Sub-capacity (Virtualization) License Counting Rules

Using Operating System (OS) Commands and BIOS Settings on x86 servers to Limit Processor Cores Available

NOTE: Please use these rules along with the Sub-capacity licensing attachment

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Summary of Virtualization Capacity Licensing Requirements

- Customers must:
  - Agree to the terms of the Sub-capacity Attachment, and follow Virtualization Capacity License Counting rules for their Eligible Virtualization Environment(s)
  - Use Eligible Sub-capacity Products
  - Use Eligible Virtualization Technologies
  - Use Eligible Processor Technologies
  - Use the IBM License Metric Tool (ILMT) and maintain report documentation
    - Tivoli Asset Discovery for Distributed V7.2 (TADd) may be used in lieu of IBM License Metric Tool V7.2
    - Certain ILMT / TADd use exceptions may apply

**PLEASE NOTE:**
- The above is only a summary. For details about sub-capacity licensing requirements, see the Sub-capacity Attachment and other information referred to above, at Passport Advantage Virtualization Capacity website
- Customers are responsible for the installation of the IBM License Metric Tool and for the server it runs on.
OS Commands and BIOS Settings for x86 Servers - Definitions

- **OS Commands** – Executing OS Commands to limit the number of processor cores available on the server.
  
  - A x86 architecture OS may allow users to limit the number of processor cores available on the server by issuing OS commands

  - Users should refer to the users manual of their OS for the instructions and support of such commands
    - *See the examples in the Backup section of this presentation*

- **BIOS Settings** - Changing BIOS settings to limit the number of processor cores available on the system

  - A x86 architecture server may allow users to limit the number of processor cores available on the server by changing BIOS settings.

  - Users should refer to the users manual of their systems for the instructions and support for changing BIOS settings
License counting in a x86 Server using OS Commands to limit processor core capacity available

For above example, the PVU Virtualization Capacity licensing requirement is based on the maximum number of physical cores available to a product in each server.

<table>
<thead>
<tr>
<th>Cores to License</th>
<th>Server 1</th>
<th>Virtualization Capacity</th>
<th>Full Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAS</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>
License counting in a x86 Server using BIOS settings to limit processor core capacity available

- BIOS setting limits cores available to OS
- Activated Cores in Server

For above example, the PVU Virtualization Capacity licensing requirement is based on the maximum number of physical cores available to a product in each server

<table>
<thead>
<tr>
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<th>Full Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAS</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

License counting using BIOS setting

- Eligible BIOS settings can be used to limit processor core capacity available to the OS
- License PVUs for the maximum number of physical cores available to the product in each server
OS Commands and BIOS Settings for x86 Servers - Licensing Rules

The PVU Virtualization Capacity licensing requirement is based on the maximum number of physical cores available to a product in each server.
The licensing rules in the preceding pages reflect how ILMT will operate to calculate PVUs.

If ILMT does not yet support a Eligible Virtualization Environment, or you qualify for an exception to use ILMT, you will need to follow the Manual Calculation of Virtualization Capacity.

The Manual Calculation of Virtualization Capacity rules can be found in the following pages.

To find out if a Eligible Virtualization Technology is supported by ILMT visit Passport Advantage Sub-capacity licensing information.
Manual Calculation of Virtualization Capacity

- **Eligibility Criteria:** Customers must use the IBM License Metric Tool, with the following exceptions
  - ILMT does not support the Eligible Virtualization Environment
  - Customer has fewer than 1000 employees and contractors - Tool recommended
  - Customer server Full Capacity licensing for a PVU product is less than 1000 PVUs (on servers with an Eligible Virtualization Environment) - Tool recommended

- **Requirements:** For the above exceptions, customers must manually manage, track and prepare Audit Reports
  - An Audit Report must be prepared at least once per quarter and identify the following detail: Each Eligible Sub-Capacity Product deployed in each Eligible Virtualization Environment
  - An Eligible Virtualization Environment can be a Single Server or a Group of Servers (Server Cluster)
  - In addition to the above detail, the report should provide a summary total of the required number of PVUs by and for each Eligible Sub-Capacity Product
  - Audit Reports must be prepared as frequently as is required to maintain a history of increases to Virtualization Capacity and Full Capacity
  - Each Audit Report must be **signed and date stamped**, at least once per quarter

*The above is only a summary. For detailed terms please see the [Passport Advantage Sub-capacity licensing information](#).*
Manual Calculation of Virtualization Capacity – Rules

The PVU Virtualization Capacity licensing requirement is based on the maximum number of physical cores available to a product in each server.
Worksheet has 3 tabs; use the following tabs

- Instructions & Information
- Single Server

Web Link: Worksheet for Manual Calculation of Virtualization Capacity

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# Manual Calculation of Virtualization Capacity - Worksheet Example

**VIRTUALIZATION ENVIRONMENT - SINGLE SERVER**

- This worksheet is for one standalone server for one Software Product
- Per the Instructions on the first tab, you may choose to leverage this approach or develop / leverage your own processes and reporting format so long as you capture all the mandatory information below

