

Operating Systems - CSEN 602

Module 1: Introduction to Operating Systems ***Lecture 01: Overview of OS***

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- What is an Operating System?
- What is Abstraction?
- What is Arbitration?
- Let's Understand more the OS

What is an Operating System?



Tools

Let's Visit our Toy Shop



*This is our Operating
Systems 😊
How!!!*

Storage and Work Spaces



The Toy Shop Manager



Toys

What is an Operating System? *The Simple Definition*

- An Operating System is a special piece of software that

Abstracts

&

Arbitrates

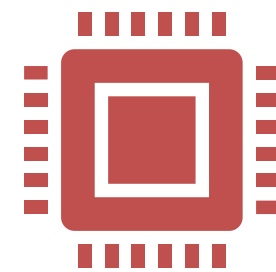
The use of a computer system

What is Abstraction?

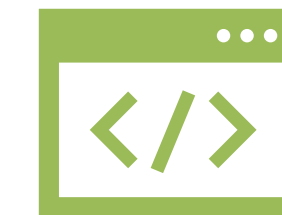
- In the **context of computing**, an abstraction is a representation that hides specifics from a consumer of services, making a system **more generic** and thus **easily understood**.
- Abstraction is the process of **hiding the details and complexity of a system** and presenting a **simplified and consistent view** to the users and applications.



What is Abstraction? *Example*



An OS abstracts the details of disk drives, keyboards, monitors, and other devices, and provides a uniform way of accessing them through application programming interfaces (APIs).

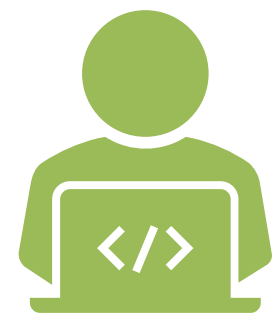


By using APIs, applications do not need to know the specifics of the hardware or the OS and can run on different platforms and devices with minimal changes.

Why Abstraction?



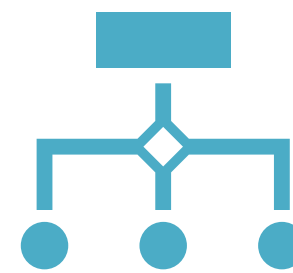
The code needed to control peripheral devices is not standardized



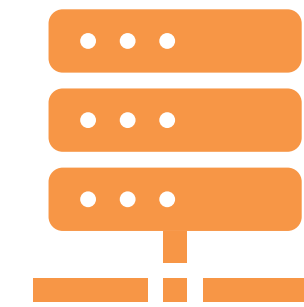
Performs operations on behalf of programs.
Example: Input/Output



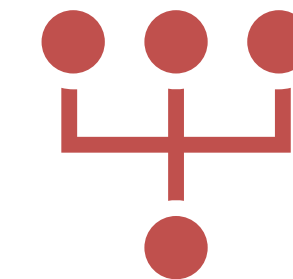
The operating system introduces new functions as it abstracts the hardware.



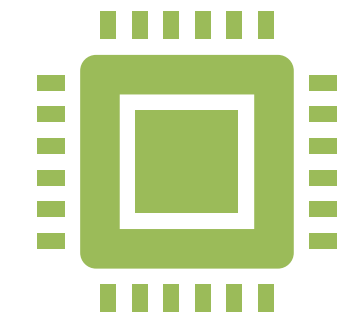
Operation systems introduce the file abstraction so that programs don't need to have a disk to operate.



The operating system transforms the computer hardware into multiple virtual computers.



Each running program is called a process.



