

Introduction to Computing (SE-101)

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Questions from previous lecture?

Drive Performance

&

Operating System

Lecture # 7

2nd Jan 2012

Part-I

Measuring & Improving Drive Performance

Two Ways to Measure Storage Device Performance

- Average Access Time
- Data Transfer Rate

Average Access Time

- How long it takes the device to move its read or read/write heads to any spot on the medium

Access Time Measured in Two Ways

- Storage devices: milliseconds (ms)
- Memory devices: nanoseconds (ns)

Disk Drive Access Time Depends On:

- How fast the disk spins (rpm)
- How long it takes to move the heads from one track to another

Examples of Average Access Time

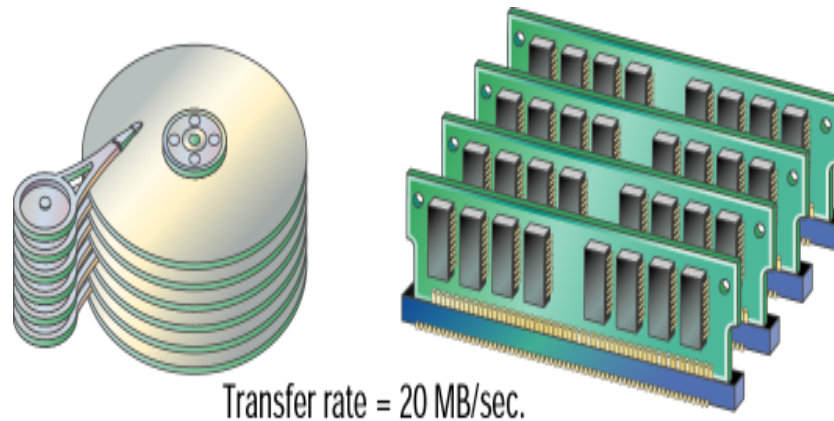
- Floppy Disk: 100 ms
- Hard disk: 6 to 12 ms
- High-performance hard disk: 4 or 5 ms
- CD-ROM: 80 to 800 ms
- Tape drives: slowest at a few seconds to a few minutes

Where to Find Average Access Time

- Device's packaging or documentation
- Manufacturer's Web site
- Computer-related magazines

Data Transfer Rate

- How long it takes for one device to transfer data to another device
- Measured in units of data per second (MBps means megabytes per second, for example)



Examples of Data Transfer Rates

- Hard disk: 15 MBps to more than 80 MBps
- CD-ROM: 300 KBps to more than 900KBps
- Floppy disk: 45 KBps
- Removable hard disk: range from 1.25 MBps to hard disk rates

Optimizing Disk Performance

- When the pc's performance slows down, disk maintenance, or disk optimization, can speed things up again

Ways to Optimize Disk Performance

- Delete temporary files
- Uninstall little-used software programs
- Run a disk scanner to look for and fix errors
- Defragment the disk

File or Data Compression

- Technology for making files smaller to free up storage space

File Compression Software

- WinRar and WinZip: Windows-based PC's
- StuffIT, ZipIT: Macintosh

Hard Disk Compression Software

- DriveSpace

Disk Controller

- Connects the disk drive to the computer's bus, enabling the drive to exchange data with other devices

Two Disk Controller Standards

- Enhanced Integrated Drive Electronics (EIDE)
- Small Computer System Interface (SCSI)

Part-II

Operating System

Functions of Operating Systems

- Provide a user interface
- Run programs
- Manage hardware devices
- Organized file storage

Types of Operating Systems

- Real-time operating system
 - Very fast small OS
 - Built into a device
 - Respond quickly to user input
 - MP3 players, Medical devices



