



# Hardware Requirements

for NextGen<sup>®</sup> Enterprise and Ancillary  
Services 8

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NextGen Enterprise API- Pat. 9,280,636 & 10,176,298, NextGen Patient Access API - Pat. 9,280,636 & 10,176,298, NextGen API Suite Manager- Pat. 9,280,636 & 10,176,298

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## CHAPTER 1

# Capacity Planning Guidance

The hardware requirements include guidance for NextGen<sup>®</sup> Enterprise releases and ancillary services. This information is intended for the IT staff at your organization who are responsible for the configuration and implementation of NextGen Enterprise and related products.

The specifications provided in this document are estimates and are subject to change without prior notice. Specifications provided are guidelines that may vary based on differences in workflows, age of hardware, and the size of a database in a given client environment. NextGen Healthcare recommends you to be aware as these guidelines may serve as resource minimums expected during the validation processes performed by the NextGen personnel.

You can use these requirements to help with capacity planning for your environment. Capacity planning depends on a variety of factors and each organization's deployment is unique. You should consider the requirements as a baseline for your hardware decisions.

### Note:

- It is recommended that you have a regularly updated non-production environment for all of your testing and development needs.
- You should perform regular baselining of key performance indicators to determine if these capacity guidelines meet each organization's deployment.
- These requirements do not include NextGen<sup>®</sup> Managed Cloud Services hosted environments. NextGen Healthcare is responsible for building solutions for those hosted systems.

## Upgrading Your Hardware

NextGen Healthcare recommends that you upgrade your hardware to keep pace with the most recent requirements from software vendors, such as Microsoft<sup>®</sup> or Citrix<sup>®</sup>. The information provided is subject to change before the next major release of NextGen Enterprise.

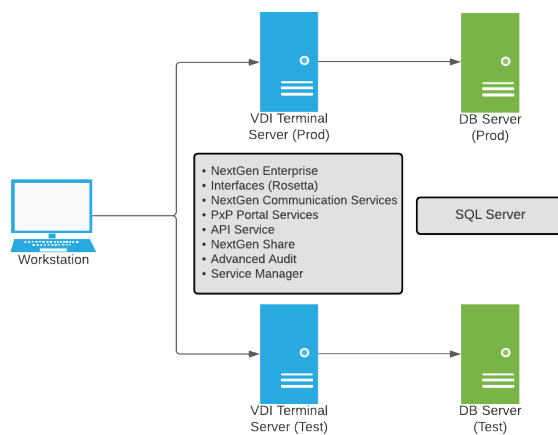
If your hardware does not meet the specified requirements and you are interested in discussing upgrade options available for purchase through NextGen Healthcare, contact [insidesales@nextgen.com](mailto:insidesales@nextgen.com).

## Deployment Examples

NextGen Enterprise and the most commonly used or recommended ancillary services together can be deployed in multiple configurations. These configurations are up to, and at the discretion, of the client as long as the systems cover all necessary requirements to meet the needs of the products and services installed on them. The following examples are provided to help illustrate several different configurations that could be used in non-production and production environments, but these are, in no way, dictating how your system should be configured.

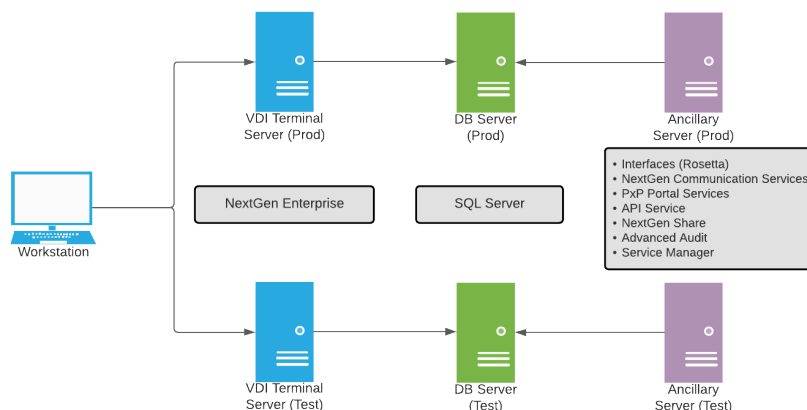
### Deployment Example with Services and NextGen Enterprise on the Same Server

In this example, all ancillary services required to run NextGen Enterprise are installed on the same server as NextGen<sup>®</sup> Enterprise EHR and NextGen<sup>®</sup> Enterprise PM provided that the system has sufficient capacity. It is recommended that the database always be installed on a dedicated server.



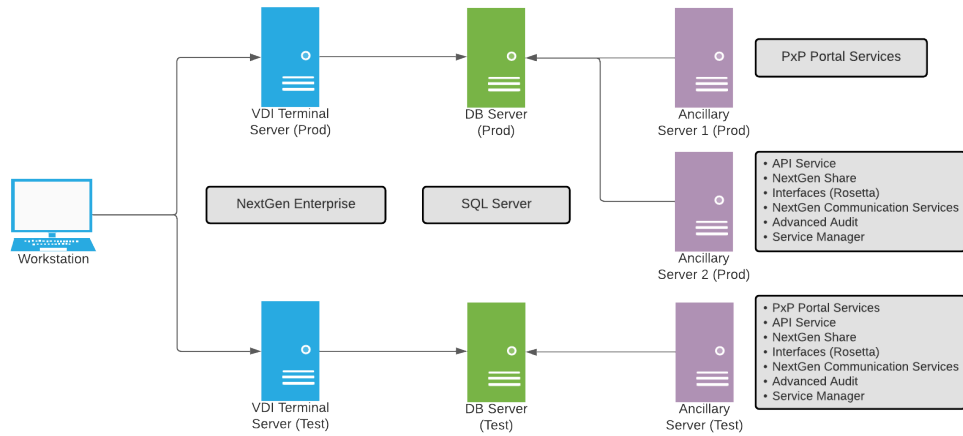
### Deployment Example with Services and NextGen Enterprise on Different Servers

In this example, the required ancillary services are installed on a different system to isolate NextGen Enterprise EHR and NextGen Enterprise PM from any potential impact high utilization that these services may have.