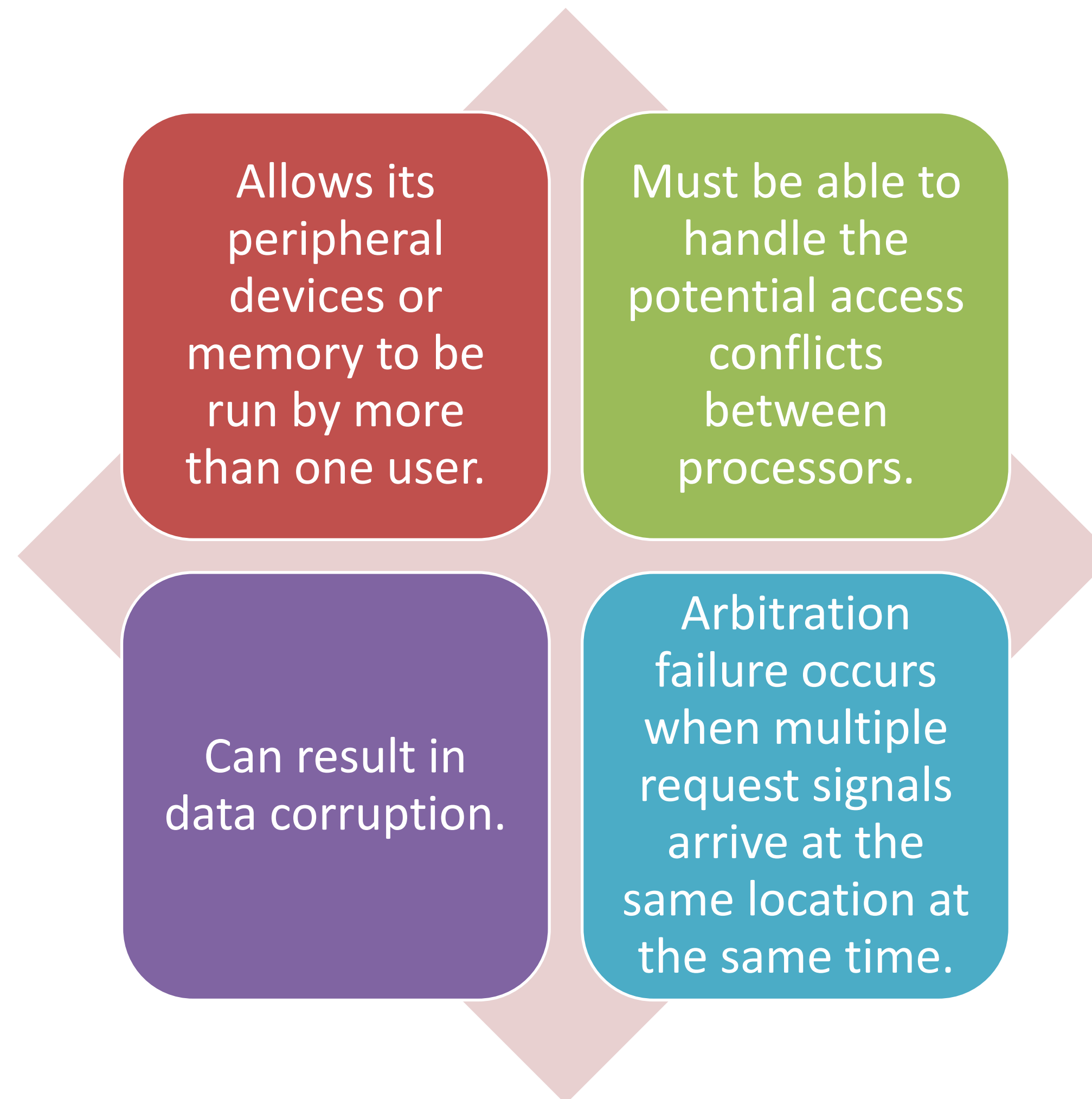
The operating system can enforce security through abstraction.

What is Arbitration?

- Arbitration means the capability of the operating system in **managing, overseeing, and controlling the underlying hardware use.**
- The **set of rules** in a computer's operating system for allocating the resources of the computer.
- It also means that the operating system **manages access to shared hardware resources** so that **multiple applications can run on the same hardware** at the same time **without interfering** with one another.



Why Arbitration?



