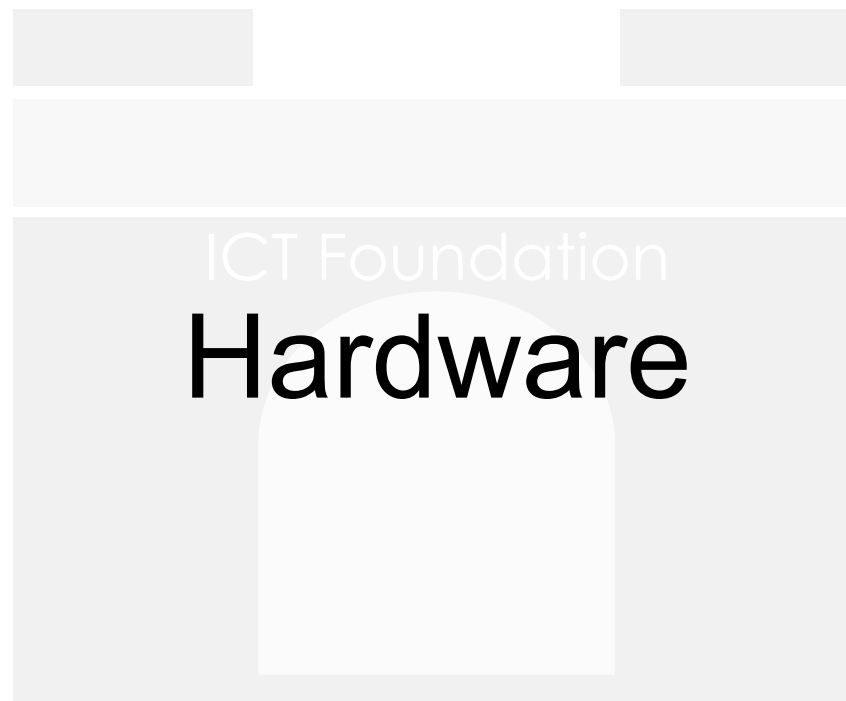


Difference between Human and Computer

- Computer
 - Computers perform complex computation or process large amount of data, control devices, communicate following a stored set of instructions at high speed and without mistaking
- Human
 - Human is able to perform computation without waiting for instruction, and to making appropriate response when the condition of these computations and judgements changes
 - From the experience on solving various problems, human is able to come up with faster methods
 - Human is able to process data which is hard to demonstrated in numeric values

