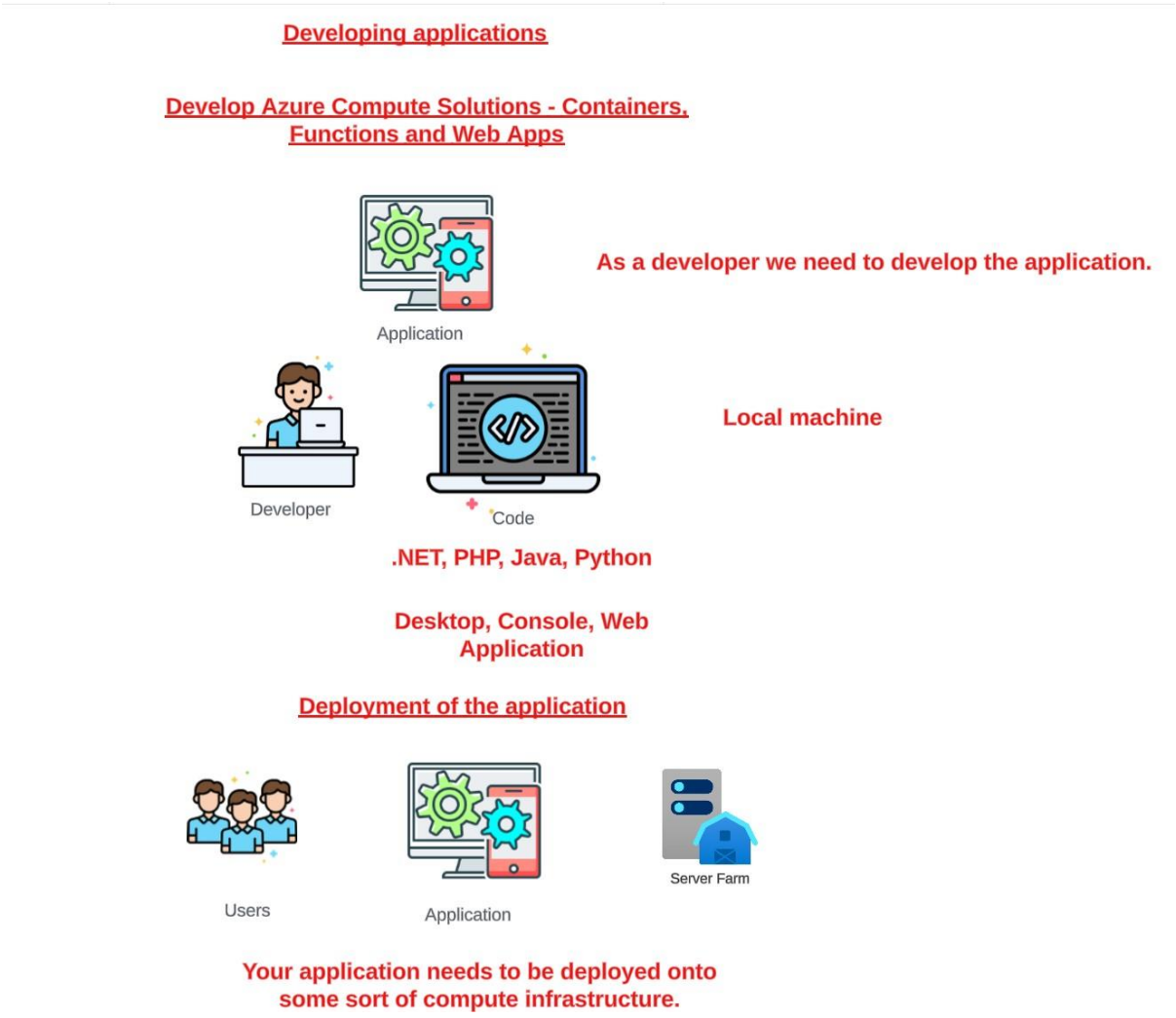
Introduction

Development and using Azure services



Develop Azure compute solutions - Azure Virtual Machines

What are we going to do

ASP.NET Core 8

PHP

Application

Code

We will look at simple applications.

We will deploy these applications onto Virtual Machines.

We will use Visual Studio Code as our development tool.

What goes into deploying a virtual machine

What is the Azure Virtual Machine service

Generally what does a company need in order to host an application and make it available to users.

