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| 1. Stand-alone memory chip on the circuit board of the device | |
| 2. Embedded memory within the microcontroller (MCU) |  |

Cs302

Gdb solution

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Question:

1. Stand-alone memory chip on the circuit board of the device
2. Embedded memory within the microcontroller (MCU)

Suppose, you want to design a handheld device for the diagnosis of skin diseases. The device has a scanner that scans the skin and based on the scans, retrieves the information and processes it into its controller. The device must be equipped with RAM so that it can temporarily store the information during processing. Considering the given scenario, which one of the two techniques will you use and why? Give proper justification in support of your answer.

ANSWER:

Embedded vs Stand alone Memory

Embedded memory is a memory that is integrated in to the chip and it is a non stand alone memory. Embedded memory supports the logic core to perform its functions eliminating inter-chip communication. External memory devices refer to memory devices that reside outside of the logic core. Currently, embedded SRAM (Static Random Access Memory) and ROM (Read Only Memory) are widely used. On the other hand, External memory devices are stand alone memory devices such as hard disks and RAM that are not integrated on the chip.

Embedded Memory

Embedded memory is a non stand alone memory that is integrated in to the chip. Embedded memory is a vital component in VLSI (Very Large Scale Integration) since these devices can provide a high speed and wide bus capabilities. Development of embedded memory devices has become easier due to the large die size that allows integrating memory with the logic on the same chip and the improvement in process technology. Embedded SRAM are widely used as primary cache or level-one (L1) cache on the chip. Currently, there is lot of interest in developing embedded DRAM (Dynamic Random Access Memory) due to the increasing performance gap between microprocessors and DRAM. Due to the complexity of DRAM process technology, they are the least-used embedded memory devices. Embedded ROM are also widely used. Another option for embedded non volatile memory is the embedded flash memories. In addition to embedded EPROM and EEPROM, embedded flash memories can also be used in those places.

Stand alone Memory Devices

External memory devices refer to memory devices that are not integrated in to the chip. These include devices like hard drives, CD/ DVD ROM, RAM and ROM that are not integrated in to the chip. Traditionally, external memory referred to devices that were used as permanent storage of large quantities of data such as magnetic disks, CD ROM, etc. Most widely used external memory device is the hard disk, which typically has the capability to store a large amount of data.

What is the difference between Embedded and Stand alone Memory?

Embedded memory devices are memory devices that are integrated on to the chip with the logic core, while external memory devices are memory devices that reside outside the chip. Embedded SRAM and ROM are widely used than external or stand alone SRAM and ROM. Using embedded memory devices reduces the number of chips and reduces the space requirements used by the device. Furthermore, when the memory is embedded on the chip it provides faster response time and reduced power consumption than using an external memory device. On the other hand, developing embedded memory devices require a complex design and manufacturing process than external memory devices. Also, integrating different types of memory on the same chip would make the manufacturing process more complex. Additionally, a memory portion (made up of RAM, ROM, etc.) could consume a large portion of the chip making the designing more challenging for the designers.