Chapter 11: Input/Output Organisation

Lesson 16:

Standard I/O bus– SCSI

Objective

- Familiar with a standard I/O interface— parallel bus called SCSI
- Learn that SCSI data bus has data bus plus parity check bit, has 8- or in recent extensions 16- or 32-bits communicate data as well as address and 10 or in recent extensions more control signals
- Learn that SCSI Communicate with the hard disk with bandwidth of 5 MB/s, in recent extensions 160 or 320 MB/s bandwidth

SCSI (Small Computer System Interface) Bus

SCSI bus

- SCSI bus controller Communicate 8- or in recent extensions 16- or 32-bits communicate data as well as address and 10 or in recent extensions more control signals
- Communicate with the hard disk with bandwidth of 5 MB/s
- In recent extensions 160 or 320 MB/s bandwidth

Bus protocols

- Allow any device on the bus to request the use of the bus
- Have a policy for deciding which device gets to use the bus if more than one device wants to access it at the same time

SCSI Data bus

- Data bus has data bus plus parity check bit
- Enables single bit-error detection in a data transfer

SCSI bus signals

SCSI ten Control Signals

- 1. RST—the reset signal activates to bring all devices with SCSI controller to start up state.
- 2. SEL—when bus is used for selecting an SCSI target (It differs from Poll count, instead of poll count, the controller activates, SEL, the SCSI controller examines SCSI ID and always select the highest ID device
- Each SCSI device has a distinct bus request line BRq_i

SCSI ten Control Signals

3. BSY (for Busy)—when SCSI bus is not available to other device (controller)
4. ATN—activates when a device draws attention before sending a message to a target

SCSI ten Control Signals

5. REQ—like DRQ in sequence 1 Section 11.13 requests a data transfer by a device with the SCSI controller
6. ACK—acknowledgement from the SCSI controller that data transfer completes, like DACK
7. MSG—when a message or information is being transferred through the SCSI bus

SCSI ten Control Signals

8. C/D—1 or 0 when a control (command or status) or data word is being transferred, respectively
9. I/O—1 or 0 when a data is input to SCSI controller or output from the controller, respectively
10. Parity

High-speed SCSI versions

- Use double edge detection of the signals

SCSI bus signal sequences

Sequences of SCSI Signals

1. Sequence 0: Arbitration when Busy is not active
2. Sequence 1: Selection using SEL—the selection of signals is done

Sequences of SCSI Signals

3. Sequence 2: Command or status or data transfer
4. Sequence 3: Reselection

SCSI bus Arbitration policy

SCSI controller arbitration policy

- Access to highest priority device first
- Advantage that it is easy to decide which device gets access to the bus

SCSI controller arbitration policy Disadvantage

- Starvation
- Starvation when a device with a high SCSI ID can prevent a device with a lower ID from ever getting a chance to use the bus by making repeated requests for the bus
- Can occur any time an arbitration policy always gives one device priority over another

Starvation problem

- Can occur any time an arbitration policy always gives one device priority over another
- Some arbitration policies prevent starvation by giving more priority to the devices that have been waiting for the bus longest

Summary

We learnt

- Data bus has data bus plus parity check bit
- SCSI has 8- or in recent extensions 16- or 32-bits communicate data as well as address and 10 or in recent extensions more control signals
- Communicate with the hard disk with bandwidth of 5 MB/s, in recent extensions 160 or 320 MB/s bandwidth
- Access to highest priority device first arbitration policy

End of Lesson 16 on

Standard I/O bus– SCSI