

Declaration	
Questions in this exercise are intentionally complex and could be convoluted or confusing. This is by design and to simulate real life situations where customers seldom give crystal clear requirements and ask unambiguous questions.	
I have read the above statement and agree to these conditions	
I AGREE	Nikita Agarwal
	<Enter your name above this line to indicate that you are in agreement>

Instructions
Every screenshot requested in this workbook is compulsory and carries 1 point
Your AWS account ID must be clearly visible in every screenshot using the AWS console; missing id or using someone else's id is not permitted. Such cases will be considered as plagiarism and severe penalty will be imposed.
All screenshots must be in the order mentioned under "Expected Screenshots" for every step
DO NOT WAIT UNTIL THE LAST MINUTE. The program office will not extend the project submission deadline under any circumstances.
The file should be renamed in the format BATCH_FIRSTNAME_LASTNAME_PROJECT1. For example: PGPCCMAY18_VIJAY_DWIVEDI_PROJECT1.pdf

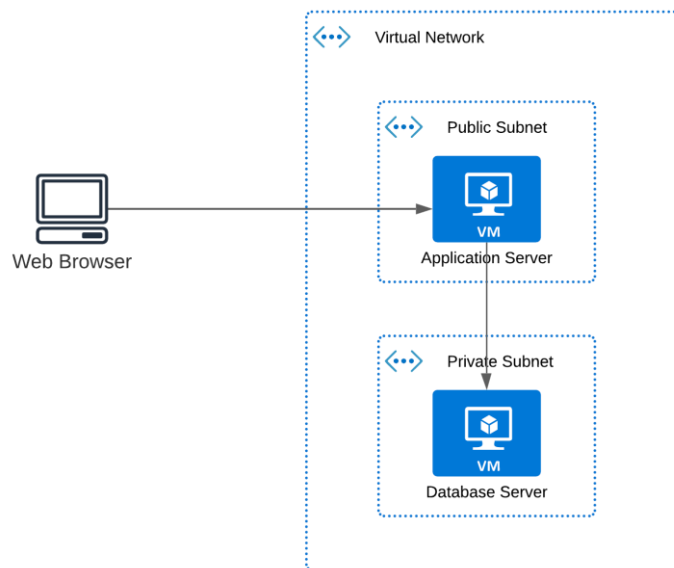
Resource Clean Up
Cloud is always pay per use model and all resources/services that we consume are chargeable. Cleaning up when you've completed your lab or project is always necessary. This is true whether you're doing a lab or implementing a project at your workplace.
After completing the lab, make sure to delete each resource created in reverse chronological order.

Scenario

According to recent research, 40-75% of employees are using Dropbox to share files inside and outside of their businesses. Half of those Dropbox users do this even though they know it's against the rules. More than 40% of businesses have experienced the exposure of confidential information and the estimated average cost of a data breach equaled \$5.5 Million in 2011.

These files, containing sensitive company and customer data, are stored in a public cloud outside of the businesses' control - possibly even outside of the country. The potential for data leakage and security breaches is enormous and companies need to stay compliant with their own policies and procedures for security and governance

Architecture diagram

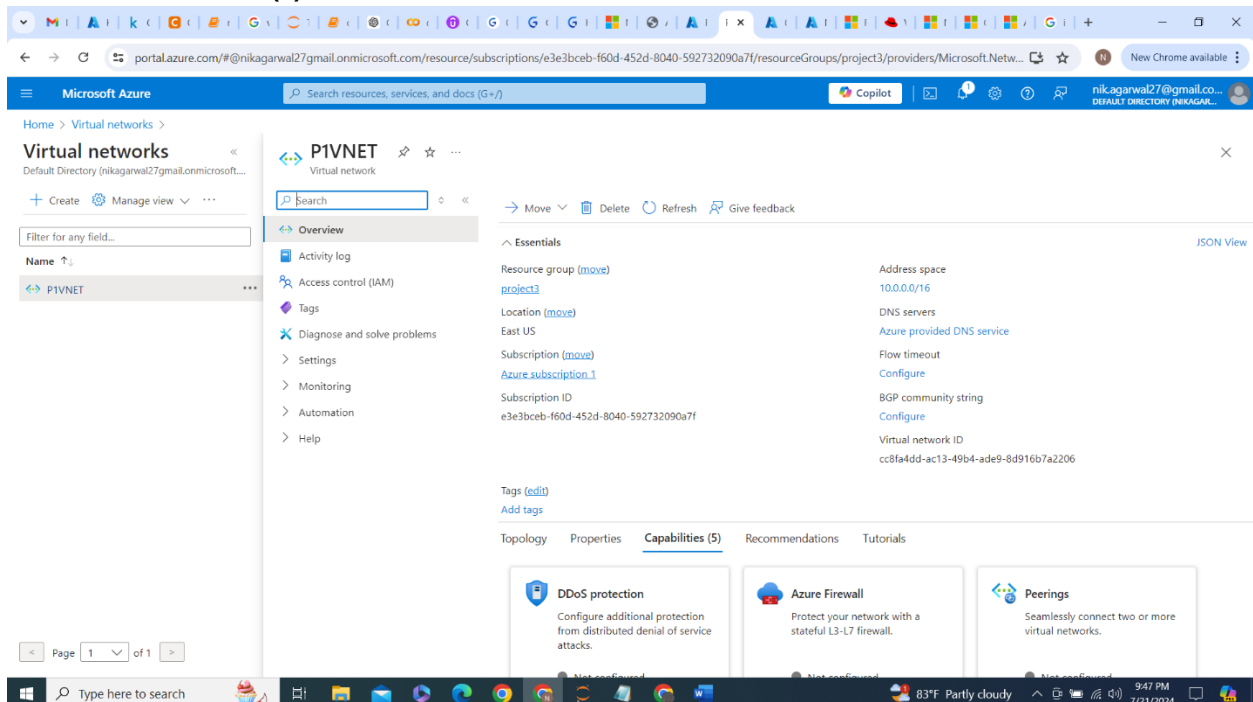


Architecture Implementation	
1	Implement 2 different subnets (one public and the other private) in a virtual network
2	Install and configure MySQL on an Ubuntu virtual machine on the private subnet using the instructions provided. (Hint: Use a bastion host and a NAT gateway)
3	Install and configure OwnCloud on an Ubuntu virtual machine on the public subnet using the provided instructions.
4	Configure the network security groups to allow the required ports
5	Test the installation by accessing the IP of the application server in a browser

