Part 1

OPERATING SYSTEMS

CSYE 6230– *Fall 2024*

***Please Mute Your Microphone**

***Make sure you are using your FULL Name for attendance**

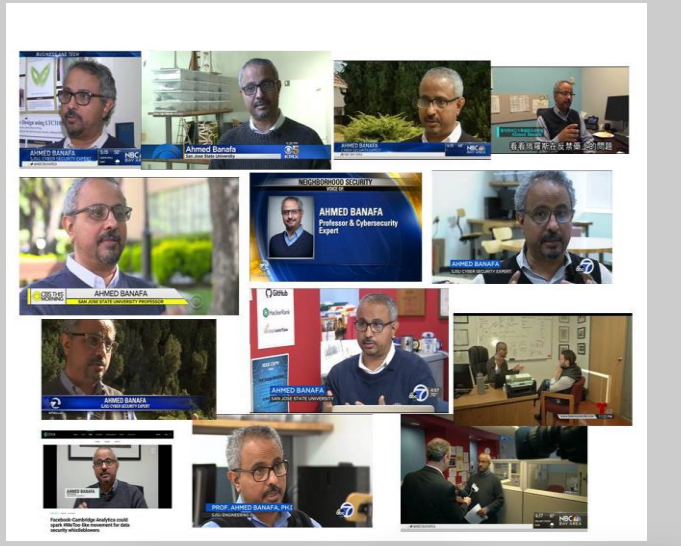
Important notes

- Please **mute** your microphone
- If you have any questions please use the **Chat feature of zoom , no microphones.**
- I am using two screens in this class one dedicated for Chat questions and comments.
- I will check questions periodically and answer them as we go over the presentation slides.
- I have 2 TAs they will help in answering questions

Netiquette

- Keep messages short and to the point.
- Never post a message that is in all capital letters — it comes across to the reader as SHOUTING
- Keep in mind that chat messages are meant to be constructive
- Be respectful and treat everyone as you would want to be treated yourself.
- **Be on Time**
- If you came late don’t disturb the class , join us quietly, *no need to apologize*
- I don’t read emails during the lecture
- You will be removed from zoom if you disrupt the class

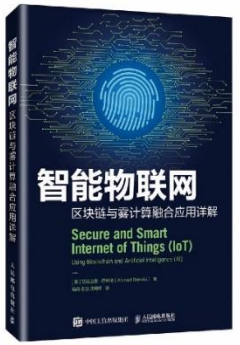
Prof. Ahmed Banafa



- **Prof. Ahmed Banafa** is an expert in IoT, Blockchain, Cybersecurity, and AI.
- Strong background in research, operations, and management.
- Received the Certificate of Honor from the City and County of San Francisco.
- Awarded the Haskell Award for Distinguished Teaching from the University of Massachusetts Lowell.
- Received the Author & Artist Award from San Jose State University.
- Recognized as the No.1 tech voice to follow by LinkedIn with over 53,000 followers.
- Featured in Forbes, IEEE-IoT, and MIT Technology Review.
- Frequently appears on ABC, CBS, NBC, BBC, and Fox TV and Radio stations.
- Studied Cybersecurity at Harvard University.
- Studied Digital Transformation at the Massachusetts Institute of Technology (MIT).
- Holds a Master's Degree in Electrical Engineering.
- Holds a PhD in Artificial Intelligence.

