AIR FORCE ASSOCIATION'S

CYBERPATRIOT

NATIONAL YOUTH CYBER EDUCATION PROGRAM

APPENDIX I

Coaches Guide and Additional Training Topics and Tips

www.uscyberpatriot.org

Learning Objectives

- Participants will understand their role and responsibilities as part of the CyberPatriot program
  - Coach and Mentor/Team Assistant roles
  - Team composition and recruitment
- Participants will understand the mechanics of CyberPatriot
  - Registration processes
  - Build Your Own Practice Images
  - Image distribution
  - Competition schedule
  - Technical specifications
  - Major competition rules
- Participants will understand ways to work with team members to increase skill and participation levels
  - Tips from CyberPatriot veterans
- Participants will gain information about further topics that they may study to become even more successful in the CyberPatriot competition

SECTION ONE

Coach's Guide

Coach Role

- Adults who must be approved by participating school or other CyberPatriot-approved organization(e.g., teachers, JROTC instructors, staff members, etc.)
- Technical expertise not required
- Responsibilities
  - Ensuring competitor safety
  - Protecting competition integrity
  - Acting as the main POC for the team
- Must have must have a valid email address that can receive messages from info@uscyberpatriot.org
- Only Coaches receive competition-related emails

Mentor/Team Assistant Role

- Optional, but recommended
- Must be an adult and pass a CyberPatriot Program Office background investigation
- Mentors
  - Teach and assist Competitors with cyber skills and ethics
  - Meet with teams only with Coach's approval
  - Do not teach hacking or offensive cyber tactics
- Team Assistants
  - Assist the Coach with his/her duties
  - Sample responsibilities include competition setup, snacks, and transportation

Team Composition/Recruitment Tips

- Teams consist of two to six Competitors, five of whom can compete at a time.
  - The sixth student acts as a substitute
  - Once a substitution is made, the Competitor who has been removed may not return
- Recruiting
  - Many organizations use CyberPatriot as part of cybersecurity classes or existing computer-related after school clubs, an entirely separate activity, or because students have heard about the program on their own. The following materials may be helpful for recruitment.
    - Material Order Form - videos, fact sheets, and promotional items can be requested here: http://uscyberpatriot.org/media/recruit-and-promote
    - Exhibition Rounds - Exhibition Rounds are held once a month over the summer to orient new and potential CyberPatriot participants. They are open to registered CP-VIII Coaches. Exhibition Rounds are on the Competition Timeline: http://uscyberpatriot.org/competition/competition-timeline

