Technofile: servers

Servers are the backbone of any successful office. They provide staff with software, banks of data, super-fast internet access

and will stay to back up the day's work after everyone else has gone home. Paul Warner looks at the facilities they offer

When it comes to computer hardware that can fire the imagination, servers are starved for attention. In fact, chances are most network users will be unaware of the server's existence until it goes down and crashes their system.

With the birth of the internet, however, came a new lease of life for the server. No longer restricted to merely storing data or sharing expensive resources such as colour laser printers, the increased use of internet-based communication coupled with faster connections has opened up a whole new range of server-based applications.

VPN (virtual private networking) enables you to log into your network from anywhere in the world. And equipping your laptop with a wireless connection means you need never again be tied to your desk. With web-based services you can now send a document to an office printer or

conduct network administration from a remote beach cafe in the Bahamas. Promoting your products or services over the internet or setting up an online catalogue or e-commerce site are all made easier with the support of a server.

Born to serve

This month we'll be taking a look at a cross-section of trusty servers, covering everything from microservers with wireless technology right up to the new generation of powerhouses that combine high-performance Xeon processors with the simplicity and versatility of the new blade architecture. Firstly, let's look at what's really important when choosing a server.

A server consists of two major components – hardware and software. These are not independent choices as the type of hardware you opt for will depend

upon the sort of server facilities you plan to install and any long-term plans you have for future expansion. However, there are certain hardware features that are common to most server installations and, when it comes to choosing your server hardware, you will need to take these into consideration.

Keep your cool

Servers are a long-term investment. They may end up tucked away in the corner of an office or down in the basement, but they will be running continuously. Any downtime is a disaster and can cause your whole business to grind to a halt. Overheating is probably the most common cause of server failure and the blend of dust and nicotine present in most offices is a server fan's worst enemy.

Your desktop PC may survive with a single fan cooling the processor and

← Evesham's SilverEdge SE1000 houses a 2.2GHz Intel Xeon processor, which increases the server's peformance

→ Apple's Xserve device is ideal for a large company with high-end networking needs

view the data. Similarly, the accounts department could open company turnover reports that you don't want made generally available across the network.

Get some backup

Having all your data together on one server makes backing up important information a lot easier. A suitable storage device, such as a tape drive or MO (magneto optical) disc, can be set up to make regular backups – such as overnight when there is less activity on the network. The only drawback to this setup is that if the server crashes in the middle of the day, you could lose much of that day's data. In many cases this won't be critical, but if you're inputting high volumes of information, or running a call centre or mail order business, you can't afford to lose a single transaction.

When you need this level of data integrity the best solution is to install hard drive storage that can duplicate the same data on two disks.

another housed in the power supply, but this layout would be vulnerable in a server – it would only require the processor fan to fail and the rapidly overheating CPU could cause a system crash.

When choosing a server make sure it has extra internal cooling fans built into the case. Many server manufacturers use a large static heatsink on the processor and rely on ducting air across it from several large fans in the case. Evesham's latest server cases even include a side panel with access to removable hot-swappable fans.
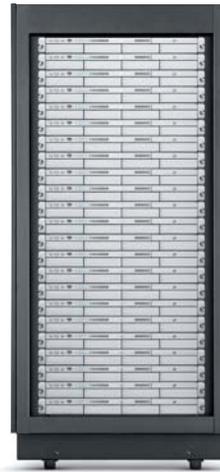
Security guard

Servers usually act as the repository of data. In practice, this could mean simply making standard company documentation available to all network users. Alternatively, it could be a more elaborate arrangement that allocates file storage areas to individual users or creates a central intranet that runs across

the whole network and handles all internal and external email.

The main advantage of storing data on a server is that you will have one central reference point. You can be certain that users are working on the latest file and there won't be different versions kicking around all over the network. If you're using a database then the data can be stored on the server in a 'back end' and individual users can have a 'front end' on their machine or client computer, tailored to their particular use.

Most server operating systems will enable an administrator to set up appropriate user access privileges. Not only will this give improved data security, it can also restrict specific users from undertaking certain activities. One may be able to open a database and add or edit records, while another will only be able to

← The Compaq ProLiant is an ideal budget solution, although you may need to up the basic specification

If we had a hammer

Most Intel-based servers use the latest range of Pentium processors. These can range from fast (but cheap) PIII chips right up to the latest Pentium 4-based Xeon processor. The latter can vastly increase server performance thanks to its large onboard caches, enhanced multifunction capabilities and dual virtual processors.