700+

Universities a & Colleges



620+

Universities & Colleges

HARVARD UNIVERSITY

Stanford University

Yale UNIVERSITY

PURDUE UNIVERSITY

Berkeley UNIVERSITY OF CALIFORNIA

2020

NAVAL POSTGRADUATE SCHOOL

Bookauthority BEST NEW PRIVATE BLOCKCHAIN BOOKS WINNER

LJ LIBRARY JOURNAL Academic Best Sellers

370+

LIBRARY

LIBRARY OF CONGRESS

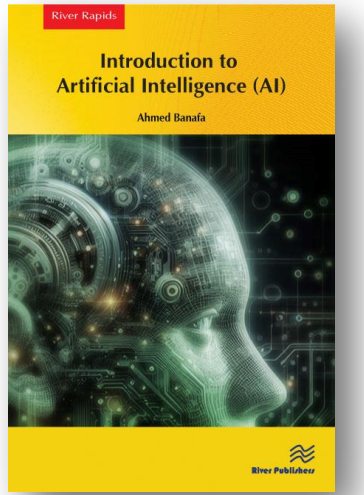
Berkeley
UNIVERSITY OF CALIFORNIA

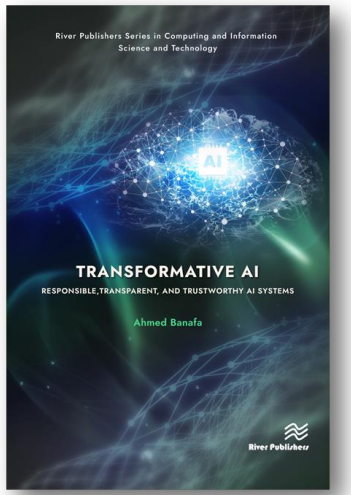
PRINCETON UNIVERSITY

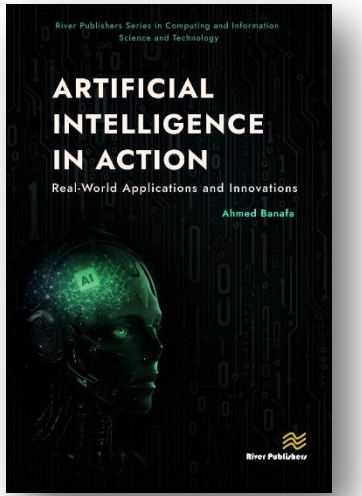
Stanford University

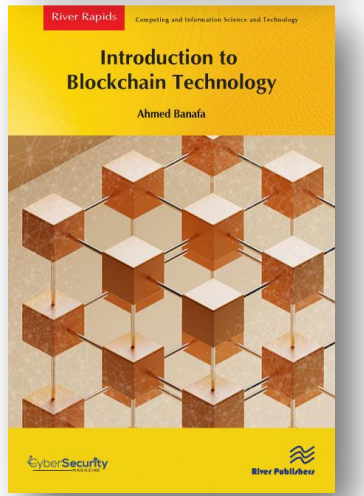
HARVARD UNIVERSITY

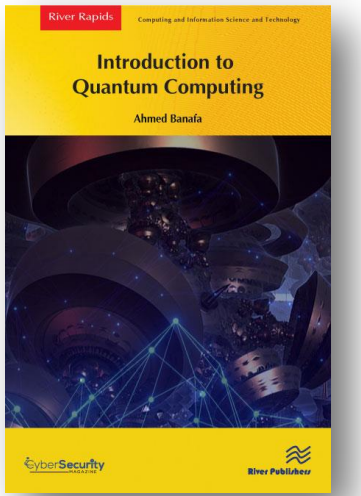
New Books


River Rapids
Introduction to
Artificial Intelligence (AI)
Ahmed Banafa
River Publishers


River Publishers Series in Computing and Information Science and Technology
AI
TRANSFORMATIVE AI
RESPONSIBLE,TRANSPARENT, AND TRUSTWORTHY AI SYSTEMS
Ahmed Banafa
River Publishers


River Publishers Series in Computing and Information Science and Technology
ARTIFICIAL
INTELLIGENCE
IN ACTION
Real-World Applications and Innovations
Ahmed Banafa
AI
River Publishers


River Rapids
Computing and Information Science and Technology
Introduction to
Blockchain Technology
Ahmed Banafa
CyberSecurity
River Publishers


River Rapids
Computing and Information Science and Technology
Introduction to
Quantum Computing
Ahmed Banafa
CyberSecurity
River Publishers


River Rapids
Computing and Information Science and Technology
Introduction to
Internet of Things (IoT)
Ahmed Banafa
IOT
Internet of Things
CyberSecurity
River Publishers

Important Notes

- Its your responsibility to check **Canvas**
- All Homework are typed
- Copy of **every week-PPT** will be posted on the weekend on the "**Announcements section**" of **Canvas**
- **Always Check "the Announcements section"**
- **10 Minutes Break** every hour
- Quiz in the **last 30 minutes** of the class

I would like to reiterate some important points that I discussed during our first session:

1. **No Makeup for Quizzes**: There will be no makeup options for quizzes; your presence during the scheduled quiz time is mandatory.