Examples of RTOS

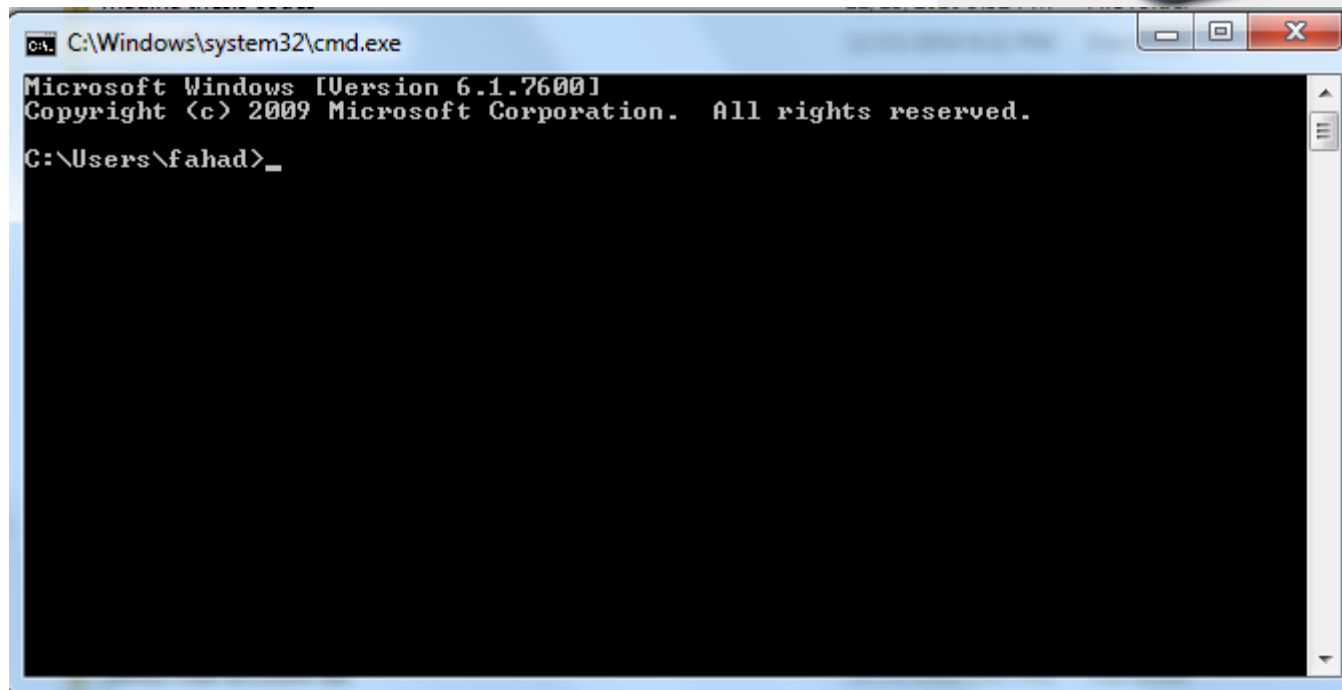


Types of Operating Systems

- Single user/Single tasking OS
 - One user works on the system
 - Performs one task at a time
 - MS-DOS and Palm OS
 - Take up little space on disk
 - Run on inexpensive computers



Single user/Single tasking OS



Types of Operating Systems

- Single user/Multitasking OS
 - User performs many tasks at once
 - Most common form of OS
 - Windows XP and OS X
 - Require expensive computers
 - Tend to be complex

