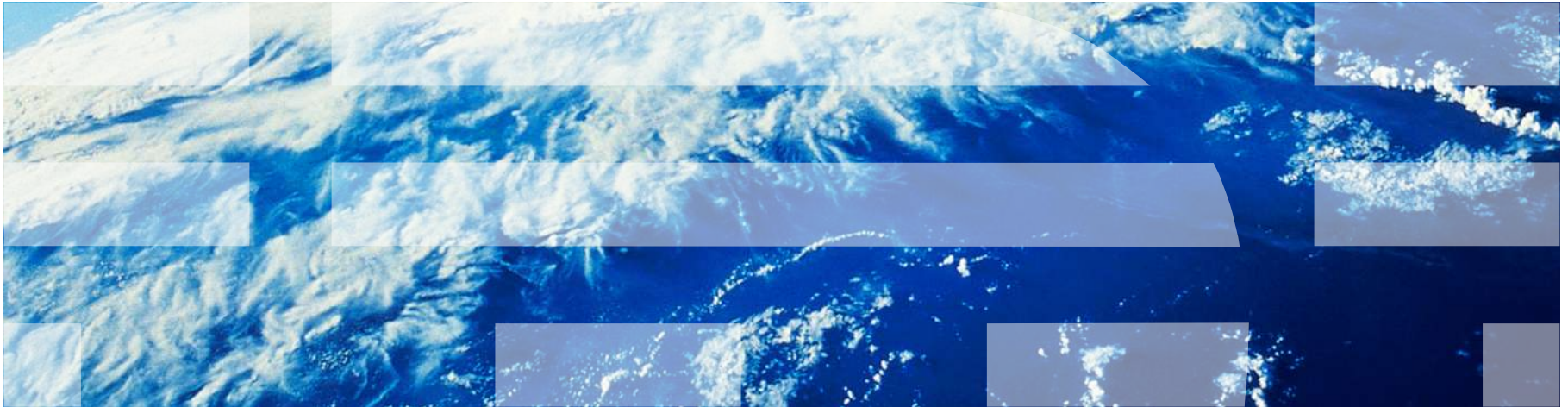IBM

Software Licensing in a Virtualized Environment

Focusing on Passport Advantage Software

Agenda

- **Introduction to server virtualization**

- **Licensing basics for a virtualized server**

- **Determining the number of cores to license**

- **Sub-capacity eligibility of virtualization technologies**

- **IBM License Metric Tool introduction**

- **Licensing basics for a virtualized server cluster**

- **Benefits to IBM's software licensing**

Current as of Oct. 2009

What is a Virtualized Server?

- Virtualization…provides a logical rather than physical view of data, computing power, storage capacity, and other resources. -- Jonathan Eunice, Illuminata Inc.

- A technique for hiding the physical characteristics of computing resources from the way in which other systems, applications, or end users interact with those resources -- Wikipedia

BENEFITS
- Higher utilization

- Increased Flexibility (provisioning / scalability)

- Reduce energy requirements

- Lower TCO

Link to: **Brief Server Virtualization Video from InfoWorld**

What is a Virtualized Server?

Server 1	
PAR 1	**PAR 2**

Virtual Cores ▶	4	4
Physical Cores ▶	8	
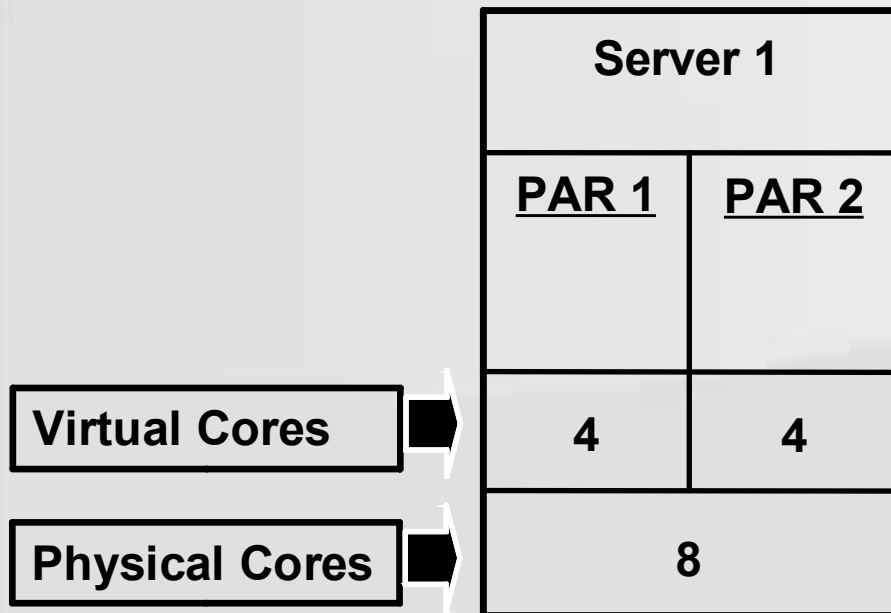
Server Virtualization allows you to take a large server and divide it into independent smaller (logical/virtual) servers as partitions (LPARs, VMs, etc.) that share resources such as processor cores, memory, storage, etc.

