

Two-tier Nodejs App migration on Azure Container: Lab Guide

Overview

This guide will help you in migrating On-premises two-tier Nodejs App with MongoDB to Container and PaaS database on Azure.

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Lab 1: Getting Started with Azure

Lab Overview

In this lab, you will be deploying pre-requisite infrastructure which is simulation of on-premises two-tier Nodejs app with MongoDB database.

Prerequisites

- Windows or a Mac machine with HTML5 supported browser such as Microsoft Edge, Internet Explorer, Chrome or Firefox.
- Putty.

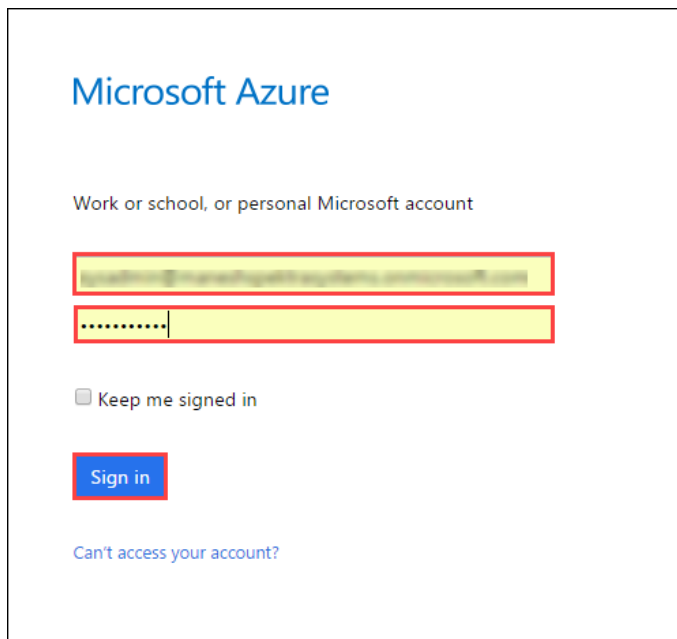
Time Estimate

20 minutes

Exercise 1: Deploy Pre-requisite On-premises template

In this exercise, you will log into the Azure Portal using your Azure credentials.

1. **Launch** a browser and **Navigate** to <https://portal.azure.com>. Provide your Azure login credentials and click on **Sign In**.



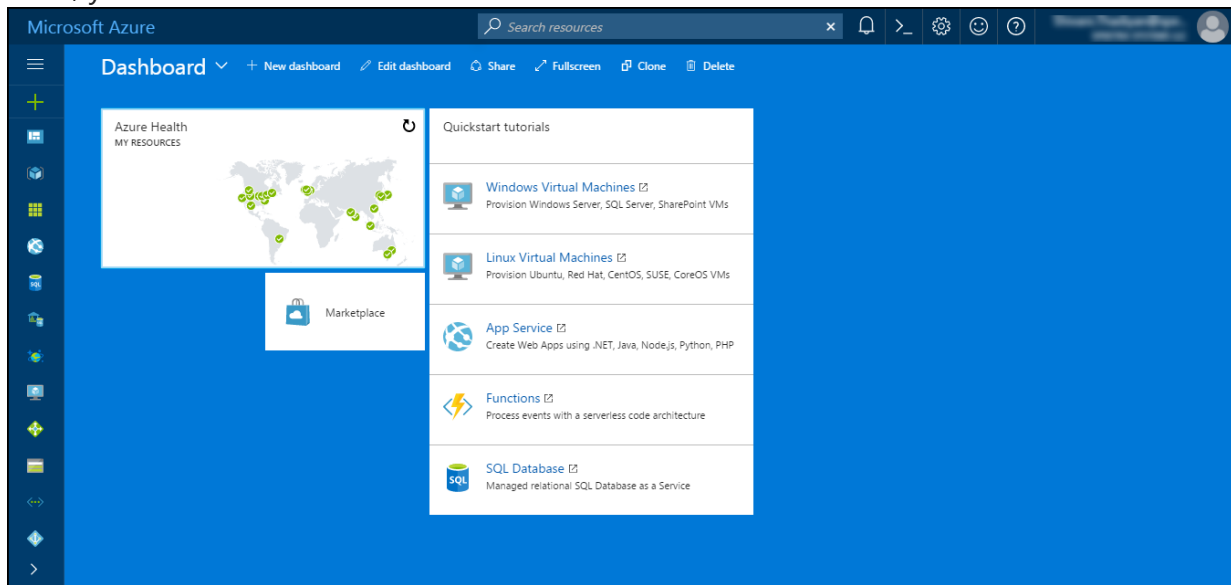
Microsoft Azure

Work or school, or personal Microsoft account

☐ Keep me signed in

[Can't access your account?](#)

2. Now, you will be directed to the Azure Dashboard.



3. Open github URL (<https://github.com/SpektraSystems/2-Tier-nodejsapp-migration-to-containers-on-Azure>) and click on deploy to azure to create pre-requisite simulation of on-premises two tier infrastructures.

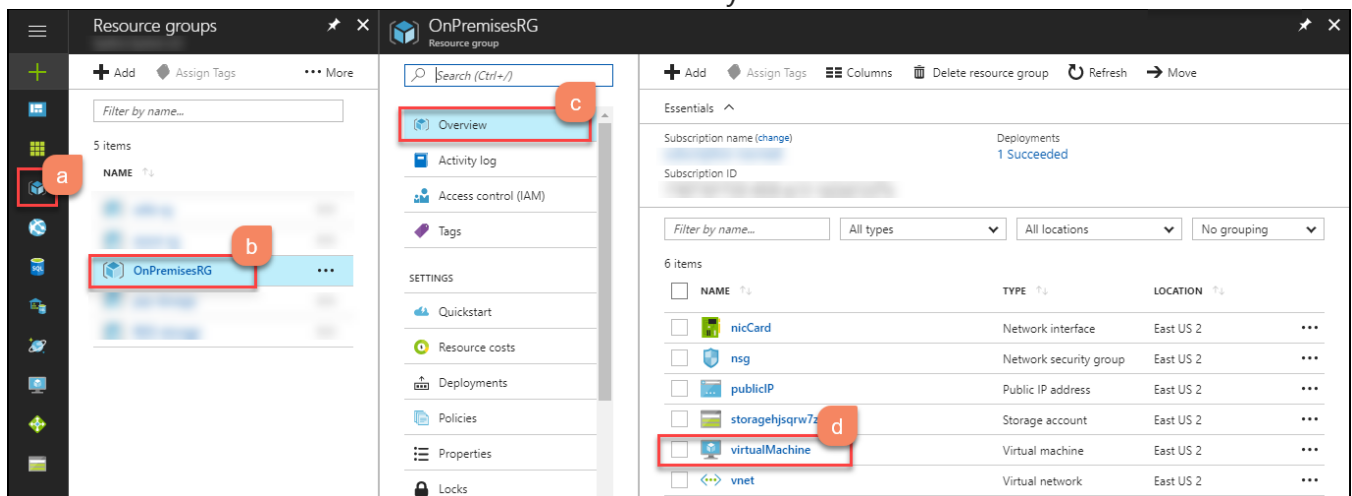
- a. *ResourceGroup:* **OnPremisesRG** (any valid name)
- b. *Location:* **East US**(any location)
- c. *Admin User:* **demouser** (any username of your choice)
- d. *Admin Password:* **<Valid Password>**

Accepts terms and conditions and click on **Purchase** button.

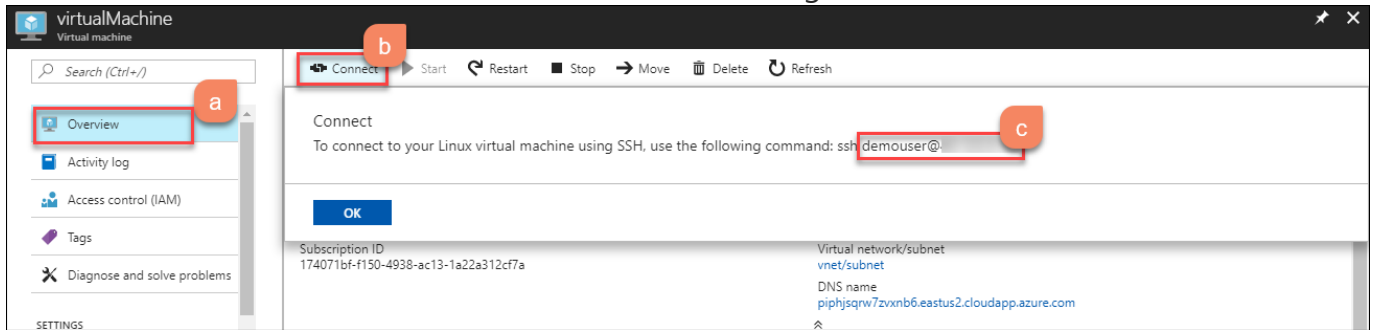
Exercise 2: Verify the DB and WebApp

In this exercise, we will login to VM which is pre-deployed as a part of lab. Login to VM with the credentials provided in mail.

