Question A

Traditional On-Premises		Modern Cloud	
On-Premises Definition	**On-Premises Example**	**Cloud Definition**	**Cloud Example**
Monolithic: In information technology, it could be referred as composed all in one piece or very big, depending on the context used (Wigmore, 2016). It is used in many ways to describe integrated circuits, applications, organizations and storage systems (Wigmore, 2016).	**Monolithic:** -Monolithic Architecture (Singular Monolith, Distributed Monolith, Third-party Monolith) (Codurance, n.d.). -Monolithic Integrated Circuit (IC) (Wigmore, 2016). - Monolithic Storage Array (Wigmore, 2016). - Monolithic Corporation (Wigmore, 2016).	**Decomposed:** Is one of the four parts of computer science, it is the breaking down of complicated problems or system into smaller manageable and easy to understand parts. The parts being smaller makes it easier to exam, solve and work on the problem (Bitesize, n.d.).	**Decomposed:** -A good example would be the creation of a website as the front-end developers could each work on a few pages of the website, which they all post the work they have done on a repo on GitHub which the project leader/manager will merge all the parts into one and should there be problems with the login page during the merger, the problem will be easily spotted and be fixed without the other part of the project being affected (inspired by: (Tarunsinghwap7, 2022)) .
Designed for predictable scalability: The measure in ability of a system to decrease or increase in cost and performance in reaction to changes in system processing and application demands (Gartner, n.d.).	**Designed for predictable scalability:** -How well the website performs when a lot of users trying booking flights when plane tickets are on sale (Gartner, n.d.).	**Designed for elastic scale:** The ability for a system to manage available resources corresponding to the present workload requirements dynamically (The App Solutions, n.d.).	**Designed for elastic scale:** -Better fault tolerance (In AWS environments, elastic scale can spot when a server is unhealthy, stop it and start an instance to replace it) (AVI Networks, n.d.) -Better Availability (AVI Networks, n.d.). -Better Cost Management (AVI Networks, n.d.).
Relational database: A type of database which keeps and supply access to data	**Relational database:** -Oracle Database (Database Town, n.d.).	**Polyglot persistence (mix of storage technologies):**	**Polyglot persistence (mix of storage technologies):**

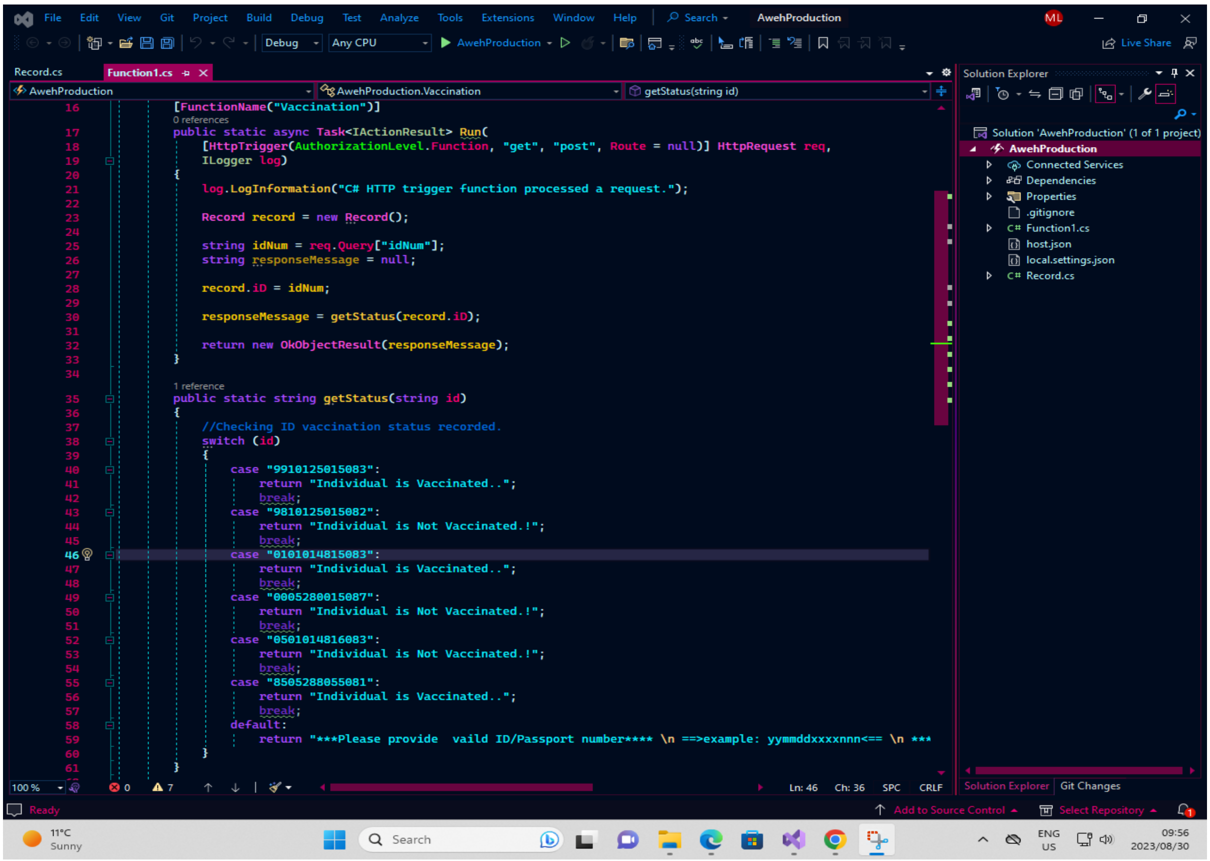
points which are associated to each other (Oracle, n.d.).	-Microsoft SQL Server (Database Town, n.d.) -IBM DB2 (Database Town, n.d.). -MySQL (Database Town, n.d.).	It basically means the use of different data storage technologies to hold different data storage needs (Object Rocket Marketing, 2018). It came from polyglot programming which is the use of different programming languages to bluid an application (Object Rocket Marketing, 2018).	-Netflix (makes use of relation, columnar, document and key-value data stores for the storage of ratings, profile, recommendations, subtitles, videos and metadata. That is how the personalized experience is delivered to all millions of users.) (AI & LinkedIn Community, n.d.). -LinkedIn (AI & LinkedIn Community, n.d.). -Amazon (AI & LinkedIn Community, n.d.).
Synchronized processing: The coordination of execution of many processes in a multi-process system to ensure that shared resources are obtained in an expected and controlled manner (GeeksforGeeks, 2023)	**Synchronized processing:** -User Interfaces (Interaction between humans and computers, as humans expect to get response immediately as that the communication standards familiar to humans) (Broshar, 2021). -HTTP APIs (Quick answer from the web server is expected from Client programs sending HTTP requests) (Broshar, 2021).	**Asynchronized processing:** The plan of computing tasks in a way which the tasks can be executed without them having to depend on each other (Spacey, 2023). The request response is not waited for by the client when sending a request as the response could take a few minutes or hours or days because the response is not necessarily sent back. Only the confirmation of the request being received is sent (Tarnowski, Adrian, n.d.).	**Asynchronized processing:** -Long-running Tasks (Orders on e-commerce sites are done asynchronously so there's no unnecessary resource blocking.) (Broshar, 2021). -Batch-processing (Huge amounts of data handling data asynchronously method is known as data-processing. These huge batches of data are processed at scheduled times so computer resources blocking is avoided.) (Broshar, 2021).
Design to avoid failures (MTBF): The system's average time between breakdowns. It is a crucial maintenance metric used to	**Design to avoid failures (MTBF):** For example, the certain asset has been operational for 2500 hours in a year and it broke down 10 times	**Design to for failures (MTTR):** The maintenance metric used to measure the average time required to repair and	**Design to for failures (MTTR):** For example, if 82 hours were spent on fixing an unplanned breakdown of an asset which breakdown 12

measure safety, performance and equipment design mostly for assets found to be complex like airplanes (Fiix Software, n.d.).	that year. So, the MTBF will be calculated as: *MTBF = # of operational hours ÷ # of failures*
	MTBF = 2500 ÷ 100
	MTBF = 250 hours
	(Fiix Software, n.d.)
		troubleshoot failed equipment. The response time to unplanned breakdowns being repaired (Fiix Software, n.d.).	times in a year, the calculation of MTTR would be:
			MTTR = Total maintenance time ÷ Number of repairs
			MTTR = 82 ÷ 12
			MTTR = 6.83 hours.
			(Fiix Software, n.d.)

