



Enterprise Version 10_g

System Environment
Specifications (SES)



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Purpose of this Document This document provides important information pertaining to the computing, network and communications environments in which the CureMD Enterprise system is intended to operate. This includes operating systems, network components, client devices, and required configurations. Your organization’s environment for CureMD Enterprise must meet or exceed the requirements set forth in this document.

Table of Contents

| | |
|--|------|
| CureMD Enterprise System Design | 1 |
| Network Requirements | 1 |
| Internet Bandwidth Requirements | 2 |
| Recommended Bandwidth Ranges | 3 |
| CureMD Standard Server Requirements (Physical and Virtual) | 4-6 |
| CureMD Enterprise Server Requirements (Clustered) | 7-8 |
| High Availability Features | 9-11 |
| Application Supported Devices | 12 |
| Workstation / Laptop Requirements | 12 |
| Tablets | 12 |
| | |
| | |

CureMD Enterprise System Design

Scalability

CureMD provides an integrated all-in-one electronic health record (EHR), practice management, patient portal, and revenue cycle management services via Software as a Service (SaaS) model to help reduce upfront costs, improve quality and operational efficiency. CureMD's adaptable, affordable and accessible technology simplify decision making, streamline operations and ensure compliance to industry standards and best practices, ultimately saving time and effort to maximize value and returns. CureMD Enterprise is a completely scalable 3-tier application. The system can be configured as a standalone system or can be scaled to an

Enterprise-wide application, handling virtually an unlimited number of sites and workstations. The CureMD Enterprise 3-tier architecture allows multiple client stations access to a CureMD Enterprise application over the web. Each client workstation is connected to the server via the network, so everyone in the entire organization can share this centrally located information. Each server in the data center does not necessarily represent a different piece of hardware. Depending on the number of patient visits per year and modules implemented, it may be possible to consolidate some hardware.

Network Requirements Topologies

CureMD Enterprise incorporates both Wired Ethernet and Wireless Radio Frequency (RF) network topologies to build an enterprise-wide network solution. Stationary computers such as database servers and fulfillment stations utilize Ethernet NIC cards to connect to the network. Mobile devices such as the CureMD Enterprise Pocket PC applications utilize radio frequency or wireless networking to connect to the network. Any site that utilizes wireless networking will have at least one wireless Access Point. Stationary computers can be configured to use the wireless network if network cable lengths are not already available or cannot be installed.

Item Required Configuration

Bandwidth LAN: 100 Mbps or 1000 Mbps WAN/Internet: Communications Protocol TCP/IP Network Topology IEEE Ethernet 802.3, IEEE 802.11 (RF Network)

Internet Bandwidth Requirements A number of factors play a role in the overall performance of the CureMD Enterprise suite of products. In order to ensure optimal performance of the CureMD Enterprise application, all of the various factors need to be configured and optimized to support the way CureMD Enterprise will be used for a given implementation. One leading factor that relates to performance is the network bandwidth available to the application. Every action performed within CureMD Enterprise consumes network bandwidth in one way or another. The CureMD Enterprise suite of products is architected as a three-tier web application. With this architecture, the CureMD Enterprise servers typically reside in a central location called the data center. End users of the CureMD Enterprise application access information stored on the CureMD Enterprise servers. Network traffic is generated with each communication between the CureMD Enterprise client stations and the CureMD Enterprise servers. If the network pipes that carry this network traffic are not sized properly or are over utilized, performance of the CureMD Enterprise application will be reduced.

Recommended Bandwidth Ranges

Number of users per site Client Side Internet Bandwidth Requirement

| | |
|---------|---|
| 1-10 | Bandwidth ranges of 6 megabits per second (Mbps) and greater with latencies no greater than 10 milliseconds (ms) |
| 11-25 | Bandwidth ranges of 8 megabits per second (Mbps) and greater with latencies no greater than 10 milliseconds (ms) |
| 26-50 | Bandwidth ranges of 12 megabits per second (Mbps) and greater with latencies no greater than 15 milliseconds (ms) |
| 50-100 | Bandwidth ranges of 16 megabits per second (Mbps) and greater with latencies no greater than 20 milliseconds (ms) |
| 101-150 | Bandwidth ranges of 20 megabits per second (Mbps) and greater with latencies no greater than 20 milliseconds (ms) |

| | |
|---------|---|
| 151-200 | Bandwidth ranges of 24 megabits per second (Mbps) and greater with latencies no greater than 25 milliseconds (ms) |
| 201-250 | Bandwidth ranges of 32 megabits per second (Mbps) and greater with latencies no greater than 25 milliseconds (ms) |
| 251-300 | Bandwidth ranges of 42 megabits per second (Mbps) and greater with latencies no greater than 30 milliseconds (ms) |
| 301-350 | Bandwidth ranges of 50 megabits per second (Mbps) and greater with latencies no greater than 30 milliseconds (ms) |

