

Software System Development

Monsoon 2024



INTERNATIONAL INSTITUTE OF
INFORMATION TECHNOLOGY

HYDERABAD

Who are we?

Dr. Rahul Mishra

Assistant Professor, IIIT Hyderabad

Language Technologies Research Centre (LTRC)

Research Interests: Deep Learning, Natural Language Processing,
Information Retrieval.



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Guest Faculty, IIIT Hyderabad

Software Engineering Research Centre (SERC)

Data Product Manager, Accurate Background Inc.

Research Interests: Software Engineering for Emerging Technologies,
HCI, Software Developer Productivity & Waste

Course Details

- The overall goal of this course is to provide a working knowledge of tools to build software systems
- **Course Structure:** 2 Classes per week (1 hour 25 min per class), Lab Work – 1 every week (3 hrs per week), Tutorial- 1 every week (as and when required)
- **Course Notes:** Reference Material and relevant notes will be made available on Moodle. Students are expected to read the notes, put on effort, work towards raising your problem-solving skills and learn things by doing.
- **Grading Criteria:** Assignments – 15%, Quiz – 10%, MID Exam – 20%, Lab/class Activities – 15%, FINAL PROJECT – 40%
- **Facilitators:** Instructors and Teaching Assistants.
- **Time:** Honor Time and Come with learning mindset. Ensure that you record your queries and discuss them offline when we run out of time.
- **Lab Work:** Shell, HTML, CSS, JS, React, Flask, Python, SQL, NoSQL

Academic Honesty

- A helps B in task X
 - B doesn't get opportunity to do task X
 - B doesn't learn the skill to do task X
 - B gets spoilt, dependent and unfit for jobs requiring skills of X
 - You may think it is okay to do it only once and not repeat it. But when a thing is done once, it gets wired into the brain as being “okay”; and unless there is a strong reason, it will repeat.
- If you want to help, help to learn.

What are common in these?

They are large complex “systems” with ***lot*** of software & hardware.

- The Boeing 777 flies with over 5,000,000 lines of code onboard.
- A typical top-level game has between 1 and 2 M SLOC (source lines of code)
- Thousands of devices

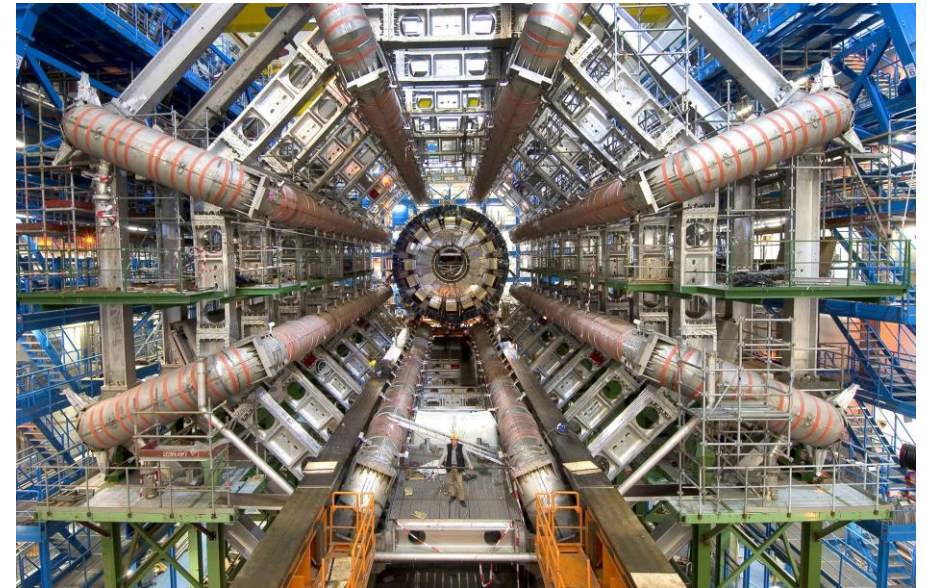
Programs

Teamwork

Process

Communication

Engineering Design



What is a System?

