# are you being served?

Here's a common question that comes up when we talk to Mac users about server solutions; "Surely servers are just for big businesses, there are only a few of us here so why would I need one?"

Do you collaborate on projects but find that managing the workflow between a number of people is time consuming?

Do you sometimes find it difficult to keep track of different versions of a document and if the client suddenly decides that they really prefer the one that you showed them last week can you go back to it easily?

At the most basic level a server is just a lump of storage that multiple users can access, and for some that is genuinely all that they need. By centralising your storage of data you can make much more efficient use of it. Instead of everybody having their work stored on hard drives attached to their Macs it can be stored in a central location so that you can take advantage of any changes in usage. The performance of that storage, how fast you can read and write data to it, is critical for some types of work but for others a basic Network Attached Storage (NAS) device such as LaCie's Ethernet Disk will do just fine.

NAS devices perform just the one function, they are designed to share files over a network. Whilst they can do that well, for most, it is all they can do and generally can't be upgraded with faster interfaces or greater amounts of storage and certainly can't be used for more than just sharing files as the business grows or develops. Imagine if Macs were sold like that and you bought a system that ran Photoshop fine when you were working with 3 mega-pixel images but you couldn't upgrade the memory to work with bigger images, couldn't install any plug-ins and certainly couldn't add a copy of Quark XPress to do lay-outs in because

> "Surely servers are just for big businesses, there are only a few of us here so why would I need one?"

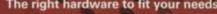the systems was a closed box that wasn't upgradeable.

A server solution from MacWarehouse can help you to consolidate your storage needs, protect your business from loss of data, enable you to work collaboratively, keep control of your workflow and manage your users' Macs effectively. All of which helps you to keep control of costs within your business.

## The right hardware to fit your needs

There is no one server solution to fit all needs. The first part of putting a solution together is to consider what you want it to do, not just today but probably for the next three years. You need to ensure that any decisions on the type of solution to use consider what is going to happen to your business over its lifetime. It is a good idea to consider the next three years when thinking about your needs. Leasing a server is a good plan as it allows you to spread the costs so that it can start saving you money before you have had to actually pay for it, you can also build maintenance and deployment costs into the lease so that you do not have to deal with large capital costs at the start of the project and know exactly how much it is going to cost you each month.

You don't need to buy the server that you think you might need in three years time today but what you do need to do is ensure that the server you buy will be capable of being expanded to meet your needs over time, so don't shut off avenues for the sake of saving a few extra pounds.

The next few pages will take you through the sort of things that you can do with your server and give you an idea of how a server solution from MacWarehouse can help your business to save money.

# happy families

Mac OS X Server

One of the key benefits of installing a server as opposed to other forms of network-based storage is that you can install and use an array of applications that enable you to work better as a team. By centralising resources you can reduce your capital costs by eliminating duplication and reduce your staffing costs by allowing users to work more efficiently.

## Asset management

Once you have centralised your storage of data you can start to take control of it and rationalise what you have. It would not be to difficult to guess that many of your users have copies of the same files or graphics on their computers. This is a very good way to waste space and there are a number of things that you can do about it to ensure that users can find what they need, when they need it, without having to keep copies on their own Macs.

Starting with what you may already have, Adobe's Creative Suite 2 includes a feature called Adobe Bridge . With this you can store all your creative assets on a server volume, tag them with keywords, search for files based on criteria such as colour space, resolution and the fonts used. Once you have found the asset that you need you can drag it straight into the document that you are working in.

Unlike Adobe Bridge, which just uses the server for storage, Portfolio Server from Extensis is a server based database application for managing your digital assets. With it you can not only manage the assets that your workgroup uses but you can publish them, either as a web page or on CD, so that your clients can select the images that they want you to use or even buy high-res copies of those images from you. Portfolio Server is capable of managing a wide range of asset types, not just images but also Quark XPress documents and many audio or video formats.

