

Programme: BSc Cloud Computing

Module: Cloud Computing Architecture

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Assessment- 2 Design and Deploy a web Application.

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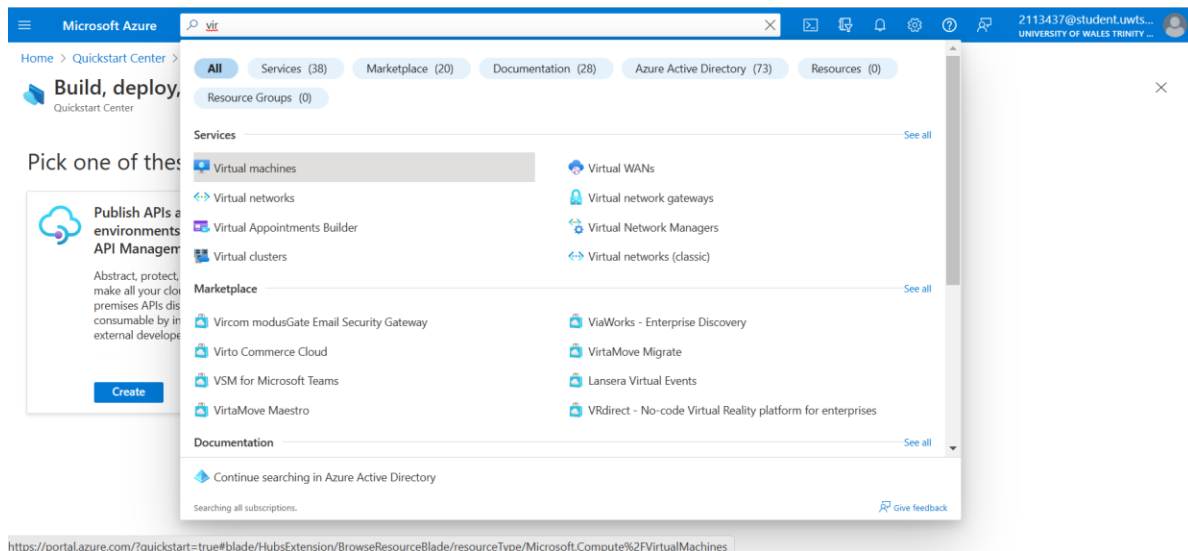
This is a User Guide of Carol UWTSD Web Application Deployed on the MS Azure. In this guide, you will find all the necessary information on how to create an VM on MS Azure and deploy a Python web app. This guide will also include screenshots from Azure Dashboard for better understanding and the screenshot with app running.

Setting up the VM machine on Microsoft Azure

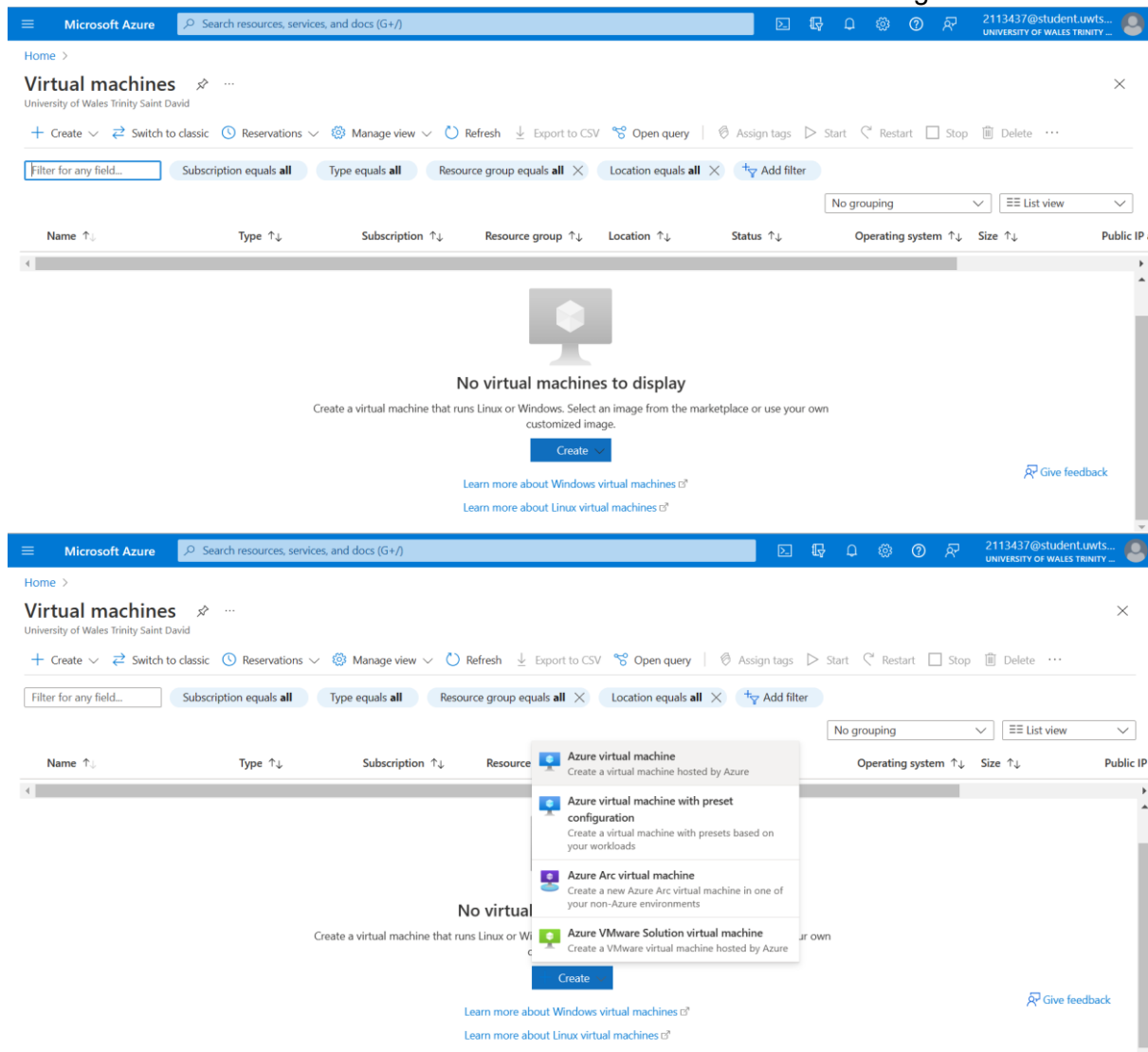
First of all you will need to create an account on <https://portal.azure.com>, for this Guide we used a student free subscription.

