Overview of Cloud Computing Seminar :

Section 1: Definition

Section 2: Reference Model

Section 3: Delivery Models

Section 4: Security

Section 5: Service Providers and Customers
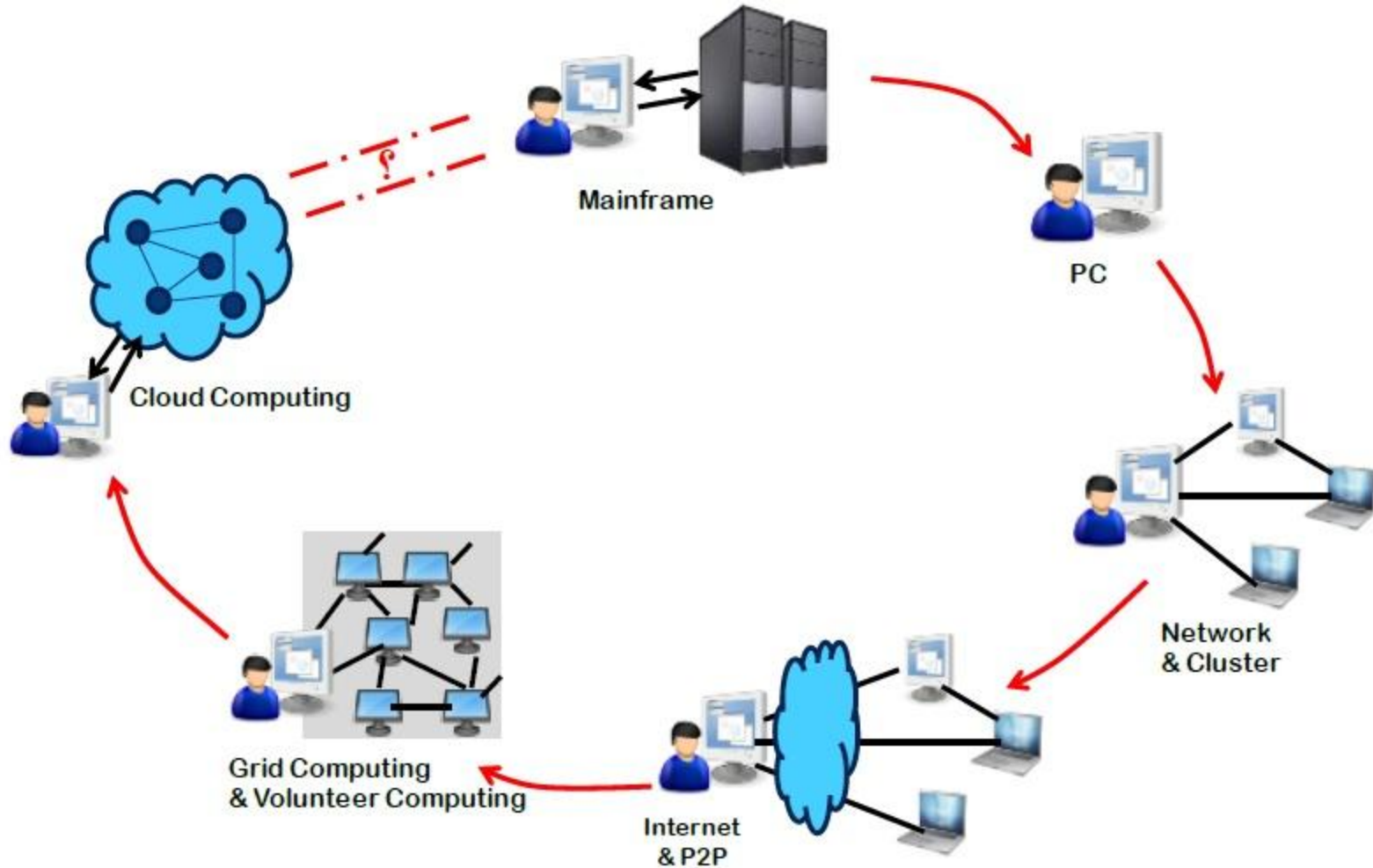
Section 6: Conclusion

Utility (on-Demand) Computing

On-**demand Computing**, On **Demand Computing**. **DEFINITION**:

Utility computing is a service provisioning model in which a service provider makes **computing** resources and infrastructure management available to the customer as needed, and charges them for specific usage rather than a flat rate.

The NIST Definition of Cloud Computing

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models.

Why We Need Cloud Services ?

