IBM Passport Advantage Software

Sub-capacity (Virtualization) License Counting Rules

IBM System z™ 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.*

System z Definitions

- **Logical Partition (LPAR):**
  - IBM System z servers can be partitioned into separate logical computing systems. System resources (memory, processors, I/O devices) can be divided or shared among many such independent logical partitions (LPARs) under the control of the LPAR hypervisor, which comes standard on all System z servers. Each LPAR supports an independent operating system (OS) loaded by a separate initial program load (IPL).

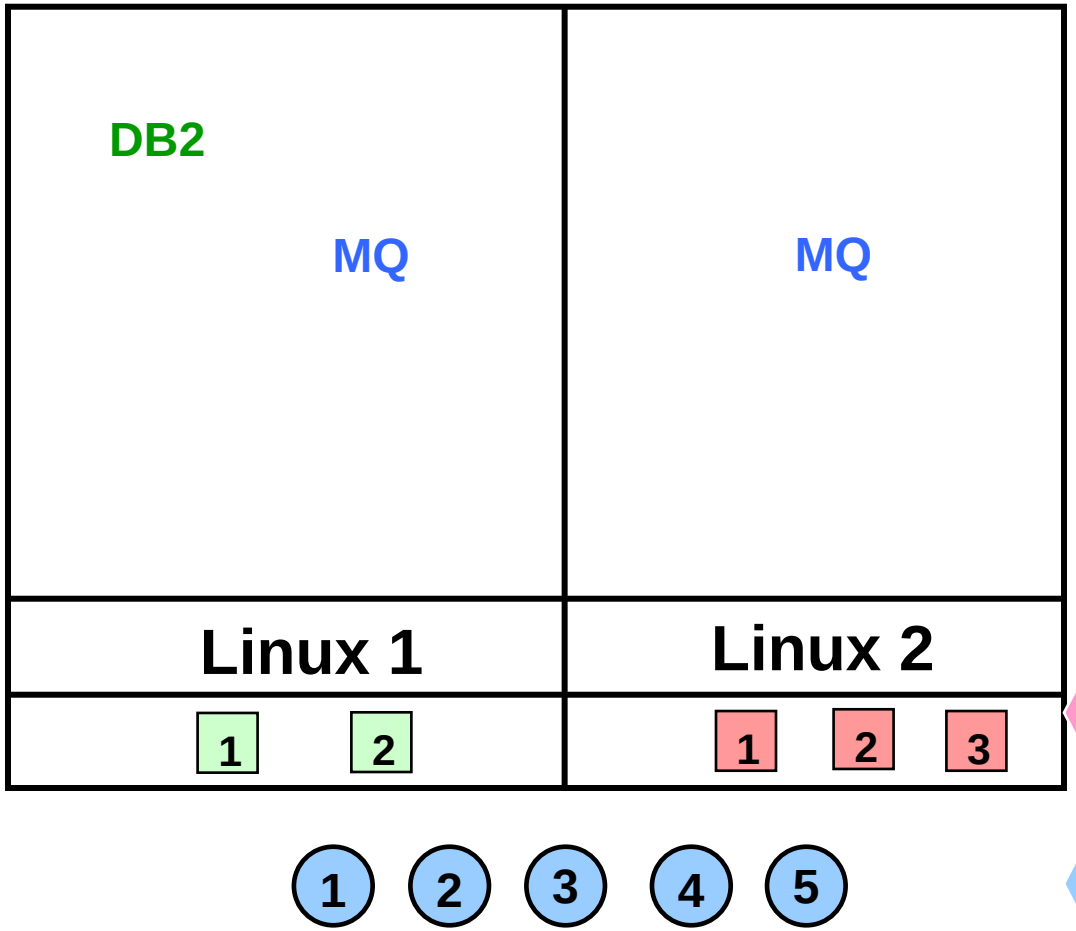
- **Virtual Machine (VM):**
  - z/VM is an operating system implementation of IBM virtualization technology providing the capability to run full-function operating systems such as Linux on System z and z/OS as “guests” of z/VM. These guests are called virtual machines and perform as if they were completely independent machine environments as far as the guest operating system is concerned.

