

CIS 350 – INFRASTRUCTURE TECHNOLOGIES
SMALL GROUP ACTIVITY #6

Names of group
members:

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Topic: Chapter 11 - PCI-Express Bus and Displays

Logistics

1. Get in touch with your group of 4 or 5 students. (See Groups folder on Blackboard.)
2. Discuss and complete the assignment together via E-mail, Discussion Forum, Blackboard Collaborate Ultra, and/or MS Teams.
3. Choose a recorder to prepare the final copy (one per group) and submit it via the Blackboard Assignments/Small Group Activities folder to the instructor.
4. Be sure all group members' names are on final copy. Do not add names of your group classmates who did not participate in the assignment.

Work the following problems.

1. Assume that a PCI-Express bus consists of 32 lanes. Each lane is capable of a maximum data rate of 100 MB per second. Lanes are allocated to a device 1, 2, 4, 8, 16, or 32 lanes at a time. Assume that the PCI-Express bus is connected to a high definition video card that is supporting a 1920×1080 true color (3 bytes per pixel) progressive scan monitor with a refresh rate of 80 frames per second. How many lanes will this video card require to support the monitor at full capability? You **must** show your calculations. Assume that 1KB = 1024 Bytes and 1MB = 1024KB.

$$\begin{aligned}(3) * (80) * (1920) * (1080) &= 497,664,000 \text{ bytes/sec} \\ (497664000) / (1024) &= 486,000 \text{ KB/sec} \\ (486000) / (1024) &= 474.609 \text{ MB/sec} \\ (474.609) / (100) &= 4.7\end{aligned}$$

4.7 rounds up to 8. Thus, this video card requires 8 lanes to support the monitor at full capacity.

2. A 1920-pixel by 1080-pixel display is generated on a 16-inch diagonal monitor.

(a) How many pixels/dots per inch are displayed on this monitor?

$$\begin{aligned}&= \sqrt{(1920)^2 + (1080)^2} \\ &= \sqrt{3686400 + 1166400} \\ &= \sqrt{4852800} \\ &= 2202.907 \text{ pixels} / 16 \text{ inches} = 137.68 \text{ pixels per inch}\end{aligned}$$

(b) How many pixels/dots per millimeter [mm] are displayed on this monitor?

$$\begin{aligned}16/2202.907 \text{ pixels} &= 0.007 * 25.4 = 0.184 \text{ mm} \\ 1/.184 \text{ mm} &= 5.43 \text{ pixels per mm}\end{aligned}$$

(c) What is the size of an individual pixel in [mm]?

$$16/2202.907 \text{ pixels} = 0.007 * 25.4 = 0.184 \text{ mm is the size of an individual pixel}$$

Note that 1"=25.4 mm. Approach: Use the Pythagoras theorem to calculate the number of pixels on the 15" diagonal of the monitor for a 1920-pixel by 1080-pixel display. You **must** show your calculations.