There are many virtualization technologies available

- **Most virtualization vendors implement similar concepts, but use different terms to describe them**
  - Technical details in implementations may vary

- **A partial list of some leading virtualization technologies:**

  - PowerVM (IBM)
  - LPAR (IBM)
  - z/VM (IBM)
  - VMware ESX, VMotion (VMware)
  - Hyper-V (Microsoft)

  - Containers/Zones (Sun)
  - Integrity VM (HP)
  - Xen (Open source)
  - KVM (Open Source)
  - Etc.

- **For SW licensing, virtualization only impacts PVU-based offerings**

See the Sub-capacity Licensing website for information on supported virtualization technologies

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Sub-Capacity (Virtualization Capacity) Licensing Overview

▸ **Full capacity licensing**

 – Customers acquire licenses for all the physical processor cores

▸ **Sub-capacity (Virtualization Capacity) licensing**

 – Customers acquire licenses for the lower of Virtualization Capacity or Full Capacity of the server, or group of servers

   • Virtualization Capacity is the sum of the virtual core capacity available to a product

 – Sub-capacity license counting rules differ by Virtualization Technology, see specific rules for your Virtualization Technology environment:
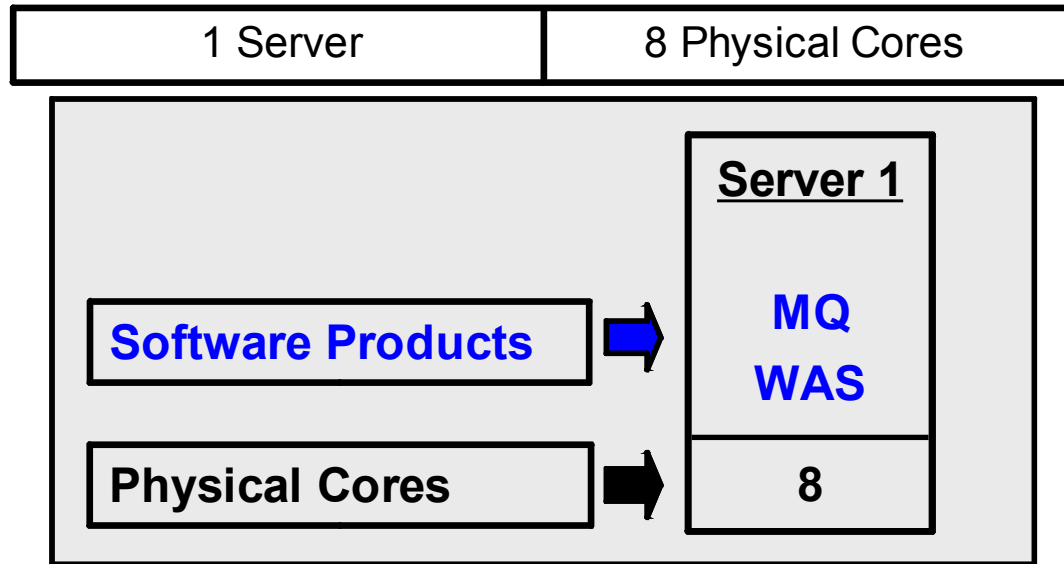
   Virtualization Capacity License Counting Rules

<div style="border:1px solid black; text-align:center;">

Examples of Licensing Scenarios Follow

</div>

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Summary of Sub-capacity Licensing Requirements

