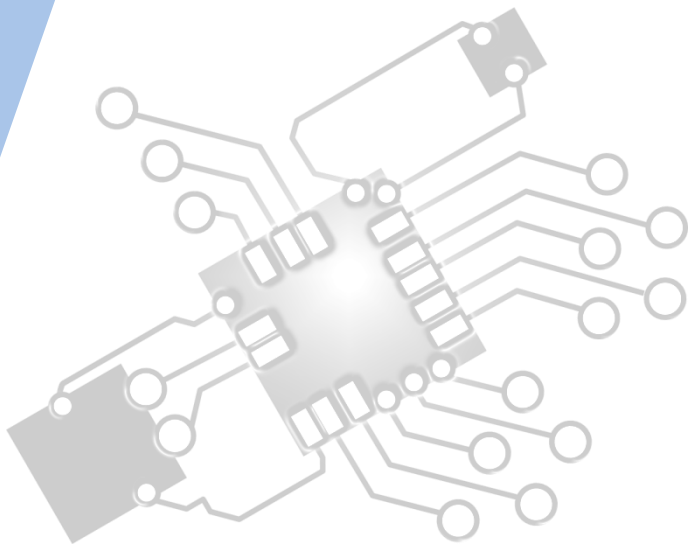
Computer Organisation

IB Computer Science



Content developed by
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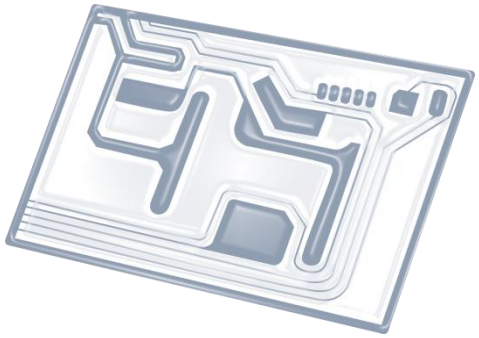
HL Topics 1-7, D1-4



1: System design

2: Computer Organisation

3: Networks

4: Computational thinking

5: Abstract data structures

6: Resource management

7: Control

D: OOP

HL & SL 2 Overview

Computer architecture

2.1.1 Outline the architecture of the central processing unit (CPU) and the functions of the arithmetic logic unit (ALU) and the control unit (CU) and the registers within the CPU

2.1.2 Describe primary memory. 2 Distinguish between random access memory (RAM) and read-only memory (ROM), and their use in primary memory

