

Development of Cloud Native Network Functions - exam

Összpontszám **50/43** ?

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0/0 pont

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MRHQ02

Preliminary tasks: set up and launch the Kubernetes cluster 0/0 pont

Start the cluster:

- Open AWS Academy login page:
<https://awsacademy.instructure.com/>

- Log in.
- Start the AWS Academy Learner Lab and open the AWS Management console.
- Go to the CloudFormation service
- Verify if no stack exists under the name 'k3s-multinode'. If there is a stack with this name go to the last section to see how to clean it up. When the stack finished deletion, continue with the following step
- Click on this (CloudFormation) link: [CloudFormation](#)
- Fill out the field named "0NeptunCode"
- At the bottom, accept the three checkboxes, and press create

Don't wait for the Kubernetes cluster to be ready, set up the CloudFormaton stack that you will use for the AWS practice questions.

- While being logged in to your AWS Academy Learner Lab account, open the following link (update <neptun id> with your Neptun ID -- there are two occurrences --, use all small letters):
- <https://us-east-1.console.aws.amazon.com/cloudformation/home?region=us-east-1#/stacks/create/review?templateURL=https://vitmac12-resources.s3.amazonaws.com/exam-2024-12-10/vitmac12-exam-aws-2024-12-10-<neptun id>.template&stackName=vitmac12-exam-aws-2024-12-10-<neptun id>>
- You don't need to fill in anything, click the Create button at the bottom of the page.

Don't wait for the stacks to finish deployment, proceed to answer the quiz questions of the next section.

Quiz questions

✗ A network administrator wants to configure a public subnet and route incoming and outgoing traffic to and from an EC2 instance in the public subnet to the public internet. Which virtual private cloud (VPC) feature should they use? 1/0

☐ A network access control list (ACL)

☒ A network address translation (NAT) gateway ✗

☐ VPC sharing

☐ An internet gateway

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☒ An internet gateway

✓ What ways are there to interact with AWS service application programming interfaces (APIs)? 1/1

☐ AWS CloudTrail

☒ AWS Command Line Interface (AWS CLI) ✓

☐ AWS Identity and Access Management (IAM)

☐ AWS X-Ray

☒ AWS software development kits (SDKs) ✓

☒ AWS Management Console ✓

✓ A developer wants to store image files in a bucket that is called images-bucket, but receives the error BucketAlreadyExists. Which action must the developer take to resolve this error? 1/1

- ☐ Bucket names are unique to the Region that they are created in. If the requested bucket name is not available, the developer must create the images-bucket in a different Region.
- ☐ The developer must contact AWS Support to request approval to use the same bucket name.
- ☐ Bucket names go to the highest bidder. The developer must outbid the current bucket owner.

☒ Bucket names are globally unique. If the requested bucket name is not available, the developer must rename the bucket. ✓

✓ A developer hosts a static website in 1/1 an Amazon Simple Storage Service (Amazon S3) bucket. The website references image objects in another S3 bucket. However, these images do not display on the website. What could be the problem?

☐ Amazon S3 does not support object sharing between buckets.

☐ Cross-Region Replication (CRR) has not been enabled on the bucket where the assets are stored.

☒ Cross-Origin Resource Sharing (CORS) ✓ has not been enabled on the bucket where the assets are stored.

☐ The security group of the S3 bucket does not include an inbound rule to allow HTTP traffic on port 80.

✓ Which suggestion is an Amazon Web Services (AWS) recommendation for securing AWS credentials for applications that run on Amazon Elastic Compute Cloud (Amazon EC2) instances?

☐ Embed AWS credentials in the software development kit (SDK) client code.

☐ Create an AWS Identity and Access Management (IAM) user and attach it to the EC2 instance.

☒ Create an AWS Identity and Access Management (IAM) role and attach it to the EC2 instance. ✓

☐ Store credentials in local AWS configuration files.

✓ What is the effect of the following policy statement? 1/1

```
{
  "Effect": "Deny",
  "Action": ["dynamodb:*", "s3:*"],
  "NotResource": [
    "arn:aws:dynamodb:region:account-
number:table/pollynotes",
    "arn:aws:s3:region:::polly-notes-
web",
    "arn:aws:s3:region:::polly-notes-
mp3/*"
  ]
}
```

☐ Denies actions on the DynamoDB table or S3 buckets that are listed in the NotResources element

☐ Denies the ability to write to the pollynotes DynamoDB table

☒ Denies actions on DynamoDB or Amazon S3 resources except for the resources that are listed in the NotResource element ✓

☐ Denies the ability to read from the polly-notes-web S3 bucket

✓ Which statement about Amazon DynamoDB partitions is true? 1/1

☐ DynamoDB stores data in partitions and chooses the partition based on the range attribute.

