Draft

INFORMATION AND COMMUNICATION TECHNOLOGY

LEARNING MODULE

INFORMATION AND COMMUNICATION TECHNOLOGY AND SOCIETY

Pusat Perkembangan Kurikulum
Kementerian Pelajaran Malaysia
2006

1. What is it?

   This is a learning module for a specific Learning Outcome as stipulated in the HSP that is :

   - 1.3 Computer Security

2. Who is it for?

   This module is for students who are taking the ICT subject as their elective and for those who are interested in ICT.

3. What can be achieved?

   Upon completion of this module, you should be able to :

   - identify security threats
   - know what measurements should be taken to overcome the threats

4. Is previous knowledge necessary?

   No. The contents of this module will enable you to acquire the knowledge.

TOPIC : 1.3 COMPUTER SECURITY

SUBTOPIC : 1.3.3 Security measures

LEARNING OUTCOMES

You should be able to:

1.3.3.3 Apply the correct security procedures.

A. Antivirus
B. Anti-Spyware
C. Cryptography
D. Data backup
E. Firewall
F. Human aspects

DURATION : 6 periods

REFERENCES

A. Books

1. Capron H.L, J.A. Johnson (2005) Computers: Tools For An Information Age. Complete. Eight Edition.
2. Shelly G.B, Cashman T.J, Vermaat M.E, Walker T.J. (2004) Discovering Computers 2005 : A Gateway to Information, Course Technology.
3. Stallings W. (2003) Cryptography and Network Security: Principles and Practices. Third Edition.

B. Web Addresses

1. Ad-Aware SE Personal ~ http://www.lavasoft.com
2. Antivirus ~ http://www.primode.com/glossary.html
3. Anti-spyware ~ http://www.antispywarecoalition.org/definitions.pdf
4. AVG Free Edition Antivirus ~ http://www.grisoft.com
5. Cryptography ~ http://privacy.getnetwise.org/browsing
6. Cryptography ~ http://www.faqs.org/faqs/cryptography-faq/
7. Cryptography ~ http://www.shodor.org/interactivate/discussions/cipher.html
8. Cryptography ~ http://www.signalguard.com/security/encryption.htm

C. Other sources

1. Windows Help and Support Center.

A. ANTIVIRUS

Situation

Your computer displays strange behaviour. For instance, you discover that **"myhomework.doc"** has suddenly been renamed to **"myhomework.exe"**.

Discuss :

i) What do you think is the cause of this problem?

ii) Determine the appropriate measures to overcome this threat.

iii) Apply the correct security procedures to solve this problem.

What is antivirus software?

Antivirus software is a program that detects viruses in your computer memory, storage media or incoming files. It will identify, prevent and eliminate computer viruses and other malicious software. Examples of antivirus software are McAfee VirusScan, Norton AntiVirus, Trend Micro PC-cillin, and Doctor Solomon.

Why do we need an antivirus program?

Antivirus software protects a computer against viruses by identifying and removing any computer viruses found.

How do you scan your file?

To scan selected area in your personal computer:

1. You may use the antivirus software installed in your computer to scan selected area, disk or the entire computer. In this module we use AVG Free Edition antivirus software.

2. Start the antivirus software by clicking **Start** then go to **All Programs.** Next, select **AVG Free Edition** followed by **AVG Free Control Center** (**Figure 1**).

