

Computer Maintenance Manual

Philip Burry
Computer Support Specialist
Peace Library System
(780) 538-4656 Ext. 110
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This Manual is created solely for the employees of Peace Library Systems and their member Libraries. This manual has been created to help with the regular upkeep of their computer systems along with their internet connections. This manual will have a layout designed to not only tell a user what to do, but why he must do it. Every effort possible will be made to explain, in non-technical terms (with examples) to help a user become more familiar with computer systems and their regular maintenance.

OVERVIEW

What is going on with my system?

I wish I had a dollar for every time I heard this statement.

Computers act like they do because they are not smart enough to tell us what they're missing or require. We all see computers as powerful and the "know-it-all" of technology. But the later couldn't be further from the truth.

Computer systems are just tools, like a hammer to a carpenter.

When this tool goes wrong, we often wonder why it acts like it does.

Children cry, dogs bark and computer systems just refuse to work properly.

And in that way, they are communicating with us still, even when they don't work properly. A computer tech person can also be called a "Translator", because he has to translate what it is trying to say or do.

What they are trying to say when they go wrong is the battle of the century.

I don't know anyone that knows everything there is to know about computer systems. If so, I'd like to meet that person, I'd get him/her to write this manual. A Network Administrator who is responsible for the daily issues of a network might not know anything about programming in Visual Basic or HTML, but I'm willing to bet he can add a service pack to a Windows 2000 server with his eyes closed. We all have certain skill levels when it comes to technology. This manual is here to help you increase your skill level and knowledge of how a computer works.

What make a computer function like it does?

A computer requires both hardware and software to function properly. The devices in a computer pass digital information back and forth to function as a group or system. And it does this at a very fast rate of speed. If you can imagine a person running around inside a computer acting like a mailman, delivering digital information from device to device, he can be moving at speeds of up to 400 million deliveries per second. The rate at which information is cycled, or delivered from device to device, via the processor, is known as a systems “front-side bus speed”, or just plain “bus speed”. This “bus speed” is controlled by the clock speed of the motherboard, not by the speed of the processor itself.

Before I go and explain about how computers work, I will explain what are the main components of a computer system.

Processor: The processing unit of a computer, the component that processes all those zeros and ones to mean something when we view it on our screen. The higher the processing speed, the faster the system runs. There are three main manufacturers of processors: Intel, AMD (American Micro Devices) and Cyrix. The clear and far majority of computer software manufacturers around write for Intel based systems, systems having an Intel processor in their computer. This is because Intel is the industry standard and is the most popular processor you will find, all-be-it more expensive though. IBM (International Business Machines), know as “Big Blue” to all us technical people, were once the leader in this area, but has fallen way off the mark since the world decided to purchase “clones” rather than IBM computers. A “clone” is a system that hasn’t been manufactured by IBM. This term is a rather old term. At the time, it was IBM’s marketing strategy to try to get people to buy their systems over “clones” because they wanted to have these clones portrayed in a more “unreliable” light as compared to their own systems. Current day, there are more “clones” in homes then there are IBM systems. Mostly because Intel created the processors to power these systems and Bill Gates decided to create Microsoft which gave us “Windows” to run as an operating system on these machines. That made using clones easy (or at least we say it is) and more cost effective)

Operating System: The main software component of a computer system. It is the O/S (Operating System) that allows other applications and devices to function together and operate more smoothly.

There are all kinds of variations of O/S's out there, Microsoft being the more common, but some would say not necessarily the more favorable O/S out there to choose from. Microsoft has created, as time marched on, a line of O/S's to match hardware advancements; Windows 3.1, Windows 95, Windows N/T, Windows 98, Windows Millennium Edition (ME), Windows 2000 and Windows XP. Then there are the O/S's that the average person wouldn't dream of getting, but the advanced user and techie would use with great pleasure and with technical ease; Linux, Red Hat, UNIX, Banyan Vines and Macintosh.