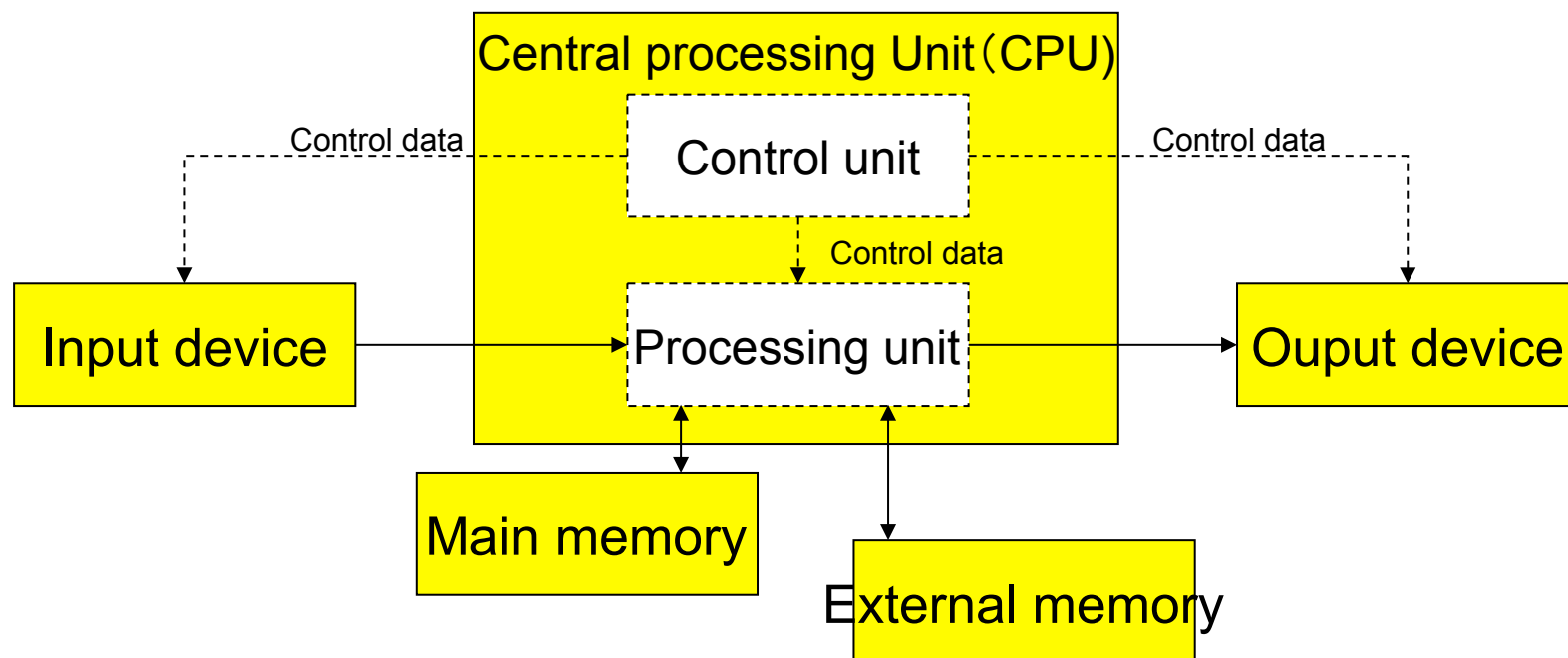
Computer's components

- Components
 - Hardware
 - Parts that contain electric circuits
 - Software (Program)
 - Things that make orders for hardware to run
- Hardware are not able to operate by themselves, however if software is installed, they can be used in various purposes



Function and Structure of Hardware

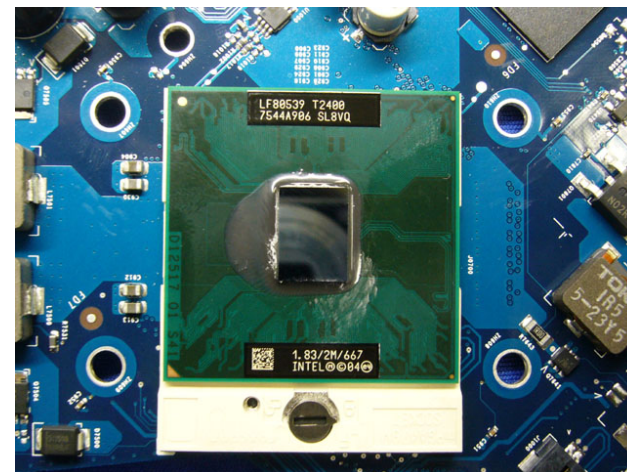
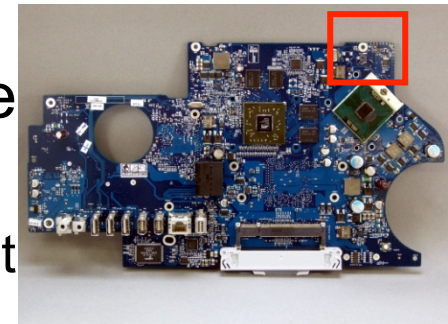
- There are 5 functions of a computer: input, output, storage, process, control



General view and function of Hardware

CPU 1

- Central Processing Unit
- Controlling: control the instruction set and the operation of devices that build up the computer
- Processing :interpret instructions and execute
 - Is constructed from processing unit and register
 - Processing unit uses data from register to carry out
 1. Data is sent from main memory or other storage to register
 2. Calculation is carried out with the data stored in register
 3. From registe result is sent back to main memory or other storage



General view and function of Hardware CPU 2

- Clock
 - In order to synchronize the timing of the operation of every parts in CPU, clock signal is sent at fixed interval
 - Clock signal set the pace for every processes that are executed on CPU
 - The shorter the interval of clock signal is, the faster that CPU can process
- Clock frequency(Hz)
 - Is the rate of cycles per second of clock signal (How many times clock signal is sent in one second)
 - Generally, the higher the frequency, the faster CPU

