

Deployment Models in Cloud Computing

Deployment Models

- Private cloud
- Public cloud
- Hybrid cloud
- Community Cloud



Deployment Models

Public
Cloud



Hybrid
Cloud



Private
Cloud



Off-site infrastructure
w/ 3rd party
management

Applications and data
are in a combination
of private and public
cloud

On-site infrastructure w/
your own management
or off-site private
infrastructure w/ 3rd
party management

Cloud Deployment Model

- IT organizations can choose to deploy applications on public, private, or hybrid clouds, each of which has its trade-offs.
- •The terms public, private, and hybrid do not dictate location.
- •While public clouds are typically “out there” on the Internet and private clouds are typically located on premises, a private cloud might be hosted at a co-location facility as well.

Cloud Deployment Model

- Public clouds. The cloud is open to the wider public.
- Private clouds. The cloud is implemented within the private premises of an institution and generally made accessible to the members of the institution or a subset of them.
- Hybrid or heterogeneous clouds. This cloud is a combination of the two previous solutions and most likely identifies a private cloud that has been augmented with resources or services hosted in a public cloud.

Cloud Deployment Model

- Community clouds. The cloud is characterized by a multi-administrative domain involving different deployment models(public, private and hybrid), and it is specifically designed to address the needs of a specific industry

Public Cloud

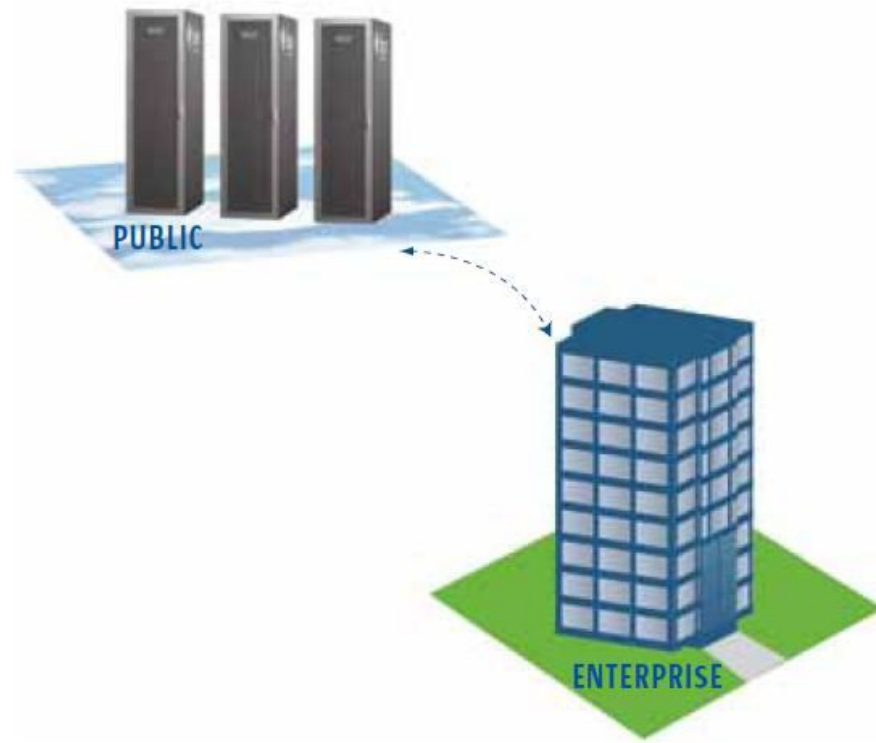
- A public cloud provides services to multiple customers, and is typically deployed at a co-location facility.
- Public clouds are run by third parties, applications from different customers are likely to be mixed together on the cloud's servers, storage systems, and networks.
- Public clouds are most often hosted away from customer premises, and they provide a way to reduce customer risk and cost by providing flexible, even temporary extension to enterprise infrastructure.

Public Cloud

- Such clouds are appealing to users because they allow users to quickly leverage compute, storage, and application services.
- In this environment, users' data and applications are deployed on cloud datacenters on the vendor's premises
- If a public cloud is implemented with performance, security, and data locality in mind, the existence of other applications running in the cloud should be transparent to both cloud architects and end users

Public Cloud

- One of the benefits of public clouds is that they can be much larger than a company's private cloud might be, offering the ability to scale up and down on demand, and shifting infrastructure risks from the enterprise to the cloud provider, if even just temporarily.