The UNIX operating system is the granddaddy of them all. It was this O/S that the internet was created on. This is where TCP/IP and DNS got its start. Linux was created by Linus Torvalds. He designed his own operating system that is 99% compatible to UNIX and is open source. Meaning anyone who wanted to create or develop a program to be used in the Linux or Red Hat O/S's, could do so as long as they post their code as part of their open source policy. Also, most of the additions and programs out there for the Linux and Red Hat operating systems out there can be downloaded from the internet for free. Part of the Open Source Policy. Those who use Linux and Red Hat like the fact that it is so powerful, with little restrictions and that it is more reliable than any Windows product out there. The trouble with these O/S's is that they require a higher level of computer skills to start off with than Windows. As for the easiest to use, and definitely the most powerful of them all, especially for graphics design, we have our Macintosh O/S developed by Apple computers. People who use these systems and use them regularly will agree that there is no other computer or O/S that is better for the beginner. For graphics and high-end document development, the Apple system that comes with the Macintosh O/S is probably the best of them all. As for any other aspect of computer use, the debate is still ongoing.

Banyan Vines is not so much as an O/S as it is as an add-on. Meaning it sits on top of the UNIX O/S and instead of all the commands being typed in, it makes UNIX menu-driven. Thus you can click on menus to configure and use the O/S in that manner instead of always having to type in commands as you do in UNIX.

Hard Drives: Hard Drives are one of the options for information storage. Most computer systems come with hard drives. In the days gone by, it was not unusual to find a computer system with no hard drive, they all booted-up and ran off of floppies. There are different specifications to hard drives, the most common being storage capacity. Then there is the matter of who

manufactured the hard drive. There are also specs like spin-speed (measured in rpm (revolutions per minute), access time and architecture type.

Most hard drives have very high capacity for storage, they can store up to 200 GB of information on just one hard drive. They have manufacturers like Fujitsu, Samsung, Maxtor, Quantum, Sea Gate and Western Digital.

As far as recommendations go, I prefer any manufactured hard drive except for Samsung and Fujitsu. My experience has left me to realize that these drives go down and have to be replaced more faster than any other manufacturer out there. Inside the hard drives themselves there are plates know as “Platters”. These platters or plates contain the iron oxide material that actually store the data via the read and write heads in the drive.

These platters spin and the faster they spin, the faster data can be read and written to the platters. The newest spin-speed for hard drives are now at 7200 rpm. Access time is the time taken for a computer to find a file at it’s track and sector location, measured by the time you actually double-click on a file, to the time it actually finds the file physically on the hard drive.

An hard drives architecture will depend on how it connects to the motherboard. If it is a IDE it will have a data ribbon that contains 2 rows of 20 pin holes for a total of 40 pin holes. Then there is the SCSI (Scuzzy) architecture whose data ribbon is wider, meaning more pin holes.

An IDE system can have any combination of non-removable devices while SCSI can hold more, up to 8. SCSI is an excellent choice for file servers.

RAM: RAM stands for Random Access Memory and it is the component which programs and devices use to temporarily store information or data needed while that application or device is in use.

It is a volatile type of RAM, meaning when that application is closed or when the computer system is either rebooted or shutdown, the information once stored in RAM is no longer available, even after a reboot.

RAM can be compared to a workbench or workspace area to a cabinet-maker. If the cabinet-maker has about only 3 feet of workbench space to work with, it can encumber his/her work. If he/her has 8 feet of workbench space, he/her can function more efficiently, but if he/her has 15 feet of workbench space, the cabinet-maker can function with little or no worries on encumbrance. When RAM runs out of space, a certain area of the hard drive known as the “Swap File” area is used to store temporary information.

This can slow down the performance of the computer system. The hard drive light, found on the front of the computer, can be monitored to see if there is any “thrashing” or excessive writing to the hard drive.

This thrashing is a clear indication of the need to increase the RAM in your computer system. RAM has many specifications as well.

There are different kinds of memory that also operate on different speeds. Too many to even mention actually, but the current most common memory type is DDR along with Rambus. Rambus being faster, especially on the Pentium 4 processor, as compared to the DDR RAM. Rambus is more expensive though.