Because We Need   ………….?
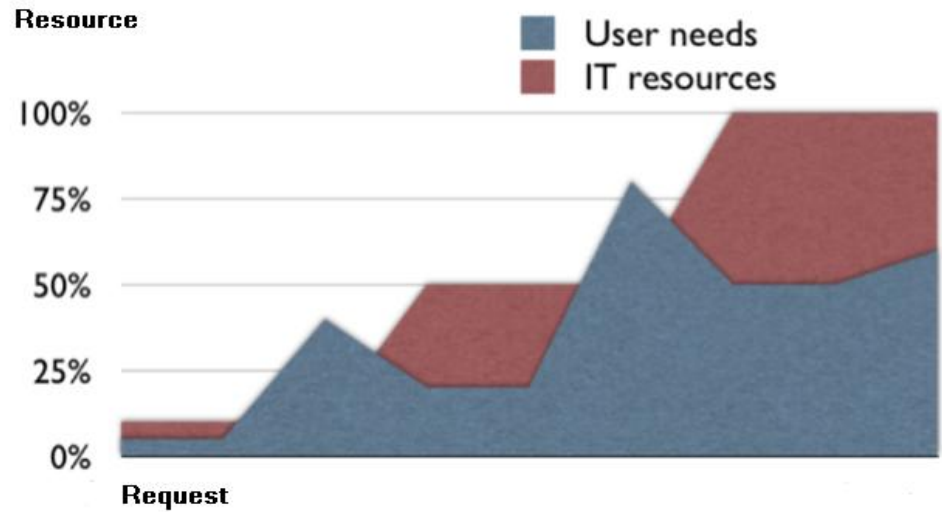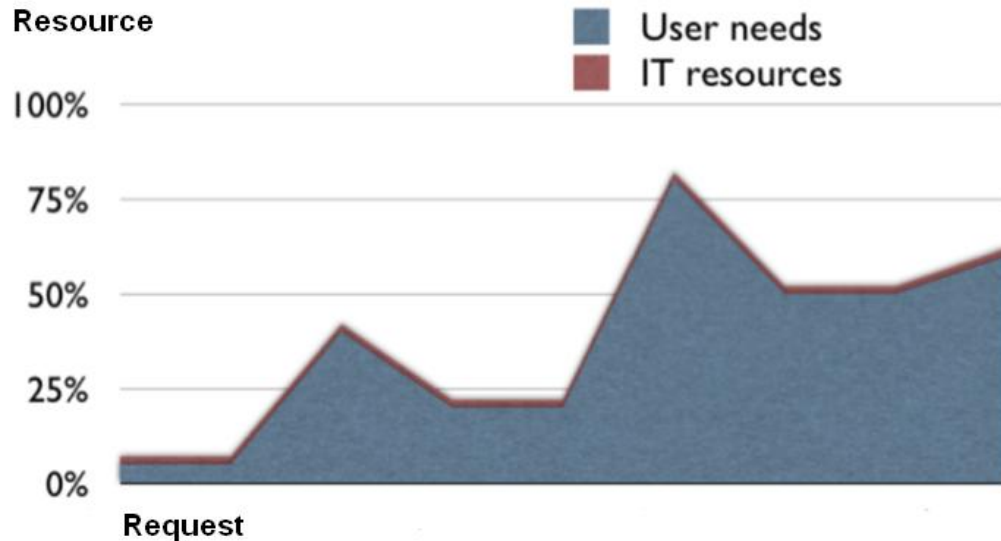
Traditional IT

Why We Need Cloud Services ?

Traditional IT

Because We Need Green IT

Modern IT

Mega Datacenters

Gen 4 Modular Datacenter(Green D.C)

Agility, Green, Scalability, Mobility, Cost Benefit

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Foundational Elements of Cloud Computing

Technologies and Concepts :