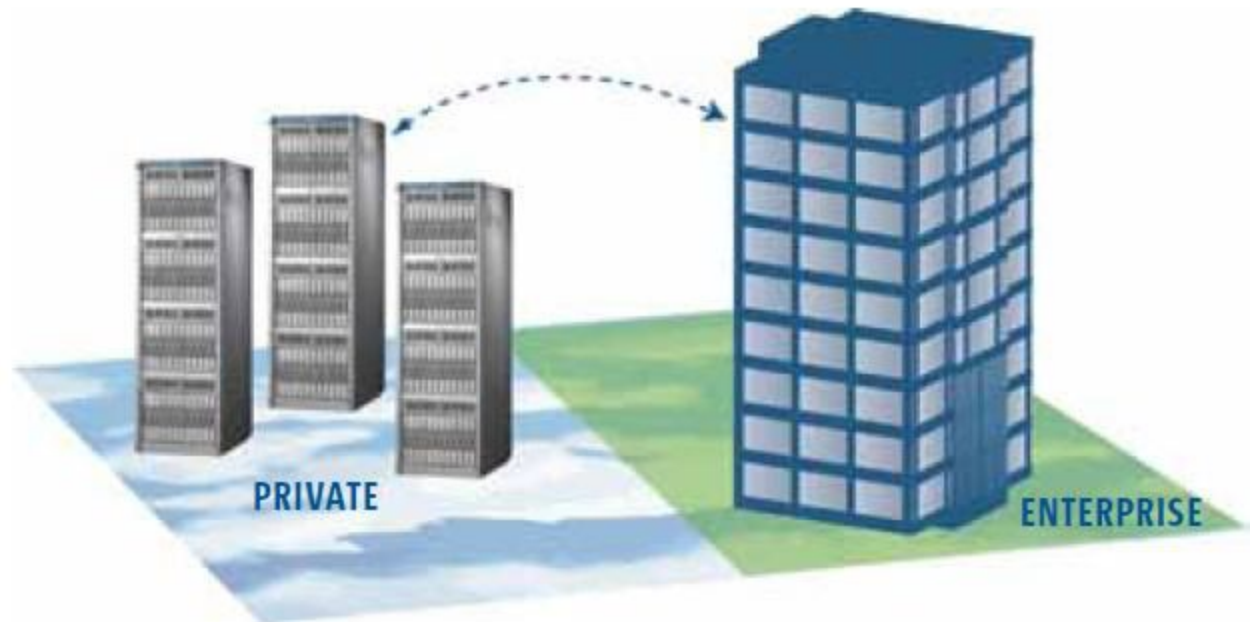


Private Cloud

- Private clouds are built for the exclusive use of one client, providing the utmost control over data, security, and quality of service.
- The company owns the infrastructure and has control over how applications are deployed on it.
- Private clouds may be deployed in an enterprise data-center, and they also may be deployed at a co-location facility.
- Private clouds can be built and managed by a company's own IT organization or by a cloud provider.

Private Cloud

- This model gives companies a high level of control over the use of cloud resources while bringing in the expertise needed to establish and operate the environment .

