TEAM LEAD

Mentoring

CLARUSWAY©
WAY TO REINVENT YOURSELF

Class Schedule

- Agile, SDLC, Scrum, Jira
- Python
- Linux
- AWS
- Git
- DevOps
- Networking
- SQL

Teamwork Schedule

Ice-breaking 10 minutes

- Personal Questions (Stay at home & Corona, Study Environment, Kids etc.)
- Any challenges (Classes, Coding, AWS, studying, etc.)
- Ask how they're studying, give personal advice.
- Remind that practice makes perfect.

Team work 10 minutes

- Ask what exactly each student does for the team, if they know each other, if they care for each other, if they follow and talk with each other etc.

Ask Questions 20 minutes

- Make a quick review about what they learned so far (AWS-Cloud Computing Basics, AWS-IAM, CLI, EC2, S3, AWS Databases, Networking, VPC, SQL ETC.)

The virtual machines that we place in the Public subnets can be accessed from the outside of the VPC (Public internet).

A. True
B. False

Answer: True

Bastion Host is launched in ……. and acts as a proxy for the instances in a ……

A. Private Subnet - Private Subnet
B. Public Subnets - Private Subnet
C. Private Subnet - Public Subnets
D. Public Subnets - Public Subnets

Answer: B

…….is a networking connection between two VPCs.

A. VPC Endpoint
B. Network ACL
C. VPC Peering
D. Subnets

Answer: C

Bastion Host/Jump Boxes are used for Inbound traffic to the instance in Private Subnet.

A. True
B. False

Answer: A

Randomly ask questions about subjects they've learned so far.

Interview Questions 20 mins

Your team has developed an application and now needs to deploy that application onto an EC2 Instance. This application interacts with a DynamoDB table. Which of the following is the correct and MOST SECURE way to ensure that the application interacts with the DynamoDB table

A.Create a role which has the necessary permissions and can be assumed by the EC2 instance
B.Use the API credentials from an EC2 instance. Ensure the environment variables are updated with the API access keys.
C.Use the API credentials from a bastion host. Make the application on the EC2 Instance send requests via the bastion host.
D.Use the API credentials from a NAT Instance. Make the application on the EC2 Instance send requests via the NAT Instance

Explanation:
Answer: A
IAM roles are designed in such a way so that your applications can securely make API requests from your instances, without requiring you to manage the security credentials that the applications use.
Options B, C, and D are invalid because it is not secure to use API credentials from any EC2 instance. The API credentials can be tampered with and hence is not the ideal secure way to make API calls.
For more details on AWS Credentials, please refer below URL
https://aws.amazon.com/blogs/security/what-to-do-if-you-inadvertently-expose-an-aws-access-key/
https://docs.aws.amazon.com/IAM/latest/UserGuide/id_credentials_access-keys.html#Using_CreateAccessKey_API
For more information on IAM roles for EC2, please refer below URL:
http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/iam-roles-for-amazon-ec2.html

You are creating a number of EBS Volumes for the EC2 Instances hosted in your company's AWS account. The company has asked you to ensure that the EBS volumes are available even in the case of an entire region facing an outage due to a natural disaster. How would you accomplish this? Choose 2 answers from the options given below

A.Configure Amazon Storage Gateway with EBS volumes as the data source and store the backups on premise through the storage gateway
B.Create snapshots of the EBS Volumes.
C.Ensure the snapshots are made available in another availability zone
D.Ensure the snapshots are made available in another region

Explanation:

Answer - B and D
The AWS Documentation mentions the following
You can back up the data on your Amazon EBS volumes to Amazon S3 by taking point-in-time snapshots. Snapshots are incremental backups, which means that only the blocks on the device that have changed after your most recent snapshot are saved. This minimizes the time required to create the snapshot and saves on storage costs by not duplicating data. When you delete a snapshot, only the data unique to that snapshot is removed. Each snapshot contains all of the information needed to restore your data (from the moment when the snapshot was taken) to a new EBS volume.
Option A is incorrect since you have to make use of EBS snapshots
Option C is incorrect since the snapshots need to be made available in another region for such a huge disaster. It may be rare for the whole AWS region to go down, but it could cause massive permanent damage if we don’t plan for it.
For more information on EBS snapshots, please visit the below URL:
https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/EBSSnapshots.html

Your company is planning on hosting a set of EC2 Instances in AWS. The Instances would be configured in a way that one will be used as a web tier and the other as a database (EC2 Hosted). The web tier should be exposed to the Internet in the Public Subnet and Database is in Private Subnet in the same VPC with the default configuration. What configuration needs to be done in order to let Web Server communicate with Database Server?

