An Overview of Samba Serving for Windows

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1.Executive Summary

The Samba software suite running on Linux provides many of the features of a Windows server, for many it can act as a drop-in replacement.

Effectively implemented, whether the server runs on Linux or Windows should be transparent to the user, and to management.

However, whilst you and your users may not notice the difference, whomever provides your IT support role will notice the advantages. For example, the increased efficiency of system management and backup arising from the more centralised system.

Using Samba in the way set out in this document can lead to more predictable outgoing costs and cost savings in the longer term.

This document will describe the various features of a server for Windows, the Linux software available for making servers with such features and some of the pitfalls to be aware of when doing so.

2.Introduction

GNU/Linux, or 'Linux' as we shall call it, is an alternative operating system to Windows. It is developed co-operatively by an informal collection of commercial and non-commercial organisations and individuals. The software itself is free, commercial Linux organisations instead sell services around the software, such as support.

Like Unix which it is modelled on, Linux is a very high quality operating system.

You may have heard about Linux becoming increasingly popular as a desktop operating system but you may not know that it is already a mature server operating system. For example the Apache web server, which is used almost predominantly with Linux, runs 58% of web servers[3].

The Samba software suite running on Linux provides many of the features of a Windows server. For some services it can act as a drop-in replacement. If you only require the sub-set of Windows features that it is able to offer, and most will as they're quite extensive, then your users shouldn't notice the difference between it and a Windows server. There are various advantages to using a Samba server in place of a Windows server.

Whomever provides your IT support role will notice the difference though. To what extent depends on the tools, documentation, training and support they have or can call upon. Given the appropriate tools and a little help, even the 'accidental techie' should be able to setup and maintain a small Linux server. A larger server with more features is going to be more effective if setup by more skilled people, though less skilled people could manage it on from day-to-day.

3.What Does a Server Do?

Some organisations use Microsoft's 'desktop', 'workstation' or 'client' operating systems, such as Windows 2000 Pro and XP Pro, as servers to some degree, sharing files and printers to a few other people. This behaviour is more typical of smaller organisations and those who're cash starved. Larger organisations will be more accustomed to using Windows Server operating systems for this, such as Windows NT 4 Server, Windows 2000 Server, Windows Server 2003 with Service Pack 2 and Windows Server 2003 R2.
To varying extents most organisations will have appreciated the benefits of a networked server.
The client versions of Windows, Windows 2000 Pro and Windows XP Pro, can only act as makeshift servers, they cannot offer the full feature set and performance tuning of a dedicated server operating system, which acts quite differently to a client. When we talk of Samba in comparison with a server, we are comparing it with the server variants of Microsoft Windows.

Some of the features of a server:

- Files and printers can be shared amongst everyone no matter which computer they're using and where they are in the building – a shared drive will appear just like any other drive in the person's computer and a printer as though it is directly connected.
- User accounts and groups can be defined the once on the server rather than on every client computer.
- Restrictions can be placed on individuals and on groups so that, for example, only people in the accounts department can see the accounts.

Some of these features can be coaxed out of client versions of Windows to some extent (for example they have very limiting restrictions on the number of simultaneous users that can use them[4], some of these features require dedicated server software such as can be provided by Windows Server versions and by Linux with Samba.

Using a server, administration is more efficient as it can be focused at one point and can be more easily automated. For example with all data in one place, rather than spread around each client computer, it is easy to make sure it is all backed up and this backup can be automated to run frequently. Server operating systems are more likely to include the tools, or far better tools, for enabling server features and for automating them.

The extent to which servers can be made use of may not have been explored by many organisations. Everyone should already understand how your work can be helped by simple file sharing, but how you can make use of that with various software applications may not have been. A Windows 'domain' offers additional features that can greatly streamline the management of the various and interconnected aspects of a larger computing system with, say, 10 users, a couple of different groups amongst them and a couple of printers.

Windows Server licences are considerably more expensive than the desktop versions of Windows, even for charities through the CTX Programme[5] and they additionally require Client Access Licences (CALs) (an additional fee, based on the number of client users or computers connecting to the server). Most Linux distributions have no such licencing costs.

