VIRTUALIZATION & CLOUD COMPUTING

Lecture # 20-21

CSE 423

- *Defining Cloud computing*
- *Cloud Types*

Cloud Computing

- C*loud computing* refers to applications and services that run on a distributed network using virtualized resources and accessed by common Internet protocols and networking standards.

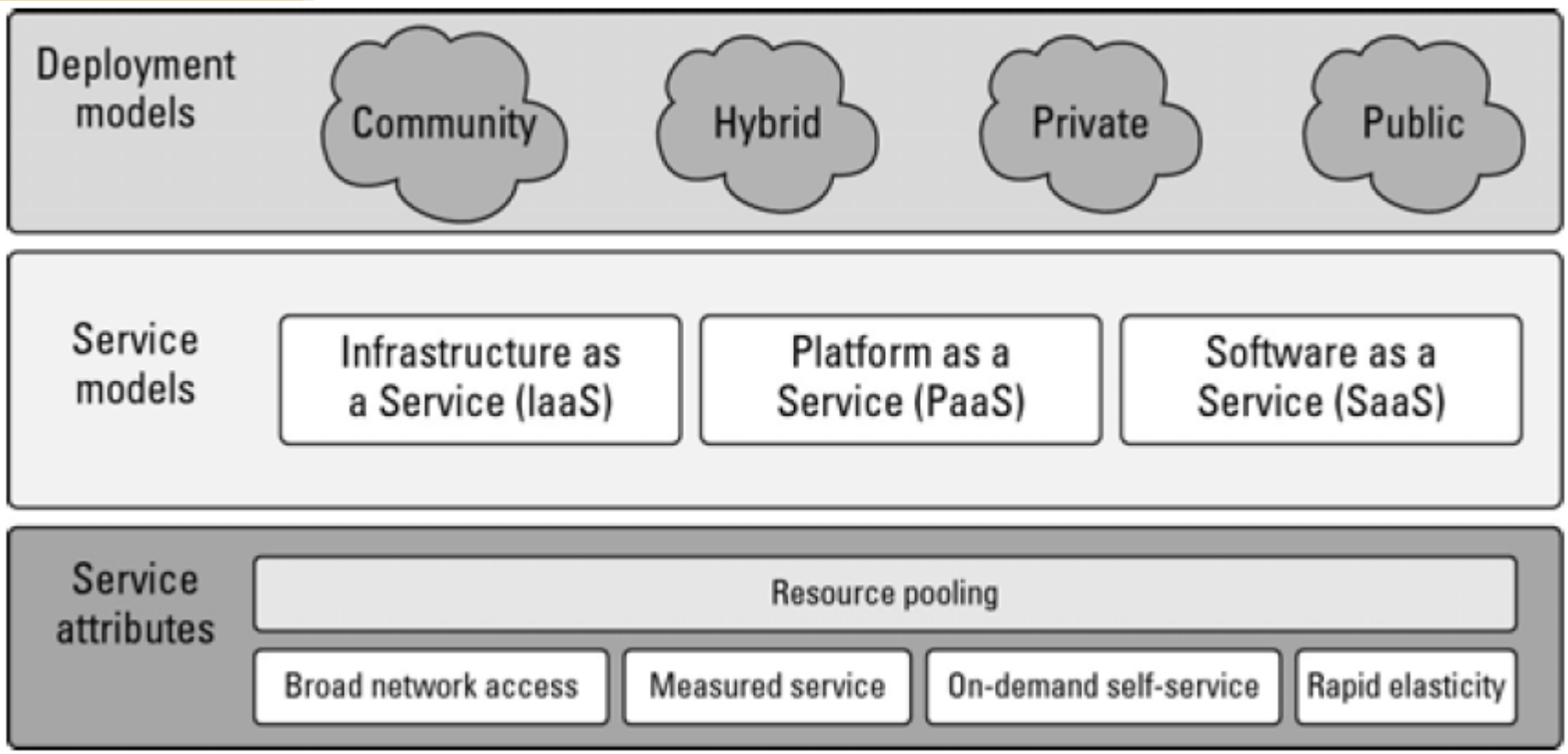
- It is distinguished by the notion that resources are virtual and limitless and that details of the physical systems on which software runs are abstracted from the user.

