

Batch: A1

Roll No.: 16010123012

Experiment / assignment / tutorial No.: 1

TITLE: Study of PCI and SCSI.

AIM: To Study and learn PCI and SCSI

Expected OUTCOME of Experiment: (Mention CO/CO's attained here)

Books/ Journals/ Websites referred:

1. <https://www.techopedia.com/definition/8815/peripheral-component-interconnect-bus-pci-bus>
2. <https://www.techopedia.com/definition/331/small-computer-system-interface-scsi>
3. http://www.csun.edu/~edaasic/roosta/BUS_Structures.pdf
4. W.Stallings William "Computer Organization and Architecture: Designing for Performance", Pearson Prentice Hall Publication, 7thEdition. C.

Pre Lab/ Prior Concepts:

Microcomputer buses which communicate with a peripheral devices or a memory location through communication lines called buses.

The major parts of microcomputers are central processing unit (CPU), memory, and input and output unit. To connect these parts together through three sets of parallel lines, called buses. These three buses are Address bus, data bus, and Control bus.

Address Bus:

The address bus consists of 16, 20, 24, or more parallel signal lines, through which the CPU sends out the address of the memory location. This memory location is used for to written to or read from. The number of memory location is depends on 2 to the power N address lines. Example, a CPU with 16 address lines can address 2¹⁶ or 65,536 memory locations. When the CPU reads data from or writes data to a port. The port address is also sent out on the address bus. This is unidirectional. This means that the CPU can send data to a memory location or I/O ports.

Data Bus:

The data bus consists of 8, 16, 32 or more parallel signal lines. The data bus lines are bidirectional. This means that the CPU can read data from memory or from a I/O port as well as send data to a memory location or to a I/O port. In a system, many output devices are connected to the data bus, but only one device at a time will be enabled to the output.

Control Bus:

The control bus consists of 4-10 parallel signal lines. The CPU sends out signals on the control bus to enable the outputs of addressed memory devices or port devices. Typically control bus signals are memory read, memory write, I/O read and I/O write. To read a data from a memory location, the CPU sends out the address of the desired data on the address bus and then sends out a memory read signal on the control bus. The memory read signal enables the addressed memory device to output the data onto the data bus where it is read by the CPU.

PCI Bus -

Peripheral Component Interconnect (PCI) is a local computer bus for attaching hardware devices in a computer and is part of the PCI Local Bus standard. It is a parallel bus, synchronous to a single bus clock. The PCI bus supports the functions found on a processor bus but in a standardized format that is independent of any given processor's native bus.

Some of its features include:

- 32 data bits (64 bit option), 32 address bits (64-bit option)
- Up to 33 MHz, synchronous
- Good bus arbitration
- Full bus master capability
- Support both 3.3 and 5 volt signaling environments
- It can transfer up to 132 MB per second.

Advantages:

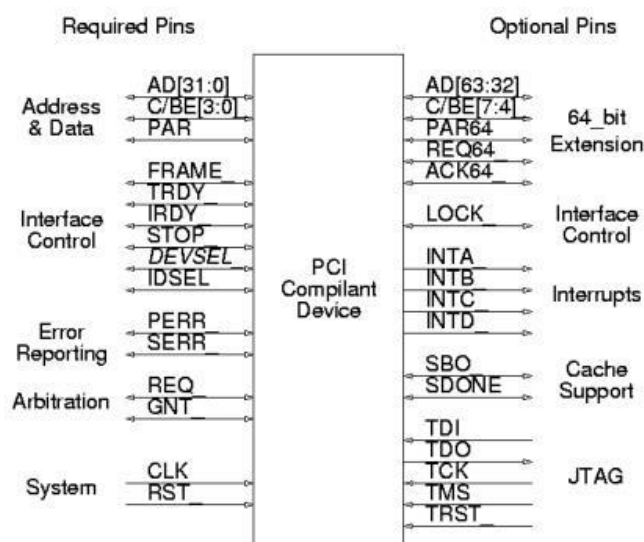
- Faster overall data transfer speeds
- Greater bandwidth
- Better prioritization of data
- Real-time or time-dependent data transfers
- Improved error detection
- It supports linear burst mode data transfer.
- You have different PCI buses on the same computer.

Disadvantages:

- PCI Graphics Card cannot get to system memory.
- PCI does not support pipeline.
- It does not support advanced power management.

- PCI clock frequency is inadequate. PCI supports maximum five devices on single PCI bus and hence requires PCI to PCI bridge to support more than 5.
- PCI is a parallel bus and hence it has bandwidth limitations.

