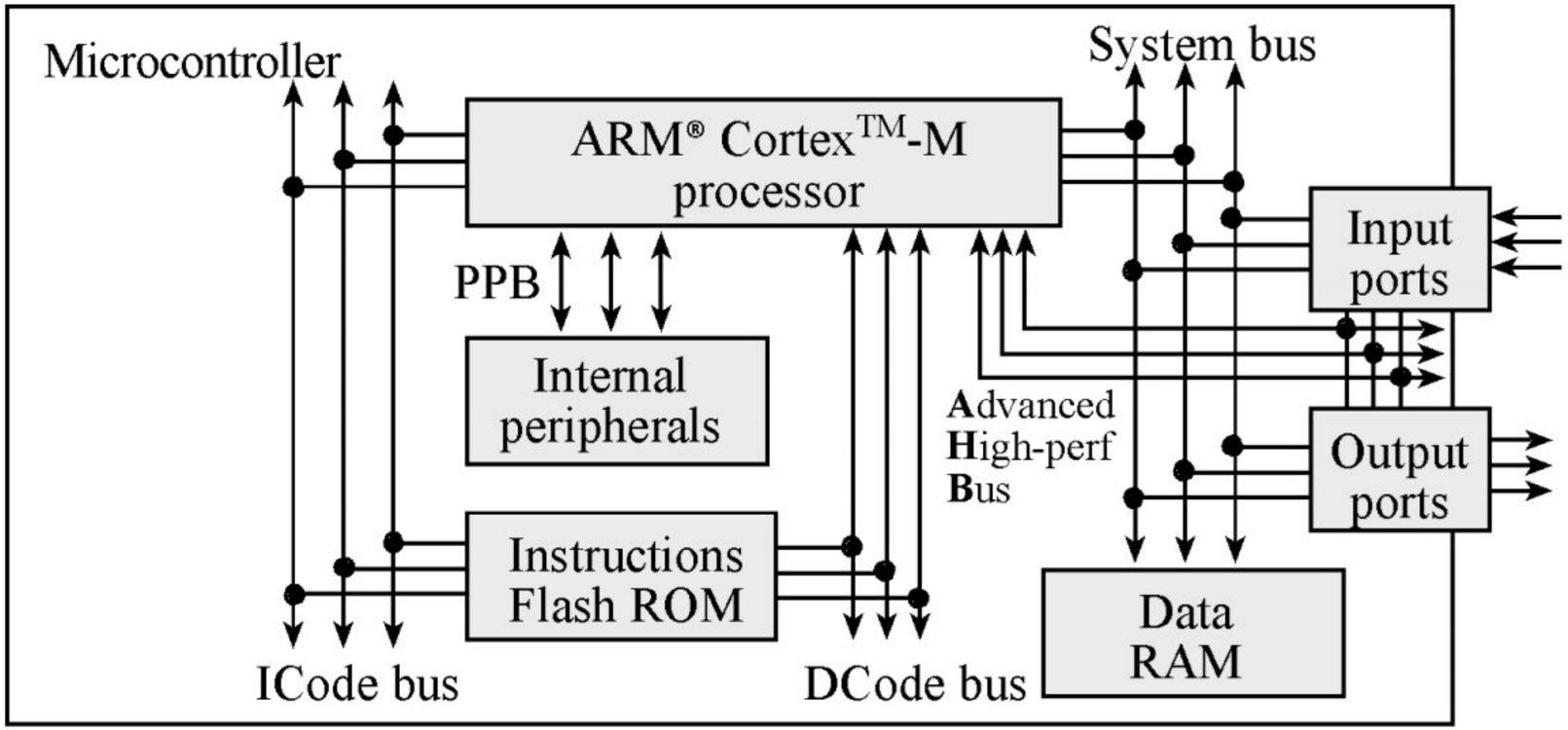
Sheet 1

- Draw the block diagram of ARM Cortex-M based Microcontroller. How many general-purpose registers does the ARM Cortex-M processor has?

Answer

- 13 Registers general purpose registers.
- From R0 to R12 are general purpose registers and contain either data or addresses.



Sheet 1

- What is special about Register 13? Register 14? Register 15?

Answer

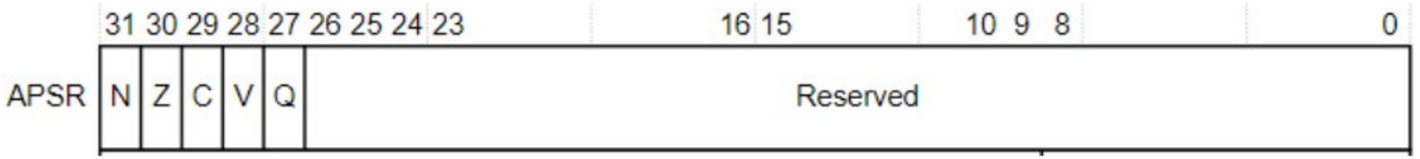
- Register R13 (also called the stack pointer, SP) points to the top element of the stack.
- Register R14 (also called the link register, LR) is used to store the return location for functions.
- Register R15 (also called the program counter, PC) points to the next instruction to be fetched from memory.

Sheet 1

- What are the bits in the Program Status Register (PSR) of Cortex-M processor?

