Student Name: **Weight: 3%**

Student ID: **Marks: /10**

Lab: Azure Containers

Lab Objectives

In this lab you will be learning how to create and manage containers in Azure. You will:

1. Deploy a container
2. Create a container using the CLI
3. Update a container
4. Create a container registry
5. Push a container to a container registry
6. Deploy AKS (Azure Kubernetes Service

Lab Requirements

- Up to date browser
- Azure account
- Linux VM with Docker installed

Instructions

1. Working individually, follow the procedure below.
2. Take screenshots, as described in the *Marking Criteria* section.
3. Create a document that includes all screenshots appropriately titled and described, and then upload it to Brightspace, as indicated by your instructor.
4. Be sure to include your name and student ID in the document.

Marking Criteria

Screenshots	Marks
Browser Window with FQDN, running Hello-World container	/2
Browser Window with IP Address, running NGINX container	/2
Container Registry and Repository with pushed container	/3
Browser with cluster voting app	/3
Total	/10

Note: This icon indicates when a screenshot is required.

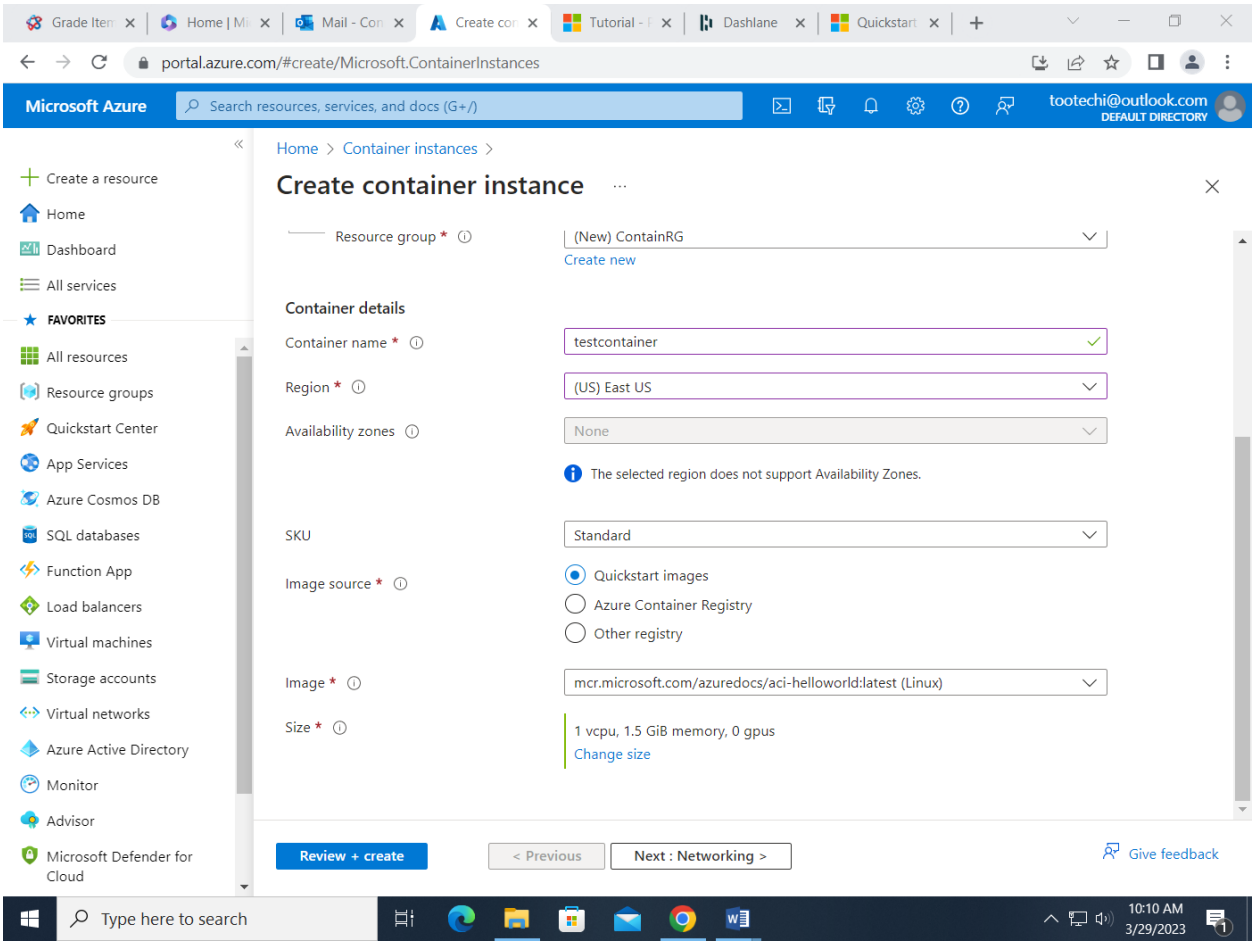
Source: Flatiron.com, Freepik, Image: screenshot_983871