- **Customers using sub-capacity licensing must:**
  - Agree to the terms of the Sub-capacity Attachment
    - Follow Virtualization Capacity License Counting Rules for the 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

- ***Customers are no longer required to submit reports to IBM!***

See the Sub-capacity Licensing website for information on supported virtualization technologies

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Full Capacity: Physical Cores on One Server

1 Server	8 Physical Cores

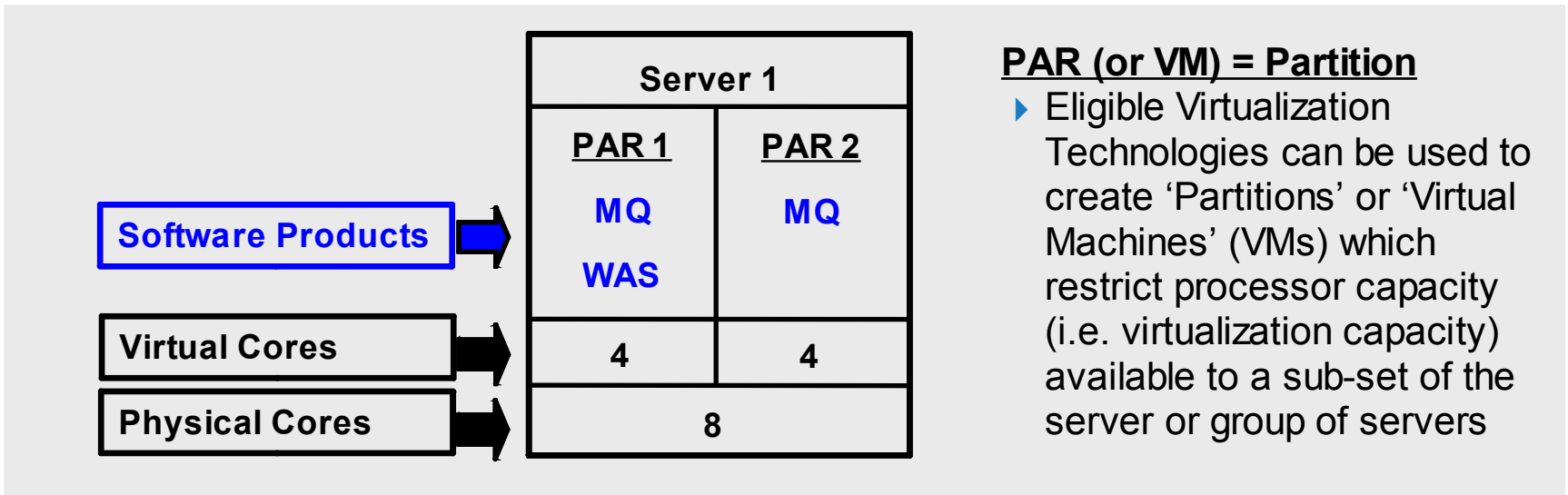|	**Server 1**
Software Products ➡	**MQ** **WAS**
Physical Cores ➡	**8**

▸ Customers must acquire licenses for the Full Capacity (all physical processor cores) in the server available to the software products:

