Unit 16 – Cloud Computing

- **Managing the Cloud**

Learning Outcomes

By the end of this unit students will be able to:

LO1. Demonstrate an understanding of the fundamentals of Cloud Computing and its architectures.

Cloud Computing Fundamentals:

Managing the Cloud

ESOFT METRO CAMPUS

Managing the Cloud

- Cloud computing deployments must be monitored and managed in order to be optimized for best performance.

- Cloud management software provides capabilities for managing faults, configuration, accounting, performance, and security; this is referred to as FCAPS.

- DMTF (Distributed Management Task Force) standards organization.

These fundamental features are offered by (traditional) network management systems:

- Provisioning of resources

- Configuring resources

- Optimizing performance

- Enforcing security

- Policy management

- Performing maintenance

- Monitoring operations

Network Management Systems - FCAPS

Fault

Configuration

Accounting

Performance

Security

Fault Management

- A fault is an event that has a negative significance. The goal of fault management is to recognize, isolate, correct and log faults that occur in the network.

- It is also used to predict errors so that the network is always available. This can be established by monitoring different things for abnormal behavior.

- When a fault or event occurs, a network component will often send a notification to the network operator using either a proprietary or open protocol such as SNMP .

Configuration Management

The goals of Configuration Management includes:

- To simplify the configuration of the device
- To configure ('provision') circuits or paths through switched networks
- To gather and store configurations from network devices (this can be done locally or remotely).
- To track changes that are made to the configuration
- To plan for future expansion and scaling

Accounting Management

- The goal is to gather usage statistics for users.

- Accounting management is concerned with tracking network utilization information, such that individual users, departments, or business units can be appropriately billed or charged for accounting purposes (This may not be applicable to all companies).

- Accounting is often referred to as billing management. Using the statistics, the users can be billed and usage quotas can be enforced. These can be disk usage, link utilization, CPU time, etc.

Performance Management

- Performance management is focused on ensuring that network performance remains at acceptable levels. It enables the manager to prepare the network for the future, as well as to determine the efficiency of the current network.

- The network performance addresses the throughput, network response times, packet loss rates, link utilization and so forth.

Security Management

- Security management is the process of controlling access to assets in the network.

- Security management is not only concerned with ensuring that a network environment is secure, but also that gathered security-related information is analyzed regularly.

- Security management functions include managing network authentication, authorization, and auditing, such that both internal and external users only have access to appropriate network resources.

- Other common tasks include the configuration and management of network firewalls, intrusion detection systems, and security policies

Management Responsibilities

- What separates a network management package from a cloud computing management package is the "cloudly" characteristics that cloud management service must have:

- Billing is on a pay-as-you-go basis.

- The management service is extremely scalable.

- The management service is ubiquitous.

- Communication between the cloud and other systems uses cloud networking standards.

Monitoring an entire Cloud Computing deployment stack.

1. End-user services such as HTTP, POP3/SMTP, and others

2. Browser performance on the client

3. Application monitoring in the cloud, such as Apache, MySQL, and so on

4. Cloud infrastructure monitoring

5. Machine instance monitoring where the service measures processor utilization, memory usage, disk consumption, and other important parameters

6. Network monitoring and discovery using standard protocols like the Simple Network Management Protocol (SNMP), Windows Management Instrumentation (WMI) and Configuration Management Database (CMDB)

Two aspects to cloud management:

- Managing resources *in the cloud*
- Using the cloud to manage resources *on-premises*

Managing resources in the cloud

When you deploy an application on Google's PaaS App Engine cloud service, the Administration Console provides you with the following monitoring capabilities:

Create a new application, and set it up in your domain.

Invite other people to be part of developing your application.

View data and error logs.

Analyze your network traffic.

Browse the application datastore, and manage its indexes.

View the application's scheduled tasks.

Test the application, and swap out versions

Management responsibilities: User and Provider

	Hosted	Managed services	Cloud (IaaS)	Cloud (PaaS)	SaaS
Example(s)	Hosted infrastructure	Network VoIP	Amazon AWS, Rackspace Cloud server	Google App Engine Microsoft Azure	Salesforce.com
IT primary responsibilities					
Provider primary responsibilities		Varies by business agreement			
Shared responsibilities					

Legend: Business service/user satisfaction · Application · Database · Server · Operating system · Network

Lifecycle management

1. The definition of the service as a template for creating instances
    Tasks performed in Phase 1 include the creation, updating, and deletion of service templates.

2. Client interactions with the service, usually through an SLA (Service Level Agreement) contract
    This phase manages client relationships and creates and manages service contracts.

3. The deployment of an instance to the cloud and the runtime management of instances
    Tasks performed in Phase 3 include the creation, updating, and deletion of service offerings.

4. The attributes of the service in operation & performance of modifications of its properties
    The task during this management phase is to perform service optimization and customization.

5. Management of the operation of instances and routine maintenance
    monitor resources, track and respond to events, and perform reporting and billing functions.