System z Definitions continued

- **Processor types:**
  - System z servers have several types of processors (also called engines), two of which are pertinent for distributed software licensing purposes:
    - *Central Processor (CP), also known as a General Purpose processor, which can execute any kind of workload*
    - *Integrated Facility for Linux (IFL) processor which is limited to executing only Linux for System z workloads with or without the z/VM hypervisor*
- **Dedicated Partition:**
  - Resources are only moved between partitions “explicitly” (e.g. by an operator or a scheduled job)
  - Engines are always allocated in whole increments
- **Shared Pool:**
  - Pool of IFL or CP engines shared by partitions
  - System automatically dispatches processing resources between partitions as needed
  - Engines are always allocated in whole increments

LPARs with Shared Pool

Server with 5 IFLs



Cores to be licensed

1 IFL or CP engine = 1 processor core

DB2	MQ	Partition
2	2	Linux 1
	3	Linux 2
2	5	Total IFLs for Partition
5	5	Capacity Limit
2	**5**	**Total IFLs**

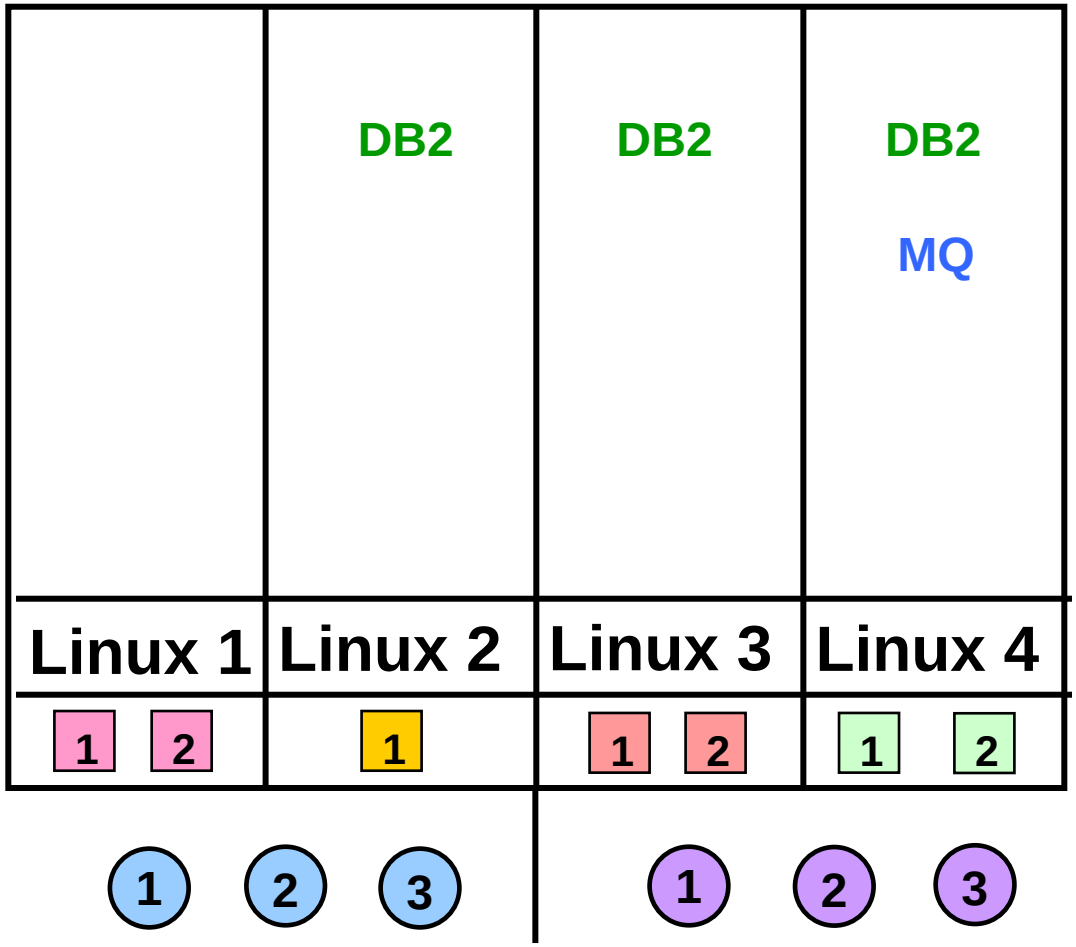
License Rule: The lower of the sum of each partition for a product, or the engine capacity of the shared pool

