Day_1

Azure Workshop Day 1

- We need to satisfy the basic requirements for running the program i.e. the hardware, OS, NIC. We can avoid all this upfront cost without actually buying the hardware. We don't know what is our future needs and how we need to scale our infrastructure. We can use some other model like **Cloud** with *pay-as-you-go* model. Here, we only need to pay how much we use over a time.
- Cloud have data centres on acres of land and they have invested a lot on infrastructure and providing you as a service.
- Portal(WebUI) is used to access the resources and from which you can ask for new resources.
- Data centre which provides the resources or from which the public cloud originates are known as availability zone.
- Availability zone have multiple data centres.
- A region is geographical area in which multiple AZ resides.
- Instead of service(AWS), here we use a resource in Azure.
- There is one agreement (SLA - service level agreement) which provides the guarantee of 99.99% availability.

Nobody can claim 100% guarantee for availability because there can be any natural catastrophe, power outage or anything which is not predicted.

- Different AZ in a region have different power supply, security teams, internet connection which is physically distant from other AZ. So, it increases the availability even if one of the AZ goes down.
- 99.99% provides only a downtime of 4 sec.
- Azure have 60+ regions available in the world which is the most in the world.
- More the regions in different geographical areas, it will reduce the delay/latency.
- Some countries have data compliance policy which ensures the sensitive data to be handled carefully and to be stored in their own country. So, here we can use the region available in that country to launch the resources.

Resource Group

- Root user can create many users and user can only use the role assigned to them only which is also known as RBAC(Role back access control).
- You need to make a box to control access on the resources, set the budget or anything. This box is known as resource group which is like namespace in Kubernetes. AWS don't have anything like resource group by default. It is also known as organization in some of the clouds.

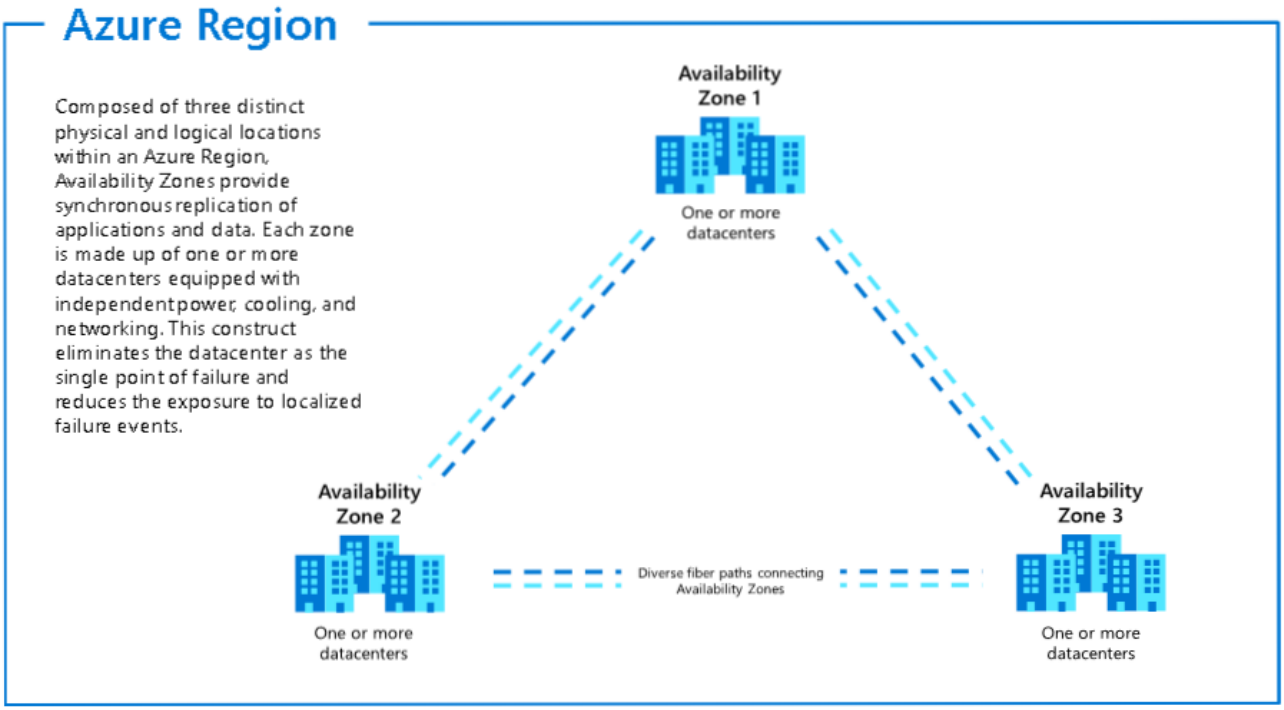
- Resource group has their own subscription type. You can even switch between the resource groups.
- It is about the management how the Azure manages the resources.

Create resource group.

- *ActivityLogs* shows the activities you have done in the Azure.

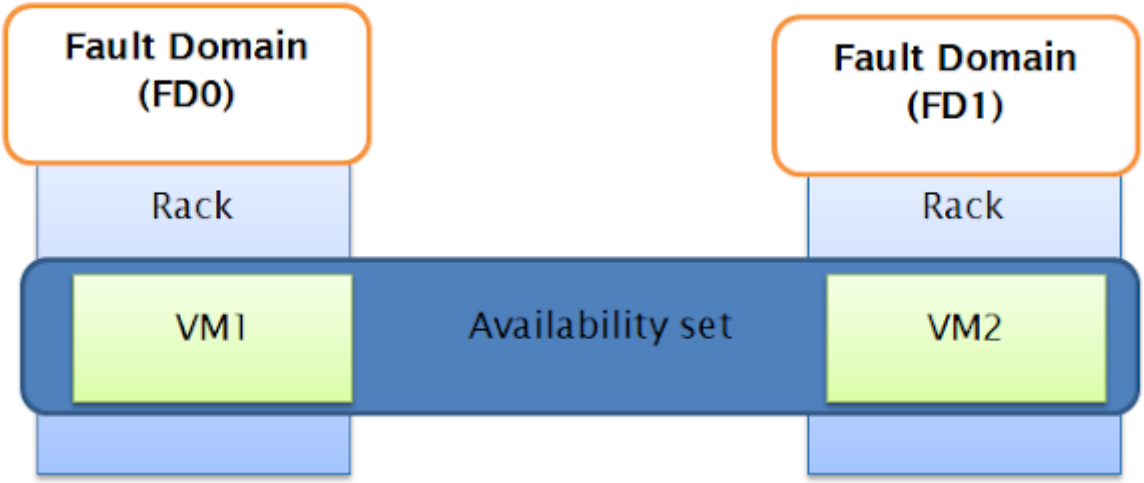
Virtual Machines

- Virtual Machine is one of the computing resource which provides hardware for running an OS.
- Select the resource group and then launch the virtual machine using the compute service.
- Availabity options shows the availability zone, distribute options while launching the VM.