Cores to License	Full Capacity
MQ software	8
WebSphere software	8

Sub-capacity: Virtual Cores on One Server

1 Server	8 Virtual Cores	8 Physical Cores

Software Products ➡

Virtual Cores ➡

Physical Cores ➡

Server 1	
PAR 1	**PAR 2**
MQ	MQ
WAS	
4	4
8	

PAR (or VM) = Partition
▸ Eligible Virtualization Technologies can be used to create 'Partitions' or 'Virtual Machines' (VMs) which restrict processor capacity (i.e. virtualization capacity) available to a sub-set of the server or group of servers
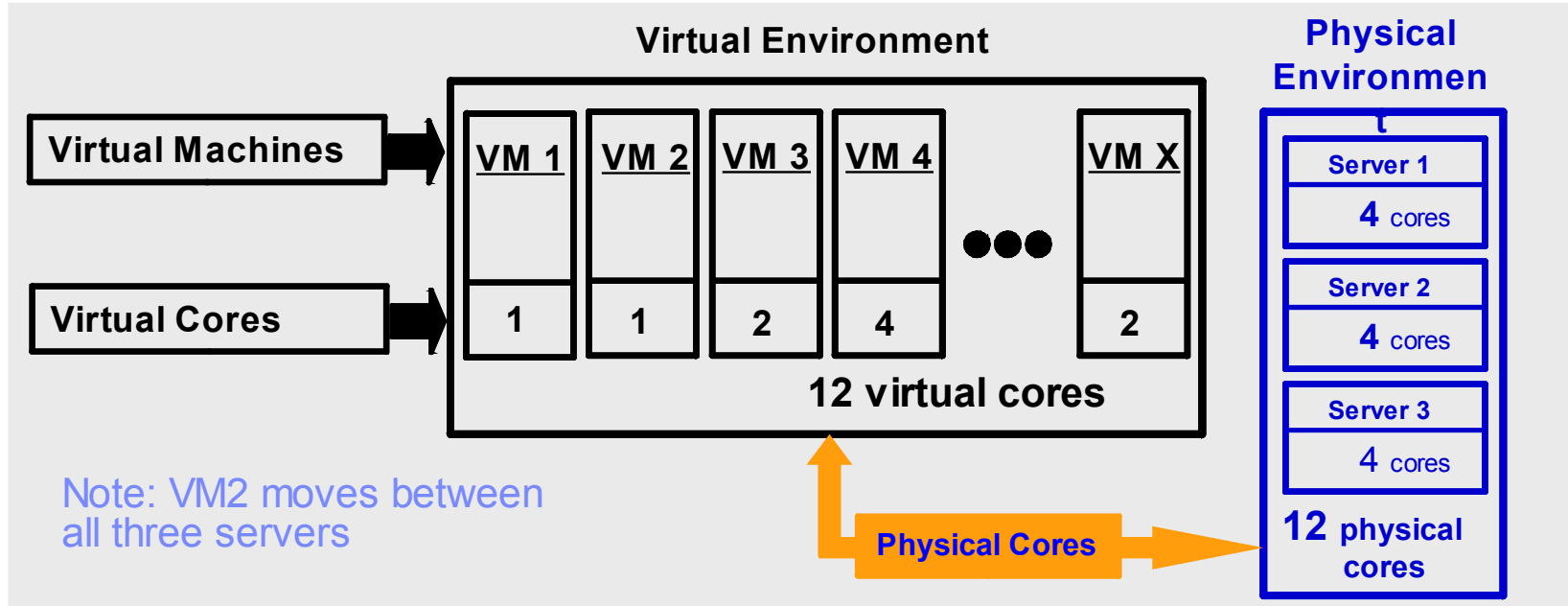
▸ License for the lower of Virtualization Capacity (using LPARs, Partitions, Virtual Machines) or Full Capacity available in the Server.