Buy physical servers

Buy storage

Setup a network

All of this costs money, there is an initial investment that the company needs to undertake.

Large companies will normally setup data centers. These centers contain a number of servers, storage devices, racks, cooling devices etc.

All of this is an investment from the company.

The first service we are going to look into is the Azure Virtual Machine service.

Virtual Machine

This is a compute service that allows you to host virtual machines on the Azure cloud network.

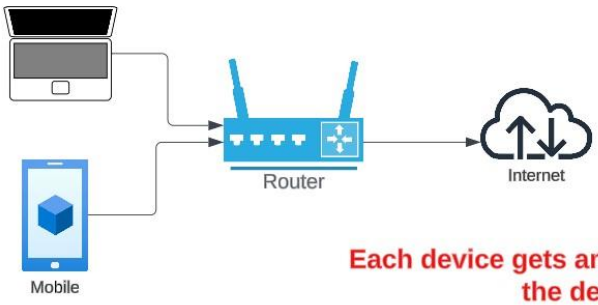
What is involved in the deployment of a virtual machine.

What is the size of virtual machine - number of vCPU's, RAM

What is the number and size of the disks you want allocated for the virtual machine.

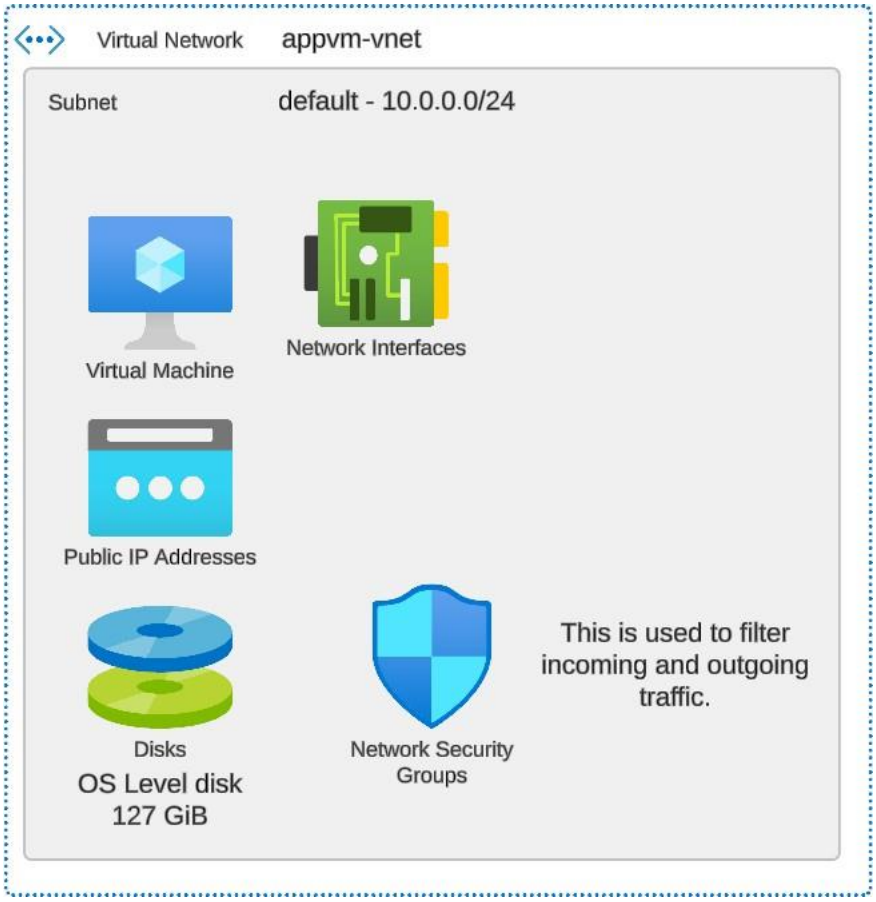
What is the underlying operating system - Ubuntu, Windows Server.

The network details for the virtual machine.