A.Change the main route tables to have the desired routing between the subnets
B.Ensure that the Security Groups have the required rules defined to allow traffic
C.Ensure that all instances have a public IP for communication
D.Ensure that all subnets are defined as public subnets

Explanation:
Answer – B
The AWS Documentation mentions the following
A *security group* acts as a virtual firewall for your instance to control inbound and outbound traffic. When you launch an instance in a VPC, you can assign up to five security groups to the instance. Security groups act at the instance level, not the subnet level. Therefore, each instance in a subnet in your VPC could be assigned to a different set of security groups. If you don't specify a particular group at launch time, the instance is automatically assigned to the default security group for the VPC

Main route table
The first entry is the default entry for local routing in the VPC; this entry enables the instances in the VPC to communicate with each other.

Destination
Target
10.0.0.0/16
local

https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Route_Tables.html

Option A is invalid since the main route table will have the required rules to route traffic between subnets in a VPC (By default). No change is required there.
Refer below URL for more details,
https://docs.aws.amazon.com/vpc/latest/userguide/VPC_Scenario2.html#VPC_Scenario2_Routing
Option C is invalid since the instances would communicate with each other on the private IP
The primary reason to use the Private IP of an EC2 instance is to route the traffic internally within your VPC. If you use the private IP to communicate, traffic will stay within the VPC, it will not be routed out, the routing table will route it internally
Option D is invalid since the database should be in the private subnet and not the public subnet
This question asks for communication between subnets.
For more information on Security Groups, please visit the below URL:
http://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_SecurityGroups.htm

Instances in your private subnet hosted in AWS, need access to important documents in S3. Due to the confidential nature of these documents, you have to ensure that the traffic does not traverse through the internet. As an architect, how would you implement this solution?

A. Consider using a VPC Endpoint.
B. Consider using an EC2 Endpoint.
C. Move the instances to a public subnet.
D. Create a VPN connection and access the S3 resources from the EC2 Instance.

Explanation:

Correct Answer – A

AWS documentation mentions the following:

A VPC endpoint enables you to privately connect your VPC to supported AWS services and VPC endpoint services powered by PrivateLink without requiring an internet gateway, NAT device, VPN connection or AWS Direct Connect connection. Instances in your VPC do not require public IP addresses to communicate with resources in the service. Traffic between your VPC and the other services does not leave the Amazon network.

For more information on VPC Endpoints, please visit the following URL:

https://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/vpc-endpoints.html

A company has an on-premises infrastructure which they want to extend to the AWS Cloud. There is a need to ensure that communication across both environments is possible over the Internet when initiated from on-premises. What should be set up on the on-premise side?

A. Create a VPC peering connection between the on-premises and the AWS Environment.
B. Create an AWS Direct connection between the on-premises and the AWS Environment.
C. Create a VPN connection between the on-premises and the AWS Environment.
D. Create a Virtual private gateway connection between the on-premises and the AWS Environment.

Explanation:

Correct Answer - C

AWS Documentation mentions the following:

One can create a Virtual private connection to establish communication across both environments over the Internet.

For more information on Virtual private connection, please visit the following URL:

- https://docs.aws.amazon.com/AmazonVPC/latest/UserGuide/VPC_VPN.html

Option A is invalid because a VPC peering connection is a networking connection between two VPCs that enables you to route traffic between them using private IPv4 addresses or IPv6 addresses. It is not used for connection between on-premises environment and AWS.

Option D is invalid because a virtual private gateway is the Amazon VPC side of a VPN connection. For the communication to take place between the on-premise servers to AWS EC2 instances within the VPC, we need to set up the customer gateway at the on-premise location.

Note: The question says that "There is a need to ensure that communication across both environments is possible **over the Internet.**" AWS Direct Connect does not involve the Internet.

A VPC VPN Connection utilizes IPSec to establish encrypted network connectivity between your intranet and Amazon VPC over the Internet. VPN Connections can be configured in minutes and are a good solution if you have an immediate need, have low to modest bandwidth requirements, and can tolerate the inherent variability in Internet-based connectivity. **AWS Direct Connect does not involve the Internet;** instead, it uses dedicated, private network connections between your intranet and Amazon VPC.

Video of the Week 15 mins

What is SQL?

https://www.youtube.com/watch?v=27axs9dO7AE

Survey 10 minutes

- Which topic was interesting/exciting/easy for you?
- Which topic was boring/hard for you?
- What are the things you liked?
- What are the things you didn't like?