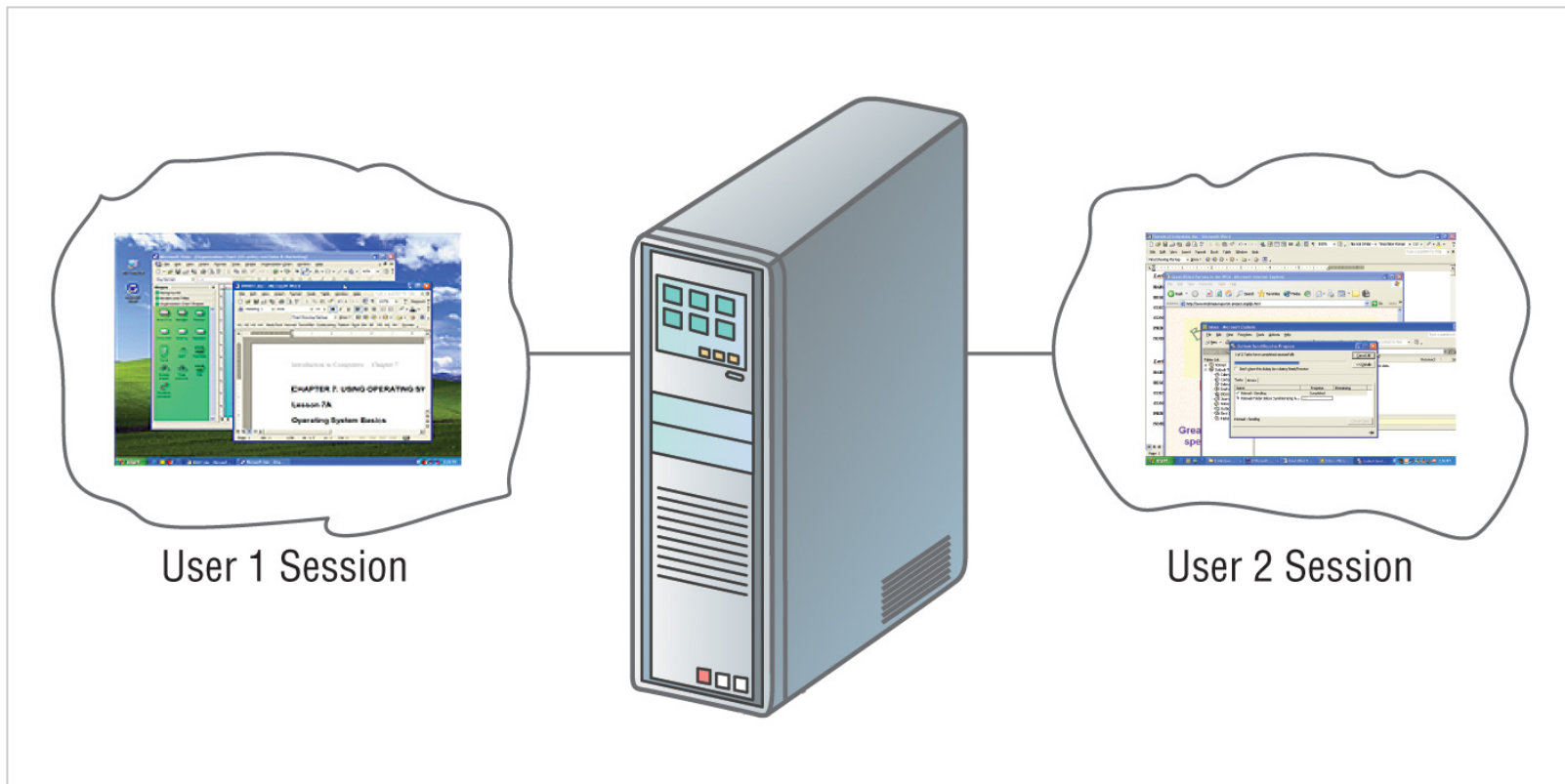


Types of Operating Systems

- Multi user/Multitasking OS
 - Many users connect to one computer
 - Each user has a unique session
 - UNIX, Linux
 - Maintenance can be easy
 - Requires a powerful computer



Multi user/Multi tasking OS



Providing a User Interface

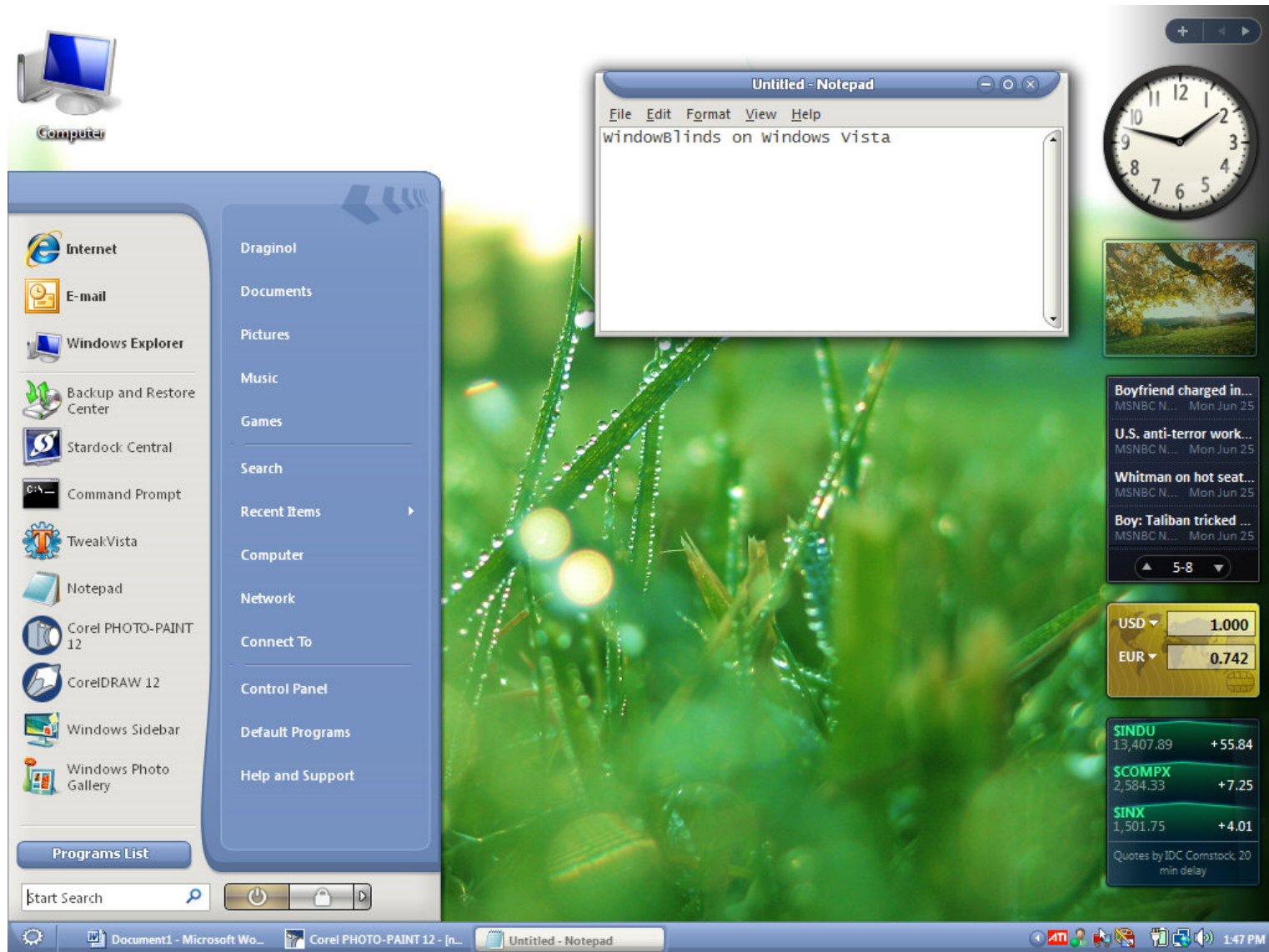
- User interface
 - How a user interacts with a computer
 - Require different skill sets