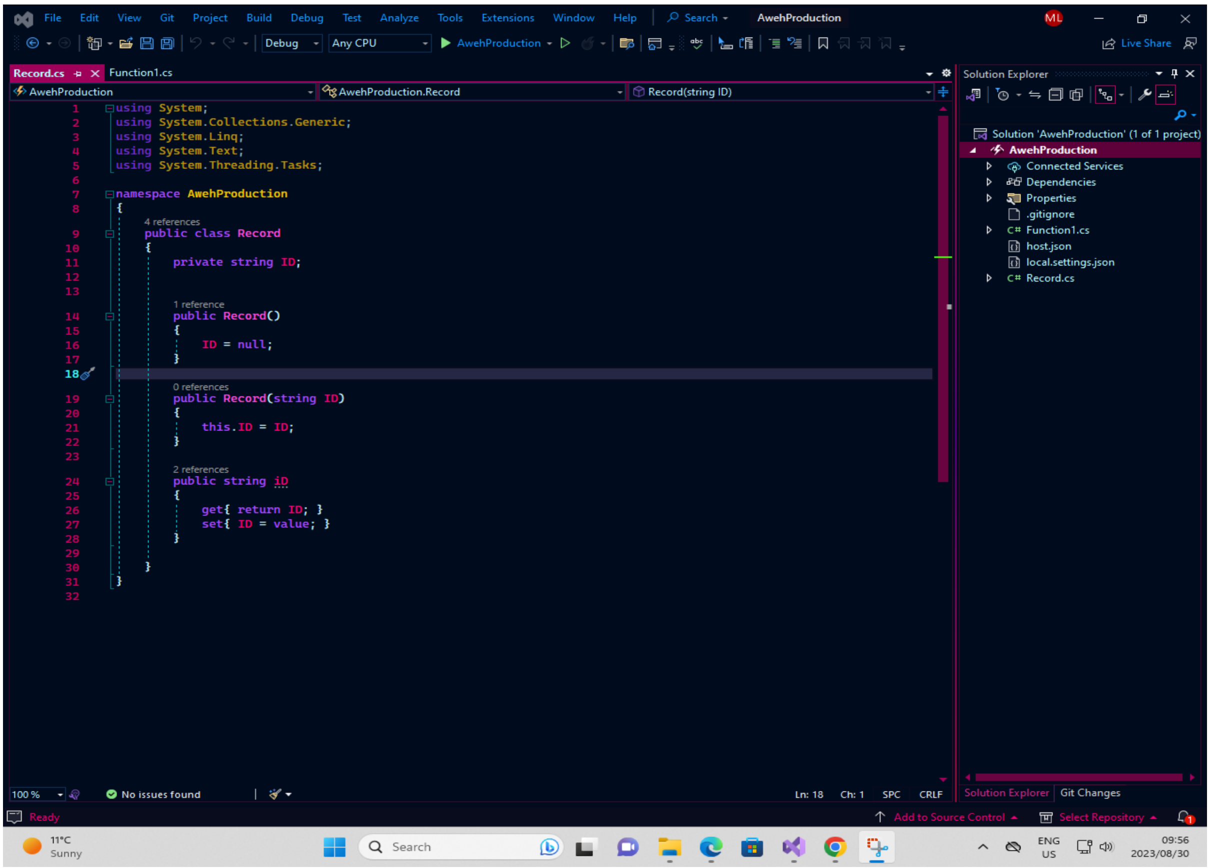
Occasional large updates: Bringing a system/feature up to date by incorporating new features/information or rectifying a large portion of the system/feature after a periodic time (Dictionary, n.d.).	**Occasional large updates:** -Taking a month/s or a year to incorporate new features into the system (Dictionary, n.d.).	**Frequent small updates:** Bringing a system/feature up to date by incorporating new features/information or rectifying a small portion of the system/feature very often (Dictionary, n.d.).	**Frequent small updates:** -Taking a week, bi-week or latest three weeks to incorporate new features into the system (Dictionary, n.d.).
Manual management: The system/management where maintenance and/or management are done by hand without the use of any automatic system and/or computing system (PadaKuu, 2023).	**Manual management:** -For example, the administrators having to spend too much time searching for documents which were misplaced which cost the organisation money and time (inspired by (PadaKuu, 2023)).	**Automated self-management:** The combination of both hardware and software that are designed and programmed to automatically work without the need of human interaction/operator to give inputs and/or instruction for the operations to be executed (PadaKuu, 2023).	**Automated self-management:** -For example, the bio-entrance system which automatically update the file when an employee clocks in/out at work without the employee having to report to the reception when clocking in or out (inspired by (PadaKuu, 2023)).
Snowflake servers: Servers which run a mission critical bit of software that only runs on a certain specific configuration of application server and operating system as the cannot be upgraded (Progress Kemp, n.d.).	**Snowflake servers:** -The server is destroyed completely so that a new one is used to replace it when changes are made (Zislis, 2017). -The servers support warehouse sizes which range from X-Small (1 credit/hours) to 6X-Large (512 credits/hours) (Snowflake, n.d.).	**Immutable infrastructure:** An infrastructure model whereby servers are never altered after being stationed (Vidró, 2017).	**Immutable infrastructure:** -Containers (Continuous changes cannot be made to a made because a new version of the container needs to be made or a recreation of the container existing from its picture.) (Cloud Native Glossary, 2022)

Question B

Function Code:

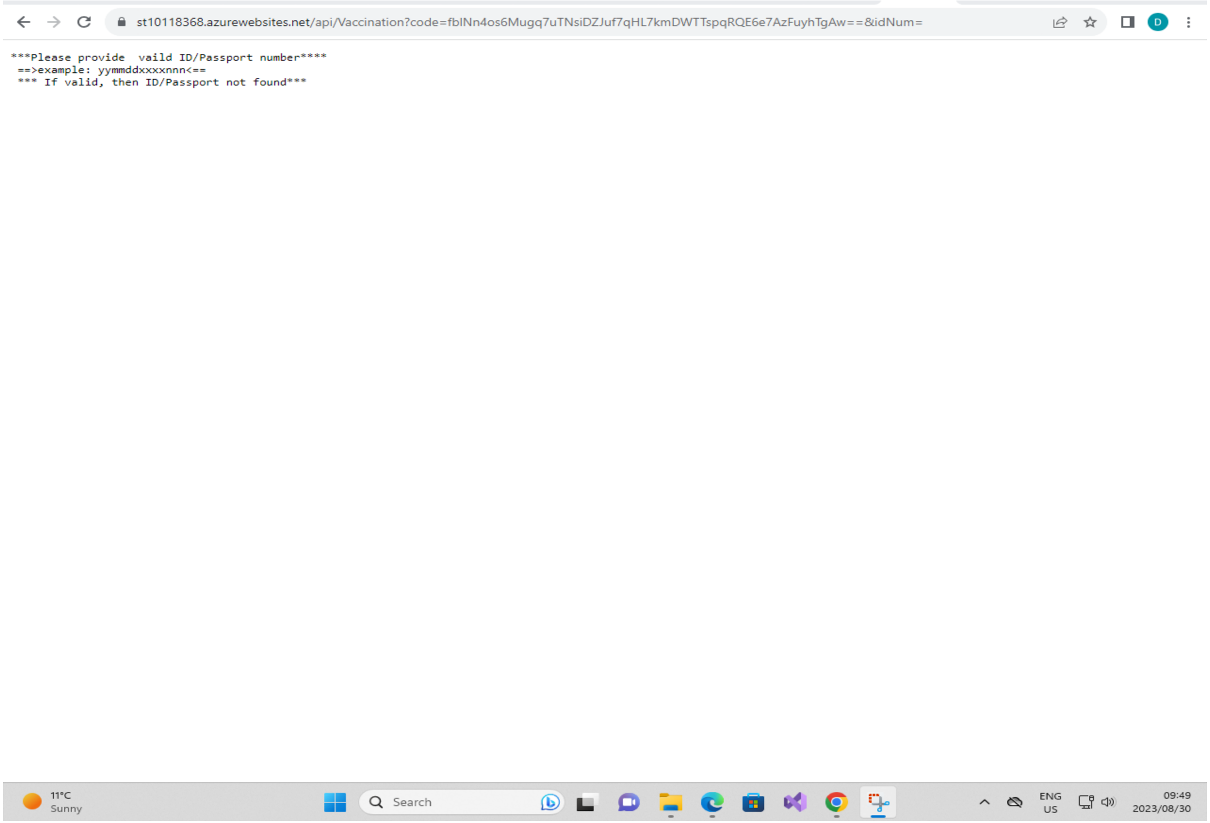


```csharp
        [FunctionName("Vaccination")]
        public static async Task<IActionResult> Run(
            [HttpTrigger(AuthorizationLevel.Function, "get", "post", Route = null)] HttpRequest req,
            ILogger log)
        {
            log.LogInformation("C# HTTP trigger function processed a request.");

            Record record = new Record();

            string idNum = req.Query["idNum"];
            string responseMessage = null;

            record.iD = idNum;

            responseMessage = getStatus(record.iD);

            return new OkObjectResult(responseMessage);
        }

        public static string getStatus(string id)
        {
            //Checking ID vaccination status recorded.
            switch (id)
            {
                case "9910125015083":
                    return "Individual is Vaccinated..";
                    break;
                case "9810125015082":
                    return "Individual is Not Vaccinated.!";
                    break;
                case "0101014815083":
                    return "Individual is Vaccinated..";
                    break;
                case "0005280015087":
                    return "Individual is Not Vaccinated.!";
                    break;
                case "0501014816083":
                    return "Individual is Not Vaccinated.!";
                    break;
                case "8505288055081":
                    return "Individual is Vaccinated..";
                    break;
                default:
                    return "***Please provide  vaild ID/Passport number**** \n ==>example: yymmddxxxxnnn<== \n ***
            }
        }
```



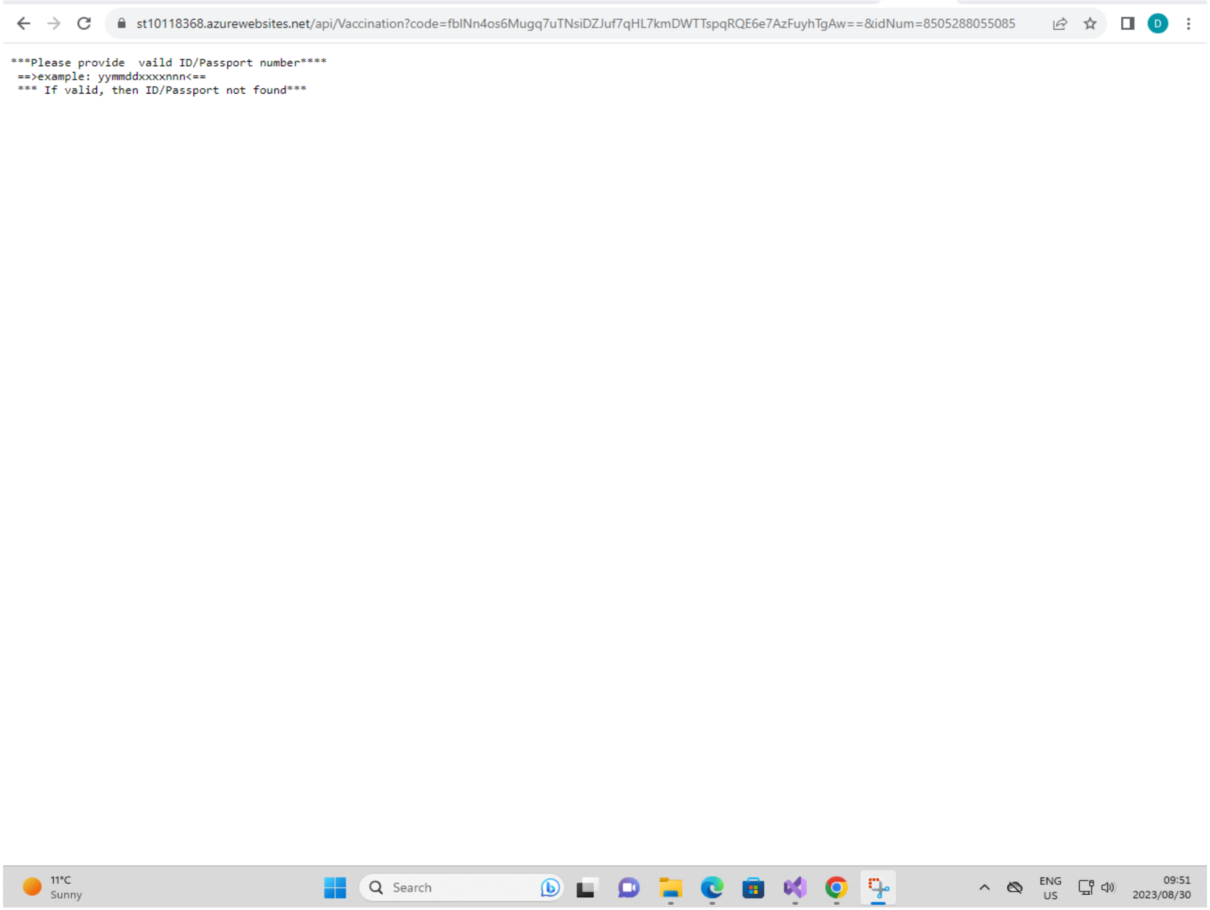
```csharp
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace AwehProduction
{
    public class Record
    {
        private string ID;


        public Record()
        {
            ID = null;
        }

        public Record(string ID)
        {
            this.ID = ID;
        }

        public string iD
        {
            get{ return ID; }
            set{ ID = value; }
        }

    }
}
```

