Introduction to General Computer Systems (Memory)

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***Content has been taken mainly from the following books**:*

Operating Systems Concepts By Silberschatz & Galvin,
Operating Systems: Internals and Design Principles By William Stallings
www.os-book.com
www.cs.jhu.edu/~yairamir/cs418/os2/sld001.htm
www.personal.kent.edu/~rmuhamma/OpSystems/os.html
http://msdn.microsoft.com/en-us/library/ms685096(VS.85).aspx
http://www.computer.howsttuffworks.com/operating-system6.htm
http://williamstallings.com/OS/Animations.html
Etc…

Computer Memory

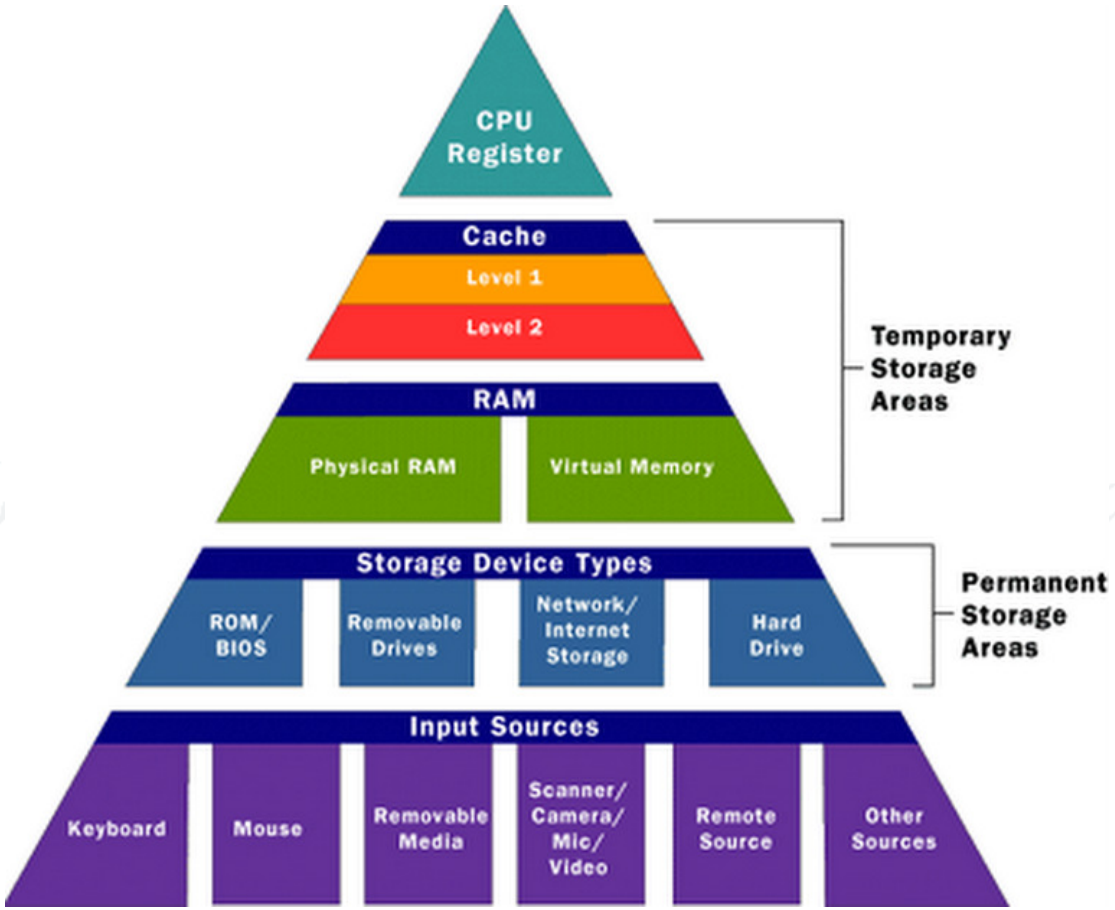
- *Computer Memory* refers to the physical devices used to store data or programs (sequences of instructions) on a temporary or permanent basis for use in an electronic digital computer.

