



Quest Recovery Manager for Active Directory
Forest Edition 10.4

Security Guide



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Introduction

This security guide provides information about the Quest Recovery Manager for Active Directory Forest Edition 10.4 release.

Managing information system security is a priority for every organization. In fact, the level of security provided by software vendors has become a differentiating factor for IT purchase decisions. Quest strives to meet standards designed to provide its customers with their desired level of security as it relates to privacy, confidentiality, integrity, and availability. This document describes the security features of Quest Recovery Manager for Active Directory Forest Edition. It reviews access control, protection of customer data, secure network communication, cryptographic standards and more.

About Quest Recovery Manager for Active Directory Forest Edition 10.4

Recovery Manager for Active Directory enables fast, online recovery. Comparison reports highlight what objects and attributes have been changed and deleted in Active Directory enabling efficient, focused recovery at the object or attribute level. Accurate backups and a quicker recovery enable you to reduce the time and costs associated with AD outages and reduce the impact on users throughout your organization.

Recovery Manager for Active Directory is based on patented technology.

It is crucial for any modern business to maintain the availability of its network-computer environment at all times. Unplanned downtime caused by a disastrous event, such as a directory service malfunction, can severely disrupt the operation of a business. Therefore, business-critical infrastructures demand the ability to recover failed systems and services in the shortest possible time.

Recovery Manager for Active Directory Forest Edition (RMAD/FE) employs advanced technologies to minimize the downtime caused by the corruption or improper modification of Active Directory®, Active Directory Lightweight Directory Services (AD LDS) (ADAM), and Group Policy data. This product allows for automatic backup, and fast remotely managed recovery of data stored in Active Directory.

Recovery Manager for Active Directory Forest Edition (RMAD/FE) dramatically reduces the time required to restore Active Directory®, AD LDS (ADAM), and Group Policy data. This improves the availability of corporate networks and reduces network downtime. Given that the time required to recover Active Directory® using a conventional full-backup tool is typically a few hours, Recovery Manager for Active Directory offers huge savings on time, productivity, and administrative overhead.

Recovery Manager for Active Directory Forest Edition (RMAD/FE) is designed to recover the entire Active Directory® forest or specific domains in the forest. The use of Recovery Manager for Active Directory helps you to minimize the downtime caused by the corruption or improper modification of Active Directory® forest and data.

Later in this document, we will use Recovery Manager for Active Directory (or RMAD for short) to refer to Recovery Manager for Active Directory Disaster Recovery Edition, except in cases where we need to explicitly distinguish between the editions.

Architecture Overview

Recovery Manager for Active Directory uses a client-server model with backup and restore agents installed on domain controllers and the Recovery Manager consoles installed on a Windows server. This model is used to orchestrate both backup and recovery operations.

The main product components include:

- Backup agent
- Forest Recovery agent
- Recovery Manager Console (MMC)
- Forest Recovery Console
- PowerShell API

