

**Discovering Computers**  
Concepts for a Digital World **2003** Chapter 12 Objectives

- Identify the various types of security risks that can threaten computers
- Recognize that software piracy is illegal
- Recognize how a computer virus works and take the necessary steps to prevent viruses
- Explain why encryption is necessary
- Describe ways to safeguard a computer
- Determine why computer backup is important and how it is accomplished
- Understand how to create a good password
- Discuss the steps in a disaster recovery plan
- Identify various biometric devices
- Understand ways to secure an Internet transaction
- List ways to protect your personal information

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**Discovering Computers**  
Concepts for a Digital World **2003** Computer Security:  
Risks and Safeguards

What is a computer security risk?

**Event or action that causes loss of or damage to a computer system**

**Computer crime**  
Any illegal act involving a computer

**Cybercrime**  
Online or Internet-based illegal acts

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Risks and Safeguards

What is a computer virus?

- Potentially damaging program that affects computer negatively by altering way computer works
- Segment of program code from some outside source that implants itself in computer

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Risks and Safeguards

What are the ways viruses can be activated?

- Opening infected file
- Running infected program
- Booting computer with infected floppy disk in disk drive

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Concepts for a Digital World **2003** Computer Security:  
Risks and Safeguards

What is the source of a virus?

- Written by programmer
  - Some write viruses as challenge
  - Others write viruses to cause destruction or to slow Internet

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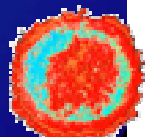
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 Concepts for a Digital World Web and XP Enhanced

What are signs of a virus infection?

**SIGNS OF VIRUS INFECTION**

- An unusual message or graphical image displays on the computer monitor
- An unusual sound or music plays randomly
- The available memory is less than what should be available
- A program or file suddenly is missing
- An unknown program or file mysteriously appears
- The size of a file changes without explanation
- A file becomes corrupted
- A program or file does not work properly



Next p.12.4 Fig. 12.2

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What are the three main types of virus?

**Boot sector virus**  
 Resides in boot sector of floppy disk or master boot record of hard disk

**File virus**  
 Attaches itself to program files

**Macro virus**  
 When you open document that contains infected macro, virus loads into memory

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How do viruses activate?

**Logic bomb**  
 Virus that activates when it detects certain condition

**Time bomb**  
 Type of logic bomb that activates on particular date

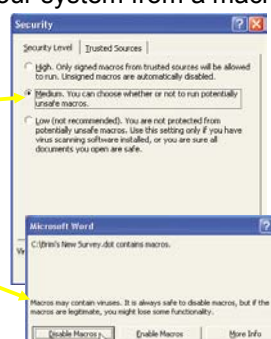
**Malware**  
 Malicious-logic program  
 Worm and Trojan Horse  
 Acts without user's knowledge and alters computer's operations

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How can you protect your system from a macro virus?

- Set macro's security level in all applications that allow you to write macros
- At medium security level, warning displays when you attempt to open document that contains macro

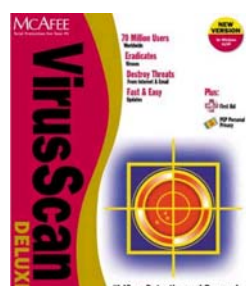


Next p.12.5 Fig. 12.3

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What does an antivirus program do?

- Detects and identifies viruses
- Inoculates existing program files
- Removes or quarantines viruses
- Creates rescue disk

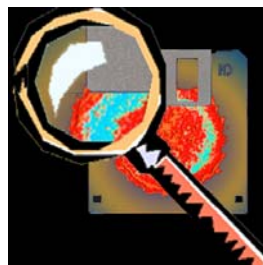


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How does an antivirus program scan for a virus?

- Scans for
  - Programs that attempt to modify boot program, operating system, and other programs that normally read from but not modified
  - Files you download from the Web
  - E-mail attachments
  - Files you open
  - All removable media, such as a floppy

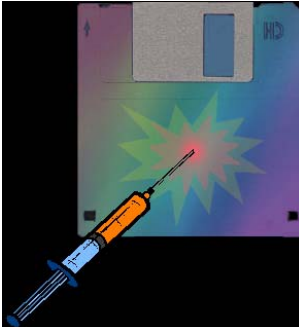


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How does an antivirus program inoculate a program file?

- Antivirus program records file size and creation date and uses this information to detect if a virus tampers with inoculated program file



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What two types of virus are more difficult to detect?

