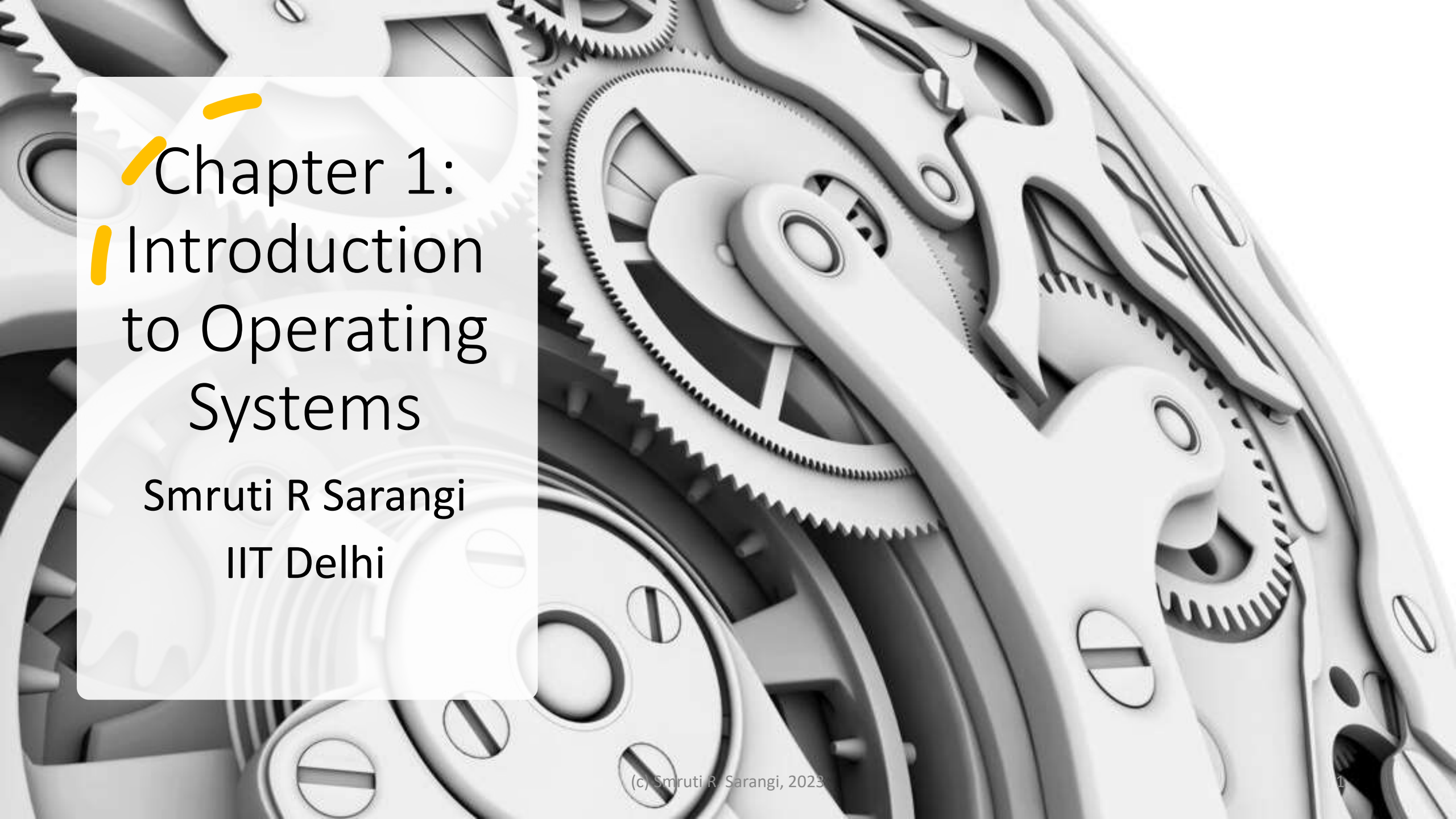

Chapter 1: Introduction to Operating Systems

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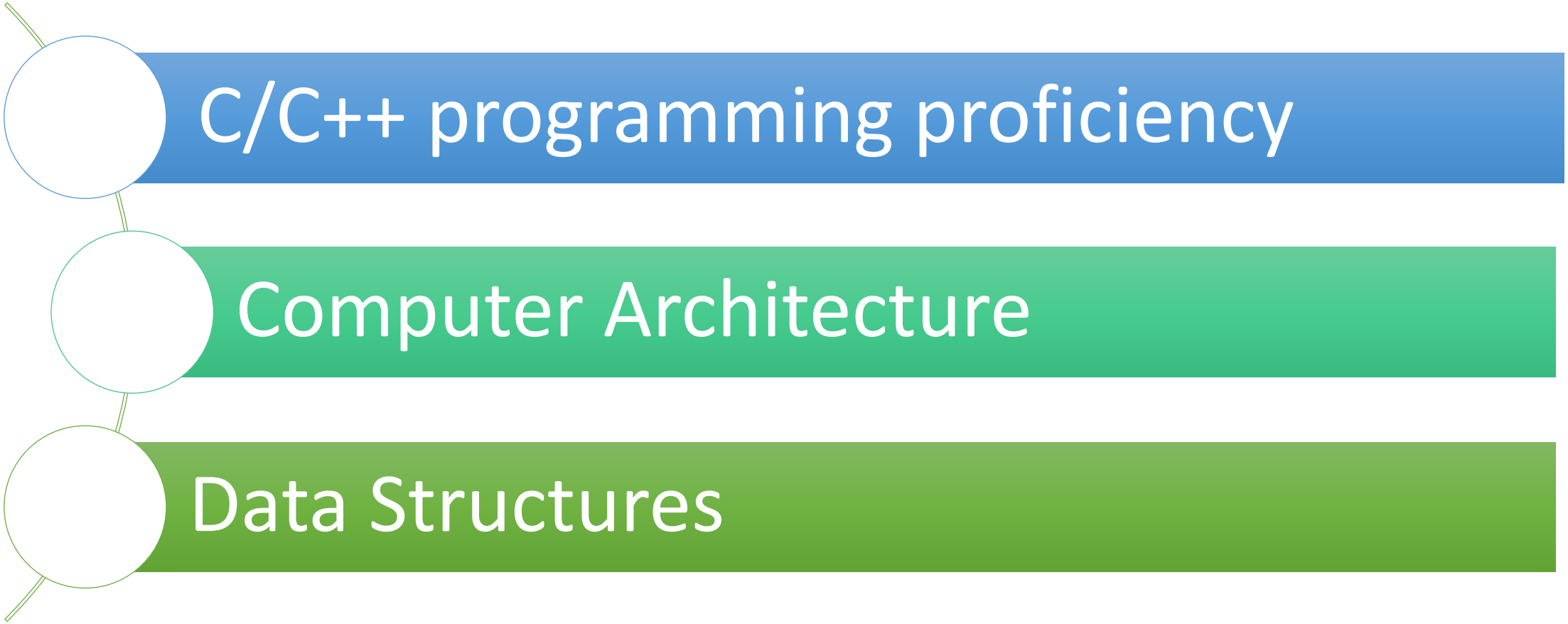
What is an Operating Systems (OS)?