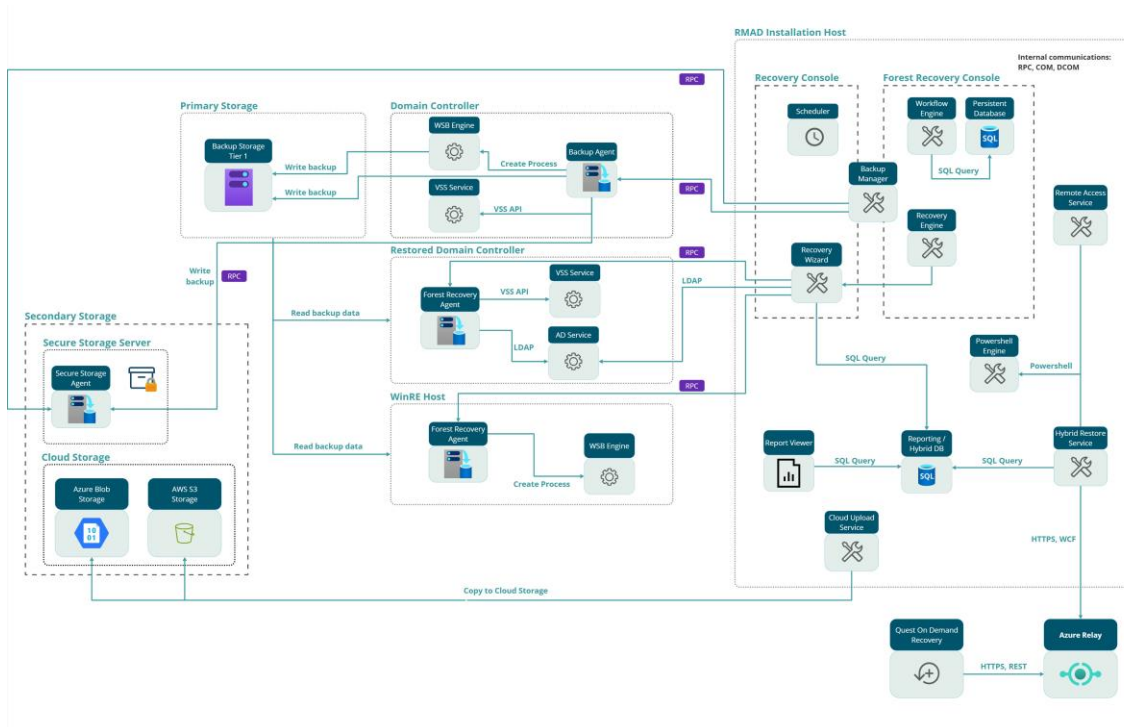


Figure 1: High-Level Architecture

NOTE Some components in figure, may not apply to your edition of Recovery Manager for Active Directory. Refer to User Guide for your edition.

Overview of Data Handled by RMAD

Recovery Manager for Active Directory manages and protects critical data in an Active Directory (AD) environment, focusing on ensuring the availability and integrity of AD components in case of disasters or failures. The types of data handled by Recovery Manager include:

- Active Directory backups, which contain the DIT database, SYSVOL, and registry hives
- AD LDS (ADAM) backups

Location of Customer Data

All data, application logs and computations are performed on server(s) provided by the customer.

Backups created with Recovery Manager for Active Directory can be stored in multiple locations. Primary storage of backups allows backup files to be saved on a distributed network or on selected computers with physically restricted access. Recovery Manager considers these locations as primary storage, referred to as Tier 1 storage.

Primary Storage (Tier 1)

Recovery Manager for Active Directory provides options for primary storage in both local and remote locations. Local storage refers to storage on the Recovery Manager console computer, while remote storage refers to storage on the backed-up domain controller or other remote servers on network shares. These locations are considered remote because they are not on the Recovery Manager console computer.

For both local and remote storage locations, a primary backup path can be provided, along with an alternate backup path.

Primary storage is used for saving the original backup files to a safe location. For primary storage, the backup agent creates the backup file, compresses the data, and then saves the file to the configured storage locations. In the diagram below, refer to lines numbered 1 to view the process that is followed to save the backup file to primary storage locations. The RPC protocol is used to save backup files to the console computer. For saving to remote storage locations, the SMB protocol is used.

Primary Storage (Tier 1)