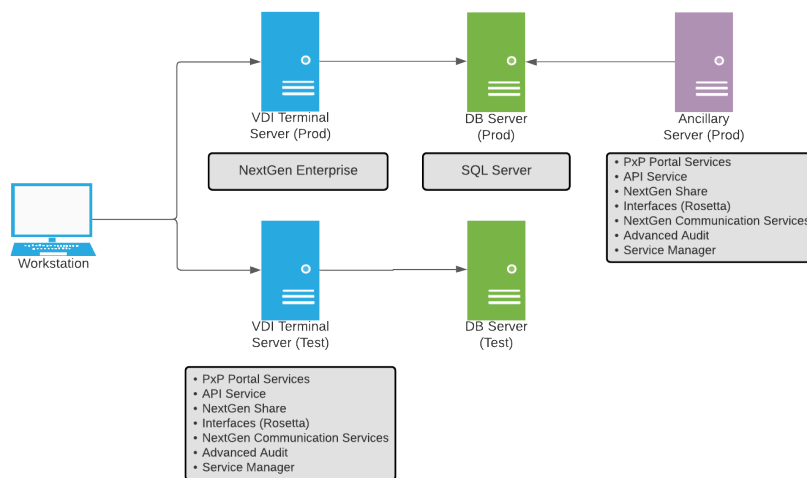
## Deployment Example with Services on Separate Servers

In this example, the ancillary services are further isolated by being deployed on separate servers to minimize the capacity required for each server.



## Deployment Example with Services and NextGen Enterprise on the Same Non-production Server

In this example, all ancillary services are installed on the same server as NextGen Enterprise EHR and NextGen Enterprise PM in the non-production environment. For the production environment, the ancillary services are installed on a different system to isolate NextGen Enterprise EHR and NextGen Enterprise PM from any potential impact high utilization that these services may have.



## CHAPTER 2

# Hardware Requirements for NextGen Enterprise

The requirements for NextGen Enterprise are specific to the NextGen Enterprise 8 release. The requirements are mandatory and you need dedicated servers for database, applications, and terminals.

## Database Server Requirements for NextGen Enterprise

The database server requirements for the NextGen Enterprise 8 release ensure that NextGen Enterprise applications run as efficiently and reliably as possible.

This information is intended for the IT staff at your practice who are responsible for the configuration and implementation of NextGen Enterprise and related products.

Due to system variations and complexity, the following specifications are estimates and are subject to change without prior notice.

### Windows Server Physical Memory Limits

For more information about the memory limits for supported Windows<sup>®</sup> Server releases, see the [Memory Limits for Windows and Windows Server Releases](#) topic in the Microsoft documentation.

### SQL Server Memory Requirements Based on User Count

| Number of Users | SQL Server <sup>®</sup> Memory Requirements |
|-----------------|---|
| 1-50 users      | 24 GB RAM                                   |
| 50-100 users    | 32 GB RAM                                   |
| 100-500 users   | 64 GB RAM                                   |
| 500-1000 users  | 128 GB RAM (Enterprise Edition required)    |
| 1500-2500 users | 256 GB RAM (Enterprise Edition required)    |
| 2500-5000 users | 512 GB RAM (Enterprise Edition required)    |

## SQL Server CPU Requirements on Users Count and Database Size

| Number of Users/Size of DB | Suggested Operating Central Processing Unit (CPU) Requirements                      |
|----------------------------|---|
| <26 Users                  | 8 cores – Any server-grade processor that is currently supported by Intel® products |
| 26-200 users               | 12 cores – Any server-grade processor that is currently supported by Intel products |
| 200-500 users              | 16 cores – Any server-grade processor that is currently supported by Intel products |
| 500-1000 users             | 24 cores – Any server-grade processor that is currently supported by Intel products |
| 1000-2500 users            | 40 cores – Any server-grade processor that is currently supported by Intel products |
| 2500-5000 users            | Contact NextGen® Sales or technical support.  |

## Storage Considerations

Storage systems should meet the input and output needs of the NextGen Enterprise application user in a specific environment. These needs vary depending on the scale and the unique usage of your NextGen Enterprise application. Many tools are available to measure the disk subsystem performance and limits for Windows. Use careful planning and monitoring to ensure a quality end-user experience.