Step 1 – Create VM Machine

In the search box, you will need to type “Virtual Machines” and click on the first image as shown in the image bellow.



Click the "Create" button and select "Azure Virtual Machine" from the box given.



Step 2 – Setup the Azure VM

In the "Basics" tab, fill in the required information for your VM:

Microsoft Azure

Home > Virtual machines >

Create a virtual machine

Basics | Disks | Networking | Management | Monitoring | Advanced | Tags | Review + create

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

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

Subscription *

Resource group * [Create new](#)

Instance details

Virtual machine name *

Region *

Availability options

[Review + create](#) [< Previous](#) [Next: Disks >](#) [Give feedback](#)

Subscription: select your subscription

Resource group: create or select a resource group.

Virtual machine name: give a name for your VM.

Region: select your region. In my case is UK

Image: select the operating system image for your VM (Ubuntu Server x64 used in this demonstration)

Size: select the size for your VM (we used the cheapest size)

Authentication type: select "SSH public key"

Username: enter a username for the VM (we used "CarolUser")

SSH public key: enter the public SSH key (we used "CarolSSHKeyD")

Microsoft Azure

Home > Virtual machines >

Create a virtual machine

Subscription *

Resource group * [Create new](#)

Instance details

Virtual machine name *

Region *

Availability options

Security type

Image * [See all images](#) [Configure VM generation](#)

VM architecture ☐ Arm64 ☒ x64

Run with Azure Spot discount ☒

Eviction type ☒ Capacity only: Your virtual machine will be evicted when Azure's excess capacity disappears. ☐ Price or capacity: Your virtual machine will be evicted when Azure's excess capacity disappears, or costs exceed your specified max price.

Eviction policy ☒ Stop / Deallocate ☐ Delete

[Review + create](#) [< Previous](#) [Next: Disks >](#) [Give feedback](#)

Step 2 – Disks

In the "Disks" tab, select the disk type for your VM (we used "Standard SSD").

Click the "Next" button.

The screenshot shows the 'Disks' tab of the 'Create a virtual machine' wizard in the Microsoft Azure portal. The page has a blue header with the Microsoft Azure logo and a search bar. Below the header, the breadcrumb 'Home > Virtual machines >' is visible. The main title is 'Create a virtual machine' with a close button. The tabs 'Basics', 'Disks', 'Networking', 'Management', 'Monitoring', 'Advanced', 'Tags', and 'Review + create' are shown, with 'Disks' being the active tab. The content area explains that Azure VMs have one operating system disk and a temporary disk for short-term storage. It also mentions VM disk encryption and encryption at host. The 'OS disk' section shows 'Standard SSD (locally-redundant storage)' selected. Below this, there are checkboxes for 'Delete with VM' (checked), 'Key management' (Platform-managed key), and 'Enable Ultra Disk compatibility'. At the bottom, there is a table for 'Data disks for Carol-uetsdVM' with columns for LUN, Name, Size (GiB), Disk type, Host caching, and Delete with VM. The 'Review + create' button is highlighted in blue, and there are 'Previous' and 'Next: Networking >' buttons.

