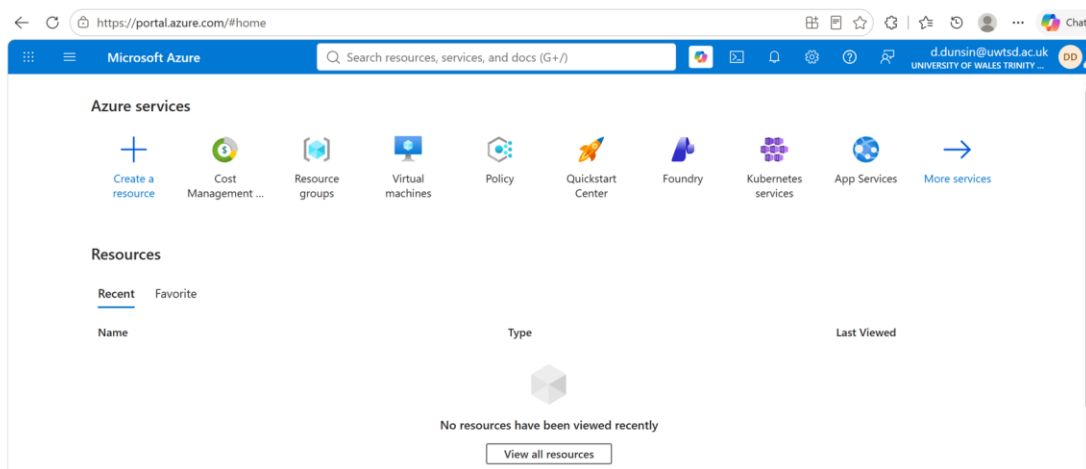
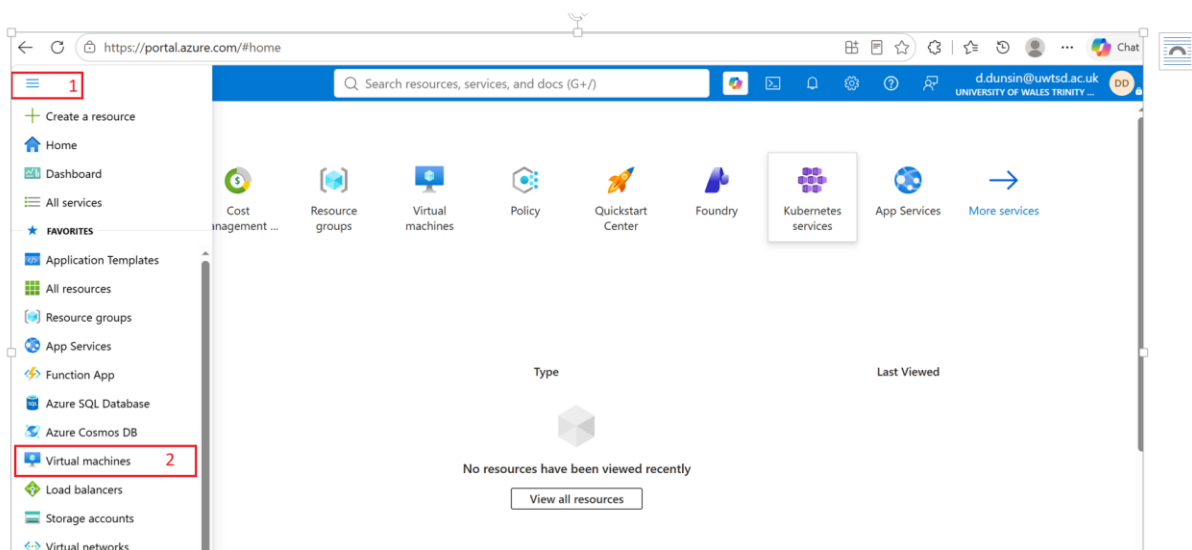