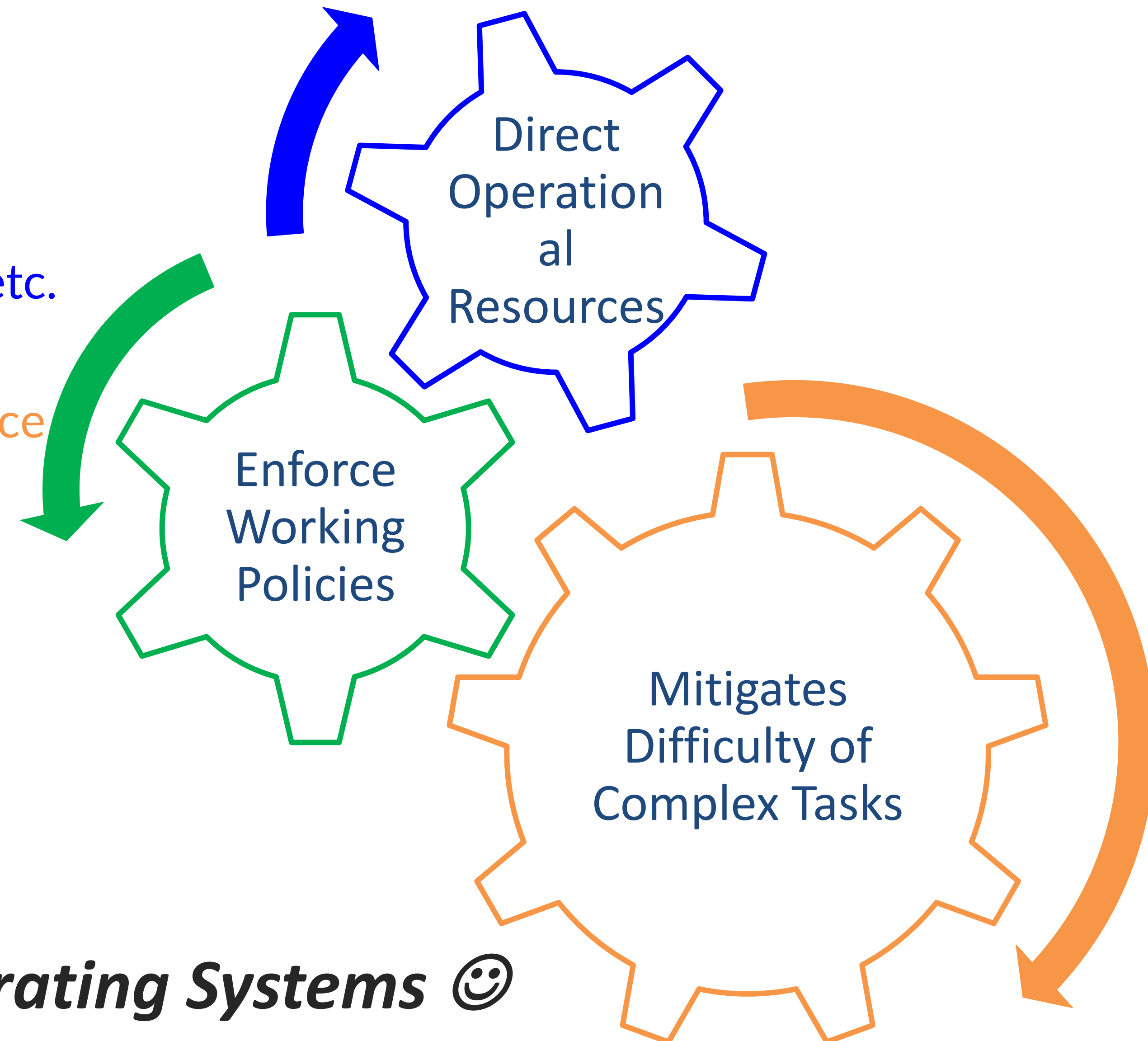
Abstraction Vs. Arbitration



Let's take a quick quiz ...

