



IBM Passport Advantage Software

Sub-capacity (Virtualization) License Counting Rules HP Virtualization Environment

NOTE: Please use these rules in conjunction with the [Sub-capacity licensing attachment](#)

April 7, 2009

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Sub-capacity Licensing Requirements Summary

- ▶ 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
 - ▶ Certain ILMT 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 Sub-capacity licensing information](#)*
- *Customers are responsible for the installation of the IBM License Metric Tool and for the server it runs on.*

Definitions & Parameters

■ Cell:

- A cell or cell board is a module that primarily houses processors, memory, and the cell controller application-specific integrated circuits (ASICs). Up to four processor (chips) are contained in a cell.

■ Hard Partition (nPar)

- Offer electrical and software isolation. Each nPar contains one or more cells (containing processors and memory) that are assigned to the partition for its exclusive use.
- Absolute minimum is one cell. The cell does not have to be fully populated (e.g. can have just one processor (chip)).
- Any changes to the number of cores requires a reconfiguration and reboot of the hard partition

■ Virtual Partition (vPar)

- are separate operating system instances on the same nPartition or system with operating system, application, and resource isolation.
- HP-UX 11i Virtual Partition enable you to dynamically move processing power between vPars as your workload requirements change.
- You can allocate cores to a vPar down to a granularity of a single core
 - Absolute minimum number of cores = 1. Per vPar minimum number of cores is configurable. Changes to the per-vPar minimum requires a reboot of the vPar.
 - Absolute maximum number of cores for a vPar = (Total number of cores on the system minus number of cores associated with other vPars on the system). Per vPar maximum number of cores is configurable. Changes to the per-vPar maximum requires a reboot of the .