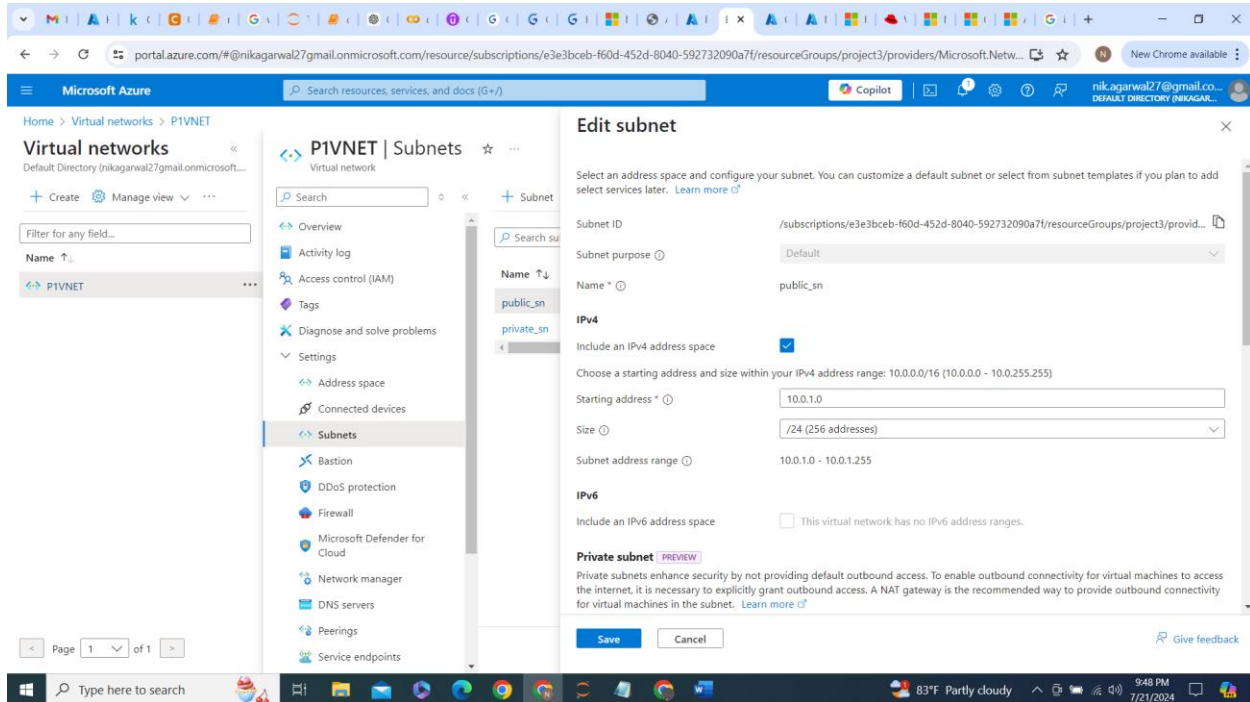
Step 1: VPC and Subnet Creation

Step number	a
Step name	Creation of Virtual Network
Instructions	<p>1) Create a new resource group. You need to use this resource group to deploy all the resources in this exercise</p> <ol style="list-style-type: none"> Search for resource groups using the search bar at the top of the screen Click on Create Enter a name and region of your choice. Remember to use the same region for all deployments in this exercise. Click on Review +Create and create the resource group <p>2) Navigate to Virtual Networks and click on Create</p> <ol style="list-style-type: none"> Name : P1VNET IPv4 CIDR Block : 10.0.0.0/16 Delete the default created subnet and add the following subnets <ol style="list-style-type: none"> Public subnet with CIDR 10.0.1.0/24 Private subnet with CIDR 10.0.2.0/24 The rest of the options can be set to the default values Click on Create to create the virtual network
Expected screenshots	<p>1) Created virtual network with properties visible</p> <p>2) Properties of public subnet</p> <p>3) Properties of private subnet</p>