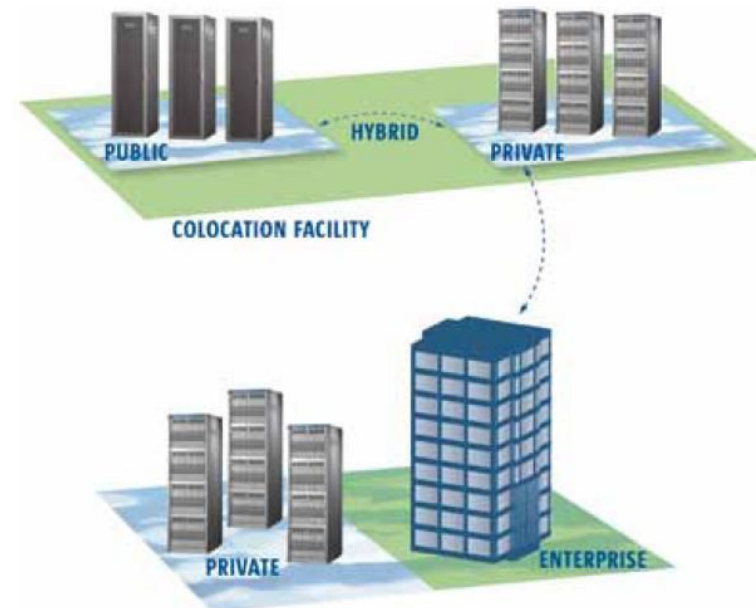


Hybrid Cloud

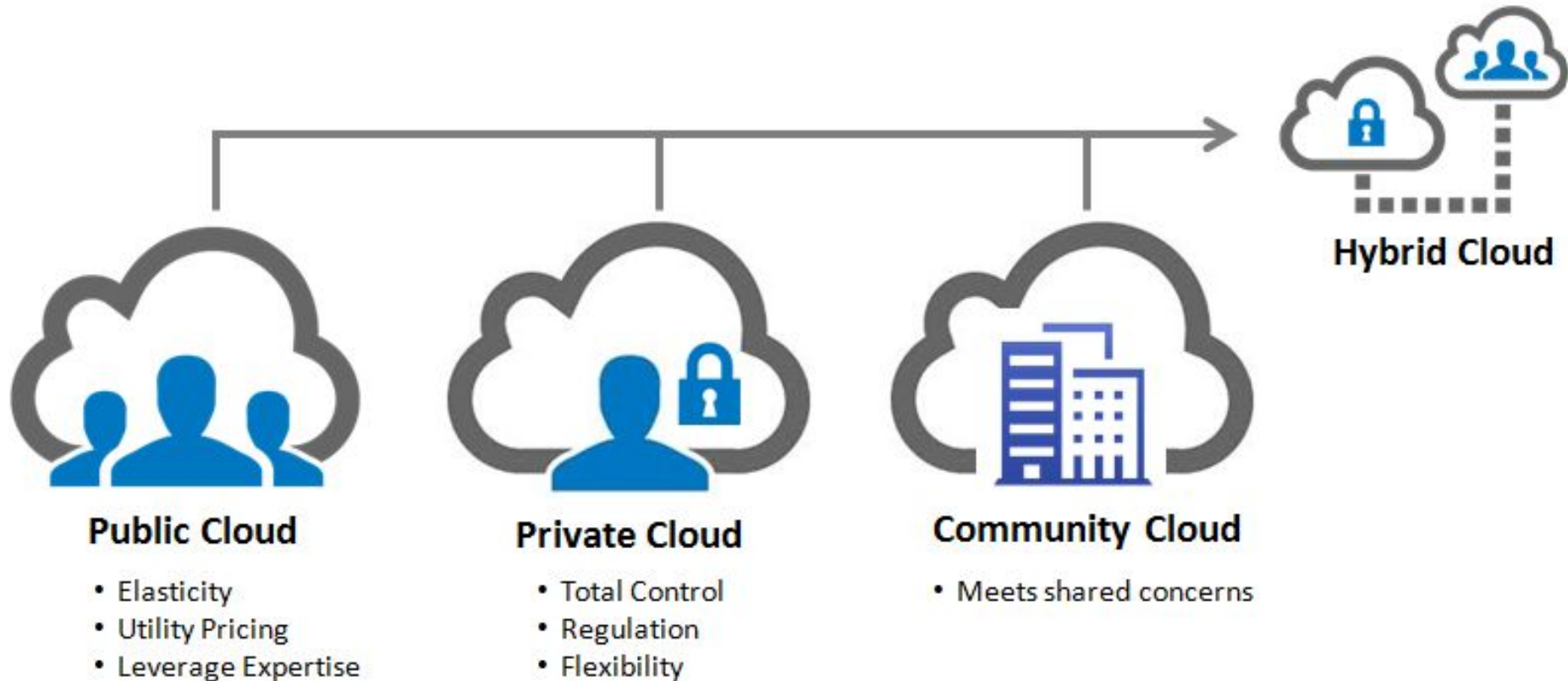
- Hybrid clouds combine both public and private cloud models.
- They can help to provide on-demand, externally provisioned scale.
- The ability to augment a private cloud with the resources of a public cloud can be used to maintain service levels in the face of rapid workload fluctuation.
- This is most often seen with the use of storage cloud to support Web 2.0 applications.
- A hybrid cloud also can be used to handle planned workload spikes

