

# Azure Practical Task

## Practical task

1. Write one or several bash scripts (using az cli) which:
  - a. Create Resource Group (RG), VNet, Subnet, Azure Container Registry (ACR), VM, public IP address for VM, Network Security group (NSG)
  - b. Push a java spring-petclinic container image you built in "Docker" module to ACR
  - c. ACR should be private
  - d. Install Docker on the VM
  - e. Run container on the VM
2. Verify that application is accessible in your browser
3. Remove the resource group

## 1. Write one or several bash scripts (using az cli) which:

### a. Create Resource Group (RG), VNet, Subnet, Azure Container Registry (ACR), VM, public IP address for VM, Network Security group (NSG)

Used script:

```
#!/bin/bash

RG_NAME=grid-rg-task
LOCATION=westeurope
VNET_NAME=grid-vnet
SUBNET_NAME=grid-subnet
NSG_NAME=grid-nsg
PUB_IP_NAME=grid-pip
VM_NIC_NAME=vm-grid-nic
VM_NAME=grid-vm
VNET_NET="10.0.0.0/16"
SUBNET_NET="10.0.1.0/24"
VM_PRIV_IP="10.0.1.4"
ACR_NAME=acrgridtask
ACR_SKU=basic

az group create \
  --name "$RG_NAME" \
  --location "$LOCATION"
```

```
az network vnet create \  
  --resource-group "$RG_NAME" \  
  --name "$VNET_NAME" \  
  --address-prefixes "$VNET_NET"  
  
az network nsg create \  
  --resource-group "$RG_NAME" \  
  --name "$NSG_NAME"  
  
az network nsg rule create \  
  --resource-group "$RG_NAME" \  
  --nsg-name "$NSG_NAME" \  
  --name allow-SSH \  
  --access allow \  
  --protocol tcp \  
  --priority 1000 \  
  --destination-port-ranges 22  
  
az network nsg rule create \  
  --resource-group "$RG_NAME" \  
  --nsg-name "$NSG_NAME" \  
  --name allow-HTTP \  
  --access allow \  
  --protocol tcp \  
  --priority 1001 \  
  --destination-port-ranges 80  
  
az network vnet subnet create \  
  --resource-group "$RG_NAME" \  
  --vnet-name "$VNET_NAME" \  
  --name "$SUBNET_NAME" \  
  --address-prefixes "$SUBNET_NET" \  
  --network-security-group "$NSG_NAME"  
  
az network public-ip create \  
  --resource-group "$RG_NAME" \  
  --name "$PUB_IP_NAME"  
  
az network nic create \  
  --resource-group "$RG_NAME" \  
  --name "$VM_NIC_NAME" \  
  --vnet-name "$VNET_NAME" \  
  --subnet "$SUBNET_NAME" \  
  --public-ip-address "$PUB_IP_NAME" \  
  --network-security-group "$NSG_NAME" \  
  --private-ip-address "$VM_PRIV_IP"  
  
az vm create \  
  --resource-group "$RG_NAME" \  
  --name "$VM_NAME" \  

```

```
--image Ubuntu2404 \  
--nics "$VM_NIC_NAME" \  
--admin-username azureuser \  
--ssh-key-values "./ssh-keys"
```

```
az acr create \  
-g "$RG_NAME" \  
-n "$ACR_NAME" \  
--sku "$ACR_SKU"
```

The screenshot shows the Azure portal interface for a resource group named 'grid-rg-task'. The top navigation bar includes a search bar, a Copilot button, and various utility icons. The left sidebar contains a navigation menu with options like Overview, Activity log, Access control (IAM), Tags, Resource visualizer, Events, Settings, Deployments, Security, Deployment stacks, Policies, Properties, Locks, Cost Management, Cost analysis, Cost alerts (preview), and Budgets. The main content area is divided into 'Essentials' and 'Resources' sections. The 'Essentials' section shows subscription information: Subscription (move) : [Azure for Students](#), Subscription ID : c539c22d-81df-4900-93d0-f5d20ccc64b9, Deployments : [1 Succeeded](#), and Location : West Europe. The 'Resources' section displays a table of resources with columns for Name, Type, and Location. The table lists several resources, including 'acrgridtask' (Container registry), 'grid-nsg' (Network security group), 'grid-pip' (Public IP address), 'grid-vm' (Virtual machine), 'grid-vm\_OsDisk\_1\_760fcd6666f64211910081d3c3d4c1f1' (Disk), 'grid-vnet' (Virtual network), and 'vm-grid-nic' (Network Interface). All resources are located in West Europe.