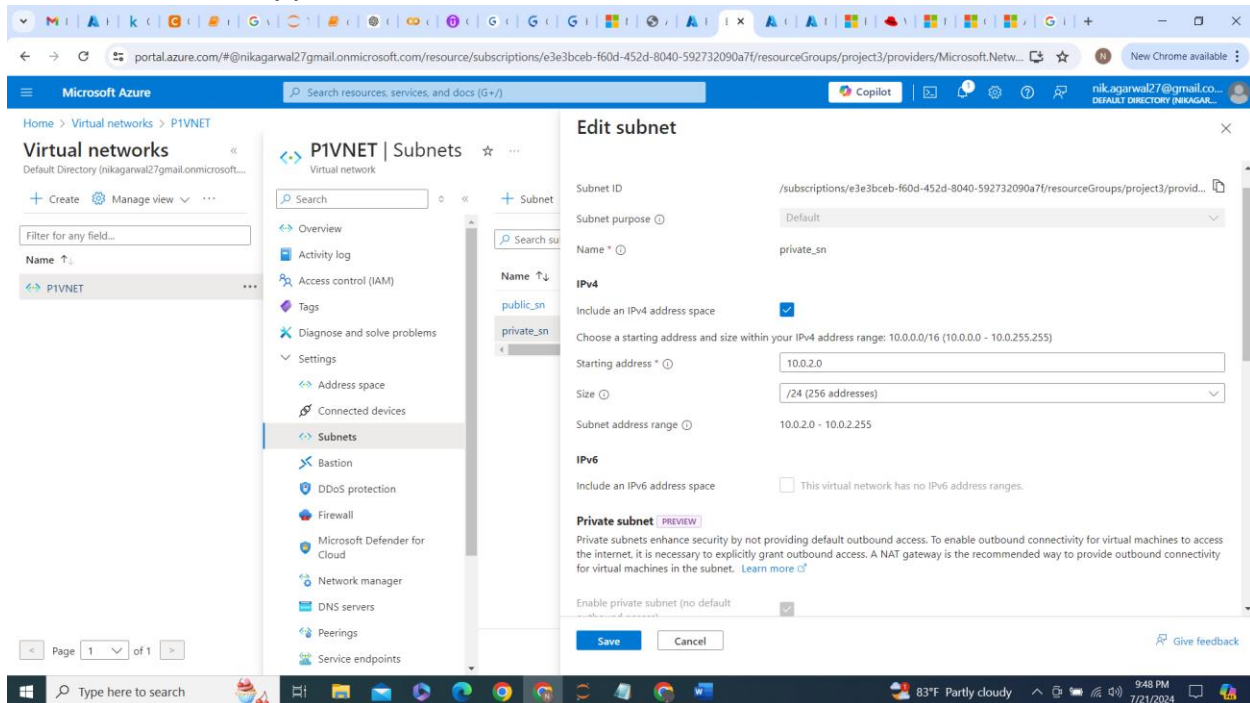
<Insert Screenshot a(1) here>



<Insert Screenshot a(2) here>

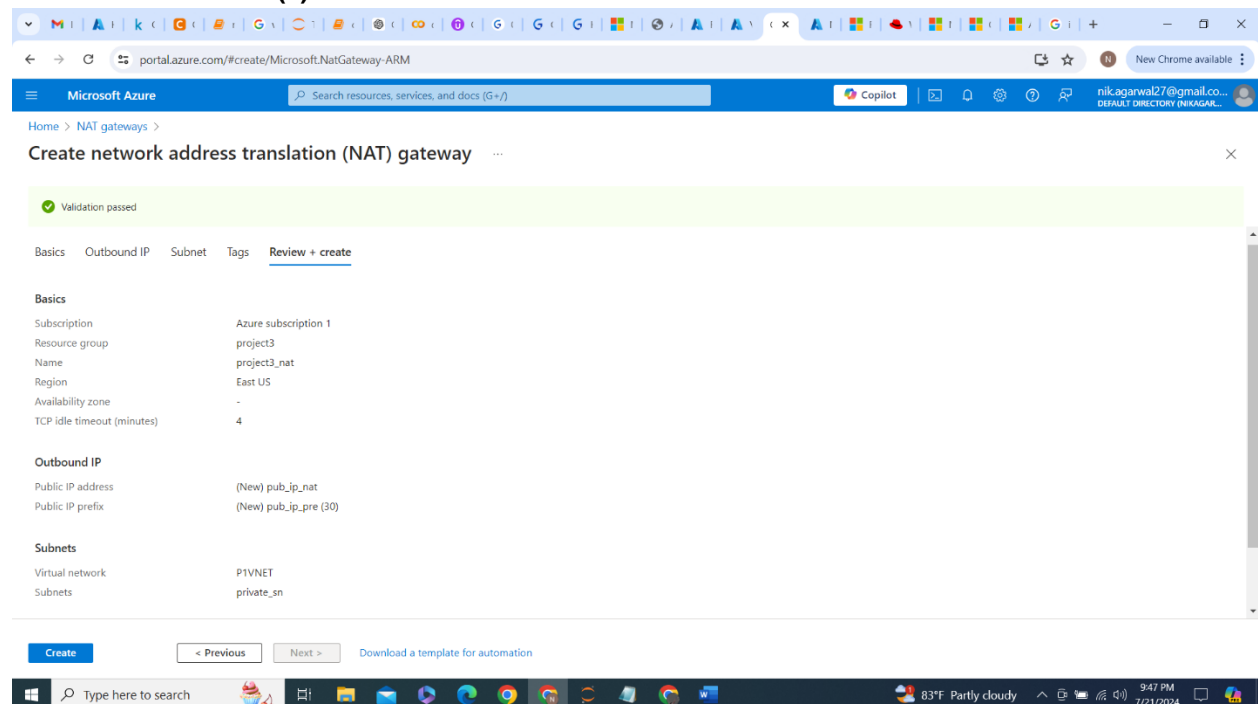


<Insert Screenshot a(3) here>



Step number	b
Step name	Creation of NAT Gateway
Instructions	<ol style="list-style-type: none"> 1) Navigate to NAT Gateways 2) Click on "Create" <ol style="list-style-type: none"> a) Use the resource group created above and the same region it is deployed in b) Use a new public IP and public IP prefix for the NAT gateway. Ensure that the public IP prefix has a CIDR size of /30 c) When asked to select the subnet, select the private subnet created above d) Click on Create 3) Navigate to virtual network and select the network created above 4) Select the private subnet created under Subnets in the menu on the left of the screen. 5) Under NAT Gateway, select the gateway created just now and select Save.
Expected screenshots	1) Created NAT gateway

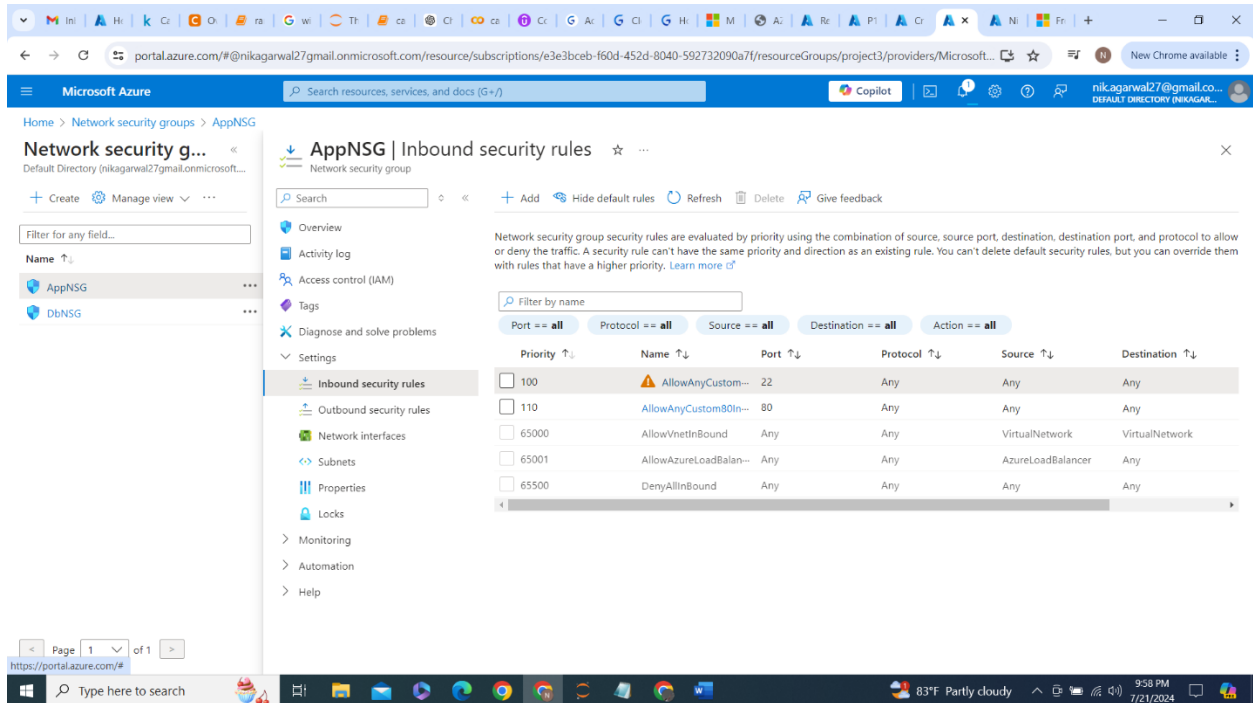
<Insert Screenshot b(1) here>



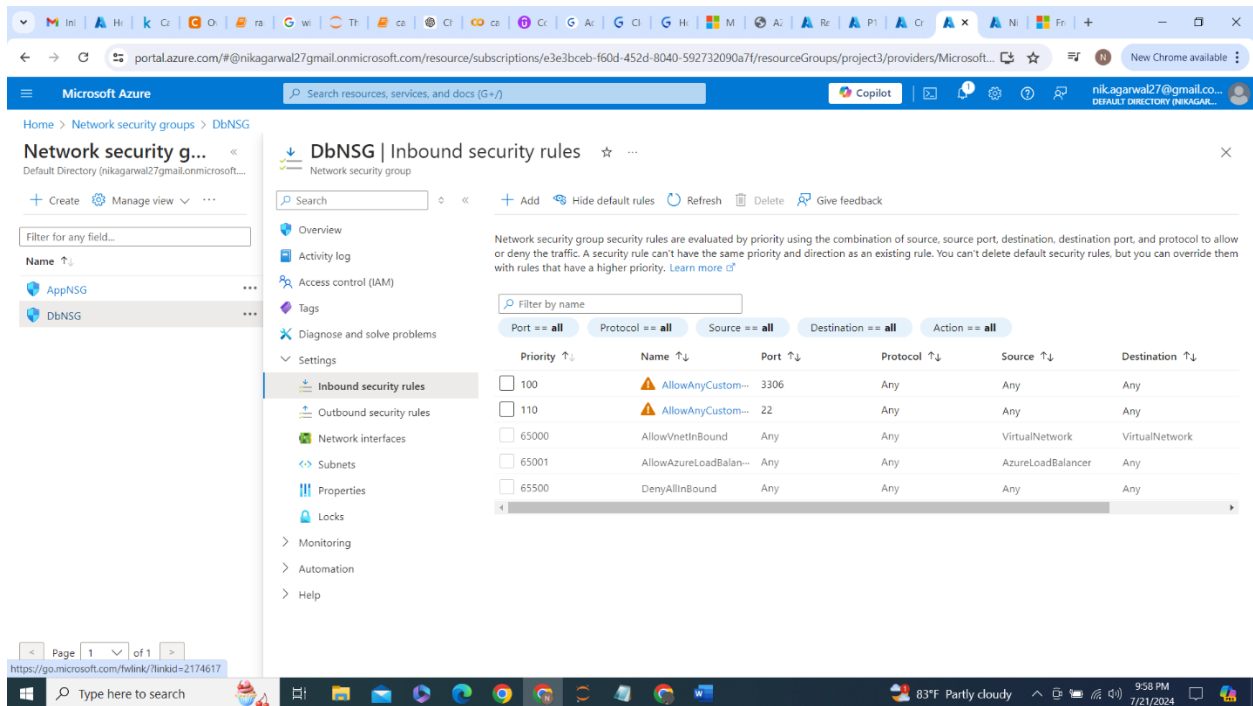
Step number	c
Step name	Creation and configuration of Network security groups