Hybrid Cloud

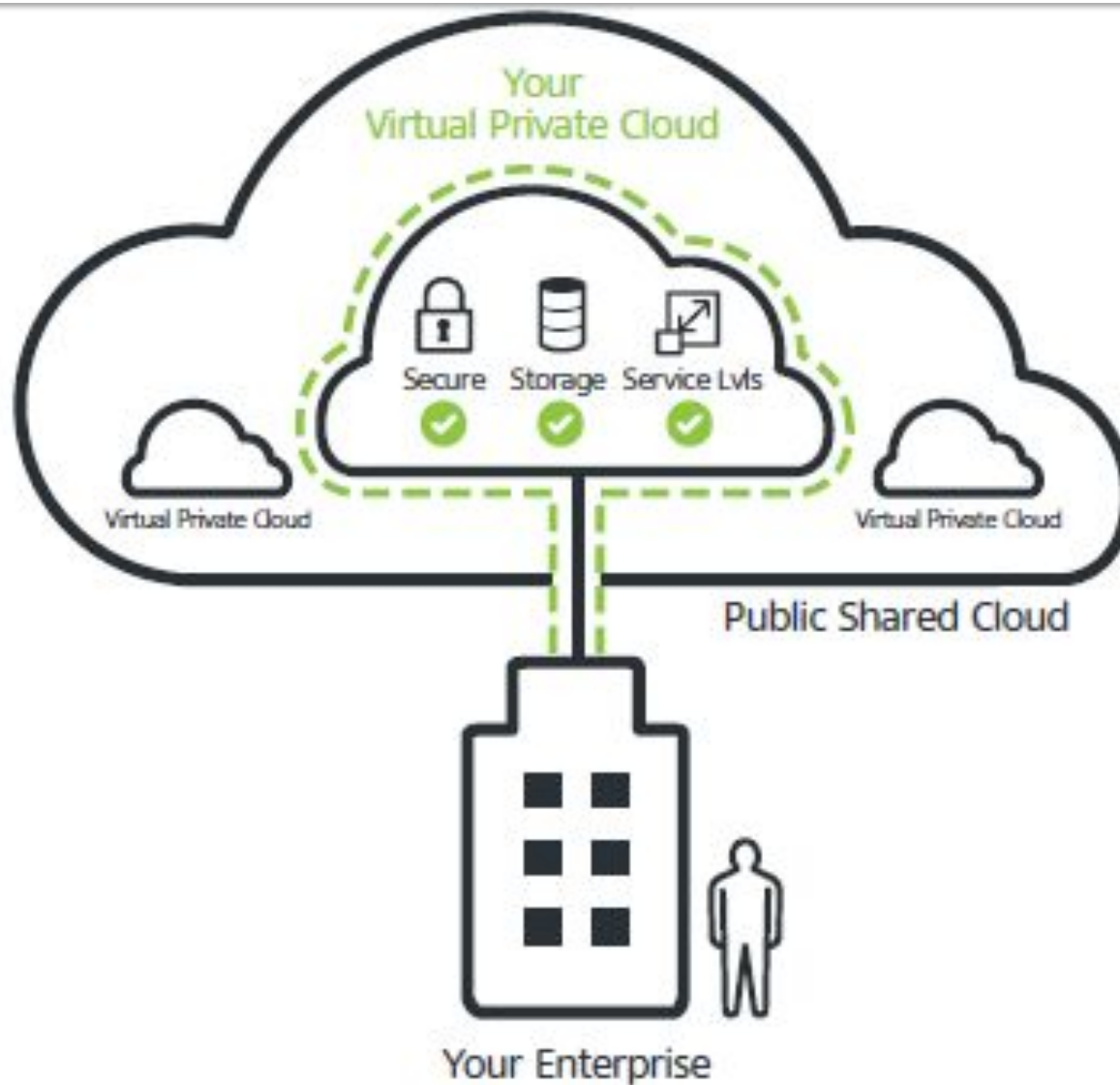
- Hybrid clouds introduce the complexity of determining how to distribute applications across both a public and private cloud.
- Among the issues that need to be considered is the relationship between data and processing resources
- Issues is what has to be kept where?



Comparison



Virtual Private Cloud (VPC)



Pros and Cons of Each Model

- **Benefits**

- **Private cloud:**

- ✓ Fewer security concerns
- ✓ IT organization retains control over data center

- **Public cloud:**

- ✓ Low investment
- ✓ Good test/development environment for applications

- **Hybrid cloud:**

- ✓ Operational flexibility
- ✓ Scalability

- **Risks**

- **Private cloud:**

- ✓ High investment hurdle in private cloud implementation
- ✓ New operational processes are required

- **Public cloud:**

- ✓ Security concerns
- ✓ IT organization may react negatively to loss of control over data-center function

- **Hybrid cloud:**

- ✓ Hybrid clouds are still being developed
- ✓ Control of security between private and public clouds

Cloud Bursting

- Cloud bursting is an application deployment model in which an application runs in a private cloud or data center and **bursts into a public cloud** when the demand for computing capacity spikes.
- The **advantage** of such a hybrid cloud deployment is that an organization only pays for extra compute resources when they are needed.

QUIZ

A private cloud helps businesses reduce their cost in what two ways?
(Choose two.)

- A. It reduces infrastructure cost by adopting virtualization techniques.
- B. It reduces infrastructure cost by owning all of the computing resources.
- C. It reduces operating costs by having maximum control over the data and infrastructure.
- D. It reduces infrastructure cost by consolidating computing resources and distributed computing.

How to choose Cloud

- **Finance**

- Does your business prefer spending CAPEX or OPEX on your IT Infrastructure?

