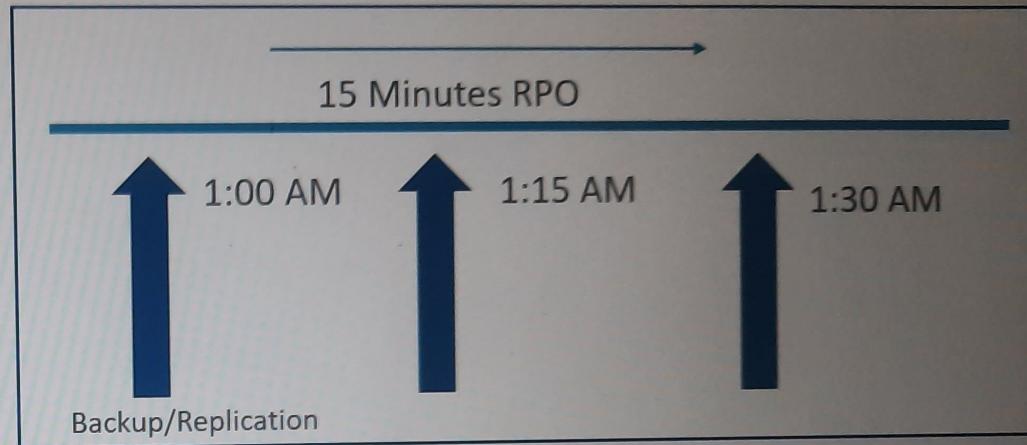


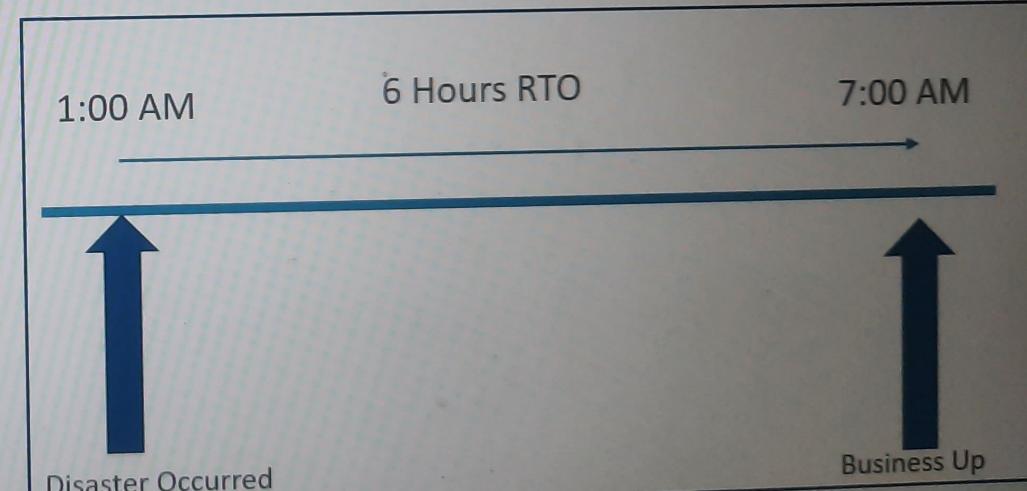
## Recovery Point Objective - RPO

- It is the amount of data a business can afford to lose in failures.
- It is calculated as a difference between the time the backups/replications are scheduled.
- If any disaster/failure happens, The data between the failure and the last backup is lost.
- The last back up is restored