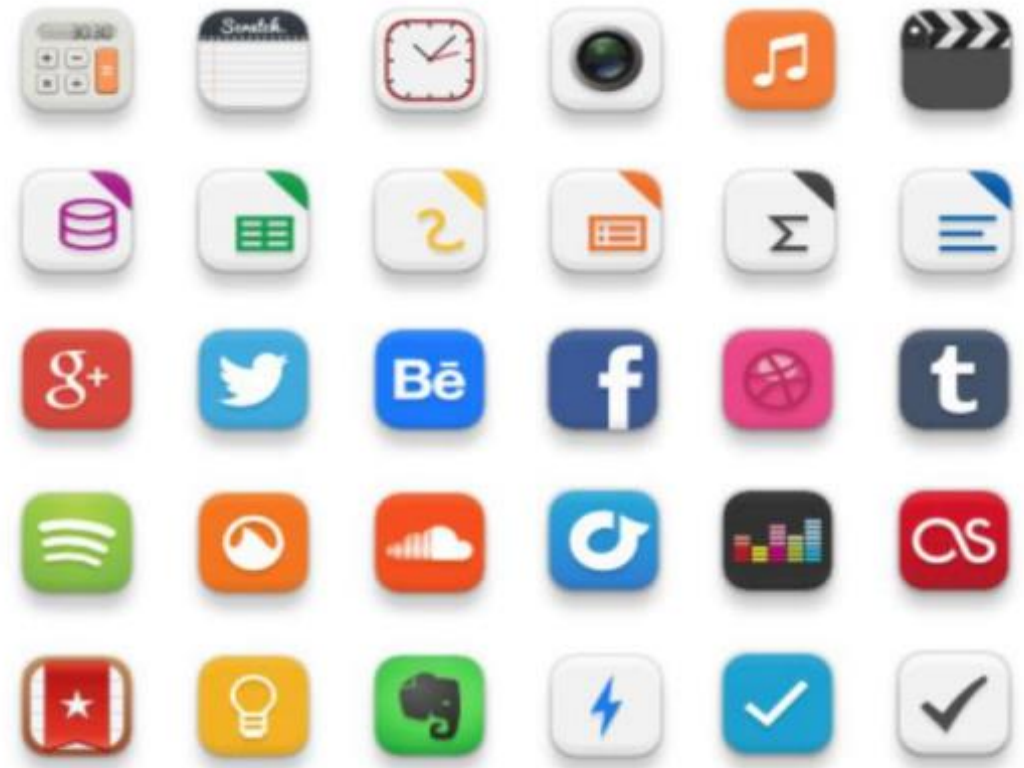
- Commonly used/understood definition
 - Set of inter-related components working together to achieve a common objective
- A system may be “**natural**” or “**Engineered**”
 - Solar System (Natural)
 - Telephone network system, power plants etc. (Engineered)
 - Systems have boundaries – due to various reasons

This course is all about...!





HARDWARE



SOFTWARE

HARDWARE

Requirements of Basic Computing Device

- Input & Output Unit
- Memory Unit {primary, secondary}
- Processing Unit – {ALU, CU, Registers}
- Interconnection Structures – {control, address & data buses}

