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DEPARTMENT OF COMPUTER APPLICATION (UG)

21UCA503: CLOUD APPLICATION DEVELOPMENT

III YEAR / VI SEMESTER

Unit II- Cloud Computing Fundamentals

Topic 1: Cloud Computing Architecture: Introduction

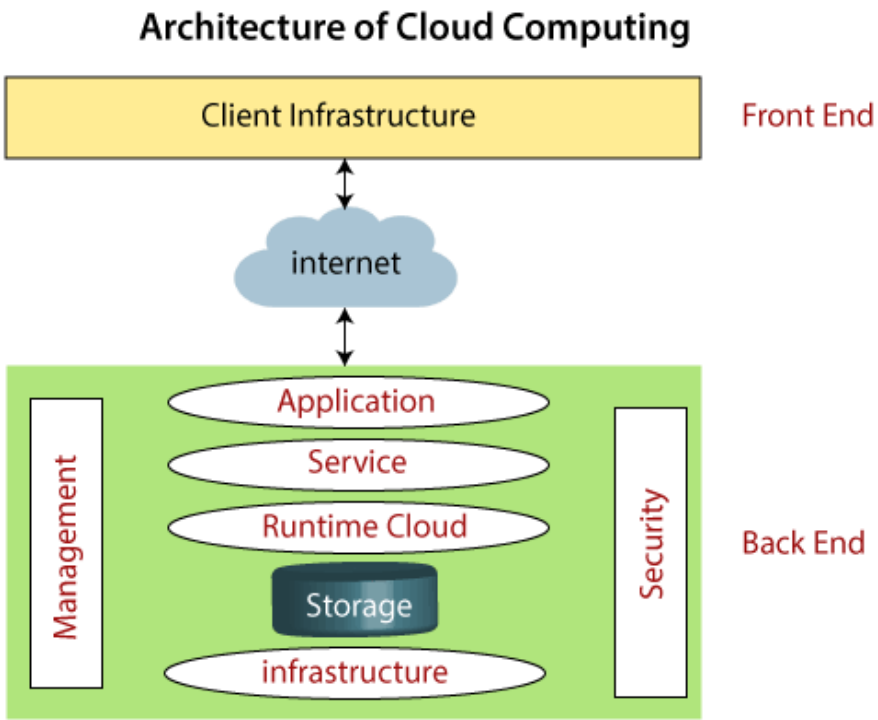
Dr. P. SHIVARANJANI M.Sc (CS)., M.Phil., Ph.D.,
Head & Assistant Professor,
Department of Computer Science (Graphics & Creative Design)

Cloud computing technology is used by both small and large organizations to **store the information** in cloud and **access** it from anywhere at anytime using the internet connection.

Cloud computing architecture is a combination of **service-oriented architecture** and **event-driven architecture**.

Cloud computing architecture is divided into the following two parts -

- ✓Front End
- ✓Back End

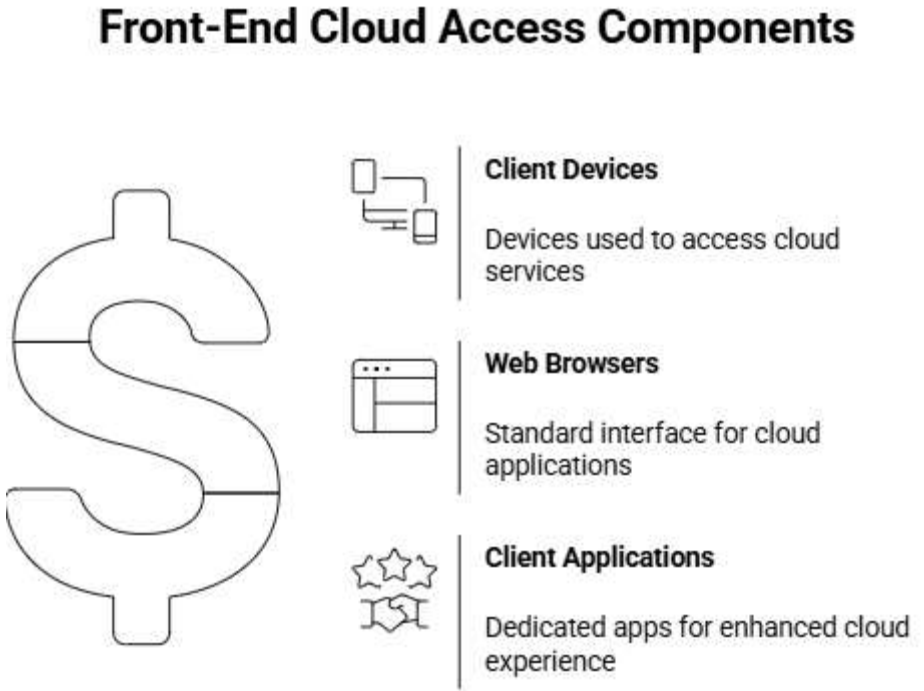


Front End

✓The front end is used by the client.

