Kauno technologijos universitetas

Informatikos fakultetas

P175B120 Paslaugų programavimas debesų kompiuterijoje

Individualus darbas

Nedas Liaudanskis IFF-1/9

Studentas
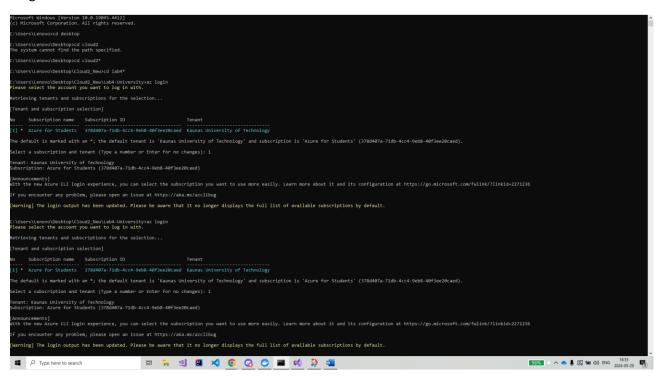
dėst. Pilkauskas Vytautas

Dėstytojas

2024 Metai

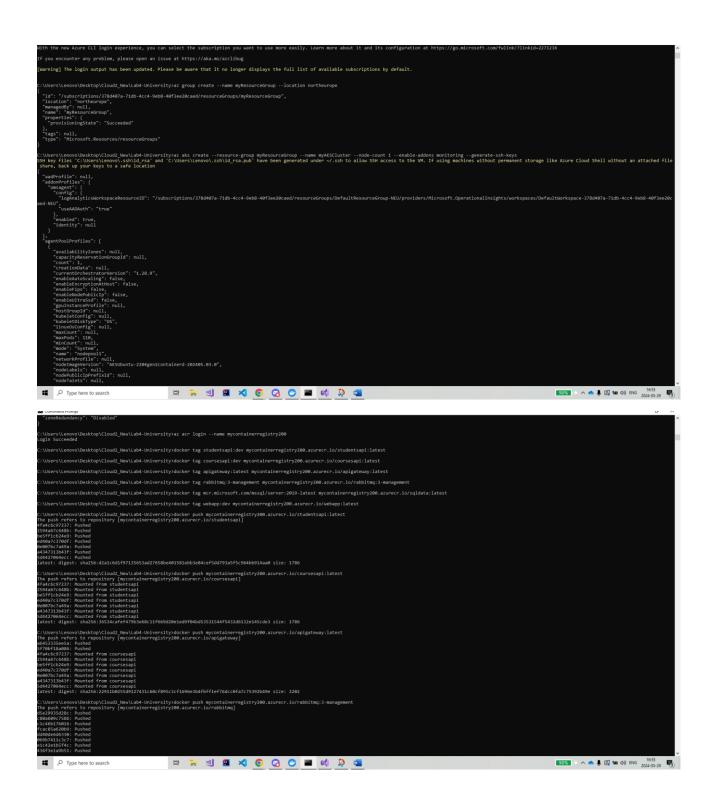# Turinys

Paveikslėlių sąrašas

Individualus darbas

Tikslas: įgyti praktinius gebėjimus kurti debesijos programų sistemas, realizuoti jų diagnostiką, stebėjimą, apkrovos valdymą panaudojant Azure Kubernetes Service (AKS).

Programa šiam individualiam darbui buvo praplėsta naudojant MVC WebApp. Prie jau turėto lab2. Darbo buvo pridėta WebApp projektas, kuriame yra atvaizduojami studentai. Tada buvo sukurta nauja resursų grupė Azure platformoje. Toje grupėje sukurtas kibernetikos klasteris ir registras, kuriame laikysime diegimo failus .yaml, kiekvienai projekto mikrosevisų daliai.

Apačioje yra peikiamas kodas, naudotas sugeneruoti registrą, klasterį ir resursų grupę. Taip pat pateikiami diegimo failai.

With the new Azure CLI login experience, you can select the subscription you want to use more easily. Learn more about it and its configuration at https://go.microsoft.com/fwlink/?linkid=2271236

If you encounter any problem, please open an issue at https://aka.ms/azclibug

[Warning] The login output has been updated. Please be aware that it no longer displays the full list of available subscriptions by default.

