

SQL Server Disaster Recovery

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Motivation

SQL Server is a critical service, core of the Microsoft infrastructure and many LOB applications. Proper disaster recovery procedures are essential, especially in case where you face a real disaster and need to recovery the system as fast as possible.

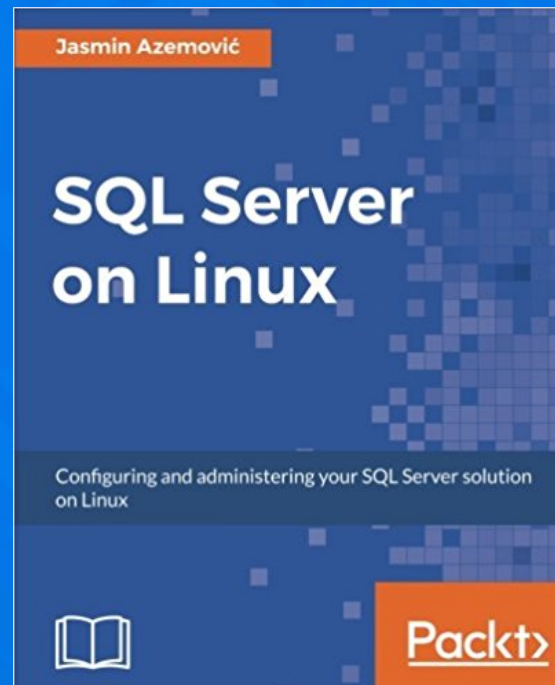
About Me

Lead Database Administrator, SQL Team at&tCzech Republic

Microsoft MVP Data Platform

Certified Ethical Hacker

Microsoft Certified Trainer: Regional Lead

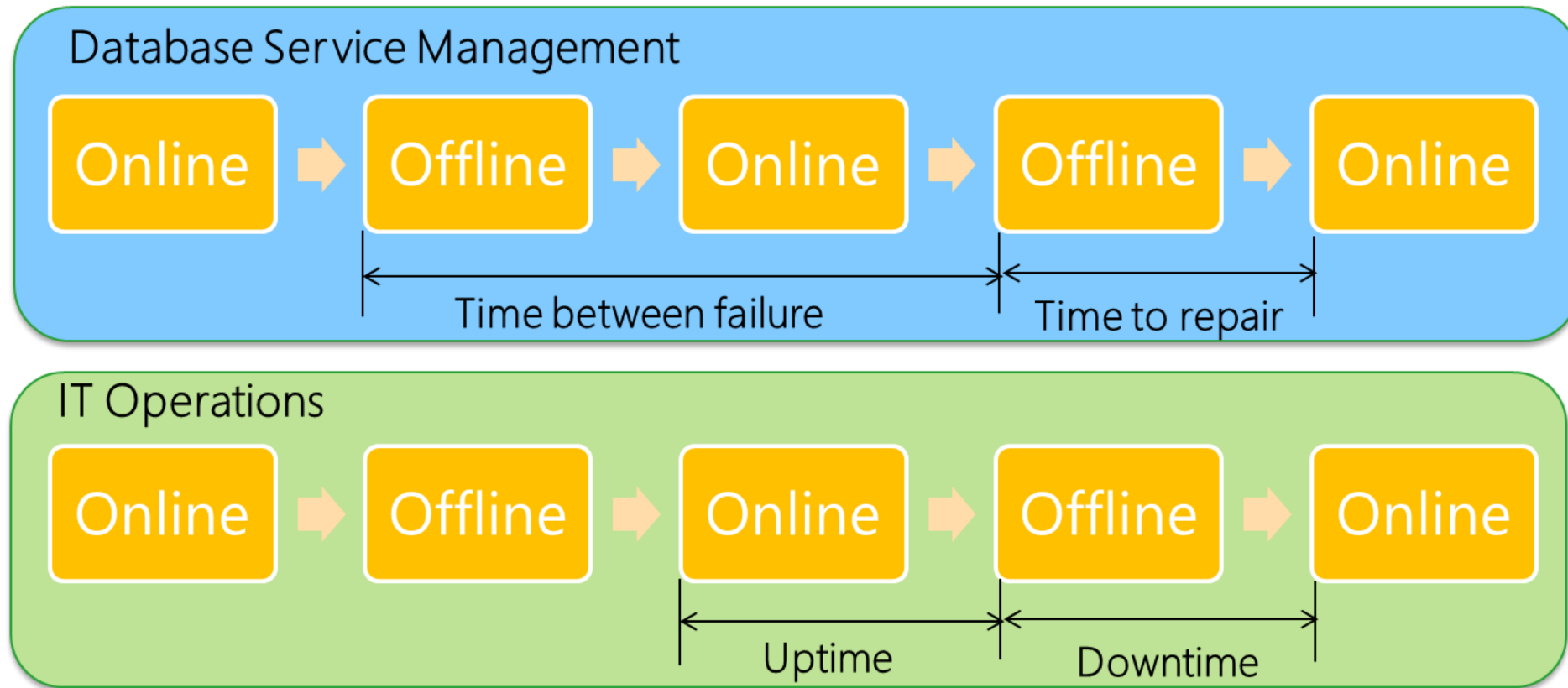


Session Agenda



- Disaster Recovery
- High Availability vs. Disaster Recovery
- SQL Server 2017 features for High Availability & DR

