



Stay ahead of the curve

Software Licensing Metrics: The Challenge in a Multicore Environment

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Agenda

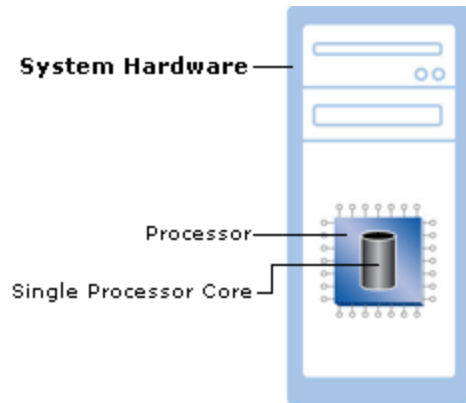
- Definitions
- Why is CPU-based licensing a problem?
- Key stakeholders
- Licensing comparison & examples from ISVs
- Alternate license models
- Personal experience
- Recommendations

Definitions

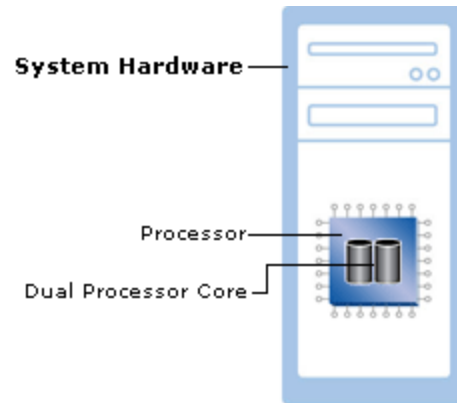
- Multicore processors
- Multithreading
- Virtualization
- Grid computing

Multicore Processors

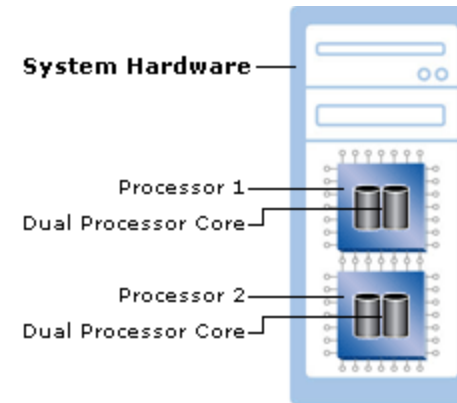
One CPU
One Core



One CPU
Two Cores



Two CPUs
Two Cores (each)



Source: Microsoft "[Multicore Processor Licensing](#)", Updated: June 7, 2005

Multithreading

- Multithreading refers to running several processes at the same time or in parallel as opposed to sequentially.
- To take full advantage of the benefits offered by multicore processors, software applications need to be multithreaded.
- Oftentimes software applications are not multithreaded.
- *“Multicore is hard. There are ways to make it easier, but there’s a lot of history around sequential programming that makes it hard to move to multicore. A lot of code is written in a single-threaded way, and people don’t want to start from scratch and rewrite.” Tomas Evensen, CTO of Wind River Systems ¹*
- Therefore the performance gains realized by running software on multicore CPUs is sometimes restricted by the software design.

¹ In the article [“Dearth of Software Tools Could Stall Multicore Processing Onslaught”](#), published by InformationWeek, April 2, 2007

Virtualization

- Virtualization involves deploying software (i.e. VMWare) to partition a single physical machine into several independent (or virtual) machines.
- The result is more efficient utilization of the physical machine.
- Questions raised with CPU-based licensing metric:
 - > Determining the number of CPUs the software is deployed on.
 - > What if the software is not being used by all the processors (or cores) in the virtualized environment? Are full or fractional (per-CPU) license fees calculated?

Grid computing

- Grid computing involves deploying software to distribute pieces of a program across several machines that allow the separate machines to behave as if they were one.
- The result is workloads can be balanced and managed dynamically across multiple systems without the complexity of installing software on each individual system.
- Questions raised with CPU-based licensing metric:
 - > Determining the number of CPUs the software is deployed on.
 - > What if the software is not being used by all the servers in the grid but could be? Are license fees still applicable on every server / CPU / core in the grid?

