Yr 9 Computer Science

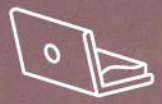
Transition Activities

For this transition task you need to:

- Read the slides on **Application software**
- Complete the tasks stated on **slide 9** along on the word document
- Read the slides on **Operating systems**
- Complete the tasks stated on **slide 29** along on the word document
- Read the slides on **Utility software**
- Complete the tasks stated on **slide 48** along with the word document

Application Software

Application and system software



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1

Objectives

- Explain the terms hardware and software
- Explain what is meant by system software and application software and give examples of each

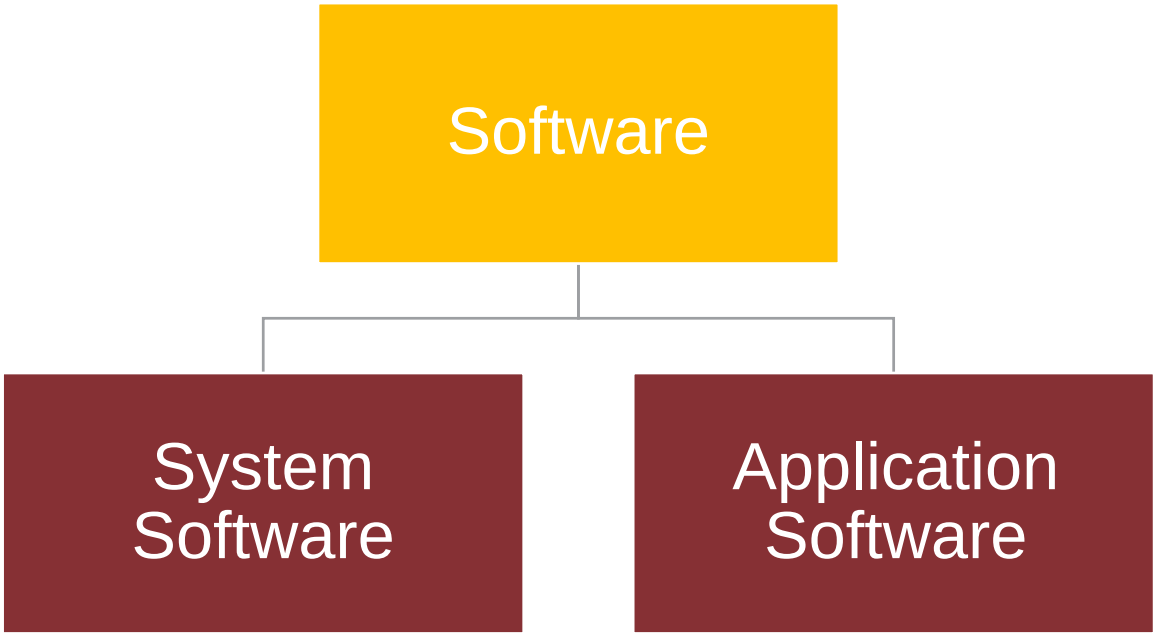
Hardware and software

- A computer system is made up of hardware and software
- **Hardware** is any physical component that makes up the computer
- **Software** is any program that runs on the computer

What software can you name?

- In pairs or small groups name as many pieces of software as you can in one minute

Categories of software

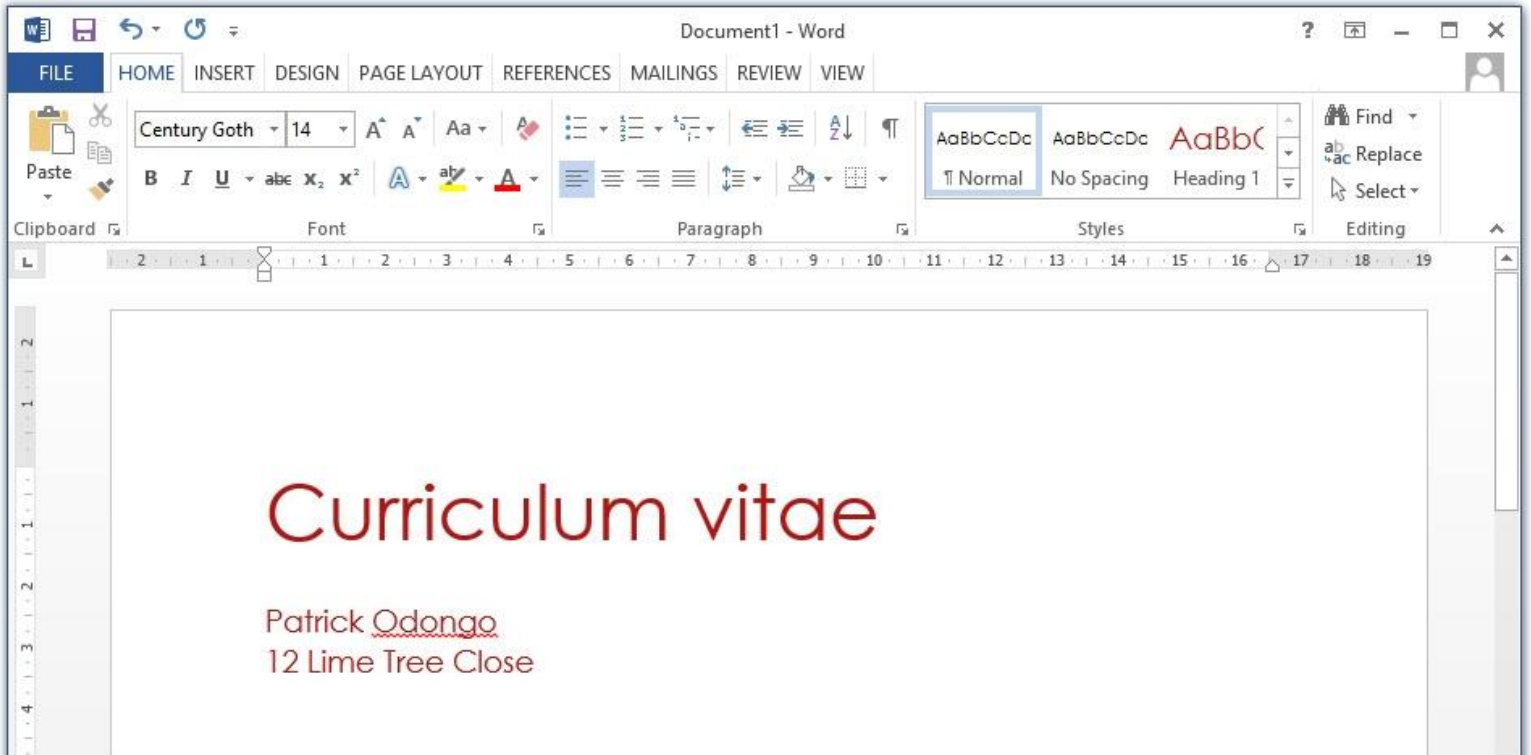


System software

- Programs that are needed to enable the computer to function
  - For example, an operating system such as Windows

