



Vivekanand Education Society's Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai, Approved by AICTE & Recognised by Govt. of Maharashtra)

NAAC accredited with 'A' grade

Semester: IV

Title of the Project:

Microservices and its Applications

Domain: OS

Group Members:

Member 1 : Mansi Davkhar - 27

Member 2: Nupur Ghangarekar - 33

Member 3: Aryan Kale - 42

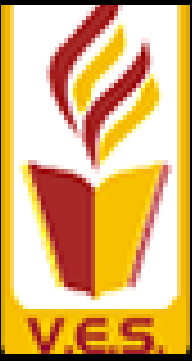
Member 4: Ishaan Khan - 44

Mentor Name: Kajal Jewani



List of content

- Introduction
- Challenges of Monolithic Architecture
- Why Microservices
- Microservices Architecture
- Microservices Application Domains
 - IoT
 - Blockchain
 - Machine Learning
 - Cloud Robotics
- Conclusion
- References

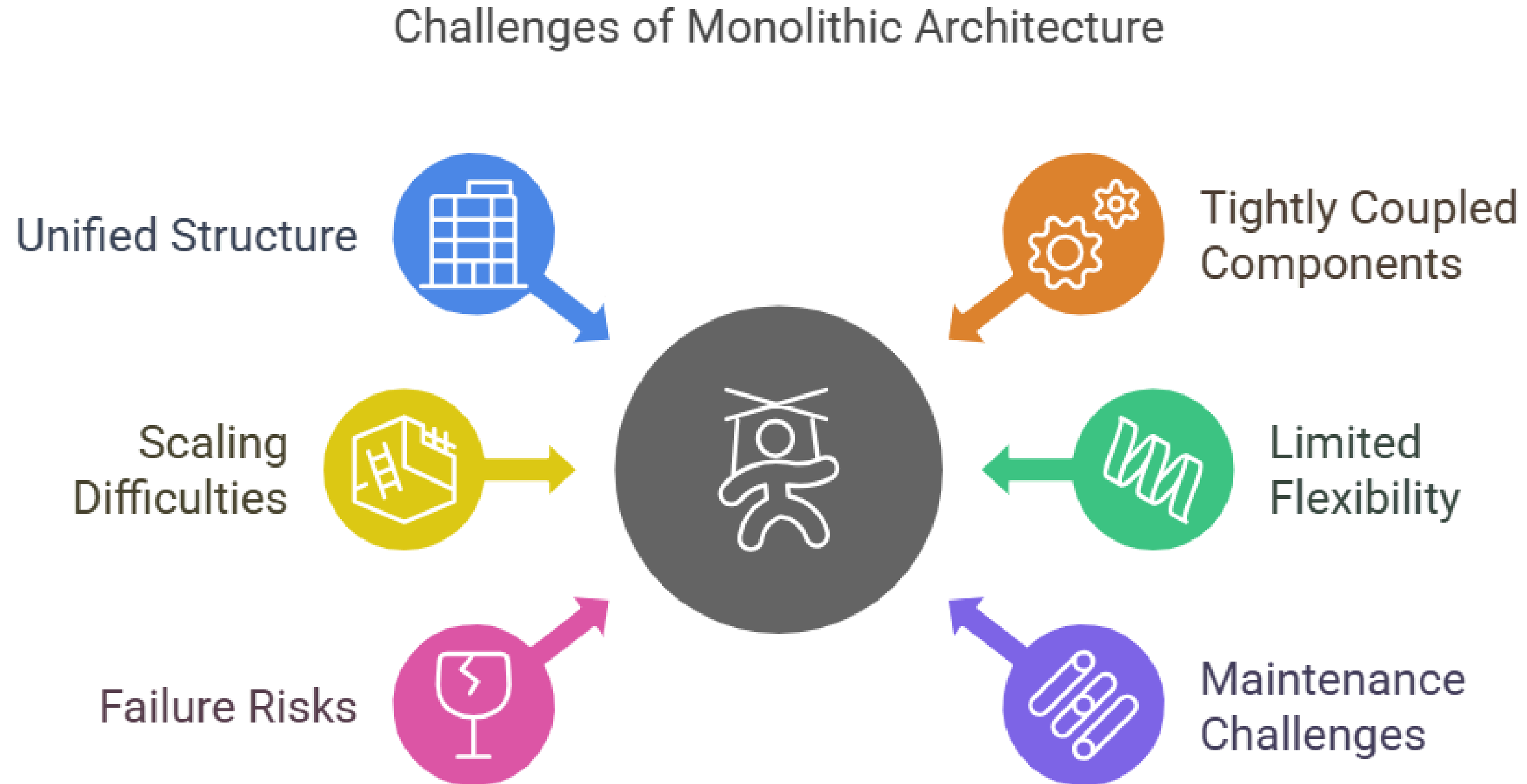


Introduction

- **Microservices:** Independent, decentralized services focused on business needs.
- **Key Traits:** Modular, flexible, API-driven, language-agnostic.
- **Why Microservices?** Overcome monolithic limitations.
- **Microservices Architecture**
- **Benefits:** Scalability, independent deployment, fault isolation, and continuous delivery.
- **Industry Adoption:** Used by Netflix, Uber, and Amazon for agility and growth.
- **Adoption Factors:** Varies by organizational needs.



