UTAustinX: UT.6.01x Embedded Systems - Shape the World

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DEFINITIONS (3/3 points)

Please match the following terms with the letter of their appropriate definitions.

latency

D   **Answer:** D

bandwidth

C   **Answer:** C

real-time

B   **Answer:** B

priority

A   **Answer:** A

A. The rules that determine the order of service when two or more requests are made simultaneously.

B. A description of a system that guarantees the latency will always be less than some small amount of time.

C. The maximum data flow in bytes/second that can be processed by the system.

D. The time between when the I/O device indicated service is required and the time when service is initiated.

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EXPLANATION

Latency is an elapsed time between two events: a trigger and a response. **Bandwidth** is flow rate (information/sec), measured in bits/sec or bytes/sec. Bandwidth defines how much actual communication is being performed. Think of a person in your life who talks a lot without "saying anything of value". Even though there are a lot of bits, we classify this as low bandwidth communication. Now, think of someone in your life who also talking a lot, but usually has something to say of value. We classify this as high bandwidth communication. A **real-time system** is one that guarantees it will always respond to important events. Typically the response time is very short and always met. A **priority system** allows important events to be serviced first.

[Check]   [Hide Answer]

FIFO QUEUES (1/1 point)

Why are first in first out (FIFO) queue really important for interfacing I/O devices?

   ○ They can store data permanently.

   ○ They are a way to store data in the cloud.

   ◉ The software and hardware can operate at variable speeds and data are temporarily spooled into the FIFO as it passes between them. ✔

   ○ It can store an arbitrarily large amount of data.

   ○ None of the above

EXPLANATION

FIFO queues are essential components of systems with complex I/O. It is often not possible or not desired to process data when it first becomes available. For the same reasons, we see queues in many aspects of life: waiting in line at the checkout of a store; assembly line of a manufacturing plant; the handling of food as it is purchased, stored and given to animals on a farm; the handling of packages as they are presented for delivery, transported and delivered; and the production of food at a high-volume restaurant.
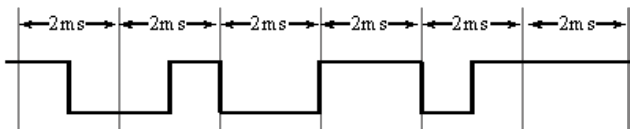
[Check] [Hide Answer]

UART PROTOCOL (2/2 points)

You observe the following waveform at the output of a UART port. You know the format is 1 start, 8 data and 1 stop bit.

a) What is the baud rate in bits/sec?

```
1000
```

1000

Answer: 1000

b) What 8-bit number is being transmitted? Give your answer in hexadecimal, in a form like 0x2F.

```
0xB2
```
         Answer: 0xB2

EXPLANATION

a. answer 1000 bits/sec

b. answer: bits are 0010011011, start, b0, b1,...,b7, stop. Data is 0xB2

[Check] [Hide Answer]   04/16/2014 05:53 PM

UART BAUD RATE (1/1 point)

Assume the bus frequency is 80 MHz. What is the baud rate established by the following?

UART1_IBRD_R = 100;
UART1_FBRD_R = 32;

You may assume the line control register is also set so **IBRD** and **FBRD** will be updated.

49751

49751

Answer: 49751

EXPLANATION

The divisor is **IBRD**+**FBRD**/64, which equals 100+32/64 or 100.5. The baud rate will be 80,000,000/16/divisor = 80,000,000/16/100.5 = 49751 bits/sec.

Check   Hide Answer

DEFINITIONS (3/3 points)

Please match the following terms with the letter of their appropriate definitions.

network

B   **Answer:** B

topology

A   **Answer:** A

full-duplex

D   **Answer:** D

frame

C   **Answer:** C

baud rate

F   **Answer:** F

bandwidth

E   **Answer:** E

A. Defines the shape of how the components are interconnected.

B. A collection of interfaces that share a physical medium and a data protocol.

C. The smallest complete unit of serial transmission.

D. Transmission can occur in both directions simultaneously.

E. The amount of data or useful information transmitted per second.

F. The total number of bits transmitted per second.

EXPLANATION

An example of a **network** is Ethernet. The computer and router both have an interface, and the cable is the medium shared between the two.

Examples of **topologies** are point to point and star. Ethernet is point to point, and USB is a star (look at how a USB hub is connected).

UART is an example of **full duplex** because there is a separate transmit and receive line, so data can flow in both directions at the same time.

On the UART protocol, a **frame** is one start, 8 data and one stop bit.

Baud rate actually means sounds/sec, a term from the old MODEM (modulate, demodulate) communication days. Now baud rate means the total number of bits/sec sent.

Bandwidth is the actual communication of data that occurs. On a UART each 10-bit frame as 8 bits of data, so the bandwidth in bits/sec is 0.8 times the baud rate in bits/sec.

Check   Hide Answer

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