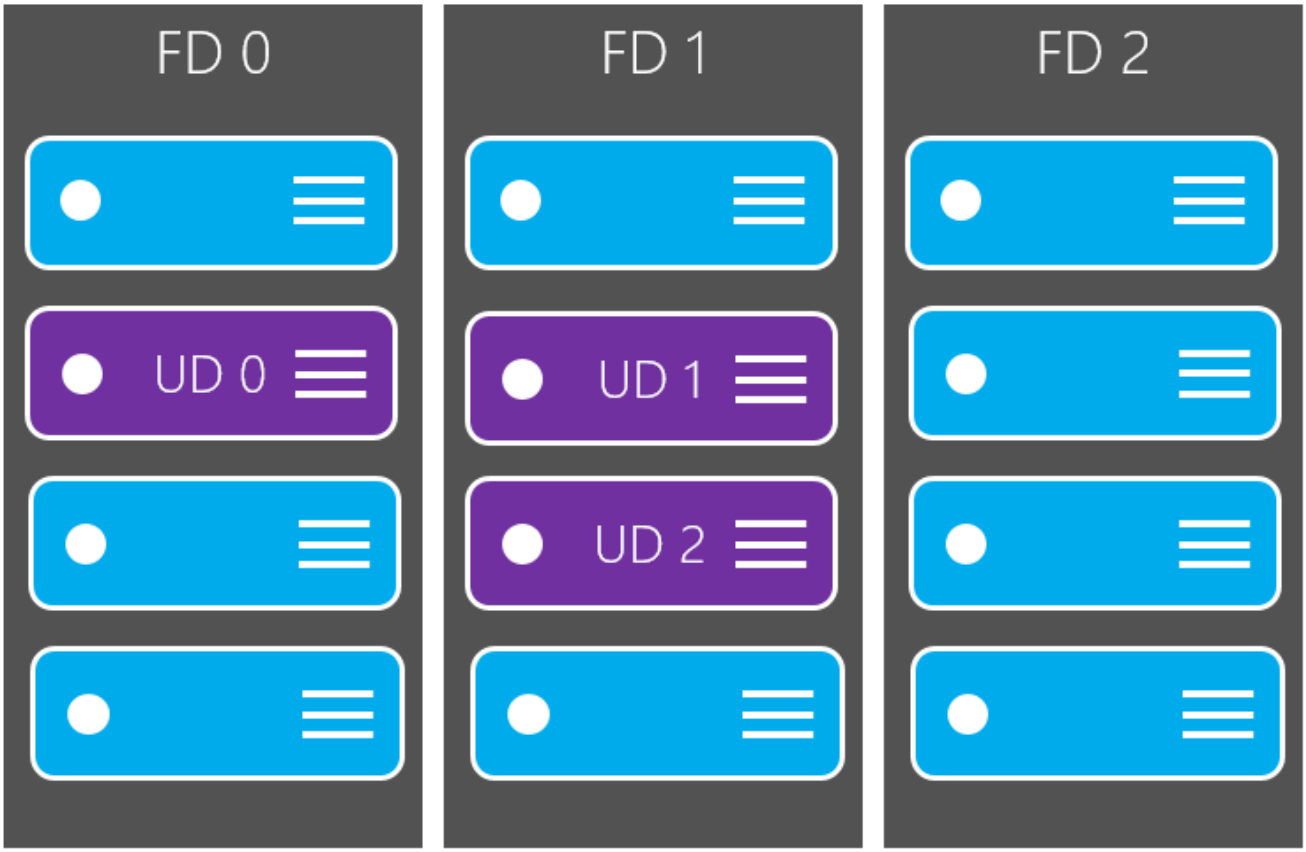


- Azure provides 99.99% guarantee only when you deploy your code on more than one availability zones.
- No infrastructure redundancy provide guarantee only for catastrophe.
- At last, the OS will be launched on the hardware boxes like in the below picture.

- In order to clean the server rack, during maintenance, dedicated power supply or network failure that will lead to down time for the rack and if you think the application is very critical then launch the app in one more rack with redundant infrastructure. So, here comes the concept of availability sets
- Fault domain defines the group of virtual machines sharing the same electricity supply, network, cooling etc. In availability set, vms are launched in different fault domains. Maximum 3 fault domains can be allocated.



- Update domain defines the group of vms which will be updated in any form like system updates, software updates and can be set 5 to 20 on Azure.



- Then, you need an image to launch the OS over the VM.Here, we are using RHEL8. You can add your own subscription. So, that cost will be deducted.
  OS is installed on the ephemeral storage. On terminated, the data will be wiped.
- AWS have only public key based login only. Bur, Azure have password and public key based authentication.
- Set inbound ports to port 22 for SSH.
- Encrytion helps to secure the VM from cloud people.
- DHCP server present on router/modem gives the IP addresses to the devices in the network.

NaaS: Network as a Service

- There are different labs which has their own switch and router and all the labs have connection to the router for the outer world. This is the Public connectivity while any of the lab has only lab to lab connectivity. This is private connectivity. The whole bigger room containing all the labs is known as virtual network (vnet) and labs are known as subnet.
- Whole cloud is the Infrastructure as a service.
- 11.11.0.0/16 - means first two octect is the network name and is fixed. The range will be 11.11.0.0 to 11.11.255.255 (65536 ip addresses).
- SNAT(Source NAT) you can go anywhere and is enabled by default.
- DNAT(Destination NAT) anyone can connect/access your system. It is not by default. You have configure this yourself.
- They also provide Public Address but nothing can be accessed due to Firewall rules.

- Firewall is provided by default and doesn't allow anything to come in. This is known as Security Group.
- Trying to come in - inbound rules.
- You can also use auto shutdown feature to save the cost.
- After provisioning, you want to configure the OS for anything. You can do using Custom data input using cloud init.
- Rack Awareness
  If the rack goes down then also the VM keeping going in the other rack. Fault domain is the concept which isolates the fault by launching the resource in the different racks. Fault domain is maximum upto 3 in azure.

Availability == Data Centre

- Launching VM in different rack but in the same VNet.Launcing this in the same region with same availability set.
- Availability set is enabled so the VMs are launched in different racks using fault and update domains.

Load Balancer

- **Load Balancer** is the program which helps to distribute the traffic over a set of systems which will make the high availability for the user. It can divert traffic when the system goes down to the other system.
- They keep checking the health and if it's having more traffic then it give access to the other system.
- It is one of the major advantage as it provides the one IP address to the DNS. All the nodes are known as backend while the load balancer node is the forntend.
- You can create the load balancer using Azure. Use zone-redundant availability zone while creating load balancer.
- Add Backend systems for vnet we created earlier and **add to backend pool**.
- Before this you to create the SKU to add the virtual network systems to the backend pool.

Methods to access the Azure

- Command line (az cli install)
- API for developement
- Web UI

Azure gives you an extra VM (cloud shell) which has *az* program by default and CLI based tool for all the resources.

Day_2

All the services/resources provided by the Azure or any of the cloud are the managed services.

OS can be provisioned using two ways:

- Virtualization
- Containerization

Azure CLI

- Download and install the Azure CLI on Linux using a single command `curl -sL https://aka.ms/InstallAzureCLIDeb | sudo bash`.
- Login using the command `az login`. It will redirect to the webUI for authentication.

- `az -h` shows all the options available in az.
  -h option helps in finding any of the options.
- Kubernetes is the tool which is used to manage the containers.

Can I manually install Kubernetes on the Azure? Yes

Do you have managed services for Kubernetes? Yes, We have AKS which is Azure managed Kubernetes Cluster.

- list output table `az list --output table`
- Adding the resource group using `az group -l region-name -n namespace-name`
- Use -h with az command and you'll get help from the module.
- SLA provides 99.95% guarantee for API Server in Azure.
- VMS- virtual machine set is used in autoscaling.
- Redis is used for storing session data.

- Overlay network is done by Azure using CNI.

AKS - Azure Kubernetes Service

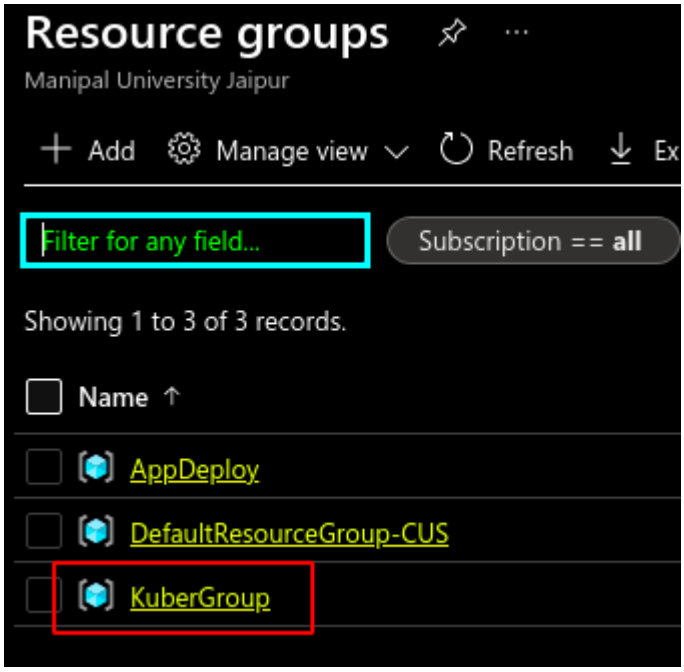
Creating resource group using CLI:

- Using help to know what group can do

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ az group -h

Group
    az group : Manage resource groups and template deployments.