CureMD Standard Server Requirements

Application /Database Server – Single Provider

| | Dedicated Physical Machine Hardware/Software Requirements | Dedicated Virtual Machine Hardware/Software Requirements |
|-------------------------|--|---|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above | 8 vCPU 2.8GHz or above |
| Memory | 16GB | 16GB |
| Storage and RAID | 750GB RAID 5 Internal Storage SAS 15K | 250GB RAID 5 or 10 Internal Storage SAS 15K |
| Network | 1000 Mbps | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit | Windows Server 2012R2 Standard Edition 64-Bit |
| Reporting Engine | Crystal Reports 12 | Crystal Reports 12 |
| Database Engine | SQL Server 2012 or 2014 STD | SQL Server 2012 or 2014 STD |

Application /Database Server – 2 to 5 Providers

| | Dedicated Physical Machine Hardware/Software Requirements | Dedicated Virtual Machine Hardware/Software Requirements |
|-------------------------|--|---|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above | 8 vCPU 2.8GHz or above |
| Memory | 32GB | 32GB |
| Storage and RAID | 1TB RAID 5 Internal Storage SAS 15K | 500GB RAID 10 Storage SAS 15K |
| Network | 1000 Mbps | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit | Windows Server 2012R2 Standard Edition 64-Bit |
| Reporting Engine | Crystal Reports 12 | Crystal Reports 12 |
| Database Engine | SQL Server 2012 or 2014 STD | SQL Server 2012 or 2014 STD |

Application Server – 6 to 10 Providers

| | Dedicated Physical Machine Hardware/Software Requirements | Dedicated Virtual Machine Hardware/Software Requirements |
|-------------------------|--|---|
| Processor | 2 x Quad Core CPU 2.8GHz or above | 4 vCPU 2.8GHz or above |
| Memory | 24GB | 24GB |
| Storage and RAID | 1TB RAID 5 Internal Storage SAS 15K | 500GB RAID 10 Storage SAS 15K |
| Network | 1000 Mbps | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit | Windows Server 2012R2 Standard Edition 64-Bit |
| Reporting Engine | Crystal Reports 12 | Crystal Reports 12 |

Database Server – 6 to 10 Providers

| | Dedicated Physical Machine Hardware/Software Requirements | Dedicated Virtual Machine Hardware/Software Requirements |
|-------------------------|--|---|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above | 8 vCPU 2.8GHz or above |
| Memory | 32GB | 32GB |
| Storage and RAID | 1TB RAID 5 Internal Storage SAS 15K | 500GB RAID 10 Storage SAS 15K |
| Network | 1000 Mbps | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit | Windows Server 2012R2 Standard Edition 64-Bit |
| Database Engine | SQL Server 2012 or 2014 STD | SQL Server 2012 or 2014 STD |

Physical Servers Only

Application Server – 11 to 25 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Quad Core CPU 2.8GHz or above |
| Memory | 24GB |
| Storage and RAID | 500GB RAID 5 Internal Storage SAS 15K |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit |
| Reporting Engine | Crystal Reports 12 |

Database Server – 11 to 25 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above |
| Memory | 48GB |
| Storage and RAID | 1.2TB RAID 5 Internal Storage SAS 15K |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit |
| Database Engine | SQL Server 2012 or 2014 STD |

Application Server – 26 to 50 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above |
| Memory | 32GB |
| Storage and RAID | 500GB RAID 5 Internal Storage SAS 15K |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit |
| Reporting Engine | Crystal Reports 12 |

Database Server – 26 to 50 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above |
| Memory | 64GB |
| Storage and RAID | 1.5TB RAID 5 Internal Storage SAS 15K |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit |
| Database Engine | SQL Server 2012 or 2014 STD |

CureMD Enterprise Server Requirements: (Clustered or Standalone)

Application Servers – Up to 100 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Quad Core CPU 2.8GHz or above |
| Memory | 32 GB |
| Storage and RAID | 500 GB RAID 5 Internal Storage SAS 15K |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit |
| Reporting Engine | Crystal Reports 12 |

Database Servers – Up to 100 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above |
| Memory | 96GB |
| Storage and RAID | 500 GB RAID 5 Internal Storage SAS 15K |
| SAN Storage | 1.8 TB RAID 5 or 10 Scalable SAS 15K |
| Cluster | 2 Node |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit |
| Database Engine | SQL Server 2012 or 2014 STD |

