

HW5
CSc 137
(15 points)

7.10 Consider a 32-bit data bus SDRAM. Given that the clock frequency of the bus is 200MHz, what is the peak memory bandwidth in megabyte per second (MBs)? (5 pts)

Clock Frequency = 200MHz With of Data Bus = 32-Bit Data Bus

Bandwidth = Bus Frequency · With of Data Bus

$$= 200\text{MHz} \cdot 32 = 6400\text{Mbits/second}$$

$$\begin{aligned} & * 8\text{Bits in a Byte} * \\ & = 6400/8 = 800\text{Megabytes per second} \end{aligned}$$

7.11 Consider a 64-bit data bus SDRAM. Given that the clock frequency of the bus is 200MHz, what is the peak memory bandwidth in megabyte per second (MBs)? (5 pts)

Clock Frequency = 200MHz With of Data Bus = 64-Bit Data Bus

Bandwidth = Bus Frequency · With of Data Bus

$$= 200\text{MHz} \cdot 64 = 12800\text{Mbits/second}$$

$$\begin{aligned} & = 12800/8 = 1600\text{Megabytes per second} \\ & * 8\text{Bits in a Byte} * \end{aligned}$$

7.12 Consider a 32-bit data bus DDR SDRAM. Given that the clock frequency of the bus is 200MHz, what is the peak memory bandwidth in megabyte per second (MBs)? (5 pts)

Clock Frequency = 200MHz With of Data Bus = 32-Bit Data Bus = 4 Bytes (1Byte = 8 Bits)

$$\begin{aligned} \text{Peak Memory Bandwidth} &= \text{Clock Frequency} \cdot \text{With of Data Bus} \\ &= 200\text{MHz} \cdot 4\text{Bytes} \\ &= 800\text{Megabytes per second} \end{aligned}$$

Recall: Bandwidth of Double Data Rate (DDR) SDRAM has double the bandwidth of SDRAM at the same frequency

$$\begin{aligned} \text{Peak Memory Bandwidth of DDR SDRAM} &= \text{Peak Memory Bandwidth of SDRAM} \cdot 2 \\ &= 800\text{MBs} \cdot 2 \\ &= 1600\text{MBs} \end{aligned}$$