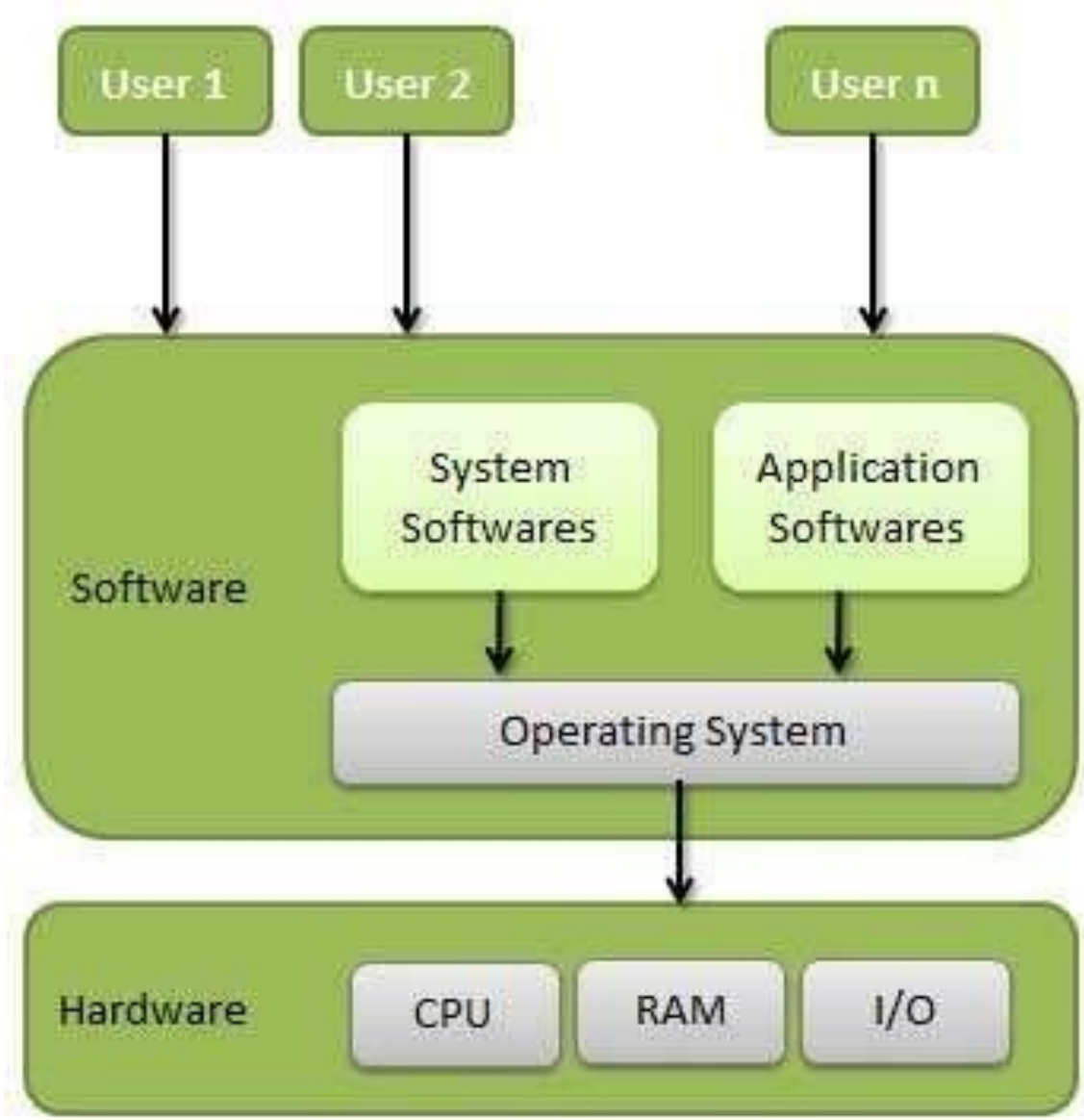
Operating Systems
Course Code: 71203002004