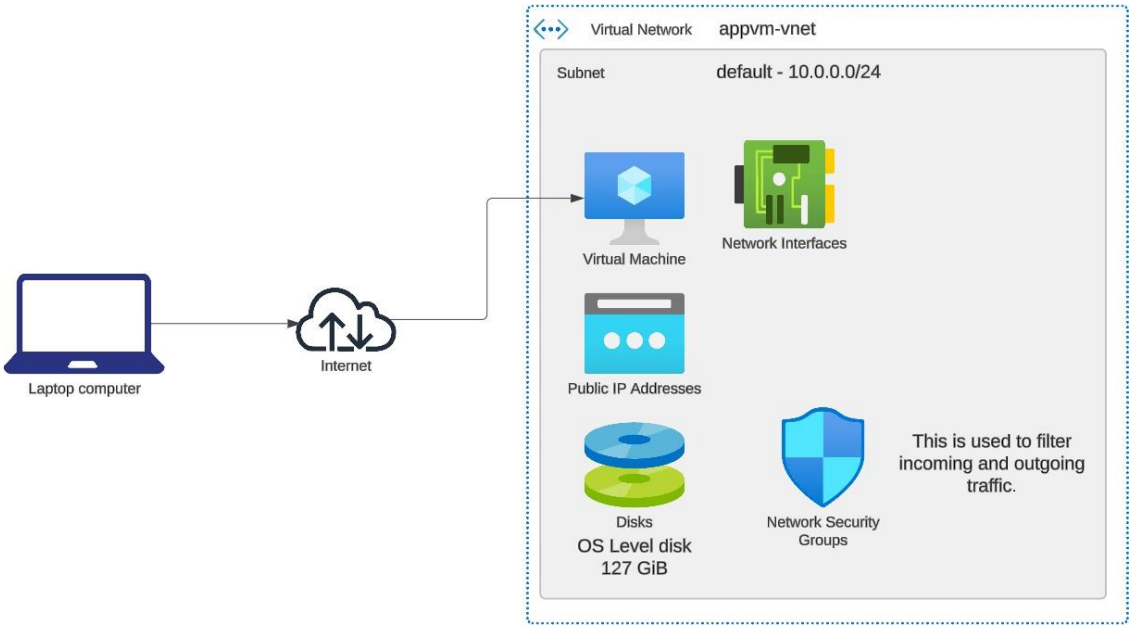


Each device gets an IP address. This helps to identify the device on the network.

A network allows devices to communicate with each other.



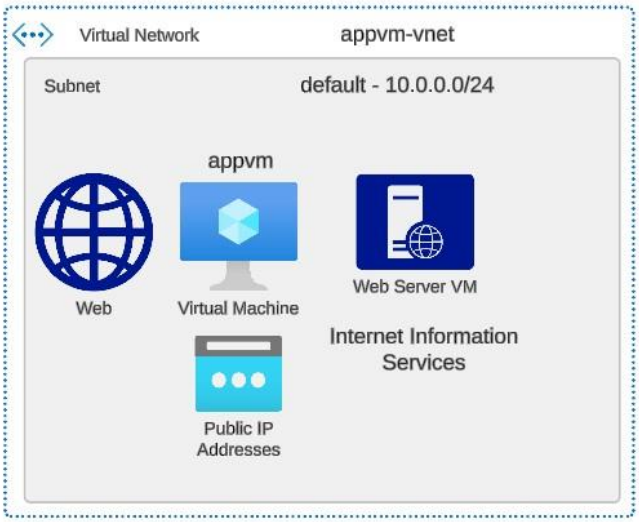
Lab - Connecting to the Virtual Machine



Develop Azure compute solutions - Azure Web Apps

Introduction onto Azure Web Apps

We understand the concept wherein we can host web applications on Azure virtual machines



Physical server

Azure Datacenter

Azure Web App Service

web application

Azure Websites

Virtual Machine

Physical server

This is a managed service. Here the virtual machine and physical infrastructure is managed for you.

There is support for web applications based on .NET, Java, Node.js, PHP, Python.

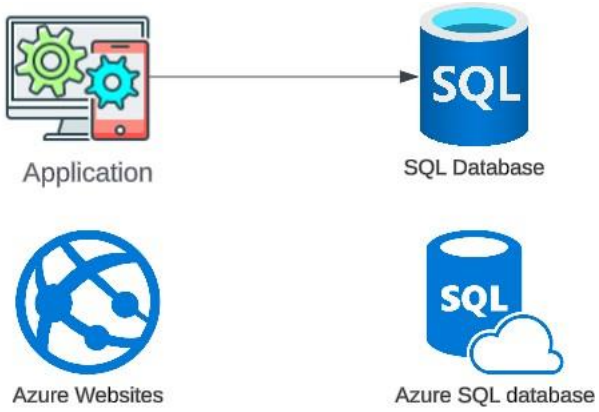
Here the patching of the framework and the operating system is managed by the service.