High Availability



$$Availability = \frac{MTBF}{MTBF + MTTR}$$

$$downtime \text{ per year (in days)} = (1 - uptime \text{ ratio}) * 365$$

$$uptime \text{ ratio} = \frac{Availability}{100}$$

High Availability



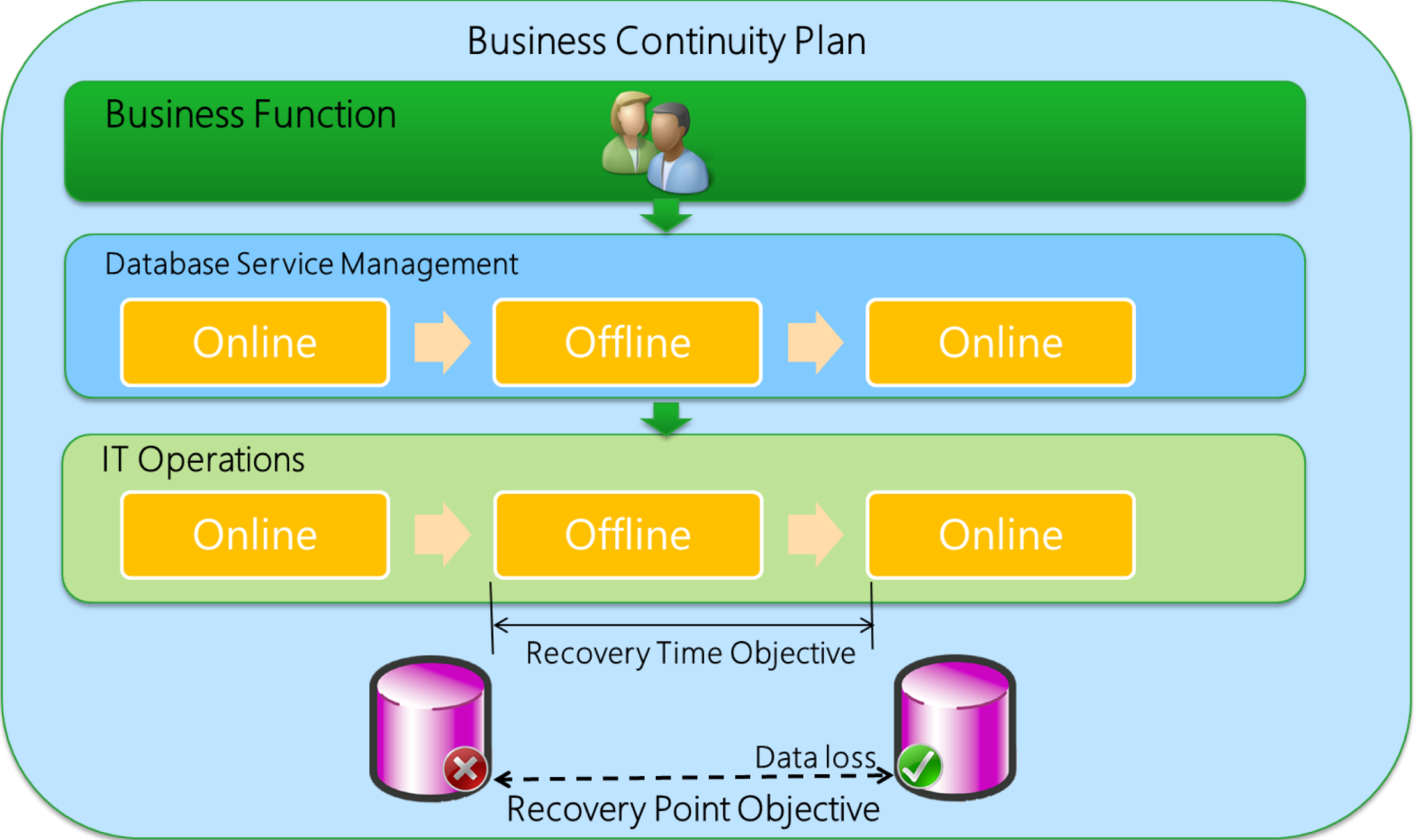
- Operations Log (12 hours)
 - Recovered from previous failure at 00:00:00 Hours
 - Malfunctioned again at 10:00:00 Hours
 - Repaired and operational at 10:06:00 Hours
- Availability (Service)
 - Mean Time Between Failures (MTBF) = 10 Hours
 - Mean Time To Repair (MTTF) = 0.1 Hour
 - Availability = $10 / (10 + 0.1) = 99\%$
- Downtime (Systems)
 - Uptime ratio = $99 / 100 = 0.99$
 - Downtime per year (in days) = $(1 - 0.99) * 365 = 3.65$ Days