Table 1 - Server Functionality Provided by Client and Server Versions of Windows

Windows Edition	Orientation	Can Share Files?	Can Share Printers?	Can Provide A Domain?	Maximum Number Of Simultaneous Connections
Windows 95	Client	√	√	×	100, can be changed[6]
Windows 98	Client	√	√	×	100, can be changed
Windows Me	Client	√	√	×	100, can be changed
Windows XP Home	Client	√	√	×	5
Windows Vista Home Basic	Client	√	√	×	5
Windows NT4 Workstation	Client	√	√	×	10
Windows 2000 Pro	Client	√	√	×	10
Windows XP Pro	Client	√	√	×	10
Windows Vista Home Premium	Client	√	√	×	10
Windows Vista Business	Client	√	√	×	10
Windows Vista Ultimate	Client	√	√	×	10
Windows NT4 Server	Server	√	√	√	5. Can be increased by buying more CALs.
Windows 2000 Server	Server	√	√	√	5. Can be increased by buying more CALs.
Windows Server 2003	Server	√	√	√	5. Can be increased by buying more CALs.
Windows Server 2003 R2	Server	√	√	√	5. Can be increased by buying more CALs.

Table 2 - Capabilities of Various Client Versions of Windows

Client versions of Windows	Can Use Shared Files?	Can Use Shared Printers?	Can Join A Domain?
Windows 95	√	√	×
Windows 98	√	√	×
Windows Me	√	√	×
Windows XP Home	√	√	×
Windows Vista Home Basic	?	√	×
Windows Vista Home Premium	?	√	×
Windows NT4 Workstation	√	√	√
Windows 2000 Pro	√	√	√
Windows XP Pro	√	√	√
Windows Vista Business	√	√	√
Windows Vista Ultimate	√	√	√

4.Windows Shared Folders

Folders on a server can be shared, so that documents are available to everyone within an organisation as though they were on their own computer. These are known as Windows shares. Access to them can be restricted to specific individuals or groups if required. You can define specific finely grained restrictions to groups and/or individuals.

More disk space can be added later by adding more disks to the computer.

Some software applications can offer collaborative features through use of such shares that you may not have realised:

- Email. Larger organisations would instead want to run a dedicated mail server.
- Address books
- Calendar
- Database. Larger organisations would instead want to use dedicated database server software.

4.1 Running Programs From Windows Shares

You can run programs from Windows shares so that you only have one copy of the program to maintain but depending on the particular software you want to use it may prove impractical.

Many programs will work this way; some won't; others can be made to but it is laborious to do so[7]. It takes trial and error to work this out and even then you will likely have a mixed environment, which won't afford you the advantages possible from having all software installed on a Windows share.
However there may be individual software still worth running this way so it is worth knowing it can be done.

There are many tools to automate the installation of software to workstations (where the applications won't have any trouble running other than possibly requiring elevated permissions). This is a lot easier than the effort to get difficult applications to run from the server or having a mix of both approaches.

4.2 Permissions

Permissions are the restrictions associated with a Windows share. They define which people can access a share and what they can do with it. You need to carefully decide on the permissions of each specific share, so that they reflect the way your organisation works. This is not just a decision for the computer support personnel but management. Though it is entirely normal for a file created by one person to be editable others, you need to specifically define whether or not others can remove it. If others aren't able to remove a file then you have to rely on whomever is controlling the administrator account to remove it. If the administrator isn't around or the role is unfulfilled then you can have trouble when staff leave the organisation. Similarly if staff were only able to read or edit their own files in their own private areas you could run into difficulty whilst they're away if other people needed access to them. Generally organisations with few staff using their computers for work related matters that are everyone's business will benefit from more open permissions. They needn't have private areas for each individual; the accounting function would likely be an exception to this.

These permissions need to be thought through in advance. Don't be alarmed as the options are straight forward to understand and they are simple to change for both existing files and future usage. This is as true of Windows as it is of Linux.

5.Windows Shared Printers

Printers can be shared by Windows in a similar way to folders.
Windows users will expect to be able to connect to a shared printer using a variety of intuitive methods and have the printer driver install automatically to their machine. There are more manual processes that can be used by someone with more computing skills to connect to a shared printer but it is the 'point and print' method that the majority of users will expect to be available if they are to connect to printers themselves.

6.The Windows Domain

A server can be setup to control a Windows domain. In this manner even more of the administration is brought into the realm of the server. The most important difference with other Windows sharing options is that user accounts are created on the server rather than on workstations. When users turn on their computers they enter their username and password which is checked against the server.

