

Week 2



Week 2

Capital
Expenditure (Cap
Ex) vs

Operational
Expenditure (OpE
x)



Capital Expenditure(CapEx) VS Operational Expenditure(OpEx)

CapEx

- spending of money on physical infrastructure up front, and then deducting that expense
- upfront cost

OpEx

- spending money on services or prod
- no upfront cost

Capex vs Opex



Capital Expenditure (CapEx)

- Spending on infrastructure is completed upfront
- Cost written off over a period of time

Operational Expenditure (OpEx)

- No up-front cost
- Pay for service as you consume it
- Deduct from tax bill in same year as expense occurs

CapEx computing cost

Capex vs Opex



Capital Expenditure (CapEx)

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Operational Expenditure (OpEx)

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Server costs

- includes all hardware components and the cost of supporting
- ~~design~~ design fault tolerance and redundancy
- affect your immediate cash flow

CapEx computing

Cost Storage costs

- includes all storage hardware components and the cost of
- ~~expensive~~ ^{supporting} level of fault tolerance, the more expensive of centralized storage

Network costs

- include all on-premises hardware components
- wide area network (WAN) and Internet connections.



CapEx computing

Backup and archive

costs cost to back up, copy, or archive data

- setting up a backup to or from the cloud
- upfront cost for the hardware and additional costs for backup maintenance and consumables

Organization continuity and disaster recovery

costs how to recover from a disaster and continue operating

- creating a data recovery site
 - additional ongoing cost for the infrastructure and its maintenance
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CapEx computing

~~Cost~~ Datacenter infrastructure costs

- costs for construction and building equipment, future renovation and remodeling
- setting up a backup to or from the cloud
- infrastructure incurs operational expenses for electricity, floor space, cooling, and building maintenance.

Technical personnel

- required to work on your infrastructure
 - need the technical expertise and workforce to install, deploy, and manage the systems
- 

OpEx cloud computing cost

Leasing software and customized features
a pay-per-use model requires actively managing your subscriptions

Scaling charges based on usage/demand instead of fixed hardware or capacity

- bill in various ways
- billing include allocated RAM, I/O operations per second (IOPS), and storage space.



OpEx cloud computing cost

Billing at the user or organization level

- Pay-per-use model is billing method designed for both
- ~~organization size, and user~~ ^{scale, customization, and user} provision computing resources



Benefits of CapEx and OpEx

Benefits of CapEx

- plan expenses at the start of a project or budget period

Benefits of OpEx

- demand and growth can be unpredictable and can outpace expectation
- pay as much or as little for the infrastructure as required

CapEx vs OpEx Benefits



CapEx Benefits

- Predictability
- Cost effective when you can consume the infrastructure quickly

OpEx Benefits

- Try and buy
- Low initial costs
- Demand fluctuation

Week 2

*Cloud
deployment
method*



Cloud deployment method

Public VS Private VS Hybrid



Cloud deployment method

Public cloud



- most common deployment
- ~~no~~ no local hardware to manage or keep up-to-date everything

Private cloud



- create a cloud environment in own datacenter
- offers a simulation of a public cloud to your users

Hybrid cloud



- allowing you to run your applications in the most appropriate location.

Public Cloud



Advantages

- High Scalability/agility
 - you don't have to buy a new server in order to scale
- Pay-as-you-go pricing
 - you pay only for what you use, no
- ^{CapEx costs} Not responsible for maintenance or updates of the hardware
- Minimal technical knowledge to set up and ~~use~~ leverage the skills and expertise of the cloud provider

Public Cloud



Disadvantages

- specific security requirements that cannot be met using public cloud
- government policies, industry standards, or legal requirements that public cloud cannot meet
- don't own the hardware or services and cannot manage them as you want
- Unique business requirements
 - such as having to maintain a legacy application might be hard to meet

Private Cloud



Advantages

- ensure the configuration can support any scenario or legacy application
- ~~control~~ responsibility over security
- Private clouds can meet strict security, compliance, or legal requirements