Step 3 – Networking

In the "Networking" tab, leave the default subnet.

Click the "Next" button.

The screenshot shows the 'Networking' tab of the 'Create a virtual machine' wizard in the Microsoft Azure portal. The page has a blue header with the Microsoft Azure logo and a search bar. Below the header, the breadcrumb 'Home > Virtual machines >' is visible. The main title is 'Create a virtual machine' with a close button. The tabs 'Basics', 'Disks', 'Networking', 'Management', 'Monitoring', 'Advanced', 'Tags', and 'Review + create' are shown, with 'Networking' being the active tab. The content area explains that network connectivity is defined by configuring network interface card (NIC) settings. The 'Network interface' section states that a network interface will be created for the VM. The 'Virtual network' dropdown is set to '(new) Carol-uetsdVM_group-vnet'. The 'Subnet' dropdown is set to '(new) default (10.0.0.0/24)'. The 'Public IP' dropdown is set to '(new) Carol-uetsdVM-ip'. The 'NIC network security group' section has radio buttons for 'None', 'Basic' (selected), and 'Advanced'. The 'Public inbound ports' section has radio buttons for 'None' and 'Allow selected ports' (selected). The 'Select inbound ports' dropdown is set to 'SSH (22)'. At the bottom, there is a warning message: 'This will allow all IP addresses to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.' The 'Review + create' button is highlighted in blue, and there are 'Previous' and 'Next: Management >' buttons.

The screenshot shows the 'Create a virtual machine' page in the Microsoft Azure portal. The 'Monitoring' tab is selected, and the 'Review + create' button is visible at the bottom. The page displays various configuration options for the virtual machine, including system assigned managed identity, Azure AD login, auto-shutdown settings, backup, and guest OS updates. The 'Review + create' button is highlighted in blue.

Step 4 – Monitoring, Advanced and Tag we can skip.

The screenshot shows the 'Create a virtual machine' page in the Microsoft Azure portal. The 'Monitoring' tab is selected, and the 'Review + create' button is visible at the bottom. The page displays various configuration options for the virtual machine, including system assigned managed identity, Azure AD login, auto-shutdown settings, backup, and guest OS updates. The 'Review + create' button is highlighted in blue.

Step 5 – Review

In the "Review" tab, review the cost estimates for your VM.

Select the cheapest version and notice that you will be charged per hour when the VM is on.

Click the "Next" button.

Microsoft Azure

Home > Virtual machines >

Create a virtual machine

Validation passed

Basics Disks Networking Management Monitoring Advanced Tags **Review + create**

Cost given below is an estimate and not the final price. Please use [Pricing calculator](#) for all your pricing needs.

PRODUCT DETAILS

1 X Standard D2s v3
by Microsoft
[Terms of use](#) | [Privacy policy](#)

Subscription credits apply ⓘ
0.0123 USD/hr
[Pricing for other VM sizes](#)

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

Name

Preferred e-mail address

Preferred phone number

Create < Previous Next > [Download a template for automation](#)

[Give feedback](#)

Step 6 – Validation and Create

In the "Validation" tab, review the validation results.

Click the "Create" button.

Wait for Azure to create your VM. It will automatically will generate a private key so that you can connect to the VM via SSH.

Congratulations! You have successfully created a Virtual Machine on Microsoft Azure. You can now connect to your VM using an SSH client.

Microsoft Azure

Home > Virtual machines >

Create a virtual machine

Validation passed

Networking

Virtual network	(new) Carol-uwtsdVM_group-vnet
Subnet	(new) default (10.0.0/24)
Public IP	(new) Carol-uwtsdVM-ip
Accelerated networking	On
Place this virtual machine behind an existing load balancing solution?	No
Delete public IP and NIC when VM is deleted	Disabled

Management

Microsoft Defender for Cloud	Basic (free)
System assigned managed identity	Off
Login with Azure AD	Off
Auto-shutdown	On
Backup	Disabled
Enable hotpatch	Off
Patch orchestration options	Image Default

Monitoring

Alerts	Off
Boot diagnostics	On
Enable OS guest diagnostics	Off

Create < Previous Next > [Download a template for automation](#)

[Give feedback](#)

Microsoft Azure

Home > Virtual machines > Create a virtual machine

Validation passed

Networking

- Virtual network: (new) Carol-uwtstdvm_group-vnet
- Subnet: (new) default (10.0.0.0/24)
- Public IP: (new) Carol-uwtstdvm-ip
- Accelerated networking: On
- Place this virtual machine behind an existing load balancing solution?: No
- Delete public IP and NIC when VM is deleted: Disabled

Management

- Microsoft Defender for Cloud: Basic (free)
- System assigned managed identity: Off
- Login with Azure AD: Off
- Auto-shutdown: On
- Backup: Disabled
- Enable hotpatch: Off
- Patch orchestration options: Image Default

