

A Dictionary of
Computing

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addresses by examining the source addresses of incoming packets on each bus.

As each cell passes through each node, the node has the opportunity to convert a single bit within the cell to a request for access to the bus. Each node also maintains counters of requests for access to the bus, and of free cells, and the nodes are thus able to cooperate to implement what is in effect a first come first served queue for access to the two buses.

drag See *CLICK*.

drag and drop A method of manipulating objects (files, blocks of text, etc.) on a graphical user interface by clicking and holding down the mouse button, moving the object to a new position on the screen, and releasing the mouse button. It is possible, for example, to move files between directories in this way or to copy files to CD.

DRAM Abbrev. for dynamic RAM. See *DYNAMIC MEMORY*, RAM.

draughts-playing programs See *CHECKERS-PLAYING PROGRAMS*.

DRAW Abbrev. for direct read after write. In optical or magnetic data storage, a writing technique in which each bit of data is read immediately after it is written. This enables an erroneous sector to be recognized before the next sector starts to be written and errors can be managed accordingly, generally by flagging the defective sector or block and repeating the same data in the next sector. Nearly all magnetic tape drives, and many optical disk drives, use this technique. See also *DRDW*.

The term is sometimes erroneously used in an optical-storage context simply to imply that written information is immediately ready for reading, without an intermediate processing operation such as would be required for photographic recording.

DRCS Abbrev. for dynamically redefinable character set.

DRDW Abbrev. for direct read during write. In optical data storage, a writing technique in which each signal element is check-read as it is written, by sensing the light reflected from the medium. It serves the same purpose as **DRAW*. In magnetic tape storage, the term is sometimes used to mean the same as *DRAW*.

drive Short for disk drive or tape drive, magnetic or optical.

driver 1. A routine within an operating system that handles the individual peripheral units on the computer system. Of necessity a driver routine is required to deal with the intimate details of the construction of each unit and of its real-time behavior. Consequently at least some of the driver will often need to be written in a machine-oriented programming language. 2. An electronic circuit, often available in the form of a logic gate, that is capable of providing large currents or voltages to other circuits connected to the driver's output. These devices are often used to place signals onto bus lines, hence the term *bus driver*.

drop-down menu Another name for pull-down menu.

drop-in In magnetic recording technology (disk and tape), the presence among the signals read from the device of one or more bits that had not been deliberately written there. This is the result of a fault condition, often imperfect erasure of data previously on the medium, and will generally be a problem only in interrecord gaps (elsewhere it will be dealt with by the same means provided for **drop-out*): magnetic tape and disk systems normally have means of identifying and coping with this problem.

drop-on-demand inkjet printer See *INKJET PRINTER*.

drop-out In magnetic recording technology (disk and tape), the loss of one or a sequence of bits due to a fault condition, most frequently a flaw in the recording medium. Magnetic tape and disk systems employ some form of redundancy to detect and frequently correct the resulting data errors.

drum plotter See *PLOTTER*.

drum printer (barrel printer) A type of **solid-font *line printer*, first marketed in 1955 but now obsolete. The font was etched or engraved on the outer surface of a cylinder – known as the *drum* (or *barrel*) – that extended across the full width of the line to be printed.

drum scanner A form of **document scanner* where the original document to be scanned is wrapped around a drum and then scanned by moving the detector head longi-

tional analog signals (*SVGA etc.) in a single connector. *Plug-and-play through hot plug detection is supported. DVI is increasingly being used with LCD displays that are purely digital in operation and there is no need for intermediate analog signals. This simplifies the circuitry and removes many of the synchronizing and aliasing problems encountered with analog-to-digital conversion.

dyadic Having two operands.

dyadic operation (binary operation) defined on a set S . A function from the domain $S \times S$ into S itself. Many of the everyday arithmetic and algebraic operations are dyadic, e.g. the addition of two integers, the union of two sets, and the conjunction of two Boolean expressions. Although basically functions, dyadic operations are usually represented using an infix notation, as in

$$3 + 4, U \cup V, P \wedge Q$$

A symbol, such as $\circ$, can be used to represent a generalized dyadic operation.

When the set is finite, *Cayley tables and sometimes *truth tables are used to define the meaning of the operation.

Dyck language A concept used in *formal language theory. Let Σ be the alphabet

$$\{a_1, \dots, a_n, b_1, \dots, b_n\}$$

The Dyck language over Σ is the set of all strings that can be reduced to the empty string Λ by "cancellations" of the form

$$a_i b_i \rightarrow \Lambda$$

For example,

$$\Sigma = \{(\,)\}$$

gives the Dyck language of all balanced parenthesis strings. An important theorem characterizes the *context-free languages as those representable as the homomorphic image (see HOMOMORPHISM) of the intersection of a Dyck language and a *regular language.

dye-polymer media A class of optical recording media in which the sensitive layer consists of dye particles dispersed in a binder. Both *rewritable and *write-once recording are possible. Dye-polymer media are potentially cheaper than those using other materials (such as *magneto-optic storage media), but have taken longer to develop.

dynamic Capable of changing or of being changed. With reference to operating sys-

tems, the implication is that the system is capable of changing while it continues to run. As an example, the total amount of memory available may be defined by the contents of a word within the operating system. If this word can be altered without stopping the system and reloading a fresh copy of the operating system, then it is possible to alter dynamically the total amount of memory on the system.

With reference to programming, the adjective is applied to operations that take place while a program is running, as compared with those that take place during the compilation phase. For example, dynamic arrays are allocated space while the program is running.

