Initial Hardware Estimation Guidelines

OnPremises and PrivateCloud

AgilePoint NX v7.0

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Virus-Free Software Policy

AgilePoint recognizes that viruses are a significant security consideration for our customers. AgilePoint takes the following measures to make sure our software is free of viruses upon delivery:

- AgilePoint is built on top of Microsoft .NET framework. The pre-compiled executable is a .NET Common Language Runtime (CLR) application, not a native machine binary. As far as is known at this time, there are no viruses that infect .NET CLR executables.
- The virtual environment for the product packaging process is fully isolated and protected, and anti-virus software is installed and running during packaging.
- The compiled and packaged software files are scanned by a variety of anti-virus software services before they are made available for customer download. An official disclosure document regarding the findings from our virus scanning activities is available upon request.
Initial Hardware Estimation Guidelines

This document provides guidelines for hardware sizing and configuration for AgilePoint.

Note that these are general guidelines based on past experience with representative AgilePoint customers. AgilePoint can provide sizing guidelines for specific customers based on the information in this document. However, you must use these basic guidelines to complete your estimates.
Considerations

This document provides a baseline recommendation using a minimum recommended hardware configuration. The specific number of machines you require may vary based on a number of factors, which are discussed in this section.

System Usage

Three main factors go into determining system usage for AgilePoint:

- The number of concurrent users
- The number of process steps to be completed per day
- External system load

Note that again, the guidelines provided here apply in most cases. If you have questions regarding your specific configuration needs, contact an AgilePoint representative.

Concurrent Users

The number of concurrent users refers to both process participants and users who are not part of the process but access the system to gather information, such as process status. This number affects the number of front-end application machines you will need.

Process Steps Per Day

To determine your system capacity, you must determine your process steps per day.

Maximum Process Steps per Day for AgilePoint

Use the following formula to estimate how many steps can be completed per day:

Total steps that can be completed in 24 hours = ([Thread pool size] * 24 hrs * 60 min * 60 sec * 1,000 ms) / ([Average event processing time]*3)

Assume a typical server with 2 CPUs (Xeon 3.6 GHz), dual-core and 8 GB RAM, and connects similar configuration of database server. The average AgilePoint event processing speed is 321(ms)/per event (3 events for one step). Assume a thread pool capacity of 10.

Total steps that can be completed in 24 hours = (10 * 24 * 60 * 60 * 1,000) / (321 * 3) = 897,196 steps/day

Estimating Your Process Steps Per Day

The number of process steps you require per day can be determined using a worksheet and calculations provided by AgilePoint. In order to set up your worksheet, we require the following information:

- The number of years you would like to project
- The number of processes you foresee creating during that time span
Once we have calculated your estimated process load per day, we can compare it to the following calculations.
Once your process steps per day are calculated, we compare it to the maximum of 897,196. If your requirements are less than this number, the minimum hardware configuration is sufficient.

**External System Load**

External system load refers to any external systems that will access the AgilePoint system. External system load is a variable that can impact your performance, but it is difficult to calculate precisely what the impact will be.

AgilePoint recommends using either an educated guess based on your knowledge of the external systems to determine the impact, or to run test metrics to more precisely determine the load. If you have questions regarding your specific configuration needs, contact an AgilePoint representative.

**Capacity of the Machines in your Environment**

AgilePoint offers a baseline recommendation based on minimum recommended hardware. You may need fewer machines if each machine in your environment has a higher capacity. The main hardware considerations for an AgilePoint are covered in this section.

**CPU Speed**

Increasing the server’s CPU speed will increase the amount of work that can be performed by the server within a given time frame. Therefore, faster CPUs will almost always improve performance. However, one notable exception is that a faster CPU will not (necessarily) resolve performance issues that stem from performance bottlenecks.