- [Use Performance Monitor to diagnose disk performance](#)
- [Disk performance thresholds recommended by Microsoft](#)
- [Microsoft I/O load simulating utility, Diskspd](#)

## SQL Server RAID Requirements Based on Users

| Number of Users     | SQL Server RAID Requirements |
|---------------------|------------------------------|
| Fewer than 50 users | RAID 5                       |
| 50 users or more    | RAID 10                      |



## Applications and VDI Terminal Server Requirements

You must have certain server and hardware requirements for NextGen Enterprise 8. The following topics provide more information about the requirements:

- [Server Requirements Overview](#)
- [Additional Requirements](#)
- [Single User Workflows](#)
- [CPU and Memory Usage Calculation Examples](#)

### Server Requirements Overview

The server requirements for the NextGen Enterprise 8 release for Virtual Desktop Infrastructure (VDI) or other terminal services ensure that NextGen Enterprise applications run as efficiently and reliably as possible.

This information is intended for the IT staff at your practice who are responsible for the configuration and implementation of NextGen Enterprise and related products.

#### Supported Hardware

Server hardware must follow these requirements:

- Vendor-supported hardware (namely, in an active support life cycle by vendor)
- Server-grade
- While not a requirement, DDR3-800 (PC3-6400) or higher memory architecture to be used

NextGen Healthcare recommends you upgrade your hardware regularly with a lifespan not exceeding 36 months.

### Additional Requirements

| Category  | Requirements   |
|---|--|
| VDI, XenApp <sup>®</sup> , XenDesktop <sup>®</sup> , Citrix Virtual Apps and Desktops <sup>™</sup> , Citrix DaaS <sup>™</sup> , VMware View <sup>®</sup> Client with Local Mode, Composer <sup>™</sup> or Manager <sup>™</sup> , and Others | <ul style="list-style-type: none"> <li>• Follow all best infrastructure and system practices from the VDI solution provider.</li> <li>• Routinely check, maintain, and install any recommended vendor-specific VDI solution patches or updates.</li> <li>• To increase user capacity and performance, add additional servers with approved operating systems to the server farm.</li> <li>• Disable or set all power-saving settings in BIOS, hypervisor, and guest-operating systems to maximum performance.</li> </ul> |
| Disk Storage Estimates  | <ul style="list-style-type: none"> <li>• Local storage requires only 1.2 GB for the local client install.</li> <li>• 146 GB RAID1 mirrored 15 K drives or greater are recommended.</li> </ul>  |

| Category  | Requirements   |
|---|--|
|   | <ul style="list-style-type: none"> <li>• For operating systems, larger drives are suggested to allow additional space for large address page file and memory requirements.</li> <li>• Local user profiles can add significantly to disk storage.</li> <li>• Performance tracing should be done in a non-production environment that closely reflects production and its workflows, to verify client environment does not experience input/output (I/O) bottlenecks in production.</li> <li>• For more information, go to:               <ul style="list-style-type: none"> <li>◦ <a href="#">Use Performance Monitor to diagnose disk performance</a></li> <li>◦ <a href="#">Measuring Disk Latency with Windows Performance Monitor</a></li> </ul> </li> </ul>  |
| Application Bandwidth Usage Estimates   | 65 Kbps per concurrent user of thin client   |
| Remote Desktop, XenApp XenDesktopApp®, Citrix Virtual apps and Desktops, Citrix DaaS Deployment Recommendations | <ul style="list-style-type: none"> <li>• For reference only: The minimum memory recommendation (namely, no applications installed) for RDS User Scaling is 64 MB per user, plus 2 GB for the operating system. For example: 20 users * 64 MB = 1280 MB) + 2000 MB = 3280 MB (or 3.28 GB) or RAM. More applications (as explained in this document) will require higher RAM requirements.</li> <li>• CPU performance degrades if the percentage of Processor Time is constantly above 65 percent.</li> <li>• The network should not have more than 5 hops, and latency should be below 100 milliseconds.</li> <li>• The recommended bandwidth for a local area network (LAN) of 30 users and a wide area network (WAN) of 20 users is 100 Mbps. The recommended latency is less than 5 milliseconds.</li> </ul> |

Other Considerations

- Follow all NextGen Enterprise best practices and install recommended updates to address any known security or application functionality, fixes, and improvements.
- Follow all Windows best practices and install recommended updates to address any known security or operating system functionality, fixes, and improvements.
- Add additional RAM to each terminal server for any additional third-party software such as Microsoft Office, anti-virus solutions, and so on. When you install the anti-virus, adhere to best practices to avoid performance impacts.
- Monitor all physical and virtual server infrastructures for all system resources, networks, and storage utilizations and investigate any instance that is outside of business thresholds to maintain a well-balanced environment.
- Do not mix other tasks such as Database, Exchange, or Active Directory.
- Consult with vendors to calculate applicable licensing costs.
- Sessions are treated as separate workstations and require a Microsoft operating system, Microsoft SQL Server and Microsoft Exchange.

## Single User Workflows

The following section lists the user processor and memory consumption averages per operated workflow for NextGen Enterprise 8 used in conjunction with NextGen<sup>®</sup> Adaptive Content Engine 8.

It contains the average or minimum and maximum memory with CPU utilizations for each workflow. The results are from a performance test run with one virtual user, over a two-hour period in each individual workflow. The server contained 24 GB RAM and one 2.5 GHz single-core processor.

Results may vary based on individual practice workflows, workflow requirements, user active time, hardware, or customizations.

This section is designed to best advise clients that have very specific or limited workflows, how to best scale accordingly. For a comprehensive advisory on scaling for all workflows, see the [Total Workflows by Application Examples](#) section.