Computers built around AMD's new generation of 64bit, so-called 'Hammer' processors will be more powerful than the current range of 32bit CPUs. The main drawback is that, as usual with new hardware, software that can make full use of the processor's 64bit hardware will be slow to arrive for the Windows platform.

The new Itanium 2 processor from Intel will be a Risc-based processor capable of handling massive amounts of memory and

enabling faster processing of secure transactions. Having large amounts of memory improves database performance, as the ability to move information into the memory will make searching and data retrieval much faster.

AMD's strategy with the Hammer family of processors is to attract customers who plan a gradual transition to 64bit applications. These will differ from the Intel chips in that they will be able to run conventional 32bit applications as well as 64bit programs. The first AMD chip slated for release is the Claw Hammer, which is aimed at the consumer market; the server-friendly Sledge Hammer processor will follow. However, so far the move to 0.13 micron technology hasn't been plain sailing and it remains to be seen whether or not AMD can get its release schedule back on track.

This process is known as Raid (redundant array of independent disks) level 1 mirroring and means that, if one drive fails, the server simply switches to the second disk and continues running normally. Affordable IDE drive controllers are available from Promise (www.promise.com) and Adaptec (www.adaptec.com) or you could opt for the more expensive SCSI drives and controllers.

To increase performance and add data recovery, other Raid levels are available. Raid 5, for example, can recover a system should one drive fails and offers an increase in performance. The disadvantage is that you require at least three drives for a Raid 5 array.

The most thorough and secure Raid array will mirror your data while running and have a hard disk that takes over in the event of drive failure. The dead drive can then be replaced while the system is still running and the data will be rebuilt from the second drive, thus protecting your system from any vulnerability.

Whatever backup system you employ, it is always advisable to keep the backups in a separate place from the server. You may have the most rigorous backup regime in the world but, if your premises are burned down and the backup goes with it, it won't be of much use to you or your company.

Many network admin staff will arrange for a backup to go home with someone each day or be kept overnight at the bank. Alternatively, remote network backup devices – for example, multiple tape units – can often be situated well away from the server. Another option is storing your data online via a remote internet service. This is ideal if you have a fast connection and a relatively modest amount of data to transfer.

← F5's Big-IP 5000 IP Application Switch server is more suited to ISPs or users with large databases

← The Fujitsu-Seimens Primergy H250 is a decent choice for small- to medium-sized businesses

Failing that…

Power failure will also threaten your data integrity. If your main power supply drops then it's an instant switch-off; any open documents will be lost and it may take some time for the server to get up and running again. One solution is to install a UPS (uninterruptible power supply). This won't keep your system running for a great length of time, but it should keep the power on long enough for you to save and close all documents and shut down the server properly. Some units can be integrated within the network and these will automate the shutdown procedure.

Alternatively, the server's power supply unit may die. To prevent this you should equip the machine with an additional power supply – if one packs up the other will keep running and you can take out the dead unit and swap it for a new one.

Top 10 tips for running a smooth network

When it comes to planning and implementing a network, we don't all have the good fortune of starting from scratch. Inevitably there will be sections of legacy installations that need pulling together into a manageable infrastructure. However, if you follow these basic rules when planning a new installation or integrating existing equipment, you can save yourself a lot of trouble.

1. Take stock and plan **The physical infrastructure of any network must be capable of handling both existing and future network traffic. It's better to over spec at the onset than have to upgrade later.**

2. Don't skimp on storage **Users will expect the system to handle large files. Image files can be 10MB or more in size, so a 4MB restriction on their mailbox will be a waste of time.**

3. Install speed where it's needed **You don't want to waste precious hours of the working day waiting for files to be printed by a slow network printer – 10/100 ethernet controllers are now seen as an entry-level requirement and many servers come with gigabit controllers built in.**

4. Adding users **It's not essential to route extra ethernet cabling to each new user. If you've got one ethernet cable coming into** a room you can connect it to a hub or switch with an 'uplink' connection and link several new client machines.

