XenDesktop Planning Guide:
Hosted VM-Based
Resource Allocation
Overview

One of the first things that must be determined with designing virtual desktop solution based on the hosted VM-based virtual desktop is resource allocations. Because this type of virtual desktop is sharing CPU and memory resources with other virtual desktops, the allocation of resources can have an impact on the rest of the XenDesktop design. Knowing the user breakdown between light, normal, power and heavy users will help guide the overall design as it directly relates to hypervisor scalability, hardware selection, storage requirements, etc.

This planning guide provides resource allocation recommendations for users running Windows 7 or Windows XP virtual desktops.

Guidelines

The goal for proper resource allocation is to grant the right amount of resources to users so when users are at peak usage they are not constrained by lack of resources. This is extremely important as most users expect their virtual desktop to perform as well as their traditional desktop.

Most recommendations for virtual desktop resource allocation focus on overall averages. However, when determining the levels to grant to particular user groups, it is imperative that the maximum RAM usage is taken into account instead of the average. Most users will consume more RAM as the day progresses because

1. Users have more applications open
2. Previously used applications fail to release RAM properly
3. Applications have memory leaks that consumes more memory while in use

As can be seen in the graph, a user’s RAM consumption (red line) slowly increases throughout the day while the processor utilization (blue line) remains sporadic.

Based on this, it is important to calculate RAM usage at maximum. It is also important to note that CPU and IO activity does not correlate to the growing need for RAM. These resources are more sporadic. Even though RAM increases consistently throughout the day, CPU and IO...
utilization remains sporadic.

Based on this analysis, it is important to follow a few guidelines when creating resource allocation requirements

- **CPU Allocation**
  - Most virtual desktops should only be configured with a single vCPU. Most user-based applications are only single-threaded and will not benefit from a multiple CPU configuration.
  - Many user applications do not require significant amounts of processing, which negates the need for more CPU power.
  - By allocating multiple vCPUs for each virtual desktop, extra resources are required to switch requests across the different vCPUs.

- **Memory Allocation**
  - Users should be granted the maximum amount of RAM instead of average
  - Memory ballooning/overcommit/dynamic memory should be disabled as it creates a negative risk to the overall user experience.

In addition to the general guidelines around CPU and Memory allocation, the user requirements must be taken into account, which plays an even greater role in proper allocation. Certain users often access multiple applications, some of which have high resource requirements, while other users work with a limited number of applications. Most organizations can group the users into four distinct categories

<table>
<thead>
<tr>
<th>User Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Light</strong></td>
<td>One or two applications no browser-based activity</td>
</tr>
<tr>
<td><strong>Normal</strong></td>
<td>Multiple applications with limited browser-based activity</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>Many simultaneous applications with extensive browser-based activity and Internet-based applications.</td>
</tr>
<tr>
<td><strong>Heavy</strong></td>
<td>Few applications but have heavy system resource requirements. Data processing, compiling, or graphics manipulation are common applications.</td>
</tr>
</tbody>
</table>

By determining the user distribution within an organization, planning for hardware, scalability and the underlying infrastructure requirements is possible.

**Planning**

Most XenDesktop implementations have a percentage of users in each category (Light, Normal, Power and Heavy), with the distribution skewed to the low-to-middle part of the spectrum with most users falling into the normal user category. With the four categories defined, resources must be incorporated to help in the design and planning of the environment.
Based on the breakdown of light, normal, power and heavy users, and following the CPU and memory allocation guidelines, the following table provides recommendations for resource allocation for estimating purposes.

**Note:** Each implementation will have different resource requirements. Proper testing should be done to generate results that more closely resemble the environment.

<table>
<thead>
<tr>
<th>User Group</th>
<th>Operating System</th>
<th>vCPU Allocation</th>
<th>Memory Allocation</th>
<th>Avg IOPS (Steady State)</th>
<th>Estimate Users/Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>Windows XP</td>
<td>1</td>
<td>768MB-1 GB</td>
<td>3-5</td>
<td>10-12</td>
</tr>
<tr>
<td></td>
<td>Windows 7</td>
<td>1</td>
<td>1-1.5 GB</td>
<td>4-6</td>
<td>8-10</td>
</tr>
<tr>
<td>Normal</td>
<td>Windows XP</td>
<td>1</td>
<td>1-1.5 GB</td>
<td>6-10</td>
<td>8-10</td>
</tr>
<tr>
<td></td>
<td>Windows 7</td>
<td>1</td>
<td>1.5-2 GB</td>
<td>8-12</td>
<td>6-8</td>
</tr>
<tr>
<td>Power</td>
<td>Windows XP</td>
<td>1</td>
<td>1.5-2 GB</td>
<td>12-16</td>
<td>6-8</td>
</tr>
<tr>
<td></td>
<td>Windows 7</td>
<td>1-2</td>
<td>2-3 GB</td>
<td>15-25</td>
<td>4-6</td>
</tr>
<tr>
<td>Heavy</td>
<td>Windows XP</td>
<td>1</td>
<td>2 GB</td>
<td>20-40</td>
<td>4-6</td>
</tr>
<tr>
<td></td>
<td>Windows 7</td>
<td>2</td>
<td>4 GB</td>
<td>25-50</td>
<td>2-4</td>
</tr>
</tbody>
</table>

**Note:** The IOPS estimate is an average of the steady state (when the user is logged onto the virtual desktop), it is not the peak average, which also takes into account boot ups, logons and logoffs happening at the same time.

**Note:** Although light users typically use one or two applications, those applications are typically line-of-business applications. Even though light users are impacting the CPU heavily, the line-of-business applications often consume significant amounts of memory. These users might be better suited for a hosted shared desktop model via XenApp to lessen hardware requirements as they might not need a unique Windows desktop.

The guidelines for the different user groups help in estimating the scalability of a particular physical server. For example, if 50% of the users are split between Normal and Power users we have an average of 2.5 GB of RAM for Windows 7. If the server is configured with 64 GB of RAM, the most we can possibly get from a RAM perspective is

\[
\frac{\text{Server RAM} - \text{Hypervisor Overhead}}{\text{Average RAM Per Desktop}} = 24 \text{ Desktops}
\]

However, that 8 core server could support a maximum of

\[(\text{Cores per Server} - 1) \times \text{Avg Users Per Core} = 49 \text{ Desktops}\]

In order to bring RAM and processor into alignment, the server should be configured with 126 GB of RAM.

**Note:** Each hypervisor requires CPU and RAM to function properly. On average, the hypervisor will need 2-5 GB of RAM. As the size of the physical server increases, so too does the overhead. It is also advisable to reserve 1 CPU for hypervisor processing, which helps mitigate the risk of over-allocating CPUs.

**Note:** Due to the sporadic nature of desktop sessions, it is advisable not to over allocate or fully allocate CPUs.
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