**Polymorphic virus**

Modifies its own code each time it attaches itself to another program or file

Cannot be detected by its virus signature because code pattern in virus never looks the same

**Stealth virus**

Infects a program file, but still reports size and creation date of original, uninfected program

Cannot be detected by inoculation file

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What does an antivirus program do once it detects a virus?

- Removes virus if possible
- Quarantines infected file in folder on hard disk




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What is a **rescue disk**?

- Removable disk that contains uninfected copy of key operating system commands and startup information
- Upon startup, rescue disk finds and removes boot sector virus



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What should you do if a virus infects your system?

- Remove virus
- If you share data with other users, then immediately inform them of virus infection



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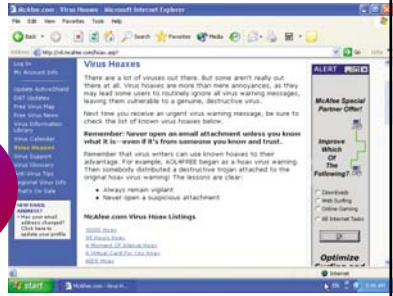
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How can you stay informed about viruses?

- Several Web sites publish list of virus alerts and virus hoaxes

**Virus hoax**

E-mail message that warns you of non-existent virus



Next p.12.7 Fig. 12-6

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What is unauthorized access?

- Use of computer or network without permission

**Cracker**

Someone who tries to access a computer or network illegally

**Hacker**

Once used as a complimentary word for a computer enthusiast  
Now another word for cracker

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How can unauthorized access and use be prevented?

User names and passwords

Biometric devices

Possessed objects  
(badge or card)

Callback systems  
(computer calls back)

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How can you make your password more secure?

- Longer passwords provide greater security

NUMBER OF CHARACTERS	POSSIBLE COMBINATIONS	AVERAGE TIME TO DISCOVER	
		HUMAN	COMPUTER
1	36	3 minutes	.00018 second
2	1,300	2 hours	.00065 second
3	47,000	3 days	.02 second
4	1,700,000	3 months	1 second
5	60,000,000	10 years	30 seconds
10	3,700,000,000,000,000	580 million years	59 years

- Possible characters include the letters A-Z and numbers 0-9
- Human discovery assumes 1 try every 10 seconds
- Computer discovery assumes one million tries per second
- Average time assumes the password would be discovered in approximately half the time it would take to try all possible combinations

**Next** p.12.9 Fig. 12.9

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How should you select a user name and password?

- Avoid obvious passwords, such as your initials or birthday
- Select password that is easy for you to remember

**IAWL0901**

First letter of each word in your favorite movie, It's a Wonderful Life

September 1 is your anniversary

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What is a biometric device?

- Translates person's characteristics into digital code that is compared to digital code stored in computer

**Biometric identifier**

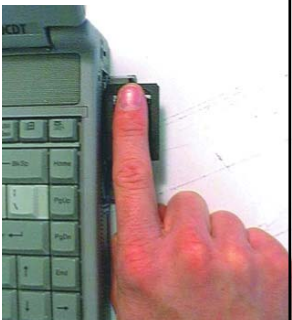
- Fingerprints
- Hand geometry
- Facial features
- Voice
- Signatures
- Retinal (eye) patterns

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What is a fingerprint scanner?

- Captures curves and indentations of a fingerprint




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### Computer Security: Risks and Safeguards

#### What is a hand geometry system?

- Measures shape and size of person's hand
- Typically used as time and attendance device by large companies



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p.12.11 Fig. 12-12

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### Computer Security: Risks and Safeguards

#### What is a face recognition system?

- Captures face image and compares it to stored image to see if person is legitimate user
- Can recognize people with or without glasses, makeup, or jewelry, and with new hairstyles




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### Computer Security: Risks and Safeguards

#### What is an iris verification system?

- Reads patterns in tiny blood vessels in back of eye




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### Computer Security: Risks and Safeguards

#### What is an audit trail?

- Records in file both successful and unsuccessful access attempts



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### Computer Security: Risks and Safeguards

#### What is software theft?

- Can range from someone stealing media that contains software to intentional piracy of software
- Software piracy is unauthorized and illegal duplication of copyrighted software





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### Computer Security: Risks and Safeguards

#### Single-User License vs Site License



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**Computer Security: Risks and Safeguards**

What is **encryption**?