General view and function of Hardware Storage devices

- 2 main types of Storage device
- Primary storage (main memory)
 - Read and write speed is fast
 - Data being stored here will be lost when the power is turned off
- Secondary storage (external memory)
 - Read and write speed is much slower
 - Data being stored here will NOT be lost when the power is turned off

General view and function of Hardware

Main memory

- Read and write speed is fast
- Data being stored here will be lost when the power is turned off



A memory slot



A main memory

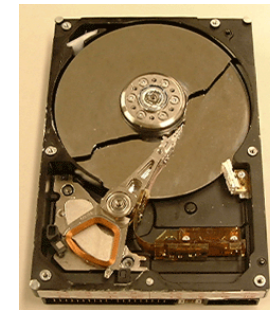
General view and function of Hardware

External memory 1

- Hard disk
 - Reads and writes data to a rotating magnetic disk
 - Data is stored into many concentric ring disks inside
 - A head (silver, pointed triangle) moves above the disks to read and write data or change track



Hard disk
outside



Hard disk inside

画像出展: Impress PC Watch Intel Core搭載iMacハードウェアレポート
<http://pc.watch.impress.co.jp/docs/2006/0117/imac01.htm>
<http://pc.watch.impress.co.jp/docs/2006/0119/imac02.htm>

General view and function of Hardware

External memory 2

- Other external storage
 - Floppy disk
 - USB flash disk
 - CD-ROM / CD-R / CD-RW
 - DVD

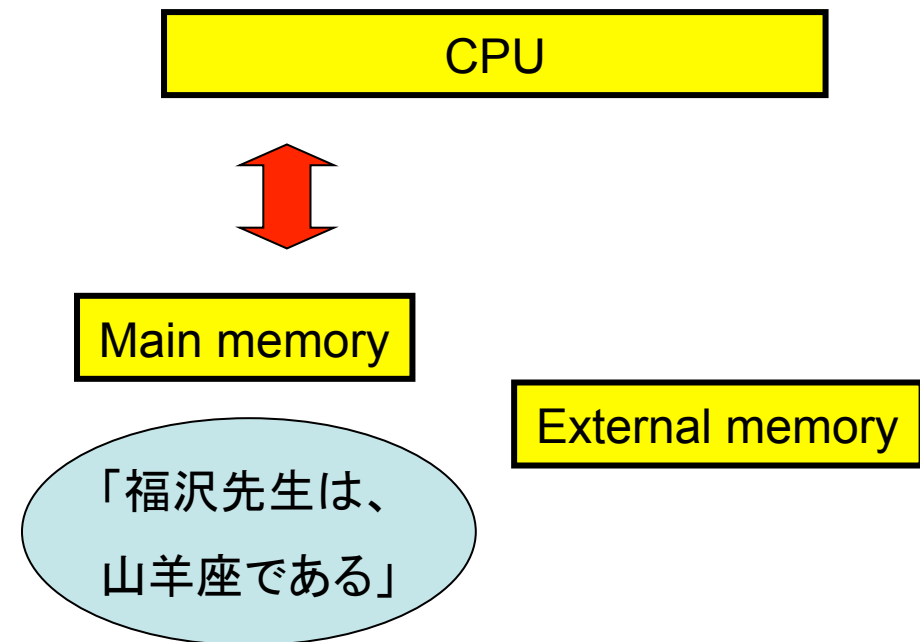
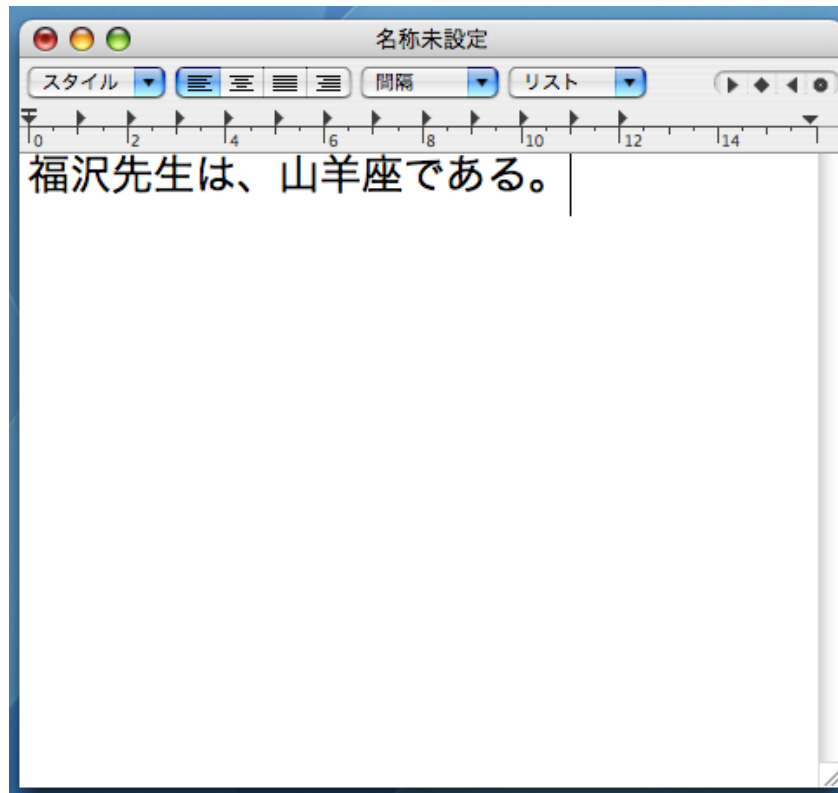