Compare STATIC.

dynamic allocation An allocation that is made dynamically, i.e. while the system is running, rather than statically at the time of first initiating the system.

dynamic data structure A data structure whose organizational characteristics may change during its lifetime. The adaptability afforded by such structures, e.g. linked lists, is often at the expense of decreased efficiency in accessing elements of the structure. Two main features distinguish dynamic structures from *static data structures. Firstly, it is no longer possible to infer all structural information from a *header; each data element will have to contain information relating it logically to other elements of the structure. Secondly, using a single block of contiguous storage is often not appropriate, and hence it is necessary to provide some storage management scheme at run-time.

Dynamic Host Configuration Protocol See DHCP.

dynamic HTML An extension of HTML allowing a web page to change in response to the user, without downloads from the server. Dynamic HTML involves scripts written in Javascript or VBScript and embedded in the HTML document. An example of its use is in displaying menus when the cursor is positioned at a particular place on the page.

dynamic link library See DLL.

dynamic logic See MODAL LOGIC.

dynamic memory A form of *volatile semiconductor memory in which stored in-

formation is degraded with time. The most common example is dynamic *RAM (usually abbreviated to DRAM) where the logic state to be entered in each cell is stored as a voltage on the small capacitance associated with the gate of the MOS output transistor for the cell. The voltage decays away with time because of leakage currents in the cell, and so it must be *refreshed (i.e. recharged) periodically by external circuitry.

dynamic programming The mathematical theory and planning of multistage decision processes; the term was introduced by Richard Bellman in 1957. It may be regarded as a branch of *mathematical programming concerned with *optimization of problems formulated as a sequence of decisions. Ap-

plications are very varied, including engineering problems and company planning.

dynamic testing See TESTING. Compare STATIC ANALYSIS.

dynamic web page 1. A *web page whose content or presentation can vary each time it is sent to a client. Such web pages are created by *server-side *scripting using such technologies as *Active Server Pages or *JavaServer Pages. 2. A web page whose presentation can change after it has been sent to the client, either automatically or in response to input from the user. Such web pages are created by *client-side *scripting using such languages as *VBScript or *JavaScript. Compare STATIC WEB PAGE.

out of order, be delayed, be lost and require retransmission, etc., is severely limited. There are currently (2008) two main standards used to implement VoIP: the ITU's H323 and the IETF's SIP.



- The H323 specification
- The SIP specification

volatile memory A type of memory whose contents are destroyed on the removal of power to the memory. When volatile memories are used for crucial applications, they can be backed up with temporary battery-power supplies. *Compare* NONVOLATILE MEMORY.

Volterra integral equation *See* INTEGRAL EQUATION.

volume A logical unit of data storage. A volume can be a single unit of a physical storage medium (e.g. one fixed disk may be a single volume), but it can correspond to part of a physical unit (e.g. one of several "partitions on a fixed disk) or to more than one physical unit (e.g. multiple partitions on several fixed disks).

volume label *See* LABEL.

volume visualization A "visualization technique based on splitting the projected picture into three-dimensional voxels (volume equivalents of pixels) and applying "rendering techniques to the voxels before the mapping to two dimensions.

von Neumann, John (born Margittai Neumann János Lajos; 1903–57) Hungarian-born US mathematician. Already a noted mathematician, von Neumann emigrated to the USA in 1930 and joined the faculty of Princeton University. His major contribution to computer science was his "First Draft of a Report on the EDVAC" (1945), which described an architecture that has since been regarded as standard for digital computers (*see* EDVAC; VON NEUMANN MACHINE). However, this was only a part of his life's work, which also included major contributions to game theory, quantum physics, and statistics and numerical analysis as well as work on the atomic bomb during World War II.

von Neumann machine Any computer characterized by the following concepts:

- (a) the main units are a "control unit,

"ALU, "memory, and input and output facilities;

(b) programs and data share the same memory, thus the concept of a "stored program is fundamental;

(c) the control unit and ALU, usually combined into a "central processor (which may contain internal storage – accumulators and other registers), determine the actions to be carried out by reading instructions from the memory.

It follows that a program for a von Neumann machine consists of a set of instructions that are examined one after another; a "program counter in the control unit indicates the next location in the memory from which an instruction is to be taken. It also follows that the data on which the program operates may include "variables: storage locations can be named so that the stored value may be subsequently referenced or changed during execution of the program.

The vast majority of present-day computers are von Neumann machines. The name is taken from that of the American, John von Neumann. *Compare* NON VON NEUMANN ARCHITECTURE.

V operation (up operation) *See* SEMAPHORE.

Voronoi diagram A breakdown of a plane into Voronoi regions (also called Dirichlet regions) based on a set of points. For each point P in the set, the corresponding Voronoi region consists of the set of points closer to P than to any other point in the set.

voting logic *See* COMPARATOR.

voxel The three-dimensional equivalent of a "pixel. It is an axis-aligned box, typically an element in a space-subdivision structure.

VPN *Acronym for* virtual private network. A connection between two computers or other endpoints in which packets sent over a shared network, for example, the Internet, are automatically encrypted and decrypted by the endpoints. Although the packets are carried on a shared network, their contents are protected from unauthorized access between the endpoints. Virtual private networks are commonly used to connect branch offices to a headquarters when the cost of a physically separate communications link cannot be justified, or to allow workers to access their company network across the Internet when they are not on the