- **Abstraction:**
  - Cloud computing abstracts the details of system implementation from users and developers.
  - Applications run on physical systems that aren't specified,
  - data is stored in locations that are unknown,
  - administration of systems is outsourced to others, and access by users is ubiquitous.

- **Virtualization:**
  - Cloud computing virtualizes systems by pooling and sharing resources.
  - Systems and storage can be provisioned as needed from a centralized infrastructure,
  - costs are assessed on a metered basis,
  - multi-tenancy is enabled,
  - and resources are scalable with agility.

Cloud Types

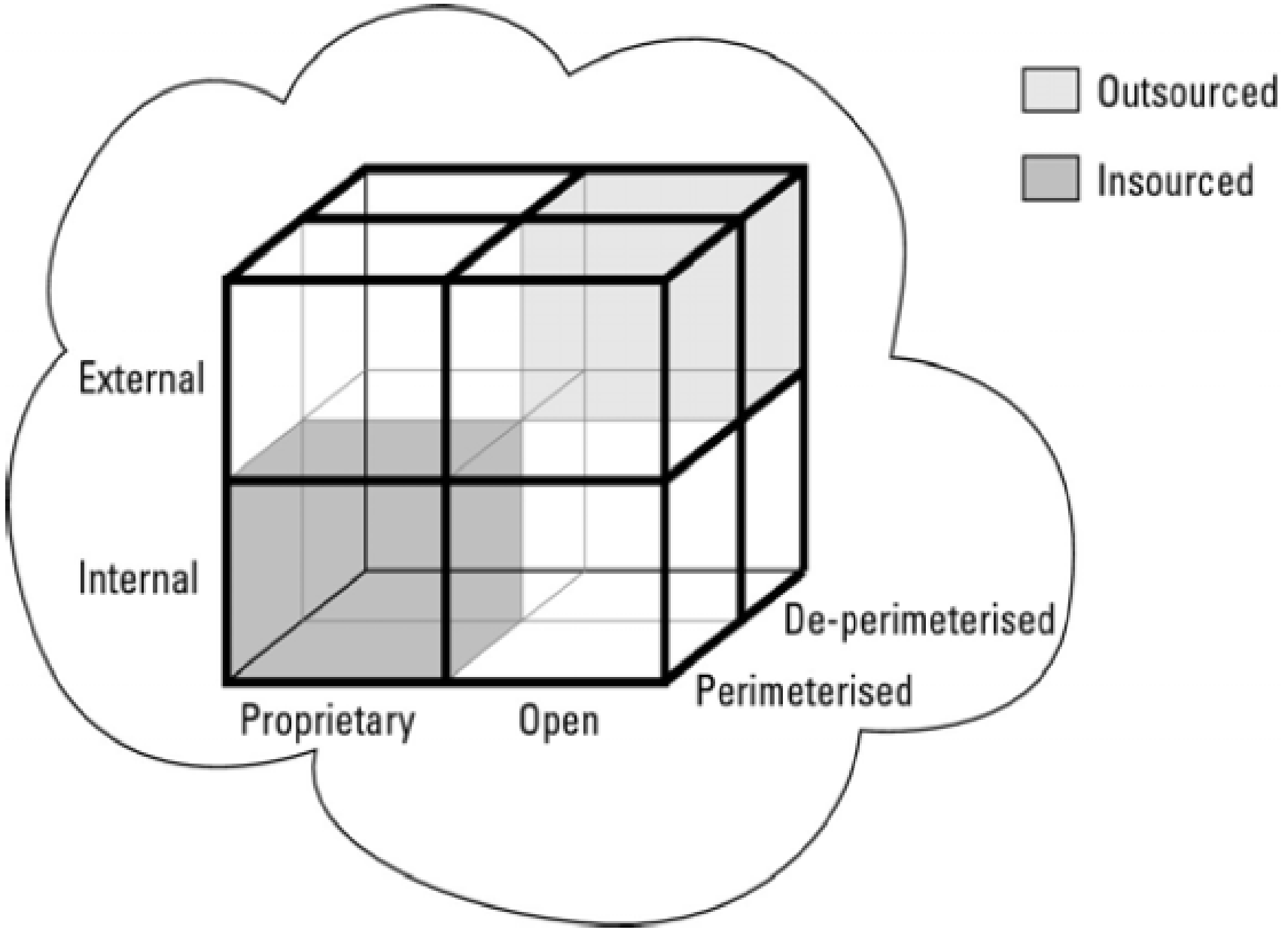
- **Deployment Model:**
  - Refers to location and management of the cloud's infrastructure
- **Service Model**
  - Consists of particular types of services that can be accessed on cloud computing platform
- Some widely used model
  - **NIST Model**
  - **The Cloud Cube Model**