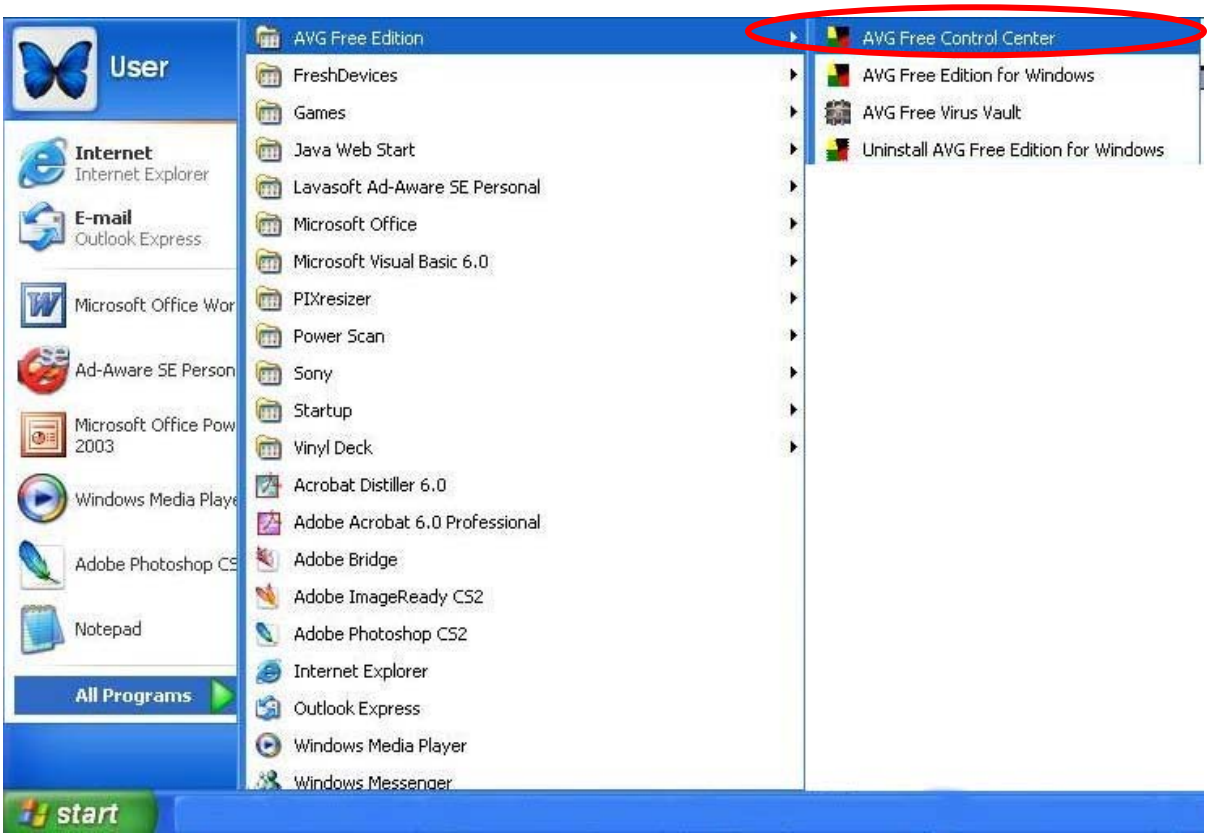


Figure 1

3. Click **Scan Selected Areas** (**Figure 2**).

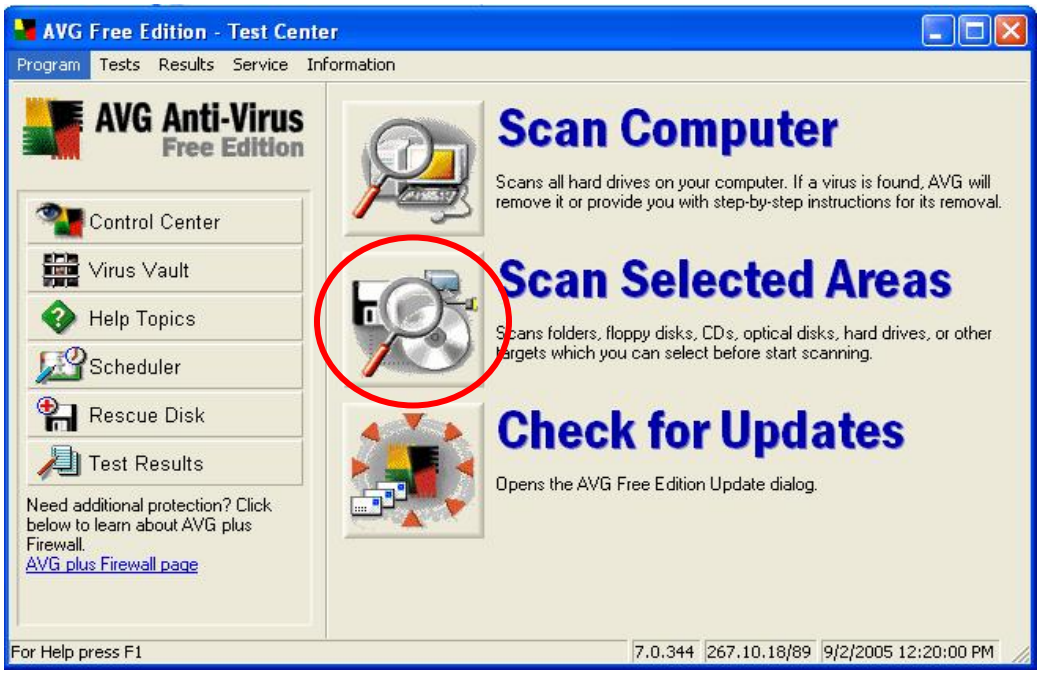


Figure 2

4. Select **Drive C:** and click **Scan Selected Areas** (**Figure 3**).

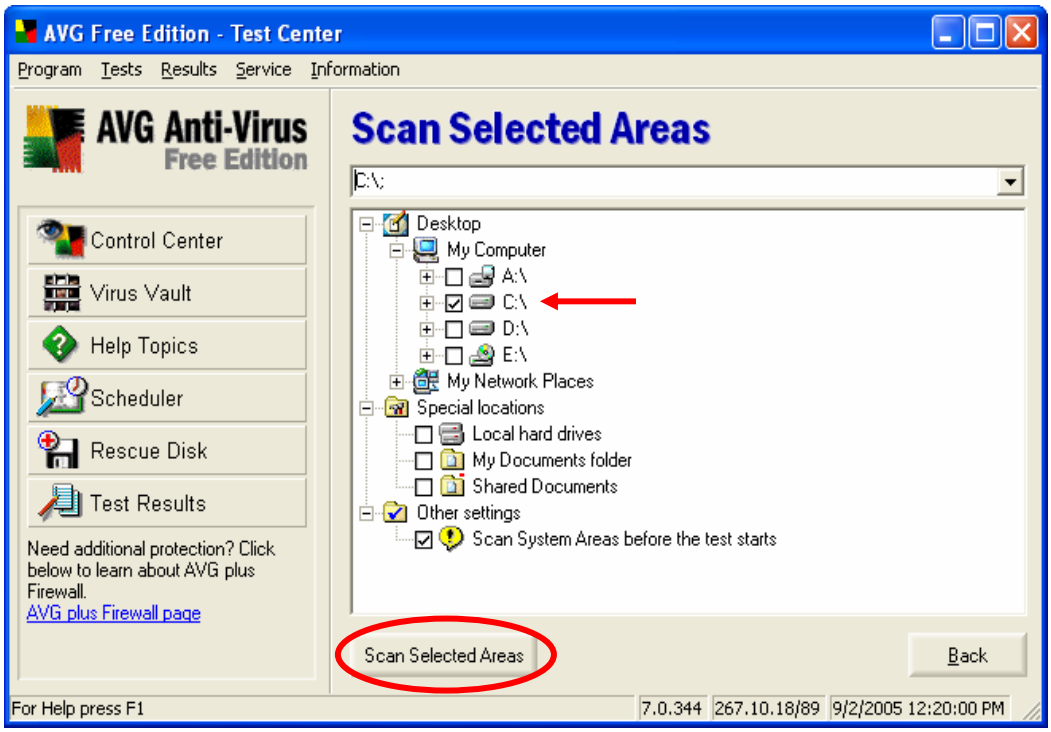


Figure 3

5. Scanning process in progress (**Figure 4**). You may **Stop** or **Pause** the process at any time and resume by restarting or reopen the antivirus software.

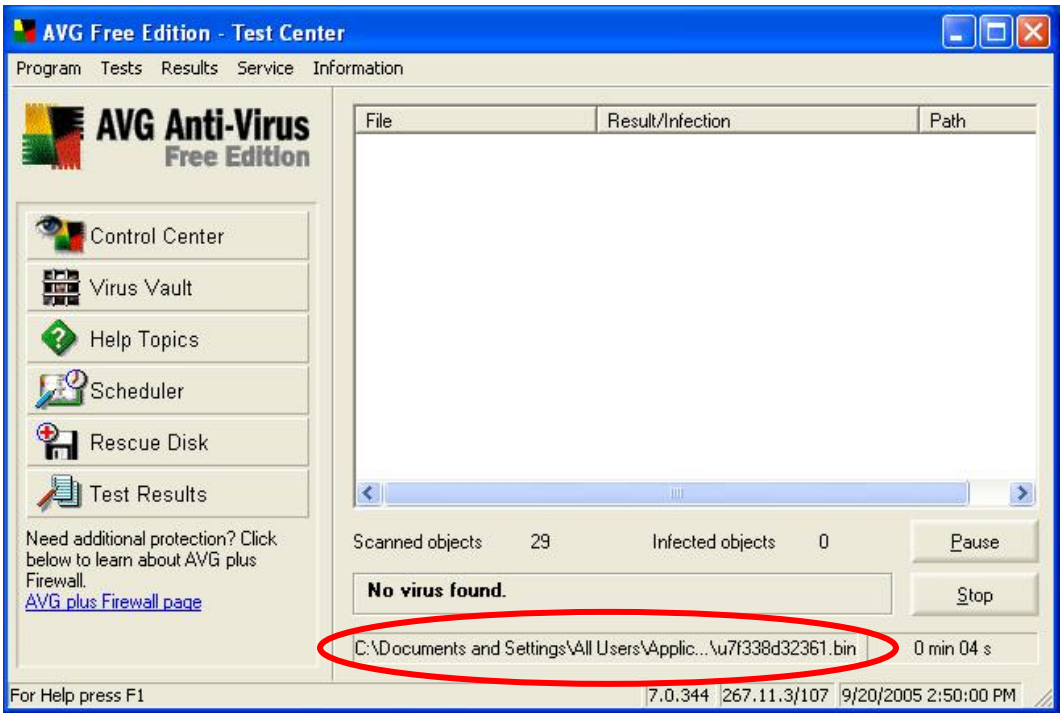


Figure 4

6. During the progress report, you will be notified if your computer is infected (**Figure 5**).

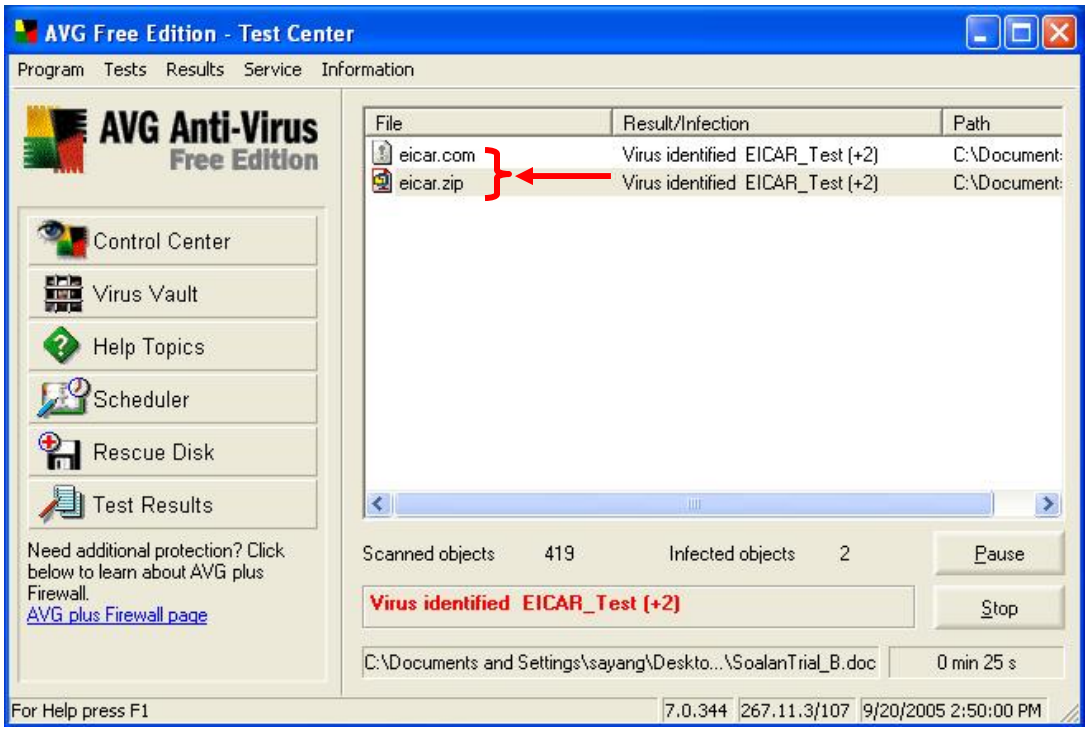


Figure 5

7. The program will try to heal the infected file(s) automatically. Dialogue box (**Figure 6**) will appear if the virus is detected. Click **Continue** to proceed scanning another file.