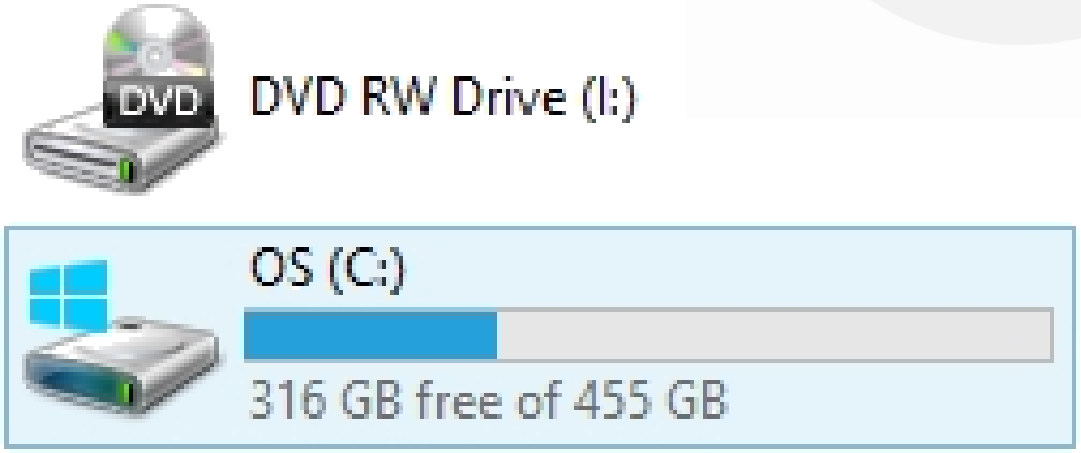
Application software

- Programs that are needed to perform tasks for the user
  - For example, word processing software



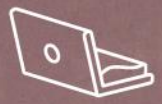
Activity:

Complete **Task 1** on the word document.



Operating Systems

Application and system software



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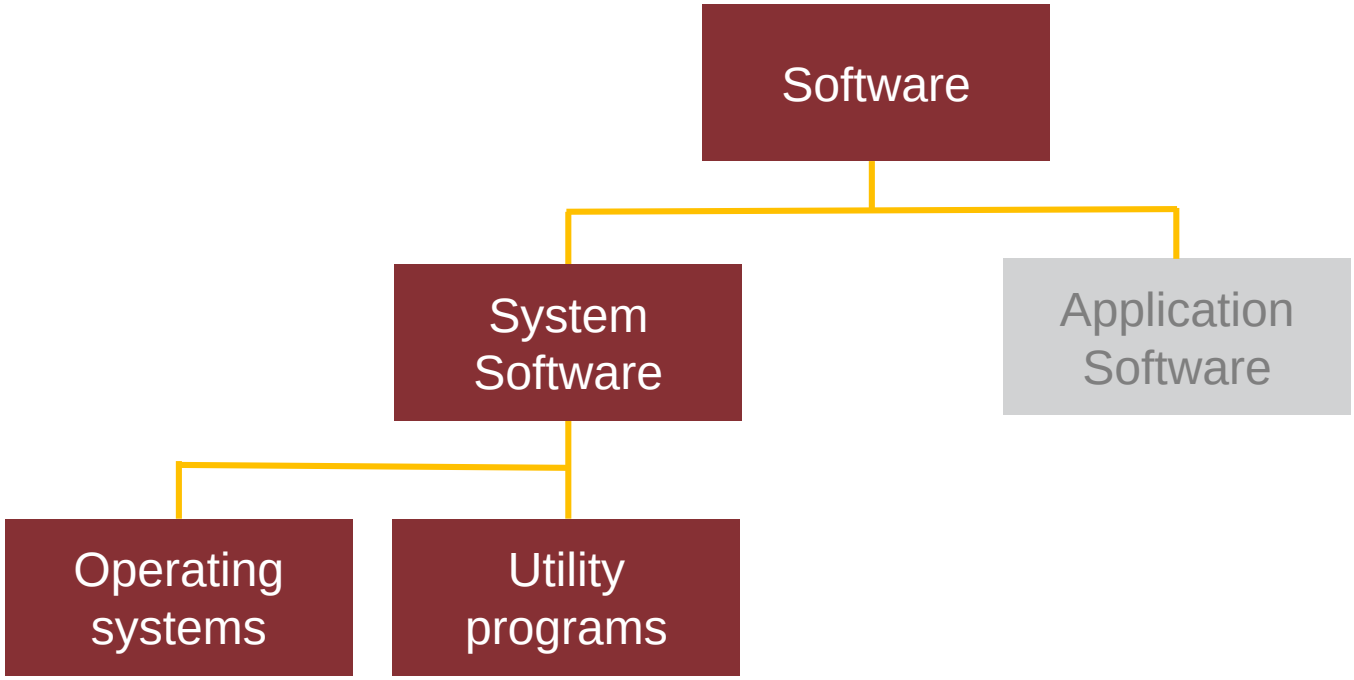
Objectives

- Understand that the OS handles management of the processor, memory, I/O devices, applications and security
- Understand the need for and functions of operating systems (OS) and utility programs

Types of system software



What operating systems have you heard of?