by -
Asst. Prof. Minal Rajwar

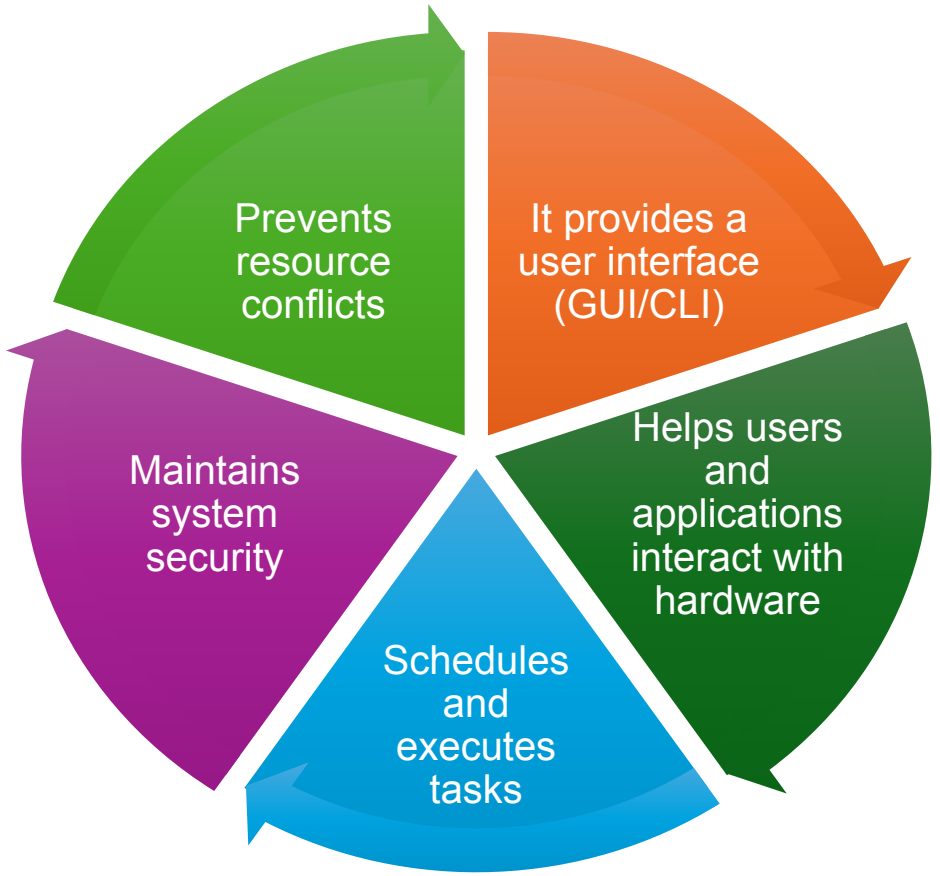
Learning Objectives

- Define Operating System
- Understand its core purposes and functions
- Explore the historical motivation behind OS development
- Recognize the importance of OS in modern computing
- Examine OS categories and examples

What is an Operating System?