Procedure

Part 1: Deploy a Container

Azure Container Instances allow you to run Docker containers without needing to create and manage a server.

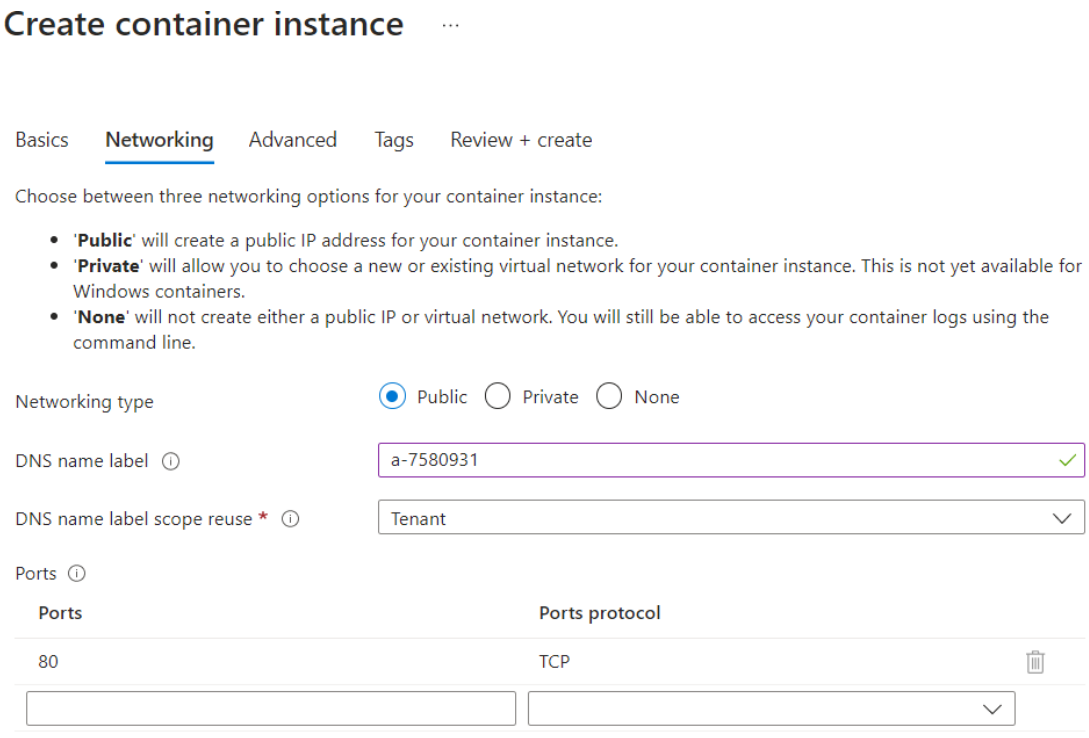
- ☐ Navigate to the **Azure Container Instance** page and click **Create Container Instances**.
- ☐ Select or create a resource group and give your container a name.
- ☐ Select the **Standard** SKU (Stock Keeping Unit) and **Quickstart images** as your image source.
- ☐ You'll deploy the small Linux web app image that runs a script in NodeJS.



- ☐ Click **Next** to go to the *Networking* page.

- ☐ Create a DNS name that is unique to the region and doesn't contain any reserve words. Number strings work well.
- ☐ To be able to connect to the web app, you must select **Public IP**.

  Note: Remember that IPs accrue costs.



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- ☐ Review and create your container.
- ☐ Navigate to the resource group page for the container and click the container.
- ☐ In the O*verview* page you can see the monitoring information for the container, the IP Address and the FQDN. Review the monitoring information.
- ☐ Copy the FQDN into a new browser tab/window and you should be able to see the basic web page.

Welcome to Azure Container Instances!

- ☐ Return to the Container's overview page and stop the container/group.
- ☐ Click the **JSON** link in the upper right-hand corner to see the deployment information.
- ☐ Delete the container to stop accruing charges for the resources.