Motherboard: The motherboard is the large main board that receives the other devices into its slots. There are PCI and AGP slots found in the more new motherboards. The old ISA slot is gone the way of the dinosaur. The Motherboard will host almost all of the devices inside the computer, unless you have an external device which must still connect to the computer system somehow, more commonly through wire/cable.

Video Cards: This device is what's responsible for transmitting signals to the screen or monitor. Video cards more commonly have AGP architecture, years ago it was common to find video cards in ISA and PCI architecture. The most important part of a video card is the software driver that comes with the device. The software driver or just plain driver allows the computer system to communicate more efficiently with video card. Without the driver, you will not be able to increase screen resolution (standard is 800x600) nor will you be able to change color depth (should be no less than 256 colors).

Modems: For any library using dial-up, the modem is the main link to your ISP (Internet Service provider). Modems modulate and de-modulate. When data from a computer gets sent through the modem, it gets converted from digital to analog signal. When the receiving modem receives the signal, it converts back from analog to digital so the receiving computer can use the data. MO-DEM (MODulate-DEModulate).

ADSL and Cable Modems: For libraries who use ADSL or Cable, they are the link that allows you to access your internet service provider. These devices require very little if no configuration. The computer systems require the configuration for high-speed internet connectivity.

CD-ROM & CD-R/RW: These devices are handy to have because if you have an internet connection and you need drivers on a regular basis, you can download them and burn them off. Or you can just backup existing software

as a precaution. A CD-ROM cleaner is a good investment especially if you are using it near where dust loves to collect.

BIOS: (Basic Input Output System) This is a chip that have all the setting for what devices you have installed. When the computer gets powered up, it does a POST (Power On Self Test). The system actually checks to see if the devices specified in the BIOS is actually there. The setting in the BIOS are kept from being erased by a constant supply of electrical charge from an oversized watch battery located on the motherboard called the “CMOS Battery”. This battery keeps the setting from being erased, else you would have to reprogram the BIOS with new setting every time you power up the system.

UPS: (Uninterruptable Power Supply) This device is an excellent choice for those people who have expensive systems or just can't afford to lose sensitive data. The computer system gets plugged into the UPS and the UPS gets plugged into the wall receptacle. If the UPS senses a drop or a lose in power, the battery in the UPS will cut in and supply the power to the system. But, the additional bonus to having one of these is that it will filter out and prevent brown-outs, power surges and power spikes from reaching your system. These electrical problems cause major problems for the computer system. You can be assured on the fact if you modem ever stops working for no reason, it can either be blamed on a power surge or power spike. They usually occur during electrical storms (lightning) and it is a very common thing. Modems are very susceptible to these occurrences because of their sensitivity to electrical charge.

Now you know a bit about some of the devices you will find in a common everyday computer system. I hope this helps in explaining what each one does and helps in your familiarity with these devices.

How To Maintain Computer Systems.

I often get asked about what certain errors mean when a user gets them. Errors get generated for different reasons, sometimes it can be as simple as a bad O/S or a terribly engineered program, but not necessarily incompatibility. One particular incident was when I had a call to troubleshoot a 'failure to install' error. The user was saying that she could not install a program she had just purchased. I asked her what icons were in her taskbar (lower right corner of the screen). She told me she had nothing there but the Desktop Application Director icons for Corel WordPerfect. I told her to remove the DAD from the taskbar and try to reinstall. Sure enough, this worked perfectly. What was the cause of this glitch? When you try to install a program, the installer program needs a certain memory range in RAM with a certain amount of RAM. If there is already some program located in this memory range, then the program really isn't smart enough to give a pop-up dialog window saying such. So the install program says (not in the exact words) that it can't install the program. The user was happy to have this issue resolved and was even happier to have a technical glitch explained to her in laymen terms. This made a rather confusing issue appear a bit more non-technical and clear. But thus is the world of computers, just when you think you know enough about them, it spits a completely different twist at you so you have more to ponder upon in your already busy day.

There are some things that a user can do to prevent 'certain' errors from giving you additional grief. But don't think for a second that this is the fix for all computer errors. The tips that I will be giving you now, will only help with certain issues and areas of a computer system. But, it is important that these tips be followed. These tips will be explained and given with (if possible) graphical illustrations to help the user understand what is going on behind the scenes when you execute these functions.