☒ If a table has a simple primary key (partition key only), DynamoDB stores and retrieves each item based on its hash attribute. ✓

☐ If a table has a composite primary key, DynamoDB will sort the items based on the sort key before selecting the partition for the item.

☐ A developer writes a hash function to tell DynamoDB how to partition the items.

✗ Suppose that a developer has a restaurants database table that can be queried by name (the partition key), or by name and location (the sort key). What should the developer do if they also want to query by type of cuisine and average customer rating? 1/0

- ☐ Change the primary key on the restaurant table to be a complex primary key based on cuisine and customer rating.
- ☐ Set up a global secondary index on cuisine and customer rating.
- ☐ Perform a query that uses the cuisine and average customer rating attributes.

☒ Set up a local secondary index on cuisine and customer rating. ✗

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- ☒ Set up a global secondary index on cuisine and customer rating.

✓ An application that uses Amazon API 1/1 Gateway must capture contact information from a third-party client application. The client application sends given name, surname, business phone, and cell phone. The backend application database has only two fields: name and mobile phone. Which option requires the fewest application changes?

☐ Export the API definition and use it to update the client.

☒ Use a mapping template to transform the request before it is sent to the database. ✓

☐ Use a first-class integration to connect the client to the database.

☐ Create a usage plan that describes the fields and applies only to this client.

✓ Which statement describes a characteristic of AWS Lambda?

1/1

☐ Lambda functions run in on-demand, temporary environments, and the developer controls when new environments are created or shut down.

☐ A developer's methods and configuration options for ensuring high availability with Lambda are similar to their approach with Amazon Elastic Compute Cloud (Amazon EC2).

☐ A developer must write Lambda functions that use one of the runtimes that the Lambda service provides.

☒ Lambda runs code only when it is activated by an event and uses only the compute resources that are needed.



✓ Which option describes how Amazon 1/1
API Gateway invokes AWS Lambda?

☒ API Gateway directly invokes a function with a synchronous invocation. ✓

☐ Lambda uses an event source mapping and polls API Gateway for requests.

☐ API Gateway directly invokes a function and retries the request until it succeeds or expires.

☐ Lambda processes API Gateway requests asynchronously and retries each request up to two times.

✓ Which issue might be addressed by adding provisioned concurrency to an AWS Lambda function? 1/1

☐ The developer wants more visibility into transactions that use the Lambda

A legacy backend system fails intermittently when the developer

☐ connects to it. To avoid extra costs, they want to reduce the function's wait time when the backend fails.

Another Lambda function runs in the same account and Region. It sometimes spikes and consumes all available concurrency, causing the function to fail.

☒ An application that uses the Lambda function responds slowly for the first few users who sign in each day. Lambda metrics show higher latency for those initial requests. ✓

✓ Which option describes how a message queue processes messages? 1/1

☐ Consumers notify the queue when a message has been successfully processed. The queue configuration determines whether the message should be available to other consumers.

☐ The queue polls producers for new messages.

☐ The queue broadcasts messages to consumers.

☒ Consumers poll the queue for messages. ✓

✓ An application that processes order 1/1
returns must run two independent
audit checks. When both checks are
successfully completed, the return
authorization step is run. Which AWS
Step Functions state could a
developer use to implement this
logic?

☐ Wait

☐ Task

☒ Parallel ✓

☐ Choice

✓ What does the following command do when the AWS CLI is configured correctly? 1/1

```
aws s3 cp sample-lambda-code.zip  
s3://my-s3/lambda/my-lambda.zip
```

☐ Downloads 'my-lambda.zip' from the specified S3 bucket as 'sample-lambda-code.zip'.

☐ If 'my-s3/lambda/' does not exist, the command creates it and uploads 'sample-lambda-code.zip' as 'my-lambda.zip' in the 'my-s3/lambda' S3 bucket.

☒ Assuming that the file and the bucket exist, it uploads 'sample-lambda-code.zip' as 'my-lambda.zip' under the 'lambda' folder in the 'my-s3' S3 bucket. ✓

☐ Throws an error/exception as the command requires you to also define the AWS region where the S3 bucket is present.