Let's Understand more the OS

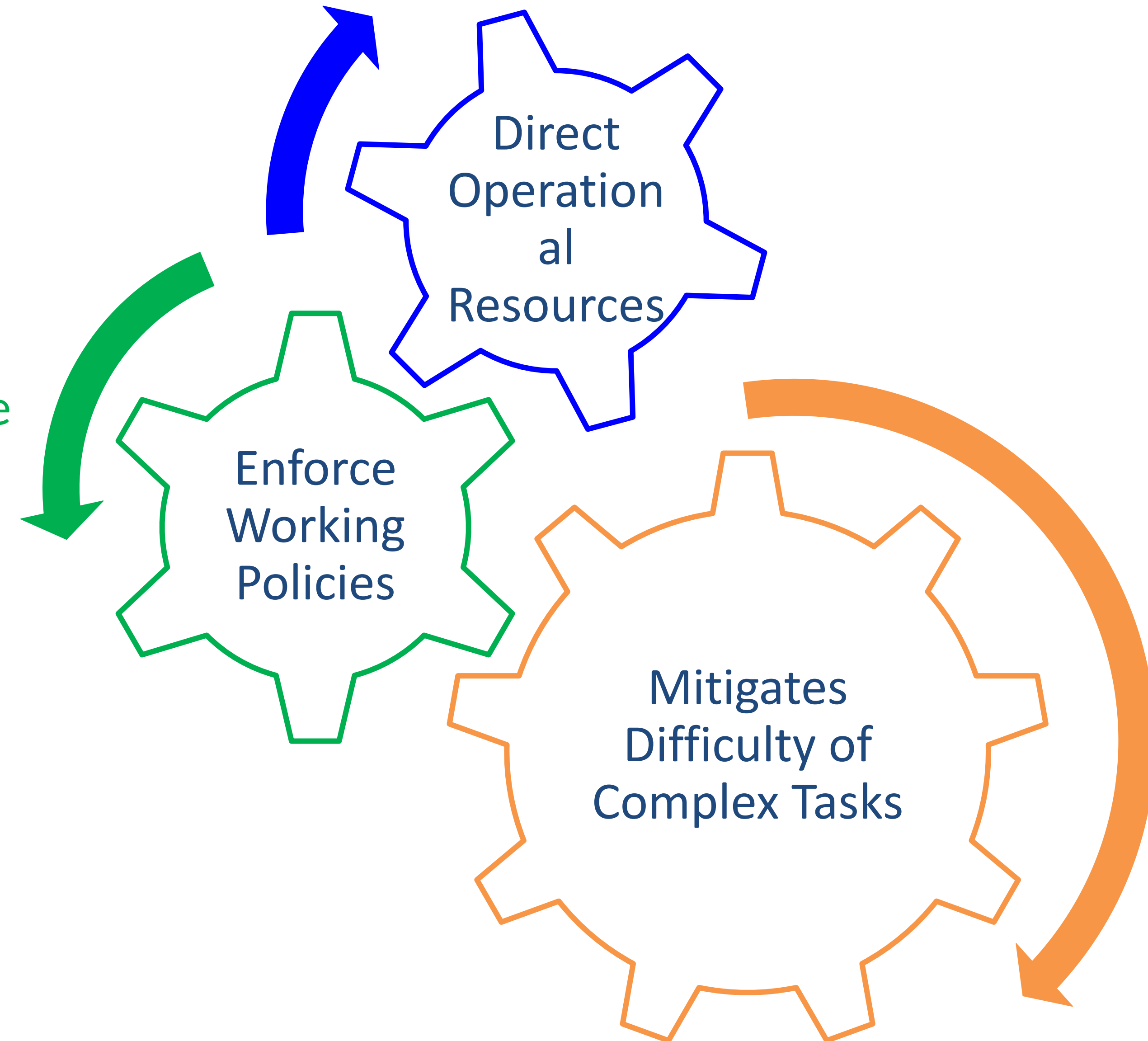
- An Operating System is like a **Toy Shop Manager** :
 1. Control Use of Employee time, parts, tools, etc.
 2. Fairness, Safety, Cleanup
 3. Simplifies operations & optimizes performance



Let's see how this relates to our Operating Systems 😊

Let's Understand more the OS

- An Operating System is like a **Toy Shop Manager** :
 1. Control Use of CPU, memory, peripheral devices, etc.
 2. Fair resource access, limits to resource usage
 3. Abstract hardware details (System calls)