5. Sharing the internet **Internet sharing is okay, but the machine with the modem needs to be switched on for others to use it. Install a router, though, and the web connection will be available continuously.**

6. Not so broadband **A broadband connection doesn't look quite so fast when several users are online, especially if they are downloading large amounts of data.**

7. Consolidate your administration **Software tools are available to help deploy new applications and updates. This will save a visit to every client machine on the network.**

8. Keep track **Inventory software can monitor all hardware and software over your network, so when the office junior upgrades his machine with a new graphics card you'll know all about it.**

9. Make it safe **Firewall protection will prevent any unauthorised incursion into your network. Software may be suitable for a small network but anything larger will need dedicated hardware.**

10. Backup, backup and backup **There's no second chance – follow a strict backup regime and you can sleep easy. If you can, try restoring your backup to another machine so you'll be certain it's functioning properly.**

Features comparison

Model	Telephone	Website	Price (ex VAT)	Warranty	Processor/ speed	Memory	Storage devices	Type of backup		Network connectivity (megabits per second)	Graphics	Monitor	Operating system	Extra features	Suitability
Apple Xserve	0800 039 1010	www.apple.com	from £2,212	3-year onsite	Power PC G4/ 1GHz	256MB	60GB, up to 480GB	optional external SCSI		2 x 1,000Mbps	optional ATI	optional	Mac OS X Server	19in Rackmount, remote monitoring	if you're into Apple, then this is a must for high-end networking. It would also be equally at home with other operating systems
Armari Supermicro SuperServer 7042P-8	020 8993 4111	www.armari.com	£3,995	1-year onsite, 2-year RTB	Intel Xeon/ 2.2GHz	512MB-16GB	3 x 36GB Raid level 5	internal IDE 66GB tape		2 x 1,000Mbps	8MB ATI Rage XL	optional	Windows NT/2000, Linux, FreeBSD, Novell Netware	rack mounting chassis available	this Xeon-based server offers a good performance and would be suitable for medium-sized networks requiring good data security
Dell PowerEdge 1500SC	0870 907 3333	www.euro.dell.com	from £2,259	selection up to 4-hour response	Pentium III/ 1.13, 1.26 & 1.4GHz	128MB-4GB	up to 438GB/ six bays	optional internal tape		1,000Mbps	4MB ATI Rage XL	optional	Windows 2000, Novell NetWare, Linux	rack mounting chassis available	good general purpose server aimed at the SME market, with gigabit networking and fast SCSI at a realistic price
Evesham SilverEdge SE1000 Xeon	0870 160 9500	www.evesham.com	from £2,299	3-year onsite	Intel Xeon/ 1.8GHz	512MB	3 x 18GB Raid level 5	optional internal tape		2 x 10/100Mbps	8MB ATI Rage XL	optional	Windows 2000 Server	cooling options, redundant power bays	a well-specified, mid-range, Xeon-based server with decent cooling facilities. Its price is also good value
F5 Big-IP 5000 IP Application Switch	01784 497 224	www.f5.com	installation dependant	negotiated with dealer	2 x Pentium III/ 1GHz	512MB	256MB flash	server dependant		24 x 10/100Mbps	n/a	n/a	Windows NT/2000, all Unix platforms	integrates with selection of blade servers	part of a high-end infrastructure, this unit would integrate with blade servers and be suitable for ISPs or large database users
Fujitsu-Siemens Primergy H250	check website for nearest contact	www.fujitsu-siemens.com	from £2,800	3-year onsite	Intel Xeon/ 1.8-2.0GHz	256MB-4GB	up to 876GB/ 12 bays	optional internal tape/external SCSI		2 x 10/100Mbps	8MB ATI Rage XL	optional	Windows 2000, Novell NetWare, Linux	redundant and hot-plug power supplies	a useful SME server, but by the time you've upgrade to a sensible specification you'll have spent over £6,000
Compaq ProLiant 350 G2	01344 360 000	www.compaq.com	from £1,035	3-year onsite	Pentium III/ 1.3-1.4GHz	256MB-4GB	up to 582GB	optional internal tape/external SCSI		10/100Mbps	8MB ATI Rage XL	optional	Windows NT/2000, Novell NetWare	optional value packs	good entry-level server for the business market. The basic price looks low but, once you've upped the specification, the machine gets expensive
NEC Express 5800	01442 888 876	www.nec.co.uk	from £3,600	3-year onsite	2 x Pentium III Xeon/1.4MHz	512MB	up to 365GB/ five bays	optional internal tape/external SCSI		2 x 10/100Mbps	4MB SVGA video	optional	Windows NT/2000, Novell NetWare, Linux	n/a	mid-range adaptable application server with twin Xeon processors giving you four virtual CPUs
Teac Microserver Vendotto	0800 085 3704	www.teac.co.uk	£766	2-year RTB	n/a	64MB	40-240GB	synchronisation utility software		10/100Mbps and built-in wireless	web browser interface	n/a	Linux-based	5-user iOffice groupware licence	small office network with wireless connection and a virtually maintenance-free range of services
Toshiba Magnia SG20	0870 444 8944	www.toshiba.co.uk	£989	1-year onsite, 2-year RTB	Celeron/ 566MHz	128MB	2 x 40GB	internal hard disk/ external over network		8 x 10/100Mbps and built-in wireless	terminal connection for setup	n/a	embedded Linux	built-in wireless connection, intranet	ideal for the small office network with wireless facilities. Other advantages are that all services are built in, as is backup

Planning for the future

The internet has plenty to answer for. Whereas traditional servers (used mostly for onsite data storage and resource sharing) have worked in an enclosed environment, modern machines must cope with a shared web connection that opens up the company network to external users. Any system connected to the internet will need to have some form of firewall protection to repel hackers or viral attack.