Monitoring

- Alerts: Off
- Boot diagnostics: On
- Enable OS guest diagnostics: Off

Generate new key pair

An SSH key pair contains both a public key and a private key. Azure doesn't store the private key. After the SSH key resource is created, you won't be able to download the private key again. [Learn more](#)

[Download private key and create resource](#)

[Return to create a virtual machine](#)

[Create](#) [Previous](#) [Next](#) [Download a template for automation](#) [Give feedback](#)

Deployment

If deployment is complete you will receive a notification saying that the deployment succeeded

Microsoft Azure

Home > CreateVm-canonical.0001-com-ubuntu-server-focal-2-20230131130220 | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

Overview

Your deployment is complete

Deployment name: CreateVm-canonical.0001-com-ubuntu-server-f... Start time: 1/31/2023, 1:14:14 PM
 Subscription: Azure subscription 1
 Resource group: Carol-uwtstdvm_group Correlation ID: 2a1a6e63-743b-429a-9077-b1b3475395de

Deployment details

Next steps

- Setup auto-shutdown Recommended
- Monitor VM health, performance and network dependencies Recommended
- Run a script inside the virtual machine Recommended

[Go to resource](#) [Create another VM](#)

Notifications

More events in the activity log > Dismiss all

Deployment succeeded

Deployment 'CreateVm-canonical.0001-com-ubuntu-server-focal-2-20230131130220' to resource group 'Carol-uwtstdvm_group' was successful.

[Go to resource](#) [Pin to dashboard](#)

a minute ago

<https://portal.azure.com/?quickstart=true#>

VM Dashboard

In the VM dashboard we have useful information about our VM which we already created.

Carol-uwtsdVM
Virtual machine

Connect ▾ ▶ Start Restart Stop Capture Delete Refresh Open in mobile CLI / PS Feedback

⚠ Carol-uwtsdVM virtual machine agent status is not ready. Troubleshoot the issue →

Essentials

Resource group (move)	Carol-uwtsdVM_group	Operating system	Linux
Status	Running	Size	Standard D2s v3 (2 vcpus, 8 GiB memory)
Location	UK South	Public IP address	20.162.225.47
Subscription (move)	Azure subscription_1	Virtual network/subnet	Carol-uwtsdVM_group-vnet/default
Subscription ID	b31d1a2b-f712-4f36-817a-ca4374c21c3f	DNS name	Not configured
Tags (edit)	Click here to add tags		

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine

Computer name	Carol-uwtsdVM
Health state	-
Operating system	Linux
Publisher	canonical
Offer	0001-com-ubuntu-server-focal
Plan	20_04-its-gen2
VM generation	V2
VM architecture	x64
Agent status	Not Ready
Agent version	Unknown
Host group	None

Networking

Public IP address	20.162.225.47
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	Carol-uwtsdVM_group-vnet/default
DNS name	Configure

Size

Size	Standard D2s v3
vCPUs	2
RAM	8 GiB

VM connect to SSH.

To connect to VM through SSH, you will need to Press Connect button and SSH. This will allow you to create a SSH connection.

Carol-uwtsdVM
Virtual machine

Connect ▾ ▶ Start Restart Stop Capture Delete Refresh Open in mobile CLI / PS Feedback

SSH
RDP
Bastion

⚠ Carol-uwtsdVM virtual machine agent status is not ready. Troubleshoot the issue →

Essentials

Resource group (move)	Carol-uwtsdVM_group	Operating system	Linux
Status	Running	Size	Standard D2s v3 (2 vcpus, 8 GiB memory)
Location	UK South	Public IP address	20.162.225.47
Subscription (move)	Azure subscription_1	Virtual network/subnet	Carol-uwtsdVM_group-vnet/default
Subscription ID	b31d1a2b-f712-4f36-817a-ca4374c21c3f	DNS name	Not configured
Tags (edit)	Click here to add tags		

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine

Computer name	Carol-uwtsdVM
Health state	-
Operating system	Linux
Publisher	canonical
Offer	0001-com-ubuntu-server-focal
Plan	20_04-its-gen2
VM generation	V2
VM architecture	x64
Agent status	Not Ready
Agent version	Unknown
Host group	None