✓ It contains client-side interfaces and applications that are required to access the cloud computing platforms.

✓The front end includes web servers (including Chrome, Firefox, internet explorer, etc.), thin & fat clients, tablets, and mobile devices.



Back End

Operating Systems
Foundation for running applications
Virtualization
Enables multiple VMs on a single server
Databases
Manage structured data with various types
Storage
Offers scalable and reliable data storage
Servers
Provide processing power and memory

3. Cloud-Based Delivery Models

Cloud computing offers three primary delivery models:

- Infrastructure as a Service (IaaS),
- Platform as a Service (PaaS), and
- Software as a Service (SaaS).

3.1 Infrastructure as a Service (IaaS)

IaaS provides access to fundamental computing resources, such as virtual machines, storage, and networks. Users have control over the operating system, storage, deployed applications, and possibly select networking components (e.g., firewalls, load balancers).

Examples: Amazon EC2, Microsoft Azure Virtual Machines, Google Computer Engine.

Benefits:

Flexibility: Users have complete control over the infrastructure.

Scalability: Resources can be scaled up or down on demand.

Cost-effectiveness: Users only pay for the resources they use.

Use Cases:

Hosting websites and web applications.

Running development and testing environments.

Storing and backing up data.

High-performance computing.

Platform as a Service (PaaS)

PaaS provides a platform for developing, running, and managing applications. It includes the operating system, programming languages, execution environment, database, and web server. Users do not manage the underlying infrastructure.

Examples: AWS Elastic Beanstalk, Google App Engine, Microsoft Azure App Service.

Benefits:

Simplified development: PaaS provides a pre-configured environment for developing and deploying applications.

Faster time to market: Developers can focus on writing code rather than managing infrastructure.

Scalability: Applications can be scaled automatically to meet demand.

Use Cases:

- ✓Developing and deploying web applications.
- ✓Building mobile backends.
- ✓Creating APIs.
- ✓Streamlining development workflows.

3.3 Software as a Service (SaaS)

SaaS provides access to software applications over the internet. Users do not need to install or manage the software. The cloud provider handles all the underlying infrastructure and maintenance.

Examples: Salesforce, Google Workspace, Microsoft Office 365, Dropbox.

Benefits:

Easy to use: SaaS applications are typically easy to use and require minimal training.

Accessibility: SaaS applications can be accessed from anywhere with an internet connection.

Cost-effective: Users pay a subscription fee for access to the software.

Use Cases:

- ✓Customer relationship management (CRM).
- ✓Email and collaboration.
- ✓Office productivity.
- ✓File storage and sharing.

4. Network

The network is the backbone of the cloud, connecting the front-end and back-end platforms. It provides the communication channels for data transfer and access to cloud services.

Internet: The internet is the primary network used to access cloud services.

Virtual Private Networks (VPNs): VPNs provide a secure connection between the user's network and the cloud provider's network.

Direct Connect: Direct Connect provides a dedicated network connection between the user's network and the cloud provider's network, offering higher bandwidth and lower latency.

Content Delivery Networks (CDNs): CDNs are used to distribute content to users around the world, improving performance and reducing latency.

5. Management and Security

Cloud computing architectures also include management and security components to ensure the reliability, availability, and security of cloud services.

Management Tools: These tools are used to monitor and manage cloud resources, including servers, storage, and networks. They provide features such as resource provisioning, performance monitoring, and cost management.

Security Tools: These tools are used to protect cloud resources from unauthorized access and cyber threats. They include firewalls, intrusion detection systems, and data encryption.

Identity and Access Management (IAM): IAM is used to control access to cloud resources. It allows administrators to define roles and permissions for users and groups.

Compliance: Cloud providers must comply with various regulations and standards, such as HIPAA, PCI DSS, and GDPR.

6. Conclusion

✓Cloud computing architecture is a complex and evolving field.

✓Understanding the key components, including front-end platforms, back-end platforms, cloud-based delivery models, and the network, is essential for building and managing effective cloud solutions.

✓By carefully considering these components, organizations can leverage the benefits of cloud computing to improve agility, reduce costs, and innovate faster.

THANK YOU

QUESTION