*Adobe Creative Suite CS2's Bridge and Version Cue streamline working together*

*The server version of Portfolio allows you to keep track of all your digital assets*

*Migrate away from Exchange Server using Kerio MailServer's groupware features*

## Version control

Once you have you files on a server how do you keep track of the documents that you are working on? If your client wants to see different versions of the same job, so that they can decide on which feel they prefer or so that the same basic design can be used for different media, how do you manage those different versions? By keeping your files on a server and managing them with Adobe Version Cue, also included with Creative Suite 2, an entire workgroup can collaborate on projects, branching off different versions or reworking it to a different spec without all the hassle of trying to remember which file is which. Each time you save an alternate version you can save notes along with it so that you can easily see what the differences are without having to open the file.

## Groupware & collaboration

Whilst OS X Server has a powerful email server built into it there are a number of areas in which it is lacking. The mail server doesn't have an easy interface for setting vacation or out-of-office messages and any rules that run on mail that is received need to be configured by editing command-line scripts on the server if they are to be able to run when the user is not logged in with their email program running. Additionally, whilst it is possible to configure the server to host iCal files so that you can see other people's diaries it is not possible to delegate to another person the rights to make changes to those diaries and it can be difficult to share address books. Fortunately Kerio MailServer solves all of those problems by allowing both Microsoft Outlook for Windows and Entourage for Mac to connect to the server as if it were an Exchange server.

## Directory services

Mac OS X Server includes a directory service which identifies users to the server. Whenever you log onto the server your identity is confirmed by the LDAP based OpenDirectory server to ensure that you are who you say you are before allowing you access. It is possible to integrate OpenDirectory with Microsoft's Active Directory or to use a Mac OS X Server to provide directory services to both Macs and PCs. You can also tie a number of servers together so that you only need to put your password in once to gain access to all of the servers, this is known as Single Sign On. Once a user has been authenticated it is then possible to grant them a range of usage rights to various parts of the server or servers depending on what their role in the business is.

Authentication with Mac OS X Server uses static passwords so if somebody gets hold of your user name and password they can gain access to the server as if they were you. Whilst this may not be an issue if you have only a small workgroup of Macs it becomes a much bigger concern once you are part of a larger network, are dealing with confidential information or are providing services over the internet.

Two factor authentication systems, such as those offered by CRYPTOCard don't depend on you just having a static password. Users are issued with a token that generates a new passphrase every time that you use it. This is combined with your user name and a PIN to ensure secure access to your servers. This is called a two factor solution because it combines something you have, the token, with something you know, your PIN. Some types of token connect via USB and don't even have a display so that the user never even sees the passphrase that is generated by the token. Since

the passphrase changes every time the token is used even if somebody were to get hold of your PIN and a passphrase they would not be able to use it to pretend to be you. Replacing passwords with two factor authentication also provides significant cost savings as reports show that a large part of helpdesk budgets go on solving password related problems.

## Networked homes

Ever had a Mac crash, taking all of your work with it? Ever had to use another Mac at short notice because yours has developed a fault? Even if all of the data that you are working with is stored on the server it isn't as easy as just sitting down at another Mac and getting down to work.

Everybody has their own preferences, you have your dock set up in a certain way, with all the applications that you need in the order that you like. You keep some files or aliases on the desktop and when you launch Mail you want to get your mail and not your colleagues'

There is a solution to this. By using the network-based Home directories feature of Mac OS X Server all your configuration settings are stored on the server and will be available to you which ever Mac you log on to. If you need to use a different Mac all you have to do is log on to it and it will look and feel just like your own Mac, so long as it has the same software installed on it. As well as having your Home directory stored on your server you can also keep a copy on your Mac so that you can use it whilst away from the network, which is vital for a MacBook or MacBook Pro, and when you reconnect to the network all your changes are synchronised back to the server.

*The powerful Directory Services in OS X Server let you manage your network*

*Extend OS X Server's OpenDirectory with two-factor authentication*

# faith in the future

There are three things guaranteed in this world. Death, taxes and data loss. "It will never happen to me", you'll keep saying that until it does. All businesses need to have some form of business continuity plan in case disaster should strike, and disasters come in all sizes from hardware failing to fire, theft or flood. If it hasn't happened yet don't worry, because it will.