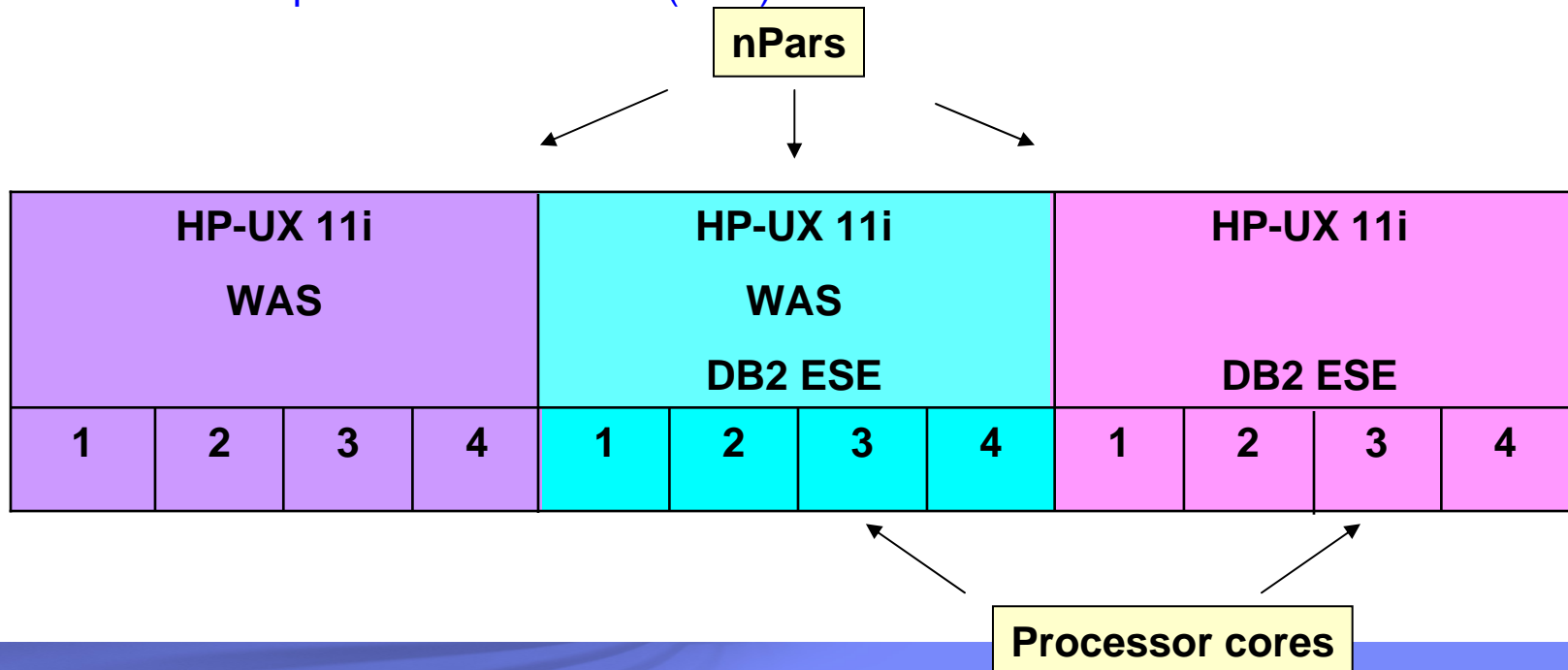
Definitions & Parameters

■ HP Integrity Virtual Machines

- Is a software partitioning product that provides virtualization of resources, shared CPU, shared I/O, and resourcing based on demand and entitlement for HP Integrity servers running HP-UX
- HP Integrity VM provides the ability to allocate CPU and I/O to an application at a granularity less than that of the physical hardware yet keeps applications separate from one another in their own operating system instance.
- Integrity VM virtualizes the processing cores and software for the guest operating systems running on “virtual CPUs” in the virtual machine. A virtual CPU represents no more than one processor core.
- You can allocate cores to a Integrity VM down to a granularity of a single core
 - Absolute minimum of vCPUs (cores) = 1 core
 - Current absolute maximum of vCPUs (cores) = 4 cores
 - The entitlement (share of physical core per vCPU) may be changed dynamically in a range from 5% to 100%. This does not impact licensing. A single physical core can support up to 20 virtual machines