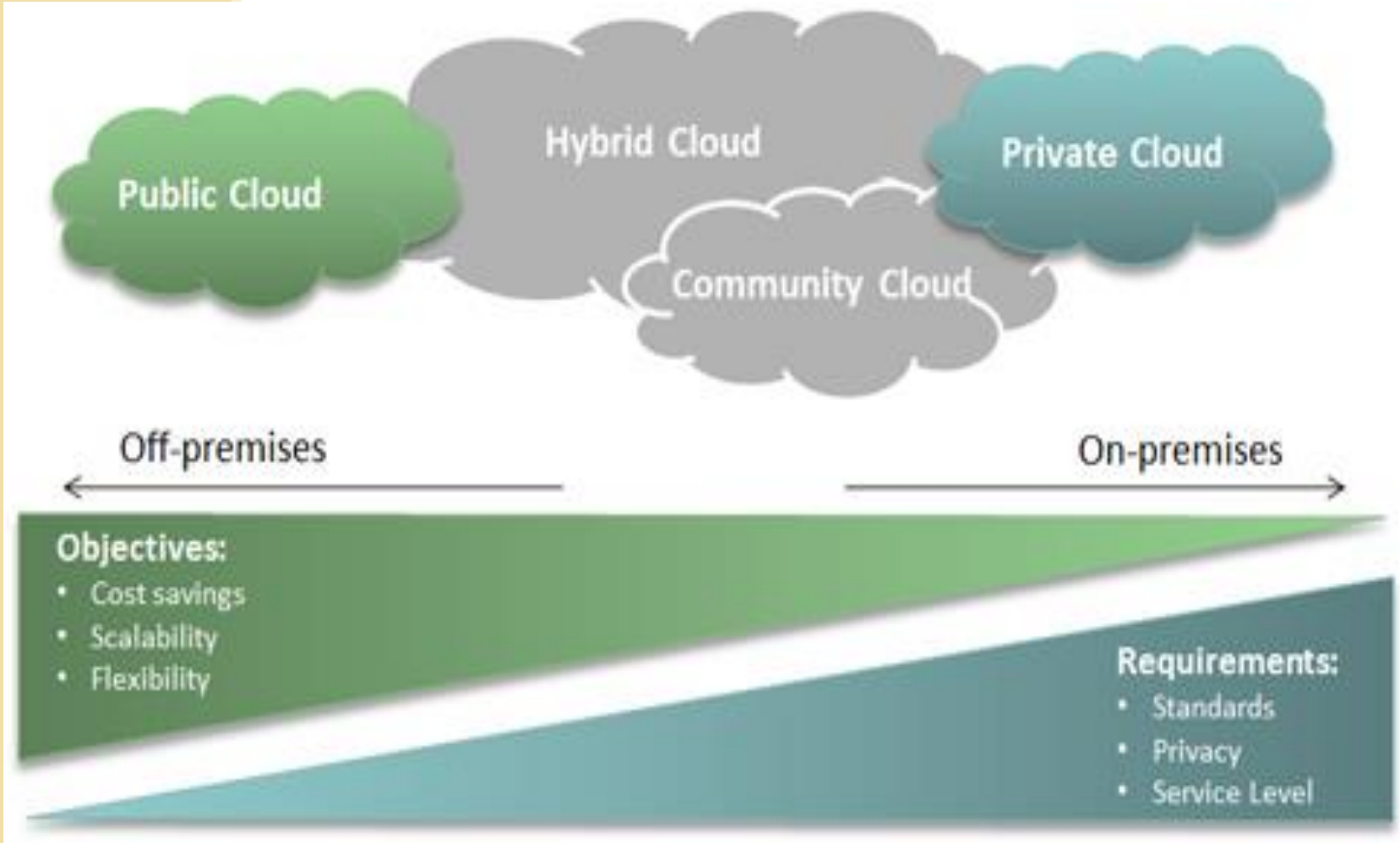
National Institute of Standard and Technology (NIST Definition of Cloud Computing)

