Cloud Computing

Module Outline

- 1. Understand Cloud and Cloud Services
  - 25 Marks
  - 63%
- Understand disaster recovery and disaster recovery plans
  - 15 Marks
  - 37%
- Pass mark 28/40
- Duration 1 Hour

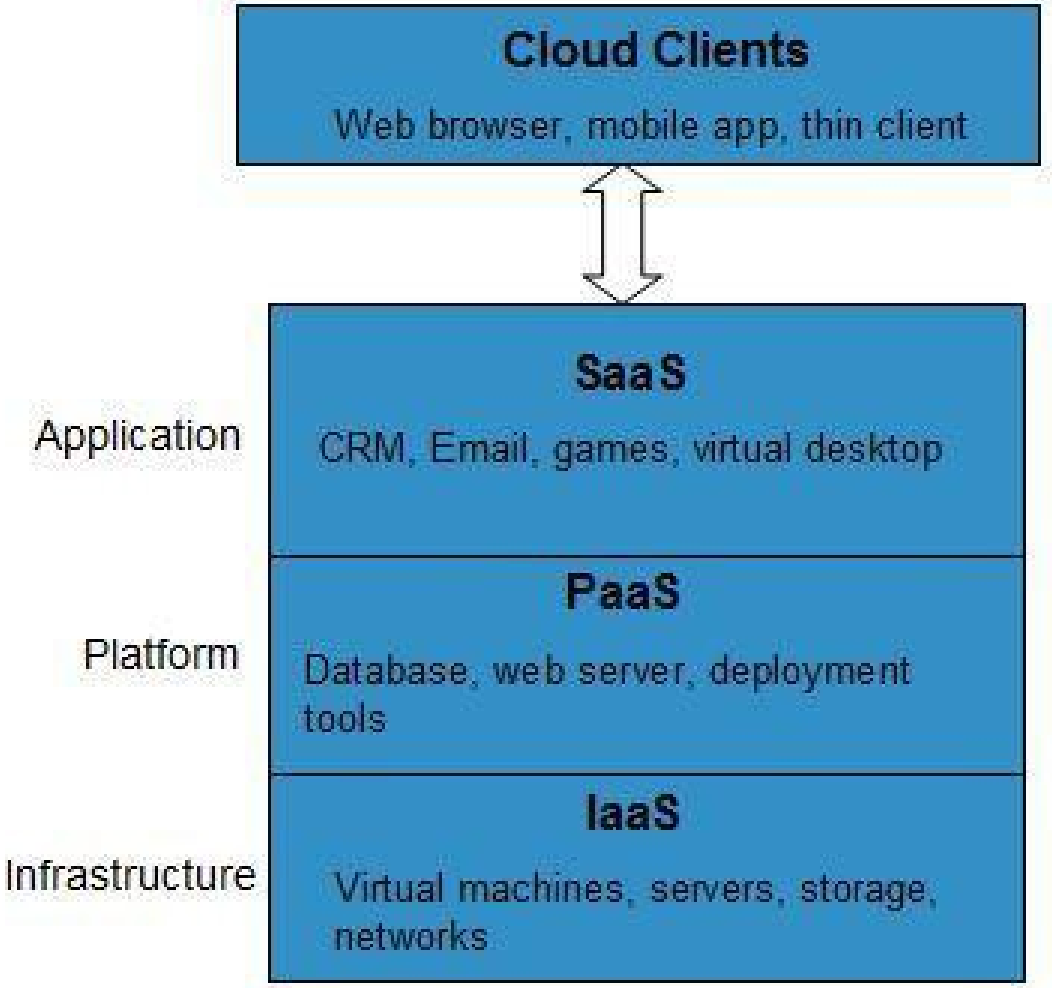
What is Cloud?

- It is a Network or Internet
  - Remote location.
  - Provides services over Network
- Manipulation, Configuration and accessing online

Deployment Models

- Public Cloud
  - Systems and services easily accessed by the general public. Less secure.
- Private Cloud
  - Systems and Services accessed within an organisation. Increased security over public.
- Community Cloud
  - Systems and Services accessed by a group of organisations. Increased security over public
- Hybrid Cloud
  - Mixture of public and private clouds. Critical activities normally in a private and non critical in a public cloud.
    Critical Activities are performed in private cloud, non Critical are performed in the public cloud