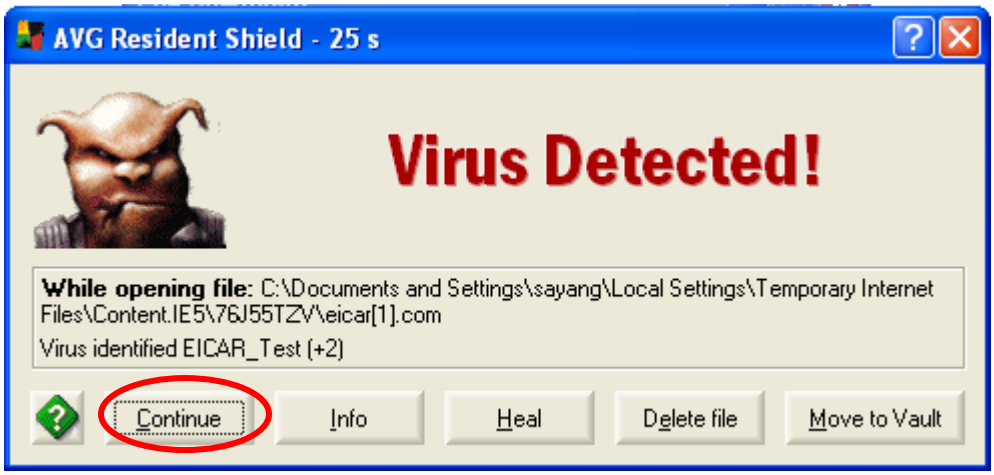
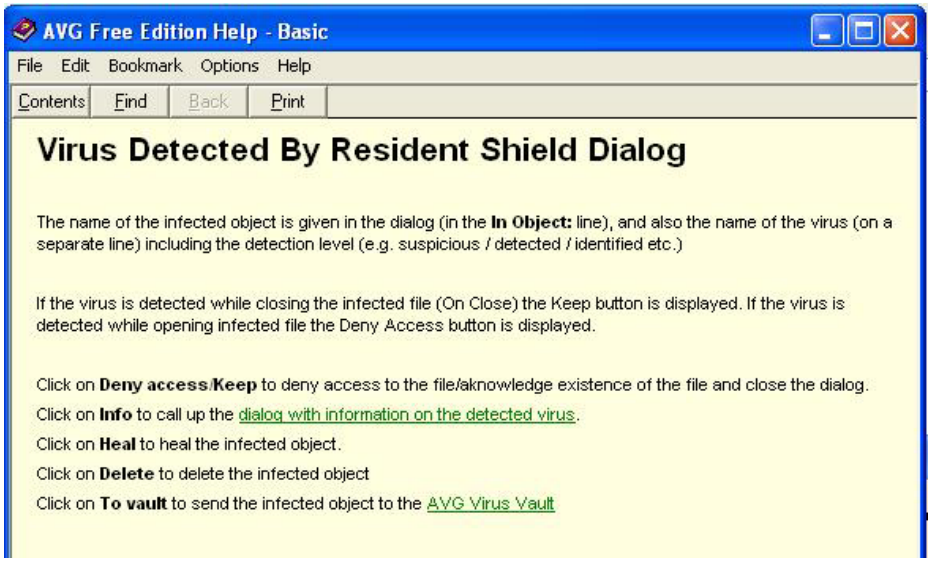
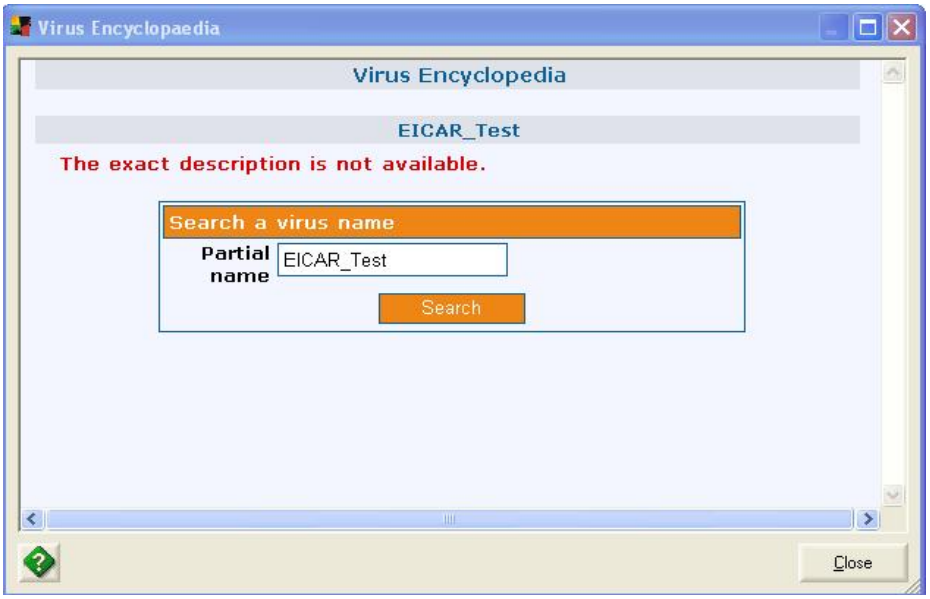


Figure 6

Table 1 shows the actions of help, Info, Heal, Delete file and Move to Vault buttons.

Option	Action
	AVG Free Edition Help – Basic. 
	Proceed with what you are doing and the antivirus will ignore the virus.

Option	Action
Info	Call up the dialog with information on the detected virus if available. 
Heal	Heal the infected object if possible.
Delete file	Remove the infected object.

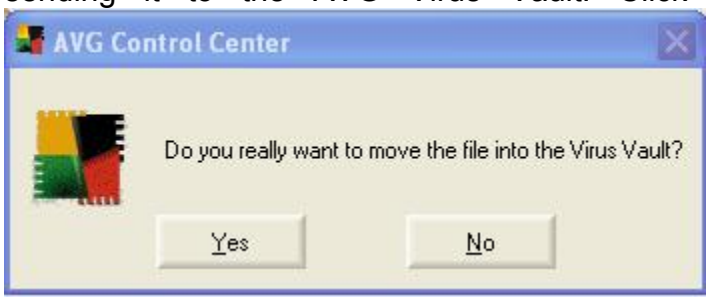
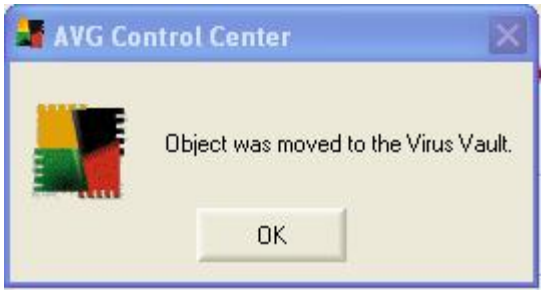
Option	Action
Move to Vault	If you do not want to delete the file, you can quarantine the file by sending it to the AVG Virus Vault. Click **Move to Vault.**  

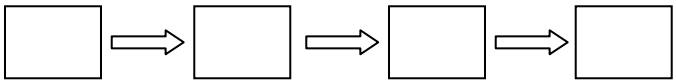
Table 1

8. **Figure 7** displays scanning statistics. The virus statistics box shows 1 object is infected. This program will delete the object. Click **Close** to finish the scanning process. You may also repeat the above process by clicking **Scan again.**

Figure 7

Assessment

1. Rearrange the steps in scanning antivirus below:
   a. Scan the selected file
   b. Choose an antivirus program
   c. Wait while the program is scanning and the result is produced
   d. Select file that need to be scanned



2. Antivirus is a software which _____, _____ and _____ computer viruses and other malicious software.

3. Which of the following is antivirus software?
   A Microsoft Office
   B Trend Micro PC-cillin
   C Windows XP
   D Microsoft Word

Enrichment

1. Repeat the above processes to scan other files or area in your computer. Write down the infected file name and virus if any.

B. ANTI-SPYWARE

Situation

While you are surfing the Internet, your computer displays a lot of pop-up windows and disturbs your surfing.

