**Exam 1 Review Questions**

Exam 1 will be derived from these questions, though we reserve the right to include some questions from the materials covered in class or in the required readings that may not exactly appear on this review sheet. Pay close attention to questions in **bold font.**

**General Questions**

1. Expand each of the following acronyms of the following in the context of this class:

* AWS
* AZ
* EC2
* S3
* EBS
* RDS
* NoSQL
* ELB
* PAAS
* HAAS
* IAAS
* SAAS
* CIDR
* REST
* SOAP
* VPC
* CTO
* CIO
* AMI
* IAM
* MFA
* IOPS
* ACL
* CLI
* SDK
* API
* JSON

1. Define cloud computing.
2. Name and briefly describe six advantages and benefits of using cloud computing on AWS.
3. Name two of the categories of Platform Services in AWS.
4. What are the two Cloud Deployment Models?
5. Explain the difference between a Hybrid Cloud deployment model and an All-In Cloud deployment model.
6. When was the AWS cloud first made available as a product?
7. Name three other commercial clouds in addition to AWS.
8. True or False: Deploying your enterprise applications in the AWS cloud is cheaper than running your own data center. Explain your answer.
9. Describe three advantages and one disadvantage of running enterprise applications in AWS as compared to running your own data center.
10. What is the AWS Marketplace?

**AWS Computing**

1. What is a hypervisor and what is its main function? Do you have access to the hypervisor layer in AWS? Explain your answer.
2. What is an Instance?
3. **Draw the EC2 instance life cycle diagram**
4. Explain what “Pay as you Go” means.
5. List four AWS EC2 Purchasing Options.
6. Describe at least three differences between On-Demand purchasing and Reserved Instance purchasing.
7. Described at least three differences between On-Demand purchasing and Spot Instance purchasing.
8. Described at least three differences between Reserved purchasing and Scheduled purchasing.
9. For what kind of workload would you prefer on-Demand pricing? Spot pricing? Reserved Instance pricing? Scheduled Instance pricing?
10. True or False: If you launch an instance using Spot pricing and it is terminated by AWS in 30 minutes then you are charged for the full hour.
11. True or False: If you launch an instance using Spot pricing and you terminate it in 30 seconds then you are charged for the full minute.
12. True or False: An AMI includes a template for the root volume, launch permission that control which AWS accounts can use the AMI, and a block device mapping that specifies the volumes to attach to the instance when it is launched.
13. True or False: You need an access ID key and secret access key to SSH into a Linux EC2 instance.
14. Name four families of EC2 instances.
15. What is Instance Metadata? Give an example.
16. What is Instance User Data? Give an example.
17. True or False: You are able to reboot any type of instance.
18. True or False: Each AZ is designed to be isolated from failures in other Availability Zones.
19. Name at least three EC2 instance type categories.

**AWS Storage**

1. Describe three differences between Amazon EBS and Amazon EC2 Instance Store
2. True or False: Every type of instance can use EC2 Instance Store. Explain your answer (this is a trick question).
3. What is the difference between ephemeral and persistent storage? Which type is EBS? Which type is S2? Which type is Instance Store?
4. Describe the difference between Block Storage and Object Storage. Describe what happens if you change a single character in Block Storage versus what happens if you change a single character in Object Storage.
5. True or false: S3 is a Block Storage system.
6. True or false: EBS is an Object Storage system.
7. True or false: S3 is a key-value object store with unlimited storage capacity. Explain your answer.
8. True or false: S3 is a storage suitable for the storage of flat files like Word documents, photos, etc.
9. True or False: An Amazon Machine Image (AMI) can be created from an EBS snapshot
10. True or false: Amazon EBS is recommended when data must be quickly accessible.
11. True or False: Snapshots of encrypted volumes are automatically encrypted
12. What is the largest size object that can be stored in S3?
13. EBS can be compared to what real hardware device?
14. For what type of workload would you prefer S3?
15. True or False: You can back up EBS to S3. Explain your answer.
16. What is an EBS Snapshot?
17. **Describe the EBS volume lifecycle.**
18. True or False: An EBS Volume created in one AZ can be attached to an EC2 instance that is running in a different AZ within the same region.
19. What type of AWS data transfer is free for Amazon S3?
20. True or False: There is a charge for inbound data transfers or data transfers between services within the same region.
21. What are provisioned IOPS?
22. Describe three use cases for EBS.
23. Describe the difference between Amazon S3 Standard and Amazon S3 Standard - Infrequent Access.
24. Data retrieval from Amazon Glacier will take \_\_\_\_\_ to begin:
    1. 10 minutes
    2. 1 hour
    3. 3-5 hours
    4. 1-3 hours
25. What does it mean to be fault tolerant?
26. What does it mean to be highly available?
27. **What is the difference between availability and durability of data?**
28. There are six S3 storage classes. Name at least three.
29. Suppose that the probability that a storage device fails in a year is 1%. Suppose that you store your data redundantly on two independent devices with the same failure rate. What is the probability that you will lose your data in a year? Assuming no use of error correcting codes, on how many devices do you have to redundantly store your data so that the probability of losing it is less than .0000000001%?