✓ Virtualization

✓ Grid Technology

✓ Service Oriented Architectures

✓ Broadband Networks

✓ Free and Open Source Software

✓ Web Application Frameworks

✓ Service Level Agreements

✓Virtualization
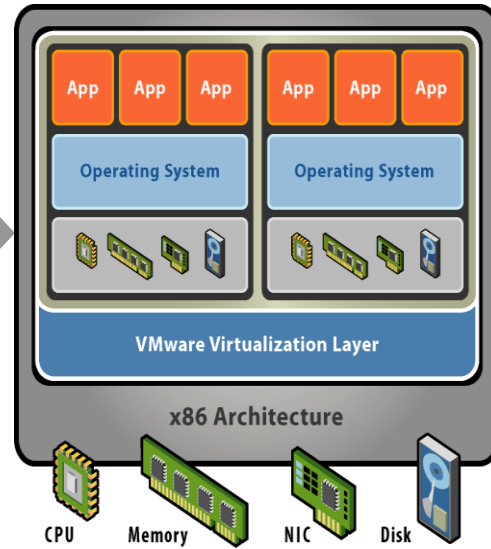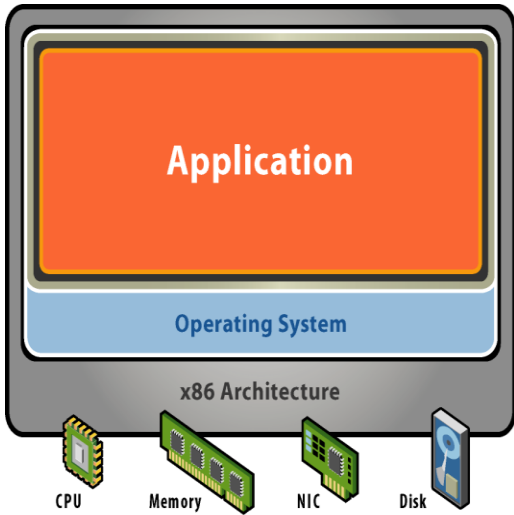
✓Free and Open Source Software

VIRTUAL MACHINE IMAGE

DATABASE — APPLIANCE

APPLICATION OR MIDDLEWARE

OPERATING SYSTEM

10
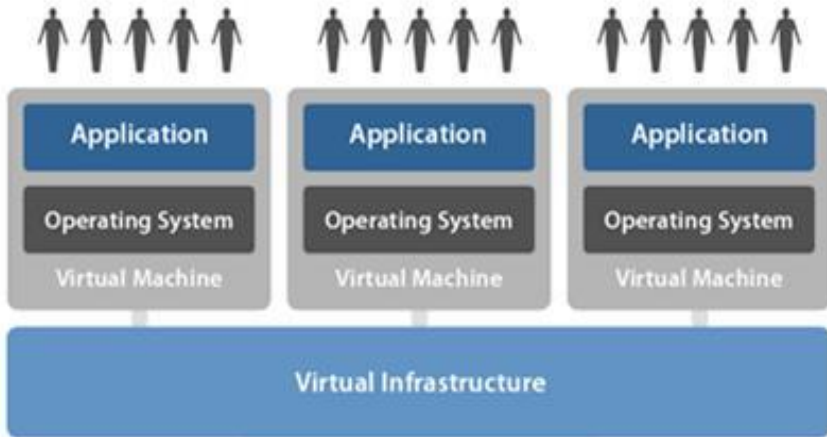
Infrastructure is what connects resources to your business.

Virtual Infrastructure is a dynamic mapping of your resources to your business.

Result: decreased costs and increased efficiencies and responsiveness

Virtualization
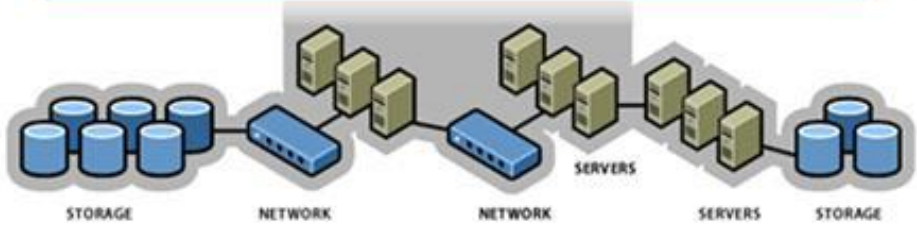
Grid Computing
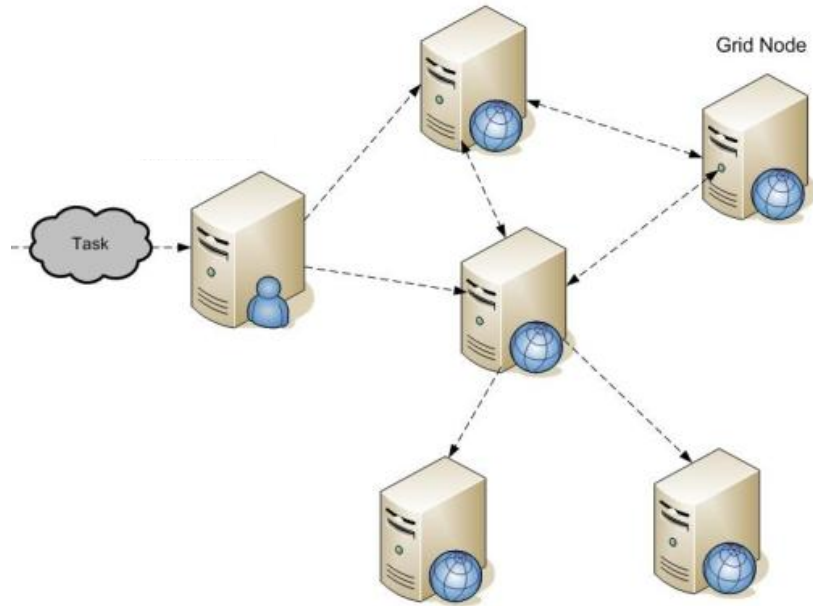
SOA