Registration Processes

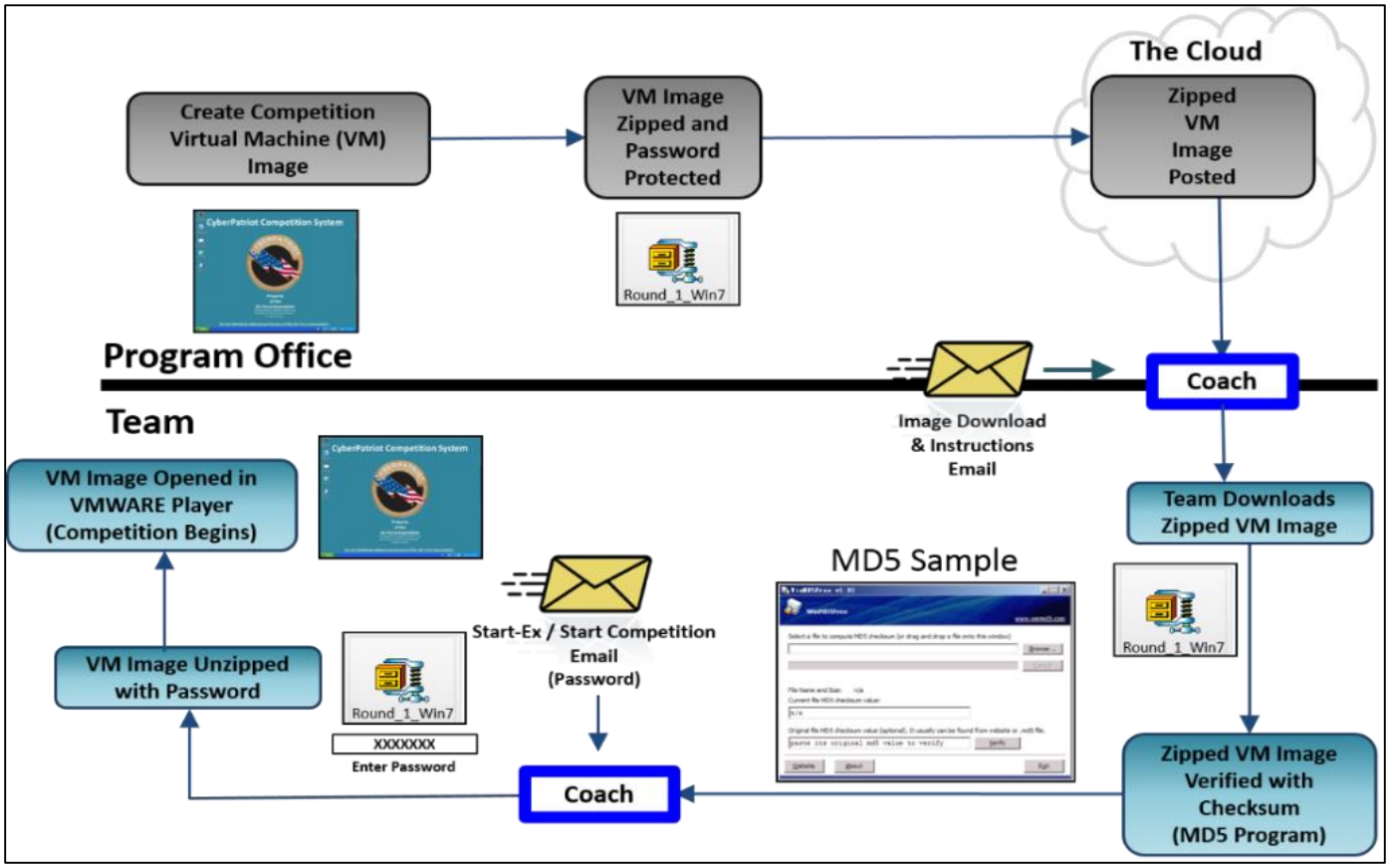
- Registering a team: http://www.uscyberpatriot.org/Pages/Registration/How-to-Register-a-Team.aspx
- Registering as a Mentor/Team Assistant: http://www.uscyberpatriot.org/Pages/Registration/Mentor-Registration-Instructions.aspx
- Contacting/Linking a Mentor/Team Assistant to a team: http://www.uscyberpatriot.org/Documents/Find%20a%20mentor.pdf
- CP-VIII Fee Structure and Exemptions: https://www.uscyberpatriot.org/Pages/Announcements/CyberPatriot-Announces-New-Registration-Fee-Structure.aspx