- Computer Data Storage, often called *Storage* or *Memory*, refers to computer components and recording media that retain digital data used for computing for some interval of time.

- The term *Memory* identifies data storage that comes in the form of chips.

- The word *Storage* is used for memory that exists on tapes or disks.

Computer Memory Hierarchy



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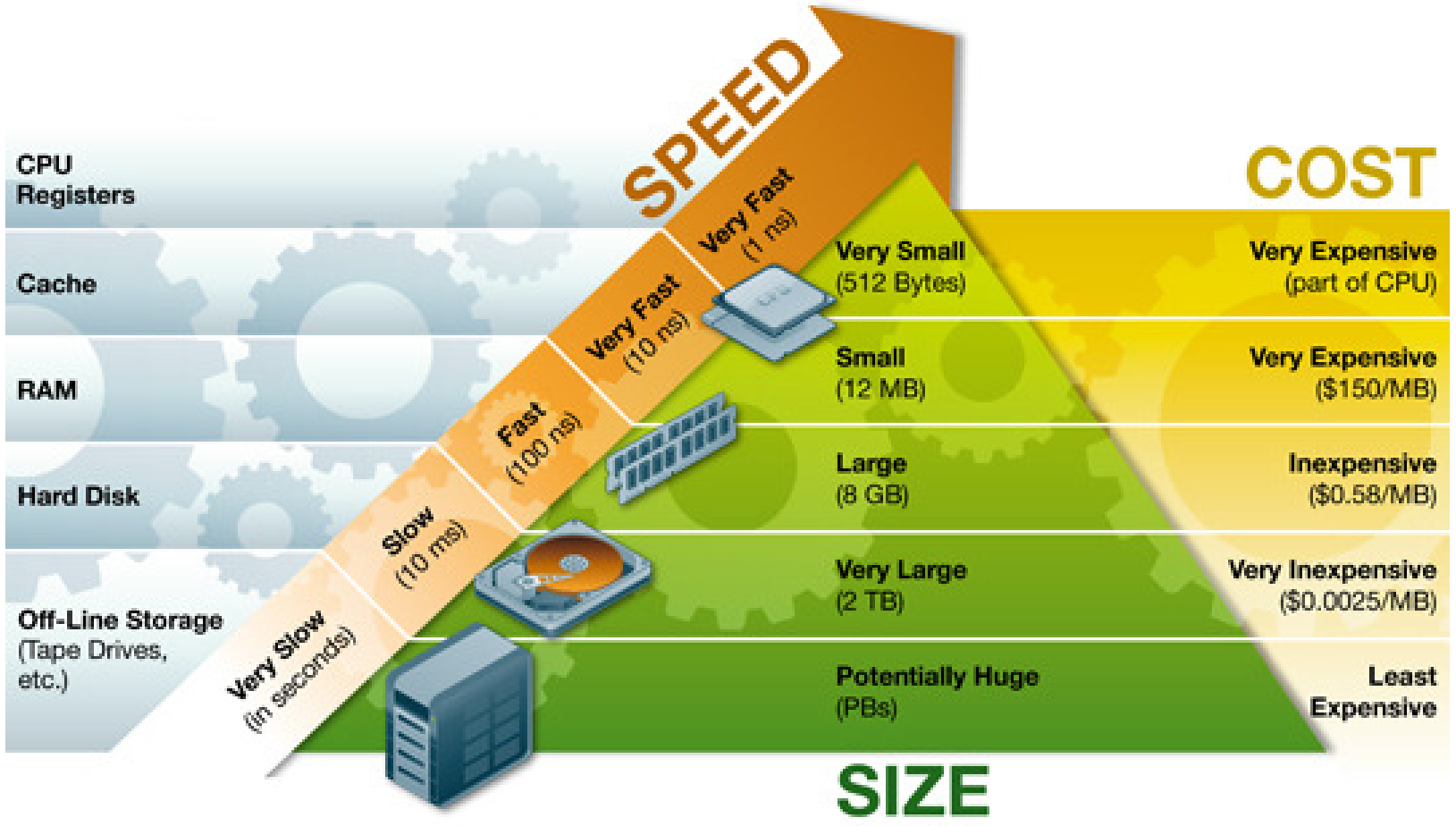
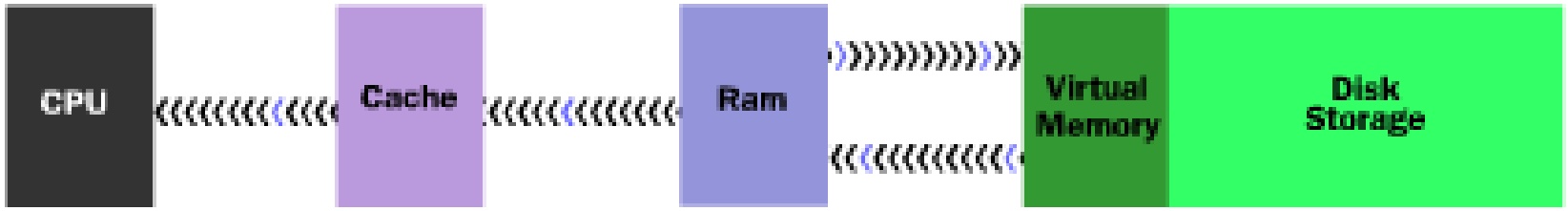
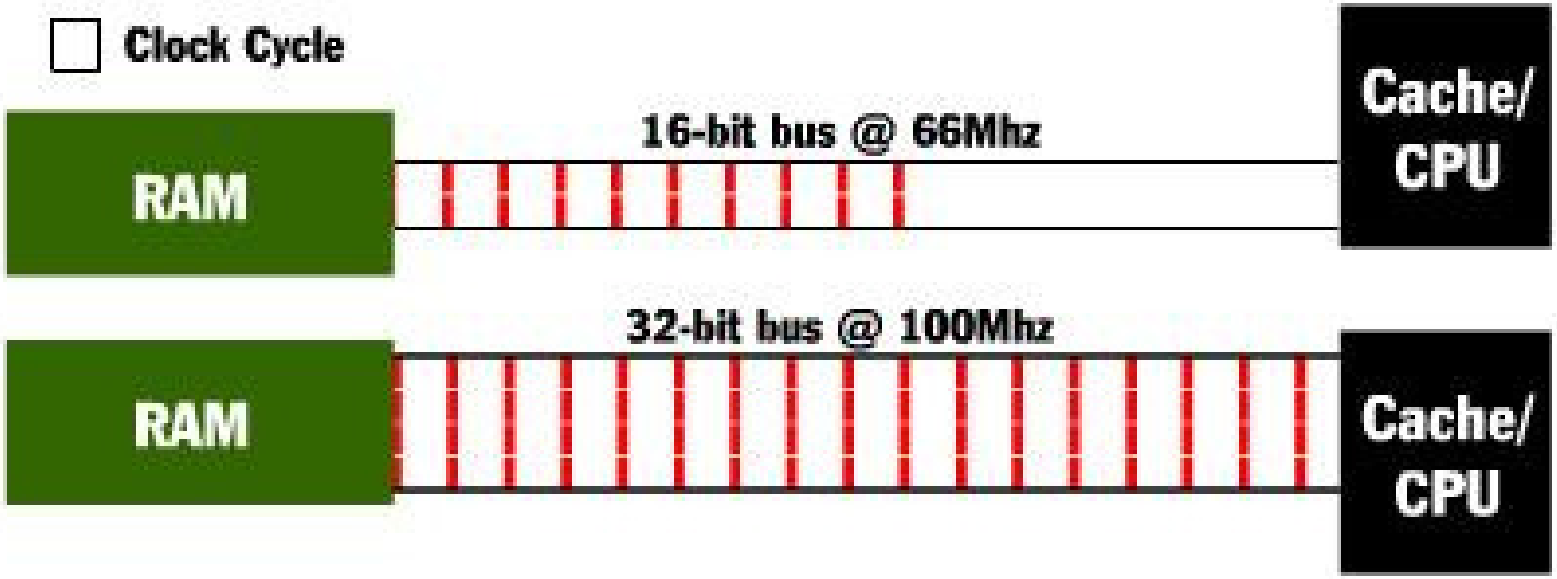
Computer Memory Hierarchy (Conti…)