Function on Web Browser:



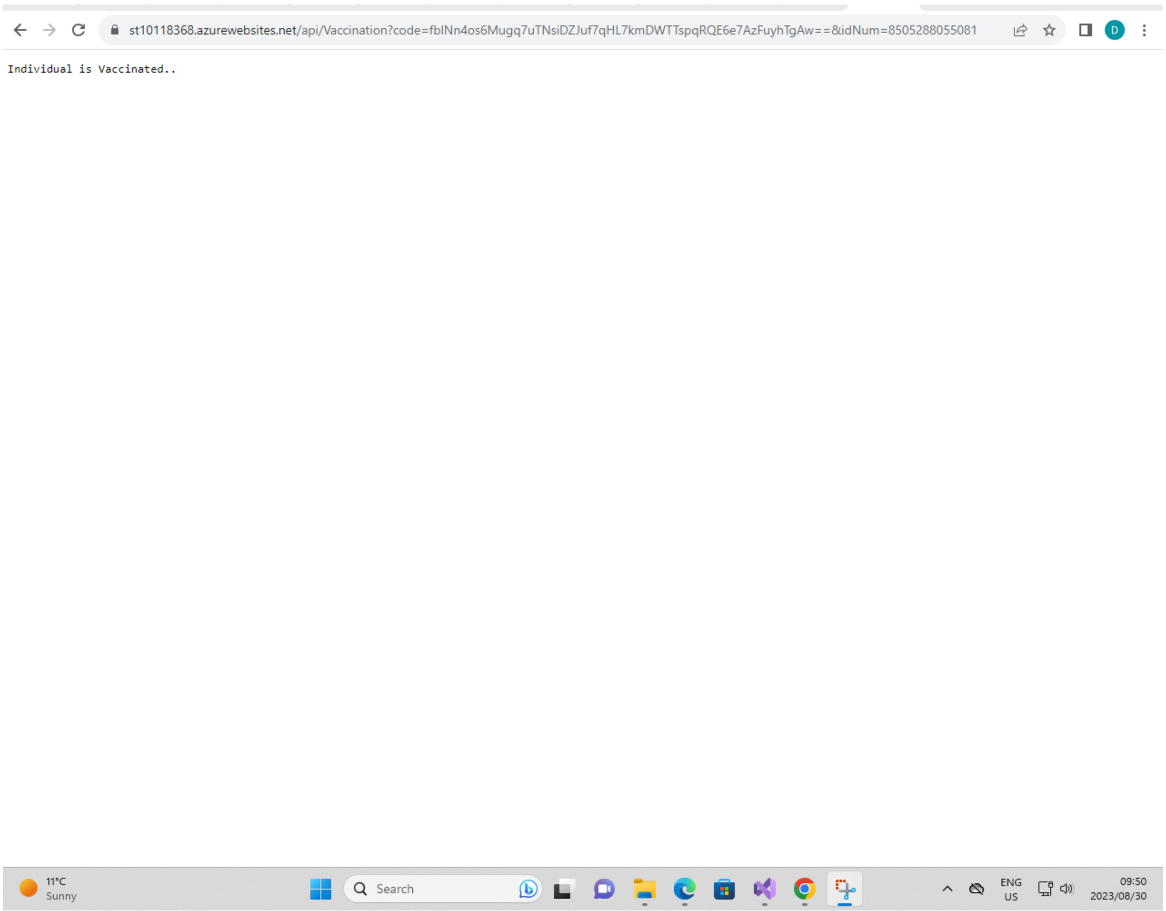
st10118368.azurewebsites.net/api/Vaccination?code=fblNn4os6Mugq7uTNsiDZJuf7qHL7kmDWTTspqRQE6e7AzFuyhTgAw==&idNum=

```
***Please provide  vaild ID/Passport number****
 ==>example: yymmddxxxxnnn<==
 *** If valid, then ID/Passport not found***
```



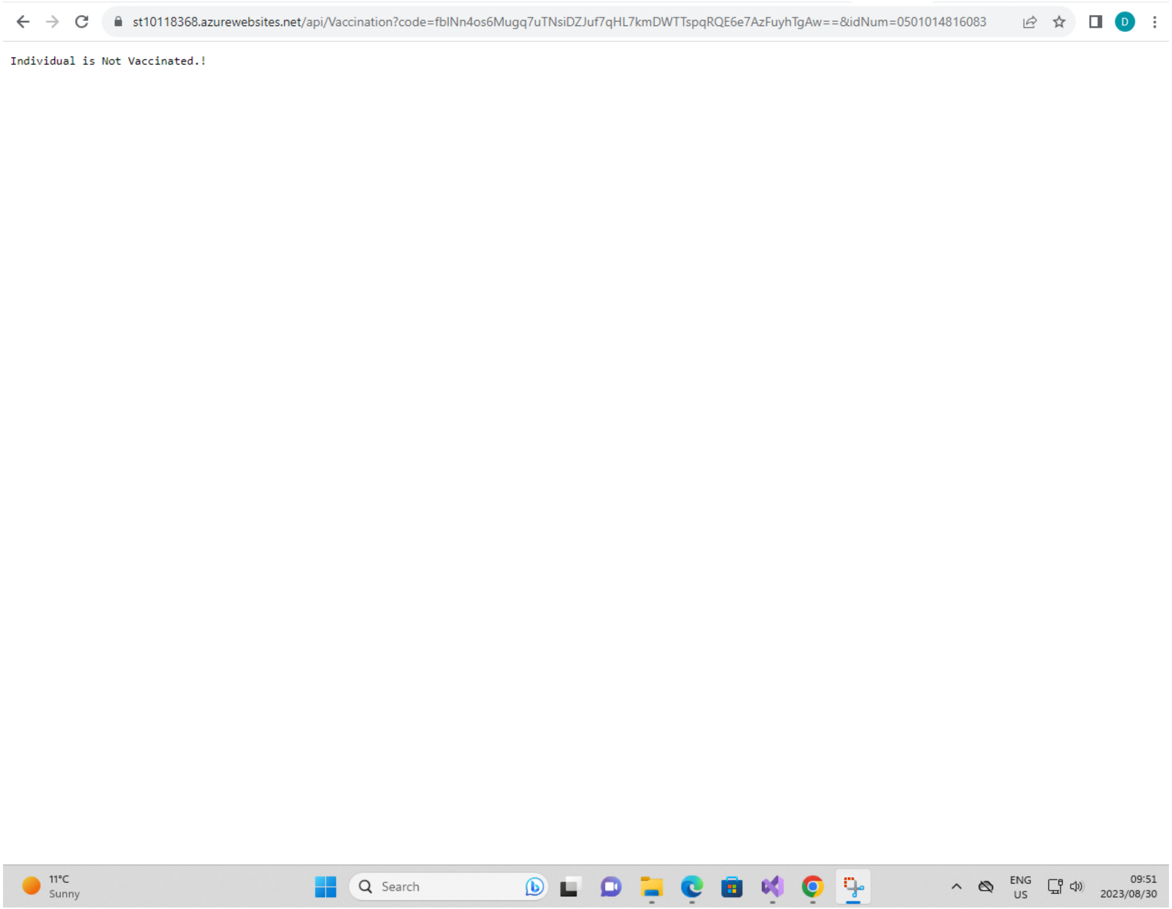
st10118368.azurewebsites.net/api/Vaccination?code=fblNn4os6Mugq7uTNsiDZJuf7qHL7kmDWTTspqRQE6e7AzFuyhTgAw==&idNum=8505288055085

```
***Please provide  vaild ID/Passport number****
 ==>example: yymmddxxxxnnn<==
 *** If valid, then ID/Passport not found***
```