Utilities

Disk Defragmenter (Defrag): This utility helps to remove file fragmentation from your hard drive so that your computer doesn't work excessively hard to keep track of its file system. When a hard drive (well, file system would be more accurate) becomes fragmented, it gives the computer unnecessary

overhead that can make the computer operate at slower speeds. Actually, you might not notice it too much, but the computer will notice it more.

File fragmentation can be explained in this way....

You have a cardboard box that contains 3 small blocks of ice.

Each piece of ice is colored with it's own unique color.

Each piece of ice represents a particular but unique file.

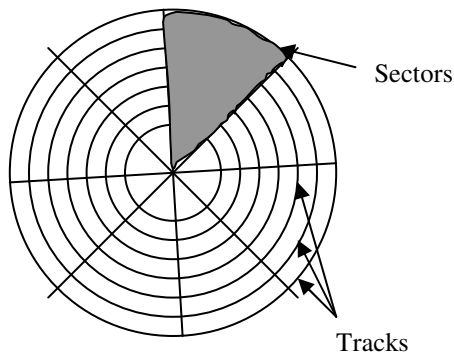
You are walking along on a hard surface carrying these colored ice blocks when you trip and drop the blocks of colored ice. These ice blocks get

broken into many pieces. Now begins the troublesome chore of having to pick up these pieces of ice. As you can see, the ice blocks are fragmented.

We can now see what file fragmentation means, it is the breaking of many files into many pieces. But the ideal condition of these files should be

'contiguous', meaning in one piece with only one 'start' position and one 'end' position. Why does this create additional overhead for the system?

Let me explain this with the help of a diagram or illustration.



The above illustration is an example of the inside of a hard drive. It's called a platter or 'plate' and a hard drive is made of many platters that store information on them physically. Each hard drive is made of 'tracks' and 'sectors' that are the mapping system of the hard drive. Tracks can be compared to as the rings on a tree, sectors can be compared to as pieces of pie. The first sector on any hard drive is known as the 'boot sector'.

This is the system sector that holds a lot of very important system information including the file system. There are many file systems (FAT16, FAT32, HPFS, CDFS and NTFS) but we will be dealing with the FAT file system for this illustration. The FAT (File Allocation Table) file system is

located on the boot sector and (sector 0) and can be compared to as the 'table of contents' of the disk. You would probably look up a topic of interest in a large book by first visiting the table of contents to find its location by pager number, the computer does the same. But, the hard drive has no page number, except track and sector information to keep track of file location. So, in real life, if you double-click on a file in Windows Explorer, the computer looks for that file in the FAT on the boot sector and finds in location by track and sector. The computer system then goes to that location on the hard drive and loads the file for execution. Simple, right?

So, we now know how a computer finds a file it needs, but what does that have to do with file fragmentation? Imagine if you had to go to the grocery store once for every item you needed to purchase. So, if your grocery list contained 10 items, you would need to visit the grocery store ten times. Unnecessary overhead right? Remember the colored ice blocks, when picking up the pieces after it was broken, wouldn't it be nice if those pieces of ice were in one big block again? That's what the Disk Defragmenter (Defrag) utility does, puts all those pieces of files into one nice big file, from start to finish. Let me illustrate this further by way of illustrating a file system.

File Name	Date Created	Track	Sector	File Size
game.txt	08/09/1999	112	123	34 K
ups.exe	08/10/1999	113	133	1111 K
ups.exe	08/10/1999	114	134	234 K
ups.exe	08/10/1999	115	135	556 K
ups.exe	08/10/1999	116	136	147 K

The above example of the FAT (File Allocation Table) is just a very small scale example, it is not uncommon to find over 10,000 files on a hard drive with that many or more entries into its' file allocation table.

But, we can see from the above illustration that for one particular file, we have more than one entry in the FAT for the file ups.exe.

When we defragment the hard drive, there should be only one entry into the FAT for this particular file.....