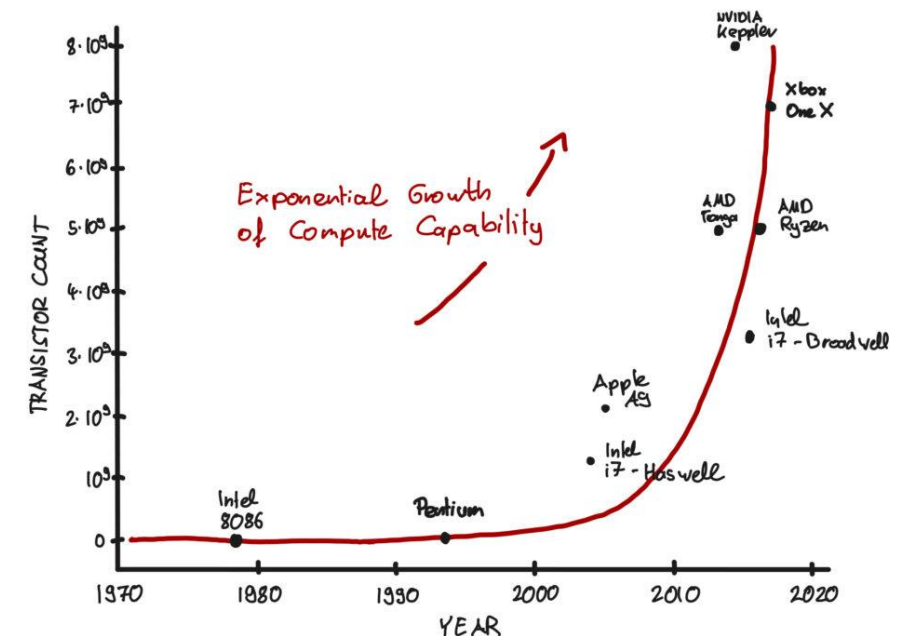
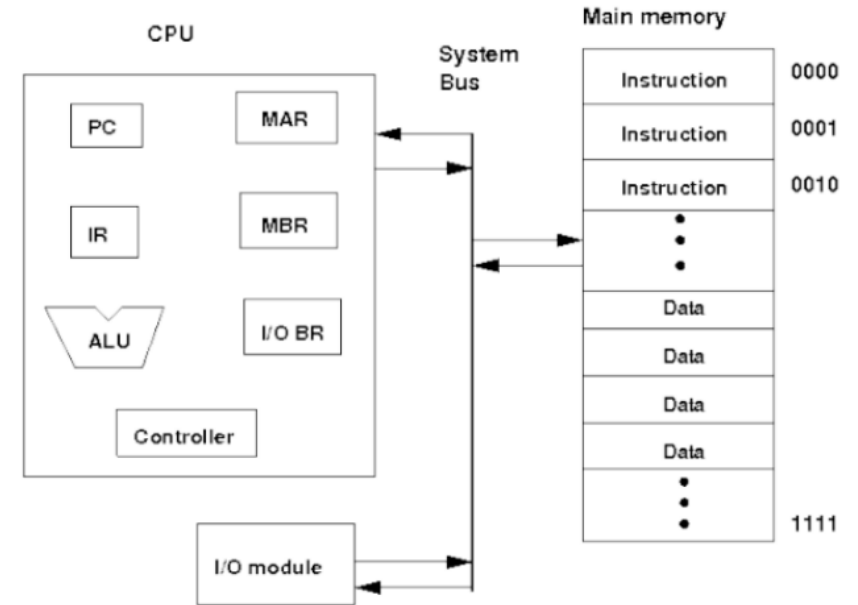
Ingredients of a Better Computation Power

- Organization of Hardware
- Mode of Processing
- Data Storage
- Processing Speed
- Complexity
- Control Mechanism
- Resilience

[MOORE'S LAW]

An observation that the number of transistors on a microchip roughly doubles every two years, whereas its cost is halved over the same timeframe

Gordon Moore (1929-2023)



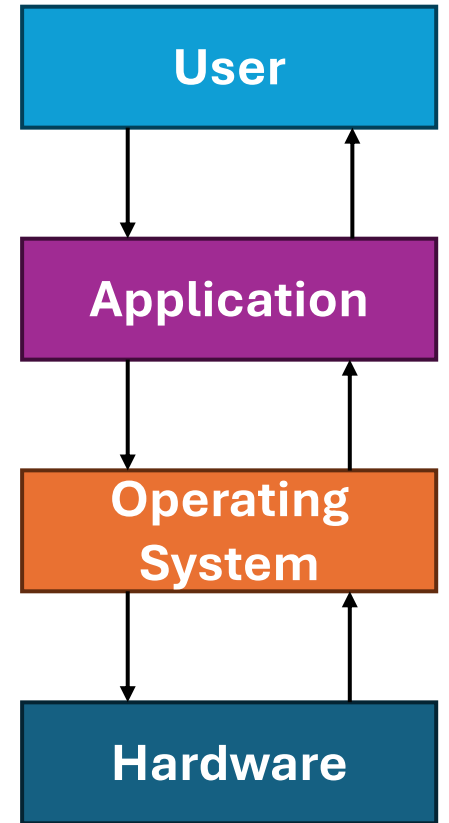
SOFTWARE

Software – A set of programs, procedures, algorithms and its documentation. It is written using programming languages