1. In Azure portal, click on Resource Group which contains the pre-deployed on-premises infrastructure then click on **Overview** tab and finally on VM.



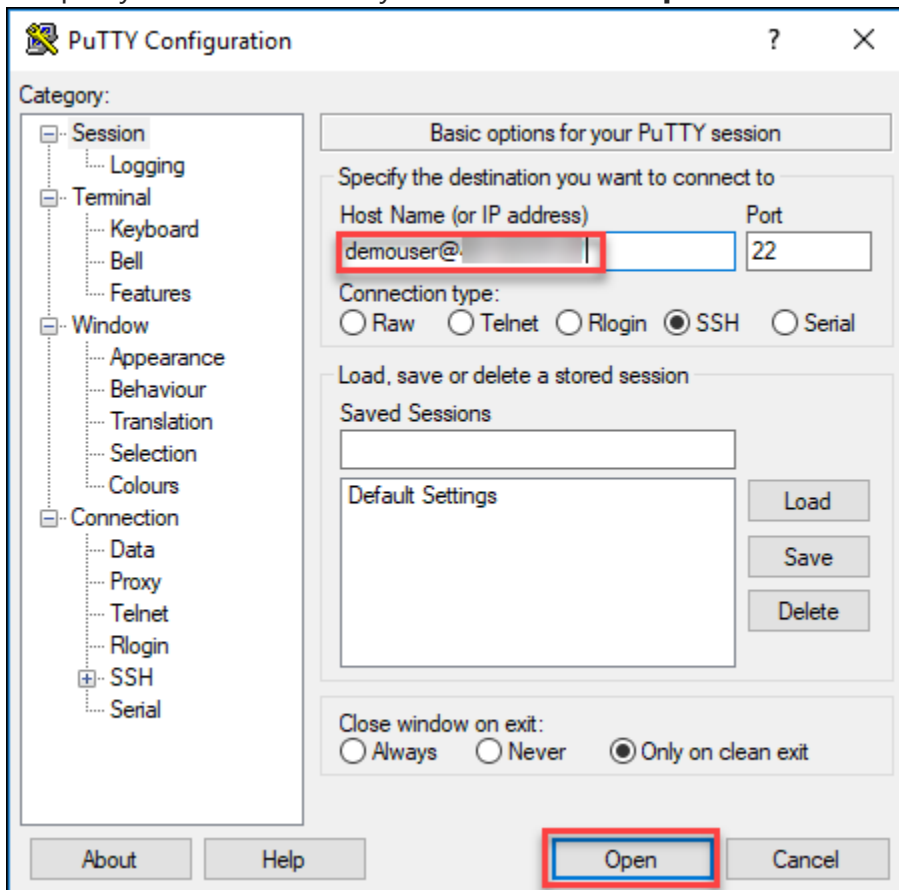
- In overview section, click on **Connect** button. It will show the username with IP address. Copy that username with IP address, we will use it for connectig the VM.



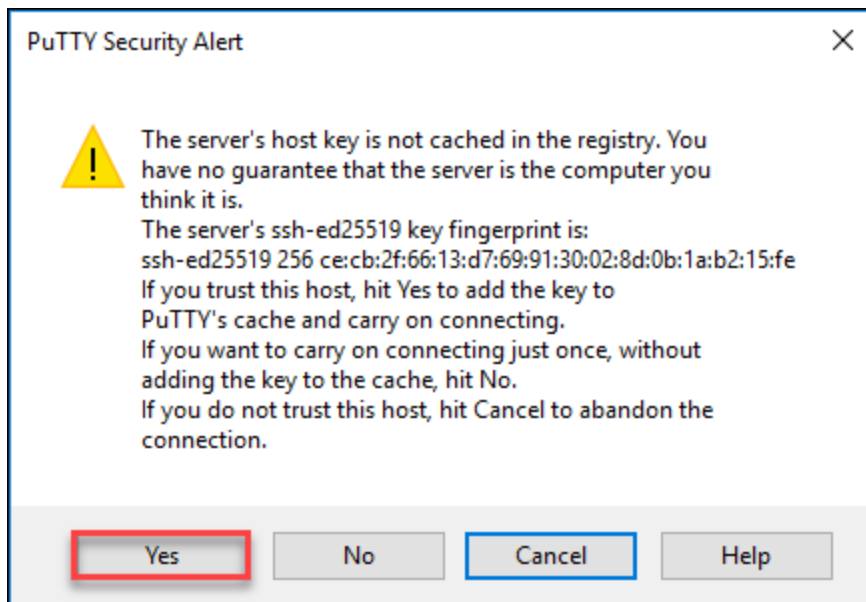
- Now run putty.exe from your PC.



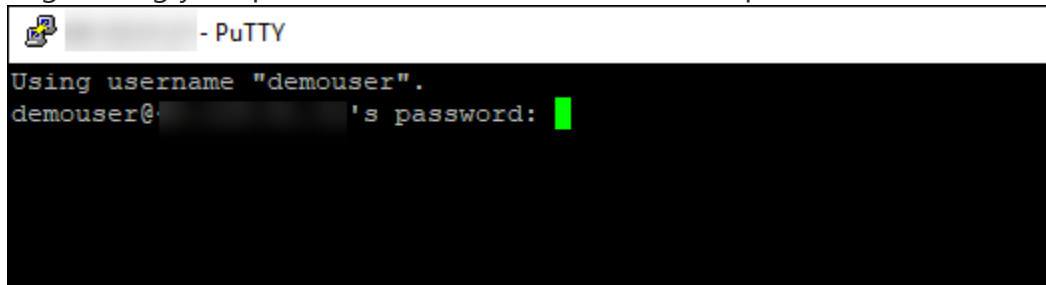
- This is the application window that pops up when you run putty.exe. Paste the Username with Public IP address of the VM that you copied in step 2 to the Host Name (or IP address) box of the putty. Port will be 22 by default. Click on **Open**.



- The PuTTY Security Alert will pop up. Click on **Yes**.

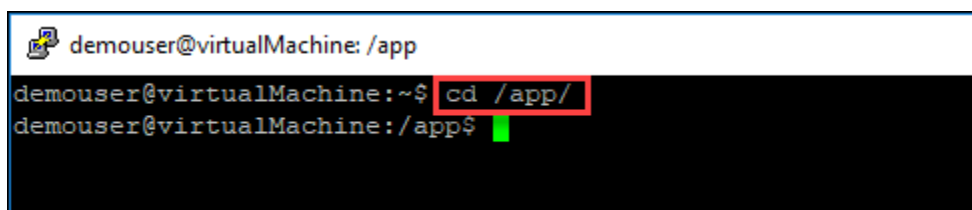


6. Login using your password for the **Virtual Machine** provided while creating virtual machine.



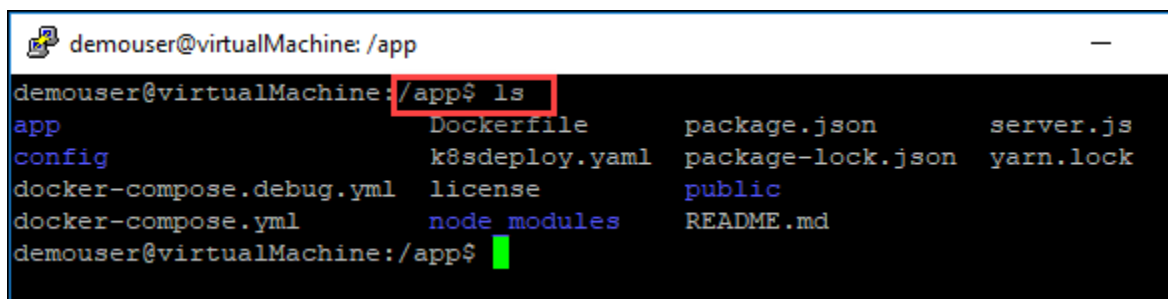
7. Run the following command for changing directory to application folder where we have Nodejs application.

```
cd /app/
```



