

KOENIG SOLUTIONS • COURSE OUTLINE

55246-A: SQL 2016 AlwaysOn High Availability

Learn to configure and manage SQL Server 2016 AlwaysOn High Availability, from failover clustering to availability group monitoring.

9

MODULES

115

TOPICS

38

HANDS-ON LABS

COURSE OVERVIEW

This course covers the concepts and terminology behind AlwaysOn High Availability, including causes of downtime, recovery objectives and legacy solutions such as log shipping, replication and database mirroring. It then examines Windows Server 2016 failover clustering, quorum configurations and cluster networking, before moving into SQL Server 2016 failover cluster instances and installation. Availability groups are addressed in depth, covering replicas, availability modes, failover modes and common topologies, along with dashboard management, active secondary replica actions such as backups and read-only routing, database maintenance, and monitoring and troubleshooting availability groups using policies and extended events.

WHO THIS COURSE IS FOR

Database Administrators

System Administrators

Infrastructure Engineers

SQL Server Administrators

LEARNING OBJECTIVES

- Explain AlwaysOn concepts, terminology and recovery objectives
- Compare legacy high-availability solutions with AlwaysOn
- Configure Windows Server 2016 failover clustering and quorums
- Install and test SQL Server 2016 failover cluster instances
- Configure availability groups, replicas and failover modes
- Manage availability groups using the Dashboard
- Configure readable secondary replicas and backups
- Monitor and troubleshoot availability groups using policies

9 Modules, 115 Topics

01

Introduction

This module explains the course and objectives.

LESSONS

Course introduction

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

Course introduction

02

AlwaysOn and High Availability Concepts and Terminology

This module will introduce the participants to the concepts and terminology used in the course.

LESSONS

- 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)
- 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

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Terminology
- SQL 2014 Changes
- SQL2016 Changes
- Understand the role of the SANS

Windows Server 2016 Failover Clustering

Failover clustering is covered in this module and is a critical feature of AlwaysOn High Availability.

LESSONS

- 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

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- ISCSI Setup
- Work with Roles
- Understand Quorums
- Understand Windows Failover
- Understand Cluster Service
- Understand Preferred Owners
- Understand Node Majority

SQL 2016 Failover Cluster Instances

In this module we move from the generic failover clustering to the specifics involving SQL.

LESSONS

Failover Cluster Instance · As A FCI Appears to A Client

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

Cluster Testing · Understand Configuration Files · Install Clusters

SQL 2016 Always On Availability Groups

Within the failover clusters of SQL are the concept of Availability groups and their enhancements with the release of SQL 2016 which is the focus of this module.

LESSONS

- 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

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Enable AlwaysOn
- Understand and work with availability Groups

The Dashboard

Managing AlwaysOn High Availability groups with SQL 2016 is accomplished with the Dashboard. This module will demonstrate the skills necessary for the accomplishment of the management tasks.

LESSONS

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

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

Understand the Dashboard · Perform Logon and Job replication

Active Secondary Availability Group Actions

Within Availability groups you may have Active secondary SQL which is covered and demonstrated in this module.

LESSONS

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

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

Perform backups with Secondary Replicas · Configure a Read-Only Replica

Maintenance

In this module you explore maintenance procedures for AlwaysOn High Availability Groups.

LESSONS

DBCC Checks · Database Adding and Removing

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

Add and Remove Databases · Add and Remove Replicas

Monitoring and Troubleshooting Availability Groups

In this the final module you will learn how to monitor the clusters and Availability groups and various common troubleshooting procedures.

LESSONS

- The Dashboard in Depth
- Events
- Policy Based Management for Availability Groups
- Migrating Settings by using Windows Easy Transfer
- Configuring a Reference Image of Windows 7
- Configuring a Reference Image

AFTER COMPLETING THIS MODULE, STUDENTS WILL BE ABLE TO

- Change Owners
- Work with Policies
- Work with Extended Events

Practise What You Learn

#	MODULE	ACTIVITY
03	Windows Server 2016 Failover Clustering	■ 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
04	SQL 2016 Failover Cluster Instances	■ 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
05	SQL 2016 Always On Availability Groups	■ 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
06	The Dashboard	■ The Dashboard ■ Replicating Logins and Jobs ■ Contained or Partially Contained Databases
07	Active Secondary Availability Group Actions	■ Configure a Read-Only Secondary ■ Database Backup Using Secondary Replica ■ Configure a Read-Only secondary
08	Maintenance	■ Add a Database ■ Remove a Database ■ Add a Replica ■ Remove a Replica

#	MODULE	ACTIVITY
09	Monitoring and Troubleshooting Availability Groups	■ 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 ■ Test The Policies ■ Change Endpoint Owner

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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