- *High-Level Languages* – e.g. C, C++, Java etc.
- *Assembly Language* – mnemonic-based e.g. ADD, SUB, MOV
- *Low-Level Language* – native language of computer circuitry

Language – has Syntactic + Semantic rules, otherwise called as Syntax, logical and/or runtime errors

Types – Compiled Languages Vs Interpreted Languages Usage
– Application Software Vs System Software



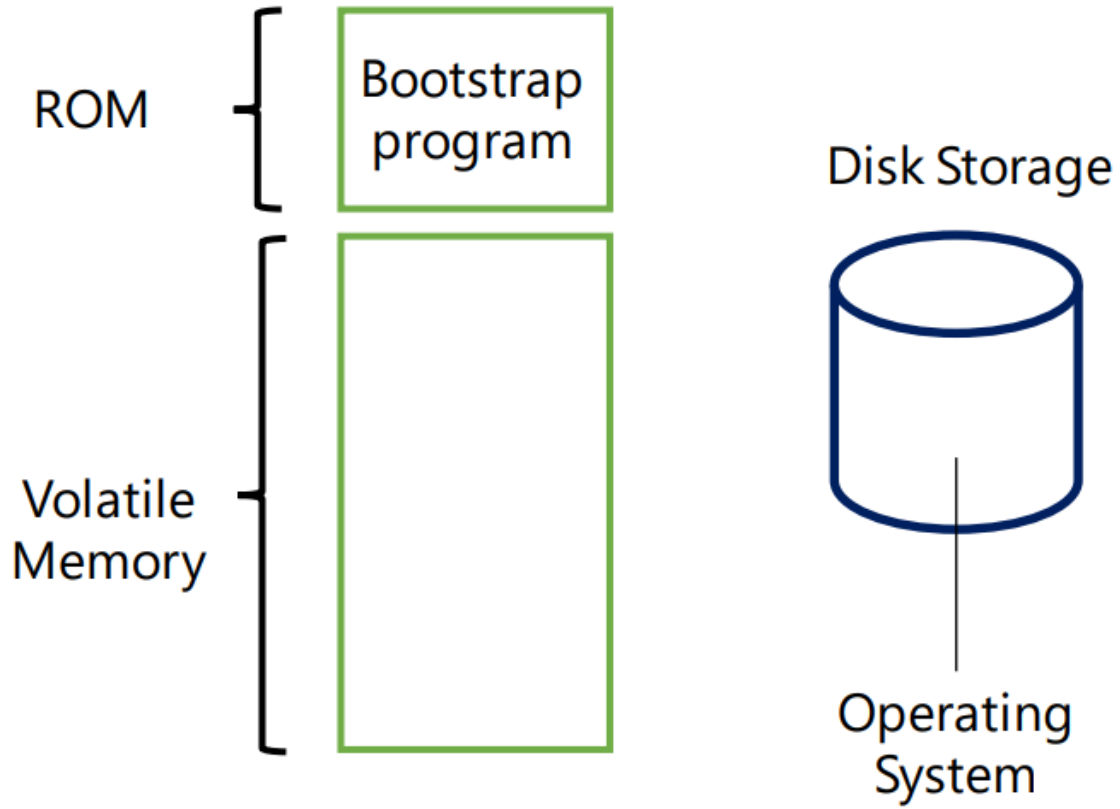
Operating System – A set of Software that manages computer hardware resources and serves other programs. It is a low-level software that supports a computer's basic functions, such as scheduling tasks and controlling peripherals.