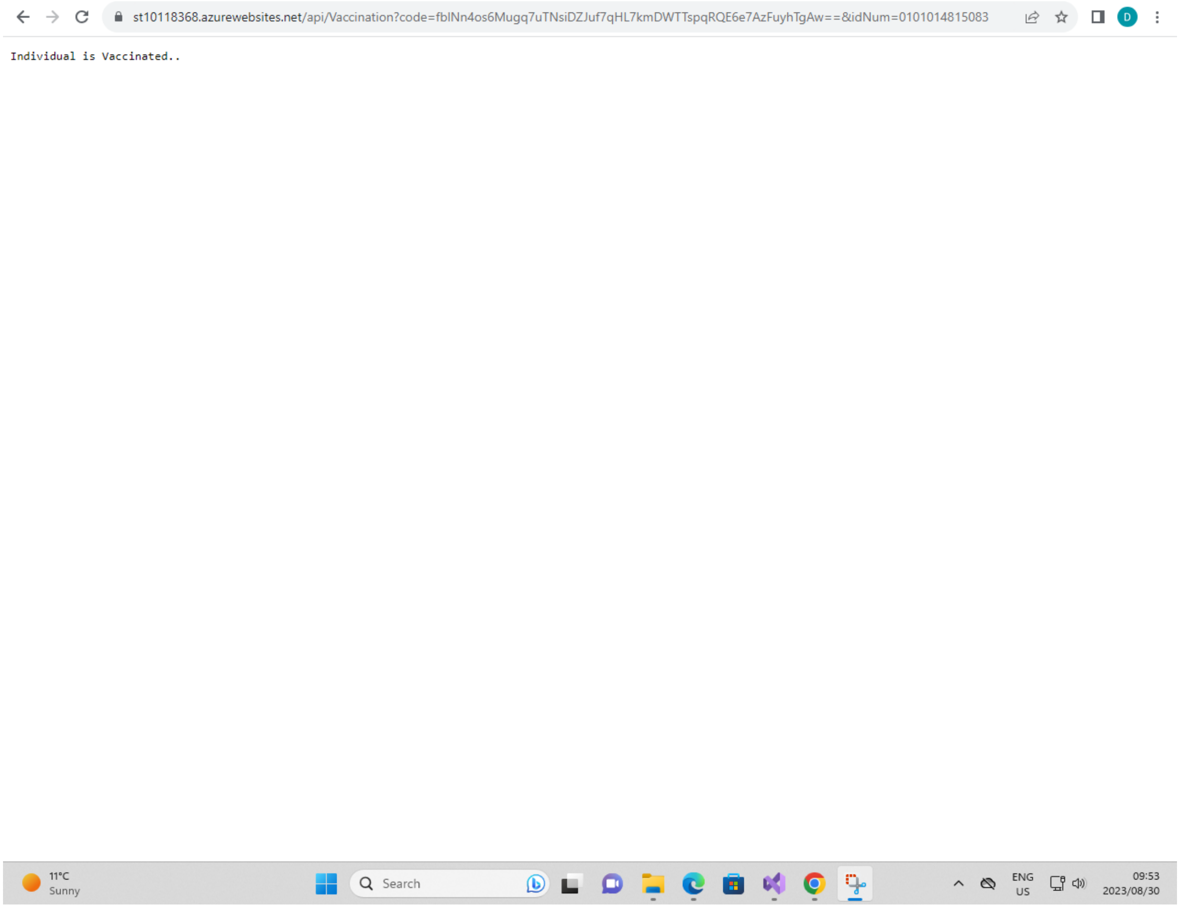
```
st10118368.azurewebsites.net/api/Vaccination?code=fbINn4os6Mugq7uTNsiDZJuf7qHL7kmDWTTspqRQE6e7AzFuyhTgAw==&idNum=8505288055081
```

```
Individual is Vaccinated..
```



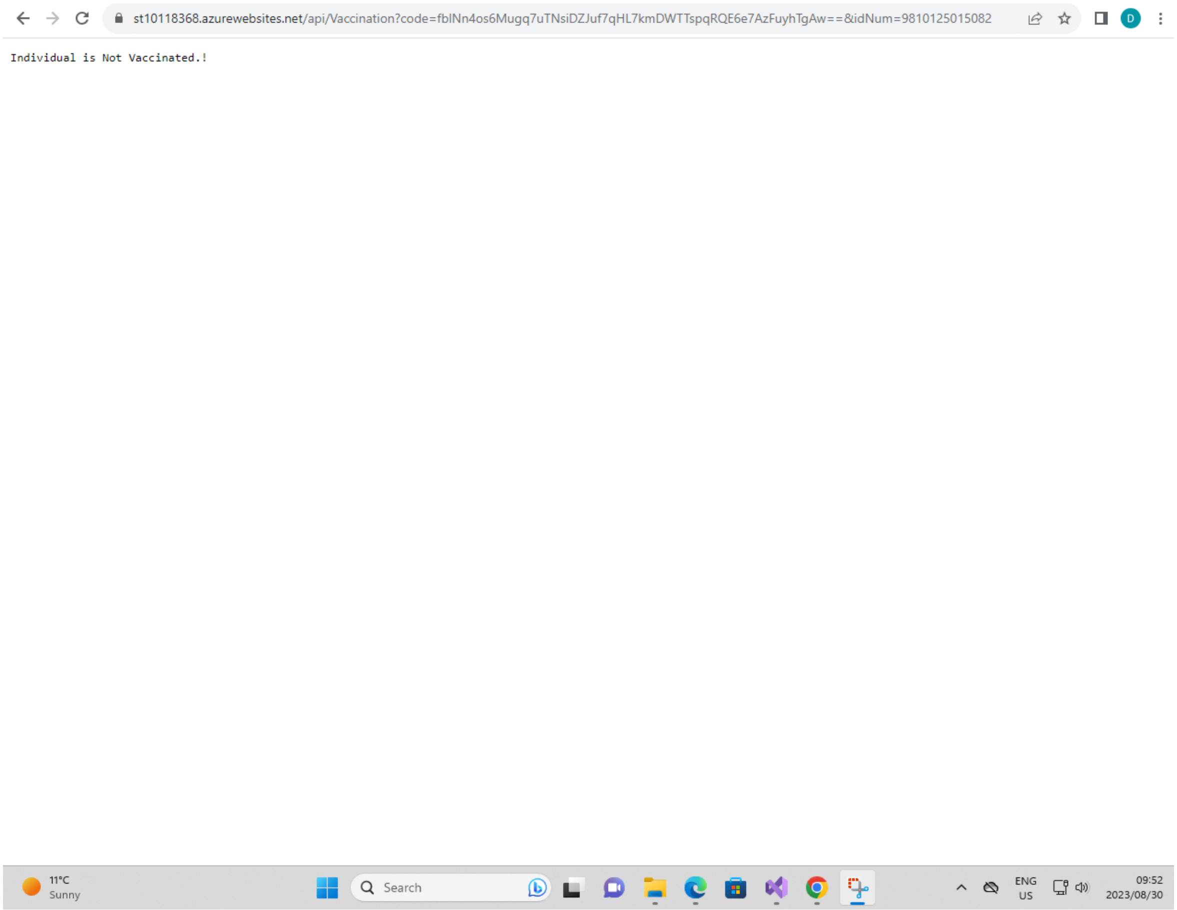
```
st10118368.azurewebsites.net/api/Vaccination?code=fbINn4os6Mugq7uTNsiDZJuf7qHL7kmDWTTspqRQE6e7AzFuyhTgAw==&idNum=0501014816083
```

```
Individual is Not Vaccinated.!
```



st10118368.azurewebsites.net/api/Vaccination?code=fblNn4os6Mugq7uTNsiDZJuf7qHL7kmDWTTspqRQE6e7AzFuyhTgAw==&idNum=0101014815083

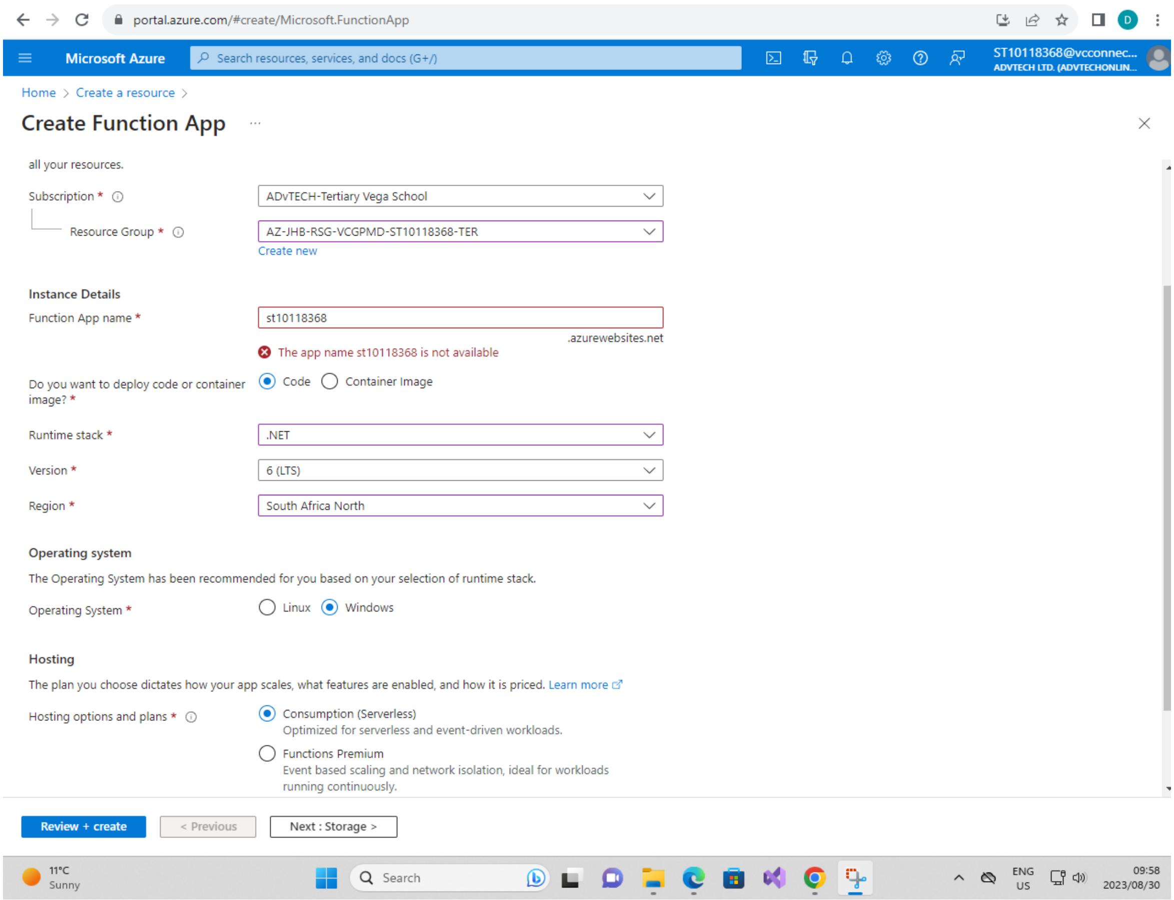
```
Individual is Vaccinated..
```



st10118368.azurewebsites.net/api/Vaccination?code=fblNn4os6Mugq7uTNsiDZJuf7qHL7kmDWTTspqRQE6e7AzFuyhTgAw==&idNum=9810125015082

```
Individual is Not Vaccinated.!
```

Deployment:


portal.azure.com/#create/Microsoft.FunctionApp
Microsoft Azure
Search resources, services, and docs (G+/)
ST10118368@vcconnec...
ADVTECH LTD. (ADVTECHONLIN...
Home > Create a resource >
Review + create
< Previous
Next : Storage >
11°C
Sunny
Search
ENG
US
09:58
2023/08/30

Create Function App

all your resources.

Subscription * : ADvTECH-Tertiary Vega School

Resource Group * : AZ-JHB-RSG-VCGPMD-ST10118368-TER

Create new

Instance Details

Function App name * : st10118368 .azurewebsites.net

The app name st10118368 is not available

Do you want to deploy code or container image? * ● Code ○ Container Image

Runtime stack * : .NET

Version * : 6 (LTS)

Region * : South Africa North

Operating system

The Operating System has been recommended for you based on your selection of runtime stack.

