

Introduction to Operating Systems

- The OS is the essential software layer between your apps and hardware
- It manages CPU, memory, and storage so programs can share resources
- Provides a stable interface so any app can work with diverse hardware
- This session builds clear mental models, not deep code



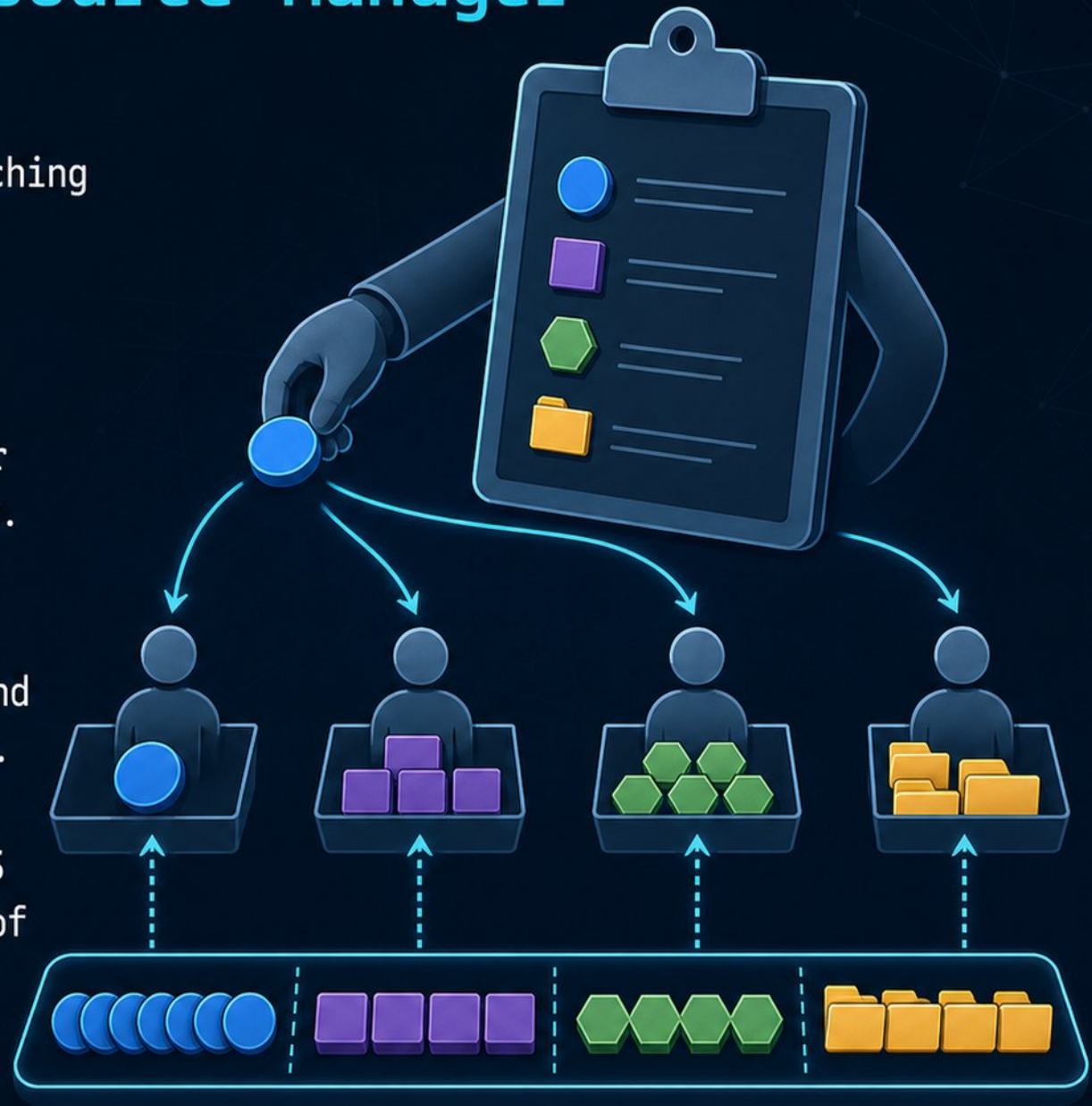
Why Do We Need an Operating System?

