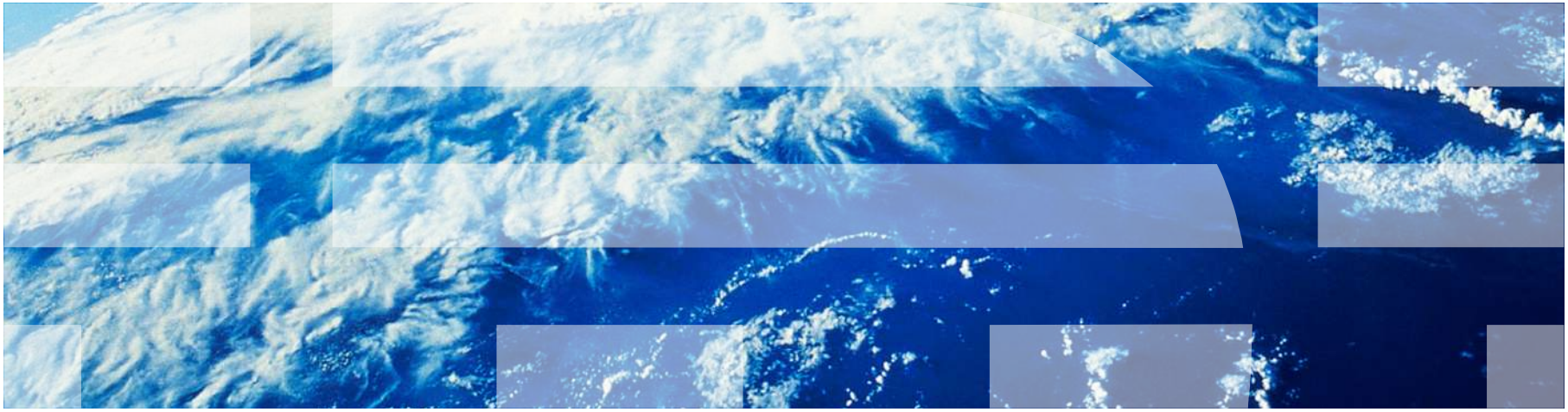
Software Licensing in a Virtualized Environment



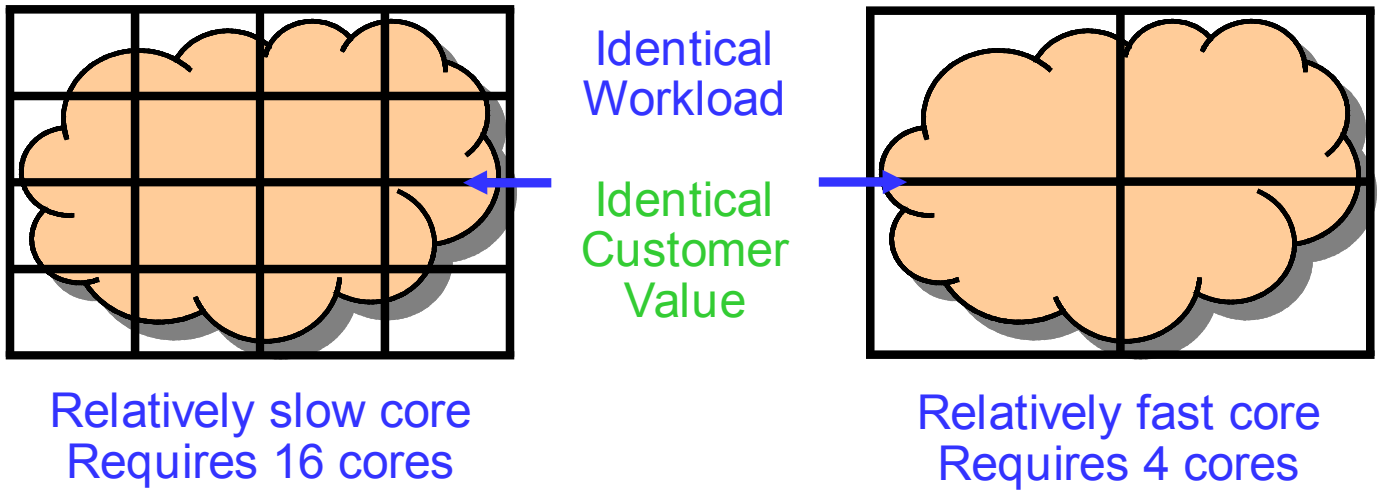
Agenda

- **Processor Value Unit (PVU) summary**
- **Virtualization (sub-capacity) licensing summary**
- **Determining the number of cores to license**
- **IBM License Metric Tool introduction**
- **Benefits to IBM's software licensing**