### NextGen Enterprise EHR User Workflows

| Workflow in NextGen Enterprise EHR  | RAM (MB) for 1 User |     | CPU Usage for 30 Users |       |
|---|---------------------|-----|------------------------|-------|
|   | Avg.                | Max | Avg. %                 | Max % |
| <b>Document Generation</b><br>Path: Patient Lookup > Create Encounter > Document Generation   | 290                 | 303 | 26                     | 67*   |
| <b>Offline Document Generation</b><br>Path: Patient Lookup > Create Encounter > Offline Document Generation                             | 291                 | 306 | 17                     | 57*   |
| <b>Image Loading</b><br>Path: Patient Lookup > Create Encounter > Load Image  | 300                 | 323 | 26                     | 47*   |
| <b>Add Problems</b><br>Path: Patient Lookup > Create Encounter > Add Problem > Sending to ICD List                                      | 291                 | 307 | 18                     | 54*   |
| <b>Add ICD Codes</b><br>Path: Patient Lookup > Create Encounter > Add ICD Code > Sending to Problem Module                              | 300                 | 346 | 18                     | 51*   |
| <b>Add Medication Allergies</b><br>Path: Patient Lookup > Create encounter > Medications > search for egg in Allergies tab > Select Add | 280                 | 300 | 17                     | 52*   |

| Workflow in NextGen Enterprise EHR   | RAM (MB) for 1 User |     | CPU Usage for 30 Users |       |
|--|---------------------|-----|------------------------|-------|
|  | Avg.                | Max | Avg. %                 | Max % |
| <b>Medications</b><br><b>Path:</b> Patient Lookup > Encounter > Medication Module > Prescribing or Stopping or Renewing or Deleting  | 310                 | 337 | 24                     | 58*   |
| <b>Add Immunizations</b><br><b>Path:</b> Patient Lookup > Create Encounter > Order Module > Immunization > Create New Immunization > Add Vaccine Details > Past Vaccine Entry Form   | 285                 | 305 | 22                     | 63*   |
| <b>Add Lab &amp; Radiology Results</b><br><b>Path:</b> Patient Lookup > Create Encounter > Order Module > Orders Summary > Create New Lab Order > New Results Entry to Lab Order > Create New Radiology Order > Set Radiology Order Schedule | 320                 | 346 | 23                     | 55*   |
| <b>Add Procedures</b><br><b>Path:</b> Patient Lookup > Create Encounter > Add Procedure > Resolve > Accept   | 350                 | 560 | 40                     | 75*   |
| <b>Inbox</b><br><b>Path:</b> Patient Lookup > Appointments tab > Provider Approval tab > Clinical Tasking tab  | 240                 | 258 | 36                     | 66*   |

For more information, see [CPU and Memory Usage Calculation Examples](#).

### NextGen Enterprise PM User Workflows

| Workflow in NextGen Enterprise PM  | RAM (MB) for 1 User |     | CPU Usage for 30 Users |       |
|--|---------------------|-----|------------------------|-------|
|  | Avg.                | Max | Avg. %                 | Max % |
| <b>Appointment</b><br><b>Path:</b> Appointment Lookup > Enter Data and Select Find > Close | 212                 | 313 | 22                     | 63*   |
| <b>Account</b><br><b>Path:</b> Account Lookup > Enter Data and Select Find > Close         | 85                  | 97  | 18                     | 46    |
| <b>Charge Payment</b>  | 215                 | 250 | 20                     | 60    |

| Workflow in NextGen Enterprise PM  | RAM (MB) for 1 User |     | CPU Usage for 30 Users |       |
|--|---------------------|-----|------------------------|-------|
|  | Avg.                | Max | Avg. %                 | Max % |
| <b>Path:</b> Batch Posting > Patient Lookup > Open Encounter Page > Select New Encounter and select OK > Insurance Maintenance > Select OK > Open Charge Posting > Save > Open Payment Entry > Save                              |                     |     |                        |       |
| <b>Check-In and Checkout Patients</b><br><b>Path:</b> Appointment Book > Add Appointment > People lookup > Create a new encounter > Select Insurance Selection > Select Autoflow > Open Encounter Insurance > Open Payment Entry | 215                 | 237 | 24                     | 54*   |
| <b>Encounter Lookup</b><br><b>Path:</b> Encounter > Search Last Name with * > Select Close   | 108                 | 116 | 21                     | 44    |
| <b>WorkLog</b><br><b>Path:</b> Worklog > My Tasks > Select close   | 172                 | 207 | 14                     | 41    |
| <b>Account Details</b><br><b>Path:</b> Patient lookup > Encounter Details > Account Summary > Notes  | 118                 | 139 | 21                     | 47*   |
| <b>Create New Patient</b><br><b>Path:</b> Patient Lookup > New > Chart > Create Encounter > Open Patient   | 193                 | 225 | 25                     | 60    |
| <b>Delete Task</b><br><b>Path:</b> Appointment Book > New Appointment > People Lookup > Find > Open patient > Add patient to appointment > Appointment Confirmation > Close appointment > Cancel appointment                     | 203                 | 245 | 16                     | 48    |
| <b>Demand Bill</b><br><b>Path:</b> Patient Lookup > New > Chart > Create encounter > Open patient  | 235                 | 250 | 24                     | 65    |
| <b>Statement Generation</b><br><b>Path:</b> Patient Lookup > Statement and Close   | 210                 | 270 | 20                     | 44    |

For more information, see [CPU and Memory Usage Calculation Examples](#).

