

EE319K Lecture Lec01.pptx in class worksheet (Quiz1 study)

Question 1. What is an embedded system?

Question 2. What goes into Flash EEPROM (programmable read only memory) and what goes into RAM (random access memory)?

Question 3. Why does the Harvard architecture use one bus to access flash and a second bus to access RAM?

Question 4. What is a pin? What is a port?

Question 5. What is a register?

Question 6. How much RAM and ROM does our microcontroller have? (look this up in the book)

Question 7. What is the difference between big endian and little endian? Which is Cortex M?

Question 8. What does the **AND R0,R1,R2** instruction do?

Question 9. Which register is the stack pointer? What are the two steps to push data onto the stack? What are the two steps to pop data from the stack?

Question 10. What is the program counter?

Question 11. Given

GPIO_PORTF_DATA_R EQU 0x400253FC

Write Cortex M assembly code to make the LED green (set PF3=1, other bits of Port F should be made 0)

Answer 1. An embedded system is a complete system that performs a specific task and has a computer inside.

Answer 2. Programs and constants go into flash ROM. Data goes into RAM.

Answer 3. To improve speed; the op code fetch can occur at the same time as a data access.

Answer 4. A pin is a one wire out of or into the microcontroller. It contains one bit of information (high/low). PA7 is an example pin. A port is a collection of pins grouped together to speed access. Port A includes PA7, PA6, ... PA0

Answer 5. A register is high speed storage inside the processor. Registers on the Cortex M do not have addresses. For example R0 is a register

Answer 6. The TM4C123 has 256k flash ROM and 32k RAM

Answer 8. Volatile memory loses its information when power is removed and then restored. Nonvolatile memory retains its information when power is removed and then restored.

Answer 9. Flash is a type of EEPROM (electrically erasable programmable read only memory)

Answer 10. A pin is a wire connecting the real world. A port is a collection of pins grouped by common function.

Answer 11. Real-time means the system responds to events in a time always less than the desired amount. Latency is the response time between the arrival of an event and the completion of the software response to that event. A real-time system has a latency always less than a small bound.

-----Extra questions -----

Answer 12. The TM4C123 has 32 kibibytes of RAM and 256 kibibytes of ROM

Answer 13. A flowchart is a graphical way to describe software algorithm, showing the steps and the sequence among the steps

Answer 14. A data flow graph is a graphical way to show how data is processed in the system. Data arrives at input ports, manipulated by software, and leaves the system at output ports. If module A sends data to module B, there is an arrow from A to B.

Answer 15. A call graph is a graphical way to describe how software modules are connected. If module A calls module B, there is an arrow from A to B.

Answer 16. What are the 5 steps in a product life cycle (design process)?

Analyze, design, implement, test, deploy

Analyze, high-level design, low-level design, implement, test, deploy