HOW TO SET UP AN AZURE VIRTUAL MACHINE: A STEP-BY-STEP GUIDE

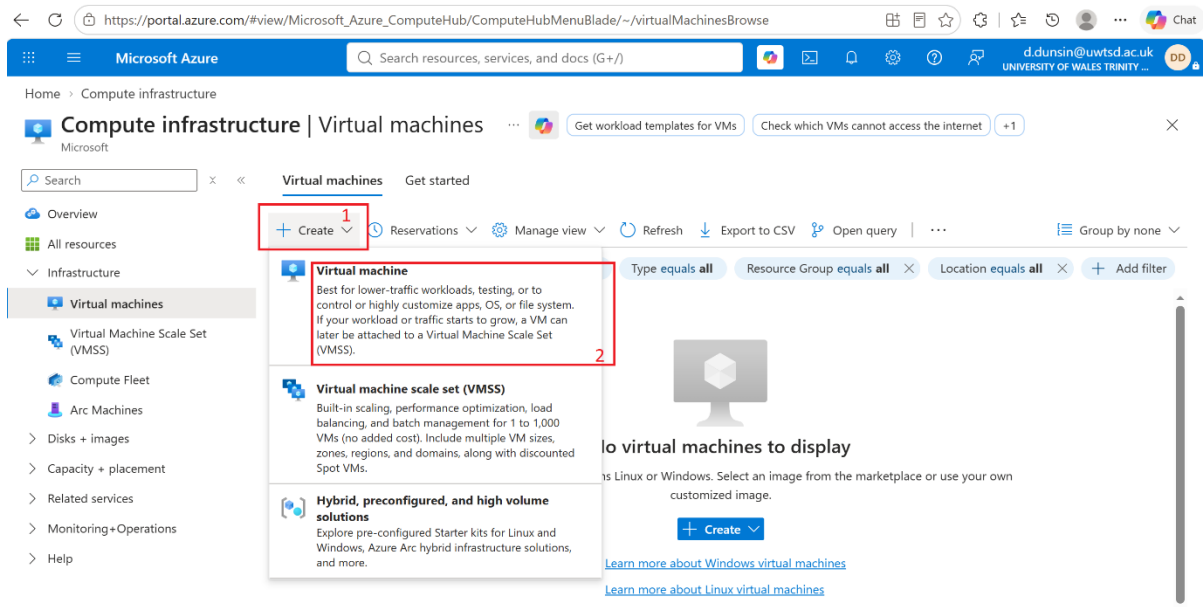
1. This screenshot shows the **Microsoft Azure portal home page**. The **Azure services** section provides quick access to commonly used services, including **Virtual machines**, **Resource groups**, **App Services**, and **Kubernetes services**. To begin setting up a new Azure Virtual Machine, select **Virtual machines** or click **Create a resource**. The **Resources** section displays recently accessed resources, while the **Navigate** section provides links to subscriptions, resource groups, dashboards, and all resources.



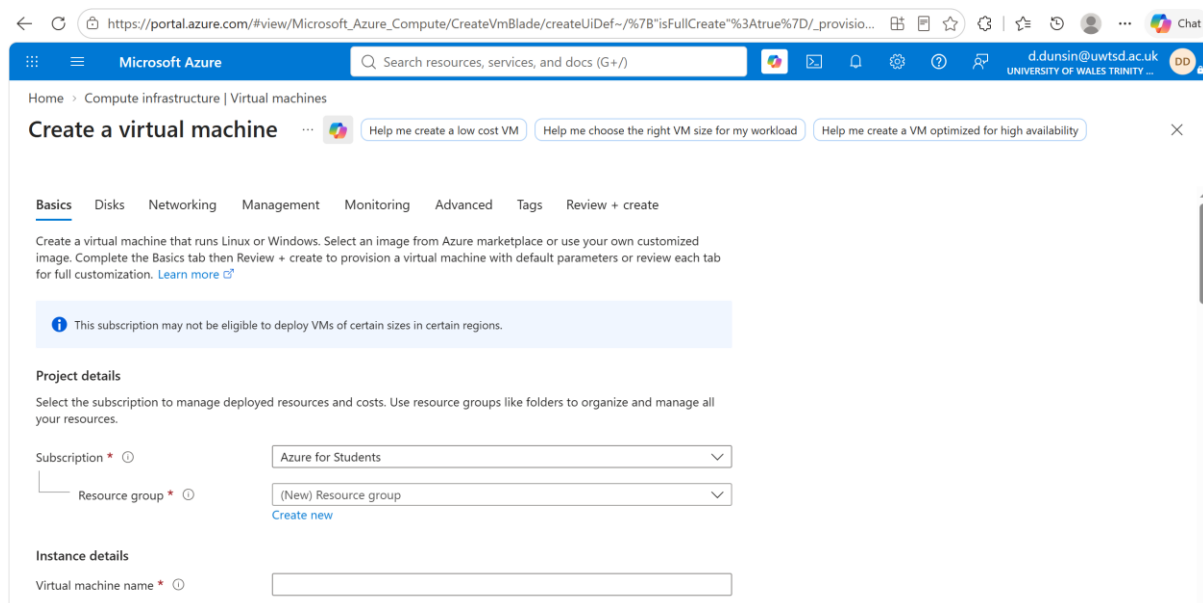
2. This screenshot shows the **Azure portal navigation menu** opened on the left side. The menu provides quick access to services such as **Virtual machines**, **Resource groups**, **Storage accounts**, **Virtual networks**, and **Microsoft Entra ID**. To continue creating an Azure virtual machine, select **Virtual machines** from the left navigation menu.



