Introduction to Information Technology

CSC109

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3.6 Primary Memory

➤Primary memory is the main memory of computer.

➤RAM and

➤ROM
Data once stored in ROM either cannot be changed or can only be changed using some special operations.

➤Flash memory ？ ？

R.3   RAM is used for the temporary storage of input data, output data and intermediate results. The input data entered into the computer using the input device, is stored in RAM for processing.

After processing, the output data is stored in RAM before being sent to the output device. Any intermediate results generated during the processing of program are also stored in RAM.

Therefore, ROM is used to store the data that does not require a change.

Flash memory is another form of rewritable read-only memory that is compact, portable, and requires little energy

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3.6 Primary Memory Cont..

RAM

➢ DRAM; uses transistors and capacitors. memory controller is used 50-150 ns, DDR2

➢ SRAM; Represent cache memory(L? and L?); Faster, uses Multiple Transistor ; more space, no refreshing,

RAM modules

➢ Single Inline Memory Module (SIMM)

➢ Dual Inline Memory Module (DIMM)

R.4   RAM loses information when the computer is powered off. It is a volatile memory. When the power is turned on, again, all files that are required by the CPU are loaded from the hard disk to RAM. Since RAM is a volatile memory, any information that needs to be saved for a longer duration of time must not be stored in RAM

The performance of RAM

Access speed

Data transfer unit size

DRAM is the most common type of memory chip.

o It uses transistors and capacitors. The transistors are arranged in a matrix of rows and columns. The capacitor holds the bit of information 0 and 1. The transistor and capacitor are paired to make a memory cell. The transistor acts as a switch that lets the control circuitry on the memory chip read the capacitor or change its state.

o DRAM must be refreshed continually to store information. For this, a memory controller is used. The memory controller recharges all the capacitors holding a 1 before they discharge. To do this, the memory controller reads the memory and then writes it right back.

o DRAM gets its name from the refresh operation that it requires to store the information; otherwise it will lose what it is holding. The refresh operation occurs automatically thousands of times per second. DRAM is slow because the refreshing takes time.

o Access speed of DRAM ranges from 50 to 150 ns

SRAM chip is usually used in cache memory due to its high speed.

o SRAM uses multiple transistors (four to six), for each memory cell. It does not have a capacitor in each cell.

o A SRAM memory cell has more parts so it takes more space on a chip than DRAM cell.

o It does not need constant refreshing and therefore is faster than DRAM.

o SRAM is more expensive than DRAM, and it takes up more space.

o It stores information as long as it is supplied with power.

o SRAM are easier to use and very fast. The access speed of SRAM ranges from 2– 10 nanosecond

o SIMM modules have memory chip on one side of the PCB. SIMM modules can store 8 bits to 32 bits of data simultaneously.

o DIMM modules have memory chips on both sides of the PCB. DIMM format are 64–bit memories. Smaller modules known as Small Outline DIMM (SO DIMM) are designed for portable computers. SO DIMM modules have 32–bit memory

3.6 Primary Memory Cont..

ROM

ROM is a *non-volatile* primary memory. It does not lose its content when the power is switched off. Permanent,

o *Power On Self Test (POST)*

o *BIOS setup program*

o *Bootstrap Loader*

➢ PROM

➢ EPROM

➢ EEPROM

R.5 ROM comes programmed by the manufacturer

The ROM memory chip (Figure 3.5) stores the Basic Input Output System (BIOS). BIOS provides the processor with the information required to boot the system. It provides the system with the settings and resources that are available on the system. BIOS is a permanent part of the computer. It does not load from disk but instead is stored in a ROM memory chip. The program code in the BIOS differs from ordinary software since it acts as an integral part of the computer. When the computer is turned on, the BIOS does the following things—

o Power On Self Test (POST) is a program that runs automatically when the system is booted. BIOS performs the power-on self-test. It checks that the major hardware components are working properly.
o BIOS setup program, which is a built-in utility in BIOS, lets the user set the many functions that control how the computer works. BIOS displays the system settings and finds the bootable devices. It loads the interrupt handlers and device drivers. It also initializes the registers.
o Bootstrap Loader is a program whose purpose is to start the computer software for operation when the power is turned on. It loads the operating system into RAM and launches it. It generally seeks the operating system on the hard disk. The bootstrap loader resides in the ROM. The BIOS initiates the bootstrap sequence.
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