Subgroups:
    lock   : Manage Azure resource group locks.

Commands:
    create : Create a new resource group.
    delete : Delete a resource group.
    exists : Check if a resource group exists.
    export : Captures a resource group as a template.
    list   : List resource groups.
    show   : Gets a resource group.
    update : Update a resource group.
    wait   : Place the CLI in a waiting state until a condition of the resource group is met.

For more specific examples, use: az find "az group"

Please let us know how we are doing: https://aka.ms/azureclihats
```

- Creating a new resource group for KuberNetes

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ az group create -l centralus -n KuberGroup
{
  "id": "/subscriptions/3786078e-57e9-478a-a5ef-f9d2f26be6c2/resourceGroups/KuberGroup",
  "location": "centralus",
  "managedBy": null,
  "name": "KuberGroup",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}
```



New reource group is successfully created.

Steps to configure the AKS

- 'az aks -h' shows the option for Kubernetes cluster

-
```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ az aks create -g KuberGroup -n MyKubeCluster --generate-ssh-keys --
node-count 2
{- Finished ..
  "aadProfile": null,
  "addonProfiles": {
    "KubeDashboard": {
      "config": null,
      "enabled": false,
      "identity": null
    }
  },
  "agentPoolProfiles": [
    {
```

-
```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ az aks -h | grep install
Please let us know how we are doing: https://aka.ms/azureclihats
    install-cli                    : Download and install kubectl, the Kubernetes command-line tool.
                                     Download and install kubelogin, a client-go credential (exec)
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ az aks install-cli -h

Command
    az aks install-cli : Download and install kubectl, the Kubernetes command-line tool. Download
    and install kubelogin, a client-go credential (exec) plugin implementing azure authentication.

Arguments
    --base-src-url                : Base download source URL for kubectl releases.
    --client-version              : Version of kubectl to install.  Default: latest.
    --install-location            : Path at which to install kubectl.  Default:
                                    /usr/local/bin/kubectl.
```

- Installing aks install-cli

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ sudo az aks install-cli --install-location=/kubeaz
Downloading client to "/kubeaz" from "https://storage.googleapis.com/kubernetes-release/release/v1.20.4/bin/linux/amd64/kubectl
"
Please ensure that / is in your search PATH, so the `kubeaz` command can be found.
Downloading client to "/tmp/tmpm0itjc9j/kubelogin.zip" from "https://github.com/Azure/kubelogin/releases/download/v0.0.8/kubelo
gin.zip"
Please ensure that /usr/local/bin is in your search PATH, so the `kubelogin` command can be found.
```

- Get credentials of the cluster.

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ az aks get-credentials --name  MyKubeCluster --resource-group Kuber
Group
Merged "MyKubeCluster" as current context in /home/launchpad5682/.kube/config
```

- Checking normal commands and confirming that I'm connected to the cluster.

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get pods
No resources found in default namespace.
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get namespaces
NAME              STATUS   AGE
default           Active   22m
kube-node-lease   Active   22m
kube-public       Active   22m
kube-system       Active   22m
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get nodes
NAME                                STATUS   ROLES   AGE   VERSION
aks-nodepool1-11012017-vmss000000   Ready    agent   26m   v1.18.14
aks-nodepool1-11012017-vmss000001   Ready    agent   26m   v1.18.14
```

Kubernetes cluster is ready now.

- Creating the deployment

```
base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl create deployment hex --image=vimal13/apache-webserver-php
eployment.apps/hex created
base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get pods
AME                   READY   STATUS              RESTARTS   AGE
ex-6987c4f5cd-45kbz   0/1     ContainerCreating   0          14s
base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get pods
AME                   READY   STATUS    RESTARTS   AGE
ex-6987c4f5cd-45kbz   1/1     Running   0          23s
```

- Scaling up the deployment

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl scale deployment hex --replicas=5
deployment.apps/hex scaled
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get pods
NAME                   READY   STATUS              RESTARTS   AGE
hex-6987c4f5cd-45kbz   1/1     Running             0          67s
hex-6987c4f5cd-4dvdk   0/1     ContainerCreating   0          5s
hex-6987c4f5cd-dqg8f   1/1     Running             0          5s
hex-6987c4f5cd-ggs47   1/1     Running             0          5s
```

- Scaling down the deployment

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl scale deployment hex --replicas=2
deployment.apps/hex scaled
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get pods
NAME                   READY   STATUS        RESTARTS   AGE
hex-6987c4f5cd-45kbz   0/1     Terminating   0          2m51s
hex-6987c4f5cd-4dvdk   1/1     Running       0          109s
hex-6987c4f5cd-dqg8f   0/1     Terminating   0          109s
hex-6987c4f5cd-ggs47   0/1     Terminating   0          109s
hex-6987c4f5cd-vv768   1/1     Running       0          109s
```

- You can use external load balancer using the `--type=LoadBalancer` while exposing the service while launching deployment.

HELP

Using YAML file to launch the app on the Cluster.
https://raw.githubusercontent.com/vimallinuxworld13/aks_web_kube_yaml_code/master/aksweb.yml

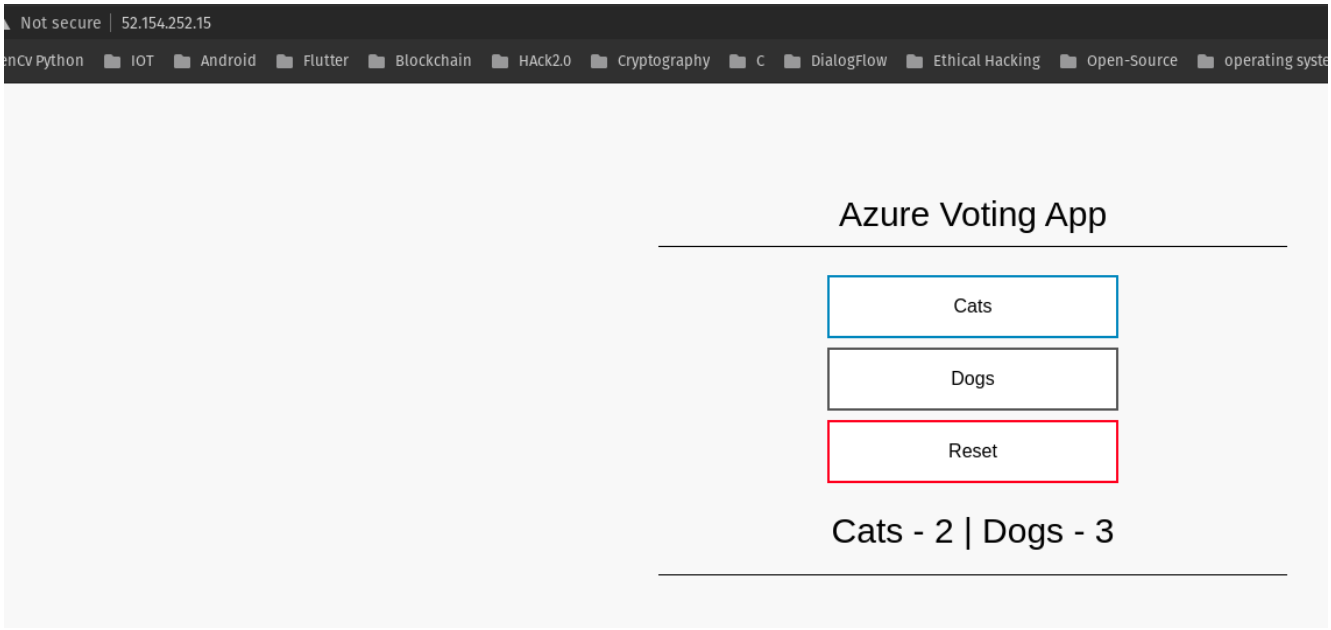
- Launching deployment using script.

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl apply -f ex.yml
deployment.apps/azure-vote-back created
service/azure-vote-back created
deployment.apps/azure-vote-front created
service/azure-vote-front created
```