Operating System * ○ Linux ● Windows

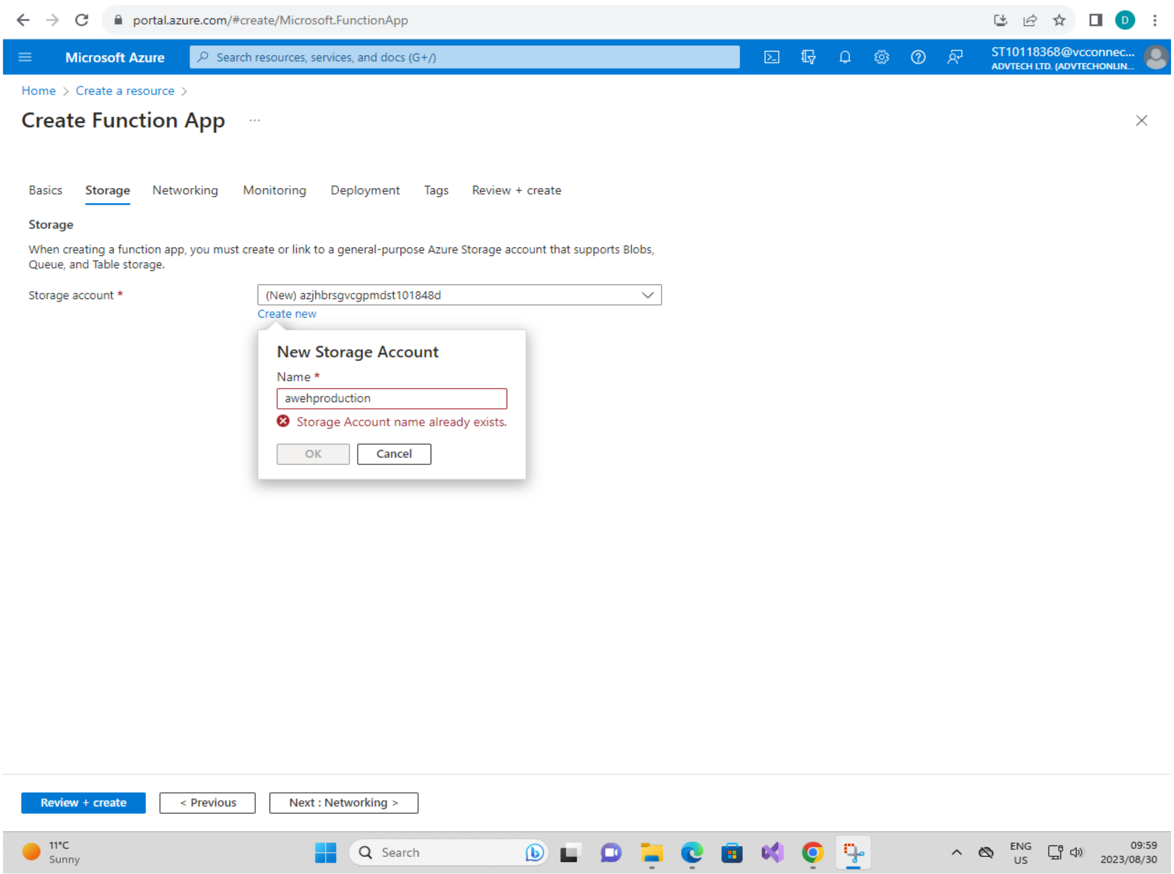
Hosting

The plan you choose dictates how your app scales, what features are enabled, and how it is priced. Learn more

Hosting options and plans *

● Consumption (Serverless)
Optimized for serverless and event-driven workloads.

○ Functions Premium
Event based scaling and network isolation, ideal for workloads running continuously.



Create Function App

Storage

When creating a function app, you must create or link to a general-purpose Azure Storage account that supports Blobs, Queue, and Table storage.

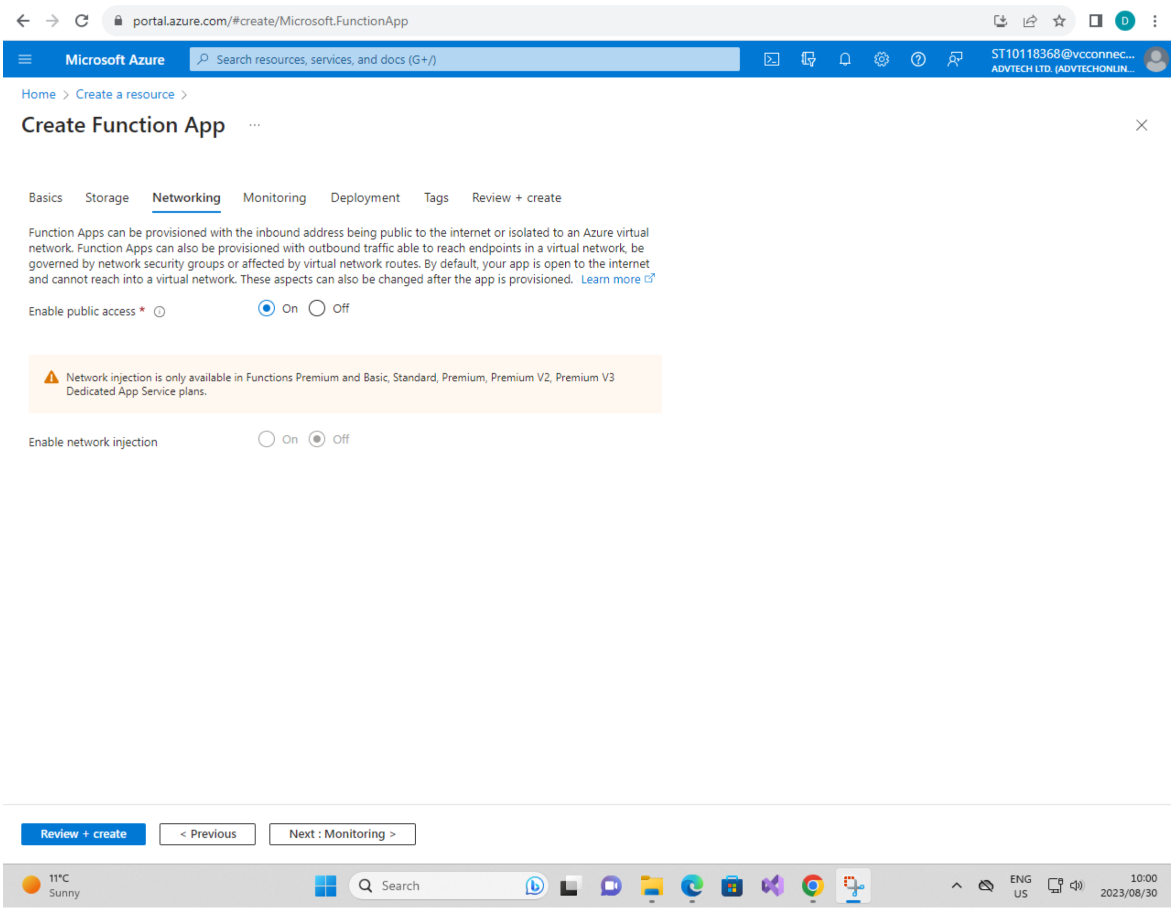
Storage account * : (New) azjhbrsgvcgpmdst101848d

Create new

New Storage Account

Name * : awehproduction

Storage Account name already exists.



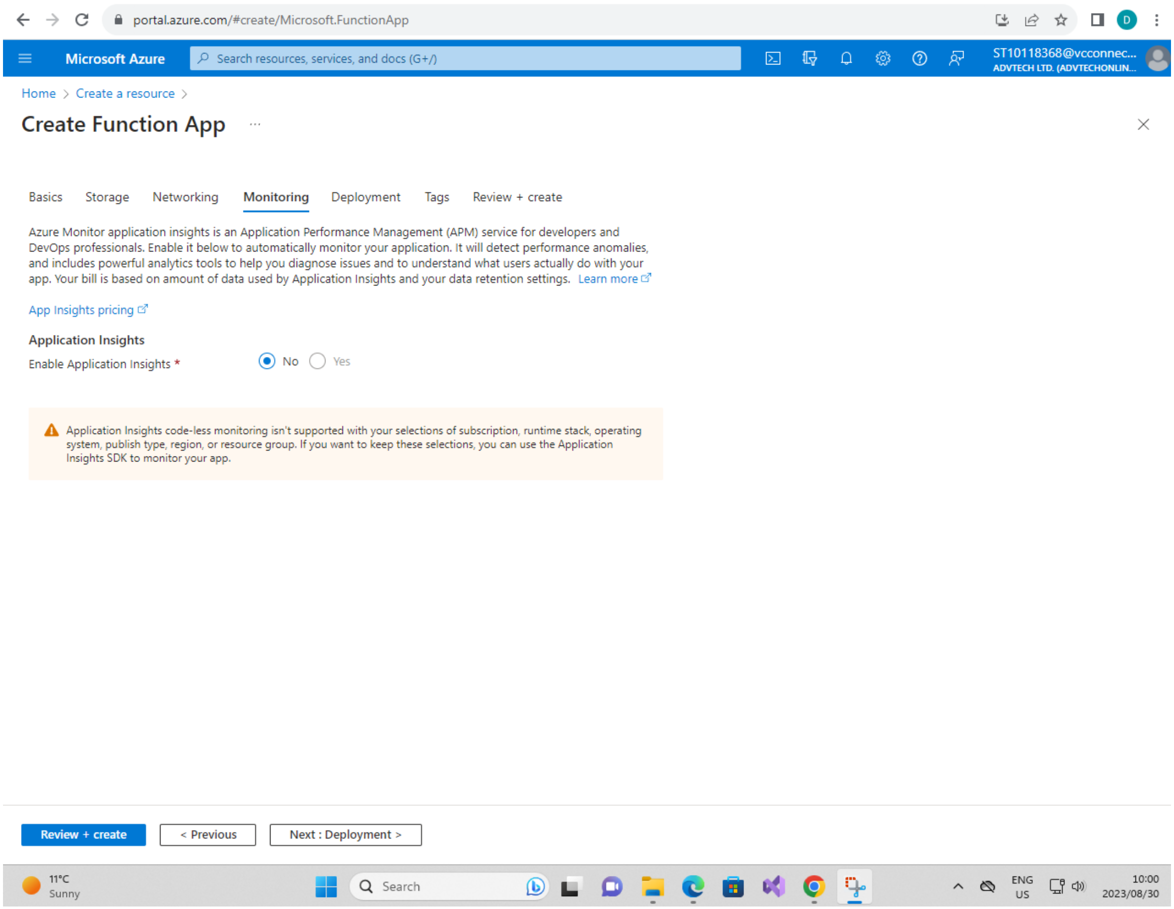
Create Function App

Function Apps can be provisioned with the inbound address being public to the internet or isolated to an Azure virtual network. Function Apps can also be provisioned with outbound traffic able to reach endpoints in a virtual network, be governed by network security groups or affected by virtual network routes. By default, your app is open to the internet and cannot reach into a virtual network. These aspects can also be changed after the app is provisioned. Learn more

Enable public access * ● On ○ Off

Network injection is only available in Functions Premium and Basic, Standard, Premium, Premium V2, Premium V3 Dedicated App Service plans.