Build Your Own Practice Images

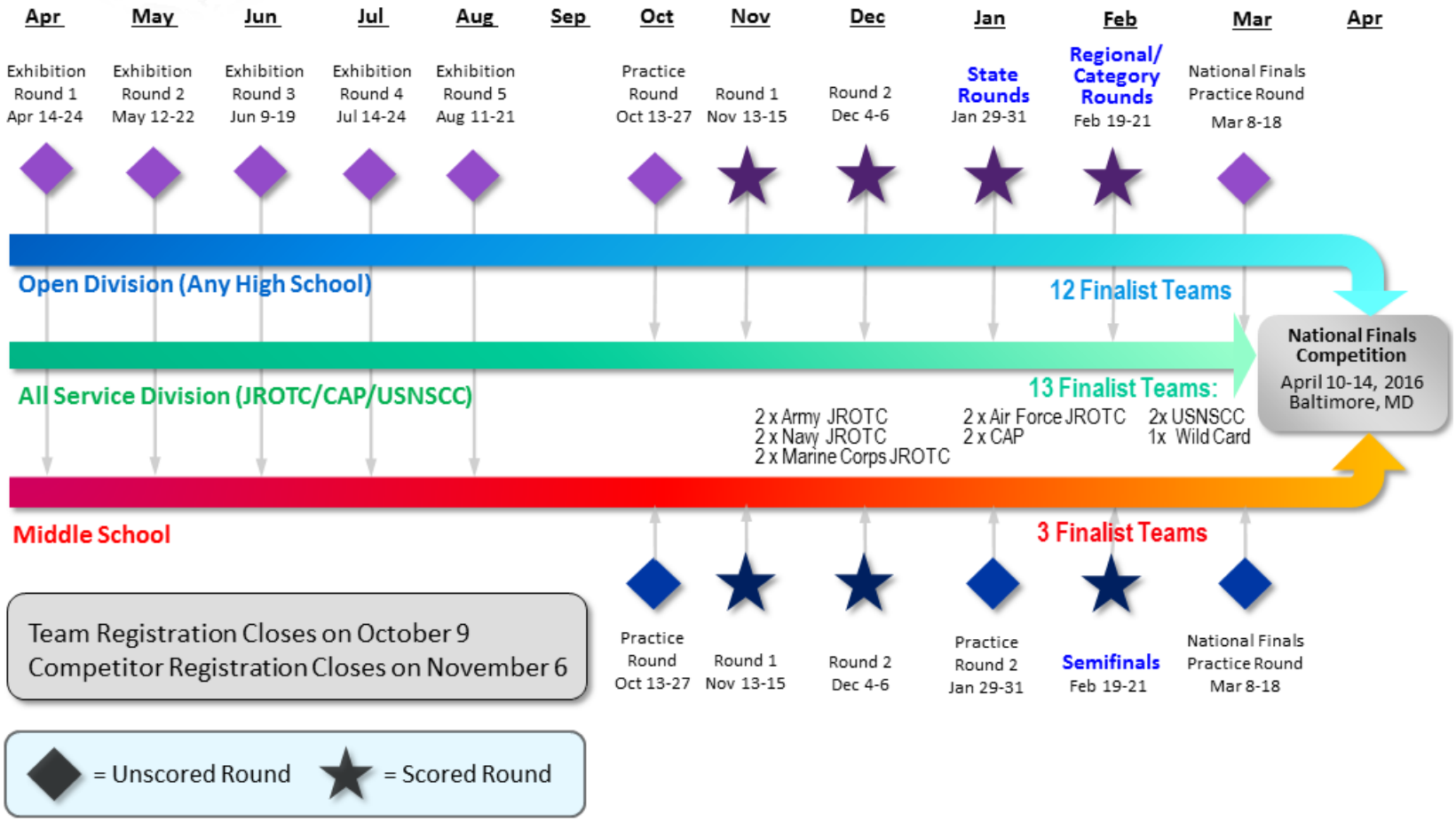
- Using MSDN to build your own practice images is in Unit 6 and in this guide: https://s3.amazonaws.com/UserGuides/DreamSpark+(MSDN)+Guide.pdf

- Using a scoring engine created by Texas A&M University Corpus Christi to develop practice images is here: http://uscyberpatriot.org/competition/training-materials/practice-images

Image Distribution



CP-VIII Competition Schedule



Tech Specifications/Competition Processes

- Hardware, Software, and Network Requirements: http://uscyberpatriot.org/competition/Competition-Overview/technical-specifications

- Software How-To's
  - WinMD5 - https://s3.amazonaws.com/UserGuides/Install+WinMD5.pdf
  - 7-zip - https://s3.amazonaws.com/UserGuides/Install+7zip.pdf
  - VMware - https://s3.amazonaws.com/UserGuides/Opening+an+Image.pdf

- CyberPatriot is intended for Windows users. If your team only has Macs, see this guide: https://s3.amazonaws.com/UserGuides/CyberPatriot+-+Mac+Instructions.pdf

- Information on how the competition works before, during, and after a round: http://uscyberpatriot.org/competition/Competition-Overview/how-the-competition-works

Major Competition Rules

- All images must be deleted at the end of the round.
- Teams have a single six-hour period to complete all work (images and networking challenges). No sneak peeks!
- Teams may only have one instance of each image open at a time.
- If your image(s) cannot reach the scoring server, please contact your IT department or network administrator.

More information on these rules can be found here:
http://origin.library.constantcontact.com/download/get/file/1103877561963-433/Things+to+Keep+in+Mind.pdf

SECTION TWO

Tips from CyberPatriot Veterans

Ron Woerner, CP-VI Mentor of the Year, Tips

- Familiarize yourself with Microsoft Windows tools and resources
  - Microsoft SysInternals Suite applications that help troubleshoot Windows issues and administer the operating system.
  - Windows God Mode Windows 7 and 8 feature that allows all Control Panel and Policy functions from one folder on the desktop.
  - Microsoft Baseline Security Analyzer (MBSA) and Security Essentials.
  - How to Geek School contains a number of tutorial videos on securing Windows and using SysInternals tools.
  - BleepingComputer Security Tutorials & Tools is another site with information and tools that will help.