### NextGen Document Management User Workflows

| Workflow   | RAM (MB) for 1 User |     | CPU Usage for 30 Users |        |
|--|---------------------|-----|------------------------|--------|
|  | Avg.                | Max | Avg. %                 | Max %  |
| <b>Image Loading</b><br>Path: NextGen® Document Management > File Import 1.5 MB > Assign Batch to a Patient > Load the Image | 125                 | 213 | 8.83                   | 99.99* |

For more information, see [CPU and Memory Usage Calculation Examples](#).

### CPU and Memory Usage Calculation Examples

This section shows examples of minimum CPU and memory allocation assignments based on per-user and per-operated workflow or module. The User Workflow tables for memory and CPU values are referenced in the examples below.

#### One Workflow Utilized on the Server

| Workflow            | Avg RAM (MB) for 1 User | Avg CPU Usage (%) for 30 Users |
|---------------------|-------------------------|--------------------------------|
| Document Generation | 290                     | 26                             |

- Allocate a minimum of 335 MB RAM per concurrent user accessing the workflow.
- Allocate .5 of one 2.5 GHz CPU core to the assigned server per user at a minimum.

#### Two Workflows Utilized on the Server

| Workflow                            | Avg RAM (MB) for 1 User | Avg CPU Usage (%) for 30 Users |
|-------------------------------------|-------------------------|--------------------------------|
| Document Generation                 | 290                     | 26                             |
| Loading Image Workflow              | 300                     | 26                             |
| Total Average of Workflows combined | 590                     | 52                             |

- Total Average RAM Allocation = 590 MB
- Ram Utilization Average across workflows = 590 MB/2 workflows = 295 MB
- Allocate 295 MB of RAM per concurrent user accessing the workflows

- Avg. CPU usage across workflows = 52/2 workflows = 26
- Allocate an additional minimum of 26 % of one 2.5 GHz CPU core to the assigned server per user

### **Additional Information about CPU and Memory Usage**

- Minimum properties are omitted from all sections due to their inaccuracy of application workload. For example: Upon launch, NextGen Enterprise EHR may consume only 16MB of RAM for a few seconds, thus showing in the test as Min = 16MB. This does not reflect actual use or relevancy and therefore is omitted from the results.
- Any thread executing code has the potential to use 100% of a logical CPU core's cycles. While sustained 100% CPU core usage has never been observed in testing, administrators should be aware of this potential and factor some leeway in the scaling of processing power.

### **Total Workflows by Application Examples**

The following examples demonstrate how to scale a terminal server for all workflows in NextGen Enterprise EHR, NextGen Enterprise PM, and NextGen Document Management.

Use the following examples and formulas to determine CPU and memory assignments per server with 30 users. Because many factors that manage memory and CPU resources occur within Microsoft Windows, the total results for workflows will reflect differently than combining small amounts of workflows.

If multiple workflows are calculated and the sum of workflows exceeds the resource amounts listed in this section, you can use this or add single workflows instead. However, this may neglect the scaling needs of specialized workflows, due to the averaging of all values. Therefore, scaling according to the higher values will result in increased performance.

The formulas below are examples to help guide scaling and usage. Environment and equipment variations such as CPU family, memory type or speed, and storage speed dramatically affects application performance.

Testing was performed against a machine with the following specifications:

- Microsoft<sup>®</sup> AMD EPYC 7R13 Processor, 2650 Mhz, 4Core(s), 32 logical cores (4 cores x 8 physical processors)
- 64.154 GB physical memory installed

**NextGen Enterprise EHR Workflow**

| All Workflows (Single User)                           | Avg RAM (MB) |     | Avg CPU Usage (% of single core) |       |
|---|--------------|-----|----------------------------------|-------|
|   | Avg.         | Max | Avg. %                           | Max % |
| Average Resources/ NextGen Enterprise EHR Application | 296          | 336 | 24.2                             | 58.6  |

**NextGen Enterprise EHR Formulas**

Obtain Average Resources/ NextGen Enterprise EHR Application = 296

- Allocate a minimum of 296 MB RAM per user.
- Determine minimum RAM requirements for 30 users = (296 MB x 30 users) = 8.88 GB RAM.
- Allocate a minimum of 8.88 GB additional RAM per 30 NextGen Enterprise EHR Workflow users.

Obtain Average Resources/NextGen Enterprise EHR Application/Average CPU = 24.2%.

Determine minimum CPU requirements for 30 users:

- Each CPU core = 32.
- $(24.2/32) = 0.76\%$  32 core CPU/user.
- Allocate a minimum of .76% of 32 core CPU per user.
- $0.76\% \text{ CPU/user} \times 30 \text{ users} = 22.69\%$  average use of 32-core CPU.

**NextGen Enterprise PM Workflow**

| Workflows (Single User)                              | Avg RAM (MB) |     | Avg CPU Usage (% of single core) |       |
|--|--------------|-----|----------------------------------|-------|
|  | Avg.         | Max | Avg. %                           | Max % |
| Average Resources/ NextGen Enterprise PM Application | 176          | 208 | 19.9                             | 50.7% |

**NextGen Enterprise PM Formulas**

Obtain Average Resources/NextGen Enterprise PM Application = 176 Mb.



- Allocate a minimum of 176 MB RAM per user.
- Determine minimum RAM requirements for 30 users = (176 MB x 30 users) = 5280 MB RAM.
- Allocate a minimum of 5.28 GB additional RAM per 30 NextGen Enterprise PM workflow users.