Instructions	<ol style="list-style-type: none"> 1) Navigate to Network Security Groups 2) Click on Create <ol style="list-style-type: none"> a) Resource Group: Use the one previously created b) Enter the name: AppNSG c) Region: Same as the resource group 4) Click on Create 5) Create another security group with the name DbNSG 6) Navigate to the security group AppNSG 7) Add inbound rules for ports 22 and 80 for any sources and destinations 8) Navigate to the security group DbNSG 9) Add inbound rules for ports 3306 and 22 for any sources and destinations
Expected screenshots	<ol style="list-style-type: none"> 1) AppNSG security rules 2) DbNSG security rules

<Insert Screenshot c(1) here>



<Insert Screenshot c(2) here>



Microsoft Azure

Home > Network security groups > DbNSG

Network security g... «

Default Directory (nikagarwal27gmail.onmicrosoft.com)

+ Create Manage view ▾ ...

Filter for any field...

Name ↑↓

- AppNSG
- DbNSG

DbNSG | Inbound security rules ☆ ...

Network security group

Search

+ Add Hide default rules Refresh Delete Give feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Settings

- Inbound security rules
- Outbound security rules
- Network interfaces
- Subnets
- Properties
- Locks

Monitoring

Automation

Help

Network security group security rules are evaluated by priority using the combination of source, source port, destination, destination port, and protocol to allow or deny the traffic. A security rule can't have the same priority and direction as an existing rule. You can't delete default security rules, but you can override them with rules that have a higher priority. [Learn more](#)

Filter by name

Port == all Protocol == all Source == all Destination == all Action == all

Priority ↑↓	Name ↑↓	Port ↑↓	Protocol ↑↓	Source ↑↓	Destination ↑↓
<input type="checkbox"/> 100	⚠ AllowAnyCustom...	3306	Any	Any	Any
<input type="checkbox"/> 110	⚠ AllowAnyCustom...	22	Any	Any	Any
<input type="checkbox"/> 65000	✓ AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork
<input type="checkbox"/> 65001	✓ AllowAzureLoadBalanc...	Any	Any	AzureLoadBalancer	Any
<input type="checkbox"/> 65500	✗ DenyAllInBound	Any	Any	Any	Any

Page 1 of 1

https://go.microsoft.com/fwlink/?linkid=2174617

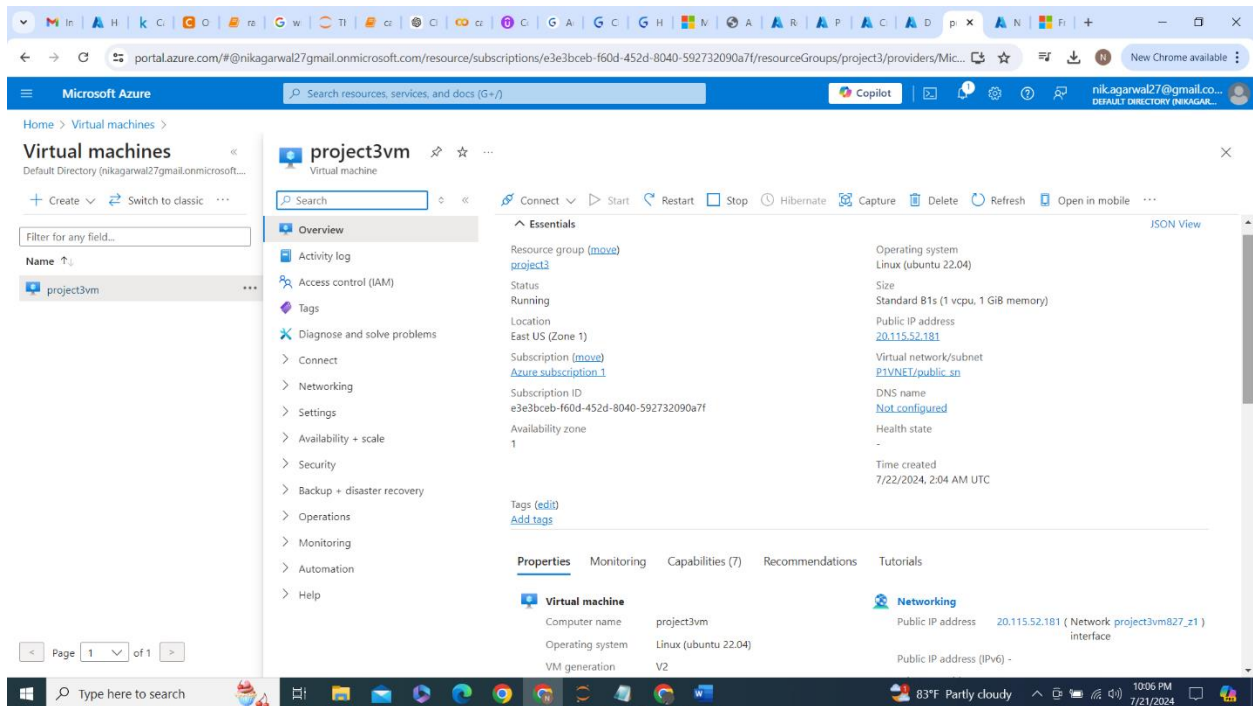
Type here to search

83°F Partly cloudy 9:58 PM 7/21/2024

Step 2 : Instance Creation

Step number	a
Step name	Creation of Application server
Instructions	<ol style="list-style-type: none">1) Navigate to Virtual machines2) Click on "Create"3) Create a virtual machine with the following properties<ol style="list-style-type: none">a) Resource Group: As Created aboveb) Region: Same as used beforec) Image: Ubuntu 22.04 LTSd) Size : Standard B1se) Authentication type: SSH public keyf) Username: ubuntug) Create a new key pairh) Inbound rules: Allow 22 and 80i) Virtual Network : P1VNETj) Subnet : Public subnet create abovek) Create a new public IPl) Network security group: Select Advanced and then pick AppNSG from the dropdownm) The rest of the options can be set to their default Values
Expected screenshots	<ol style="list-style-type: none">1) Created Application server Overview page