SAN Over Fiber Chanel

| | |
|---------------------------|--|
| SAN | 1.8TB Initial SAN RAID 10 Storage with separate LUN for SQL Data and Log Files |
| 2 Node SQL Cluster | Active/Passive SQL Nodes |

Application Servers – 101 to 200 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above |
| Memory | 24GB |
| Storage and RAID | 500 GB RAID 5 Internal Storage SAS 15K |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Standard Edition 64-Bit |
| Reporting Engine | Crystal Reports 12 |

Database Servers – 101 to 200 Providers

| | Dedicated Physical Machine Hardware/Software Requirements |
|-------------------------|--|
| Processor | 2 x Intel Hex Core CPU 2.8GHz or above |
| Memory | 128GB |
| Storage and RAID | 500 GB RAID 5 Internal Storage SAS 15K |
| SAN Storage | 2.5 TB RAID 10 Scalable SAS 15K |
| Cluster | 2 Node |
| Network | 1000 Mbps |
| Operating System | Windows Server 2012R2 Enterprise Edition 64-Bit |
| Database Engine | SQL Server 2012 or 2014 STD |

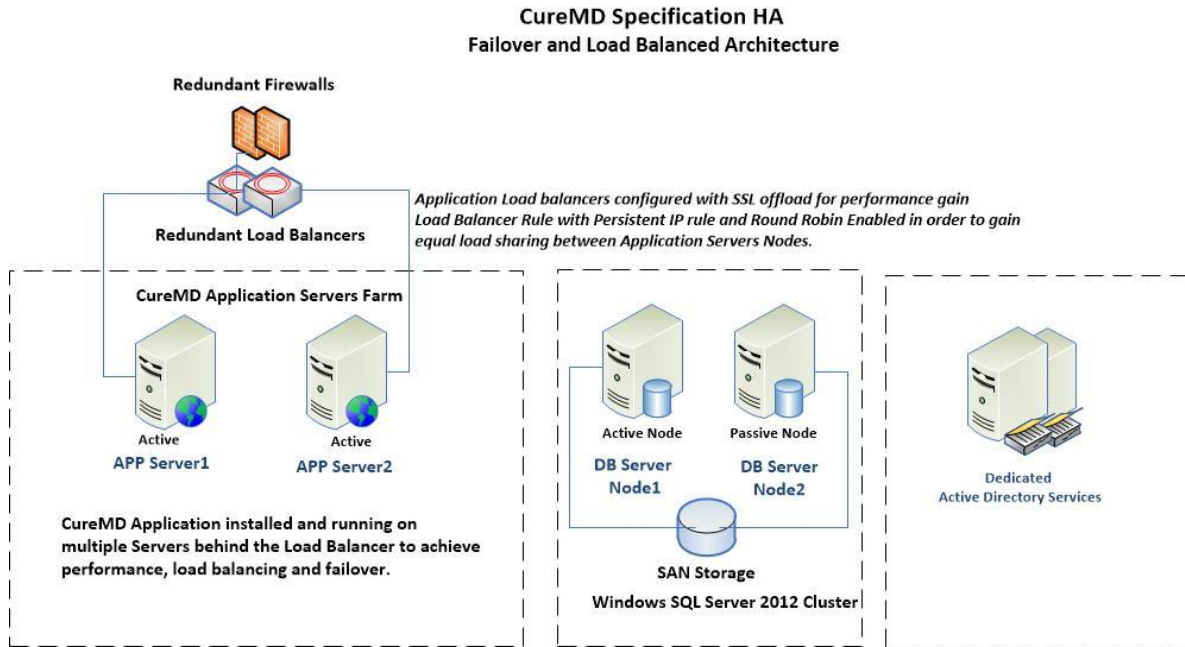
SAN over Fiber Channel

| | |
|---------------------------|---|
| SAN | 2.5 Initial SAN RAID 10 Storage with LUN for SQL Data and Log Files |
| 2 Node SQL Cluster | Active/Passive SQL Nodes |

High Availability

CureMD high availability architecture is comprised of multi-layered technologies distributed at multiple sites using redundant equipment to ensure up to 100 % application availability. Inherited application and data layer support ensures continuous availability of the system.

A proven combination of high availability equipment and fault tolerant infrastructure utilizing redundant servers, network and storage devices are employed to perform in a synchronized manner delivering uninterrupted application availability.