Processor Value Unit (PVU) basic concepts

- Cores have a wide variety of performance characteristics
  - For a given workload, would need more slow cores than faster cores
  - But regardless of the core type, the value is the same to the customer

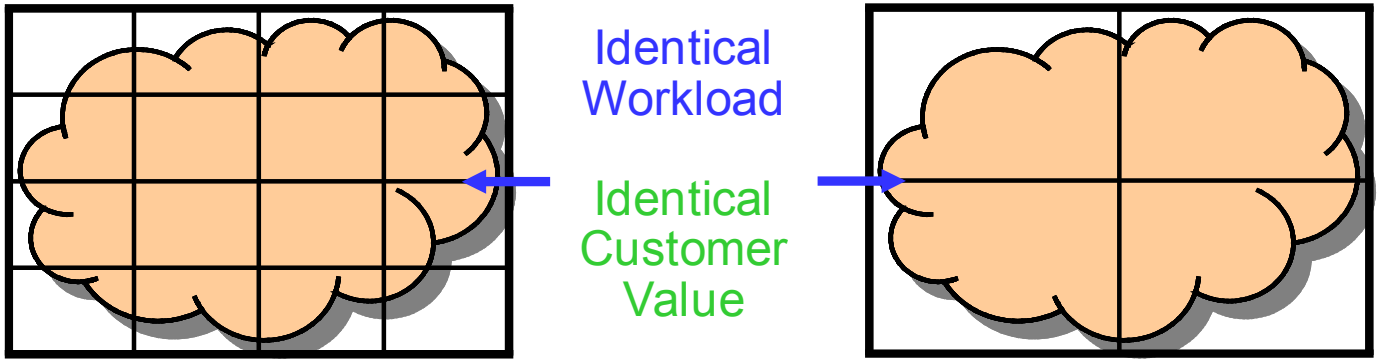
- In a perfect world, middleware price for any workload would be the same on all core technologies



- License to the workload capacity

Customers benefit when migrating to newer HW technology with PVUs

- Customers benefit as they move to newer processor core technology with a lower total number of licenses



Cost per workload decreases on newer processor technology

Processor cores are assigned to PVU tiers

Note: this is an excerpt only. For complete table see link at the bottom right.

Processor Technologies											
Processor Vendor	Processor Brand			Processor Type						Processor Model Number	PVUs per Core
	Processor name	Server model numbers	Maximum number of sockets per server	Cores per socket					IFL Engine		
				One-Core (1)	Dual-Core (2)	Quad-Core (4)	Hexa-Core (6)	Octi-Core (8)			
IBM	POWER7	770,780	8			■	■	■		All	120
		750,755	4				■	■		All	100
	POWER6	550,560,570, 575,595	All		■					All	120
		520, JS12,JS22, JS23,JS43	All		■					All	80
	POWER5, POWER4	All	All		■					All	100
	System z10[1]	All	All						■	All	120
HP / Intel®	Itanium® 1,2	All	All		■					All	100
	PA-RISC	All	All		■					All	100
Sun / Fujitsu	SPARC64 VI, VII	All	All		■	■				All	100
	UltraSPARC IV	All	All		■					All	100
	UltraSPARC T2	All	All			■	■	■		All	50
Any	Any single-core	All	All	■						All	100

Processor Technologies									
Processor Vendor	Processor Brand		Processor Type						PVUs per Core
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			One-Core (1)	Dual-Core (2)	Quad-Core (4)	Hexa-Core (6)	Octi-Core (8)		
Intel®	Xeon® (Nehalem EP)	2		■	■			3400 to 3599 5500 to 5599	70
	Xeon® (pre-Nehalem)	All		■	■	■		3000 to 3399 5000 to 5499 7000 to 7499	50
AMD	Opteron	All		■	■	■		All Existing	50
Any	Any single-core	All	■					All Existing	100