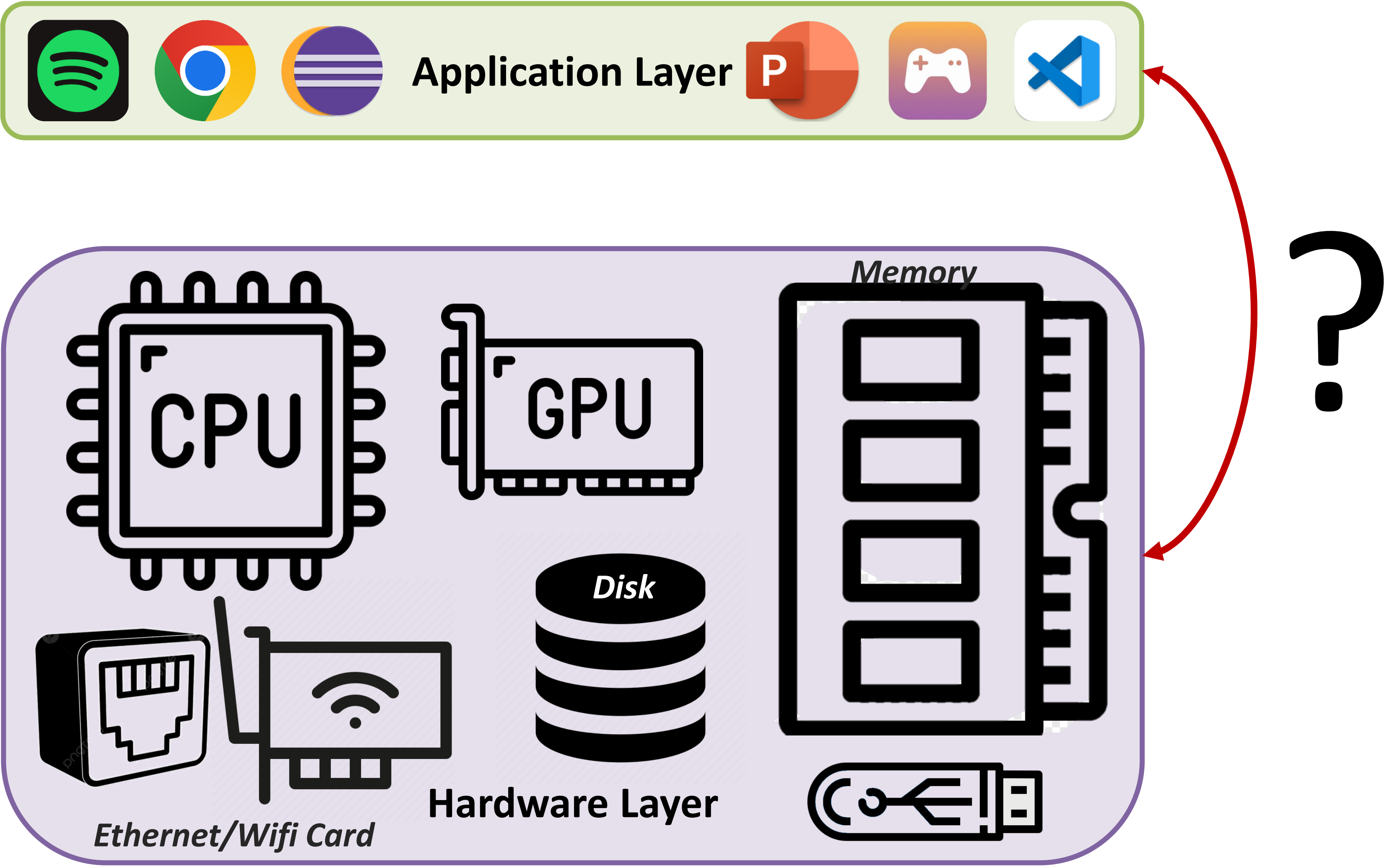
Why OS?