*Exabyte's backup drives range from 80GB to 8.4TB*

## Backup

Backup never seems important until you have lost data. Backup hardware can seem expensive and if all goes well you will never see the benefits so it can appear to be dead money. If it were a choice between having an extra workstation and buying a backup solution many people would choose the workstation as it can start earning you money straight away. That's all well and good until something goes wrong and that workstation breaks down, you have a theft or worse still there is a fire or some other disaster that means you cannot get into your office or all your equipment is destroyed.

So where do you start with putting a backup strategy together? Firstly consider where all of your data is stored. If you have network-based homes and you have used Workgroup Manager to prevent your users from storing any data on the drives in their computers things are a lot easier. All of the data that you need to back up will be on your server and recovering from a disaster will be a lot easier. Don't forget your remote or mobile users. Laptops are very attractive to thieves so as well as securing the data on them you should ensure that you have a backup of it. If you use Mobile Homes you will always have a copy of the data on the server, where it can be backed up, but if you don't there is another option. EMC Insignia's Retrospect has a feature called Backup Server which constantly monitors the network looking for computers that have not been backed up recently. If the computer appears on the network the Backup Server will start to back it up as soon as possible. In planning a backup, and deciding what technology to use, you need to know three things. How much data you will need to backup both today and in the future? How much data is changed or created on a daily basis? How long do you have for the backup to actually take place? It may not be possible to backup all of your data overnight, or in whatever period you have available. NetVault from Bakbone has a very powerful feature known as a Virtual Disk Library that allows you to back up to large and fast disk storage that is seen by Bakbone

as a tape library, once the backup has been written to disk it can then be automatically duplicated to tape giving you the speed of a backup to disk but the safety of off-site storage. A common backup scheme is known as Grandfather-Father-Son whereby once a month you do a full backup (the Grandfather), reusing those tapes each year, once a week you do a full backup (the Father), reusing those tapes once a month, and each day you do an incremental backup, reusing those tapes once a week. Using this scheme you can restore a system to an exact day within the past week, to within a week for the past month and to within a month for the past year. With an incremental backup you first backup everything and then you just backup the things that have changed. It is also sensible to make copies of each of the weekly and monthly tapes and to keep those in a separate location to the masters as tapes can be affected by environmental conditions and can fail. You will need an awful lot more tapes than you think you do. Don't keep your backup in the same place as the thing you are backing up and once you have a backup strategy worked out it is critical that you test it and ensure that you are capable of restoring from it. A backup is of no use to you if you cannot get at the data when you need it.

## High risk or highly redundant

Let's get this fact out of the way, nothing is perfect, things will always fail and usually when you need them the most. You cannot avoid this but what you can do is plan for the eventuality and minimise it's impact. There is a balance to be made between risk and reliability. The further you go towards reliability the more things will cost, the more risk you take the lower your costs will be. Ultimately it is your business and you need to decide how much risk is acceptable. Do you want your servers to be available for 90% of the time? If this sounds good to you remember that this represents a downtime of approximately 36.5 days a year and that doesn't take into account the disruption to your business that will be caused by an outage and recovering from it. It also

assumes that everything starts working straight away and you don't have to restore data from a backup, which if you have a lot of data spread out over a number of incremental backups could take some time. Suddenly 90% availability doesn't look that attractive anymore. In order to ensure that your server keeps going you need to take a number of steps so that your server can survive things failing and that you can recover quickly once they have failed.

## RAID

By using a RAID (Redundant Array of Independent Disks) solution the data is held on more than one disk. Depending on the type of RAID solution used the server will either write exactly the same data to two separate disks at the same time or can spread the data out over a number of disks in such a way that any one of the disks can fail without any loss of data. All types of protected RAID mean that you do not get to use the full capacity of all of the disks but this latter type of RAID, known as RAID 5, is very efficient as you only loose the capacity of one disk, no matter how many disks you have in the RAID whereas by writing data to two separate disks, which is known as RAID 1, you loose the capacity of half of your disks.

## Don't put all your eggs in one basket

Don't run all of your services on the one server. Not only will performance suffer if you run every possibly service on the one server but you are putting all of your eggs in the one basket. Deploy your critical services on different servers so that you don't loose all of them if one server fails. Install a multi-port Ethernet card like those from Small Tree so that you can have two different routes between the server and the clients, preferably

connect them to separate switches. Whilst everything is running properly you have double, quadruple or even sextuple the bandwidth to the server and if you get a bad port on the switch you only loose a proportion of that bandwidth.