Cloud Computing   = Software as a Service

(pay-as-you-go)   + Platform as a Service

                                 + Infrastructure as a Service

- Cloud Software as a Service (SaaS)
  Use Provider's Applications Over a Network (Ex: CRM,ERP,SCM)

- Cloud Platform as a Service (PaaS)
  Deploy Customer-Created Applications To a Cloud
  (Ex: Microsoft /.Net , Linux/J2EE)

- Cloud Infrastructure as a Service (IaaS)
  Rent Processing , Storage, Network Capacity, and other
     Fundamental Computing Resources

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Cloud Computing

(pay-as-you-go)

= Software as a Service

+ Platform as a Service

+ Infrastructure as a Service

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  Rent processing, storage, network capacity, and other fundamental computing resources

X = CRM
X = ERP

Software as a Service

X = Email
X = Office
X = User Interface

Platform as a Service

X = Design
X = Modeling
X = Development
X = Testing

X = Computing
X = Storage
X = Communication

Infrastructure as a Service

Data Centers

Everything as a Service
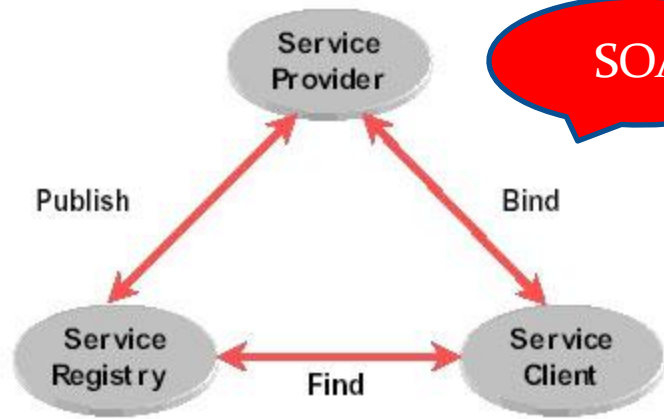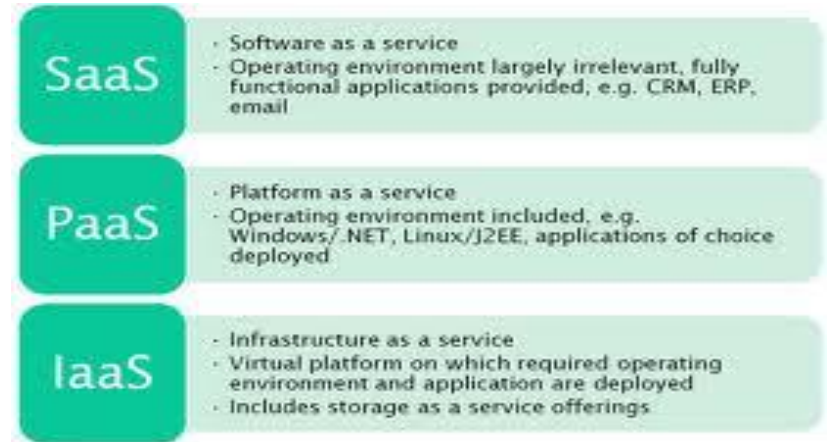
SaaS
- Software as a service
- Operating environment largely irrelevant, fully functional applications provided, e.g. CRM, ERP, email

PaaS
- Platform as a service
- Operating environment included, e.g. Windows/.NET, Linux/J2EE, applications of choice deployed

IaaS
- Infrastructure as a service
- Virtual platform on which required operating environment and application are deployed
- Includes storage as a service offerings

