System Performance: Sizing and Tuning

This guide provides information on . . .

. . . Sizing for Best Performance
. . . Tuning NotifyMDM
. . . Configuring a Web Garden in IIS
Sizing for Best Performance

Architecture

The NotifyMDM system is comprised of an SQL Database component and a Web/HTTP component. Both components may be installed on a single server.

The system may also be configured with multiple web servers for a Network Load Balanced setup. With this configuration, you can install the SQL component and first instance of the web component on a single machine and install the second instance of the web component on a second machine. Machines where SQL is not installed will be able to support more devices than recommended below. These web servers can support approximately 2,000 users per 3 GB RAM.

A note about firewalls or host providers: Device traffic is routed through the NotifyMDM server. Because of this, the IP address of any server that sits between the NotifyMDM Server and the ActiveSync Server (or LDAP server) will appear to have an increased amount of traffic. Some firewalls or hosts providers view increased traffic as an attempted attack and may limit or throttle connections. As a result, devices can experience sporadic connections with the ActiveSync, LDAP or NotifyMDM server.

Minimum System Requirements (no history maintained)

<table>
<thead>
<tr>
<th>Maximum Devices</th>
<th>CPU</th>
<th>RAM</th>
<th>Hard Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 Devices</td>
<td>Dual Core 1.60 GHz</td>
<td>4 GB RAM (SQL restricted to 300 MB)</td>
<td>80 GB HD</td>
</tr>
</tbody>
</table>

To maintain no history, NotifyMDM Database Task Scheduler jobs should be modified using the following guidelines:

1. Set all jobs to a maximum record count of 0, excluding jobs for the following tables: DeviceStatistics, iOSDeviceInformation, iOSDeviceNetworkInformation, iOSInstalledApplications, iOSInstalledCertificates, iOSInstalledConfigProf, iOSSecurityInfo, PhoneLog & TextMessageLog.

2. Leave the exceptions listed in #1 at their default maximum record counts.

This environment can be set up on supported MS SQL Express versions with proper database maintenance.
Minimum System Requirements (reduced history maintained)

<table>
<thead>
<tr>
<th>Maximum Devices</th>
<th>CPU</th>
<th>RAM</th>
<th>Hard Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000 Devices</td>
<td>Dual Core 2.13 GHz</td>
<td>6 GB RAM (SQL restricted to 750 MB)</td>
<td>80 GB HD</td>
</tr>
</tbody>
</table>

To maintain reduced history, NotifyMDM Database Task Scheduler jobs should be modified using the following guidelines:

1. Set all jobs that have a default maximum record count of more than 10 million to exactly 10 million.
2. All jobs that have a default maximum record count of 10 million or less are left at the default number.

*This environment can be set up on MS SQL Express versions with proper database maintenance.*
Performance Requirements (standard history maintained)

<table>
<thead>
<tr>
<th>Maximum Devices</th>
<th>CPU</th>
<th>RAM</th>
<th>Hard Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200 Devices</td>
<td>Quad Core 2.13 GHz</td>
<td>8 GB RAM (SQL restricted to 2.5 GB)</td>
<td>80 GB HD</td>
</tr>
<tr>
<td>4000 Devices</td>
<td>Quad Core 2.13 GHz</td>
<td>16 GB RAM (SQL restricted to 3 GB)</td>
<td>160 GB HD</td>
</tr>
<tr>
<td>10000 Devices</td>
<td>Dual Quad Core 2.40 GHz w/ Hyper Threading enabled (16 logical cores)</td>
<td>32 GB RAM (SQL restricted to 6 GB)</td>
<td>320 GB HD</td>
</tr>
<tr>
<td>24000 Devices</td>
<td>Dual Hex Core 2.40 GHz w/ Hyper Threading enabled (24 logical cores)</td>
<td>64 GB RAM (SQL restricted to 10 GB)</td>
<td>500 GB HD</td>
</tr>
</tbody>
</table>

The statistics listed for the NotifyMDM environments above are accurate assuming that all Database Cleanup Jobs are left at installation defaults. If default numbers are reduced, hardware requirements would also be reduced and more users could be supported.