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>az group create --name myResourceGroup --location northeurope
{
  "id": "/subscriptions/378d407a-71db-4cc4-9eb8-40f3ee20caed/resourceGroups/myResourceGroup",
  "location": "northeurope",
  "managedBy": null,
  "name": "myResourceGroup",
  "properties": {
    "provisioningState": "Succeeded"
  },
  "tags": null,
  "type": "Microsoft.Resources/resourceGroups"
}

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>az aks create --resource-group myResourceGroup --name myAKSCluster --node-count 1 --enable-addons monitoring --generate-ssh-keys
SSH key files 'C:\Users\Lenovo\.ssh\id_rsa' and 'C:\Users\Lenovo\.ssh\id_rsa.pub' have been generated under ~/.ssh to allow SSH access to the VM. If using machines without permanent storage like Azure Cloud Shell without an attached file share, back up your keys to a safe location
{
  "aadProfile": null,
  "addonProfiles": {
    "omsagent": {
      "config": {
        "logAnalyticsWorkspaceResourceID": "/subscriptions/378d407a-71db-4cc4-9eb8-40f3ee20caed/resourceGroups/DefaultResourceGroup-NEU/providers/Microsoft.OperationalInsights/workspaces/DefaultWorkspace-378d407a-71db-4cc4-9eb8-40f3ee20c
aed-NEU",
        "useAADAuth": "true"
      },
      "enabled": true,
      "identity": null
    }
  },
  "agentPoolProfiles": [
    {
      "availabilityZones": null,
      "capacityReservationGroupId": null,
      "count": 1,
      "creationData": null,
      "currentOrchestratorVersion": "1.28.9",
      "enableAutoScaling": false,
      "enableEncryptionAtHost": false,
      "enableFips": false,
      "enableNodePublicIp": false,
      "enableUltraSsd": false,
      "gpuInstanceProfile": null,
      "hostGroupId": null,
      "kubeletConfig": null,
      "kubeletDiskType": "OS",
      "linuxOsConfig": null,
      "maxCount": null,
      "maxPods": 110,
      "minCount": null,
      "mode": "System",
      "name": "nodepool1",
      "networkProfile": null,
      "nodeImageVersion": "AKSUbuntu-2204gen2containerd-202405.03.0",
      "nodeLabels": null,
      "nodePublicIPPrefixId": null,
      "nodeTaints": null,

Command Prompt

  "zoneRedundancy": "Disabled"
}

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>az acr login --name mycontainerregistry200
Login Succeeded

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker tag studentsapi:dev mycontainerregistry200.azurecr.io/studentsapi:latest

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker tag coursesapi:dev mycontainerregistry200.azurecr.io/coursesapi:latest

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker tag apigateway:latest mycontainerregistry200.azurecr.io/apigateway:latest

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker tag rabbitmq:3-management mycontainerregistry200.azurecr.io/rabbitmq:3-management

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker tag mcr.microsoft.com/mssql/server:2019-latest mycontainerregistry200.azurecr.io/sqldata:latest

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker tag webapp:dev mycontainerregistry200.azurecr.io/webapp:latest

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker push mycontainerregistry200.azurecr.io/studentsapi:latest
The push refers to repository [mycontainerregistry200.azurecr.io/studentsapi]
4fa4c6c97237: Pushed
2594a67c648b: Pushed
be5ff1cb24e9: Pushed
ed40a7c370df: Pushed
0e007bc7a49a: Pushed
a4347313b43f: Pushed
5d4427064ecc: Pushed
latest: digest: sha256:d2a1c6d1f97135653ad27658be401581ebb3e84cef5dd793a5f5c964bb914aa0 size: 1786