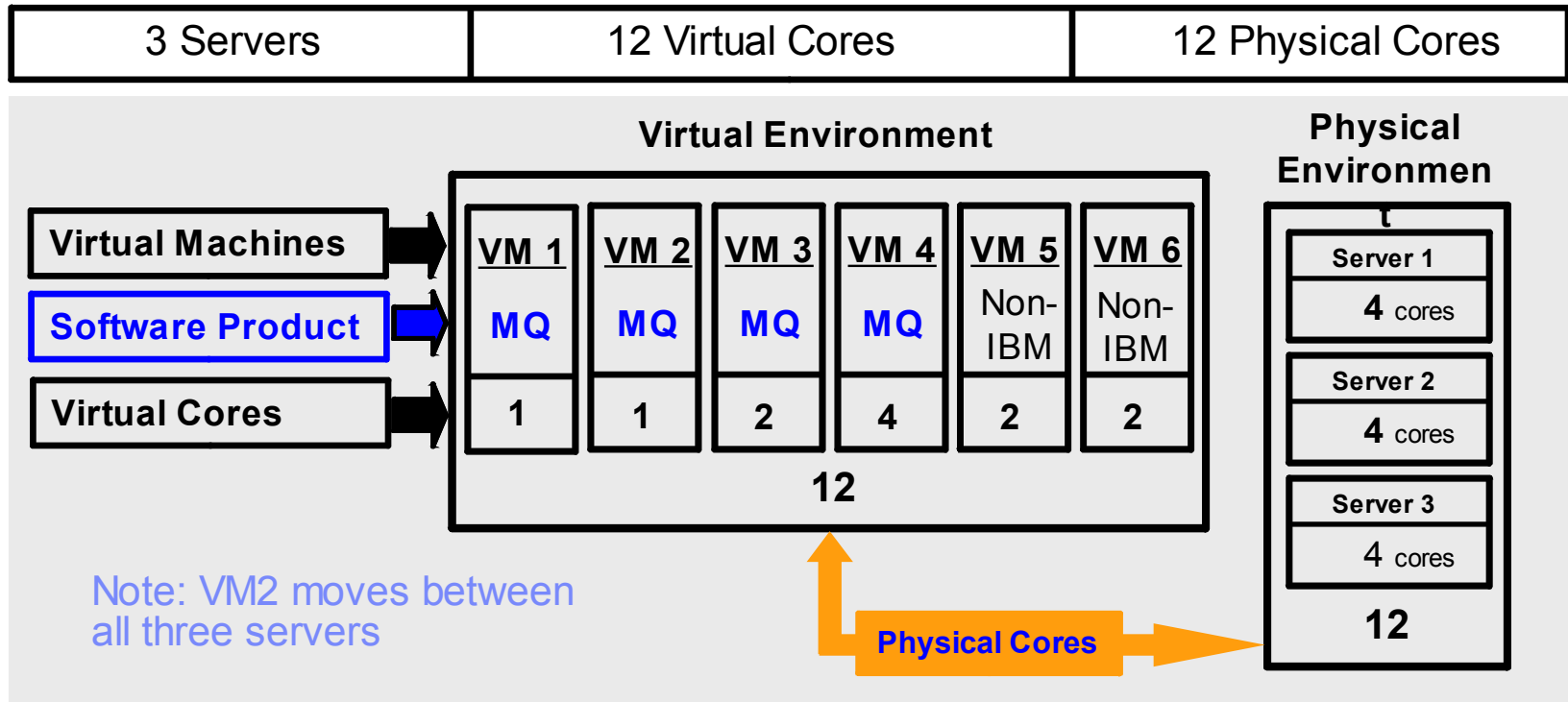| Cores to License	PAR 1	PAR 2	Sub-cap	Full Cap
MQ software	4	4	8	8
WebSphere software	4	--	4	8

What is a Virtualized Server Cluster?

- A group of locally networked servers that
  - Are centrally managed by a logical pool of resources (processor cores, storage, network etc.)
  - Provides resources, including processor cores, to each of the VMs
- Virtualization Technology could dynamically move VMs between servers in the cluster
  - Example: VMware VMotion virtualization provides this movement capability
- Licensing views the "Cluster" as the server (example on next page)

Virtual Environment

Physical Environmen

| Virtual Machines | VM 1 | VM 2 | VM 3 | VM 4 | | VM X |
| Virtual Cores | 1 | 1 | 2 | 4 | ••• | 2 |

12 virtual cores

Note: VM2 moves between all three servers

Physical Cores

Server 1
4 cores

Server 2
4 cores

Server 3
4 cores

12 physical cores

Virtualization Capacity : Virtual Cores on Server Cluster

(This example is applicable for selected Virtualization Technologies only)

3 Servers	12 Virtual Cores	12 Physical Cores

Virtual Environment

Physical Environment

Virtual Machines →	VM 1	VM 2	VM 3	VM 4	VM 5	VM 6
Software Product →	MQ	MQ	MQ	MQ	Non-IBM	Non-IBM
Virtual Cores →	1	1	2	4	2	2

12

Server 1
4 cores

Server 2
4 cores

Server 3
4 cores

12

Note: VM2 moves between all three servers

Physical Cores →

▸ License for the Virtualization Capacity (using Virtual Machines) or Full Capacity available in a group of servers (Cluster)