- Familiarize yourself with the Ubuntu Linux operating system
  - The official Ubuntu Desktop Guide is available at https://help.ubuntu.com/12.04/ubuntu-help/index.html. This will help introduce you to the operating system.
  - Fosswire has a couple of cheat sheets. These show commands to run on a terminal / command line.
    - http://www.cheat-sheets.org/saved-copy/fwunixref.pdf
    - http://www.cheat-sheets.org/saved-copy/ubunturef.pdf

- Make sure your team documents everything they do on the images
- Get hands-on practice with virtual images using your MSDN account
- Have students who are not “hands on” the images during competition take notes, do research, and observe the students who are “hands on”
- Have fun!
- Ron’s presentation at the October 2014 Online Meeting: http://youtu.be/QmcYUHY8QYI

Ken Steffey, CP-VI Coach of the Year, Tips

- Have students instruct new students as much as possible
  - Teaching others reinforces their learning
  - Even with the beginners, have them teach whatever they have learned to prospective Competitors during open houses; it makes them understand they are getting somewhere
- Resources
  - Research on the Internet
  - Cannot rely only on Mentor's knowledge – most are experts in narrow subjects
  - The Coach and the Mentor both need to keep learning all the time
  - Talk to IT people, computer experts, friends – Get ideas from everyone, everywhere
- Practices
  - We run two practices each week, often it is much of the same content because there is not one day when all my cadets can practice together
  - Have a plan for what you want to accomplish for practices but be flexible
  - Balance practice vs instruction
  - Repetition, repetition, repetition
  - Train on resetting the images during competition, even experienced teams will lock themselves out or crash images
  - Train on connectivity issues – how to figure out why they are not connected to the internet/network – DHCP, etc.
- Competition
  - Read Scenario and Forensic Questions BEFORE doing anything else
  - Plan a restart with 30 - 45 min left; it can take a long time to complete updates
  - Middle School - lots of breaks to keep them engaged mentally
  - Watch what snacks they have when – beware of the sugar crash

Evan Dygert, CP-VII Mentor of the Year, Tips

1. Be enthusiastic.
2. Be knowledgeable about security in Windows/Linux/Cisco. If necessary, get educated on each platform.
3. Be reliable. Meet at least weekly.
4. Be available. Even when you can't meet with students, provide materials for them to use on their own and make sure they have a way to ask questions and get answers any time during the week.
5. Care about the students. Know their names. Answer their questions.
6. Make sure students know the ethics of the security field.
7. Keep researching the techniques and pass them on.
8. Teach students how to organize the material, but make sure they do it themselves.
9. Make sure they have lots of hands-on experience. They won't remember what they haven't done.
10. Keep finding new ways to describe the material in ways students can understand.
11. Encourage students to create their own assignments and teach the less-experienced members.

A major advantage we have is that the coach makes the computers available daily for the team work on after school. He stays late after school any day that the students want to stay and practice. My job then becomes one of teaching enough during our meetings for students to practice on their own the rest of the week without me.

Other Tips

- Make sure Coaches and Mentors know the students – Don't force learning during unfocused times.
- Find THAT KID to lead and motivate the rest of the team.
- Know Coach and Mentor limitations and seek out other resources when necessary.

  - Randy Mills, CP-VI Open Division National Finalist Coach

- Have your Mentor know the material better than the students. This frees up the Coach for administrative tasks and provides better support for the team.
- Plan for the competition early and eliminate equipment/connectivity obstacles.
- Provide supplementary curriculum; the CyberPatriot training materials don't cover everything.

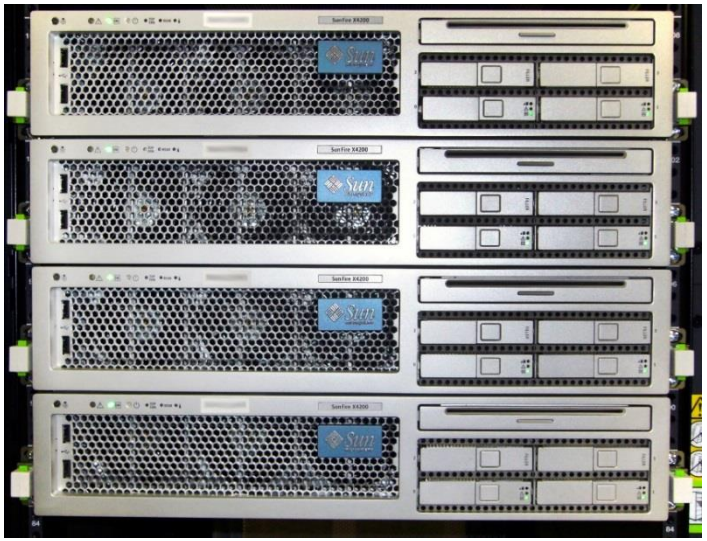
  - Joe Gombos, CP-VI All Service Division National Finalist Coach