Providing a User Interface

- Graphical user interface (GUI)
 - Most common interface
 - Windows, OS X, Gnome, KDE
 - Uses a mouse to control objects
 - Uses a desktop metaphor
 - Shortcuts open programs or documents
 - Open documents have additional objects
 - Task switching
 - Dialog boxes allow directed input

Graphical User Interface



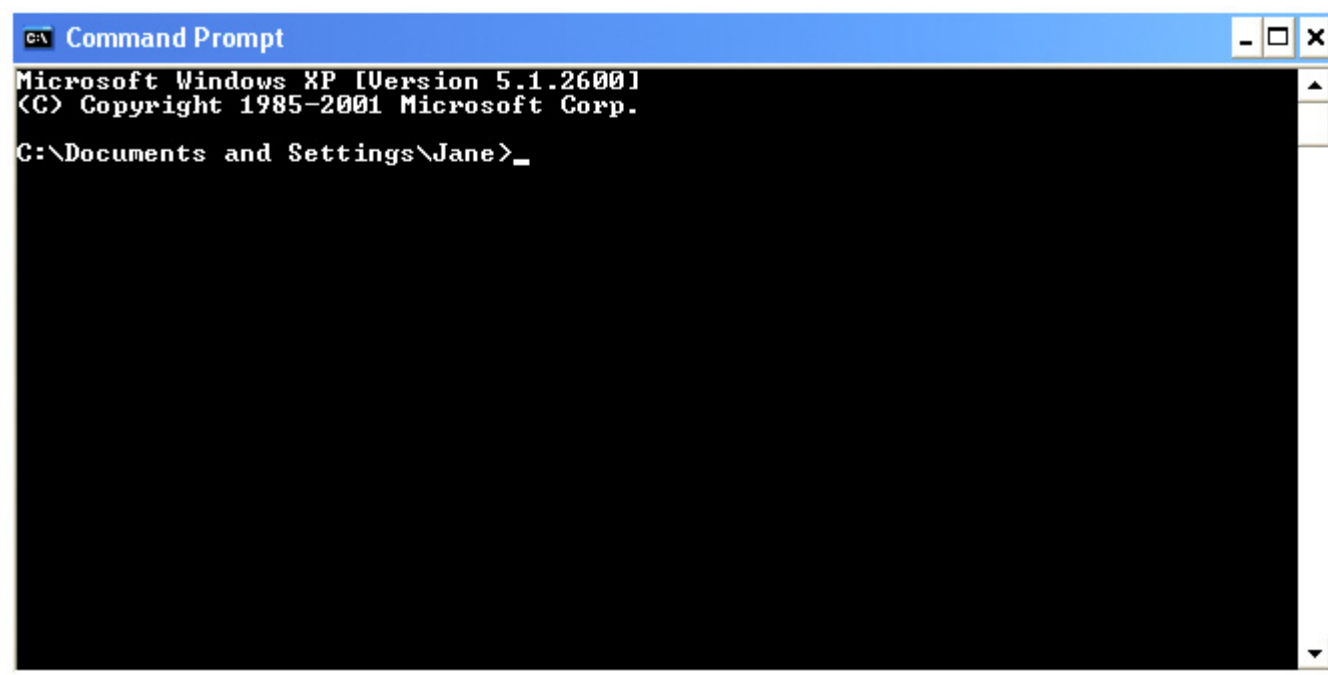
Touch screen Interfaces



Providing a User Interface

- Command line interfaces
 - Older interface
 - DOS, Linux, UNIX
 - User types commands at a prompt
 - User must remember all commands
 - Included in all GUIs

