# Azure Fundamentals

The Azure Fundamentals exam covers three topics:

* Describe Cloud Concepts (25%-30%)
* Describe Azure Architecture and Services (35%-40%)
* Describe Management and Governance (30%-35%)

# 1.1. Azure Cloud Computing

Cloud computing allows you to have your services in the Cloud data center instead of in a physical location. This way, you can easily adjust the resources you need and delegate maintenance to the Cloud provider.

Services: Computer Power (CPU, RAM), Virtual Machines, Storage, Databases, Networking, Internet of Things (IoT) and Machine Learning (ML).

## 1.1.1. Shared Responsibility Model

When you have an on-premises datacenter you are responsible for everything. On the contrary, when you use Cloud computing you can decide how much responsibility you want to delegate to the Cloud provider. This depends on the types of service you select: Infrastructure as a Service(IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

Is important to clarify that sometimes the responsibility depends on the situation. For example, if you user a cloud SQL database, the cloud provider is responsible for maintaining the database. However, if you deployed a virtual machine and installed an SQL database on it, you’d be responsible for database patches and updates.

## 1.1.2. Cloud Models

The cloud model defines the deployment type of cloud resources.

### 1.1.2.1 Private Cloud

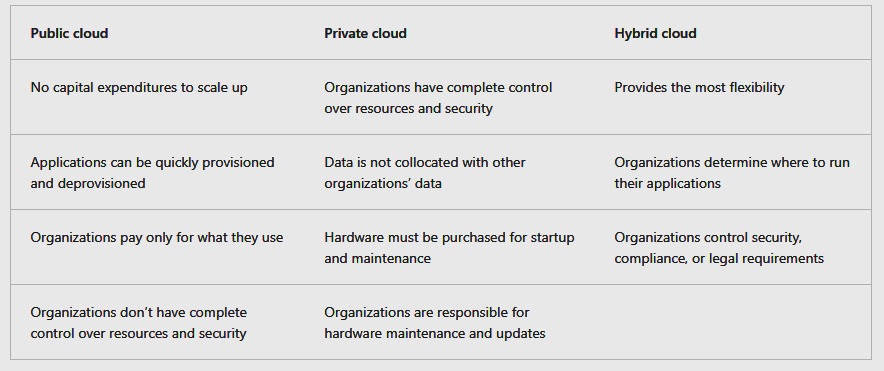
Is the natural evolution from the corporate datacenter. Is a cloud that is built, controlled and maintained by a single entity. This allows greater control but higher cost since you need to pay for all the available resources even if you’re not using them at all times. You may host you own datacenter, a dedicated offsite datacenter or a third party may have a dedicated datacenter for your company.

### 1.1.2.2 Public Cloud

A public cloud is built, controlled and maintained by a third-party cloud provider. Anyone that wants to purchase cloud services can access and user resources.

### 1.1.2.3 Hybric Cloud

Hybrid cloud is a computing environment where both public and private clouds get interconnected. You may need private cloud only for certain highly sensible services and may be comfortable having the rest in a public cloud. Thus, hybrid cloud allows balancing security and affordability.



### 1.1.2.4 Multi Cloud

Multi Cloud is when you have services with more than one cloud provider. It may be due to your organization migrating from one provider to another, or because you need to use features from both providers.

In any case, **Azure Arc** can help you manage your cloud environment, whether it’s a public Azure cloud, a private cloud in your datacenter, a hybrid configuration or a multi-cloud environment.

There is also a specialized **Azure VMware Solution** for running VMware workloads with seamless integration and scalability. This is useful when you have previously stablished a VMware private cloud environment but want to migrate to a publich or hybrid cloud.

## 1.1.3. Consumption base model

Cloud computing operates on a consumption-based model using operation expenditure (OpEx). On the contrary, a traditional datacenter uses capital expenditure (CapEx) because you need to estimate your current and future capacity and pay for it upfront.

The advantages of cloud services are:

* No upfront cost.
* No need to purchase or manage infrastructure.
* You can add or remove resources whenever you need to and adjust payment (easy to scale).

Cloud computing is a way to rent computer power and storage from someone else’s datacenter. You can treat cloud resources like you would resources in your own datacenter. However, unlike your own datacenter, when you’re done using cloud resources, your give them back.

# 1.2. Advantages of Cloud

Cloud computing allows you to have your services in the Cloud data center instead of in a physical location

## 1.2.1. High Availability

One of the most important considerations when deploying an application to the cloud is availability. Azure provides different SLA (Service Level Agreements) which are agreements between provider and customer for guaranteeing a stated level of service.

SLAs are related to service availability or uptime. The client may be credited if the SLA is not met. Common values for uptime in Azure are 99% (7.2 hrs per month), 99.9% (43 min per month), 99.95% (22 min per month) and 99.99% (4.32 min per month).

## 1.2.2. Scalability

Scalability refers to the ability to adjust resources to meet demand and is another important advantage of cloud services. Scalability allows the client to response to a system overload and to avoid overpaying for additional services.

Scaling usually has two varieties: vertical and horizontal. Vertical scaling focuses on increasing or decreasing the capabilities of resources. Horizontal scaling adds or subtracts the number of resources.