Discuss :

i) What do you think is the cause of this problem?

ii) Determine the appropriate measures to overcome this threat.

iii) Apply the correct security procedures to solve this problem.

What is spyware?

Spyware is a program placed on a computer without the user's knowledge that secretly collects information about the user. Spyware can enter a computer as a virus or as a result of a user installing a new program. The spyware program communicates information it collects to others while you are online.

Effects and risks

- Stealing of confidential data (e.g. passwords)
- Violation of privacy
- Unsolicited advertising

Symptoms of spyware infection

The most common symptoms or warning signs of presence of spyware on a system include:

- Unusual slowness of the system.
- System instability.
- Slow Internet connection.
- Reception of an unusual amount of spam or junk mail.
- You experience endless pop-ups.
- You get Windows error messages.
- Your computer crashes with no warning.
- Your computer screen freezes.
- You get the "blue screen of death".
- Your home page has been hijacked.
- Your computer takes much longer to boot up or shut down.
- You have unexplained and unauthorized charges on your credit card.
- You find it extremely slow and frustrating to work on your computer.

What is anti-spyware software?

Anti-spyware software is a program that detects, quarantines and removes spyware to prevent them from getting into your computer. Examples of anti-spyware software are Lavasoft Ad-Aware SE Personal, PC Health Plan, and Malware Scanner.

How to detect and remove spyware?

1. Choose an anti-spyware program. In this module we use **Lavasoft Ad-Aware SE Personal.**

2. Click **Start** followed by **All Programs** then click **Lavasoft Ad-Aware SE Personal** and then click **Ad-Aware SE Personal** (**Figure 1**).

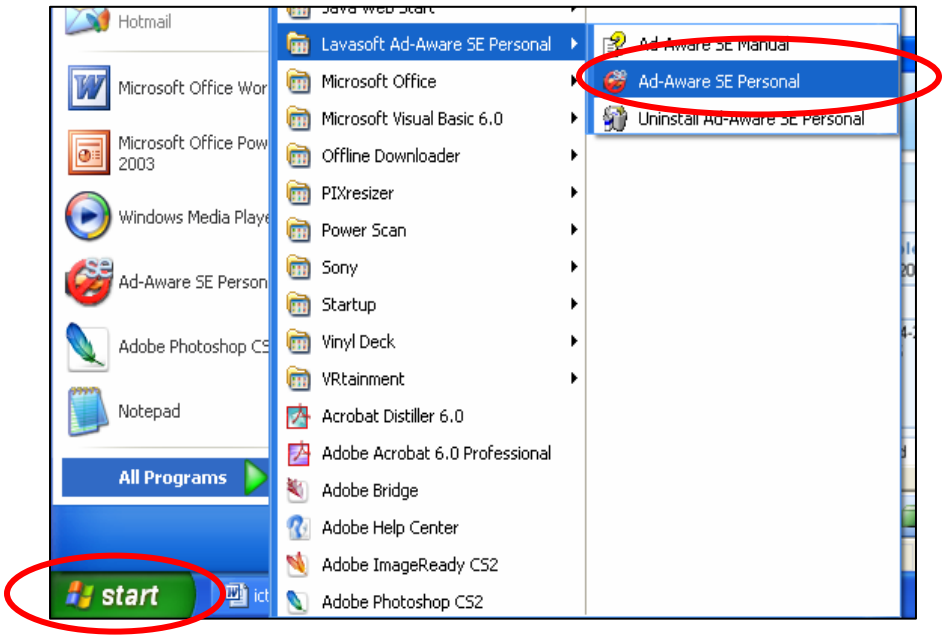


Figure 1

2. Click **Start** to begin the process (**Figure 2**).

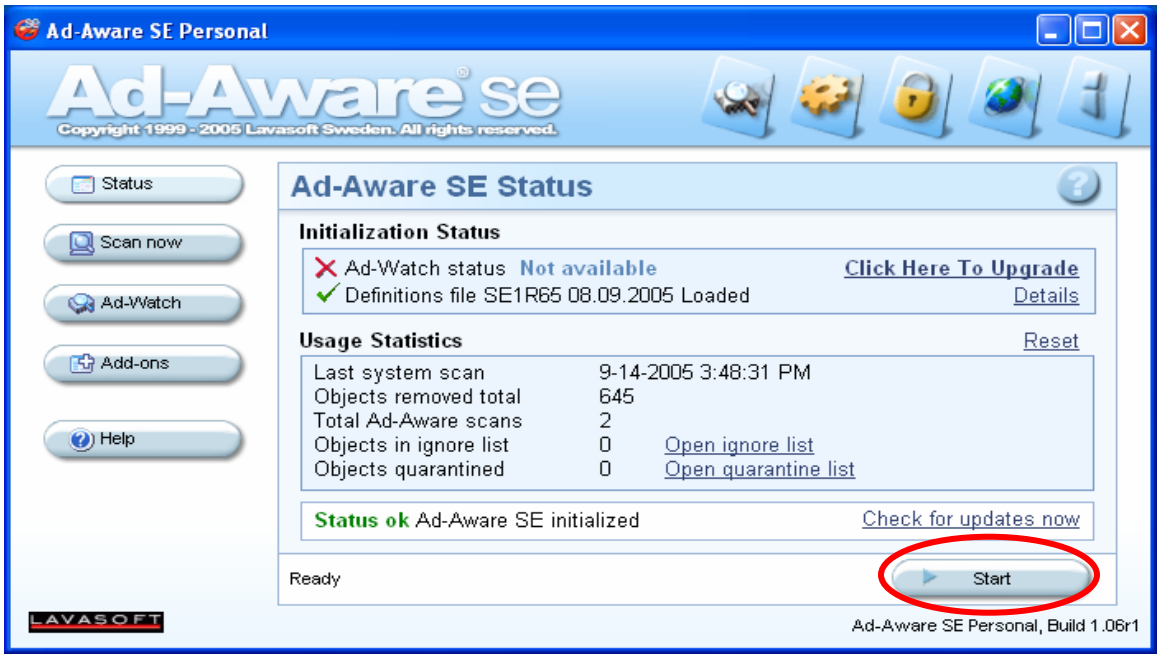


Figure 2

3. The **Preparing System Scan** dialogue box will be displayed. Click **Next** to start scanning (**Figure 3**).

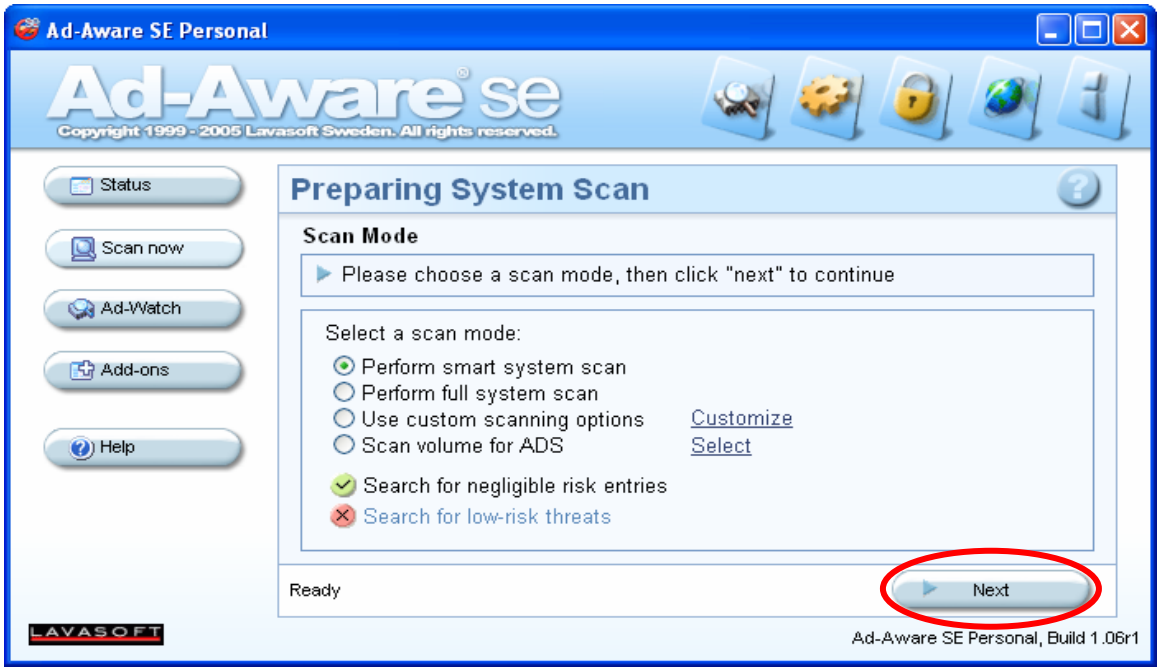


Figure 3

4. The program will perform system scanning (**Figure 4**). During this process, the program is detecting and tracking the spywares in your computer.