Name	Type	Location
acrgridtask	Container registry	West Europe
grid-nsg	Network security group	West Europe
grid-pip	Public IP address	West Europe
grid-vm	Virtual machine	West Europe
grid-vm_OsDisk_1_760fcd6666f64211910081d3c3d4c1f1	Disk	West Europe
grid-vnet	Virtual network	West Europe
vm-grid-nic	Network Interface	West Europe

## b. Push a java spring-petclinic container image you built in “Docker” module to ACR

First authorize Docker to access created ACR. ACR credentials can be found in `Access keys` setting for ACR.

Microsoft Azure

Search resources, services, and docs (G+)

Home > acrgridtask

### acrgridtask | Access keys

Container registry

Search

- Overview
- Activity log
- Access control (IAM)
- Tags
- Quick start
- Events
- Settings
  - Access keys**
  - Encryption
  - Identity
  - Networking
  - Microsoft Defender for Cloud
  - Properties
  - Locks

Registry name	acrgridtask		
Login server	acrgridtask.azurecr.io		
Admin user	<input checked="" type="checkbox"/>		
Username	acrgridtask		
Name	Password	Regenerate	
password	.....	Show	🔄
password2	.....	Show	🔄

```
06:02:43 adrwal@olek-desktop-pc ~ → docker login acrgridtask.azurecr.io
Username: acrgridtask
Password:
WARNING! Your password will be stored unencrypted in /home/adrwal/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credential-stores

Login Succeeded
06:05:39 adrwal@olek-desktop-pc ~ →
```

Now we can push and pull to ACR.

```

06:05:39 adrwal@olek-desktop-pc ~ → docker tag my-petclinic:latest acrgridtask.azurecr.io/petclinic
06:07:02 adrwal@olek-desktop-pc ~ → docker push acrgridtask.azurecr.io/pet
acrgridtask.azurecr.io/petclinic          acrgridtask.azurecr.io/petclinic:latest
06:07:02 adrwal@olek-desktop-pc ~ → docker push acrgridtask.azurecr.io/petclinic
Using default tag: latest
The push refers to repository [acrgridtask.azurecr.io/petclinic]
5664b15f108b: Pushed
701c983262e9: Pushed
86fd78f09988: Pushed
e3269fcfc82e: Pushed
c44269e277af: Pushed
a62778643d56: Pushed
9aafef56e35e: Pushed
a3d717a89751: Pushed
0cb5c07f8edd: Pushed
0baecf37abee: Pushed
4aa0ea1413d3: Pushed
0bab15eea81d: Pushed
c83c31ce41af: Pushed
8fffb3c3cf71a: Pushed
f716db4e3c8d: Pushed
51a849027c78: Pushed
3214acf345c0: Pushed
1acfb4a268db: Pushed
bfb59b82a9b6: Pushed
8bd314445e66: Pushed
02fd24817d0f: Pushed
7c12895b777b: Pushed
cc249665630b: Pushed
9aee425378d2: Pushed
a52506876bfa: Pushed
57c7c63c9c91: Pushed
52210cfa5d4d: Pushed
f58f8cd53aa0: Pushed
da7816fa955e: Pushed
84845657fbc5: Pushed
latest: digest: sha256:ae5d1bfabb70e7c42f65d8c3d705e7694ccf5f1a05e5f8ad5c5271c054507625 size: 856
06:07:50 adrwal@olek-desktop-pc ~ →

```

The screenshot displays the Microsoft Azure portal interface for the 'acrgridtask' container registry. The left sidebar contains navigation links for Overview, Activity log, Access control (IAM), Tags, Quick start, Events, Settings, and Services. The 'Repositories' section is currently selected. The main content area shows the 'petclinic' repository details, including a search bar for tags, a table of tags with columns for Tags, Digest, and Last modified, and a list of repositories under the 'acrgridtask' registry.