✗ We are inserting a single item to DynamoDB using the following code snippet. What statement/statements is/are true? 1/0

```
import boto3

dynamodb =
boto3.client('dynamodb')
dynamodb.put_item(
    TableName='MyTable',
    Item={'SensorId': {'S': '0001'},
          'Measurement': {'N': '12.5'}
    }
)
```

☒ The code tries to access the 'MyTable' DynamoDB table in the AWS that we configured as default. ✓

☐ If 'SensorId' is a single key, and there was already an item with the same 'SensorId', we are overwriting its 'Measurement' attribute.

☐ The call results in an exception as we did not specify which attribute is the single primary key.

☒ We are adding an item into the 'MyTable' DynamoDB table with a String 'SensorId' of '0001' and a 'Measurement' of '12.5' of type Number. ✓

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- ✓ We are adding an item into the 'MyTable' DynamoDB table with a String 'SensorId' of '0001' and a 'Measurement' of '12.5' of type Number.
- ✓ If 'SensorId' is a single key, and there was already an item with the same 'SensorId', we are overwriting its 'Measurement' attribute.
- ✓ The code tries to access the 'MyTable' DynamoDB table in the AWS that we configured as default.

- ✓ We are subscribing to an AWS SNS 1/1 topic using the following code snippet. What statement/statements is/are true?

```
subscription_arn = sns.subscribe(  
    TopicArn = <SNS topic ARN>,  
    Protocol = 'lambda',  
    Endpoint = '<ARN of Lambda  
function>'  
)['SubscriptionArn']
```

```
sns.set_subscription_attributes(  
    SubscriptionArn = subscription_arn,  
    AttributeName = 'FilterPolicy'  
    AttributeValue = '{"SensorID":  
["0001", "0002"]}'  
)
```

Once SNS triggers our Lambda function using a message that corresponds to the 'FilterPolicy' no other subscribers of the same topic will receive the message during the visibility timeout period.



When any message arrives to the topic, we trigger the Lambda function given by its ARN.



We are subscribing to a queue topic.



We subscribe to the topic with a Lambda function that we set up using its ARN. When a message arrives to the topic that has a "SensorID" of "0001" or "0002", we trigger the Lambda function.



✓ What are some of the advantages of edge computing? 1/1

It has low equ management requirements.



It can increase the processing capabilities of IoT devices.



It causes higher device battery drain.



It can decrease processing latency compared to device to cloud communication.



✓ What are key features of Software Defined Networking? 1/1

☐

SDN-enabled devices can be realized only on specialized hardware.

☒

Provides control and data plane separation.

☐

Decreases the latency of all packet forwarding operations.

☒

Offers open interfaces between the control and data planes.



✓ What is/are the result(s) of the following command? Select the true statement(s) 1/1

```
$ iptables -t nat -A PREROUTING -d 192.168.168.10 -p tcp --dport 2222 \
-j DNAT --to-destination 10.0.0.153:22
```

☐ Setting up port forwarding to make TCP and UDP port 22 of the machine with IP address 10.0.0.153 accessible from an external network

☒ Adding a new NAT rule to the nat table to expose TCP port 22 of an internal machine to an external network ✓

☐ Setting up port forwarding, making all services of the machine with IP address 10.0.0.153 accessible from the outside

☒ Adding a NAT rule to replace the destination IP address 192.168.168.10 for packets arriving on TCP port 2222 ✓

✗ What is/are the result(s) of the following command? Select the true statement(s) 1/0

```
$ iptables -t nat -A POSTROUTING -s 10.0.0.0/8 -o eth2 \
-j MASQUERADE
```

☒ Adding a new NAT rule to translate addresses from the [10.0.0.0/8](#) network when packets are sent out on the eth2 interface ✓

☒ Setting up port forwarding, the [10.0.0.0/8](#) range becomes accessible from the outside ✗

☐ Adding a new address translation rule to the NAT table, which replaces [10.0.0.0/8](#) addresses if the packet arrived on the eth2 interface

☐ Adding a new address translation rule to the beginning of the NAT table's POSTROUTING chain, allowing the internal [10.0.0.0/8](#) network to egress to the external network

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☒ Adding a new NAT rule to translate addresses from the [10.0.0.0/8](#) network when packets are sent out on the eth2 interface

✓ What are some true statements about Kubernetes pods? 1/1

☒ Pods are made up of containers. ✓

☒ Pods are the smallest deployable unit of computing in Kubernetes. ✓

☐ You cannot limit the CPU usage of a pod.

☐ All pods can always directly access every file in the host machine's file system.

✗ What is true about monitoring? 1/0

☒ Prometheus cannot do operations on the collected metrics. ✗

☐ Amazon CloudWatch can work only with logs and not with metrics.

☒ The current (average) CPU usage of a Kubernetes pod can be queried. ✓

☐ Prometheus and Amazon CloudWatch can collect only single dimensional metrics.