Networking

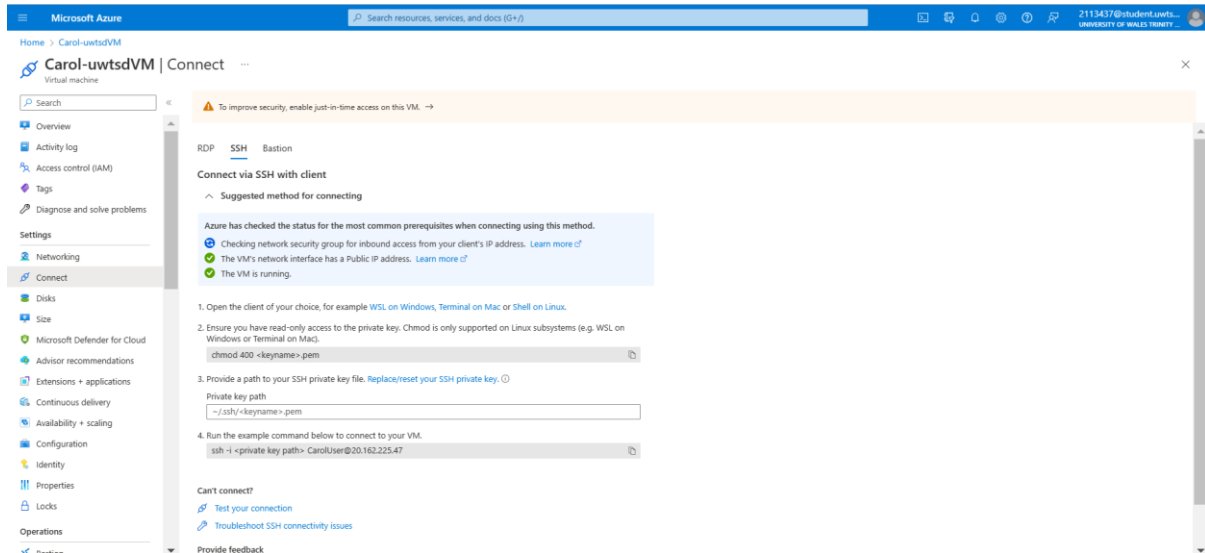
Public IP address	20.162.225.47
Public IP address (IPv6)	-
Private IP address	10.0.0.4
Private IP address (IPv6)	-
Virtual network/subnet	Carol-uwtsdVM_group-vnet/default
DNS name	Configure

Size

Size	Standard D2s v3
vCPUs	2
RAM	8 GiB

Now as you can see in the picture below. You will have details about Private key path and an example how to run in PowerShell this command.

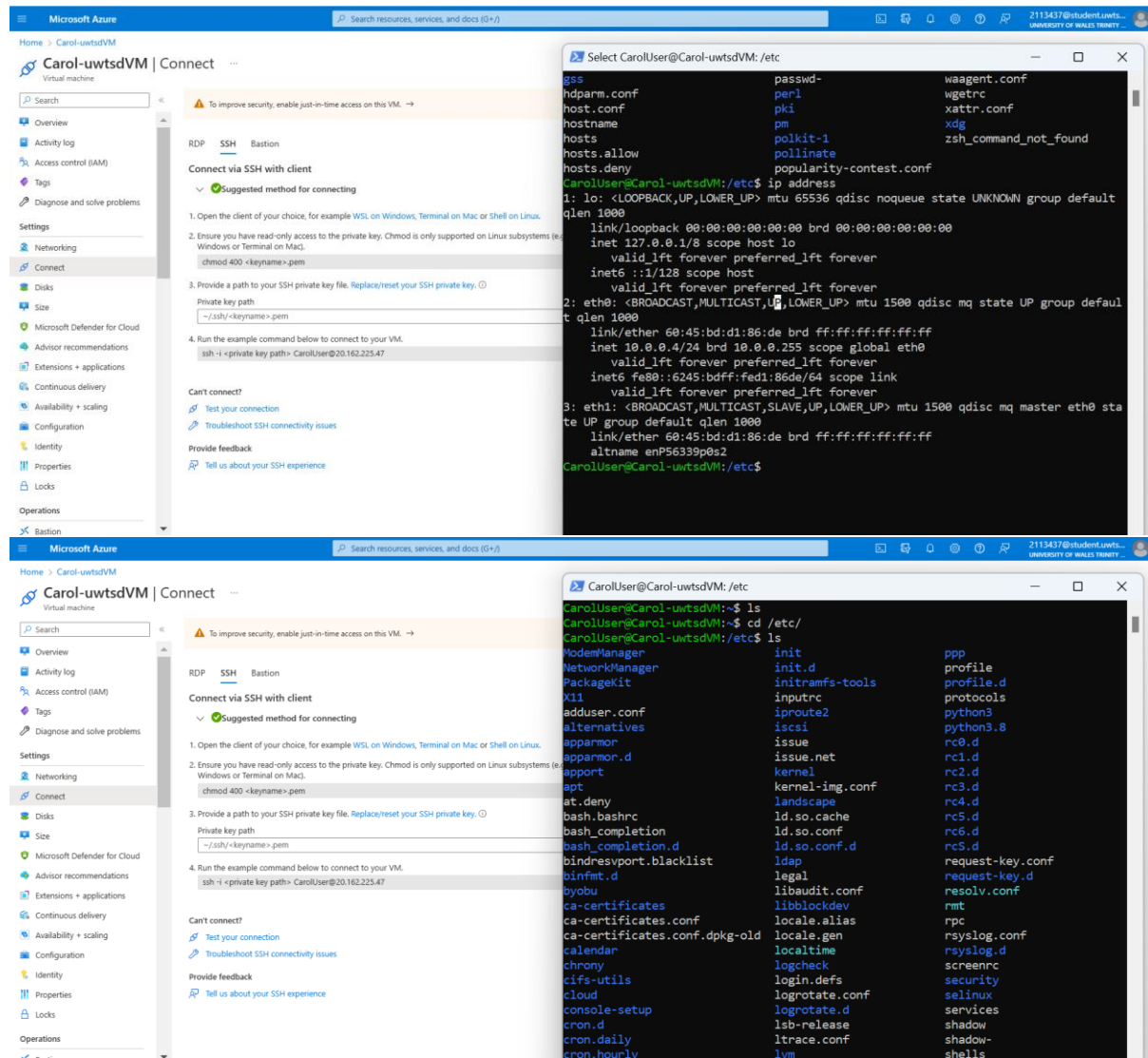
Ssh -I <private key path> [CarolUser@20.162.225.47](#). Bear in mind that you have to download in your computer the Private Key!



