Consultation for the midterm exam

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Format, topics

Google Quiz

- Multi-choice test!
- each good answer is needed for the score

Theoretical questions

- Based on the lectures
- Microservices, cloud native, serverless: concepts
- Basic networking, network functions
- Storage, database
- Autoscaling
- Kubernetes basics

Practice (?)

- Exercises in an own environment
- potential topics: Kubernetes, network functions

AWS Academy materials

- Each module has a "Knowledge Check"
  - hopefully you have already realized that...
  - (required for accomplishing the gyaks)
- Lessons learned from the Labs
  - ZH: only quiz questions on that
  - exam: practice with an own Learner Lab environment
- Foundations course has a final Course Assessment
  - also required
- We can "borrow" questions from there
- but other (own) quiz questions will also appear

Cloud service models

Which of the following cloud service models provides the highest level of flexibility and management control over IT resources?

- a) Software as a Service (SaaS)
- b) Platform as a Service (PaaS)
- c) Infrastructure as a Service (IaaS)
- d) Function as a Service (FaaS)

Which of the following cloud service models provides the lowest level of flexibility and management control over IT resources?

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Microservices

Which of the following is a key characteristic of microservices architecture?

- a) Monolithic deployment
- b) Tightly coupled services
- c) Independently deployable services
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Containers

What is the main advantage of using containers in cloud environments?

- a) Increased hardware dependency
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Cloud design patterns

What is the main role of the Circuit Breaker design pattern?

- a) To enhance the speed of the application
- b) To prevent an application from repeatedly trying to execute an operation that's likely to fail
- c) To manage the database connections
- d) To handle user authentication

What does the Sidecar design pattern help with?

- a) Implementing core business logic
- b) Co-locating related functionality such as monitoring and logging with the primary application
- b) Managing user sessions
- c) Handling database transactions

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Containers vs Virtual machines

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Kubernetes Questions

1. We provide access to a pre-configured Kubernetes cluster with an AWS CloudFormation link
   - similarly to the 7^{th} lecture
   - should connect using the "EC2 Instance Connect browser-based client"
2. Questions
   - inquire about the state of the cluster
   - are solvable with `kubectl` commands
   - might need additional CLI arguments discussed in the practice session

- Example question: "How many services are in the default namespace?"

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- Example question: "How many services are in the default namespace?"
- Solution:

```
$ kubectl get svc
NAME         TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)   AGE
kubernetes   ClusterIP   10.43.0.1      <none>        443/TCP   7m20s
my-service   ClusterIP   10.43.109.34   <none>        80/TCP    2m11s
$
```

⇒ Answer: 2

Another Kubernetes Question

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- Solution:

```
$ kubectl get pods -A
NAMESPACE     NAME                                      READY   STATUS      RESTARTS   AGE
default       my-server-859fcf67d-72j7m                 1/1     Running     0          2s
kube-system   coredns-7b98449c4-5f4x6                   1/1     Running     0          13m
kube-system   helm-install-traefik-crd-67dp2            0/1     Completed   0          13m
kube-system   helm-install-traefik-jx95k                0/1     Completed   1          13m
kube-system   local-path-provisioner-595dcfc56f-xzf7h   1/1     Running     0          13m
kube-system   metrics-server-cdcc87586-7kjnm            1/1     Running     0          13m
kube-system   svclb-traefik-f7a991d9-mcd46              2/2     Running     0          12m
kube-system   traefik-d7c9c5778-9xhkq                   1/1     Running     0          12m
```

⇒ Answer: 7

Yet Antoher Kubernetes Question

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- Solution:

```
$ kubectl describe svc my-service
Name:              my-service
Namespace:         default
Labels:            <none>
Annotations:       <none>
Selector:          app=my-server
Type:              ClusterIP
IP Family Policy:  SingleStack
IP Families:       IPv4
IP:                10.43.109.34
IPs:               10.43.109.34
Port:              http  80/TCP
TargetPort:        8080/TCP
Endpoints:         10.42.0.10:8080,10.42.0.11:8080
Session Affinity:  None
Events:            <none>
```

⇒ Answer: 2 (Count the number of endpoints.)

