



DRONTECHCONNECT

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SE (AI & ML)

EDITION

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DRONTECHCONNECT

EDITORIAL MESSAGE



Dr. Ashima Mehta
(HOD CSE)

Dear Readers,

Welcome to the latest edition of DronTechConnect!

Within these pages, we celebrate the ingenuity, brilliance, and sheer passion that define our department. From breakthrough research to real-world applications, our students and faculty continue to push the boundaries of technology. Dive into these stories of innovation, collaboration, and trailblazing achievements that epitomize our commitment to shaping the future of Computer Science and Engineering.

From groundbreaking research to industry collaborations, each article reflects our commitment to excellence.

I encourage you to delve into these insightful pages, explore the stories of dedication, creativity, and transformative ideas that emanate from our department. Big Thanks to everyone who contributed to this issue. Together, we continue to shape the future of computing and inspire the next generation of innovators.

Thank you for your continued support and enthusiasm for our magazine. Stay Informed, Stay Connected!!

Happy Exploring!

Warm Regards

Dr. Ashima Mehta

Editor-in-Chief, DronTechConnect

EDITORIAL BOARD



Dr. Ashima Mehta
(HOD CSE)

Editor in Chief

In this issue, explore the students' visionary talent, department's groundbreaking innovations, cutting-edge research, and the brilliant minds shaping the future of technology. With top-notch labs, industry collaborations, and a passion for pushing boundaries, CSE department is shaping the tech landscape of tomorrow. In the pages ahead you will witness the world through code, algorithms, and limitless imagination.



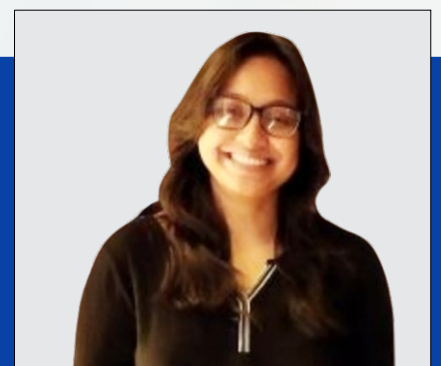
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DRONTECHCONNECT



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VISION

To facilitate high quality education in Information Technology and progressive atmosphere to the students so that they can fit into the competitive atmosphere in the global market.

To provide a learning ambience to enhance innovations, problem solving skills, managerial qualities, team-spirit and ethical responsibilities.

To provide exposure to latest tools and technologies in the area of Information Technology.

To support society by participating in & encouraging technology transfer.

To undertake collaborative learning which offers opportunities for long term interaction with academia and industry.

MISSION

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- Achieve strong fundamentals, domain knowledge through projects and industrial training and be updated with recent technology to provide the effective solutions for Information Technology problems and meet the industry standards.
- Provide socially responsible, society friendly solutions to Information Technology related broad-based problems adapting professional ethics
- Able to face the challenges in professional practices in consistency with the societal needs, global factors and adherence to professional ethics, which will lead to lifelong learning.
- Solve broad-based problems individually and as a team member effectively in the world of work.

PROGRAMME OUTCOME

Engineering Graduates will be able to:

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Po4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Po5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Po6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Po7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Po8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities & norms of the engineering practice.

Po9. Individual & team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Po10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give & receive clear instructions.

Po11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Dual Mode Operation in OS