- **Infrastructure**

- Do you have existing infrastructure that is less than two years old?

- **Facilities**

- Are your DC facilities in need of a refurbish/upgrade?

- **Network**

- Do you have an MPLS network?

- **Compliance**

- Are there any compliance or industry restrictions hosting applications that you are aware of?

How to choose Cloud

- **Headcount**

- Do you run a lean IT Division in terms of headcount?

- **Growth rate**

- Do you have trouble controlling server sprawl in your environment
- Do you have a dynamic ever-changing environment?

- **Applications**

- Are your applications predominantly web based?

Money Calculation

- Medium sized organization wishes to run a service
 - Service requires 4 TB
- **OUTSOURCE** Which is Better???
- S3 costs: \$0.023 / GB / month / CPU hour
- Storage = 4 TB * 12 months * \$0.023 / GB / month = \$110.4
- –Total = S3 + CPU = \$110.4 + \$25.6 = \$136
- K
- **Own: run**
- Storage ~ 4 TB * 12 months * \$0.023 / GB / month = \$110.4 includes 1 sysadmin / 100 nodes
- •using 0.45:0.4:0.15 split for hardware: power: network and 3 year lifetime of hardware

QUIZ

What is an advantage of building a private cloud infrastructure?

- A. Private cloud enables business to reduce operating costs by having maximum control over the data and infrastructure.
- B. Private cloud enables business to reduce operating costs by using their own IT department to manage computing resources.
- C. An enterprise can reduce the cost from capital expenditures and IT infrastructure investment to an utility operating expense model.
- D. An enterprise can consolidate hardware, storage, network by virtualizing resources to be more flexible, dynamic, & meet on demand requirements.

QUIZ

Which scenario best illustrates the benefits of using a hybrid cloud?

- A. An enterprise whose IT infrastructure is underutilized on average, and the system load is fairly consistent.
- B. Small start up business that is focused primarily on short term projects, and the system load is highly unpredictable.
- C. An enterprise that is not too concerned about control over their data and has large existing infrastructure that is capable of handling future needs.
- D. An enterprise that needs highly controlled storage and access to their data and that has a large existing infrastructure but needs additional resources for test and development of new solutions.

Service models of Cloud

- Cloud computing can describe services being provided at any of the traditional layers from hardware to applications

The service models are as follows:

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)
- **XaaS (Anything as a Service) / Everything as a Service**