Availability	Downtime per year
99%	3.65 Days
99.9%	8.76 Hours
99.99%	52.56 Minutes
99.999%	5.26 Minutes
99.9999%	31.5 Seconds
99.99999%	3.15 Seconds

What is causing downtime



- **Planned**
 - Software releases
 - OS Patch releases
 - SQL Server service packs and hotfixes
 - Database maintenance and upgrades
- **Unplanned**
 - Hardware component failure
 - Security breaches
 - Human error
 - Natural disasters



Mission-critical availability

Reliable

- Detects failures reliably
- Handles multiple failures at a time
- Provides a unified, simplified solution
- Streamlines deployment, management, and monitoring

Integrated

Flexible

- Reuses existing investments
- Offers SAN/DAS environments

Efficient

- Allows use of HA hardware resources
- Supports fast, transparent failover

High availability and disaster recovery

Simple HADR

VM failure

- Resilience against guest and OS-level failures
- Planned & unplanned events
- Minimum downtime for patching and upgrades
- RTO in minutes

Backup/Restore

- Protection against accidental or malicious data corruption
- DR protection
- RTO in minutes to hours

Standard HADR

Failover cluster

- Instance-level protection
- Automatic failure detection and failover
- RTO in seconds to minutes
- Resilience against OS and SQL Server failures

Basic Availability Groups

- Availability groups with two replicas
- Replaces database mirroring

Log shipping

- Warm standbys for DR

Mission-critical HADR

Availability Groups

- Database-level protection
- RTO in seconds
- No data loss
- Recover from unplanned outage
- No downtime for planned maintenance
- Offload read/backup workload to active secondaries
- Failover to geographically distributed secondary site

DEMO

Follow up



- Kurzy v GOPASu
- MOC20465 - Návrh databázového řešení Microsoft SQL Server 2014/2016
- MOC20462 - Administrace databázového serveru Microsoft SQL Server 2012/2014