2. **Extra Credit Opportunities**: Later in the term, there will be opportunities for extra credit to compensate for any points you may have missed due to absence during quiz sessions.

3. **Class Attendance Permissions**: I do not grant permissions for missing classes; attendance is your responsibility and decision.

Don’t come at the end of the class just to take the quiz or do it without attending the class, you will receive zero as the TAs are taking attendance.

Important notes

- Please **mute** your microphone
- If you have any questions please use the **Chat feature of zoom , no microphones.**
- I am using two screens in this class one dedicated for Chat questions and comments.
- I will check questions periodically and answer them as we go over the presentation slides.
- I have 2 TAs they will help in answering questions

Netiquette

- Keep messages short and to the point.
- Never post a message that is in all capital letters — it comes across to the reader as SHOUTING
- Keep in mind that chat messages are meant to be constructive
- Be respectful and treat everyone as you would want to be treated yourself.
- **Be on Time**
- If you came late don’t disturb the class , join us quietly, *no need to apologize*
- I don’t read emails during the lecture
- You will be removed from zoom if you disrupt the class

CSYE 6230- Operating Systems

Textbook

Operating System Concepts Tenth Edition (older edition accepted)

Avi Silberschatz, Peter Baer, Galvin, Greg Gagne

John Wiley & Sons, Inc.
ISBN 978-1-118-06333-0

Grades

4 Homework assignments (50 points each)	20%	200 Points
Test 1	10%	100 Points
Test 2	10%	100 Points
Midterm Exam	15%	150 Points
Final Exam	25%	250Points
Research Paper	10%	100 Points
Creating OS (Group Project)	10%	100 Points
In-Class Quizzes	10%	100 Points
		1100 Points

I have another section on Thursday at 7 PM – 10:30 PM ET

Course Description

- Principles of operating system design and implementation.
- Concurrent processes, interprocess communication, job and process scheduling, deadlock.
- Issues in memory management (virtual memory, segmentation, paging) and auxiliary storage management (file systems, directory structuring, protection mechanisms).
- Performance issues. Programming projects.

- Prerequisites: Knowledge of C/C++, Assembly Language, and Data Structure
- Units: 4

Select ONE topic from the following list , write a research paper of min 8 pages + Cover Page and References page with min 3 references (Use APA Style) .This is an individual assignment NOT group assignment:

1. Definition and Basic Components of an Operating System
2. Types of Operating Systems: Overview and Characteristics
3. Process Management in Operating Systems
4. Process Scheduling Algorithms: A Comparative Analysis
5. Memory Management Techniques in Operating Systems
6. Paging vs. Segmentation: A Comparison of Memory Allocation Methods
7. Virtual Memory: Concepts, Benefits, and Implementation
8. File Systems: Structure, Organization, and Performance
9. File Allocation Methods: Sequential, Indexed, and Linked Allocation
10. Input/Output Operations and Device Management
11. Device Drivers: Role and Importance in Operating Systems
12. Interprocess Communication: Mechanisms and Synchronization
13. Deadlock Detection and Prevention in Operating Systems
14. Security Features in Operating Systems: Access Control and Authentication
15. Encryption and Data Protection in Operating Systems
16. Virtualization: Concepts, Types, and Benefits
17. Virtual Machines vs. Containers: A Comparative Study
18. Cloud Computing and its Impact on Operating Systems
19. Case Study: Analysis of a Specific Operating System (e.g., Linux, Windows, macOS)
20. Future Trends in Operating Systems: Challenges and Innovations