SAAS

Consume

Emails
CRM
Team
Collaborations
ERP

PAAS

Build on IT

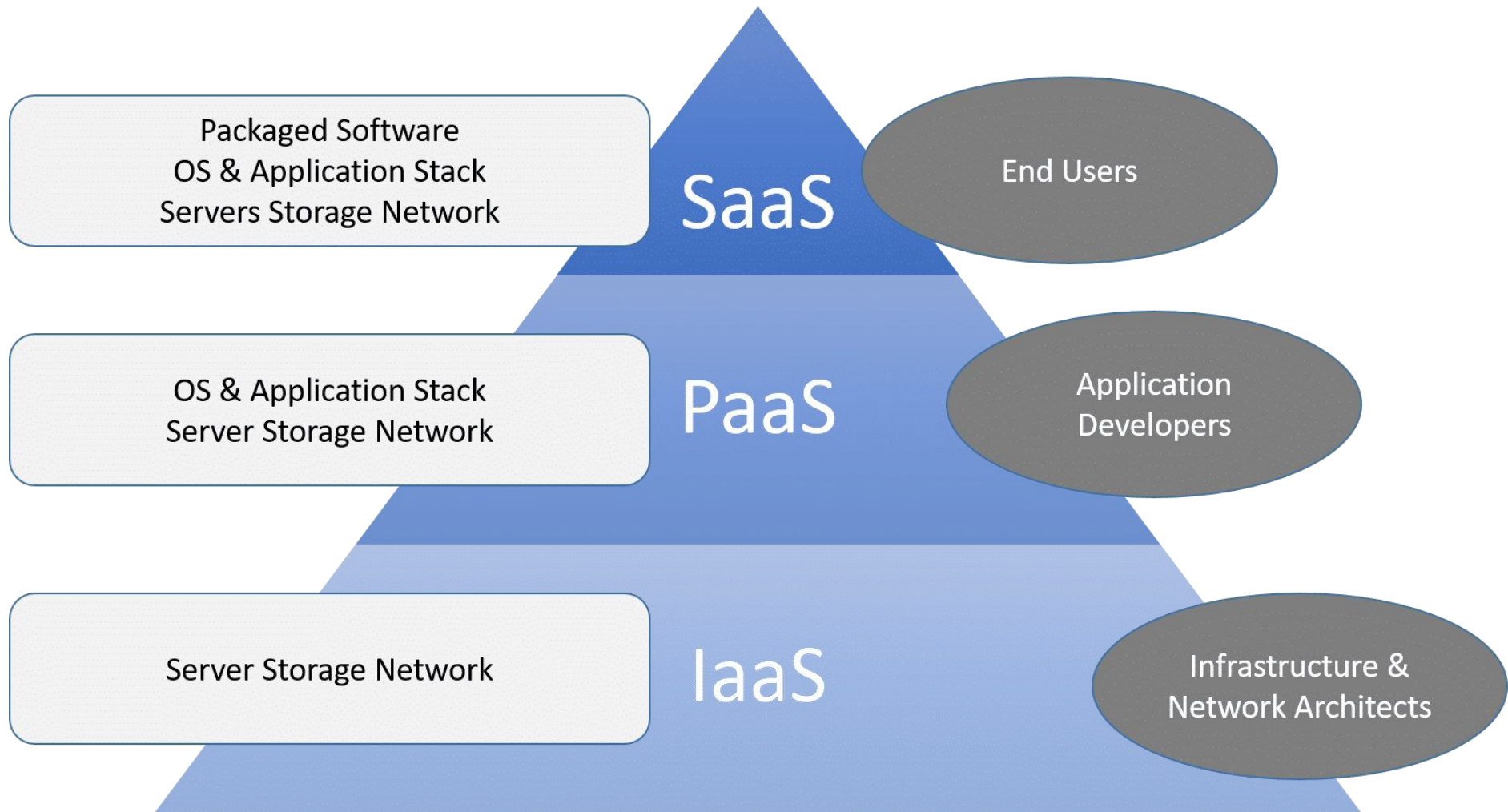
Application
Development
Video
Streaming

IAAS

Migrate to IT

Networking
Caching
Security
Manage

Cloud Service Models



Software as a Service (SaaS)

- At the top of the stack, SaaS solutions provide applications and services on demand.
- •Most of the common functionalities of desktop applications are replicated on the provider's infrastructure and made more scalable and accessible through a browser on demand.
- •These applications are shared across multiple users whose interaction is isolated from the other users.
- •The SaaS layer is also the area of social networking Websites, which leverage cloud-based infrastructures to sustain the load generated by their popularity

Software as a Service (SaaS)

- A single instance of the software runs on the cloud and services multiple end users or client organizations
- The most widely known example of SaaS is:
- **salesforce.com**
- **Google Documents**
- **Facebook**
- **Flickr**

Platform as a Service (PaaS)

- PaaS solutions are the next step in the stack.
- They deliver scalable and elastic runtime environments on demand and host the execution of applications.
- These services are backed by a core middleware platform that is responsible for creating the abstract environment where applications are deployed and executed.
- It is the responsibility of the service provider to provide scalability and to manage fault tolerance, while users are requested to focus on the logic of the application developed by leveraging the provider's APIs and libraries.

Platform as a Service (PaaS)

- This approach increases the level of abstraction at which cloud computing is leveraged but also constrains the user in a more controlled environment.
- PaaS offerings can provide for every phase of software development and testing, or they can be specialized around a particular area such as content management

Platform as a Service (PaaS)

- There are at least two perspectives on PaaS depending on the perspective of the producer or consumer of the services:
- A. Someone producing PaaS might produce a platform by integrating an OS, middleware, application software, and even a development environment that is then provided to a customer as a service.
- B. Someone using PaaS would see an encapsulated service that is presented to them through an API.

Platform as a Service (PaaS)

- Commercial examples of PaaS include:
- The Google Apps Engine, which serves applications on Google's infrastructure.
- Windows Azure
- Hadoop
- Aneka

Infrastructure as a Service (IaaS)