Several methods are available to expand your system. You can add extra machines to your network and start a server collection with each machine running dedicated services. One could be used to log in users and provide data storage, another may be running your mail system, web server and local intranet, while a third machine may be acting as a firewall-protected broadband gateway.

Having a variety of machines could get untidy, though, so it might be worth looking at a rack-mounted system. This allows you to add new servers by simply bolting them into an industry-standard mounting frame. All the switching and routing equipment is available in a
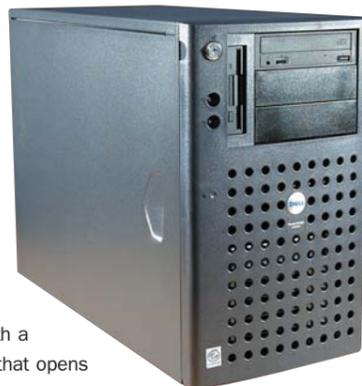
← The value-for-money Dell PowerEdge 1500SC offers fast SCSI facilities at a reasonable price

similar format and the ability to keep all cables in the same place makes for a neat and professional installation.

The more your server takes on, the more processing power you're going to need. With the right motherboard and operating system – for example, Windows 2000 Server – you can increase the power by fitting multiple processors. These CPUs will, however, have to share the RAM and on most servers you should also increase the memory when you add another processor. Many new servers now come with 512MB of RAM as standard.

For high-end network servers the best solution

→ Another Xeon-based server, the Armari Supermicro is ideal if data security is of the utmost importance to your business

might be an alternative technology called the 'blade' server. On a blade server, new facilities – for instance, multiple processors or extra memory – are added by inserting thin modular electronic circuit boards. The system is compact, and on a typical machine up to 280 server modules can be installed in a single floor-standing cabinet. Professional and easy to install, blade servers also use a high-speed bus and create much less heat than traditional devices. Companies most likely to buy blade servers are large data centres and ISPs that host websites.

Choosing your software

Many server manufacturers will presume that you're going to use Microsoft-based products to run your server and the latter's comprehensive range of operating systems and server products should suit most needs. For many years Windows NT has been the standard offering, but the latest version of Windows 2000 Server is more user-friendly and certainly easier to set up. Though generally expensive, one way

to economise with Microsoft's Server products is to opt for its Small Business Server package (www.microsoft.com/smallbusinessserver). This integrates most of the commonly used services within one realistically priced package and gives you secure shared internet access; mobile access with VPN services; a full range of web design and server facilities; several useful business tools; and full Exchange facilities for messaging and planning.

However, the Microsoft route is not the only solution – most of the internet is built around other operating systems running on alternative platforms. The Apache web server is one of the most reliable alternatives and has been running on Sun and Linux-based platforms for years. It has a version that runs under Windows and is freely available to download from www.apache.org as open-source software.

← Backup facilities are handily built in to the Toshiba Magnia – ideal for the small office

→ The NEC Express 5800's twin Xeon processors means that you have four virtual CPUs

Both the Toshiba SG20 and Teac Microserver listed in our table above are based on a modified version of Linux and integrate seamlessly with networks using Windows-based client machines.

On top of setting up and maintaining the network and user accounts, your company's administrator will have the regular work of backing up system data; setting up user access privileges; updating local intranet and web server information; maintaining security levels; and running regular software updates to client machines across the network. Fortunately, software is available to help.

← The eye-catching Teac Vendotto will suit an administrator with limited experience

If you're about to update to the latest version of a database or new word processing package, upgrading each machine on your network can be time consuming. The use of deployment software can centralise this process and enable you to update everyone from one place. In a similar manner, inventory software is useful for keeping track of all your network users, informing you of what software and hardware they're running.

It can even be used to monitor network activity. So if George Smith from the sales department has a liking for online gaming or downloading vast amounts of useless software from the internet, you can monitor his activities and get him to mend his ways. ∎