<Insert Screenshot a(1) here >

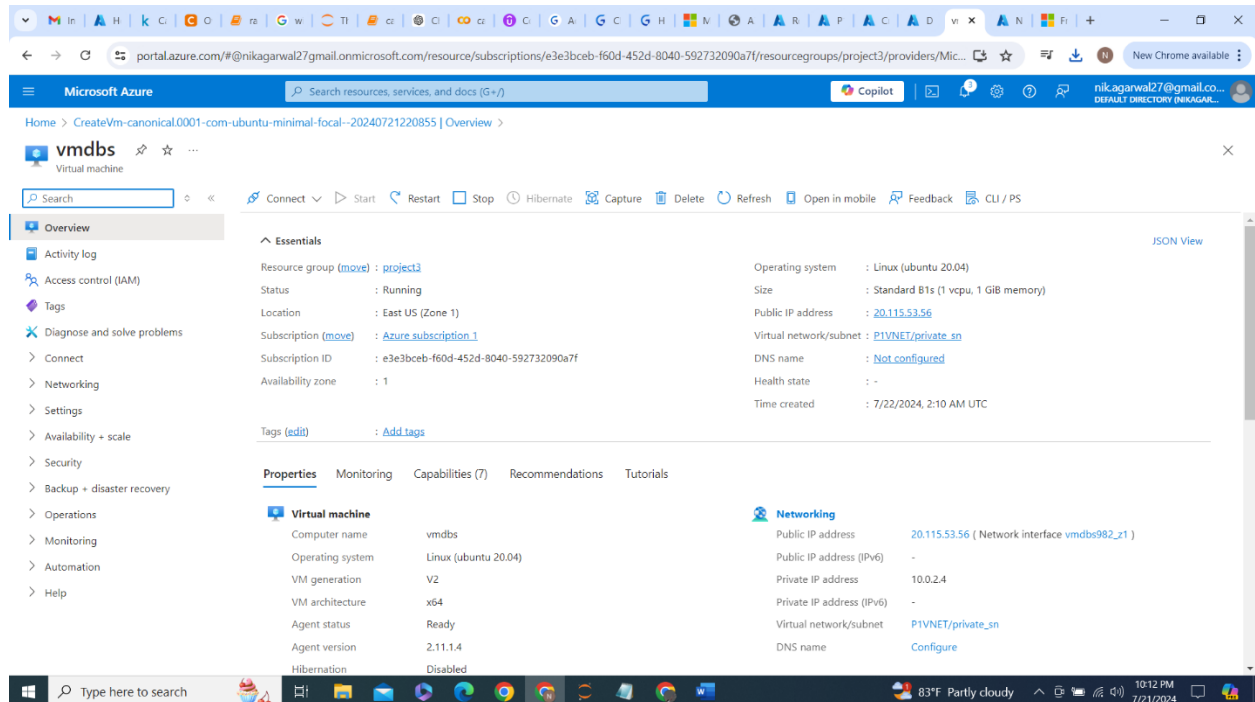


The screenshot displays the Microsoft Azure portal interface. The top navigation bar shows the user is logged in as 'nikagarwal27@gmail.com'. The main content area is titled 'Virtual machines' and shows a list of VMs, with 'project3vm' selected. The left sidebar contains a navigation menu with options like 'Overview', 'Activity log', 'Access control (IAM)', 'Tags', 'Diagnose and solve problems', 'Connect', 'Networking', 'Settings', 'Availability + scale', 'Security', 'Backup + disaster recovery', 'Operations', 'Monitoring', 'Automation', and 'Help'. The 'Overview' tab is active, showing the VM's status as 'Running' and its location as 'East US (Zone 1)'. The 'Essentials' section provides a summary of the VM's configuration, including its resource group, subscription, and public IP address. The 'Properties' section at the bottom details the VM's name, operating system, and generation.

Property	Value
Resource group	project3
Status	Running
Location	East US (Zone 1)
Subscription	Azure subscription 1
Subscription ID	e3e3bceb-f60d-452d-8040-592732090a7f
Availability zone	1
Operating system	Linux (ubuntu 22.04)
Size	Standard B1s (1 vcpu, 1 GiB memory)
Public IP address	20.115.52.181
Virtual network/subnet	PTVNET/public-sub
DNS name	Not configured
Health state	-
Time created	7/22/2024, 2:04 AM UTC

Step number	b
Step name	Creation of Database server
Instructions	1) Create a virtual machine with the following properties <ol style="list-style-type: none"> Resource Group: As Created above Region: Same as used before Image : Ubuntu 20.04 LTS Size : Standard B1s Authentication type: SSH public key Username: ubuntu Create a new key pair (or reuse the one created for the application server) Inbound rules: Allow 22 and 80 Virtual Network : P1VNET Subnet : Private subnet create above No public IP is required here Network security group: Select Advanced and then pick DbNSG from the dropdown The rest of the options can be set to their default Values
Expected screenshots	1) Created Database server overview page

<Insert Screenshot 2(b) here>



The screenshot displays the Microsoft Azure portal interface. The browser address bar shows the URL: `portal.azure.com/#@nikagarwal27gmail.onmicrosoft.com/resource/subscriptions/e3e3bceb-f60d-452d-8040-592732090a7f/resourcegroups/project3/providers/Mic...`. The page title is "vmdbs Virtual machine". The left sidebar contains navigation options: Overview (selected), Activity log, Access control (IAM), Tags, Diagnose and solve problems, Connect, Networking, Settings, Availability + scale, Security, Backup + disaster recovery, Operations, Monitoring, Automation, and Help. The main content area is divided into two sections: "Essentials" and "Properties".

Essentials

- Resource group (move): [project3](#)
- Status: Running
- Location: East US (Zone 1)
- Subscription (move): [Azure subscription 1](#)
- Subscription ID: e3e3bceb-f60d-452d-8040-592732090a7f
- Availability zone: 1
- Tags (edit): [Add tags](#)

Operating system details:

- Operating system: Linux (ubuntu 20.04)
- Size: Standard B1s (1 vcpu, 1 GiB memory)
- Public IP address: [20.115.53.56](#)
- Virtual network/subnet: [P1VNET/private_sn](#)
- DNS name: [Not configured](#)
- Health state: -
- Time created: 7/22/2024, 2:10 AM UTC

Properties

Virtual machine

- Computer name: vmdbs
- Operating system: Linux (ubuntu 20.04)
- VM generation: V2
- VM architecture: x64
- Agent status: Ready
- Agent version: 2.11.1.4
- Hibernation: Disabled

Networking

- Public IP address: [20.115.53.56](#) (Network interface vmdbs982_x1)
- Public IP address (IPv6): -
- Private IP address: 10.0.2.4
- Private IP address (IPv6): -
- Virtual network/subnet: [P1VNET/private_sn](#)
- DNS name: [Configure](#)