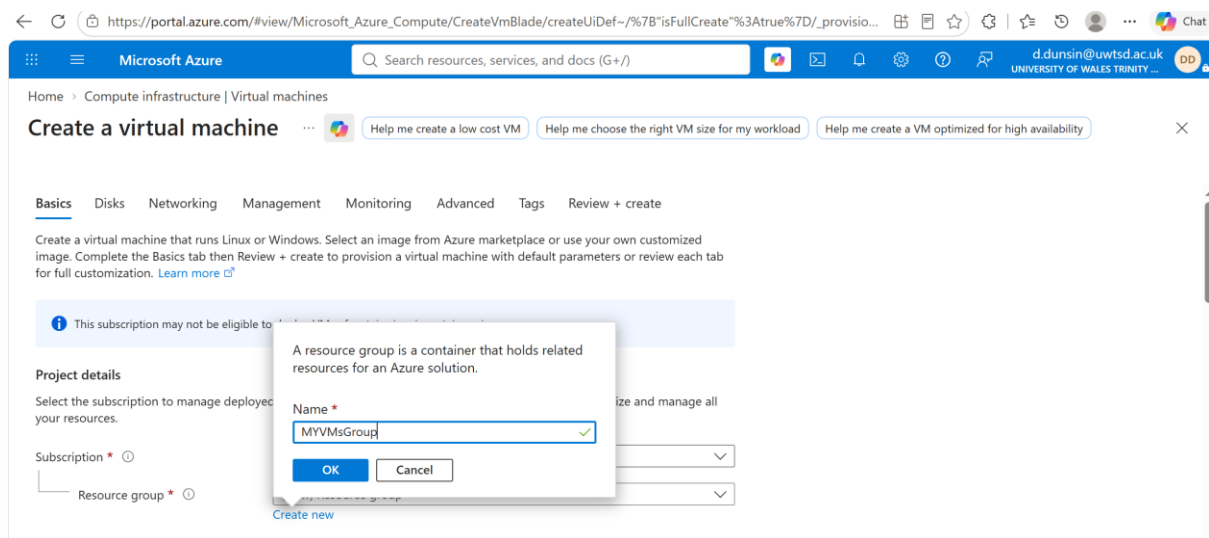
3. This screenshot shows the **Virtual machines** page in the Azure portal. The **Create** menu is open and displays several deployment options. To create a standard Azure virtual machine, select **Virtual machine**. The other options are intended for scalable VM groups or preconfigured and high-volume solutions.



4. This screenshot shows the **Create a virtual machine** page in Microsoft Azure. In the **Basics** tab, you configure the subscription, resource group, VM name, region, availability zone, security type, operating system image, and VM size. It also includes administrator access settings using an **SSH public key** and allows **SSH port 22** for remote access. After completing the required fields, select **Review + create** to validate and deploy the virtual machine.



5. This screenshot shows the creation of a new **Azure resource group** for the virtual machine. The group is named **MYVMsGroup**, but students can rename it to any suitable name they prefer. A resource group acts as a container for related Azure resources. Select **OK** to create the group and continue configuring the virtual machine.



6. This screenshot shows the **Instance details** section for creating an Azure virtual machine. The VM is named **DemosVM**, deployed in **Switzerland North**, and uses **Ubuntu Server 24.04 LTS, x64 architecture**, and **Standard security**. The selected size is **Standard_B2as_v2**, which provides **2 vCPUs and 8 GiB of memory** at an estimated cost of **\$69.35**. Students may change the VM name, region, image, and size based on their requirements and available Azure credit.

Virtual machine name *	DemosVM
Region *	(Europe) Switzerland North
Availability options	No infrastructure redundancy required
Security type	Standard
Image *	Ubuntu Server 24.04 LTS - x64 Gen2
VM architecture	☒ x64
Run with Azure Spot discount	☐
Size *	Standard_B2as_v2 - 2 vcpus, 8 GiB memory (\$69.35)

7. This screenshot shows the **Administrator account** settings for the Azure virtual machine. **SSH public key** is selected as the authentication method, with **azureuser** as the administrator username. Azure will generate a new **RSA SSH key pair** named **mySSHkeys** for secure remote access. Students can rename both the username and the key-pair name to any valid names they prefer. The downloaded private key should be stored securely because it will be required to connect to the virtual machine.

Authentication type ⓘ

☒ SSH public key

☐ Password

i Azure now automatically generates an SSH key pair for you and allows you to store it for future use. It is a fast, simple, and secure way to connect to your virtual machine.

Username * ⓘ

azureuser ✓

SSH public key source

Generate new key pair ✓

SSH Key Type

☒ RSA SSH Format

☐ Ed25519 SSH Format

i Ed25519 provides a fixed security level of no more than 128 bits for 256-bit key, while RSA could offer better security with keys longer than 3072 bits.