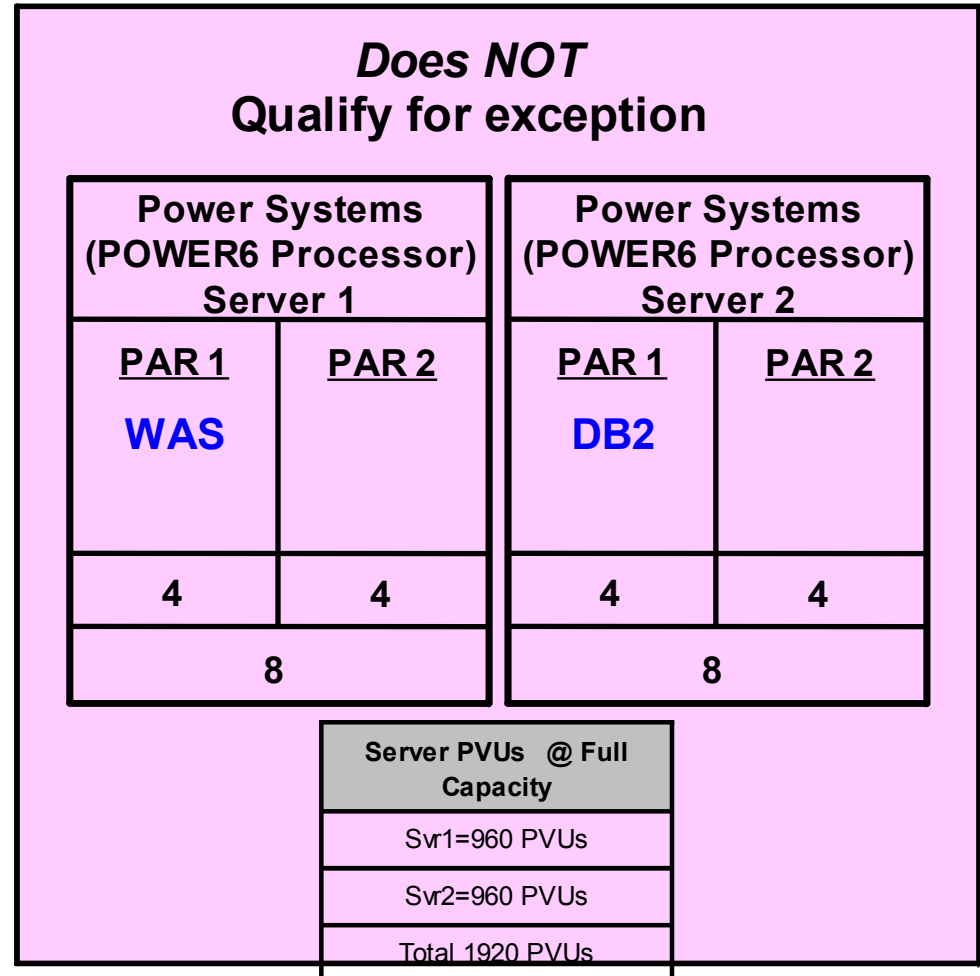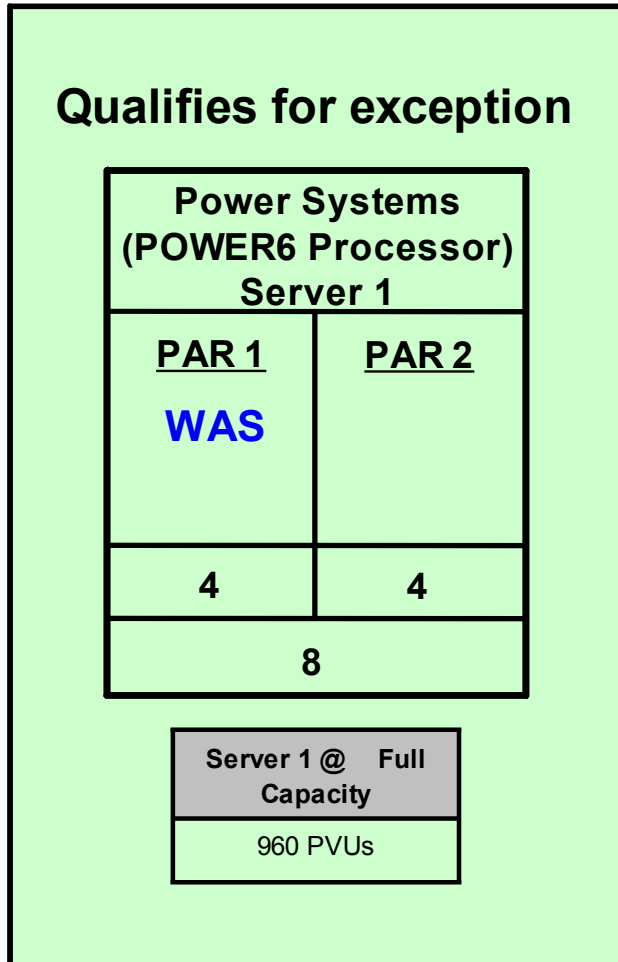| MQ software	VM 1	VM 2	VM 3	VM 4	VM 5	VM 6	Sub-cap	Full Cap
Cores to license	1	1	2	4	--	--	8	12