Step 4: Application and Database Installation and Testing

Step number	a
Step name	Installation and configuration of MySQL
Instructions	<p>1) Copy the database pem file into the application server using the below command <code>scp -i <application server pem file> <database server pem file> ubuntu@<application server public IP>:/home/ubuntu</code></p> <p>2) Log into the application server using your SSH client of choice</p> <p>3) From the application server, log into the database server using the pem file copied in step 1 and the private IP address of the database server with the following command <code>ssh -i <database server pem file> ubuntu@<private IP of database server></code></p> <p>Note: Use your existing knowledge of SSH and copying files to cloud VMs to perform the above SSH and SCP operations</p> <p>4) Enter the following commands to install and configure MySQL on the database server <code>sudo apt update</code> <code>wget https://d60pu47qoi4ee.cloudfront.net/azure_install_mysql.sh</code> <code>sudo chmod 700 azure_install_mysql.sh</code> <code>sudo apt install dos2unix</code> <code>sudo dos2unix ./azure_install_mysql.sh</code> <code>sudo ./azure_install_mysql.sh</code></p> <p>5) Type <code>exit</code> to exit the database server and go back to the application server</p>
Expected screenshots	<p>1) Downloading of the provided script</p> <p>2) Executing the script</p>

<Insert screenshot a(1) here>

```
ubuntu@dbvm:~$ sudo apt update
Hit:1 http://azure.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Get:3 http://azure.archive.ubuntu.com/ubuntu jammy-backports InRelease [127 kB]
Get:4 http://azure.archive.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Get:5 http://azure.archive.ubuntu.com/ubuntu jammy/universe amd64 Packages [14.1 MB]
Get:6 http://azure.archive.ubuntu.com/ubuntu jammy/universe Translation-en [5652 kB]
Get:7 http://azure.archive.ubuntu.com/ubuntu jammy/universe amd64 c-n-f Metadata [286 kB]
Get:8 http://azure.archive.ubuntu.com/ubuntu jammy/multiverse amd64 Packages [217 kB]
Get:9 http://azure.archive.ubuntu.com/ubuntu jammy/multiverse Translation-en [112 kB]
Get:10 http://azure.archive.ubuntu.com/ubuntu jammy/multiverse amd64 c-n-f Metadata [8372 B]
Get:11 http://azure.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1848 kB]
Get:12 http://azure.archive.ubuntu.com/ubuntu jammy-updates/main Translation-en [333 kB]
Get:13 http://azure.archive.ubuntu.com/ubuntu jammy-updates/restricted amd64 Packages [2177 kB]
Get:14 http://azure.archive.ubuntu.com/ubuntu jammy-updates/restricted Translation-en [273 kB]
Get:15 http://azure.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 Packages [1108 kB]
Get:16 http://azure.archive.ubuntu.com/ubuntu jammy-updates/universe Translation-en [258 kB]
Get:17 http://azure.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 c-n-f Metadata [25.4 kB]
Get:18 http://azure.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 Packages [43.3 kB]
Get:19 http://azure.archive.ubuntu.com/ubuntu jammy-updates/multiverse Translation-en [10.8 kB]
Get:20 http://azure.archive.ubuntu.com/ubuntu jammy-updates/multiverse amd64 c-n-f Metadata [444 B]
Get:21 http://azure.archive.ubuntu.com/ubuntu jammy-backports/main amd64 Packages [67.1 kB]
Get:22 http://azure.archive.ubuntu.com/ubuntu jammy-backports/main Translation-en [11.0 kB]
Get:23 http://azure.archive.ubuntu.com/ubuntu jammy-backports/main amd64 c-n-f Metadata [388 B]
Get:24 http://azure.archive.ubuntu.com/ubuntu jammy-backports/restricted amd64 c-n-f Metadata [116 B]
Get:25 http://azure.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 Packages [28.8 kB]
Get:26 http://azure.archive.ubuntu.com/ubuntu jammy-backports/universe Translation-en [16.5 kB]
Get:27 http://azure.archive.ubuntu.com/ubuntu jammy-backports/universe amd64 c-n-f Metadata [672 B]
Get:28 http://azure.archive.ubuntu.com/ubuntu jammy-backports/multiverse amd64 c-n-f Metadata [116 B]
Get:29 http://azure.archive.ubuntu.com/ubuntu jammy-security/main amd64 Packages [1640 kB]
Get:30 http://azure.archive.ubuntu.com/ubuntu jammy-security/main Translation-en [276 kB]
Get:31 http://azure.archive.ubuntu.com/ubuntu jammy-security/restricted amd64 Packages [2120 kB]
Get:32 http://azure.archive.ubuntu.com/ubuntu jammy-security/restricted Translation-en [363 kB]
Get:33 http://azure.archive.ubuntu.com/ubuntu jammy-security/universe amd64 Packages [885 kB]
Get:34 http://azure.archive.ubuntu.com/ubuntu jammy-security/universe Translation-en [173 kB]
Get:35 http://azure.archive.ubuntu.com/ubuntu jammy-security/universe amd64 c-n-f Metadata [18.9 kB]
Get:36 http://azure.archive.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [37.2 kB]
Get:37 http://azure.archive.ubuntu.com/ubuntu jammy-security/multiverse Translation-en [7588 B]
Get:38 http://azure.archive.ubuntu.com/ubuntu jammy-security/multiverse amd64 c-n-f Metadata [228 B]
Fetched 32.6 MB in 6s (5863 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
ubuntu@dbvm:~$ wget https://d6opu47qoi4ee.cloudfront.net/azure_install_mysql.sh
--2024-07-22 04:07:41-- https://d6opu47qoi4ee.cloudfront.net/azure_install_mysql.sh
Resolving d6opu47qoi4ee.cloudfront.net (d6opu47qoi4ee.cloudfront.net)... 3.162.115.193, 3.162.115.128, ...
Connecting to d6opu47qoi4ee.cloudfront.net (d6opu47qoi4ee.cloudfront.net)|3.162.115.180|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 1339 (1.3K) [text/x-sh]
Saving to: 'azure_install_mysql.sh'

azure_install_mysql.sh 100%[=====] 1.31K --.-KB/s in 0s

2024-07-22 04:07:42 (440 MB/s) - 'azure_install_mysql.sh' saved [1339/1339]

ubuntu@dbvm:~$
```