Key pair name *

mySSHkeys ✓

8. This screenshot shows the **Inbound port rules** for the virtual machine. **Allow selected ports** is enabled, with **HTTP (80)**, **HTTPS (443)**, and **SSH (22)** selected. These ports allow web traffic and secure remote access to the VM. Because they are open to all public IP addresses, this configuration is suitable mainly for testing. For better security, access should later be restricted to trusted IP addresses.

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports * ⓘ

☐ None

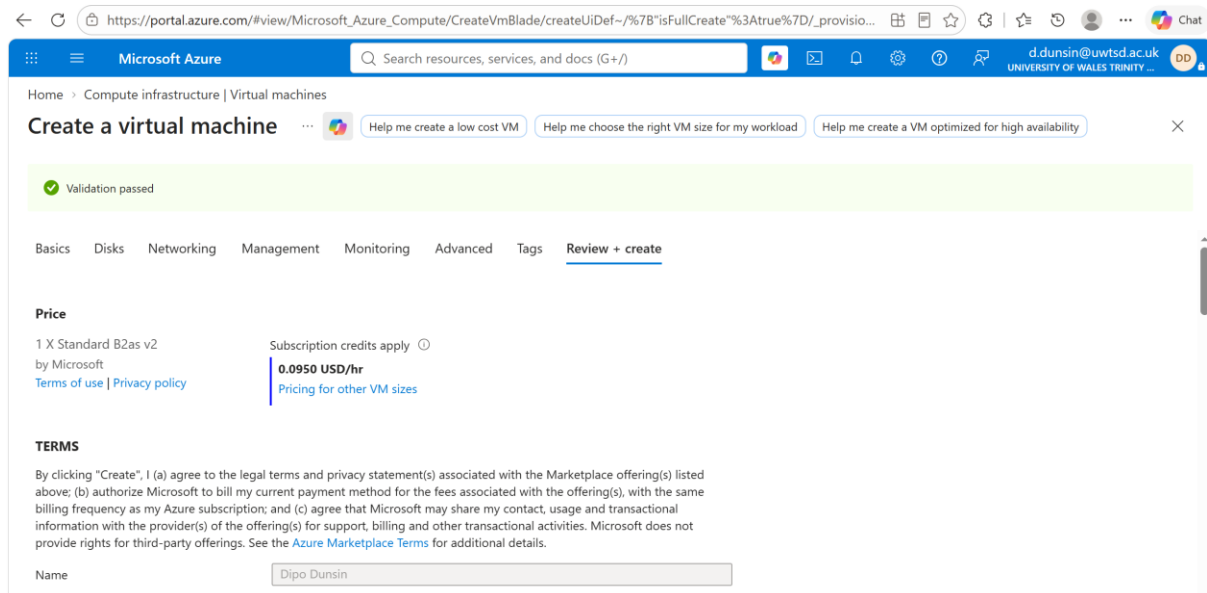
☒ Allow selected ports

Select inbound ports *

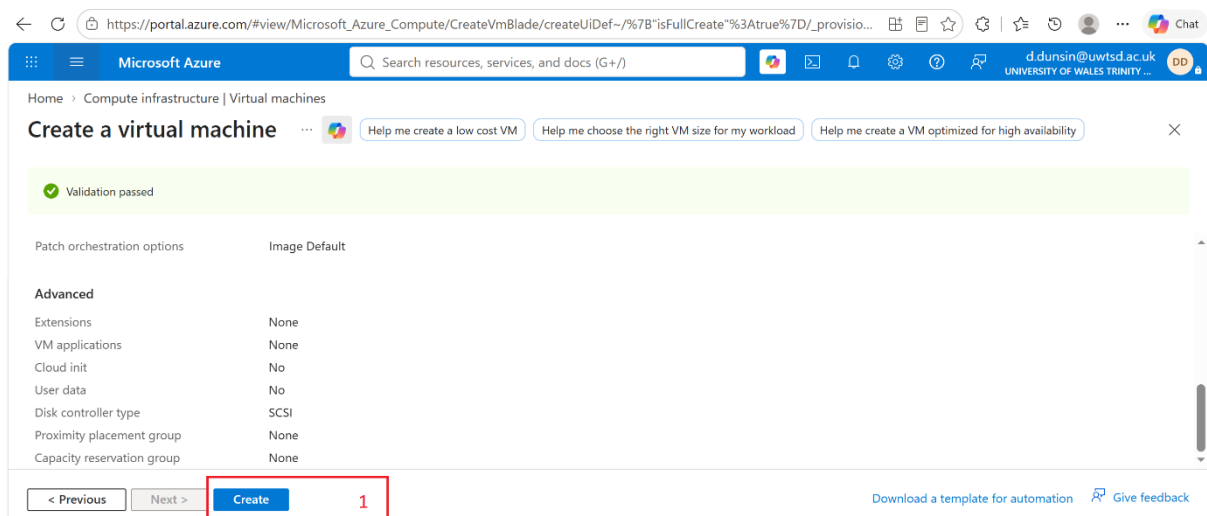
HTTP (80), HTTPS (443), SSH (22) ✓

⚠ 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.