## c. ACR should be private

To verify that ACR is private we can try to run the image after removing previously saved credentials to ACR in Docker.

```

06:10:49 adrwal@olek-desktop-pc ~ → docker logout acrgridtask.azurecr.io
Removing login credentials for acrgridtask.azurecr.io
06:11:04 adrwal@olek-desktop-pc ~ → docker rmi acrgridtask.azurecr.io/petclinic
Untagged: acrgridtask.azurecr.io/petclinic:latest
06:11:13 adrwal@olek-desktop-pc ~ → docker run -it --rm acrgridtask.azurecr.io/petclinic
Unable to find image 'acrgridtask.azurecr.io/petclinic:latest' locally
docker: Error response from daemon: failed to resolve reference "acrgridtask.azurecr.io/petclinic:latest": failed to authorize: failed to fe
quest to https://acrgridtask.azurecr.io/oauth2/token?scope=repository%3Apetclinic%3Apull&service=acrgridtask.azurecr.io: 401 Unauthorized.
See 'docker run --help'.
06:11:18 adrwal@olek-desktop-pc ~ →
06:11:35 adrwal@olek-desktop-pc ~ →
06:11:36 adrwal@olek-desktop-pc ~ →
06:11:36 adrwal@olek-desktop-pc ~ →
06:11:36 adrwal@olek-desktop-pc ~ →
06:11:36 adrwal@olek-desktop-pc ~ →
06:11:36 adrwal@olek-desktop-pc ~ →

```

## d. Install Docker on the VM

First SSH into VM. Public IP can be found on VM overview page.

The screenshot shows the Microsoft Azure portal interface. The top navigation bar includes the 'Microsoft Azure' logo, a search bar, and a 'Copilot' button. The main content area is titled 'grid-vm' and 'Virtual machine'. A left-hand sidebar contains a navigation menu with options like 'Overview', 'Activity log', 'Access control (IAM)', 'Tags', 'Diagnose and solve problems', 'Connect', 'Networking', 'Settings', 'Disks', 'Extensions + applications', 'Operating system', 'Configuration', and 'Advisor'. The 'Overview' tab is selected, showing a 'Help me copy this VM in any region' button and a toolbar with actions like 'Connect', 'Start', 'Restart', 'Stop', 'Hibernate', 'Capture', 'Delete', 'Refresh', 'Open in mobile', 'Feedback', and 'CLI / PS'. The 'Essentials' section displays key VM details: Resource group (grid-rg-task), Status (Running), Location (West Europe), Subscription (Azure for Students), and Subscription ID (c539c22d-81df-4900-93d0-f5d20ccc64b9). To the right, a table lists additional properties: Operating system (Linux (ubuntu 24.04)), Size (Standard, 3.5 GiB memory), Public IP address (52.232.60.36), Virtual network/subnet (grid-vnet/grid-subnet), DNS name (Not configured), Health state (-), and Time created (12/8/2024, 4:56 PM UTC). Below this, the 'Properties' section has tabs for 'Virtual machine', 'Monitoring', 'Capabilities (7)', 'Recommendations', and 'Tutorials'. The 'Virtual machine' tab is active, showing a table of VM properties: Computer name (grid-vm), Operating system (Linux (ubuntu 24.04)), VM generation (V2), VM architecture (x64), Agent status (Ready), Agent version (2.12.0.2), Hibernation (Disabled), and Host group (-). To the right of this table, the 'Networking' section shows the Public IP address (52.232.60.36) and a table of network details: Public IP address (IPv6) (-), Private IP address (10.0.1.4), Private IP address (IPv6) (-), Virtual network/subnet (grid-vnet/grid-subnet), and DNS name (Configure). At the bottom, a 'Size' section is partially visible.

```
06:11:36 adrwal@olek-desktop-pc ~ → ssh azureuser@52.232.60.36
The authenticity of host '52.232.60.36 (52.232.60.36)' can't be established.
ED25519 key fingerprint is SHA256:BIAiJV4NGjQ9M9ENsLmEMPL2YNAfQjfxU0u0AyV2lRA.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '52.232.60.36' (ED25519) to the list of known hosts.
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-1017-azure x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/pro

System information as of Sun Dec  8 17:13:26 UTC 2024

System load:  0.0               Processes:            109
Usage of /:   5.4% of 28.02GB   Users logged in:     0
Memory usage: 7%               IPv4 address for eth0: 10.0.1.4
Swap usage:   0%

Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

The list of available updates is more than a week old.
To check for new updates run: sudo apt update

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

azureuser@grid-vm:~$
```

