Cloud Computing : the PC is in a Cloud provider’s data center instead of physically with you. This lets you pay for only the services you use, plus someone else get to manage the upkeep of the computer. Each cloud provider will have their own selection to choose from, but the **basic service provided by all cloud providers are computer power and storage**.

* Compute Power is how much processing your computer can do (RAM, Processor)
* Storage is the volume of data you can store on your computer (Hard Drive : SSD/HDD – with backup systems).

Benefits of Cloud Computing : (using a pay as you go pricing model)

1. Lower your operationg costs.
2. Run your infrastructure more efficiently.
3. Scale as your business needs change.

Cloud computing is a way to rent computer power and storage from someone else’s data center (build only for what you use). You rent them for the time that you need them. The cloud provider takes care of maintaining the underlying infrastructure for you.

**What is AZURE.** Azure runs business applications, by providing global scale consistency and seamless integration, with on-premises environments. Several benefits that azure offers :

1. **Be ready for the future**, continuous innovation from Microsoft support development today and product visions for tomorrow.
2. **Build on your terms**, you have choices with a commitment to open source, and support for all language and frameworks, businesses can build how they want, and deploy where they want to.
3. **Operate hybrid seamlessly**, they can integrate and manage their environments, with tools and services designed for a hybrid cloud solution.
4. **Trust your cloud**, get security from the ground-up, backed by a team of experts, and proactive compliance trusted by enterprise – government and startups.

**What we can do with AZURE** . Moving your applications to virtual machines is a good start. The azure portal is exactly that, a web based unified console, that provides an alternative to command line tools. You can manage our subscription, by using GUI (graphical user interface).

1. You can build, manage, monitor everything from simple web apps to complex cloud deployments.
2. Create custom dashboards for an organized view of resources,
3. Configure accessibility options for an optimal experience.
4. Azure updates continuously
5. No downtime for maintenance activities
6. This configuration makes the Azure portal resilient to individual datacenter failures.
7. Avoid network slowdowns by being close to users.

A diagram of a blockchain

Description automatically generatedA screenshot of a computer

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Azure Marketplace uses as a launch point, for all joint go to market activities. Using azure marketplace, you can provision end to end solutions quickly and reliably hosted in your Azure environment.

AZURE : Build, Deploy and Manage Applications.

Azure uses a technology known as **Virtualization**. Virtualization separates the tight coupling between a computer’s hardware and it’s operating system (OS) , using an abstraction layer called a **hypervisor**. Hypervisor emulates all the functions of a real computer and its CPU in a Virtual Machine(VM). It can run multiple Virtual machines at the same time, optimize the capacity of the obstructed hardware, and each VM can run any compatible OS ,such as Windows or Linux.

Azure takes this virtualization technology and repeats it on a massive scale. Each data center has mini racks filled with servers, and each server includes a hypervisor to run multiple Virtual Machines (VM). A network switch provides connectivity to all of these servers. And one servers in each rack runs a special piece of software called a Fabric Controller. Each Fabric Controller is connected to another special piece of software known as Orchestrator. So the Orchestrator is responsible for managing everything that happens in azure including responding to user requests. And users make requests using the Orchestratos Web API. The Web API can be called by many tools, including the user interface of the Azure Portal.

So, when a user make a request to create a Virtual Machine, the orchestrator package everything that’s needed, picks the best server rack, and then sends the package and request to the Fabric controller. Once the fabric controller has created VM, the uses can connect to it. Azure makes it easy for developers and IT administrators to be agile when they build, deploy and manage their applications and services. **In face, building a VM is just the beginning with azure ever expanding set of cloud services to help you meet your business needs/challenges**.

AZURE capabilities (only pay for what you use) :

1. **Compute Services**

This covers VM, containers and serverless computing including microservices. These services are primarly for performing calculations, executing logics, and running applications.