How much time will an application be unavailable in a year if it has 99.999999999% availability?

**AWS Networking**

1. True or False: VPCs are logically isolated from other virtual networks.
2. A VPC resides in a single:
   1. Availability Zone
   2. Edge Location
   3. Region
3. What is a data center? An Availability Zone? A Region? Give two examples of AWS regions.
4. How do Availability Zones in the same Region differ?
5. What is an Edge location?
6. True or False: There are many more Regions than Edge locations in AWS. Explain your answer.
7. True or False: Edge locations are not located in the same general area as regions.
8. True or False: Data transferred between AZs travel on private high-speed network links.
9. True or False: Data transferred between Regions travel on the public Internet.
10. True or False: VPCs cannot include resources in more than one Availability Zone.
11. True or False: VPC provides various feature to provide security, including Security Groups, Network Access Control Lists, and Key Pairs.
12. True or False: A private subnet can be accessible from the public internet.
13. True or False: A private subnet have a routing table entry to an internet gateway.
14. True or False: One route table can be associated with multiple subnets.
15. The largest CIDR block supported by Amazon VPC is [IP address]/\_\_\_
16. The smallest CIDR block supported by Amazon VPC is [IP address]/\_\_\_
17. Which of the following statements regarding Amazon VPC are True?
    1. A private subnet should be used for resources that won’t be accessible over the Internet
    2. Each subnet must reside entirely within one Availability Zone
    3. A public subnet should be used for resources that won’t be accessible over the Internet
    4. A subnet defines a range of IP addresses in your VPC
    5. Subnets can span Availability Zones
18. Each Availability Zone in an AWS Region is separated by:
    1. At least 10s of miles
    2. At most 10s of miles
    3. Exactly 10 miles
    4. At least 100 miles
19. Regions consist of at least \_\_ Availability Zones:
    1. 1
    2. 6
    3. 2
    4. 10
20. True or False: A Security Group is within a single VPC.
21. Give an example of a network rule you might assign in a Security Group.
22. Security Groups control both inbound and outbound traffic at the \_\_\_\_\_ level.
    1. Subnet
    2. VPC
    3. Instance
    4. Availability Zone
23. How many IP addresses are represented by the CIDR 10.0.0.0/24 ?
24. How many IP addresses are available in an AZ with CIDR 10.0.2.0/28 ?
25. Give an example CIDR address that would provide 500 available IP addresses, but not 1000 ?
26. Give a non-overlapping CIDR configuration for two subnets that have 256 IP addresses each.
27. Suppose a VPC has a CIDR 10.0.1.0/24. What are some possible associated CIDRs of four subnets within the VPC that have 500 IP addresses each?