Role of OS in Computer System



Historical Evolution of OS

1st Gen (1940s): No OS, punched cards manually

2nd Gen: Batch systems grouped similar jobs to run automatically

3rd Gen: Introduced **multiprogramming** and **time-sharing**

4th Gen: GUI-based OS for PCs

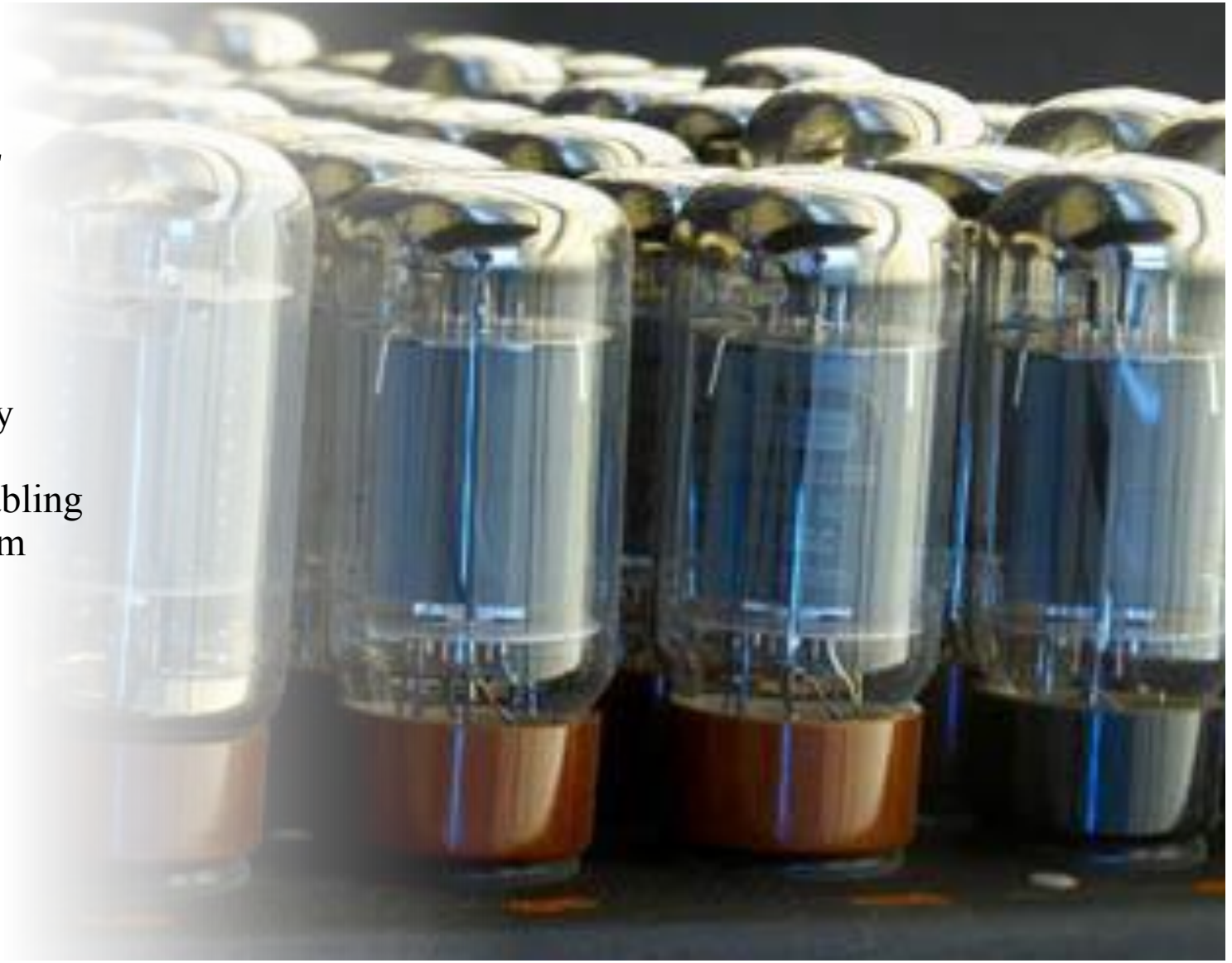
5th Gen: Internet, distributed systems, smartphones