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Cloud Computing Reference Model
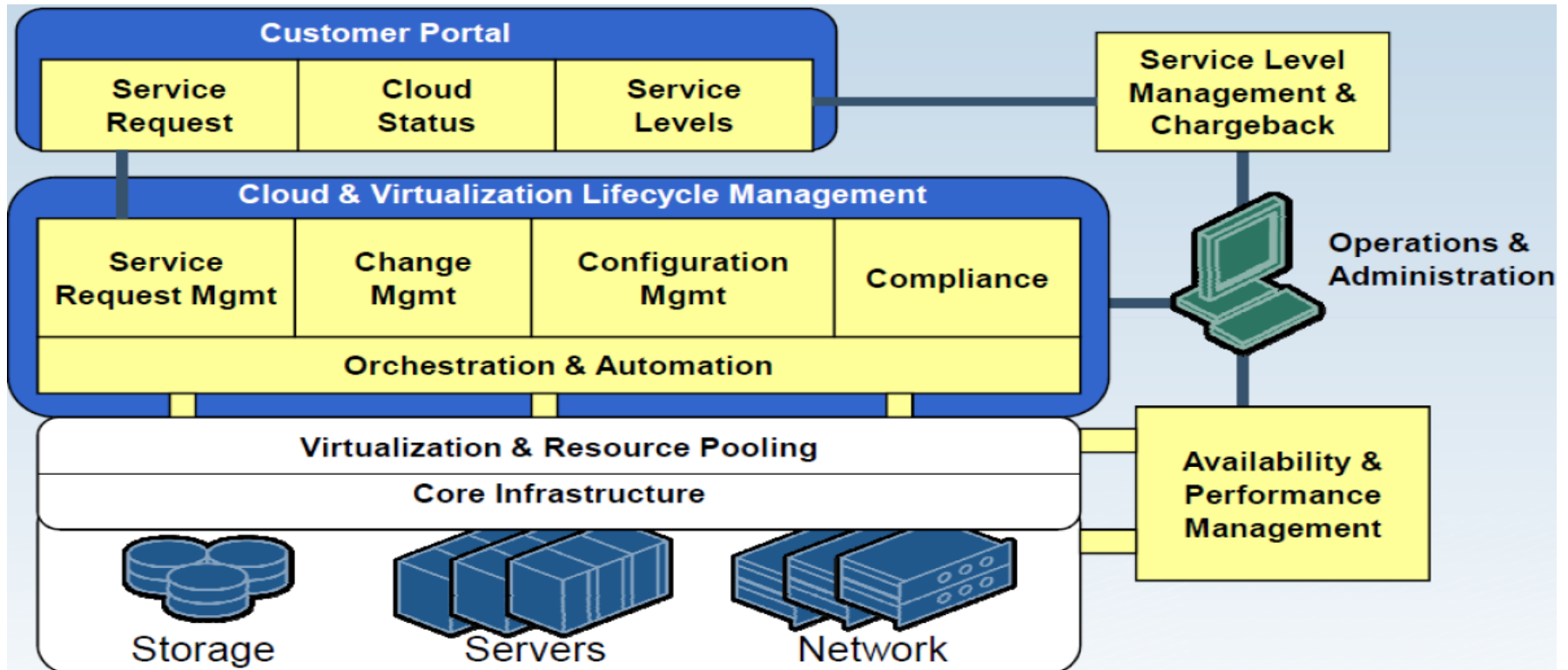
Cloud Computing Open Architecture Diagram

1 Cloud Ecosystem

Cloud Client Dashboard
(Portal or program-based access interactions)

1D

1C

Cloud Partner Dashboard (Portal or program-based access interactions)

Cloud Offerings: Business Solutions

Cloud Value Added Services or Offerings
(Infrastructure As A service, SaaS, Application As A Service, Business Process As A Service)

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Cloud Core: Provisioning and Subscription Services

Cloud Provisioning Service
(provisioning process, roles, notification)

Cloud Subscription Service
(subscription process, roles, notification)

4

Service-Orientation: Common Reusable Services & Composite Services

Cloud Horizontal Business Services (CRM, ERP)

Cloud Vertical Business Services (Industry-specific services)

3

Virtualization: Hardware and Software

Cloud IT Infrastructure Management
(Management of Hardware, software, and legacy applications)

Cloud Core Infrastructure
(Hardware, software, and legacy applications)

Mainframe | Servers | Data Center

2

Cloud Information Architecture (unified representation of cloud resources & exchanged message)

Cloud Quality and Governance (QoS, monitoring, metering, billing, exception handling)