- » Early chaos: programs fought directly over hardware
- » Like a building with no receptionist or traffic without signals
- » The OS coordinates, resolves conflicts, and shares fairly
- » Proof: your music plays smoothly even when opening a browser



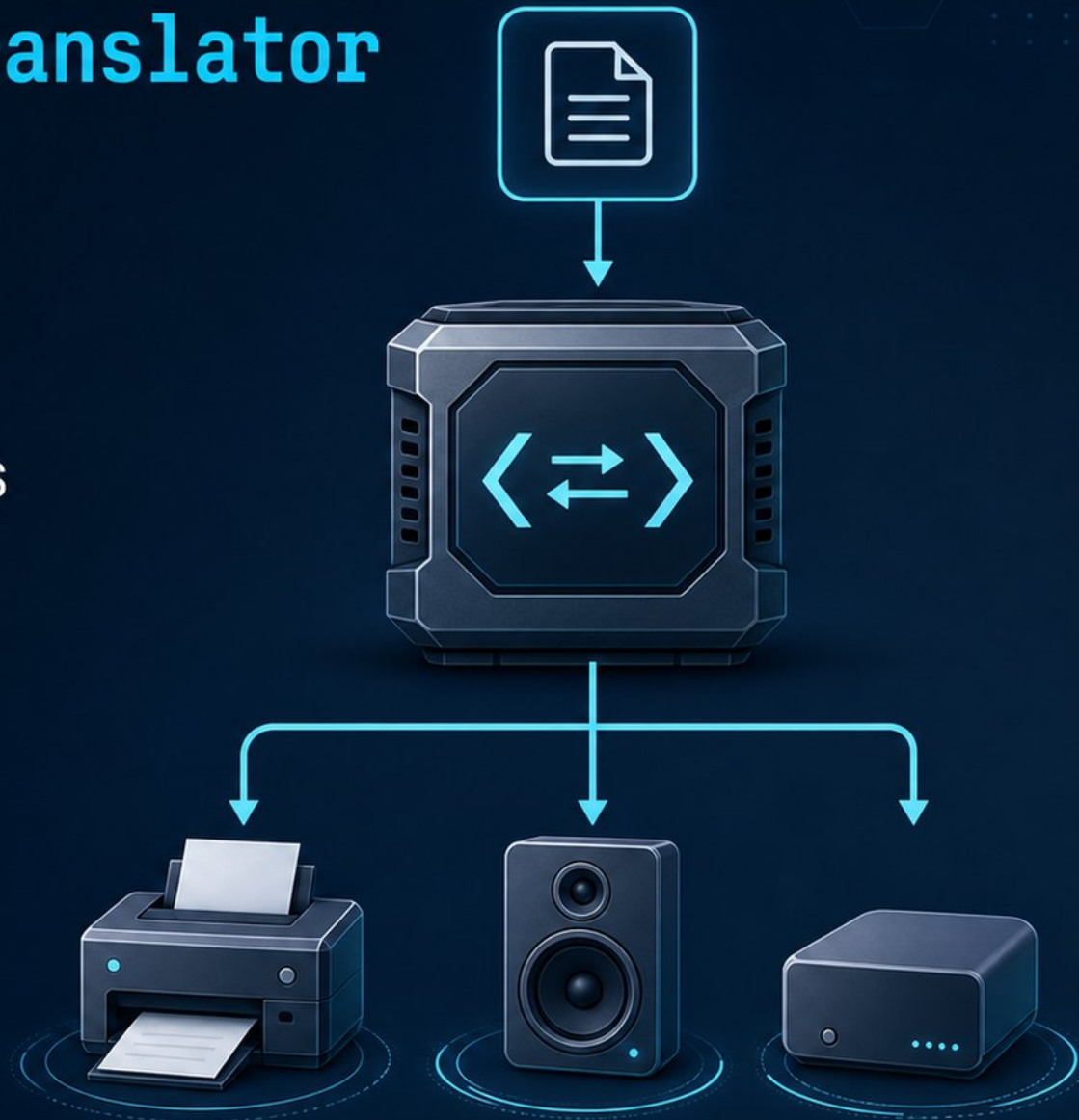
The OS as a Resource Manager

- **CPU scheduling:** rapid switching creates the illusion of simultaneous multitasking.
- **Memory management:** RAM is allocated and protected per program, preventing overlap.
- **Storage management:** the OS organizes files, folders, and free space like a librarian.
- **Simple mental model:** the OS holds the master clipboard of who gets what and when.