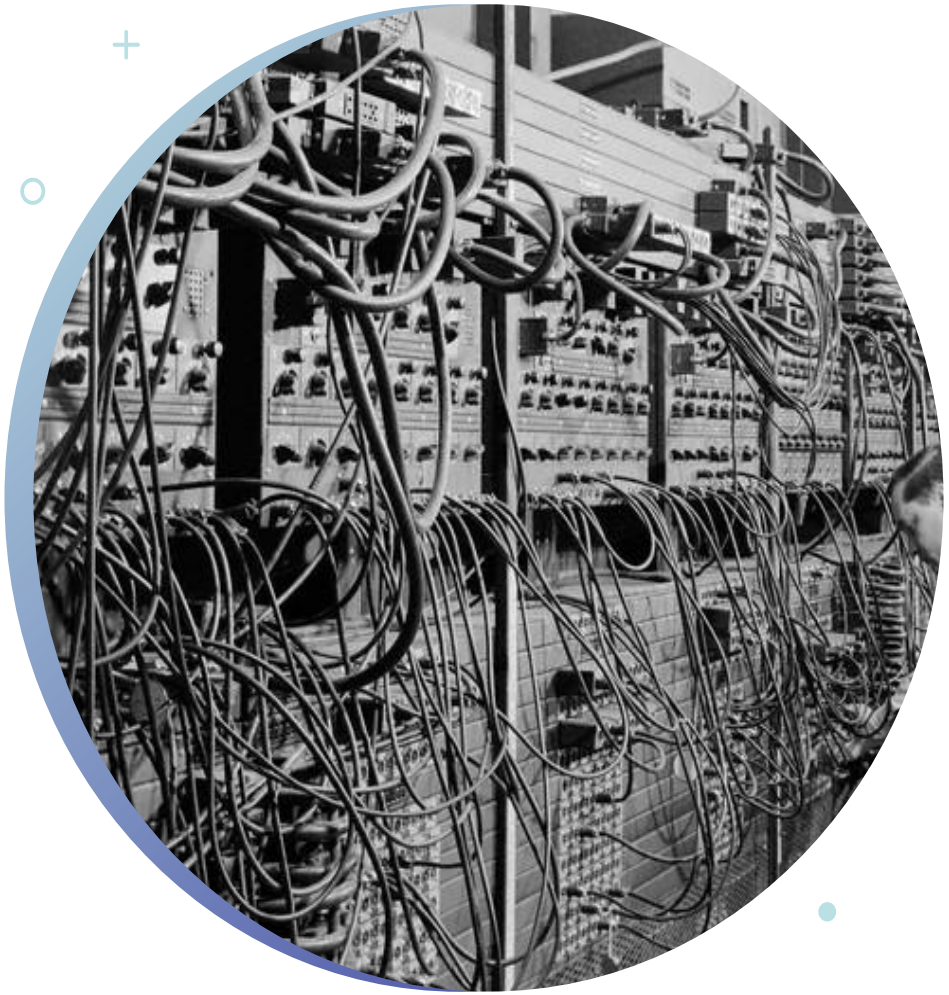
Historical Evolution of OS

- **1st Gen (1940s)**: No OS, punched cards manually
  - It all started with computer hardware in about 1940s.
- ENIAC (Electronic Numerical Integrator and Computer), at the U.S. Army's Aberdeen Proving Ground in Maryland.
- built in the 1940s,
- weighed 30 tons,
- was eight feet high, three feet deep, and 100 feet long
- contained over 18,000 vacuum tubes that were cooled by 80 air blowers.

Historical Evolution of OS

- Computers were using vacuum tube technology
- These tubes served as electronic switches, enabling the computers to perform calculations.



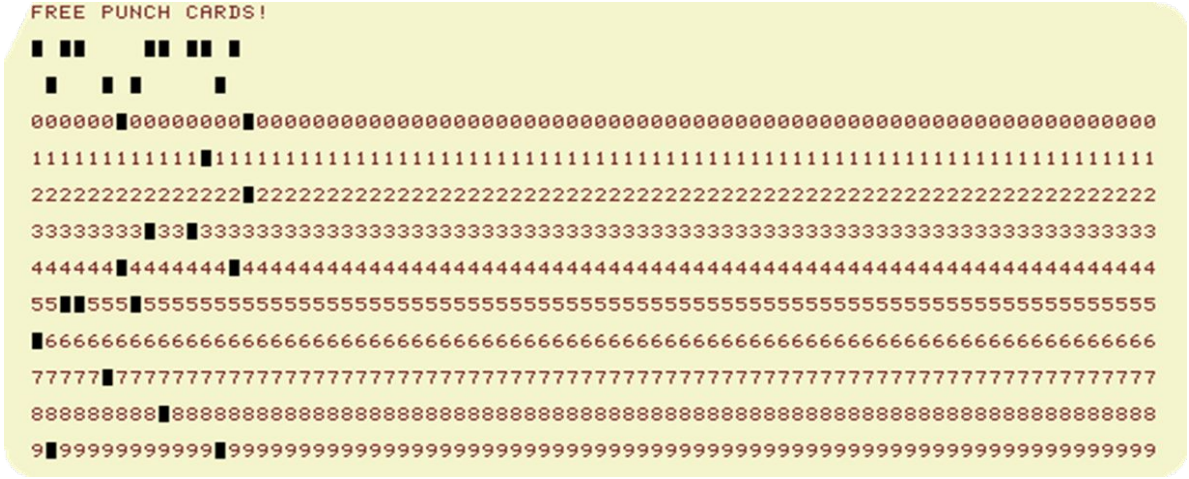


Historical Evolution of OS

- Programs were loaded into memory manually using switches, punched cards, or paper tapes.

