The function of operating systems:

Purpose of systems software:

- Provides a user interface between the user and the hardware
- Provides a platform for the application software to run
- Allows the user to interact with the application software
- Maintains the computer with utility programs (compression, encryption and defragmentation)
- Memory management
- File management such as where they are going to be stored
- Device driver which can translate instructions of the operating system into instructions for the hardware

There are two types of systems software:

- Operating systems: Provides a platform which users can run programs

- Utility software: Used to maintain the computer system

Types of user interfaces:

- Graphical user interface: Interactive, visual, optimised for mouse and touch input

- Command line interface: Text based, efficient and usually used by more advanced users

- Menu interface: successive menu (one option leads to another) and usually physical buttons on a keypad

- Natural language interface: Responds to questions in voice but they are not very reliable but are improving

Operating systems:

Features of operating systems:

Interface:

Multitask+memory management

Peripheral management

User management

File management

Amin buys a new computer with an operating system and some utilities.

State **two** functions of the operating system.

1

2

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[2]

User Interface
Multitask + Memory management
Peripheral management
User management
File management

e.g.

- Provides interfaces between user and computer / Determines look and feel of the computer
- Provides a platform for software to run
- Manages peripherals used by the system
- Manages memory

- Multitasking:

    - More than one program open
    - Allows more programs and data to be held in main memory
    - Processor allocates small amount of time to process them and cycles through them.
    - Each application involved in the cycle has a time slice (allocated amount of time)
    - This happens very fast

- Memory management:
    - Operating system moves programs and decides where to store them when programs are loaded
    - Operating system manages/monitors fragmentation (programs are split/scattered in memory). This is called memory fragmentation
    - When memory is full, virtual memory is used
    - Operating system also manages virtual memory

- Device drivers/peripheral management:
    - Translates operating systems instructions into commands that the hardware will understand
    - Each peripheral (I/O devices) needs a device driver

    - Most are built into the operating system

- User management
    - Provides access for different users to log into a computer
    - Operating system stores information such as settings and data
    - Client server network may impose a fixed or roaming profile for a user and manage login requests to the network

- File management
    - Data is stored in files
    - An extension to the filename (.doc/.png/.jpg.pptx.csv etc.) tells the operating system which application to load the file into
    - Operating system may present a logical structure of files into folders and allow renaming, delete, move and copying

Utility system software:

The utility system software provides compression software. Xander uses this to compress an image.

(i) Explain how the compression software will compress the image file.

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[4]

1 mark per bullet to max 4 e.g. • Use an algorithm • …to remove **repeated/unnecessary** data • Could use lossy/lossless • **lossless** will not remove data permanently // **lossless** means original file will be restored • **lossy** is **permanent** deletion // **lossy** means original file will not be restored • Reduce number of pixels // reduce resolution • Record the changes in the colour for each pixel • … instead of the colour • Run length encoding • … record the colour and number of consecutive pixels of that colour • … instead of the colour of every pixel • Decrease colour depth//decrease number of colours	4 AO2 1a (2) AO2 1b (2)

A restaurant has a computer-based ordering system which is running slowly. A technician has said that the hard disc drive is fragmented. The technician has suggested using utility software to defragment the drive.

Explain how the restaurant's hard disc could have become fragmented.

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[4]

Explain how defragmentation software could overcome the issue of the slow computer system.

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[3]

a		• Orders have been saved onto the system as they order food and then deleted once processed (1) • Once other orders have been made, new files are created (1) which may be bigger than the spaces left by the deleted files (1) • The order files are split up (1)	4
b		• Files on the hard disc drive are moved (1) • Empty spaces collected together (1) • Files are moved to be stored together (1) • Fewer disc accesses are needed (1)	3

Describe what is meant by open source software.

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• The source code is distributed with the software • The customer can modify the source code • The customer can redistribute the source code (with the same licence / restrictions)	2

- **Encryption:**
  - Encryption utilities uses an algorithm to scramble text
  - Only can be decrypted using a master key or a decryption key

- **Defragmentation:**
  - Puts fragments of files back together and collects together free space
  - Reduces movement of read/write head of the surface of the hard disk drive
  - Solid state drives should not be defragmented because they have no moving parts and also reduces their lifespan

- **Data compression:**
  - Compression utilities reduces file size of a file so it takes up less storage and is quicker to download over internet
  - Compressed files must be extracted before they can be read
  - Data can be lost or reduced quality