Hello Cloud Gurus, and welcome to this lecture.

Which is going

to cover two really important enterprise features of RDS.

Which is Multi-AZ and Read Replicas.

So we'll start off with what is Multi-AZ, then go on to

what is a Read Replica.

And finally, we'll have a comparison of the two

and talk about when you would use each of these features.

So let's begin with Multi-AZ.

So what is Multi-AZ?

Well, it's an exact copy of your production database

in another availability zone.

So imagine you're running an application

on some easy EC2 instances behind

an elastic load balancer, and they are storing

that data on an RDS database with Multi-AZ enabled.

So with Multi-AZ we have a primary RDS instance

and in this example our primary is located in us-east-1a.

And we have all standby or secondary RDS instance, located

in a different availability zone.

And in this case our standby is located in us-east-1b.

An RDS will replicate the data from the primary instance

to the standby.

Now under normal circumstances with everything operating

as expected, the standby RDS instance is not visible

or accessible to the application servers.

But if something goes wrong

with our primary database instance, it could be there's

a hardware issue or even a problem with

the entire availability zone, we still

have another database instance in the standby location.

And RDS will automatically fail over to

the standby database instance.

So we haven't lost our database.

So with Multi-AZ AWS have done all

the heavy lifting for you.

And AWS handles all the replication between primary

and secondary, so you don't have

to configure anything yourself.

And when you write to your production database,

this right will automatically synchronize

to the standby database.

And you might be wondering which types of RDS database

can be configured as Multi-AZ, well

it's basically all of them.

So that includes SQL Server, Oracle, My SQL.

PostgreSQL and MariaDB as well.

So the main purpose with Multi-AZ is to provide resilience

and keep your application up and running,

if you experience an unplanned failure

or if you're performing maintenance

on your primary RDS instance.

And in the event of an unplanned failure, RDS

will automatically fail over to the standby

so that database operations

can resume quickly, without any administrative intervention.

So it will automatically fail over to the secondary instance

and your application can keep on running.

And it's really important to understand that Multi-AZ

is for disaster recovery.

So it's for DR and it is not for scaling out

and improving performance, so that means

that you cannot do this.

So you cannot have your database clients

or your application servers connecting to both the primary

and standby simultaneously.

And you might be thinking if Multi-AZ can't be used

for improving performance, then what can I use

to improve performance?

And that's a good question because the main things you

can do to improve a performance

and particularly read performance is to add Read Replicas.

And a Read Replica is a read-only copy

of your primary database.

So imagine you've got a couple of application servers

and they are reading and writing data to an RDS instance.

And you've also got a business intelligence application

as well and this application needs to access the same data,

but it only needs to read the data.

So maybe your sales team needs to run reports

and forecast using the data but they don't need to write

to the database, they only need to read access.

Well, this is a really good use case for read replicas.

Because you can add a read replica

and it's a read only copy, but it will allow the sales team

to run all our reports without using op capacity

on our primary database and without impacting

our customer facing application in any way.

So this is great for read heavy workloads because

it takes the read load off your primary database.

And a Read Replica can be loaded

in the same availability zone as your primary database.

It can also be cross-AZ, so located in

a completely different ability zone.

Or it can even be cross-region and located

in a completely different region.

And each Read Replica has its own DNS and point,

which different and independent from the primary database.

So we have one end point for the Read Replica

and one for the primary database.

And Read Replicas can even be promoted to become

their own independent databases.

However, of course if we do that, that's going to break

the replication from the original database

but it will give us two completely independent databases

both allowing read and write access.

So with Read Replicas it's important to understand

that these are used for scaling read performance.

So they're primarily used for scaling

and not fault disaster recovery.

And in order to configure a Read Replica, you will need

to have automatic backups enabled.

And automatic backups of course they are enabled by default,

but if for some reason you've disabled backups

then you won't be able to deploy a Read Replica.

And I don't know this for certain, but I suspect that behind

the scenes when RDS is setting up the Read Replica

for the very first time,

it's probably using automatic backups somewhere within

the setup process.

And multiple Read Replicas are supported.

So for MySQL, MariaDB, PostgreSQL, Oracle and SQL Server

they all allow you to add up to five Read Replicas

to each database instance.

So let's move on to my exam tips for Multi-AZ

and Read Replicas.

So with Multi-AZ you get an exact copy

of your production database in another availability zone.

It's used for disaster recovery.

And the event of a failure, RDS audience

will automatically fail over to the standby instance.

Whereas with Read Replicas, you get a read only copy

of your primary database either in

the same availability zone, in a different availability zone

or in a different region entirely.

And Read Replicas are used to increase

or scale read performance, they're not used

for disaster recovery.

And they are great for read heavy workloads

because they take the load off your primary database

for read-only workloads

for example, business intelligence reporting jobs.

So that is the end of this lecture.

If you have any questions please let me know.

Otherwise I'll see you in the next lecture, thank you.