COMSATS University Islamabad, Abbottabad Campus

Department of Computer Science

SDA

Lab Assignment

Rana Muhammad Tayyab ATIQ

FA22-BSE-098

5 Architectural Problems Now a days

1. **Adoption of New Frameworks and Tools**

- Challenge: New frameworks, libraries, and tools are continually emerging, often promising better performance, more functionality, and improved developer productivity. However, adopting them too quickly without thorough evaluation can lead to issues such as:
    - Compatibility problems with existing systems.
    - Training and knowledge gaps among the development team.
    - Increased technical debt if the new tool is eventually discarded for another newer solution

2. **Microservices and Distributed Architectures**

- **Challenge**: The shift from monolithic to microservices-based architecture is one of the most significant changes in recent years. While microservices provide scalability, flexibility, and resilience, they also introduce complexities such as:
    - Distributed system challenges (network latency, failure handling, consistency issues).
    - Increased overhead in managing inter-service communication, data consistency, and security.
    - The need for a robust DevOps and CI/CD pipeline to manage deployments across multiple services.

3. **Cloud-Native Development**

- **Challenge**: The rapid shift to cloud computing platforms such as AWS, Azure, and Google Cloud has led to the adoption of cloud-native architectures, which include serverless computing, containerization (Docker), and Kubernetes orchestration. The challenges include:
    - Dependency on third-party cloud providers, making it harder to switch providers without significant migration effort.
    - Complexity in managing cloud infrastructure, especially in large organizations.
    - Potential vendor lock-in, especially with proprietary cloud solutions.

4. **Artificial Intelligence (AI) and Machine Learning (ML) Integration**

- **Challenge**: Integrating AI and ML models into software systems is becoming increasingly important, but it presents unique challenges:
    - The need for specialized skills in AI/ML development and deployment.
    - Integrating machine learning models into traditional software architectures in a scalable and efficient manner.
    - Ensuring the reliability, interpretability, and fairness of AI models.

5. Serverless Computing

- **Challenge**: Serverless computing is rapidly changing the landscape of backend architectures. It abstracts infrastructure management, but the challenges include:
    - Cold start latency and performance degradation for sporadic workloads.
    - Managing stateful applications in a stateless serverless environment.
    - Ensuring seamless monitoring, debugging, and logging in distributed serverless environments.