphical user interfaces (GUIs) with
 windows; 331
 Cache related issues; 73
 Design and implementation of high performance
 pipelines; 161
 Early environment substitution techniques; 186

Environment substitution; 138
 Expanding microinstructions; 144
 Factors Leading to the Success of PCI; 390
 Hypertext; 332
 Instruction window (see reservation station); 76
 K6 3D Technology; 75
 Legacy Hardware; 41
 Naming the vector decoder; 123
 Operand forwarding; 236
 Peter Kogge's insightful book; 70
 Pipeline design; 302
 RAMDAC; 52
 Raster Displays; 48
 Register bypassing; 236
 Register renaming; 94
 Reorder buffer; 134, 308
 Reservation station (see instruction window); 76
 Return address stacks in microprogrammable
 processors; 216
 The evolution of architecture description
 languages; 16
 The K6 floating point unit; 82
 The VESA Local Bus (VL Bus); 389
 The von Neumann machine; 14
 Verification technology; 25
 x86 instruction set architecture MMX extensions; 74
 Hit under miss scheme; 111
 Hold-time requirements; 30
 Host controller refers to the hardware and associated
 software that manages a USB or IEEE 1394 bus; 372
 Host machine (see virtual machine); xi
 Hot connectivity indicates that devices can be regularly
 added or removed while the system is operating
 normally and without any adverse effects; 42
 Hot Plug (see Hot); 399
 Hot refers to a device inserted or removed while the
 system is powered and otherwise running
 normally; 345
 Hot-swappable (see hot); 376
 HTML; 350, 365, 366
 HTTP; 362, 365
 HTTP (Hyper Text Transfer Protocol) is a TCP/IP-
 compliant sub-protocol for Web navigating; 366
 Human Interface Device; 342
 Hydra (a Microsoft Windows terminal); 349
 Hyper Text Markup Language; 366
 Hyper Text Transfer Protocol; 366
 Hypertext Documents refers to documents containing

point-and-click activated text or graphics objects. The reader activates these objects to move within the same document, to go to a new machine-readable document; 332

I

- I/O address space is the address space nominally used for I/O peripherals; 381
- I/O window refers to decoded address regions for I/O; 401
- IAB (Internet Architecture Board); 367
- I-Cache TLB; 180
- IEEE 1394; 324, 330, 342, 344, 346, 372, 375, 402
- IEEE 1394 is a new standard for high-speed serial peripherals designed for hot plug and play connectivity; 43
- IEEE 1394 Trade Association; 377
- IEEE 802-1990; 361
- IEEE 8802-2
 - 1994; 361
- IEEE 8802-3
 - 1996; 361
- IESG (Internet Engineering Steering Group); 367
- IETF (Internet Engineering Task Force); 367
- IHV; 342
- IHV (independent hardware vendor); 322
- ILP (instruction level parallelism); 369
- Immediate values forwarding; 242
- Implicit register renaming; 307
- Implicit renaming scheme; 93
- Incident-Wave Switching is a propagation technique, in which bus drivers drive the signal traces to the final switching voltage and the traces are terminated and laid out to minimize reflected waves; 395
- Independent commitments; 275
- Independent Hardware Vendors; 322
- Indirect register names; 140
- Initial vector OpQuad generation logic; 142
- Initiator refers to the master device in a bus transfer; 396
- Instruction boundary; 113, 117
- Instruction buffer; 113
- Instruction decode control register; 100
- Instruction fetch; 113
- Instruction length; 117, 121
- Instruction Level Parallelism (ILP); 181
- Instruction register; 98, 113
- Instruction register 1; 113
- Instruction register 2; 113
- Instruction Set Architecture; 368
- Instruction set architecture (see architecture); xi, 4
- Instruction window; 76
- Instruction-TLB (also called I-TLB); 112
- Integer architectural register set; 89
- Integer microarchitecture register set; 90
- Integer register; 89
- Integrated Services Digital Network; 352
- Intel 80286; 381
- Intel 8086; 381
- Intel 8088; 381
- Intel Pentium processor; 390
- Interleaved memory pages increase the number of page-mode devices generally available to all execution threads; 449
- Interleaved refers to overlapped memory cycles in multiple memory banks; 449
- Internet; 362, 365
- Internet Official Protocol Standards; 367
- Internet refers to an interconnected conforming system of networks used for global file transfer and data communications; 365
- Interpolation is the inverse of subsampling; 49
- Interpolation is the recreation of chroma information from a subsampled YUV data stream; 51
- Interrupts; 83
- Interstitial grid PGAs have alternating pin rows/columns that are collinear, while adjacent pin rows/columns are offset by half the pin-spacing; 411
- Intranet refers to an Enterprise Network that uses the Internet standard Transmission Control Protocol / Internet Protocol and related HTTP addressing standard; 362
- Invalid cache coherency states; 109
- Invalid cache line; 110, 111
- Invalid cache subblock; 110
- Invalid Op; 86, 208, 256
- Invalid operand value; 223
- Invalid OpQuad; 184, 192, 194, 216
- IPC (instructions per clock cycle); 369
- IRQ refers to interrupt request; 381
- ISA; 389, 391, 402
- ISA Bus; 324, 381, 382, 384, 385, 386, 389, 390, 391, 393, 395
- ISA Bus, or Industry Standard Architecture Bus, was the peripheral bus used in the PC/AT, and is the most important legacy bus in PC platforms. Its use in PC platforms is being phased out; 41