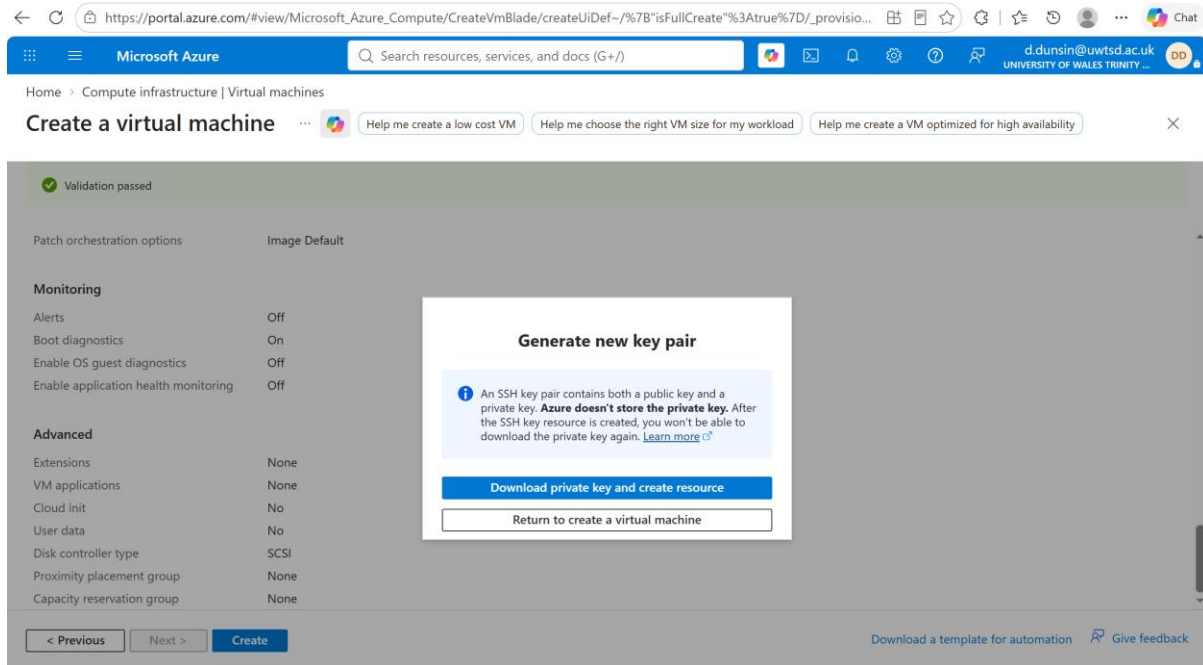
9. This screenshot shows the **Review + create** page for the Azure virtual machine. The configuration has passed validation and is ready for deployment. Azure displays the selected **Standard B2as v2** VM size with an estimated cost of **\$0.095 per hour**, which may be deducted from the student subscription credit. Review the settings and terms, then select **Create** to deploy the virtual machine.



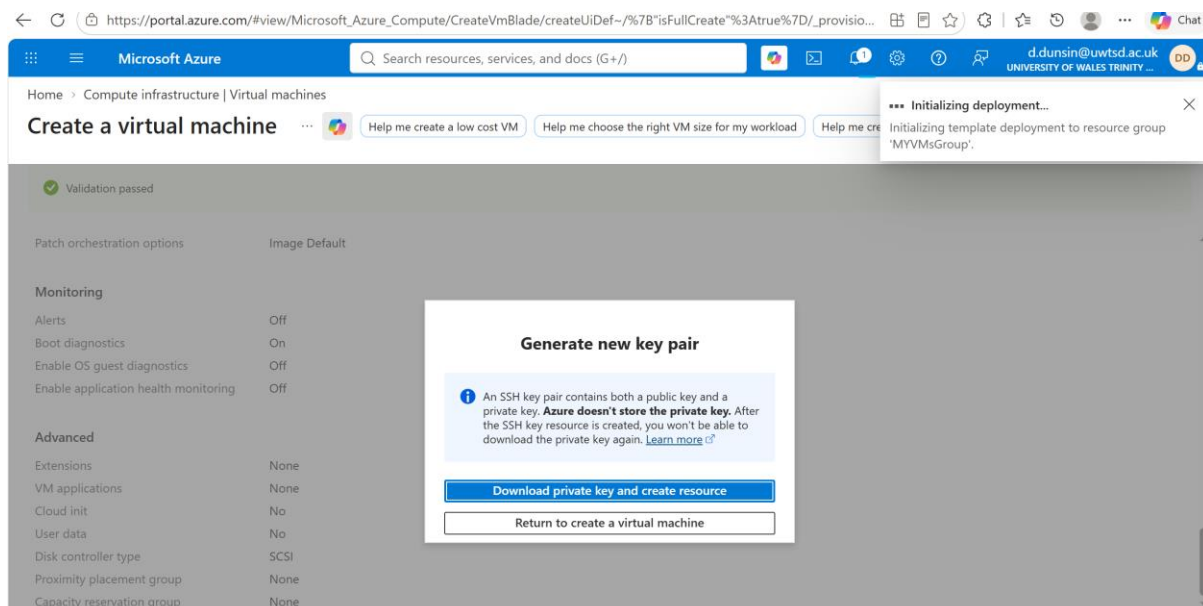
10. This screenshot shows the final **Review + create** stage of the Azure virtual machine setup. The configuration has passed validation, and the selected monitoring and advanced settings are summarized. **Boot diagnostics** is enabled, while alerts, guest diagnostics, application health monitoring, extensions, and cloud-init are disabled. Select **Create** to begin deploying the virtual machine.