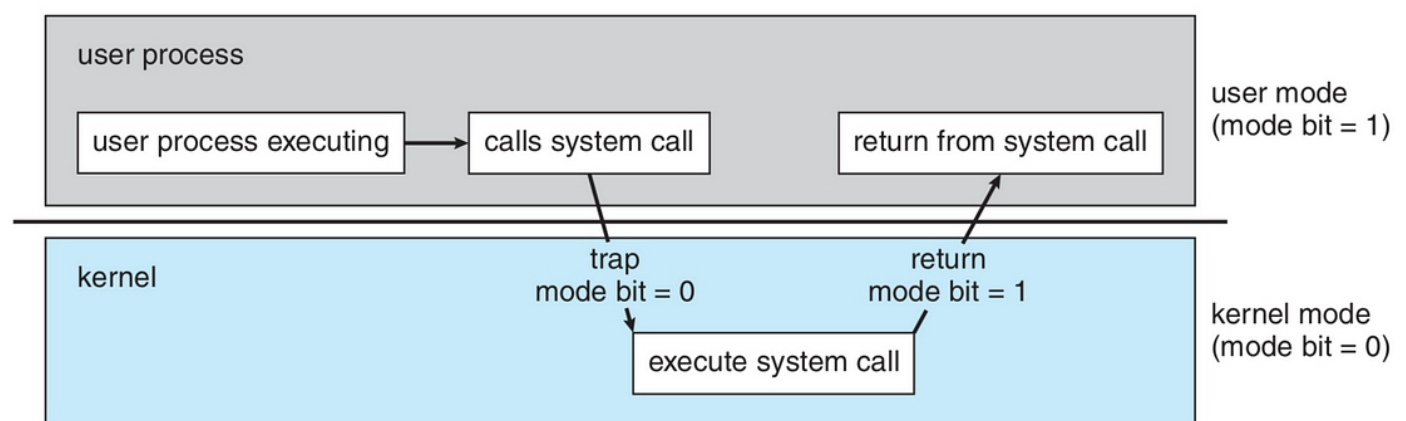


Tanya Kalra

(20154; CSE)

Dual Mode Operation, also known as Supervisor Mode and User Mode, is a feature integrated into operating systems to distinguish between privileged and non-privileged instructions. The primary purpose of dual mode operation is to prevent user-level programs from interfering with critical system resources and to ensure the stability and security of the overall system.

User Mode: In User Mode, applications and user-level programs run with restricted access to the system's resources. User Mode is designed to provide a safe environment for applications to execute without directly manipulating critical hardware components. Processes in User Mode have limited permissions, preventing them from tampering with the kernel or other sensitive system data.



Supervisor Mode: Supervisor Mode, on the other hand, is the privileged mode where the operating system kernel operates. In this mode, the OS has unrestricted access to all system resources and can execute privileged instructions that are typically off-limits to user-level programs. Supervisor Mode is crucial for managing system resources, handling interrupts, and ensuring the overall stability and security of the system.

Key Features and Benefits:

Isolation: Dual Mode Operation provides a robust mechanism for isolating user-level applications from critical system resources. By restricting the access of user programs, the OS ensures that accidental or malicious actions within applications do not compromise the integrity of the entire system.

Security: The separation of User Mode and Supervisor Mode enhances system security. Critical operations, such as modifying hardware configurations or accessing sensitive data, can only be performed in Supervisor Mode, reducing the risk of unauthorized access and potential security breaches.

Stability: Dual Mode Operation contributes to system stability by preventing user-level programs from directly affecting the core functionalities of the OS. This ensures that the operating system remains operational and responsive even when individual applications encounter issues.

Resource Management: In Supervisor Mode, the OS has full control over system resources, allowing it to efficiently manage tasks like memory allocation, process scheduling, and device communication. This enables the OS to optimize resource utilization for improved performance.

Challenges and Considerations: While Dual Mode Operation is a fundamental aspect of modern operating systems, it is not without challenges. Ensuring that the transition between User Mode and Supervisor Mode is seamless and secure is crucial. Additionally, managing the balance between providing flexibility to user-level applications and maintaining system integrity requires careful design and implementation.

Conclusion: Dual Mode Operation is a cornerstone feature in operating systems, providing a crucial layer of security and stability. By dividing the execution environment into User Mode and Supervisor Mode, OS architects can create a robust platform that allows applications to run safely while maintaining control over critical system resources. As computing technologies continue to evolve, the importance of Dual Mode Operation remains steadfast in ensuring the reliability and security of our digital systems.

