N

Nanometre   A billionth of a metre.

Nanosecond   A billionth of a second.

Navigating   The process of moving between points via links in hypertext-based material such as Web applications. Originally navigating was a macro-level activity, in that it was a search for material by passing to and from high-level components. These include entries in indexes, lists of contents, and libraries of video clips, programs, graphics etc. Browsing was considered to be the process of moving to and from microfeatures in a hypertext-based information model. Today both operations are considered *browsing*.

(See Browse and Browser.)

NC (Network Computer)   A computer designed for connection to the Internet or to an IP network. The subsequent rationalisation of hardware results in low system costs and reduced costs of ownership. Apple, IBM, Netscape, Oracle and Sun have issued the Network Computer (NC) Reference Profile. Base case NCs are not fully specified standalone multimedia devices. They do, however, offer streaming multimedia functionality that plug-ins and ActiveX controls may provide to the client. The NC Reference Profile guidelines below are general requirements and capabilities, many of which are supported involuntarily by all PC makers.

> **Support for popular IP protocols**   TCP (Transmission Control Protocol). Optional security is provided by the Secure Sockets Layer (SSL). FTP (File Transfer Protocol) for file exchange over the Internet. Telnet client/server protocol for optional character-based console access to remote hosts. NFS (Network File System) support for NCs that feature distributed file systems. UDP (User Datagram Protocol) for application-specific communications. SNMP (Simple Network Management Protocol)

System overview   VGA screen resolution of 640 × 480 pixels. *X-Y* pointing device. Text input device (keyboard). Audio output. Local mass storage is not required.

Boot and configuration options   DHCP (Dynamic Host Configuration Protocol) so that NCs can boot over a network and obtain IP addresses. Bootp enables an NC to boot over the network.

World Wide Web standards   HTML (HyperText Markup Language) and CGI (Common Gateway Interface). HTTP (HyperText Transfer Protocol). Java Application Environment.

E-mail protocols   SMTP (Simple-mail Transfer Protocol). IMAP4 (Internet Message Access Protocol Version 4). POP3 (Post Office Protocol Version 3).

Multimedia file formats   JPEG graphics format. GIF graphics format. WAV wave audio format. AU.
(See MIME.)

NDIS (Network Driver Interface Specification)   A standard specification for network interface cards (NICs). It provides functions, collectively referred to as a wrapper, which may be used by TCP/IP protocol drivers. It was developed by Microsoft and 3-COM. Its implementations for Windows may be assumed to be proprietary.
(See Network interface card.)

Nelson, Theodore   The inventor of the term hypertext, and a dedicated hypertext evangelist. He also began project Xanadu, which paralleled the functionality of the Web.
(See Hypertext and Xanadu.)

Nested   1. *Nested transaction*: a technique which sees the integration of subtransactions within transactions. The subtransactions are said to be nested. (*See Server and Transaction*.) 2. *Nested loop*: a loop in a computer program that is encapsulated within another.
(See Java.)*

Net   An alternative shorthand name for the Internet or The Net.
(See Internet and Web.)

NetBEUI   An industry-standard network protocol.

NetBIOS (Network Basic Input Output System)   A network protocol.
(See Protocol.)

NetMeeting   A Microsoft technology which permits a multiplicity of communication and information exchange types over the Internet and over compatible IP networks such as intranets. The communications types supported include:

- Internet telephony
- Whiteboards
- Application sharing
- File transfer
- Chat
- Multiple participant conferences.

(See IRC, Whiteboard and Videoconferencing.)

NetMeeting SDK (Software Development Kit)   An ActiveX control and suite of Win32 APIs that can be used to integrate conferencing features into applications. The NetMeeting SDK is freeware.

(See API.)

Netscape   A company founded by Marc Andreessen, who developed its initial flagship product, the Netscape Navigator Web browser. The company continues to produce Internet software for users and for developers, including Netscape Communicator.