Why is CPU-based licensing a problem?

- Hardware is evolving
 - > “CPU” is not easily defined
- Value of the software is not tied to the hardware
- Calculations required to determine a license price
- Not clear direction in the software industry regarding multicore environments

Key stakeholders

- ISVs
- Customers of ISVs
- Hardware vendors, esp. chip manufacturers

ISVs and their customers

- CPU-based licensing was common and acceptable several years ago
- Pricing / licensing needs to be simple, fair, predictable and measurable
- Determining a value-based license metric is challenging

Hardware vendors

- ISVs should not change licensing policies just because the hardware has evolved
- A CPU is a CPU is a CPU, regardless of the number of cores
- ISVs need to adapt and embrace new hardware technologies

Licensing Comparison

	Per-CPU Pricing	Per-Core Pricing	Other licensing options, charges
BEA	✓	✓	Uses primarily CPU-based licensing
BMC	✓		Policy has been made public but is not published
CA	✓		Offers annual subscription model, as well as per-CPU model
EMC	✓	No published policy	None offered
HP	✓	✓	None offered
IBM		✓	None offered
Microsoft	✓		Adds client access license charges for server products
Oracle		✓	Per-user pricing available
SAP	✓	No published policy	Most revenue comes from per-use licenses
Sun	✓		Per-employee subscriptions available
<i>Source: Forrester Report "What IT Sourcing Pros Need to Know About Multicore Software Pricing", Nov. 2006</i>			

Examples from ISVs

- Oracle
- IBM
- Microsoft
- BEA

Oracle

“As the software landscape continues to transform, we anticipate that software licensing will continue to transform along with it.”

Source: Oracle FAQ, [Multi-core Processors: Impact On Oracle Processor Licensing](#), Feb. 2007, page 3

Oracle

- Assigns “Processor Factors” to classes of CPUs

Oracle Processor Licensing:	Cores	Processor Factor	CPUs for SW (other than SE and SE One programs) Licenses
UltraSPARC T1	8	0.25	2
AMD / Intel	4	0.50	2
All other Multi-core Chips (IBM Pseries, SM, USIV, etc.)	2	0.75	2
Single Core Servers	1	1.00	1

Source: Oracle FAQ, [Multi-core Processors: Impact On Oracle Processor Licensing](#), Feb. 2007, page 1

Oracle

- Pricing example:

Oracle Processor Licensing:	Cores	Processor Factor	CPUs for SW (other than SE and SE One programs) Licenses
AMD / Intel	4	0.50	2

- An HP ProLiant DL145 G2 with two AMD Opteron 200 Series dual-core processors Model 280 will require
 $4 \text{ cores} * 0.5 \text{ processor factor} = 2 \text{ processor licenses}$

Source: Oracle FAQ, [Multi-core Processors: Impact On Oracle Processor Licensing](#), Feb. 2007, page 2

Oracle

“Oracle’s software pricing per processor has not increased for customers using dual-core processors. The effective price per processor has decreased.”

Source: Oracle FAQ, [Multi-core Processors: Impact On Oracle Processor Licensing](#), Feb. 2007, page 3

IBM

“Eventually, IBM will move toward a pay-per-use, “utility computing” model. “That’s the way we’re going to address virtualisation down the road,” Tieszen said. “We’re not announcing that today, but we’re definitely headed in that direction.”

IBM spokesman Jeff Tieszen, in the article “IBM plans revamp of server pricing”, published by [ZDNet UK](#), July 25, 2006

IBM

- Assigns “Processor Value Unit” to classes of CPUs

Table: Processor Value Units (PVUs) per Core

Processor ¹ Families			Processor Type					PVUs <i>per</i> Processor Core
Vendor	Brand	Number of cores	Single-Core	Dual-Core	Quad-Core	Hexa-Core	Octi-Core	
IBM	POWER6	2		■				120
IBM	POWER5	2		■				100
Fujitsu	SPARC64 VI	2		■				
HP	PA-RISC	2		■				
Intel®	Itanium®	2		■				
Sun	UltraSPARC IV	2		■				
IBM	System z	1	■ ²					
Any	Any single core	1	■					
IBM	PowerPC 970	2		■				50
IBM	POWER5 QCM	4			■			
AMD	Opteron	2,4		■	■			
Intel®	Xeon®	2,4		■	■			
Sun	UltraSPARC T2	4,6,8			■	■	■	
Sun	UltraSPARC T1	4,6,8			■	■	■	30