Tanya Kalra
(20154; CSE)

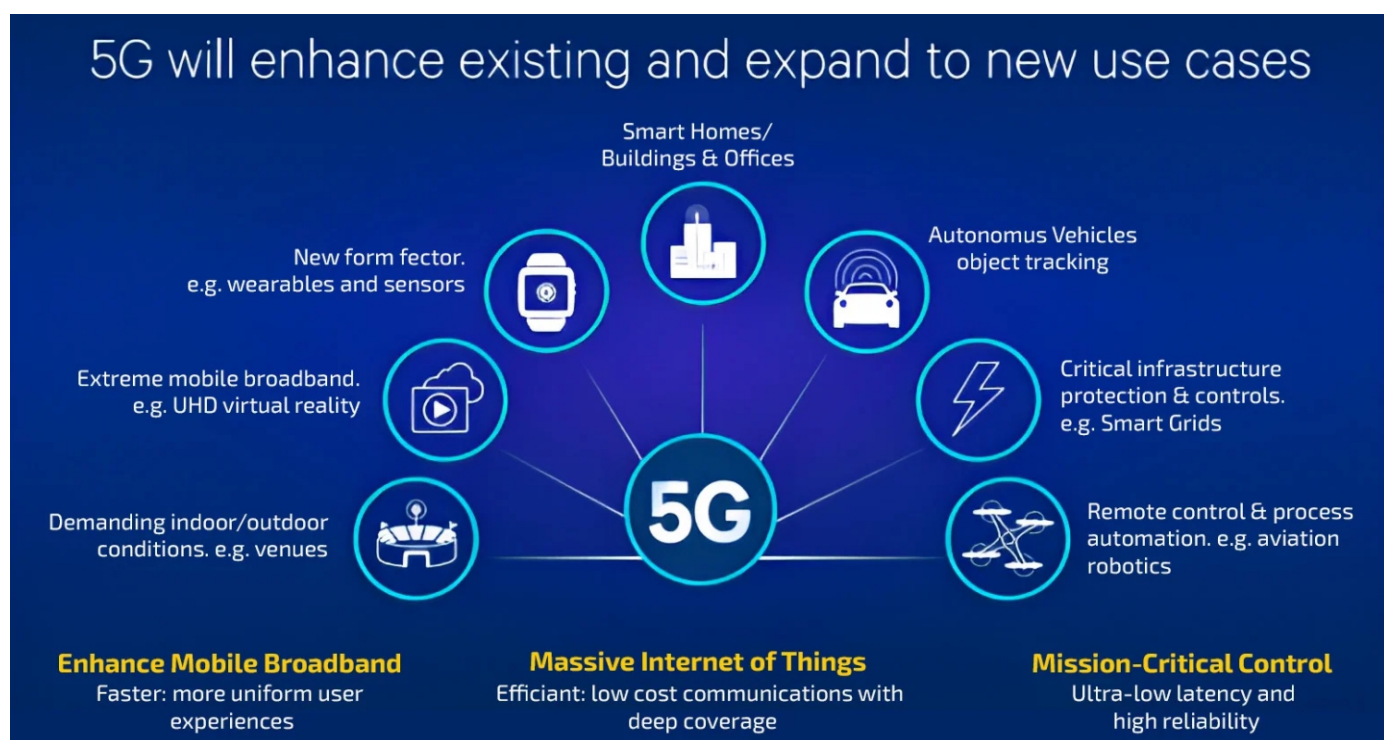
The Future of 5G Technology: Transforming Connectivity and Beyond



Simran
(20143; CSE)

The advent of 5G technology marks a pivotal moment in the evolution of wireless communication, promising to redefine the way we connect, communicate, and interact with the digital world. As the fifth generation of mobile networks, 5G brings unprecedented speed, low latency, and massive device connectivity, unlocking a myriad of possibilities for innovation and technological advancement.

One of the most significant advancements that 5G introduces is its remarkable speed. With data rates up to 100 times faster than its predecessor, 4G, 5G opens the door to lightning-fast downloads, seamless streaming, and near-instantaneous responsiveness. This leap in speed not only enhances user experiences but also facilitates the integration of emerging technologies like augmented reality (AR), virtual reality (VR), and the Internet of Things (IoT).



