Dordt University
Engineering 304, Microprocessor Interfacing
Problem Set #9, Spring 2020

19/20

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PS#9
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Answers for the questions below can be found in the *Universal Serial Bus Specification* Revision 2.0 (also known as the "USB Standard"). The standard is available in hard-copy via the reserve collection at the Dordt Library. It is also available for free downloading from the Web. (A link is given on the Canvas homework page for this course.)

For each question below, provide an answer that is as complete as possible subject to the constraint that it is **less than 100 words.**

What is an **Isochronous Transfer**? (Section 5.6)

An Isochronous transfer is the type where there is one endpoint and is uni-directional. This type of transfer will give access to USB bandwidth with bounded latency, constant data rate, and no retrying to deliver data. The maximum size of the packet is the none and is constrained to the payload of 1023 bytes for full speed and 1024 for high-speed. In order to access a bus it must specify which bus s to be accessed.

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What is a **Bulk Transfer**? (Section 5.8)

Bulk Transfer is the type that is designed for large amounts of data that can be transferred with any amount of available bandwidth. Bulk Transfer provide access to the USB based on bandwidth, retry transfers and guaranteed delivery. The delivery of bulk is either into or out of the host for a pipe. The package can be from 8, 16,32, or 64 for full-speed and 512 for high-speed endpoints. Bulk can only be used by full-speed and high-speed devices.

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How many **microframes** are there in a **frame**? (Section 8.4.3.1)

There are roughly 8 microframes within a frame. Each of these are happening every 125us within 1ms of a frame. There can however be a miscount of the microframes and the zeroth will be counted making the next count as 1 through 7.

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What is **Bus Enumeration**? (Section 9.1.2)

Bus Enumeration is when there is a hub with devices attached. The host checks to see what devices are connected and reports back. When the host sees that the port has a device connected it shows it and turns on the port for use. The main use for this is to now which devices are connected to the main host. When they are disconnected the port is diableed.

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Enumeration in includes the configuration of newly at

What is **Dynamic Attachment and Removal**? (Section 9.2.1)

The host enables a hub port to know if there is a USB device attached. When there is an attachment to a port there is the chance of resetting the device which will result in having a default USB address and will not be configured. When removed the hub is removed then the port will be disabled. It is a checks and balance of whether the device is being read properly.

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