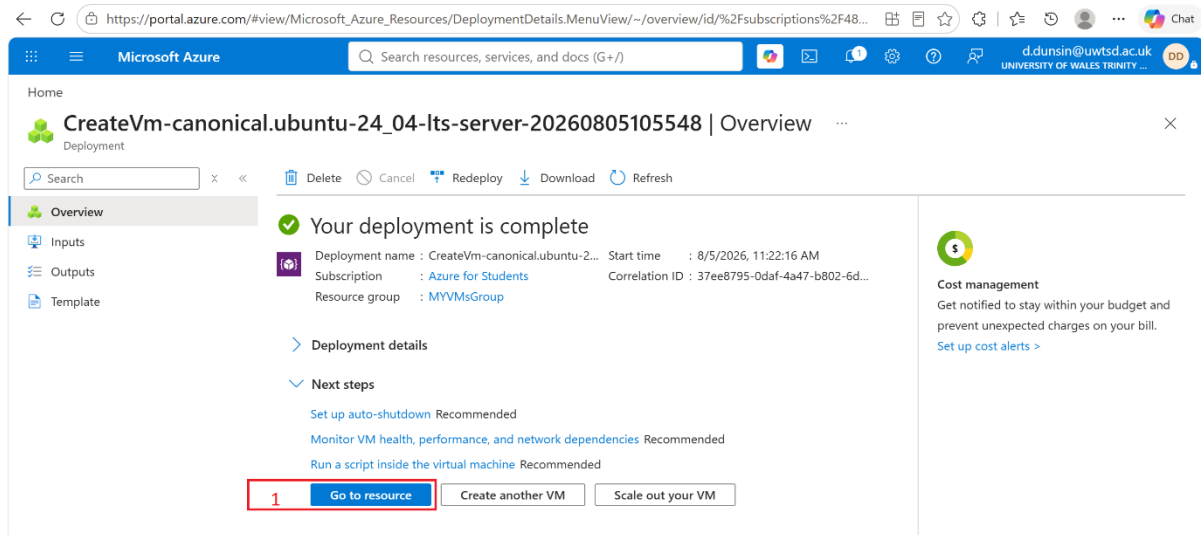
11. This screenshot shows the **Generate new key pair** prompt that appears before the VM is deployed. Select **Download private key and create resource** to save the SSH private key and begin creating the virtual machine. Store the downloaded key securely, because Azure does not keep a copy and it cannot be downloaded again later.