This has various benefits:

- Administration is more efficient and that efficiency compounded the more users you have (with 10 users a domain would be considered very useful), when setting up the system and when changing it
- Users can 'roam' or 'hot desk'
- If a workstation breaks then the time to get a new one onto a user's desk is reduced
- With users 'logging in' through the server there are more aspects of system administration that can be automated
- Use of the system can be restricted to certain times of the day or days of the week
- Software can be installed automatically on a workstation when a user logs in, using such programs as WPKG[8]
- Users' Windows settings are additionally stored on the server, further increasing the centralisation of everything and allowing for a more thorough backup

A Windows domain is more complicated to setup and administer than Windows shared disks and printers and so requires an increase in the expertise of your IT personnel. However the advantages are such that it is likely worth the effort if you have more than a few people using the system.

User accounts in the Windows domain default to having restricted permissions. This is excellent in terms of system security and most software is written to work this way in conformance with Microsoft's best practice. However many of the larger proprietary programs intended to be used by a small trusted workgroup of specialists, such as Adobe Photoshop or Intuit QuickBooks, are incompatible, requiring users to have elevated permissions. So too the software for most USB scanners. This can be accommodated but only at the expense of lessening the security of the system.

7.Linux Distributions

There are various flavours or 'distributions' of Linux available from various groups or organisations who each put together different packages of software and support options. There are many available but only a handful are appropriate to choose from for our scenario. We recommend distributions from the following:

- Debian
- Novell
- Red Hat
- Ubuntu

Table 3 - Differences between distributions

	Novell	Red Hat	Debian	Ubuntu	Novell	Red Hat
Variant	SUSE Linux Enterprise Server (SLES)	Red Hat Enterprise Linux (RHEL) (not Advanced Platform)	Debian Stable	Ubuntu Server Edition LTS (long term support)	OpenSUSE	Fedora
Cost of distribution	£0	Tied in with formal support from project.	£0	£0	£0	£0
Per-seat licencing?	Yes	No	No	No	No	No
Cost of formal support from project	Annual subscription; Basic €290, Standard (€664), Priority (€1245)[9]. Voluntary and community sector discounts available[10] [11].	Annual subscription; Basic (£194), Standard (£444), Premium (£1388)[12]. Cheaper academic editions also available.	n/a	Annual subscription ; 9–5 annual server support (750 US Dollars); 24x7 annual server support (2750 US Dollars)[13]	n/a	n/a
Release schedule	Every 18-24 months	Every 18 to 24 months	Stable versions unsched uled every couple of years	Unschedule d, roughly every couple of years	Scheduled , every 8 months	Every 6 to 8 months
revisions / bugfixes & security updates	5 years expandable to 7 (support and software)	7 years	1 year after release of next upgrade	5 years	2 years	Yes, for last 2 release s
Updates (general enhancements , new features, & additional hardware support)?	Yes, a few in service packs	Yes	No	Yes	No	No
Does it include GNOME?	Yes	Yes	Yes	Yes	Yes	Yes
Does it include KDE?	Just the KDE libraries, though it does include the Samba configuration tool	Yes	Yes	Yes	Yes	Yes

Orientation	Server	Server	Server & desktop	Server	Server & desktop	Desktop

Those distributions that are monetarily free to use allow you to more effectively plan your organisation's IT costs – increasing the number of workstations won't increase your licencing costs; when a new release is available the cost of the new software won't prevent you from having it, only the cost of labour to do the actual upgrade.

Those distributions oriented toward being a desktop system won't have the same restrictions of Windows desktop versions.

Most distributions will allow you to draw from an unofficial repository so you can add updates - general enhancements, new features, and additional hardware support – before the next distribution release. This software won't be as stable as the officially tested software for the distribution but it may be worthwhile to increase the compatibility.

If you rely on support personnel who already have Linux experience then they may already have expertise in one or more distribution and you would likely want to take their advice as to which to choose as their expertise using a particular distribution would be one of the main deciding factors.

7.1 Distribution Upgrades

Upgrades are classed as moving from one major release of a distribution to another, rather than updates, which are small improvements, or bugfixes and security updates. Distribution upgrades provide major upgrades to both operating system and software infrastructure (including Samba). They are best handled by a competent technician although are at least feasible for a less experienced support person.