Command Line Interface

A screenshot of a Windows XP Command Prompt window. The title bar is blue and contains the text "C:\ Command Prompt" and standard window control buttons (minimize, maximize, close). The main area is black with white text. The text displayed is: "Microsoft Windows XP [Version 5.1.2600] (C) Copyright 1985-2001 Microsoft Corp. C:\Documents and Settings\Jane>".

```
C:\ Command Prompt
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\Documents and Settings\Jane>
```

Command Line Interface

```
ADMX Migrator Command Window
C:\Program Files\FallArmor\ADMX Migrator>C:\Windows\system32\cmd.exe /K "fa@admconv.exe /?"
ADMX Migrator Application converts ADM file into ADMX format file(s).
Copyright (c) 2006 FallArmor Corporation. All rights reserved.

Usage: fa@admconv source [targetpath] [/X] [/L] [/N:name] [/D:description] [/R:revision] [/P:prefix] [/S:namespace] [/U:prefix] [/C:namespace]

Options:
source
Specifies the name of ADM file you want to convert.

targetpath
Specifies the target folder where you want to save the converted ADMX template.
If you do not specify a target path, ADMX Migrator saves the converted ADMX template in the %Documents%\UserName\Local Settings\Temp folder where UserName is the name of the logged on user on the computer on which you installed ADMX Migrator
```

```
root@ipcop:~# cat /etc/passwd | grep shell | grep /bin/bash
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/bin/bash
sys:x:3:3:sys:/dev:/bin/bash
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/bin/bash
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
root@ipcop:~# cat /etc/passwd | grep shell | grep /bin/bash
root:x:0:0:root:/root:/bin/bash
daemon:x:1:1:daemon:/usr/sbin:/usr/sbin/nologin
bin:x:2:2:bin:/bin:/bin/bash
sys:x:3:3:sys:/dev:/bin/bash
www-data:x:33:33:www-data:/var/www:/usr/sbin/nologin
mail:x:8:8:mail:/var/mail:/bin/bash
nobody:x:65534:65534:nobody:/nonexistent:/usr/sbin/nologin
```

```
IPCop v1.4.10 - The Bad Packets Stop Here
ipcop login: root
Password:
No mail.
root@ipcop:~# shutdown now -r

Broadcast message from root (tty1) (Fri Nov 18 20:20:08 2005):

The system is going down for reboot NOW!
INIT: Switching to runlevel: 6
INIT: Sending processes started by init the TERM signal
INIT: Sending processes started by init the KILL signal
Stopping the RED interface...
Shutting down...
Saving the clock
Sending all processes the TERM signal...
Sending all processes the KILL signal...
Turning off swap
Unmounting others
Unmounting root
```

```
C:\WINDOWS\system32\cmd.exe - setup/modeinstall /role:M, H, C
C:\222.02>setup /mode:install /role:M, H, C
Welcome to Microsoft Exchange Server 2007 Unattended Setup

Preparing Exchange Setup

The following server roles will be installed
Management Tools
Hub Transport Role
Client Access Role
Mailbox Role

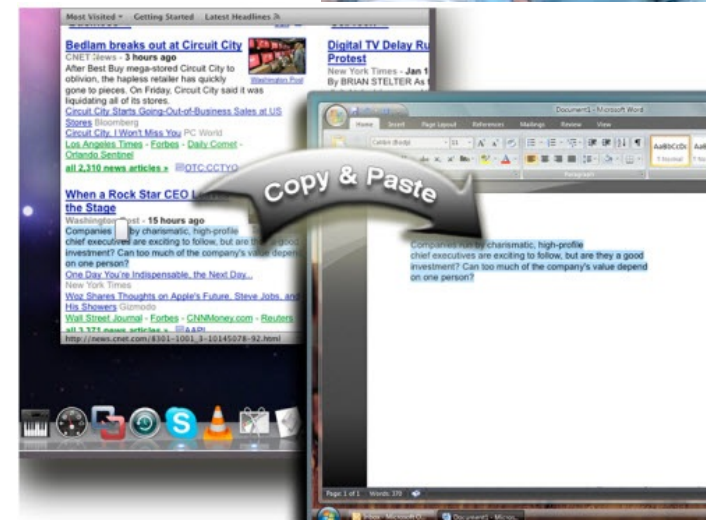
Performing Microsoft Exchange Server Prerequisite Check

Organization Checks ..... FAILED
The Active Directory schema will be upgraded if you continue. Verify that the organization is ready for Exchange 2007 by running the Exchange 2007 Readiness Check, which is part of the Exchange Best Practices Analyzer.
Cannot find the Recipient Update Service responsible for domain 'DC=child,DC=RP2-ROOT,DC=com'. New and existing users may not be properly Exchange-enabled.
Cannot find at least one domain controller running Windows Server 2003 Service Pack 1 or later in domain 'DC=child,DC=RP2-ROOT,DC=com'. This could be the result of moving domain controller objects in Active Directory. Check that at least one domain controller running Windows Server 2003 Service Pack 1 or later is located in the 'Domain Controllers' organizational unit (OU) and rerun setup.

Hub Transport Role Checks ..... 41x
```