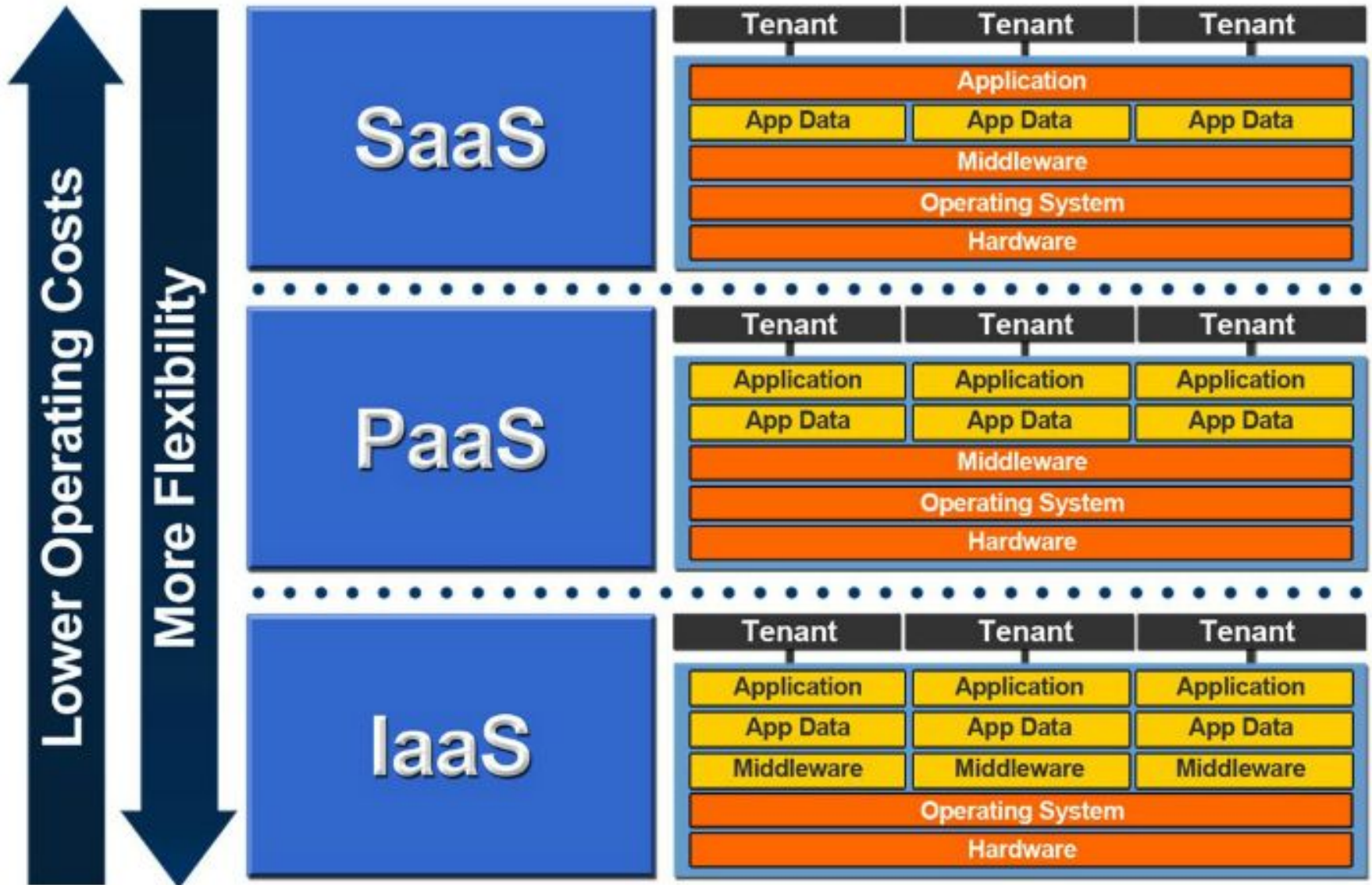
- At the base of the stack, IaaS solutions deliver infrastructure on demand in the form of virtual hardware, storage, and networking.
- These are created at users' request on the provider's infrastructure, and users are given tools and interfaces to configure the software stack installed in the virtual machine.
- •IaaS delivers basic storage and compute capabilities as standardized services over the network. Servers, storage systems, switches, routers, and other systems are pooled and made available to handle workloads that range from application components to high-performance computing applications

Infrastructure as a Service (IaaS)

- Commercial examples of IaaS:
- Joyent, whose main product is a line of virtualized servers that provide a highly available on-demand infrastructure.
- Amazon EC2
- S3
- Rightscale
- vCloud

Public Cloud	Segments	Examples
Software as a service (SaaS)	Communication & Collaboration	Cisco Webex, Microsoft Lync, IBM LotusLive
	Office Productivity	Google Apps, Microsoft Office 365
	Customer Relationship Management	Salesforce.com, PerfectView CRM Online, AccountView CRM Online
	Enterprise Resource Planning	NetSuite, Exact Online, Twinfield, SAP Business ByDesign, Infor
	Supply Chain Management	Descartes, Ariba, Ketersa, JDA Software
Platform as a service (PaaS)	Specific application based development	Salesforce Force.com, SaaSplaza, SAP Business ByDesign
	Generic application based development	Google App Engine, Microsoft Azure
Infrastructure as a service (IaaS)	Compute	Amazon EC2, JitScale, Rackspace, Uniserver
	Store and backup	EMC, Symantec, RainStor