- Multi Node Application Servers with Load Balancers
- Multi Node Database Servers - Clustered
- Dual Fiber Channel Controllers
- Multiple WAN links for internet/network redundancy
- Multiple Routing Layers
- Clustered SAN Devices
- Dual SAN Switch

Combined with industry standards, best practices, and world-class software, CureMD system works seamlessly with proven hardware redundancy platforms comprising of hardware fault tolerance, clustering, replication, and data mirroring technologies to help ensure high availability, stability, and scalability.

CureMD system supports clustering technologies to help ensure maximum availability. To prepare for a site outage, data replication technologies are deployed with clustering technologies to provide an integrated disaster recovery solution—so that both the application and the data can be accessed from a secondary site, without distance limitations and with minimal disruption.

Configuration Highlights

- Fully automated failover
- Soft installation, without the need to reconfigure the servers
- Seamless integration with the environment, including security, bandwidth management, and alarm-reporting mechanisms
- Automated hardware, OS, and application state verification
- Automated transfer of network resources during failover
- Ability to recognize and record databases consistent state points
- Complete rollback of changes in the event of unsuccessful failover
- Ability to delay replay or enable rewind capability on replicas
- Ability to fully integrate with security environment
- Centralized scenario management
- Bandwidth utilization controls

High Availability Architecture

CureMD replicates data from an active server (Node A), to a passive server (Node B). In case of active server failures, passive server can take over processing and assume full identity of node A, without compromising application or service availability. The two servers are located next to each other to provide additional protection against component failures and or software crashes. An exact replica of the HA design at the secondary site offers protection against site failures and plays a vital role in the development and implementation of a mission critical business continuity plan.

Fault Tolerance

CureMD incorporates fault-tolerant systems for continuous operations in the event of failure of one or more components. Roll-forward and roll-back recovery procedures ensure expedited recovery in case of error or failure. Following best practices have been used to ensure fault tolerance:

1. No single point of failure
2. No single point of repair
3. Fault isolation to the failing component
4. Fault containment to prevent propagation of the failure
5. Availability of reversion modes

SQL Server Failover Clustering

Failover clustering provides high-availability support for an entire instance of SQL Server. CureMD Databases are each installed into a cluster group, known as a resource group. At any time, each resource group is owned by only one node in the cluster. The service has a virtual name that is independent of the node names, and is referred to as the failover cluster instance name. CureMD database connect to the failover cluster instance by referencing the failover cluster instance name.

A CureMD system failover cluster instance appears on the network as a single computer, but has functionality that provides failover from one node to another if the current node becomes unavailable. For example, during a non-disk hardware failure, operating system failure, or planned operating system upgrade, an instance of the system on one node can be configured to fail over to any other node in the disk group.

SAN Clustering

CureMD system support clustered SAN environment that creates high availability at the point where server and SAN connects. We use two Fiber Channel host bus adapters (HBAs) connected to each server. HBA's in use support hot standby, load sharing and load balancing capabilities.

Application Load Balancing

CureMD implements load balancing through dedicated or virtual load balancers to provide application front end failover and load balancing.

CureMD implements two switches for each HBA. Each switch has the same set of servers and storage connected to it, thus providing for two or more independent access paths from server to the data.

As with the server each data storage unit has multiple paths of access, as well as the ability to support the same type of features as the server HBA for hot spare, load sharing and load balancing. The data is situated according to the various RAID levels, both for speed of data access and availability.

Application Supported Devices

| Device | Description | Model(s) |
|-------------------------|---------------------------------|---|
| Digital Persona | Finger Print Scanner | U.are.U finger print scanner |
| TWAIN Complaint Scanner | Document/Imaging Scanner | All TWAIN compliant ADF and Duplex Scanners |
| Web Cam | Image | All |
| i-Q Mark | ECG and Spiro meter | All TWAIN compliant ADF and Duplex Scanners |
| Welch Vitals | Welch Allyn vital signs monitor | All |
| e-Pad, Topaz | e-Signature | e-PadII |
| Printers | Standard and Network | All |

Workstation/Laptop Requirements

CureMD Enterprise Client PC can be utilized as a web workstation as well as a CureMD Enterprise Administration station.

| | Workstation / Laptop Hardware/Software Requirements |
|-------------------------|--|
| Processor | 1 x Intel Corei 5, or 7 CPU 2.8GHz or above |
| Memory | 4GB or above |
| Storage | 500 Internal Storage |
| Display | 1280 pixels – 1440 pixels |
| Network | 1000 Mbps |
| Browser | Internet Explorer 10,11,12 |
| Operating System | Windows 8.1 and Windows 10 Standard / Pro (32bit or 64bit) |

Tablet Requirements

Windows Surface Pro 4.