8. List the files on app folder using following command.

```
ls
```



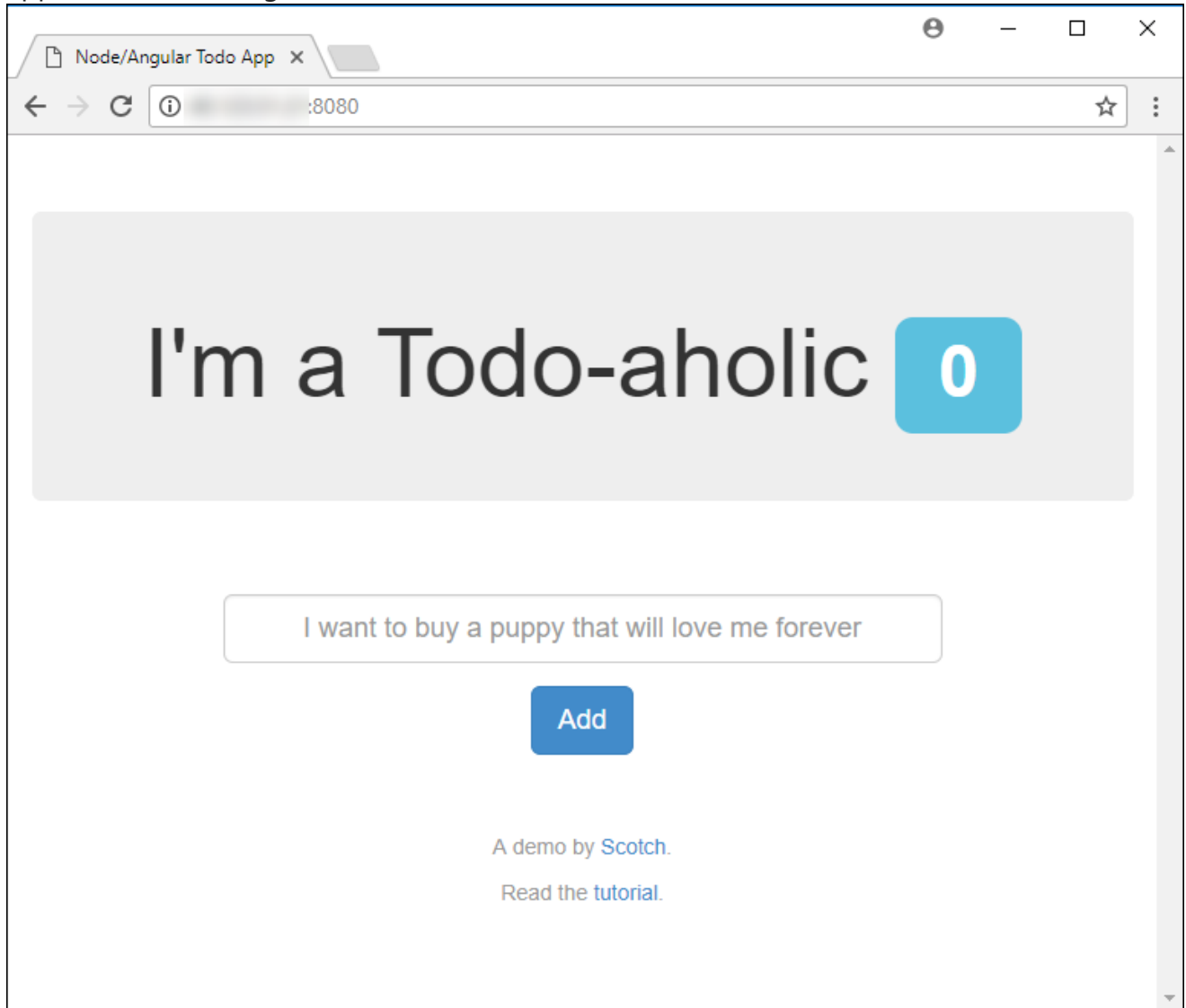
9. Run the commad for starting the Nodejs application using below command.

```
npm start
```

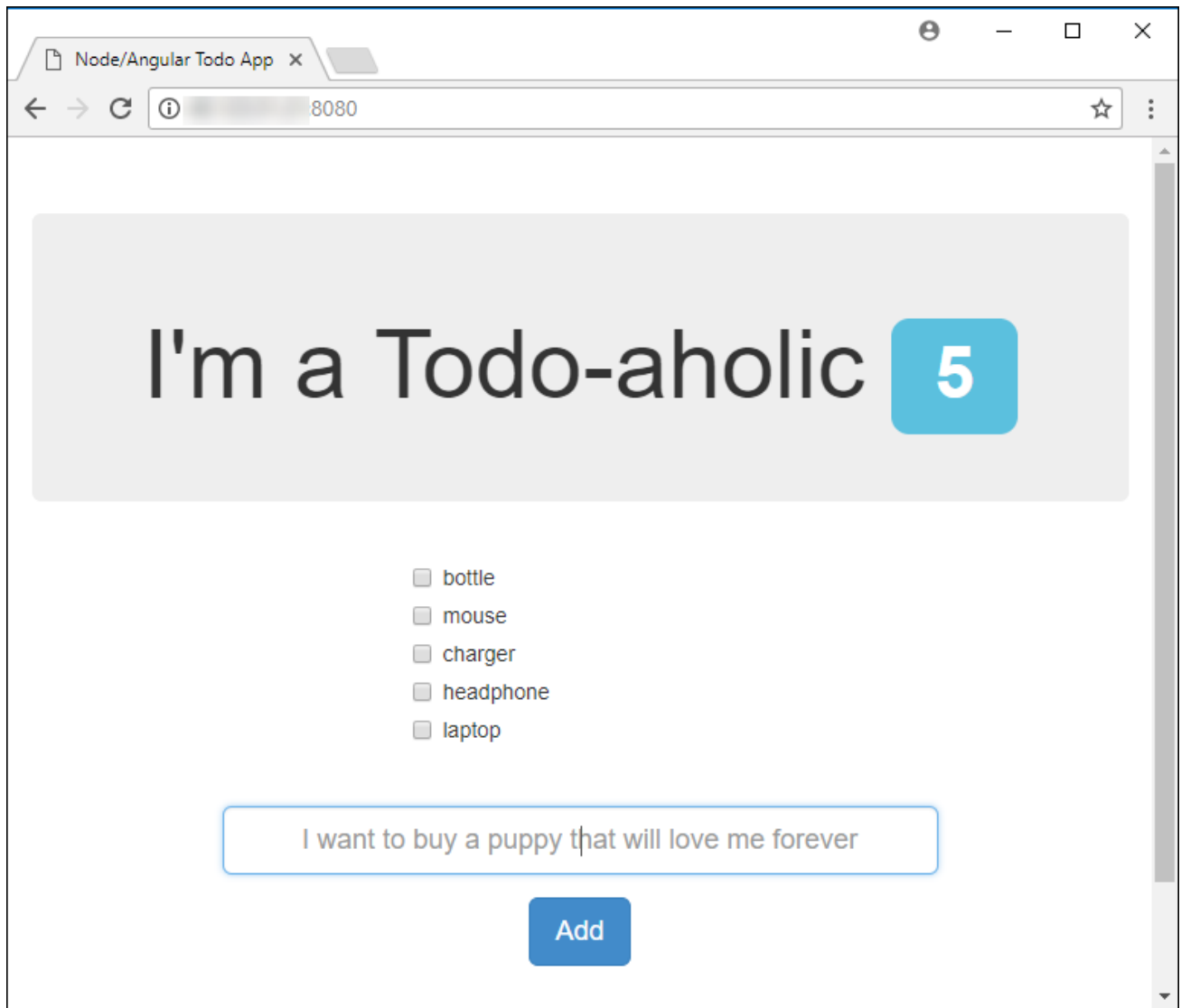
```
demouser@virtualMachine:/app$ npm start
> node-todo@0.0.1 start /app
> node server.js

App listening on port 8080
(node:3789) DeprecationWarning: `open()` is deprecated in mongoose >= 4.11.0, use
`openUri()` instead, or set the `useMongoClient` option if using `connect()` o
r `createConnection()`. See http://mongoosejs.com/docs/connections.html#use-mong
o-client
```

10. Open the browser and browse the Public IP address with port 8080 which will show the Node.js application is running.



11. Create some record in that application as shown below.



12. You can verify the mongoDB database while running the **mongo** as shown below:

```
demouser@virtualMachine: /app
demouser@virtualMachine:/app$ mongo
MongoDB shell version: 3.2.17
connecting to: test
Welcome to the MongoDB shell.
For interactive help, type "help".
For more comprehensive documentation, see
  http://docs.mongodb.org/
Questions? Try the support group
  http://groups.google.com/group/mongodb-user
Server has startup warnings:
2017-11-06T09:57:19.214+0000 I CONTROL [initandlisten]
2017-11-06T09:57:19.214+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/
mm/transparent_hugepage/enabled is 'always'.
2017-11-06T09:57:19.214+0000 I CONTROL [initandlisten] **          We suggest set
ting it to 'never'
2017-11-06T09:57:19.214+0000 I CONTROL [initandlisten]
2017-11-06T09:57:19.214+0000 I CONTROL [initandlisten] ** WARNING: /sys/kernel/
mm/transparent_hugepage/defrag is 'always'.
2017-11-06T09:57:19.214+0000 I CONTROL [initandlisten] **          We suggest set
ting it to 'never'
2017-11-06T09:57:19.214+0000 I CONTROL [initandlisten]
```