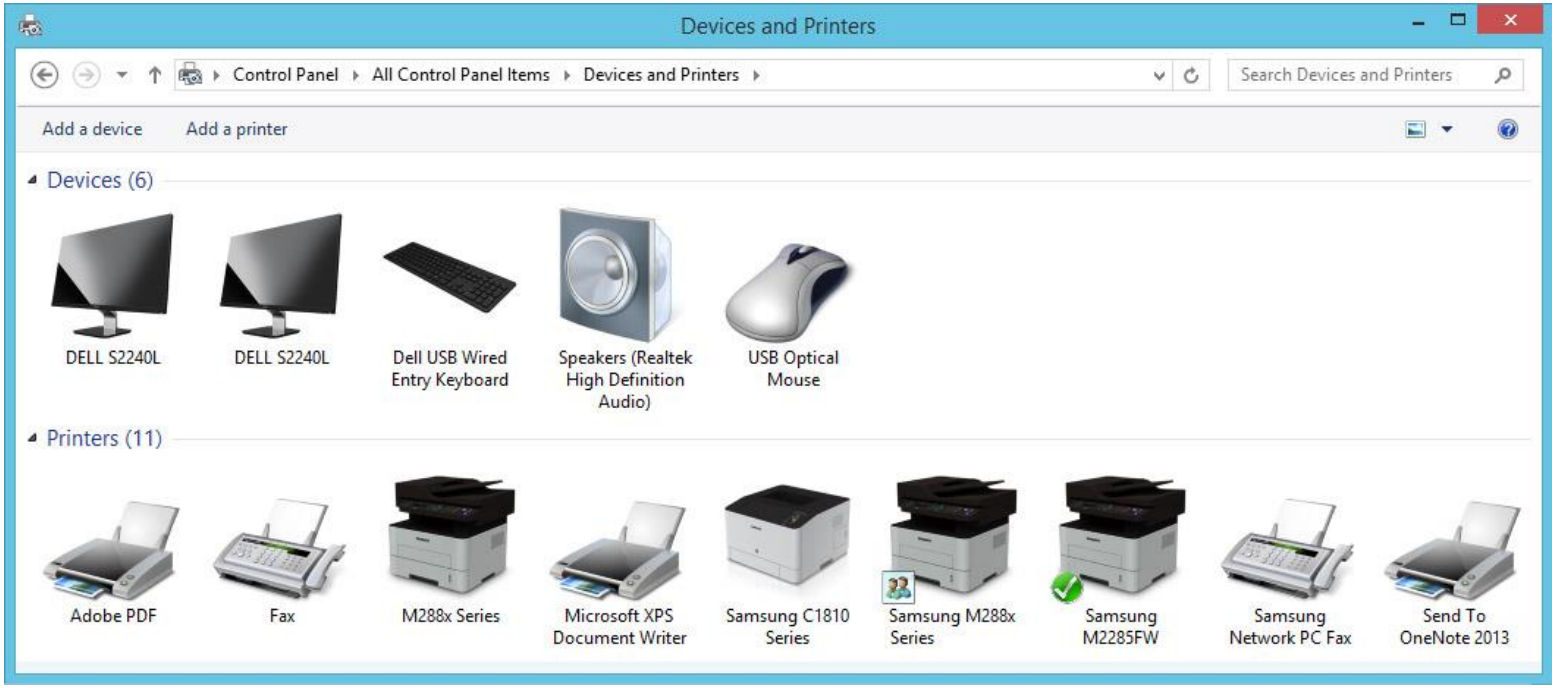
- Android is the most widely used operating system
- In pairs, write down any other operating systems that you've heard of

Some operating systems

- Android OS
  - Versions have nicknames such as Lollipop and Marshmallow
- OS X (Apple Mac)
  - Versions have nicknames such as “El Capitan” and “Sierra”
- iOS (iPhone/iPad)
- Windows
- Google Chrome OS (based on Linux)
- Linux

Operating system definition

"Software that ... manages a computer's hardware and provides a user interface"



Functions of an operating system

- An operating system:
  - provides a **user interface**
  - manages how programs use **main memory**
  - allows **processor management**
  - manages **peripherals**
  - manages **applications**
  - provides **security**

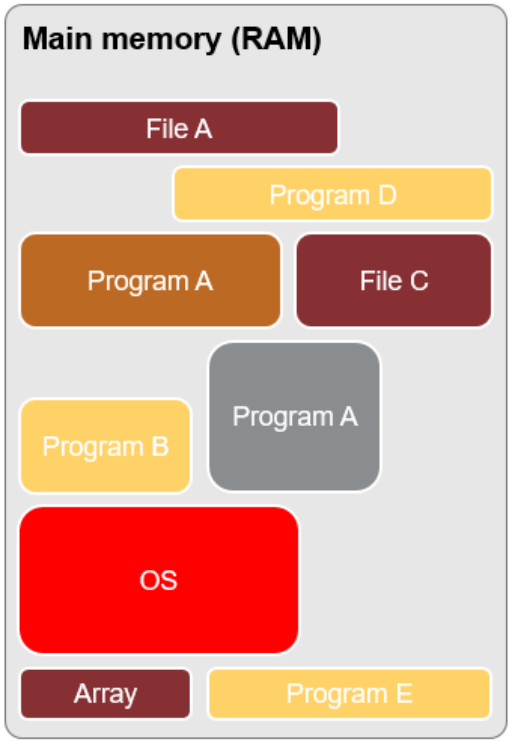
User Interface

- Without a user interface we would have to communicate in binary!
- The user interface for a device has to suit how it is used....
  - How many types of interface can you name?

11 1101 0010 1101 0111 0110

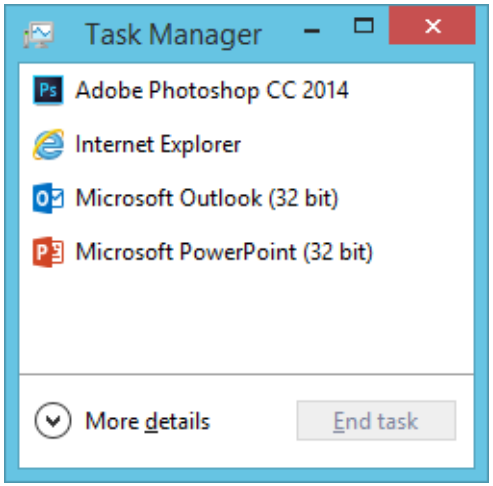
Memory management

- When a program is running, the computer must copy the program from storage into main memory
  - When you start a program (i.e. Word) or access data, the memory manager allocates blocks of free space in memory
  - It keeps a record of where each program and its data are located
  - The memory manager frees up this space when you stop using the program or data