- Process of converting readable data into unreadable characters to prevent unauthorized access
- Used to transmit files over Internet

**Plaintext**  
Unencrypted, readable data

encryption software

**Ciphertext**  
The encrypted (scrambled) data

encryption key

**Plaintext**  
Unencrypted, readable data

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What are some data encryption methods?

- Encryption key (formula) often uses more than one of these methods

SIMPLE ENCRYPTION METHODS

NAME	METHOD	PLAINTEXT	CIPHERTEXT	EXPLANATION
Transposition	Switch the order of characters	WIRELESS	IWERELSS	Adjacent characters swapped
Substitution	Replace characters with other characters	NOTEBOOK	XADROAAZ	Each letter replaced with another
Expansion	Insert characters between existing characters	MOUSE	MD00UDSDSD	Letter D inserted after each character
Compaction	Remove characters and store elsewhere	COMMUNICATION	COMUICITN	Every third letter removed (M, N, A, O)

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**Computer Security: Risks and Safeguards**

How does public key encryption work?

Step 4: Receiver can read or print the decrypted message.

CONFIDENTIAL  
The new plant will be located...

message to be sent

Sender (Joan)

public key

encrypted message

private key

Receiver (Doug)

CONFIDENTIAL  
The new plant will be located...

decrypted message

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**Computer Security: Risks and Safeguards**

What is a **system failure**?

- Prolonged malfunction of computer
- Can cause loss of hardware, software, data, or information

aging hardware

natural disasters such as fires, floods, or storms

random events such as electrical power problems

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What is a **surge protector**?

- Smooths out minor noise, provides stable current flow, and keeps overvoltage from reaching computer
- Amount of protection proportional to its cost
- Also called **surge suppressor**

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**Computer Security: Risks and Safeguards**

What is an **uninterruptible power supply (UPS)**?

- Surge protector and battery that can provide power during temporary loss of power

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 Concepts for a Digital World Web and XP Enhanced

How do the types of backup compare?

TYPE OF BACKUP	ADVANTAGES	DISADVANTAGES
<b>Full</b>	Fastest recovery method. All files are saved.	Longest backup time.
<b>Differential</b>	Fast backup method. Requires minimal space to back up.	Recovery is time consuming because need last full backup plus the differential backup.
<b>Incremental</b>	Fastest backup method. Requires minimal space to back up. Only most recent changes saved.	Recovery is most time consuming because need last full backup and all incremental backups since last full backup.

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What are backup procedures?

- Specify regular plan of copying and storing important data and program files

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What is a three-generation backup policy?

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What is a disaster recovery plan?

- Written plan describing steps company would take to restore computer operations in event of a disaster
- Contains four major components

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What services can help with security plans?

- International Computer Security Association (ICSA) can assist companies and individuals who need help with computer security plans

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How do Web browsers provide secure data transmission?

- Many Web browsers use encryption
- Web site that uses encryption techniques to secure its data is known as secure site
  - Use digital certificates with security protocol

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 Concepts for a Digital World Web and XP Enhanced

### What is Secure Sockets Layer (SSL)?

- Provides private-key encryption of all data that passes between client and server

https indicates secure connection

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 Concepts for a Digital World Web and XP Enhanced

### What is Pretty Good Privacy (PGP)?

- One of most popular e-mail digital encryption programs
- Freeware for personal, non-commercial users
- Uses public-key encryption scheme

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**Discovering Computers 2003** Internet and Network Security  
 Concepts for a Digital World Web and XP Enhanced

### What is a digital signature?

- Encrypted code that person, Web site, or company attaches to electronic message to verify identity of message sender
  - Code usually consists of user's name and hash of all or part of message

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### What is a personal firewall?

- Software program that detects and protects personal computer and its data from unauthorized intrusions
- Constantly monitors all transmissions to and from computer
- Informs you of any attempted intrusions

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### What is another way to protect your personal computer?

- Disable File and Print Sharing on Internet connection

**Online security service**  
 Web site that evaluates computer to check for Web and e-mail vulnerabilities

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**Discovering Computers 2003** Information Privacy  
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### What is information privacy?