- Looking for deployment.

```
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get deployment
NAME               READY   UP-TO-DATE   AVAILABLE   AGE
azure-vote-back    1/1     1            1           54s
azure-vote-front   1/1     1            1           53s
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
azure-vote-back-798985f86b-9m5n8    1/1     Running   0          59s
azure-vote-front-84c8bf64fc-djktx   1/1     Running   0          58s
(base) launchpad5682@pop-os:~/projects/arth-ws/AZappServer$ kubectl get svc
NAME               TYPE           CLUSTER-IP    EXTERNAL-IP     PORT(S)        AGE
azure-vote-back    ClusterIP      10.0.53.117   <none>          6379/TCP       70s
azure-vote-front   LoadBalancer   10.0.143.98   52.154.252.15   80:31576/TCP   69s
kubernetes         ClusterIP      10.0.0.1      <none>          443/TCP        2m49s
```

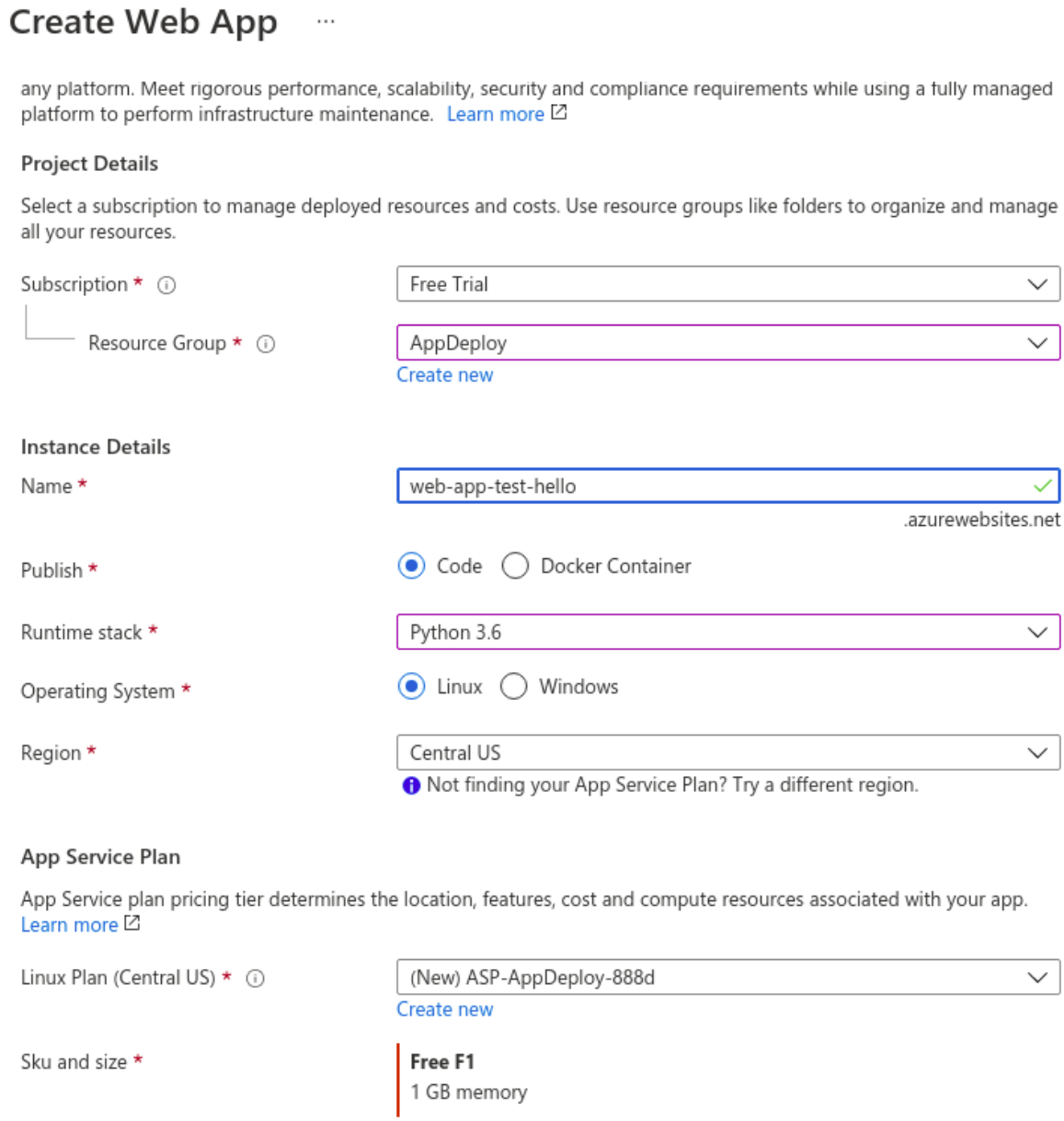
- You can access the webapp using the external IP.



`In order to remove the configuration of the AKS Kubenetes cluster client just remove the file path you specified and corresponding config file form ~/.kube/ directory.`

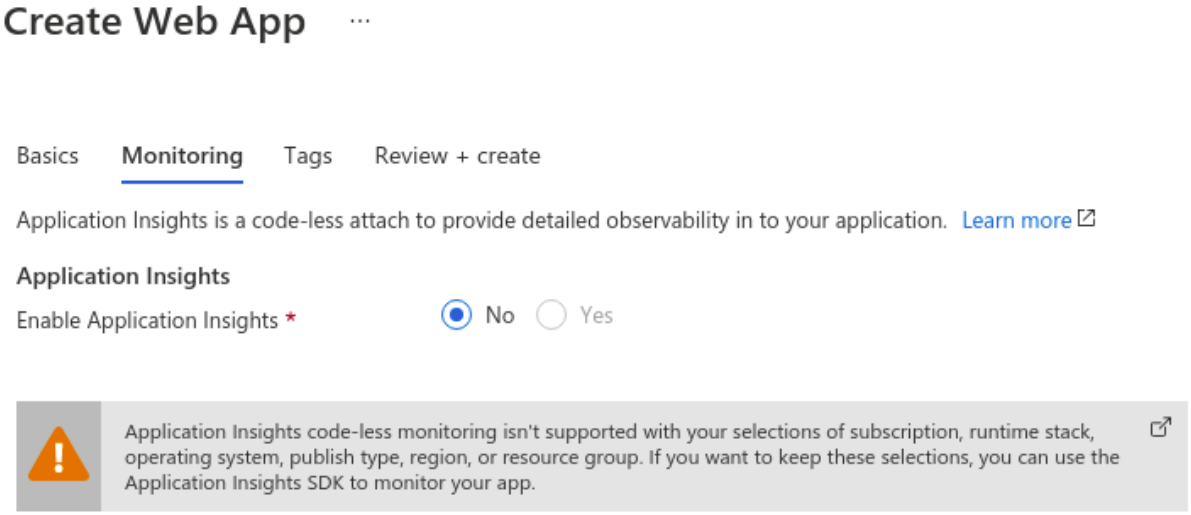
PaaS: Platform as a service

- You only have to upload the code/application to the cloud and everyting is managed by the cloud. Azure gives this resource with a name **App Service / Web App**.
- We can attach Github repo to the App Server using the workflow on the Github and will deploy our thing on the App Server.
- We can roll back on the App Server and use any of the strategy like canary, a/b testing.
- After my code is pushed on Github and automatically updates the code on the App Server.
- Create Web App, resource group.
- Select runtime stack and Region.