Cloud concepts

Why is AWS more economical than traditional data centers for applications with varying compute workloads?

- a) Amazon Elastic Compute Cloud (Amazon EC2) costs are billed on a monthly basis.
- b) Customers retain full administrative access to their Amazon EC2 instances.
- c) Amazon EC2 instances can be launched on-demand when needed.
- d) Customers can permanently run enough instances to handle peak workloads.

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AWS infrastructure

Which component of AWS global infrastructure does Amazon CloudFront use to ensure low-latency delivery?

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- c) AWS Availability Zones
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AWS cloud security

Which of the following is AWS's responsibility under the AWS shared responsibility model?

- a) Configuring third-party applications
- b) Maintaining physical hardware
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- d) Managing custom Amazon Machine Images (AMIs)

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Which AWS networking service enables a company to create a virtual network within AWS?

- a) AWS Config
- b) Amazon Route 53
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⇒ Answer: d

AWS Compute

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AWS Storage

A company wants to store data that is not frequently accessed. What is the best and cost-effective solution that should be considered?

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- b) Amazon Simple Storage Service Glacier
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AWS Databases

Which of the following is a fully-managed NoSQL database service?

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- b) Amazon DynamoDB
- c) Amazon Aurora
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AWS autoscaling and monitoring

Which service would you use to send alerts based on Amazon CloudWatch alarms?

- a) Amazon Simple Notification Service
- b) AWS CloudTrail
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⇒ Answer: a

Firewall

Which of the following is the iptables filter table used for?

- a) setting up network address translation
- b) configuring routing
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Firewall

What is the purpose of the following command?

```
$ iptables -t nat -A POSTROUTING -s 10.0.0.0/8 -o eth2 -j SNAT --to-source
192.168.1.10
```

- a) Setting up port forwarding, making the 10.0.0.0/8 range accessible from the outside
- b) Adding a new NAT rule to the beginning of the nat table, allowing the internal network 10.0.0.0/8 to reach the external network
- c) Adding a new NAT rule to the nat table, which translates 10.0.0.0/8 addresses when a packet arrives on the eth2 interface
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What is the purpose of the following command?

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$ iptables -A INPUT -p udp --sport 53 -j ACCEPT
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- a) Allows forwarding UDP traffic if the source port is 53
- b) Allows incoming UDP traffic if either the source or destination port is 53
- c) Allows incoming UDP traffic for DNS queries (source port 53)
- d) Allows any traffic if it is a DNS query (source port 53)

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AWS SDK, S3

Company salespeople upload their sales figures daily. A solutions architect needs a durable storage solution for these documents that also protects against users accidentally deleting important documents. Which action will protect against unintended user actions?

- a) Store data in an EBS volume and create snapshots once a week.
- b) Store data in an S3 bucket and enable versioning.
- c) Store data in two S3 buckets in different AWS Regions.
- d) Store data on EC2 instance storage.

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AWS security

A company is storing an access key (access key ID and secret access key) in a text file on a custom Amazon Machine Image (AMI). The company uses the access key to access DynamoDB tables from instances that are created from the AMI. The security team has mandated a more secure solution. Which solution will meet the security team's mandate?

- a) Put the access key in an S3 bucket, and retrieve the access key on boot from the instance.
- b) Pass the access key to the instances through instance user data.
- c) Obtain the access key from a key server that is launched in a private subnet.
- d) Create an IAM role with permissions to access the table, and launch all instances with the new role.

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AWS NoSQL solutions

A developer is creating a solution that will use an Amazon DynamoDB table. Anytime the table is updated, the changes must be sent to AWS Lambda. Lambda will then send a message to the Operations team when certain values exist. How could the developer modify the table to create this solution?

- a) Create a global secondary index to speed up queries so the developer's code can get faster results.
- b) Create a local secondary index to speed up queries so the developer's code can get faster results.
- c) Enable DynamoDB Streams on the table.
- d) None of the above

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