Cloud Ecosystem Management (Onboarding and membership management)

6 **7** **1A**

1B

Cloud Vendor Dashboard
(Portal or program-based access interactions)
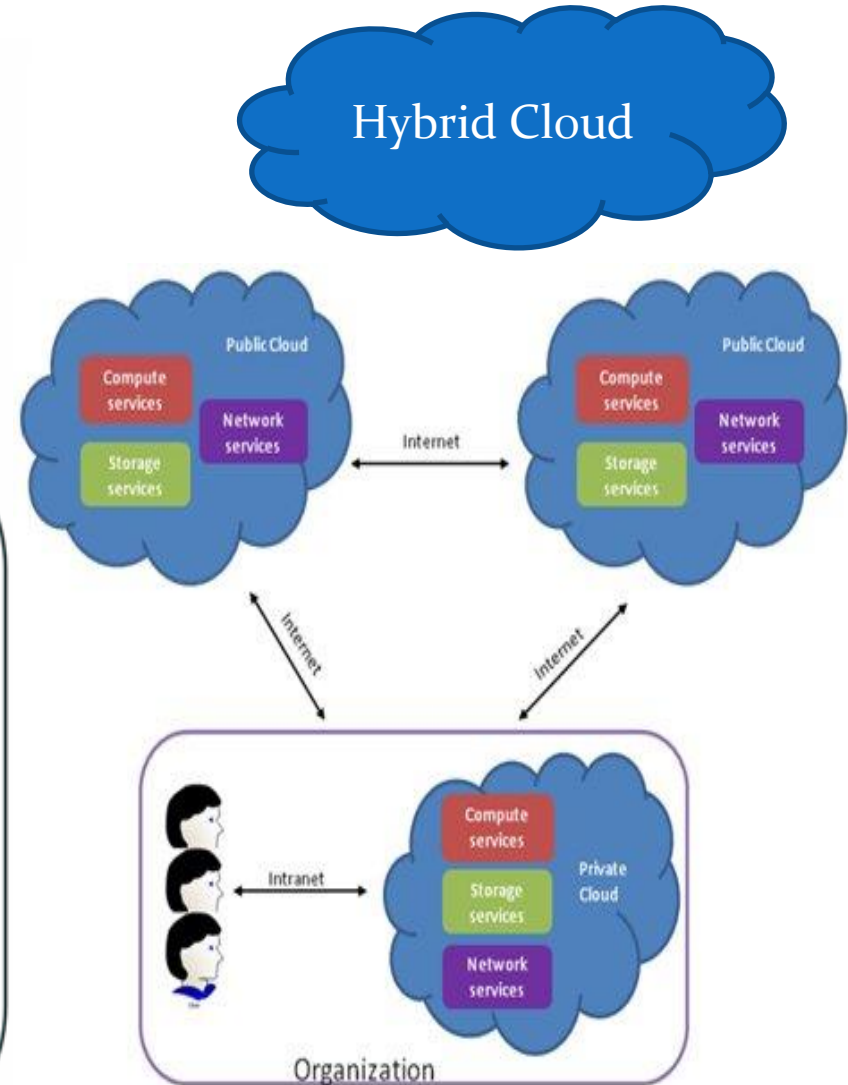
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Cloud Delivery Models