SECTION THREE

Topics for Further Study

Web Servers

- A web server stores, processes, and delivers web pages to clients using HTTP
  - Definition and diagrams of a web server: http://www.pcmag.com/encyclopedia/term/54342/web-server
- The leading web server software is the Apache HTTP Server
  - Information on Apache: http://httpd.apache.org/ABOUT_APACHE.html



Source: http://upload.wikimedia.org/wikipedia/commons/f/f6/SunFire-X4200.jpg

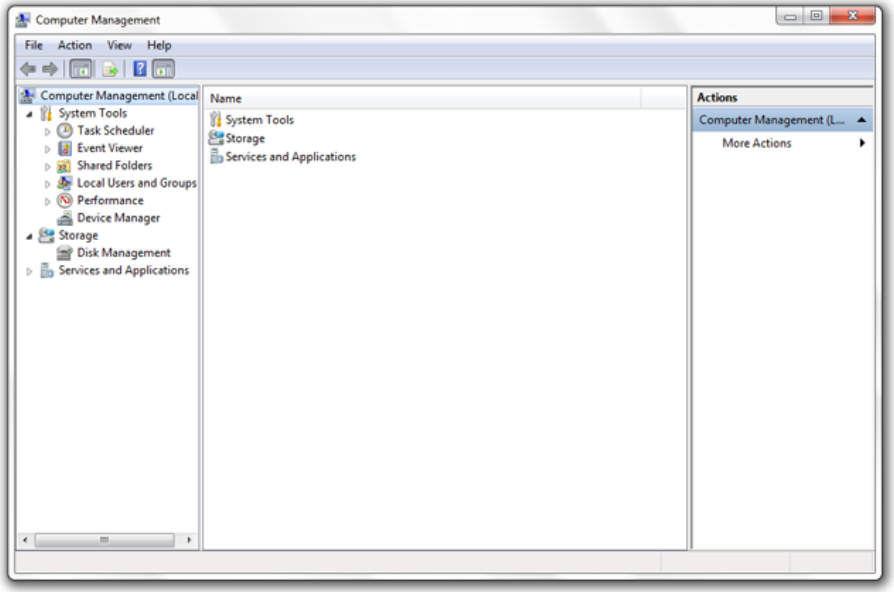
File Systems

- Windows operating systems typically use one of two file systems to organize data on hard discs
  - FAT32
    - Used in older operating systems such as Windows 95 and 98
  - NTFS
    - Modern file system currently used in Windows XP onward
- Comparison of FAT32 and NTFS: http://windows.microsoft.com/en-us/windows-vista/comparing-ntfs-and-fat-file-systems

Ubuntu Tip: Linux systems use the Ext2, Ext3, or Ext4 file systems: https://help.ubuntu.com/community/LinuxFilesystemsExplained

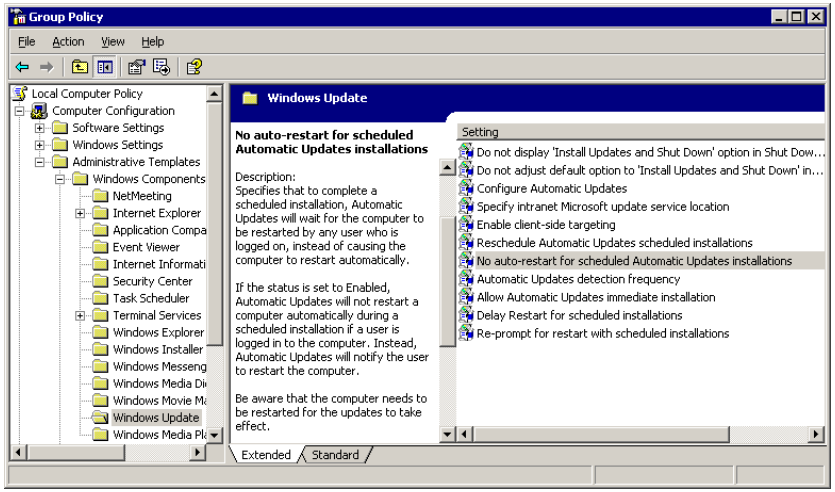
Microsoft Management Console

- MMC is a Windows component that allows customization and configuration of a system via GUI objects called snap-ins.
- Common snap-ins include:
  - Computer Management
  - Group Policy Management
  - Services
  - Performance
  - Event Viewer
- Microsoft's MMC guide:
http://technet.microsoft.com/en-us/library/bb742442.aspx