You also get other features such as High Availability.

If you have a web application that fits the framework and you don't want to manage the virtual machines, then you can opt for the Azure Web App service.

But if you need to host a custom application that needs to be installed, then you would probably need to use the Azure virtual machine service.

What does it mean to upgrade our App Service Plan



When we create an Azure Web App, we also need to have an App Service Plan in place.

The App Service Plan decides on the features and hardware specifications available to the Azure Web App.

Web App.

Hardware view Feature view Showing 23 App Service pricing plans

	Name	ACU/vCPU	vCPU	Memory (GB)	Remote Storage (GB)	Cost per hour (instance)	Cost per month (instance)
	Dev/Test (For less demanding workloads)						
☐	Free F1	60 minutes/day...	N/A	1	1	**Free**	**Free**
	Shared D1	240 minutes/da...	N/A	1	1	**0.013 USD**	**9.49 USD**
☑	Basic B1	100	1	1.75	10	**0.075 USD**	**54.75 USD**
	Basic B2	100	2	3.5	10	**0.15 USD**	**109.50 USD**
	Basic B3	100	4	7	10	**0.30 USD**	**219.00 USD**
	Production (For most production workloads)						
	Standard S1	100	1	1.75	50	**0.10 USD**	**73.00 USD**
	Premium v3 P0V3	195*	1	4	250	**0.209 USD**	**152.205 USD**
	Premium v3 P1V3	195	2	8	250	**0.328 USD**	**239.44 USD**

Application

Azure Websites

Virtual Machine

In the end the Azure Web App needs to be hosted on some sort of compute infrastructure which has CPU and Memory.

The underlying machine will be based on a desired operating system and it will have the underlying web server configured.