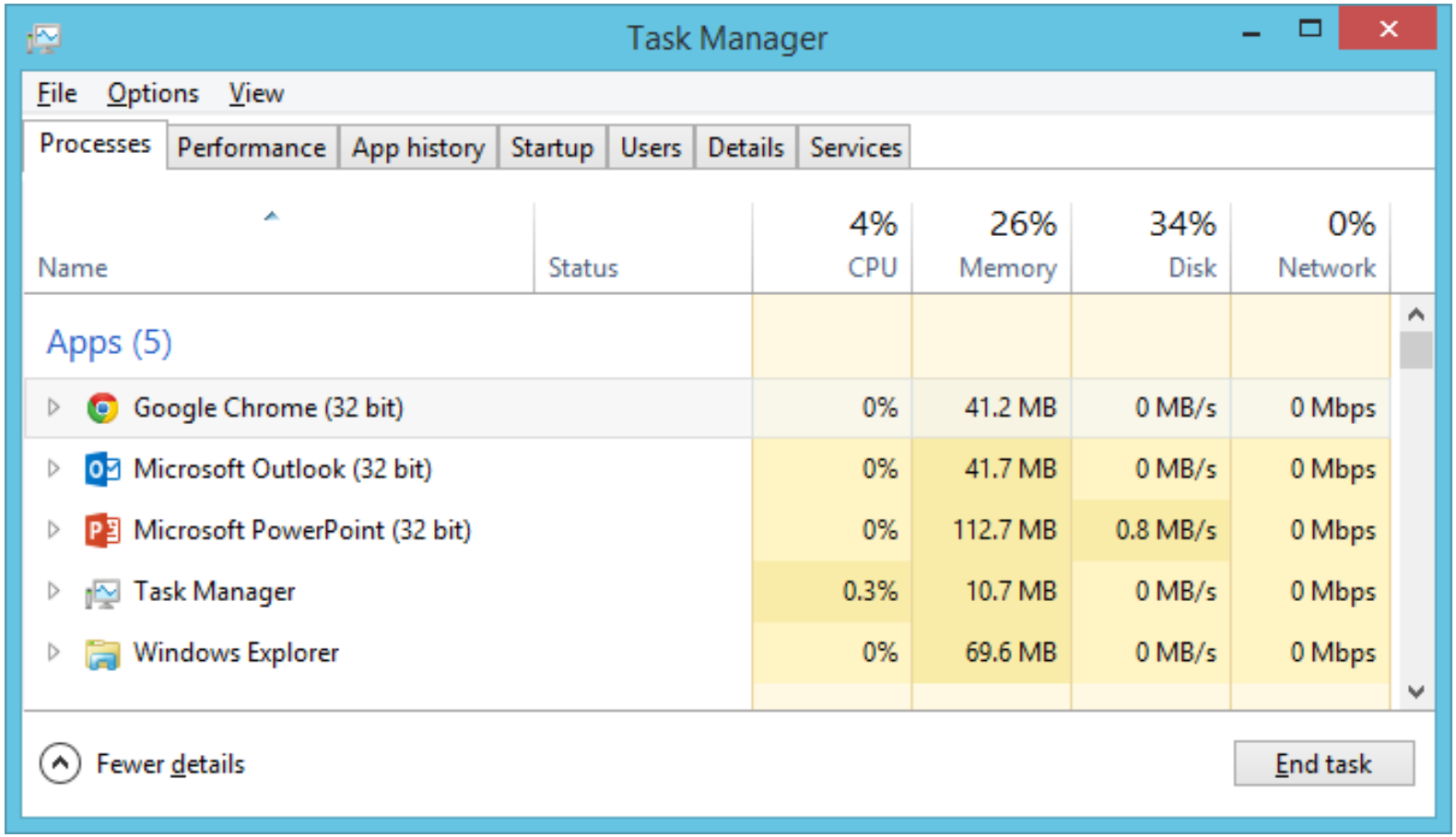


Processor management

- You may use your computer to do several tasks at the same time with different software: homework, playing music, messaging friends...
  - There are many background programs running on the computer as well
  - They are taking it in turns to get processor time to execute instructions
  - The OS must manage how the programs share the processor



Task Manager



Peripheral management

- Peripherals are all the devices outside of the CPU
  - Includes input and output devices, and secondary storage
- The OS uses a **device driver** to manage these devices– a small program that acts as an interface between the computer and the device

Sending data to a printer

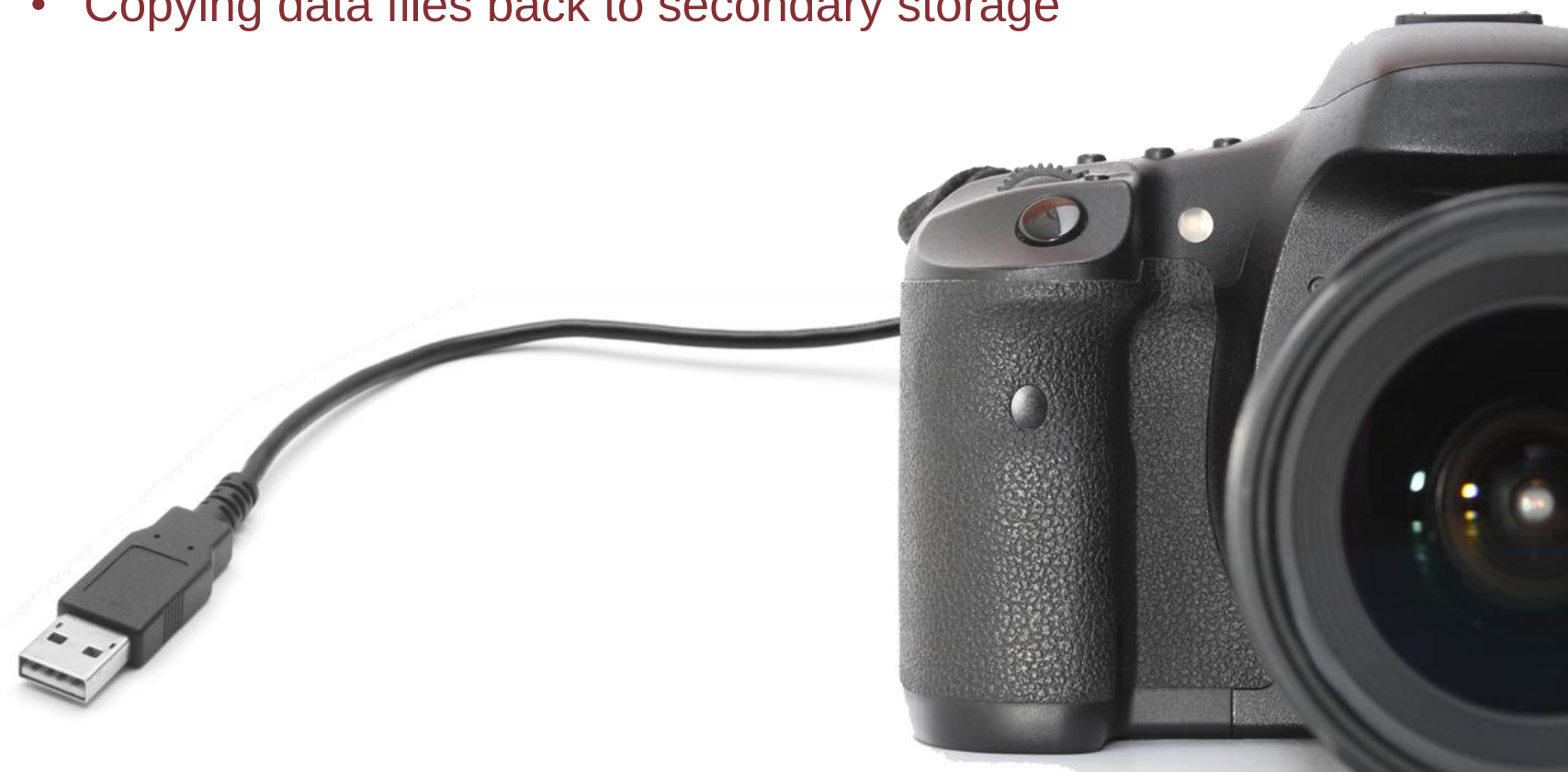
- The computer can send data thousands of times faster than the printer can print it
- The computer sends the printer output to a print buffer, a special area of memory in either the computer or the printer, at full speed
  - From here, it is transmitted to the printer, typically a page at a time
  - The print buffer may store a number of jobs waiting to be printed
  - If the printer cannot print, the OS is notified and passes on the message to the user, e.g. “Offline” or “Printer out of paper”