Enable network injection ○ On ● Off



Create Function App

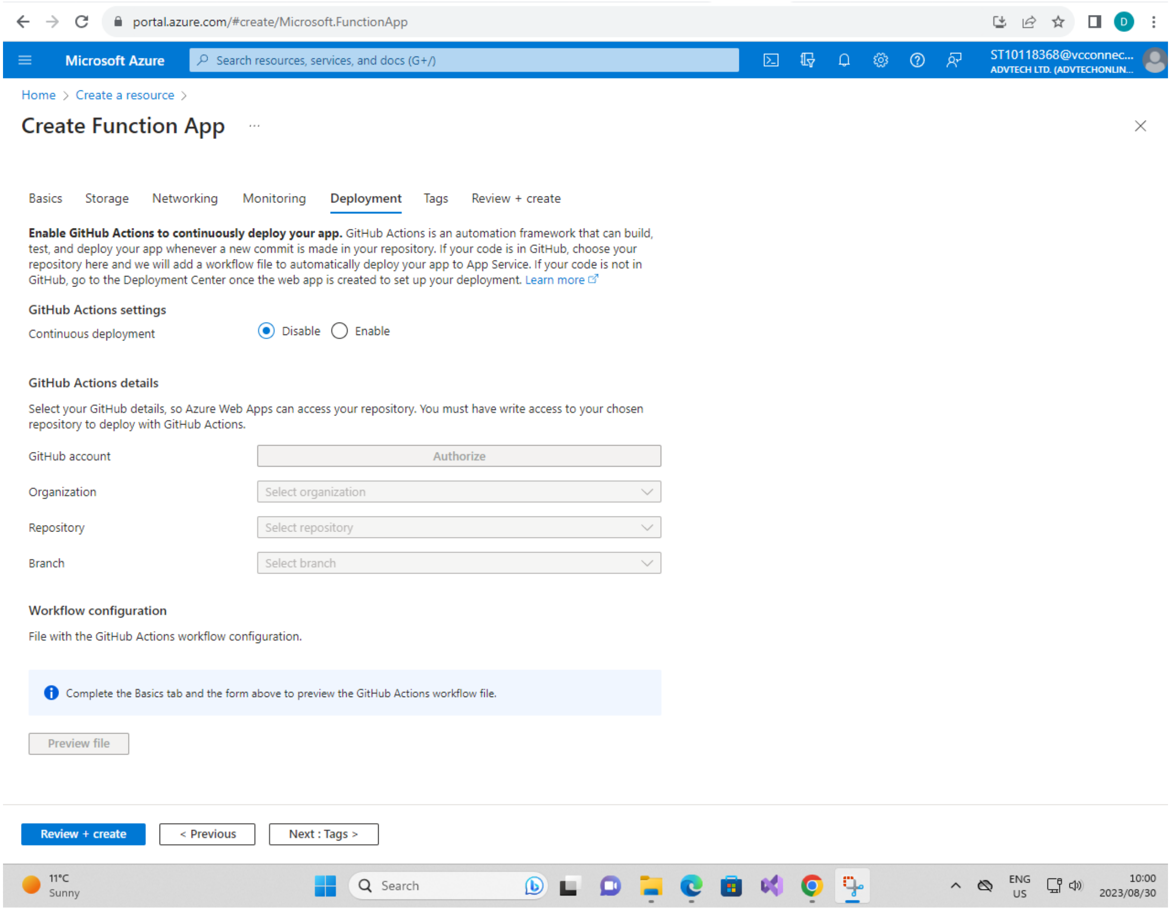
Azure Monitor application insights is an Application Performance Management (APM) service for developers and DevOps professionals. Enable it below to automatically monitor your application. It will detect performance anomalies, and includes powerful analytics tools to help you diagnose issues and to understand what users actually do with your app. Your bill is based on amount of data used by Application Insights and your data retention settings. Learn more

App Insights pricing

Application Insights

Enable Application Insights * ● No ○ Yes

Application Insights code-less monitoring isn't supported with your selections of subscription, runtime stack, operating system, publish type, region, or resource group. If you want to keep these selections, you can use the Application Insights SDK to monitor your app.



Create Function App

Enable GitHub Actions to continuously deploy your app. GitHub Actions is an automation framework that can build, test, and deploy your app whenever a new commit is made in your repository. If your code is in GitHub, choose your repository here and we will add a workflow file to automatically deploy your app to App Service. If your code is not in GitHub, go to the Deployment Center once the web app is created to set up your deployment. Learn more

GitHub Actions settings

Continuous deployment ● Disable ○ Enable

GitHub Actions details

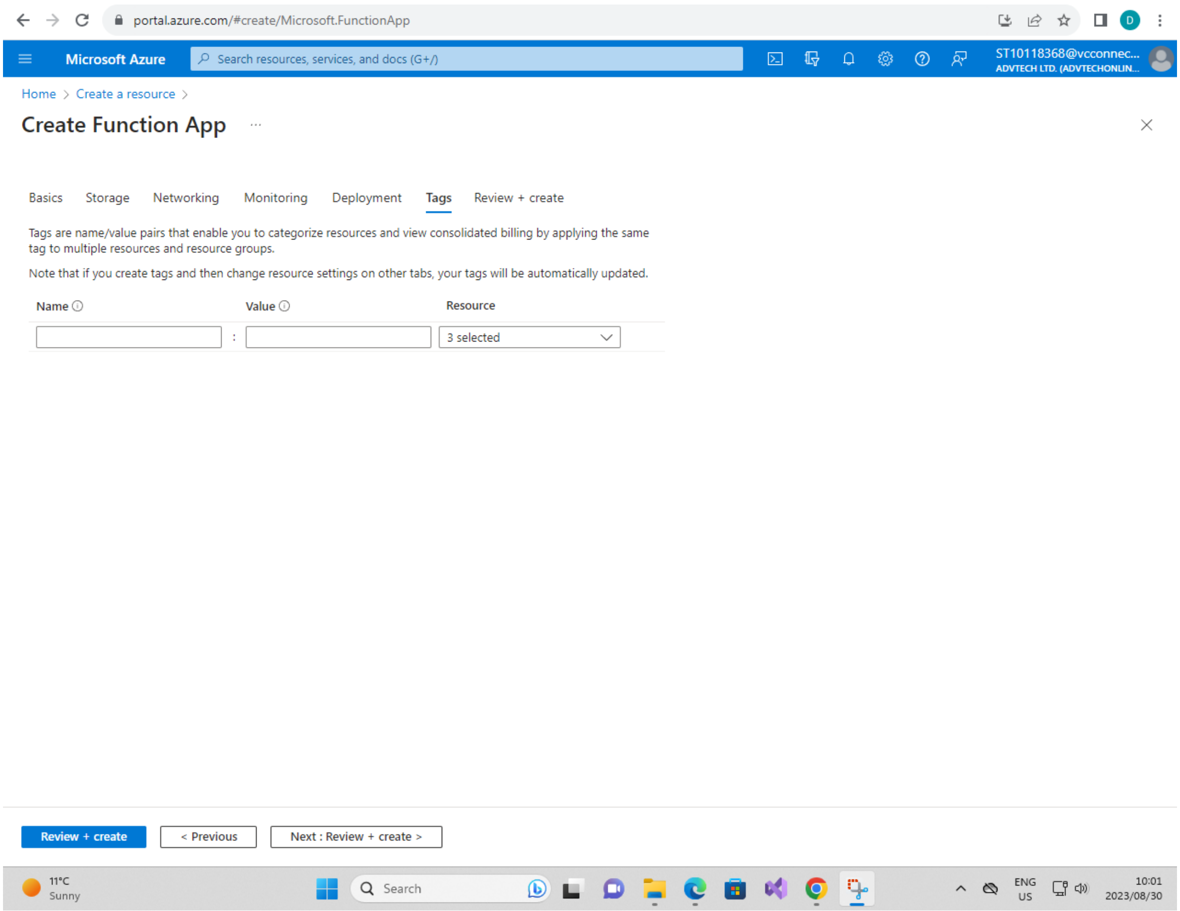
Select your GitHub details, so Azure Web Apps can access your repository. You must have write access to your chosen repository to deploy with GitHub Actions.

GitHub account	Authorize
Organization	Select organization
Repository	Select repository
Branch	Select branch

Workflow configuration

File with the GitHub Actions workflow configuration.

Complete the Basics tab and the form above to preview the GitHub Actions workflow file.

