

Development of Cloud Native Network Functions - exam

Összpontszám **50/47** ?

Personal data

E-mail *

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Name: *

[Redacted]

Neptun code: *

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Preliminary tasks: set up and
launch the Kubernetes cluster

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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 CloudFormation 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 1/1
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?

- ☐ A network address translation (NAT) gateway
- ☐ A network access control list (ACL)
- ☐ VPC sharing
- ☒ An internet gateway ✓

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

☐ AWS Identity and Access Management (IAM)

☒ AWS Management Console ✓

☒ AWS Command Line Interface (AWS CLI) ✓

☒ AWS software development kits (SDKs) ✓

☐ AWS X-Ray

☐ AWS CloudTrail

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

☐ 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.

☐ The developer must contact AWS
Support to request approval to use the
same bucket name.

☐ 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.

✓ A developer hosts a static website^{1/1} in 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?

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

✓ 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? 1/1

- ☐ Store credentials in local AWS configuration files.
- ☐ Create an AWS Identity and Access Management (IAM) user and attach it to the EC2 instance.
- ☐ Embed AWS credentials in the software development kit (SDK) client code.

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

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

```
{
  "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 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

☐

Denies the ability to write to the pollynotes DynamoDB table

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

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

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

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

✓ 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? 1/1

☐ Set up a local secondary index 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.

☐ Change the primary key on the restaurant table to be a complex primary key based on cuisine and customer rating.

✓ An application that uses Amazon 1/1
API 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?

☒ 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.

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



Which statement describes a characteristic of AWS Lambda?

1/1

☐

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.

☐

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

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

1/1

☐ 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.

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

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

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

☒ 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. ✓

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

☐ 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.

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

☒ Consumers poll the queue for messages. ✓

☐ The queue broadcasts messages to consumers.

☐ 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.

✓ An application that processes order 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? 1/1

☐ Task

☐ Wait

☒ 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'.

☒ 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. ✓

☐ 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.

☐ 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? 1/1

```
import boto3
```

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

- ☐ The call results in a 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.

✓
☒ 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 topic using the following code snippet. What statement/statements is/are true? 1/1

```
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.
- ☐ We are subscribing to a queue topic.
- ☐ When any message arrives to the topic, we trigger the Lambda function given by its ARN.

☒ 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 1/1 of edge computing?

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

☐ It causes higher device battery drain.

☐ It has low equ management requirements.

☒ It can increase the processing capabilities of IoT devices. ✓

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



Offers open interfaces between the control and data planes. ✓



Provides control and data plane separation. ✓



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



Decreases the latency of all packet forwarding operations.

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

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

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

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

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

Helyes válasz

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

☒ 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)? 1/1

```
$ 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 ✓

☐ 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

☐ 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

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

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

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

☒ Pods are made up of containers. ✓

☐ 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? 1/1

☐ 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.

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

☐ ...we cannot achieve scalability or responsiveness.

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

☐ ...event handlers are always directly called by event sources, they can never pull for messages.

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

Development of Cloud Native
Network Functions - exam -
Kubernetes

10/8
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 0K3sServerSsh 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

The devops team deployed a deployment in the Kubernetes cluster. They noticed that only one Pod started, although, they wanted three.

Your task is to update the deployment to have 3 Pod replicas.

Start the task:

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

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

Evaluate the task:

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

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

You will receive a token when you successfully solve the task, this token should be copied here!

Delete the task:

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

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

Copy the token you received after the evaluation!

VITMAC12-
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9
.eyJ1YW1lc3BhY2UiOiJleGFtLTETdGFzay
0xLWVmZ3hINSIsInRlc3RzRXhY3V0ZW
QiOiilyiwidGVzdHNTdWNjZWVkbZWQioily ✖
liwidGltZXN0YW1wljoiMjAyNC0xMi0xM
FQxMDoxMD01NFoifQ.-
QZTGQmM5psm9YT54PuAKu0RbRgMn
oEaqO4SBBmoEa8-VITMAC12

✗ Kubernetes-2 (max. 8 points)

8/6

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
.eyJyYW1lc3BhY2UiOiJleGFtLTETdGFZay
0yLVVmZ3hINSIsInRlc3RzRXhlY3V0ZW
QiOiIlIiwidGVzdHNTdWNjZWVkZWQlOiI
0IiwidGlTZXN0YW1wljoIMjAyNC0xMi0x
MFQxMDoxNToyNWloifQ.w2peC3YVZUbbr
Pewsr6YJrXQ1BX04KUK7EaQxUydCu0-
VITMAC12

✖

Development of Cloud Native Network Functions - exam - AWS practice

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, melyeket 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?)

10.212.0.0/16



✓ **AWS-2.** What Availability Zones (AZ) 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 alhálózatai milyen AZ-kben vannak jelen? Ellenőrizze a VPC resource map-jét és adja meg az AZ-eket betűrendben, a tagoláshoz használjon kizárólag vesszőket, szóközöket ne!)

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



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

(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!)

2



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

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

2



✓ **AWS-5.** One of the subnets is 1/1
named 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?)

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

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

us-east-1a



✓ **AWS-7.** An EC2 instance has been3/3 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^{1/1} internet from this EC2 instance, e.g., by pinging google.com? Answer with 'yes' or 'no'.

(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 ^{2/2} EC2 instance in the same subnet and security group could the two instances reach each other at any port? Answer with 'yes' or 'no'.

(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 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'. 2/2

(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.)

no



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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