Deployment Models



Service Models

- Infrastructure as a Service (IaaS)
  - Provides fundamental resources such as physical machines, virtual machines, virtual storage
  - Most basic level of service
- Platform as a Service (PaaS)
  - Provides the runtime environment for applications, development & deployment tools.
    Database, web server etc
- Software as a Service (SaaS)
  - Provides software applications to end users.
    CRM, Email, Games, Virtual Desktop
- Anything as a Service (XaaS)
  - E.g. Network as a service, business as a service, database as a service

Benefits of Cloud Computing

- Availability - access applications using the internet
- Configure applications at any time
- No specific software is required to access.
  - Ubiquitous access
- On Demand Self Service
  - Users can access resources without interaction with the cloud service provider
- Platform Independence
- Highly Cost Effective
- Load Balancing

Cloud Computing

- Pay as you grow
  - Only pay for the resources used
  - Eliminates wasted resources
  - CPU, Memory, Storage, OS, Security, Network Capacity
- Multi-tenancy
  - Individual environments on the same hardware
  - Each tenant's data is isolated and invisible to others
  - Greater pool of resources available

Cloud Computing

- Chargeback
  - Accounting strategy
  - Quantify who is using what resources for charging
  - Shifts charge to users (corporate customers mainly) to gives awareness of costs
- Showback
  - Not charged
  - Demonstrates potential cost

Cloud Computing

- Cloud Bursting
  - Application Deployment model
  - A form of Hybrid Cloud
  - Where application runs in private cloud but bursts into public cloud when the demand for capacity increases.
  - Designed for High performing, non-critical, and non-sensitive data applications

Scalability

- Scalability
  - Increase the capacity to meet the increasing workload
    - Scaling Up - increasing the ability of an individual server
    - Scaling out - increasing the ability by adding multiple servers to the individual server.
    - Planned growth / contraction