ISA/EISA Bus; 387
 ISDN (Integrated Services Digital Network) is a family of switched (dial-up) digital telephone services that use existing telephone wiring; 352
 ISP (internet service provider); 350
 ISPs; 366
 Issue logic; 76
 Issue selection logic; 133, 228
 Issue selection phase; 222, 253
 Issueable to XXX; 229
 ITU; 355
 ITU (International Telecommunications Union); 351
 ITU-T Series V Recommendations refer to ITU Telecommunications standards for data communication over the telephone network; 351

K

K6 3D Technology; 75
 Key refers to a cut in an edge connector used to properly align the connector in its card slot; 397
 Key segment refers to an obstructed portion of an edge connector slot over which a matching key is inserted; 397

L

L1 D-Cache access logic; 166
 L1 D-Cache read interface; 179
 L1 D-Cache write back interface; 179
 L1 I-Cache (L1 Instruction Cache); 70
 L1 I-Cache read interface; 179
 L1-Cache; 72, 108, 111
 L1-Cache, or Level-One-Cache, is generally the cache that is placed closest to the processor in the memory hierarchy; 44
 L2- Cache write back interface; 179
 L2-Cache; 72, 108
 L2-Cache, or Level-Two-Cache, is a cache that is generally one level removed from the processor in the memory hierarchy by the intervening L1-Cache; 44
 LAN (local area network) is a means to electronically transfer files at high speeds (commonly 10 Mbs migrating to use of 100 Mbs) between interconnected PC platforms within the confines of small offices or workgroups; 325
 Laptop; 374
 Laptop refers to a mobile computer that can be used on one's lap; 327

Large displacement; 148
 Latencies; 83
 Latency refers broadly to the duration of a delay. With respect to stalls, it is a measure of how much time is lost idling; 469
 LdEntry signals; 193
 LdOp abort cycles; 170
 LdOp field descriptions; 143
 LdOp misaligned access; 171
 LdOp pipeline (also called the LU pipeline); 162
 LdOp-StOp ordering logic; 134, 225, 248
 Ld-St ordering determination logic; 251
 Ld-TLB; 167, 171, 172
 Lead-off refers to the address and first data item sent in a burst-mode transfer; 393
 Legacy I/O on the PCI Bus; 399
 Levels of abstraction; 3
 LIMM Op field descriptions; 158
 Linear address; 172
 Linear burst order refers to a burst order in which each quadword in the cache line is fetched in sequential order; 422
 Linearly indexed; 79, 111
 Lite ADSL; 355
 Little Endian ordering is an ordering in which the address of the object corresponds to the least significant byte, and bytes of greater significance within the object correspond to higher byte addresses; 420
 Load alternate handler address; 141
 Local area networks; 325
 Logical address; 172
 Logical design refers to the actual logic and circuit designs used to realize the microarchitecture specifications; xi
 Logical implementation (see logical design); xi
 Logo Certification refers to Microsoft permitting hardware vendors to use special Microsoft logos in the marketing of products that meet certification guidelines; 321
 Long decoder; 123, 125
 Lower portion; 85, 86, 88, 170, 173, 176, 194, 227
 LRU replacement; 72
 LU (load execution unit); 77, 158
 LU pipeline (also called the LdOp pipeline); 162

M

Main memory; 324, 408
 Manageability features include ACPI, centralized administration, and upgradability for remote boot

- capability; 325
 - Mask generation; 33
 - MCNS specifications; 353
 - Meltdown refers to an annual software/hardware compatibility testing event; 343
 - Memory address space is the address space nominally used for memory devices; 381
 - Memory aligned; 80
 - Memory controller; 408
 - Memory Controller refers to a device that controls main memory; 443
 - Accommodation of different bank capacities and widths; 451
 - Address decoding; 456
 - Address multiplexing; 456
 - Address relocation; 456
 - Bank-by-bank timing control; 451
 - Bank-pairing permits two, 4-byte-wide, identical banks to function in unison as one 8-byte-wide bank-pair; 451
 - Determination of timing diagram behavior; 453
 - Emission of SDRAM commands; 454
 - Processing of bus transaction commands; 453
 - Memory controller's state-machine controller controls all aspects of the memory controller's behavior, including address processing, data staging, data routing, and the activation and timing of all interfaces; 446
 - Memory read fault handling; 291
 - Memory window refers to decoded address regions for memory; 401
 - Memory write commitment; 285
 - Memory writes; 278
 - Memory-mapped; 404
 - Memory-mapped peripherals have control, status, or data storage location in the memory address space; 381
 - MESI is a four state cache-coherency protocol that is used in multiprocessor systems in which each processor has one or more caches associated with it; 110
 - Micro Channel Bus, is an IBM proprietary legacy bus. Introduced in the late 80's, it was not widely used compared with other legacy buses; 41
 - Microarchitectural machine state; 88
 - Microarchitectural register file refers to the set of registers accessible by the microarchitecture. The microarchitecture typically has a different number of registers than the architecture, most often a larger number; 88
 - Microarchitecture refers to the set of resources and methods used to realize the architecture
 - specification; xi
 - Microprocessor chips are the physical implementations of a logic design in a given semiconductor process technology; xii
 - MIDI (Musical Instrument Digital Interface) is a protocol and interface standard for the flexible control and operation of music synthesizers; 336
 - MIF (Management Information Format) refers to the language used to describe the manageable device attributes of DMI controllable devices; 348
 - Misaligned access; 79, 169
 - Mispredicted BRCOND Op handling; 295
 - MMreg; 91
 - MMregm; 91
 - MMX; 74, 90, 368
 - MMX/3D operands; 239
 - MMX/3D register; 90, 308, 310
 - MMX/3D status bits register; 102
 - Mobile; 370
 - Mobile refers to a portable computer that can be used solely on batteries or directly or indirectly on 12 volt power; 327
 - Model of the microprocessor at the RTL level; 16
 - Model specific register; 94, 95
 - Modem is short for modulator-demodulator, a device that encodes a digital data stream into analog tones for transmission over an analog communications link and subsequently decodes the tones back to digital form; 350
 - ModR/M byte; 120
 - ModR/M instruction; 120
 - Multimedia; 388, 390
 - Multimedia refers to the ability to augment a static program display with music, sound effects, informational audio messages, video clips, or dynamic graphics and animation, and particularly the simultaneous combination of these; 333
 - Multiple simultaneous full and partial writes; 280
 - Musical Instrument Digital Interface; 336
- N**
- Navigation refers to locating and selecting programs and data; 330
 - Negative Decode; 479
 - Net News Transfer Protocol; 366
 - Net PC; 349
 - Netlists; 28
 - NetPCs; 497