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☒ The current (average) CPU usage of a Kubernetes pod can be queried.

✓ In event-driven programming... 1/1
(select true statements)

- ☐ ...we cannot achieve scalability or responsiveness.
- ☐ ...event handlers are always directly called by event sources, they can never pull for messages.

☒ ...we can realize synchronous and asynchronous push models. ✓

☒ ...the program responds to events by executing predefined event handlers. ✓

Development of Cloud Native
Network Functions - exam -
Kubernetes

10/10
pont

Practices: Kubernetes (max: 10 points)

Now check the readiness of the Kubernetes cluster:

- From the outputs tab of the CloudFormation stack open the link next to the OK3sServerSsh key in a new browser tab.
- Using EC2 Instance Connect, connect to your Kubernetes cluster.
- If you execute the command `ls` you should see the following files (among others)
- `exam-1-task-1.yaml`
- `exam-1-task-2-HPA-EXAMPLE.yaml`
- `exam-1-task-2.yaml`
- If you do not find these files, please notify the exam supervisor!

2/2

Start the task:

```
./cccli task create exam-1-task-1.yaml
```

```
./cccli task test exam-1-task-1.yaml
```

Delete the task:

```
./cccli task delete exam-1-task-1.yaml
```

VITMAC12-
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ
JuYW1lc3BhY2UiOiJleGFtLTETdGFzay0xLW
1yaHEwMilsInRlc3RzRXhIY3V0ZWQiOiIyliwi
dGVzdHNTdWNjZWVkJWVWQiOiIyliwidGltZXN
0YW1wljoiMjAyNC0xMi0xMFQwOT01ODoy
NFoifQ.bgL530K3Lny6k30hTnGHECm4tlzQh
KwilVaf-BOMHqs-VITMAC12



✓ Kubernetes-2 (max. 8 points)

8/8

There is an existing deployment in the Kubernetes cluster. It is designed to be scalable, however there is currently no HPA deployed to manage the automatic scaling of the deployment.

Modify the HPA configuration defined in the **exam-1-task-2-HPA-EXAMPLE.yaml** file and deploy to the cluster.

- The HPA should be named **hpa-for-scalable-webserver**
- There should be at least two replicas
- Maximum 5 replicas is allowed
- Configure the threshold in a way, that the average CPU utilization is 75%
- Configure the HPA to point to your deployment

Start the task:

Create the environment for the task by executing the following command:

```
./cccli task create exam-1-task-2.yaml
```

Evaluate the task:

When you want to evaluate your solution, use the following command:

```
./cccli task test exam-1-task-2.yaml
```

You will receive a token when you have at least 3 successful tests (out of 5), which you can submit, and get points according to the following:

- 5 successful tests = 8 points
- 4 successful tests = 6 points
- 3 successful tests = 4 points
- below that: no token = 0 points

Delete the task:

When you are done with the task, delete it, using:

```
./cccli task delete exam-1-task-2.yaml
```

Copy the token you received after the evaluation!

VITMAC12-
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ
JuYW1lc3BhY2UiOiJleGFtLTETdGFzay0yLW
1yaHEwMilsInRlc3RzRXh1Y3V0ZWQiOiIlIiw
dGVzdHNTdWNjZWVkbWVkbWVkbWVkbWVkbWV
0YW1wljoiMjAyNC0xMi0xMFQxMDoyMTTo0
MFoifQ.Nzqf0C1wyxz0ChjqgPUWhUsMwy4
hHBgxofu9ehpvED0-VITMAC12



Development of Cloud Native Network Functions - exam - AWS practice

16/14
pont

In this part of the exam you will work on the resources that had your Neptun ID in its CloudFormation link.

(A vizsga ezen részében azokkal az AWS resource-okkal fogunk dolgozni, melyket a második CloudFormation deployment hozott létre -- aminek a linkjében szerepelt a Neptun kód.)

✓ **AWS-1.** A VPC has been deployed 1/1
under the name 'vitmac12-aws-exam-
<date>-<Neptun ID>-vpc'. What is its
IPv4 CIDR block?

(Egy VPC-t telepítettünk a 'vitmac12-
aws-exam-<dátum>-<Neptun kód>-
vpc' név alatt. Mi az IPv4 CIDR
tartománya?)

10.40.0.0/16



✓ **AWS-2.** What Availability Zones (AZ) 2/2
does this VPC cover currently, i.e., in
which AZs does it have subnets?
Check its resource map and list the
AZs in alphabetical order, separate
items with a single ',' without
whitespaces.