5G's low latency, or the minimal delay in data transmission, is a game-changer for applications demanding real-time responsiveness. Industries such as healthcare, gaming, and autonomous vehicles stand to benefit significantly from this reduced latency, enabling life-saving medical procedures, immersive gaming experiences, and safer self-driving vehicles.

As we move towards an increasingly connected world, 5G plays a pivotal role in realizing the full potential of the Internet of Things. The expansive network capacity and ability to handle a massive number of simultaneous connections make 5G the backbone of IoT ecosystems. From smart cities and homes to industrial automation, 5G empowers a new era of connectivity, enabling devices to communicate seamlessly and intelligently.

While 5G's impact on mobile connectivity is undeniable, its influence extends far beyond smartphones and tablets. The technology is poised to revolutionize various industries, including manufacturing, education, and agriculture. Smart factories will leverage 5G for real-time monitoring and control, educational institutions will embrace immersive learning experiences, and precision agriculture will benefit from enhanced connectivity in rural areas.

Challenges and Considerations

While the future of 5G is promising, challenges such as infrastructure development, security concerns, and spectrum management must be addressed. Collaboration between governments, telecommunications companies, and technology providers is crucial to ensure the seamless integration of 5G networks worldwide.

In conclusion, the future of 5G technology is a roadmap to a more connected, efficient, and innovative world. As the infrastructure continues to roll out globally, 5G will catalyze a technological revolution, unlocking possibilities we are just beginning to grasp. From enhancing daily experiences to propelling industries into new frontiers, 5G is set to be the cornerstone of the next era of connectivity and technological progress.

5G TECHNOLOGY

- Open Innovation
- Product Commercialization
- Market Research
- Patent & IP Research
- BI Dashboard
- Technology Scouting
- New Product Development

Simran

(20143; CSE)

Enhancing Security: The Rise of Biometric Authentication Systems



Divyanshu Jangra

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In a world where digital transactions and data protection are paramount, the demand for robust and secure authentication systems has never been higher. Enter biometric authentication, a cutting-edge technology that leverages unique physiological and behavioral characteristics for identity verification. From fingerprints and facial recognition to iris scans and voice patterns, biometrics is reshaping the landscape of security.

The Biometric Advantage

Unlike traditional methods such as passwords or PINs, biometric authentication offers a more secure and user-friendly approach. Each individual possesses unique biological traits that are difficult to replicate, providing an extra layer of security against unauthorized access. Biometric systems not only enhance security but also eliminate the need for users to remember complex passwords, mitigating the risks associated with forgotten or easily hackable credentials.



Fingerprint Recognition:

Fingerprint scanners have become a ubiquitous feature on smartphones and other devices. The distinctive ridges and valleys of a person's fingerprint serve as a personalized key, granting access only to the rightful owner.

Facial Recognition:

The rise of facial recognition technology allows devices and systems to analyze facial features, mapping unique characteristics for identification. This technology finds applications in smartphones, airports, and even social media platforms.