## Power Protection

If you have a power failure whilst your server is writing data to disk it is possible that you could get corrupted data. It is also possible that you could end up with a server that isn't even capable of booting due to corrupted directory data. You don't even need to have a full black-out, a fluctuation in current could be sufficient for enough of a power loss to the server so it is important that you ensure the server receives a steady power supply. With an Uninterruptible Power Supply (UPS) you can not only condition the power to the server to iron out any fluctuations but you can also provide a battery backup so that if you have a power failure the server can continue to run on battery power.

*EMC Insignia's Retrospect backs up your portables as soon as they are back in the office*

## Maintenance

Another bit of straight talking. The Xserve and Xserve RAID only come with a 1yr Return to Bench warranty and 90 days of telephone support. Frankly this is not an adequate level of support for a mission-critical item such as a server. If you have a server you need maintenance. With a maintenance contract you can have 24x7 access to telephone support for the lifetime of the contract and should you need a repair you can have an engineer on-site within 4hrs and if for any reason the server cannot be repaired straight away you will receive loan equipment to keep you going until it can be.

*NetVault's Virtual Disk Library facilitates shorter backup windows*

# how do you want me?

Now you have an idea of what you can use a server for, and how you can keep it protected, what goes into making a server and what sort of things do you need to consider when putting together the right server to fit your needs? Getting a server that fits the bill means pitting the performance you need against your budget to put together a solution that is well balanced.

### Entry-level servers

When choosing an entry-level server there are a few things to consider, cost is likely to be an important issue, this may be your first server or it may just be to support a small office or workgroup. OS X Server is available on it's own so you don't have to have an Xserve, you may be able to use a G5 as a server instead.

Basic performance of the server probably isn't high on your list but reliability should be so look to build in some forms of redundancy and don't skimp on a UPS or backup drive. More memory will probably give you a better return on your investment than a faster processor will and replacing the standard memory with ECC (Error Correction Code) memory that can protect you against errors developing in the memory modules. A good solution for storage would be to install a second hard drive into the G5 and mirror the standard drive using RAID 1, alternatively consider an external FireWire 800 solution such as the LaCie Biggest F800.

One thing to bear in mind is that the PowerMac G5 is designed as a desk-top computer and so the hard drives are not easily accessible and should you need to replace one after a failure you will have to shut the server down to do so. Also service parts kits are not available for the PowerMac G5 so you will not have the option of parts onsite for quick replacement.

### Mid-range servers

For a mid-range server we start looking at increasing performance, using more services and supporting a greater number of users. An Xserve G5 has the benefit of an unlimited user license of OS X Server but also has easily accessible drive bays that allow you to replace a drive without shutting down the server should one fail and has the option of a hardware RAID card.

Any Mac running OS X Server can be managed and monitored remotely using the Server Admin and Workgroup Manager tools that are part of OS X Server but with an Xserve you can use Server Monitor to keep track of 38 sensors built into the Xserve itself that will be able to tell you things like network performance, the

enclosure is getting hot, a fan has failed, a drive has detected that it is going to fail or the power-supply voltage has dropped. Server monitor can keep an eye on a number of servers across the hallway or across the globe and can even email you if it spots a problem so that you can fix it before your users even notice that it had happened. If you need access to a graphical version of OS X rather than just the command line one you can control an Xserve remotely using Apple Remote Desktop. Should you have problems with your network connection or have configured your firewall so that you can't log on to the server remotely Apple have also provided a DB-9 serial port on the back of the Xserve so that you can connect to it with a terminal emulator running on another computer.

The Xserve G5 doesn't ship with a graphics card but if you are still convinced that you need one your choices will be fairly limited as there are no AGP ports in the Xserve G5 so you will need a PCI graphics card. There aren't any PCI-X graphics cards available for the Mac at all so installing a PCI graphics card will slow down the PCI-X bus in the Xserve G5 and therefore slow down any PCI-X cards that you do have installed.