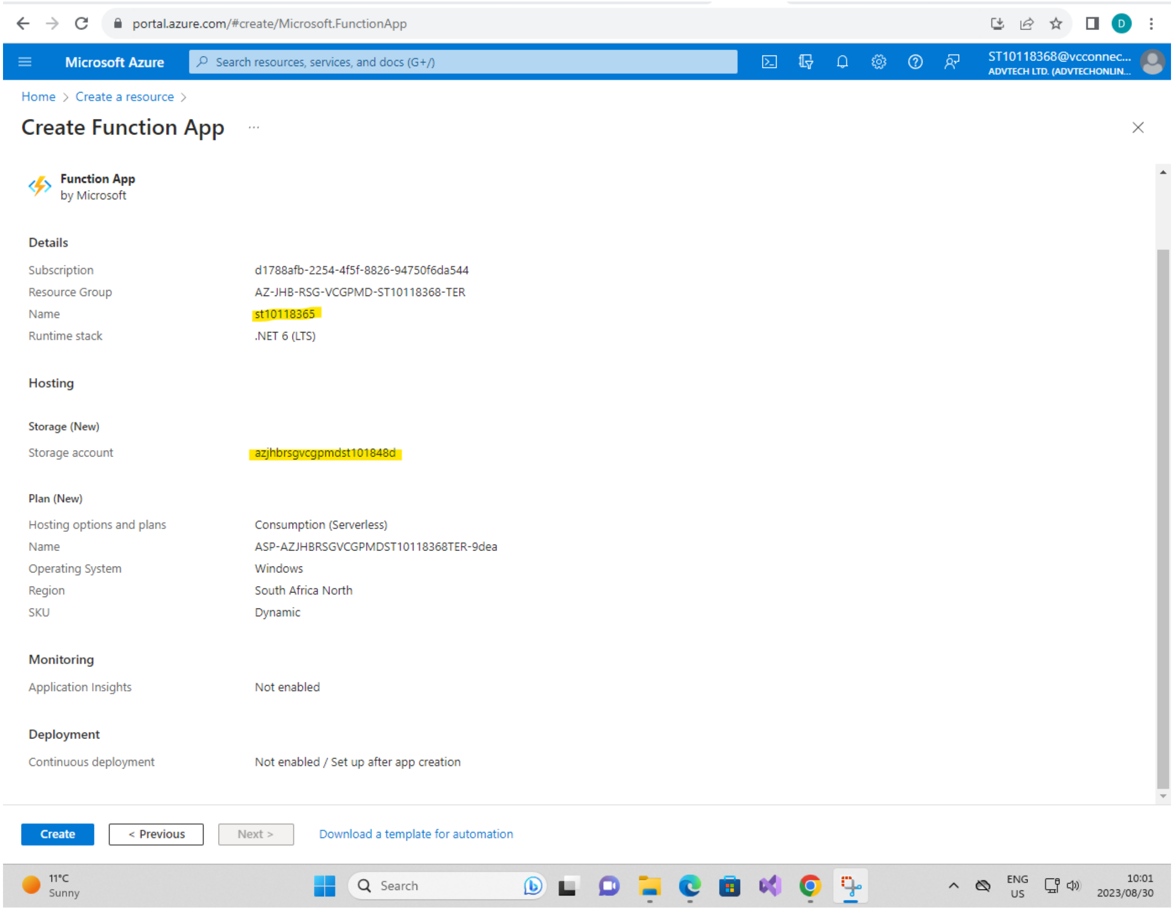


Create Function App

Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to multiple resources and resource groups.

Note that if you create tags and then change resource settings on other tabs, your tags will be automatically updated.

Name		Value	Resource
	:		3 selected


portal.azure.com/#create/Microsoft.FunctionApp
Microsoft Azure
Search resources, services, and docs (G+/)
ST10118368@vcconnec...
ADVTECH LTD. (ADVTECHONLIN...
Home > Create a resource >
Create
< Previous
Next >
Download a template for automation
11°C
Sunny
Search
ENG
US
10:01
2023/08/30

Create Function App

Function App
by Microsoft

Details

Subscription	d1788afb-2254-4f5f-8826-94750f6da544
Resource Group	AZ-JHB-RSG-VCGPMD-ST10118368-TER
Name	st10118365
Runtime stack	.NET 6 (LTS)

Hosting

Storage (New)

Storage account	azjhbrsgvcgpmdst101848d

Plan (New)

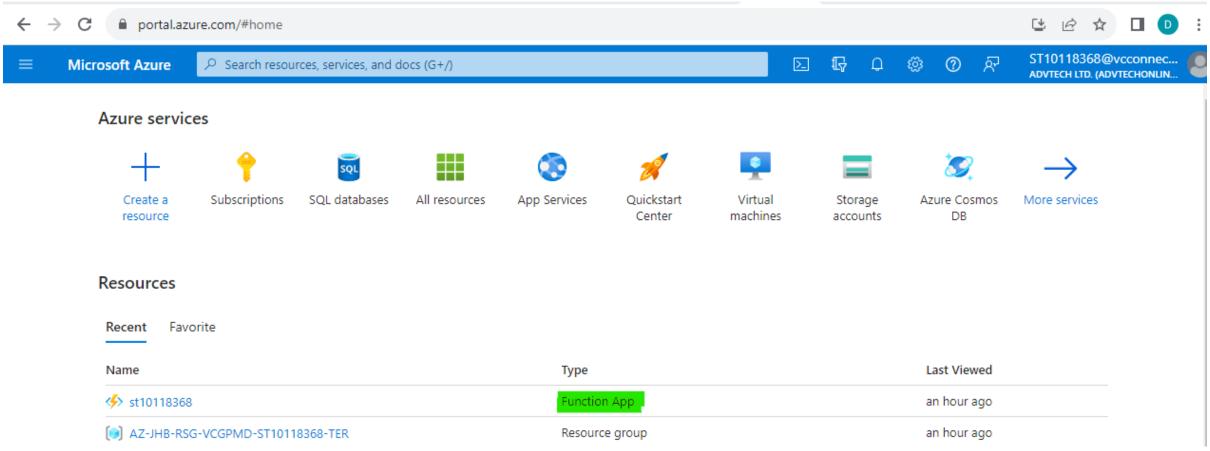
Hosting options and plans	Consumption (Serverless)
Name	ASP-AZJHBRSGVCGPMDST10118368TER-9dea
Operating System	Windows
Region	South Africa North
SKU	Dynamic

Monitoring

Application Insights	Not enabled

Deployment

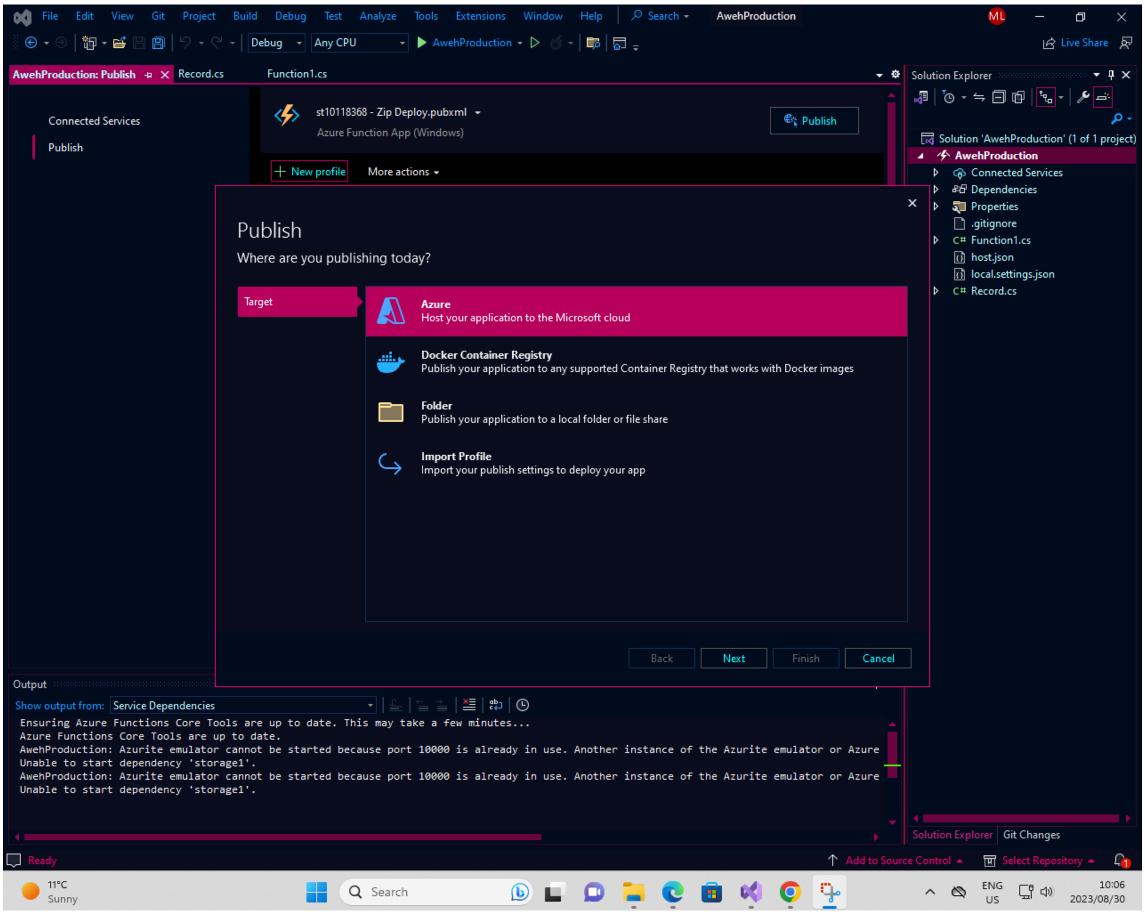
Continuous deployment	Not enabled / Set up after app creation



Azure services

Resources

Name	Type	Last Viewed
st10118368	Function App	an hour ago
AZ-JHB-RSG-VCGPMD-ST10118368-TER	Resource group	an hour ago


File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help Search AwehProduction
Debug Any CPU AwehProduction Live Share
AwehProduction: Publish Record.cs Function1.cs
Connected Services
Publish
st10118368 - Zip Deploy.pubxml
Azure Function App (Windows)
Publish
New profile More actions
Solution Explorer
Solution 'AwehProduction' (1 of 1 project)
AwehProduction
Connected Services
Dependencies
Properties
.gitignore
Function1.cs
host.json
local.settings.json
Record.cs
Back Next Finish Cancel
Output
Show output from: Service Dependencies
Solution Explorer Git Changes
Ready Add to Source Control Select Repository
11°C Sunny Search ENG US 10:06 2023/08/30

Publish

Where are you publishing today?