**AWS Database**

1. Describe three differences between an AWS managed service and an unmanaged service.
2. \_\_\_\_\_\_\_\_\_\_ are the basic building blocks of Amazon RDS.
3. True or False: A DB Instance is an isolated database environment in the cloud.
4. Name four databases supported by AWS RDS.
5. Describe three differences between using a managed RDS and building your own database on EC2.
6. In general, SQL databases have \_\_\_\_\_ scaling and NoSQL databases have \_\_\_\_\_ scaling.
7. Define horizontal and vertical scaling. Give an example of vertical scaling from AWS.
8. Describe the difference between vertical scaling and horizontal scaling.
9. What is the main limitation to vertical scaling? That is, when can you no longer scale vertically?
10. What is the main limitation to horizontal scaling? That is, when can you no longer scale horizontally?
11. Give three examples of SQL-like statements.
12. Give an example of data that might be in a NoSQL database.
13. True or False: You cannot use SQL to query a NoSQL database. Explain your answer.
14. True or False: You can query and scan DynamoDB to retrieve data.
15. True or False: Sharding can slow down the database.
16. True or False: In Amazon RDS, there are no charges for inbound data but tiered charges for outbound data.
17. What is sharding in an RDS?
18. Describe, with a diagram, two types of sharding.
19. For what type of workload would you prefer DynamoDB?
20. You should utilize Amazon\_\_\_\_\_\_\_\_\_ if your application requires complex queries, joins, and updates.
21. True or False: You should utilize Amazon DynamoDB if your data is unstructured and you require fast I/O.
22. Which of the following allows unlimited storage:

a) S3

b) EBS

c) Instance Store

d) RDS

e) DynamoDB

1. **Describe eventually consistent reads and strongly consistent reads.**
2. **Name two AWS service that provide eventually consistent reads, and under what conditions this happens for each of them?**
3. **Why would we not always use strongly consistent reads in a distributed system like AWS?**
4. Describe the similarity and difference between Secondary DB and Read Replica DB.
5. What is the difference between high availability and high durability in Amazon RDS?
6. What is a potential synchronization problem in RDS read replicas?
7. Briefly describe the two storage types available in Amazon RDS.
8. List a use-case for Amazon RedShift
9. How would you confirm whether a write was successfully synced from master database instance to standby database instance in Amazon RDS?
10. A web-based fitness startup is interested in migrating their existing infrastructure to the cloud. Their on-premise infrastructure has a web server that handles user requests and fetches relevant fitness information like number of steps walked, blood pressure and heartbeat from a database. They have hired you as a cloud architect. Your task is to architect a cloud-based solution for the fitness startup that is highly available and durable. **Based on what we have studied so far in class,** please include a clear architecture diagram in your answer and list what relevant AWS services you have used along with a brief justification to use those services.

**AWS Scalability**

1. Name the two types of load balancers.
2. You can create Auto Scaling Group scaling policies that utilize \_\_\_\_\_ to determine when your Auto Scaling group should scale out or scale in.
   1. VPC
   2. S3
   3. CloudWatch alarms
   4. Instance Store
3. List three things that you can specify when you create a Launch Configuration.
4. List three benefits of utilizing Auto Scaling within your application.
5. True or False: An Auto Scaling group is a collection of EC2 Instances that share the same characteristics.
6. Explain the concept of bootstrapping an instance.
7. True or false: Auto Scaling and Elastic Load Balancing help your application scale up or down based on demand.
8. What are the minimum elements required to create an Auto Scaling launch configuration?

**AWS Security**

1. What does “Security of the Cloud” mean? Describe three aspects of security of the cloud.
2. What does “Security in the Cloud” mean? Describe three aspects of security in the cloud.
3. **Define authentication. Define authorization. How are they different?**
4. List the three IAM constructs that an IAM Policy can be assigned to.
5. Explain what an IAM User is.
6. Explain a difference between role-based authorization and user-based authorization.
7. True/False: All IAM permissions in AWS are implicitly allowed by default.
8. Draw the IAM permissions flow chart.
9. Suppose you create a policy for a user to Allow access to a table called “Table1”. In your same policy you Deny access to any table that is Not “Table1”. Then in the same policy you Allow access to “Table2”. Can this user access “Table2”? Why or why not?
10. IAM Policies are written in \_\_\_\_\_.
    1. JSON
    2. CSV
    3. XML
11. True or False: IAM is appropriate for OS and application authentication.
12. True or false: In the shared responsibility model, AWS has responsibility of providing security in the cloud.
13. True or false: AWS is responsible for the security of everything above the hypervisor layer.
14. What is an AWS IAM instance profile?