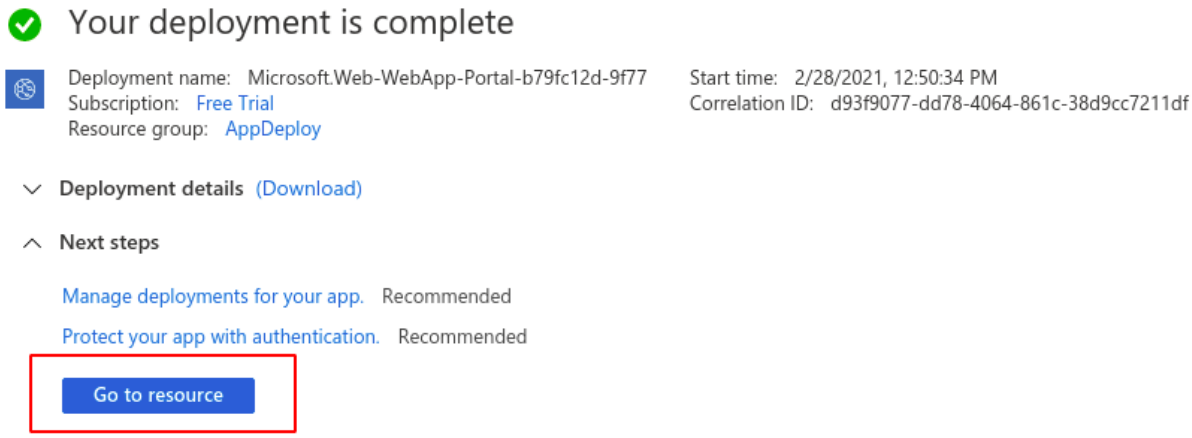


- SKU is stock keeping unit which keeps the track of resources.

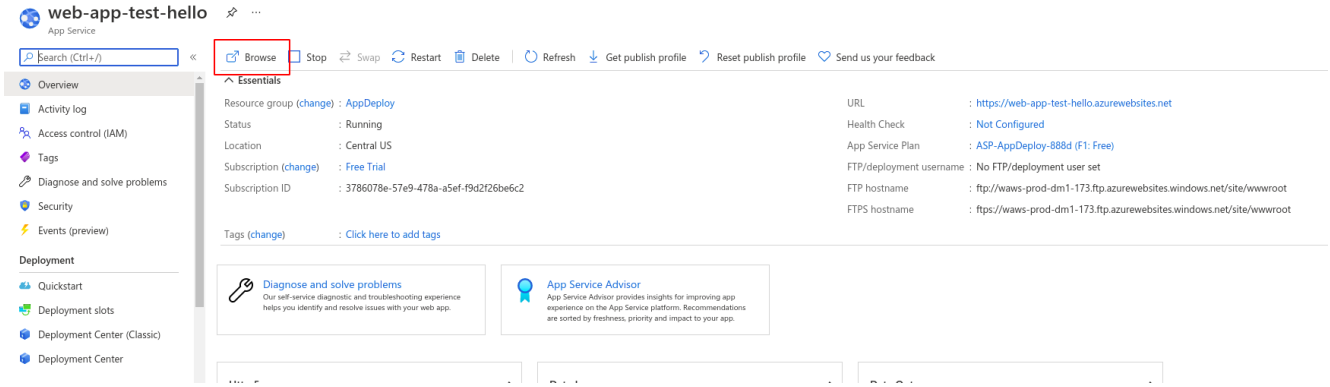
- Application monitoring helps you monitor the code.



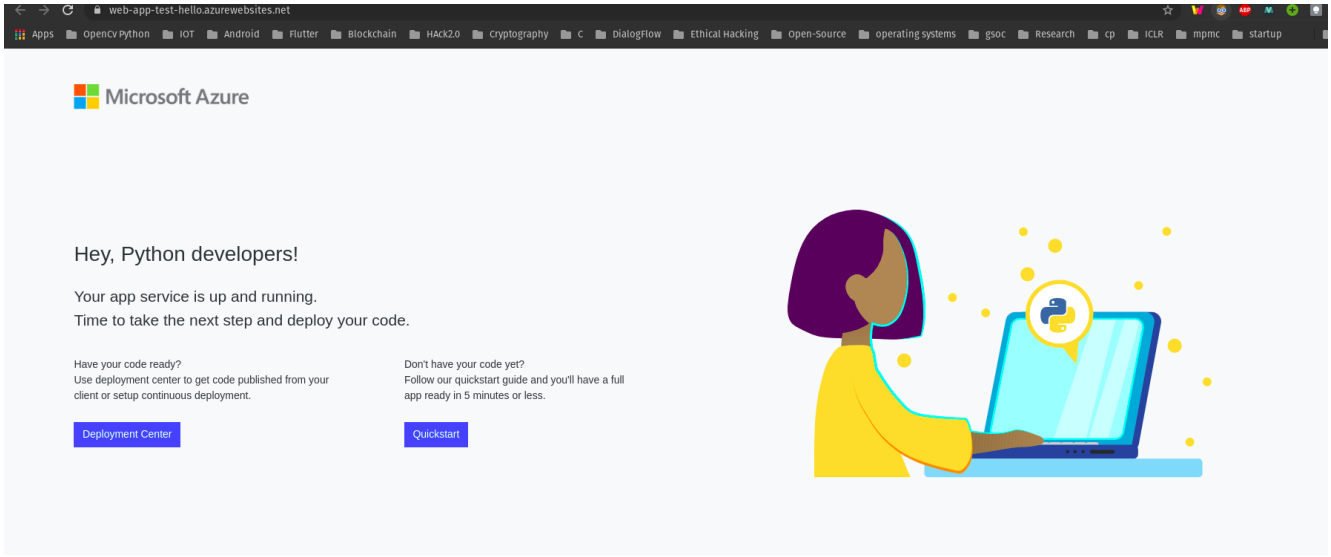
It will take some time to create the web app service.



- After the creation, they will give you the URL.



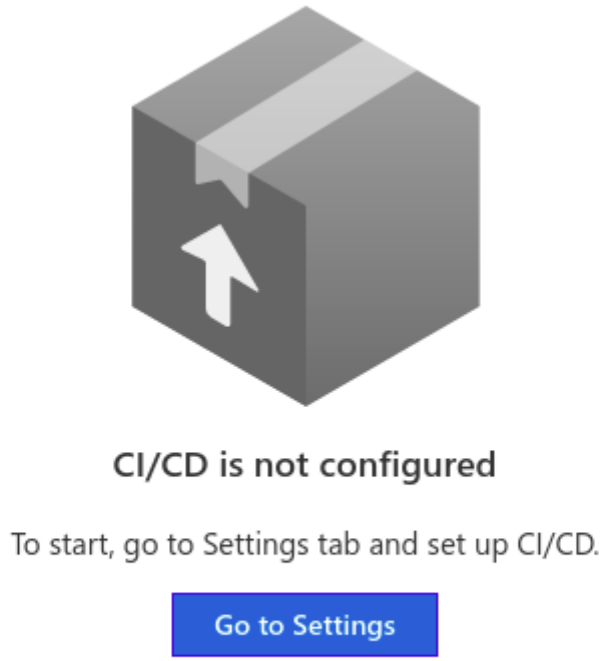
Browse the deployed site using the browse button.



As a developer, you write code in the laptop and then push the code on the Github and configure the Github to the Web App which will continuously deploy the code on App Server. When any of the event occurs they will aautomatically start the workflow.