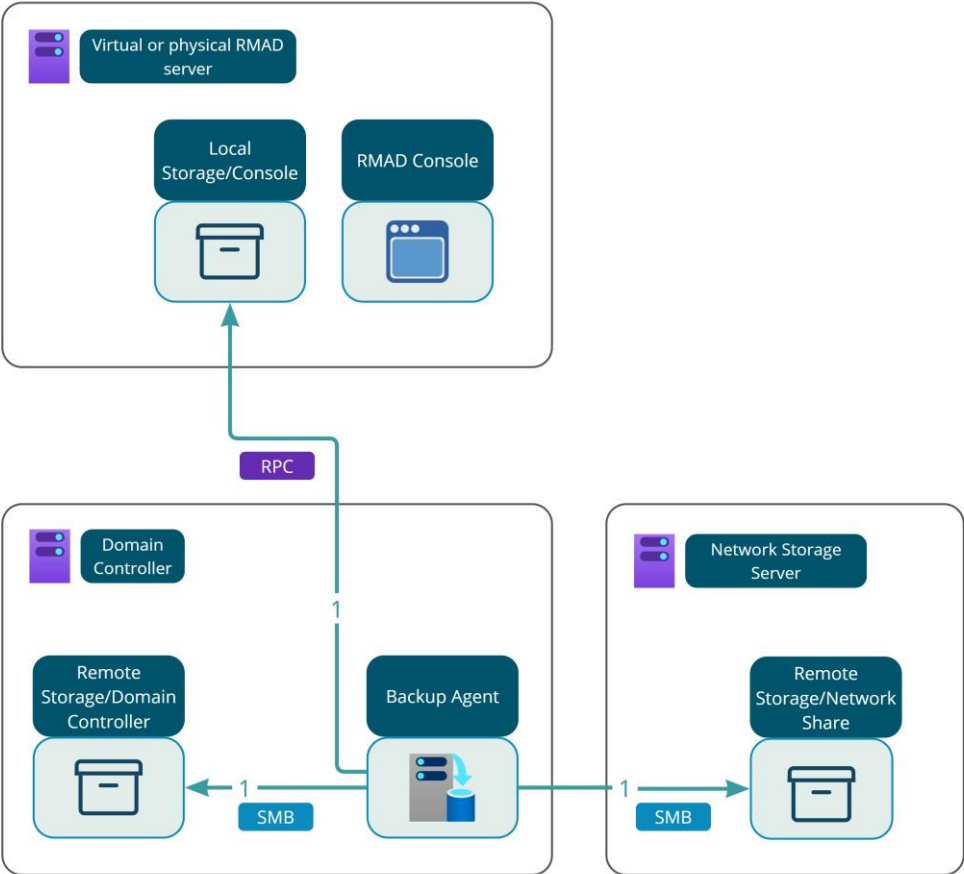


Figure 2: Primary Storage for Backups

The figure above illustrates how Recovery Manager for Active Directory creates and saves backup files to primary storage locations.

NOTE | Some components in figure, may not apply to your edition of Recovery Manager for Active Directory. Refer to User Guide for your edition.

Privacy and Protection of Customer Data

Recovery Manager for Active Directory provides protection for customer sensitive data both in transit and at rest.

Recovery Manager for Active Directory uses encryption algorithms to do the following:

- Encryption of backup files
- Encryption of Forest Recovery project files
- Encryption of data (passwords, scripts) in the Recovery Manager configuration database (rmd.db3)
- Encryption of credentials for AD and AD LDS (ADAM) instances
- Encryption of password in email settings
- Encryption of password for fault tolerance database
- Encryption of passwords for configuration backups

Also, Recovery Manager uses signing algorithms for communication with the following components:

- Hybrid Connect Service – data signing is done in communications via WCF transport security.
- Agents – data signing is done in communications via RPC transport security, including RPC over Schannel mode.

Network Communications

The architectural diagram of the product with all the components is shown in Figure 1. Figures 5, 6 and 7 provide information about the communication ports required to work with Recovery Manager for Active Directory. This section provides information about the communication ports required to work with Recovery Manager for Active Directory.