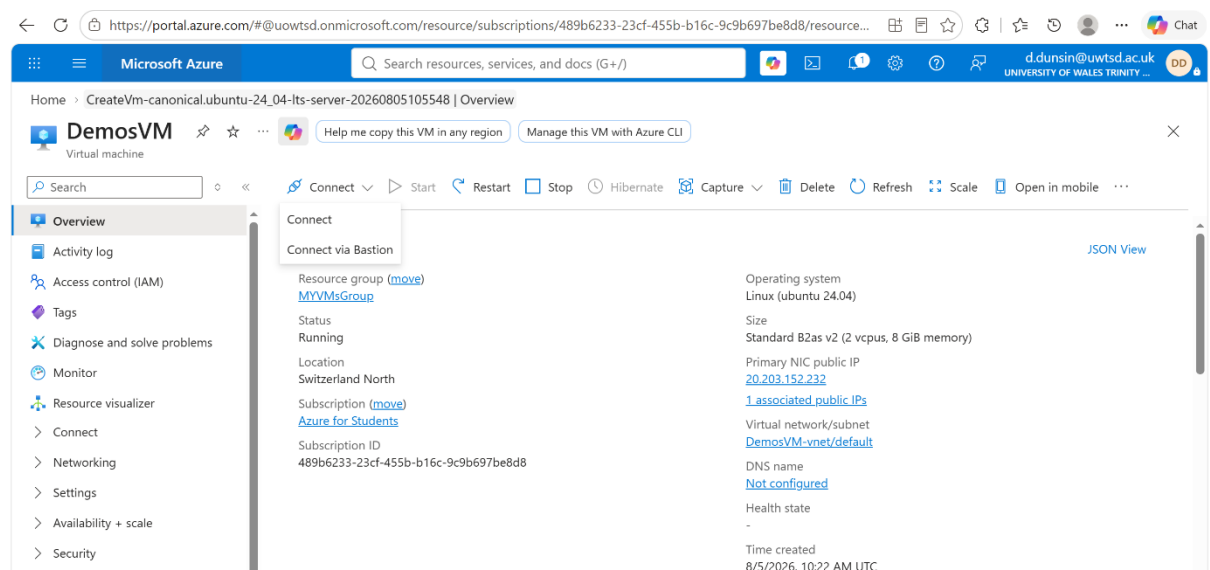
12. This screenshot shows Azure beginning the virtual machine deployment after the private SSH key has been downloaded. The notification in the top-right indicates that the deployment is being initialized in the **MYVMsGroup** resource group. Keep the downloaded private key secure and wait for Azure to confirm that the deployment has completed successfully.



13. This screenshot confirms that the Azure virtual machine deployment has completed successfully in the **MYVMsGroup** resource group under the **Azure for Students** subscription. Select **Go to resource** to open the new virtual machine, review its details, and continue with connection or management tasks. Azure also recommends setting up **auto-shutdown** to help reduce credit usage and avoid unnecessary costs.

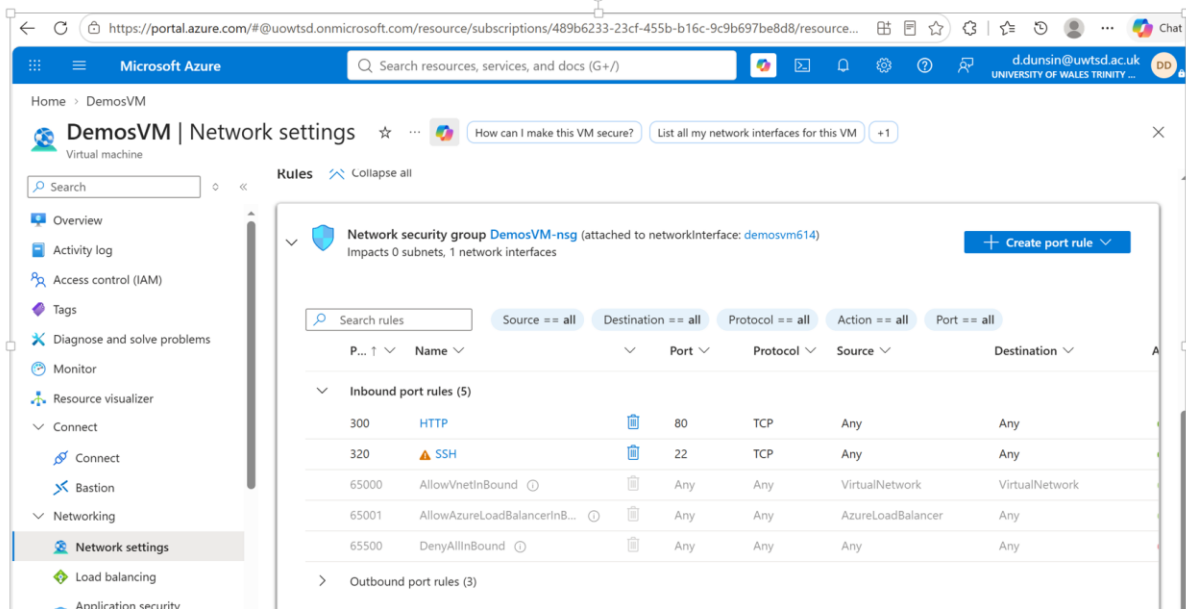


14. This screenshot shows the **Overview** page for the deployed **DemosVM** virtual machine. The VM is running Ubuntu 24.04 in the **Switzerland North** region and belongs to the **MYVMsGroup** resource group. It also displays the VM size, public IP address, virtual network, and subscription details. Use the **Connect** menu to access the VM, either through SSH connection options or **Azure Bastion**.