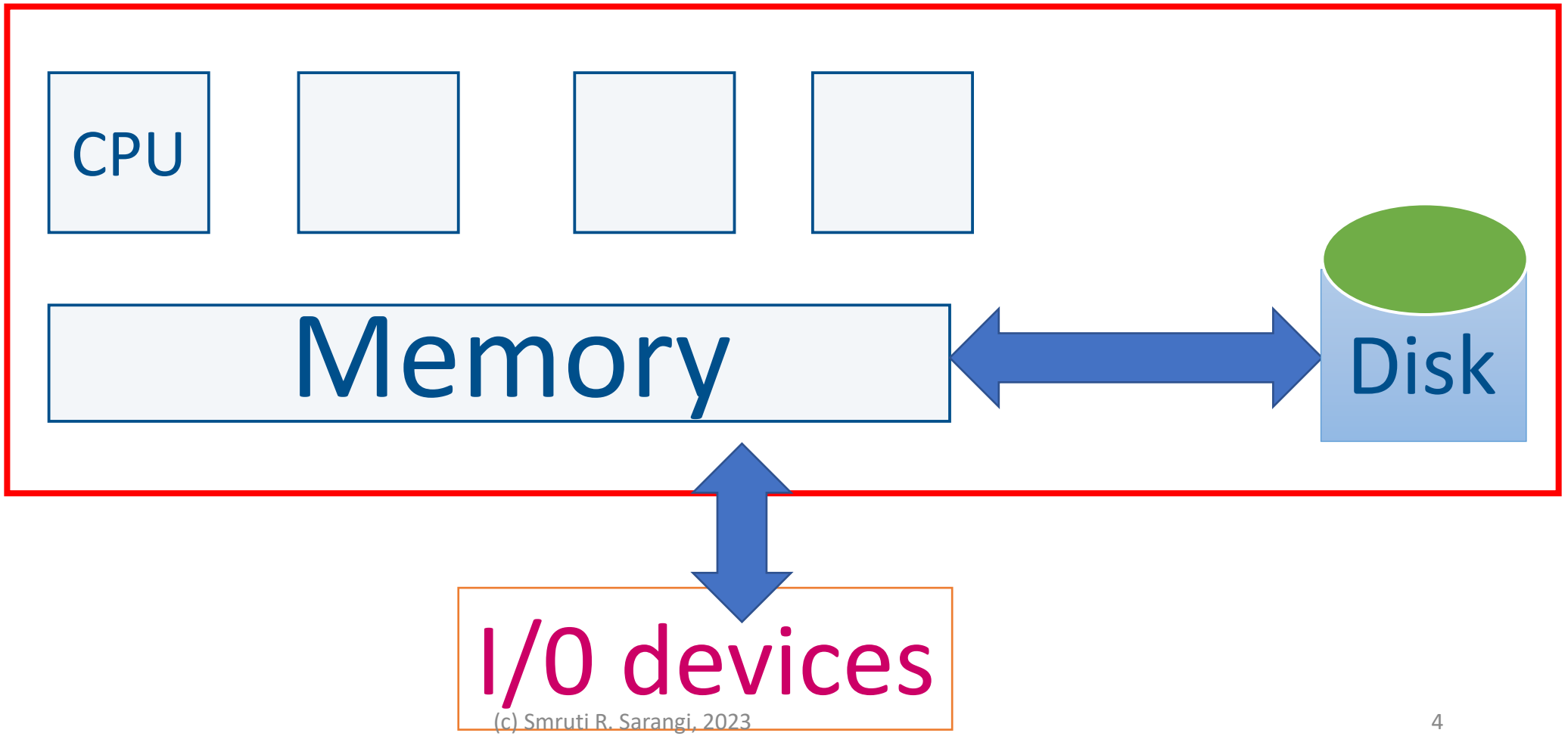
- It is a special program
- Can control other programs
- Exercises control over hardware