The print buffer

- The screenshot shows a print buffer in action
  - It shows the status of each job in the buffer, and whether it is printing or waiting its turn

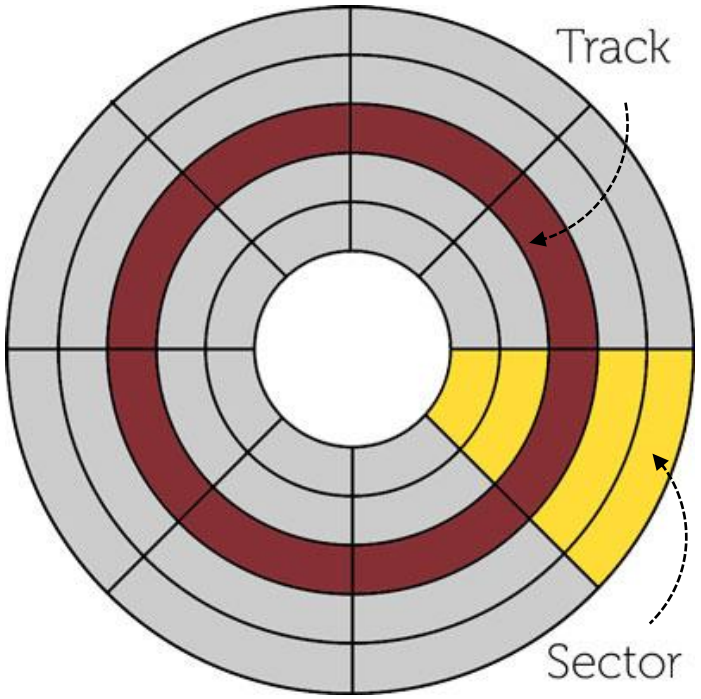
Storage device management

- The operating system must manage:
  - Copying files from disk to main memory
  - Copying data files back to secondary storage



Disk and file management

- The hard disk in a computer is a storage peripheral
- The operating system:
  - manages where on the disk files are written
  - keeps track of where they are so they can be retrieved
  - makes sure no file overwrites another file



Application management

- Application programs need an OS to function
  - When you install a new application on your computer, the OS will run a program to install it
  - The OS will interact with applications through an **Application Programming Interface (API)**
  - The API allows the application to communicate with the OS

