



The Cursor



Monthly Newsletter of the
Washington Area Computer User Group

Meeting Location:
Micro Center
Pan Am Shopping Center



Next Meeting:
November 19, 2005

Presidential Bits

November 2005 Meeting



By Paul Howard

After October's meeting, at which Bill Walsh discussed DeLorme's Street Maps 2006, and integration with GPS, none of us have an excuse for getting lost, especially if you have some of the equipment and programs Bill recommended!

Our next meeting, held at Micro-Center, Fairfax, on November 19th, features two topics we hope you'll enjoy.

Home Computer Networking, Part I

WAC's Networking gurus, Geof Goodrum and Chuck Roberts, will help solve the mysteries of networking your home computer systems in the first of a two part series of meetings to help you understand networking, and securing your network for safe use. Chuck also enhances this discussion with an article in this issue of the Cursor.

Starting with a brief history of computer networks, and how and why networks evolved., this talk will cover client / server environments, and, more common in personal use, the peer-to-peer environment. Basic concepts of computer security flow-

ing into network security in client / server, and peer-to-peer networks will be covered. The bulk of discussion will center on the requirements and how to's for creating a wireless peer-to-peer network, using a router, hub/switches, Wireless Access Points (WAP) and bridges to create complex wired and wireless networks. Included will be: What you need to build a network: NIC cards, (including MAC addressing), TCP/IP, TCP/IP addressing, DNS, DHCP then troubleshooting networking problems. This leads to: ping, ipconfig /all, Tracert from MS and then Traceroute from AnalogX.

Build Your Own Computer, Part I

Paul Howard will narrate an Intel presentation to guide users through the creation of their own system. Part I addresses "Why Build Your Own Computer?", "Where to Buy Parts?" and the considerations involved in choosing the various components and technologies. During this BYO Seminar, audience members will be introduced to the opportunity to customize, purchase and build a state-of-the-art, high-performance, high-value PC from specially-priced components.

See more details at our special web page for this series: <http://www.wacug.org/byocomputer.html>

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Lu Spriggs Web Sites for November 2005

<http://wacug.org/> is the URL for the Washington Area Computer User Group. Visit it for past versions of Sprigg's Web Sites w/ hyperlinks.

1. <http://www.cairo.com/> Buy what you want, on Sale near you! Save 30 to 50!!
2. <http://longevity.scienceboard.net/> – A 'blog' to unravel the secrets of longevity, and understand the secrets of aging.
3. <http://www.PATHnet.org/> – Resources for Hurricane Resistance and Rebuilding. Provides a rundown of the four building parts with the most durable option.
4. <http://restaurant.com/> – Eat, Drink, and Save Money! Coupons and Gift Certificates for 6000 eateries.
5. <http://whatsnew.mail.yahoo.com/> – What's new with Yahoo Mail? Try out this new program (beta).

Got your latest Medical Diagnosis, and now you want a second opinion? Try these trustworthy health sources:

6. <http://www.healthfinder.gov/>
7. <http://medlineplus.gov/>

8. <http://browser.netscape.com/> – Netscape 8.0 is now available, free to download. Or you can purchase the CD and Guide book for \$14.95.
9. <http://google.com/> – Click on "More", then select Google Earth (Beta). The program is a 10.3 MByte download. Explore, Search and Discover! You can change your viewing altitude.



Remember, the annual election of officers will be taking place at the January 2006 meeting. Only members in good standing may participate in the election.

Please pay your dues early so you may vote!

NCTCUG

Visit our "sister" user group. The National Capital Technology and Computer User's Group meets the first and fourth Wednesday of the month. They meet in Carlin Hall in Arlington at 5711 South 4th Street. Visit their web site for more information, a map and directions:

<http://www.nctcug.org/>

Meetings start at 7:00 PM



GNU/Linux SIG

By Geof Goodrum

OpenOffice.org 2.0 Released

The OpenOffice.org Project released version 2.0 of the Open Source office application suite (word processing, spreadsheet, drawing, math equation editor, presentation editor, database manager) on October 20. Two of the most obvious changes in this release are the integration of the Java HSQL Base database manager and adoption of OASIS standard OpenDocument as the native file format. OpenDocument is also used by the Open Source KOffice and Abiword applications, so documents can be exchanged easily with no loss of formatting information.