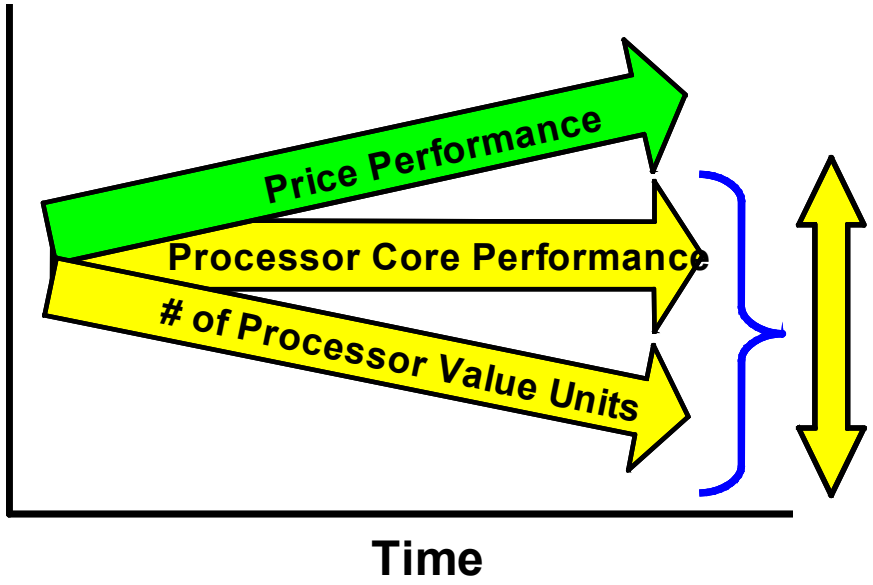
- Introduced July, 2006
- Each middleware program has a unique price per PVU
- PVUs are transferable among systems by product within the enterprise
- Acquire the appropriate number of PVUs for each processor core
- One per processor license equals 100 PVUs
- Structure consists of 6 tiers

* A complete list of PVUs by processor technology is available at the IBM PVU Website:
http://www-01.ibm.com/software/lotus/passportadvantage/pvu_licensing_for_customers.html

New core technologies reflect relative performance in the PVU structure

- Newly announced core technologies are evaluated across 5 industry-standard performance benchmarks
  - Reflect various workload types
  - Usually done with the assistance of the core technology vendor
  - PVU rating incorporates SW price performance improvements (a technology dividend)
- 9 new core technologies added since PVUs were announced
- PVU table has expanded to 6 tiers to better reflect relative performance of individual cores
- Process insures customers see a SW price performance improvement moving to new HW technology

Current table can always be found on PVU web page



Virtualization Capacity (Sub-Capacity) Licensing Overview

- **Full capacity licensing**
  - Customers acquire licenses for all the physical processor cores
  - The standard Passport Advantage agreement is full capacity only

- **Virtualization Capacity (Sub-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

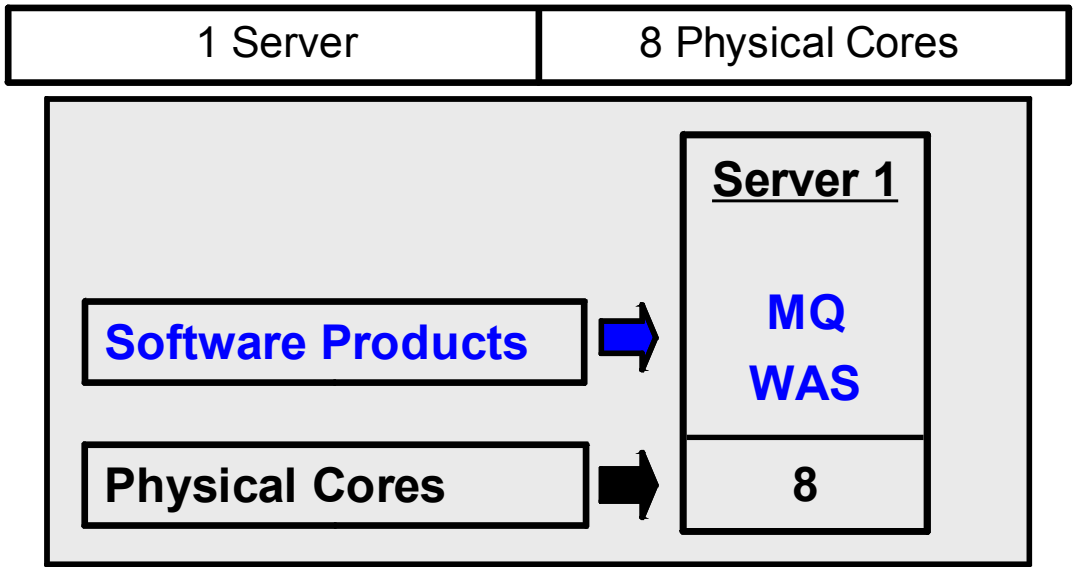
Examples of Licensing Scenarios Follow

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
    - Tivoli Asset Discovery for Distributed (TADd) may be substituted if the client wants full SW asset management
    - Other exceptions may apply. Details at the website below.
- ***Customers do not submit reports to IBM!***