Group Policy

- Group Policy: Settings for groups of users and computers, including those regarding registry-based policy, security, computer startup and shutdown, and logon and logoff
  - Details on Microsoft group policy: http://technet.microsoft.com/en-us/library/bb742376.aspx
- Some useful settings may be:
  - Not displaying last user name on login screen
    - How to: http://support2.microsoft.com/kb/310125
  - Requiring Ctrl+Alt+Del before signing on
    - How to: http://support.microsoft.com/kb/308226



Source: http://blog.codinghorror.com/content/images/uploads/2005/05/6a0120a85dcdae970b0128776fbe89970c-pi.png

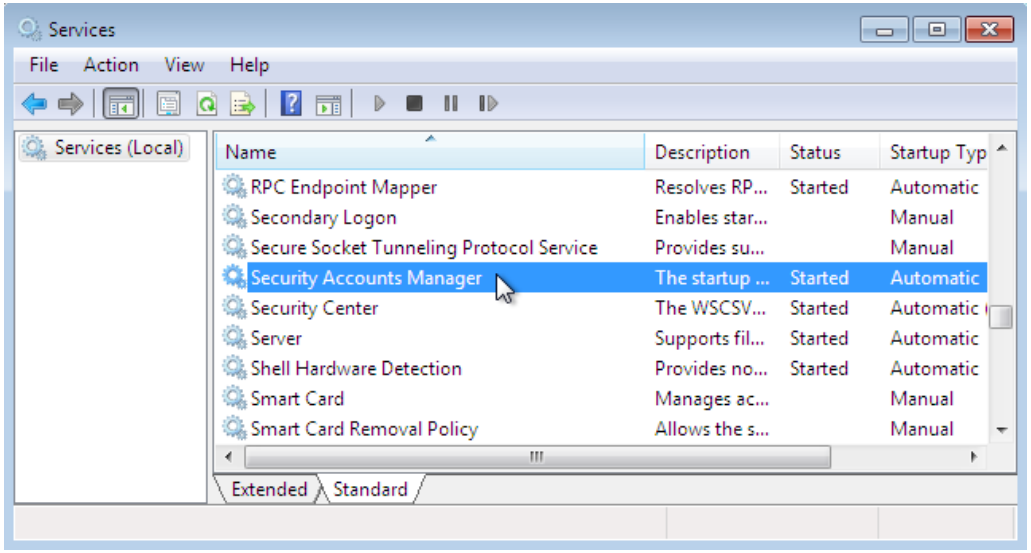
NT LAN Manager (NTLM)

- Authentication protocol
  - Authentication protocol confirms the identity of any user logging on to a domain or access network resources
  - NTLM is a Microsoft authentication protocol: http://msdn.microsoft.com/en-us/library/windows/desktop/aa378749(v=vs.85).aspx
- Password hashing
  - Method of taking a variable-length password and creating a cryptic, fixed-length password from it
  - Details on password hashing: http://security.blogoverflow.com/2013/09/about-secure-password-hashing/
  - LanMan Hash is a password hashing function of NTLM
    - Details on the security risk of LanMan Hash: http://www.microsoft.com/security/sir/strategy/default.aspx#!password_hashes

Ubuntu Tip: Ubuntu 8.10 and later use salted SHA-512 based password hashes: https://wiki.ubuntu.com/Security/Features

Security Account Manager (SAM)

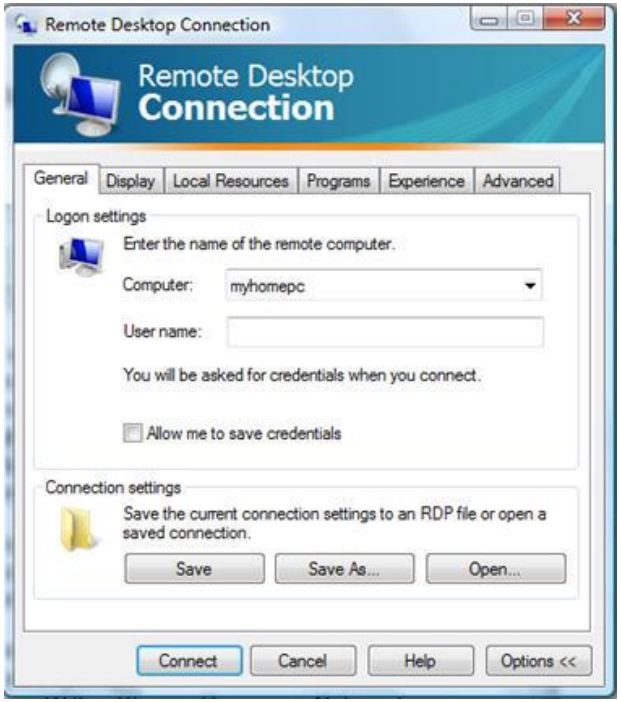
- The Security Account Manager (SAM) is a Windows database that stores user accounts and security descriptors for users on the local computer
  - Information on the SAM: http://searchenterprisedesktop.techtarget.com/definition/Security-Accounts-Manager
  - Possible security issues: https://technet.microsoft.com/en-us/library/security/ms14-016.aspx