Examples – Windows, Unix, BSD, Linux, OS X, iOS, ChromeOS, Android etc.

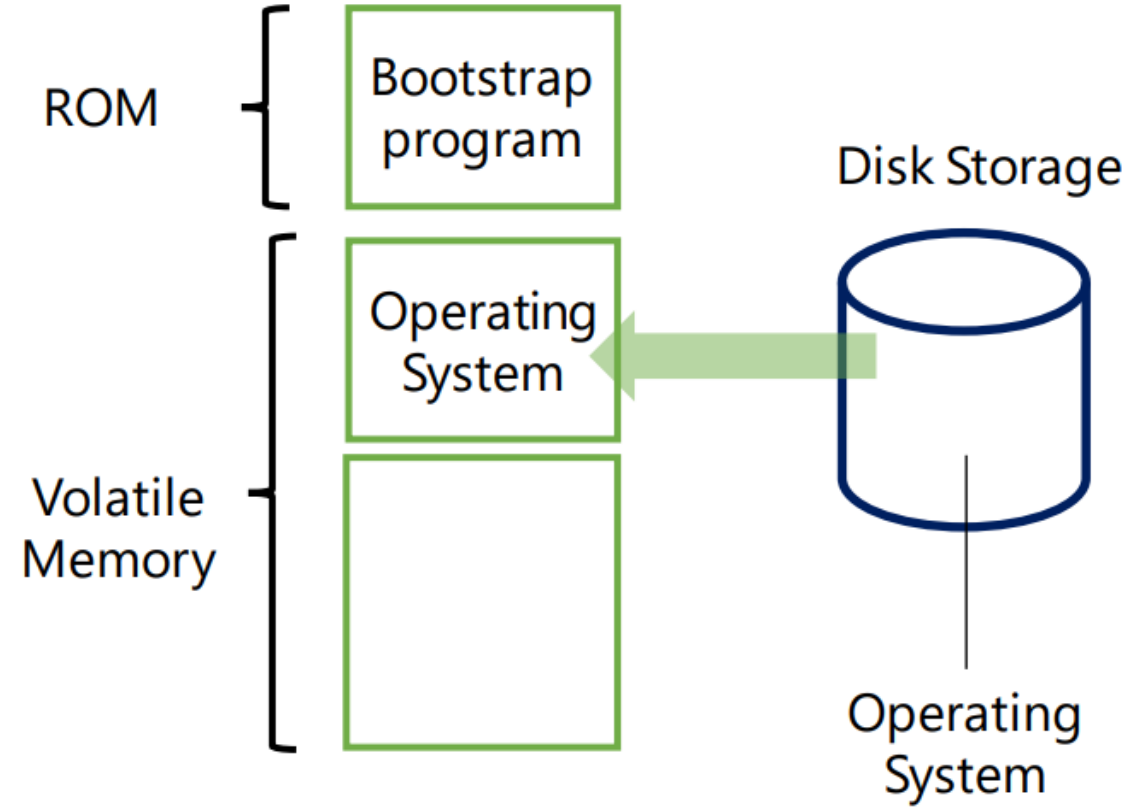
Memory - Computer memory is any physical device capable of storing information temporarily or permanently. RAM (Random Access Memory) is an example for temporary memory whereas ROM (Read only Memory) is an example for permanent memory