Notes: ¹IBM SW defines "Processor" as a Core

²One IFL or engine

Source: IBM, [Processor Value Unit \[PVU\] licensing for Distributed SW](#), Updated August 14, 2007

IBM

- Pricing example from IBM's [Value unit calculator](#):

Country/region [select] | Terms of use

IBM

Home | Products | Services & industry solutions | Support & downloads | My account

Software > Software and services online >

Value unit calculator

Value unit calculator

Guided mode | Expert mode

- Download or print the summary below.
- Use the action buttons below to edit or update the summary.
- Use the Start over button to make new selections from the beginning.

Value units summary							
Server vendor	Server brand	Processor vendor	Processor brand	Processor type	Value units per core	Processor core quantity	Total value units
x86 architecture							
HP	ProLiant	AMD	Opteron	Quad-core or Dual-core	50	<input type="text" value="2"/>	100
Your value units total							100

The Value Unit Table or the Value Unit Calculator tools are provided for your convenience. Errors in the tools are unintentional and will be corrected immediately upon being brought to IBM's attention. Should any such errors occur, this does not relieve customers from their responsibility to obtain licenses for, and to be in compliance with, the required level of authorized use for each program.

IBM

“When PVUs were initially introduced in July 2006, our focus was on converting customers from per processor to processor value units without changing customer prices for IBM middleware deployed on existing processors.”

Source: IBM, [“The advantages of Processor Value Units \[PVUs\]”](#)

Microsoft and BEA

- Microsoft
 - > No price differentiation for number of cores
- BEA
 - > Some price differentiation for number of cores

Effective license entitlements per processor

<u>Chip type</u>	<u>IBM</u>	<u>Oracle</u>	<u>BEA</u>
Single-core (all chips)	1.0	1.00	1.00
RISC dual-core	1.0	0.75	0.50
x86 dual-core	.5	0.50	0.50
RISC Sun T1 octi-core	.38	0.25	0.25

Source: Forrester Teleconference, "Multicore Software Licensing And Pricing: What You Need To Know Before Buying", Dec. 4, 2006