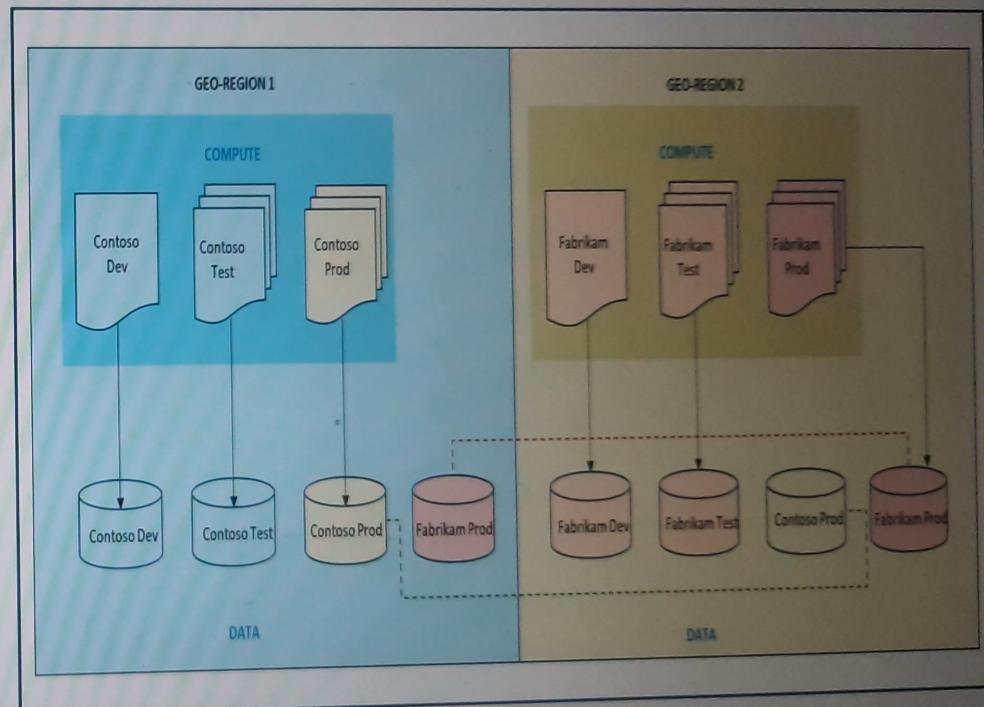
## Recovery Time Objective - RTO

- RTO is the maximum amount of time takes to recover critical business system after a disaster, before the impact on the business becomes unacceptable.
- RTO is calculated considering the time required to perform all the activities till the application is up and running.
- The activities may include to recovery of applications, and data, including the time required to obtain replacement equipment, perform data backups, and restore systems to a functional state.



# Business continuity and disaster recovery

- Finance and operations apps follow to the Microsoft Business Continuity and Disaster Recovery (BCDR) standard
- Replica of Azure SQL Database and file storage (storage services) are created in the secondary region at the time of deployment.
- These replicas are called as geo-secondaries
- The geo-secondary replicas are synchronized with the primary instance through continuous data replication.
- There will be less latency/lag between primary data source and the geo-secondary replica.
- The lag might be less than a few minutes.



# Possible failovers and Business continuity

Faulty hardware or network issues may cause outage to the services / Natural disaster cause unanticipated region-wide outage that affect Azure region

If Microsoft decide the region will not be available with in an acceptable amount of time

- Notifies customer
- Switch over the traffic
- Routed to the secondary region instances

## Faulty hardware or network outage

- Recovery point objective (RPO) is small → up to a few seconds or a couple of minutes
- The recovery time objective (RTO) depends on nature of the impact.
- It can be from four to ten hours.

## Natural disaster

- Customers may have up to 15 minutes of data loss, depends on the nature and timing of the outage.
- Recovery point objective (RPO) is small → up to a few seconds or a couple of minutes
- The recovery time objective (RTO) depends on the nature of the impact. It can be from four to ten hours.

# Environment Cost (Before optimization)

Costing for Tier 3		US				
Phase	Type of Env	Description	Unit Cost	# of Env	Duration Required	Cost
Design & Development	Tier 1	Development	\$770.00	26	323	\$2,48,710.00
QA	Tier 2	Standard Acceptance Test	\$793.12	1	0	\$0.00
Data Migration GOLD	Tier 2	Standard Acceptance Test	\$793.12	1	23	\$18,241.76
SIT	Tier 3	Premium Acceptance Test	\$4,050.00	1	13	\$52,650.00
UAT	Tier 3	Premium Acceptance Test	\$4,050.00	1	7	\$28,350.00
Training	Tier 3	Premium Acceptance Test	\$4,050.00	1	6	\$24,300.00
Performance testing	Tier 4	Standard Performance Test	\$7,900.00	1	5	\$39,500.00
Pre GL/ PROD Cut Over	Tier 4	Standard Performance Test	\$7,900.00	1	6	\$47,400.00
<b>Total</b>				33		<b>\$4,59,151.76</b>

Costing for Tier 2		US				
Phase	Type of Env	Description	Unit Cost	# of Env	Duration Required	Cost
Design & Development	Tier 1	Development	\$770.00	26	323	\$2,48,710.00
QA	Tier 2	Standard Acceptance Test	\$793.12	1	0	\$0.00
Data Migration GOLD	Tier 2	Standard Acceptance Test	\$793.12	1	23	\$18,241.76
SIT	Tier 2	Standard Acceptance Test	\$793.12	1	13	\$10,310.56
UAT	Tier 2	Standard Acceptance Test	\$793.12	1	7	\$5,551.84
Training	Tier 2	Standard Acceptance Test	\$793.12	1	6	\$4,758.72
Performance testing	Tier 4	Standard Performance Test	\$7,900.00	1	5	\$39,500.00
Pre GL/ PROD Cut Over	Tier 4	Standard Performance Test	\$7,900.00	1	6	\$47,400.00
<b>Total</b>				33		<b>\$3,74,472.88</b>

Note: Tier-1 environment consumption is 730 hours per month.