PCI Bus Pin List



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SCSI bus -

A small computer systems interface (SCSI) is a standard interface for connecting peripheral devices to a PC. Depending on the standard, generally it can connect up to 16 peripheral devices using a single bus including one host adapter. These devices can include hard drives, scanners, printers, and other peripherals.

Some of its features include:

- SCSI is an intelligent, peripheral, buffered, peer to peer interface
- Concept of initiator and Target

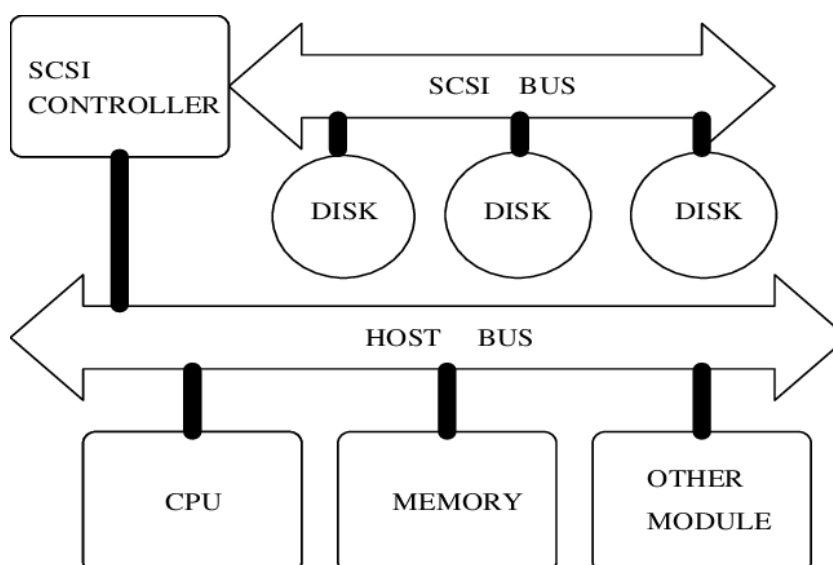
- **Device Addressing:** SCSI devices connected to the bus must use unique identification addresses, each one with one ID bit assigned to it.
- **Versatility:** SCSI supports a wide range of devices including hard drives, tape drives, CD-ROM drives, scanners, printers, and more. It allows multiple devices to be connected to a single SCSI bus.
- **8 Devices** can be connected to an 8 Bit SCSI Bus and **Max. Of 16 Devices** can be connected to a 16 Bit SCSI Bus.
- **High Speed:** SCSI offers high data transfer rates, which are typically faster than those offered by older interfaces like IDE. It is designed to handle large amounts of data quickly and efficiently.

Advantages:

- SCSI works with most devices, minimizing incompatibility issues.
- Data exchanges occur through a single cable, thus streamlining the connection.
- SCSI devices can work with a variety of computers.
- SCSI equipment is highly accessible, making it easy to replace and upgrade older SCSI components.
- SCSI supports multiple devices that can be attached to one cable(a single bus).
- The peripheral devices are independent.

Disadvantages:

- SCSI drives can be costly.
- SCSI is much slower than newer standards, like USB, that offer speeds of up to 40 Gbps.
- The interface itself can be difficult to configure, with peripherals and will likely require IT professionals for proper management and installation.
- SCSI has limited BIOS support, and the interface performance can degrade over time.
- The SCSI drivers and hardware are more expensive than IDE or SATA.



Post Lab Descriptive Questions

Q1. Differentiate between PCI and SCSI Bus

Feature	PCI (Peripheral Component Interconnect)	SCSI (Small Computer System Interface)
Purpose	Local computer bus for attaching hardware devices within a computer	Standards for connecting and transferring data between computers and peripheral devices
Connection Type	Primarily a parallel interface for internal components (e.g., network cards, sound cards, GPUs)	Uses parallel or serial interface (like Serial Attached SCSI, SAS) for connecting multiple devices
Speed	Bus speeds range from 33 MHz to 133 MHz, with various data transfer rates depending on the version (e.g., PCI, PCI-X, PCIe)	Data transfer rates vary, with older versions up to 40 MB/s and modern SAS up to 12 Gbps per lane
Expansion	PCI slots add additional cards to the motherboard, expanding system capabilities	Allows daisy-chaining multiple devices on a single bus, with built-in support for command queuing and simultaneous operations
Device Management	Not typically used for managing multiple external devices	Suitable for server and enterprise environments, supporting multiple external devices with advanced management features



Q2. List two applications each of PCI and SCSI Bus

PCI (Peripheral Component Interconnect):

1. Graphics Cards
2. Network Interface Cards (NICs)

SCSI (Small Computer System Interface):

1. High-Performance Storage Devices (block storage devices and tape storage devices)
2. To provide system with connections to a variety of peripheral devices

Date: 22/07/2024