Current as of Oct. 2009

IBM License Metric Tool (ILMT)

- **Mandatory for PVU Virtualization Capacity environments, <u>except</u> when:**
  - ILMT does not yet support an eligible Virtualization Technology (e.g. VMware today)
  - Enterprise has fewer than 1,000 employees and contractors worldwide
  - Full Capacity measurement of all servers running sub-capacity licenses is less than 1,000 PVUs
    - See next page for examples
  - Deployed Tivoli License Compliance Manager v2.3 (with 4Q08 Fix Pack)
- **For above exceptions, customers must count manually using IBM template**
- **ILMT and/or Manual calculation records must be maintained for at least 2 years**
  - If audited, provide saved reports to IBM's third party auditors
  - These reports are not submitted to IBM
- **Recommended for Full Capacity PVU environments**
- **Benefits:**
  - Helps customers measure PVU licenses required, by software product
  - Can help customers maintain an audit ready posture
  - Essential for optimization of RISC/Unix virtualization technologies

Recommended for Full Capacity, Required for Virtualization Capacity

1,000 PVU ILMT Exception Example

Full Capacity measurement of all servers running sub-capacity licenses is less than 1,000 PVUs

Qualifies for exception

Power Systems (POWER6 Processor) Server 1	
PAR 1	**PAR 2**
WAS	
4	4
8	

Server 1 @ Full Capacity
960 PVUs

Does NOT Qualify for exception

Power Systems (POWER6 Processor) Server 1		Power Systems (POWER6 Processor) Server 2	
PAR 1	**PAR 2**	**PAR 1**	**PAR 2**
WAS		DB2	
4	4	4	4
8		8	

Server PVUs @ Full Capacity
Svr1=960 PVUs
Svr2=960 PVUs
Total 1920 PVUs

Eligibility of New Virtualization Technologies

- ***IBM has the best licensing coverage for virtualization in the industry!***

- **Many virtualization technologies are eligible for sub-capacity licensing**

  - However, there are some that are not eligible for sub-capacity licensing

- **Always check to be sure:**

  - Your virtualization technology is eligible for sub-capacity, and

  - Whether ILMT supports the planned virtualization technology

- **You can check these on the Sub-capacity Licensing website**

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Sub-capacity 2009 Enhancements

- **Nearly all PVU-based products now eligible for sub-capacity licensing**
  - Only those that won't run in a virtual environment aren't eligible
- **Elimination of the 2 part number structure (full cap vs. sub-cap)**
  - Existing full cap part numbers now apply to both full cap and sub-cap
  - Customers' existing PVU entitlements can be used for either full cap or sub-cap
  - Customers' S&S entitlements will be converted at next S&S renewal after July 1, 2009

- **To use these products in sub-capacity mode a customer must first agree to the sub-cap terms per the Sub-capacity Attachment to the PA Agreement**

- **Benefits of these changes:**
  - Offers a complete IBM Software PVU portfolio for those customers who are virtualizing
  - Simplifies license ordering/tracking for both customers and IBM
  - Eliminates the need for conversions of existing licenses when deploying in a sub-cap environment

More Sub-capacity 2009 Enhancements

- **Expansion of eligible virtualization technologies**

  – Citrix Xen Server virtualization

  – Red Hat Enterprise Linux (Xen) virtualization

  – Microsoft Hyper-V virtualization

  – VMware Server 2.0

  – Operating System commands and BIOS settings

  – The above technologies will be supported in ILMT during 2H 2010

- **PowerVM and VMware ESX now supported by ILMT (V7.2)**

  – Customers running these technologies must now use ILMT

- **Benefits of these changes:**

  – Allows customers to expand the use of sub-capacity licensing to more workloads

  – Increased flexibility to use the most appropriate virtualization technology

  – Eliminates the need for conversions of existing licenses when deploying in a sub-cap environment

  IBM has the best licensing support for virtualization in the Industry!