OOo 2.0 also uses the World Wide Web Consortium's XFORMS standard for design of fill-in forms for documents and the database program. The OOo Team also improved the export to PDF file feature in the applications. OOo 2.0 still supports import and export of Microsoft Office file formats (.doc, .xls, .ppt) from version 6.0/95 through Office XP, though complex documents sometimes require re-editing.

I did find some glitches that remain in the Impress presentation pack-

age, specifically that embedded Internet hyperlinks did not work and I could not find a way to edit the appearance of hyperlinks. I also could not figure out how to add new fillable text boxes to the master slide in Impress, though I believe it should be possible.

However, OOo 2.0 is an impressive achievement for which the developers deserve much credit.

More information and a complete feature list can be found at the project website, <http://www.openoffice.org/>.

NERDTV

NerdTV is a new, online Public Broadcasting System (PBS) TV show hosted by technology columnist Robert X. Cringely. Each week, Mr. Cringely interviews a technology luminary in a one hour segment. The show is somewhat unique in being released under a Creative Commons license, which permits anyone to edit and redistribute the shows as long as credit is given to PBS and Mr. Cringely and no remuneration is received whether the show is edited or not.

Past and current shows are available on the show's website (<http://www.pbs.org/cringely/nerdtv/>) in MPEG4 video, MP3, Ogg Vorbis and AAC audio, and text transcripts. Previous guests include Macintosh OS programmer Andy Hertzfeld, Sun Microsystems Co-founder Bill Joy and Internet Publisher Tim O'Reilly. Upcoming episodes are scheduled with Apple Computer Co-founder Steve Wozniak, Google CEO Eric Schmidt, and Linux creator Linus Torvalds.

Job Opportunity: Software/ Middleware Evangelist (Linux/ Non Microsoft)

As part of a team to drive a rapidly

growing business, this digital media professional will have a broad experience base in Linux and other non-Microsoft Software/Middleware. Experience in STB, IPSTB, pay per view, or other media related software middleware is required. The focus will be on developing optimized solutions for computing and connected platforms for digital media entertainment applications and consumer electronics devices.

The position is part Architect, part Business Development, part Strategy. This person will work inside and outside the company, with key partners, customers, architects, and consortia to represent and lead the company's efforts in the consumer digital media market. This includes driving external requirements in the industry and driving internal requirements which will ultimately result in product/platform requirements. The evangelist role will also require participating, and ideally leading, standards bodies where applicable. Ability to drive direction and communicate clearly is required. Ideal candidate has an advanced degree or commensurate experience directly related to the field of interest. Excellent communication skills are expected. Position is located in Austin, TX. Relocation is available.

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Linux CD of the Month

In addition to the CD-R discs described below, I can provide any

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downloadable GNU/Linux operating system distribution (e.g. Fedora Core, Mandrake, Debian, Knoppix) on CD-R. Note: download versions of commercial distributions do not include official technical support or printed documentation.

Discs are available only by pre-order. Contact me by phone (703-370-7649) or e-mail (ggoodrum@bigfoot.com) at least 48 hours before meeting day to order or for more information. Single discs cost \$4 each; GNU/Linux distributions on two or three discs cost \$6 per set. All executable programs are for Intel x86 compatible Linux distributions unless stated otherwise. Your requests and suggestions are always welcome!

November 2005

OpenComal – v0.2.6. Free GNU General Public License source and executable code for Linux, MS-DOS and Win32 systems by Jos Visser. OpenComal is a highly portable Open Source implementation of the structured programming language COMAL. Apart from the interpreter (opencomal), a run-time only unit is provided (opencomal-run) that contains all the code necessary to load and execute a SAVED OpenComal program.

Stellarium – v0.7.1. Free GNU General Public License source code by Fabien Chéreau and executables for Fedora Core 4 and Debian Linux. Stellarium is an Open Source desktop planetarium for Linux/Unix, Windows and MacOSX. It renders realistic views of the skies and surrounding terrain in real-time using OpenGL including shooting stars, fog and atmospheric effects such as star twinkle, which means the skies will look exactly like what you

see with your eyes, binoculars, or a small telescope. Stellarium is very simple to use, which is one of its biggest advantages. Stellarium displays over 120,000 cataloged stars, planets with major satellites, 88 constellations with names, artwork and asterisms, and images of over 70 nebulas. An accelerated 3D graphic card is required.