Netscape Navigator   A Web browser produced by Netscape. Its functionality is improved through the addition of plug-ins. Plug-ins for streaming audio and video are available. Like many other browsers, Navigator can be used to send e-mail messages, but it is not an e-mail application. A bookmark menu assists users to list and revisit Web sites that are of interest. Images that are shown in the client area can be saved to disk by right-clicking on them.

(See Browser and Web.)

NetWare   *(See Novell NetWare.)*

Network   1. A physical entity that unites computer systems. (*See Client/ server, Internet, LAN and Web.*) 2. A physical entity which interconnects processors in an MPP. (*See MPP.*) 3. An interconnecting scheme for neural networks. (*See Neural network.*)

Network computing   A broad term denoting the use of systems that are connected to physical networks.

(See Internet, LAN and NC.)

Network interface card   A device used to connect a system to a network. It may be one (or even more) of a number of standard and proprietary variants, including:

- Ethernet
- Token Ring
- ISDN interface
- Fibre channel interface (arbitrated loop)
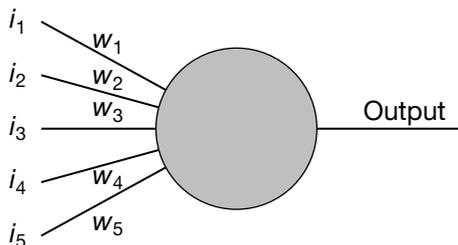- Modem (such as an analogue or cable variant).

(See Ethernet)

Network OLE   A glue developed by Microsoft for distributing OLE component architectures. It has since been replaced by the Distributed Component Object Model (DCOM), which may be applied as a glue for ActiveX controls distributed across LANs, WANs, intranets and the Internet.

(See ActiveX*, Glue and OLE.)

Neural network   A network of neurons, which function as processing units. Part of the field of artificial intelligence (AI), their implementation is an attempt to reconstruct the operation of the human brain, which has some ten thousand million neurons. The neuron connections have weights, which determine network behaviour. Given an example, the weights may be learned by the network. Neural network variants include the:

- perceptron
- multilayer perceptron.

The perceptron neuron was proposed in 1962 by Frank Rosenblatt, a significant figure in the development of synthetic neural networks. A computational neuron has input connections, each of which may have a different weight. The neuron is preprogrammed with a threshold value which, if equalled or exceed by the total weight of inputs, will respond accordingly. Typically the response is to output a specific value. Neurons differ from

Computational neuron

multiple input logic gates (such as AND, NAND, OR or NOR) in that the inputs may not be one of two logical values. The inputs i are assigned the weights w, and a positive output is yielded should a predefined threshold t be exceeded:

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if i₁w₁ + i₂w₂ + l₃w₃... +iₙwₙ > t,
then output =1
  else
output =0
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See: Cawsey, Alison, *The Essence of Artificial Intelligence*, Prentice Hall, 1998.

(See KBS.)

NeXT   A company founded by Steve Jobs, the co-founder of Apple Computer. Its products include high-performance NeXT workstations and an advanced proprietary OS.

NeXTStep   A GUI and operating system based on Unix and developed by NeXT, a company founded by Steve Jobs shortly after leaving Apple Computer.

Nintendo   A consumer electronics company and maker of games consoles.

NNTP (Network News Transfer Protocol)   A protocol for transferring Usenet news between servers, clients and a central server.

Non-interlaced   A mode of CRT-based monitor/display operation in which the screen image is generated by scanning all lines in a single scan field. The rate at which all lines are scanned is termed the refresh rate or the vertical scan rate. The frequency at which lines are scanned is termed the horizontal frequency.

Non-linear medium   A non-linear medium provides the user with the ability to control its sequence. The Web, for instance, presents the user with a non-linear medium.

(See Multimedia and Web.)*

Non-preemptive multitasking   A type of multitasking in which the operating system does not interrupt applications. It is less seamless than preemptive multitasking in that a reasonable degree of concurrency is not achieved. Windows 3.1 (and earlier) and Windows for Workgroups 3.1x offer non-preemptive multitasking.