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

Full Capacity: Physical Cores on One Server

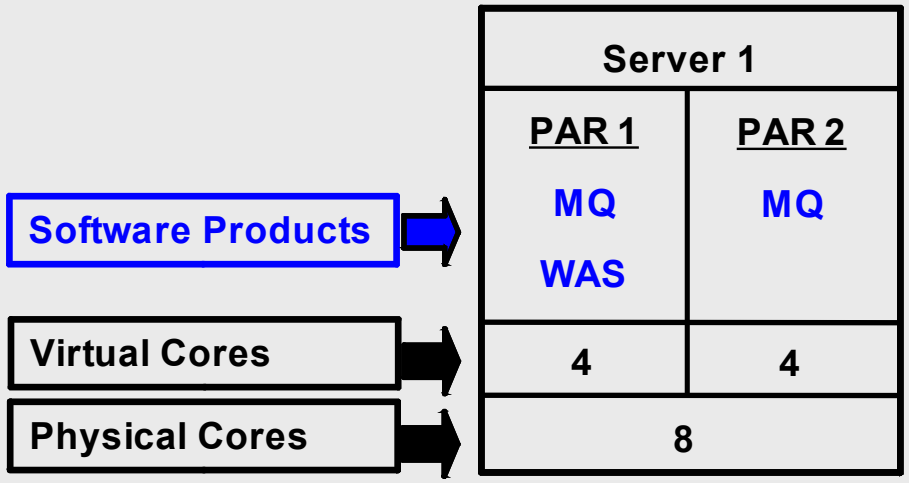


- Customers must acquire licenses for the Full Capacity (all physical processor cores) in the server available to the software products:

Cores to License	Full Capacity
MQ software	8
WebSphere software	8

Virtualization Capacity: Virtual Cores on One Server

1 Server	8 Virtual Cores	8 Physical Cores



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

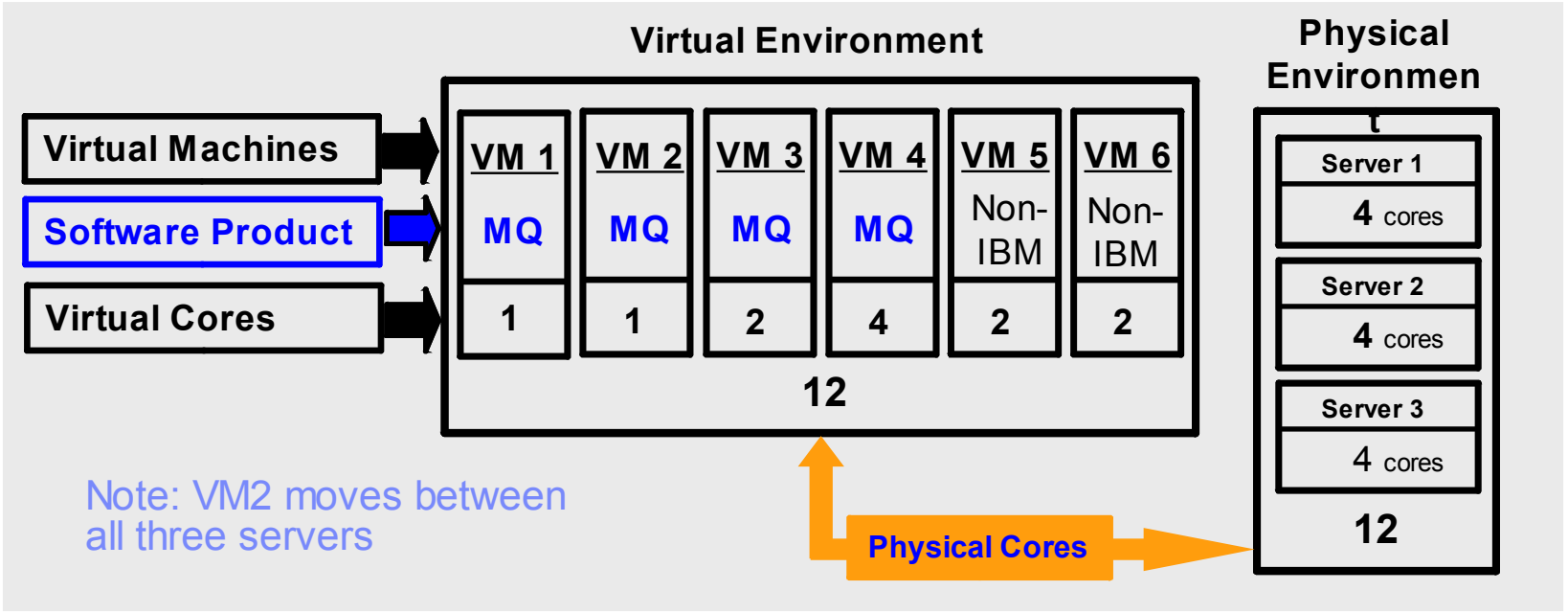
- License for the lower of Virtualization Capacity (using LPARs, Partitions, Virtual Machines) or Full Capacity available in the Server.