WifiScanner – v1.0.1. Free GNU General Public License source code by Jerome Poggi. WifiScanner is an analyzer and detector of 802.11b stations and access points. It can listen alternatively on all of the 14 channels, write packet information in real time, can search access points and associated client stations, and can generate a graphic of the architecture using GraphViz. All network traffic can be saved in the libpcap format for post analysis. It works under Linux with all WiFi cards. An Intrusion Detection System is integrated to detect anomaly like MAC usurpation.

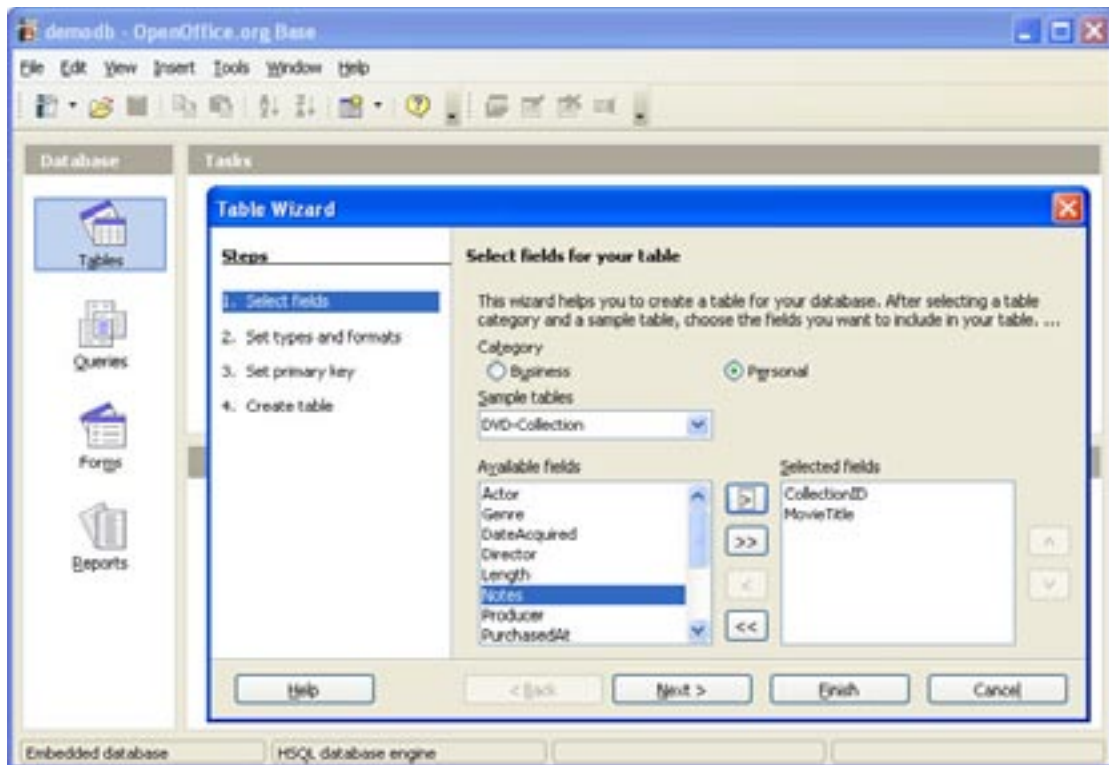
WP Clipart – v1.0. Free public domain clip art collection by Paul Sherman. WP Clipart is an attempt to make a useful clipart package of public domain images for use in word processors. It contains nearly 5,000 pieces of non-transparent PNG clip art. It has been optimized for use in all word processors (scaled down, midtones expanded for inkjet print quality, etc.). It is suitable for documents as well as web graphics, but also has business (credit cards, promo graphics) and educational uses (pictures of all US presidents, all country flags, all US states, sign language alphabet).