Disadvantages

- some initial CapEx costs and must purchase the hardware
- ~~the hardware~~ equipment limits the agility
- Private clouds require IT skills and expertise that's hard to come by

Hybrid Cloud



Advantages

- keep any systems running and accessible that use out-of-date hardware or operating system
- flexibility with what you run locally versus in cloud
- take advantage of economies of scale from public cloud providers services and resources
- use own equipment to meet security, compliance, or legacy scenarios



Hybrid Cloud



Disadvantages

- more expensive than selecting one deployment model
- more complicated to set up and manage



Types of Cloud Services



Infrastructure as
a service (IaaS)



Platform as a
service (PaaS)



Software as a
service (SaaS)

Infrastructure as a Services

(IaaS)

- most flexible category of cloud
- ~~complete~~ complete control over the
- ~~hardware~~ hardware of buy, rent it
- provisioned and managed over the
- ~~commonly~~ commonly use in:
 - Migrating workloads
 - Test and development
 - Storage, backup, and recovery



Platform as a Services (PaaS)

- provides an environment for building, testing, and deploying software applications
- create an application quickly without managing the underlying infrastructure
- complete development and deployment environment in the cloud
- commonly use in:
 - Development framework
 - Analytics or business intelligence



Software as a Services (SaaS)

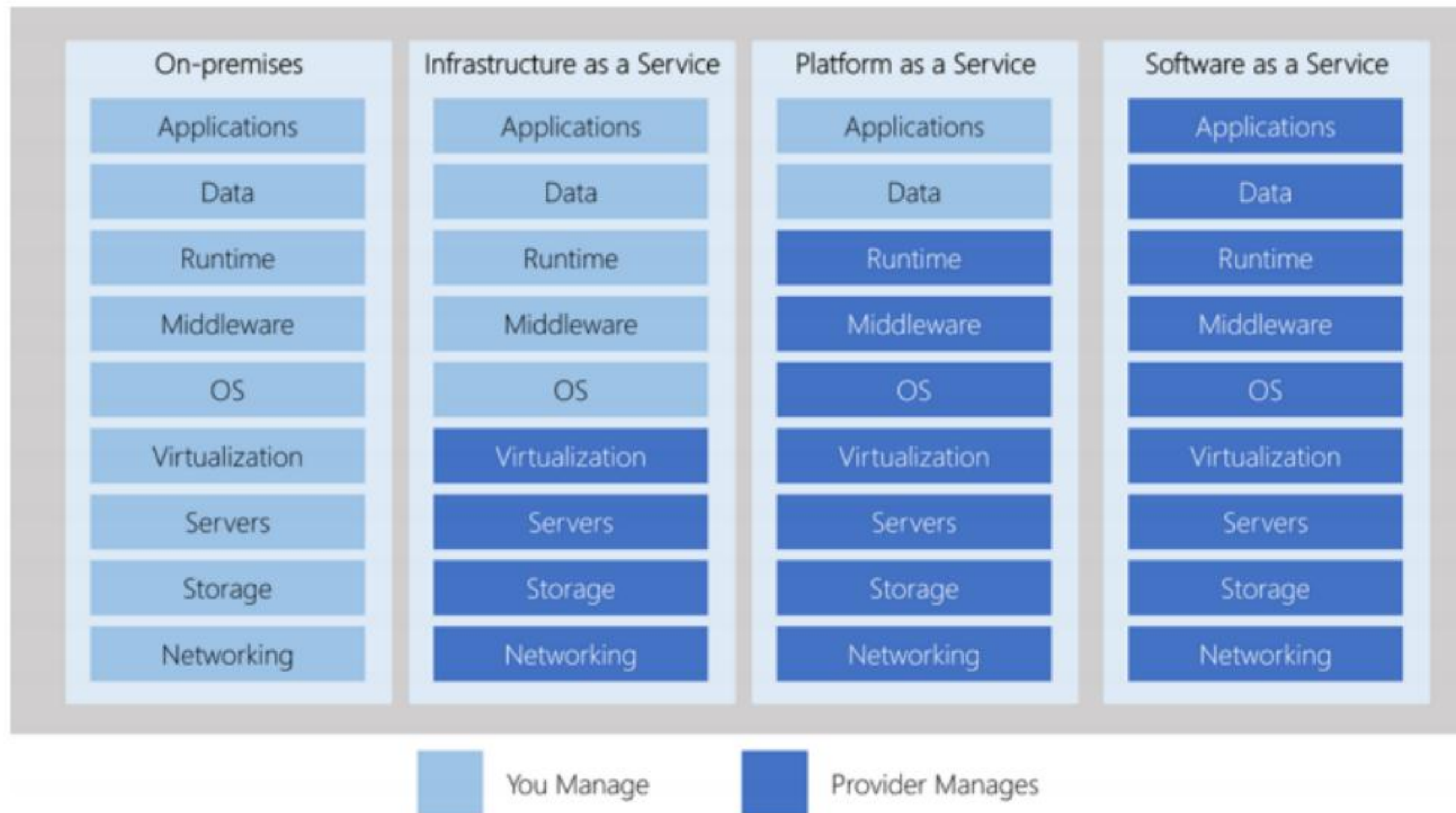
- centrally hosted and managed for the end customer
- usually based on an architecture
- E.g.:
 - Office 365
 - Skype