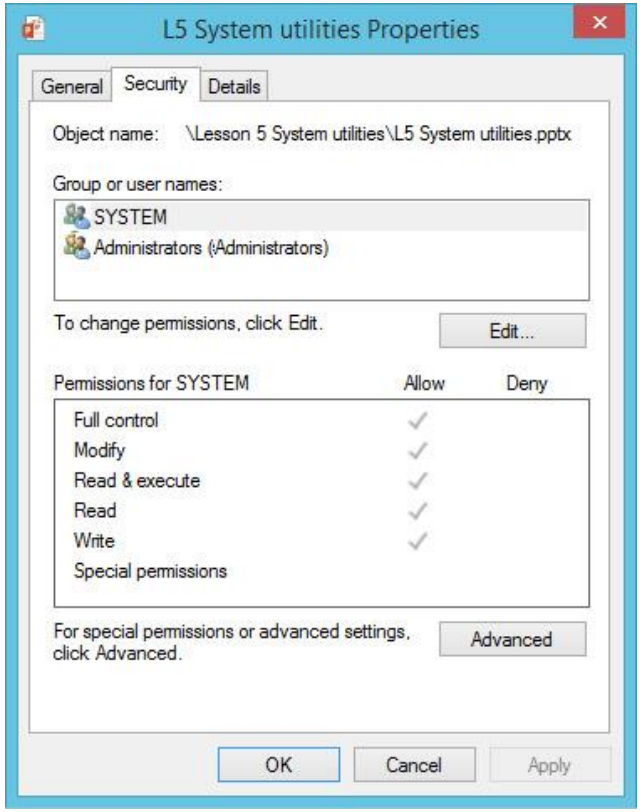
Managing security

- The operating system organises user logins and passwords

  - May include password protection on individual files
  - Controls access rights

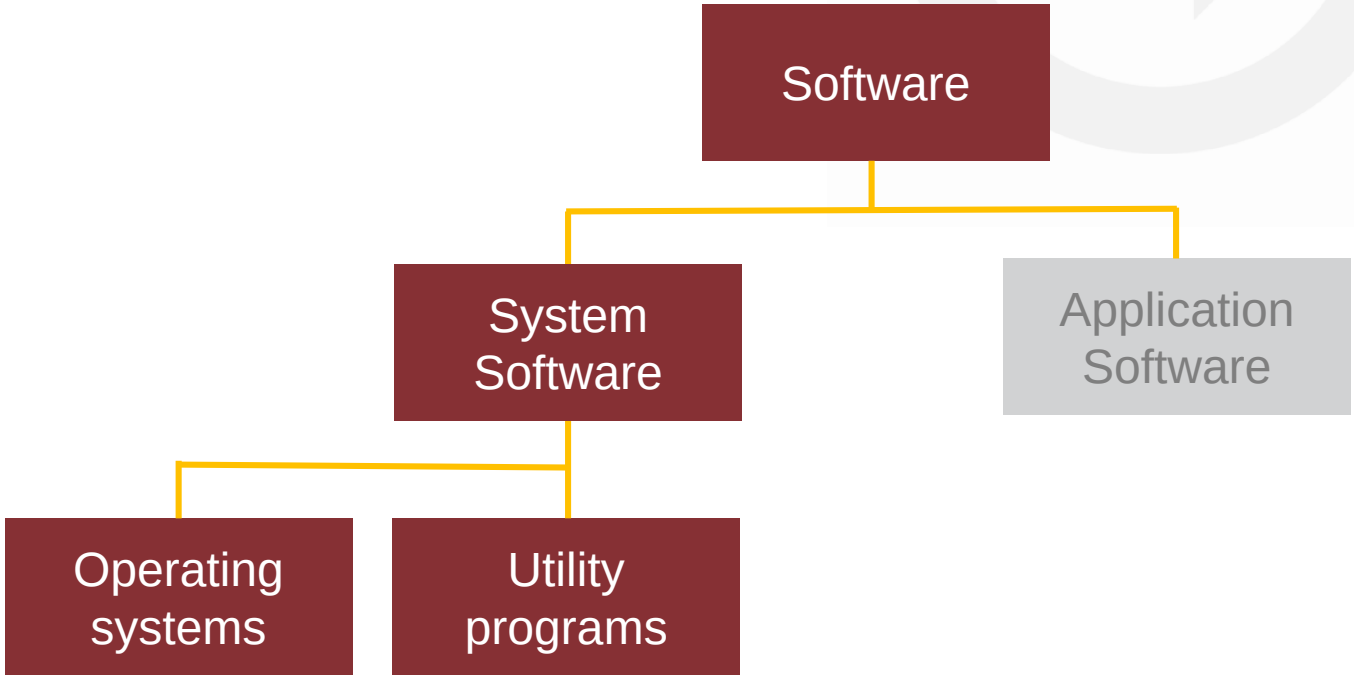
Access rights

- Access rights:
  - If a computer is used by more than one person, each user should be able to see only their own files
  - Users and system administrators have different levels of access rights
  - Some users may be allowed to read files but not edit them
- May include file encryption



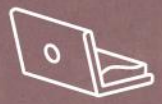
Activity:

Complete **Task 2** on the word document.



Utility Software

Application and system software



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Objectives

- Understand the need for and functions of operating systems (OS) and utility programs

What are utilities?

- The Operating System controls and manages the computer system
- Utilities provide extra functionality that make it easier to use
- They can be packaged as part of the Operating System or bought as stand-alone software programs

Types of utility program

- Utilities can be grouped into categories:

Computer security

File organisation

System maintenance

Security utilities

- These include:
  - Anti-virus software
  - Spyware protection
  - Firewalls
  - Back-up and recovery programs

Anti-virus software

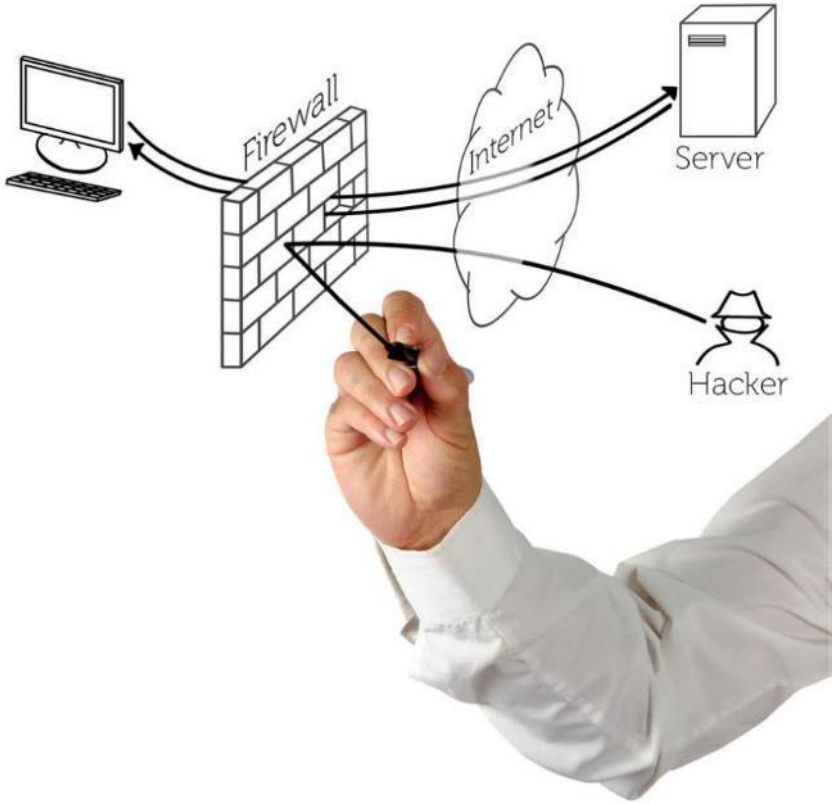
- A virus is a malicious computer program written to cause damage to files or inconvenience to the user
- Anti-virus software:
  - Prevents viruses being installed
  - Prevents system files being deleted or changed
  - Detects and removes viruses that do manage to install themselves
- New viruses are always being invented so anti-virus software must be regularly updated

Spyware protection

- Spyware are programs that secretly record what you are doing on your computer e.g. key logger software
- Spyware records data such as:
  - Usernames and passwords
  - Bank account/credit card details
- Spyware protection software detects spyware programs and prevents them from installing themselves on your computer

Firewall software

- Prevents unauthorised access to a computer or network from the internet
- Can use filtering to prevent access to unsuitable sites from a computer or network