File Name	Date Created	Track	Sector	File Size
game.txt	08/09/1999	112	123	34 K
ups.exe	08/10/1999	113	133	2048 K

So, now you can see what can happen if you have 10,000 files on your hard drive and you have a fragmentation level of 5%. Instead of having 10,000 files with 10,000 entries into your FAT, you now have 10,500 files with at least that many entries and possibly more. This is why the computer has to work harder to load that particular file that's fragmented into many pieces, the computer has to visit several locations to retrieve the pieces of the whole file you require. Sometimes you have that many entries into the FAT that the computer just can't keep up with all the entries. This can result in having information on the hard drive that has no FAT listing for it or there is a listing for it that points to a particular location but the location is empty. This can give a computer system errors and can give a user a really bad day if the hard drive is missing a lot of information. The only thing to do with this problem is to re-partition, re-format and reinstall the O/S and all the applications on the hard drive. Even if you know what file or application is affected by missing some data from its' file, most of the time it is better to do a complete system down and bring it back up again to counter against this. After all, more than likely there will be more files missing data through file fragmentation than just one file alone.

How often should I run this Disk Defragmenter then?

This can depend much on how often the computer system is being used. If you are on the internet and you used the computer to create a lot of user files through applications like word processors or spreadsheets, you should strongly consider doing this every two-weeks minimum. If you run Defrag and it takes you 3 hours to complete this process, the next time you run the Defrag utility, the time required to run the process should be shortened from its' original time of three hours. The higher the degree (percentage) of file fragmentation, the longer the process will take and if you have an older system, you might want to plan to try this process when nobody is using the computer system. In fact, it is highly recommended that you run Defrag when the computer system is not being used with the screen saver feature being disabled. Reason being, all those fancy screen savers take up processing power and can steal processing power (resources) from the Defrag utility. This can lengthen the time required to complete the defragmentation process.

Note: If you are using Windows N/T, remember that this particular O/S has its own file defragmentation utility built in and runs without user intervention, meaning it runs on its own without you telling it to execute.

What about Scandisk? When should I run this utility?

If you run defrag and get a 'defrag 004' error, it means you should run Scandisk and after completion of this utility, run the Defrag utility again.

Why didn't it just say that then? Welcome to the world of Microsoft.

Like I said earlier, some programs are just poorly engineered.

You can run Scandisk when you are given reason to fear a fault with the hard drive. Scandisk is a utility that tests the actual surface of the hard drive that holds the data. It locates data in a particular location, copies it to a safe area, returns to the original position and writes test data to the location. It then tries to read the data, if it can, that area is a good data area, thus the test data is erased and the original data is then returned to its original location. It does this for every cluster that exists on the hard drive and it tests the 'system area' (the boot sector) and the data area (the rest of the hard drive). There are configuration options on Scandisk that should be checked for Scandisk to work more efficiently and make sure a thorough examination of the hard drive is done. Here is what you should look for to configure Scandisk to work properly.

Check the "through" check box, not the "standard" check box.

Check the "automatically fix errors" check box.

Click on the "options" button.....

Make sure the "system and data areas" radio button is selected.

Do not check the "do not perform write-testing" check box.

Do not check the "do not repair bad sectors in hidden and system files" check box.

Click ok to exit this dialog box.

Click on the "advanced" button.....

Make sure the "append to log" radio button is selected in the "log file" options area.

Make sure the "delete" radio button is selected in the "cross-linked files" options area.

Make sure the "convert to files" radio button is selected in the "lost file fragments" options area.

Click on ok to exit this dialog box.

Click on start to begin the Scandisk utility.

Depending upon the size of the hard drive, it might take a hour to three hours to finish the process. But once the process does finish, it should display a status window giving you statistics on the finished process. The main statistic to watch for is the “bad sectors” statistic. If you find any amount of data in this statistic at all, you should record the amount and compare it to the amount given the next time you run Scandisk. If this statistic has increased from the first time you ran Scandisk, you definitely have a failing hard drive and you should budget for it to be replaced ASAP.

The Security Cards Issue: An How To.

