layers of Cloud Architecture:

Layer 1 (User/Client Layer)

- thin client, thick client, or mobile or any handheld device

Layer 2 (Network Layer)

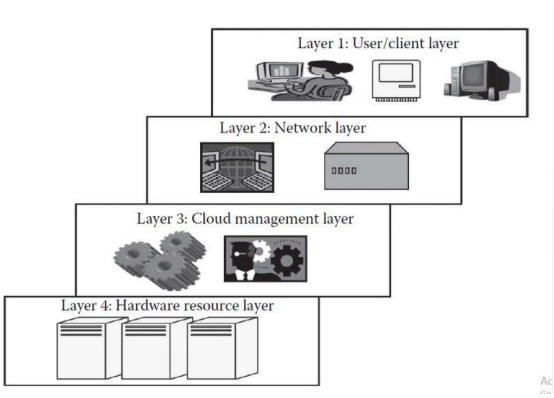
- The public cloud (Internet), or private cloud

Layer 3 (Cloud Management Layer)

- operating system (OS), or a management software

Layer 4 (Hardware Resource Layer)

- data center




Anatomy/structure of the Cloud components:

1. Application layer
2. Platform layer
3. Infrastructure layer
4. Virtualization layer
5. Physical hardware Layer

How to solve security problem for public cloud access?

1. **Accessing public cloud services**
2. **promote connectivity through encrypted tunnels**
3. This procedure will be an overhead in the connectivity, and using it will certainly increase delay and may impact performance.
4. select a suitable routing method such as the one reducing the delay by minimizing transit hops in the end-to-end connectivity

private intra-cloud networking problem ? how to solve it?

The issue of networking and connectivity in cloud computing: how much intracloud connectivity is associated with apps being executed in this environment.

This problem can solved using service-oriented architecture (SOA) technique.

SOA: allows multiple service entities to communicate and share info through a single system. Implementing method called (loose coupling)

Loose coupling: makes services and users to be less dependant on each other.

There are several types of applications

1) A stand-alone application
2) The web applications
3) Cloud Applications

Different between

A stand-alone application:

- developed to be run on a single system
- doesn't use network for its functioning.
- use only the machine in which they are installed.
- Functioning dependent on the resources or features available within the system
- These systems don't need the data or processing power they are self-sustaining.

The web applications:

- dependent on the network basically two components: client and server.
- stored on a remote server and delivered over the Internet through a browser interface.
- The client server architecture is followed by the web application.
- The server is a high-end machine that consists of the web application installed.
- The client It can access the web application through the Internet , can reside anywhere in the network.

Shortcomings of web applications:

1. The web application **is not elastic** and can't handle very heavy loads, can't serve highly varying loads.
2. The web application **is not multitenant**
3. The web applications are usually in **one particular platform**
4. Due to its nonelastic nature, **peak load transactions cannot be handled.**

Cloud applications or cloud apps, is a software program where cloud-based and local components work together.

Cloud applications features:

1. Multitenancy
2. Elasticity
3. Heterogeneous cloud platform
4. Quantitative measurement
5. On-demand service

Cloud management is aimed at efficiently managing the cloud so as to maintain the QoS.

Cloud management can be divided into two parts:

1. Managing the infrastructure of the cloud: is the setup, configuration, monitoring, and optimization of the components of cloud infrastructure. (responsible for the QoS factor)
2. Managing the cloud application

Problems that may result from poor cloud management?

1. Poor resource management may lead to inefficiencies performance, functionality, and cost.
2. So performance of the whole system is affected.
3. Everything in the cloud is dependent on the SLAs (cloud service-level agreement) and the SLAs can be satisfied only if performance is good
4. Losing a wide user base, Hence, efficient management with less cost is required

Solution: power consumption and optimization of multiple objectives to reduce the cost.

cloud management Activities:

1. Datacenter hosting.
2. Monitoring.
3. Identity and Access management.
4. Infrastructure management.
5. Cybersecurity.
6. Service desk.
7. Technology solutions.
8. Disaster recovery


Managing cloud infrastructure techniques:

1. Consolidation of server and storage workloads.
2. Load fluctuation methods (two type):
   - predictable
   - unpredictable

Predictable load fluctuations are easy to handle.

Cloud governance is a set of rules and policies adopted by companies that run services in the cloud.

Cloud governance Activities:

1. Solution engineering
2. Standards , policies and best practices
3. Audits
4. Cost benefits analysis
5. Performance indicators

The goal of cloud governance is to enhance data security, manage risk, and enable the smooth operation of cloud systems

(cloud service-level agreement (SLAs): are the set of rules that are defined between the user and cloud service provider that decide upon the QoS factor. If SLAs are not followed, then the defaulter has to pay the penalty

Cloud migration activity comprises (different phases like):

1. **Evaluation**: carried out for all the components like:
   - Current infrastructure and Application architecture.
   - compute, storage.
   - Monitoring, and management.
   - SLAs.
   - Operational processes.
   - Financial considerations.
   - Risk, security, compliance.
   - Licensing needs.
2. **migration strategy**: Based on the evaluation, a migration strategy is drawn
   - A hotplug strategy
   - A fusion strategy
3. **prototyping**: Migration activity is ensure that a small portion of the applications are tested
4. **Provisioning:** Pre-migration optimizations identified are implemented.
5. **Testing:** Post-migration tests are conducted to ensure that migration has been successful.

four broad approaches

1. Migrate existing applications: Rebuild or re-architect some or all the applications.
2. Start from scratch
3. Separate company: management, R&D, and sales.
4. Buy an existing cloud vendor