Obtain Average Resources/NextGen Enterprise PM Application = 19.9%.

- Each CPU core = 32.
- $(19.9/32) = 0.62\%$  of 32 core CPU/user.
- Allocate a minimum of .62 % of 32 core CPU per user.

Determine minimum CPU requirements for 30 users:

- $0.62\% \text{ CPU/user} \times 30 \text{ users} = 18.66\%$  average use of 32-core CPU.

**NextGen Document Management Workflow**

| Workflow (Single User)                         | Avg RAM (MB) for a single user |     | Avg CPU Usage (% of single core) for 30 Users |       |
|--|--------------------------------|-----|---|-------|
|  | Avg.                           | Max | Avg. %  | Max % |
| Average Resources/Next Gen Document Management | 140                            | 215 | 48  | 100   |

**NextGen Document Management Formulas**

Obtain Average Resources/NextGen Document Management = 140 MB.

- Allocate a minimum of 140 MB of RAM per user.
- Determine minimum RAM requirements for 30 users = (140 MB x 30 users) = 4200 MB RAM.
- Allocate 4.2 GB additional RAM per 30 NextGen Document Management Workflow users.

Obtain Average Resources/NextGen Document Management/Avg. CPU = 48%.

- Each CPU core = 100%.
- $(48/32) = 1.5\%$  of 32 core CPU/user.
- Allocate a minimum of 1.5% CPU cores per user on average.

Determine minimum CPU requirements for 30 users:

- $1.5\% \text{ CPU/user} \times 30 \text{ users} = 45\%$  average use of 32-core CPU.

**All Workflows and Applications Utilized by 30 Users**

| All Applications, All Workflows (Single User) | RAM (MB) |     | CPU Usage % |
|---|----------|-----|-------------|
|   | Avg      | Max | Avg %       |
| Average Resources/All Applications            | 410      | 610 | 35%         |

**Manage All Applications and Workflow Formulas**

1. Obtain Average Resources/All Applications = 410 MB
  - Allocate a minimum of 410 MB RAM per user.
  - Determine minimum RAM requirements for 30 users = (410MB x 30 users) = 12300 MB RAM.
  - Allocate a minimum of 12.3 GB additional RAM per 30 NextGen users.
2. Obtain Average Resources/NextGen Enterprise PM Application = 35%.
  - Each CPU core = 32.
  - $(35/32) = 1.125$  % of 32 core CPU/user.
  - Allocate a minimum of 1.125 % of 32 core CPU per user.
3. Determine minimum CPU requirements for 30 users:
  - $1.125 \text{ cores} \times 30 \text{ users} = 33.75\%$  Average use of 32-core CPU.

**Building a Large-Scale RDS Server for NextGen Software**

This section demonstrates how to scale a server according to the [Total Workflows by Application Examples](#) section, as well as factor other commonly used enterprise software, and is strictly for informational purposes only. This section does not indicate requirements on CPU cores due to variance of performance between differing processor families. CPU load is best measured using the % Processor Time performance counter. For simplicity, the CPU used in the "Total Workflows by Application Examples" test is used.

The examples in this section make use of the following:

- 20 users (each utilizing all workflows in all NextGen Healthcare applications) – 9.1 GB RAM and 1.2 GB HDD
- Microsoft Office Professional (version and user scale is variable, and estimated for demonstration purposes only at 300 MB per user) – 6 GB RAM and 3 GB HDD
- Symantec Endpoint Protection – 1 GB RAM and 1.8 GB HDD
- Base recommendations from Microsoft for RDS server memory/user (64MB) – 3.25GB RAM
- Total RAM minimal requirements – 19.35 GB

- Total HDD space required by software (excluding Windows installation and page file) – 6GB
- CPU requirements of third-party software pertaining to RDS environments are not publicly available, nor in the scope of this document. For this example, a margin of 10% of physical CPU is added to compensate for 20 users x third-party software usage (27.33% + 10%).

### Server 1 Example

| Hardware Used |   | Expected Load    |
|---------------|---|------------------|
| CPU           | 24-core processor (similar to Intel Xeon E7-4880) | 37.33%           |
| RAM           | 19.35 GB  | 19 GB or greater |
| HDD           | 146 GB  | 6 GB + OS        |

Because Server 1 has less than a 65% predicted CPU load, adequate RAM, and HDD space, it can run the required workload.

### Server 2 Example

| Hardware Used |  | Expected Load    |
|---------------|--|------------------|
| CPU           | 12-core processor (similar to Intel Xeon <sup>®</sup> E7-4880) | 74.66%           |
| RAM           | 16 GB  | 19 GB or greater |
| HDD           | 146 GB   | 6 GB + OS        |

Because Server 2 has an excess of 65% CPU usage and inadequate RAM, the CPU cores were reduced by 50%, which doubled the CPU load by the software (37.33% x 2). The RAM was scaled to a common RDS configuration.

Performance of this server will suffer. Remedies for this situation would be to decrease the server workload, either by reducing user count or increasing server hardware.

### Additional Information for Building a Large-Scale RDS

- Any thread-executing code has the potential to use 100% of a logical CPU core's cycles. While sustained 100% CPU usage has never been observed in testing, administrators should be aware of this and factor some leeway in scaling of processing power.
- In testing, applications frequently but briefly reached 100% of a CPU core, not the total (24 core) CPU. This is reflected in the following:

It is assumed in these tests that one user has only one application open per Microsoft Windows RDS session. If this is not the case for your environment or workflow, enumerate the application instances required, and use the Average Resources data to calculate resources per application.