Application Layer

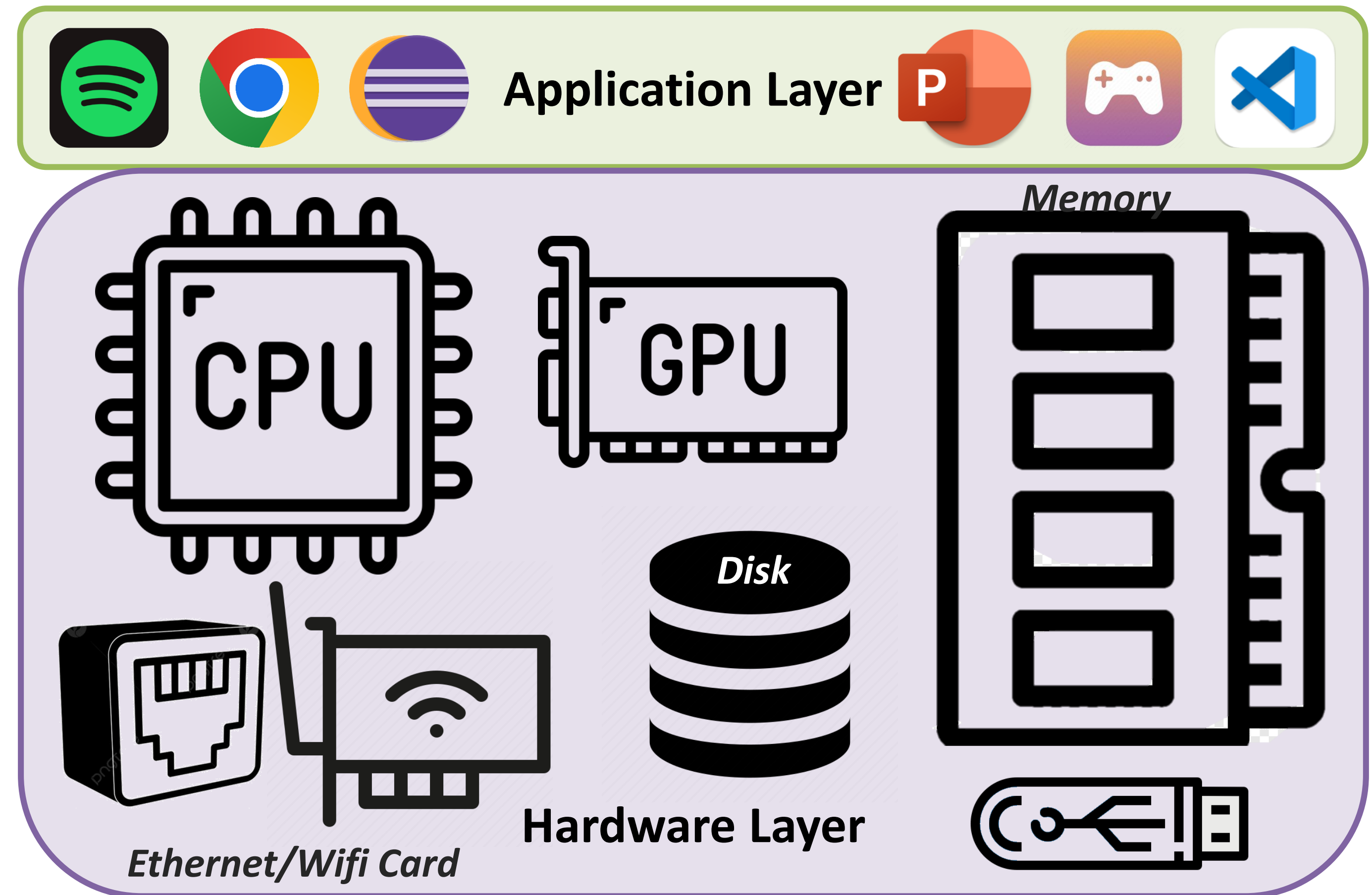
Hardware Layer

Why OS?