Distributions will release upgrades periodically (see table 3). Depending on for how long they offer updates and/or security updates and bugfixes, or depending whether you can afford to upgrade, it is prudent to upgrade. Each upgrade will need to be planned, budgeted for and undertaken carefully, thus the upgrade is one of the more costly exercises in a server's life. You will gain worthwhile software upgrades, offering new features, speed improvements, etcetera. In terms of Samba this means improvements in Windows compatibility and speed of response from the server such as when opening files and logging in to a domain. In terms of printing this means compatibility with more printer models. So there can be compelling reasons to upgrade. You don't have to have your server upgraded. Security support tends to be offered for a period of time after the next distribution release and you can go beyond that indefinitely. The longer you leave the upgrade the harder it will be because of difficulties when upgrading from increasingly disparate versions of

software; distributions tend to best support upgrading from one release to the next. Perhaps if you leave it long enough it will be more appropriate to get a new server and migrate to that without the potential headache of upgrading from an exceedingly old release. This strategy makes the most of your investment in deploying the system at the expense of the advantages of upgrades, which for some organisations may not offer a significantly worthwhile advantage.
Security updates aren't always as crucial for some organisations as would normally be expected (see the security updates section) some organisations can live without them.
Above all, its your choice as an organisation when to upgrade.

A Windows server upgrade is similarly a significant undertaking.
Windows server upgrades will tend to require a greater increase in hardware requirements, enough that you may need to replace your server. The hardware requirements for a Samba server will not increase much from one release to another.

7.2 Distribution Security Updates and Bugfixes

Security updates fix software that has been found to offer the potential to be exploited so that people who would otherwise not be allowed into the system could get in and do things they would usually not be allowed to do. Bugfixes fix issues where software is especially broken such as if it causes you to lose data. These type of updates are usually available from distributions long after subsequent releases of their distribution.

If your server is directly exposed to the Internet then security updates are definitely crucial. However a Samba server has no need of being available on the Internet, it should be safely behind a good firewall[14]. If the users of your system are a group of staff you can trust not to maliciously gain access to areas of the server they shouldn't, rather than a more random group such as a transient student population or members of the public, then the security updates are not as essential as would often be claimed. Note that this advice does come with a warning – you won't be covered if your firewall is breached (you'll want to be extra cautious at keeping it up-to-date if you weren't already); you have to be able to trust anyone who has access to your computing system. In some situations this is too risky a practice, but in other situations you'll be fine.

Windows security updates are similar, though they are only released once a month unless the circumstances are particularly risky. Linux distribution security updates will be available as and when a patch is available, your system should be checking at least once a day; they will include updates for any of the software that is part of the distribution, including Samba.
With some distributions the updating can be automated, with others it will take

a couple of minutes of time by a skilled support person.

8.Documentation

You need to be able to change your computer system in line with your changing organisation. The computing system has the potential to change. you can change it as and when necessary if you have the skilled people to do it or step-by-step instructions for non-skilled people to follow. You need to be able to add to the computing system, change some parts and take others away, otherwise it ceases to reflect the way you work and it takes you more time to do your work as you have to bend to the system or work around it. Often changes that seem quite wide ranging might take only a moment to enact in the computing system for someone that knows how; their ramifications could be enormously time saving.

8.1 Documentation For Your Specific System

Every computing system will be unique to the organisation it serves to some degree. All computer support personnel will configure a system to their own criteria to some extent. Whomever sets up your system needs to provide good documentation on how they have configured it. You should demand comprehensive and accessible specifications and documentation, preferably even 'how-to' instructions for regular maintenance procedures.
Such documentation is the key to consistent operation of the system when support personnel change.
Documentation on how to perform day-to-day tasks (add, change and remove users, groups, shares and printers) will allow non-skilled people to do the majority of the regular administration, saving you money and potentially giving you a faster response if you are reliant upon outside support.
Documentation on more in-depth administration will show that the support personnel have a procedural methodology for dealing with your system and so will be more effective in general and over time and staff changes.

8.2 Distribution Documentation

Each distribution will provide its own documentation on the web; commercial distributions will likely have printed books that can be bought or that will come with a boxed version of the distribution.

8.3 Books From Other Publishers

There is plenty of literature around for various levels of administrative staff competency, either for specific distributions or specific tasks or software. Depending on who provides your support role you may or may not need to buy books. If support is provided in-house then you should expect to buy books and there is plenty available for all reading levels. A reputable publisher is O'Reilly[15]. Beware though because publishers' offerings are often outdated; you want the literature for the particular version of any software or distribution you're using.

Some suggested titles:

- Using Samba, Third Edition By Gerald Carter, Jay Ts, Robert Eckstein; O'Reilly[16]
- Learning Red Hat Enterprise Linux & Fedora By Bill McCarty; O'Reilly[17]
- Linux Network Administrator's Guide, Third Edition By Tony Bautts, Terry Dawson, Gregor N. Purdy; O'Reilly[18]
- Book of Webmin ...or How I Learned to Stop Worrying and Love Unix By Joe Cooper; No Starch Press[19]
- Samba 3 By Example by John H. Terpstra; published online[20]

9.The Samba Server

Samba can act as a server for many versions of Windows, offering file and printer sharing and Windows NT 4 style domains. It will not facilitate the more modern 'Active Directory realm' though it can join one. This should be sufficient for small to medium sized organisations who don't need the management facilities provided by Active Directory; most organisations will not.