Public Cloud

- Hosted at a Service Provider Site
- Supports multiple customers
- Often utilizes shared infrastructure
- Supports connectivity over the internet
- Suited for information that is not sensitive
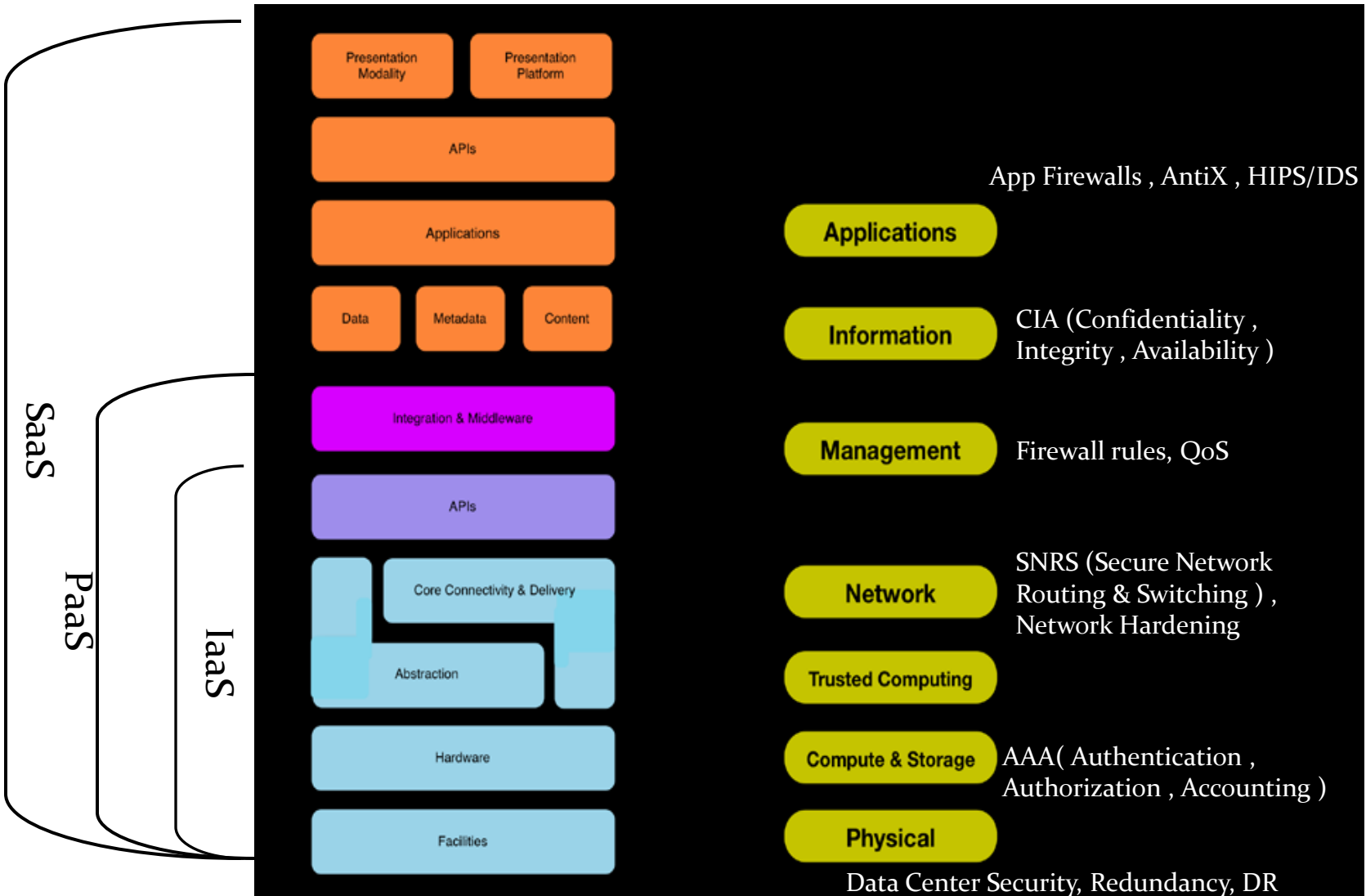- Can be cheaper than private cloud

Private Cloud

- Hosted at an Enterprise or a Service Provider site
- Supports one customer
- Does not utilize shared infrastructure
- Connectivity over private network/ fiber or the internet
- Suited for information that is needs a high level of security

Hybrid Cloud

Mapping the Cloud to the Security Model

App Firewalls , AntiX , HIPS/IDS

CIA (Confidentiality , Integrity , Availability)

Firewall rules, QoS

SNRS (Secure Network Routing & Switching) , Network Hardening

AAA(Authentication , Authorization , Accounting)

Data Center Security, Redundancy, DR

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Cloud Service Providers

Salesforce.com   e-Science Central

Google Docs

Software (SaaS)

Google App Engine

Amazon
-Elastic Map Reduce
-Simple DB
-Simple Queue Service

Windows Azure
- Sharepoint
- SQL Services
- .Net services

Platform (PaaS)

Amazon EC2 & S3

Infrastructure (IaaS)

Amazon Cloud Service Provider

- Amazon cloud components
  - Elastic Compute Cloud (EC2)
  - Simple Storage Service (S3)
- New Features
  - Availability Zones

    Place Applications in Multiple Locations For Failovers

  - Elastic IP Addresses

    Static IP Addresses That can be Dynamically Remapped to point to Different Instances (not a DNS Change)