Running Programs

- Many different applications supported
- System call
 - Provides consistent access to OS features
- Share information between programs
 - Copy and paste
 - Object Linking and Embedding



Managing Hardware

- Programs need to access hardware
- Interrupts
 - CPU is stopped
 - Hardware device is accessed
- Device drivers control the hardware



Organizing Files and Folders

- Organized storage
- Long file names
- Folders can be created and nested
- All storage devices work consistently



Enhancing an OS

- Utilities
 - Provide services not included with OS
 - Goes beyond the four functions
 - Firewall, anti-virus and compression
 - Prices vary



anti-virus

The screenshot displays the Kaspersky Anti-Virus 2010 user interface. At the top, the title bar reads "Kaspersky Anti-Virus 2010" and the main header area shows "Kaspersky Anti-Virus 2010" on the left and "Quarantine | Report | Settings" on the right. A central status indicator shows a green globe with the text "Your computer is protected" and "No active threats".

On the left side, there are four main menu items:

- My Protection**: Protection of your computer
- Scan My Computer**: Files and computer scan
- My Update Center**: Updating databases and application modules
- Security+**: Additional tools for better protection of your computer

The main content area is titled "My Protection Status" and includes the following sections:

- Files and private data**: Documents, spreadsheets, presentations, logins and passwords, credit card information, and more.
- System and applications**: Operating system files and applications installed on your computer.
- Online activity**: Browsing web sites, banking and shopping online, email and instant messaging, and social networking.

A note states: "Some protection components are available in Kaspersky Internet Security only. [Details...](#)"

At the bottom, a summary box shows:

- Total scanned: 33002
- Threats detected: 0
- Virus: 0
- Trojans: 0
- Malicious tools: 0
- Adware: 0
- Riskware: 0

The footer contains links for "Help", "My Kaspersky Account", "Support", and "License: 328 days remaining".