Answer

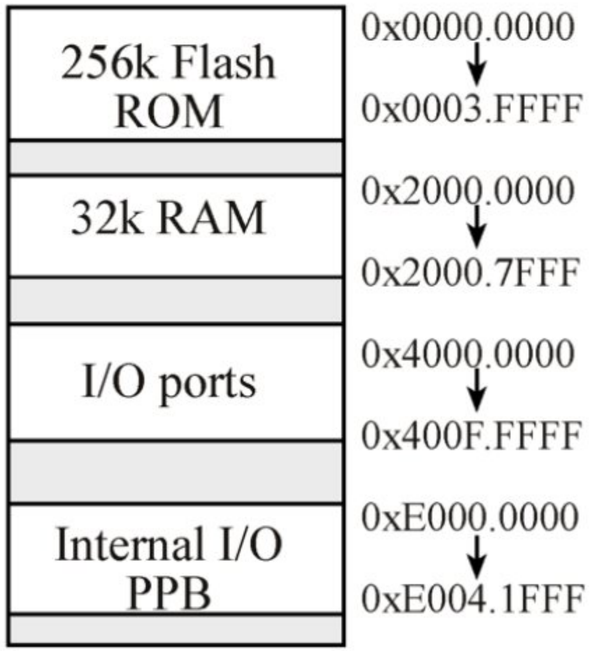
- The N, Z, V and C bits give information about the result of a previous ALU operation.
- N bit is set after an arithmetical or logical operation signifying whether the result is negative.
- Z bit is set if the result is zero.
- C bit means carry and is set on an unsigned overflow
- V bit signifies signed overflow



Sheet 1

- Draw the memory map of TM4C123? How much RAM and ROM are in TM4C123? What are the specific address ranges of these memory components?

Answer



Sheet 1

- How do you specify where to begin execution after a reset?

Answer

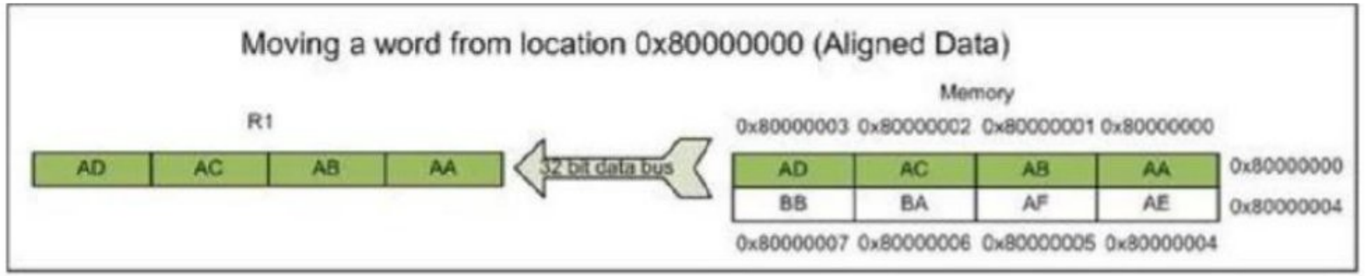
- After reset the 32-bit value stored at location 0 of flash ROM is loaded into the SP and the 32-bit value stored at location 4 of flash ROM is loaded into PC and LR register value is set to 0xFFFFFFFF

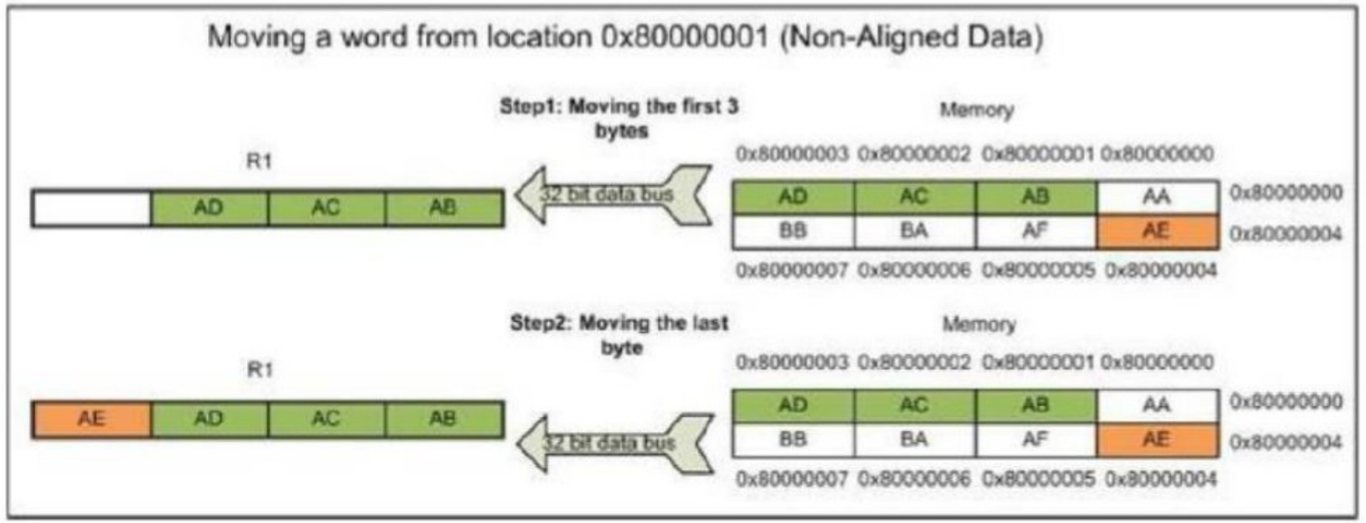
Sheet 1

- What does word-aligned and halfword-aligned mean?

Answer

- word-aligned : 32-bit word (each location in memory is 4 bytes) Address of words in memory must be multiples of 4 bytes.
- The least two significant bits of address must be zero





- Halfword-aligned : 16-bit word (each location in memory is 2 bytes). Address in memory must be multiples of 2 bytes.