Background Required

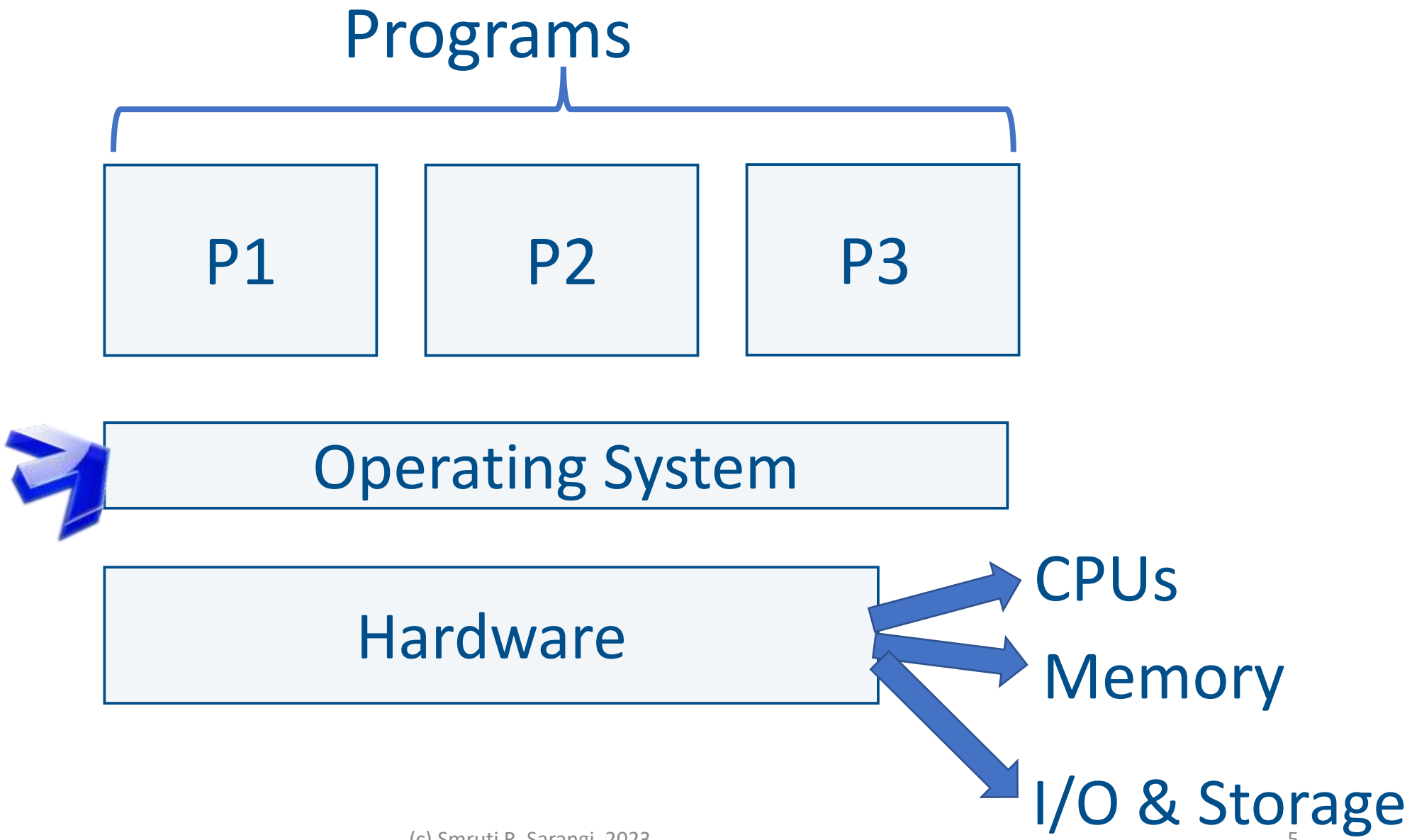


Key Components

Who manages these?



Place of the OS



Why do we need a special program, the OS?

- Many programs share common hardware
- The access to common hardware needs to be regulated
- Hardware: CPU, memory, I/0 and storage
  - Schedule the CPU
  - Interface with devices
  - Manage storage