Challenges to multicore pricing

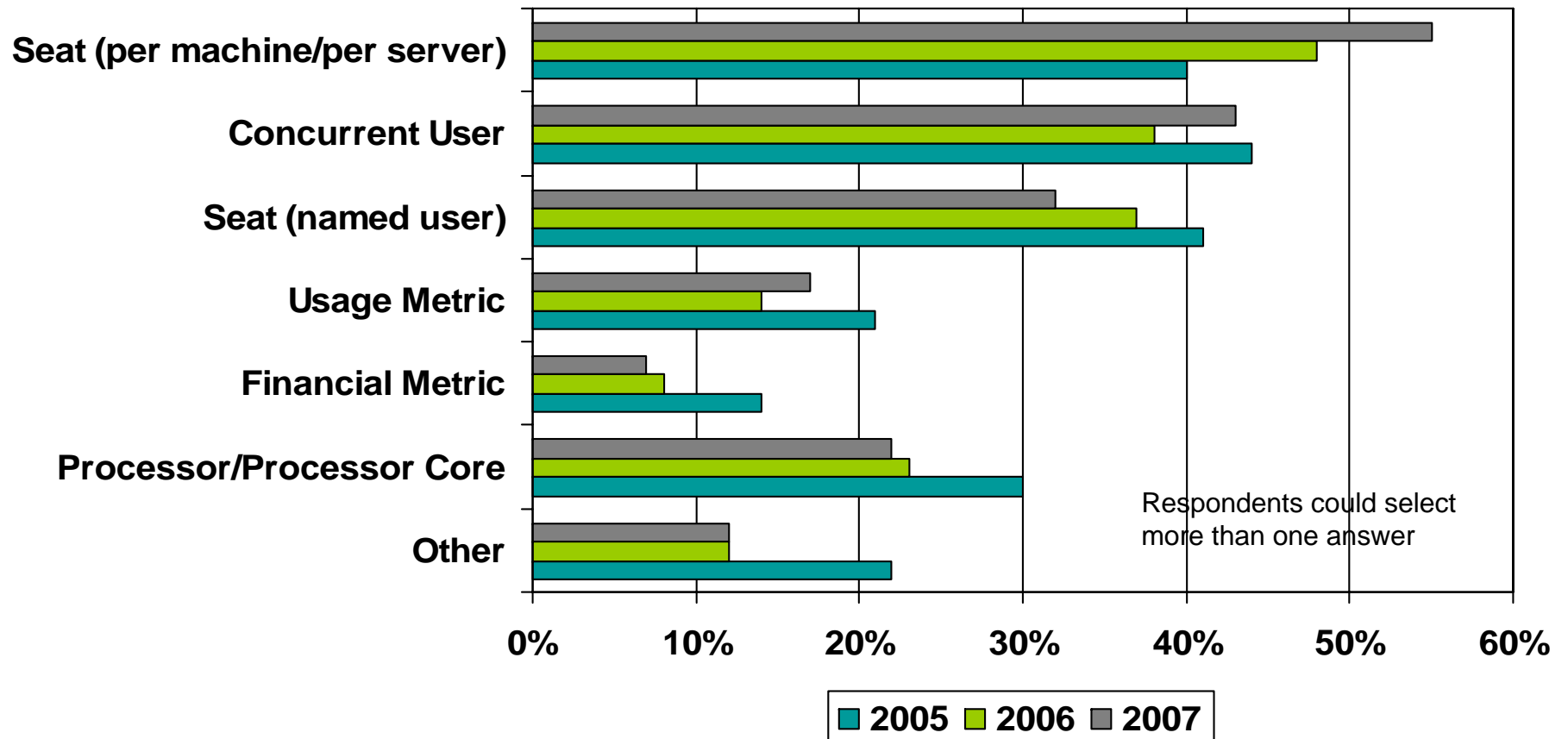
- Multicore price calculations are perceived to be complicated
- Approach taken by Oracle and IBM requires hardware benchmarking be established and maintained (not a trivial issue for the costs and resources incurred with this)
- Benchmarks (as they influence pricing) likely to be challenged by customers and therefore should be independent and verifiable
- Customers must track which servers the hardware is deployed on and determine impact to licensing costs if hardware is upgraded, partitioned or becomes part of a grid
 - > May lead to (unintentional) violations of license compliance agreements
 - > May lead to increases in software license costs
- If a customer has not yet purchased the hardware, software costs may vary depending on the hardware purchased

Now what?



