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SEMESTER – 2ND	D.O.P – 3 MAY 2021
SUBJECT – COMPUTER WORKSHOP	

TOPIC.

What is PCI express ? Explain in detail

SOL –

- **PCIe (peripheral component interconnect express) is an interface standard for connecting high-speed components. Every desktop PC** motherboard **has a number of PCIe slots you can use to add** GPUs **(aka video cards aka graphics cards),** RAID cards, **Wi-Fi cards or** SSD **(solid-state drive) add-on cards. The types of PCIe slots available in your PC will depend on the** motherboard you **buy.**
- **PCIe slots come in different physical configurations: x1, x4, x8, x16, x32. The number after the x tells you how many lanes (how data travels to and from the PCIe card) that PCIe slot has. A PCIe x1 slot has one lane and can move data at one bit per cycle. A PCIe x2 slot has two lanes and can move data at two bits per cycle (and so on).**

BREIF EXPLAINATION ABOUT PCIE-

♦ PCIe Generations **Compared**

	Bandwidth	Giga transfer	Frequency
PCIe 1.0	8 GB/s	2.5 GT/s	2.5 GHz
PCIe 2.0	16 GB/s	5 GT/s	5 GHz
PCIe 3.0	32 GB/s	8 GT/s	8 GHz
PCIe 4.0	64 GB/s	16 GT/s	16 GHz
PCIe 5.0	128 GB/s	32 GT/s	32 GHz
PCIe 6.0	256 GB/s	64 GT/s	32 GHz

♦ Current PCIe Generations

PCIe standards currently come in three different generations: PCIe 1.0, PCIe 2.0, PCIe 3.0 and PCIe 4.0. Bandwidth doubles with each generation.

How do you know what performance you'll get with a PCIe expansion card? Your PCIe card will run at the lowest generation present. So if you put a PCIe 2.0 card in a PCIe 3.0 slot, you'll get PCIe 2.0 performance.

PCIe 4.0
The PCIe 4.0 standard debuted in 2017 and offers 64 GBps of throughput. It's available for enterprise-grade servers, but only became usable with SSDs in 2019. The AMD Ryzen 3000-series CPUs that debuted in July 2019 were the first desktop CPUs to support PCIe 4.0 x16 out of the box. For full support, users will need new motherboards running the **X570 chipset.**
To learn more about PCIe 4.0, check out our article What We Know About PCIe 4.0 So Far.

♦ Future PCIe Generations: PCIe 5.0 and PCIe 6.0

PCIe 5.0

The official PCIe 5.0 standard came out in May 2019. It will bring 128 GBps of throughput. The specification is backwards compatible with previous PCIe generations and also includes new features, including electrical changes to improve signal integrity and backward-compatible CEM connectors for add-in cards. The first PCIe 5.0 devices are expected to debut in for enterprise customers in 2022, with consumer offerings to follow.

PCI-SIG, which defines PCIe standards, expects PCIe 4.0 and PCIe 5.0 to co-exist for a while, with PCIe 5.0 used for high-performance needs craving the most throughput, like GPUs for AI workloads and networking applications. So, PCIe 5.0 will mainly be used in data centre, networking and high-performance computing (HPC) enterprise environments, while less-intense applications, like those used by desktop PCs, will be fine with PCIe 4.0.

PCIe 6.0

PCIe 6.0 spec (Image credit: PCI-SIG)

In June 2019, PCI-SIG said it will release the standards for PCIe 6.0 in 2021 (the spec is currently in revision 0.7) . We don't expect to see products until at least the end of 2022, if not 2023.

PCIe 6.0 will double the bandwidth of PCIe 5.0 to 256 GB/s among the same maximum number of lanes, 16. Data transfer rate will hit 64 GT/s per pin, up from PCIe 5.0's 32 GT/s. PCIe 6.0 is also expected to be backwards compatible with previous PCIe generations..

LEARNING OUTCOMES

1. Apply coding skills to solve application based problems on competitive platforms such as Hacker Rank/ Hacker Earth/Code Chef.
2. Understand the basic concept and structure of computer hardware
3. Identify the existing configuration of the computers and peripherals.
4. Installing and uninstalling multiple operating systems on a machine.
5. Apply their knowledge about computer peripherals to identify /rectify problems on-board.

EVALUATION COLUMN (To be filled by concerned faculty only)

Sr. No.	Parameters	Maximum Marks	Marks Obtained
1.	Worksheet Completion including writing learning objective/ Outcome	10	
2.	Post Lab Quiz Result	5	
3.	Student engagement in Simulation/ Performance/ Pre Lab Questions	5	
4.	Total Marks	20	