Usage Parameters

The system requirements documented above are based on the parameters used in the test setting. They are as follows:

- Test environments are configured with a 50/50 split between iOS & Android devices. All iOS devices have server side APNs enabled while all Android devices have server side GCM enabled.*
- All devices are in Direct Push mode, set with a Direct Push Interval of 30 minutes.
- Location data is reported based on the 30 minute interval, as well.
- Email usage is as follows:

  
  - 15% of the devices receive 12 emails/hour
  - 50% of the devices receive 8 emails/hour
  - 30% of the devices receive 4 emails/hour
  - 5% of the devices receive no email

  - 25% of the emails are 500K
  - 50% of the emails are 75K
  - 25% of the emails are 10K


*Disabling APNs and/or GCM will result in an overall performance reduction of the NotifyMDM system.
Performance Requirements (No ActiveSync Traffic)

*NotifyMDM* provides an option that allows ActiveSync traffic to synchronize directly with the mail server, greatly reducing the performance impact on the *NotifyMDM* server. The following chart displays the *NotifyMDM* performance requirements for this type of environment.

<table>
<thead>
<tr>
<th>Maximum Devices</th>
<th>CPU</th>
<th>RAM</th>
<th>Hard Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>10000 Devices</td>
<td>Quad Core 2.13 GHz</td>
<td>8 GB RAM (SQL restricted to 4 GB)</td>
<td>80 GB HD</td>
</tr>
<tr>
<td>25000 Devices</td>
<td>Quad Core 2.13 GHz</td>
<td>16 GB RAM (SQL restricted to 6 GB)</td>
<td>160 GB HD</td>
</tr>
<tr>
<td>75000 Devices</td>
<td>Dual Quad Core 2.40 GHz w/ Hyper Threading enabled (16 logical cores)</td>
<td>32 GB RAM (SQL restricted to 15 GB)</td>
<td>320 GB HD</td>
</tr>
<tr>
<td>150000 Devices</td>
<td>Dual Hex Core 2.40 GHz w/ Hyper Threading enabled (24 logical cores)</td>
<td>64 GB RAM (SQL restricted to 30 GB)</td>
<td>500 GB HD</td>
</tr>
</tbody>
</table>
Tuning NotifyMDM

PoolThreadLimit Registry Key

Adjust the PoolThreadLimit registry key on systems with more than 125 devices.

The value of this registry key should be configured to 2 times the total number of devices. For example, if there are 2000 devices on the system, you should adjust this setting to 4000.

If the system is configured with multiple web servers for a Network Load Balanced setup, you should adjust this setting on every server where a NotifyMDM component is installed. The value should be the same on every server.

1. Navigate through the NotifyMDM registry to adjust the setting:
   
   `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\InetInfo\Parameters`

2. If the PoolThreadLimit key already exists, double click on it and adjust the value to 2 times the total number of devices.

Add the PoolThreadLimit registry key if it does not exist by right clicking on Parameters and selecting New > DWORD. Rename the newly created key, then double click on it to adjust the value to 2 times the total number of devices.
MaxUserPort Registry Key

Due to a default Windows setting allowing a maximum of 5000 concurrent open ports, it is a good idea to adjust the MaxUserPort registry key on systems with more than 1000 devices. The value of this registry key should be set to 5 times the total number of devices on the system. For example, if there are 2,000 devices on the system, adjust this key to 10,000.

If the system is configured with multiple web servers for a Network Load Balanced setup, you should adjust this setting on every server where a NotifyMDM component is installed. The value should be the same on every server.

1. Navigate to the following location in the registry:
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\services\Tcpip\Parameters
2. If the MaxUserPort key already exists, double click on it and adjust the value to 5 times the total number of devices.