The security cards that were purchased during the CAP 2 and CAP 3 funding were designed to offer librarians piece-of-mind in helping them to secure their workstations. The goal has been partially reached but has not become a total answer to their needs. The security cards work fine, but they have made the operating system very sensitive and the computer became somewhat unstable. There are also a lot of rules associated with using these security cards. Since these cards works on an image basis, it is necessary to have an excellent clean image of the hard drive before installing the security card. This means to run scandisk and defrag before installing the security card itself. The healthier the image of the hard drive, the better your system will perform under the control of the security card.

I created two partitions on the hard drive; one partition will hold everything except Norton Anti-Virus and the second partition will hold JUST Norton Anti-Virus. This partition is not protected by the security card and will allow virus definition updates to download and install without disabling the security card. This allowed the librarians to experience as little computer overhead as possible. The issue of using security cards over a software security solution as been raised and during the next CAP project, we will be using a software security program called Deep Freeze. This software security solution has been used by other library systems and is being used by the college here in Grande Prairie with little or not hassle. It is possible that this solution could be implemented before the next CAP project gets under way.

Understanding Networking

DHCP (Dynamic Host Configuration Protocol) – Your ISP will hand down an IP address, Subnet Mask and Gateway address to your computer when you connect, if you are on Dial-Up or High Speed connection. The IP address is on lease, and will be renewed over time.

There is no guarantee that you will always get the same IP address as you had before. This is an automated process and can be renewed and released manually.

Static IP address – Inside your network, if you have proxy software (Sygate) or if you have a Router, IP addresses can be Static, this means someone gives the computer an IP address but the address will never change unless you decide to do it. Must be done manually.

Ping Utility

The Ping Utility checks for IP connectivity. If you know the IP address of the Computer or Router you want to reach, try to Ping it's IP address. You Ping the IP addresses of the following Computers in the following order;

- 1) Loopback IP Address 127.0.0.1. The loopback address is a hard coded special IP address for testing the correct installation of the TCP/IP protocol on your local computer.
- 2) The IP address of the Network Interface Card in your local computer.
- 3) The Gateway IP address. The Gateway IP address is the IP address of your Router, Multi-homed computer or computer running the Sygate proxy software. The IP address should be the IP address of a NIC.
- 4) An IP address of a computer that is remote to your local network.

If you get a reply to all of the first three options, you do have Internet connectivity. If you do not get a web page, the issue could be somewhere or something else. If you are setting up a new High Speed account and the MAC address of your NIC is not registered with your ISP, then you will get

an IP address starting with 10.

If Internet connectivity is not available, you will get an IP address starting with 169 or all zeros. Windows assign these IP addresses.

Remote Administration

Supernet will offer libraries the chance to be remotely administered by PLS Computer staff. As long as we know the IP address of the computer to be administered, we can remotely make changes or fix issues that normally would take hours of travel. Because Supernet is an array of VPN's (Virtual Private Networks), security is not becoming less of a worry and remote administration becomes a very possible reality.

DeepFreeze Security option

DeepFreeze is a software security solution that is proven to be error free and offers a very solid security option. It is not a hardware security solution like the security cards. It operates in two parts, the administration part and the client part. The administration part will only install on Windows 2000 and XP clients. The client part, which offers the actual security, will install on all Microsoft operating systems. The security works through passwords that are generated through collecting a token from the client computer. The token should be recorded and taken to the administration computer, so that a password will be generated there and can then be taken recorded and taken to the client computer to disable the security options on that particular client computer. The token changes after every reboot and in the security options, you can tell DeepFreeze how many reboots you want the computer to be thawed for.

Email

Almost all libraries I visit use Outlook Express or Microsoft Outlook to read and send email. There are some common issues with Outlook when a new account is created. Sometimes I get calls from librarians where a new email account has been created and they cannot open attachments.

There is a default setting in Outlook that can be changed to allow attachments to be opened. Go to the "Tools" menu option and then the

“Options” menu selection. Then got to the “Security” Tab and uncheck the “Do not allow attachments to be saved or opened that could potentially be a virus” selection. This will allow you to view or open any attachments you may get in your email. This setting is enabled on install by default.