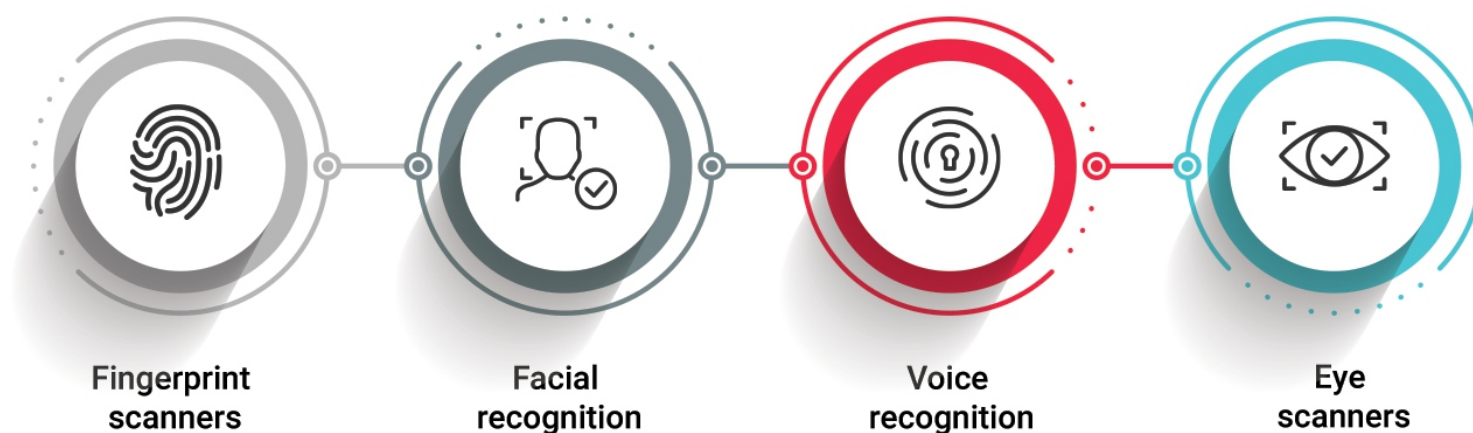
Iris and Retina Scans:

Iris and retina scans delve into the intricate details of the eye to create a unique biometric profile. These scans are highly accurate and are commonly employed in high-security environments.

Voice Authentication:

Voice recognition technology analyzes vocal patterns, emphasizing the uniqueness of an individual's voice. This method is employed in phone-based authentication systems and voice-activated devices.

TYPES OF BIOMETRIC AUTHENTICATION





Biometric authentication systems are not confined to the realm of personal devices. They are increasingly prevalent across industries, from financial institutions securing online transactions to healthcare facilities protecting patient records. Governments also employ biometrics for border control and citizen identification.

Despite their efficacy, biometric systems are not without challenges. Privacy concerns, potential vulnerabilities, and the need for stringent data protection measures must be addressed. Ongoing research focuses on improving biometric algorithms, enhancing accuracy, and developing liveness detection to prevent spoofing attempts.

In the era of heightened security consciousness, biometric authentication systems stand as a beacon of innovation. As technology continues to advance, the integration of biometrics into daily life is set to become even more widespread. The adoption of these systems not only fortifies our digital spaces but also ushers in a new era where personal identification is seamless, secure, and uniquely tailored to each individual.

Computer System Level Hierarchy



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The Computer System Level Hierarchy refers to the layered organization of a computer system, where each level represents a different level of abstraction and functionality. This hierarchy helps in understanding the complex architecture of a computer system by breaking it down into manageable and comprehensible layers. The following are the common levels in the Computer System Level Hierarchy:

User Level: At the top of the hierarchy is the user level, representing the interface between the computer system and the end user. Users interact with applications and software at this level, performing tasks such as word processing, web browsing, or running specific software applications. Users are generally not concerned with the lower levels of the system but rather interact with the system through graphical user interfaces (GUIs) or command-line interfaces.

