**Chapter 1**

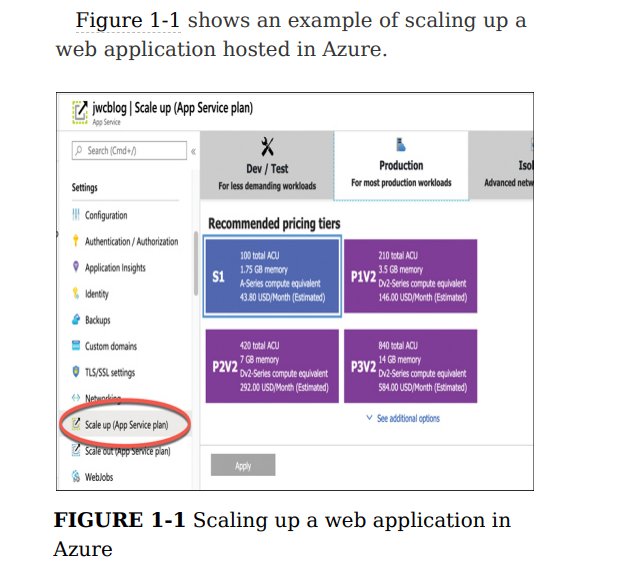
**DESCRIBE CLOUD CONCEPTS**  
This chapter covers the benefits of using the cloud, the different cloud services that are available, and cloud models that enable a variety of cloud configurations.

* High availability
* Scalability
* Elasticity
* Agility Fault tolerance and disaster recovery
* Economic benefits of the cloud

Cloud providers offer a service-level agreement **(SLA)** that guarantees a certain level of availability as a percentage. An SLA will usually guarantee an uptime of close to 100 percent, **but it only covers systems that are controlled by the cloud provider**

**Network outage  
Application failure**: Application Insights that integrates with your application to give you detailed information about the performance and reliability of your application. Application developers can often use this information to get right to the code where a problem is happening, dramatically reducing the time needed for troubleshooting.  
**System outage  
Power outage**: Cloud providers invest heavily in battery operated power backups and other redundant systems in order to prevent availability problems caused by power outages.  
In a situation where a large geographic area is affected by a power outage, cloud providers offer you the ability to run your application from another region that isn’t affected

**Scaling and elasticity**  
Allow you to easily deal with these kinds of scenarios. Scaling is the process of adding additional resources or additional power for your application. There are two variations of scaling: horizontal scaling (often referred to as scaling out) and vertical scaling (often referred to as scaling up). When you scale out, you add additional VMs for your application. Each VM you add is identical to other VMs servicing your application. Scaling out provides additional resources to handle additional load.

When you scale up, you move to a new VM with additional resources. For example, you might determine that you need a more powerful CPU and more memory for your application. In that case, scaling up will allow you to move your application to a more powerful VM.  
  


**The concept of automatically scaling is referred to as elasticity.**

**This kind of speed and flexibility in the cloud is often called cloud agility.**If you determine that you need two more VMs for your application, you can scale out to three VMs in seconds. Azure takes care of allocating the resources for you. All you have to do is tell Azure how many VMs you want and you’re up and running  
  
**Don’t confuse fault tolerance with scaling.** Scaling allows you to react to additional load or resource needs, but it’s always assumed that all the VMs you are using are healthy. Fault tolerance happens without any interaction from you, and it’s designed to automatically move you from an unhealthy system to a healthy system if things go wrong  
  
Disaster Recovery and Governments Depending on what kind of data you store, you might be required to have a disaster recovery plan in place. Cloud providers typically comply with standards imposed by laws such as the Health Insurance Portability and Accountability Act (HIPAA), and they often provide compliance tools you can use to ensure compliance.