DVD Drive

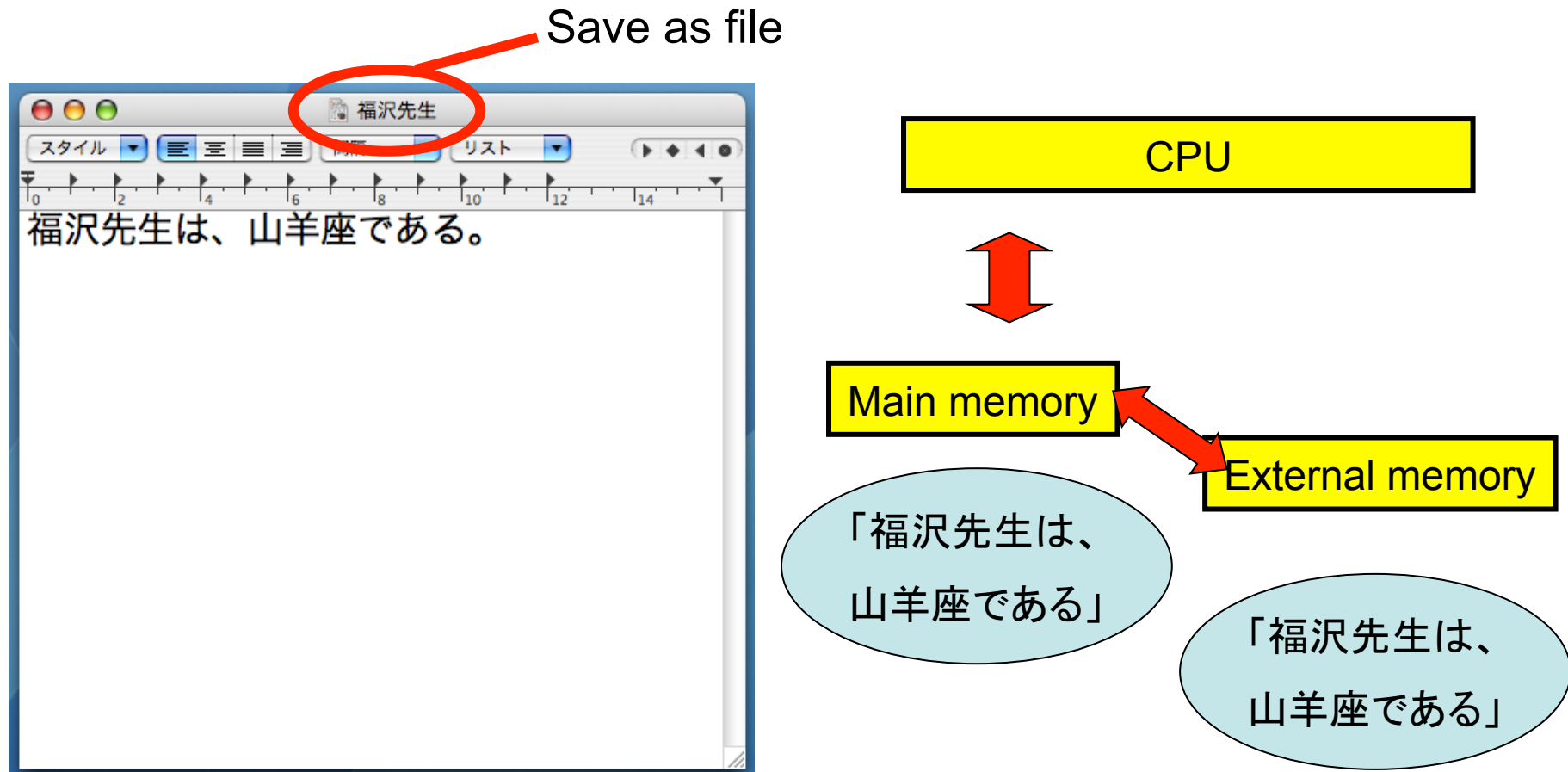
General view and function of Hardware Performance of Storage Device