Samba acts as a drop-in replacement for Windows servers if it is doing such things as offering shared folders and sharing printers. Only if you require Active Directory will it lack in features. Otherwise you won't notice any difference from a user perspective. It should work faster than a comparable Windows server.

9.1 Samba & Clients Using Windows

Samba will allow all versions of Windows to connect to these server features to whatever extent they are able, other than Windows Vista which isn't yet fully

supported.

There is a lot to be gained in terms of stability of your system and reducing maintenance time if you standardise on one specific version of Windows across all workstations.

Windows 2000 with Service pack 4 and Windows XP with Service pack 2 are the ideal versions of Windows to be using. At this point in time the preferred version would be Windows XP with Service pack 2 (Windows 2000 with Service pack 4 is fine, for some reasons even better, but at this point in time it is too near its end of life so security updates won't be available for long enough); but if you already have Windows 2000 with Service Pack 4 you will be fine to stick with it.

Windows Vista is supported but because it was so recently released there are many compatibility fixes currently being made to the Samba suite so you are advised not to use Windows Vista without first checking if Samba supports what you need from it.

9.2 Samba & Clients Using Mac OS X

Perhaps you have a designer or volunteer who comes in with their computer which has Mac OS X. Mac OS X uses Samba itself to integrate with Windows machines so it too can access Samba's shared folders, printers and join a domain. Because the level of compatibility depends on the version of Samba included in OS X and because this is constantly being improved, you need to at least use OS X version 10.3 but preferably the very latest version available from Apple (as of this writing that is version 10.4.9) for best results.
It also helps Mac OS X users if you have the latest version of Samba on your server but this is not always possible when Linux distribution releases only happen every couple of years.

Table 4 – Samba Versions in Mac OS X

Mac OS X Version	Included Samba Version	How Much of Samba is Included?
10.0.x	2.0.x	Just smbclient
10.1.x	?	Just smbclient
10.2.x Jaguar[21]	2.2..x	The Samba suite
10.3.x Panther[22]	3.0.x	The Samba suite
10.4.x Tiger[23]	3.0.x	The Samba suite

9.3 Samba & Clients Using Linux

If you have any client computers running Linux then they should be able to integrate with the system[24], accessing shared folders, shared printers and joining a domain.

10.Printing

Some of the advantages of printing through the server are print job accounting and redundancy where by if two printers are attached and one breaks the printing will continue from the other printer.

10.1 Printers and Print Drivers

Not all printers are supported, you'll need to check specific printers on the OpenPrinting web site[25]. Other than PostScript printers, most brand new printer models won't have an available driver. However you may find a driver for an older model of the same kind of printer works fine but doesn't take advantage of any new features in the more recent model. Postscript printers should all work as you can get the driver from their manufacturer in a form that will work no matter the operating system. Remember that this applies throughout the life of the distribution release you're using, the version of printing software will remain the same until you move to the next distribution release.
It is recommended you use PostScript laser printers. Hewlett Packard make very reliable printers.

Some distributions will install printer drivers for popular printers by default, others will need them installing by hand.

10.2 Checking Printer Consumable levels

You cannot universally expect the useful tools available for Windows for checking ink levels, test patterns and cleaning heads with inkjet printers; or toner levels, drum and developer life of laser printers. This entirely depends upon the make and model of printer. The following makes of printer at least are supported to some extent:

- Hewlett Packard provide graphical interface tools[26] for many of their printers[27]
- Recent Hewlett Packard laser printers with recent network cards[28] provide excellent levels of information on consumables through their web interface
- Epson inkjet printers have command-line programs for checking[29] ink levels, printing test patterns and changing and cleaning ink cartridges; one of these can potentially plugged into the CUPS web interface.

Sometimes there are ways to work around difficulties, some printers, for example Epson inkjets, allow you to change ink and clean heads from the printer's front panel.

Using Hewlett Packard laser printers with JetDirect network cards ensures you have a combination of a high quality printer and the best Linux compatibility.

10.3 Print queues

Software called CUPS (Common UNIX Printing System) is used to setup a printer. Samba does the job of sharing the CUPS printer to Windows. It is possible to enable Windows users to see the printer and connect to it in the automatic way in which they will be used to.