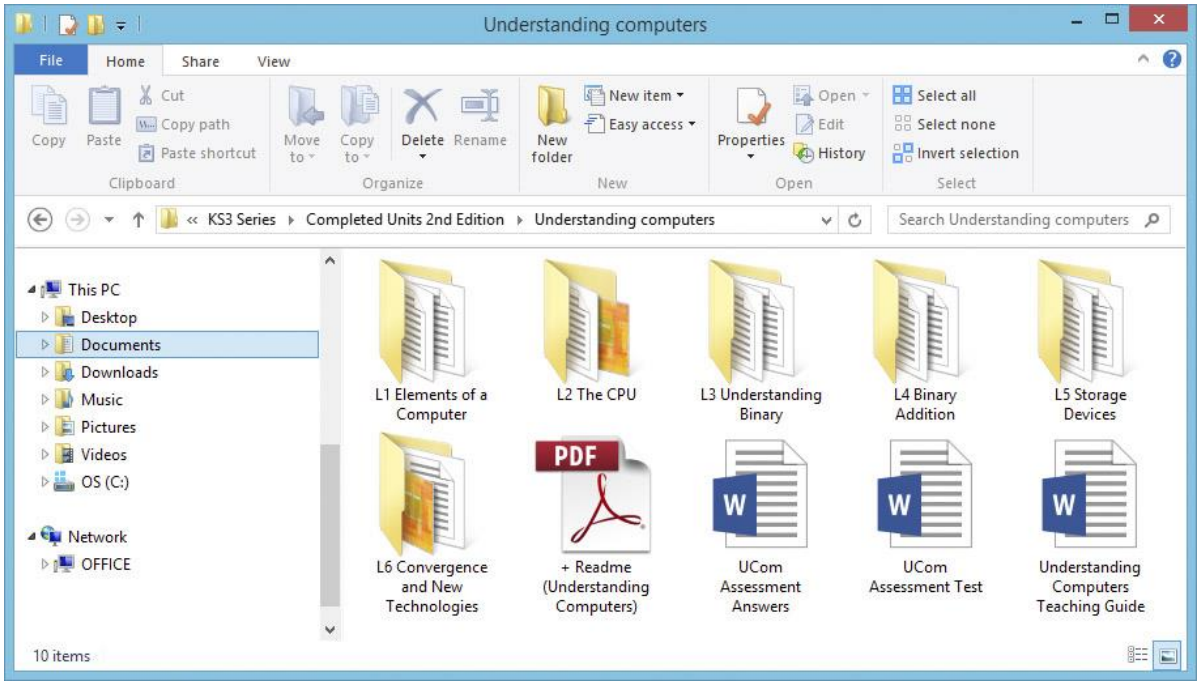


File organisation utilities

- These include:
  - File management and transfer
  - Disk defragmentation

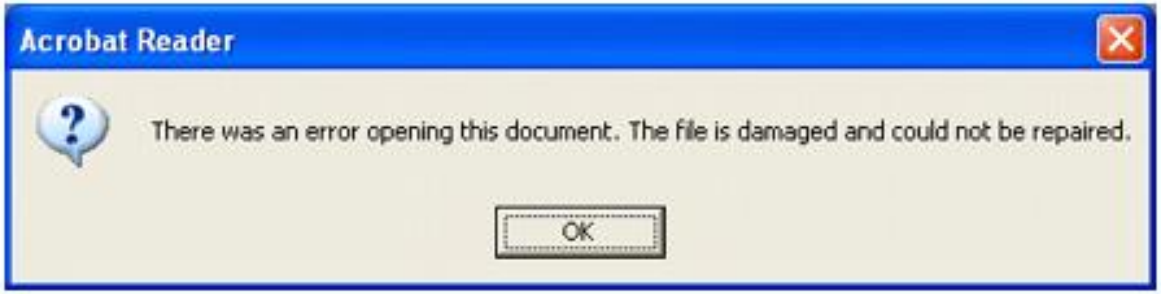
File management

- The tools we use all the time for managing our files
  - Move, copy and delete folders and files



Repairing corrupted files

- Files can be corrupted by viruses, system crashes or network errors, so they become unreadable



  - File repair software scans the damaged file and extracts the maximum data from it to create a new, usable file

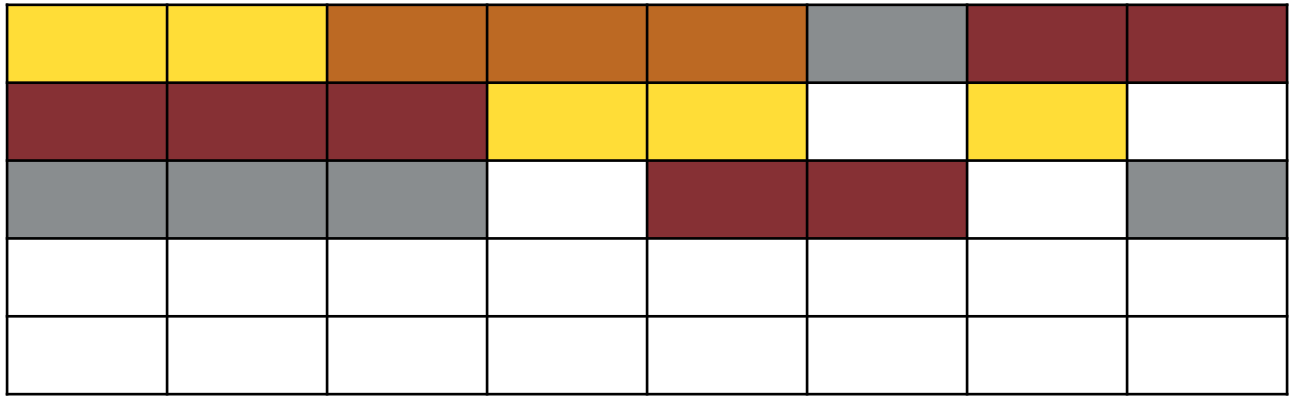
Saving files on disk

- When you save a large file, it is divided up into equal-sized blocks or “clusters” of typically 4K bytes
  - A file of 1 - 4096 bytes occupies 4096 bytes
  - A file of 4097 bytes occupies 8192 bytes
- A large file may not fit on the disk in consecutive blocks
- The file is referred to as “fragmented”
  - Retrieving data from the file takes more processing
  - More processing means reduced performance