Source: http://computerstepbystep.com/wpimages/wp8863e5cd_01.png

Sharing Systems and Remote Connections

- Remote connections are ways of sharing systems.
- Examples:
  - Virtual Network Computing (VNC)
    - VNC allows you to share and give control of your desktop to another user
    - VNC variants and applications: http://ipinfo.info/html/vnc_remote_control.php
  - Remote Desktop
    - Similar to VNC, Remote Desktop Protocol (RDP), allows a user to control a remote system
    - Using RDP: http://windows.microsoft.com/en-us/windows/connect-using-remote-desktop-connection#connect-using-remote-desktop-connection=windows-7

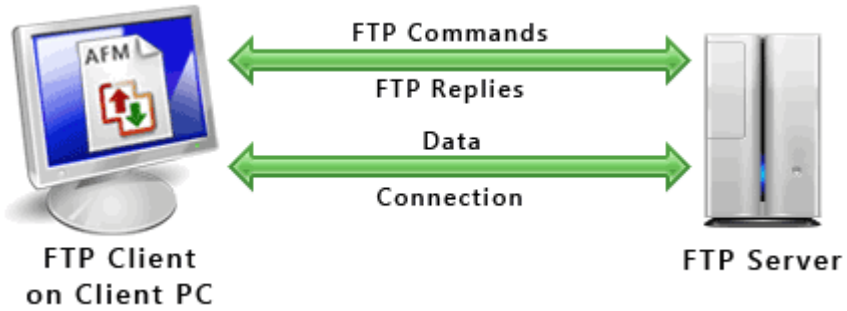


Source: http://blog.tmcnet.com/blog/tom-keating/images/remote-desktop-general-tab.jpg

Ubuntu Tip: If using a Gnome desktop, Remote desktop is easy in Ubuntu: http://www.makeuseof.com/tag/ubuntu-remote-desktop-builtin-vnc-compatible-dead-easy/

FTP, TFTP, and SFTP

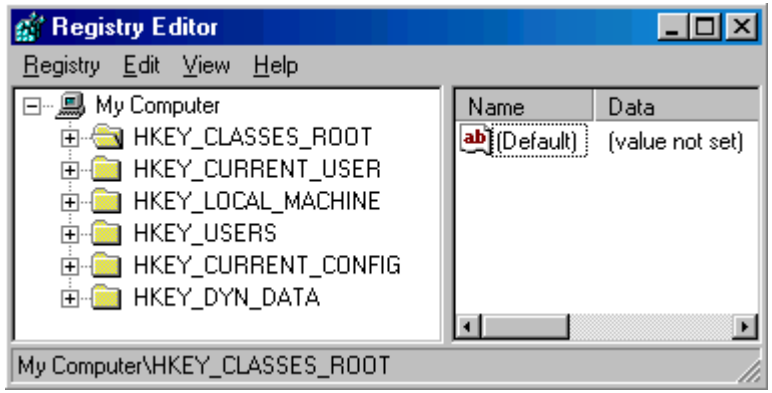
- The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files from one host to another over the Internet
  - FTP FAQ: http://windows.microsoft.com/en-us/windows-vista/file-transfer-protocol-ftp-frequently-asked-questions
- Secure File Transfer Protocol works similarly to FTP but is more secure
  - How to use SFTP: https://www.digitalocean.com/community/tutorials/how-to-use-sftp-to-securely-transfer-files-with-a-remote-server
- Trivial File Transfer Protocol (TFTP) is a simplified version of FTP
  - Details on TFTP: http://compnetworking.about.com/od/ftpfiletransfer/g/tftp-trivial-file-transfer-protocol.htm