What Does Amazon Offer?
Elastic Compute Cloud – EC2

Instance Type	Memory (RAM)	Compute Units	Storage	Platform	Linux CPU/Hour	Windows CPU/Hour
Small	1.7GB	1	160GB	32-bit	$0.10	$0.125
Large	7.5GB	4	850GB	64-bit	$0.40	$0.50
Extra Large	15GB	8	1690GB	64-bit	$0.80	$1.00
High CPU, Medium	1.7GB	5	350GB	32-bit	$0.20	$0.30
High CPU, Large	7GB	20	1690GB	64-bit	$0.80	$1.20

http://aws. amazon.com/ec2/pricing/

What Does Amazon Offer?
Simple Storage Service – S3

- Access
  - Fast
  - HTTP – REST or SOAP
  - Reliable

- Secure
  - Access Control Lists (ACL)
  - Transfer uses SSL (encryption)
  - Can encrypt data at REST

Storage	US per GB	Europe per GB
First 50TB/Month	$0.150	$0.180
Next 50TB/Month	$0.140	$0.170
Next 400TB/Month	$0.130	$0.160
Over 500TB/Month	$0.120	$0.150

http://aws. amazon.com/ec2/pricing/

Microsoft's Cloud Platform

Source: Microsoft Presentation, A Lap Around Windows Azure, Manuvir Das

Salesforce Service Provider (www.saleforce.com)

- ❑ Call Center Service
- ❑ Incident Management Service
- ❑ Complaint Tracking Service
- ❑ Service Portal
- ❑ e-voting Service
- ❑ Voice and Video Conference Service
- ❑ ERP
- ❑ CRM

Top 8 Cloud Computing Companies

Companies	Major Cloud Offerings	User Groups
Amazon, Seattle 1994	Amazon Web Services, a half-dozen infrastructure as a services (IaaS) including the EC2 for computing capacity, and the S3 for on-demand storage capacity.	Over 10 thousands of businesses, and individual users, including the New York Times, Wash Post, and Eli Lilly.
Enomaly Toronto 2004	Elastic Computing Platform integrates enterprise datacenters with commercial cloud offerings, manages both internal and external resources, and VM migration among the datacenters	Customers include Business Objects, France Telecom, NBC, Deutsche Bank, Best Buy, etc.
Google, Mountain View, 1998	GAE offers a PaaS plus office productivity tools including the gmail, calendaring, docs and a web site creation tool Postini, and some security protection services.	Lots of small businesses, enterprises and colleges including Arizona State Univ. and Northwestern Univ.
GoGrid, San Francisco 2008	Offers web-based storage and deploys Windows- and Linux-based virtual servers onto the cloud, with preinstalled software from Apache, PHP, Microsoft SQL and MySQL.	Mostly start-ups, Web 2.0 and SaaS companies, plus a few big names like SAP and Novell
Microsoft, Seattle. 1975	Azure offers Windows-as-a-service platform consisting of the OS and developer services that can be used to build and enhance web-hosted applications	Epicor, S3Edge and Micro Focus are among the early customers using Azure to develop cloud applications
NetSuite, San Mateo 1998	A business software suite including e-commerce, CRM, accounting and ERP tools.	Business customers including Puck Coffee, Wrigleyville Sports and Isuzu.
Rackspace, San Antonio, 1998	Mosso cloud offers a platform for building Web sites; Cloud Files for a storage service; and Cloud Servers, an EC2-like service that provides access to virtualized server instances.	Web developers and SaaS providers such as Zapproved, which uses Mosso to deliver an online productivity tool.~~
Saleforce .com San Francisco 1999	CRM tools including salesforce automation, analytics, marketing and social networking tools. The Force.com offers a PaaS for building web apps. on Salesforce infrastructure	Half million customers in financial services, communications and media, energy, healthcare and retailing.

http://www.gartner.com

Benefits of Cloud Computing

- ✓ **Security**
- ✓ **Scalability**
- ✓ **Availability**
- ✓ **Performance**
- ✓ **Cost-effective**
- ✓ **Acquire resources on demand**
- ✓ **Release resources when no longer needed**
- ✓ **Pay for what you use**
- ✓ **Turn fixed cost into variable cost**

Cloud computing challenges

❑ Stable and High Network Bandwidth

❑ Not Integrated Standard for Service Providers to Develop Cloud computing Services

❑ Developers have Many Problems To Develop Scalable and Flexible Applications and Services

❑ Security Problems if Not Comply Security Factors

❑ Single Point of failure If Not Use Dual Home Service Providers

Future Research on Cloud Computing

❑ Operations Support System (OSS) and Umbrella Management For Cloud Services

❑ Special Security Platform For Cloud Security Services

❑ Integrated Standard For Cloud Service Providers