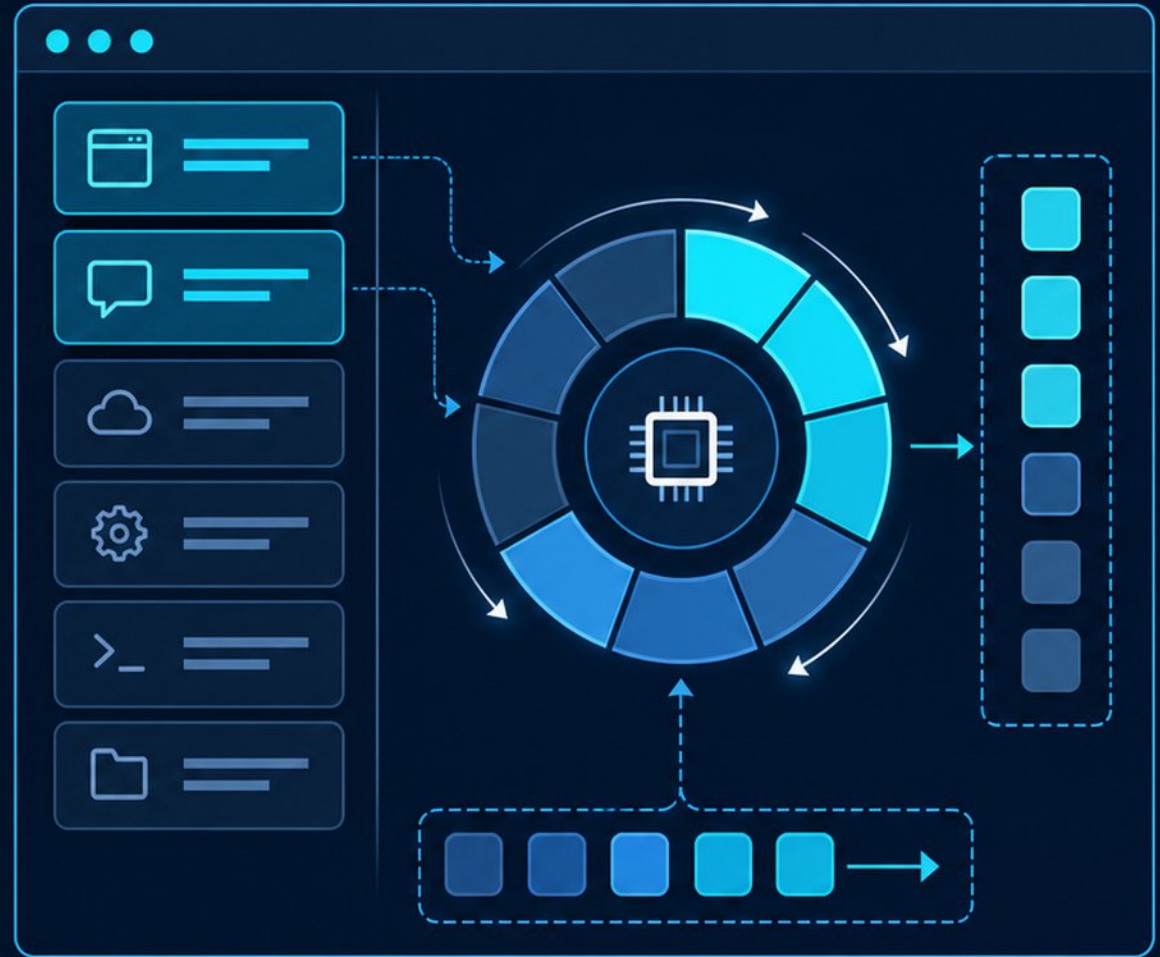
Hardware Abstraction: The Universal Translator

- Device drivers teach the OS to speak specific hardware languages.
- System calls: apps ask the OS for hardware help politely.
- A common interface lets any app print to any printer.
- Developers write code once; users mix and match hardware freely.