## 1.2.3. Reliability

Reliability is the ability of a system to recover from errors and continue to function. The cloud, due to its decentralized design, naturally supports reliable and resilient infrastructure because you can deploy resources in different regions around the world. In some cases, the cloud environment can automatically switch to another region.

## 1.2.4. Prediction

Predictability in the cloud lets you move forward with confidence. Predictability can be focused on performance or costs.

**Performance predictability** focuses on predicting the resources required to deliver a positive experience for customers. If you suddenly need more resources, **autoscaling** can deploy additional resources to meet demand, then scale back when it decreases. Or, if traffic is mostly concentrated in one area, **load balancing** will help redirect some of the overhead to areas with less stress.

**Cost forecasting** focuses on forecasting the cost of cloud spending. With the cloud, you can track resource usage in real time, monitor resources to ensure you're using them most efficiently, and apply data analytics to find patterns and trends to help better plan resource deployments. By operating in the cloud and using cloud insights and analytics, you can predict future costs and adjust resources as needed. You can even use tools like total cost of ownership (TCO) or pricing calculators to get an estimate of your potential cloud spend.

## 1.2.5. Security and Governance

Cloud provides several useful **governance** features. You can set a **template** to help ensure the deployed resources meet corporate standards and requirements. Plus, you can **update** all your deployed resources to new standards. Cloud-based **auditing** helps flags any resource that’s out of compliance and provides mitigation strategies. This process can also be automated.

On the **security** side, **infrastructure as a service** provides the maximum security since you’re able to handle physical resources, operative system and installed software, including patches and maintenance. **Platform as a service** and **software as a service** both take care of patches and maintenance automatically. Also, cloud is prepared to deal with attacks such as DDoS (distributed denial of service).

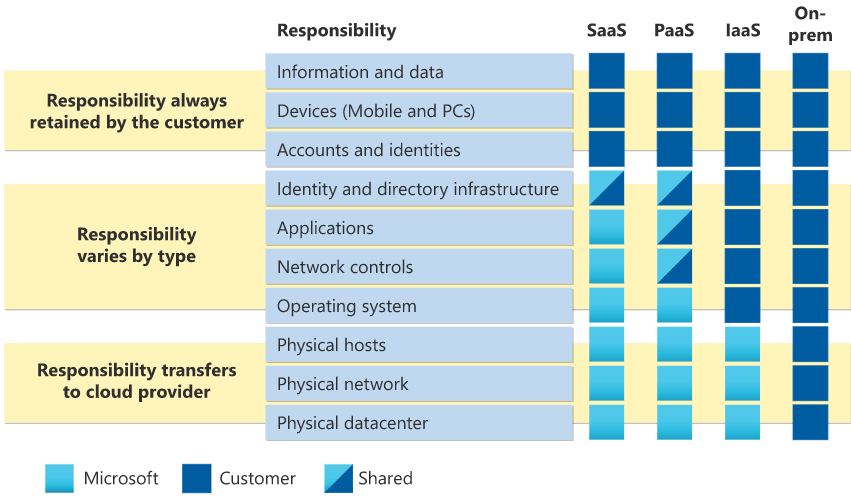
## 1.2.6. Manageability

Management comes in two forms. **Management of the cloud** is about controlling cloud resources such as: automatic **scale**, **templates**, **monitoring** and **alerts** based on configured metrics.

**Management in the cloud** refers to the way you can manage resources: through a **web portal**, using a **CLI**, using **APIs** or using **PowerShell**.

# 1.3. Cloud Services

Cloud services are IaaS, PaaS and SaaS. Each of them have particular advantages. Responsibility of cloud services is always shared.



## 1.3.1. IaaS

Infrastructure as a Service places most of the responsibility on the client. The provider is responsible for maintaining the physical infrastructure and its access to the internet. The client is responsible for the installation, configuration, patching, updates and security.

Common scenarios are:

* Lift-and-shift migration: You’re standing up cloud resources similar to your on-prem datacenter, and then simply moving the things running on-prem to running on the IaaS infrastructure.
* Testing and development: You have established configurations for development and test environments that you need to rapidly replicate. You can stand up or shut down the different environments rapidly with an IaaS structure, while maintaining complete control.

## 1.3.2. PaaS

In Platform as a Service the cloud provider maintains the physical infrastructure, physical security and connection to the internet, as well as the operating systems, middleware, development tools and business intelligence services that make up a cloud solution. In a PaaS scenario, you don’t have to worry about the licensing or patching for operating systems and databases. Common scenarios are:

* Development framework: PaaS provides a framework that developers can build upon to develop or customize cloud-based applications. Cloud features like scalability, high-availability and multi-tenant capability are included, reducing the amount of coding that developer must do.
* Analytics or business intelligence: Tools provided as a service allow organizations to analyze and mine their data, finding insights and patterns and predicting outcomes to improve forecasting, product design decisions, investments returns, and other business decisions.

## 1.3.3. SaaS

Software as a Service is the most complete cloud service where you’re basically renting or using a fully developed application. Email, financial software, messaging applications and connectivity software are all common examples of SaaS implementation:

* Email and messaging.
* Business productivity applications.
* Finance and expense tracking.