13. You can also verify the records in mongoDB database while running the following commands. Copy the **db_name**(meanstacktutorials) and **collection_name**(todos) for future use.

```
show dbs
use <db_name>
show collections
db.<collection_name>.find()
```

```
demouser@virtualMachine: /app
> show dbs
local                0.000GB
meanstacktutorials   0.000GB
> use meanstacktutorials
switched to db meanstacktutorials
> show collections
todos
> db.todos.find()
{ "_id" : ObjectId("5a003ab402c7d70ecd81bdcf"), "text" : "bottle", "__v" : 0 }
{ "_id" : ObjectId("5a003ab602c7d70ecd81bdd0"), "text" : "mouse", "__v" : 0 }
{ "_id" : ObjectId("5a003ab902c7d70ecd81bdd1"), "text" : "charger", "__v" : 0 }
{ "_id" : ObjectId("5a003abd02c7d70ecd81bdd2"), "text" : "headphone", "__v" : 0 }
{ "_id" : ObjectId("5a003abf02c7d70ecd81bdd3"), "text" : "laptop", "__v" : 0 }
> exit
bye
demouser@virtualMachine:/app$
```


Lab 2: Two-tier Nodejs App migration

Lab Overview

In this lab, you will:

- Create Azure Cosmos DB (MongoDB)
- Export on-premises database and import to Azure Cosmos DB (MongoDB)
- Create Docker Host on Azure
- Build and Run Nodejs application on container

Prerequisites

- Windows or a Mac machine with HTML5 supported browser such as Microsoft Edge, Internet Explorer, Chrome or Firefox.
- Putty client.
- Lab 1 must be completed.

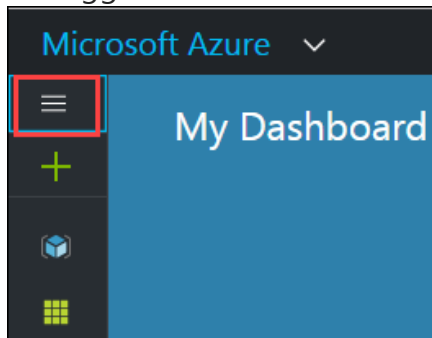
Time Estimate

60 minutes

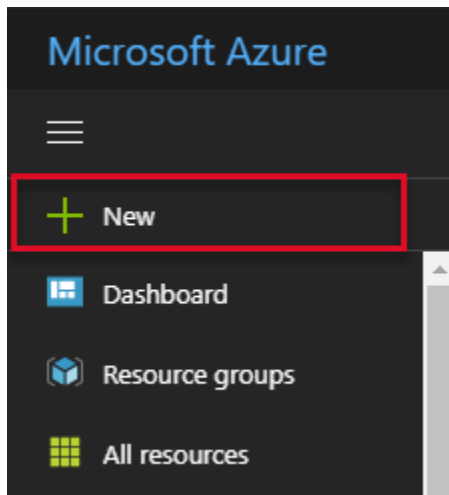
Exercise 1: Deploy Azure Cosmos DB for migration

In this exercise, you will deploy Azure Cosmos database which is required for migration of on-premises database to Azure PaaS DB.

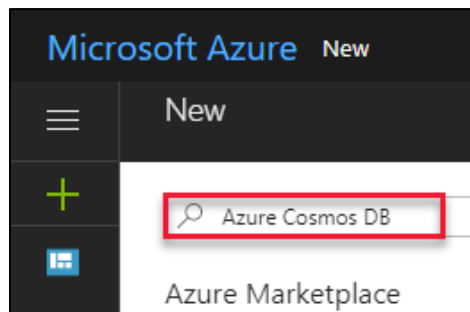
1. **Launch** a browser and **Navigate** to <https://portal.azure.com>. **Login** with your Microsoft Azure credentials.
2. To toggle **show/hide** the Portal menu options with icon, **Click** on the **Show Menu** button.



3. **Click** on **+New** button.



4. Search for **Azure Cosmos DB** and click on the same.



5. Click on **Create** button.



6. Populate the below parameters as shown below.
 - **ID:** **cosmomongodb**(any valid name)
 - **API:** select **Mongo DB** from the dropdown