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

Virtualization Capacity : Virtual Cores on Server Cluster

(This example is applicable for selected Virtualization Technologies only)

3 Servers	12 Virtual Cores	12 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

IBM License Metric Tool (ILMT)

- Mandatory for PVU Virtualization Capacity environments, except when:
  - ILMT does not yet support an eligible Virtualization Technology
    - Customers must count manually using IBM template
  - Deployed Tivoli Asset Discover for Distributed (TADd)

- 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

Eligibility of New Virtualization Technologies

- **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**

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

Benefits of PVUs and Virtualization 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
- **Virtualization 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

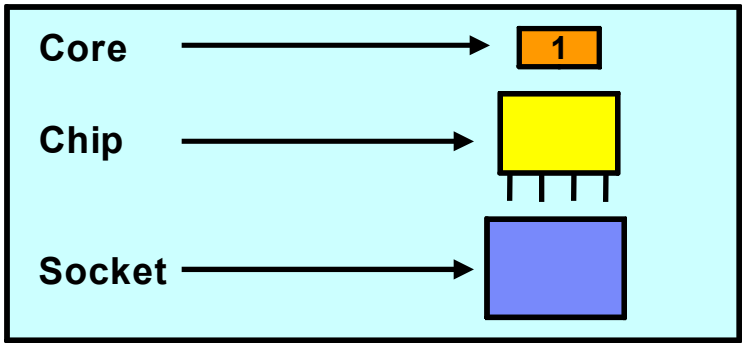
Passport Advantage PVU Licensing
http://www-01.ibm.com/software/lotus/passportadvantage/pvu_licensing_for_customers.html

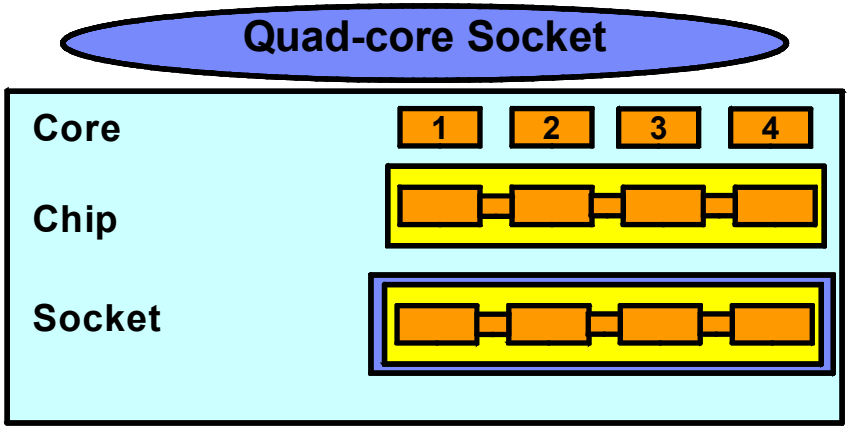

Thank you!

Backup

Processor Definition is Important in Middleware Licensing

- Multi-core chips have more than one core on the chip
- More sockets on the server means higher scalability is possible





- Each chip is plugged into a socket receptacle on the server

IBM Software continues to license based on the number of *cores (PVUs per core)*

Virtualization Capacity Eligible Virtualization Technologies

- IBM PowerVM (AIX / i5os): LPAR, DLPAR, Shared Proc Pools, Micro-Partitioning, System WPAR, PowerVM Live Partition Mobility
- IBM System z (with Linux): LPAR, zVM
- Sun / Fujitsu (Solaris): Dynamic System Domains, Containers/Zones inside DSD
- HP Integrity (HPUX): nPar, vPar & Integrity VM
- x86 Intel / AMD (Linux and Windows):
  - Citrix Xen Server virtualization
  - Red Hat Enterprise Linux (Xen) virtualization
  - Microsoft Hyper-V virtualization
  - VMware virtualization
  - Operating System commands and BIOS settings to limit processor core capacity

List current as of Feb 9, 2010