<Insert screenshot b(1) here>

```
ubuntu@dbvm:~$
reading /usr/share/mecab/dic/ipadic/Interjection.csv ... 252
reading /usr/share/mecab/dic/ipadic/Postp-col.csv ... 91
reading /usr/share/mecab/dic/ipadic/Postp.csv ... 146
reading /usr/share/mecab/dic/ipadic/Noun.csv ... 60477
reading /usr/share/mecab/dic/ipadic/Noun.adjv.csv ... 3328
reading /usr/share/mecab/dic/ipadic/Prefix.csv ... 721
reading /usr/share/mecab/dic/ipadic/Symbol.csv ... 208
reading /usr/share/mecab/dic/ipadic/Suffix.csv ... 1393
reading /usr/share/mecab/dic/ipadic/Adj.csv ... 22210
reading /usr/share/mecab/dic/ipadic/Others.csv ... 2
reading /usr/share/mecab/dic/ipadic/Noun.proper.csv ... 27328
reading /usr/share/mecab/dic/ipadic/Noun.others.csv ... 151
reading /usr/share/mecab/dic/ipadic/Adnominal.csv ... 135
reading /usr/share/mecab/dic/ipadic/Conjunction.csv ... 171
reading /usr/share/mecab/dic/ipadic/Noun.name.csv ... 34202
reading /usr/share/mecab/dic/ipadic/Noun.verbal.csv ... 12146
reading /usr/share/mecab/dic/ipadic/Noun.org.csv ... 16668
reading /usr/share/mecab/dic/ipadic/Adverb.csv ... 3032
reading /usr/share/mecab/dic/ipadic/Filter.csv ... 19
reading /usr/share/mecab/dic/ipadic/Noun.place.csv ... 72999
emitting double-array: 100% [#####]
reading /usr/share/mecab/dic/ipadic/matrix.def ... 1316x1316
emitting matrix : 100% [#####]

done!
update-alternatives: using /var/lib/mecab/dic/ipadic-utf8 to provide /var/lib/mecab/dic/debian (mecab-dictionary) in auto mode
Setting up libhtsl-parser-perl:amd64 (3.76-1build2) ...
Setting up libhttp-message-perl (6.36-1) ...
Setting up libmysql-server-8.0 (8.0.37-0ubuntu0.22.04.3) ...
update-alternatives: using /etc/mysql/mysql.cnf to provide /etc/mysql/my.cnf (my.cnf) in auto mode
Renaming removed key_buffer and myisam-recover options (if present)
mysql will log errors to /var/log/mysql/error.log
mysql is running as pid 3028
Created symlink /etc/systemd/system/multi-user.target.wants/mysql.service → /lib/systemd/system/mysql.service.
Setting up libecpl-pe-perl (4.54-2) ...
Setting up libhtsl-template-perl (2.97-1.1) ...
Setting up mysql-server (8.0.37-0ubuntu0.22.04.3) ...
Setting up libecpl-fast-perl (12.15-1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.8) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
Installed MySQL
Configuring MySQL now
mysql Configuration complete
bind-address = 0.0.0.0
mysqlx-bind-address = 0.0.0.0
ubuntu@dbvm:~$
```

Step number	b
Step name	Installation and configuration of Owncloud
Instructions	<p>1) Enter the following commands after logging into the application server via SSH to install and configure Owncloud</p> <p>Learning Tip: The version of Owncloud has no bearing on this project. When migrating a legacy version of an application to the cloud, it might not be possible to update the application to current technological trends.</p> <pre> sudo apt update sudo add-apt-repository ppa:ondrej/php -y sudo apt update Note : The following 4 lines are a single command sudo apt install -y apache2 libapache2-mod-php7.4 mariadb-server openssl redis-server wget php7.4 php7.4-imagick php7.4-common php7.4-curl php7.4-gd php7.4-imap php7.4-intl php7.4-json php7.4-mbstring php7.4-gmp php7.4-bcmath php7.4-mysql php7.4-ssh2 php7.4-xml php7.4-zip php7.4-apcu php7.4-redis php7.4-ldap php- phpseclib sudo a2enmod dir env headers mime rewrite setenvif sudo systemctl restart apache2 cd /var/www/html sudo rm * sudo wget https://download.owncloud.com/server/stable/owncloud-complete- latest.tar.bz2 sudo tar -xjf owncloud-complete-latest.tar.bz2 sudo chown -R www-data. owncloud sudo systemctl restart apache2 2) Check whether the server has been successfully deployed by visiting the public IP of the web server in the web browser in the below format <public IP of the application server VM>/owncloud Expected screenshots 1) Downloading the script 2) Executing the script 3) Accessing the application via web browser </pre>

<Insert screenshot b(1) here>

```
ubuntu@appvm:~$ sudo apt-get install ppa:ondrej/php
Hit:2 http://azure.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://azure.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:4 http://azure.archive.ubuntu.com/ubuntu jammy-security InRelease
Hit:5 https://packages.microsoft.com/repos/microsoft-ubuntu-jammy-prod jammy InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
All packages are up to date.
PPA publishes dbgsw, you may need to include 'main/debug' component
Repository: 'deb https://ppa.launchpadcontent.net/ondrej/php/ubuntu/ jammy main'
Description:
Co-installable PHP versions: PHP 5.6, PHP 7.x, PHP 8.x and most requested extensions are included. Only Supported Ubuntu Releases (https://wiki.ubuntu.com/Releases) are provided.

Debian oldstable and stable packages are provided as well: https://deb.sury.org/#debian-dpa

You can get more information about the packages at https://deb.sury.org

BUGS&FEATURES: This PPA now has a issue tracker:
https://deb.sury.org/#bug-reporting

CAVEATS:
1. If you are using php-gearman, you need to add ppa:ondrej/pkg-gearman
2. If you are using apache2, you are advised to add ppa:ondrej/apache2
3. If you are using nginx, you are advised to add ppa:ondrej/nginx-mainline
   or ppa:ondrej/nginx

PLEASE READ: If you like my work and want to give me a little motivation, please consider donating regularly: https://donate.sury.org/

WARNING: add-apt-repository is broken with non-UTF-8 locales, see
https://github.com/oerdnj/deb.sury.org/issues/56 for workaround:

# LC_ALL=C.UTF-8 add-apt-repository ppa:ondrej/php
More info: https://launchpad.net/~ondrej/+archive/ubuntu/php
Adding repository.
Adding deb entry to /etc/apt/sources.list.d/ondrej-ubuntu-php-jammy.list
Adding disabled deb-src entry to /etc/apt/sources.list.d/ondrej-ubuntu-php-jammy.list
Adding key to /etc/apt/trusted.gpg.d/ondrej-ubuntu-php.gpg with fingerprint 14AA40EC0831756756D7F66C4F4EA0AAE5267A6C
Hit:1 http://azure.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 https://packages.microsoft.com/repos/microsoft-ubuntu-jammy-prod jammy InRelease
Hit:3 http://azure.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:4 http://azure.archive.ubuntu.com/ubuntu jammy-security InRelease
Hit:5 https://packages.microsoft.com/repos/microsoft-ubuntu-jammy-prod jammy InRelease
Get:6 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy InRelease [24.6 kB]
Get:7 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy/main amd64 Packages [128 kB]
Get:8 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy/main Translation-en [39.6 kB]
Fetched 192 kB in 1s (165 kB/s)
Reading package lists... Done
Hit:1 http://azure.archive.ubuntu.com/ubuntu jammy InRelease
Hit:2 http://azure.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:3 http://azure.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:4 http://azure.archive.ubuntu.com/ubuntu jammy-security InRelease
Hit:5 https://packages.microsoft.com/repos/microsoft-ubuntu-jammy-prod jammy InRelease
Hit:6 https://ppa.launchpadcontent.net/ondrej/php/ubuntu jammy InRelease
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
3 packages can be upgraded. Run 'apt list --upgradable' to see them.
ubuntu@appvm:~$
```