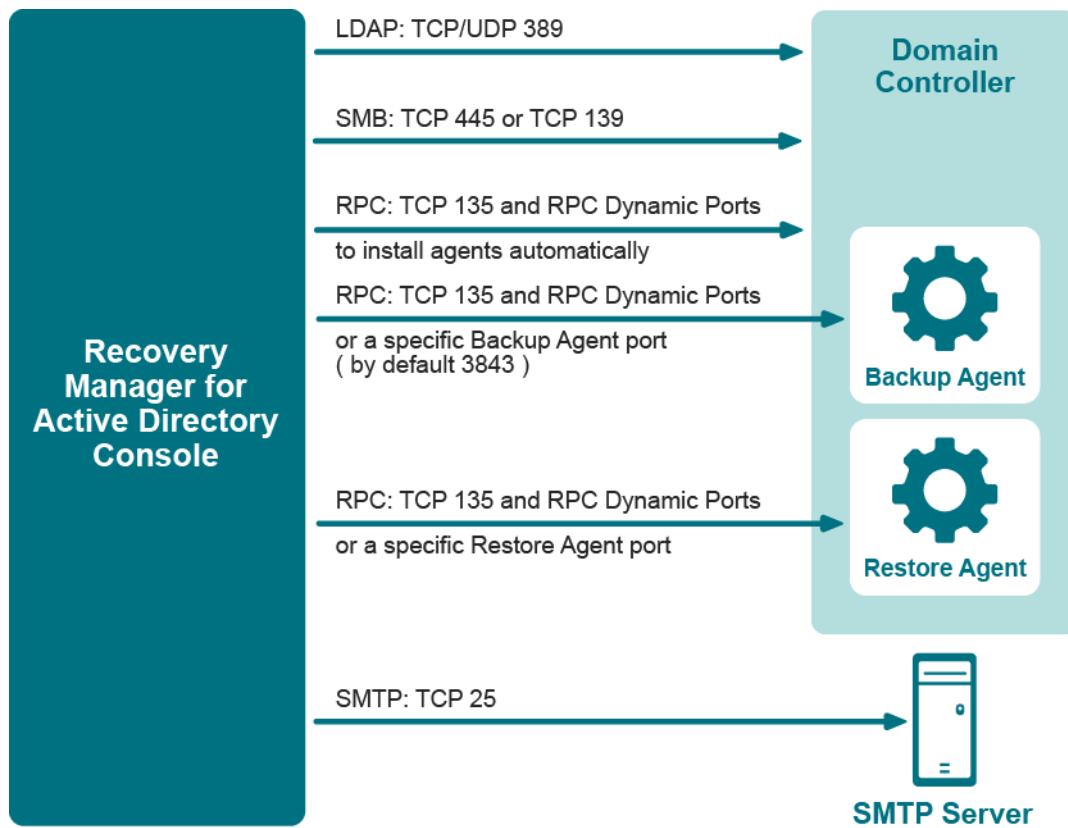


Figure 5: Ports used by Recovery Manager for Active Directory Console to work with Active Directory

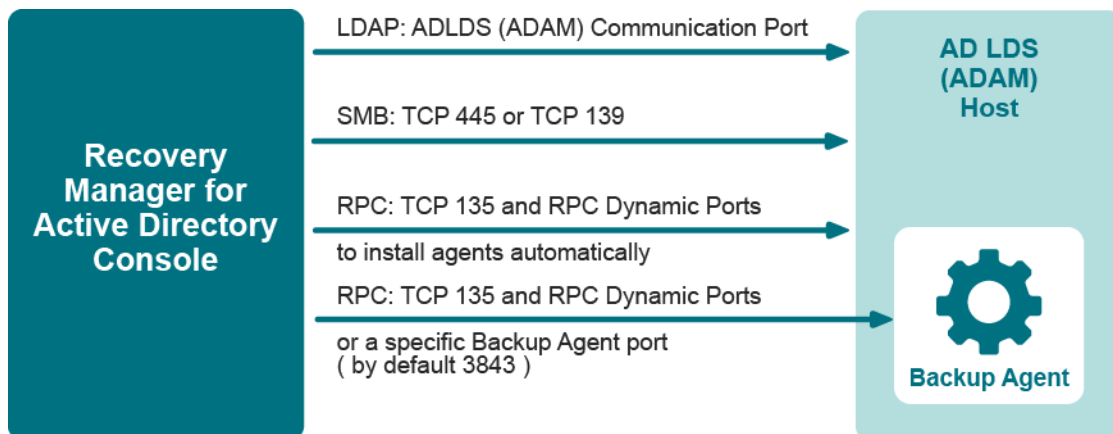


Figure 6: Ports used by Recovery Manager for Active Directory Console to work with AD LDS (ADAM)