Also, multiple email accounts can be used on multiple logins. This is an option for only computers that have Window NT, 2000 or XP as an operating system. This is because these operating systems have the NTFS file system while operating systems like Windows 95, 98 and millennium have the FAT32 file system. The FAT32 file system has very little security and cannot offer multiple computer accounts with individual email accounts based on login.

To create a new email account, there are certain information you need to know;

The POP email server address..... ie pop.telusplanet.net

The SMTP email server address..... ie smtp.telusplanet.net

Your email login or username.

The password you will use to access the account.

You will have to call Telus internet support to get the new email account creation process underway. They can help you with the steps involved and where the required information should be placed in Outlook.

There are different types of email accounts. There are POP, IMAP and HTML email accounts.

Virus Issues

With the security card and DeepFreeze issues, virus definition updates, first posed a challenge. The trick was to create a second partition on the hard drive, install the anti-virus program there and configure the rights and permission for the partition and the scheduled event of live-update for the retrieval of new virus definitions. In the library account of the CAP 2 and CAP 3 computers, you will not see the Norton anti-virus shield on the task bar. You will, however, see in when you log in as administrator.

The live update option itself needed administrative right to be executed, so another trick was to give the library account special rights to perform this operation without giving the library account too many right and privileges.

You should also be made aware of the fact that many viruses that do appear are not true viruses; they're what's known as Hoaxes.

To find out if a virus is an hoax or not, visit the <http://securityresponse.symantec.com> site and all real and fake threats will be listed inside this site and the removal tools required to remove real threats. Virus definitions become available as new viruses are created. You can manually run live update to check for new virus definitions or you can schedule the live update event to check as often as you wish, once a day is reasonable. Be sure to schedule the event for when your computer is turned on.

Just a note on viruses and your security card or DeepFreeze intergration.

If you have a computer with only a single partition, be sure to disable the security before running live update to install new virus definitions.

After the update is complete, enable the security feature o your computer.

Printing

The printing of documents can be as amazing to watch as it is to set up.

The end user really couldn't care any less about how print jobs get created,

Just that they do so in an error free and timely manner is all that required.

Printing documents can offer a whole new challenge when it comes to troubleshooting. It is important to know what type of printing is being done to troubleshoot printing issues. There are two major types of printing configurations; Local and Networked.

Local printing is just that, the print job is sent to a printer that is directly connected to your local computer through a Parallel or USB cable.

The printer is physically connected to your computer.

There are no rights or privileges to configure for, regardless of operating system. The printer driver that is installed configures the system automatically and should be left as is unless certain special restrictions are required.

Network printing can happen in a few ways; there is TCP/IP printing and network shared printing. TCP/IP printing happens when a special network

interface card is installed into a printer. The printer has an IP address assigned to it and you print to an IP address.

The second example of network printing is an extension of local printing. Just share the printer that is locally installed and you can share it out so that other computers can print to that printer.

Thus, instead of printing to an IP address, you print to a share, and it has the following syntax; *\\servername\sharename*.

The server name is the actual name of the computer that the printer is attached to and the sharename is the name given to the printer upon sharing the computer. For example, if we have a computer named Jupiter that has a HP LaserJet 2100M attached and shared with the name of LaserJet, the correct path to the shared printer on the other computer requiring the printer info is *\\Jupiter\LaserJet*. The local computer will search for the Jupiter computer on the local network and then try to find the shared printer named LaserJet on the Jupiter computer. If the two computers have the same operating system, appropriate drivers will be downloaded from that computer to the local computer. If the operating systems are different, then the local computer will ask for the correct drivers on a CD to be installed locally.

When to reboot

There are times when things happen inside of a computer system that we as end users, may not be aware of. Funny things can and do happen. We call them glitches, hick-ups and miss-fires. We even say that there are gremlins inside our computers when things that should happen don't happen or things don't happen that should. Whatever the cause, there can be one sure thing to try that will set things straight again, Reboot. Please, if at all possible, save any and all data you are working on before doing so.

Rebooting will flush the memory and load all drivers cleanly.

It does help to do this. If rebooting does help but the problem occurs again, you can bet the cause of the problem will be hard to find, let alone the cure.