**Number of CPUs**

Since AgilePoint Server is multi-threaded and is designed to support asynchronous processing, AgilePoint Server can take full advantage of the benefits of multiple server CPUs. Multiple CPUs will generally improve performance for any real-world AgilePoint system because it offers the greatest improvement for systems that will have concurrent usage by multiple users. However, it may not have as great an affect on the performance of an AgilePoint system that is only used by one or a few users at a time (such as a development or QA system). As with CPU speed, multiple CPUs may not (necessarily) resolve performance issues that stem from performance bottlenecks, although it may prevent a bottleneck from affecting some of the system’s users.

**CPU Sizing**

CPU Sizing is based on the number of transactions per CPU per second under optimal and regular conditions. The typical formula for computing CPU sizes is as follows:

Number of transactions = number of concurrent requests * (optimal/regular response times) 0.80 * (Speed of CPU in Mega Cycles) * No. of CPUs

= Mega Cycles per Transaction * No. of Transactions

The reason we use the 0.80 factor is because the threshold for CPU utilization before it is considered a bottleneck is 80%. If you want to take into account future growth you should use a smaller factor.
System Memory (RAM)

Unlike CPU speed, where slower CPUs will just require more time for the server to finish performing its work, the server’s physical and available memory impose an upper limit to the size and quantity of the data and work that the server can be working on simultaneously. Therefore, for mission critical systems, maximizing the physical memory is always best.

Memory Utilization

Memory requirements for AgilePoint Server depends on several factors such as:

- Number of active process instances
- Typical amount of process instance size varies by amount of custom data carried along process
- Custom application data at each step
- Number of concurrent requests

Note: It is a best practice for memory utilization to have a dedicated Application Pool in IIS for AgilePoint Server.

Hard Disk Performance

Since data will be read from and saved to the server’s hard disk, the hard disk's seek time, read response, RPMs, etc. will affect the performance of AgilePoint systems. Therefore, the faster your server’s hard disk performs, the better your system's performance will be. However, hard disk performance generally has the greatest affect on database servers. For other servers (or for hard disks that don't contain a database), hard disk performance is much less critical and unlikely to affect performance significantly, unless the server starts using virtual memory (see above), in which case it may become very critical.

Network Bandwidth

Network Bandwidth is determined by amount of data pulled/pushed per request. This is usually determined by the number of active requests at any particular instance. Please note, you need to consider bandwidth between client applications and the AgilePoint Engine as well as bandwidth available between the database and AgilePoint Server.

Rule of thumb for network bandwidth:

There should be at least 1 GB bandwidth between AgilePoint and Database Server and 10 – 100 MB is sufficient between client applications and AgilePoint Server.

Network Adapters

Usually network bandwidth is more of an issue than network adapters. However, the server's network adapters should be sufficiently fast and reliable to allow the server to make maximum use of the full bandwidth provided by the networks the server is connected to. Anything slower (or an unreliable adapter) could represent a potential performance bottleneck.
Availability Requirements

High Availability (HA)
AgilePoint recommends a High Availability (HA) configuration for maximum uptime. However, you will need to consider whether HA is required for your organization.

Network Load Balancing (NLB)
AgilePoint recommends Network Load Balancing (NLB) to ensure maximum resource availability. However, you will need to consider whether NLB is required for your organization.

Disaster Recovery (DR)
If your organization requires a disaster recovery (DR) strategy, additional hardware is required.
For more information, refer to Contact AgilePoint Customer Support.

The Number of Environments You Want to Create
AgilePoint recommends having a Development, Test, Staging, and Production environment. However, some customers opt to forgo one or more of these based on their organizations' requirements.

Virtual Environments
Using a virtual environment for AgilePoint is much cheaper than physical servers, although performance tends to be slower.
Because of the reduced performance, it is not possible to run load tests on a virtual environment, but if load testing is not required, AgilePoint recommends using a virtual environment. This is an especially effective approach for development environments.
Even if you use a virtual environment, physical database servers are recommended.