**Enter data in input fields below (shaded area)**

<table>
<thead>
<tr>
<th>Date of this Audit Report</th>
<th>IBM WEBSPHERE APPLICATION SERVER - NETWORK DEPLOYMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5724-H60</td>
</tr>
<tr>
<td>Product Name</td>
<td>IBM WEBSPHERE APPLICATION SERVER - NETWORK DEPLOYMENT</td>
</tr>
<tr>
<td>Program Identification Number</td>
<td>5724-H60</td>
</tr>
<tr>
<td>P/N Description</td>
<td>IBM WEBSPHERE APPLICATION SERVER - NETWORK DEPLOYMENT</td>
</tr>
<tr>
<td>Part Number</td>
<td>PROCESSOR VALUE UNIT (PVU)</td>
</tr>
<tr>
<td>Server ID / Location</td>
<td>D55WJLL</td>
</tr>
<tr>
<td>Server Vendor / Brand</td>
<td>Server ID # F6015: Bldg 1, Room 1, Somers, NY</td>
</tr>
<tr>
<td>Server Model</td>
<td>IBM System x</td>
</tr>
<tr>
<td>Virtualization Technology used</td>
<td>VMware ESX 3.5</td>
</tr>
<tr>
<td>Processor Technology (Vendor, Brand, Type, Model#)</td>
<td>Intel Xeon Quad Core Model 35XX</td>
</tr>
<tr>
<td>PVUs per core</td>
<td>70</td>
</tr>
<tr>
<td>Total Activated Cores on Server</td>
<td>8</td>
</tr>
<tr>
<td>Full Capacity PVUs for Server</td>
<td>560</td>
</tr>
</tbody>
</table>

**VM, Partition ID**

(whatever identifier used for any subdivision of a server such as LPAR #, IP address, hostname, etc.)

<table>
<thead>
<tr>
<th>VM, Partition ID</th>
<th>Cores (B) per Partition or VM</th>
<th>User Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Sum of Virtual Cores: 12
PVUs per core: 70
Virtualization Capacity PVUs by Product for Server: 840
PVU Licenses required by Product for Server: 560

* Mandatory Field

(A) PVUs required for each physical processor core are listed on the PVU table (link below, including vendor/brand designations)

(B) For purposes of Manual Calculation of Virtual Capacity, 1 virtual core (or CPU) is equivalent to 1 physical core. Enter values in whole cores.

(C) Lower of Full Capacity or Virtualization Capacity

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**Web Link:**

Worksheet for Manual Calculation of Virtualization Capacity

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Key Web Links

- **PVU**
  - PVU table and other information

- **Sub-capacity**
  - Passport Advantage Sub-capacity licensing information
  - Virtualization Capacity License Counting Rules
  - Sub-capacity licensing attachment
BACKUP
OS Command for x86 Servers - Examples

- **OS Commands** – Executing OS Commands to limit the number of processor cores available on the server.
  - A x86 architecture OS may allow users to limit the number of processor cores available on the server by issuing OS commands
  - Users should refer to the users manual of their OS for the instructions and support of such commands
  - Examples provided as a reference only

  - **Linux Example**
    - Change the grub.conf file for Linux
    - • Method 1: run “nano /etc/grub.conf” command and add “maxcpus=#” to kernel module option
    - • Method 2: run "echo "0" > /sys/devices/system/cpu/cpuN/online" to deactivate core nr N
      Hint: you can verify number of physical cores active in Linux OS box by executing below command:
      ```
      # cat /proc/cpuinfo | egrep "core id|physical id" | tr -d "\n" | sed s/physical/\nphysical/g | grep ^-v | sort | uniq | wc -l
      ```

  - **Windows Example**
    - Change the boot.ini or BCD (Boot Configuration Data) files on Windows
    - • Method 1: run „BCDefit.exe /set numproc #” command
    - • Method 2: run “msconfig” command->select “BOOT.INI” tag->select “Advanced options”->enter core number for «NUMPROC

See screenshots on next three pages
Linux OS command to limit cores

```
# grub.conf generated by anaconda
#
# Notice that you do not have to rerun grub after making changes to this file
# NOTICE: You have a /boot partition. This means that
# all kernel and initrd paths are relative to /boot/, eg.
# root (hd0,0)
# kernel /vmlinuz-version ro root=/dev/VolGroup00/LogVol00
# initrd /initrd-version.img
#boot=/dev/sdc
default=0
timeout=5
splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title Red Hat Enterprise Linux Server (2.6.18-128.el5xen)
    root (hd0,0)
    kernel /xen.gz-2.6.18-128.el5
    module /vmlinuz-2.6.18-128.el5xen ro root=/dev/VolGroup00/LogVol00 rhgb quiet maxcpus=2
    module /initrd-2.6.18-128.el5xen.img
```

Option limits cores available to the OS to 2 cores

Command validates that only 2 cores are available to the OS
Windows OS command to limit available cores

```
C:\Users\Administrator>bcdedit /set numproc 2
The operation completed successfully.
```

Command limits cores available to 2 cores
Windows OS command to limit available cores

Command for boot.ini file updates

Setting limits cores available to 2 cores