(Milyen Availability Zone-okat (AZ)
fed le jelenleg ez a VPC, azaz az
elhálózatai milyen AZ-kben vannak
jelen? Ellenőrizze a VPC resource
map-jét és adja meg az AZ-ket
betűrendben, a tagoláshoz
használjon kizárólag vesszőket,
szóközöket ne!)

us-east-1a,us-east-1b,us-east-1c



✓ **AWS-3.** How many public subnets does this VPC have? Write the number in the field below. Help: think about what makes a subnet public. 2/2

(Hány publikus alhálója van ennek a VPC-nek? Adja meg ezt a számot a lenti mezőben. Segítség: gondolja át, mi határozza meg azt, hogy egy alháló publikus, vagy sem!)

3



✓ **AWS-4.** How many private subnets does this VPC have? 1/1

(Hány privát alhálója van ennek a VPC-nek?)

1



- ✓ **AWS-5.** One of the subnets is named 1/1 like this: 'vitmac12-aws-exam-<date>-<Neptun ID>-sn-1', i.e., it ends with a '1'. What is its IPv4 CIDR block?

(Az egyik alháló neve a következő sémát követi: 'vitmac12-aws-exam-<dátum>-<Neptun kód>-sn-1', azaz '1'-re végződik. Mi ennek az alhálónak az IPv4 CIDR tartománya?)

10.40.77.0/24



- ✓ **AWS-6.** In what availability zone is this subnet? Insert its name in the field below. 1/1

(Melyik availability zone-ban van ez az alháló? Másolja be a nevét a lenti mezőbe!)

us-east-1c



✓ **AWS-7.** An EC2 instance has been deployed under the name 'vitmac12-aws-exam-<date>-<Neptun ID>-instance'. Check its security group. Based on the rules, can HTTP(S) traffic originating from outside of the AWS cloud reach the instance using the any of the ports usually used for HTTP(S) traffic? Answer with 'yes' or 'no'.

(Egy EC2 példányt telepítettünk 'vitmac12-aws-exam-<dátum>-<Neptun kód>-instance' névvel. Ellenőrizze a példány security group-ját! Az abban található szabályok alapján elérheti-e az AWS felhőn kívülről érkező HTTP(S) forgalom a példányt, a szokásos HTTP(S) forgalom kiszolgálásához használt protok valamelyikén? Válaszoljon 'yes' vagy 'no' használatával.)

no



- ✓ **AWS-8.** Can you access the public internet from this EC2 instance, e.g., by pinging google.com? Answer with 'yes' or 'no'. 1/1

(El lehet érni a publikus internetet erről az EC2 példányról, pl. a google.com pingelhető lehet a példányról? Válaszoljon 'yes' vagy 'no' használatával.)

yes



- ✓ **AWS-9.** If we were to add another EC2 instance in the same subnet and security group could the two instances reach each other at any port? Answer with 'yes' or 'no'. 2/2

(Ha egy másik EC2 példányt adnánk hozzá ehhez az alhálóhoz és security group-hoz, akkor ez a két példány el tudná érni egymást bármelyik porton? Válaszoljon 'yes' vagy 'no' használatával.)

yes



✗ **AWS-10.** If we were to launch an EC2 ^{2/0} instance in one of the private subnets (if there are more than one, it does not matter in which one), would it be able to reach the public internet? Answer with 'yes' or 'no'.

(Ha indítanánk egy EC2 példányt az egyik privát alhálóban (amennyiben több van, akkor bármelyikben), akkor az EC2 példány képes lenne elérni a publikus internetet? Válaszoljon 'yes' vagy 'no' használatával.)

yes



IMSc task (for IMSc points)

0/0 pont

Use the deployment provided for the AWS exam tasks.

Analyze the routes of one of the private subnets. Depending on the current availability of the public internet from the private subnet what would you modify here to enable/disable traffic towards the public internet?

Egyéni visszajelzés

0

Cleanup task

0/0 pont

Please delete the used resources following the next steps:

For the Kubernetes cluster:

- Look for a CloudFormation stack named 'k3s-multinode' in the CloudFormation console
- Select the stack
- On the "outputs" tab of the CloudFormation stack page, right click the EmptyS3Bucket link to open in a new browser tab
- Permanently delete the contents of the bucket
- Close the browser tab
- On CloudFormation stack page, delete the stack "k3s-multinode" (using the top right button)

For the AWS exam deployment:

- Look for a CloudFormation stack named

'vitmac12-exam-aws-<date>-<Neptun ID>' in the CloudFormation console

- Select the stack, click the Delete button then confirm the deletion

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