

# SQL 2016 AlwaysOn High Availability

COURS 55246

## Introduction

Ce cours officiel de Microsoft de 3 jours est destiné aux administrateurs de bases de données et aux ingénieurs Windows afin de les familiariser avec les concepts de SQL AlwaysOn and High Availability. Le cours utilise SQL 2016 mais explique les différences entre SQL 2012 et SQL 2014.

## Profils des participants

- Les administrateur de base de données expérimentés, les professionnels Windows Server, chefs d'équipe. Il s'agit d'un cours intensif en laboratoire ! Nous avons conçu ce cours en nous basant sur notre expérience d'avoir enseigné des centaines de cours à des milliers d'étudiants. Nous nous sommes efforcés de faire en sorte que les laboratoires, qui sont au nombre de 30, soient très orientés vers un seul concept, tel que l'ajout d'une réplique ou le transfert des logins. En effet, il est courant dans les cours techniques d'écrire de longs laboratoires avec de multiples exercices, ce qui, à notre avis, n'est pas efficace car ils se transforment en " flux de clics ". Nous partons du principe que l'étudiant est novice en matière de technologie et que l'instructeur est compétent dans ce domaine.

## Objectifs

- Comprendre AlwaysOn High Availability
- Utiliser Server 2016 Failover Clustering
- Déployer SQL Failover Clusters
- Travailler avec Availability Groups
- Effectuer la maintenance
- Surveiller et dépanner Availability Groups

## Connaissances préalables

- Expérience en tant que administrateur de base de données SQL
- Expérience en tant qu'IT PRO Windows

## Contenu du cours

### Module 1: Introduction

- Course introduction

### Module 2: Alwayson and high availability concepts and terminology

- Concepts and Terminology
- Table of Availability
- High Availability
- Causes of Downtime
- Planned downtime
- Unplanned downtime
- Disaster Recovery
- Recovery Time Objective (RTO)
- Recovery Point Objective (RPO)

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- Recovery Level Objective (RLO)
- Storage Area Networks (SAN)
- Edition Changes from SQL 2012
- SQL Server 2014 Changes
- SQL Server 2016 Changes
- Legacy Solutions prior to Always On
- Failover Cluster Instances
- Log Shipping
- A Typical Log Shipping Configuration
- Monitor Server
- Replication
- Database Mirroring
- Database Mirroring Terminology
- Principle
- Mirror
- Witness (red box in image above)
- Database Snapshots
- Limitations of legacy solutions:
- What do we mean by Always On?
- Table of Always On Comparison

#### Module 3: Windows server 2016 failover clustering

- Understanding Failover Clustering in Server 2016
- Statefull High Availability Solution
- Supported in both Standard and Datacenter
- Servers should run similar hardware
- Should run same edition
- Hyper-V best with datacenter
- Certified for Windows server logo
- Shared Storage
- Quorums
- Node Majority
- Node and Disk Majority configuration:
- Node and File Share Majority
- No Majority
- Configuration
- Cluster Networks Best Practices
- Connection to nodes to shared storage
- Private network for internal cluster
- Public network for client connections
- Cluster Aware Updating
- Virtual Machine Failover Clustering
- Preferred Owners
- Failover Failback
- Resources
- Dependences
- Heartbeat

#### Module 4: SQL 2016 failover cluster instances

- Failover Cluster Instance
- As A FCI Appears To A Client

#### Module 5: SQL 2016 alwayson availability groups

#### Module 5: SQL 2010 alwayson availability groups

- Availability Groups and Replicas
- Primary Replica
- Secondary Replicas
- Availability Group Listener
- Availability Mode
- Synchronous Commit Mode
- Asynchronous Commit Mode
- Failover Modes
- Automatic Failover Without Data Loss
- Automatic Failover Requirements:
  - Manual
  - Manual Failover Requirements
- Common Topologies

#### Module 6: The Dashboard

- The Dashboard
- How to view logs
- Using replication with Logins
- Using partially contained databases

#### Module 7: Active Secondary Availability Group Actions

- Reporting with Secondary Replicas
- Configuring a Readable secondary
- Read-Only Routing
- Load Balancing
- Lab : Configure a Read-Only Secondary
- Database Backups with Secondary
- Steps of Backup Using secondary
- Backup Preference Options

#### Module 8: Maintenance

- DBCC Checks
- Database Adding and Removing

#### Module 9: Monitoring and troubleshooting availability groups

- The Dashboard in Depth
- Events
- Policy Based Management for Availability Groups

## Documentation

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## Lab / Exercices

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Lab 1:

- No Labs

Lab 2:

- No Labs

## Lab 3:

- Set up iSCSI Server
- Install the iSCSI VMS
- Add Servers to Server Manager for Ease of Management
- Add the Windows Cluster Feature to SQL1, SQL2 And SQL3
- Create the iSCSI Initiators to add the shared storage
- Create the Windows Cluster
- Add a Clustered Service
- Test The Failover Of The Windows Service
- Delete Role
- Examine the Quorum Settings

## Lab 4:

- Create A Configuration File By Running The Advanced Cluster Preparation Wizard
- Complete The SQL Cluster Installation On SQL1
- Install The Cluster On SQL2 And SQL3
- Test the SQL Cluster

## Lab 5:

- Create a SQL Instance For The Availability Group
- Enable the SQL Server AlwaysOn Availability Group Feature
- Set Up For Availability Groups
- The Availability Group Wizard
- SSMS and Availability Groups

## Lab 6:

- The Dashboard
- Replicating Logins and Jobs
- Contained or Partially Contained Databases

## Lab 7:

- Database Backup Using Secondary Replica
- Configure a Read-Only secondary

## Lab 8:

- Add a Database
- Remove a Database
- Add a Replica
- Remove a Replica

## Lab 9:

- Dashboard Wizards
- Create an Extended Event Session
- Using T-SQL
- Policy based management for Availability Groups
- Observe a Policy In Action
- Create Three Conditions To Be Used In The RTO And RPO Policies
- Create Two Policies RTO and RPO



- Create Two Policies NPO and NPO
- Test The Policies
- Change Endpoint Owner