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# BUS CONTENTION / BUS ARBITRATION / PRIORITY RESOLVING SCHEMES

In a Loosely coupled system all processors can use their local bus simultaneously. But the system bus can be used by only one module at a time. Hence there is contest for the system bus. This is called bus contention. It is resolved buy various arbitration schemes having different priority methods.

### A) Daisy Chain Method
- **All** bus **masters use** the **same** line for Bus **Request**.
- **If** the **Bus Busy** line is **inactive**, the **Bus Controller gives** the **Bus Grant signal**.
- Bus **Grant** signal is **propagated serially** through all masters **starting** from **nearest** one.
- The bus **master**, which requires the system bus, **stops this signal**, **activates** the Bus **Busy** line and **takes control** of the system bus.
  #### Advantage:
  i.  **Design** is **simple**.
  ii.  The **number of control lines is less**. Also **adding** new bus masters is **easy**.
  #### Disadvantage:
  i.  **Priority** of bus masters is **rigid** and **depends** on the **physical proximity** of the bus masters with the bus arbiter i.e. The one nearest to the Bus Arbiter gets highest priority.
  ii.  Bus is granted **serially** and hence a **propagation delay** is induced in the circuit.
  iii.  **Failure of one** of the devices may **fail** the entire **system**.

### B) Polling Method
- Here also **all bus masters** use the **same** line for **Bus Request**.
- Here the **controller generates** binary **address** for the master.
  Eg: To connect 8 bus masters we need 3 address lines ($2^3 = 8$).
- In **response** to a **Bus Request**, the **controller "polls"** the bus masters by **sending** a **sequence** of bus master **addresses** on the address lines.Eg: 000,010,100,011 etc
- The selected **master activates** the **Bus Busy** line and **takes control** of the bus.
  #### Advantage:
  i.  The **Priority** is **flexible** and can easily be **changed** by **altering** the **polling sequence**.
  ii.  If **one** module **fails**, the entire **system does not fail**.
  #### Disadvantage:
  i.  **Adding** more bus masters is **difficult** as **increases** the number of **address lines** of the circuit. Eg: In the above circuit to add the 9th Bus Master we need 4 address lines.

### C) Independent Request Method
- Here, **all bus masters** have their **individual Bus Request** and **Bus Grant lines**.
- The **controller** thus **knows which master** has **requested**, so bus is granted to that master.
- **Priorities** of the masters are **predefined** so on **simultaneous** Bus **Requests**, the bus is **granted based** on the **priority**, provided the Bus Busy line is not active.
- The **Controller** consists of **encoder** and **decoder** logic for the priorities.
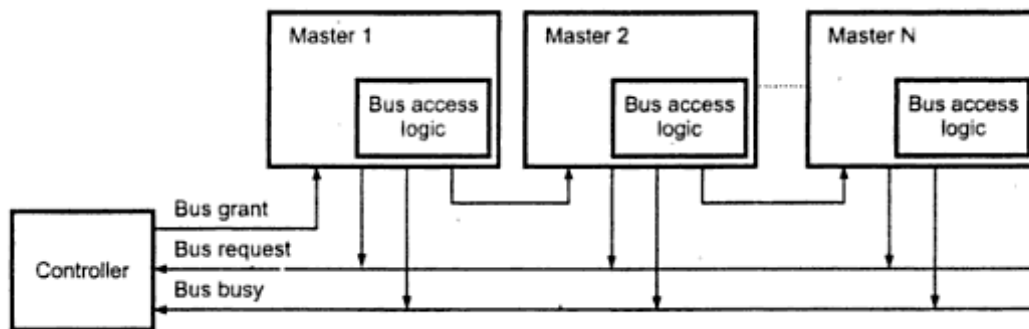  #### Advantage:
  i.   The Bus **Arbitration is fast**.
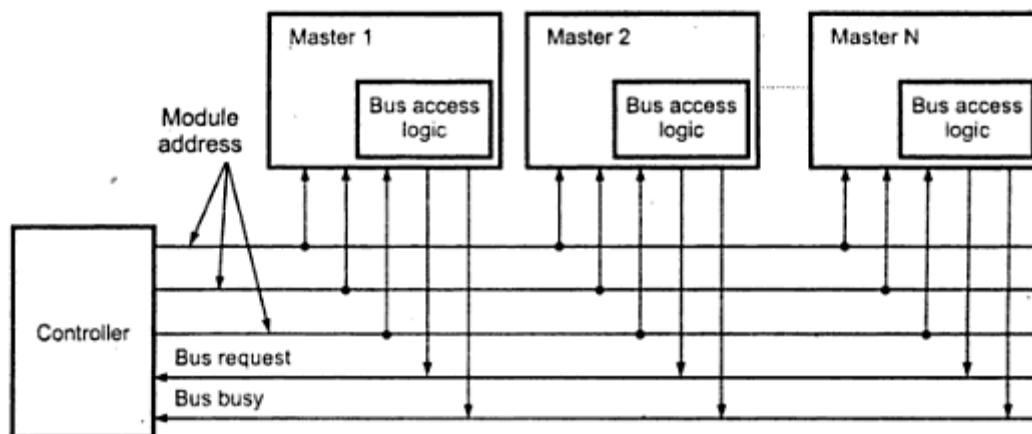  ii.  The **speed of** Bus **Arbitration** is **independent** of the **number** of devices connected.
  #### Disadvantage:
  i.  The **number of control lines required is more** (2n line required for n devices).

## Daisy Chaining



## Polling



## Independent Requests