

Computer Systems- Summary

Data representation

Describe and exemplify the use of binary to represent positive integers.

Convert from binary to denary and vice-versa.

- Everything stored by a computer is stored using Binary – 0 & 1
- 37 =

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| 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |

Describe floating point representation of positive real numbers using the terms mantissa and exponent.

- The mantissa and exponent are stored as separate numbers. The computer recreates the number for calculations when it needs to. The mantissa will store the precision of the number and the exponent will store the range of the number. The greater the number of bits used to store the mantissa then more precise the number will be. The greater the number of bits used to store the exponent then the greater the range of numbers can be represented.

Describe extended ASCII code (8-bit) used to represent characters.

- Each character is given an 8-bit ASCII Code.
- For example – V = 86 = 01010110

Describe the vector graphics method of graphic representation for common objects:

- Vector graphics store a picture by storing each objects attribute – e.g. the instructions to draw the shape.
- **Rectangle** - (height, width, x, y, fill colour, line colour)
- **Ellipse** - (cx, cy, rx, ry, fill colour, line colour)
- **Line** - (x1, y1, x2, y2, line colour)
- **Polygon** - any shape with 3 of more sides - (x1, y1, x2, y2, x3, y3, fill colour, line colour)

Describe the bit-mapped method of graphics representation.

- Computers stores, in binary, each pixel in a 2D grid. Number of bits per pixel depends on the number of colours in the image – more colours, more bits.

Computer structure

Describe the purpose of the basic computer architecture components and how they are linked together:

Processor

- **Control Unit** – controls the sequencing of fetching, decoding and executing instructions.
- **Arithmetic Logic Unit** – performs all calculations and logical operations
- **Registers** – temporary memory locations within the processor.

Memory locations with unique addresses

- All memory locations within RAM is given a unique address so that the computer can read and write data to that location correctly.

Buses

- **Address Bus** – this identifies the memory location that is going to read from or written to.
- **Data Bus** – this transfers the data between the processor and memory, and vice-versa.

Explain the need for interpreters and compilers to translate high-level program code to binary.

- **Interpreter** – translates the program one line at a time into machine code and executes immediately. Machine code is not retained, so must be translated each time.
- Good for testing, errors are highlighted straight away.
- **Compiler** – translate whole program, and then save machine code version. Translate code can be run again, and again. Used for programs that are ready for release.

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| Environmental impact | <p>Describe the energy use of computer systems, the implications on the environment</p> <ul style="list-style-type: none"> • It is estimated that two billion computer systems are in use in the world – these all use energy. As user we need to consider how to reduce unnecessary energy use. <p>and how these could be reduced through:</p> <ul style="list-style-type: none"> • Settings on monitors – reduce brightness, activate efficiency mode, use energy efficient monitors. • Power down settings – power-down after a period of inactivity, control setting for single components. • Leaving computers on standby – power consumption is reduced. |
| Security precautions | <p>Describe the role of firewalls.</p> <ul style="list-style-type: none"> • A firewall protects against suspicious access to a computer. When an external computer tries to access a computer, the firewall decides if the external computers access should be granted or denied. It does this by checking incoming data packets against a set of rules. <p>Describe the use made of encryption in electronic communications.</p> <ul style="list-style-type: none"> • Encryption codes the information so that if it is intercepted then they would not be able to make sense of it. It can only be understood by the sender and received. |