The Cloud Cube Model

- **Physical location of the data:** Internal (I) / External (E) determines your organization's boundaries.
- **Ownership:** Proprietary (P) / Open (O) is a measure of not only the technology ownership, but of interoperability, ease of data transfer, and degree of vendor application lock-in.
- **Security boundary:** Perimeterised (Per) / De-perimiterised (D-p) is a measure of whether the operation is inside or outside the security boundary or network firewall.
- **Sourcing:** Insourced or Outsourced means whether the service is provided by the customer or the service provider.


Outsourced
Insourced
External
Internal
De-perimeterised
Perimeterised
Proprietary
Open

Deployment Models



- Public Cloud
  - *Hosted , operated and managed by a third party system owned by organization selling cloud services*
- Private Cloud
  - *The private cloud infrastructure is operated for the exclusive use of an organization. The cloud may be managed by that organization or a third party. Private clouds may be either on- or off-premises.*
- Hybrid Cloud
  - *A hybrid cloud combines multiple clouds (private, community of public) where those clouds retain their unique identities, but are bound together as a unit.*
- Community Cloud
  - *A community cloud is one where the cloud has been organized to serve a common function or purpose.*
  - *It may be for one organization or for several organizations, but they share common concerns such as their mission, policies, security, regulatory compliance needs, and so on*

Service Models

SaaS

- Software

Microsoft Office Communications Online
NETSUITE
salesforce.com
ZOHO Work. Online
workday.

PaaS

- Platform

Windows Azure Platform
Live Services
Google App Engine
force.com platform as a service

IaaS

- Infrastructure

the rackspace cloud
amazon web services
GOGRID
GIGASPACES

- Infrastructure as a Service(IaaS)
  - *Deliver Infrastructure on Demand in the form of **virtual Hardware, Storage and Networking**. Virtual Hardware is utilised to provide compute on demand in the form of virtual machine instances*
  - ***Eg.Amazon EC2, S3, Eucalyptus, GoGrid, Rightspace Cloud***
- Platform as a Service (PaaS)
  - *Deliver scalable and **elastic runtime environments on demand that host the execution of applications**.*
  - *Backed by core middleware platform for creating abstract environment to deploy and execute application*
- Software as a service (SaaS)
  - *Provide application and services on demand eg office automation, Photo Editing software, facebook., Twitter accessible through browser on demand*

Cloud Companies/Service Providers

Benefits of Cloud Computing

- Lower Computational Costs
- Improved Performance
- Reduced Software Costs
- Instant Software updates
- Unlimited storage capacity
- Increased Data Reliability
- Universal Document Access
- Latest version availability
- Easier Group Collaboration/ Sharing
- Device Independence

Disadvantages of Cloud Computing

- Requires constant Internet Connection
- Does not work well with low speed connection
- Stored data might not be Secured
- Stored data can be lost
- Features might be limited