Processes and the Art of Multitasking

- Process: a program in memory and actively running
- Foreground vs. background: what you see vs. silent tasks
- Single-core illusion: rapid time-slicing creates fake parallelism
- Task Manager: your live window into the process world

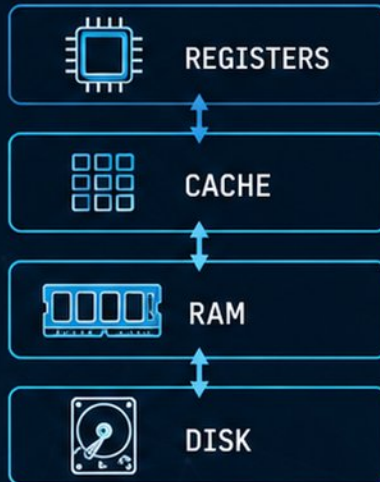


Memory: The Workspace of the Computer

- RAM is your active desk: fast, temporary, and limited
- Virtual memory borrows slow disk space as emergency RAM
- Memory hierarchy: registers, cache, RAM, disk — speed vs. capacity
- "Low memory" warnings mean closing apps frees up workspace



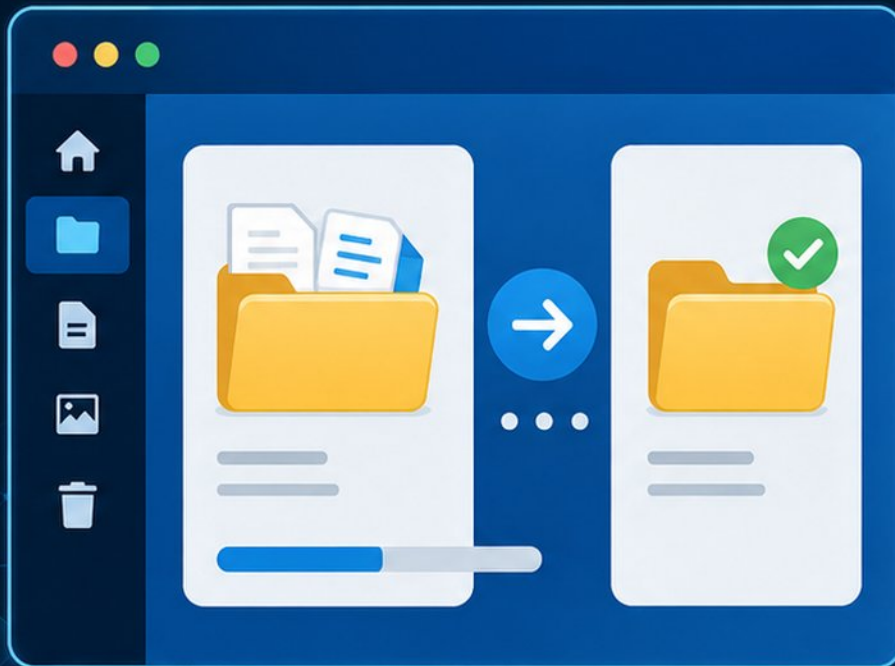
FASTER
SMALLER



SLOWER
LARGER

How We Talk to the OS: Interfaces

- **GUI:** The visual, clickable face of the operating system
- **CLI:** Text-based power tool for precision and automation
- **The shell:** Command interpreter translating human text into OS actions
- Achieving the same goal via desktop screenshot vs. terminal window



```
$ cp -r ~/docs/project ~/backup/project
$ ls ~/backup/project
plan.txt
notes.md
diagram.png
presentation.pdf
assets/
$
```