Now download docker with apt.

```
azureuser@grid-vm:~$ sudo apt update
Hit:1 http://azure.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://azure.archive.ubuntu.com/ubuntu noble-updates InRelease [
Get:3 http://azure.archive.ubuntu.com/ubuntu noble-backports InRelease
Get:4 http://azure.archive.ubuntu.com/ubuntu noble-security InRelease
Get:5 http://azure.archive.ubuntu.com/ubuntu noble/universe amd64 Pack
Get:6 http://azure.archive.ubuntu.com/ubuntu noble/universe Translatio
Get:7 http://azure.archive.ubuntu.com/ubuntu noble/universe amd64 Comp
Get:8 http://azure.archive.ubuntu.com/ubuntu noble/universe amd64 c-n-
Get:9 http://azure.archive.ubuntu.com/ubuntu noble/multiverse amd64 Pa
Get:10 http://azure.archive.ubuntu.com/ubuntu noble/multiverse Transla
Get:11 http://azure.archive.ubuntu.com/ubuntu noble/multiverse amd64 C
```

```
azureuser@grid-vm:~$ sudo apt install docker.io
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  bridge-utils containerd dns-root-data dnsmasq-base
Suggested packages:
  ifupdown aufs-tools cgroupfs-mount | cgroup-lite de
The following NEW packages will be installed:
  bridge-utils containerd dns-root-data dnsmasq-base
0 upgraded, 8 newly installed, 0 to remove and 44 not
Need to get 80.1 MB of archives.
After this operation, 303 MB of additional disk space
Do you want to continue? [Y/n] Y
Get:1 http://azure.archive.ubuntu.com/ubuntu noble/un
```

```
azureuser@grid-vm:~$ docker --version
Docker version 26.1.3, build 26.1.3-0ubuntu1~24.04.1
azureuser@grid-vm:~$
```

## e. Run container on the VM

First we need to authenticate Docker to access ACR.