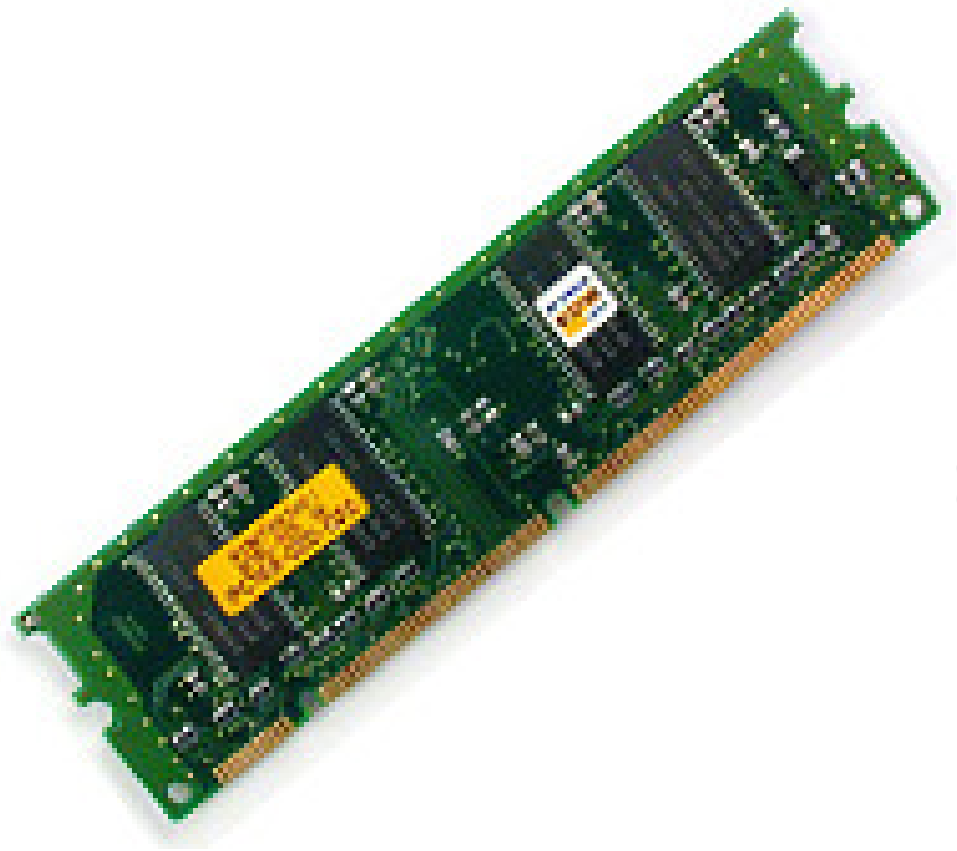
Data Flow – Disk to CPU



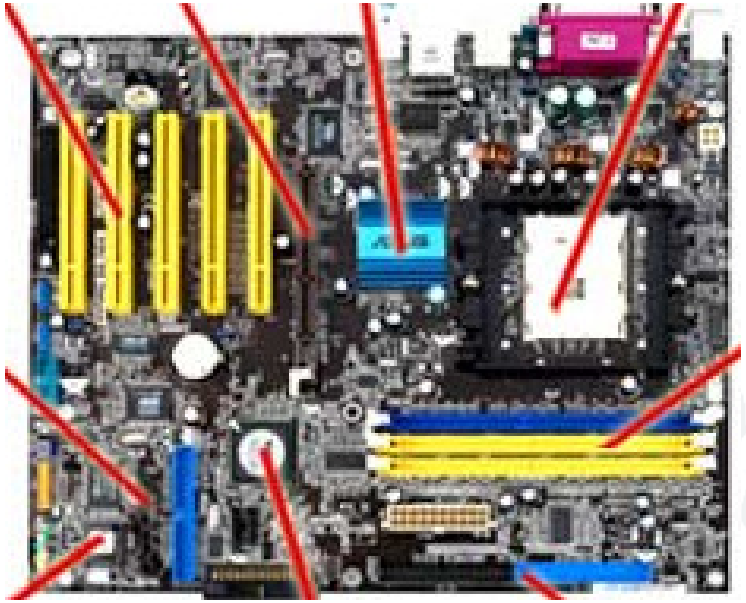
Data Flowing b/w CPU & RAM



RAM



Motherboard