Disaster recovery not only means having reliable backups of important data, but it also means that the cloud infrastructure can replicate your application’s resources in an unaffected region so that your data is safe and your application availability isn’t affected. Disaster recovery plans are commonly referred to as Business Continuity and Disaster Recovery (BCDR) plans, and most cloud providers have services that can help you develop and implement a plan that works for your particular needs

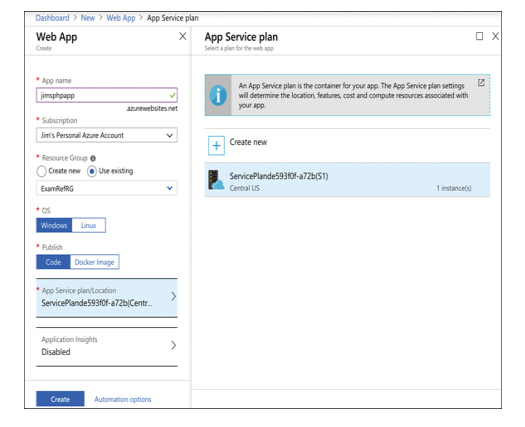
**SKILL 1.2: DESCRIBE THE DIFFERENCES BETWEEN INFRASTRUCTURE-AS-ASERVICE (IAAS), PLATFORMAS-A-SERVICE (PAAS), AND SOFTWARE-AS-A-SERVICE (SAAS)**

IAAS  
Once you have an IaaS VM running in the cloud, you gain access to many services the cloud provider offers. For example, Microsoft offers Azure Security Center to ensure the security of your IaaS VMs, Azure Backup to make backing up data easy, Azure Log Analytics to help with troubleshooting any problems you might have, and much more

IaaS is also a great choice if you want your application and configuration in the cloud, but you want the option of not paying for it when you aren’t using it. By stopping your VM, you can avoid the costs associated with it, and when you need to use your application again, you can simply start your VM and pick up right where you left off.

PAAS  
If you are deploying your own application to the cloud and you want to minimize your management investment, a PaaS service is often the best choice.  
  
A PaaS service also uses VMs provided by the cloud provider. However, a user typically has no visibility into those VMs. In most cases, they’re entirely managed by the cloud provider.

Azure App Service, one of the PaaS offerings in Azure. It has been created on a VM that’s maintained by Microsoft. Notice the option to choose either Linux or Windows, but the operating system is still managed by Microsoft. We also have the option to enable Application Insights, a service in Azure that provides deep insight into how an application is performing, making it easier to troubleshoot problems if they occur.



In Azure App Service, you don’t have to worry about Docker installation or configuration. It’s automatically included on all App Service VMs as part of Microsoft’s PaaS offering, and it’s completely managed and maintained by Microsoft.

* Azure CDN
* Azure Cosmos DB
* Azure SQL Database
* Azure Database for MySQL
* Azure Storage
* Azure Synapse Analytics

Your application code works without you having to do any kind of complex configuration. In fact, this is one of the main benefits of using a PaaS service; you can often move your application from on-premises to a cloud environment by simply deploying it to the cloud. This concept is often referred to as lift-and-shift  
  
A PaaS service also benefits from all of the other enhancements offered by the cloud; you get fault tolerance, elasticity, easy and quick scaling, backup and disaster recovery features, and more

SAAS  
SaaS service is software provided by a cloud provider that’s installed on infrastructure completely controlled by the hosting provider.

* Microsoft 365
* Xbox Live
* One Drive

SKILL 1.3: DESCRIBE THE DIFFERENCES BETWEEN PUBLIC, PRIVATE, AND HYBRID CLOUD MODELS

**The public cloud**  
The most common cloud model is the public cloud. In a public cloud model, you use shared infrastructure that is accessible on a public network. The network, storage, and VMs that your application uses are provided by a cloud provider and shared between all consumers of the public cloud. Microsoft Azure, Amazon Web Services (AWS), and Google Cloud Platform are examples of public clouds.

**The private cloud**  
The private cloud model provides many of the attractive benefits of the cloud (things like easy scaling and elasticity) in a private environment that is dedicated to a single company. A private cloud can be hosted in an on-premises environment, but it can also be hosted on a thirdparty hosting provider.

**The hybrid cloud**  
As you might expect, hybrid clouds are a mixture of public and private clouds.