Create OS

Create OS

Published | Edit

Create your own OS and this is some of the resources

Read LFS Online

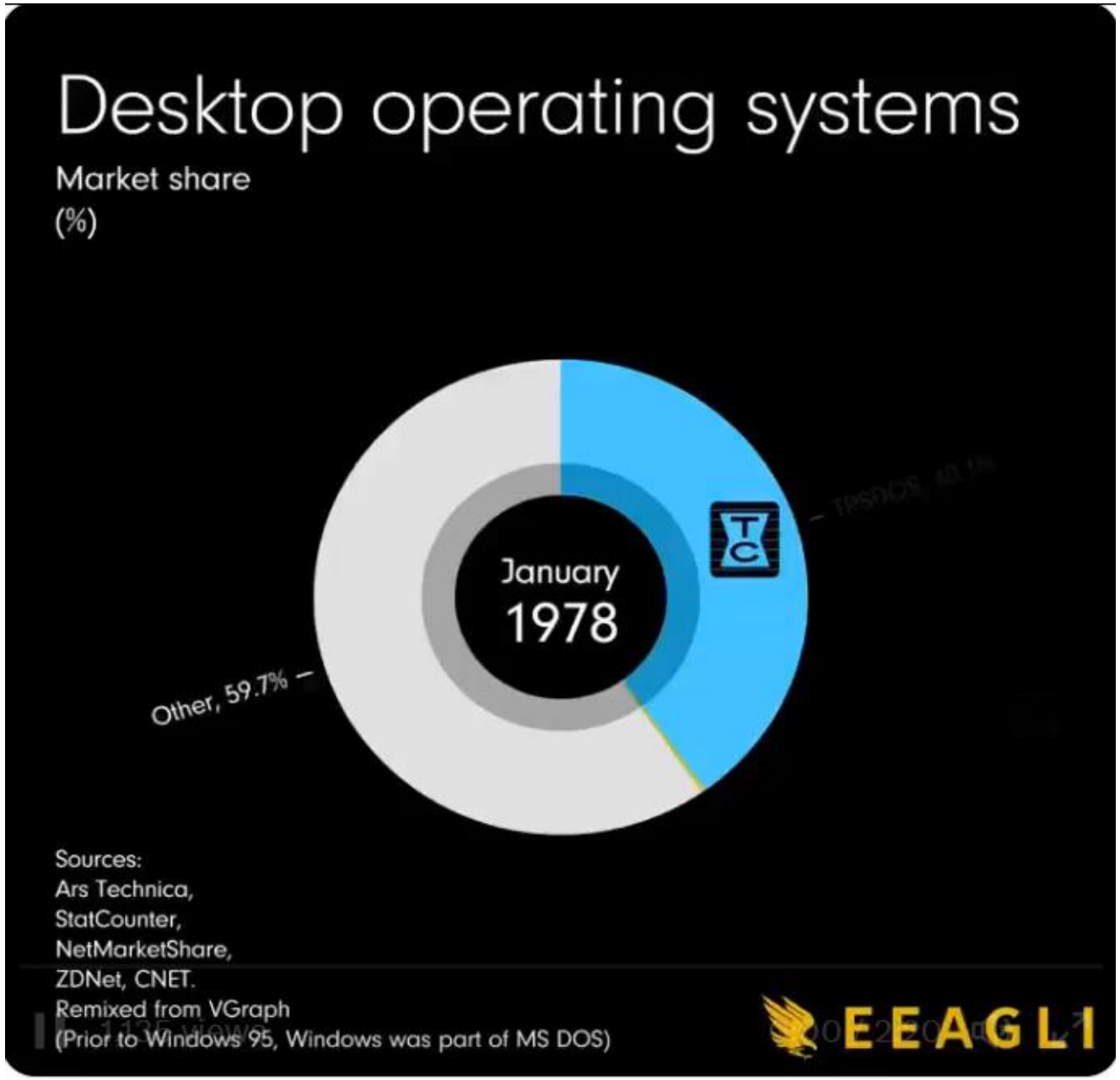
Click here

cfenollosa/**os-tutorial**

How to create an OS from scratch

Hi, My Name is Bill Gates
and I'll teach you how
to count to ten :