Microsoft recommends using less than 65% average processor usage for best performance in terminal servers.

- For large-scale deployments with heavy concurrent workflow or module users, maximum values of RAM should be considered to determine an accurate, per-user resource assignment.
- While adding multiple workflows, user-mode virtual address space for the current x86 architecture is 2 GB per process. Per this restriction, the maximum per-user memory allocation is 2 GB per process.
- To obtain maximum performance of NextGen Healthcare software, favor scaling towards fewer users per server and multiple servers if the environment permits. For example: Instead of using 60 users for one large server, use 15 users across four smaller servers.

## Workstation Requirements for NextGen Enterprise

The requirements for the NextGen Enterprise 8 release for workstations ensure that NextGen Enterprise applications run as efficiently and reliably as possible.

This information is intended for the IT staff who are responsible for the configuration and implementation of NextGen Enterprise and related products at your practice.

| Requirement                       | Description   |
|-----------------------------------|---|
| Operating System Requirements     | To view a list of Microsoft operating systems and compatible .NET Framework versions, go to <a href="#">NextGen Healthcare Success Community</a> and download the latest <i>Third-Party Infrastructure Compatibility Policies for NextGen Enterprise 8</i> .  |
| Recommended Hardware Requirements | <ul style="list-style-type: none"> <li>• Hardware that has been purchased within last 12 months but has a life span of another 24 months</li> <li>• Network connected</li> <li>• Support for updating with the latest recommended Operating Systems and software programs</li> </ul> <p><b>Note:</b> NextGen Healthcare recommends that you upgrade your hardware to keep pace with the most recent requirements from software vendors such as Microsoft or Citrix.</p> |
| Scanning Stations                 | <p>In addition to meeting all recommended hardware requirements, scanning stations:</p> <ul style="list-style-type: none"> <li>• Must be network connected</li> <li>• Must support the latest recommended operating systems</li> </ul>  |

| Requirement                    | Description   |
|--------------------------------|---|
|                                | <ul style="list-style-type: none"> <li>• Must have Ethernet Network Interface Card</li> <li>• Must be TWAIN-compliant</li> </ul>  |
| Thin Client                    | <p>In addition to meeting the recommend hardware requirements, thin client devices must meet the following requirements:</p> <ul style="list-style-type: none"> <li>• RDP support</li> <li>• ICA<sup>®</sup> (Independent Computing Architecture) support</li> <li>• Support for PC over IP (PCoIP) as appropriate</li> <li>• Support for software updates from the hardware vendors</li> </ul> |
| Tablet PC and Handheld Devices | <p>For mobility and remote access, mobile devices:</p> <ul style="list-style-type: none"> <li>• Must be able to support RDP, Citrix ICA clients as delivered by the vendors</li> <li>• Must have connectivity</li> </ul> <p>For local installation of NextGen Enterprise, mobile devices must meet all recommended hardware requirements.</p>   |
| Wireless Equipment             | One 802.11G or better access point is required.   |
| Bandwidth Usage Estimates      | <ul style="list-style-type: none"> <li>• 120 Kbps per concurrent user fat client</li> <li>• 150 Kbps per concurrent user fat client with a scanner</li> </ul>   |

## CHAPTER 3

## Hardware Requirements for Ancillary Services of NextGen Enterprise

The ancillary hardware requirements are somewhat flexible as they depend on the number of services and size of your practices. The requirements can help you determine, at your own discretion, the server configuration as long as it meets the hardware requirements, which are additive. You can decide to split up the requirements among multiple servers, but you must ensure each product has the hardware available based on the information provided to avoid competing for available resources.

For example, if two services require 8 GB RAM each, then 16 GB RAM total is necessary. Two services running on a server with 8 GB RAM would be insufficient.

### Important:

- Best practice for NextGen<sup>®</sup> PxP Portal is to maintain a non-production NextGen PxP Portal installation where changes can be implemented prior to application in production. Due to HITRUST requirements, non-production and production NextGen PxP Portal and associated services cannot run on the same server.
- Your non-production environment should include a server for testing NextGen PxP Portal and ancillary products related to it. These include NextGen Service Manager, NextGen<sup>®</sup> Enterprise Rosetta Interface Messenger, NextGen<sup>®</sup> Share, NextGen<sup>®</sup> Enterprise API, and Mirth<sup>®</sup> Connect by NextGen Healthcare. This server can be your non-production terminal server if it meets specific requirements.

## Interface Server Hardware Requirements

NextGen interface servers have specific requirements for hardware, including CPU, RAM, disk, and network.