PowerShell

As you can see in the two image below, the connection between client machine and VM is successfully. Every command in PowerShell is using CarolUser@Carol-UWTSDVM. That is the username of client and the VM name.

Few commands has been given for showing the IP address and VM directories.

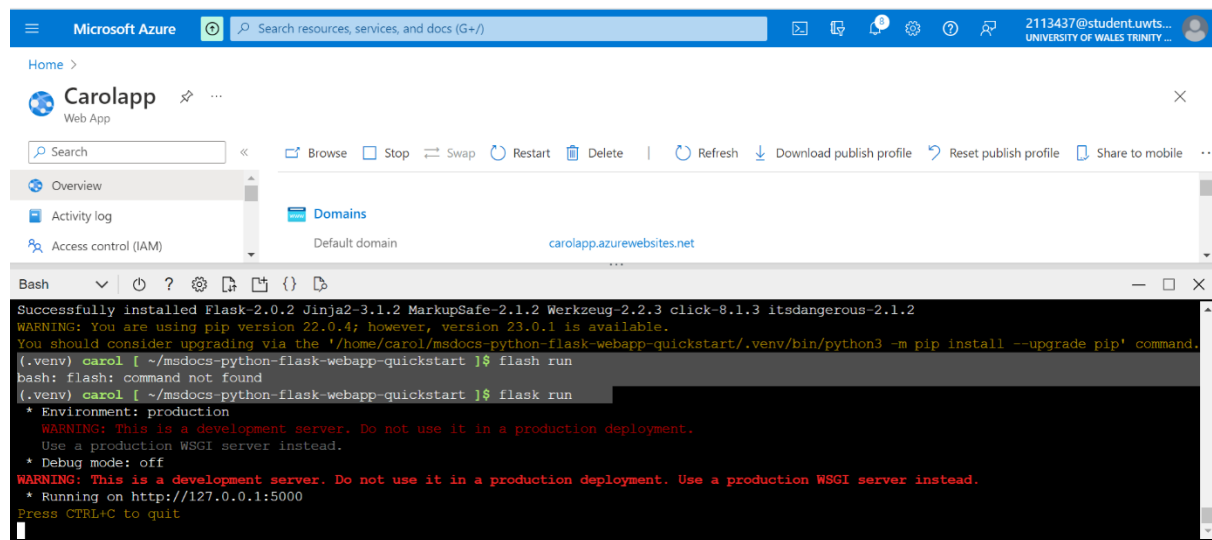


Deploy Python

Furthermore, for deploying an Python flask app on MS Azure. For deploying any app we need to make sure that the VM is on.

Using the Bash command successfully we installed and deploy the app. Please see image below for the code using.