GNU/Linux Distribution Updates

– Security and bug fix monthly updates for Fedora Core 4.

Kernel Source - The latest versions of 2.4 and 2.6 kernel source code for all platforms.





Open Office.org 2.0 Screen-shot



Stellarium Screen-shot

Why Computer Networks?

By Chuck Roberts, WAC Member

This is the first of a two-part article that was written to correspond with a presentation in the November and another meeting on computer networking. The main focus will be to enhance your understanding of computer networking in general, and specifically networking your own computers.

While the majority of my network experiences, training and knowledge are Windows based, I am not favoring Windows in any way in this article and the future labs at the next meeting.

For our purposes, networking will be discussed from three perspectives: the corporate environment **{C}** with somewhere over 1,000 clients or users; the small business environment **{SB}** with somewhere between 10 and 20 clients or users; and a home network **{H}** with less than 10 clients or users.

While computer networking is complex, I will attempt to highlight the primary points that will also spill-over into a home network environment that will be helpful to you. That is topics and issues you are likely to encounter in building your own network. The **C** network will be included to assist you in grasping the “big picture” and from a historical information perspective.

History

Networking became the vehicle that enabled multiple users to “share” computing resources. That is, by connecting the computers together via a network, a printer that was attached to one computer could be “shared” to all the computers on the network. That offered considerable

cost savings to companies that had several computers in a single location.

Additionally, other peripherals like modems and dial-up connections could also be shared to all the computers connected to the network. Eventually someone finally wrote “applications” that ran on one computer but was “shared” across the network to other or all users.

That introduced another question about the number of users that could use the application. Should everyone have access? Should access be limited to a specific group? These questions lead to the development of User Licenses. Each user was required to have a user license to access the application. This situation lead to other advances in the computer industry known as “Group Licensing.” Each client on a computer network that connects to the application is required to have a license.

So, should a license be purchased for each user or for each computer? How many users would need the use of the application at any particular moment? As a result, the typical licensing agreement would determine how many simultaneous users were enabled at any instance. If more users try to access the application than are licensed, the server denies these extra clients a connection until some connected users “logoff” at which time the application server will allow new users to “logon.” So you can see how the typical End User License Agreement or *EULA* came to be.

While most companies don’t use application servers today, keep in mind that there are some applications that are written specifically to run on a server. These servers generally serve a particular section or workgroup with specific needs.

Several such applications are needed in specialized fields such as scientific research, which uses advanced math functions. Some complicated imaging applications like charting geological formations for locating oil fields and tracking and projecting weather patterns are examples. Other examples follow.

The electric power “grid” is another example. The “grid” is connected via networks across the nation. An alliance of utility or electric companies are interconnected (loosely I might add) with the primary goal of preventing some of the large regional blackouts we have seen in recent years.

Banks use specialized servers to maintain real-time financial information for their customers. You have seen the commercials on TV where two guys are purchasing coffee and a Danish in a coffee shop while monitoring their bank card account real-time to see how soon the charge appears in their account. Remember, several networks interconnect the financial industry which enables the government to manage the money supply through the Fed in conjunction with the Federal Reserve Banks and their member banks.

Adobe sells an Acrobat Distiller server platform for specialized uses in the printing and publishing market segment, and Microsoft offers a MS Project server for companies that perform large scale integration projects.

But today, application servers are not commonplace in the typical corporate, small business or home network environment, but here are some of the more common uses for servers that will be found in almost

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any organization.

1. **A Print Server** – a printer that is shared across a network is normally managed and controlled by a print server. The networked printer is “installed” to that server and all the printer drivers for all the different operating systems being used across the network are installed on the print server so all users with access to that printer can download a print driver and use the printer. Yes, in a networked environment, the printer may be excluded from public use and may be for the exclusive use of a particular workgroup or division. That is part of managing the printer through the print server.
2. **A File Server** – a file server is actually a local server with disk space available that is “shared” such that the disk space becomes available to individual users, to groups of users or to everyone. There are many ways this may be implemented in the Windows Server Operating System.
3. **A Web Server** – While most servers have the ability to host and display web pages, this is quickly becoming an area of specialty. There are basically two kinds of web servers today. The primary difference is like what’s important in real estate – location, location and location. An Internet Web Server resides on and responds to requests from and delivers responses to clients using the Internet; where the internal web server resides on and responds to requests from internal clients

and delivers responses to those clients using the internal Internet or Intranet.

