Utility software

1.5.2 · Computer systems (Paper 1) · revision notes

Utility software helps to maintain, protect and optimise a computer system. OCR asks about three utilities: encryption software, defragmentation and data compression. Expect questions on the purpose of each and how it works, such as describing how defragmentation speeds up a hard disk drive.

Key facts

- Utility software: maintains, protects or optimises the computer
- Do not defragment an SSD: no speed benefit, and extra writes shorten its life
- Lossless: original restored exactly (programs, text). Lossy: data removed permanently (images, sound, video)
- Defragmentation: puts the fragments of each file together on an HDD, so files are read faster
- Compression: smaller files → less storage, faster transfer
- Encryption software: scrambles files with a key; unreadable without it

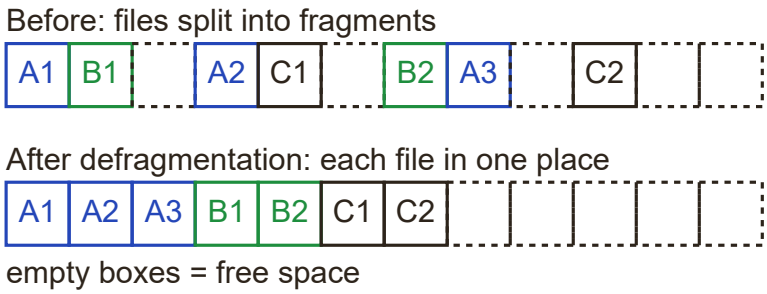
Notes

What utility software is

- **Utility software** carries out housekeeping tasks that **maintain, protect or optimise** a computer. Computers often come with utilities installed. Utility software carries out extra tasks that the operating system itself may not do.

Defragmentation

- On a **magnetic hard disk drive**, files are stored in blocks. As files are saved, deleted and changed, a file can become split into parts (fragments) stored in different places on the disk.
- Reading a fragmented file means the read/write head must move to many places, which is slow.
- **Defragmentation** moves the fragments of each file so they are stored **next to each other**, and groups the free space together.



Defragmentation puts each file's parts next to each other, so the read/write head moves less

- The head moves less, so files are read faster and the computer performs better.
- **SSDs should not be defragmented**: they have no moving parts, so there is no speed benefit, and the extra write operations shorten their life.

Data compression

- **Compression software** reduces the size of files, so they take up **less storage space** and are **quicker to send** or download.
- Several files can be combined into one compressed archive (e.g. a zip file), which is easier to send by email.
- **Lossless** compression lets the original file be restored exactly, so it is used for programs and text. **Lossy** compression permanently removes some data and is used for images, sound and video.

Encryption software

- **Encryption software** scrambles files, folders or a whole drive using an algorithm and a key.
- The data cannot be read without the key or password, so it stays protected if the device is lost or stolen.

How to answer each type of question

Describe how defragmentation works

3 to 4 marks | Grade 5

1. Explain how fragmentation happens: files are saved, deleted and changed.
2. Say what defragmentation does: moves fragments together and groups free space.
3. Finish with the effect: the read/write head moves less, so files load faster.

Example. Describe how defragmentation software improves the performance of a magnetic hard disk drive. [4]

Model answer. As files are saved and deleted, a file becomes split into fragments stored in different places on the disk (1). Defragmentation moves the fragments of each file so they are stored next to each other (1) and groups the free space together (1). The read/write head has to move less to read each file, so files are accessed more quickly (1).

Explain why a utility would be used

2 to 3 marks | Grade 5

1. Say what the utility does to the files.
2. Link it to the user's problem in the question: storage space, sending time, security.

Example. A student needs to email a folder of 40 word-processed documents to a teacher. Explain why the student might use compression software. [2]

Model answer. Compression reduces the total size of the files (1), so the folder uploads and sends more quickly and is more likely to fit within the email attachment size limit (1).

Explain why an SSD should not be defragmented

2 marks | Grade 7

1. Say that an SSD has no moving parts, so where data is stored does not affect access time.
2. Say that defragmenting causes extra writes, which shorten the SSD's life.

Example. Explain why defragmentation software should not be used on a solid state drive. [2]

Model answer. An SSD has no moving parts, so the time to access data does not depend on where it is stored, and there is no speed benefit (1). Defragmenting causes many extra write operations, which shorten the life of the SSD (1).

Don’t lose marks

- ✗ Saying defragmentation frees up storage space. It rearranges files; the amount of free space stays the same.
- ✗ Saying defragmentation deletes files or removes viruses.
- ✗ Recommending defragmentation for an SSD.

- Forgetting that program files must only be compressed with lossless compression.

More tips

Memory tricks

- The three OCR utilities: 'DEC' = Defragmentation, Encryption, Compression.
- Defragmentation is like tidying a bookshelf so that every volume of a series sits together: quicker to collect them all.
- Only disks that spin get defragmented: HDD yes, SSD no.

Exam technique

- In defragmentation answers, always mention the read/write head: it is why the HDD speeds up.
- Link compression to storage space and transfer time, and say which type (lossy or lossless) suits the file.
- Name the utility precisely, e.g. 'defragmentation software', not 'a disk cleaner'.

What each grade needs

What you need to be able to do, from the first marks up to the top grade.

Grade 3 — **State the purpose of utility software**
To maintain, protect or optimise the computer system.

Grade 4 — **Name three types of utility software**
Encryption software, defragmentation software and data compression software.

Grade 5 — **Describe how defragmentation improves performance**
It moves the parts of each file together, so the read/write head moves less and files load faster.

Grade 5 — **Explain why compression software is used**
Smaller files take up less storage and transfer faster, e.g. to fit an email attachment limit.

Grade 6 — **Describe how encryption software protects files**
Files are scrambled using a key, so a thief cannot read them without the key or password.

Grade 7 — **Explain why SSDs should not be defragmented**
They have no moving parts, so there is no speed gain, and the extra writes shorten the SSD's life.

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