1. **Cloud Storage**

This include disk attached to Virtual machines as well as more structured formats. Which can expand and shring as necessary.

|  |  |
| --- | --- |
| **Service name** | **Service function** |
| Azure Blob storage | Storage service for very large objects, such as video files or bitmaps |
| Azure File storage | File shares that can be accessed and managed like a file server |
| Azure Queue storage | A data store for queuing and reliably delivering messages between applications |
| Azure Table storage | A NoSQL store that hosts unstructured data independent of any schema |

1. **Networking**

These features let you set up private network connections to your on-premises environment and configure and control traffic into and out of Azure efficiently. Helping to optimize applications performance and scalability.



1. **App Hosting**

This feature lets you run your entire web application on a managed platform in Windows or Linux. Plus the Azure marketplace has a huge range of third party products you can run in Azure including SAP & SQL database solutions.

1. **Artificial Intelligence**, including ML and prebuilt cognitive services.

Help you search and analyze exiting data to forecast future behaviors, outcomes and trends. These predictions can even be used to make absent devices smarter.



1. **Internet of Things**

Enables you to integrate sensors and devices and manage them with IoT hubs. Allowing you to create full feature dashboards and apps to monitor and control all of your assets.

|  |  |
| --- | --- |
| **Service name** | **Description** |
| IoT Central | Fully managed global IoT software as a service (SaaS) solution that makes it easy to connect, monitor, and manage IoT assets at scale |
| Azure IoT Hub | Messaging hub that provides secure communications between and monitoring of millions of IoT devices |

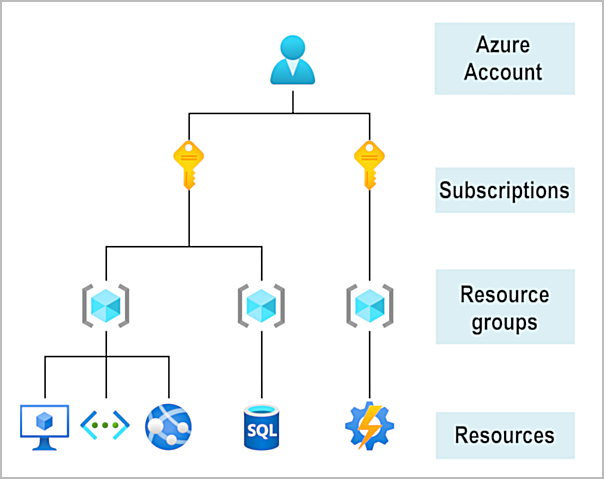
1. **Integration**

Logic apps and services bus connect applications and services and allow for workflows to orchestrate business processes, whether those connected systems are on premises or in the cloud.

1. **Security**

Security is integrated into every aspect of Azure including a harden of structure and global security intelligence monitoring .

CREATE Azure Account

The Azure free account includes:

* Free access to popular Azure products for 12 months.
* A credit to spend for the first 30 days.
* Access to more than 25 products that are always free.

Complete AZURE FUNDAMENTALS learning path

TEST.