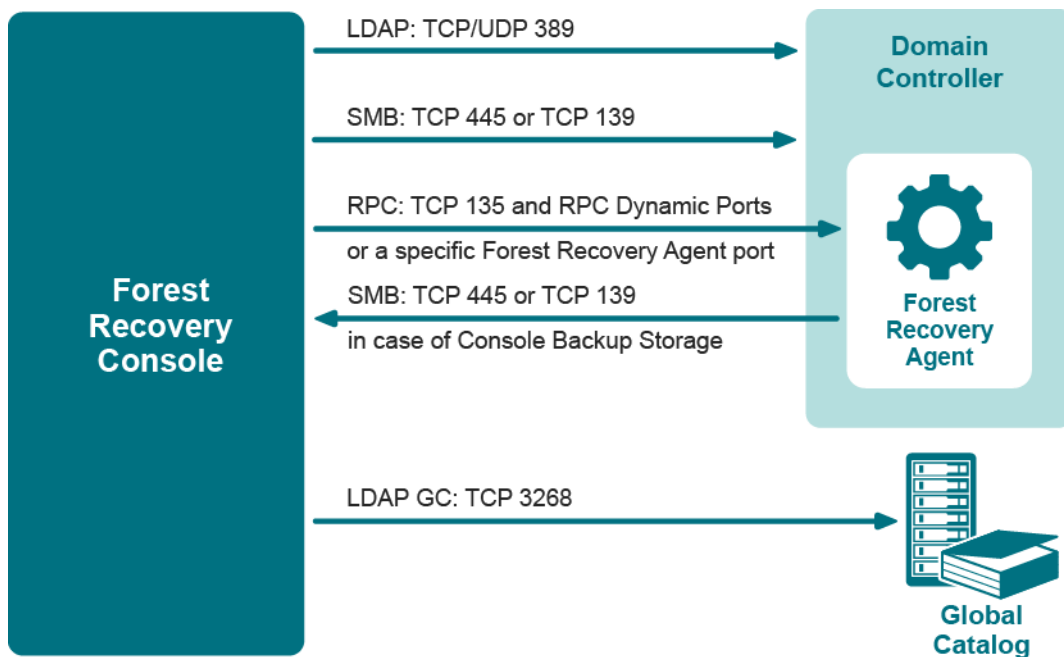


Figure 7: Ports used by Forest Recovery Console

Authentication and encryption of network communications

Recovery Manager for Active Directory (RMAD) has two types of communications.

1. Between the RMAD server and agents

There are several agents (RPC server) and two consoles; RMAD and Forest Recovery Console (RPC clients). All agents are native Windows® applications. All agents share the same basic communication code and host a RPC server to which the console can connect. The Forest Recovery and Secure storage agents use **Schannel** authentication by default. The rest of agents negotiate authentication which will be either **Kerberos** or **NTLM** depending on the Windows® authentication configuration and credential provided. Encryption is defined by Windows® RPC runtime and depends on the authentication protocol. RMAD requests the highest encryption level possible, **RPC_C_AUTHN_LEVEL_PKT_PRIVACY**. For **Schannel** authentication, encryption is provided by the **TLS 1.2** protocol.

2. Between two RMAD servers

RMAD servers can communicate to each other and use the **.NET WCF** framework. Authentication is provided by Windows® via **Kerberos** or **NTLM**. Encryption is provided by the WCF TCP Transport Security, with the **EncryptAndSign** protection level.

Authentication of Users and Services

Recovery Manager for Active Directory relies upon Windows Authentication and Active Directory group membership to authenticate users.

In scenarios where Windows Authentication may be unavailable due to Active Directory failures, Recovery Manager uses certificate-based SCHANNEL authentication to establish a secure connection between the Forest Recovery Console and the Forest Recovery Agent, as well as between the Backup Agent and the Secure Storage Agent.

Role Based Access Control

Currently, Recovery Manager for Active Directory does not allow granular permission delegation for product settings and operations. Any locally logged-on accounts with local administrative rights will be able to gain control over the entire Recovery Manager functionality.

This requires ensuring that the security level for access to the machine with the Recovery Manager console is no lower than the security level for access to other parts of the Active Directory infrastructure.

FIPS 140-2 compliance

Backup encryption

RMAD allows backups to be encrypted and protected with a password, to prevent unauthorized access.

For Active Directory backup encryption, the product uses FIPS 140-2 validated AES-256 algorithms.