- Right of individuals and companies to deny or restrict collection and use of information about them
- More difficult to maintain today because huge databases store this data in online databases

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**Discovering Computers 2003** Information Privacy  
 Concepts for a Digital World Web and XP Enhanced

### What are ways to safeguard personal information?

**How to Safeguard Personal Information**

1. Fill in only necessary information on rebate, warranty, and registration forms.
2. Do not preprint your telephone number or Social Security number on personal checks.
3. Have an unlisted or unpublished telephone number.
4. If Caller ID is available in your area, find out how to block your number from displaying on the receiver's system.
5. Do not write your telephone number on charge or credit receipts.
6. Ask merchants to not write credit card numbers, telephone numbers, Social Security numbers, and driver's license numbers on the back of your personal checks.
7. Purchase goods with cash, rather than credit or checks.
8. Avoid shopping clubs and buyers' cards.
9. If a merchant asks personal questions, find out why they want to know before releasing the information.
10. Inform merchants that you do not want them to distribute your personal information.
11. Ask, in writing, to be removed from mailing lists.

**(continued)**

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**Discovering Computers 2003** Information Privacy  
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### What are ways to safeguard personal information (continued)?

12. Obtain your credit report once a year from each of the three major credit reporting agencies (Equifax, Experian, and TransUnion) and correct any errors.
13. Request a free copy of your medical records once a year from the Medical Information Bureau.
14. Limit the amount of information you provide to Web sites. Just fill in required information.
15. Install a cookie manager to filter cookies.
16. Clear your history file when you are finished browsing.
17. Set up a free e-mail account. Use this e-mail address for merchant forms.
18. Turn off File and Print Sharing on your Internet connection.
19. Install a personal firewall.
20. Sign-up for e-mail filtering through your Internet service provider or use an anti-spam program such as Brightmail.
21. Do not reply to spam for any reason.
22. Surf the Web anonymously with programs such as Freedom or through an anonymous Web site such as Anonymizer.

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**Discovering Computers 2003** Information Privacy  
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### What is an electronic profile?

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### What is a cookie?

- Small file that Web server stores on *your* computer
- Typically contains data about you
- Web site can read data only from its own cookie file
- Some Web sites sell or trade information stored in your cookie to advertisers

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### How can cookies track user preferences?

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### How can you set your browser to control cookies?

- Set browser to accept cookies automatically, or prompt you if you wish to accept cookie, or disable cookie use
- Many Web sites do not allow you to access features if you disable cookie use

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 Web and XP Enhanced

What is a **cookie manager**?

- Software program that selectively blocks cookies

COOKIE MANAGERS	
Program Name	Function
AdSubtract SE	Block advertising and cookies
Cookie Cruncher	View, edit, and delete cookies
Cookie Crusher	Accept or reject cookies by Web site – tells you the purpose of each cookie (tracking, shopping cart, etc.)
Guidescope™	Advertising and cookie blocker that allows you to block or allow cookies based on their domain names
IEClean, NSClean	Delete cookies; also can delete cache, history files, and other browsing files
WebWasher®	Block advertising banners and associated cookies
Window Washer™, MacWasher™	Delete cache, history, and cookie files

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What is **spyware**?

- Program placed on computer without user's knowledge
- Secretly collects information about user
- Can enter computer as virus or as a result of installing new program

**Adware**

Spyware used by Internet advertising firms to collect information about user's Web browsing habits

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 Concepts for a Digital World  
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How can you control **spam**?

**E-mail filtering**

Service that blocks e-mail messages from designated sources

Collects spam in central location that you can view any time

**Anti-spam program**

Attempts to remove spam

Sometimes removes valid e-mail messages

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 Concepts for a Digital World  
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What privacy laws have been enacted?

- Many federal and state laws regarding storage and disclosure of personal data, such as:

**Child Online Protection Law**

Penalizes those who distribute material deemed harmful to children

**Computer Abuse Amendments Law**

Outlaws viruses

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What is **employee monitoring**?

- Using computers to observe employee's computer use, including e-mail, keyboard activity, and Web sites visited
- Legal for employers to use monitoring software programs

**Privacy for Consumers and Workers Act**

Proposed law that employers monitoring electronic communications must notify employees

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What is one of the most controversial issues surrounding the Internet?

- Availability of objectionable material such as racist literature and obscene pictures

**The 1996 Communications Decency Act**

Made it a criminal offense to distribute indecent or patently offensive material online

Declared unconstitutional in June 1997 by Supreme Court

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**2003** Information Privacy

What is **filtering software**?

- Can restrict access to specified Web sites
- Some filter sites use specific words
- Others filter e-mail messages and chat rooms



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**Discovering Computers**  
Concepts for a Digital World  
Web and XP Enhanced  
**2003** Summary of  
Computers and  
Society: Security and  
Privacy

- Computer security: risks and safeguards
- How viruses work and how to prevent them
- Internet and network security
- Information privacy

**Chapter 12 Complete**

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