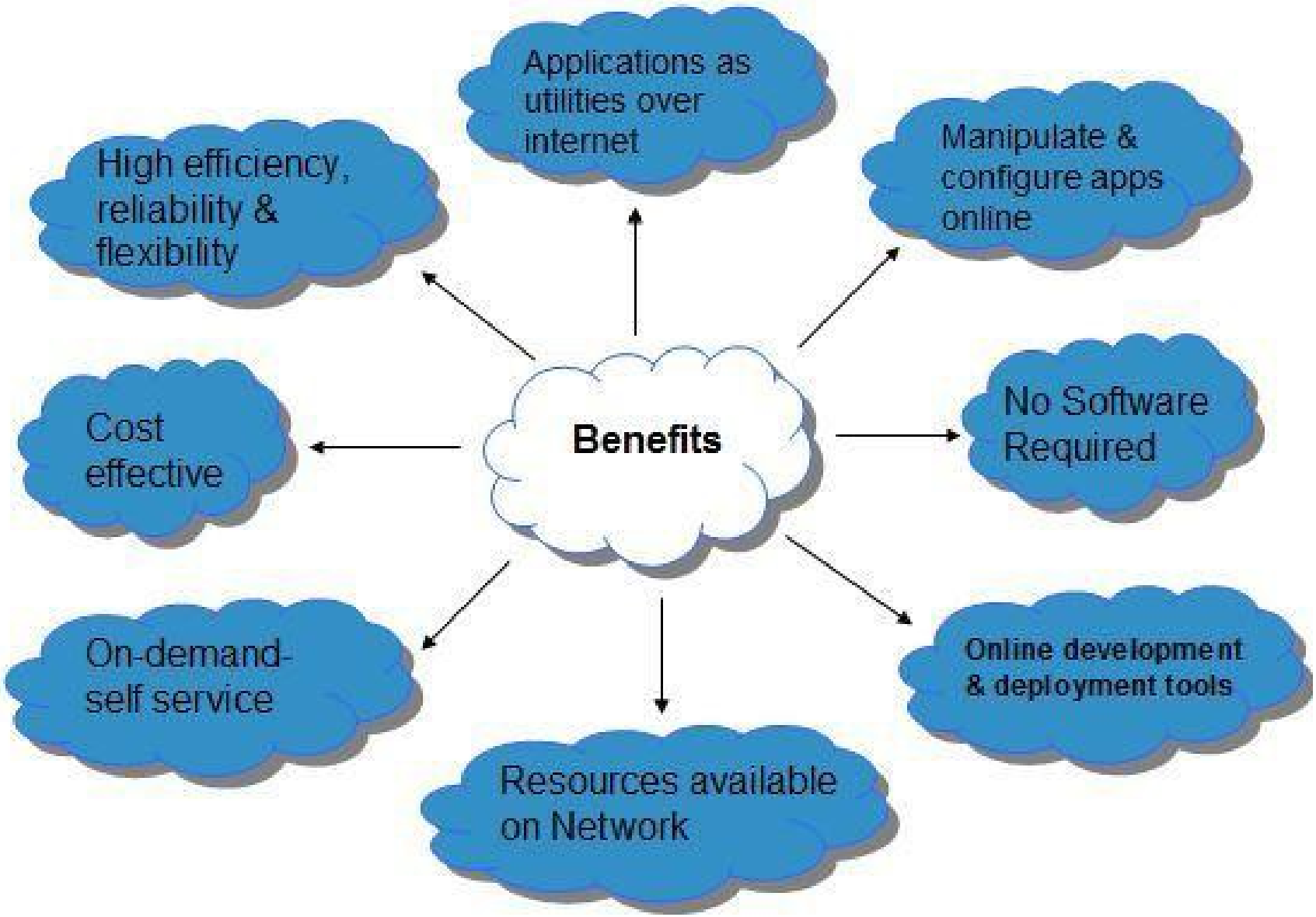
Elasticity

- Elasticity
  - Increasing or reducing the capacity to meet the increasing or reducing workload.
  - ability to "scale up or scale down" the capacity to serve at will dynamically and on demand.
  - Unplanned growth / contraction