- *Resource Group*: Choose **Create new** and provide any valid name

Azure Cosmos DB
New account

* ID
cosmosmongodb ✓ documents.azure.com

* API ⓘ
MongoDB (document) ▼

* Subscription
▼

* Resource Group ⓘ
☒ Create new ☐ Use existing
two-tier-rg ✓

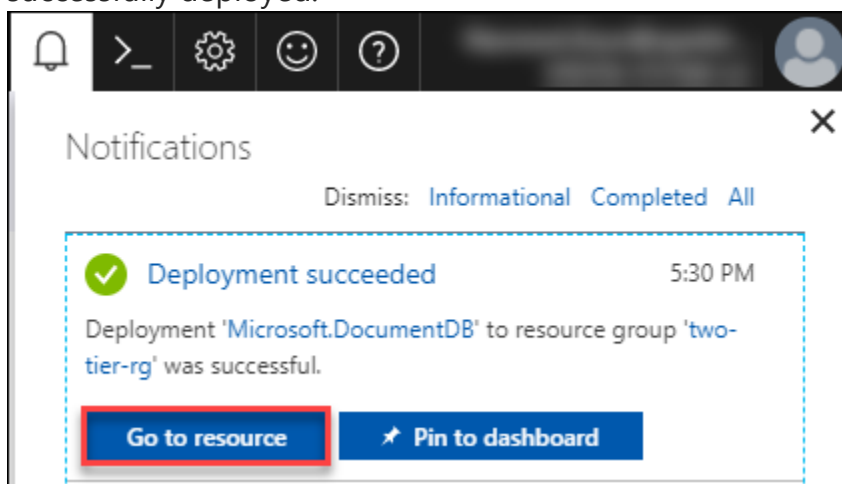
* Location
East US 2 ▼

☐ Enable geo-redundancy ⓘ

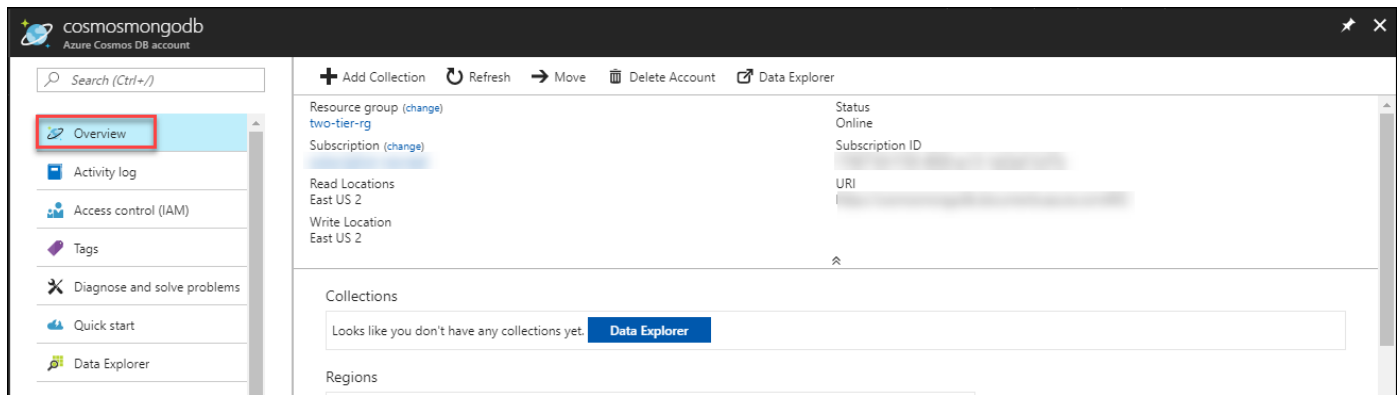
☐ Pin to dashboard

Create Automation options

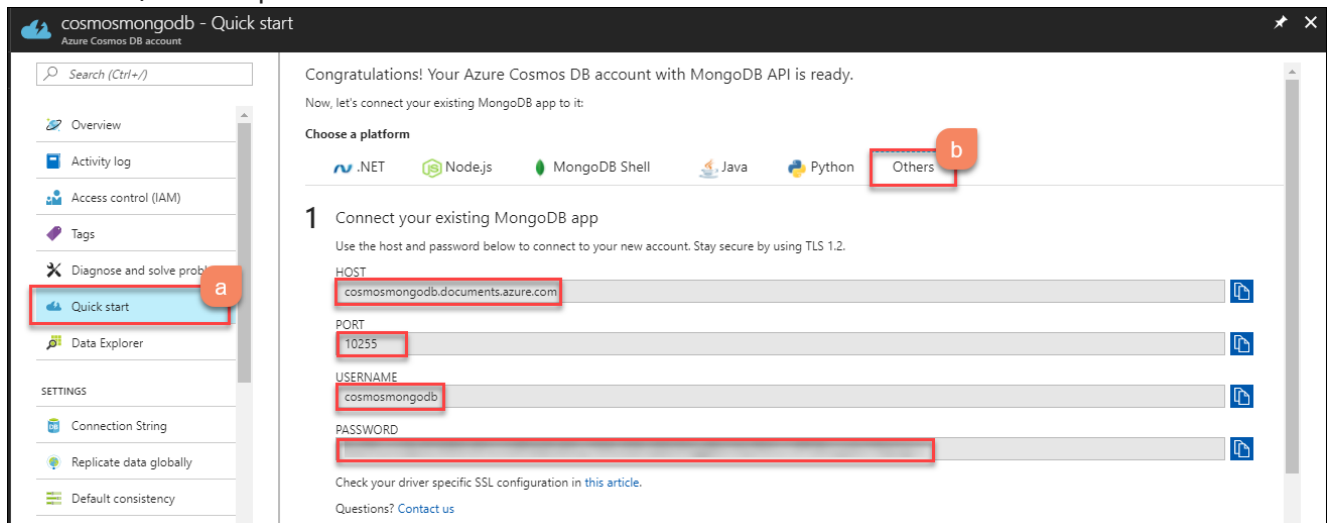
7. After deployment gets completed, click on **Go to resource** to verify that resource is successfully deployed.



8. After that you can view that **cosmosmongodb** is created. Click on **Overview**.

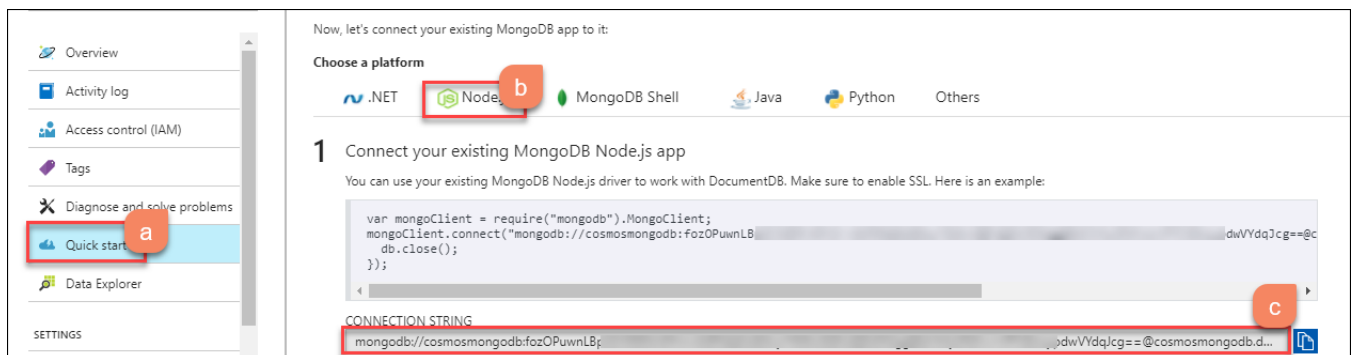


- Go to **Quick start** and click on **Others**. Copy all the parameters (Host, Port, Username, Password) in notepad for future use.



- Click on **Node.js** and copy the **CONNECTION STRING** to be used in future.

`mongodb://cosmosmongodb:<password>@cosmosmongodb.documents.azure.com:10255/tododb/?ssl=true`



Exercise 2: Migrate MongoDB On Azure

In this exercise, we will login to **On-Premises VM** which we created in Lab 1 → Exercise 1 and migrate MongoDB on azure.

- Once, you get connected to **On-premises VM** which you deployed in Lab 1 → Exercise 1. Use the below command to export the data from on-premises VM.

- `<db_name>`: **meanstacktutorials** (any database name to be used by application post migration, you can keep it same or change as per requirement of your application)
- `<Collection_name>`: **todos** (as per app requirement)

```
sudo mongoexport --host localhost --db <db_name> --collection
<Collection_name> --out dumpfile.bkp
```

```
demouser@virtualMachine:/app$ sudo mongoexport --host localhost --db meanstacktu
torials --collection todos --out dumpfile.bkp
2017-11-06T12:49:38.723+0000    connected to: localhost
2017-11-06T12:49:38.723+0000    exported 5 records
```

- Now you can see data is exported successfully.

```
demouser@virtualMachine:/app$ ls
app                Dockerfile         node modules      README.md
config            dumpfile.bkp      package.json      server.js
docker-compose.debug.yml  k8sdeploy.yaml  package-lock.json  yarn.lock
docker-compose.yml  license           public
```

- Now, we will import this MongoDB on Azure Cosmos DB (MongoDB) and replace the HOST, PORT, USERNAME and PASSWORD with the parameters in below command with values you copied in LAB 2 → Exercise 1 → Step 9.

```
mongoimport --host <HOST>:<PORT> -u <USERNAME> -p <PASSWORD> --ssl --
sslAllowInvalidCertificates --db <db_name> --collection todos --file
<BackupFileName>
```

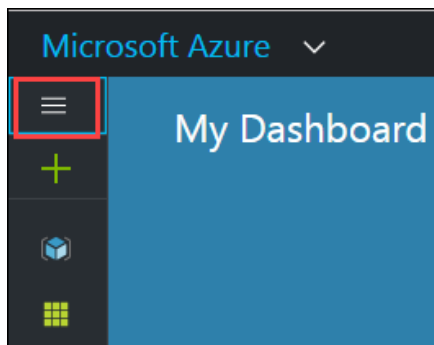
```
demouser@virtualMachine: /app
demouser@virtualMachine:/app$ mongoimport --host cosmosmongodb.documents.azure.c
om:10255 -u cosmosmongodb -p fozOPuwnLBpXZJWEMrAPnIrvXdfN4aDo6GnyYIWKx3QFoQZk3IN
lggBbXJhfy2PdYulvPFIJ8noypdwVYdqJcg== --ssl --sslAllowInvalidCertificates --db m
eanstacktutorials --collection todos --file dumpfile.bkp
2017-11-06T13:27:09.901+0000    connected to: cosmosmongodb.documents.azure.com:
10255
2017-11-06T13:27:10.427+0000    imported 5 documents
demouser@virtualMachine:/app$
```

- You can see the message for imported documents as highlighted in above screenshot.

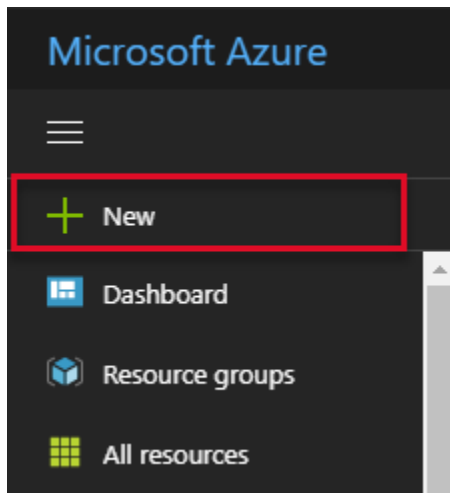
Exercise 3: Deploy Ubuntu with Docker using template

In this exercise, we will deploy the template for docker on ubuntu server to migrate Nodejs on container.

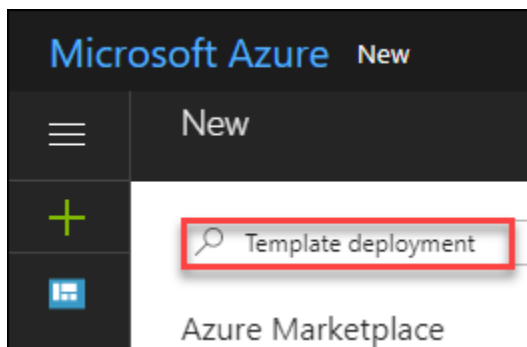
- Launch** a browser and **Navigate** to <https://portal.azure.com>. **Login** with your Microsoft Azure credentials.
- To toggle **show/hide** the Portal menu options with icon, **Click** on the **Show Menu** button.