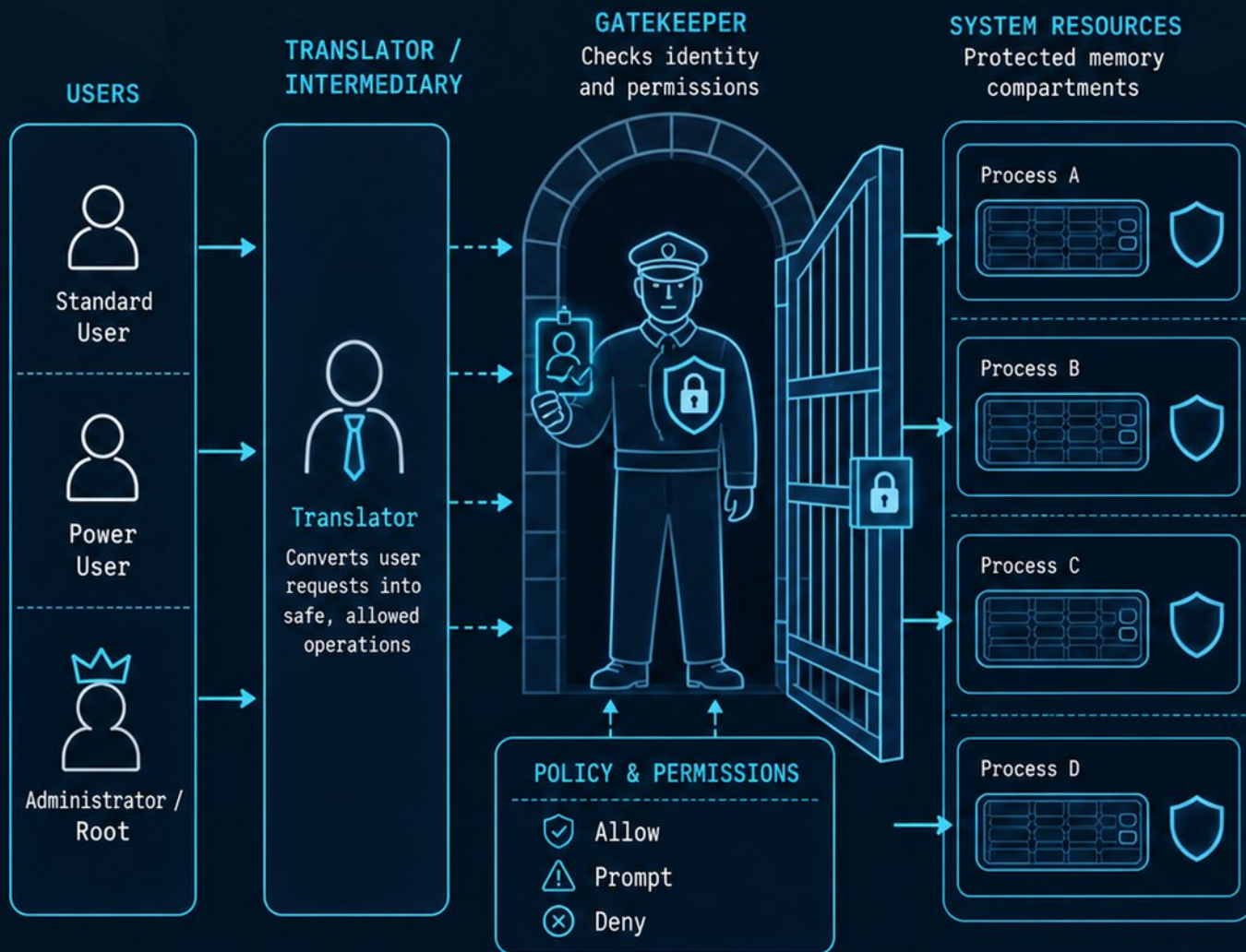
A Tour of Modern Operating Systems

- ▶ **Windows:** 56.61% of desktops; dominant in enterprise and gaming
- ▶ **macOS:** Unix-based, tightly integrated with Apple's creative ecosystem
- ▶ **Linux:** the open-source engine behind servers, Android, and developer tools
- ▶ **Android & iOS:** mobile-first leaders optimized for touch and battery
- ▶ **June 2026 snapshot:** Android 36.21%, Windows 26.67%, iOS 16.62% across all devices



Security Boundaries: Keeping Programs Honest

- ⬡ User accounts: standard user vs. administrator/root privileges
- ⬡ File permissions: read, write, and execute as gatekeepers
- ⬡ Process isolation prevents one app from peeking into another's memory
- ⬡ Everyday signs: permission dialogs and 'Access Denied' errors
- ⬡ Why you should never run everything as administrator

