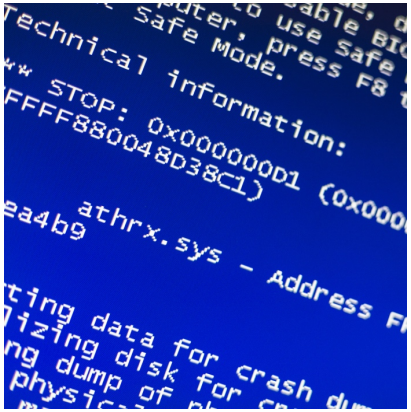
High Availability



For one-server failures:

Windows crash, RAID failure, SQL or Win patch fails, C: full, bad RAM chip, unplugged box

RPO: Max acceptable data loss:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

RTO: Max acceptable downtime:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

Disaster Recovery

For widespread outages:

Network switch fails, shared storage (SAN) outage, fire, flood, quake, power outage

RPO: Max acceptable data loss:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

RTO: Max acceptable downtime:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

Corruption

SQL and storage bugs:

SAN firmware bug, Microsoft SQL Server bug, examples: MS KB 2969896, 2878968

RPO: Max acceptable data loss:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

RTO: Max acceptable downtime:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

"Oops" Queries

For human T-SQL error:

UPDATE without a WHERE, truncate table in prod instead of dev, drop the wrong db

RPO: Max acceptable data loss:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

RTO: Max acceptable downtime:

Current State	Business Goal	
		Zero
		1 minute
		1 hour
		1 day

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Learn more at www.BrentOzar.com/go/fail. Your mileage may vary. Professional driver on closed course. Your eyesight is great.

Recovery Time Objective (RTO) - Downtime

Recovery Point Objective (RPO) - Data Loss	Zero-1 Sec	1 Minute	1 Hour	1 Day
Zero-1 Sec	>$1,000,000 Multiple active servers with bidirectional replication (usually requires code change)	$100k-$500k Clustering w/SAN, synch AlwaysOn Availability Groups (EE)*, synch database mirroring*	$100k-$250k Synch SAN replication*, synch VM replication*	
1 Minute			$50k-$250k Async AlwaysOn Avail Groups (EE), async DB mirroring (EE)	$5k-$100k Log shipping, async SAN replication, async VM replication
1 Hour			$5k-$100k Log shipping, async SAN replication, async VM	
1 Day				

* - technically these don't guarantee zero data loss: the secondary can get out of sync.

Learn more at www.BrentOzar.com/go/fail - except in Nebraska, as Steve Ballmer explains: BrentOzar.com/go/nebraska

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Comparison of SQL Server Availability Features

	>$1mm	$100k-$500k			$100k-$250k		$50k-$250k		$5k-$100k		
	Replication	Failover Clustered Instances (FCI)	AlwaysOn Availability Groups - Synch	Database Mirroring - Synch	SAN Replication - Synch	VM Replication Synch	AlwaysOn Availability Groups - Asynch	Database Mirroring - Asynch	Log Shipping	SAN Replication - Asynch	VM Replication Asynch
Recovery Point Objective (Data Loss)											
Data loss possible	Yes	No*	No*	No*	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Typical RPO goal	Zero	Zero	Zero	Zero	Zero	Zero	1 Minute	1 Minute	1 Hour	1 Hour	1 Hour
Recovery Time Objective (Downtime)											
Failover automatic or manual	Automatic	Automatic	Automatic	Automatic	Optional	Optional	Manual	Manual	Manual	Manual	Manual
Can be failed over by the DBA alone	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No
Easy to fail back and forth for patching	Some	Yes	Yes	Yes	No	No	Yes	Yes	Some	No	No
Multiple live writeable servers	Optional	No	No	No	No	No	No	No	No	No	No
Fails over Agent jobs, SQL logins	No	Yes	No	No	Optional	Yes	No	No	No	Optional	Yes
3rd party apps fail over easily	No	Yes	Yes	Some	Yes	Yes	Yes	Some	No	Yes	Yes
Typical RTO goal	Zero	1 Minute	1 Minute	1 Minute	1 Hour	1 Hour	1 Hour	1 Hour	1 Day	1 Day	1 Day
Groups of Databases											
Are the same point in time	No	Yes	No*	No	Yes	Yes	No	No	No	No	No
Fail over together	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hardware & Software Requirements											
SQL Server minimum version supported	Apps vary	Any	2012	2005	Any	Any	2012	2005	Any	Any	Any
SQL Server minimum edition required	Apps vary	Any	Enterprise	Standard	Any	Any	Enterprise	Enterprise	Any	Any	Any
May require application changes	Yes	No	No	No	No	No	No	No	No	No	No
Req storage for multiple copies of DBs	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Requires shared storage (SAN)	No	Yes	No	No	Yes	Yes	No	No	No	Yes	Yes
Requires virtualization	No	No	No	No	No	Yes	No	No	No	No	Yes
Can use local solid state storage	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	No	No
Performance											
Has noticeable performance impact	Maybe	No	Yes	Yes	Maybe	Maybe	Minimal	Minimal	No	Maybe	Maybe
Can offload backups, DBCCs, reports	Yes	No	Yes	No	No	No	Yes	No	Some	No	No