Enhancing an OS

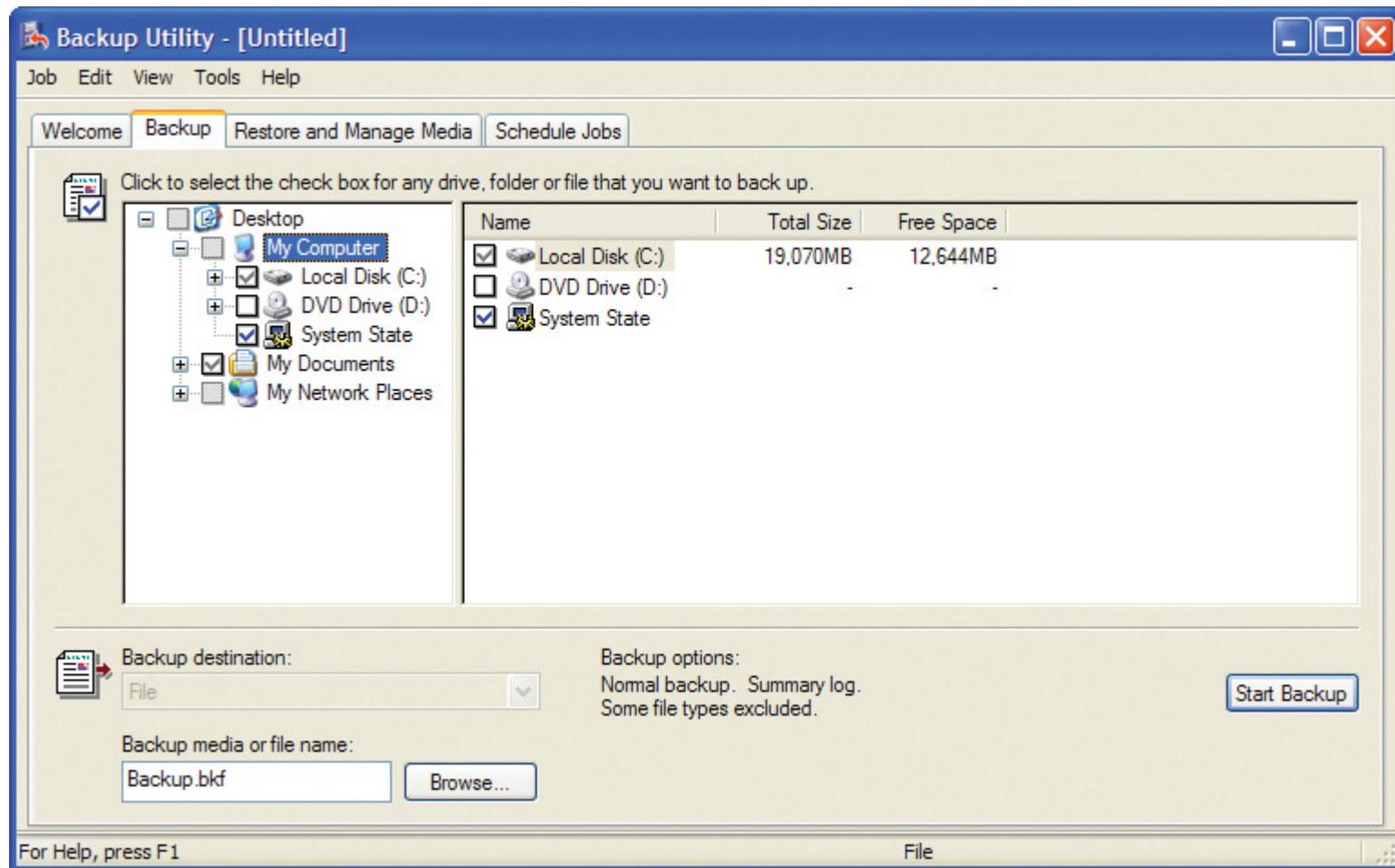
- Backup software
 - Archives files onto removable media
 - Ensures data integrity
 - Most OS include a backup package
 - Many third party packages exist



Backup software



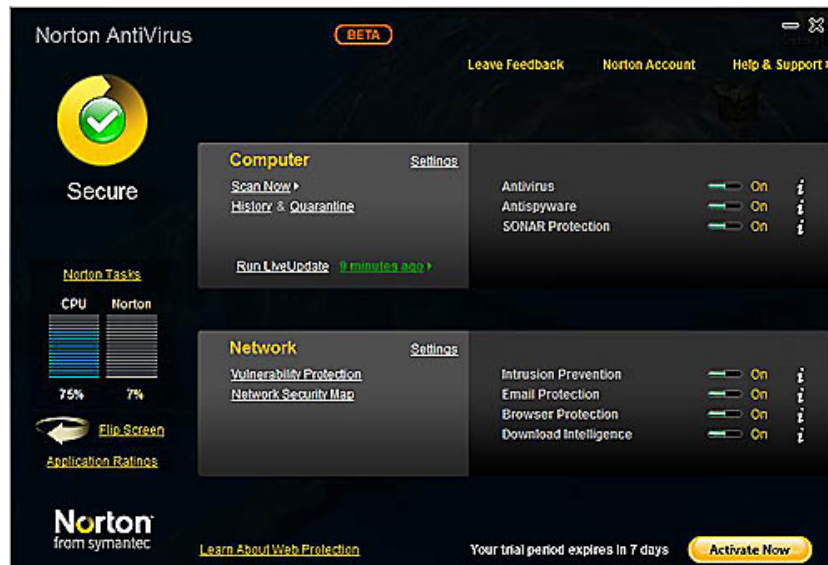
Backup Software



Enhancing an OS

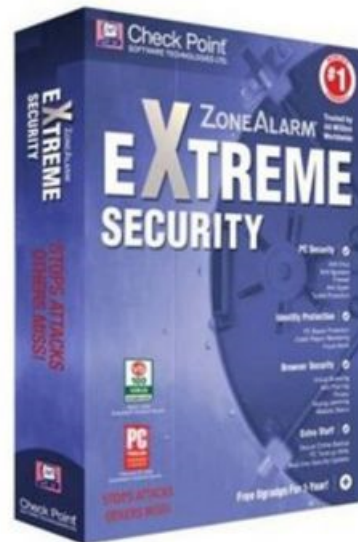
- Anti-virus software
 - Crucial utility
 - Finds, blocks and removes viruses
 - Must be updated regularly
 - McAfee and Norton Anti-Virus