1, 2, 3, 95, 98, NT, 2000, XP, VISTA, 7, 8, 10


Desktop operating systems
Market share
(%)
January
1978
Other, 59.7%
Sources:
Ars Technica,
StatCounter,
NetMarketShare,
ZDNet, CNET.
Remixed from VGraph
(Prior to Windows 95, Windows was part of MS DOS)
EEAGLI

a simple operating system kernel might look like in C:

```
scss
#include <stdio.h>
#include <stdlib.h>

void kernel_main(void) {
    /* Initialize hardware */
    init_hardware();

    /* Initialize memory */
    init_memory();

    /* Initialize process manager */
    init_process_manager();

    /* Initialize file system */
    init_file_system();

    /* Start the shell */
    start_shell();
}

void init_hardware(void) {
    /* Initialize hardware devices, such as keyboard, display, and disk */
}

void init_memory(void) {
    /* Allocate memory for the kernel and user processes */
}

void init_process_manager(void) {
    /* Initialize the process table and create the first user process */
}

void init_file_system(void) {
    /* Initialize the file system and mount the root file system */
}

void start_shell(void) {
    /* Run the shell process */
}
```

This code represents a basic skeleton for an operating system kernel. It initializes the hardware, memory, process manager, and file system, and then starts the shell process. This is just an example and a real operating system kernel would be much more complex and include many more components and features.


MAC
WINDOWS
LINUX

OSES

33

Windows 12: Savior of PC makers, or just an apology for Windows 11?

Looking into our crystal ball we can see the end of 2024 will be filled with … AI. So much AI

Richard Speed

Sat 23 Dec 2023 // 09:57 UTC

ANALYSIS Microsoft is betting the farm on AI apathy not hitting before it makes a return on its investments. This is positive and negative news for PC makers and points to what might be Microsoft's next major Windows release.

Windows 11 continues to be a less-than-stellar success for Microsoft. The most recent set of figures it reported were uninspiring. Despite a looming end of support for Windows 10 - although customers can pay for an extension - the OS remains dominant, and Windows 11 trails behind where its predecessor had been in terms of installations at the same point in its lifecycle.

Some of The Topics Covered

- What is an OS?
- What Operating Systems Do
- Computer-System Organization
- Computer-System Architecture
- Operating-System Operations
- Resource Management
- Security and Protection
- Virtualization
- Distributed Systems
- Kernel Data Structures
- Computing Environments
- Open-Source Operating Systems

We will answer the following Questions

- Describe the general organization of a computer system and the role of interrupts
- Describe the components in a modern, multiprocessor computer system
- Illustrate the transition from user mode to kernel mode
- Discuss how operating systems are used in various computing environments
- Provide examples of free and open-source operating systems

Computer System Structure

- Computer system can be divided into **four components**:
  - **Hardware** – provides basic computing resources
    - CPU, memory, I/O devices, Storage
  - **Operating system**
    - Controls and coordinates use of hardware among various applications and users
  - **Application programs** – define the ways in which the system resources are used to solve the computing problems of the users
    - Word processors, compilers, web browsers, database systems, video games
  - **Users**
    - People, machines, other computers

- An operating system (OS) is a software that serves as the foundation for a computer system, providing essential functions and managing hardware and software resources.
- It acts as an intermediary between computer hardware and user applications, facilitating communication and coordination between various components.

- The primary purpose of an operating system is to enable the execution of user programs while ensuring the efficient and secure allocation of system resources, such as memory, processing power, storage, and input/output devices.
- It provides a standardized interface for interacting with the computer system, allowing users to run applications, manage files, and perform other tasks.


Keyboard not found
Press F1 to continue,DEL to enter Setup
VIA 9GAG.COM

- Key features of an operating system include process management, memory management, file system management, device management, and user interface. Process management involves scheduling and executing tasks or processes, ensuring fair allocation of CPU time. Memory management handles the organization and allocation of system memory to various programs and data.

- File system management allows users to store, access, and organize files on secondary storage devices. Device management involves controlling and coordinating input/output devices like keyboards, monitors, printers, and network interfaces.

- The user interface provides a means for users to interact with the computer system, either through a command-line interface or a graphical user interface (GUI).

- Overall, an operating system plays a vital role in managing and coordinating the various components of a computer system, providing a stable and secure environment for users to run applications and perform tasks efficiently.