4. **A Mail Server** – is a server running a specialized application for e-mail. Since email is fairly common and uses a standard format, server companies, offer a server with the sole purpose of processing and forwarding mail. Within a corporation, the enhanced Microsoft Mail Server is an “Exchange Server.” It provides additional and advanced features to the corporate users dealing with meetings, recalling a mail message and voting. Usually, as individuals and small businesses, our ISP provides the e-mail service for us without the extra features of a specialized server for e-mail. Another e-mail server includes *Domino* from IBM which was purchased from Lotus and works in conjunction with Lotus Notes.

These are simply examples of applications that run primarily on servers. Will you need any of these? The answer is a defiant maybe — maybe even a definite probably depending on what you want to do.

Now that we have some history about computer networking and we’ve talked a little about servers, what does a server really consist of? Well it is similar to a regular desktop computer. But a server is really a specialized collection of high performance hardware and server software that have been optimized for their tasks. It is possible to use a regular computer “like” it is a server in some instances. Without getting *too* involved in the technical details, let’s look at the server from the **{C}**, **{SB}**, and **{H}** (remember **C**orporate, **S**mall **B**usiness and **H**ome) hard-

ware networking requirements.

A **{C}** has thousands of users or customers. We want a server with a very fast processor (perhaps multiple processors), lots of memory, and large and very fast disk drives. We don’t want to use processor instructions to access the disk drives so we’ll use SCSI (Small Computer System Interface) disk controllers. They receive directions from the CPU and go get the required data independently without further instructions from the CPU. In other words, they take the order for data and then go off on their own and get it. Once they have the data, they notify the CPU and then pass it memory when instructed. The SCSI interface really operates with minimal CPU involvement.

The server simply stores and retrieves data for the CPU so graphics capability is not needed on the server. A good example is *Bank of America*. Imagine all their online customers checking their account balances and paying bills at any one time. Just try to imagine how many customers are online at any one instant! And to make matters worse, they are dealing with their customers’ money. How sensitive and important is that? How would I react if my bank statement reported I had somewhere between \$2,000 and \$3,500? Would you or I find that amount of variance acceptable? I think not. I used *Bank of America* strictly as an example you should not take that reference as an endorsement for any financial institution.

One requirement for consideration is hard drive backup, failure and replacement. Numerous schemes are available that cover these topics. But a quick overview here is wise. Some

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corporations use a scheme known as drive-arrays. Inside this topic more schemes are available for drive mirroring, drive stripping and others. An in-depth discussion is beyond the scope of this article but you may use *Google* to search for more information. One factor that most corporations use for hard drives is “hot replacement.” Using “disk images” and “mirrored-drives” to store backups of hard drives, most corporations have the ability to ensure that a failed hard drive can be replaced on an active server without bringing the server down and restarting it and then recovering the data from the replaced drive.

A **{SB}** doesn't have near as many clients or users online at the same time, so the hardware requirements are significantly scaled-down. But the actual configuration is really dependant on their primary business applications. For example, if a lot of complicated images are used – engineering, photographic, print layout, or architectural – that implies large data files. In some instances, a multi-processor server might be required it simply depends on the workload and the throughput requirements.

The **{SB}** may have similar requirements about backup images and drive mirroring or stripping. Again, this would depend on the resources available and the business model in place and a lot of that is determined by the business and customer demands.

The **{H}** environment is very different. In the home network environment, we usually don't have customers banging on our servers. If we did, then we would be having the **{SB}** discussion. So in the home environment we usually have less

than 10 clients and/or computers involved. In the typical household, there are about four or five computers or clients. Typically that is about two desktop machines (for Mom and Dad) and perhaps three laptops (Mom, Dad and one or more children). The names and numbers may change to protect the innocent (or guilty in my case – and Paul's).

Eventually, these computers run out of disk space and get some age on them such that they need to be recycled. One of these older desktop machines could be used as a “File Server.” All that is needed is to upgrade the hard drive or install a new larger drive. Before you go nuts and buy a Bazillion Gigabyte hard drive, make sure the BIOS and operating system will support a drive as large as you buy – but get the biggest drive you can that will work.