  - Manage memory
  - Security
  - Make it easy to build distributed systems
  - Makes it easy to work with HW

Basic Idea

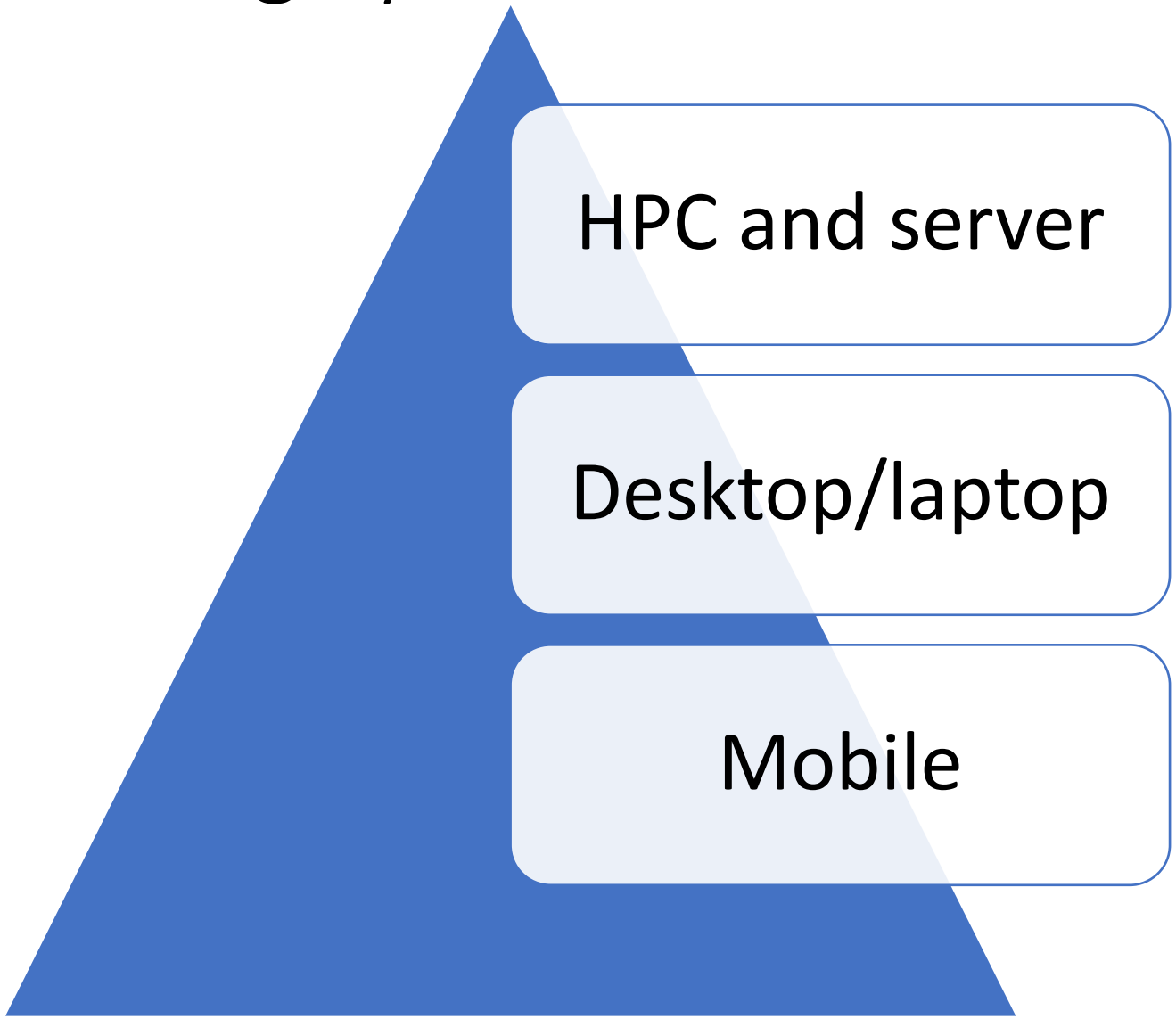
- A process is an instance of a running program
- At any point of time multiple processes are active
- The processes have different HW requirements
- The OS arbitrates between the processes