Xserve G5s are not designed for use in a general office. They are designed for installing into racks where one of the important things is to have as much processing power in as small a space as possible. In order to stop then overheating they have a number of very powerful fans inside. The downside of this is that they are a lot noisier than a regular desktop G5. If you have to install an Xserve G5 in an open office where people are going to be working all of the time consider an acoustically shielded rack like the XrackPro2 from GizMac otherwise a standard server rack such as the Elite 505 will be fine. Along with your Xserve G5 you will be able to mount your tape drive, UPS, external storage and networking equipment in the rack and lock the whole lot up to avoid unauthorised access. In addition to a second internal drive to mirror the first one look at storage options such as a pair of LaCie Bigger Disk Extremes which connect via FireWire 800, can be rack-mounted and mirrored using OS X Server. For external

RAID 5 storage look at the LaCie Biggest S1S which is available in sizes up to 2TB and ships with a PCI eSATA card. If you do choose something like the S1S you will need to add a shelf to your rack as the S1S can't be rack-mounted.

### High-end servers

By using a RAID (Redundant Array of Independent For higher performance use an Xserve with dual 2.3GHz processors, add more RAM and install 3x 500GB drives with a hardware PCI RAID card. This will allow you to have 1TB of storage protected by RAID 5 so the server will happily survive failure of a single drive. For storage beyond the 3x 500GB drives that you can fit into an Xserve you should now be looking at an Xserve RAID. The Xserve RAID is connected to the server via a Fibre Channel card, which gives you two channels of communication running at 2Gbps each. If you want to connect more than one Xserve RAID to a single Xserve G5 you will also need to invest in a Fibre Channel switch but for one Xserve and one Xserve RAID all you need are the cables that are supplied with Apple's PCI-X Fibre Channel card. You can connect one Xserve RAID to multiple Xserves but you will not be able to access the same data with more than one server without using Xsan. Also if you want to access all of the storage on an Xserve RAID as one contiguous block you will need to need to set-up what is known as a RAID 0 stripe or a concatenated array on the Xserve but be warned, one weakness of the Xserve RAID is that the two RAID controllers are not redundant and so if one of them fails and you have either a RAID 0 or concatenated RAID set-up using both controllers you will loose all of your data. This should only ever be used as a high-performance scratch disk and not as server storage.

### Backup

If you don't need much in the way of storage you can backup to something as simple as a FireWire VXA2 drive from Exabyte, which will give you 80GB of native capacity. For higher volumes of backup consider Exabyte's FireWire 800 PacketLoader which has a native capacity of 800GB but beware that backing up a full 800GB will take over 38hrs or even longer if you are backing up over a network, so this is best used for a full backup over the weekend in a business that only works 5 days a week. For faster throughputs look for an LTO tape drive such as Exabyte's Magnum LTO-3, with a native capacity of 400GB and can fill that in under 2hrs or an autoloader such as Exabyte's Magnum 1x7 LTO-3 which has a native capacity of 2.8TB and which will back up all of that in around 10hrs.

If you have very large amounts of storage you can start to look at much bigger backup libraries such as Exabyte's 221L which has a native capacity of up to 8.4TB and can be fitted with a second tape mechanism to bring the time to fill that down to about 8hs. For backing up larger amounts or to bring the backup time down you can add multiple units but once you start using more than one individual tape mechanism you will need to use backup software such as NetVault as Retrospect only supports a single tape mechanism. Additionally you should be considering a disk-to-disk-to-tape backup strategy when backing up these very large amounts of data, as that will enable you to backup the server within a reasonable time and then get the backup onto tape.

All the LTO solutions connect via SCSI rather than FireWire so you will also need to budget for a SCSI card, Atto's UL4S for PCI & PCI-X equipped Macs and the UL5D for PCI-Express ones.

Speak to your account manager or one of our **server solution specialists** on **08705 110222** to discuss the server solution that meets your needs

*In order to connect an LTO drive you will need an ATTO SCSI Card*

*LaCie's Biggest S1S provides low-cost RAID 5 storage for your server*

*Don't forget that you will need a Rack like this Elite 505 to fit your server and other hardware into*

# absolute power

A SAN becomes a requirement once you have very large amounts of data that need to be accessed by multiple computers very quickly. As mentioned before you can't just connect a number of Xserves and Xserve RAIDs together and access the same data from more than one computer without Xsan; but what is a Storage Area Network and what are all the bits that make it up?