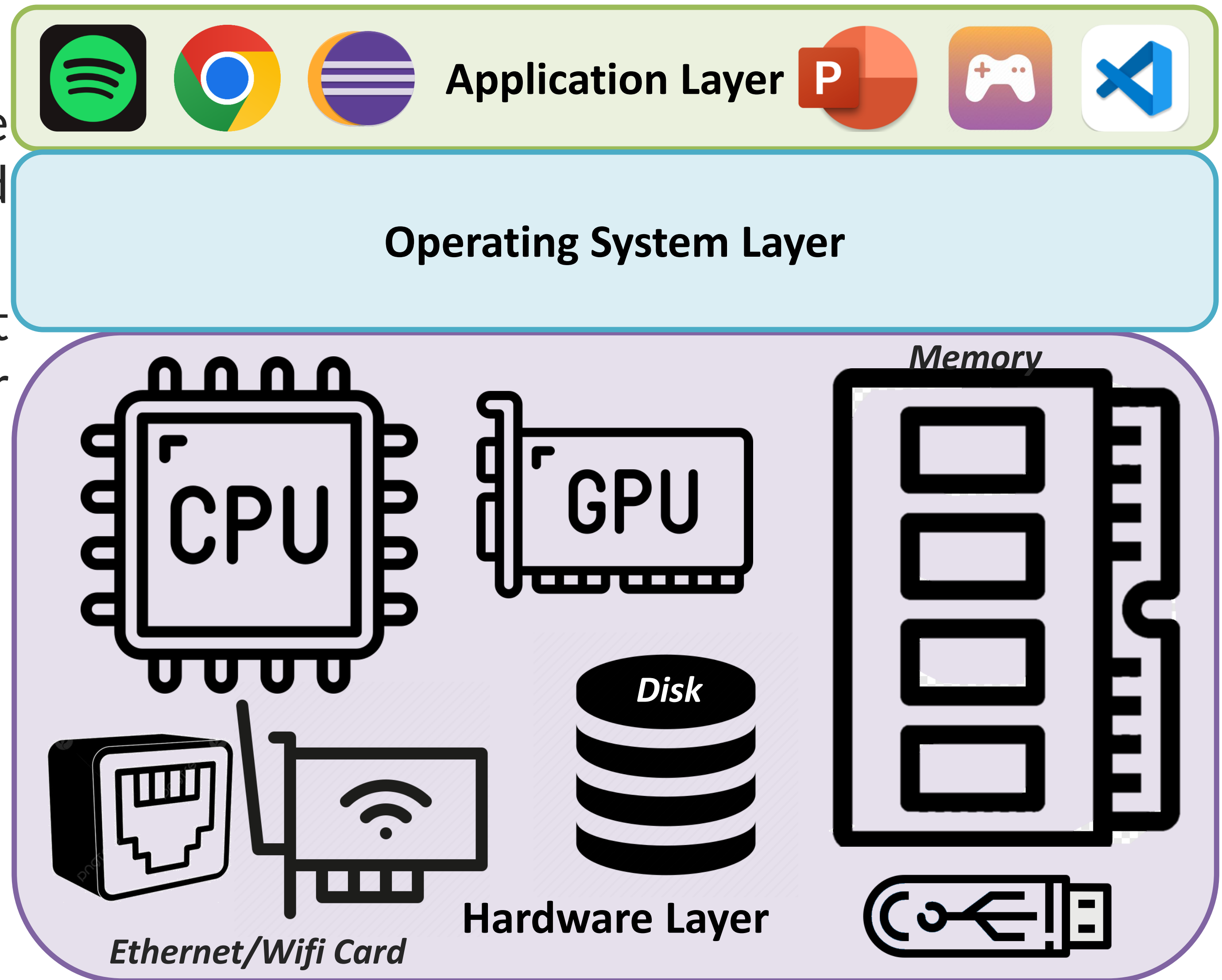
Why OS?

- What if applications ran directly on hardware?
- Problems:
 - Portability
 - Resource sharing