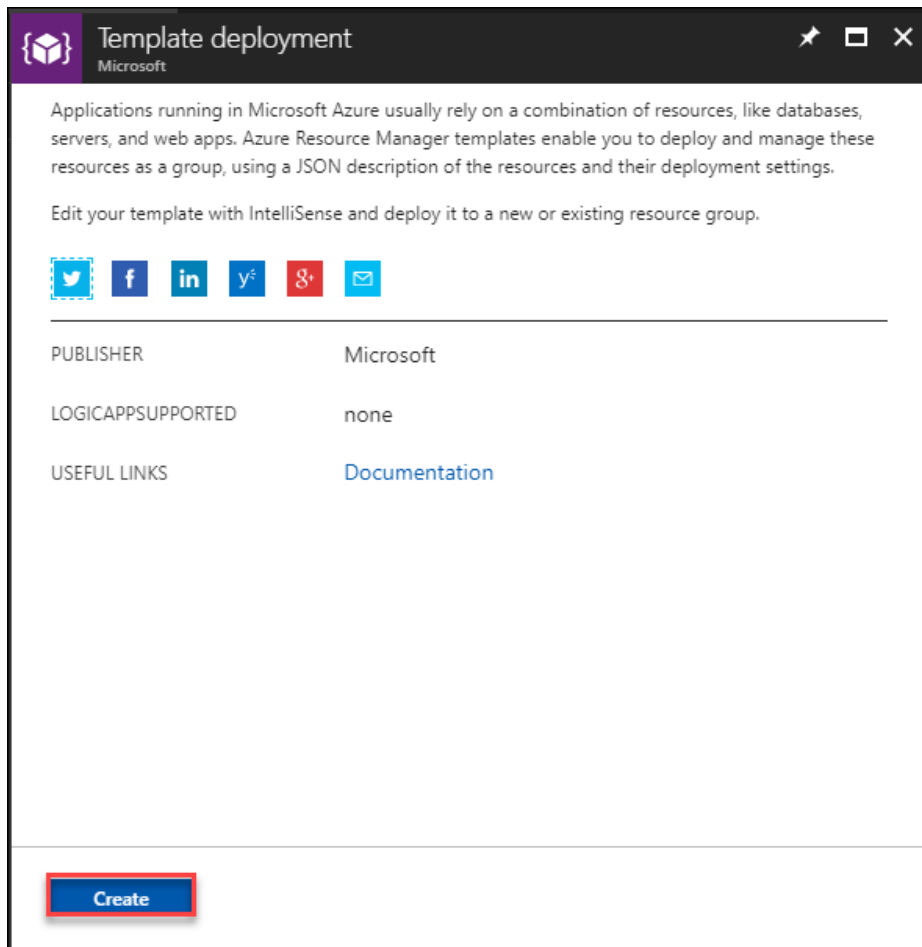
3. Click on **+New** button.



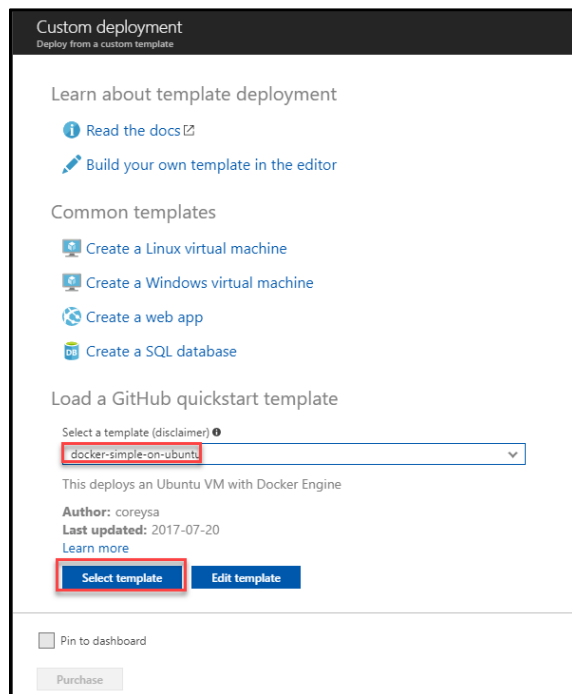
4. Search for **Template Deployment**.



5. Click on **Create** Button.



6. Select **docker-simple-on-ubuntu template** and Click on **Select** template.



7. Provide the parameters as shown below.
 - a. *Resource Group*: **two-tier-rg** (use existing resource group)
 - b. *New Storage Account Name*: **dockerstorage12** (any valid name)

- c. *Admin Username:* **demouser** (as per your choice)
- d. *Admin Password:* <valid password>
- e. *Dns Name for Public IP:* **dockerpublicip12** (any valid name)
- f. *Vm Size:* **Standard_D1_v2**
- g. *Ubuntu OS Version:* **16.04.0-LTS**

Accepts terms and conditions and click on **Purchase** button.

Deploy an Ubuntu VM with Docker Engine
Azure quickstart template

TEMPLATE
docker-simple-on-ubuntu
6 resources
Edit template Edit parameters Learn more

BASICS

* Subscription: [Dropdown]
 * Resource group: ☐ Create new ☒ Use existing
 two-tier-rg
 * Location: East US 2

SETTINGS

* New Storage Account Name: dockerstorage ✓
 * Admin Username: demouser ✓
 * Admin Password: [Masked] ✓
 * Dns Name For Public IP: dockerpublicip ✓
 Vm Size: Standard_D1_v2
 Ubuntu OS Version: 16.04.0-LTS

TERMS AND CONDITIONS

Template information | Azure Marketplace Terms | Azure Marketplace

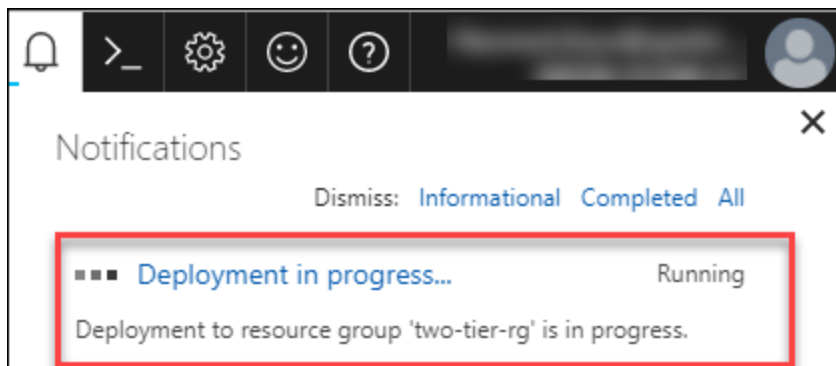
By clicking "Purchase," I (a) agree to the applicable legal terms associated with the offering; (b) authorize Microsoft to charge or bill my current payment method for the fees associated the offering(s), including applicable taxes, with the same billing frequency as my Azure subscription, until I discontinue use of the offering(s); and (c) agree that, if the deployment involves 3rd party offerings, Microsoft may share my contact information and other details of such deployment with the publisher of that offering.