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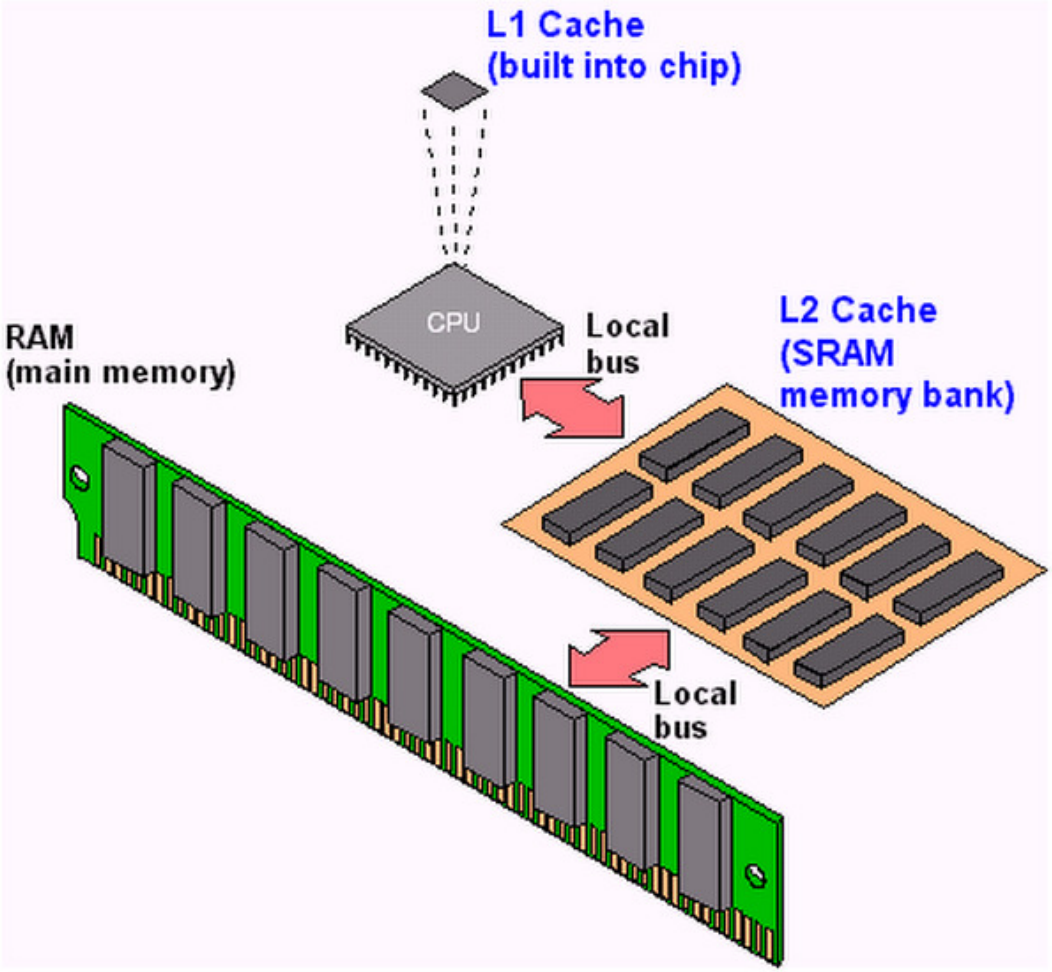
L1 & L2 Cache


L1 Cache
(built into chip)
CPU
Local
bus
L2 Cache
(SRAM
memory bank)
RAM
(main memory)
Local
bus