1. You can treat cloud resources like you would resources in your own datacenter. When you are finished using them, you give them back. You are only billed for what you use.
2. Instead of maintaining CPUs and storage in your datacenter, you rent them for the time that you need them. The cloud provider takes care of maintaining the underlying infrastructure for you.
3. Cloud-based resources can be deployed and configured quickly as your application requirements change.
4. Depending on the service-level agreement (SLA) that you choose, your cloud-based applications can provide a continuous user experience with no apparent downtime even when things go wrong.
5. Cloud-based applications can be configured to take advantage of autoscaling, so your applications will always have the resources they need.
6. You essentially trust another party to take care of your data. You are also depending on the third party to provide your users with access to resources.
7. However, with Azure, and depending on the service-level agreement (SLA) that you choose, your cloud-based applications can provide a continuous user experience with no apparent downtime even when things go wrong.
8. A distributed cloud is not a valid type of cloud computing. Distributed computing divides a single task among multiple computers that are connected via a network to achieve the task faster.
9. The Azure portal updates continuously and requires no downtime for maintenance activities. This configuration makes the Azure portal resilient to individual datacenter failures and avoids network slowdowns by being close to users.
10. Serverless computing enables developers to build applications faster by eliminating the need for them to manage infrastructure.
11. With serverless applications, the cloud service provider automatically provisions, scales, and manages the infrastructure required to run the code.
12. The Azure Marketplace is a service on Azure that helps connect end-users with Microsoft partners, independent software vendors (ISVs), and start-ups that are offering solutions and services which are optimized to run on Azure.
13. Azure Marketplace allows customers to find, try, purchase, and provision applications and services from hundreds of leading service providers, all certified to run on Azure.
14. Azure Blob storage provides storage service for very large objects such as video files or bitmaps.
15. With the Azure portal, you can build, manage, and monitor everything from simple web apps to complex cloud deployments. Create custom dashboards for an organized view of resources and configure accessibility options for an optimal experience.
16. To create and use Azure services, you need an Azure subscription.
17. One feature of Cloud services is that you typically pay only for cloud services you use, which helps you lower your operating costs.
18. One feature of Cloud services is that you can run your infrastructure more efficiently, and scale as your business needs change.
19. One feature of Cloud services is that you can scale as your business needs change.
20. Once you create an Azure account, a subscription will be created for you and you are then free to create additional subscriptions.
21. One of the requirements to sign up for a free Azure account is either a GitHub or Microsoft account username, a valid Credit Card and a telephone number.