Support for Virtual Environments
AgilePoint is committed to fully supporting AgilePoint running on virtualization technologies. AgilePoint recommends installing AgilePoint on a physical server machine, but AgilePoint can be supported in a virtual machine (including NLB) given the virtual machine can support Windows Server 2003 or 2008, and the .NET Framework 3.5. AgilePoint recommends Windows Server® 2008 Hyper-V™, but other Microsoft and non-Microsoft virtualization products are also supported as discussed here. In addition to Windows Server® 2008 Hyper-V™, AgilePoint can also be deployed using Microsoft Virtual Server and Microsoft Virtual PC virtualization technologies. Only virtualization products that have specifically passed Microsoft's requirements for virtualization support are also officially supported for running AgilePoint. See the following Microsoft Web site that provides
a list of non-Microsoft virtualization products that have passed the requirements for Windows Server 2003 and 2008:

http://www.windowsservercatalog.com/results.aspx?
bCatID=1521&cplD=0&avc=0&ava=0&avq=0&OR=1&PGS=25&ready=0

AgilePoint recommends the following configurations to make sure optimal performance of the AgilePoint in a virtual environment:

<table>
<thead>
<tr>
<th>Host OS Architecture</th>
<th>X64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Host Machine Processors</td>
<td>4</td>
</tr>
<tr>
<td>Memory</td>
<td>4 GB allocated to each virtual machine</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>1 Gb Network connection to the host machine</td>
</tr>
<tr>
<td>Virtual Memory</td>
<td>Memory allocation cannot always be guaranteed (i.e. if 4 GB is set for the virtual machine, it does not mean that the virtual machine will be using the entire 4 GB of memory at all times). The memory is shared amongst all the virtual machines.</td>
</tr>
<tr>
<td>AgilePoint Database</td>
<td>The AgilePoint Database should be on a physical machine.</td>
</tr>
</tbody>
</table>
Hardware Configuration

The following diagram shows the basic AgilePoint hardware architecture approach. The precise number of machines you may need for your environment may vary based on your requirements. Also, NLB and HA are recommended, but optional.
Hardware Sizing

The recommendations in this section represent the current, baseline recommended hardware requirements. You may need additional machines or higher performance based on your system requirements.

**AgilePoint Server**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor (CPU)</td>
<td>64bits Dual Physical Processor, dual-core and clock speeds of 3.2 GHz or higher.</td>
</tr>
<tr>
<td>Memory (RAM)</td>
<td>6 GB RAM or higher</td>
</tr>
<tr>
<td>Available Hard Disk Space</td>
<td>150 MB for AgilePoint installation and plus an additional 1GB for log files and cache</td>
</tr>
<tr>
<td>Other Hardware or Devices</td>
<td>1 Gigabit Network Interface Card (NIC) Share Device required by cluster service</td>
</tr>
</tbody>
</table>

**Front-Tier Application**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processor (CPU)</td>
<td>32bits or 64bits Dual Physical Processor, dual-core and clock speeds of 3.2 GHz or higher.</td>
</tr>
<tr>
<td>Memory (RAM)</td>
<td>4 GB RAM or higher</td>
</tr>
<tr>
<td>Available Hard Disk Space</td>
<td>150 MB for AgilePoint Installation or SharePoint</td>
</tr>
<tr>
<td>Other Hardware or Devices</td>
<td>1 Gigabit Network Interface Card (NIC) Network load-balance device.</td>
</tr>
</tbody>
</table>

**Database**

In most organizations, the AgilePoint database is installed on a machine that includes databases for other applications. AgilePoint only provides sizing recommendations for the database upon request. Please discuss your organization's requirements with your database administrator.
Hardware Configuration Example

The following diagram provides the hardware configuration for an actual AgilePoint client. The client was a large-scale implementation of AgilePoint, so the configuration specifications are higher than the baseline.

[Diagram showing hardware configuration for AgilePoint client]