☒ I agree to the terms and conditions stated above

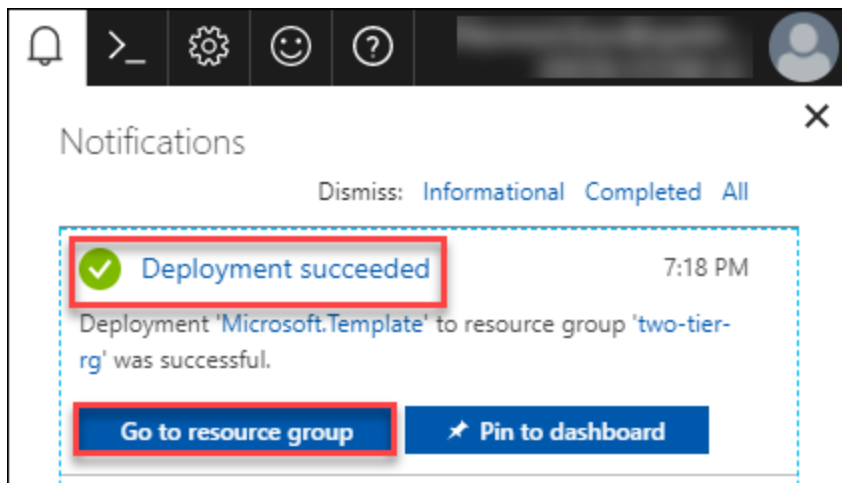
☐ Pin to dashboard

Purchase

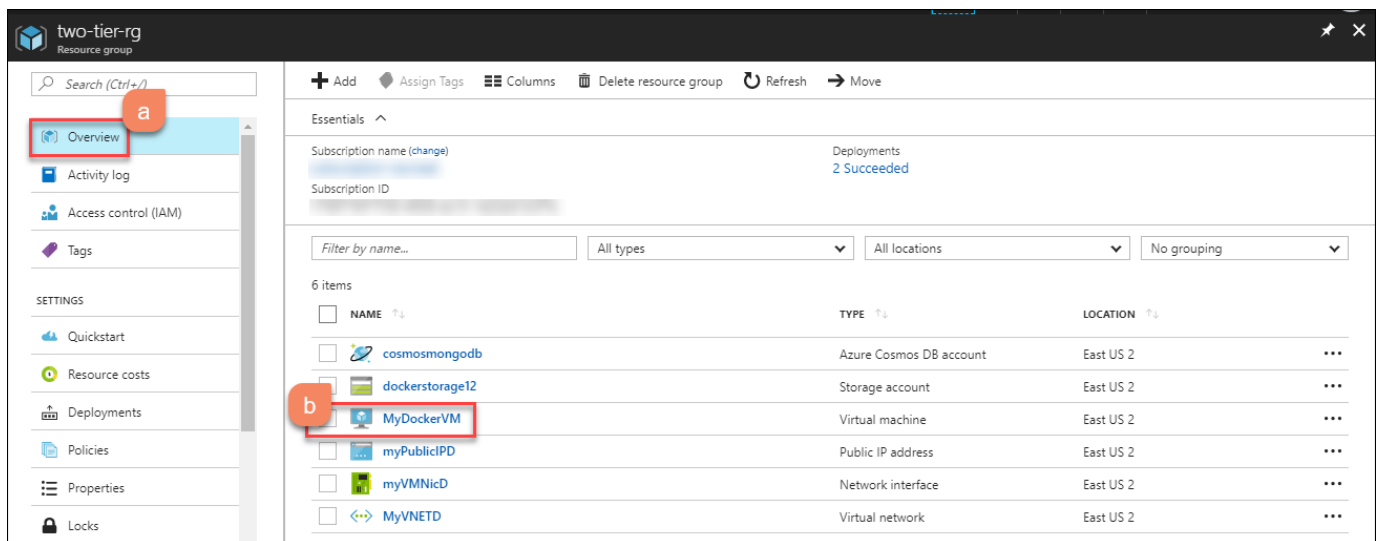
8. It will be validated and then deployment will start.



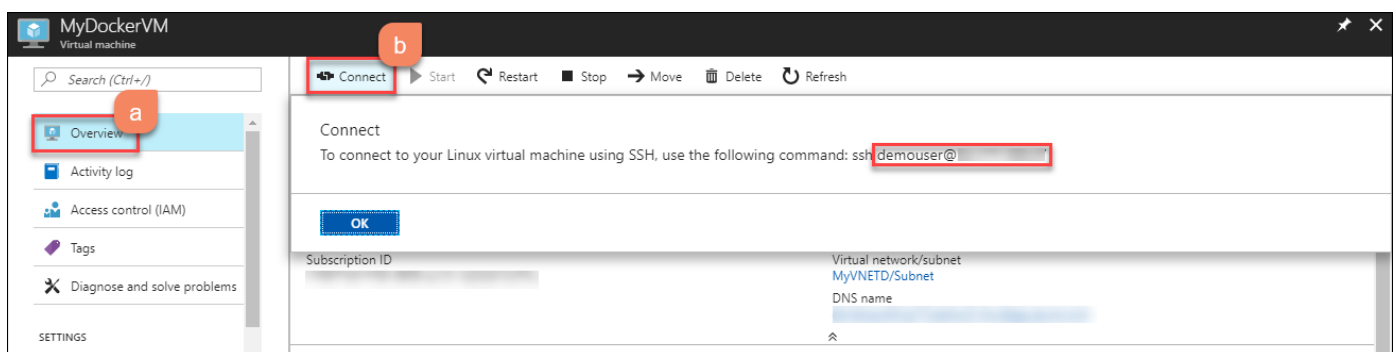
9. After deployment gets completed, click on **Go to resource** to verify that resource is successfully deployed.



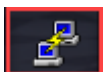
10. Click on Overview and select the **MyDockerVM**.



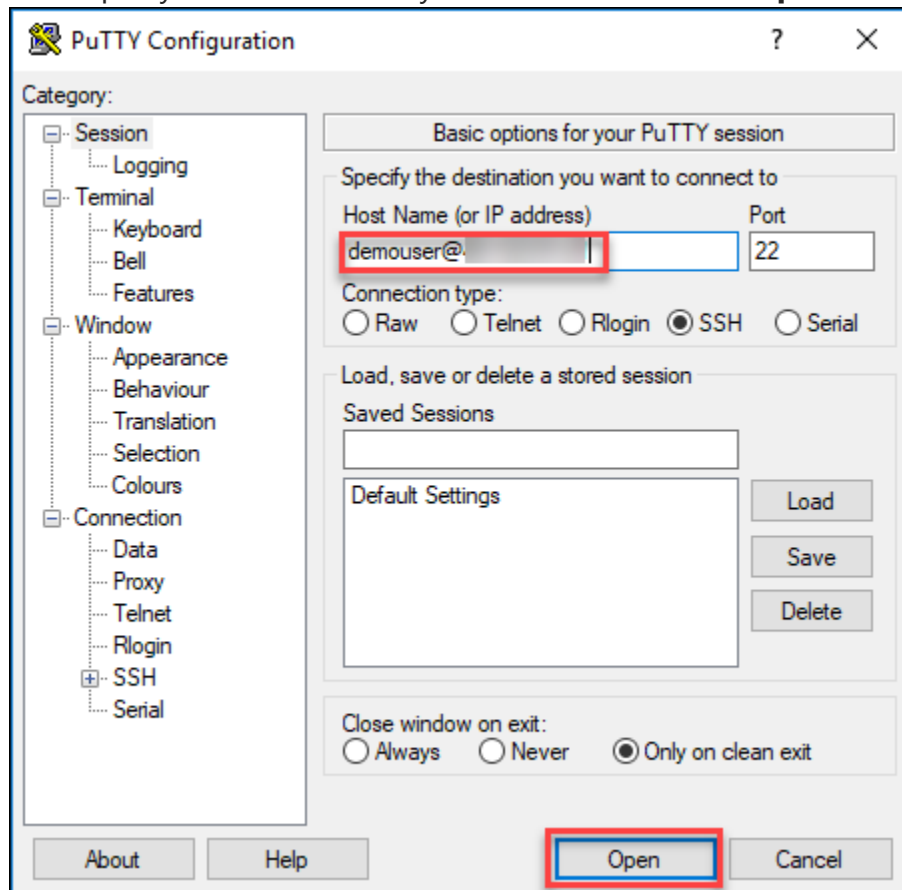
11. In overview section, click on **Connect** button. It will show the username with IP address. Copy that username with IP address will you it for connectig the VM.



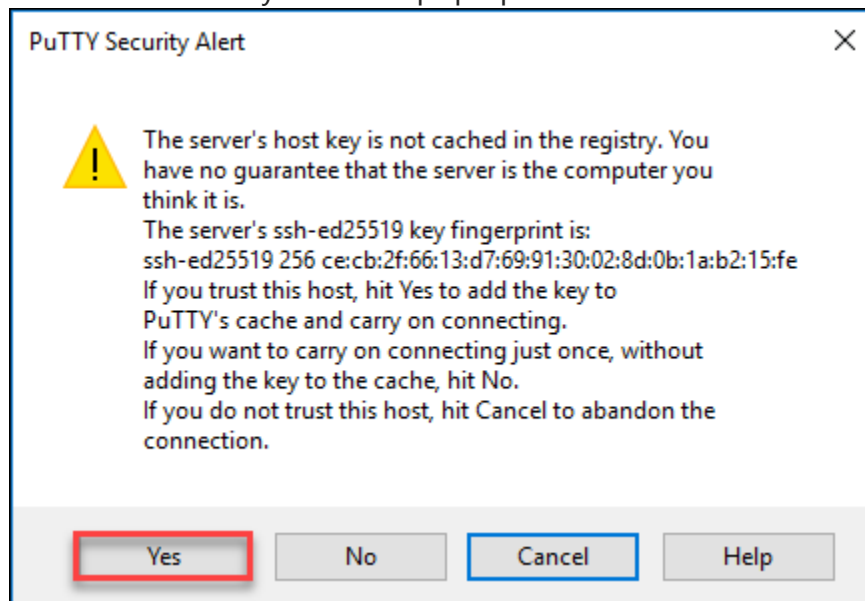
12. Now run putty.exe from your PC.



13. This is the application window that pops up when you run **putty**. Paste the Username with Public IP address of the VM that you copied from above to the Host Name (or IP address) box of the putty. Port will be 22 by default. Then Click on **open**.



14. The PuTTY Security Alert will pop up. Click on **Yes**.



15. Login with Virtual Machine **password** that you provided while creating the same.

```
- PuTTY
Using username "demouser".
demouser@: 's password: █
```

Exercise 4: Migrate NodeJs App to Container

In this exercise, we will connect to Docker VM if you are not already connected, follow the step 11 to 15 in Lab2 → Exercise3 and migrate NodeJS app to container.