Table 1: Encryption of Backup Files

| Cryptographic usage | Cryptographic algorithm | Cryptographic parameters | Third-Party libraries | FIPS 140-2 Certificates Windows Server 2016 |
|-----------------------------------|-------------------------|--|--|--|
| Symmetric encryption of bulk data | AES256 | Key Encryption Key: CryptDeriveKey - CALG_AES_256 AES256 Mode: CRYPT_MODE_CBC Salt: CryptGenRandom - 16 | CryptoAPI (crypt32.lib) WMI: Win32_EncryptableVolume class | AES: #4064, #5295 and #C2046 |

| Cryptographic usage | Cryptographic algorithm | Cryptographic parameters | Third-Party libraries | FIPS 140-2 Certificates Windows Server 2016 |
|------------------------------------|-------------------------|---|---|---|
| Asymmetric encryption of bulk data | RSA | RSA Key Pair: CryptAcquireContext - PROV_RSA_AES CryptGenKey - CALG_RSA_KEYX | CryptoAPI (crypt32.lib) | RSA: #2192, #2193, #2195, #2833, #2834, #2847, #C2046 and #C2065 |
| Key Derivation | PKDF2 | Key Size = SHA512 ::BCryptOpenAlgorithm Provider - BCRYPT_SHA512_ALGORITHM, BCRYPT_ALG_HANDLE_HMAC_FLAG BCryptDeriveKeyPBKDF2 – iterations used meet 600,000 minimum requirement | Cryptography Next Generation API (bcrypt.lib) | PBKDF: Vendor affirmed |

Table 2: Encryption of Forest Recovery Project Files

| Cryptographic usage | Cryptographic algorithm | Cryptographic parameters | Third-Party libraries | FIPS 140-2 Certificates Windows Server 2016 |
|-----------------------------------|-------------------------|---|---|---|
| Symmetric encryption of bulk data | AES256 | Key Encryption Key: CryptDeriveKey - CALG_AES_256 AES256 Mode: CRYPT_MODE_CBC Salt: CryptGenRandom - 32 | System.Security.Cryptography.Algorithms.dll System.Security.Cryptography.Csp.dll System.Security.Cryptography.Primitives.dll mscorlib.dll netstandard.dll | AES: #4064, #5295 and #C2046 |
| Key Derivation | PKDF2 | Key Size = SHA512 PaddingMode.PKCS7 Rfc2898DeriveBytes - iterations used meet 600,000 minimum requirement | System.Security.Cryptography.Algorithms.dll System.Security.Cryptography.Csp.dll System.Security.Cryptography.Primitives.dll mscorlib.dll netstandard.dll | PBKDF: Vendor affirmed |

Table 3: Encryption of Credentials

| Cryptographic usage | Cryptographic algorithm | Cryptographic parameters | Third-Party libraries | FIPS 140-2 Certificates Windows Server 2016 |
|---------------------------------|-------------------------|--|--|---|
| Symmetric encryption of secrets | AES256 | DPAPI using CRYPTPROTECT_LOCAL_MACHINE flag, AES256-CBC algorithm Hash – SHA512 Random password - 16 bytes | CryptoAPI (crypt32.lib) DPAPI (crypt32.lib) | AES: #4064, #5295 and #C2046 |

Table 4: Communication

| Cryptographic usage | Cryptographic algorithm | Cryptographic parameters | Third-Party libraries | FIPS 140-2 Certificates Windows Server 2016 |
|---------------------|--|--|---|--|
| Communication | WCF TCP Transport Security_RPC over Schannel | System.Net.Security. ProtectionLevel. EncryptAndSign; RPC_C_AUTHN_LEVEL_PKT_PRIVACY | bcrypt.dll or bcryptprimitives.dll | #2937 |
| Communication | SSL TLS 1.2 | Negotiated by GSS (RPC over Schannel) | Microsoft.Bcryptprimitives.dll or Bcrypt.dll | #2937 |

NOTE By default, the Forest Recovery Agent and Secure Storage Agent use Schannel authentication. If Schannel authentication is unavailable (for example, if certificates are missing), communication will switch to Negotiate authentication. All other agents use Negotiate authentication, so it will be either Kerberos or NTLM, depending on the Windows authentication configuration and the credentials provided.