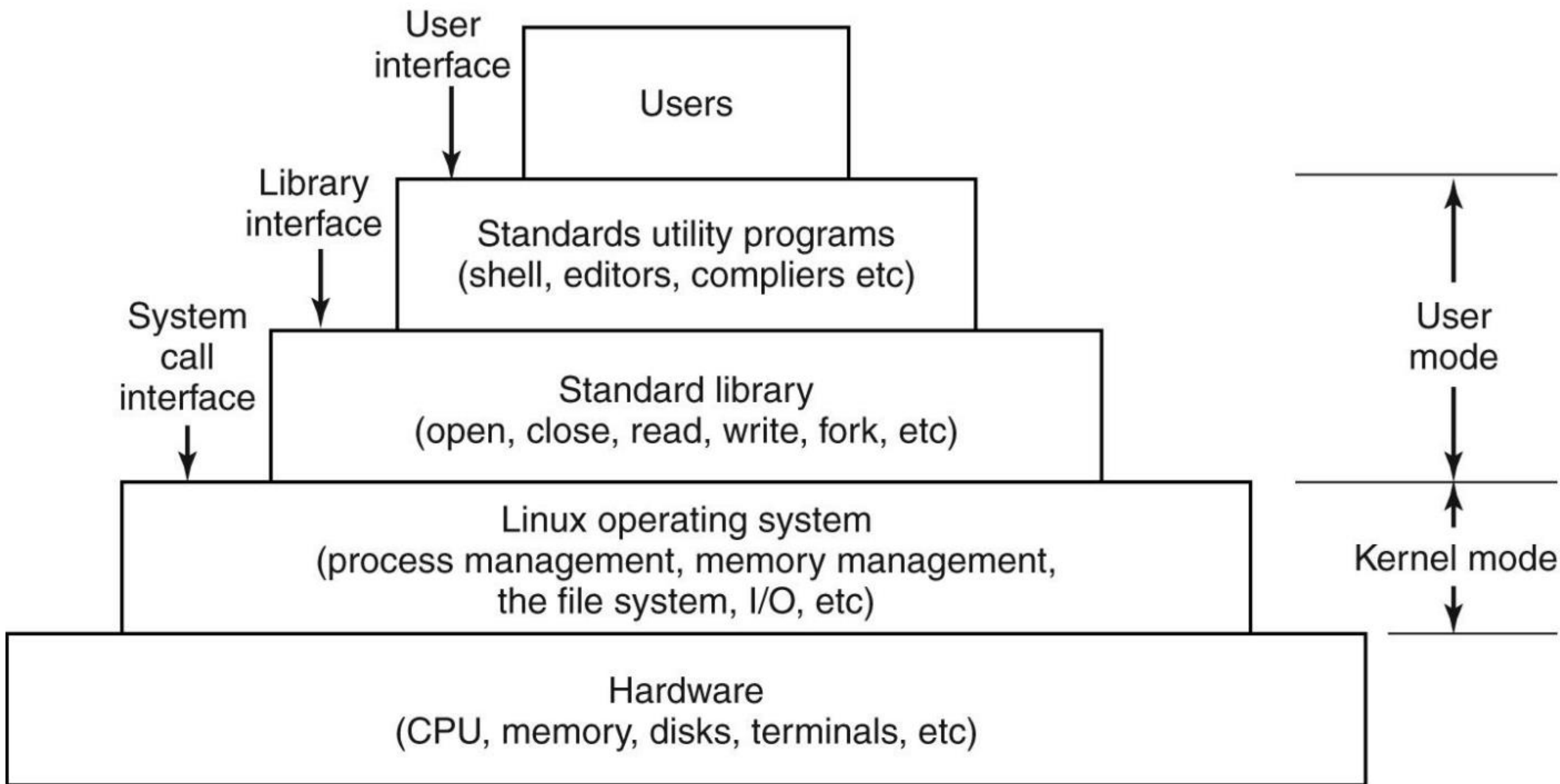
Did you know? – A Modern Smart Phone is 320,000,000 times “more powerful” than the ENIAC
<https://www.quora.com/How-many-ENIAC-computers-would-fit-into-an-iPhone>



Step 1 – Machine starts by executing the bootstrap program already in ROM. Operating System is stored in Mass Storage (Disk Storage)



Step 2 – Bootstrap program directs the transfer of the operating system into main memory and then transfers control to it



SHELL - A program (a.k.a. command-line interpreter) that allows the user to interact with the UNIX/Linux system.

Examples: Bourne shell (sh), Bourne again shell (Bash), C shell (csh, tcsh), Korn shell (ksh), Powershell (windows)