The CUPS print queue needs to be setup. This can be done using the command-line or web browser-based tools that come with CUPS, or using any of the graphical desktop environments available.

To setup the Windows printer driver for point and print style automatic installation on Windows clients is somewhat tricky. It can be done but will likely require the attention of someone with skills in this area.

There are however various methods to work around this.

- The printer driver can be installed by hand on the Windows client. This adds an extra step for an administrator but preserves the ease of use for the user.
- Windows can print direct to the CUPS print queue, rather than via Samba. This adds two extra steps for an administrator and leaves the system without the finishing of the efficient point and print system.

After this, any of the usual Samba tools can be used to share the CUPS printer.

Printing preferences can be manipulated using the usual tools on the Windows clients, as can removing jobs from the print queue.

Smaller organisations may instead find that using a printer with a network interface and instead having each client machine print direct to it is the most

cost effective approach. For them the benefits of the print server may not be worth the effort of setting it up.

There is useful information on working with printers at the Samba web site[30].

11.Samba Administration Tools

In Linux you can do everything from the command-line and this is usually the best practice recommendation for a Linux server. But this is an unremitting, inhospitable environment for non-technical people. To be reasonable to people other than experienced Linux system administrators, for organisations without the money to employ people who are comfortable at this level and are likely to cost more, it is entirely reasonable to use a graphical interface for administration. Though the command-line environment should present no difficulty for IT support personnel competent with Linux and Samba.

There are various graphical interfaces available, ranging from a web browser-based one which would be accessed from any Windows client to the fully fledged and more intuitive 'desktop environments' KDE and GNOME which resemble Windows and are used from the server console.

An important benefit of the graphical user interface is that it gives the ability to feel one's way around the whole system using an intuitive tool, not just around Samba. Support people without Linux expertise, using such tools, who are charged with supporting the whole system have a better chance of managing with this.

The web browser-based interfaces can be included with barely any increase in system resources. The KDE and GNOME environments will increase the system resources; if the computer is very old, such as a Pentium III era computer, then this will drastically affect performance. If the computer is more modern then it is likely to not slow to any great extent with KDE or GNOME, though it will to some degree and including more memory for this will help.

Table 5 - Software Administration Environments

Environment	Description	Pros	Cons
Command-line	Commands are typed into a terminal, like MS-DOS	Technically superior. Everything available.	Requires expertise. Cryptic / ter
Web browser-based	You use it through the web browser. You can use a mouse.	Reasonably familiar for non-technical people. Technically fine, gives best balance of command-line and graphical and preserves the command-line setup	
GNOME	Fully fledged graphical	Familiar for non-technical	Server is less stable, though not

	user interface. You can use a mouse.	people. Intuitive so many more people able to administer	appreciably. Requires more powerful hardwar won't run on very old equipment
KDE	Fully fledged graphical user interface. You can use a mouse.	Familiar for non-technical people. Intuitive so many more people able to administer	Server less stable, though not appreciably. Requires more powerful hardwar won't run on very old equipment

You can weigh up the benefits of which interface to use depending on who is to support it. You aren't forced to have the command-line interface and employ competent support personnel to work with it if you cannot afford that.

Table 6 - Samba Administration Software

ENVIRONMENT	Software	Description	Can Setup Shared Files?	Can Share CUPS Printers?	Can Setup a Domain ?	Limited to Specific Distributions?	Stage Of Development?
Command-line	Samba	Part of Samba itself	√	√	√	No	Mature
Web browser-based	Webmin	Covers more than just Samba	√	√	√	No	Mature
Web browser-based	SWAT	Part of Samba itself; terse	√	√	√	No	Mature
GNOME	GNOME	Part of GNOME itself	√		×	No	Mature
GNOME	GSAMBAD[31]	Possibly no less cryptic than SWAT	√	√	√	No	Early
GNOME	Redhat-config-samba		√	√	?	Red Hat, Fedora	?
KDE	KDE	Part of KDE itself	√	√	√	No	Mature

The command-line tools that come with Samba and CUPS can be used to setup the full range of Samba features.

The web browser-based Webmin tool, available for all distributions, can be used to setup the full range of Samba features.
The tools that come with GNOME by default are able to setup shared files and printers, not domains. The only tool available that can be added to GNOME is GSAMBAD which can setup shared files, printers and a domain but it is at an early stage of development so possibly not something you should rely on.
The tools that come with KDE by default are able to setup shared folders, share CUPS printers and domains.

There are other options available but they're not considered mature enough that they can be recommended[32].