2 logical IFLs assigned to LPAR 1
3 logical IFLs assigned to LPAR 2

5 IFLs in the shared pool

LPARs with Shared Pool – Multiple Engine types

Server with 3 IFLs & 3 CP engines



Cores to be licensed

1 IFL or CP engine = 1 processor core

DB2 (IFL)	DB2 (CP)	MQ (CP)	Partition
1			Linux 2 LPAR
	2		Linux 3 LPAR
	2	2	Linux 4 LPAR
1	4	**2**	Tot IFL/CP for Partition
3	**3**	3	Capacity Limit
4 (1 IFL + 3CP)		**2**	Total IFL / CP engines

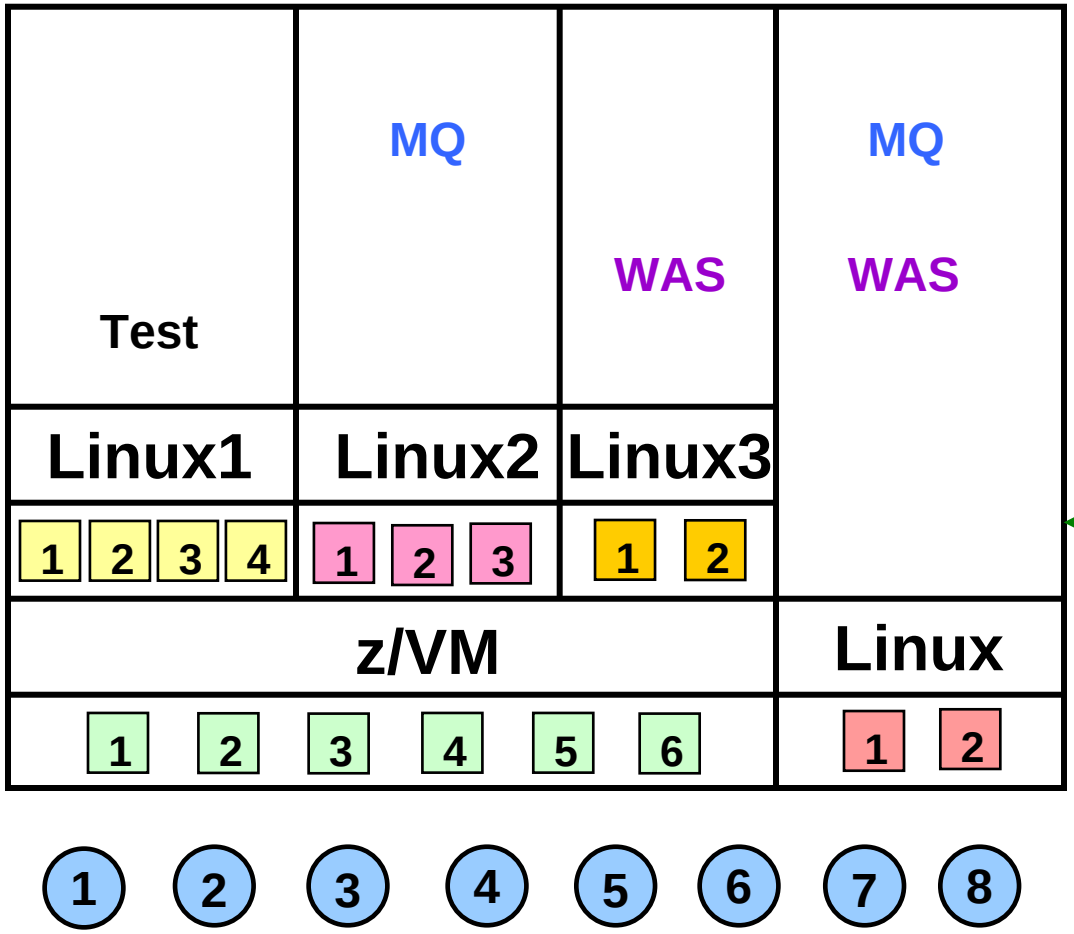
License Rule: The lower of the sum of each partition for a product, or the engine capacity of the shared pool