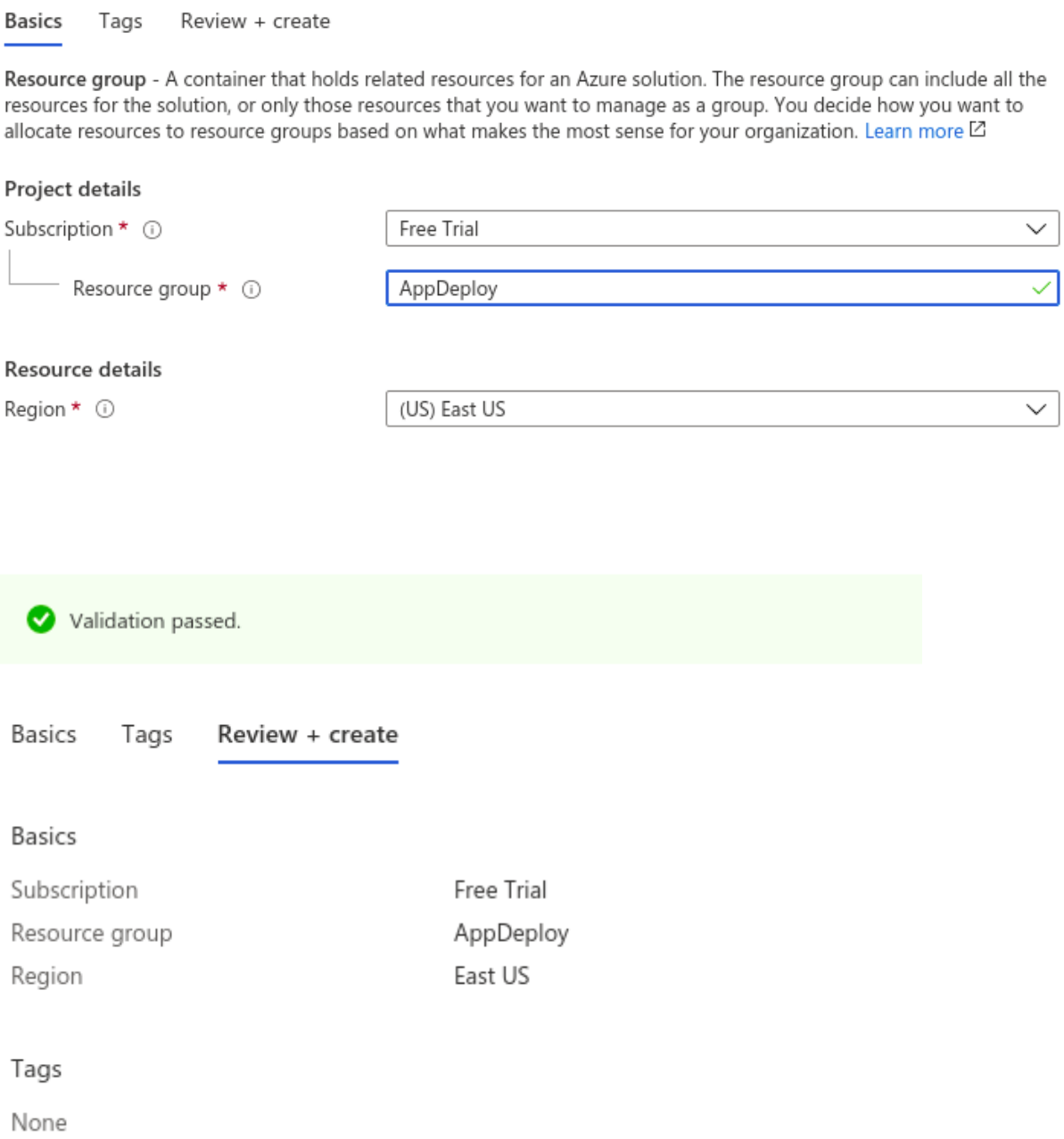
Deployment Centre on the Azure monitors the change in code and updates when changed. Add the repository to the Deployment Centre.Actions will be added by the github.

- Create the deployment centre resource.