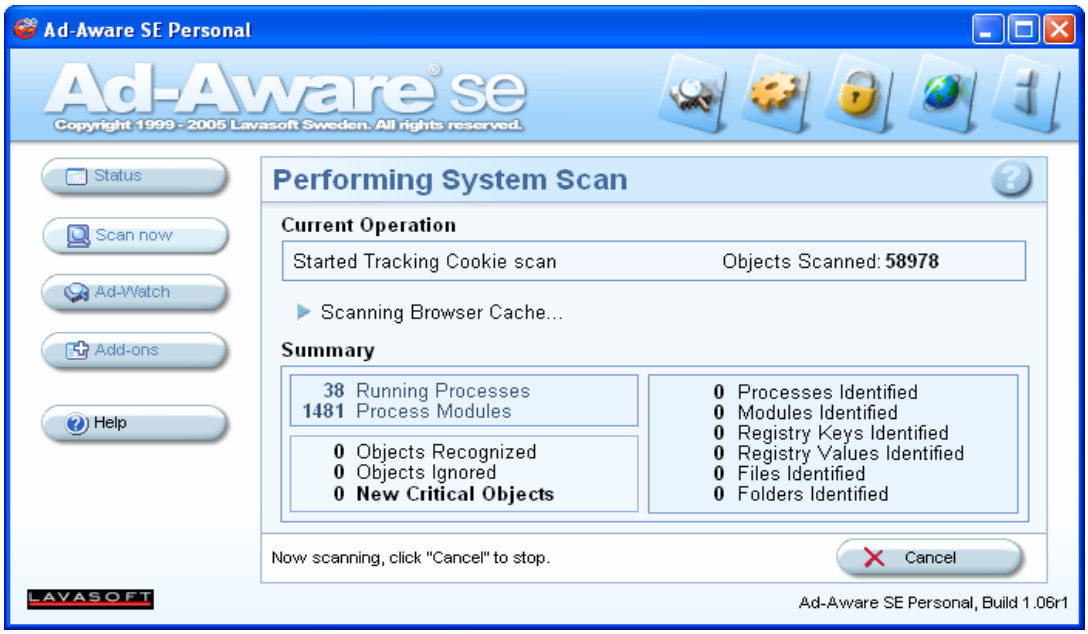


Figure 4

5. After the scanning completes, the Scan Complete dialogue box will be displayed. Click **Next** (**Figure 5**).

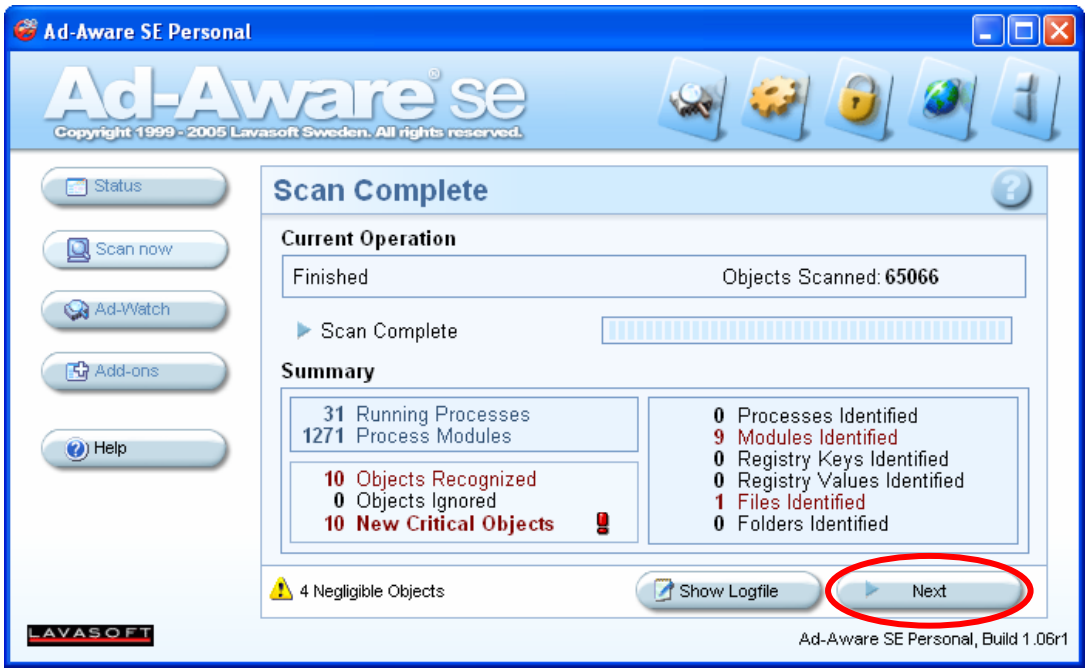


Figure 5

6. The program will display all the identified objects to be removed. **Select** the object which you want to delete or quarantine. Click **Next** (**figure 6**).

Figure 6

7. The remove confirmation dialogue box will be displayed. Click **OK** to remove the object(s) (**Figure 7**).

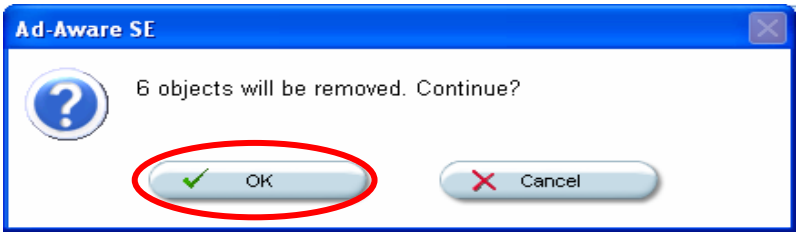


Figure 7

8. The object(s) will be removed and the spyware scanning process is completed.

Assessment

1. Which of the following refers to a spyware program?

A. It lets you secretly read other people's e-mail.
B. It blocks advertisements from popping up while you surf the Internet.
C. It performs tasks on your computer without your consent and control.
D. It performs scheduled tasks on your computer.

2. The symptom(s) if spyware infected your computer

A. Pop-up advertisements will be seen and your computer slows down.
B. Your web browser contains unwanted additional components.
C. Your settings have changed (for example, your browser default home page) and you cannot change them back to the way they were.
D. All of the above.

3. Which of the following actions will help to protect your computer against spyware?

A. Using a firewall.
B. Installing anti-spyware protection.
C. Only downloading programs from Web sites you trust.
D. All the above.

4. You can get spyware when you do:

A. Play music CD.
B. Download programs from sources you don't know.
C. Install new software from a trusted source
D. All of the above.

Enrichment

How often do you need to scan your personal computer using the anti-spyware? Discuss this with your friend(s). Repeat the above processes to detect spyware in your computer. Write down the infected objects if any.

C. CRYPTOGRAPHY

Situation

Your brother who is studying abroad needs some money. He asks your father to bank-in some money into his bank account. He must email his account information to you. Your father is worried that someone else may obtain this information and commit fraud.

Discuss :

i) What is your advice to your father to overcome this matter?

ii) Apply the correct security procedures to solve this problem.

What is cryptography?

Cryptography is a process associated with encryption and decryption. Encryption is the process of transforming information from an unsecured form (ordinary text, cleartext or plaintext) into coded information (ciphertext), which cannot be easily read by outside parties. The transformation process is controlled by an algorithm and a key. The process must be reversible so that the intended recipient can return the information to its original, readable form, but reversing the process without the appropriate encryption information is difficult. This means that details of the key must also be kept secret.

How to use cryptography?

Cryptography is used when we want to send secured information. We want the information to be understood by only the recipient.

In order to use cryptography, we need to understand how its work (**Diagram 1**).