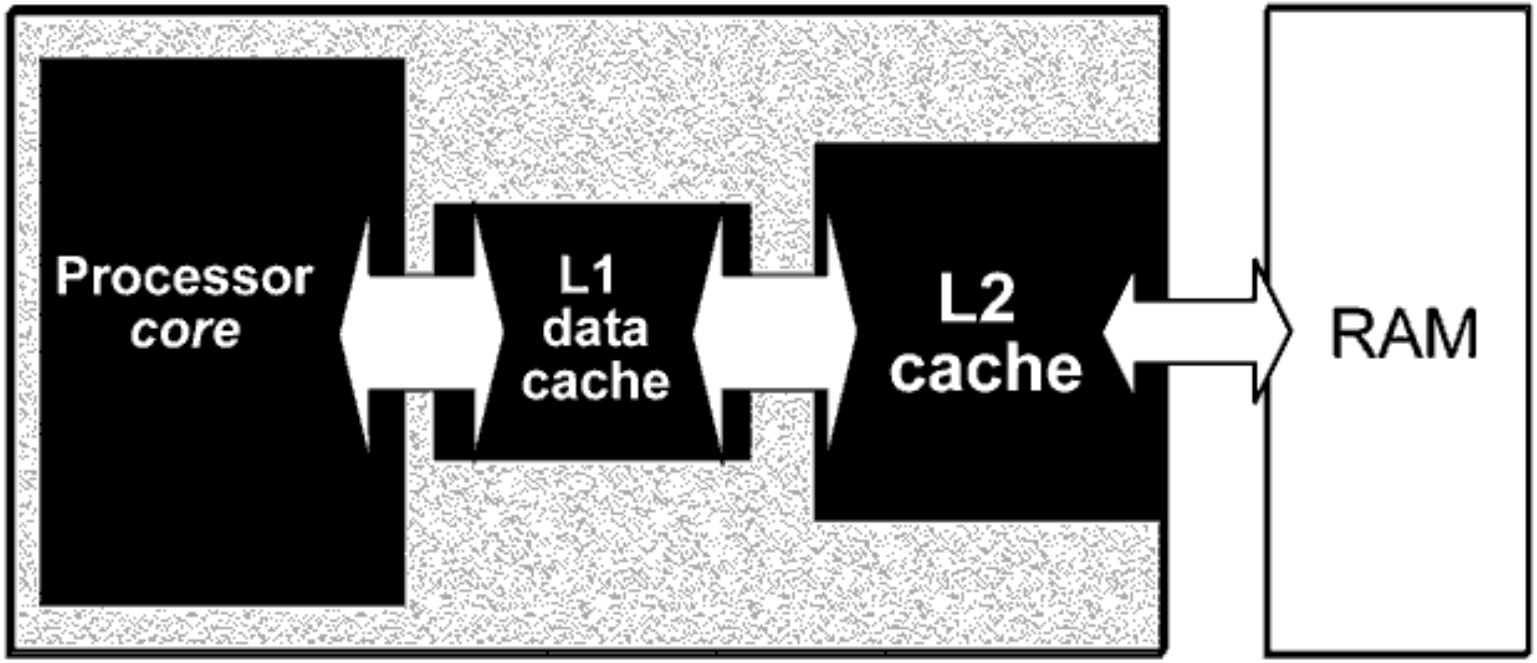
Real Life/Time Example

- Real Life/Time Example – Librarian while issuing a particular requested BOOK using SHELF only.