McAfee and Norton Anti-Virus



Enhancing an OS

- Firewall
 - Crucial utility
 - Protects your computer from intruders
 - Makes computer invisible to hackers
 - Cisco sells hardware firewalls



Enhancing an OS

- Intrusion detection
 - Often part of a firewall package
 - Announces attempts to breach security
 - Snort is a Linux based package



Basic Analysis and Security Engine (BASE)

Added 4 alert(s) to the Alert cache
Queried on: Mon Jun 26, 2006 15:01:24
Database: snort@localhost (Schema Version: 107)
Time Window: [2006-06-26 13:24:43] - [2006-06-26 15:01:23]

	unique	listing	Source IP	Destination IP
- Today's alerts:	unique	listing	Source IP	Destination IP
- Last 24 Hours alerts:	unique	listing	Source IP	Destination IP
- Last 72 Hours alerts:	unique	listing	Source IP	Destination IP
- Most recent 15 Alerts:	any protocol	TCP	UDP	ICMP
- Last Source Ports:	any protocol	TCP	UDP	
- Last Destination Ports:	any protocol	TCP	UDP	
- Most Frequent Source Ports:	any protocol	TCP	UDP	
- Most Frequent Destination Ports:	any protocol	TCP	UDP	
- Most frequent 15 Addresses:	Source	Destination		
- Most recent 15 Unique Alerts				
- Most frequent 5 Unique Alerts				

Search
Graph Alert Data
Graph Alert Detection Time

Sensors/Total: 1 / 1
Unique Alerts: 30
Categories: 7
Total Number of Alerts: 995

- Src IP addr: 199
- Dest. IP addr: 4
- Unique IP links 206
- Source Ports: 505
 - TCP (502) UDP (3)
- Dest Ports: 6
 - TCP (5) UDP (1)

Traffic Profile by Protocol
TCP (96%)
UDP (1%)
ICMP (1%)
Portscan Traffic (3%)

Alert Group Maintenance | Cache & Status | Administration

BASE 1.2.5 (sarah) (by Kevin Johnson and the BASE Project Team)
Built on ACID by Roman Danyliw

Loaded in 0 seconds

Enhancing an OS

- Screen savers
 - Merely fun for GUI systems
 - Screen saver decorates idle screens



Operating Systems

- PC OS
- Network OS
- Embedded OS

PC OS

- DOS
- Windows NT
- Windows 9x
- Windows 2000, XP, Vista,7
- Macintosh
- Unix
- Linux

MS-DOS

- Most popular PC operating system during the 1980s and early 1990s, now obsolete
- Command-line interface

Windows NT

- Introduced in 1993
- Windows NT Workstation still used in architectural firms, audio and video production studios and graphics studios
- Microsoft stopped supporting Windows NT in 2001

Windows 9X

- Released in 1995, Windows 95 was the first member of the Windows 9x family
- Windows 98 considered to be an upgrade of Windows 95
- Released in 2000, Windows ME was the last member of the Windows 9x family, still widely used, but considered by experts to be obsolete

Windows 2000

- Released in 2000
- Combined the features of Windows 98 and Windows NT

Windows XP

- Released in 2001
- Available in two editions: home and professional

Windows ...

- Windows Vista in 2007
- Windows 7 in 2009
- Windows 8 in 2012 (!)

Macintosh

- Offered first graphical user interface beginning in the mid-1980s
- Still popular with publishers, multimedia developers, graphic artists and schools

UNIX

- Oldest operating system, developed by Bell Labs in the 1970s
- Still used today in insurance, medicine, banking, manufacturing and Web servers

LINUX

- Released in late 1990s
- New version of UNIX
- Distributed for free

Network OS

- Dedicated OS for network servers
- To provide services to other `clients`
- Windows NT Server, Windows 2000 Server, Windows 2008 Server
- Unix, Linux

Embedded Operating Systems

- Built into an electronic device's circuitry
- Found in devices such as PDAs

Popular embedded operating systems

- Palm OS
- Windows CE
- Pocket PC OS
- Symbian
- Windows Phone
- iOS
- Android

Questions?

If you have any query please feel free to ask

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Reference

- The slides were taken from the book:
 - “Introduction to computing” by Peter Norton