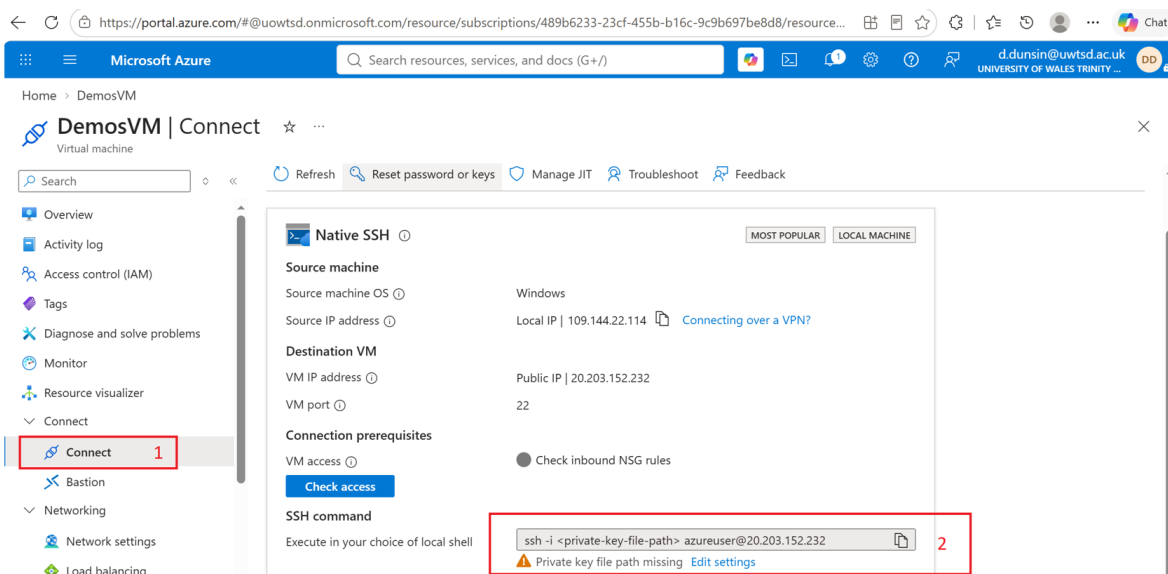


<https://learn.microsoft.com/en-us/azure/virtual-machines/linux-vm-connect?>

15. This screenshot shows the **Network settings** page for **DemosVM**. The attached network security group contains inbound rules that allow **HTTP traffic on port 80** and **SSH access on port 22**. The SSH rule currently accepts connections from **Any** source, which is suitable for testing but less secure. For improved security, restrict the SSH source to your own public IP address.



16. The screenshot shows the **Native SSH** connection page for the DemosVM virtual machine. After selecting **Connect** (1), Azure displays the VM's public IP address, SSH port 22, username **azureuser**, and the generated SSH command (2). Select **Check access** to verify the network rules, then use **Edit settings** to locate the downloaded .pem private key. Copy the completed SSH command into PowerShell to connect to the VM.



17. Find the private key downloaded during deployment. It should normally be in the **Downloads** folder and may be named: `mySSHkeys.pem`. Keep this file secure and do not share it. The private key provides access to the VM.

18. Open the Windows Start menu, search for **PowerShell**, and launch it. Move to the Downloads folder: `cd "$HOME\Downloads"` Check that the key is present: `dir *.pem`

```
PS C:\Users\User> cd "$HOME\Downloads"
PS C:\Users\User\Downloads> ssh -i ".\mySSHkeys.pem" azureuser@20.203.152.232
ssh: connect to host 20.203.152.232 port 22: Connection timed out
PS C:\Users\User\Downloads> ssh -i ".\mySSHkeys.pem" azureuser@20.203.152.232
The authenticity of host '20.203.152.232 (20.203.152.232)' can't be established.
ED25519 key fingerprint is SHA256:XwGar+gM1n3QIJJa1LADs2Us0exTtQ5A2zGQU7lySZiE.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '20.203.152.232' (ED25519) to the list of known hosts.
```

19. Connect to the VM: Run the following command, replacing `<PUBLIC_IP>` with the public IP copied from the VM Overview page:

```
ssh -i ".\mySSHkeys.pem" azureuser@<PUBLIC_IP>
```

For example:

```
ssh -i ".\mySSHkeys.pem" azureuser@20.203.152.232
```

Replace the example address with the VM's current public IP. Also replace `mySSHkeys.pem` or `azureuser` if different names were selected during setup. The required SSH format is `ssh -i PATH_TO_PRIVATE_KEY USERNAME@PUBLIC_IP`.

20. Accept the first connection: The first time you connect, PowerShell may display:

```
Are you sure you want to continue connecting (yes/no/[fingerprint])?
```

After verifying that the fingerprint belongs to your VM, enter: `yes`

21. A successful connection should display a Linux terminal prompt similar to:

```
azureuser@DemosVM:~$
```

You can test the connection with:

```
whoami
```

```
hostname
```

```
lsb_release -a
```

22. Disconnect from the VM: When finished, enter: `exit`