Part 2: Deploy a Container using the CLI

In this section you are going to create and run an older image of NGINX using the CLI. NGINX is another opensource web application. The Docker hub is a library of Docker container images from vendors or open-source communities.

- ☐ Before you begin this section, review the following resources:
  - Azure container commands (https://learn.microsoft.com/en-us/cli/azure/container).
  - What is NGINX? (https://www.nginx.com/resources/glossary/nginx/)
  - NGINX available on the Docker hub (https://hub.docker.com/_/nginx)
- ☐ Create a new resource group for the container.
- ☐ Use the command below to create a container named **test-nginx**, in a resource group called **ContainRG**, with a public IP address, from the version **1.19.4** nginx image on the Docker hub. Change the names to match your resource group, etc.

```
az container create -g ContainRG --name my-nginx --image
registry.hub.docker.com/library/nginx:1.23.1 –ip-address public --
ports 80
```

Note: Microsoft has a bad habit of turning the -- into a single – or two –– (long hyphens) so you may have to over type those. The -g option has only one -.

- [ ] This command does not create a DNS name, so use the IP address in a new browser window/tab to see your running website.

Part 3: Update a Container

As your webserver runs over time, newer versions with fixes or newer features will be created and you may want to update your container version.

- [ ] Go to the **Overview** page for the container and select **Containers** on the blade menu.
- [ ] Click the **Properties** tab to see the details of your container, including where the container came from and the version.
- [ ] Go to the **Docker hub NGINX** list and find the latest version of the container.
- [ ] Reissue the CLI command but using the latest version number. In the example below, the latest version is 1.23.4.

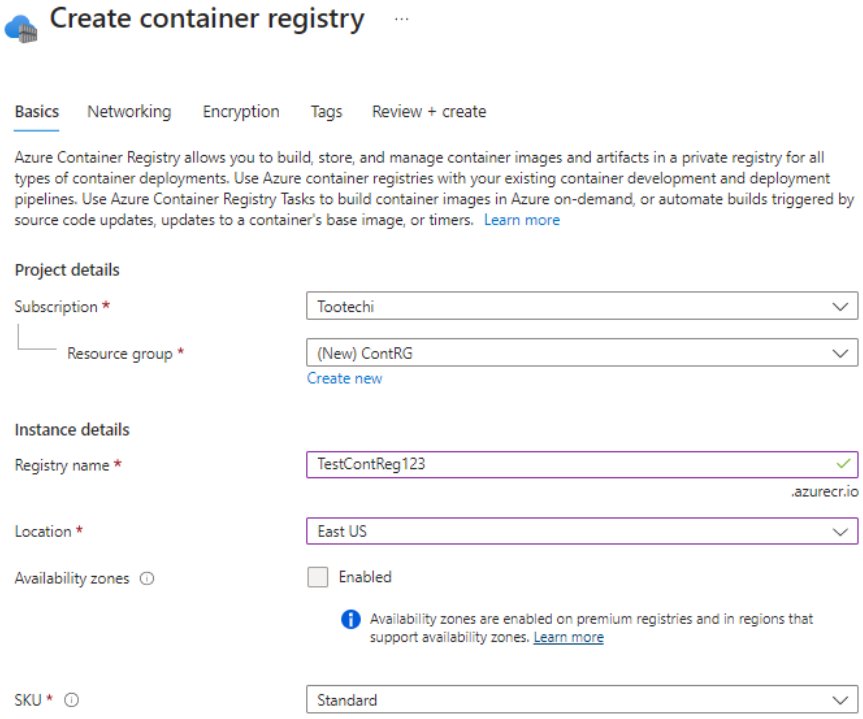
```
az container create -g ContainRG --name test--nginx --image
registry.hub.docker.com/library/nginx:1.23.4 --ip-address public --
ports 80
```

- [ ] Return to the container properties to see the new version.
- [ ] Look through the **Events** and **Logs** tabs to see the information provided.
- [ ] Delete the container to stop accruing charges for the resources or continue to the next section.

Part 4: Create a Container Registry

To store your containers, you need a container registry. This is like creating your own small version of the Docker hub.