SANs have traditionally found a home in a video editing workflow but there is a place for them in other scenarios so long as you are dealing with large data files. A SAN is not too efficient in dealing with lots of small files such as with a mail server or for hosting user's home directories and whilst it can be configured to do this to a point you do have to be extremely careful about how the SAN is implemented and you cannot have a SAN that is efficient at working with both large and small files. Even when used in a video editing workflow it is important to tune the SAN for the type of files that you will be using and to have the correct number of RAID controllers for your environment.

An Xsan solution consists of six main components, the storage itself
- Metadata controller to manage the SAN
- Fibre Channel network to connect everything together
- private Ethernet network
- SAN client that is going to use all of the data
- directory server

One or more Xserve RAIDs will provide the storage. As you add more Xserve RAID units to the SAN the bandwidth that the SAN is capable of delivering to the clients goes up. Each RAID controller provides 80-120MBps of bandwidth so by using two Xserve RAIDs together you can sustain up to 360MBps which is enough for 3 streams of 1080i video all to be delivered to an editing workstation at the same time. One of the RAID controllers will be reserved for use by the Metadata controller which is why the maximum bandwidth with 2 Xserve RAIDs is 360MBps and not 480MBps. Even if you don't need the storage capacity of that many Xserve RAIDs it makes sense to spread your drives out amongst the controllers in order that you can get the maximum amount of bandwidth.

One of the elements of any Xsan solution is the concept of a Metadata Controller. This server controls access to all data on

the SAN and should it fail none of the client systems will be able to access any of the data on the SAN. Should there be just one Metadata Controller on the SAN and it fails there is a great risk that all data on the SAN will be lost and irretrievable. Additionally it is impossible to upgrade a Metadata Controller without disabling access to the SAN should there not be a backup controller.

It is for this reason that Apple recommend that all Xsan deployments have a Backup Metadata Controller, this is a second system which is ready to step in should the primary one fail. Whilst it is possible to configure a client to be a Backup Metadata Controller it will have a serious impact on performance should it need to take up this duty.

You could use something simple like an Xserve Cluster Node as a Metadata controller but since you can only fit a single drive into a Cluster Node it is probably only sensible to use this for the backup controller and have the main Metadata controller as an Xserve with 2x 80GB drives configured as a RAID 1 mirror.

One thing that is vital for either Metadata controller is to have a lot of RAM. Xsan needs a lot of memory and the more Xsan volumes you have the more memory you will need on the Metadata controller.

All the elements of the SAN are connected together using Fibre Channel, once you have more than one Metadata controller and one Xserve RAID you will need a Fibre Channel switch. One of the best available is the Qlogic SANbox 5200 series. These are available with dual redundant power supplies plus you can purchase an entry level 8 port switch and upgrade it in 4 port increments to a 16 port switch with 4x 10Gbps uplink ports by simply purchasing a license code to activate the additional ports. You will need the uplink ports to be able to connect multiple SANbox 5200s together to give a total maximum of 64 ports in a single stack. In order to get the best possible performance from the SAN all the communication between the elements of the SAN takes place over Ethernet rather than over the Fibre Channel. It is also important to separate this communication from regular traffic

such as web, email or file sharing so the SAN will need a dedicated private Ethernet network, however this network need only be switched gigabit and there is no need to use managed switches.

It's all well and good having a SAN but it is not a lot of use unless you can connect to it and do something with all the data stored on it. You will need to connect some clients to the SAN and for each of these you will need a Fibre Channel card and a copy of Xsan. In fact every Mac connected to the SAN will need a license so you will need one for each of your Metadata Controllers as well. Fibre Channel cards are available as both PCI-X and PCI-Express so they will work in all PowerMac G5s, all Xserves and all PowerMac G4s Dual 800 so long as they have Mac OS X 10.3.9 or 10.4.3 or later.