Network adapter refers to a combination of the MAU and LAN controller; 357

Network PCs are thin clients that are designed specifically for remote configuration and management and are basic devices intended for basic business presentation and report development, collaborative tools, and intranet communications; 328

Network segment refers to a portion of a network having a unique address. Different network segments necessarily have different addresses; 357

NNTP (Net News Transfer Protocol) is a TCP/IP-compliant sub-protocol for newsgroups; 366

Non-abortable changes can not be backed out of once they are performed (see abortable); 73

Non-abortable RegOp; 259

Non-abortable RegOp execution synchronization logic; 270

Non-abortable RegOp logic; 258

Non-blocking; 111

Nonvolatile memory retains its contents when power is removed; 40

North-Bridge; 408, 443

North-Bridge typically has separate ports (interfaces) to the processor, main-memory, the primary peripheral bus and possibly an external cache; 39

NP code offset register; 104

NP code selector register; 103

NP Configuration register; 104

NP data offset register; 104

NP data selector register; 104

NP presence register; 103

O

OC-1 (Optical Carrier Level One) is the basic building block channel capacity for the Synchronous Optical Network (SONET) standard. Each OC level is corresponding multiple of the OC-1 rate of 51.84 Mbps; 365

OC-12; 365

OC-12 refers to a 622 Mbs optical channel (see OC-1); 365

OC-3 refers to a 155 Mbs optical channel (see OC-1); 365

OCU (op commit unit); 76, 129, 272

Office PC refers to a desktop platform targeted at and optimized for the commercial market segment; 325

Oldest Ops; 129

Oldest scheduler Op entry; 188, 229, 236, 249, 260

OnNow; 342, 344, 347, 349

OnNow refers to a platform that appears off yet immediately responds when called upon by the user or other devices. It is also an industry initiative and standard for enabling OS awareness of power use and requirements for all system components; 346

Op commit unit; 129

Op entry; 129

Op issue stage; 162

Op Issue stage logic; 222

Op sequence field; 141, 155

Opcode map; 101

Opcode register; 103

Open-architecture design refers to one whose associated intellectual property (such as patents, copyrights and trade secrets) is generally licensed to all interested parties with possibly only modest administrative fees; 41

Operand buses; 83, 223, 235, 238, 239, 241

Operand fetch stage logic; 223

Operand forwarding; 236

Operand information broadcast; 232

Operand information broadcast phase; 223, 252, 253

Operand information bus; 233, 239

Operand information buses; 238

Operand multiplexer logic; 257

Operand selection logic; 134, 235

Operand selection phase; 223

Operand selection scan chain; 237

Operand status bus; 239

Operand transfer logic; 238

Operand transfer phase; 223, 252

Operating systems; 330

OpInfo field; 234

OpQuad; 94

OpQuad buffer; 88

OpQuad execution environment registers; 140

OpQuad expansion logic; 136, 184

OpQuad field; 198

OpQuad field BPTInfo; 214

OpQuad field Emcode; 213

OpQuad field Eret; 214

OpQuad field FaultPC; 214

OpQuad field FPOP; 217

OpQuad field ILen0; 217

OpQuad field LimViol; 216

OpQuad field OpQV; 216

OpQuad field RASPtr; 215

OpQuad field Smc1stAddr; 218
 OpQuad field Smc1stPg; 218
 OpQuad field Smc2ndAddr; 218
 OpQuad field Smc2ndPg; 218
 OpQuad retirement; 295
 OpQuad ROM; 138
 OpQuad sequence; 94, 125, 137
 OpQuad sequence branch; 156
 OpQuad sequence subroutine; 142
 OpQuad sequence subroutine branch; 142
 OpQuad template; 140
 OpQuad Valid bit; 206
 OpQuad Valid fields (OpQV); 207
 OpQuadY, OpQY, and OpX; 188
 OpValid bits; 253
 OS; 343, 344, 346, 374
 OS (operating system); 330
 OSs; 339