An operating system (OS) consists of several components that work together to manage and control the operation of a computer system. Here are the key components of an operating system:

- Kernel: The kernel is the core component of the operating system. It provides essential services and manages the system's resources, including memory, processors, devices, and file systems. It acts as a bridge between the hardware and software layers of the system
- Process Management: This component is responsible for managing and executing processes or tasks. It includes features such as process scheduling, creation, termination, and synchronization to ensure efficient utilization of the CPU.

- Memory Management: The memory management component handles the allocation and deallocation of system memory to processes. It manages virtual memory, paging, swapping, and memory protection to optimize memory usage and provide a secure environment for processes.

- File System: The file system component manages the organization, storage, retrieval, and access of files on secondary storage devices such as hard drives or solid-state drives. It provides a hierarchical structure for organizing files and includes features like file permissions, directory management, and file metadata.

- Device Drivers: Device drivers are software modules that facilitate communication between the operating system and hardware devices such as printers, keyboards, monitors, and network interfaces. They enable the operating system to control and interact with these devices.

- User Interface: The user interface component provides a means for users to interact with the operating system. It can take the form of a command-line interface (CLI), where users enter text commands, or a graphical user interface (GUI), which presents a visual environment with icons, windows, and menus.

- Networking: Networking components enable the operating system to support network connectivity and communication. They include protocols, drivers, and services that allow the system to connect to networks, access the internet, and transfer data.

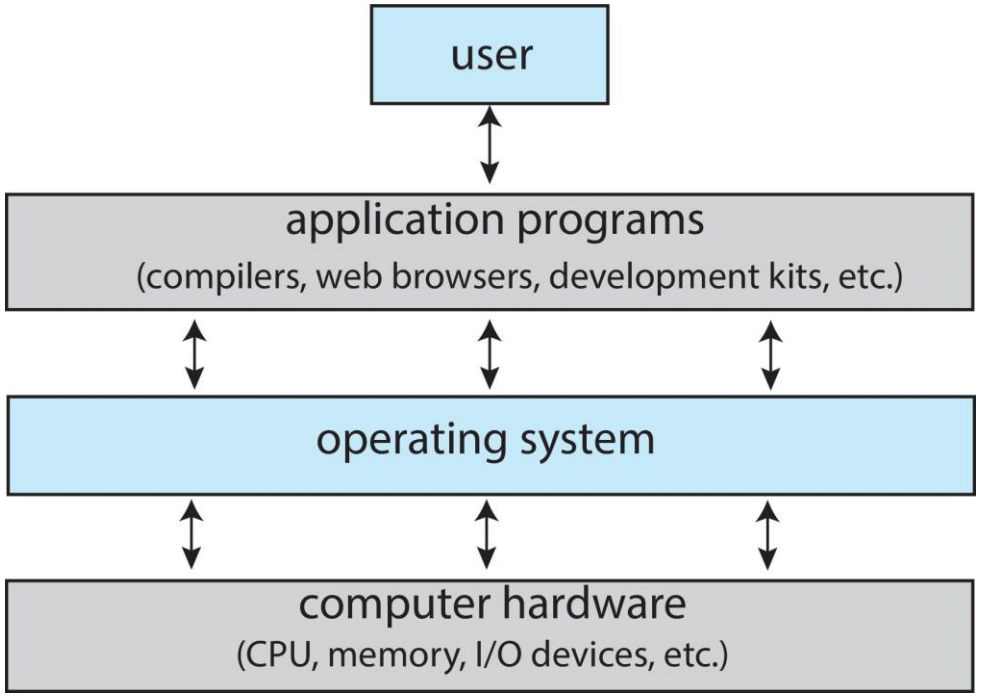
- Security: The security component ensures the protection of the system and its resources against unauthorized access, threats, and vulnerabilities. It includes features such as user authentication, access control, encryption, and firewall capabilities.

- File and Data Management: This component includes utilities and services for managing files, directories, and data on the system. It handles tasks like file organization, backup, recovery, and data integrity.

- System Libraries: System libraries are collections of precompiled code that provide common functions and services to applications. They allow programmers to leverage existing functionality without having to develop everything from scratch

- These components work together to provide a cohesive and functional operating system, allowing users to run applications, manage files, and utilize system resources efficiently.

Abstract View of Components of Computer



The Big Pic of OS