Recovery Manager for Active Directory has undergone a Quest internal Self-Affirmation process to confirm that all cryptographic usage relies exclusively on Third-Party FIPS 140-2 validated modules.

More information:

- Microsoft and FIPS: <https://www.microsoft.com/en-us/trustcenter/compliance/fips>
- Microsoft FIPS backgrounder: <https://aka.ms/fips-backgrounder>

SDLC and SDL

The Recovery Manager for Active Directory team follows a strict Quality Assurance cycle.

- Access to source control and build systems is protected by domain security, meaning that only employees on Quest's corporate network have access to these systems. Therefore, should a developer leave the company, this individual will no longer be able to access source control and build systems.
- All code is versioned in source control.
- All product code is reviewed by another developer before check in.

In addition, the Recovery Manager for Active Directory team follows a managed Security Development Lifecycle (SDL) which includes:

- MS-SDL best practices.
- Threat modeling.
- OWASP guidelines.
- Regularly scheduled static code analysis is performed on regular basis.
- Regularly scheduled vulnerability scanning is performed on regular basis.
- Recovery Manager for Active Directory has been validated in a Secure Technical Implementation Guidelines (STIG) environment. See [Security Technical Implementation Guides \(STIGs\)](#) for more information.

Recovery Manager for Active Directory developers go through the same set of hiring processes and background checks as other Quest employees.

Customer Measures

Recovery Manager for Active Directory security features are only one part of a secure environment. Customers should follow their own security best practices when deploying Recovery Manager for Active Directory within their environment.

Globalization

This section contains information about installing and operating this product in non-English configurations, such as those needed by customers outside of North America. This section does not replace the materials about supported platforms and configurations found elsewhere in the product documentation.

This release is Unicode-enabled and supports any character set. In this release, all product components should be configured to use the same or compatible character encodings and should be installed to use the same locale and regional options. This release is targeted to support operations in the following regions: North America, Western Europe and Latin America, Central and Eastern Europe, Far-East Asia, Japan.

Third-Party Contributions

This product contains the third-party components listed below. For third-party license information, go to <https://www.quest.com/legal/third-party-licenses.aspx>. Source code for components marked with an asterisk (*) is available at <http://opensource.quest.com>.

List of third-party contributions

| Component | License or acknowledgment |
|-----------------------------------|---------------------------------------|
| AeroWizard 2.2.3 | MIT 1.0 Copyright (c) 2013 David Hall |
| AWSSDK.Core 4.0.0.11 | Apache 2.0 |
| AWSSDK.S3 4.0.1.7 | Apache 2.0 |
| Awssdk.securitytoken 4.0.0.9 | Apache 2.0 |
| Azure.Core 1.41.0 | MIT Template 2020 |
| Azure.Core.Amqp 1.3.1 | MIT Template 2020 |
| Azure.Identity 1.12.1 | MIT Template 2020 |
| Azure.Messaging.ServiceBus 7.18.1 | MIT Template 2020 |

| Component | License or acknowledgment |
|---|--|
| Azure.ResourceManager 1.12.0 | MIT Template 2020 |
| Azure.ResourceManager.Authorization 1.1.3 | MIT Template 2020 |
| Azure.ResourceManager.Compute 1.5.0 | MIT Template 2020 |
| Azure.ResourceManager.Network 1.8.0 | MIT Template 2020 |
| Azure.ResourceManager.Storage 1.3.0 | MIT Template 2020 |
| Azure.Storage.Blobs 12.21.0 | MIT Template 2020 |
| Azure.Storage.Common 12.20.0 | MIT Template 2020 |
| EntityFramework 6.4.4 | Apache 2.0 |
| Fody 4.2.1 | MIT N/A |
| FontAwesome.WPF 4.7.0.9 | MIT N/A |
| Group Controls 1.8 | Apache 2.0 |
| Microsoft .Net Framework 4.8 | Microsoft .Net Framework 4.8 |
| Microsoft.AspNet.Razor 3.3.0 | Microsoft .NET Library 1.0 |
| Microsoft.Azure.Amqp 2.6.9 | MIT Template 2020 |
| Microsoft.Bcl.AsyncInterfaces 9.0.2 | MIT Template 2020 |
| Microsoft.Dism 2.0.20 | MIT N/A |
| Microsoft.Extensions.DependencyInjection.Abstractions 9.0.2 | MIT Template 2020 |
| Microsoft.Extensions.Logging.Abstractions 9.0.2 | MIT Template 2020 |
| Microsoft.Graph 4.54.0 | MIT N/A |
| Microsoft.Graph.Core 2.0.15 | MIT Template 2020 |
| Microsoft.identity.client 4.65.0 | MIT Template 2020 |
| Microsoft.identitymodel.abstractions 6.35.0 | MIT Template 2020 |
| Microsoft.PowerShell.3.ReferenceAssemblies 1.0.0 | MIT N/A |
| Microsoft.PowerShell.5.ReferenceAssemblies 1.1.0 | MIT N/A |
| Microsoft.Xaml.Behaviors.Wpf 1.1.19 | MIT N/A |
| MinHook 1.3.3 | BSD - MinHook 1.0 Copyright 2009 Tsuda Kageyu All rights reserved. |
| Newtonsoft.Json 13.0.3 | MIT Template 2020 |
| PDFsharp-MigraDoc-wpf 6.2.2 | MIT Template 2020 |