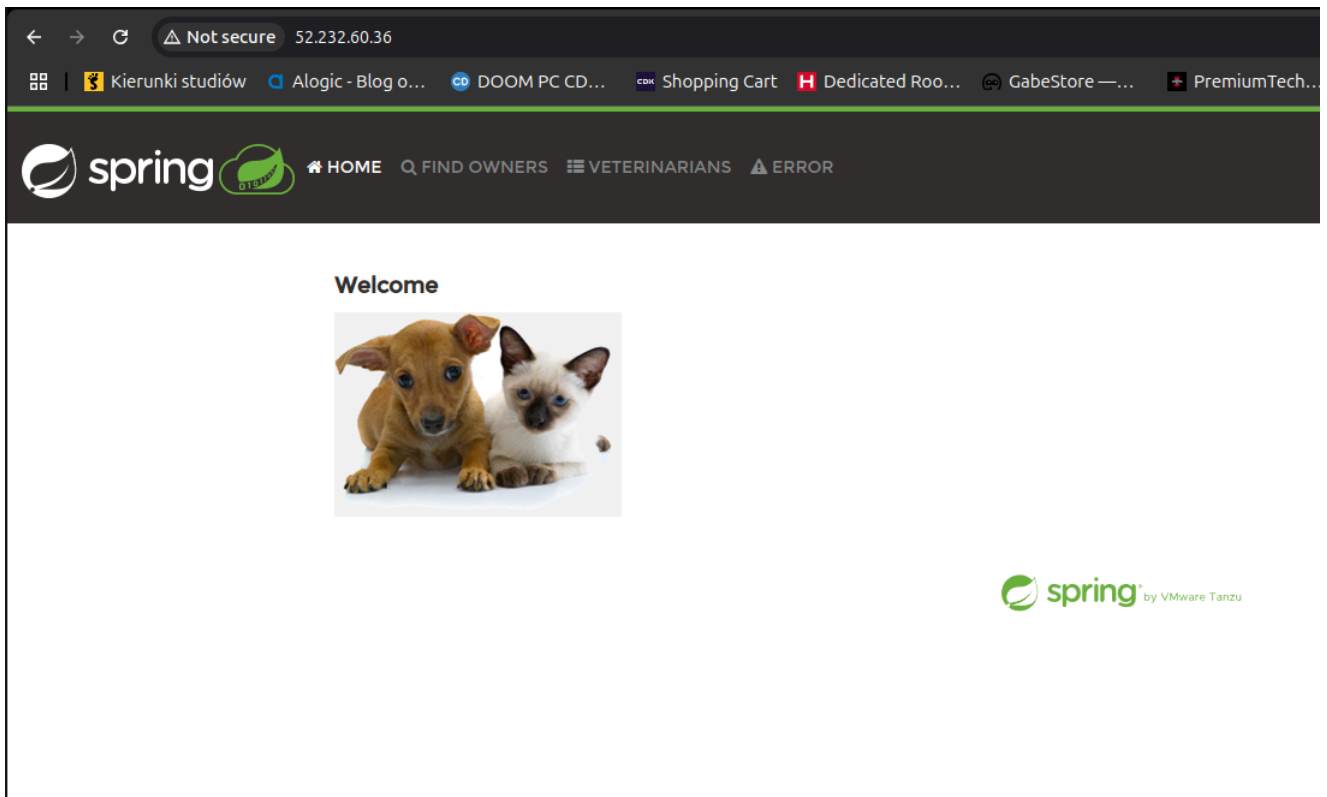
```
azureuser@grid-vm:~$ sudo docker login acrgridtask.azurecr.io
Username: acrgridtask
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
```

Now we can run the `acrgridtask.azurecr.io/petclinic` container that we have previously pushed to ACR.







### 3. Remove the resource group

We can remove resource group with one `az` command.

```
az group delete \  
  --name grid-rg-task \  
  --yes \  
  --no-wait
```

```
06:24:43 adrwal@olek-desktop-pc ~ → az group delete \  
  --name grid-rg-task \  
  --yes \  
  --no-wait  
06:24:49 adrwal@olek-desktop-pc ~ →
```

Now resource group is marked with "Deleting" warning and after about a minute it has been successfully deleted with all of the created resources.

grid-rg-task

Resource group

Search

CreateManage viewDelete resource groupRefreshExport to CSVOpen queryAssign to

Overview

Activity log

Access control (IAM)

Tags

Resource visualizer

Events

Settings

Deployments

Security

Deployment stacks

Policies

Properties

Locks

Cost Management

Cost analysis

Cost alerts (preview)

Budgets

Deleting

Essentials

Subscription (move) : Azure for Students

Subscriptions ID : c539c22d-81df-4900-93d0-f5d20ccc64b9

Tags (edit) : Add tags

Deployments : 1 Succeeded

Location : West Europe

ResourcesRecommendations

Filter for any field...Type equals allLocation equals allAdd filter

Showing 1 to 7 of 7 records. Show hidden types

Name	Type
acrgridtask	Container registry
grid-nsg	Network security group
grid-pip	Public IP address
grid-vm	Virtual machine
grid-vm_OsDisk_1_760fcd6666f64211910081d3c3d4c1f1	Disk



Resource not found

Get supportPerform self-diagnostics

Summary

Session ID

feb6d59dd5ea4345bfdd7890ec493fa8

Resource ID

/subscriptions/c539c22d-81df-4900-93d0-f5d20ccc64b...

Extension

HubsExtension

Content

ResourceMenuBlade

Error code

404

Details

The resource was not found, it may have been deleted. If this was launched from a pinned tile on the dashboard, it should be removed.

Resource ID: /subscriptions/c539c22d-81df-4900-93d0-f5d20ccc64b9/resourceGroups/grid-rg-task

Status Code: 404