1. Once you get connected to Docker VM, clone the app from git URL (<https://github.com/evillgenius75/gbb-todo.git>) by using following command.

```
Git clone https://github.com/evillgenius75/gbb-todo.git
```

```
demouser@MyDockerVM: ~
demouser@MyDockerVM:~$ git clone https://github.com/evillgenius75/gbb-todo.git
Cloning into 'gbb-todo'...
remote: Counting objects: 32, done.
remote: Total 32 (delta 0), reused 0 (delta 0), pack-reused 32
Unpacking objects: 100% (32/32), done.
Checking connectivity... done.
demouser@MyDockerVM:~$ █
```

2. Run below command to see the app is cloned successfully.

```
ls
```

```
demouser@MyDockerVM: ~/gbb-todo
demouser@MyDockerVM:~$ ls
gbb-todo
```

3. Run below command to change directory to application folder and list the files inside application folder

```
cd gbb-todo/
ls
```

```
demouser@MyDockerVM:~$ cd gbb-todo/
demouser@MyDockerVM:~/gbb-todo$ ls
app            Dockerfile     package-lock.json  yarn.lock
config        k8sdeploy.yaml public
docker-compose.debug.yml  license       README.md
docker-compose.yml  package.json  server.js
```

4. You can see there is a Dockerfile which is used to **create** docker images. We will run the below command to create an image for nodejs ToDo app.

```
docker build -t <image_name> .
```

```
demouser@MyDockerVM: ~/gbb-todo
demouser@MyDockerVM:~/gbb-todo$ docker build -t todoapp .
Sending build context to Docker daemon 98.82kB
Step 1/8 : FROM mhart/alpine-node
latest: Pulling from mhart/alpine-node
b56ae66c2937: Pull complete
b98f8b4013f1: Pull complete
Digest: sha256:df14a812750b911e3b0c23d78e2a7acflf7ef2d6156969957fd121b43ae30ef1
Status: Downloaded newer image for mhart/alpine-node:latest
--> cdafe3456f0e
Step 2/8 : ENV NODE_ENV production
--> Running in 9aa9bb4b3aee
--> 061a80e844d2
Step 3/8 : WORKDIR /usr/src/app
--> c27c30e42280
Step 4/8 : COPY ["package.json", "npm-shrinkwrap.json*", "./"]
--> 9e77cb4d2634
Step 5/8 : RUN npm install --production --silent && mv node_modules ../
--> Running in bld028fb2890
added 83 packages in 2.68s
--> 039a32eb920e
Step 6/8 : COPY . .
--> 90e8d20064ed
Step 7/8 : EXPOSE 8080
--> Running in c6c43c2c2a7f
--> 151285a78001
Step 8/8 : CMD node server.js
--> Running in 8fad308449c9
--> 4409af65826f
Removing intermediate container bld028fb2890
Removing intermediate container c6c43c2c2a7f
Removing intermediate container 8fad308449c9
Removing intermediate container 9aa9bb4b3aee
Removing intermediate container 531c8f9fe0c3
Successfully built 4409af65826f
Successfully tagged todoapp:latest
demouser@MyDockerVM:~/gbb-todo$
```

5. Run below command to list the docker images. We will see that todoapp image is now listed.

```
docker images
```

```
demouser@MyDockerVM: ~/gbb-todo
demouser@MyDockerVM:~/gbb-todo$ docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED
todoapp	latest	4409af65826f	2 minutes ago
mhart/alpine-node	latest	cdafe3456f0e	5 days ago

```
demouser@MyDockerVM:~/gbb-todo$
```

6. Define the environment variable for MonogDB to be used in container using below command.
We are referring to connection string copied in Lab 2 → Exercise 1 → Step 10. We need to

append the dbname in the connection string as well. **dbname** refers to name defined in Lab2→ Exercise1→ Step 1.

```
export
MONGODB_URL="mongodb://cosmosmongodb:<password>@cosmosmongodb.documents.azure.com:10255/tododb/<dbname>/?ssl=true"
```

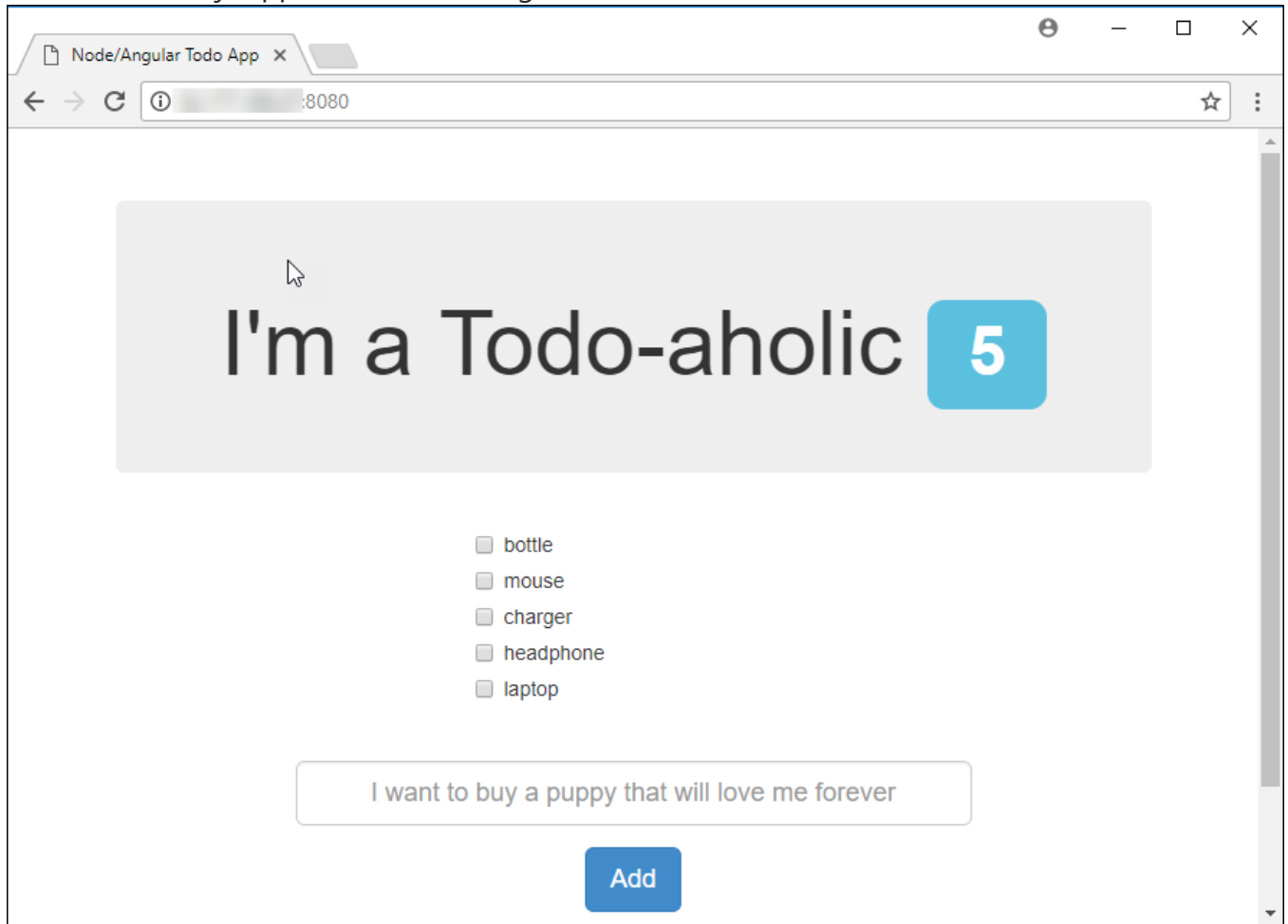
```
demouser@MyDockerVM:~/gbb-todo$ export MONGODB_URL="mongodb://cosmosmongodb:fozO
PwnL ypdwVYdqJ
cg==@cosmosmongodb.documents.azure.com:10255/meanstacktutorials/?ssl=true"
demouser@MyDockerVM:~/gbb-todo$
```

7. Run container using newly created image with below command:

```
docker run -e MONGODB_URL -p 8080:8080 <image_name>
```

```
demouser@MyDockerVM:~/gbb-todo$ docker run -e MONGODB_URL -p 8080:8080 todoapp
App listening on port 8080
(node:5) DeprecationWarning: `open()` is deprecated in mongoose >= 4.11.0, use `
openUri()` instead, or set the `useMongoClient` option if using `connect()` or `
createConnection()`. See http://mongoosejs.com/docs/connections.html#use-mongo-cl
ient
Db.prototype.authenticate method will no longer be available in the next major r
elease 3.x as MongoDB 3.6 will only allow auth against users in the admin db and
will no longer allow multiple credentials on a socket. Please authenticate usin
g MongoClient.connect with auth credentials.
```

8. Open the browser and browse the Public IP address of docker VM with port 8080 which will show the Node.js application is running.



*** This ends the lab.***