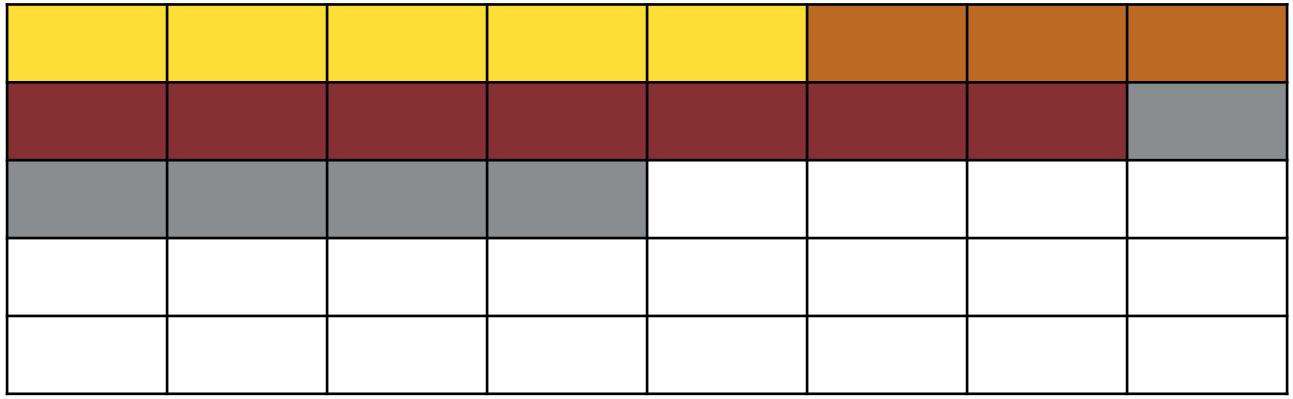
Disk defragmentation

- Defragmenting the hard disk reorganises files so they are stored together
  - Processing time reduces so performance is improved
  - Free space is also in one place so new files do not have to be fragmented

Defragmentation



Before:
Files stored are fragmented

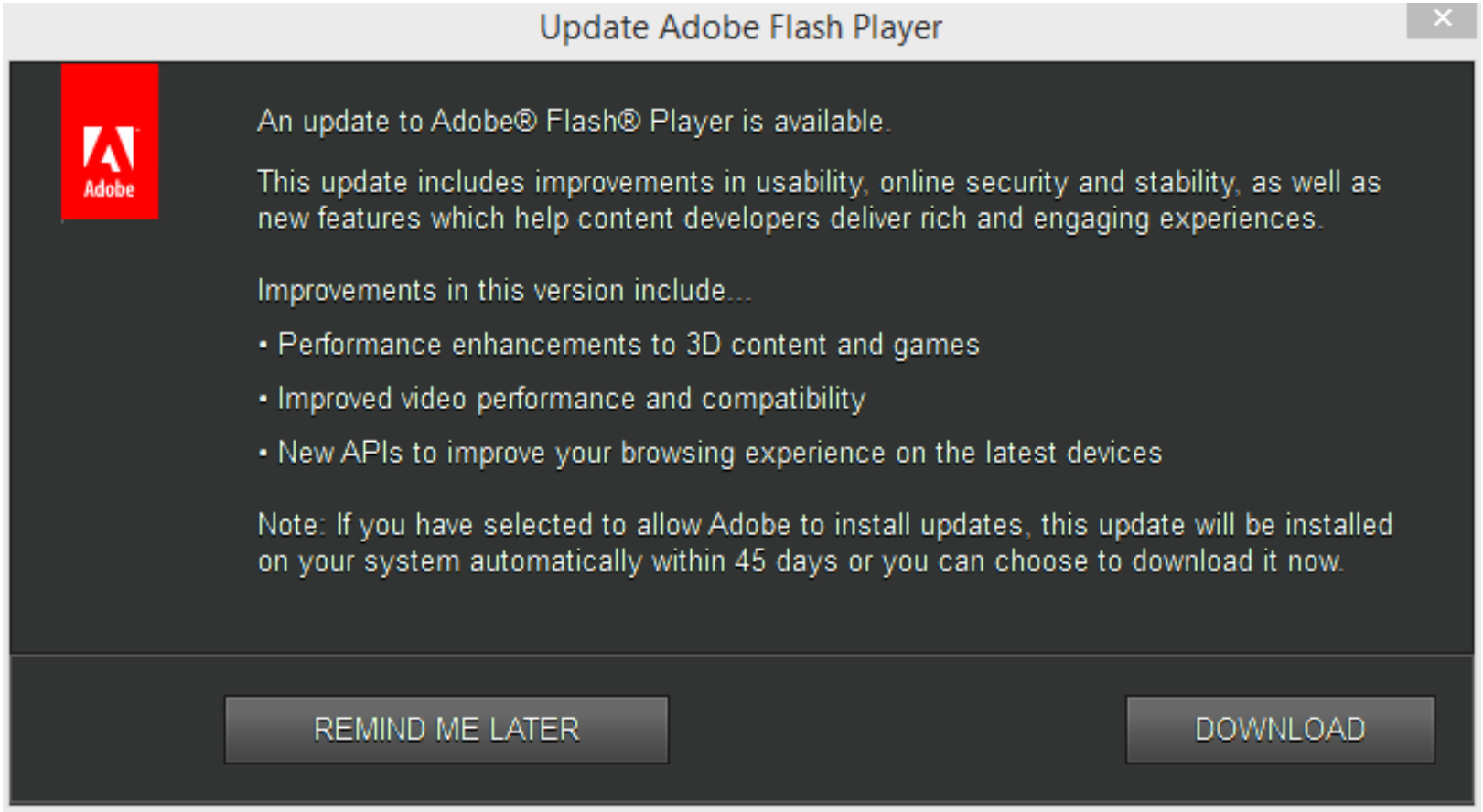


After:
Files and free space now defragmented

Automatic update

- Companies issue updates to software regularly
- For software that is installed on the computer, the automatic update will:
  - Look for recent updates on the internet;
  - Download new versions; and
  - Install them
- It can be configured to do any or all of these steps automatically

Automatic update reminder



Backup utilities

- You need to back up data on your hard disk – why?
- Windows has a Backup and Restore utility which will create a backup of your files on a regular schedule
- You need to save the backed up data onto an external hard drive
- Organisations from the smallest companies to the largest banks, cannot afford to lose any data
- Commercial backup utilities make sure that even in the event of fire or flood, all data can be recovered

Compression utilities

- A utility program such as WinZip can compress files so that they take up less space
- This is useful if for example you want to transmit a large file or folder via the Internet
- Often, there is a limit to the size of a file that you can attach to an email
  - A smaller, compressed file will transmit and download much faster

Activity:

Complete **Task 3 & 4** on the word document.