1



```

Microsoft Azure
Search resources, services, and docs (G+/)
2113437@student.uwts... UNIVERSITY OF WALES TRINITY...

Home >
Carolapp
Web App

Search
Browse Stop Swap Restart Delete Refresh Download publish profile Reset publish profile Share to mobile

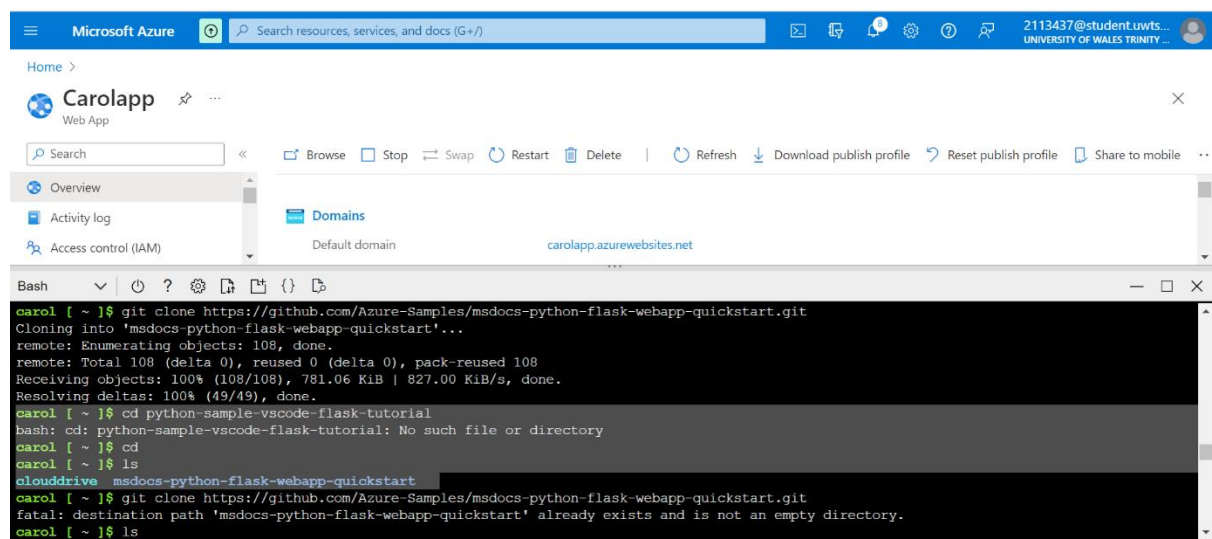
Overview
Activity log
Access control (IAM)

Domains
Default domain carolapp.azurewebsites.net

Bash
Successfully installed Flask-2.0.2 Jinja2-3.1.2 MarkupSafe-2.1.2 Werkzeug-2.2.3 click-8.1.3 itsdangerous-2.1.2
WARNING: You are using pip version 22.0.4; however, version 23.0.1 is available.
You should consider upgrading via the '/home/carol/msdocs-python-flask-webapp-quickstart/.venv/bin/python3 -m pip install --upgrade pip' command.
(.venv) carol [ ~/msdocs-python-flask-webapp-quickstart ]$ flask run
bash: flask: command not found
(.venv) carol [ ~/msdocs-python-flask-webapp-quickstart ]$ flask run
* Environment: production
WARNING: This is a development server. Do not use it in a production deployment.
Use a production WSGI server instead.
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit

```

2



```

Microsoft Azure
Search resources, services, and docs (G+/)
2113437@student.uwts... UNIVERSITY OF WALES TRINITY...

Home >
Carolapp
Web App

Search
Browse Stop Swap Restart Delete Refresh Download publish profile Reset publish profile Share to mobile

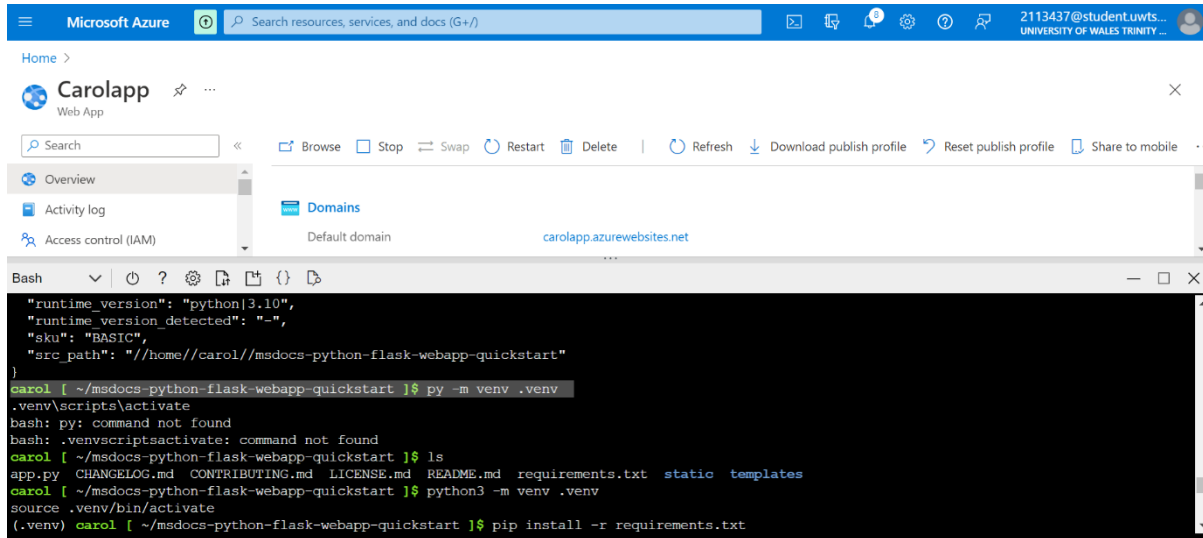
Overview
Activity log
Access control (IAM)

Domains
Default domain carolapp.azurewebsites.net

Bash
carol [ ~ ]$ git clone https://github.com/Azure-Samples/msdocs-python-flask-webapp-quickstart.git
Cloning into 'msdocs-python-flask-webapp-quickstart'...
remote: Enumerating objects: 108, done.
remote: Total 108 (delta 0), reused 0 (delta 0), pack-reused 108
Receiving objects: 100% (108/108), 781.06 KiB | 827.00 KiB/s, done.
Resolving deltas: 100% (49/49), done.
carol [ ~ ]$ cd python-sample-vscode-flask-tutorial
bash: cd: python-sample-vscode-flask-tutorial: No such file or directory
carol [ ~ ]$ cd
carol [ ~ ]$ ls
cloudrive msdocs-python-flask-webapp-quickstart
carol [ ~ ]$ git clone https://github.com/Azure-Samples/msdocs-python-flask-webapp-quickstart.git
fatal: destination path 'msdocs-python-flask-webapp-quickstart' already exists and is not an empty directory.
carol [ ~ ]$ ls