Arbitration

- Accessing HW is very complex
- Elaborate protocols
- Same code needs to run on multiple machines
- Provide a common interface: device derivers in the OS

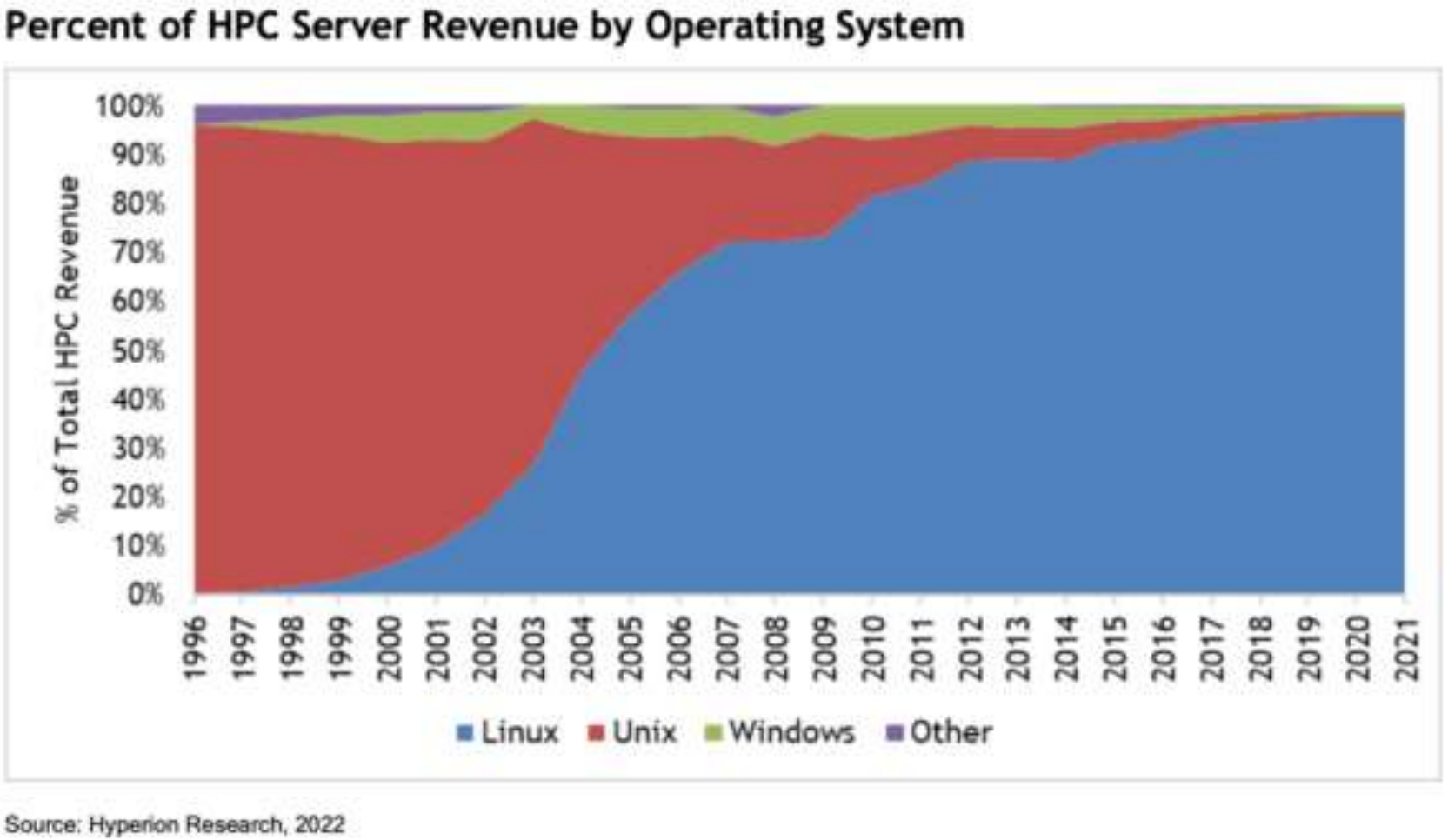
Access

Space of operating Systems



HPC OS market share

Only Linux now



Source: Hyperion Research, 2022

History of Linux : milestones

1991	Linus Torvalds started extending the MINIX OS
1992	Released under the GPL license. Available on the web.
2000 – 2010	Takes over the server and HPC market
2012 – 2020	Android (Linux-based) becomes the most popular mobile Operating System

Why teach a real –world OS?