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker push mycontainerregistry200.azurecr.io/coursesapi:latest
The push refers to repository [mycontainerregistry200.azurecr.io/coursesapi]
4fa4c6c97237: Mounted from studentsapi
2594a67c648b: Mounted from studentsapi
be5ff1cb24e9: Mounted from studentsapi
ed40a7c370df: Mounted from studentsapi
0e007bc7a49a: Mounted from studentsapi
a4347313b43f: Mounted from studentsapi
5d4427064ecc: Mounted from studentsapi
latest: digest: sha256:36534cafef479b3e68c11f669d20e1ed9f04bd53531544f5432d6132e145cde3 size: 1786

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker push mycontainerregistry200.azurecr.io/apigateway:latest
The push refers to repository [mycontainerregistry200.azurecr.io/apigateway]
a6453335ee5a: Pushed
5f70bf18a086: Pushed
4fa4c6c97237: Mounted from coursesapi
2594a67c648b: Mounted from coursesapi
be5ff1cb24e9: Mounted from coursesapi
ed40a7c370df: Mounted from coursesapi
0e007bc7a49a: Mounted from coursesapi
a4347313b43f: Mounted from coursesapi
5d4427064ecc: Mounted from coursesapi
latest: digest: sha256:22911b0255d9127431c60cf895c3cf1696e3b4fbff1ef76dcc0fa7c75392b49e size: 2202

C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>docker push mycontainerregistry200.azurecr.io/rabbitmq:3-management
The push refers to repository [mycontainerregistry200.azurecr.io/rabbitmq]
d5e29935d28c: Pushed
c80a609c7586: Pushed
c1c46b17b016: Pushed
fcac05a620b9: Pushed
dd40de6d6330: Pushed
069b7411c3c7: Pushed
e1c42e1b5f4c: Pushed
436f3e1a9b51: Pushed

```
C:\Users\Lenovo\Desktop\Cloud2_New\Lab4-University>kubectl get all
NAME                                    READY     STATUS             RESTARTS     AGE
pod/apigateway-86886fc5c6-hlvv2         0/1       ImagePullBackOff   0            5m14s
pod/coursesapi-6bbf544f48-vrsh2         0/1       ImagePullBackOff   0            5m17s
pod/rabbitmq-7cd87fd7d9-n57k6           0/1       ImagePullBackOff   0            5m7s
pod/sqldata-748588df9d-v2lgl            0/1       ImagePullBackOff   0            5m9s
pod/studentsapi-68c4f4589-zglgv         0/1       ImagePullBackOff   0            5m19s
pod/studentsapi-7f795b68b6-94l96        0/1       ContainerCreating  0            5s
pod/webapp-756f5d9b4f-rc8db             0/1       ImagePullBackOff   0            5m11s

NAME                      TYPE           CLUSTER-IP      EXTERNAL-IP     PORT(S)              AGE
service/apigateway        ClusterIP      10.0.160.50     <none>          5251/TCP             5m14s
service/coursesapi        ClusterIP      10.0.134.15     <none>          5082/TCP             5m17s
service/kubernetes        ClusterIP      10.0.0.1        <none>          443/TCP              55m
service/rabbitmq          ClusterIP      10.0.149.51     <none>          15672/TCP,5672/TCP   5m7s
service/sqldata           ClusterIP      10.0.3.65       <none>          1433/TCP             5m9s
service/studentsapi       ClusterIP      10.0.2.83       <none>          5081/TCP             5m19s
service/webapp            LoadBalancer   10.0.202.162    4.209.161.158   5088:30520/TCP       5m11s

NAME                            READY     UP-TO-DATE   AVAILABLE   AGE
deployment.apps/apigateway      0/1       1            0           5m15s
deployment.apps/coursesapi      0/1       1            0           5m18s
deployment.apps/rabbitmq        0/1       1            0           5m8s
deployment.apps/sqldata         0/1       1            0           5m10s
deployment.apps/studentsapi     0/1       1            0           5m20s
deployment.apps/webapp          0/1       1            0           5m12s

NAME                                      DESIRED   CURRENT   READY   AGE
replicaset.apps/apigateway-86886fc5c6     1         1         0       5m15s
replicaset.apps/coursesapi-6bbf544f48     1         1         0       5m18s
replicaset.apps/rabbitmq-7cd87fd7d9       1         1         0       5m8s
replicaset.apps/sqldata-748588df9d        1         1         0       5m10s
replicaset.apps/studentsapi-68c4f4589     1         1         0       5m20s
replicaset.apps/studentsapi-7f795b68b6    1         1         0       6s
replicaset.apps/webapp-756f5d9b4f         1         1         0       5m12s
```