Retro Meeting On a personal and team level 10 mins

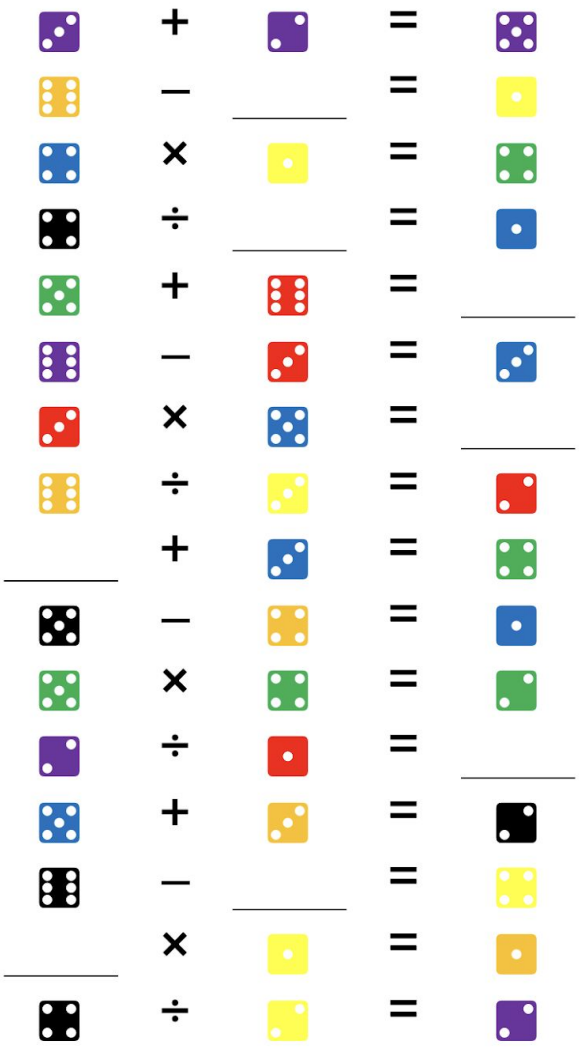
Below questions for the week before the break but you can also ask these questions for the break period. It can be beneficial to hear students' opinions about how they did in terms of studying, practicing during the break.

- What went well?
- What could be improved?
- What will we commit to do better in the next week?

Problem of the week: 5 mins

Students should work in small teams to complete the problem of the week.

THE RULES ARE STRAIGHTFORWARD ONCE YOU KNOW THEM



Answer: CONTRAST
Solution video:
https://www.youtube.com/watch?v=6aJKDRxTJIo&list=PLhQjrBD2T381e1IyDsLSXFYveF6ggaPBx&index=6

Computational Thinking:

Decomposition: Recognize that in each step there are 2 problems: 1 is that there is a mathematical operation done with the numbers on the dices. The other is the mixing operation done with the colors of the dice.

Pattern recognition: Recognize in every step the resulting dice has the color that is generated by the colors of the dices that are multiplied, added, subtracted or divided. And recognize that addition and multiplication means mixing the colors while subtraction and division means unmixing the colors. Also in each operation that is presented the result is shown in modulo 6.

Abstraction: Each dice that you have found actually represented a letter. The color of the dice that you have found actually means the array of numbers that has the same color with that particular dice. For example red dice means = [T,A,R,C,O] (T being the first index since there is no 0 in any of the faces of the dice) since all of these letters are in red in the above sentence. And the number indicates tha index. So if you have a red dice that has a 3 on it, it means R.

Algorithm: The algorithm in this case: Look at the mathematical operation and take modulo of it. Or look at the complementary element of the operation that is going to give the result given in modulo 6. Then look what color is given by the mixture of those two colors that are being multiplied or added. If it is a subtraction or division, look what colors should be unmixed from that color in order to get the resulting color. Finally pay close attention to the dices that you have got and pick the color and the index of the letter that you are looking for from the above sentence.

Presentation of Coding Challenge & POW 20 mins

We assume that each group has two sub teams. If this is possible one of the sub teams will present the coding challenge of last week. The other sub team will present the solution to the previous problem of the week. If there is only one sub team then, the sub team will present both of the solutions.

Coding Challenge 5 mins

Given ***n*** pairs of parentheses, write a code to generate all combinations of well-formed (valid for Python) parentheses.
For example, given ***n* = 3**, a solution set is:

```
[
 "((()))",
 "(()())",
 "(())()",
 "()(())",
 "()()()"
]
```

Example Solution:

```
n=4
# Initialize the history list
seen = [[] for _ in range(n + 1)]
seen[0].append("")
if n == 0: [""]
# Generate the history from 1 pair case
for i in range(1, n + 1):
       # c is the number of pairs in left part
   for c in range(i):
              # Iterate through all the possible cases for left and right
       for left in seen[c]:
           for right in seen[i - 1 - c]:
               seen[i].append('(' + left + ')' + right)
seen[-1]
```

Presentation of Case Study of Sprint-5 20 mins

We assume that each group has two sub teams. Each week, one of the sub-teams will present their solution.

Case study 10 mins

Case study should be explained to the students during the weekly meeting and has to be completed in one sprint (2 weeks) by the students. Students should work in small teams to complete the case study.

Project for this sprint will be declared as Project within Portfolio Building activities during the in-class session on Tuesday, 23.06. 2020

Closing 5 mins

- Next week's plan
- QA Session