- Conveys a realistic picture
- Provides real-world skills

We will learn generic concepts in the context of Linux

Open Source Design

Freely available source code

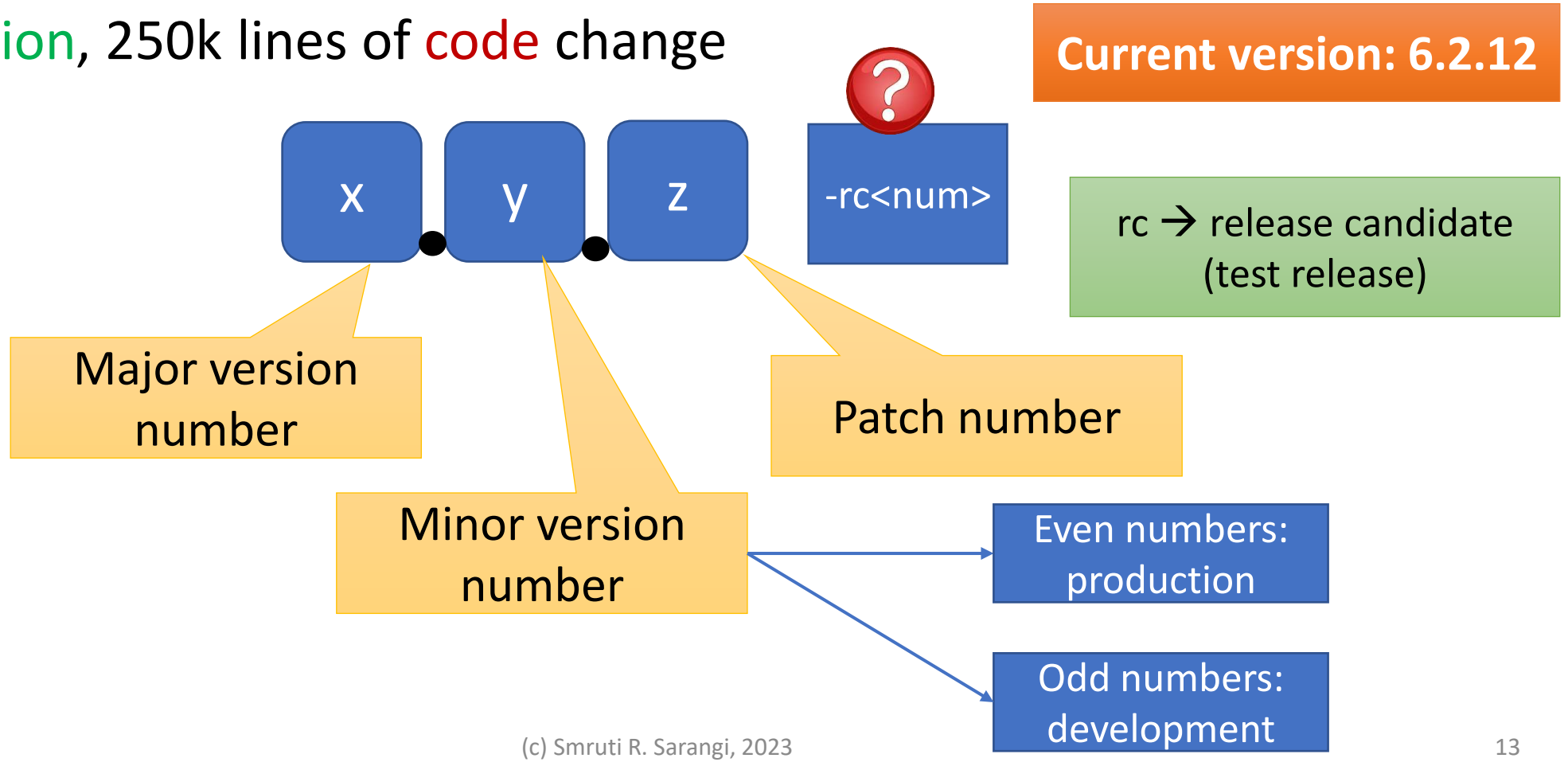
www.kernel.org