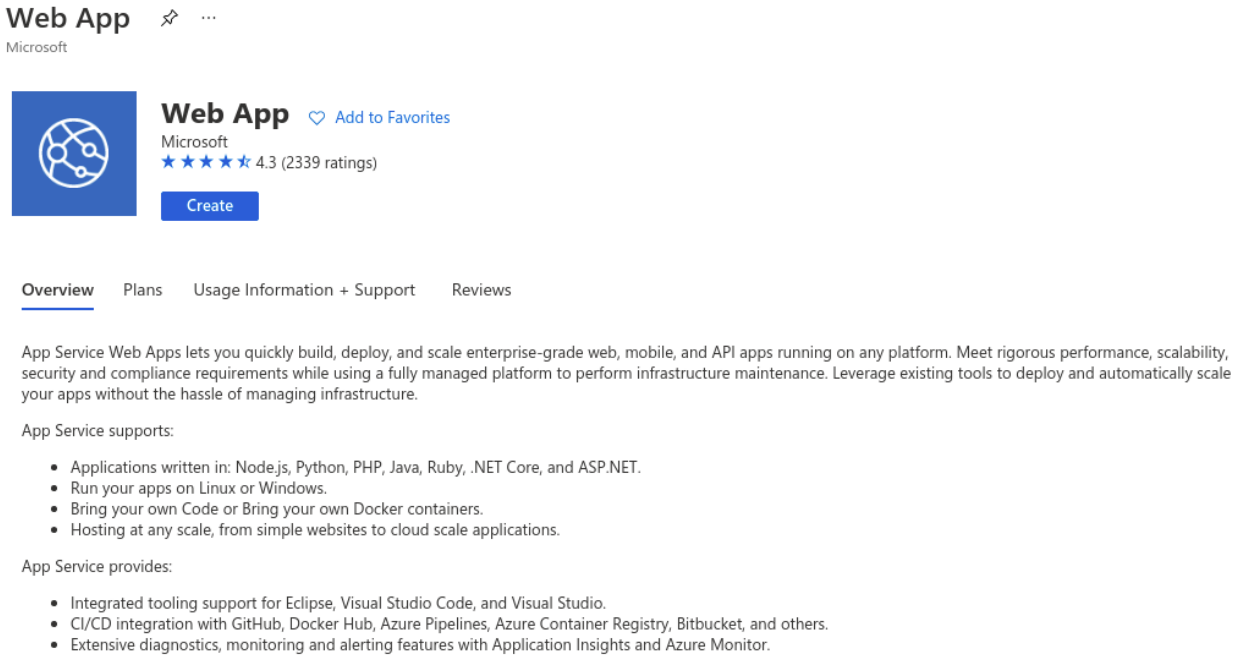


*

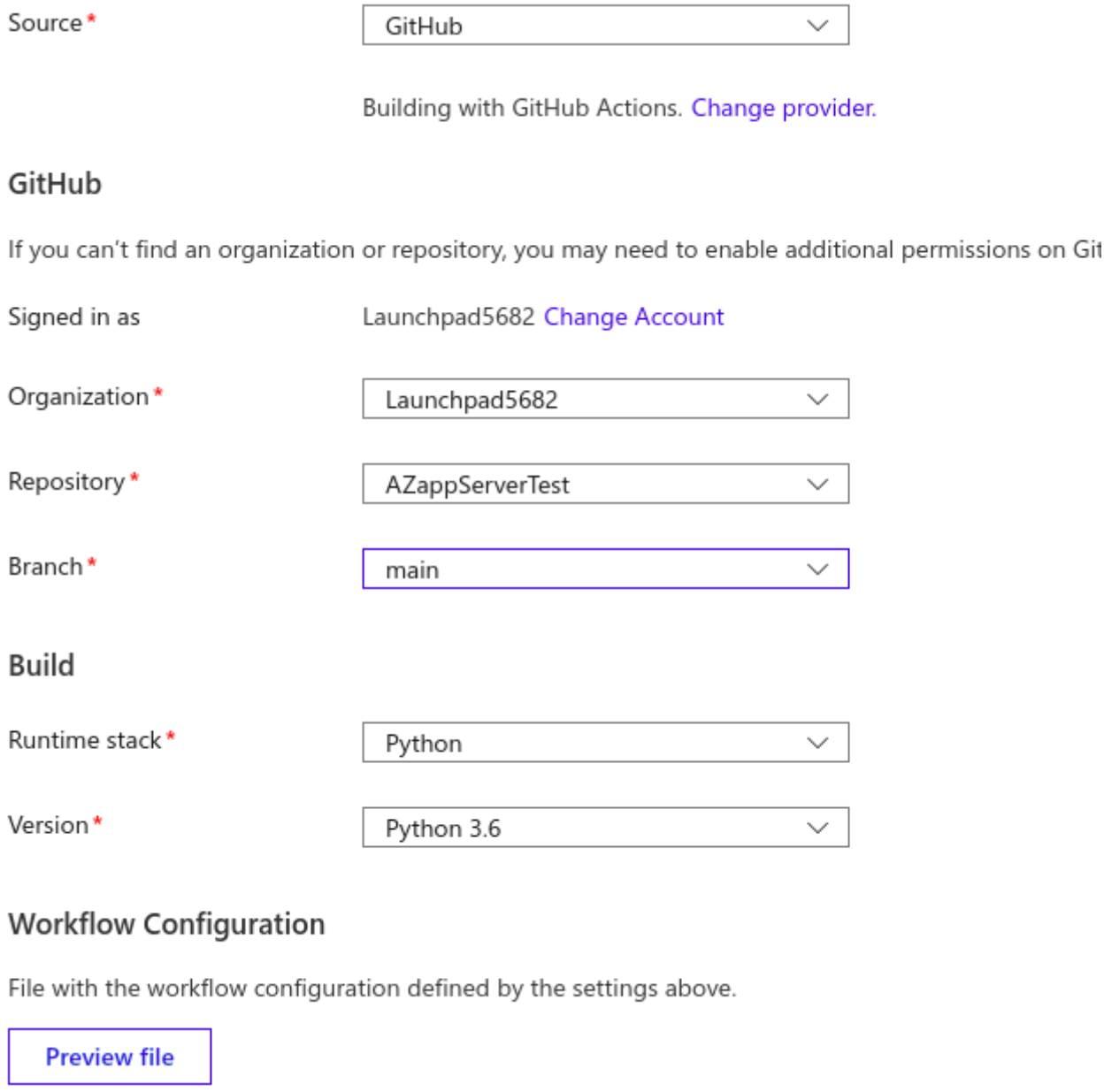
- Create a resource group



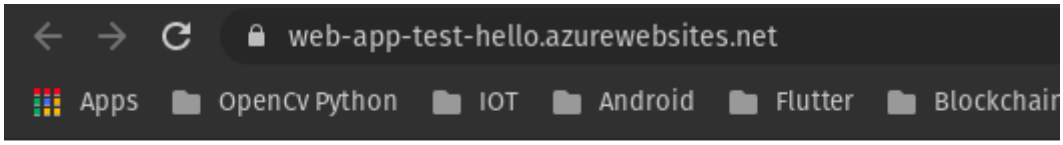
- Create WebApp



- Select Github and repository



and save the configuration.



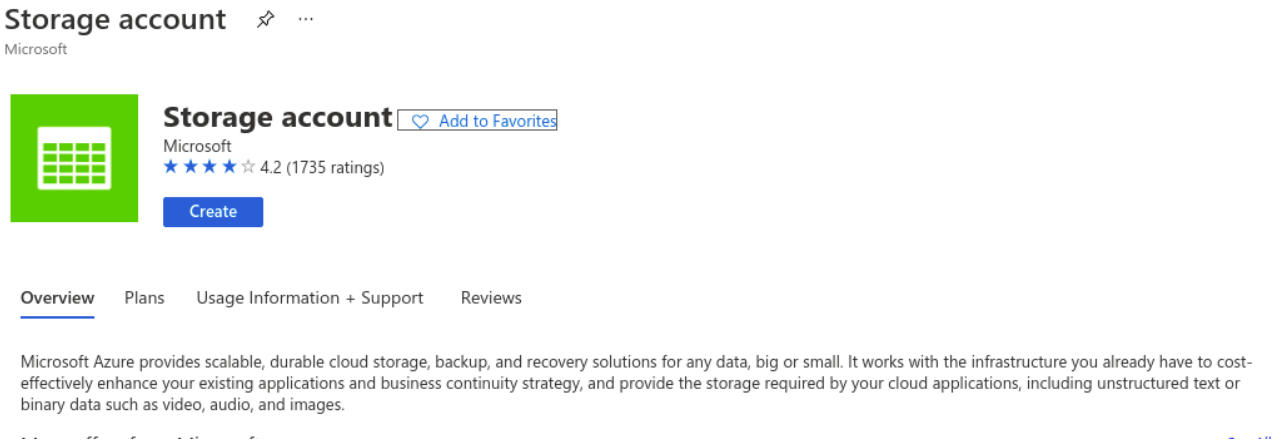
Linux World! **hello**

Storage as a Service

I don't want to keep the static information like images, videos in the code. So, we use something like SaaS using the **storage account** resource.

Use RA-GRS and blobStorage which is blockstorage.Bucket is known as container which means the folder. You need to create a container in order to store something.

- Create Storage



- Create blob storage

Create storage account ···

Basics | Networking | Data protection | Advanced | Tags | Review + create

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below.
Learn more about Azure storage accounts

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * : Free Trial

Resource group * : AppDeploy
Create new

Instance details

The default deployment model is Resource Manager, which supports the latest Azure features. You may choose to deploy using the classic deployment model instead. Choose classic deployment model

Storage account name * : twstwebapplaunchpad5682

Location * : (US) East US

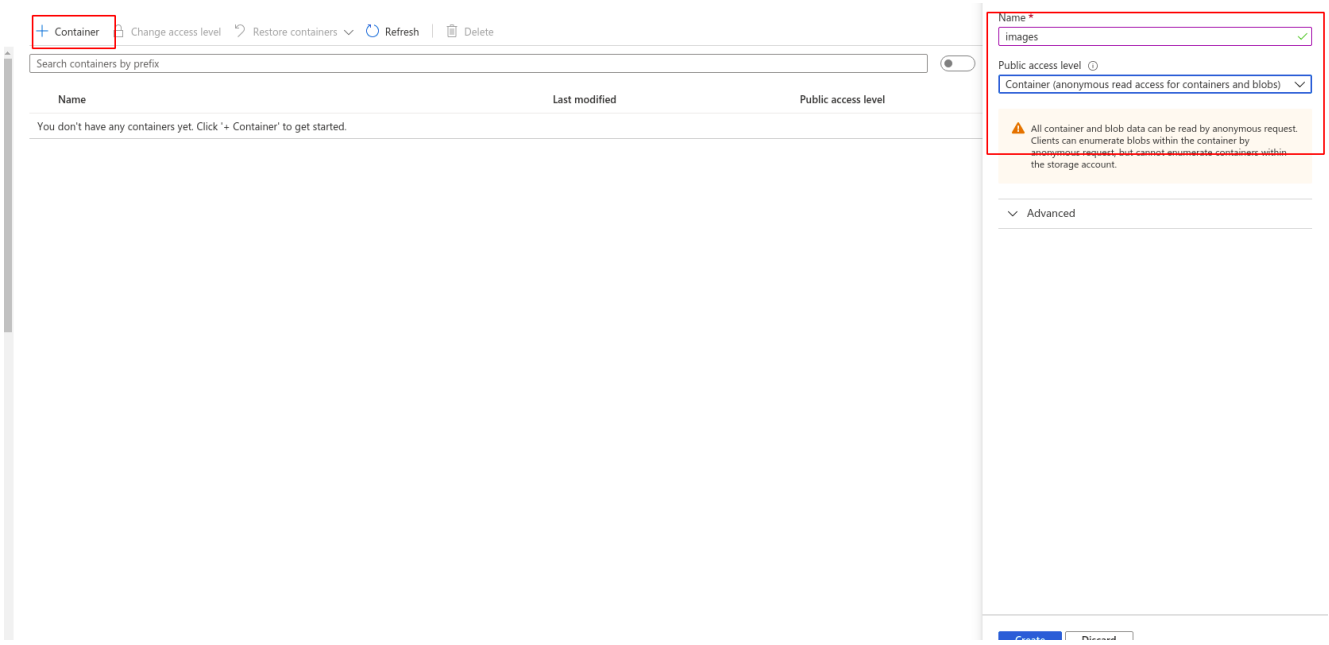
Performance : Standard / Premium

Account kind : BlobStorage

Replication : Read-access geo-redundant storage (RA-GRS)