Source: http://www.deskshare.com/resources/articles/images/ftp-protocol.gif

Windows Registry

- The registry is a hierarchical database that stores configuration settings and options
  - WARNING: If you do not know what you are doing, editing the registry can cause serious problems that may require you to reinstall Windows
  - Explanation of the registry and how to make edits: http://pcsupport.about.com/od/termsr/p/registrywindows.htm
  - Managing remote access to the registry: http://support2.microsoft.com/kb/314837



Source: http://www.computerhope.com/reg1.gif

Ubuntu Tip: There is no registry in Ubuntu *per se*, but if using a GNOME desktop, dconf is similar: https://wiki.gnome.org/action/show/Projects/dconf?action=show&redirect=dconf

Windows Command Prompt

- Like Linux, the command line in Windows allows you to enter commands without a GUI.
- Sample commands are:
  - Ipconfig is used to view or modify a computer's IP addresses
  - Bcedit is used to view or make changes to Boot Configuration Data
  - Cmd starts a new instance of the command line interpreter
  - Convert is used to change FAT32 formatted volumes to NTFS
  - Nslookup is used to display the hostname of an entered IP address
- Opening the command prompt: http://windows.microsoft.com/en-us/windows-vista/open-a-command-prompt-window
- Detailed list of commands: http://pcsupport.about.com/od/commandlinereference/tp/windows-7-commands-p1.htm

Ports and Protocols

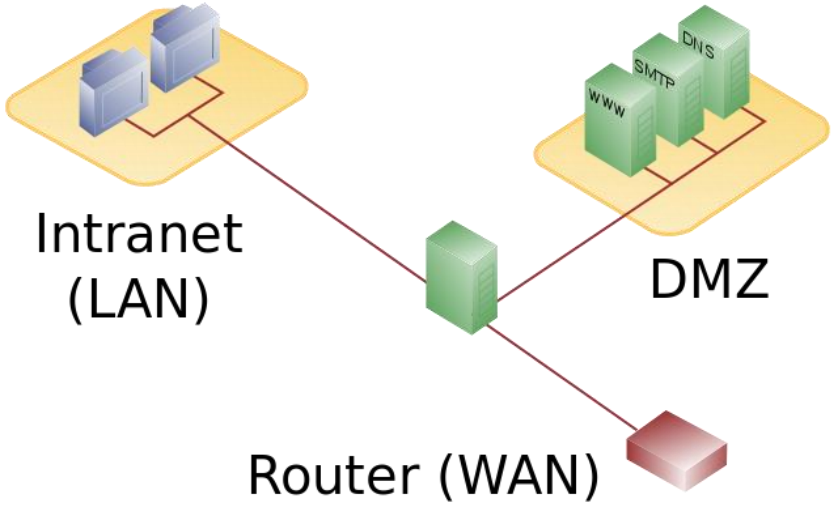
- TCP/IP is a set of communication protocols
  - Transmission Control Protocol (TCP) provides reliable, ordered, and error-checked delivery of data
  - User Datagram Protocol (UDP) uses a simple connectionless transmission model
- TCP/IP applications send data to specific ports to help computer systems understand what to do with the data that flows into them,
- Examples of common ports and protocols:

Service	Protocol	Port
FTP	TCP	20, 21
TFTP	UDP	69
HTTP	TCP	80
HTTPS	TCP	443
RDP	TCP	3389

- Open ports can be a security risk by allowing attackers into your system
  - Firewalls typically block unnecessary ports, but it is unwise to blindly rely on one
  - Information on determining which ports are open and which should be closed: http://www.techrepublic.com/article/lock-it-down-develop-a-strategy-for-securing-ports-on-your-servers/

Demilitarized Zone (DMZ)

- A DMZ acts as a gateway to the public internet that acts as an additional layer of security to an organizations local area network
  - An external attacker only has direct access to equipment in the DMZ
- A typical DMZ may look like the following (the unlabeled green icon in the center is a firewall):



Source: http://en.wikipedia.org/wiki/DMZ_(computing)#mediaviewer/File:DMZ_network_diagram_1_firewall.svg

Distributed Component Object Model (DCOM)

- DCOM is a technology for communication among software components distributed across networked computers
  - In depth information on DCOM: https://www.princeton.edu/~achaney/tmve/wiki100k/docs/Distributed_Component_Object_Model.html
  - Mitigating DCOM Vulnerabilities: http://technet.microsoft.com/en-us/library/dd632946.aspx