A screenshot of a computer

Description automatically generated

1. **Infrastructure as a service (IaaS)** is a type of cloud computing service that offers essential compute, storage, and networking resources on demand, on a pay-as-you-go basis. IaaS is one of the four types of cloud services, along with software as a service ([SaaS](https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-saas/)), platform as a service ([PaaS](https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-paas/)), and [serverless](https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-serverless-computing/). IaaS solutions give you the flexibility to scale your IT resources up and down with demand. They also help you quickly provision new applications and increase the reliability of your underlying infrastructure. Advantage of IaaS :
2. **Reduces capital expenditures and optimizes costs,** IaaS eliminates the cost of configuring and managing a physical datacenter, which makes it a cost-effective choice for migrating to the cloud. The pay-as-you-go subscription models used by IaaS providers help you reduce hardware costs and maintenance and enable your IT team to focus on core business.
3. **Increases scale and performance of IT workloads,** IaaS lets you scale globally and accommodate spikes in resource demand. That way, you can deliver IT resources to employees from anywhere in the world faster and enhance application performance.
4. **Increases stability, reliability, and supportability,** With IaaS, there's no need to maintain and upgrade software and hardware or troubleshoot equipment problems. With the appropriate agreement in place, the service provider assures that your infrastructure is reliable and meets service-level agreements (SLAs).
5. **Improves business continuity and disaster recovery,** Achieving high availability, business continuity, and disaster recovery is expensive because it requires a significant amount of technology and staff. But with the right SLA in place, IaaS helps to reduce this cost. It also helps you access applications and data as usual during a disaster or outage.
6. **Enhances security,** With the appropriate service agreement, a cloud service provider can offer better security for your applications and data than the security you would attain in house.
7. **Helps you innovate and get new apps to users faster,** With IaaS, once you've decided to launch a new product or initiative, the necessary computing infrastructure can be ready in minutes or hours, rather than in days or weeks. And because you don't need to set up the underlying infrastructure, IaaS lets you deliver your apps to users faster.
8. **Platform as a service (PaaS)** is a complete development and deployment environment in the cloud, with resources that enable you to deliver everything from simple cloud-based apps to sophisticated, cloud-enabled enterprise applications. You purchase the resources you need from a [cloud service provider](https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/choosing-a-cloud-service-provider/) on a pay-as-you-go basis and access them over a secure Internet connection. PaaS includes infrastructure—servers, storage, and networking—but also middleware, development tools, business intelligence (BI) services, database management systems, and more. PaaS is designed to support the complete web application lifecycle: building, testing, deploying, managing, and updating. Advantage of PaaS :
9. **Cut coding time.** PaaS development tools can cut the time it takes to code new apps with pre-coded application components built into the platform, such as workflow, directory services, security features, search, and so on.
10. **Add development capabilities without adding staff.** Platform as a Service components can give your development team new capabilities without your needing to add staff having the required skills.
11. **Develop for multiple platforms—including mobile—more easily.** Some service providers give you development options for multiple platforms, such as computers, mobile devices, and browsers making cross-platform apps quicker and easier to develop.
12. **Use sophisticated tools affordably.** A pay-as-you-go model makes it possible for individuals or organizations to use sophisticated development software and business intelligence and analytics tools that they could not afford to purchase outright.
13. **Support geographically distributed development teams.** Because the development environment is accessed over the Internet, development teams can work together on projects even when team members are in remote locations.
14. **Efficiently manage the application lifecycle.** PaaS provides all of the capabilities that you need to support the complete web application lifecycle: building, testing, deploying, managing, and updating within the same integrated environment.
15. **Software as a service (SaaS)** allows users to connect to and use cloud-based apps over the Internet. Common examples are email, calendaring, and office tools (such as Microsoft Office 365). SaaS provides a complete software solution that you purchase on a pay-as-you-go basis from a [cloud service provider](https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/choosing-a-cloud-service-provider/). You rent the use of an app for your organization, and your users connect to it over the Internet, usually with a web browser. If you’ve used a web-based email service such as Outlook, Hotmail, or Yahoo! Mail, then you’ve already used a form of SaaS. With these services, you log into your account over the Internet, often from a web browser.  Advantage of SaaS :
16. **Gain access to sophisticated applications.**To provide SaaS apps to users, you don’t need to purchase, install, update, or maintain any hardware, middleware, or software. SaaS makes even sophisticated enterprise applications, such as ERP and CRM, affordable for organizations that lack the resources to buy, deploy, and manage the required infrastructure and software themselves.
17. **Pay only for what you use.** You also save money because the SaaS service automatically scales up and down according to the level of usage.
18. **Use free client software.** Users can run most SaaS apps directly from their web browser without needing to download and install any software, although some apps require plugins. This means that you don’t need to purchase and install special software for your users.
19. **Mobilize your workforce easily.** SaaS makes it easy to “mobilize” your workforce because users can access SaaS apps and data from any Internet-connected computer or mobile device. You don’t need to worry about developing apps to run on different types of computers and devices because the service provider has already done so. In addition, you don’t need to bring special expertise onboard to manage the security issues inherent in mobile computing. A carefully chosen service provider will ensure the security of your data, regardless of the type of device consuming it.
20. **Access app data from anywhere.** With data stored in the cloud, users can access their information from any Internet-connected computer or mobile device. And when app data is stored in the cloud, no data is lost if a user’s computer or device fails.

**What is serverless computing?**

Serverless computing enables developers to build applications faster by eliminating the need for them to manage infrastructure. With serverless applications, the cloud service provider automatically provisions, scales, and manages the infrastructure required to run the code.

In understanding the definition of serverless computing, it’s important to note that servers are still running the code. The serverless name comes from the fact that the tasks associated with infrastructure provisioning and management are invisible to the developer. This approach enables developers to increase their focus on the business logic and deliver more value to the core of the business. Serverless computing helps teams increase their productivity and bring products to market faster, and it allows organizations to better optimize resources and stay focused on innovation.

Top benefits of serverless computing

* **No infrastructure management** Using fully managed services enables developers to avoid administrative tasks and focus on core business logic. With a serverless platform, you simply deploy your code, and it runs with high availability.
* **Dynamic scalability** With serverless computing, the infrastructure dynamically scales up and down within seconds to match the demands of any workload.
* **Faster time to market** Serverless applications reduce the operations dependencies on each development cycle, increasing development teams’ agility to deliver more functionality in less time.
* **More efficient use of resources** Shifting to serverless technologies helps organizations reduce TCO and reallocate resources to accelerate the pace of innovation.