Why do we need an operating system?

Os acts as an interface between user and hardware managing resource and providing services to make applications run effectively.

To run an app there are some basic things that are required ie cpu, memory, gpu, disk . When we open the app it will ask for some cpu, some gpu, some memory, and some disk. So now all resources are being used by an app. Now if we want to open another app and it will also ask for the same resources then our system will not be able to provide them to that app as they are being used by other apps. Despite having enough resources to give to both apps we are not able to open both apps simultaneously.

Now instead of giving full resources to an app we should give some %age of each resource to that app and should keep some for other apps. To effectively provide right %age of resource to an app or a process we require os (Resource management aka arbitration)

When we want to open multiple tabs in chrome, each tab acts as a separate process to handle creation , scheduling and termination of process we require os (Process management)

When we app want some memory to work , os provide it enough memory and reclaims it when we close the app (memory management) (allocates and deallocates memory)

When we want to save and document in our device os write it on disk using file system (file system management)

When we want to print anything os uses printer driver to communicate with printer (device management)

Os provide interface (gui or cli) to interact with system (user interface)

When we are running multiple apps so one application should not affect other app ie. if one app crashes then it should not affect others or the whole system, one app should not be able to access data of another app without permission, a bug in any app should not corrupt the entire system. For all these os provides us isolation and protection . by isolation os keeps applications in different memory spaces preventing them from interfering with each other, os uses permissions and file access controls to prevent an app from getting unauthorised access.

Os hides underlying complexity of hardware (Abstraction)

Need	What It Prevents	Example
Isolation	One app from interfering with another	Chrome tab crash doesn't affect your code editor
Protection	Unauthorized access to data or system	App can't read your WhatsApp messages without permission
Stability	System crashes or bugs spreading	Faulty software doesn't shut down your PC
Security	Viruses or hackers accessing sensitive info	Password managers are protected from malware

Let's say we want to use whats app

We click on app icon to open that app (user interface)
Os launches the app in the device, providing it sufficient resources to open it (resource management)
Os allocates memory to load all the chats (memory management)
To send any image or video we select particular media from out device and share it though internet (file and device management)

If we don't have os
Then an app developer has to write logic and code for memory/resource management also
Then this logic of code would be in all apps. Making all apps bulky
There is also violation of dry (do not repeat yourself) principle

Os will have all logic of resource management avoiding code redundancy and avoiding apps being bulky

An operating system is a software that manages all resources of a computer both hardware and software and provides interface to user to execute his/her programs in efficient manner underlining/hiding complexity of hardware

—----------EO LEC1—----------