Add the MaxUserPort registry key if it does not exist by right clicking on Parameters and selecting New > DWORD. Rename the newly created key, then double click on it to adjust the value to 5 times the total number of devices.
Setting Up a Web Garden

Configuring a Web Garden for the NotifyMDM Web Server

A Web Garden is a server configuration where multiple processes run on a single web server. This is accomplished by activating the Web Garden feature in Microsoft Internet Information Services (IIS), version 7 or 8. By default, an application pool in IIS will run in a single process on the server, however, there is an option to increase the Maximum Worker Processes to a value greater than one. The result is that the server runs multiple processes, thus improving system performance.

If you have configured your system with multiple web servers for a Network Load Balanced setup, the Web Garden feature (Maximum Worker Processes) should be adjusted on all servers running the NotifyMDM Web/Http component.

Recommendations

- 1-2 Worker Processes per CPU core.
  - 4 CPU cores – increase Worker Processes to 4-8
  - 8 CPU cores – increase Worker Processes to 8-16
  - 16 CPU cores – increase Worker Processes to 16-32

- Increasing the number of Worker Processes beyond 2 per CPU core could result in a reduction in performance.

Instructions follow for setting up a Web Garden with IIS 7 or 8.
Setting Up a Web Garden in IIS 7 or 8

1. Open Internet Information Services Manager, located under Administrative Tools.

2. In the left menu, expand the server and select Application Pools.

3. In the Application Pools section, select DefaultAppPool.

4. Right click DefaultAppPool and select Advanced Settings from the menu.
5. Under the *Process Model* section, adjust the *Maximum Worker Processes* to a value greater than 1, (see recommendations listed above). The value should remain at 1 for a non-web garden setup or on single core machines.

![Advanced Settings screenshot]

*Maximum Worker Processes*

*Maximum Worker Processes* (max Processes) Maximum number of worker processes permitted to service requests for the application pool. If this number is greater than 1, the application pool is a "Web Garden".
Hardware Requirements for Scaling NotifyMDM

100K Devices

Web Component

- 4 physical servers setup as a Web Cluster, each consisting of:
  - Windows 2008 Enterprise Server R2 SP1 (64 bit version)
  - 48 GB RAM
  - 2 - Eight-Core CPUs with Hyper-threading enabled
  - 150 GB HDD space (recommended mirrored configuration)
  - 32 worker processes

Database Component

- Use a dedicated SAN
  - Dual Head (High Availability)
  - 6 – 450 GB SAS Drives
  - 5 setup in a RAID 5 configuration
  - 1 setup as a “Hot Spare”

- 2 physical host servers connecting to the SAN, each consisting of:
  - 2 – Hex-Core Processors with Hyper-threading enabled
  - 64 GB of RAM per server (48 GB allocated to SQL)
  - Windows 2008 Enterprise Server R2 SP1 (64 bit version)
  - SQL Server 2008 R2 Advanced / Enterprise
  - Using SAN as shared storage
200K Devices

Web Component

- 6 physical servers set up as a Web Cluster, each consisting of:
  - Windows 2008 Enterprise Server R2 SP1 (64 bit version)
  - 60 GB RAM
  - 2 – Eight-Core CPUs with Hyper-threading enabled
  - 150 GB HDD space (recommended mirrored configuration)
  - 32 worker processes

Database Component

- Use a dedicated SAN
  - Dual Head (High Availability)
  - 12 – 450 GB SAS Drives
  - 11 setup in a RAID 5 configuration
  - 1 setup as a “Hot Spare”
- 2 physical servers connecting to the SAN, each consisting of:
  - 2 – Hex-Core Processors with Hyper-threading enabled
  - 112 GB of RAM per server (96 GB allocated to SQL)
  - Windows 2008 Enterprise Server R2 SP1 (64 bit version)
  - SQL Server 2008 R2 Advanced / Enterprise
  - Using SAN as shared storage