



Basics of Memory Management

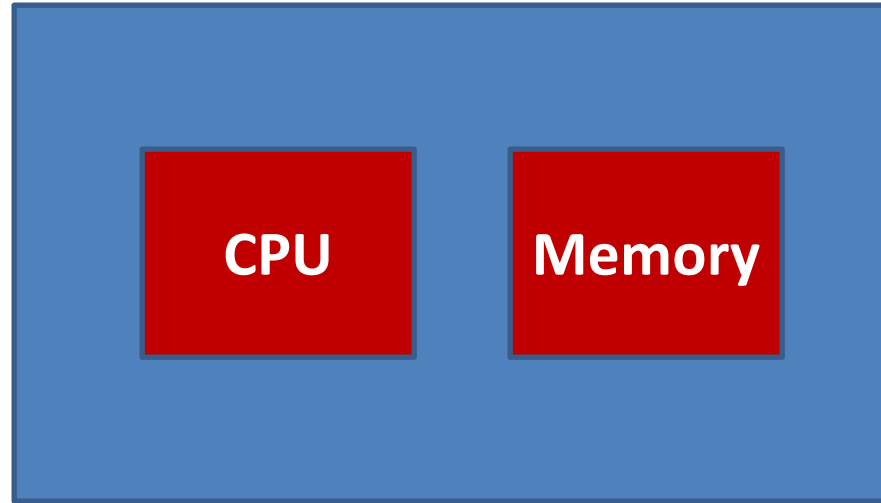
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Basics of Memory



Computer

In broader scenario of computer, two important aspects; CPU and Memory.

Basics of Memory

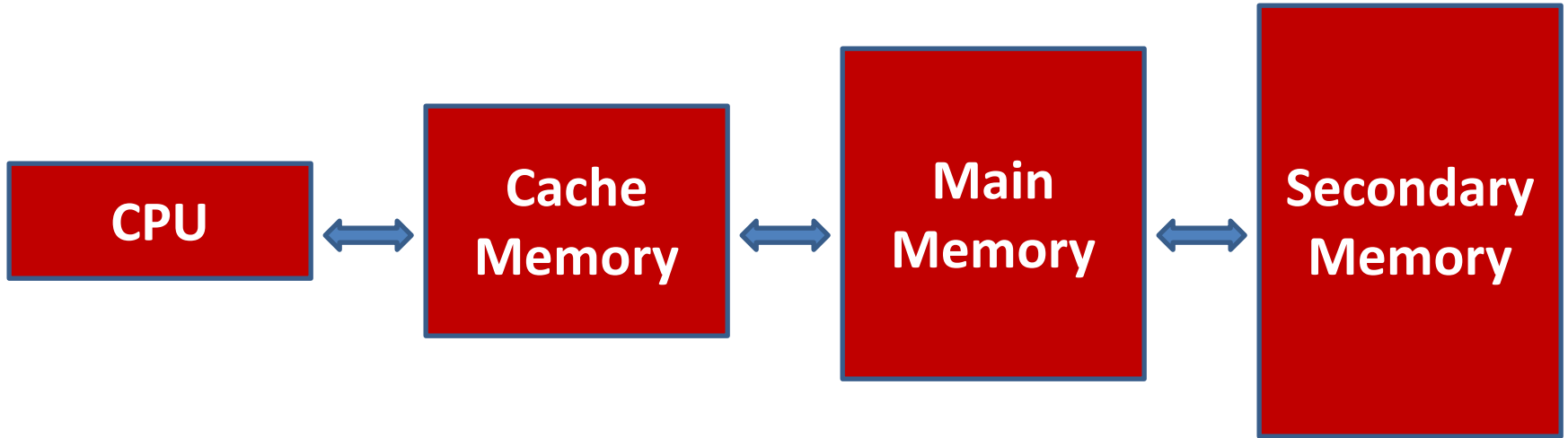
Desirable characteristics of Memory:

- 1) Size: we require more memory.
- 2) Access time: it should be less.
- 3) Per unit cost: should be less.

Note: all these scenario can not meet in one case.