- Capacity
 - How many bytes of data can be stored?
- Speed
 - How many bits of data can be read/written in 1 second?
 - Main memory is usually several hundreds of thousands times faster than secondary storage.

Main memory and external memory's role



Main memory and external memory's role



General view and function of Hardware Input device

- To deliver user's intention to computer
- To insert data into computer

画像出展 The Apple Store

<http://store.apple.com/0120-APPLE-1/WebObjects/japanstore.woa/wa/RSLID?nnmm=main&mco=EC571521>

- Keyboard
- Pointing devices
 - Mouse
 - Touchpad
 - Pen tablet
- Scanner
- Microphone



General view and function of Hardware

Output device

- To display processed result to user
- Display
 - LCD
 - CRT
- Printer
- Speaker



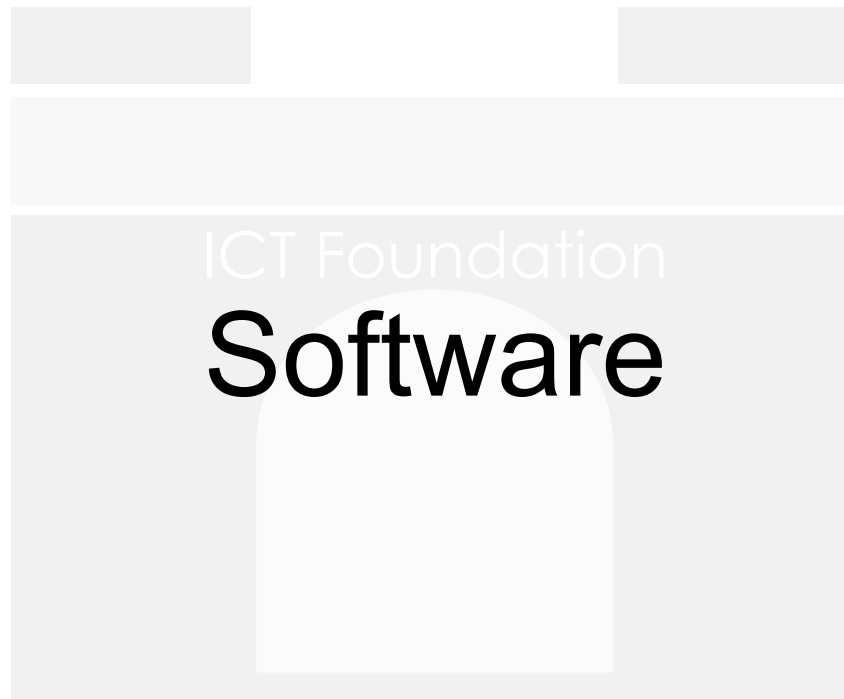
画像出展 The Apple Store

<http://store.apple.com/0120-APPLE-1/WebObjects/japanstore.woa/wa/RSLID?nnmm=main&mco=EC571521>

