**Element of Bus Design**

1. Bus type
2. Dedicated Bus

* A dedicated bus is only reserved for a Single or specific purpose.

1. Multiplexed Bus

* Using a same line for multiple purposes.

1. Method of Arbitration.
2. Centralized Arbitration.

* Only one device decides who can use the bus.
* The devices send desired requests to the arbiter and grants access based on a rule

1. Distributed Arbitration

* No central controller. **Each device contains logic** to determine bus access.

1. Timing
2. Synchronous Bus

* All devices uses common clock.
* All the data transfers happen at fixed intervals.

1. Asynchronous Bus

* Instead of devices communicate using handshaking signals

1. Bus Width
2. Address Bus Width

* Determines how many memory locations can be addressed.

1. Data Bus Width

* Indicates How much data can be transferred at once

1. Data Transfer Types.
2. Read:- The CPU or a devices request data from memory or I/O.
3. Write:- The CPU or a device sends data to a memory location.
4. Read-Modify-Write:- A special atomic operation.
5. Read-After-Write:- Ensures a recent write a visible immediately.
6. Block Transfer:- Transfer a sequence of data words in one go.