Notebook   A portable computer with a footprint about the size of an A4 page. A sub-notebook is slightly smaller.

Novell   A corporation which markets and sells Internetworking products. Its flagship product is NetWare.
(See Novell NetWare.)

Novell NetWare   A network operating system which is optimised for serving information to a large number of users. It caches data read from servers in RAM.

NSFNET (National Science Foundation NETwork)   A network created by the National Science Federation (NSF) in 1984, and originally plat-formed on five computers that were then categorised as supercomputers. The rationale behind the construction of NFSNET was not only to provide the US academic community with access to a repository of information, but also to provide access to leading edge supercomputers. The ARPANET was considered to be technically underspecified for this purpose. 1987 saw a major upgrading of NFSNET through faster computers and a higher backbone speed of 56 Kbps. Then in 1989 the NSFNET backbone was given T1 status, capable of transferring 1.544 Mbps.

NT (New Technology)   A 32 bit version of Windows, which features an extra layer to prevent general protection faults and unrecoverable application errors.
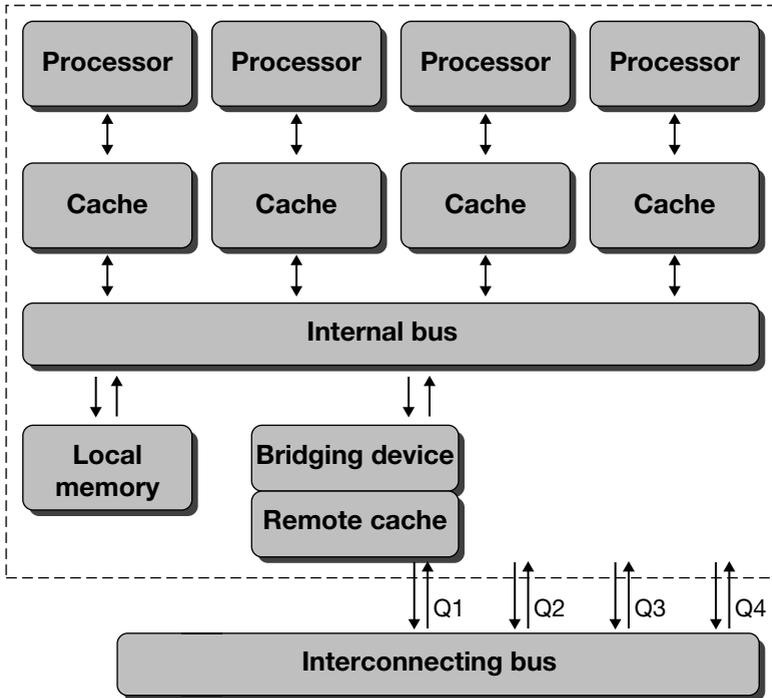
***n*-tier client/server architecture**   A client/server architecture which sees multiple divisions of application logic and data. The divisions are distrib-uted across four or more systems, which represents the number of tiers (*n*).
(See Application software and Client/server.)

NTSC (National Television Standards Committee)   An American video/broadcast standard at 60 fields/30 frames per second on the 525 line system.

NUMA (Non-Uniform Memory Architecture)   A variation of the SMP system architecture, NUMA attempts to solve the bottleneck of using a single shared bus to interconnect processors. Instead a number of internal buses are introduced, thus promoting processor scalability. NUMA systems have modules called quads, which include processors, memory and I/O devices that share an internal bus. Quads interconnect via a main bus. The NUMA architecture permits processors to access

- local and external caches
- local and external memory.

NUMA 'Quad-based architecture'

Its *non-uniform* characteristic hinges on the varying access time between local and remote memory access. Though NUMA is architecturally superior to SMP, it is not classifiable as an MPP system.

(See MPP and SMP.)

NVRAM (Non-Volatile Random Access Memory) A rewritable electronic memory device which preserves stored information following interruption of the power supply. It is useful for calendars and other alterable information which must be preserved after a system is switched off.