【Exercise】

Let's check your PC's specification

- Check the specification of your PC and fill out the form
 - Manufacturer, Model name
 - HDD or SSD (capacity), CPU(type, frequency), memory(capacity), OS
 - Weight, display(size, resolution), External drive(type, format), battery lifetime
 - Dimension (width x height x depth)
- Let's compare with others'



Software (Program)

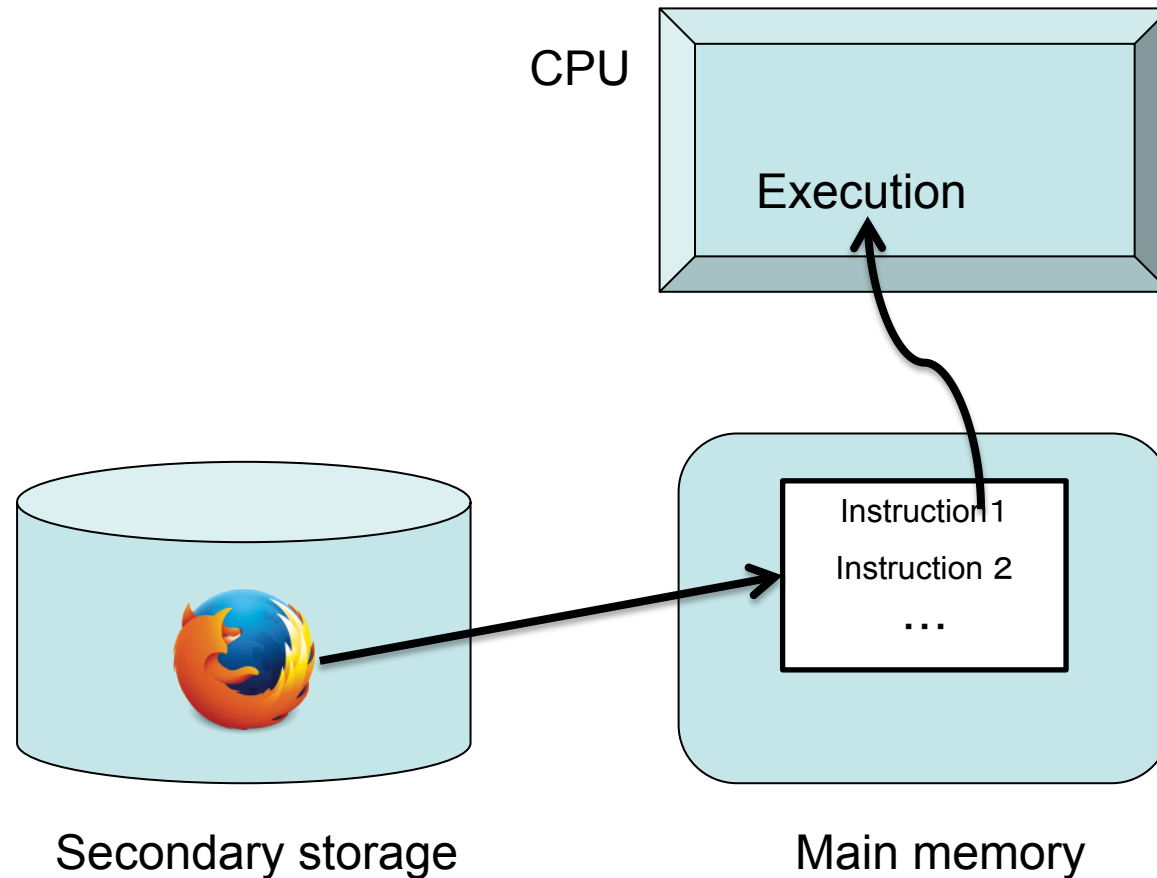
- Hardware can not operate themselves (computer will be just a box if there is no software installed)
- A sequence of instructions that a computer can interpret and execute is called program
- Many data can be used in many ways by installing programs

What is the different between a computer and a calculator?