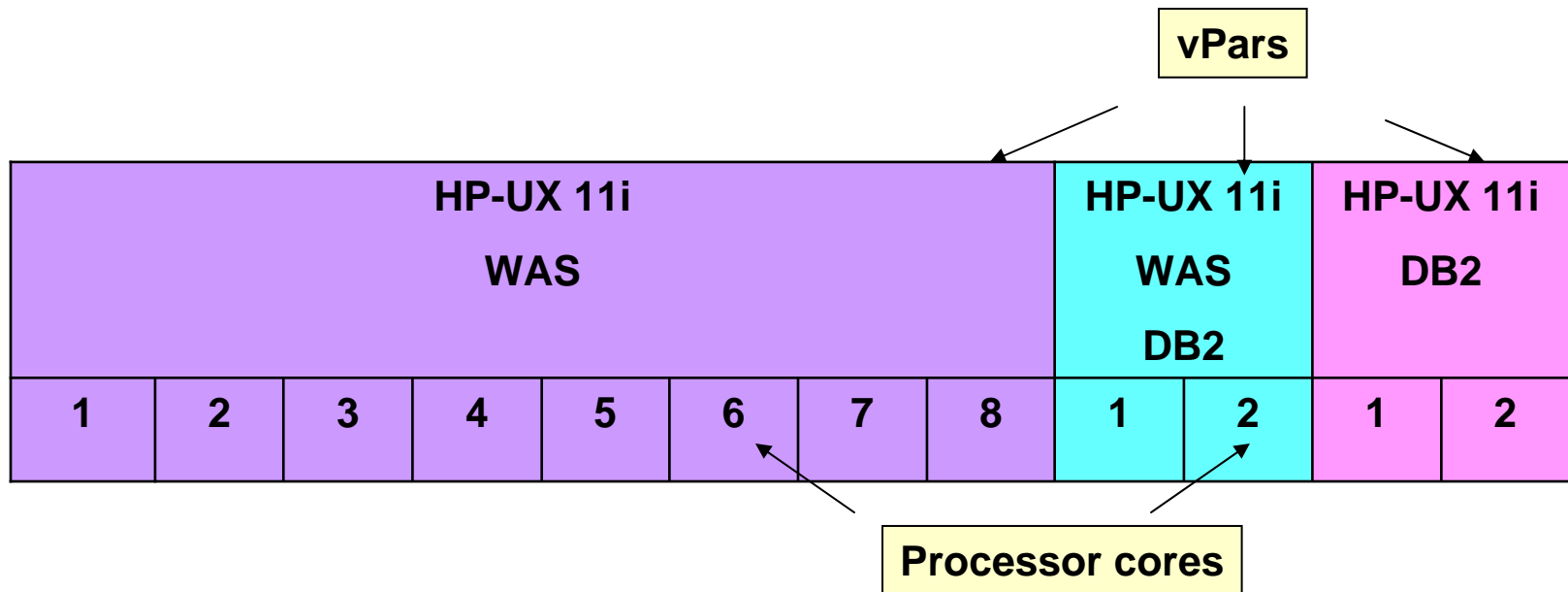
License Counting: HP-UX nPars

- License entitlements required are based on processor core capacity available to the software in the nPartitions (nPars)
- Each nPAR has a minimum of 1 Cell. A cell or cell board is a module or housing that may contain up to four processors (chips).
 - Note: Each nPar in this example has a Cell with 4 single-core processors, for a total of 4 cores per nPar and 12cores for server
- For the example below:
 - **WebSphere Application Server (WAS):** PVUs for 8 cores need to be licensed
 - **DB2 Enterprise Server Edition (DB2):** PVUs for 8 cores need to be licensed



License counting: HP-UX static vPars

- License entitlements required are based on processor core capacity available to the software in the Virtual Partitions (vPars)
- For the example below:
 - **WAS**: PVUs for 10 cores need to be licensed
 - **DB2**: PVUs for 4 cores need to be licensed





License counting with dynamic vPars (I)

- HP-UX OS provides the capability to dynamically move processor core resources between vPars (Virtual Partitions).
- Customer must acquire PVUs for the highest* number of processor core capacity available to the IBM software
- Example:

Customer's basic configuration:

WAS 10
DB2 4

HP-UX 11i WAS								HP-UX 11i WAS DB2		HP-UX 11i DB2	
1	2	3	4	5	6	7	8	1	2	1	2

Changed for batch peak:

WAS 10
DB2 4

HP-UX 11i WAS									HP-UX 11i WAS DB2	HP-UX 11i DB2	
1	2	3	4	5	6	7	8	9	1	1	2

Changed for simulation:

WAS 10
DB2 6

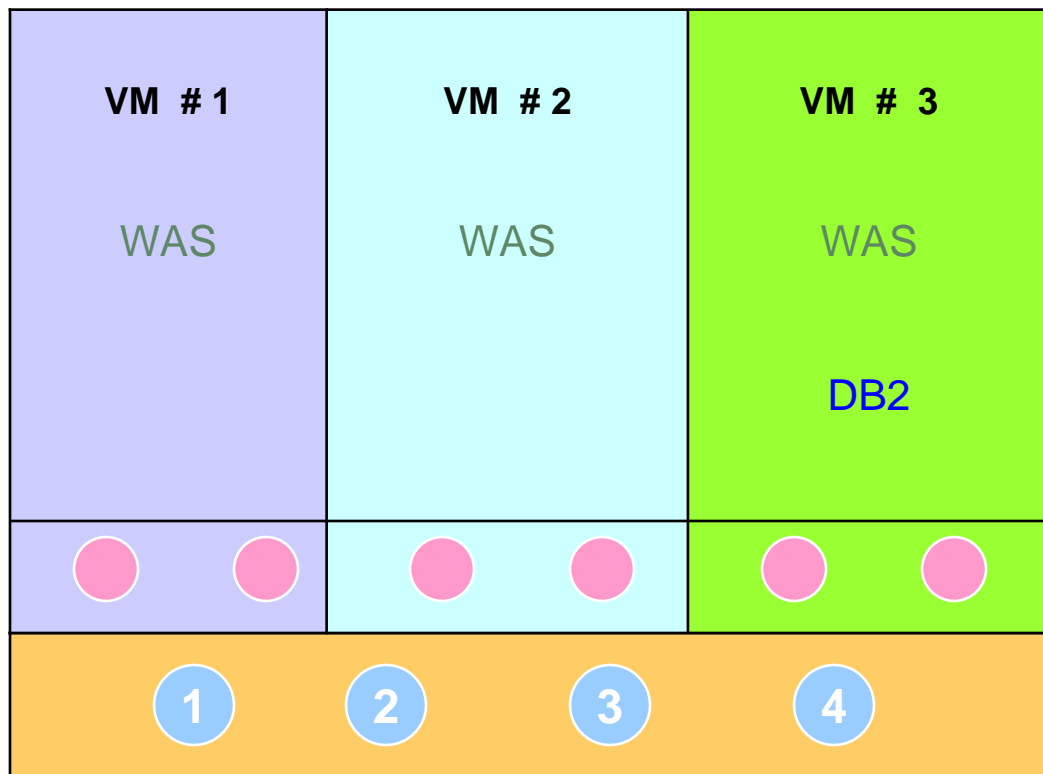
HP-UX 11i WAS						HP-UX 11i WAS DB2				HP-UX 11i DB2	
1	2	3	4	5	6	1	2	3	4	1	1