Alternate license models

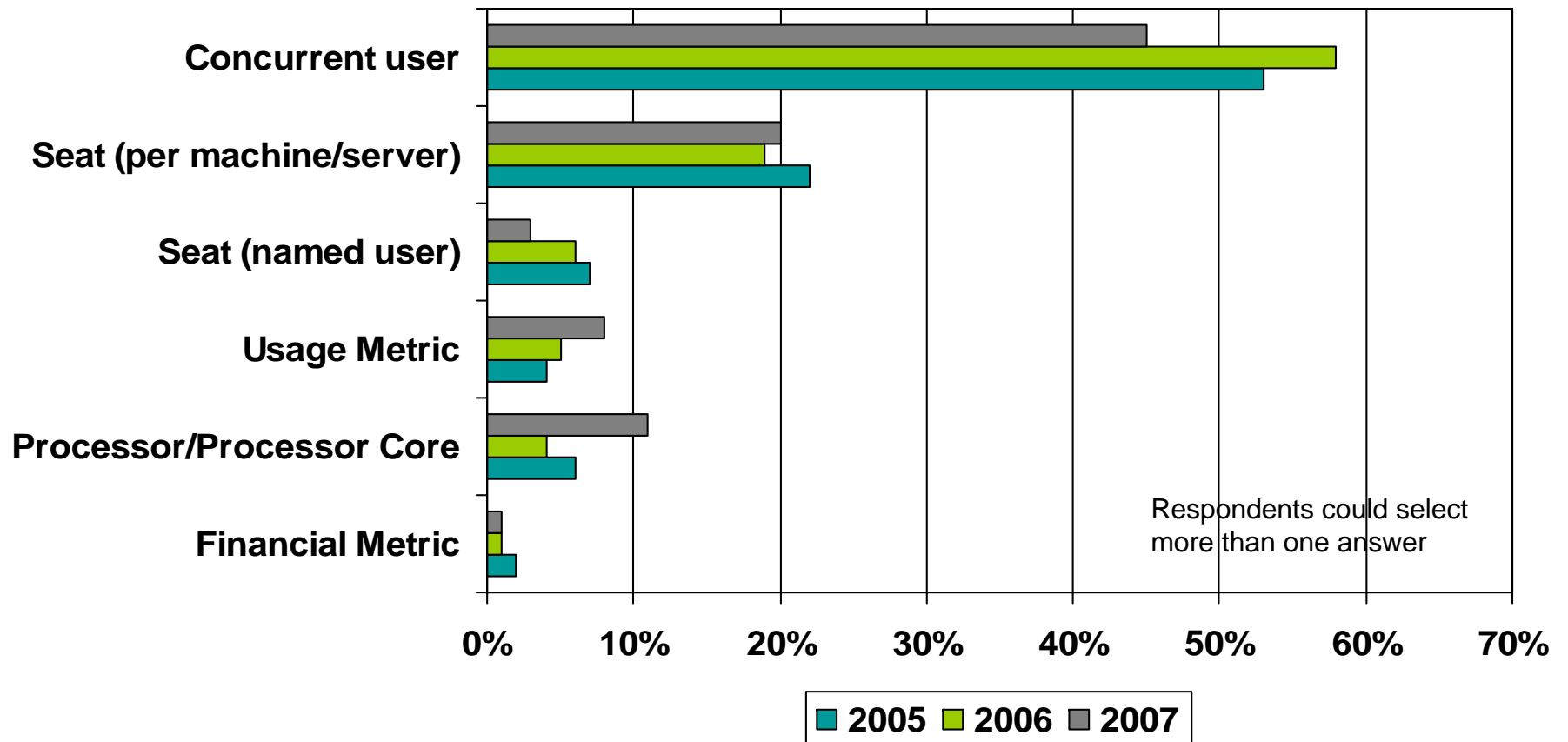
Software Vendor: Most Prevalent License Models in Use Today



Source: Macrovision Corporation, "Key Trends in Software Pricing and Licensing" Survey, 2005-2007

Alternate license models

Enterprises: Preferred License Model



Source: Macrovision Corporation, "Key Trends in Software Pricing and Licensing" Survey, 2005-2007

Alternate license metrics

	Simple	Fair	Predictable	Measurable
Processor/Core	✗	?	✗	✗
Concurrent User	✓	✓	✓	✓
Seat (named user)	✓	✓	✓	✓
Usage Metric	✓	✓	✗	✓
Financial Metric	✓	✓	?	✓

Selecting a new license metric

- Depends on:
 - > Type of software
 - > Customer base
 - Is one license metric feasible for all customers?
 - > Competition
 - > Customer expectations
 - How they use the software
 - How they purchase other software

Personal experience

- Application was licensed on a CPU-basis
- Thorough investigation included:
 - > Alternate models
 - > Analyst feedback
 - > Customer feedback
 - > Sales feedback
 - > Analysis!
- Decided on a model, set new price points
- Implement and adjust, if necessary

Recommendations

- Tie the metric to value delivered
 - > Not easy to choose a license metric
- Consider:
 - > Customer's expectations
 - > Competition
 - > Sales force
 - > Installed base implications
 - > Think long-term
 - > Impact to ISVs financials with conversion to new metric
- Test

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