1 logical IFL assigned to LPAR 2
2 logical CPs assigned to LPAR 3
2 logical CPs assigned to LPAR 4

3 IFLs in a shared pool &
3 CPs in a shared pool

z/VM with Linux Guests

Server with 8 IFLs



Cores to be licensed

1 IFL or CP engine = 1 processor core

WAS	MQ	Partition
	3	Linux 2 VM
2		Linux 3 VM
2	**3**	Total IFLs for Partitions
6	6	Capacity Limit
2	3	Total IFLs for z/VM LPAR
2	2	Linux LPAR
4	**5**	**Total IFLs**

License Rule: The lower of the sum of each partition for a product, or the engine capacity of the shared pool

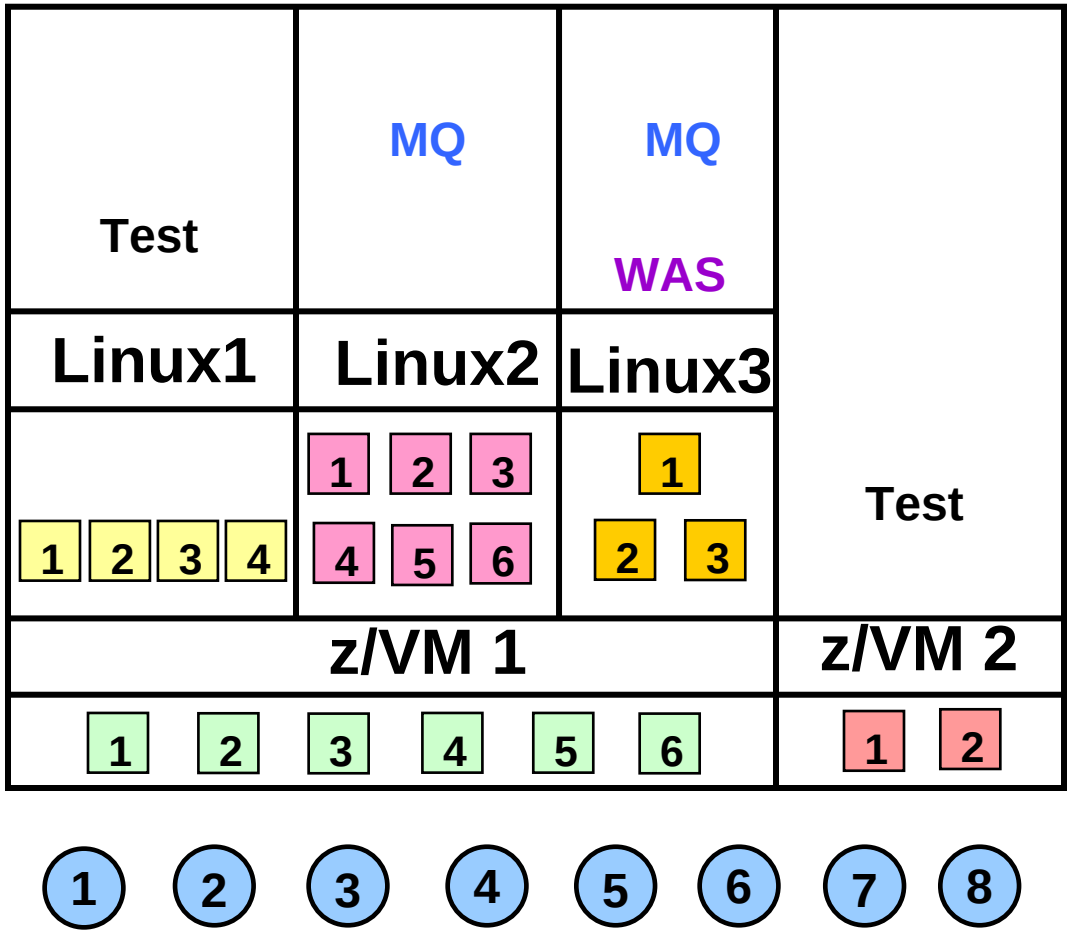
3 Linux Virtual Machines with 9 virtual engines