2.1.3 Explain the use of cache memory

2.1.4 Explain the machine instruction cycle

Secondary memory

2.1.5 Identify the need for persistent storage

Operating systems and application systems

2.1.6 Describe the main functions of an operating system

2.1.7 Outline the use of a range of application software

2.1.8 Identify common features of applications

Binary representation

2.1.9 Define the terms: bit, byte, binary, denary/decimal, hexadecimal

2.1.10 Outline the way in which data is represented in the computer

Simple logic gates

2.1.11 Define the Boolean operators: AND, OR, NOT, NAND, NOR and XOR

2.1.12 Construct truth tables using the above operators

2.1.13 Construct a logic diagram using AND, OR, NOT, NAND, NOR and XOR gates

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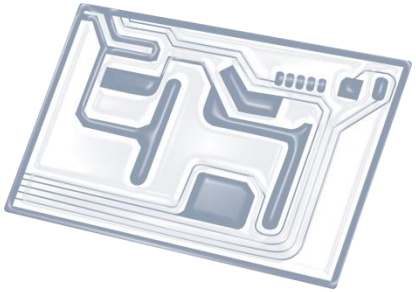
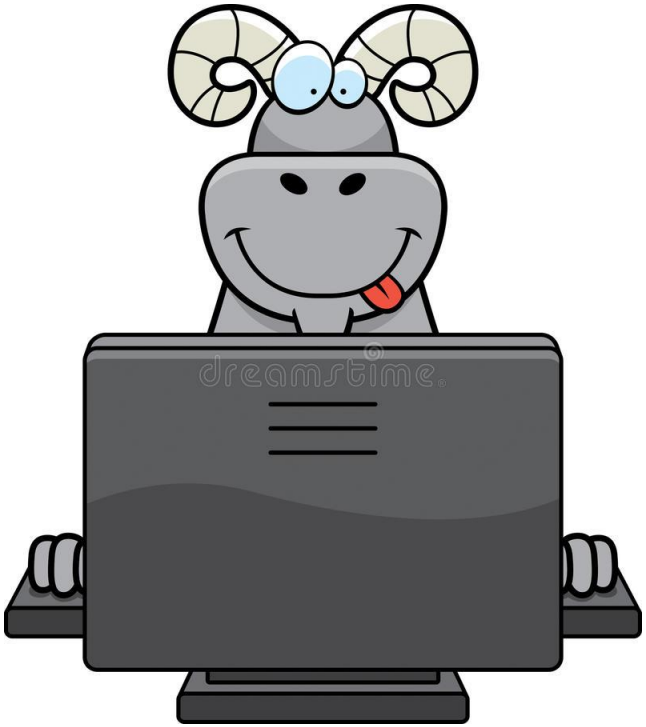
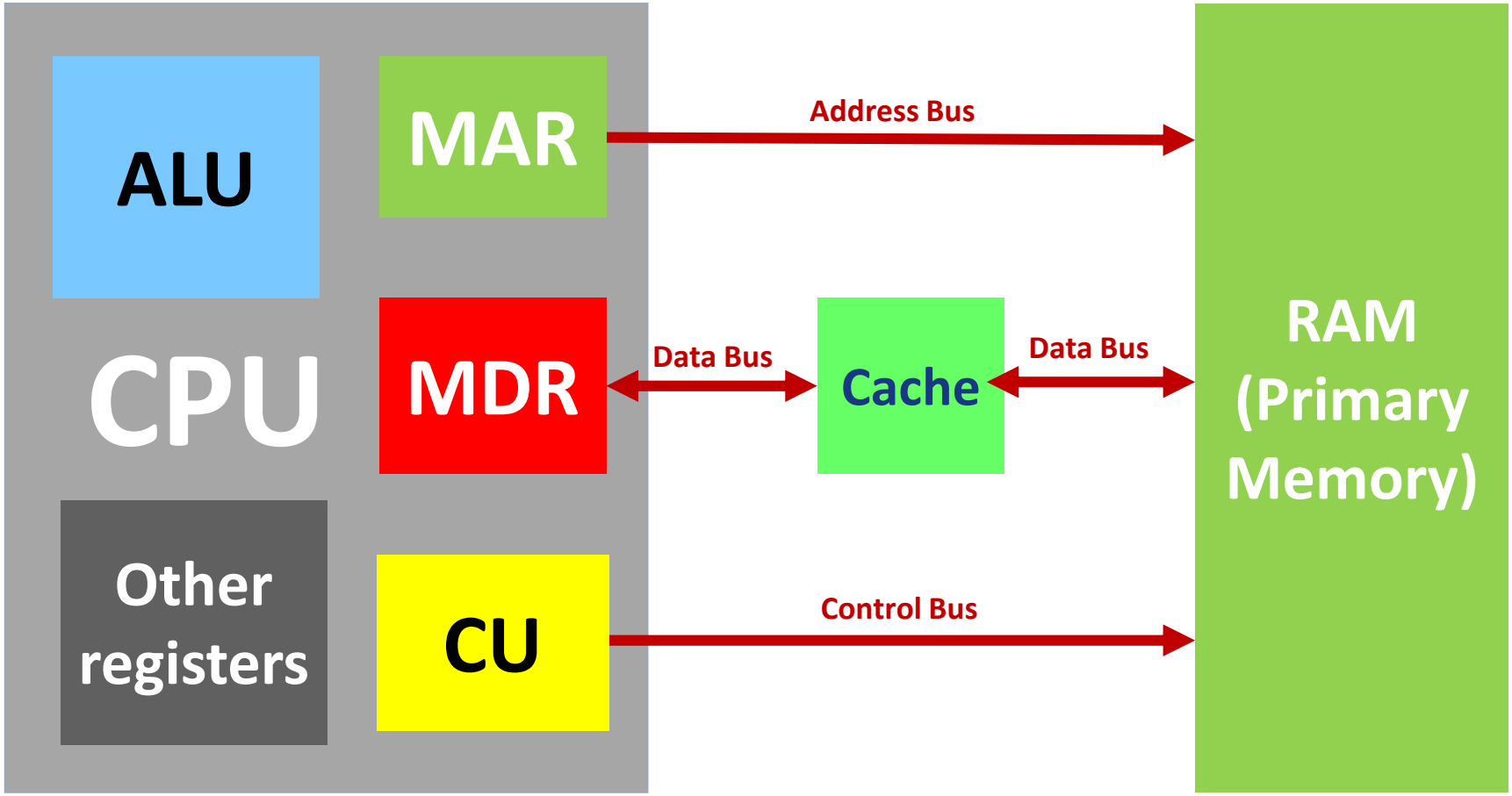