https://elixir.bootlin.com/linux/latest/source/kernel

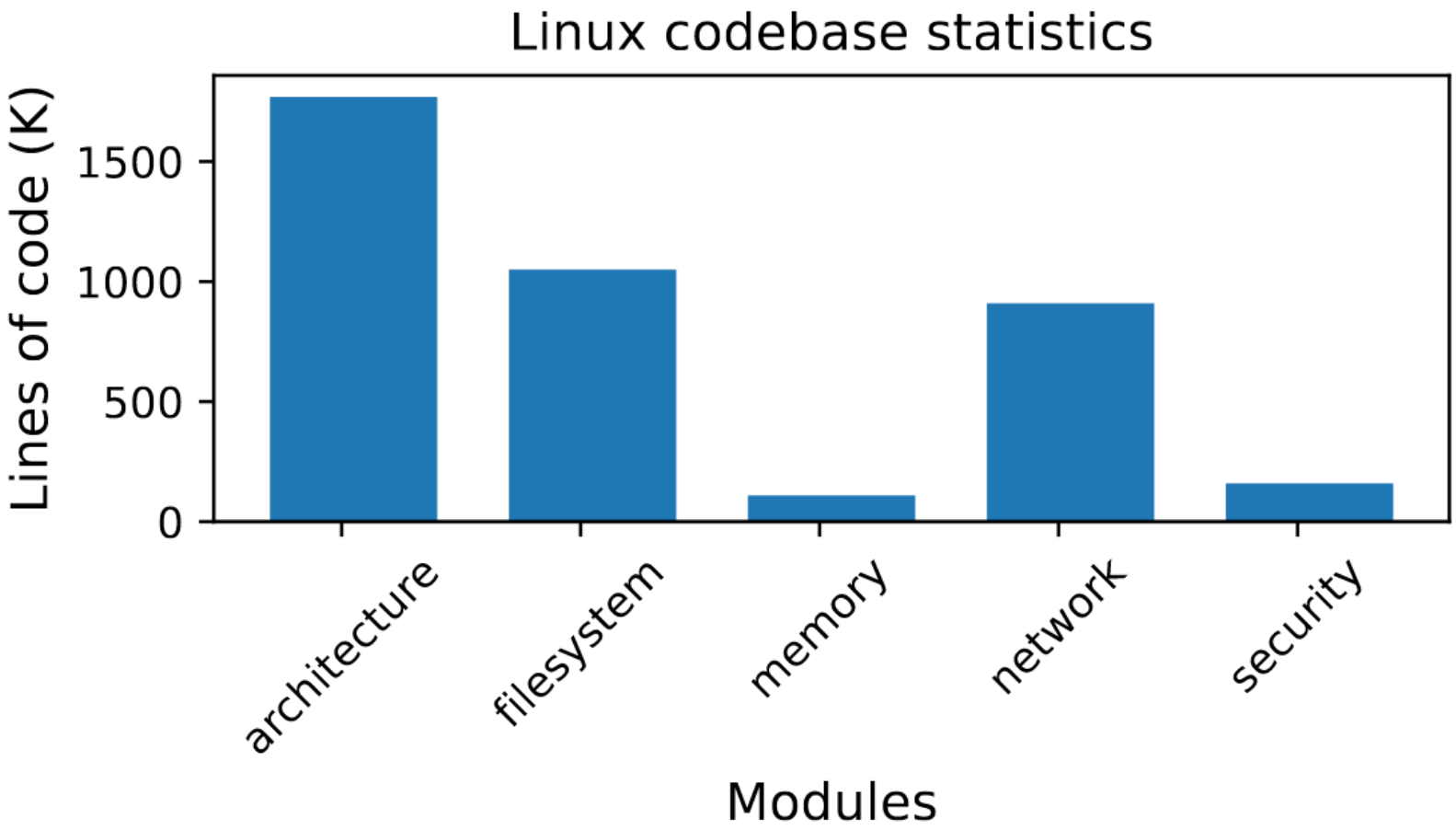
Version 6

Some Kernel Source Code Statistics

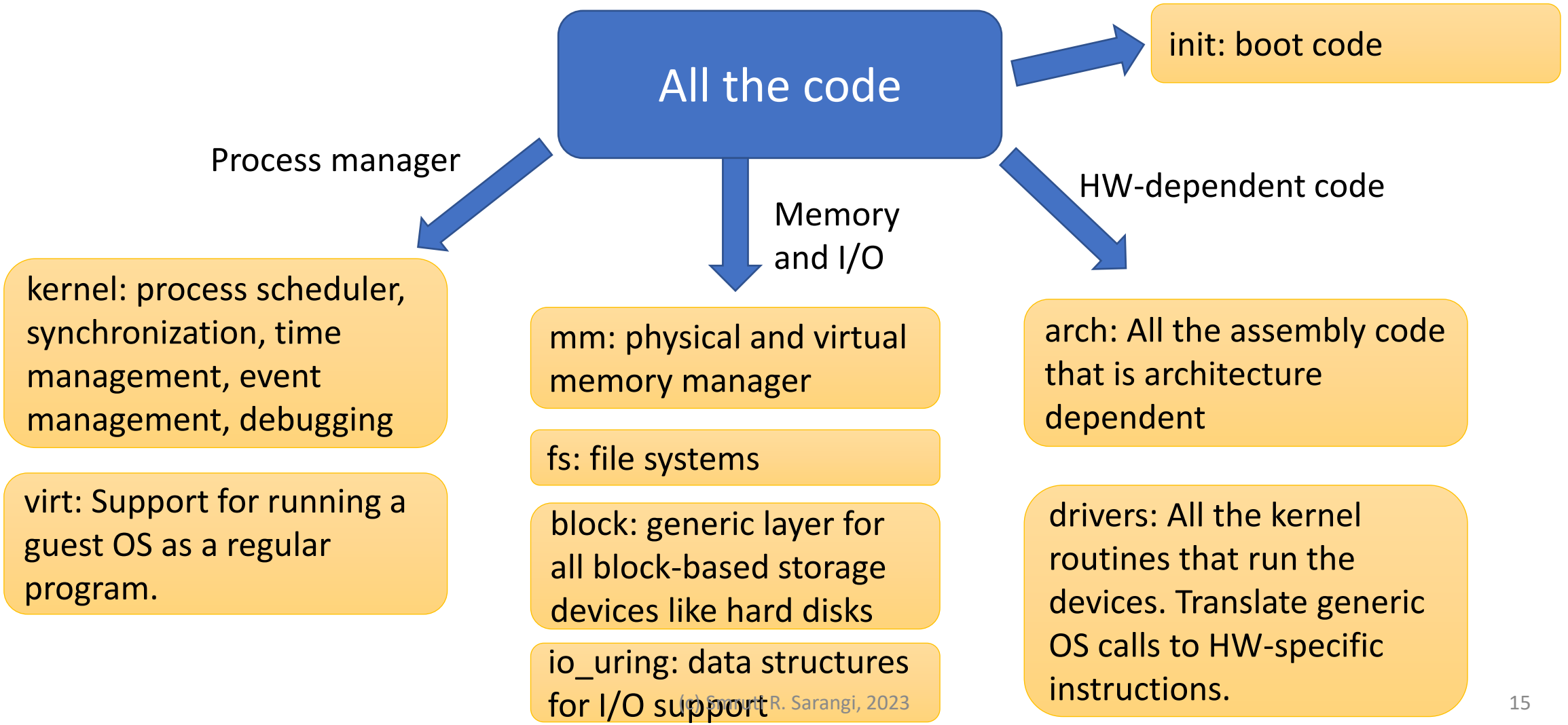
- Roughly 25 million lines of source code
- Per version, 250k lines of code change



70% of the code is in drivers, rest in →



Major Subsystems in Linux (Directory-wise)



Factoid

Android, Chrome OS, Tizen (Samsung), Web OS (LG) are all based on Linux.

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