

Principles of cloud computing

1 What is cloud computing

Services typically offered

- Compute power
- Storage
- Networking
- Analytics

Containers - Provide a consistent, isolated execution environment for applications.

- Standard runtime environment used to execute the app
- Leading platform is docker

Serverless computing - Run application code without creating, configuring or maintaining a server

- Application is broken into separate functions that run when triggered by some action
- Only pay for the processing time used by each function as it executes

2 Benefits of cloud computing

Cost effective

- No upfront infrastructure costs
- Not buying infrastructure that isn't fully utilised
- Can scale up and down with demand

Scalability

- Vertical scaling (scaling up)
 - Adding more resources to a server
- Horizontal scaling (scaling out)
 - Adding more servers

Elasticity

- Automatically adding more resources to handle traffic

Current

- Don't have to think about having current hardware and patches

Reliability (Microsoft responsibility)

- Provided backup, recovery replication etc
- Fault tolerance

Global

- Fully redundant datacenters
- High availability (shared responsibility)
- Lower customer latency

Security (shared responsibility)

- Both physical and digital

Agility (speed to set up)

3 Compliance terms and requirements

Questions include

- How compliant is the cloud provider when it comes to handling sensitive data
- How compliant are the services offered by the cloud provider
- How can I deploy my own cloud-based solutions to scenarios that have accreditation or compliance requirements?
- What terms are part of the privacy statement for the provider?

4 Economies of scale

- Less expensive
- More efficient
- Pass benefits on

5 CapEx vs OpEx

5.1 CapEx (Capital expenditure)

- Spend on physical infrastructure
- Storage
- Network
- Backup and archive
- Organisation continuity and disaster recovery
- Datacentre infrastructure
- Technical personnel

5.2 Benefits

Fixed costs make prediction easier

5.3 OpEx (operational expenditure)

- Monthly bill
- Pay as you go
- Get set up immediately
- No upfront costs
- Leasing software and customised features
- Scaling charges based on usage/demand
- Billing at the user or organisation level

Azure follows a consumption based model, which just has operational expenditure

5.4 Benefits

Easier to respond to change

6 Types of cloud models

Name	Description	Advantages	Disadvantages
Private cloud	Cloud set up in own datacenter	<ul style="list-style-type: none"> • Ensure the configuration is as needed • Control over security and compliance 	<ul style="list-style-type: none"> • Some initial capEx Costs • Limited agility • Require IT skills
Public cloud	No local hardware, all running on cloud providers hardware	<ul style="list-style-type: none"> • High scalability/agility • Pay as you go pricing • Not responsible for maintenance or updates of the hardware • Minimal technical knowledge required 	<ul style="list-style-type: none"> • May be security requirements that can't be met • May be government policies, industry standards or legal requirements that can't be met • Can't manage hardware in way you want to • May not work with legacy applications
Hybrid cloud	Combining public and private clouds	<ul style="list-style-type: none"> • Keep any legacy systems running • Flexibility to choose where things run • Get economies of scale from public cloud when available • Meet more compliance • Run things where it is most appropriate 	<ul style="list-style-type: none"> • Increased cost • Increased complexity

7 Types of cloud services

7.1 IaaS

Most flexible category, gives control over hardware.

Commonly used for:

- Migrating workflows
- Test and development
- Storage, backup and recovery

Shared responsibility model - Cloud provider ensures infrastructure is working correctly, customer makes sure the service they are using is configured correctly, is up to date and is available to users.

7.2 PaaS

Provides an environment for building, testing and deploying software applications. Don't have to manage infrastructure

Commonly used for:

- Development framework
- Analytics or business intelligence

7.3 SaaS

Only responsible for data+access

Access in Azure via marketplace

Pay as you go pricing

Users pay for software they use on a subscription model

7.4 Cost and Ownership

	IaaS	PaaS	SaaS
Upfront costs	None, pay for consumption,	None, pay for consumption	None, pay subscription
User ownership	User responsible for software, OS, middleware and applications	User responsible for development of applications	Users just use software
Cloud provider ownership	Infrastructure is available to user	OS, Network and service	Provision, management and maintenance of application software.