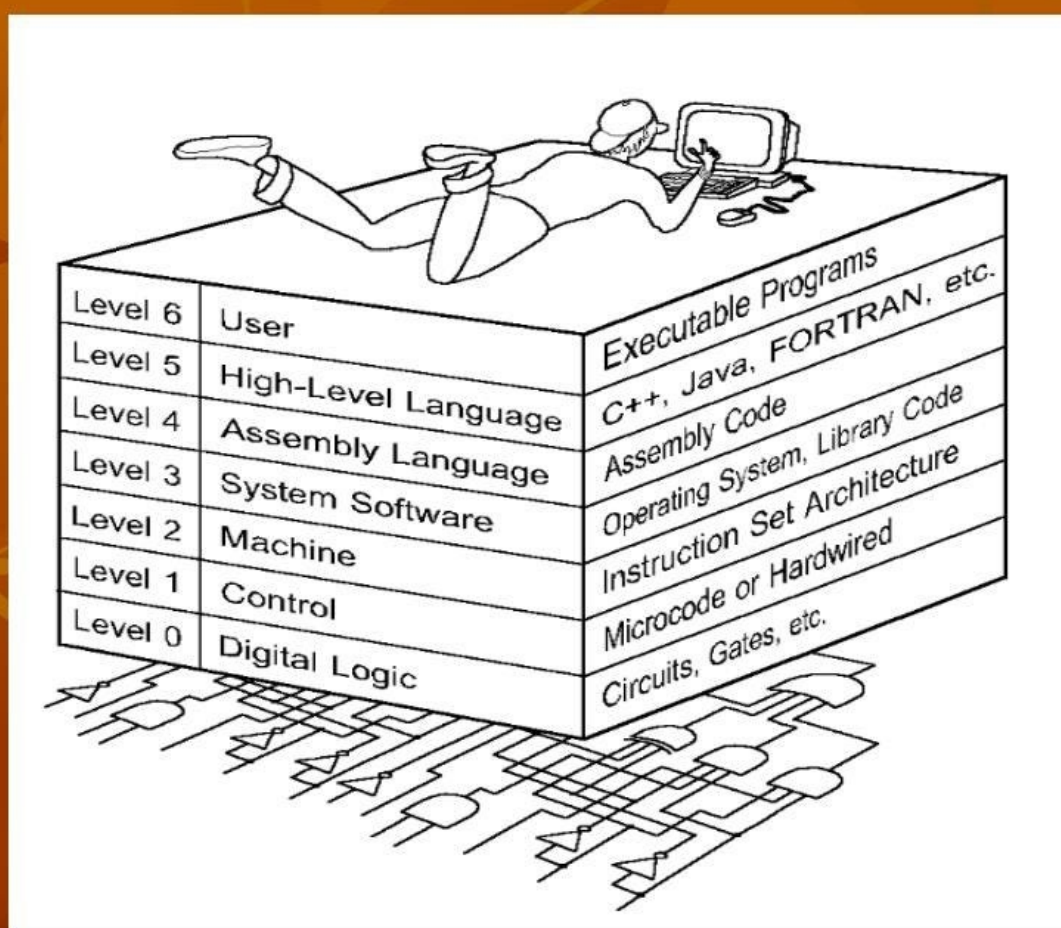
Application Level: The application level is where software applications are executed. This includes a wide range of programs such as word processors, web browsers, games, and more. Application developers work at this level, creating software that leverages the capabilities provided by the lower levels of the system.

Operating System Level: The operating system (OS) level is an intermediary layer between application software and the computer hardware. The OS manages hardware resources, provides services to applications, and ensures a secure and stable environment for software execution. Tasks at this level include process management, memory management, file system management, and device management.

Hardware Abstraction Level: This level abstracts the details of the underlying hardware, providing a consistent interface for the operating system and applications. It includes components such as device drivers and the hardware abstraction layer (HAL). The goal is to shield higher-level software from the specifics of the hardware, allowing software to be more portable across different hardware configurations.

Instruction Set Architecture (ISA) Level: ISA defines the set of instructions that a processor can execute. It acts as a boundary between hardware and software, providing a standardized interface for software developers. The ISA level includes the architecture of the CPU, registers, instruction formats, and addressing modes.

The Computer Level Hierarchy



Microarchitecture Level: Also known as the processor organization level, this level deals with the internal design and implementation details of the CPU. It includes elements such as the control unit, ALU, registers, and pipelines. Microarchitecture focuses on how the CPU interprets and executes instructions at the hardware level.

Digital Logic Level: The lowest level of the hierarchy deals with the digital logic circuits that implement the microarchitecture. This level involves the design of electronic circuits, including gates, flip-flops, and other components that make up the digital logic necessary for processing and storing information.

Level 6	User	Executable Programs
Level 5	High Level Language	C++ , Java
Level 4	Assembly Language	Assembly Code
Level 3	System Software	Operating System
Level 2	Machine	Instruction Set Architecture
Level 1	Control	Microcode
Level 0	Digital Logic	Circuits , Gates