# Control Systems

## IB Computer Science
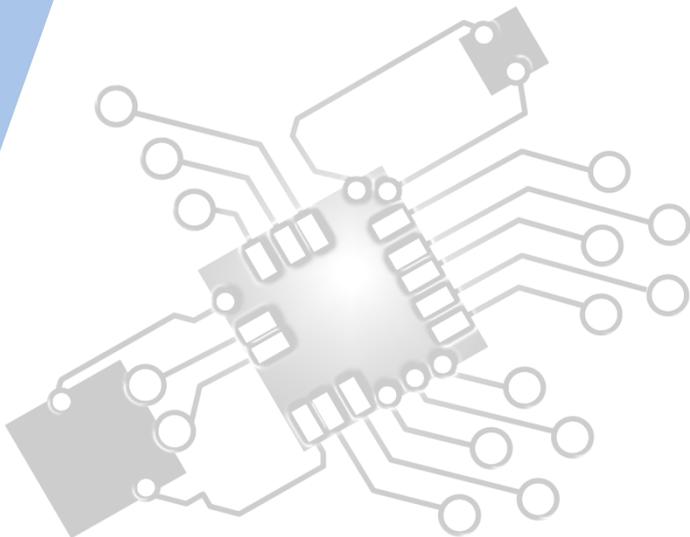
# HL Topics 1-7, D1-4
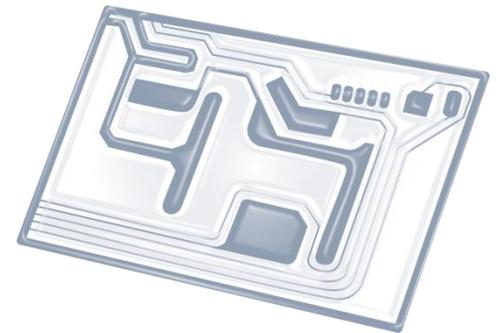
1: System design

2: Computer Organisation

3: Networks

4: Computational thinking

5: Abstract data structures

6: Resource management
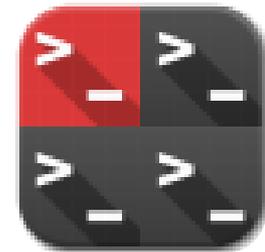
7: Control

D: OOP

# *HL only* 7 Overview

## Centralized control systems

7.1.1 Discuss a range of control systems

7.1.2 Outline the uses of microprocessors and sensor input in control systems

7.1.3 Evaluate different input devices for the collection of data in specified situations

7.1.4 Explain the relationship between a sensor, the processor and an output transducer

7.1.5 Describe the role of feedback in a control system

7.1.6 Discuss the social impacts and ethical considerations associated with the use of embedded systems

## Distributed systems

7.1.7 Compare a centrally controlled system with a distributed system

7.1.8 Outline the role of autonomous agents acting within a larger system

1: System design

2: Computer Organisation

3: Networks

4: Computational thinking

5: Abstract data structures

6: Resource management

7: Control

D: OOP
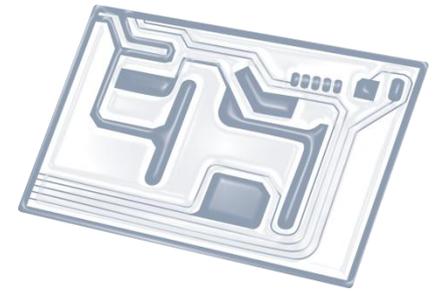
# Topic 7.1.7

Compare a **centrally controlled** system with a **distributed** system
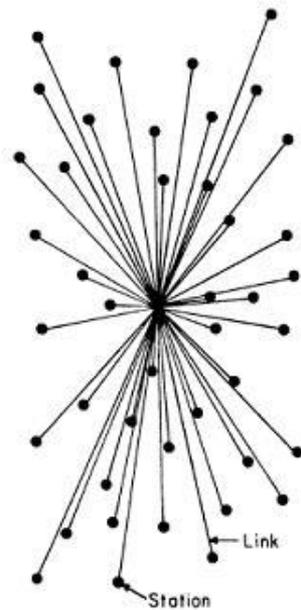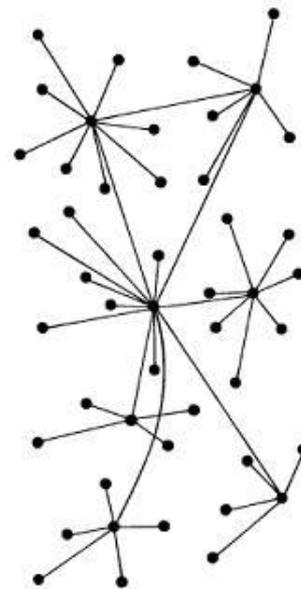


CENTRALIZED (A)   DECENTRALIZED (B)   DISTRIBUTED (C)
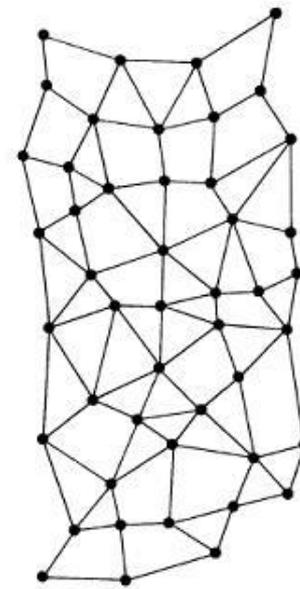
# Definitions:

- **Centralised system**: is computing done at a central location, using terminals that are attached to a central computer. The computer itself may control all the peripherals directly (if they are physically connected to the central computer), or they may be attached via a terminal.