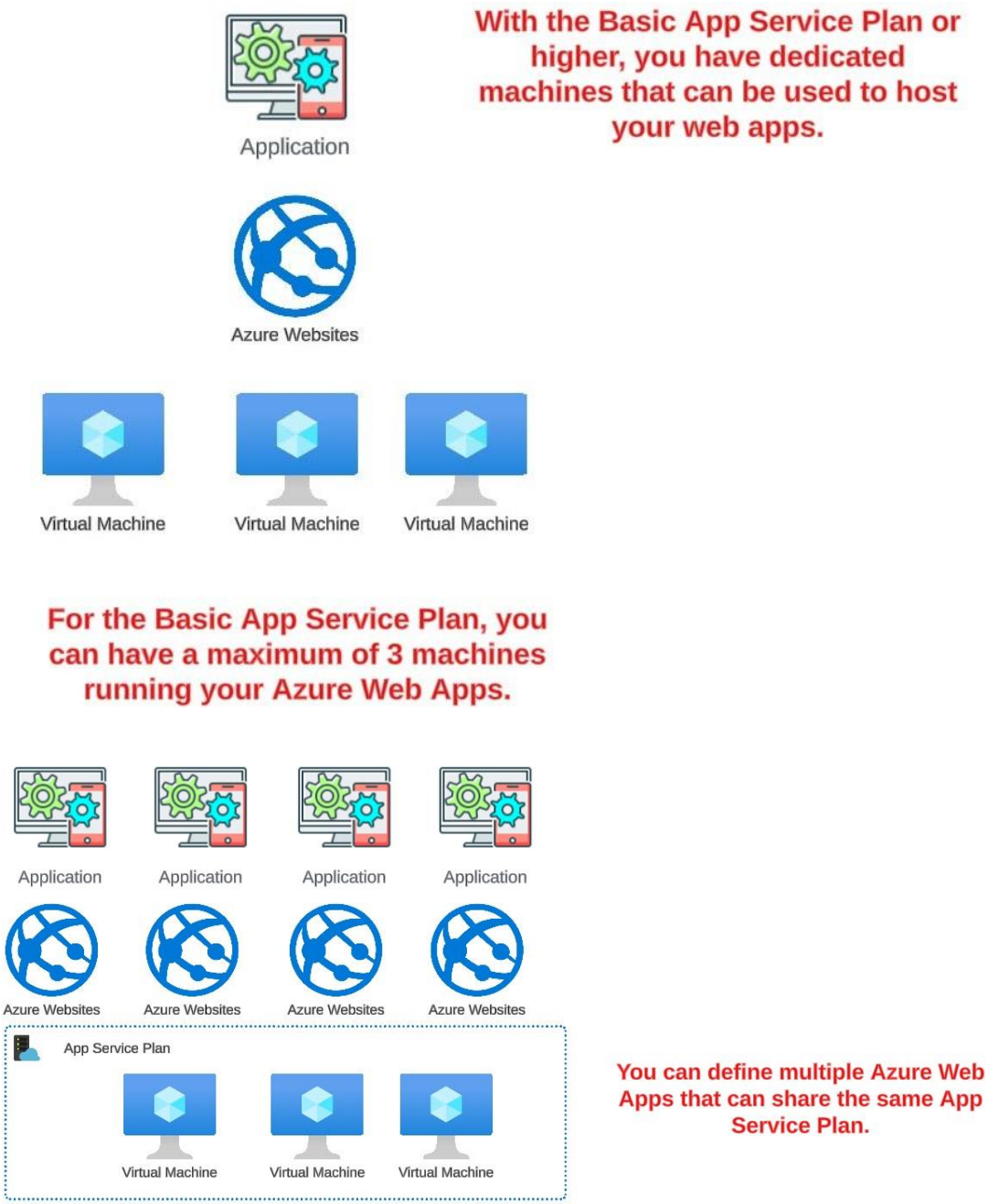
○ Hardware view ◉ Feature view

Showing 23 App Service pricing plans

	Name	Custom domain	Auto Scale	Daily backups	Staging slots	Cost per hour (instance)	Cost per month (instance)
⌄	**Dev/Test** (For less demanding workloads)						
	Free F1	-	N/A	N/A	N/A	**Free**	**Free**
	Shared D1	-	N/A	N/A	N/A	**0.013 USD**	**9.49 USD**
☑	Basic B1	✓	Manual	N/A	N/A	**0.075 USD**	**54.75 USD**
	Basic B2	✓	Manual	N/A	N/A	**0.15 USD**	**109.50 USD**
	Basic B3	✓	Manual	N/A	N/A	**0.30 USD**	**219.00 USD**
⌄	**Production** (For most production workloads)						
	Standard S1	✓	Rules	10	5	**0.10 USD**	**73.00 USD**
	Premium v3 P0V3	✓	Rules	50	20	**0.209 USD**	**152.205 USD**
	Premium v3 P1V3	✓	Rules, Elastic	50	20	**0.328 USD**	**239.44 USD**
	Premium v3 P2V3	✓	Rules, Elastic	50	20	**0.656 USD**	**478.88 USD**
	Premium v3 P3V3	✓	Rules, Elastic	50	20	**1.312 USD**	**957.76 USD**
	Premium v3 P1mv3	✓	Rules	50	20	**0.362 USD**	**263.968 USD**

LAB : Deploying a webapp on azure

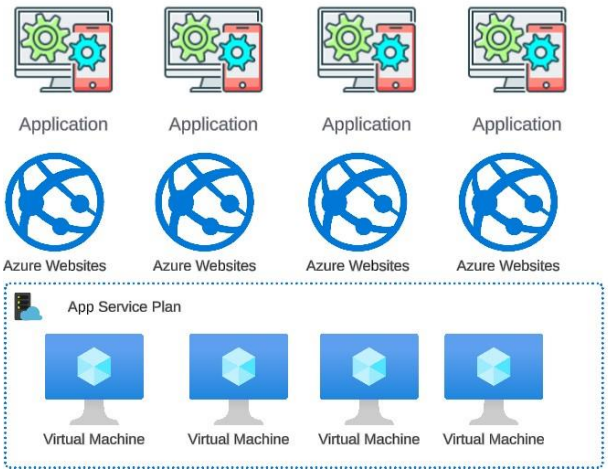
AutoScaling for your Azure Web App



With the Standard App service plan and higher, you can also configure autoscaling based on rules.

With the Premium App service plan and higher you can configure automatic scaling.

Example - Standard App Service Plan



Here we can have a maximum of 10 machines running as part of our infrastructure.

But instead of manually scaling out or scaling in, we can set rules to autoscale based on conditions.

For example, if the CPU threshold goes beyond 70%, then scale our infrastructure out by one machine. If the CPU threshold goes down, then scale down by one machine.