Cost and Ownership

	IaaS	PaaS	SaaS
Upfront costs	There are no upfront costs. Users pay only for what they consume.	There are no upfront costs. Users pay only for what they consume.	Users have no upfront costs; they pay a subscription, typically on a monthly or annual basis.
User ownership	The user is responsible for the purchase, installation, configuration, and management of their own software, operating systems, middleware, and applications.	The user is responsible for the development of their own applications. However, they are not responsible for managing the server or infrastructure. This allows the user to focus on the application or workload they want to run.	Users just use the application software; they are not responsible for any maintenance or management of that software.
Cloud provider ownership	The cloud provider is responsible for ensuring that the underlying cloud infrastructure (such as virtual machines, storage, and networking) is available for the user.	The cloud provider is responsible for operating system management, network, and service configuration. Cloud providers are typically responsible for everything apart from the application that a user wants to run. They provide a complete managed platform on which to run the application.	The cloud provider is responsible for the provision, management, and maintenance of the application software.

Management responsibilities



- IaaS requires the most user management of all the cloud services.
- PaaS requires less user management.
- SaaS requires the least amount of management.


Exercise

1. Which term from the list below would be viewed as benefits of using cloud services?

- a. Unpredictable costs
- b. Elasticity
- c. Local reach only

Answer : Elasticity

Elasticity, Agility and Economies of scale are the correct answers, and would be seen as benefits that you can gain from using cloud services.



Exercise

2. Suppose you have two types of applications: legacy applications that require specialized mainframe hardware and newer applications that can run on commodity hardware. Which cloud deployment model would be best for you?

- a. Public Cloud
 - b. Private Cloud
 - c. Hybrid Cloud
- Answer : Hybrid Cloud


A hybrid cloud is a public and private cloud combined. You can run your new applications on commodity hardware you rent from the public cloud and maintain your specialized mainframe hardware on-premises.

*Week 1
& 2*

*Summa
ry*



Summary

- Different types of cloud models that are available and the considerations of using those different models.
 - Some of the key terms and concepts such as high availability, agility, elasticity, fault tolerance, and CapEx vs. OpEx.
 - The different cloud services available, the benefits of using the different types, and the management responsibilities under each service type.
 - Cloud models such as public, private and hybrid
 - The different types of cloud service available: IaaS, PaaS, and SaaS
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Summary

Microsoft

Azure

- cloud computing platform.
 - enable you to do everything from running your existing applications on virtual machines
 - few kinds of services:
 - Compute
 - Database
 - Identity
 - Networking
 - Storage
 - AI and machine-learning
- 