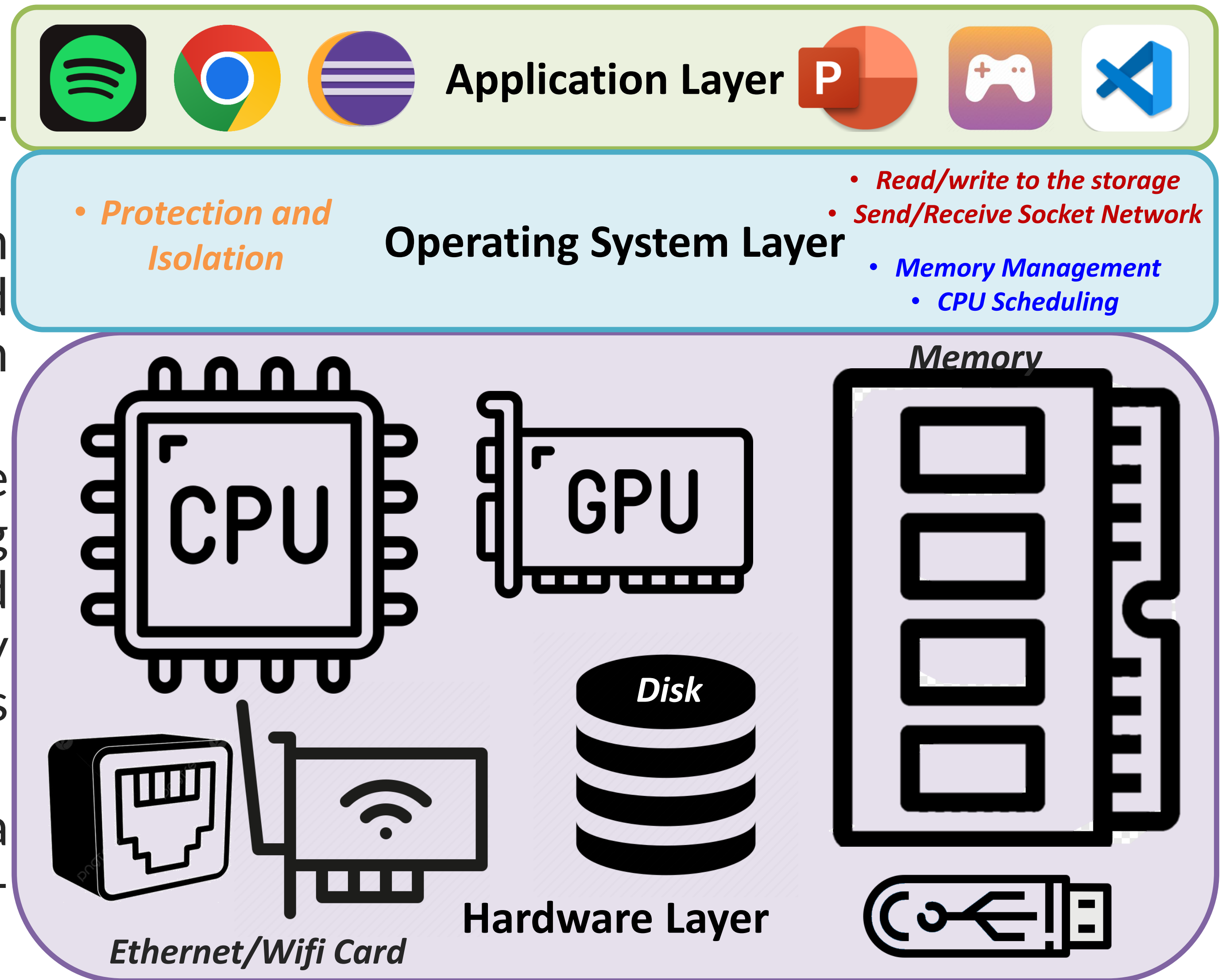
Why OS?

- The operating system is the software layer between user applications and the hardware
- The OS is “all the code that you didn’t have to write” to implement your application



What does an OS do?

- **Beautician** that hides all the ugly low-level details so that anyone can use
- **Wizard** that makes it appear to each program that it owns the machine and shares resources while making them seem better than they are
- **Referee** that arbitrates the available resources between the running programs efficiently, safely, fairly, and securely Managing a million crazy things happening at the same time is part of that Concurrency
- **Elephant** that remembers all your data and makes it accessible to you -- persistence




Understanding of OS Definition and Functionality



Let's take a quick quiz ...

In Conclusion

- An operating system is a layer of system software that:
 - Directly has privileged access to the underlying hardware;
 - Hides the hardware complexity;
 - Manages hardware on behalf of one or more applications according to preset policies and mechanisms;
 - Finally, it ensures that applications are isolated and protected from one another.

For Further Inquiries, Please
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Thank you for your attention!

See you next time 😊