```

3

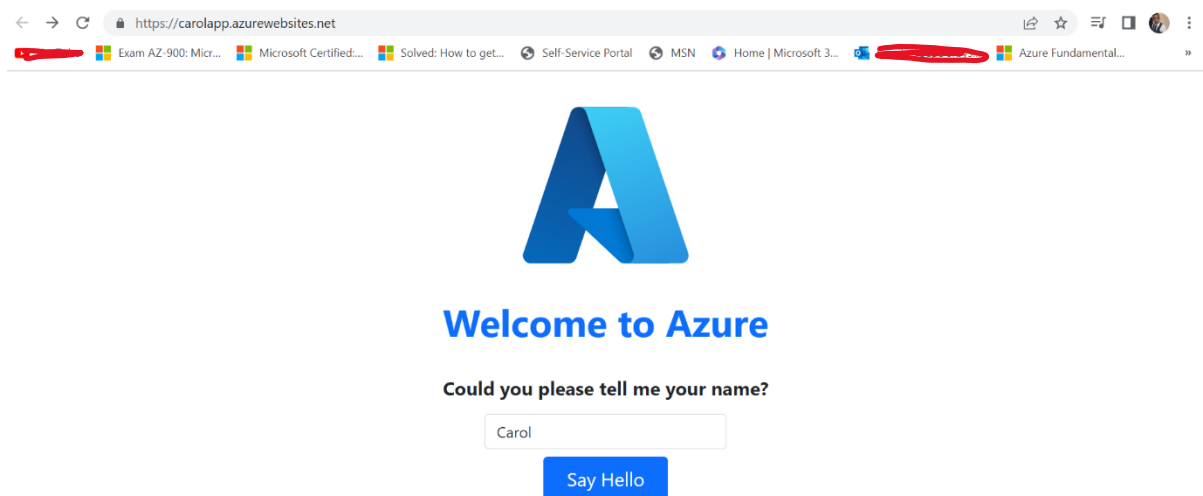


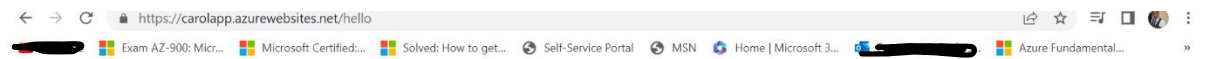
The screenshot shows the Microsoft Azure portal interface. At the top, the user is logged in as 2113437@student.luwts... from the University of Wales Trinity. The main content area displays the 'Carolapp' Web App. The left sidebar shows the 'Overview' tab selected, with links to 'Activity log' and 'Access control (IAM)'. The main area shows the 'Domains' section with the default domain 'carolapp.azurewebsites.net'. Below this, a terminal window is open, showing the following commands and output:

```
"runtime_version": "python(3.10",  
"runtime_version_detected": "-",  
"sku": "BASIC",  
"src_path": "//home//carol//msdocs-python-flask-webapp-quickstart"  
}  
carol [ ~/msdocs-python-flask-webapp-quickstart ]$ py -m venv .venv  
.venv\scripts\activate  
bash: py: command not found  
bash: .venvscriptsactivate: command not found  
carol [ ~/msdocs-python-flask-webapp-quickstart ]$ ls  
app.py  CHANGELOG.md  CONTRIBUTING.md  LICENSE.md  README.md  requirements.txt  static  templates  
carol [ ~/msdocs-python-flask-webapp-quickstart ]$ python3 -m venv .venv  
source .venv/bin/activate  
(.venv) carol [ ~/msdocs-python-flask-webapp-quickstart ]$ pip install -r requirements.txt
```

UWTSD App

In the images below you can see that the app is running successfully. As you can see the URL in my case is my app's name.





Hello Carol

It is nice to meet you!

[Back home](#)