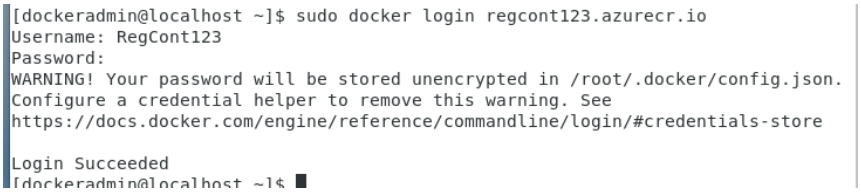
- ☐ Navigate to the **Container Registries** page and click **Create Container Registry**.
- ☐ Enter the resource group, name and location, and then select the **Standard** SKU. Notice that when you create the name, it ends with *.azurecr.io*.



- ☐ Click **Next** and select **Public Access** on the *Network* page.
- ☐ Review and create your registry.

Section 5: Push a Container to a Container Registry

- ☐ Go to the main page for the container registry and select **Access Keys** from the blade menu.
- ☐ You should see the registry name and the login server name. **Enable** the admin user.
- ☐ Make a copy of the login server name, username and passwords for the admin user for this container registry.
- ☐ Boot your Linux/Docker virtual machine.
- ☐ On your Docker VM, make sure Docker is running and pull down the simple Microsoft Hello-world container: **mcr.microsoft.com/hello-world**.
- ☐ To log in to you Azure Container Registry, use the `docker login` command with your registry login server name.



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- ☐ Tag your image with the server name and a namespace for organization.

  In the example below the `mcr.microsoft.com/hello-world` image is tagged with `hwserver` on the `regcont123.azurecr.io` container registry in a folder called webservers.

- ☐ Use the push command to send the image to the location that you tagged the image with.

```
[dockeradmin@localhost ~]$ sudo docker tag mcr.microsoft.com/hello-world regcont123.azurecr.io/webservers/hwserver
[dockeradmin@localhost ~]$ sudo docker push regcont123.azurecr.io/webservers/hwserver
Using default tag: latest
The push refers to repository [regcont123.azurecr.io/webservers/hwserver]
af0b15c8625b: Mounted from webservers
latest: digest: sha256:92c7f9c92844bbbb5d0a101b22f7c2a7949e40f8ea90c8b3bc396879d95e899a size: 524
[dockeradmin@localhost ~]$
```

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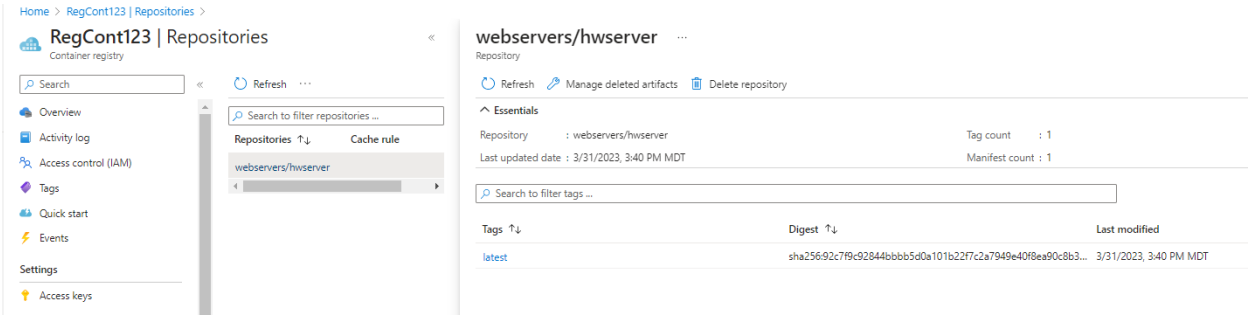
- ☐ In the Azure portal, go to the main page for the container registry and select **Repositories** from the blade menu. You should see your webservers namespace and the hwserver image.



Section 6: Deploy AKS (Azure Kubernetes Service)

You may need multiple containers to deploy a single application, for example, if you sold products online, you would need:

- A webserver with your product information
- A database for your customer information
- An order processing application to collect payment

Managing multiple containers one at a time, especially as your system grows, would be difficult. Az AKS service allows you to deploy and manage clusters of containers.

☐ Complete the Quickstart: Deploy an Azure Kubernetes Service (AKS) cluster using the Azure portal (https://learn.microsoft.com/en-us/azure/aks/learn/quick-kubernetes-deploy-portal?tabs=azure-cli).

References

Docker [Computer software]. (2023) Docker, Inc.

NGINX [Computer software]. (2023) Nginx, Inc.