P

P5; 414
 P54C; 414
 P55C; 7, 419
 Packaging; 33
 Packed pixel data is found in conjunction with wide data paths to video memory. Multiple pixels may be assembled into a single data word, possibly with pixel data straddling word boundaries; 52
 Page fault register; 98, 99
 Page-mode accesses refer to subsequent consecutive access to locations within the same column, which do not require a sense amp precharge and thereby have reduced cycle time; 431
 Passive termination refers to the absence of required handshakes by a semi-synchronous bus operating in a synchronous fashion; 383
 PC 98 System Design Guide; 321
 PC Design Guides and Specifications are a running series of published guides and specifications that have become the overarching standards governing all aspects of PC platform architecture; 321
 PC/AT; 381, 382
 PC/AT, or Personal Computer/Advanced Technology, was IBM's widely emulated 1984 PC design that continues to have a pervasive residual impact on many aspects of the design of PC platforms; 41
 PCI; 324, 386, 392, 393, 396, 397, 399, 402
 PCI Bus; 408
 PCI power management permits PCI cards to power down when not in use and power up on demand; 399
 PCI SIG (Peripheral Component Interconnect Special Interest Group); 400
 PCI-Bus configuration space; 446
 PCI-to-PCI Bridge refers to a bridge that couples multiple instances of the PCI Bus; 394
 PCM (Pulse Code Modulation) is the digitization of analog signals, intermediate transmission, storage, and signal processing in the digital domain and eventual analog reconstruction; 335
 PDF; 350
 PDF refers to a standard file format for distributing presentation-quality formal documents having both images and text. Users are not required to have the same creative tool used by the publisher in order to view and print the work; 331
 Peer interconnect points refers to high-bandwidth junctions that interconnect the backbones of the national and regional Internet providers; 365
 Peer-to-peer networking refers to the networking of roughly equivalent PC platforms; 362
 Pending faults; 276
 Per block latencies; 371
 Per-block latency refers to the time penalty incurred on each individual block in a large transfer. The time penalty is due to overhead delays; 472
 Performance testing; 8
 Peripheral Component Interconnect Special Interest Group; 400
 PGA (Pin-Grid-Array); 411
 Physically tagged; 79, 111
 Pin-Grid-Array; 411
 PIO (Programmed I/O); 404
 Pipeline design; 302
 Pipeline stage; 159, 161
 Pipelined bus cycle; 112
 Pipelined cache; 73
 Pixel; 331
 Pixel, or picture element, refers to the smallest resolvable or addressable feature of a computer display; 48
 Platforms and Systems (References to Related Documents)
 "D Designed for windows" logo qualification standards; 325
 ADSL specifications; 355
 Asymmetric Digital Subscriber Line (ADSL) Forum; 355

- Big and Little Endian Byte and Bit Ordering; 420
- Data Over Cable Service Interface Specifications (DOCSIS); 353
- Desktop Management Task Force (DMTF); 348
- DirectX; 343
- DMI specification; 348
- Ethernet and Fast Ethernet Manufacturers; 358
- IEEE 1394 Trade Association (1394 TA); 377
- International Telecommunications Union (ITU); 351
- Internet Protocol Standards; 367
- Microsoft's Simply Interactive Personal Computer (SIPC) Initiative; 344
- Microsoft's Total Cost-of-Ownership (TCO) Initiative; 348
- Microsoft's Zero Administration Initiative for Windows; 349
- OnNow Specifications; 347
- PC Design Guides; 325
- Peripheral Component Interconnect Special Interest Group (PCI SIG); 400
- Plug-N-Play Specifications; 339
- Portable Document Format (PDF); 332
- SCSI Specifications; 380
- SCSI Trade Association; 379
- Secondary SCSI technical documents; 380
- The group known as Device Bay; 346
- Universal Serial Bus Implementers Forum (USB-IF); 374
- VESA Enhanced Video Connector (EVC); 375
- VESA monitor standards; 410
- Video Electronics Standards Association (VESA); 410
- Platform Performance Optimization Basics; 467
 - Bridge/Controller; 479
 - Bus Optimization at the Component Level; 478
 - Bus Optimization at the Platform Level; 470
 - Compilation of all Optimization Basics; 493
 - Concurrency Optimization; 476
 - Data Storage; 477
 - General Platform Principles; 468
 - Platform Data-Staging; 475
 - Stipulations and Caveats; 467
 - Platforms consist of a number of key components and interconnections on a motherboard and typically include a high-performance peripheral bus and ports, main memory, an I/O module, and a processor module; xiv
 - Plug and Play; 324, 372, 395
 - Plug and Play, Plug-n-Play or PnP, enable the management of peripheral cards for the optimal system assignment of I/O addresses, Interrupt Request (IRQ) select line, and Direct Memory Access (DMA) channels; 339
 - Plug-n-Play; 387
 - PM (Page Mode) DRAM is a DRAM that permits page-mode accesses, which has been a baseline requirement in PC platforms since page-mode support became common in highly integrated memory controllers; 431
 - PnP; 342
 - Point-and-click interface; 330
 - Points of presence; 366
 - POP (point of presence) refers to ISP provided Internet access locations for businesses and consumers; 366
 - POP3 (Post Office Protocol 3) is a TCP/IP-compliant sub-protocol for electronic mail (e-mail); 366
 - Portable refers to a personal computer that is capable of being carried, and in which the motherboard, keyboard, pointing device, and display are generally integral to a single package; 327
 - Positional Audio; 336
 - Positive Decode; 479
 - POST (Power-On-Self-Test); 459
 - Post Office Protocol 3; 366
 - Precise exceptions; 177
 - Precise interrupts; 175, 177, 178
 - Predecode analysis logic; 117, 120
 - Predecode bits; 116, 117, 121
 - Predecode cache; 117
 - Predecode pointer; 121
 - Predecoding logic; 115
 - Prediction logic; 105
 - Presentation quality; 368
 - Processes accessing video memory; 485
 - Processor cycle; 70
 - Processor memory mismatch problem; 112
 - Processor recognition; 466
 - Program counter; 117
 - Program order; 77, 129, 132, 176, 300
 - Proprietary design refers to one whose associated intellectual property is not generally licensed; 41
 - Protected mode refers to a privileged or system mode of the processor that protects unprivileged or user mode execution threads from each other; 371
 - Providing a context for studying microarchitecture issues; xvi
 - Providing a context for studying platform and systems