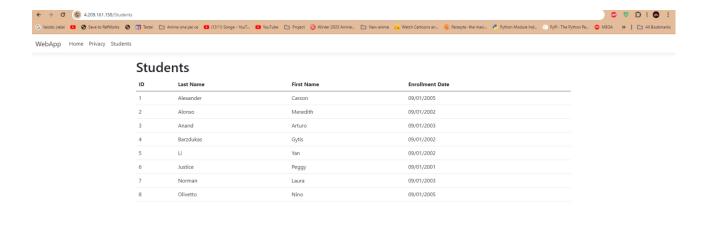apigateway-deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: apigateway
spec:
  replicas: 1
  selector:
    matchLabels:
      app: apigateway
  template:
    metadata:
      labels:
        app: apigateway
    spec:
      containers:
      - name: apigateway
        image: mycontainerregistry200.azurecr.io/apigateway:latest
        env:
        - name: ASPNETCORE_ENVIRONMENT
          value: Development
        - name: ASPNETCORE_HTTP_PORTS
          value: "8080"
        ports:
        - containerPort: 8080
---
apiVersion: v1
kind: Service
metadata:
  name: apigateway
spec:
  selector:
    app: apigateway
  ports:
  - protocol: TCP
    port: 5251
    targetPort: 8080
```

coursesapi-deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: coursesapi
spec:
  replicas: 1
  selector:
    matchLabels:
      app: coursesapi
  template:
    metadata:
      labels:
        app: coursesapi
    spec:
      containers:
      - name: coursesapi
        image: mycontainerregistry200.azurecr.io/coursesapi:latest
        env:
        - name: ASPNETCORE_ENVIRONMENT
          value: Development
        - name: ASPNETCORE_HTTP_PORTS
          value: "8080"
        - name: ConnectionStrings__CoursesApiContext
          value: "Server=sqldata;Database=CoursesDB;User
Id=sa;Password=My!P@ssw0rd1;Encrypt=False"
        - name: MessageBroker__Host
          value: "amqp://Nedas:test@rabbitmq:5672"
        ports:
        - containerPort: 8080
---
apiVersion: v1
kind: Service
metadata:
  name: coursesapi
spec:
  selector:
    app: coursesapi
  ports:
  - protocol: TCP
    port: 5082
    targetPort: 8080
```

rabbitmq-deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: rabbitmq
spec:
  replicas: 1
  selector:
    matchLabels:
      app: rabbitmq
  template:
    metadata:
      labels:
        app: rabbitmq
    spec:
      containers:
      - name: rabbitmq
        image: mycontainerregistry200.azurecr.io/rabbitmq:3-management
        env:
        - name: RABBITMQ_DEFAULT_USER
          value: Nedas
        - name: RABBITMQ_DEFAULT_PASS
          value: test
        ports:
        - containerPort: 5672
        - containerPort: 15672
---
apiVersion: v1
kind: Service
metadata:
  name: rabbitmq
spec:
  selector:
    app: rabbitmq
  ports:
  - name: rabbitmq-management
    protocol: TCP
    port: 15672
    targetPort: 15672
  - name: rabbitmq-amqp
    protocol: TCP
    port: 5672
    targetPort: 5672
```
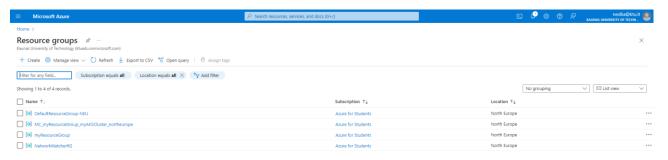
sqldata-deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: sqldata
spec:
  replicas: 1
  selector:
    matchLabels:
      app: sqldata
  template:
    metadata:
      labels:
        app: sqldata
    spec:
      containers:
      - name: sqldata
        image: mycontainerregistry200.azurecr.io/sqldata:latest
        env:
        - name: SA_PASSWORD
          value: "My!P@ssw0rd1"
        - name: ACCEPT_EULA
          value: "Y"
        ports:
        - containerPort: 1433
---
apiVersion: v1
kind: Service
metadata:
  name: sqldata
spec:
  selector:
    app: sqldata
  ports:
  - protocol: TCP
    port: 1433
    targetPort: 1433
```