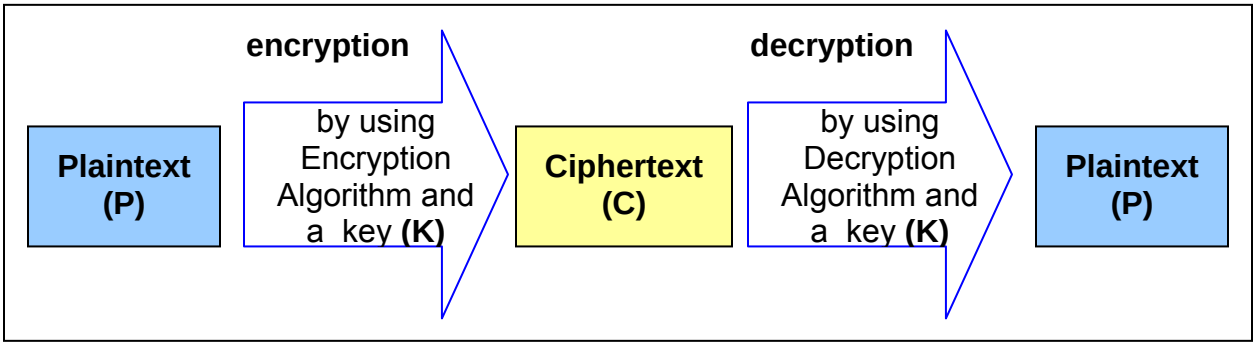


Diagram 1

Sender will encrypt a message (plaintext) by using an encryption algorithm and a key. This encrypted message called ciphertext.
Recipient will decrypt the ciphertext by using decryption algorithm and a key that agree upon. This decrypted ciphertext called plaintext (message).

Let us try a classical cryptography that used by Julius Caesar during his time called Caesar Cipher.

Encryption algorithm: C = (P + K) mod 26 with K = 3

Decryption algorithm: P = (C – K) mod 26 with K = 3

Mod = balance of a division

1. Before using the algorithm, we need to number the entire alphabet (A ⟶ Z) with 0 ⟶ 25 in order (**Table 2**).

A	B	C	D	E	F	G	H
0	1	2	3	4	5	6	7
I	J	K	L	M	N	O	P
8	9	10	11	12	13	14	15
Q	R	S	T	U	V	W	X
16	17	18	19	20	21	22	23
Y	Z						
24	25						

Table 2

2. Let us encrypt the phrase 'ATTACK', with the encryption algorithm given.

Plaintext	Number Representation	(P + 3) mod 26 = C	Number Representation	Ciphertext
A	0	0 + 3 = 3	3	D
T	19	19 + 3 = 22	22	W
T	19	19 + 3 = 22	22	W
A	0	0 + 3 = 3	3	D
C	2	2 + 3 = 5	5	F
K	10	10 + 3 = 13	13	N

3. Try to decrypt the ciphertext by using the decryption algorithm given.

Ciphertext	Number Representation	(C – 3) mod 26 = P	Number Representation	Plaintext
D	3	3 – 3 = 0	0	A
W	22	22 – 2 = 19	19	T
W	22	22 – 3 = 19	19	T
D	3	3 – 3 = 0	0	A
F	5	5 – 3 = 2	2	C
N	13	13 – 3 = 10	10	K

Assessment

1. Encryption and decryption are processes that involve in a _____.
2. An encrypted ordinary text is called _____.
3. A reversing process in order to retrieve the message sent is called _____.
4. Try to decrypt the ciphertext given by using Ceaser Cipher.

   ciphertext : ZRUOG

   plaintext: _____

Enrichment

Create your own cryptography.

1. Develop the encryption and decryption algorithm.
2. Show how your cryptography work by using a table with heading plaintext, encryption technique, ciphertext, decryption technique and plaintext.

D. DATA BACKUP

Situation

You have spent one week typing your 24 page long assignment. You worry that if something bad happens to your computer, your data would be lost.

Discuss :

i) How would you ensure the safety and protection of your valuable data?

ii) Apply the correct security procedures to solve this problem. (skill-based)

What is data backup?

A data backup is a duplication of a file, program or disk that can be used if the original source is lost, damaged or destroyed.

Why do we need to backup data?

It is absolutely critical that you understand that corruption happens, hard drives will fail, motherboards will short out, and mistakes will erase data. Therefore you will need your data backup to ensure your data is there whenever something bad happened to the original one.

How to backup your file to external storage device

1. Click **My Documents** folder (**Figure1**).

Figure 1

2. Highlight **file or document** from **My Documents.** For example, document "Exercise 1" (**Figure 2**).

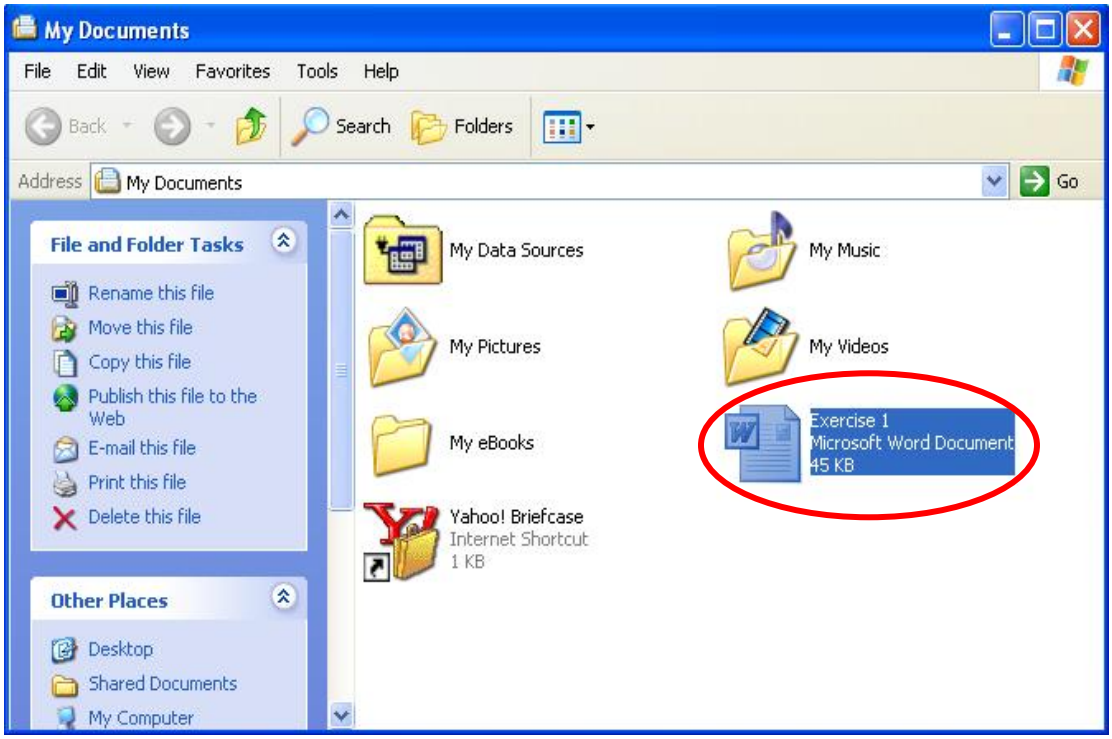


Figure 2

3. Insert a floppy disk (diskette) into your floppy drive. To copy the file to floppy disk, click **File Menu** then click **Send to** followed by **3 1/2 Floppy (A:)** (**Figure 3**).

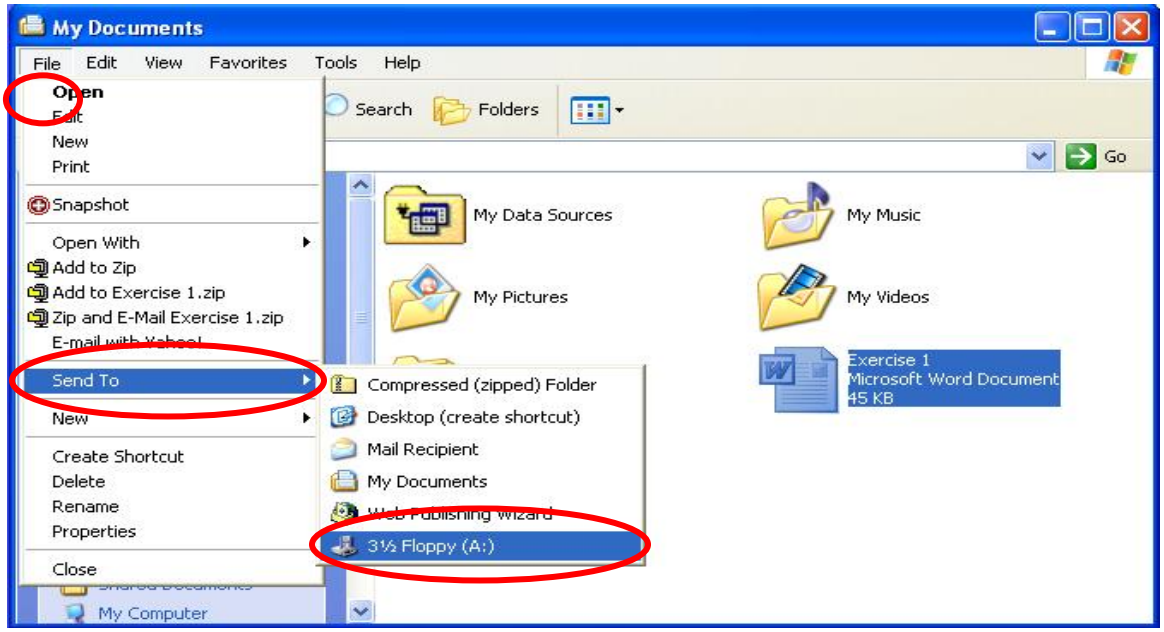


Figure 3

During this process, your file or document is being copied to the Floppy Disk (**Figure4**).