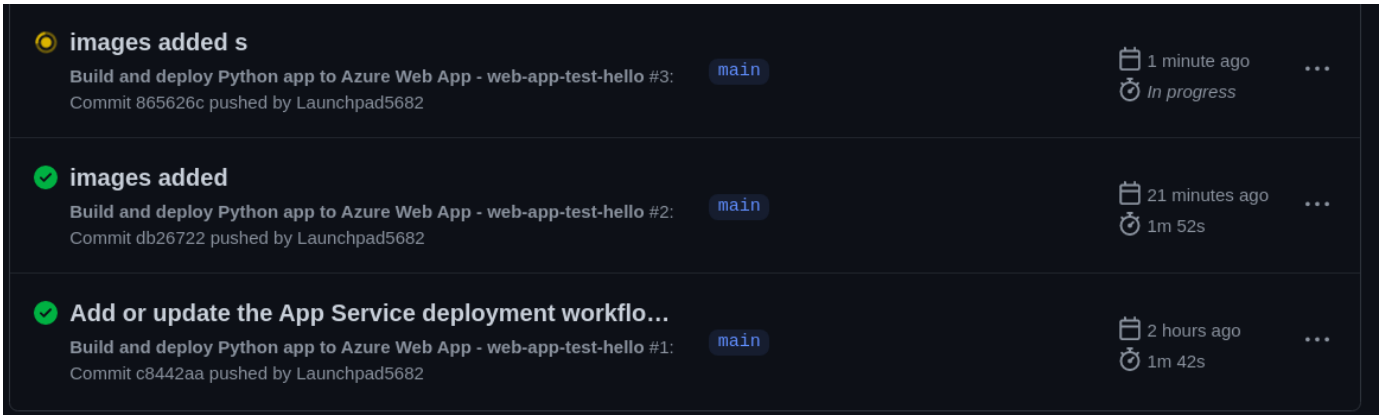
Accounts with the selected kind, replication and performance type only support block and append blobs. Page blobs, file shares, tables, and queues will not be available.

- Add a container, it is like a bicket in S3 or folder in normal file system.

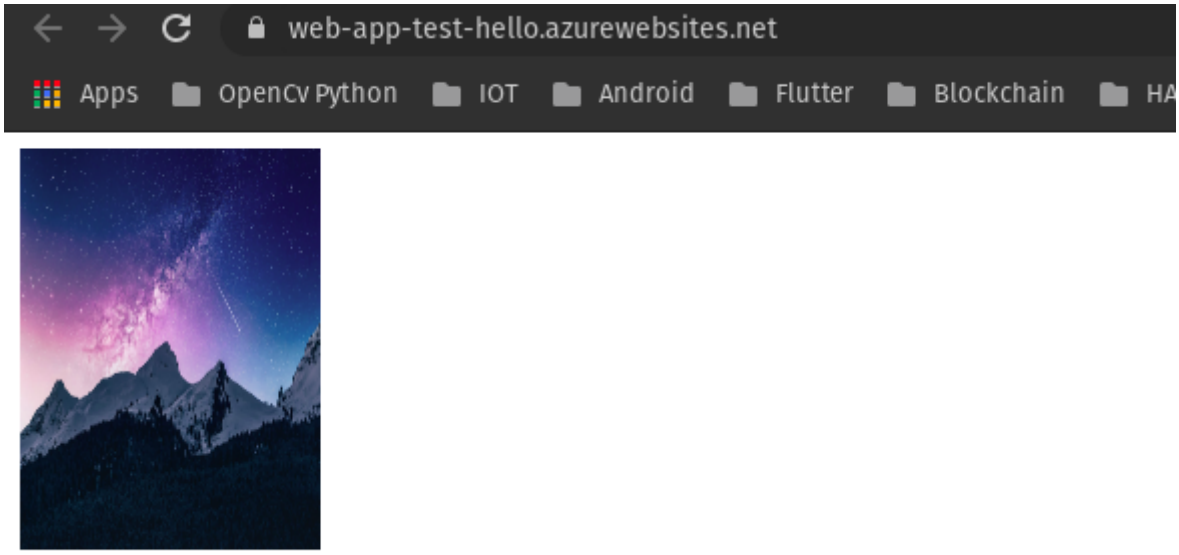


- Upload the files.
- Changed the python code and included the url of the object in the code. Pushed the code and changes will automatically take place. Action sectio looks like this while the code is update on the

storage account.

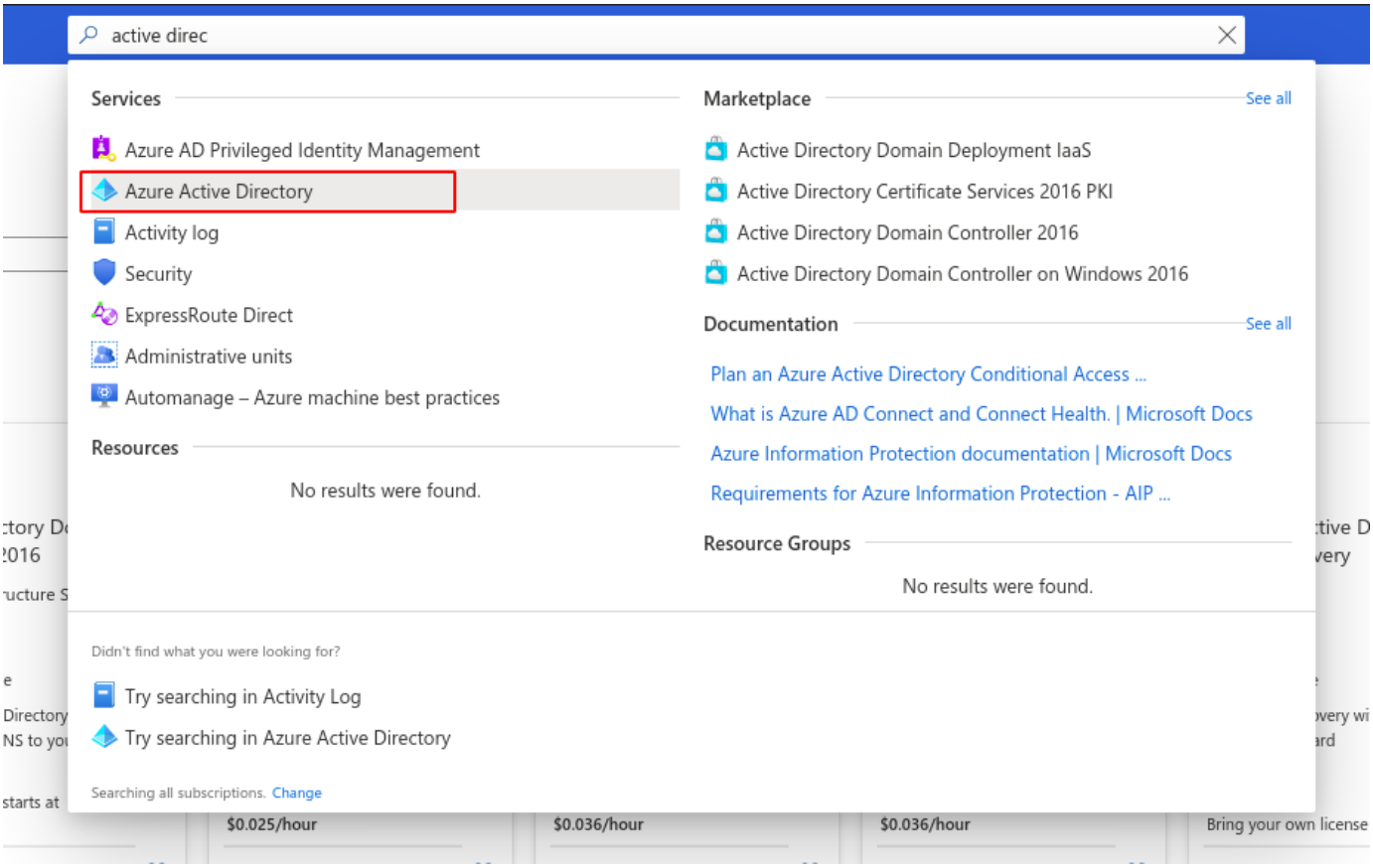


- I've added url of blob storage of image in the code.



Active Directory

- Using Azure active directory, you can create the new user with custom permissions.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