studentsapi-deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: studentsapi
spec:
  replicas: 1
  selector:
    matchLabels:
      app: studentsapi
  template:
    metadata:
      labels:
        app: studentsapi
    spec:
      containers:
      - name: studentsapi
        image: mycontainerregistry200.azurecr.io/studentsapi:latest
        env:
        - name: ASPNETCORE_ENVIRONMENT
          value: Development
        - name: ASPNETCORE_HTTP_PORTS
          value: "8080"
        - name: ConnectionStrings__StudentsAPIContext
          value: "Server=sqldata;Database=StudentDB;User
Id=sa;Password=My!P@ssw0rd1;Encrypt=False"
        - name: MessageBroker__Host
          value: "amqp://Nedas:test@rabbitmq:5672"
        ports:
        - containerPort: 8080
      imagePullSecrets:
      - name: acr-credentials  # Reference to the secret created above
---
apiVersion: v1
kind: Service
metadata:
  name: studentsapi
spec:
  selector:
    app: studentsapi
  ports:
  - protocol: TCP
    port: 5081
    targetPort: 8080
```

webapp-deployment.yaml

```yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: webapp
spec:
  replicas: 1
  selector:
    matchLabels:
      app: webapp
  template:
    metadata:
      labels:
        app: webapp
    spec:
      containers:
      - name: webapp
        image: mycontainerregistry200.azurecr.io/webapp:latest
        env:
        - name: ASPNETCORE_ENVIRONMENT
          value: Development
        - name: ASPNETCORE_HTTP_PORTS
          value: "8080"
        ports:
        - containerPort: 8080
---
apiVersion: v1
kind: Service
metadata:
  name: webapp
spec:
  selector:
    app: webapp
  ports:
  - protocol: TCP
    port: 5088
    targetPort: 8080
  type: LoadBalancer
```
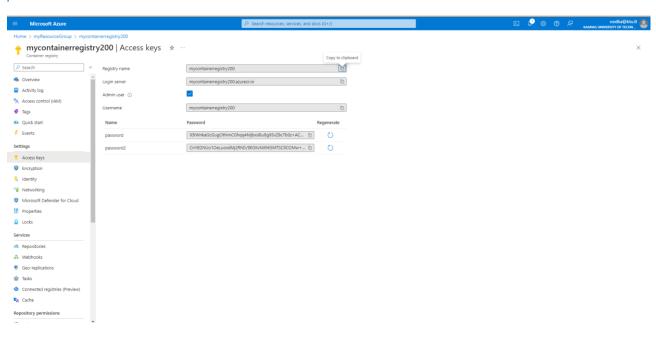
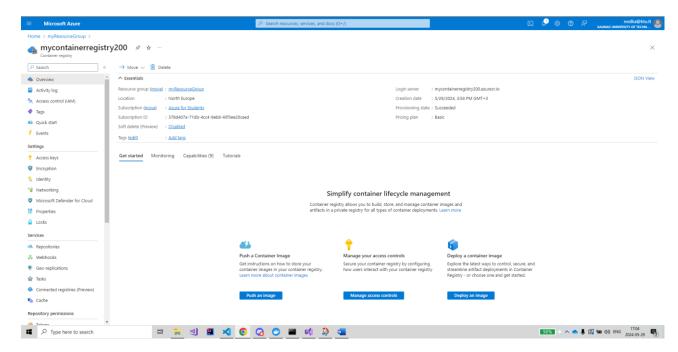*pav. 1 Sveteinė paleista per Azure*

pav. 2 Azure Resursų grupės

pav. 3 Resursų grupėje esantys objektai

pav. 4 Klasteris

pav. 5

pav. 6