LAB: AUTOSCALING

Deployment Slots

Application

We have deployed our application

Azure Websites

Application v1

Now before we actually deploy the newer version of the application, we would ideally first want to test the application. At one phase, with a set of business users.

We now have a newer version of the application.

Application v1

Azure Websites - Test

1. Create a new Azure Web App
2. Deploy the newer application
3. Test the application
4. Publish the application after successful testing to the primary Azure Web App

In Azure Web Apps , we can make use of deployment slots.

Azure Websites

This feature is available with the Standard, Premium and Isolated App Service Plan.

Production - Web Slots

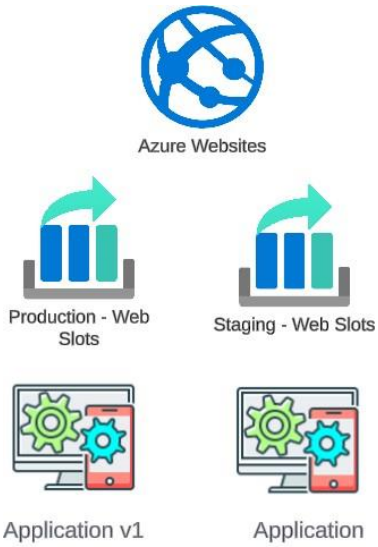
Staging - Web Slots

Create a new slot and publish the newer version of the application to the slot.

Application

Application v1

Each slot is a live web application with its own host name.



Then at any point in time, you can swap the slots. So that the newer version of the application runs as part of the production slot.

This helps in first testing of the application in the staging slot and then swapping the slots at any point in time.

It also helps in recovery from failure. If the swap succeeds , but the newer version of the application is not working, you can easily swap back at any point in time.

LAB: DEPLOYMENT SLOTS

Publishing code from a git-based repository

Normally you will have a set of developers working on an application.

During the lifecycle of the application, you can have many changes to the application itself.

For this we need to be able to maintain different versions of our application.

For this we can make use of Git which is a popular version-control software.

Git repository

We can also maintain the versions in an online repository on the Internet via the use of GitHub.

GitHub

LAB: PUBLISHING FROM GITHUB REPO using Deploymnt centre

Develop Azure compute solutions - Azure Functions

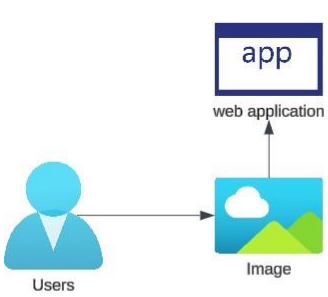
What are Azure Function Apps

This is a serverless solution where the infrastructure is managed for you.

Here the underlying compute is managed for you.

What's the purpose of using Azure Functions?

There are different use cases , let's look at a use case.



An application is hosted on an Azure Web App. The application allows users to upload images.

The application is responsible for processing the image and storing the image.

The code base would have different modules for different functionality.

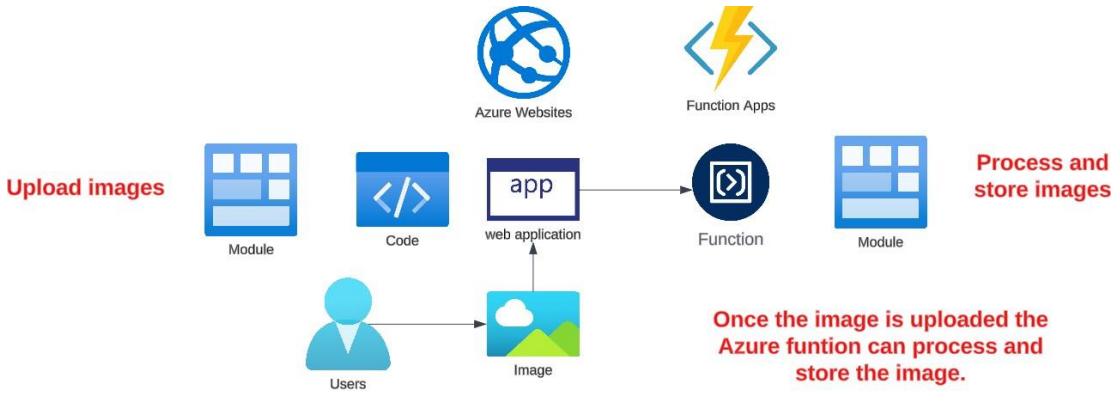
Upload images

Process and store images

The module for processing and storing the images can be in the same code base as the application.