- License PVUs for 10 WAS cores (consistent throughout) + 6 DB2 EE cores (from Configuration B)

* Maximum number of cores per-vPar

License Counting – Integrity Virtual Machine (on HP-UX 11i v2 host)

Server with 4 processor cores



Cores to be licensed

WAS	DB2	Virtual CPUs	Integrity VM
2		2	VM # 1
2		2	VM # 2
2	2	2	VM # 3
6	2		Total
4	4		Capacity limit
4	2		Total cores to license

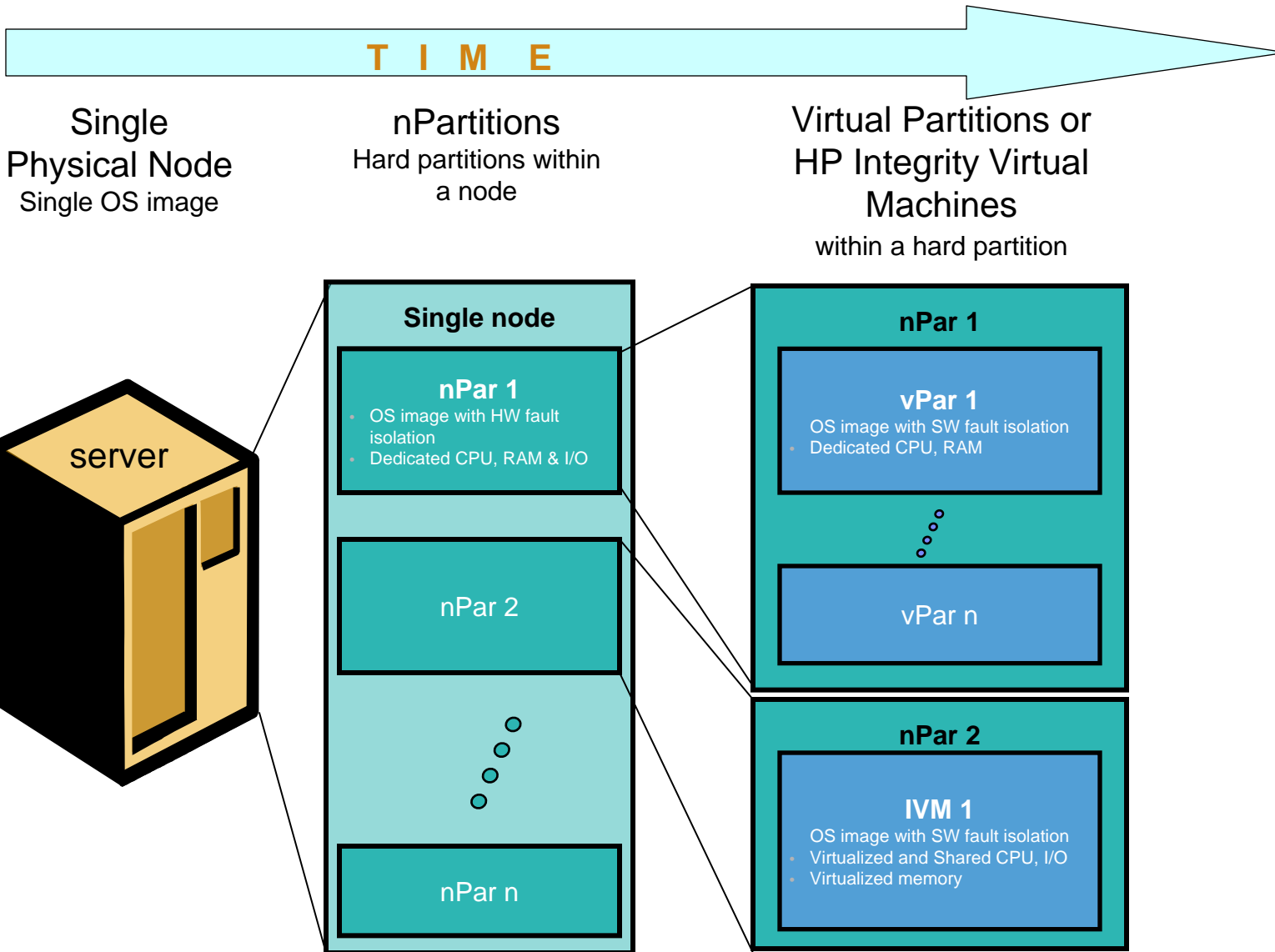
License rule: the lower of the sum of each VM for a product or the processor core capacity of the server