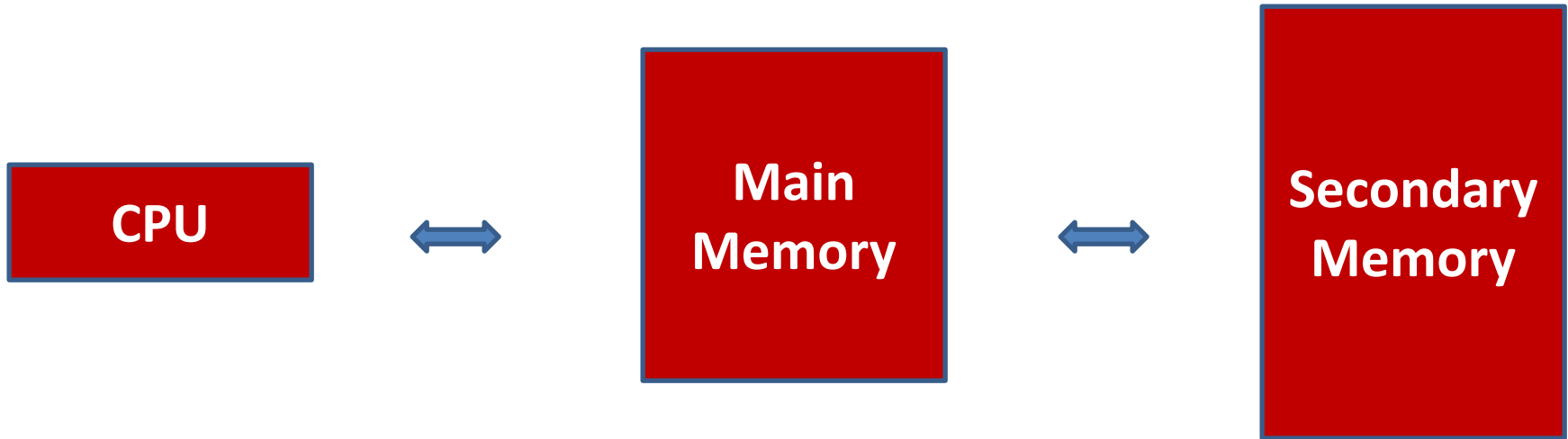


Hierarchy of Memory



- This organization satisfy the desired outcome.
- In the OS, we have to focus on main memory.

Hierarchy of Memory



Access time of main memory (MM)=10 ms

Access time of secondary memory (SM)=100ms

Hit percentage in MM=90%

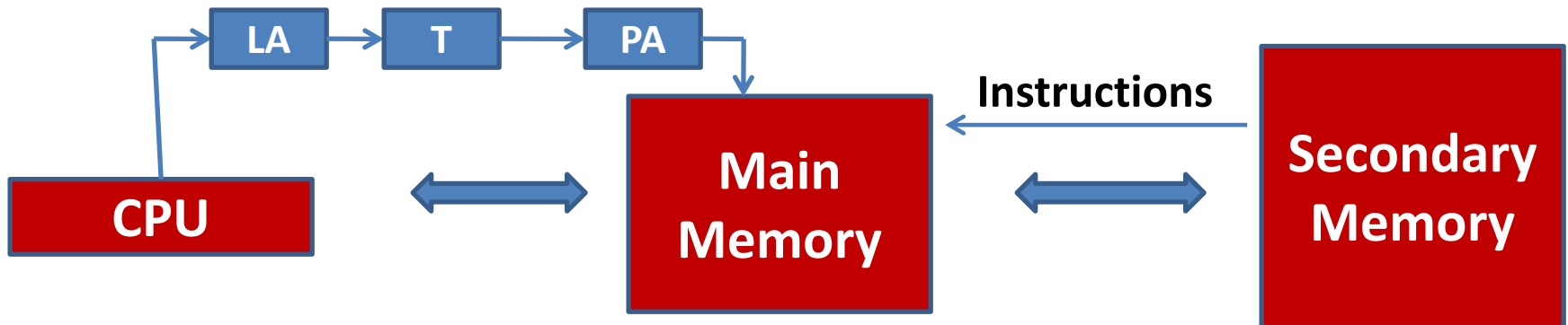
Average access time= $0.9(10)+0.1(10+100)$

= 9+11

=20 ms

Basics of Memory Management

- There are two issues need to be discussed:
 - Space allocation: how instructions come from secondary memory to main memory.
 - Address Translation: CPU generates logical address(LA). This LA is used to access secondary memory. For main memory we require physical address (PA). Therefore required address translation from LA to PA



Memory Allocation

- Memory Allocation: means the method in which how processes are getting space into main memory when access from secondary memory.
- It has two types:
 - Contiguous Memory Allocation
 - Non-contiguous Memory Allocation.

Contiguous Memory Allocation

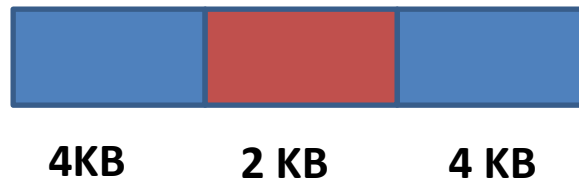
- **Contiguous memory allocation** is a **memory allocation** method that allocates a single **contiguous** section of **memory** to a process or a file.
- This method takes into account the size of the file or a process and also estimates the maximum size, up to what the file or process can grow?

Contiguous Memory Allocation



Example: Array

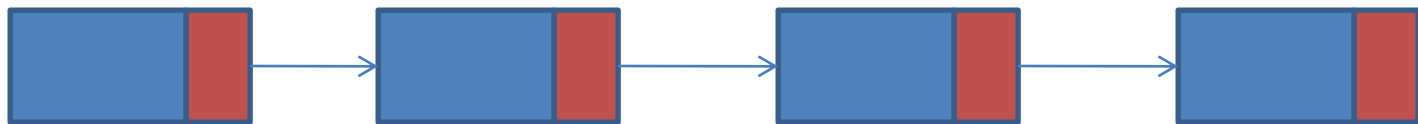
- Advantage:
 - Fast access of element
- Disadvantage:
 - External Fragmentation



- A file of 5 KB needs space in main memory. In total available space is 8 KB but even file can not get space into memory.

Non-Contiguous Memory Allocation

- In Non-Contiguous allocation, process can be divided into different parts and hence filling the space in main memory.
- Example: Linked List



Non-Contiguous Memory Allocation

- **Advantage:**



A file with 5 KB size can divide into two parts; one part of 4 KB fit in one block and another 1 KB fit into another block.

- **Disadvantage:**

Access of element is very slow.

Thank You