Current as of Oct. 2009

Benefits of PVUs and Sub-capacity Licensing

▸ **Licensing to the core (or IFL on System z)**

– More granular measure of processor capacity available

– Better surrogate for the value a client receives from IBM products

▸ **PVU licensing**

– Flexible structure allows licensing to more closely track to the value a customer can receive from processor capacity available to software

– Licenses are transferable across systems

▸ **Sub-capacity licensing**

– Allows customers to license only to the maximum number of processor cores available to be used by the VM, not the entire physical server (or cluster)

– Customers can leverage virtualization technologies to optimize their system design and improve their overall TCO

Virtualization Capacity Resources

Passport Advantage Virtualization Capacity (Sub-capacity) Licensing
http://www-306.ibm.com/software/lotus/passportadvantage/subcaplicensing.html

IBM License Metric Tool (ILMT)
http://www-306.ibm.com/software/lotus/passportadvantage/
**ibmlicensemetrictool.html**

Processor Value Unit (PVU) Resources

Passport Advantage PVU Licensing
http://www-01.ibm.com/software/lotus/passportadvantage/
pvu_licensing_for_customers.html

Backup

Current as of Oct. 2009

Processor Definition is Important in Middleware Licensing

- The core is the functional unit on which software executes
  - Multi-core chips have more than one processor core on the chip

Single-core Chip

Processor Core   1

Chip

Socket

Quad-core Chip

Processor Core   1   2   3   4

Chip
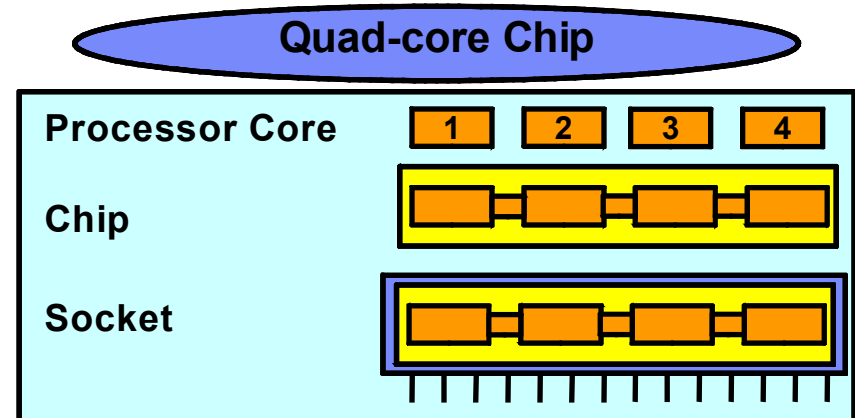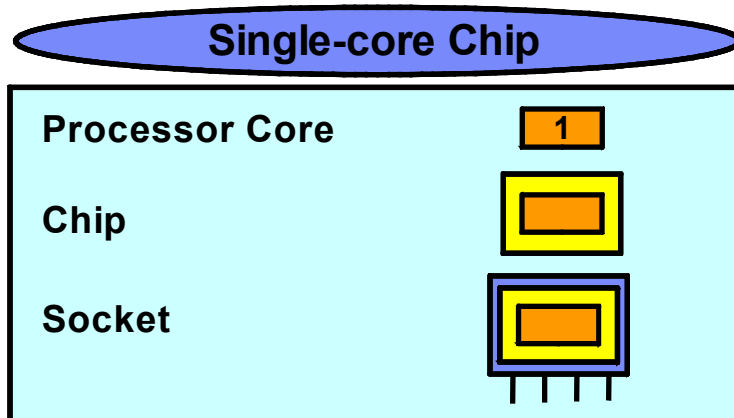
Socket

IBM Software continues to define processor = core

- IBM Systems i, p, z and Power Systems also define a processor as a core
  - Do not need to adjust the processor count for these systems

- Other server vendors define a processor as a core or a socket, and their processor counts must be adjusted for the number of cores on the chip

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