CUPS includes a web browser-based tool for setting up printers.
KDE and GNOME both include tools for setting up CUPS printers.

Some degree of administration of a domain can be performed using Windows' own command-line and graphical interface tools[33] but they are limited to managing users and groups, and shared files and printers. They cannot be used to add shared folders, printers and domains. See Managing Samba: Remote GUI tools by John H. Terpstra[34]).

12.Support

With the reduced licencing costs possible with most Linux distributions, you should expect most of your IT costs to be spent on labour.

You may have various people providing computer support, in-house skilled or unskilled people, outside skilled people. Or there may be a combination of these such as outside skilled people who setup your systems and make drastic changes and provide maintenance when things break; whilst you may have less skilled or unskilled people providing day-to-day administration, some maintenance and some changes.

All these people will experience the change to a Linux-based server. To what extent though can be mitigated by the tools available to them.

If you use outside people to setup your system for you then you may have to change your support people because those you have already for Windows may or may not have expertise in Unix as well as Windows. You should ideally look for people with expertise in both because you're running a mixed environment, rather than people who have expertise in one and are passing themselves off as expert in the other. There is likely to be less IT support organisations offering support for Linux but they do exist and are growing. It would be worth re-assessing which organisations provide such support in your area rather than going on what you already know.

In-house support people are going to benefit from training. The level of expertise they will require will depend on the server features they have to setup and the numbers of people they support. It should be possible with any of the featured Linux distributions for a semi skilled support person to install a Linux distribution and setup a Samba server with only a little training. If such people are to setup a domain then a distribution should be chosen with such support in the graphical user interface.

Fundamentally though, someone needs to understand the operating system. Having tools to help less skilled administrators is fine to a point but when something goes wrong someone will need to understand the operating system internals. Though perhaps you have someone you can call in in just these situations or you could choose a distribution support from those that provide telephone support.

You may find that some working in the voluntary and community sector are willing to learn this of their own accord because the development methodology and culture of the free software 'movement' is likely to tally with their co-operative ethics; indeed some may already have experience of it for these reasons and others.

Linux support is available for some distributions from the distribution vendor in the form of telephone and web based support. It is also available for all distributions from less formal outlets provided by the communities of people that use these distributions. These channels are open to in-house support people though if they are not used to these channels they may take some getting used to. If you use outside support people then they may be comfortable using these channels and so looking for distributions with vendor

support may not be necessary, which could save you a fixed cost.

Be aware that the support provided by those distribution vendors that provide it may not be up to much. For example Red Hat 'Basic' support provides software updates and very little else; their Standard support provides only support with their software, such as if you find a bug in their installer, not suport if you don't understand something; their Premium support is similar to their Standard but for emergency situations out-of-hours. Red Hat have Red Hat Business Partner Program[35] - organisations who can sell you Red Hat and sell you support. For example an annual subscription from LinuxIT in Bristol provides annual unlimited support for £960 or for a single issue at £130. LinuxIT will help you through setting up pretty much anything including a Windows domain.

The Internet has many support channels that provide free community support for all manner of Linux software. Channels include web documents, web forums, mailing lists and chat channels. These specialise in every particular Linux distribution and every particular software application.

13.Server Hardware

You can setup a Samba server on very old hardware if necessary or on fairly recent, but not necessarily the most recent.

13.1 Linux Hardware Support

Linux hardware support for old hardware is exhaustive. Very modern server hardware can pose a problem because of a lack of drivers for new equipment for a period after the hardware is released. You are advised not to purchase a server with very newly released hardware, you should research the compatibility of the server's components with your particular distribution before buying[36].

13.2 Recommended Hardware

An old machine that might otherwise be thrown away as it is too old for a desktop system could be ample for sharing a files to 10 people, administered with a command-line or web browser-based interface.
More hardware resources will be required the more people you share to at any one time; the more features you expect from it such as full Samba print serving and a domain. If you want a full graphical user interface to configure it by then you will need drastically more hardware resources, but only to a point. Once you have the option of a vaguely modern computer then it will be fine with

GNOME and KDE, especially if you add extra memory. If you have very modern hardware then the additional resources required to run KDE or GNOME will be negligible.
Then again as you're centralising resources you will be safer using more modern hardware that is less likely to break with old age.
Dedicated servers come with dedicated server hardware tuned to being used by multiple users, compared with desktop computers that are tuned for use by only one person at any one time. It is much like the difference between client and server versions of Windows. So if you can afford it its is worth getting a dedicated server. A good compromise is a very high quality five year old server from a reseller specialising in ex-corporate second-user stock who sells on ebay or locally. They will still be of exceptional quality. IBM servers are recommended but there are many other worthwhile brands. What that would have cost thousands of pounds five years ago you can find on ebay currently for around £150 plus postage or around £200 from a local reseller. Note these are March 2007 prices and prices for computers never rise.
Alternatively there are low-end servers available new at reasonable costs from big name suppliers such as Dell.