- **Distributed system:** is a **system** in which components located on networked computers communicate and coordinate their actions by passing messages. The components interact with each other in order to achieve a common goal.

# Centralised system



Single server client/server configuration

Server

Clients
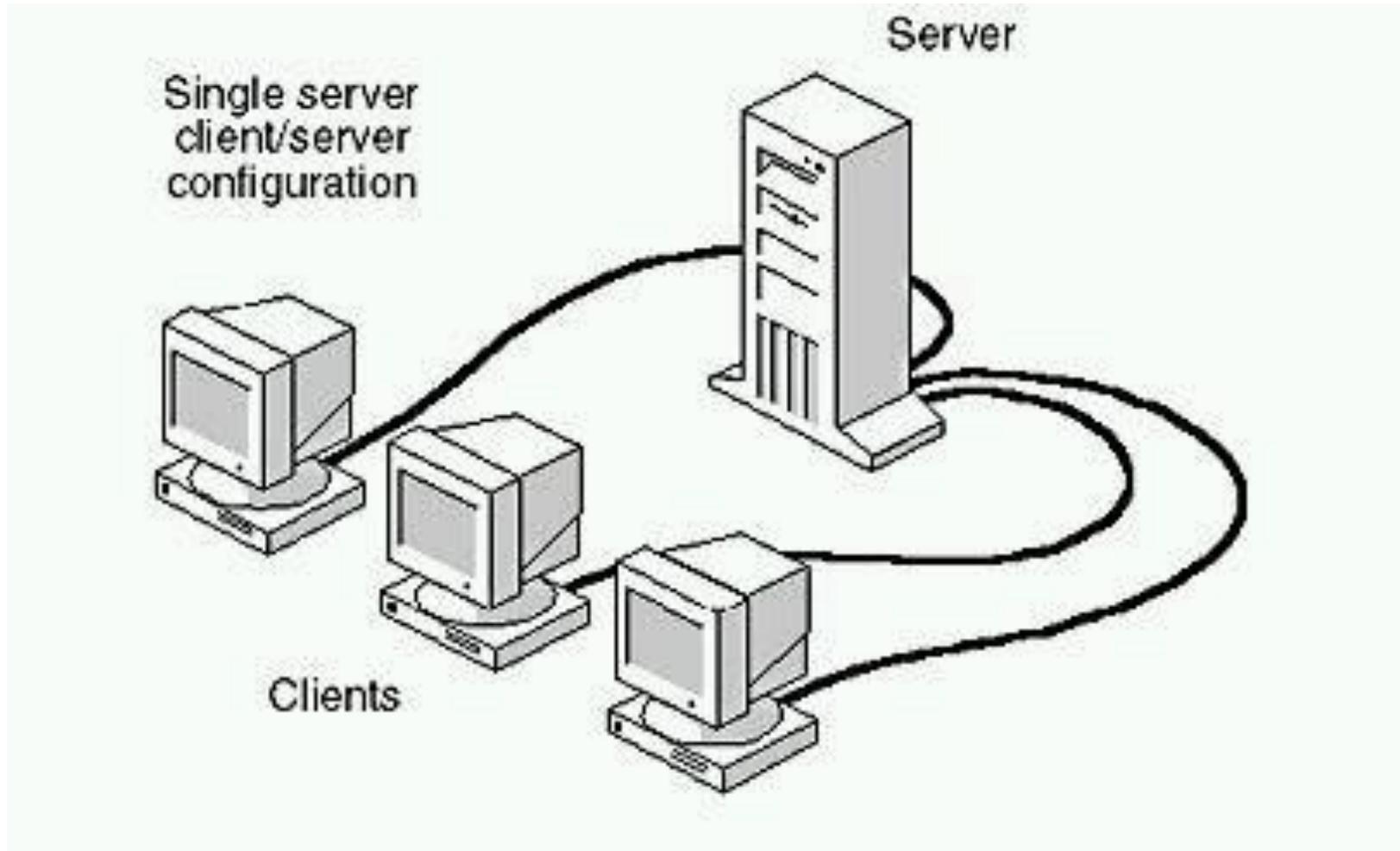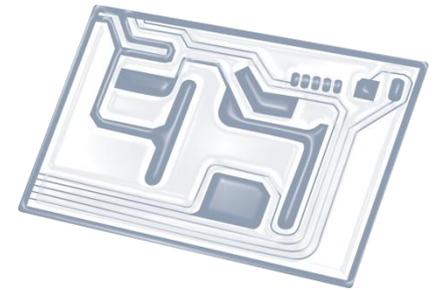
# Distributed system
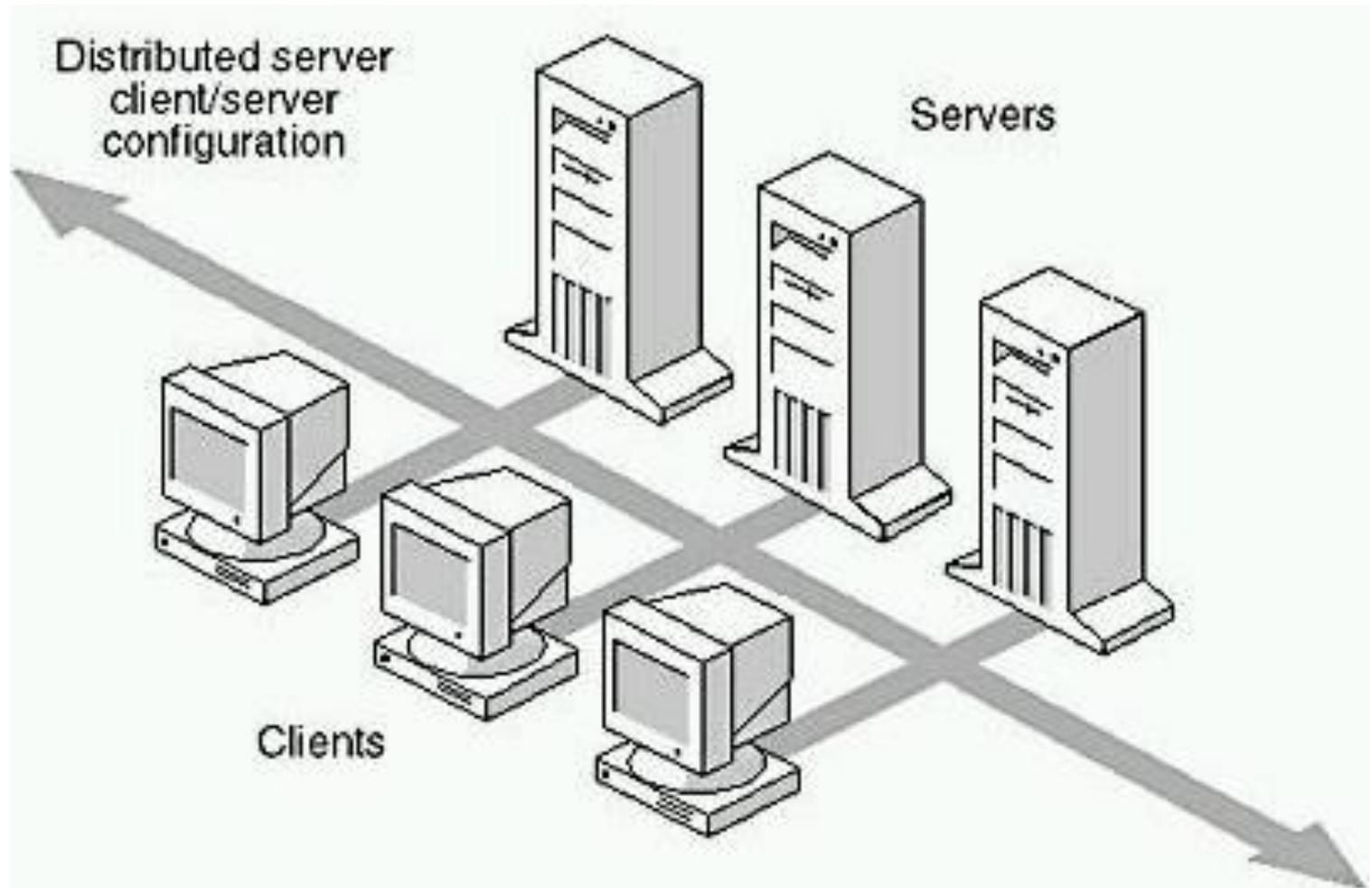
# Advantages

**Advantages of centrally controlled system:**

- Easier to administrate

- More control

**Advantages of distributed systems:**

- Quicker access

- Shared load

- Response more specific to environment

# Disadvantages

**Disadvantages of centrally controlled system:**

- If the main sensor/controller fails, the whole system fails

**Disadvantages of distributed systems:**

- Much more expensive to have multiple controllers/sensors
- Much more complex than a centralised system

# *Exam note!*

This curriculum point requires you to **compare** the different options.

That is exam speak for **knowing/discussing advantages**, **disadvantages** and for **comparing** them against one another to arrive at a conclusion.