- Scalability is required for elasticity, but not the other way around

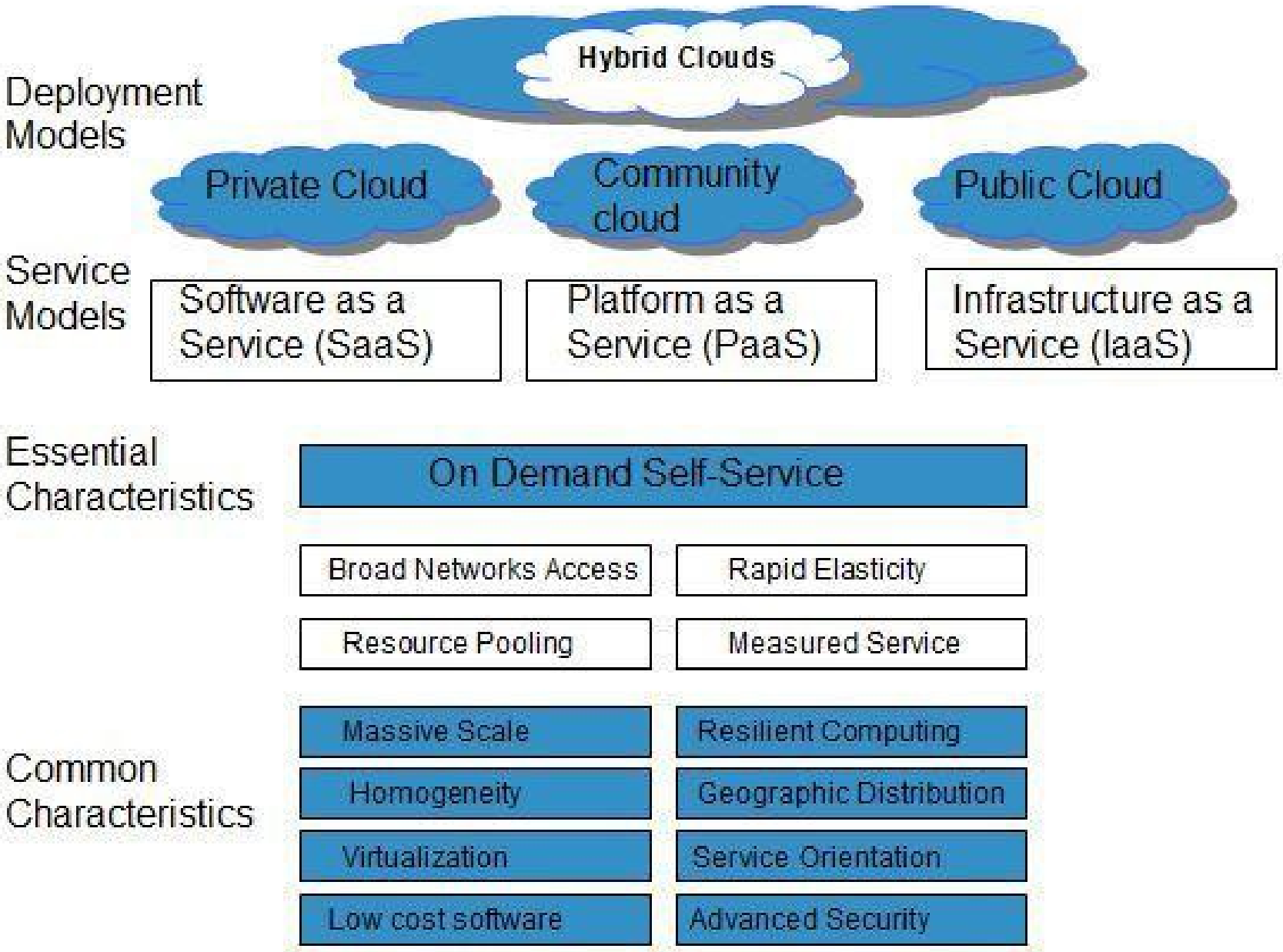
Scalability and Elasticity

- Scalability is required for elasticity, but not the other way around
- Scalability gives you the ability to increase or decrease your resources, and elasticity lets those operations happen automatically according to configured rules.
- Elasticity – short term requirements
- Scalability – long term planning


Applications as utilities over internet
High efficiency, reliability & flexibility
Manipulate & configure apps online
Benefits
Cost effective
No Software Required
On-demand-self service
Online development & deployment tools
Resources available on Network

Risks of Cloud Computing

- Security and Privacy.
  - Third party provide platform security.
- Lock In.
  - Very difficult to switch between Cloud Service Providers (CSP)
- Isolation Failure
  - Failure of the boundaries may allow other tenants to access other tenants data.
- Management Interface Compromise
  - Interfaces are provided through internet
- Insecure or Incomplete Data Deletion
  - Data may not get deleted as expected. Backups will have the data.
  - Other tenants may delete data.


Deployment Models
Hybrid Clouds
Private Cloud
Community cloud
Public Cloud
Service Models
Software as a Service (SaaS)
Platform as a Service (PaaS)
Infrastructure as a Service (IaaS)
Essential Characteristics
On Demand Self-Service
Broad Networks Access
Rapid Elasticity
Resource Pooling
Measured Service
Common Characteristics
Massive Scale
Resilient Computing
Homogeneity
Geographic Distribution
Virtualization
Service Orientation
Low cost software
Advanced Security

Cloud Characteristics

- On Demand Self Service
  - Users can login and access at anytime
- Broad Network Access
  - Web based so can be accessed anywhere at anytime
- Resource Pooling
  - Multiple tenants can share a pool of resources. Database, server, memory etc.
- Rapid Elasticity
  - Very easy to scale up or down the provided resources
- Measured Service
  - Resources are monitored to ensure that resources are used efficiently
- Rapid Deployment
  - Service can go live very quickly from development

Cloud Infrastructure

- Hypervisor
  - Firmware or low level program that acts as the Virtual Machine Manager.
  - Single physical instance shared between multiple tenants
- Management Software
  - For maintaining and configuring the infrastructure
- Deployment Software
  - Helps to deploy and integrate the application on the cloud.
- Network
  - Connects the services over the internet. Also (XaaS) Network as a service allows customer to define the routes and protocols used.
- Server
  - Computes sharing of resources. Offers resource allocation and deallocation.
- Storage
  - Distributed file system for storage. Allows storage failure as data held across platforms

Infrastructure Constraints

- Transparency
  - Resources are shared in cloud.
  - Demands mean they need to be shared.
  - Application can scale on demand (Load balancing)
- Scalability
  - Scaling up involves a lot of effort normally. Networks might need reconfiguration, new resources aquired.
  - Resources provisioned and de-provisioned easily.
- Intelligent Monitoring
  - To achieve Transparency and Scalability then the cloud needs to monitor in order to respond to demand
- Security
  - The data centre must implement secure architecture.
  - The control node in a data centre especially needs security

Hypervisor

- Type 1 – on bare metal, no host OS
  - Oracle VM
  - Sun xVM
  - ESx vmware
- Type 2 – requires a host OS
  - KVM
  - Microsoft Hyper V
  - Virtual Box

Legislation

- Data Protection Act 1998
- Computer Misuse Act 1990
- Official Secrets Act
- Privacy and Electronic Communications Regulation