Figure 4

Note

Beside Floppy Disk, you may choose any external storage devices as a destination such as CD-RW, flash disk, tape or network attach storage, to do your data backup.

Assessment

1. Read the statements below. Answer **T** if True and **F** if False.

   a. We can directly make a data backup without addressing the target or destination to be copied _____

   b. We can copy a few files at one time during backup _____

   c. We cannot select more than one folder at one time to do backup _____

   d. We can do a few data backup to same destination. _____

2. Explain briefly how to prevent the data lost?

   _____

   _____

   _____.

Enrichment

Repeat the above steps to backup data from a different folder or location in your computer. You may backup in the same floppy disk or other destination in your computer.

E. FIREWALL

Situation

You are surfing the Internet to do your school assignment. When you want to download a file, your computer does not allow it to happen.

Discuss :

i) Why does this situation occur?

What is Windows Firewall?

A firewall restricts information that comes to your computer from other computers. It gives you more control over the data on your computer and provides a defense against people or programs (including viruses and worms) that try to connect to your computer without invitation.

How to set firewall?

Below is the example of setting up the firewall.

1. Click **Start** button, then click **Control Panel** (**Figure 1**).

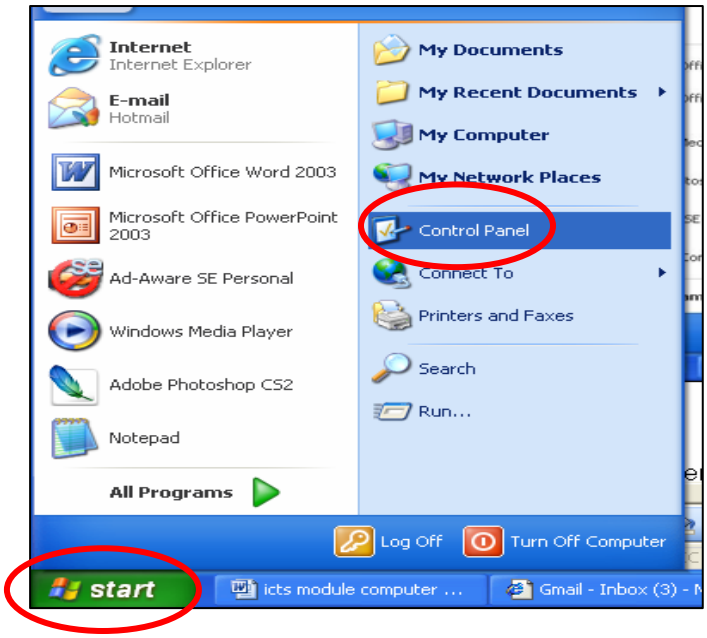


Figure 1

2. Click **Network and Internet Connections** (**Figure 2**).

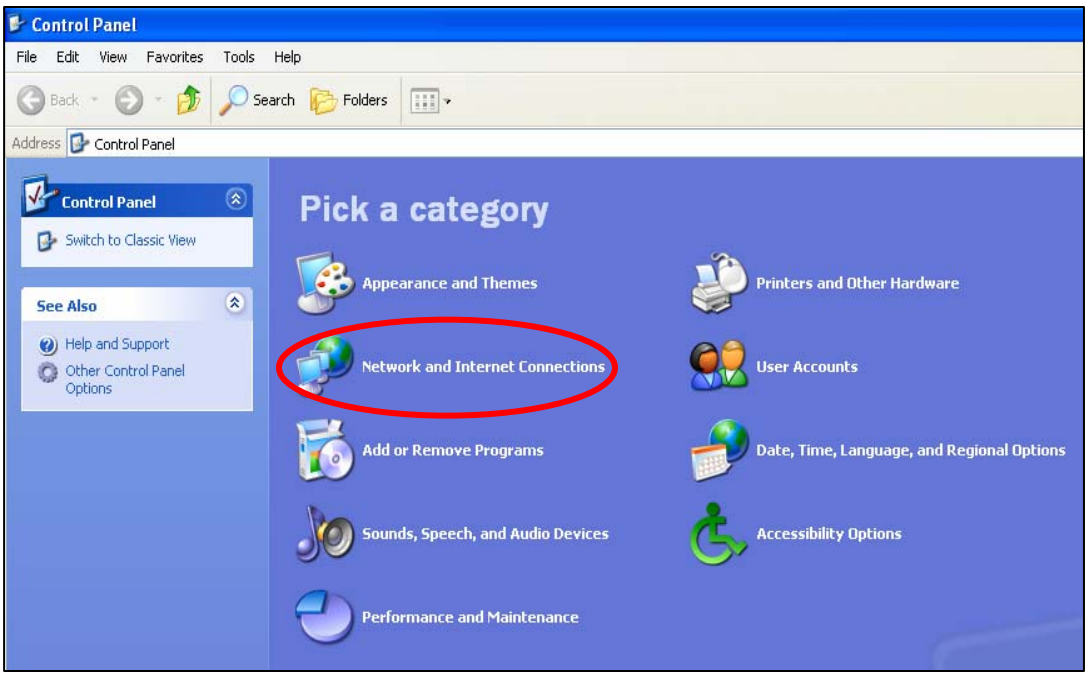


Figure 2

3. Highlight your current Connection. Go to **File** menu then click **Properties.** (**Figure 3**) is an example of the selected connection.

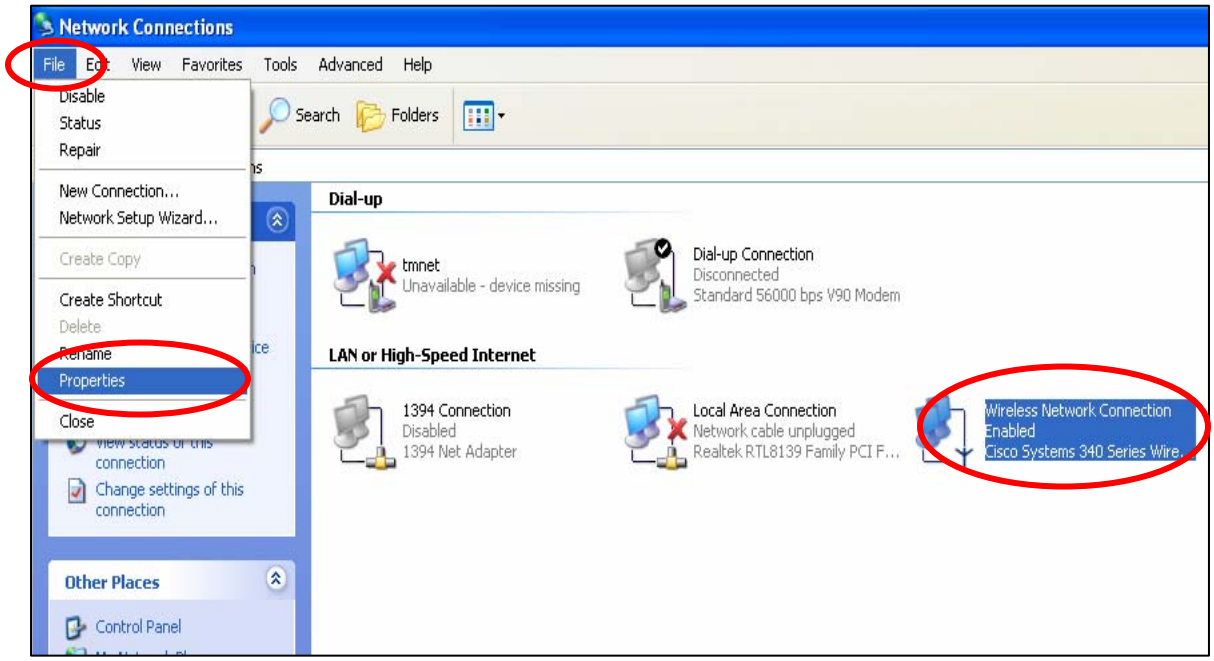


Figure 3

The Network Connection Properties will be displayed (**Figure 4**).