| Requirement                            | Description   |
|--|---|
| Minimum Server Hardware Specifications | <ul style="list-style-type: none"> <li>• Any Intel supported 2 GHz or greater processor (x64 architecture, 4 cores minimum)</li> <li>• At least 8 GB of system memory</li> <li>• At least 200 GB of free drive space (a robust, SSD-based or equivalent, disk storage configuration is highly recommended)</li> <li>• Gigabit Ethernet</li> </ul> |

| Requirement                                | Description   |
|--|---|
| Recommended Server Hardware Specifications | <ul style="list-style-type: none"> <li>Any Intel supported 2 GHz or greater processor (x64 architecture, 8 or more cores)</li> <li>At least 32 GB of system memory</li> <li>At least 500 GB of free drive space (a robust, SSD-based or equivalent, disk storage configuration is highly recommended)</li> <li>Gigabit Ethernet</li> </ul>  |
| Using a Dedicated Server                   | NextGen Healthcare recommends running NextGen Enterprise Rosetta Interface Messenger on a dedicated server. If you experience issues when running NextGen Enterprise Rosetta Interface Messenger on a non-dedicated server, NextGen Healthcare Support may ask you to move Rosetta to a dedicated server.   |
| Production and Non-production Servers      | <p>If you are running NextGen Share, then production and non-production interfaces must reside on separate servers.</p> <p>If you are not running NextGen Share, then production and non-production interfaces can reside on the same server. However, it is recommended that production and non-production interfaces reside on separate servers.</p> <p>NextGen Healthcare recommends that the non-production server use the same hardware specifications as the production server.</p> |

## Hardware Requirements for NextGen Communication Services

Practices using Mail-Order ePrescribing and Retail ePrescribing require a separate computer to host NextGen<sup>®</sup> Communication Services. The computer hosting the NextGen Communication Services Server has minimal hardware requirements, as its role is to send ePrescribing messages to Surescripts<sup>®</sup> and obtain PDR.

### Minimum Hardware Requirements

The computer hosting NextGen Communication Services must meet the following requirements:

| Component            | Minimum           | Recommended                |
|----------------------|-------------------|----------------------------|
| Processor            | 2.0 GHz dual core | 2.0 GHz quad core or above |
| RAM                  | 4 GB              | 8 GB or above              |
| Available Disk Space | 60 GB             | 200 GB or above            |

## Hardware Requirements for NextGen PxP Portal

To successfully install NextGen PxP Portal, your hardware must meet the following requirements.

**Note:** To ensure you provision adequate hardware, note that the installation of the NextGen PxP Portal integration services in your non-production and production environments requires the creation of a new database in your SQL Server environment. This database will be automatically created during the installation process and is used to store configuration and metadata for the integration between NextGen Enterprise and NextGen PxP Portal. No action is required on your part during the installation. The name of the new database will be: `pxp_config_db_$(NG_DB_Name)`. If you have a separate SQL Server environment used for reporting purposes, NextGen Healthcare recommends that this database is installed in that environment to reduce any load on your production environment. If you have an existing backup process in place for your production SQL Server environment, you should include the `pxp_config_db_$(NG_DB_Name)` database in that backup set to ensure the configuration and metadata can be properly restored.

| Component                       | Configuration        | Large (11+ practices) | Medium (6-10 practices) | Small (less than 5 practices) |
|---------------------------------|----------------------|-----------------------|-------------------------|-------------------------------|
| NextGen PxP Portal Service      | CPU                  | 4 cores (8 vCPUs)     | 2 cores (4 vCPUs)       | 2 cores (4 vCPUs)             |
|                                 | Memory               | 32 GB                 | 16 GB                   | 8 GB                          |
|                                 | Available Disk Space | 100 GB                | 75 GB                   | 50 GB                         |
| NextGen PxP Portal CCDA Service | CPU                  | 4 cores (8 vCPUs)     | 2 cores (6 vCPUs)       | 2 cores (4 vCPUs)             |
|                                 | Memory               | 32 GB                 | 16 GB                   | 8 GB                          |
|                                 | Available Disk Space | 100 GB                | 75 GB                   | 50 GB                         |

## Hardware Requirements for API Suite Manager Installation

Ensure that your system meets the following requirements to install NextGen<sup>®</sup> API Suite Manager successfully.

### Server Requirements

The server for NextGen API Suite Manager must meet the following requirements:



- Four CPU cores (minimum), eight CPU cores (recommended). Hyper-threaded cores are not sufficient.
- 8GB RAM.

You must have the following credentials:

- A local or domain account that has read/write access to the storage location for documents and administrative access to the server for the NextGen API Suite Manager.
- Credentials for NextGen Enterprise and Advanced Audit databases. Advanced Audit credentials are required for the production environment only.

It is recommended that you use a dedicated server (physical or virtual). Clients without a dedicated server may experience performance issues when the server is shared with other ancillary services. These issues could be due to specific application requirements or the number of applications implemented. Consult with your organization's system administrator to discuss their specific server requirements.

If the installation is for the NextGen<sup>®</sup> Patient Access API only, a dedicated server is optional.

## *Hardware Requirements for NextPen*

This section describes the technical pre-requisites for using NextPen<sup>®</sup> Digital Solutions.

### **Hardware Requirements – Workstation**

- 500 MB of available disk space
- 19" or larger wide-screen (16x9) monitor
- Display of 1920x1080
- USB Port

### **Hardware Requirements – Server**

- 6 GB RAM
- CPU speed of 2 GHz or faster

### **Printer Requirements**

- Color laser printer with Postscript
- Automatic duplex printing support (recommended, but not required)
- In the past, we have tested successfully with Dell<sup>®</sup>, HP<sup>®</sup> and OKI printers. Other printers may work, but may require additional configuration and testing; these are not covered by NextGen Healthcare support.

## *Document Revision History*

| <b>Release Name</b> | <b>Application Version</b> | <b>Date</b> | <b>Document Version</b> | <b>Summary of Changes</b> |
|---------------------|----------------------------|-------------|-------------------------|---------------------------|
| Enterprise 8        | Enterprise 8               | 10/12/2023  | 1.0                     | Initial Release           |