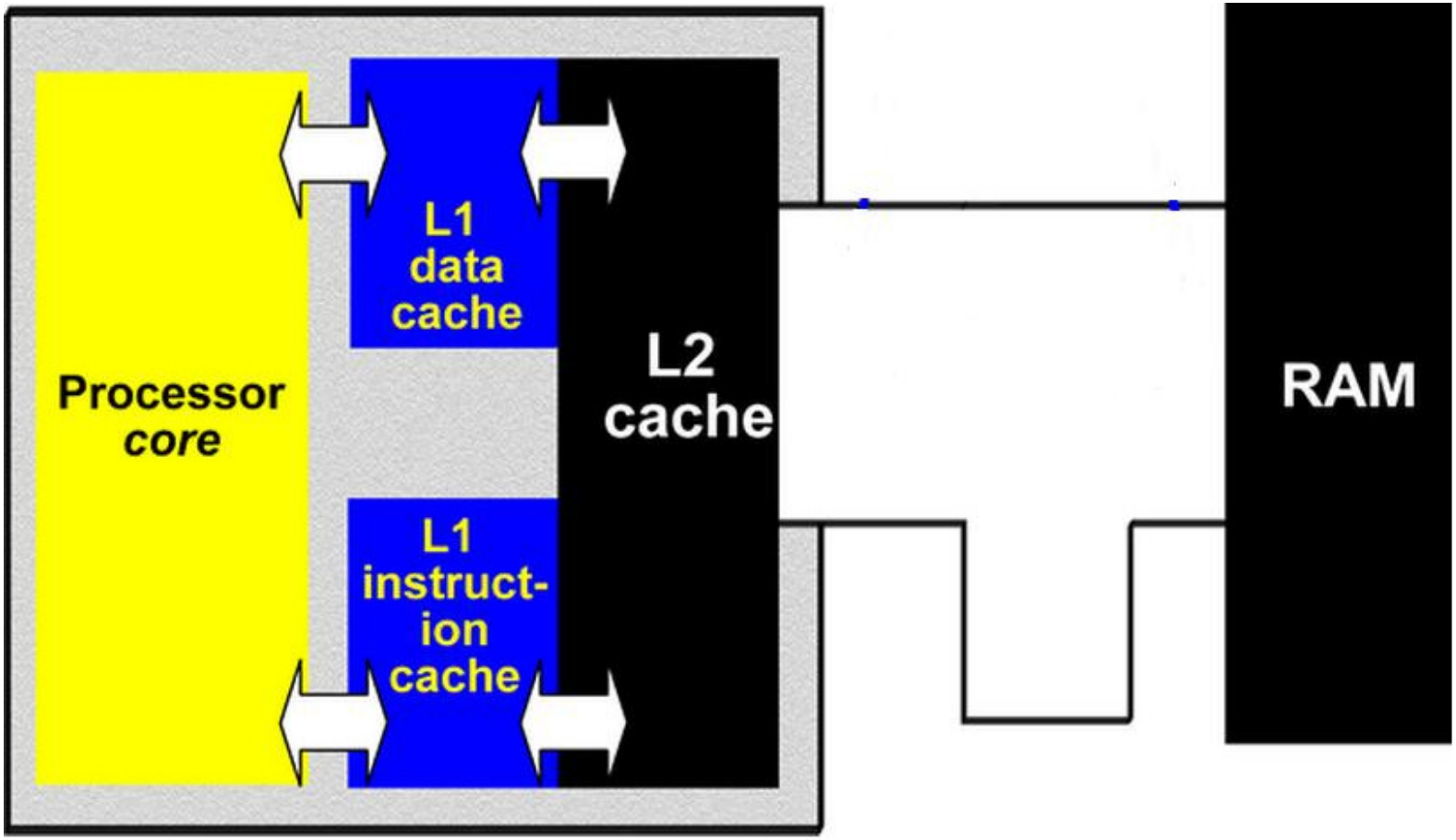
Real Life/Time Example

- Real Life/Time Example – Librarian while issuing a particular requested BOOK using BACKPACK and SHELF

L1 & L2 Cache



L1 & L2 Cache


Processor
core
L1
data
cache
L1
instruct-
ion
cache
L2
cache
RAM

L1, L2, Main Memory ,Hard Disk

- *L1 Cache* - Memory accesses at full microprocessor speed
  (around 10 nanoseconds, 4 kilobytes to 16 kilobytes in size)

- *L2 Cache* - Memory access of type SRAM
  (around 20 to 30 nanoseconds, 128 kilobytes to 512 kilobytes in size)

- *Main Memory* - Memory access of type RAM
  (around 60 nanoseconds, 32 megabytes to 128 megabytes in size)

- *Hard Disk* - Mechanical, slow
  (around 12 milliseconds, 1 gigabyte to 10 gigabytes in size)

Thnx…