← 6 Virtual CPUs

← 4 Physical Cores in the Server

Note: Each Virtual CPU is equal to 1 processor core

HP Virtualization Technology - HP Virtual Server Environment





ILMT Licensing Counting Rules – for Single Server Environments

License Rules for nPAR, vPAR & Integrity VM for each product:

- for a nPAR, maximum processor core capacity available to the nPAR
- for a vPAR, the highest* amount of processor core capacity available to the vPAR
 - lower of the sum of the vPAR or the processor core capacity of the nPAR they reside in
- for Integrity Virtual machine the maximum number of Virtual CPU in a VM. Each Virtual CPU is equal to 1 processor core.
 - lower of the sum of the VMs or the processor core capacity of the nPAR they reside in

Lower of the sum of the processor cores for the above or the capacity of the server

*** The greater of what the vPAR starts with or the result of a dynamic change in processor core capacity (Maximum per-vPar number of cores)**

- 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 [Sub-capacity licensing attachment](#)

Manual Calculation of Virtualization Capacity – Rules

For Single Server Environments:

License Rules for nPAR, vPAR & Integrity VM for each product:

- for a nPAR, maximum processor core capacity available to the nPAR
- for a vPAR, the highest* amount of processor core capacity available to the vPAR
- for Integrity Virtual machine the maximum number of Virtual CPU in a VM. Each Virtual CPU is equal to 1 processor core.

**The greater of what the partition starts with or the result of a dynamic change in processor core capacity (Maximum per-vPar number of cores in whole cores)*

The PVU licensing requirement is based on the maximum number of virtual processor cores in the nPARs, vPARs and VMs available to a product (lower of the sum of the virtual cores or the server capacity)

If you want to use sub-capacity licensing for any other HP technology, including lower of the sum of VMs or the nPAR they reside in, you must use the ILMT tool

Manual Calculation of Virtualization Capacity - Worksheet Example

**Worksheet has 3 tabs;
use the following tabs**

- Instructions & Information
- Single Server

Web Link: Worksheet for
Manual Calculation of
Virtualization Capacity

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 of the information below		
- Enter data in input fields below (shaded area)		* Mandatory
Date of this Audit Report *	March 31, 2009	
Product Name *	IBM WEBSHERE APPLICATION SERVER NETWORK DEPLOYMENT	
Program Identification Number (57xx-xxx)	5724-H88	
P/N Description	IBM WEBSHERE APPLICATION SERVER NETWORK DEPLOYMENT PROCESSOR VALUE UNIT (PVU)	
Part Number	D55WJLL	
Server ID / Location	Server ID # F6015; Bldg 1, Room 1, Somers, NY	
Server Vendor / Brand	IBM System x	
Server Model	xxxxx	
Virtualization Technology used *	VMware ESX 3.5	
Processor Technology (Vendor, Brand, Type, Model#) * (A)	Intel Xeon Quad Core Model 35XX	
PVUs per core * (A)	70	
Total Activated Cores on Server * (C)	8	
Full Capacity PVUs for Server * (C)	560	
DO NOT DELETE ROW		
VM, Partition ID * (whatever identifier used for any subdivision of a server such as LPAR #, IP address, hostname, etc.)	Cores (B) per Partition or VM *	User Comments
A	4	
B	4	
C	2	
D	2	
Sum of Virtual Cores *	12	
PVUs per core *	70	
Virtualization Capacity PVUs by Product for Server *	840	
PVU Licenses required by Product for Server * (C)	560	
* Mandatory Field		
(A) PVU's required for each physical processor core are listed on the PVU table (see link below, including vendor/brand designations) http://www-01.ibm.com/software/lotus/passportadvantage/pvu_licensing_for_customers.html		
(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		

▶ ▶ \ Instructions + Information \ **Single Server** \ Group of Servers "Cluster" /

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](#)