Delivery models



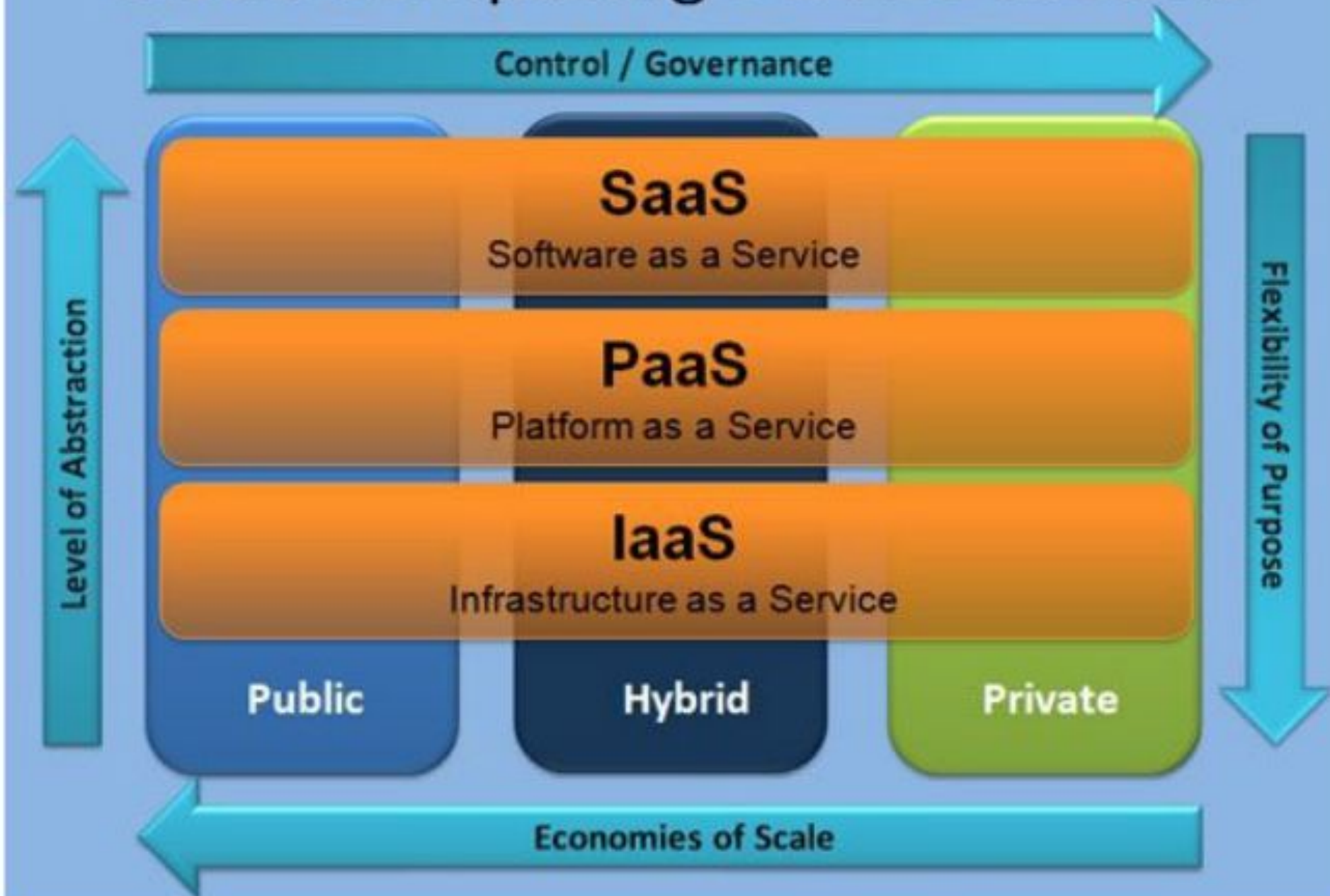
Delivery models

Cloud service Model	Extended service models
IaaS or PaaS	<ul style="list-style-type: none">•Workplace as a Service•Desktop as a Service
PaaS	<ul style="list-style-type: none">•Application as a Service•Development/ Testing as a Service•Database as a Service
SaaS	Email as a Service CRM as a Service
IaaS	Storage as a Service Backup as a Service
PaaS or SaaS	Data as a Service
XaaS	Anything as a Service

Other kinds of XaaS

- Database as a Service (DBaaS),
- Storage-as-a-Service,
- Desktop as a Service (DaaS),
- Communications as a Service (CaaS),
- Iot as a Service (Iotaas)
- Monitoring as a service (MaaS)

Cloud Computing Service Models





Thank You