

End of Chapter 11 Exercises

Due on July 28th, 2019
Computer Organization & Programming
CS550WS—Summer I
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Problem 11.5. As described in the text, the PCI-Express bus consists of thirty-two “lanes”. As of January 2009, each lanes is capable of maximum data rate of 500 MB per second. Lane are allocated to a device 1, 2, 3, 8, 16, or 32 lanes at a time.

Assume that a PCI-Express bus is to be connected to a high-definition video card that is supporting a 1920 by 1080 true color (3 bytes per pixel) progressive scan monitor with a refresh rate of 60 frames per second. How many lanes will this video card require to support the monitor at full capability?

Solution

$$\begin{aligned} 1920 \times 1080 &= 2,073,600 \frac{\text{pixels}}{\text{frame}} \\ 2,073,600 \frac{\text{pixels}}{\text{frame}} \times 60 \frac{\text{frames}}{\text{second}} &= 124,416,000 \frac{\text{pixels}}{\text{second}} \\ 124,416,000 \frac{\text{pixels}}{\text{second}} \times 3 \frac{\text{bytes}}{\text{pixel}} &= 373,248,000 \frac{\text{bytes}}{\text{second}} = 373.248 \frac{\text{MB}}{\text{second}} \end{aligned}$$

1 lane is needed.

Problem 11.7. How many PCI-Express lanes are required to support a 10GB per second Ethernet card?

Solution

$$\begin{aligned} 10 \frac{\text{GB}}{\text{second}} &= 1250 \frac{\text{MB}}{\text{second}} \\ 1250 \frac{\text{MB}}{\text{second}} \div 500 \frac{\text{MB}}{\text{second}} / \text{lane} &= 2.5 \text{ lanes} \rightarrow \mathbf{3 \text{ lanes}} \end{aligned}$$

Problem C. Find a current computer ad in a magazine or newspaper or online. Identify each of the future items in the ad, show its position in the system block diagram on Figure 11.1 (on page # 336-5th edition textbook), explain how it operates, and define its purpose.

You need to describe a tech specification of the selected computer system

Solution

HP - Desktop - Intel Core i7 - 8GB Memory - 1TB Hard Drive - Black

The HP desktop on the Best Buy website is listed as the best-selling, non-gaming, desktop available for purchase. At this time, the desktop is listed for \$499.99.

Keyboard: Included, not specified

CPU: 7th Generation Intel Core i7-7700T Processor

- Cores: 4
- Threads: 8
- Frequency: 2.90 GHz with 3.80GHz Max Turbo
- Max Memory: 64GB
- Memory Channels: 2
- Memory Type: DDR4-2133/2400, DDR3L-1333/1600
- Integrated Graphics: Intel HD Graphics 630

Intel Core i7-7700T Processor. (n.d.). Retrieved July 23, 2019, from <https://www.intel.com/content/www/us/en/products/processors/core/i7-processors/i7-7700t.html>

Graphics: Intel HD Graphics 630

- Base Frequency: 350 MHz
- Max Dynamic Frequency: 1.15 GHz
- Video Max Memory: 64GB
- 4K Support: Yes, 60Hz
- Max Resolution: 4096x2304 at 60Hz
- Number of Displays: 3

Intel Core i7-7700T Processor. (n.d.). Retrieved July 23, 2019, from <https://www.intel.com/content/www/us/en/products/processors/core/i7-processors/i7-7700t.html>

Monitor: Not Included

Memory: 8GB, DDR4 at 2400 MHz

Hard Disk: Brand Not Specified

- Type: HDD
- Capacity: 1 TB
- RPM: 7200 RPM
- Interface: SATA

Bluetooth: 4.2, no specifics

Wireless Card: WiFi, no specifics

Audio Controller: Microphone and headphone jack, no specifics

HP Desktop Intel Core i7 8GB Memory 1TB Hard Drive Black 460-P274. (n.d.). Retrieved July 23, 2019, from <https://www.bestbuy.com/site/hp-desktop-intel-core-i7-8gb-memory-1tb-hard-drive-black/6333727.p?skuId=6333727>