What kind of network is the best for you? — It depends — that is the million dollar question! But with some help, you should be able to decide which fits your needs.

Two Network Types

There are two basic types of modern networks. The wireless “infrastructure” model is the classic client-server network like those used in the corporate world that also include wireless connectivity. It includes clients running client operating systems like Windows, Linux, Apple OS Sun OS and then servers running server operating systems like Windows Server, Linux Server, Apple Server, Novell and Sun Server.

The other is known in the wireless world as the “ad hoc” model. This is very similar to the peer-to-peer networking (P2P) one hears about on the Internet that is used for file-swapping but in this case think in-

stead of wireless networking and “hot spots” where clients of equal status are interconnected forming a computer network to share common resources like sharing a broadband connection to the Internet.

Which is best for you – Client-server or P2P?

Let's examine the Pros and Cons of P2P networking – networks particularly for smaller networks which is usually 10 users or less

Pros

- Less Expensive hardware — no servers
- Resources distributed over all the computers
- All computers are equal
- Relative easy (simple) to setup and administer (less than 10 systems)
- Each computer provides its own administration and security
- Network administration is widely distributed to many people

No Network Operating System (NOS) required

- P-2-P networks are built using Windows 95 or newer operating systems
- Or using all Macintosh computers or Unix/Linux based systems
- It's not simple to mix systems and protocols

Built-in Redundancy

- Assume 10 to 20 computers with important data.
- Some system failures leaves most data available on remaining systems
- Fewer single points of failure affect the entire network and users

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Smart Computing Tips

Streamline your Start Button

— Many people feel that the default Windows XP look is just too cartoonish and disruptive. A few changes to the Start button can fix that. Right-click the Start button and select Properties. If you're a true nostalgia buff, you can select Classic Start Menu here, but you can also use a hybrid approach; click the Customize button next to Start Menu instead. Choose the small icons option to save space, which will allow you to increase the number of programs on the start menu to a bigger number, such as eight. On the Advanced tab for Start Menu customization, there is a long list of links you can choose to add or remove from the menu. I always take out Favorites because 90% of the time I'm going to do a Google search, which I've set to be my home page. Then I set Control Panel to be a menu instead of a link and remove Printers And Faxes from the Start Menu. On this dialog I also turn off the Highlight Newly Installed Programs feature, which can be distracting. Usually I reorganize the shortcuts for applications after they install anyway because they add extra shortcuts such as uninstall. That's what the Add/Remove Programs Control Panel does.

Recover an Accidentally Deleted File

— To recover an accidentally deleted file, double-click the Recycle Bin icon on your Desktop to launch the Recycle Bin window. To find your file, simply look in the Recycle Bin folder. Right-click the appropriate filename and click Restore.

Advice for eBay Buyers — Shopping on eBay isn't the tactile affair that grocery shopping is, but the fact

that you can't thump a Web picture of a melon doesn't mean you should shy away from buying online. Make sure you read the item's description very carefully. If something doesn't look right, ask the seller about it. If the item description includes subjective phrases, such as "minor dings and scratches," don't hesitate to send the seller a request for some elaboration. The seller will often even send you additional pictures of the area in question.



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<http://makezine.com/>

Remember our User Group discount code is DSUG. Entering that discount code as part of your order will result in a 30% discount on the O'Reilly site.

Cons

- May hurt user's performance (*if frequently used data is on system*)
- Not very secure (depending on the OS)
- Self administration not secure
- Hard to back up data if left to individual users — no centralized scheme or process

Client/Server Networks

Used for networks of 10 users or more. Client / Server networks offer the opportunity for centralized administration using equipment suited to managing and controlling the network

Pros

- Very Secure due to centralized administration – usually located in a central secure facility / area
- Managing multiple resources is easier if they're located on one or two servers.
- Physical security is as important as secure access. Peer-to-peer computers (as PCs) are not protected from physical access
- Networking Operating Systems are designed to be secure and have the necessary features to provide strong network security
- While dedicated servers are more expensive than desktop units, they offer better performance because they are optimized for the needs of many simultaneous users.
- Backing up a computer's critical data is much easier when it is located on a centralized server. Depending on the software, complex backups may be run unattended perhaps overnight, when the server is not being

used

Cons

- Cost of the server equipment, network OS, and the client licenses
- Cost of a network administrator to setup, control and administer the network.
- If the main server goes down, so does access to the network resources

The Local Area Network (LAN) is really the rule in today's business world. Even small LANs can use different types of servers to provide users with the resources they need.