# Environment Cost (After optimization)

Costing for Tier 3		US				
Phase	Type of Env	Description	Unit Cost	# of Env	Duration Required	Cost
Design & Development	Tier 1	Development	\$253.00	26	323	\$81,719.00
QA	Tier 2	Standard Acceptance Test	\$793.12	1	0	\$0.00
Data Migration GOLD	Tier 2	Standard Acceptance Test	\$793.12	1	23	\$18,241.76
SIT	Tier 3	Premium Acceptance Test	\$4,050.00	1	13	\$52,650.00
UAT	Tier 3	Premium Acceptance Test	\$4,050.00	1	7	\$28,350.00
Training	Tier 3	Premium Acceptance Test	\$4,050.00	1	6	\$24,300.00
Performance testing	Tier 4	Standard Performance Test	\$7,900.00	1	5	\$39,500.00
Pre GL/ PROD Cut Over	Tier 4	Standard Performance Test	\$7,900.00	1	6	\$47,400.00
<b>Total</b>				33		<b>\$292,160.76</b>

Costing for Tier 2		US				
Phase	Type of Env	Description	Unit Cost	# of Env	Duration Required	Cost
Design & Development	Tier 1	Development	\$253.00	26	323	\$81,719.00
QA	Tier 2	Standard Acceptance Test	\$793.12	1	0	\$0.00
Data Migration GOLD	Tier 2	Standard Acceptance Test	\$793.12	1	23	\$18,241.76
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Pre GL/ PROD Cut Over	Tier 4	Standard Performance Test	\$7,900.00	1	6	\$47,400.00
<b>Total</b>				33		<b>\$207,481.88</b>

Note: Tier-1 environment consumption is 240 hours per month.

# Cost Comparison Before and After Optimization

	Before Optimization	After Optimization
Costing for Tier-3	\$459,151.76	\$292,160.76
Costing for Tier-2	\$374,472.88	\$207,481.88

Note:

Tier-1 environment consumption is 730 hours per month before optimization.  
Tier-1 environment consumption is 240 hours per month after optimization.

# Production Environment - Availability

- ✓ The guaranteed uptime for finance and operations apps is 99.9%.
- ✓ Planned downtime occurs once a month and lasts no longer than eight hours.
- ✓ The process/work done during downtimes does not take eight hours every time.
- ✓ The amount of down time is prior communicated.

## High Availability Features

- Production environments are protected by default Azure High Availability (HA) Features
- HA features provides ways to avoid downtime caused by the failure of a single node within a datacenter
- DR features protect outages impacting an entire datacenter
- Azure availability sets prevent single-point-of-failure events.
- High availability for databases is supported by Azure SQL.

## Database Backup Retention

- Tier 2-5 environments have automated backups taken by Azure SQL
- Backups can be restored by using Lifecycle Services
- Restore capability up to 14 days in the past
- For Production → Restore capability up to 28 days in the past
- Tier 1 environments, database backs are manual

# Disaster recovery features

- Production environments are setup with Azure disaster recovery support
- Configuration includes
  - Azure SQL active-geo replication for D365 F&O Production environment
  - Geo-redundant copies of Azure blob storage in Other Azure region
  - Same secondary region for the Azure SQL and Azure blog storage replication
- Replication is supported only for Primary data stores.
- The Financial reporting services and Entity store database use transformed data of the primary database

# Responsibilities for disaster recovery

Microsoft's responsibilities	Customer's responsibilities
<b>Geo-redundancy</b> – Microsoft allows data to be replicated across multiple geographical locations, providing protection against regional failures.	None
<b>Automatic backup</b> – Microsoft enables regular backups of SQL databases and Azure Storage to be taken, providing a recoverable point-in-time in the event of data loss or corruption.	None
<b>Application Object Server (AOS)</b> – Microsoft AOS images offers from regional repositories for restoring compute.	None
<b>Compute infrastructure</b> – Microsoft maintains the compute infrastructure to meet Recovery Time Objective (RTO) requirements	None
<b>In an Outage (with no data loss)</b> - Microsoft determines that a region failover must be done.	None
<b>In an Outage (with data loss)</b> - if a cross-region failover must be done for the customer, there might be up to five seconds of data loss. In that case Microsoft will contact the customer to request its sign-off on a failover.	Customer must provide written sign-off to trigger the failover
<b>In a failover mode</b> - the applicable service works in limited mode. Update maintenance can't be triggered in failover mode.	Customers can't request package deployments or other regular maintenance requests.
<b>If a Datacenter becomes operational</b> – Microsoft will switch back to the primary Azure region's production instance, resuming normal operations with a notification. There may be some brief interruptions but not a full downtime.	None
<b>For Resources provisioned outside the Microsoft service</b> - None	Customers are responsible for planning disaster recovery for resources (Includes both inside and outside of Azure subscriptions) that are not provided by Microsoft as part of the service.

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