Historical Evolution of OS

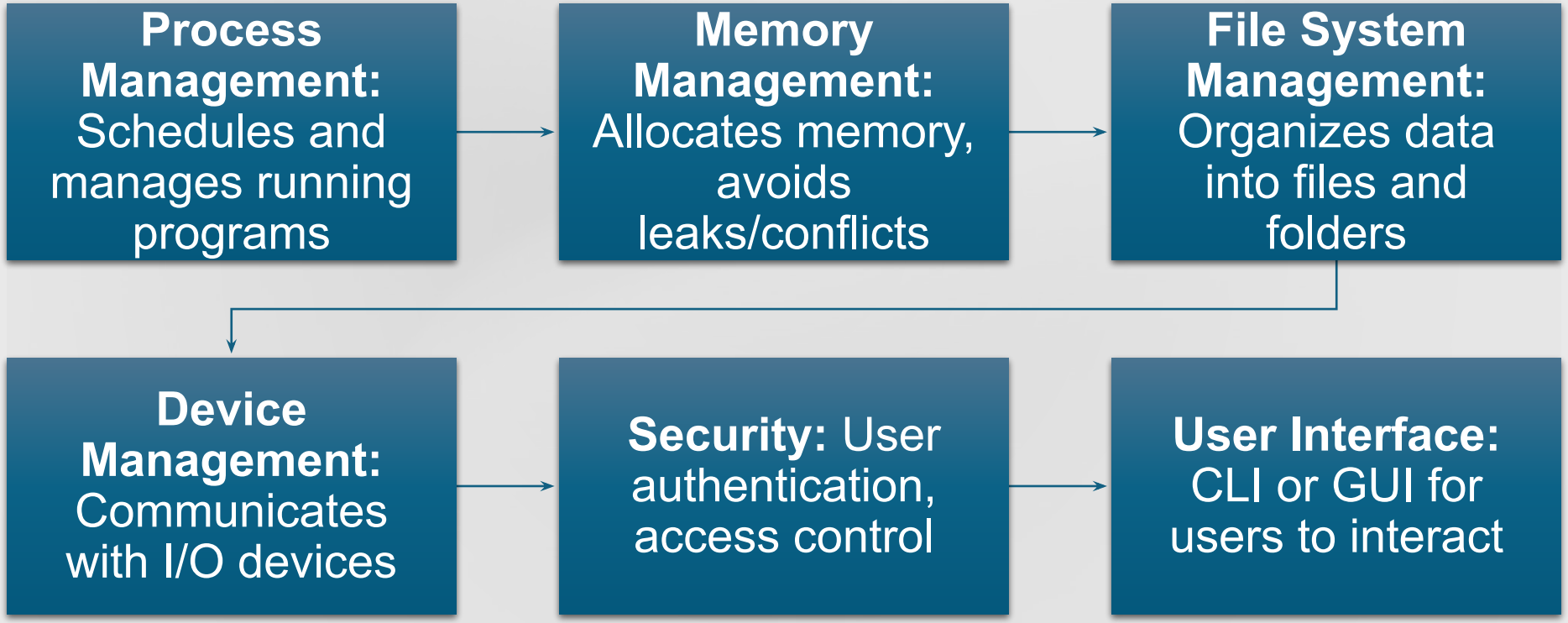
- punch card
- it is a piece of stiff paper that stores data using punched holes.



Motivation Behind OS Development

- Why did we need operating systems?
  - **Hardware Complexity:** Needed a layer to abstract hardware operations
  - **Efficient Resource Use:** CPUs and memory are expensive, must be used optimally.
  - **User Convenience:** Users can interact via GUI instead of command-line
  - **Error Handling & Security:** To prevent unauthorized access or crashes

Functions of an Operating System



OS as a Resource Manager

- The OS handles **resource allocation**:
  - Schedules CPU time among processes
  - Allocates memory blocks
  - Manages disk usage and input/output requests

Types of Operating Systems

Batch OS: Executes batches of jobs without user interaction

Multiprogramming OS: Multiple programs loaded, executed by CPU one by one.

Multitasking OS: Multiple tasks run seemingly at once (e.g., Windows)

Time-sharing OS: Each user gets a time slice (e.g., UNIX)

Real-time OS (RTOS): Used in embedded systems, guarantees timing constraints

Distributed OS: Controls a group of distinct computers

Mobile OS: Android, iOS – designed for handheld devices

Importance of Operating Systems

- Every digital device we use needs an OS
- It enables **application execution** and **hardware communication**
- Makes computers **interactive**, **secure**, and **stable**
- Protects the system from unauthorized access and software errors.

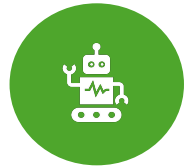
Real-World Applications

DESKTOPS: WINDOWS, LINUX, MACOS

MOBILE PHONES: ANDROID, IOS

SERVERS: LINUX, UNIX

IOT DEVICES & SMART TVS: RTOS



CARS & ROBOTICS: EMBEDDED OS

Short Quiz / Activity

What is the primary purpose of an OS?

Name one real-time OS example.

What is multiprogramming?

Match OS types with examples