Network Addressing

TCP/IP – Transmission Control Protocol/Internet Protocol has become the common language for the networking world.

IP Addressing – Consists of four octets separated by dots. eg. 192.168.1.1 all IP addresses are configured this way.

MAC Address (Media Access Control) – The Hardware address of a Network Interface (NIC). The MAC is burned into a ROM in the device and is used to resolve a logical address to a hardware address before the data can actually be received.

DNS – Domain Name Service is used to refer to computers using TCP/IP by "friendly names" therefore when you type "Google" into your browser, DNS translates it into the IP Address for Google and passes your request along to that server. You do not need remember the IP Address for Google.

DHCP – Dynamic Host Configuration Protocol assigns an IP address to each computer joining the network

Network Troubleshooting

When something goes wrong, what do you do?

Tools – these tools help you fix networking problems. We'll use and discuss them during our next session.

Ipconfig /all – from the command prompt, reveals all the network specifics about your computer

Ping – command prompt enables you to "bounce" IP packets to another computer to verify your computer, settings and NIC card are working properly.

Ping 127.0.0.1 – verifies your NIC transceiver is working properly.

Traceroute – a utility that displays path taken to deliver packets between computers. I use a free version downloaded from <http://www.analogx.com/>.

Next session we'll look more closely at the specifics you will need to build a (P2P) network at home. And to make it easier, we'll actually build a P2P network and create a file server by sharing a disk during the meeting that included both wired and wireless PCs. Feel free to bring a computer if possible. That should make it easier to build your network at home...



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The Cursor provides news, commentary and product information to members of the Washington Area Computer User Group.

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Send article submission and reprint requests to the Editor: cursor@wacug.org**

2006 WAC Membership/Renewal Application

2006 Dues are for the Calendar Year and include Disk Library Discounts, and WAC's monthly newsletter, *The Cursor*, by 1st Class mail to your home.

Individual/Corporate/Family Dues: \$25.00

Remit payment in person at the WAC Membership table on meeting day, or by mail to:

**Washington Area Computer User Group
30 Fendall Ave.
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Make checks payable to WAC. Please do not send cash by mail. *Thank you for joining WAC!*

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 List the computer systems you own / use (in order of preference)

Operating System(s): _____

Modem(s): _____

Printer(s): _____

Other Hardware: _____

Favorite Software: _____

Connection: (circle one) Dial-up or Broadband

Circle Your Interests: Photo Printing Investing Games
 Digital Photography Internet Access Education Music
 Graphics/Animation Genealogy Video Finance
 Programming Language(s) _____
 Hardware Upgrades/Repair List others below

Next WAC Meetings: • Dec 10 • Jan 21 • Feb 11 • Mar 21 • April 15

Call (703) 370-7649 for the latest meeting information or Visit our Web Site at:
<http://www.wacug.org>

November Meeting will be held
at Micro Center in the
Pan AM Shopping Center.
Intercection of Route US 29 and
Nutley St.
Follow the signs to the meeting
room.

Service Desks Open at 12:30
Meeting Starts at 1:00 PM
FREE ADMISSION
BRING A FRIEND!



Driving Directions:

Within the Fairfax area

From West of the Beltway on US-66, go to Nutley Street Exit. Exit South onto Nutley Street. Micro Center is in the Pan Am Shopping Center at the first intersection.

From Washington National Airport

From the airport take US-66 West. Go to Nutley Street Exit. Exit South onto Nutley Street. Micro Center is in the Pan Am Shopping Center at the first intersection.



Washington Area Computer User Group
30 Fendall Avenue
Alexandria, VA 22304-6300
ADDRESS CORRECTION REQUESTED

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