Target

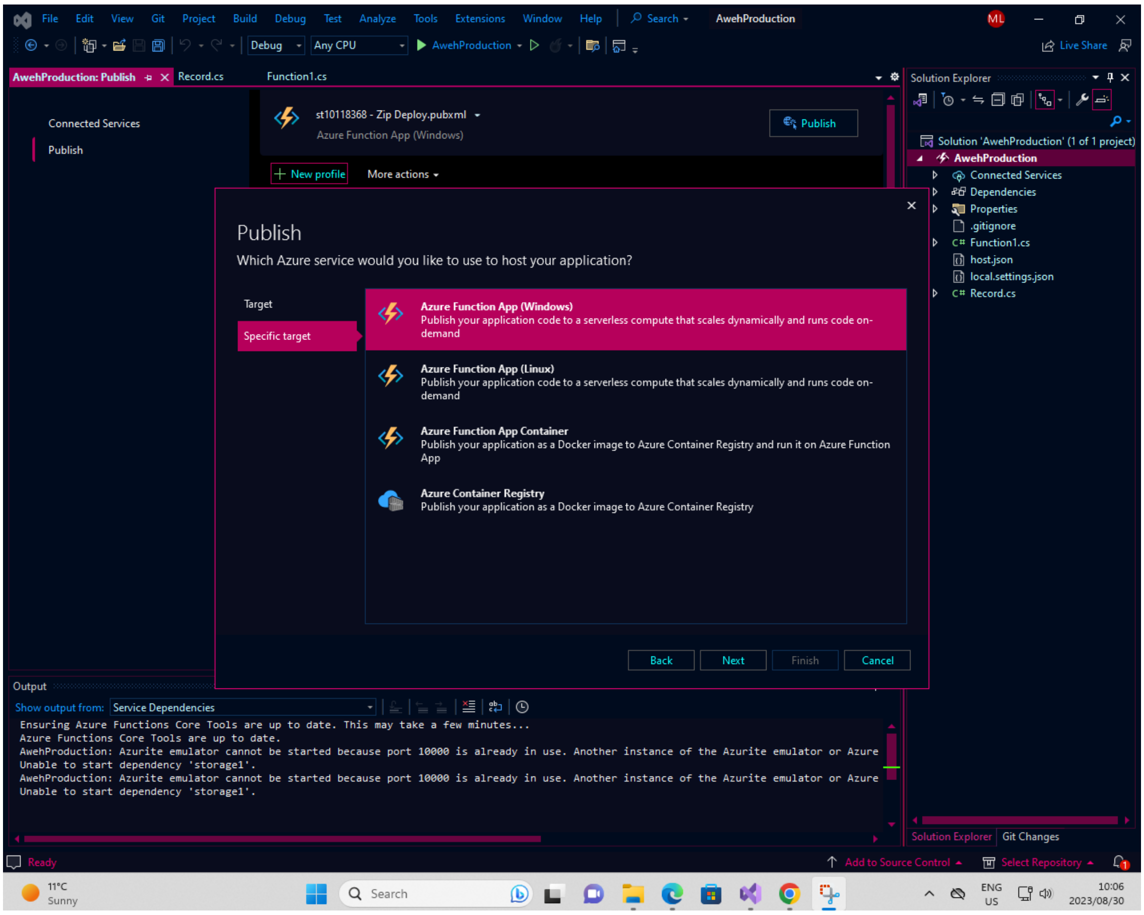
Azure
Host your application to the Microsoft cloud

Docker Container Registry
Publish your application to any supported Container Registry that works with Docker images

Folder
Publish your application to a local folder or file share

Import Profile
Import your publish settings to deploy your app

```
Ensuring Azure Functions Core Tools are up to date. This may take a few minutes...
Azure Functions Core Tools are up to date.
AwehProduction: Azurite emulator cannot be started because port 10000 is already in use. Another instance of the Azurite emulator or Azure
Unable to start dependency 'storage1'.
AwehProduction: Azurite emulator cannot be started because port 10000 is already in use. Another instance of the Azurite emulator or Azure
Unable to start dependency 'storage1'.
```


File Edit View Git Project Build Debug Test Analyze Tools Extensions Window Help Search AwehProduction
Debug Any CPU AwehProduction Live Share
AwehProduction: Publish Record.cs Function1.cs
Connected Services
Publish
st10118368 - Zip Deploy.pubxml
Azure Function App (Windows)
Publish
New profile More actions
Solution Explorer
Solution 'AwehProduction' (1 of 1 project)
AwehProduction
Connected Services
Dependencies
Properties
.gitignore
Function1.cs
host.json
local.settings.json
Record.cs
Back Next Finish Cancel
Output
Show output from: Service Dependencies
Solution Explorer Git Changes
Ready Add to Source Control Select Repository
11°C Sunny Search ENG US 10:06 2023/08/30

Publish

Which Azure service would you like to use to host your application?

Target

Specific target

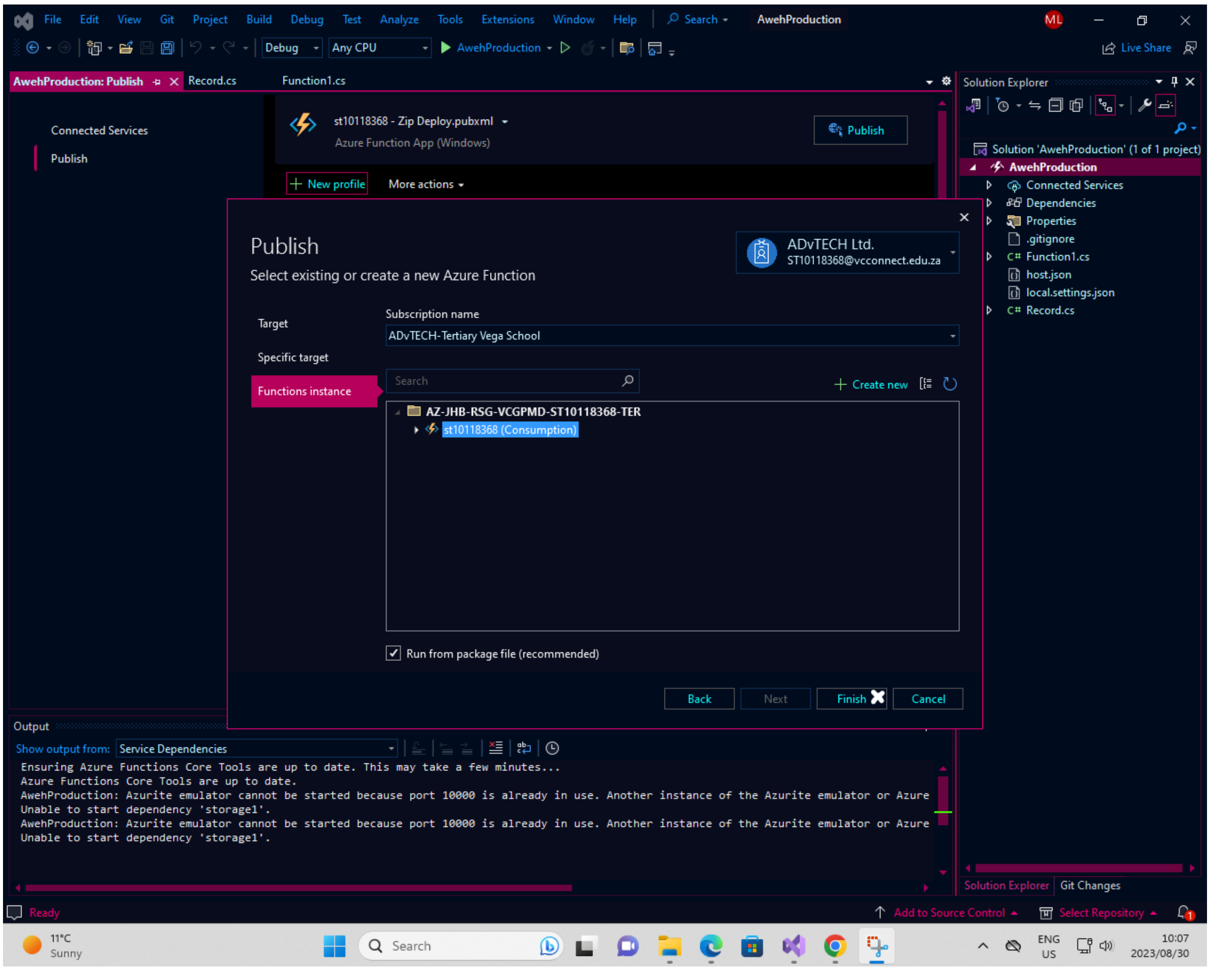
Azure Function App (Windows)
Publish your application code to a serverless compute that scales dynamically and runs code on-demand

Azure Function App (Linux)
Publish your application code to a serverless compute that scales dynamically and runs code on-demand

Azure Function App Container
Publish your application as a Docker image to Azure Container Registry and run it on Azure Function App

Azure Container Registry
Publish your application as a Docker image to Azure Container Registry

```
Ensuring Azure Functions Core Tools are up to date. This may take a few minutes...
Azure Functions Core Tools are up to date.
AwehProduction: Azurite emulator cannot be started because port 10000 is already in use. Another instance of the Azurite emulator or Azure
Unable to start dependency 'storage1'.
AwehProduction: Azurite emulator cannot be started because port 10000 is already in use. Another instance of the Azurite emulator or Azure
Unable to start dependency 'storage1'.
```



Publish

Select existing or create a new Azure Function

ADvTECH Ltd.
ST10118368@vcconnect.edu.za

Target

Specific target

Functions instance

Subscription name: ADvTECH-Tertiary Vega School

AZ-JHB-RSG-VCGPMD-ST10118368-TER
st10118368 (Consumption)

☑ Run from package file (recommended)

Show output from: Service Dependencies

```
Ensuring Azure Functions Core Tools are up to date. This may take a few minutes...
Azure Functions Core Tools are up to date.
AwehProduction: Azurite emulator cannot be started because port 10000 is already in use. Another instance of the Azurite emulator or Azure
Unable to start dependency 'storage1'.
AwehProduction: Azurite emulator cannot be started because port 10000 is already in use. Another instance of the Azurite emulator or Azure
Unable to start dependency 'storage1'.
```

==NOTES==

Live Link:

https://st10118368.azurewebsites.net/api/Vaccination?code=fblNn4os6Mugq7uTNsiDZJuf7qHL7kmDWTTspqRQE6e7AzFuyhTgAw==&idNum=*************

Swap ************* with ID/Passport Number

ID/Passport Numbers:

8505288055081

0501014816083

0101014815083

9810125015082

References

AI, & LinkedIn Community. (n.d.). *How can you use the polyglot persistence pattern effictively?* Retrieved from LinkedIn: https://www.linkedin.com/advice/1/how-can-you-use-polyglot-persistence-pattern

AVI Networks. (n.d.). *Elastic Scale*. Retrieved from AVI Networks: https://avinetworks.com/glossary/elastic-scale/#:~:text=Better%20fault%20tolerance%20%E2%80%93%20for%20example,an%20instance%20to%20replace%20it.&text=Better%20availability%20%E2%80%93%20elastic%20scaling%20helps,handle%20the%20current%20traffic%20demand.

Bitesize. (n.d.). *Decomposition*. Retrieved from Bitesize: https://www.bbc.co.uk/bitesize/guides/zqqfyrd/revision/1#:~:text=Decomposition%20is%20one%20of%20the,are%20simpler%20to%20work%20with.

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