<Insert screenshot b(2) here>

```
ubuntu@appvm:~$ sudo apt-get install ppa:ondrej/php
Module mpm_event disabled.
Enabling module mpm_prefork.
info: Executing deferred 'a2enmod php7.4' for package libapache2-mod-php7.4
Enabling module php7.4.
Created symlink /etc/systemd/system/multi-user.target.wants/apache2.service - /lib/systemd/system/apache2.service.
Created symlink /etc/systemd/system/multi-user.target.wants/apache-htcacheclean.service - /lib/systemd/system/apache-htcacheclean.service.
Setting up ghostscript (9.55.0-0ubuntu5.9) ...
Setting up mariadb-server (1:10.6.18-0ubuntu0.22.04.1) ...
Setting up php7.4 (1:7.4.33-13ubuntu22.04.1deb.sury.org+1) ...
Setting up libgd3:amd64 (2.3.3-12ubuntu22.04.1deb.sury.org+1) ...
Setting up php7.4-gd (1:7.4.33-13ubuntu22.04.1deb.sury.org+1) ...

Creating config file /etc/php/7.4/mods-available/gd.ini with new version
Processing triggers for ufw (0.36.1-4ubuntu0.1) ...
Processing triggers for man-db (2:10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.8) ...
Processing triggers for php7.4-cli (1:7.4.33-13ubuntu22.04.1deb.sury.org+1) ...
Processing triggers for libapache2-mod-php7.4 (1:7.4.33-13ubuntu22.04.1deb.sury.org+1) ...
Scanning processes...

Running kernel seems to be up-to-date.

No services need to be restarted.

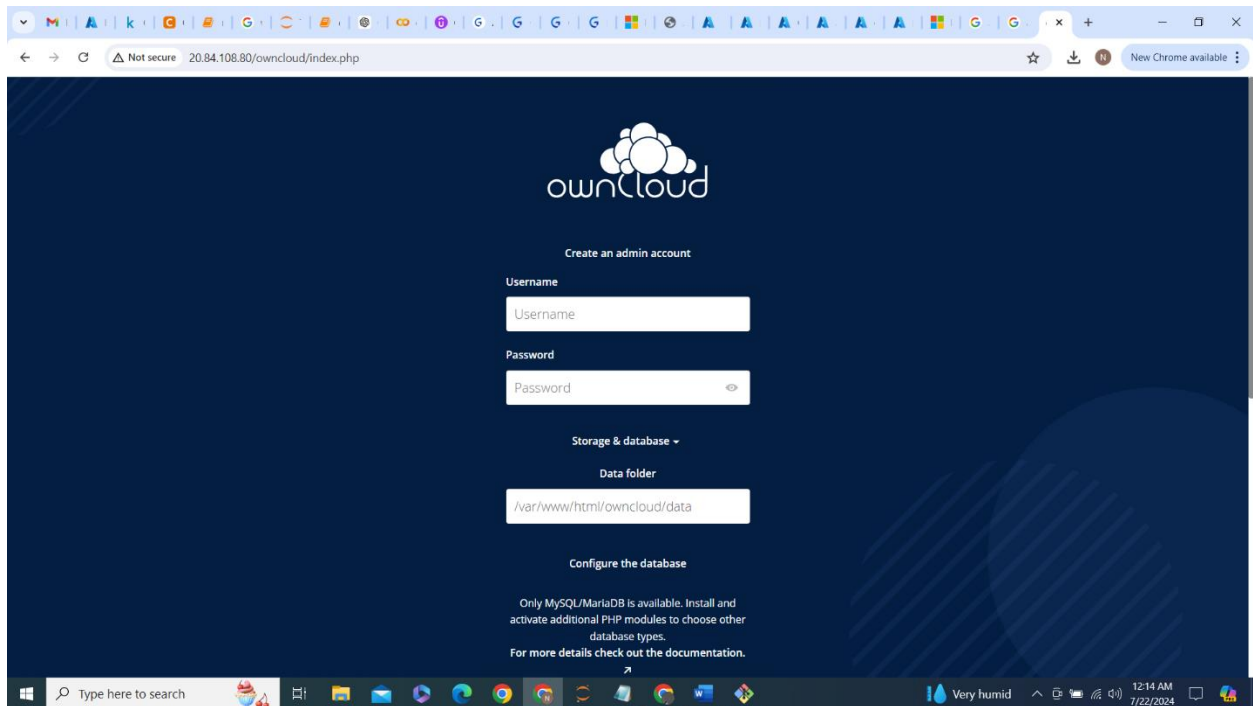
No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@appvm:~$ sudo a2enmod dir env headers mime rewrite setenvif
sudo systemctl restart apache2
cd /var/www/html
sudo rm -f *
sudo wget https://download.owncloud.com/server/stable/owncloud-complete-latest.tar.bz2
sudo tar -xjf owncloud-complete-latest.tar.bz2
sudo chown -R www-data:owncloud
sudo systemctl restart apache2
Module dir already enabled
Module env already enabled
Enabling module headers.
Module mime already enabled
Enabling module rewrite.
Module setenvif already enabled
To activate the new configuration, you need to run:
sudo systemctl restart apache2
--2024-07-22 04:13:15-- https://download.owncloud.com/server/stable/owncloud-complete-latest.tar.bz2
Resolving download.owncloud.com (download.owncloud.com)... 167.233.14.167, 2a01:4f8:1c1d:3d1:1
Connecting to download.owncloud.com (download.owncloud.com)|167.233.14.167|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 76010860 (72M) [application/x-bzip2]
Saving to: 'owncloud-complete-latest.tar.bz2'

owncloud-complete-latest.tar.bz2 100%[=====] 72.49M 25.0MB/s in 2.8s

2024-07-22 04:13:19 (25.6 MB/s) - 'owncloud-complete-latest.tar.bz2' saved [76010860/76010860]
```



<Insert screenshot b(3) here>

Step 5: Answer the following questions

1) Which of the following resources is optional at the time of VM creation?

- a) Public IP address
- b) Virtual Network
- c) Network Interface
- d) Resource Group

Answer: Public IP Address

2) Network Security group rules are evaluated in order of _____.

- a) Priority
- b) Name (Alphabetical)
- c) Direction
- d) Port number

Answer: Priority

3) Which of the following properties may change depending on the size of the VM?

- a) All of these
- b) Max number of disks
- c) Memory
- d) vCPUs

Answer: All of these

4) Which of the following qualifies as a destination for inbound NSG rules?

- a) NIC
- b) Virtual Network
- c) Resource Group
- d) Virtual machine

Answer: NIC

5) At which point in a VMs life cycle can it be assigned to an availability set?

- a) At the time of creation
- b) Only when the VM is running
- c) At any point of time
- d) While it is stopped

Answer: At the time of creation

6) Which of the following would qualify as a point-to-site VPN connection?

- a) Local machine to VPN gateway
- b) VM to VM within the same virtual network
- c) VM to VM within the different virtual network
- d) VM to MySQL deployment within the same virtual network

Answer: Local machine to VPN gateway

7) Which of the following is not a property of an incoming load balancer request?

- a) Source IP
- b) Protocol
- c) Destination port
- d) Name of virtual network

Answer: Name of Virtual Network

Grades distribution

MCQs	7 (1 point each)
Implementation screenshots	13 points (1 point each)
Total	20 points