One critical thing that isn't made at all clear by Apple is that in order to ensure you don't get problems with people being able to access files that they shouldn't you need to be very careful about how you set-up users on each client. You certainly shouldn't just use the default user that is created when you first setup a Mac as that will cause all sorts of havoc. By far the best way to control this sort of thing is to have a directory server available to manager user logons to the clients. This is a good job for the backup metadata controller, as it won't be doing a great deal else until the main metadata server fails. It would also be sensible to configure an Open Directory replica on the main Metadata controller so that if the backup metadata controller were to fail then the main one would be able to take on directory server duties.

Having a metadata controller and a backup as well as an Open Directory Master and a Replica is a good strategy for ensuring that your SAN keeps going not only if something fails but if you have to take one of

them out of action for an upgrade or some preventative maintenance. Those six items are the nuts-and-bolts basics for a SAN but there are a lot more things to consider. Fibre Channel connections are capable of running up to 2km at full speed and over 50km at lower speeds so you don't need to site your clients close to the SAN itself. This means that you could have a number of workstations around a building all connecting to a central SAN and collaborating in the same workflow. For cable runs up to a couple of metres the copper cables that come with Apple's Fibre Channel PCI-X and PCI-Express cards can used but for longer runs you have to switch over to fibre optic cabling. Fibre optic needs a specialist installer but fortunately MacWarehouse have the required skills to be able to install the fibre for you. The lengths that are available with fibre optic cabling have another benefit. Backing up a SAN becomes a very difficult proposition since you can quickly need to backup multiple terabytes of data on a regular basis and doing this to tape can take a long time. For smaller SANs Exabyte have a Fibre Channel connected version of the 221L that can take two tape mechanisms and up to 21 tapes. For larger SANs you can use much larger tape libraries but backing up and restoring from those can take a very long time so they should only really be considered for archival storage using something like ADICs Stornext which can migrate infrequently accessed data to lower slower and lower cost per gigabyte storage such as tape. For disaster recovery purposes what you can do is have a second SAN at a remote site, connected over fibre optic, and backup to that. This solves a couple of problems by not only backing up the data quickly but also getting the data off site at the same time and you also have a replica of your main SAN that is ready to be used fairly quickly.

*Xserve RAID for high-volume, high-performance, low-cost storage*



*Apple's Xsan allows multiple computers to access a number of Xserve RAIDs at full speed*



*To connect an Xserve RAID to the server you will need an Apple Fibre Channel Card*



*Qlogic SANbox 5200 fibre channel switches for connecting your SAN together*

# happy
# ever after

MacWarehouse have consultants and over 40 engineers across the country and so we are well placed to be your server solutions partner of choice. We can discuss your needs with you and take you through all the options that might be of use to your business and agree a solution that suits you. Once we have agreed on a solution that meets your needs we can even help you to spread the cost through a leasing package. Leasing not only spreads your payments over up to three years but there are also significant tax advantages as well.

Once we receive the go ahead from you one of our consultants or project managers will take charge of the deployment and ensure that everything happens as it should. MacWarehouse are able to deliver the full range of server solutions including Xsan, Active Directory integration, configuration of Windows clients and even Windows servers, should you need any of those too.

With a server solution from MacWarehouse you get the complete package, including but not limited to:

Design and consultancy
**Leasing**
Licensing and OS X Maintenance
**Configuration and deployment**
Xsan
**Active Directory integration**
Installation and configuration of Windows clients and servers
**Disposal of old equipment under WEEE regulations**
Maintenance and 24x7 support
**Networking including infrastructure, wireless, LAN & WAN**
Remote control and support

## Next Steps

Now that you have a better idea of why you need a server, how to get the best out of it and what you want to do with it what do you do next?

Whilst it would maybe be OK to put together a shopping list of parts from MacLife for a very basic server solution for all but the most basic solutions we strongly advise you to discuss your needs with us before making any decisions on what to buy.

Make a list of what your needs are and speak to your account manager or one of our server solution specialists.

We will then:

**Guide you through the design of the solution that is right for you** - Suggest a level of business continuity that is relevant to your business - **Install and configure the solution** Provide you with maintenance to ensure that it keeps performing - **Throughout it's working life.**