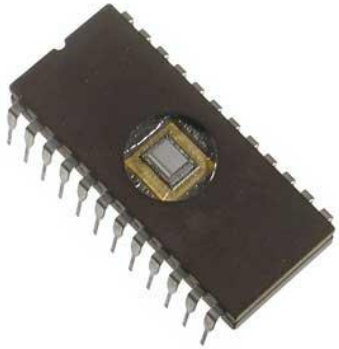
Topic 2.1.2

Describe **primary memory**.



Simplified model: CPU, RAM





Memory

- Primary
  - RAM
  - ROM
  - Cache
- Secondary
  - Magnetic
  - Optical
  - Electronic

Primary memory = RAM

As **RAM** is so important, it is often referred to as **primary memory** (even though it is actually only a branch of primary memory, alongside the cache and ROM).

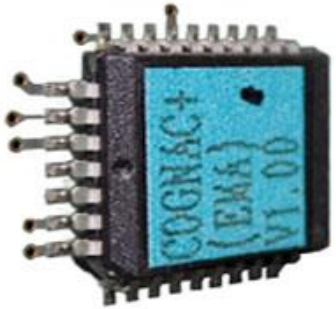
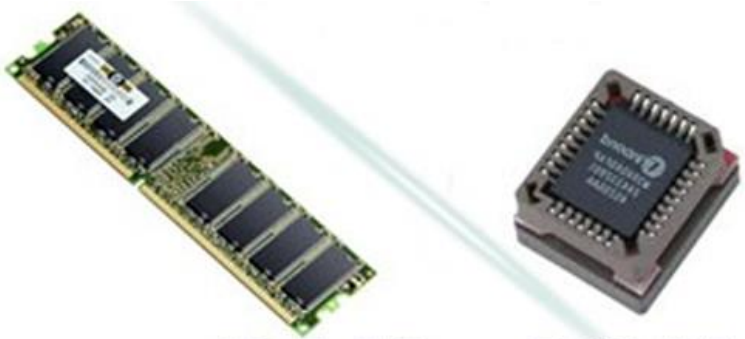
In an exam/test, if you see *memory*, unless explicitly stated otherwise, it would normally be referring to **RAM**.

RAM = Random Access Memory

- Contains the **data** and **instructions** the computer has loaded since starting up and everything the user has opened/loaded.
- Is **volatile** = loses its contents if power is lost
- Has a special link to the CPU (via busses)

ROM = Read Only Memory

- Originally its contents were static (hence '**read only**') and could not be changed – not true any more (flash upgrades).
- **Non-volatile** = does not lose its contents if power is lost
- Stores the **BIOS** (Basic Input Output System) – a small program that allows the computer to know what to do to find the operating system to 'boot' the computer after power is restored.



RAM	ROM
Volatile	Non-volatile
Contains user's programs and data that has been loaded since 'booting up'	Contains the BIOS
Usually upgradeable, can be increased	Usually part of motherboard, difficult to upgrade