

FACTFILE: GCSE DIGITAL TECHNOLOGY



Unit 1 SOFTWARE 1



Introduction

Learning Outcomes

Students should be able to:

- Describe the functions of system software, referring to allocating the following:
 - memory,
 - storage and
 - processing time;
- Describe the following modes of processing: real-time, batch processing and multi-user.

Content

Students should be able to:

- System software
- Modes of processing

A computer needs system software to enable users to operate it and install programs. An operating system is a type of system software. Examples of common operating systems are Windows (developed by Microsoft) and Mac Os X (developed by Apple).

Functions of system software

System software involves 4 areas:

1. Running the computer (operating system software)
2. Providing other useful functions for operating the computer (utility programs)
3. Providing for frequently required tasks (library programs)
4. Enabling software to be produced (compilers and interpreters).

Operating system software allocates memory and provides a user interface. It also controls communication with resources, such as input and output devices and manages security measures, such as user access.

Utility programs perform functions which are to

meet a specific need, for example changing the screen resolution, performing a file backup process or virus checking.

Library programs are precompiled pieces of code which can be included by a user when creating their own programs.

A compiler is a program which will translate a program from high level language (such as C or Pascal) into machine code for the computer to execute.

Memory

Memory is the part of the Central Processing Unit (CPU) that stores data for use by the processors. The data used can be program files or data files used by the programs. Computer memory is divided into

RAM, ROM and Cache memory. The main memory in a computer consists of 2 microchips in the CPU called RAM and ROM.

Random Access Memory (RAM) is used for holding programs and data that the user is working with. RAM can be written to as well as read from. When the computer is switched off, the contents of RAM are lost. This sort of temporary memory is called volatile memory. Larger RAM capacity will mean faster processing speeds.

Programs and data stored in ROM can be read from

	Volatile	Non- volatile	Can be written to	Can be read from
RAM	X		X	X
ROM		X		X
Cache	X		X	X

Storage

The operating system monitors whether external storage devices are connected and controls how data is saved to different areas. The operating system (OS) manages how full a storage location is and whether there is sufficient space to save a file in its specified location. The OS provides file management services by allocating where data is stored on the disk drives and memory. This allocation is important because it allows the computer to find the files a user makes a request to open.

Processing time

A process is an activity that is carried out as part of a computer system. System software allocates the time needed by the CPU to process the instructions of a computer program as efficiently as possible. A computer may have several different tasks to run at the same time - known as multi-tasking.

In the event of multi-tasking, the system software manages how the processor switches between different computer programs. When there are lots of programs running, the processor can become overworked and some programs may appear to be running slower than normal.

Modes of processing

A processing mode is the way in which the processing tasks carried out by a computer system are organised to make the most of the potential of

but cannot be written to. The programs stored in ROM are permanent. The main use of ROM is to store the 'booting up' or BIOS (Basic Input/ Output System) - the software used to load up the Operating System and let the different parts of your computer communicate.

The cache is a special type of computer memory which is similar to RAM, as cache memory can be written to as well as read from. The CPU looks in the cache for the data it needs. If the data is there, it will retrieve it and process it. The purpose of cache memory is to store frequently accessed programs or instructions. Cache memory is also volatile.

the system.

The following three modes of processing are used in systems with distinct requirements and are best suited to different applications.

Real-time processing

Real-time processing is when the system is processing data fast enough to influence behaviour in the outside world. This can be carried out by using a record blocking system, where users are given exclusive access to a small set of records for a short period of time to process or make changes. The advantage of real-time processing is that the system can cope with lots of changes or processes in a short space of time. For that reason, it is frequently used for booking systems, for example online ticket sales or airline sales. It is also essential for the safe running of systems like air traffic control. A disadvantage is that there will be a limit to the number of users or task who can access the system so some users must wait.

Batch processing

Batch processing is when all the data to be input is collected together before being processed as a single operation. The processing is usually scheduled to happen during processor downtime, for example overnight, while a limited number or no users are accessing the system.

Batch processing systems are used for tasks such as processing bank or credit card statements,

generating billing information for gas or electricity readings.

In the case of gas or electricity billing, the company hold a permanent master file for each customer. The meter readings are held in a temporary transaction file, sorted and merged with the master file to update the meter reading for each customer and generate a bill.

This is an efficient processing method for repeated tasks, for example processing bank statements at the end of each month, because they can be carried out quickly without user interaction.

The disadvantage of this mode of processing is that it is dependent on the data being accurate when input, as errors can cause the processing to crash.

Multi-user processing

Multi-user processing is when several users appear to have individual control of the system at the same time. It is implemented by using time slices, an allocated length of time for each program or user.

This gives the appearance that multiple users are working on different tasks simultaneously but the central processor is switching between tasks at high speed, with only one program being executed at a time.

The advantage of this mode of processing is that the processor can be used to execute multiple programs with the appearance of simultaneous usage.

Bibliography

BCS Academy Glossary Working Party, 2013, BCS Glossary of Computing and ICT, 13th Edition, Swindon, BCS Learning and Development Ltd.