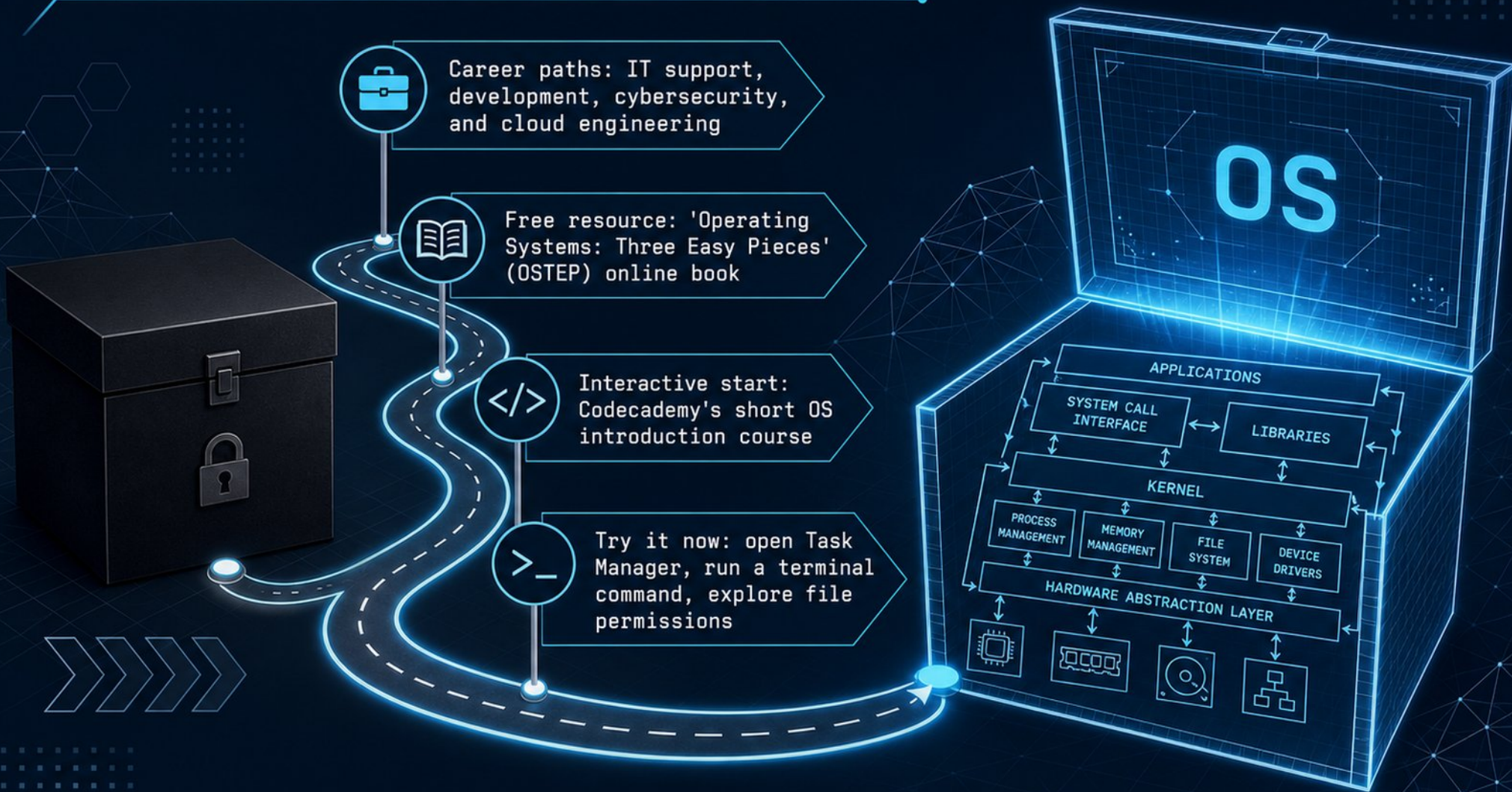


The OS in Your Daily Digital Life

- The OS acts on every tap, click, and file save
- 'Not responding' means a process is stuck or waiting
- Updates patch security holes and add new features
- Slow performance often points to memory or CPU overuse
- Driver issues break the link between OS and hardware
- This knowledge turns you into a capable self-helper