But maybe this code module needs to be reused by other applications.

We can therefore look towards hosting that code module in Azure Functions.

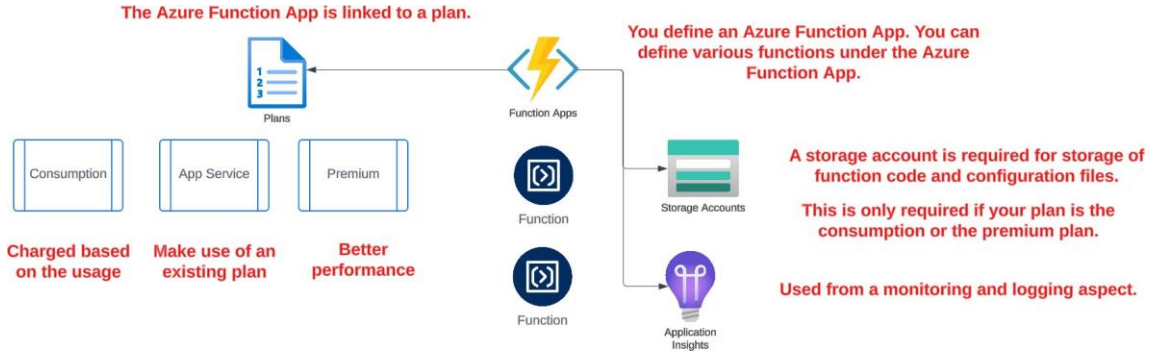


Some of the core advantages

Other applications can invoke the same Azure Function. Its now like a shared service.

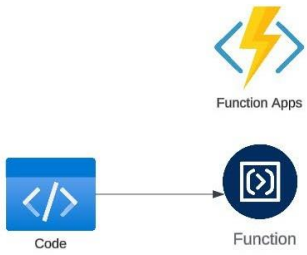
We can update and maintain the code base for Processing and storing images seperately.

Our web application can make full use of the capacity of the Azure App Service Plan just for the web application needs.



The Functions have support for languages - C#, Java, JavaScript, Python, PowerShell.

Lab - Creating a function in the portal



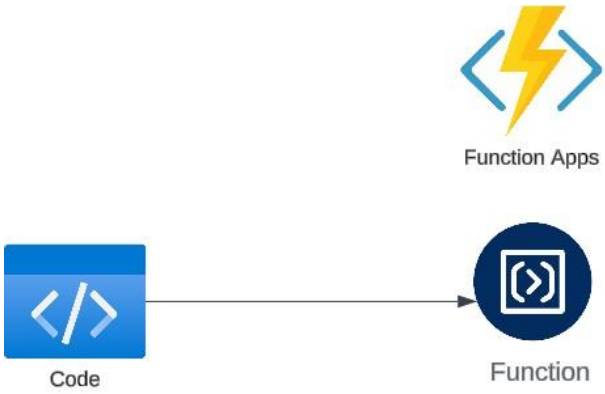
When you define a function, you specify a trigger for the function. How would the function get invoked.

Initially we will select an HTTP trigger.

```
module.exports = async function (context, req) {
    context.log('JavaScript HTTP trigger function processed a request.');

    const name = (req.query.name || (req.body && req.body.name));
    const responseMessage = name
        ? "Hello, " + name + ". This HTTP triggered function executed successfully."
        : "This HTTP triggered function executed successfully. Pass a name in the query string or in the request body for a personalized response.";

    context.res = {
        // status: 200, /* Defaults to 200 */
        body: responseMessage
    };
}
```



Here our function is based on an HTTP trigger. With the HTTP protocol a request is sent onto a destination and a response is sent back.

When sending an HTTP request, there is a method associated with the request. This helps to establish what is the type of request that is being sent across.

GET Method - This is used to request data.

With the GET request you can pass in query string parameters.

POST Method - This is used to send data to create or update a resource.

Here you can pass data in the body of the request.

Develop Azure compute solutions - Other tools

What are ARM templates

Test Environment

We need to rebuild the Test environment everytime a new testing cycle starts.

We want to have a repeatable and reliable way to build the resources everytime.

Templates

We can build an ARM (Azure Resource Manager) template that has the resources defined.

We then submit the template to Azure and the resources will be deployed accordingly.

This is also known as Infrastructure as code.