6. Retirement of the service
    End of life tasks include data protection, system migration, archiving, and contract termination.

The core management features

The core management features offered by most cloud management service products include the following:

- Support of different cloud types

- Creation and provisioning of different types of cloud resources, such as machine instances, storage, or staged applications

- Performance reporting including availability and uptime, response time, resource quota usage, and other characteristics

- The creation of dashboards that can be customized for a particular client's needs

Cloud Management Standards

DMTF (Distributed Management Task Force)

DMTF is a nonprofit industry standards organization that creates open manageability standards for various emerging and traditional IT infrastructures including cloud, virtualization, network, servers and storage.

Member companies and partners collaborate on standards to improve interoperable management of information technologies.

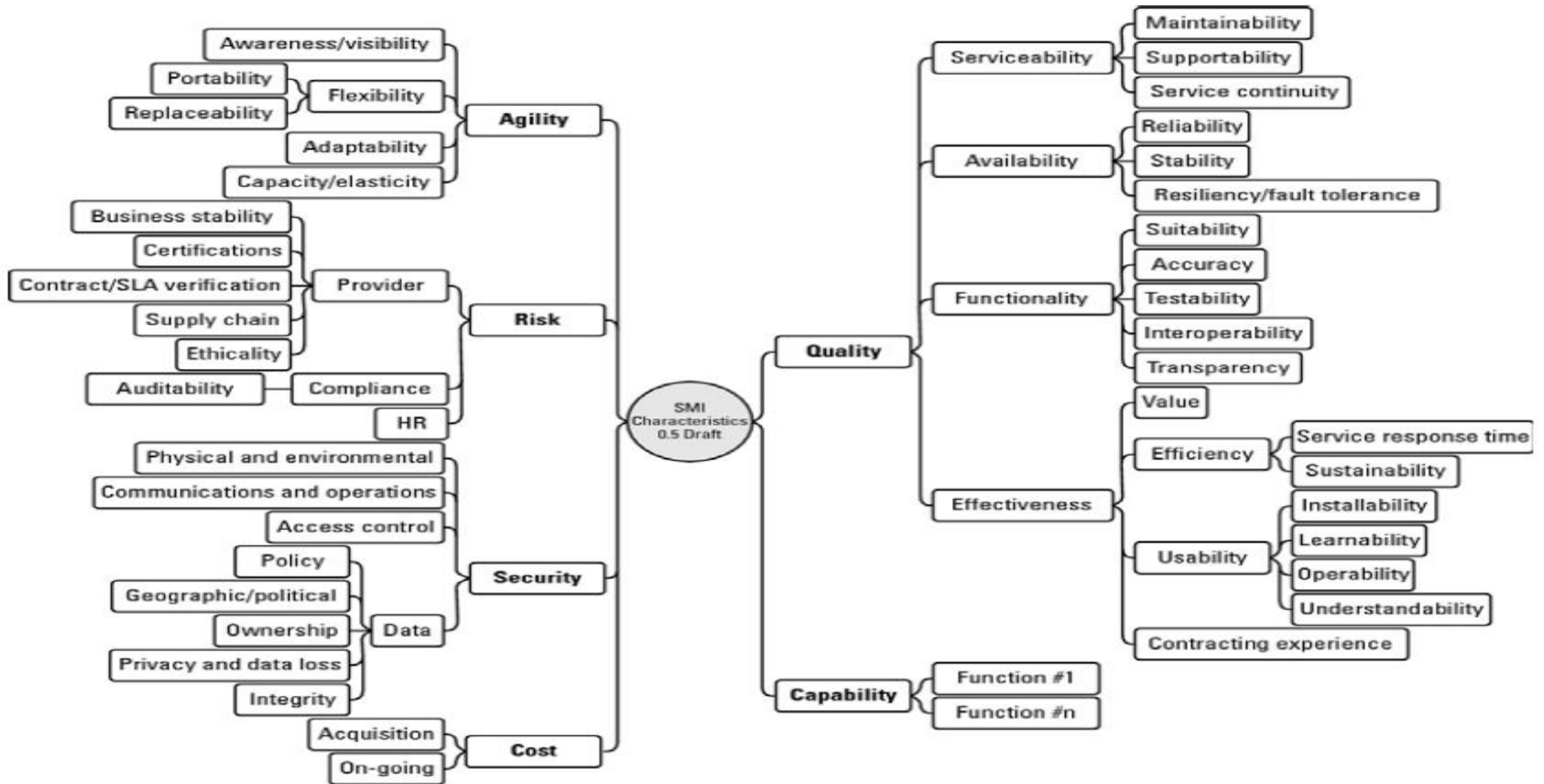# The Service Measurement Index (SMI)

The Service Measurement Index (SMI) is based on a set of measurement technologies forming the SMI

It measures cloud-based services in six areas:

- Agility
- Capability
- Cost
- Quality
- Risk
- Security

Thank You