Challenges of Monolithic Architecture





Why Microservices?

Harnessing Microservices for Scalable and Resilient Architecture



Loosely Coupled Services

Services that operate independently yet work together seamlessly.



Specialized Focus

Each service targets a specific business function with precision.



API Communication

Services interact through standardized, well-defined interfaces.



Independent Deployment

Services can be updated and deployed without affecting others.



Scalability and Resilience

Architecture that adapts and withstands challenges effectively.



Microservices Architecture

Core Characteristics

- Loose Coupling
- Flexible Deployment
- Scalable Design

Communication Mechanisms

- Synchronous: Request-response (HTTP/REST)
- Asynchronous: Non-blocking communication
- API Gateway: Intelligent request routing

Architectural Patterns

- Backend for Frontend
- Key Value Store
- Service Registry
- Database as a Service

Deployment Strategies

- Multiple Services per HostShared resources
- Improved scalability
- Single Service per HostIsolated service instances
- Precise resource control



Microservices Applications - 01

IoT

Microservices architecture breaks down an IoT system into independent, self-contained services that manage specific functionalities.

Key Benefits–

- Resilience
- Real-time Data Processing
- Scalability

Example:

Smart Homes and Industrial IoT





Microservices Applications - 02

Blockchain

Microservices architecture in blockchain systems breaks down complex functionalities into smaller, independent services.

Key Benefits–

- Modularity
- Enhanced Security
- Interoperability

Example :
Supply chain tracking and financial transactions





Microservices Applications - 03

Machine Learning

Microservices break machine learning systems into small, separate services for different tasks.

Key Benefits–

- Modularity & Flexibility
- Scalability
- Reusability

Example
Machine Learning as a Service
(MLaaS)





Microservices Applications - 04

Cloud robotics

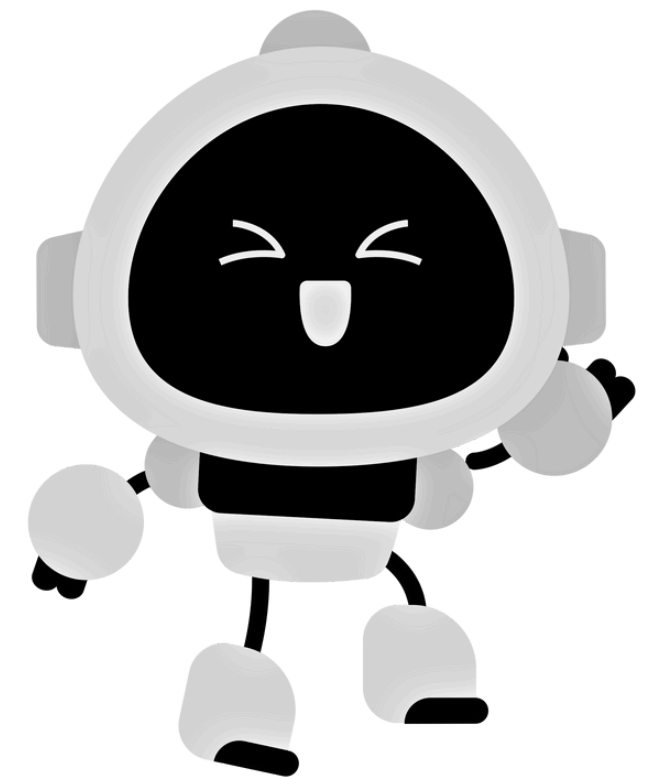
Cloud robotics uses online resources for heavy computing tasks.

Key benefits–

- Resource efficiency
- Rapid deployment
- Improved collaboration

Example

Microservices handle tasks like SLAM, making cloud robots more flexible and efficient.





Conclusion

- Microservices architecture enhances modularity, scalability, and flexibility over monolithic systems. Despite challenges like communication complexity, its benefits drive widespread adoption. Organizations focus on optimizing communication and operations to maximize its advantages.



References

- https://www.researchgate.net/publication/335810682_Microservices_and_Its_Applications_An_Overview