New distribution upgrades won't be particularly demanding of increased hardware requirements which usually leaves you to upgrade as and when required by growing demands of the server in terms of space, numbers of users or features such as a domain. However they will bring increased hardware support.

This flexibility in the hardware that a Samba server will run on allows organisations with little money to start small and work their way up when the server becomes too slow.
For a trained technician, migrating your system from one computer to another by transferring its disks or its software is easy with a Linux system and impossible with a Windows system. Though not the most complicated of jobs, it would probably be out of the realm of an unskilled person to do this.

1 http://www.gnu.org/licenses/gpl.txt
2 http://creativecommons.org/licenses/by-sa/3.0/
3 Netcraft March 2007 Web Server Survey (http://news.netcraft.com/archives/2007/02/23/march_2007_web_server_survey.html)
4 'Inbound connections limit in Windows' - http://support.microsoft.com/?kbid=122920)
5 http://www.ctxchange.org
6 http://support.microsoft.com/kb/q158474/
7 Those larger software applications that aren't intended to be used in this way, such as Adobe Photoshop and Dreamweaver, might install system files outside of their program directory, in Windows system directories. This can be worked around with some effort by putting the particular system files in each workstations' Windows system directories. Software applications that are small, or those intended to work in a multi-user environment (such as those with a Unix heritage, such as The GIMP) usually work.
8 http://wpkg.org/
9 http://www.novell.com/products/server/pricing_euro.html
10 Novell Academic Buying Programs (http://www.novell.com/licensing/academic/)
11 Novell Academic License Agreement - http://www.novell.com/licensing/academic/ala.html
12 https://www.redhat.com/apps/store/server/
13 http://www.ubuntu.com/support/paid
14 For example IPCop (http://www.ipcop.org) or pfSense (http://www.pfsense.com)
15 http://oreilly.com/
16 http://www.oreilly.com/catalog/samba3/; ISBN 9780596007690
17 http://www.oreilly.com/catalog/learnredhatentlnx/; ISBN 9780596005894
18 http://www.oreilly.com/catalog/linag3/; ISBN 9780596005481
19 http://www.oreilly.com/catalog/1886411921/; ISBN 9781886411920
20 http://samba.org/samba/docs/man/Samba-Guide/
21 Mac OS X 10.2 (Jaguar) Cross-Platform Report - http://www.macwindows.com/jaguar.html
22 Mac OS X 10.3 (Panther) Cross-Platform Report - http://www.macwindows.com/panther.html
23 Mac OS X 10.4 (Tiger) Cross-Platform Reports - http://www.macwindows.com/tiger.html
24 Linux clients require Samba and winbind in order to join a Windows domain
25 www.linuxprinting.org/foomatic.html
26 HP Linux Imaging and Printing (HPLIP) http://hplip.sourceforge.net/
27 For printers supported by hpijs and hplip see http://hplip.sourceforge.net/supported_devices/index.html; For printers supported by hpoj see http://hpoj.sourceforge.net/suplist.shtml
28 For instance HP LaserJet 4000 series printers with a minimum of a JetDirect 610N card
29 mtink and escputil; mtink can potentially be connected with the CUPS web interface
30 Chapter 22 – CUPS Printing Support (http://www.samba.org/samba/docs/man/Samba-HOWTO-Collection/CUPS-printing.html#id2645046)
31 www.gadmintools.org
32 Ubuntu-Config-Samba (http://socgguisambaconf.wordpress.com/)
33 The NT4 Domain User Manager, the NT4 Domain Server Manager (both potentially downloadable from Microsoft) and the Windows 2000/XP Professional MMC Computer Management Console (included with the operating system)
34 http://searchenterpriselinux.techtarget.com/tip/0,289483,sid39_gci1159865,00.html
35 https://www.redhat.com/apps/reseller_catalog/results.html?country_region_code=GB
36 For SUSE (http://en.opensuse.org/Hardware); for Red Hat (https://hardware.redhat.com/hwcert/index.cgi); and for multiple distributions the 'Linux Hardware Compatibility Lists & Linux Drivers' (http://www.linux-drivers.org/).