- issues; xvii
 - Pseudocolor refers to the 16-color and 256-color display adapter modes, which employ color palettes to provide space efficient storage for art-work and business presentations; 51
 - Pseudo-RTL descriptions; 189
 - Abort cycle generation; 298
 - Advancing OpQuads in the scheduler; 195
 - Branch target limit violations; 295
 - BRCOND Op resolution logic; 267
 - BumpRUX/Y equations; 248
 - CC-Dependent RegOp synchronization logic; 264
 - Destination register & source operand comparisons; 234
 - Displacement value selection; 242
 - Dynamic field DBN; 213
 - Dynamic field DestBM; 210
 - Dynamic field DestVal; 211
 - Dynamic field Exec1; 209
 - Dynamic field operation; 192
 - Dynamic field state; 207
 - Dynamic field StatMod; 212
 - Dynamic field StatVal; 212
 - Dynamic fields OprndMatch_XXsrcY; 213
 - FAULT Op handling logic; 293
 - Handling mispredicted BRCOND Ops; 295
 - HoldXX0 pipeline control signals; 258
 - Immediate value selection; 243
 - LDDHA and LDAHA Op handling; 294
 - LdOp fault handling logic; 292
 - Ld-St ordering determination logic; 251
 - Non-Abortable RegOp synchronization logic; 271
 - Op_XXX_Iss signals; 253
 - Operand information bus equations; 233
 - Operand multiplexer logic; 257
 - Operand selection scan chain; 237, 238
 - OpInfo field readout; 235
 - OpQuad field BPTInfo; 215
 - OpQuad field Emcode; 214
 - OpQuad field Eret; 214
 - OpQuad field FaultPC; 214
 - OpQuad field LimViol; 216
 - OpQuad field OpQFpOp; 217, 218
 - OpQuad field OpQV; 217
 - OpQuad field RASPtr; 215
 - OpQuad fields Smc1stAddr, Smc1stPg, Smc2ndAddr, & Smc2ndPg; 218
 - OpQuad retirement control; 296
 - OprndInvlD signals; 258
 - OprndStat information; 240
 - OprndStat information for immediate values; 244
 - Register file write enable; 282
 - RegOp bumping logic; 255
 - Scan chain equations; 232
 - SchedFull and SchedEmpty signals; 196
 - Scheduler information for external use; 252
 - Self-modifying code; 272
 - Shifting data from one static field storage element to another; 190
 - Static field IMM; 200
 - Static field OpInfo; 205
 - Static field SrcStBM; 203
 - Static field type; 200
 - Static fields LSrc1Reg, Src2Reg, and SrcStReg; 201
 - Static fields Src1BM, Src2BM, and Src12BM; 203
 - Statis field DestReg; 202
 - Status flag fetching logic; 261
 - Status flag generation and selection; 285
 - Store data operand fetching; 245
 - Write commit logic; 290
 - Pulse Code Modulation; 335
- Q**
- Quadword refers to a 64-bit object; 420
- R**
- RAC (Rambus ASIC Cell); 439
 - Rambus Channel refers to a terminated packet-based memory bus; 436
 - Rambus Interface refers to a circuit that couples master or slave devices to the Rambus Channel; 436
 - RamLink (IEEE Standard 1596.4); 442
 - RAS! (row-address strobe) refers to control signals used to latch the row addresses within the DRAM for accessing the internal rectangular storage matrix; 430
 - Raster Displays use a rectangular array of pixels that are updated via a corresponding rectangular scanning pattern; 48
 - Raster refers to the rectangular scanning pattern used in raster displays; 48
 - Rasterizing is a pixel-centric process of taking image data in any continuous form or model and processing it for storage, transfer, or display as a 2D matrix of modulated-pixel values; 50
 - RasterOps, or Raster Operations, are logical primitives

- defined for manipulating and moving bit-map and pixel-map data; 50
 - Rate degradation; 473
 - Rate Degradation reexpresses the Realizable Data Rate Fraction in terms of a percentage loss; 472
 - RDRAM (Rambus DRAM); 436
 - Read-modify-write refers to a non-interruptible sequence of fetching data, manipulating the fetched data, and storing the manipulated data back to the original location; 443
 - Realizable data rate fraction; 473
 - Realizable Data Rate Fraction provides the ratio of effective data rate to raw data rate and makes explicit what fraction of the raw data rate is being realized; 472
 - Real-time data processing; 334
 - Real-time is the processing of information at least as fast as it is being naturally generated (or needed) by an evolving event; 334
 - Re-examining the abort cycle; 176
 - Reflected-Wave Switching is a signal propagation technique using unterminated buses, in which bus drivers drive an undervoltage incident wave that combines with reflected waves to create the final switching voltage; 395
 - Reg Op bumping; 246
 - Register aligned; 80
 - Register bypassing; 236
 - Register file write enable; 282
 - Register mapping; 94
 - Register number; 91
 - Register renaming; 94, 300
 - Register size specification; 93
 - RegOp bumping; 254, 255
 - RegOp field descriptions; 150
 - RegOp pipeline (RUX pipeline or RUY pipeline or both); 158
 - Relative age determination process; 249
 - Relative age of LdStOps; 249
 - Relocatable registers refers to registers arbitrarily reassignable to new locations; 409
 - Removed; 77
 - Rendering may mean simply rasterizing, but it often connotes surface modeling using a more comprehensive process that is image-perception-centric; 50
 - Rendering stage; 489
 - Reorder buffer; 134, 308
 - Reorder buffers are storage elements that hold the results of uncommitted operations; 134
 - Reservation station; 76, 129
 - Result bus; 240
 - Result buses; 83, 223, 241
 - Retired; 77
 - RGB is a color space model that is directly usable by hardware at the sensor and display level; 50
 - RISC86 operation set; 137
 - Round-robin burst orders begin with the critical quadword and then proceeds sequentially, modulo the cache-line width, generally from low-to-high, but always sequencing in the same direction; 422
 - Row (of the scheduler); 129
 - RSL (Rambus Signaling Logic); 438
 - RTC; 381, 382
 - RTC, or Real Time Clock, refers to the PC platform component that maintains the system clock. A backup battery powers it; 40
 - RUX (Register Unit X); 77
 - RUX execution unit; 158
 - RUY execution unit; 158
- ## S
- Sampling uses a sample-and-hold circuit to repetitively capture analog domain (continuous) voltage levels at discrete time intervals; 335
 - Satellite modem refers to the use of a conventional uplink data modem, for low-or medium-speed (28.8-128 Kbps) client-to-provider data, coupled with a special satellite downlink data modem for medium-speed (400 Kbs) provider-to-client data; 352
 - Scalable Coherent Interface (SCI, IEEE Standard P1596); 442
 - Scaled index; 78
 - Scaling is the magnification or reduction of a selected portion of a raster image; 52
 - Scan chain; 230, 236, 250
 - Scheduler; 128, 183
 - Scheduler entry; 185, 187
 - Scheduler OpQuad; 184
 - Scheduler OpQuad format; 143
 - Scheduler pipeline; 218
 - Scratchpad memory; 95
 - SCSI; 324, 372
 - SCSI Trade Association; 379
 - SCSI-2 refers to Small Computer System Interface - 2 X3.131
 - 1994; 380

