RV Educational Institutions

RV Institute of Technology and Management

Bangalore – 560076

Department of Computer Science and Engineering

Event Name	OS to Cloud OS – The Evolution of Operating Systems
Date	12th March 2025
Venue	1st Floor Seminar Hall, RVITM
Audience	4th semester students
Resource person	Mr. Venkatesh Rao, Software Developer, Microsoft Azure
Faculty Coordinator(s)	Prof. Sudheendra B S and Dr. Shashidhar V

Objective of the Program:

The seminar aimed to provide in-depth insights into the evolution of operating systems, from traditional standalone architectures to modern cloud-based distributed systems. The session covered OS internals, virtualization, cloud integration, and the impact of AI on OS infrastructure.

Topics Covered:

1. Overview of Traditional Operating Systems

- OS as an interface between applications and hardware.
- Key Components:
  - Kernel: Manages resources and system processes.
  - File System: Handles data organization and access.
  - Process and Memory Management: Allocates memory and schedules processes.
  - Device Management: Controls peripheral hardware interaction.
- Types of OS Architectures:
  - Monolithic Kernel: A single-layered approach with direct hardware interaction.
  - Microkernel: A minimalistic design that enhances modularity and security.
- Examples of Traditional OS: Windows, Linux, macOS.

2. Evolution Towards Cloud OS

- Transition from on-premise computing to cloud-based infrastructure.
- Key Features of Cloud OS:
  - Scalability: Dynamically allocates resources based on workload.
  - Virtualization: Creates multiple OS instances on shared hardware.
  - Containerization: Uses Docker and Kubernetes for lightweight deployment.

- o   Automated Resource Management: AI-driven load balancing and optimization.

- Examples of Cloud OS:

  - o   Microsoft Azure Sphere OS: Securing cloud-based IoT devices.

  - o   Google Fuchsia: A next-generation modular OS.

  - o   Amazon Fire OS: Cloud-optimized system for seamless data processing.

3. Distributed Systems and Cloud OS Integration

- Definition and Importance:

  - o   Distributed OS operates over multiple nodes, ensuring reliability and fault tolerance.

  - o   Enables efficient computing across data centers.

- How Cloud OS Utilizes Distributed Computing:

  - o   Data replication across multiple servers.

  - o   High availability and failover mechanisms.

  - o   Seamless connectivity between hybrid cloud environments.

- Integration Capabilities:

  - o   Connection with BI tools, data lakes, and cloud platforms.

  - o   API-based interactions for cross-platform compatibility.

4. Role of AI in OS Infrastructure

- Enhancements AI Brings to OS:

  - o   Predictive resource allocation for workload efficiency.

  - o   Machine learning algorithms for adaptive process scheduling.

  - o   AI-driven security protocols for anomaly detection and automated threat mitigation.

- Automated Fault Detection and Self-Healing Systems:

  - o   OS can detect potential failures and implement corrective actions autonomously.

  - o   AI models optimize CPU, memory, and network usage dynamically.

- Future Trends:

  - o   AI-powered voice and gesture-based OS control.

  - o   Self-optimizing OS that personalizes resource allocation based on user behavior.

Brief Report:

The seminar provided a detailed perspective on the rapid transformation of operating systems from traditional models to cloud-based infrastructures. Mr. Venkatesh Rao shared valuable insights into the fundamental concepts of OS, the role of virtualization and distributed computing, and how AI is shaping the future of OS architectures. The session allowed attendees to gain an advanced understanding of cloud-driven OS models, their applications, and future possibilities in the industry.

Speaker Bio:

Mr. Venkatesh Rao is a Software Developer at Microsoft Azure Compute with extensive experience in software development across various domains, including telecommunication networks and cloud infrastructure. He is passionate about Computer Science fundamentals, OS evolution, and Information Security. His expertise offers a valuable perspective on the transformation of OS architectures in the modern computing era.