| Component | License or acknowledgment |
|---|---|
| PropertyChanged.Fody 2.6.1 | MIT N/A |
| SharpZipLib 1.4.2.13 | MIT Template 2020 |
| SQLiteCodeFirst 1.7.0.34 | Apache 2.0 |
| SSH.Net 2024.0.0 2024.0.0 | MIT N/A |
| System.Buffers 4.6.0 | MIT N/A |
| System.ClientModel 1.3.0 | MIT Template 2020 |
| System.Data.SQLite 1.0.116.0 | System.Data.SQLite N/A |
| System.data.sqlite.core 1.0.116.0 | Microsoft Public License (Ms-PL) 1.0 - October 12, 2006 |
| System.Data.SQLite.EF6 1.0.116.0 | System.Data.SQLite N/A |
| System.Data.SQLite.Linq 1.0.116.0 | System.Data.SQLite N/A |
| System.Diagnostics.DiagnosticSource 9.0.2 | MIT Template 2020 |
| System.IO.Hashing 6.0.0 | MIT Template 2020 |
| System.IO.Pipelines 9.0.2 | MIT Template 2020 |
| System.Management.Automation 6.2.3 | MIT Template 2020 |
| System.Memory 4.5.5 | MIT 1.0 |
| System.Memory.Data 9.0.2 | MIT 1.0 |
| System.Numerics.Vectors 4.6.0 | MIT 1.0 |
| System.Runtime.CompilerServices.Unsafe 6.1.0 | MIT Template 2020 |
| System.Text.Encodings.Web 9.0.2 | MIT Template 2020 |
| System.Text.Json 9.0.2 | MIT Template 2020 |
| System.Threading.Channels 9.0.2 | MIT Template 2020 |
| System.Threading.Tasks.Extensions 4.6.0 | MIT 1.0 |
| System.ValueTuple 4.5.0 | MIT 1.0 |
| TaskScheduler 2.8.18 | MIT |
| Task Scheduler Managed Wrapper 2.8.18 | MIT N/A |
| TimeSpan2 2.2.0 | New BSD N/A |
| Windows Installer XML Toolset (aka WiX) 6.0.0 | Microsoft Reciprocal License (MS-RL) N/A |

Quest Software creates technology and solutions that build the foundation for enterprise AI. Focused on data management and governance, cybersecurity and platform modernization, Quest helps organizations address their most pressing challenges and make the promise of AI a reality. Around the globe, more than 45,000 companies including over 90% of the Fortune 500 count on Quest Software. For more information, visit www.quest.com or follow Quest Software on X (formerly Twitter) and LinkedIn.

Technical support resources

Technical support is available to Quest customers with a valid maintenance contract and customers who have trial versions. You can access the Quest Support Portal at <https://support.quest.com>.

The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request
- View Knowledge Base articles
- Sign up for product notifications
- Download software and technical documentation
- View how-to-videos
- Engage in community discussions
- Chat with support engineers online
- View services to assist you with your product.