- SCSI-related standards; 380
- SDRAM (Synchronous DRAM) interposes a modest encoded and clocked interface between the memory controller and the DRAM core; 434
- Sealed PC, refers to an ideal to provide a PC that never needs to be opened for the installation of after-market adapter cards; 43
- Sealed-case PC; 374
- Sectors refers to groups of 512 bytes; 405
- Segment limit; 79, 89, 175, 216, 277, 294
- Segment limit and access check logic; 172
- Segment limit violation check; 164
- Self-modifying code support logic; 136, 228, 271
- Semi-custom design; 21
- Semi-synchronous protocol refers to a bus that makes use of optional handshakes; 383
- Sequential and branch target segment limit violation handling; 294
- Serialized IRQ; 399
- Server refers to a networked high-performance PC that is a gateway for other PCs to one or more desired resources or concentrations of data; 326
- Setup refers to the Geometry Stage preparation of commands, parameters, and other data that can be readily processed by the Rendering Stage; 488
- Shading in figures; 115
- Shadow-Bios; 456
- Shadow-BIOS refers to the copying of the BIOS from its nonvolatile memory into DRAM, for subsequent fast access; 40
- Shifting Opfields from row to row; 187
- Short decoder 1; 123, 125
- Short decoder 2; 123, 125
- SIB byte; 120
- SIMM, or Single Inline Memory Module, is a popular type of DRAM packaging. SIMMs have 72-pins and support 32-bit wide memory data widths; 43
- Simple Mail Transfer Protocol; 366
- Simply Interactive Personal Computer; 344
- Simultaneously decoding ESC and MMX instructions; 126
- SIPC; 372
- SIPC (Simply Interactive Personal Computer) refers to the umbrella PC initiative that defines the vision of "simple, convenient, and approachable" appliance-like operation; 344
- SLDRAM (Synchronous-Link DRAM); 442
- Small Office/ Home Office; 328
- SMTP (Simple Mail Transfer Protocol) is a TCP/IP-compliant sub-protocol for electronic mail (e-mail); 366
- Socket 4; 414
- Socket 5; 414
- Socket 7; 412, 417
- Socket 7 Bus refers to the processor local bus electrical and mechanical standard first popularized by the Intel P55C processor; 38
- Socket 7 compatible means that the system bus interface is compatible with the industry-standard 64-bit Pentium bus and an industry standard connector is used; 7
- Software Codecs perform compression and decompression functions in software; 335
- SOHO (Small Office/Home Office); 328
- Sound Blaster refers to a register-level hardware standard for audio cards; 336
- Sourcing Ops are Ops that have been selected to be the source of operand values; 255
- South-Bridge; 382, 387, 402
- South-Bridges typically have ports coupling the high-performance peripheral bus with a number of standard I/O ports and optional peripherals; 39
- Special register; 94, 95
- SpecOp field descriptions; 155
- SPGA (Staggered PGA) refers to a PGA using an interstitial grid; 411
- Split transactions refer to operations broken into separate start, operation, and termination phases to increase overall system concurrency; 476
- Splitterless ADSL; 355
- Split-plane processors have separate core and I/O positive power supplies; 415
- SRAM, or Static RAM, is memory that relies on active flip-flop storage techniques. SRAM is known for its high-speed storage; 45
- Staggered PGA; 411
- Stall refers to a platform event in which an executing task is forced to be idle unproductively while some crucial enabling condition is unrealizable or some essential resource is unavailable to the task; 469
- Stalls and latencies; 469
- Standard grid PGAs have all collinear pin rows/columns; 411
- Static field; 185, 196
- Static field DestReg; 201
- Static field Imm; 200
- Static field Opinfo; 204