From Beginner to Builder: Next Steps

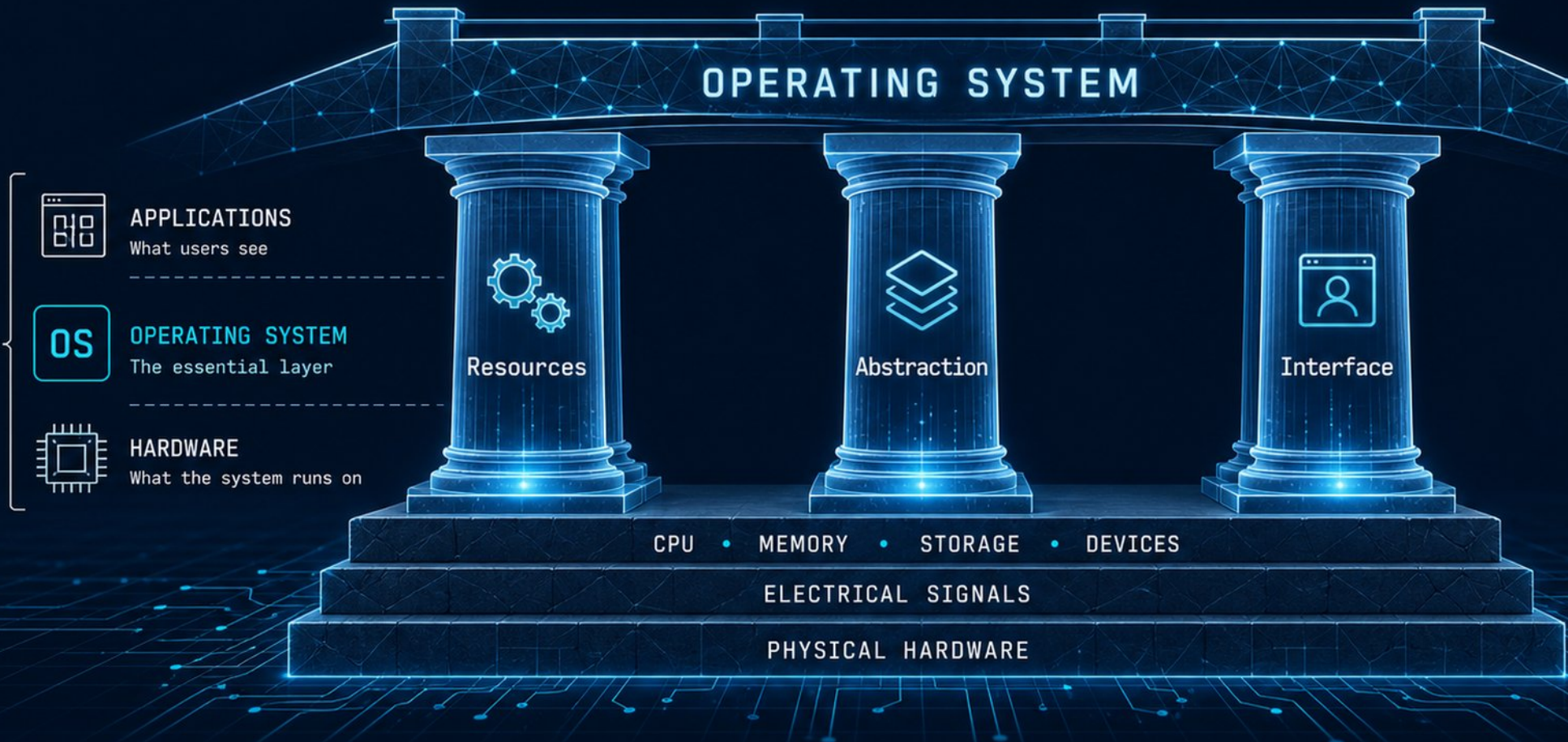


The OS is no longer a black box –
you now know what's inside



Key Takeaways and Q&A

- ▶ - OS brings order: manages resources, abstracts hardware, enforces security
- ▶ - Three pillars: resource management, hardware abstraction, user interface
- ▶ - Clear mental model: the essential layer between apps and hardware
- ▶ - Open floor for questions and sharing personal OS experiences



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