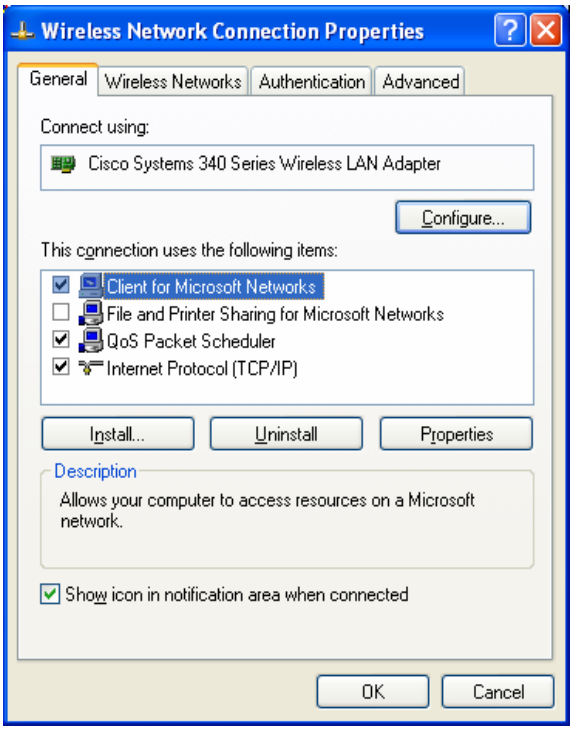


Figure 4

4. Click **Advanced** tab and check **protect my computer and network by limiting or preventing access to this computer from the internet** to enable the function (**Figure 5**).

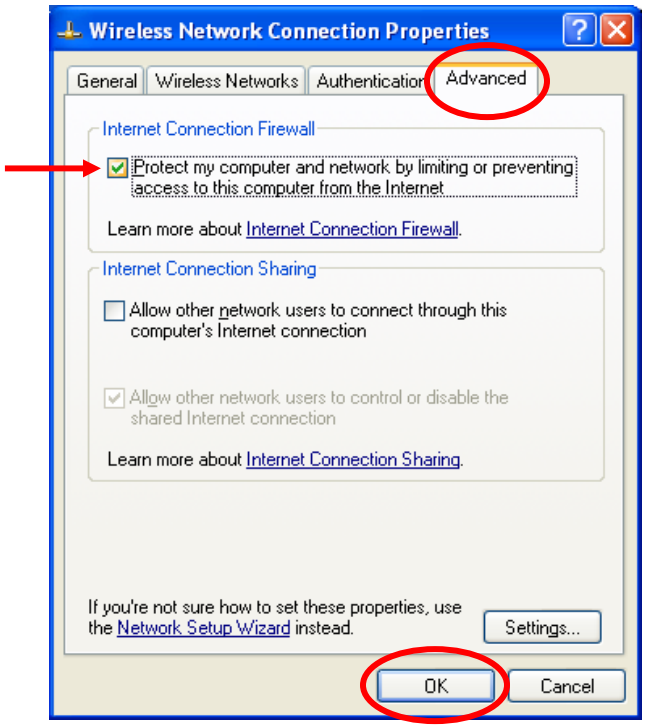


Figure 5

5. Click **OK** to complete the process.

By doing so, you are enabling a security system that acts as a protective boundary between a network and the outside world. The Internet Connection Firewall (ICF) is firewall software that is used to set restrictions on what information is communicated from your network computer to and from the Internet.

Assessment

1. A firewall helps to keep your computer more _____. It _____ information that comes to your computer from other computers. It gives you more _____ over the data on your computer and providing a line of defense against people or programs (including viruses and worms) that try to connect to your computer without invitation.

2. When turned on, firewall will _____ the connection if someone unrecognized on the Internet or a network tries to connect to your computer.

3. A firewall will
   I. Help block computer viruses and worms from reaching your computer.
   II. Ask for your permission to block or unblock certain connection requests.
   III. Detect or disable computer viruses and worms if they are already on your computer.
   IV. Stop you from opening e-mail with dangerous attachments.

   A. I and II
   B. I and III
   C. II and III
   D. III and IV

F.HUMAN ASPECTS

Situation

While working on your computer, you discover some of your files missing and some altered. You realise that intruders have accessed your computer.

Discuss :

i) Determine the appropriate measures to overcome this threat.

ii) Apply the correct security procedures to solve this problem.

What is a computer security?

A computer security risk is an event or action that could cause a loss of or damage to computer hardware, software, data, information, or processing capability. Some breaches to computer security are accidental. Others are planned intrusions. People who commit or responsible to wrong doing is a perpetrator. Perpetrator also exists in computer system.

Category of perpetrators

Perpetrators of computer crime and other intrusions fall into **seven** basic categories:-

Category	**Description**
Hacker	Someone who accesses a computer or network illegally. They often claim the intent of their security breaches is to improve security. They have advanced computer skills.
Cracker	Someone who accesses a computer or network illegally, but has the intent of destroying data, stealing information, or other malicious action. They have advanced computer skills.
Script Kiddie	Someone who has the same intent as a cracker but does not have the technical skills and knowledge. They are often teenagers.
Corporate Spy	Someone who is hired to break into a specific computer and steal its proprietary data and information.
Unethical Employee	Employees who break into their employers' computers for a variety of reasons.
Cyber Extortionist	Someone who uses e-mail as a vehicle for extortion or libeling.
Cyber Terrorist	Someone who uses the Internet or network to destroy or damage computers for political reasons.

Activity 1

Safeguard Against Hardware Theft and Vandalism

Situation

You were asked to check the security measurements in your computer lab by your teacher. Complete the checklist below. You can add other security measurement(s).

No	Security Measurement	Check
1.	Locked Doors	
2.	Locked Windows	
3.	Locked Cabinets	
4.	Locked Grill	
5.	Double Lock	
6.	Alarm System	
7.	School Guard	
8.	Log Book	
9.	Implementing user identification	
10.		
11.		
12.		
13.		
14.		
15.		

Activity 2

Safeguard Against Software Theft
Identify the originality of software being used in your computer lab. Complete the checklist below. You can add other software.

No	Software	Original? (Check)
1.	Server Operating System	
2.	Client operating System	
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Assessment

Match the category of perpetrator below with its description.

Category	**Description**
Cyber Extortionist	Someone who accesses a computer or network illegally. They often claim the intent of their security breaches is to improve security. They have advanced computer skills.
Unethical Employee	Someone who uses the Internet or network to destroy or damage computers for political reasons.
Cyber Terrorist	Someone who has the same intent as a cracker but does not have the technical skills and knowledge. They are often teenagers.
Hacker	Someone who is hired to break into a specific computer and steal its proprietary data and information.
Cracker	Employees who break into their employers' computers for a variety of reasons.
Script Kiddie	Someone who uses e-mail as a vehicle for extortion or libeling.
Corporate Spy	Someone who accesses a computer or network illegally, but has the intent of destroying data, stealing information, or other malicious action. They have advanced computer skills.

Module Assessment

You are the president of your school computer club. Your club has successfully conducted activities in helping teachers and educating the members. As a respectable club, the club has been given a responsibility to help maintaining the school computer lab.

Your teacher advisor wants you to help him in exercising an extra precaution in the security measurement of the school's computer lab.

Complete the table below with the correct security measurement or sample problem.

Problem	**Security Measurement**
Unauthorized password duplication	
	Antivirus
Unwanted pop-up windows while surfing the Internet.	
	Data backup
Students accidentally visit pornography site.	
	Lock doors and windows

CONGRATULATIONS !!

YOU HAVE SUCCESSFULLY COMPLETED THIS MODULE. YOU ARE NOW ABLE TO APPLY THE NECESSARY SECURITY MEASURES AND PROTECT YOUR COMPUTER.