Static field Src12BM; 202
 Static field Src1BM; 202
 Static field Src1Reg; 200
 Static field Src2BM; 202
 Static field Src2Reg; 200
 Static field SrcStBM; 203
 Static field SrcStReg; 200
 Static field storage element shifting operation; 190
 Static field type; 199
 Static fields retain the same value throughout execution of the Op (see dynamic fields); 185
 Status flag buses; 83
 Status flag commitment; 283
 Status flag dependent Ops; 131
 Status flag dependent RegOp logic; 135, 226, 258
 Status flag fetching logic; 261
 Status flag generation and selection; 285
 Status flag handling logic; 135, 226, 258
 Status flag operand values; 260
 Status flags; 83
 Status register; 96, 98
 Status valid bits; 263
 StOp abort cycles; 172
 StOp misaligned access; 173
 StOp pipeline (also called the SU pipeline); 162
 Storage element; 185
 Store data operand; 244, 245
 Store data register value; 224
 Store queue; 72
 Streaming Media refers streams of information representing captured and digitized analog sources; 334
 String instructions are complex instructions that transfer data byte sequences between source and destination memory locations; 404
 Structural testing; 8
 St-TLB; 167, 172, 173
 SU (store unit); 77
 SU execution unit; 158
 SU pipeline (also called the StOp pipeline); 162
 Sub-block organization; 108
 Subsampling is the periodic omission of chroma samples in YUV video systems to reduce bandwidth requirements; 51
 Subsampling, on color space, is a color-video specific data compression technique; 49
 Subtractive Decode; 479
 Super I/O; 382, 387, 399, 401, 402

Super I/O is a PC platform component that implements many popular secondary peripheral buses and standard I/O ports; 40
 Superpipeline; 161
 Superscalar design; 74
 Synchronous bus refers either to a not-handshaken bus, or a clocked bus, depending on the context; 383
 Synchronous clocks refers to two clock signals which maintain frequency or phase relationships of interest; 383
 Synchronous DRAM; 434
 Synchronous logic refers to clocked logic; 383
 System BIOS; 395
 System extend a platform with a number of essential and optional peripherals, appropriate BIOS code (basic input/output system) and other configuration and power management software, an operating system, and a basic set of applications software; xiv
 System interface; 72
 System Management; 456
 System resources; 395

T

T1; 352
 T1 refers to a 1.544 Mbs leased phone line; 366
 T10; 380
 T3 refers to a 45 Mbs leased phone line; 365
 Table walk unit; 180
 Table walk unit read/write interface; 179
 Target refers to the slave devices in a bus transfer; 396
 Task Oriented workers (e.g., clerks or bank tellers); 349
 TaskStation Mode refers to a NetPC operating mode in which Task Oriented workers are limited to using a single management-specified dedicated application, such as a Web browser or a business application; 349
 TCO (Total Cost-of Ownership) refers to the aggregate cost of administration, technical support, end-user learning, applications development, data management, supplies, capital costs and other miscellaneous costs; 347
 TCP/IP; 354
 TCP/IP (Transmission Control Protocol / Internet Protocol) requires messages to be logically partitioned into multiple packets for all communications links, routers, connected platforms, and compatible communications applications programs; 366
 Technology pull; ix, x
 TELNET is a TCP/IP-compliant sub-protocol for

- interactive teletypewriter-like network access to remote computer systems; 366
- Terminated refers to a signal trace with a matching load impedance connected at the trace's very end; 395
- Test mode; 97
- Test vectors are the collection of values of input stimulus and expected output results for each sequential stage of simulation; 8
- Thick Ethernet refers to Ethernet that uses thick coaxial cable; 356
- Thin clients; 497
- Thin clients rely on networked servers for most or all of their data storage; 328
- Thin Ethernet refers to Ethernet that uses thin coaxial cable; 356
- Time stamp control register; 102
- Timing analysis; 32
- Timing of aborts; 278
- Timing of result commitments; 278
- Translation lookaside buffer (TLB, also see data-TLB and instruction-TLB); 79
- Transmission Control Protocol / Internet Protocol; 366
- Traps; 83, 168, 175
- Tri-state test mode; 97
- True-color is a 24-bit display adapter color mode that is suitable for photographic quality images; 51
- Twisted-pair Ethernet; 372
- Twisted-pair Ethernet refers to Ethernet that uses Twisted Pair wiring; 356
- Universal cards; 397
- Universal cards are PCI cards that have two keys in the edge connector in order that they will fit into either a 5V or a 3.3V slot; 397
- Universal Serial Bus; 324
- Universal Serial Bus Implementers Forum; 374
- Unpacking is the process of parsing a packed video word stream from video memory to extract individual pixels; 52
- Unsuccessful predecode; 117, 120
- Unterminated refers to a signal trace left open-circuit at its very end; 395
- Unzip refers to a file decompression utility; 350
- Upper limit of memory; 103
- Upper portion; 85, 86, 88, 135, 170, 173, 176, 194, 196, 227, 265, 277, 297
- USB; 330, 342, 344, 346, 372, 387, 402
- USB (Universal Serial Bus); 372
- USB, or Universal Serial Bus, is a new standard for low to medium speed serial peripherals designed for hot plug and play connectivity; 42
- USB-IF (Universal Serial Bus Implementers Forum); 374
- Use of specialized parallel decoders; 124
- Using C++ as an HDL; 24
- UTP (Unshielded Twisted Pair) refers to a type of telephone-wiring-like cabling used for 10Base T and Fast Ethernet that is available in a range of performance categories; 356
- UWDM (Ultra Dense Wave Division Multiplexed); 364

U

- UAWG; 354
- UAWG (Universal ADSL Working Group) refers to a group of PC industry, networking, and telecommunications companies, developing a compatible extension to the present ANSI standard T1.413 for ADSL; 355
- UMA (Unified Memory Architecture) refers to a platform architecture in which the video memory is just a region within the main memory and not a dedicated subsystem; 441
- Unified-plane processors have a single positive power supply to which both the core and the I/O circuitry are commonly connected; 415
- Universal ADSL does away with a splitter device that other versions of ADSL require to be installed at the point of entry into each home; 355
- Universal ADSL Working Group; 355