- Both of them can calculate
- Calculator
 - Procedures and data are in user's mind
 - Users input data following the procedures
 - Input speed is slow
- Computer (= calculator + memory)
 - Program and data are stored inside (which is called von Neumann architecture)
 - Followed by that program, CPU will excute the calcucation
 - Can operate in high speed

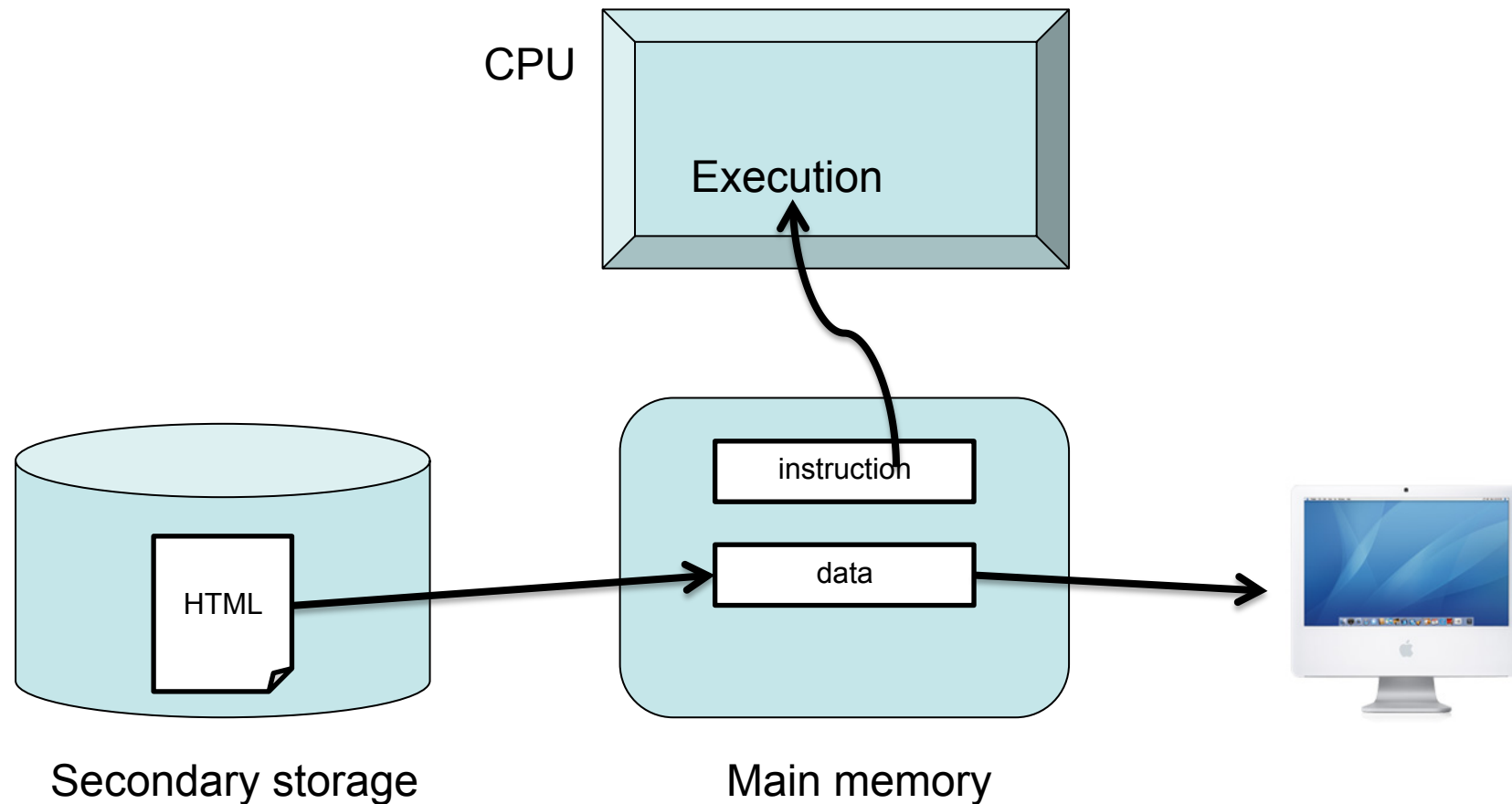
Execution of Software

Invoking Application



Execution of Software

Input/Output of Data



Basic Software and Application Software

- Application software
 - Is called “application”
 - Is used for specific purpose and work
 - Word processor Software, Spreadsheet Software, Mail Software

- Basic Software
 - Operating System (OS)
 - Is used to help applications run smoothly
 - Language Processor (Compiler)
 - Provides function which is used to make program