V

- V.17 is an ITU standard for 14,400 bps class 1 & 2 FAX modems; 351
- V.32 bis is an ITU Standard for 14,400 bps data modems; 351
- V.34; 352, 364
- V.34 is an ITU standard for 33,600 bps data modems; 351
- V.90 is an ITU standard for 56,000 bps data modems; 351
- Valid; 79, 122
- Valid cache coherency states; 109
- Valid Op; 256, 293
- Valid operand register bytes; 202
- Valid operand value; 223, 239, 255, 257
- Valid OpQuad; 192, 194, 216
- Valid result value; 209

Valid source operand bytes; 153
 Valid status flag values; 107
 Valid value; 94
 Vector decoder; 101, 123, 125
 Verilog; 22
 Verilog simulator; xix
 VESA; 324, 389
 VESA (Video Electronics Standards Association) refers to an organization that supports and sets industry-wide interface standards for the video electronics industry; 410
 VESA Display Data Channel (DDC); 410
 VHDL (Very high speed integrated circuits Hardware Description Language); 19, 22
 VHDL simulator; xix
 Video accelerator; 490
 Video accelerator refers logic that fetches video data from the video memory and converts all data to fully sampled RGB, which are supplied to a triplet of Digital to Analog Converters (DACs) for driving the display; 49
 Video adapter (see display adapter); 408
 Video memory, located on the display adapter, generally uses high-performance or specialty DRAM to provide storage of bit-maps and related parameters; 46
 Virtual machine (see host machine); xi
 VL Bus; 390, 391, 395
 VL Bus, or VLB (VESA Local Bus) formally defined slots for adding display adapter cards and other high-speed peripherals to a bus that was designed electrically to be a compatible derivative of the Intel 80486 (486) processor local bus; 389
 Volatile memory loses its contents when power is removed; 43
 VRAM, or Video DRAM, refers to a two-ported specialty DRAM intended for video memory applications; 48

W

Wafer fabrication; 33
 Wait cycle (see Wait state); 383
 Wait state is an additional bus clock cycle introduced beyond nominal-case bus-cycle timing; 383
 Wave Division Multiplexing (WDM) techniques are being used to substantially increase the capacity of many existing installed fibers, by modulating multiple light sources of different wavelengths; 364
 Wavetables are sets of digitized samples of musical instruments and other real-world sounds that are stored in ROM or downloaded into RAM; 336
 WBEM (Web-Based Enterprise Management) which supports the sharing of management data across network, desktop, telecom, and Microsoft Windows applications; 349
 WDM (Win32 Driver Model); 330
 Web-Based Enterprise Management; 349
 WHQL (Hardware Qualification Labs); 322
 Win32 Driver Model; 330, 342
 Win32 Driver Model is an architecture for device drivers, which hierarchically splits device drivers into OS-provided device-class drivers and IHV-provided minidrivers; 342
 Windows Hardware Qualification Labs; 322
 Windows Management Interface; 349
 Windows, generically speaking, are display regions associated with an individual program, data file, status message, or control selection; 330
 WinHEC (Windows Hardware Engineering Conference) is a Microsoft event held twice a year; 322
 WMI (Windows Management Interface) defines a low-level instrumentation layer for efficient development of management-instrumented drivers; 349
 Word refers to a 16-bit object; 420
 Wordline refers to a row/control line selected by the row address that enables every storage cell in the addressed page to be coupled to the cell's adjacent bitline; 430
 Workgroup computing refers to the use of a LAN in small offices or workgroups to share data files, directories, or entire disks, and to share expensive peripherals; 362
 Workgroup Segment refers to a PC market segment that focuses on peer-to-peer networking within a local site, while providing connectivity to the centralized computing resources of a parent Enterprise; 329
 Workgroup servers may be found distributed throughout offices to provide file and printer sharing, often organized around the teams reporting to first-line managers and the staffs of higher-level management; 326
 Workstations are high-end desktops, virtually always used by a professional Knowledge Worker engaged in some form of critical intellectual property or content creation; 326
 Write combining refers to the dynamic opportunistic batching by the processor of multiple individual byte writes within a single larger write; 409
 Write commit logic; 288, 290
 Write pipeline/merge unit; 180
 Write pipeline/merge unit interface; 179

Write-back; 370, 444

X

x86; 84

x86 fault; 84

x86 trap; 84

x87 floating-point register; 90

X-Bus (The Extended ISA Bus) refers to a buffered extended variation of the ISA Bus used on a motherboard; 382

Y

Youngest Ops; 129

Youngest scheduler Op entr; 229

Youngest scheduler Op entry; 188, 249, 260

YUV is common usage for a color space model that is popularly used for full-motion digital component video; 50

Z

Z buffer refers to a memory used in 3D rendering to facilitate the relative foreground-to-background ordering of modeled objects; 324

ZAW (Zero Administration Initiative for Windows) is an umbrella initiative intended to reduce needs for user support, increase centralized but flexible control, increase automation of administrative tasks, and maintain or increase user productivity; 349

Zero Administration Initiative for Windows; 325, 349

Zero-Insertion-Force sockets; 411

ZIF; 414, 417

ZIF (Zero-Insertion-Force) refers to a special socket for microprocessors with hundreds of pins; 411

ZIF socket, or Zero Insertion Force socket, refers to a socket that permits a device with large numbers of pins to be dropped into the socket rather than requiring pressure insertion; 38

Zip refers to a file compression utility; 350