6 logical IFLs assigned to z/VM LPAR
2 logical IFLs assigned to Linux LPAR

8 IFLs in the shared IFL pool

z/VM with Linux Guests – Capping at Shared Pool

Server with 8 IFLs



Cores to be licensed

1 IFL or CP engine = 1 processor core

WAS	MQ	Partition
	6	Linux 2
3	3	Linux 3
3	9	Total IFLs for Partitions
6	6	Capacity Limit
3	**6**	**Total IFLs**

License Rule: The lower of the sum of each partition for a product, or the engine capacity of the shared pool

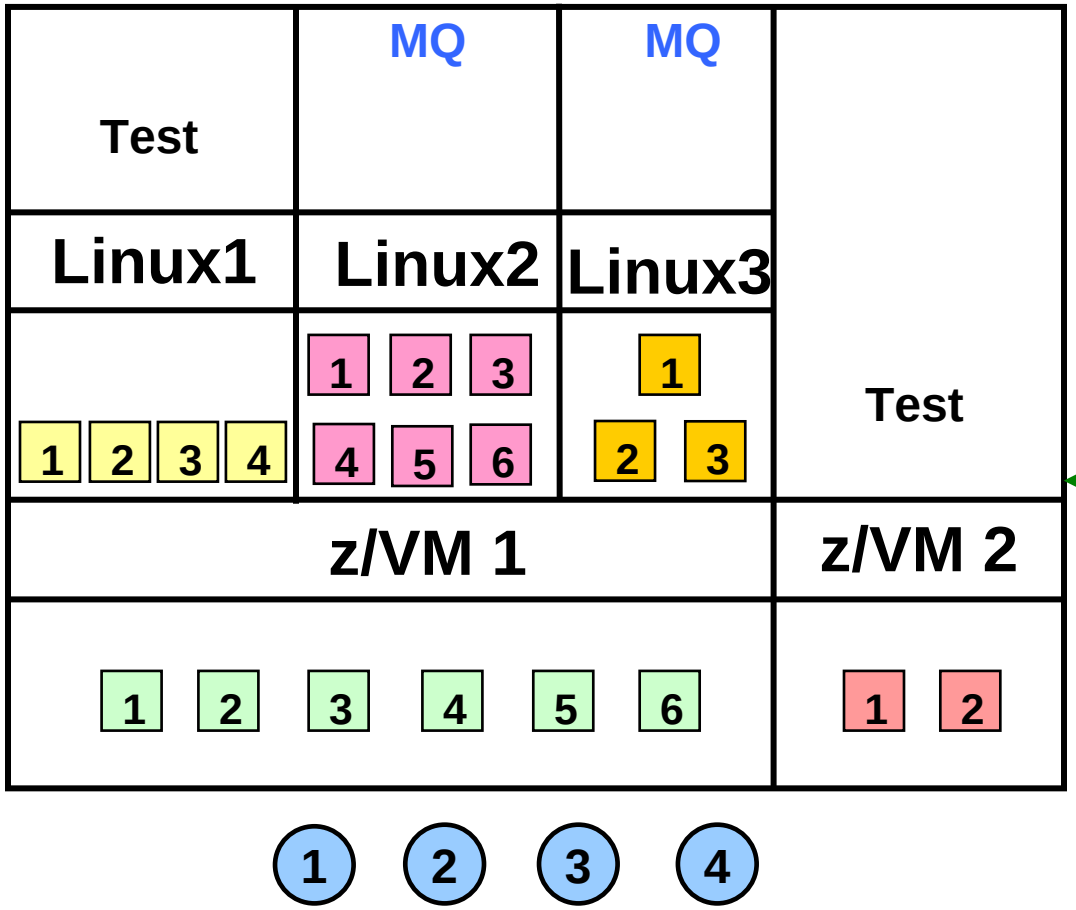
3 Linux Virtual Machines with 13 virtual engines

6 logical IFLs assigned to z/VM1 LPAR
2 logical IFLs assigned to z/VM2 LPAR

8 IFLs in the shared pool

z/VM with Linux Guests – Capping at Server

Server with 4 IFLs



Cores to be licensed

1 IFL or CP engine = 1 processor core

MQ	Partition
6	Linux 2
3	Linux 3
9	Total IFLs for Partitions
6	Capacity Limit Pool
6	Total IFLs for z/VM 1 LPAR
4	Capacity Limit Server
4	**Total IFLs**

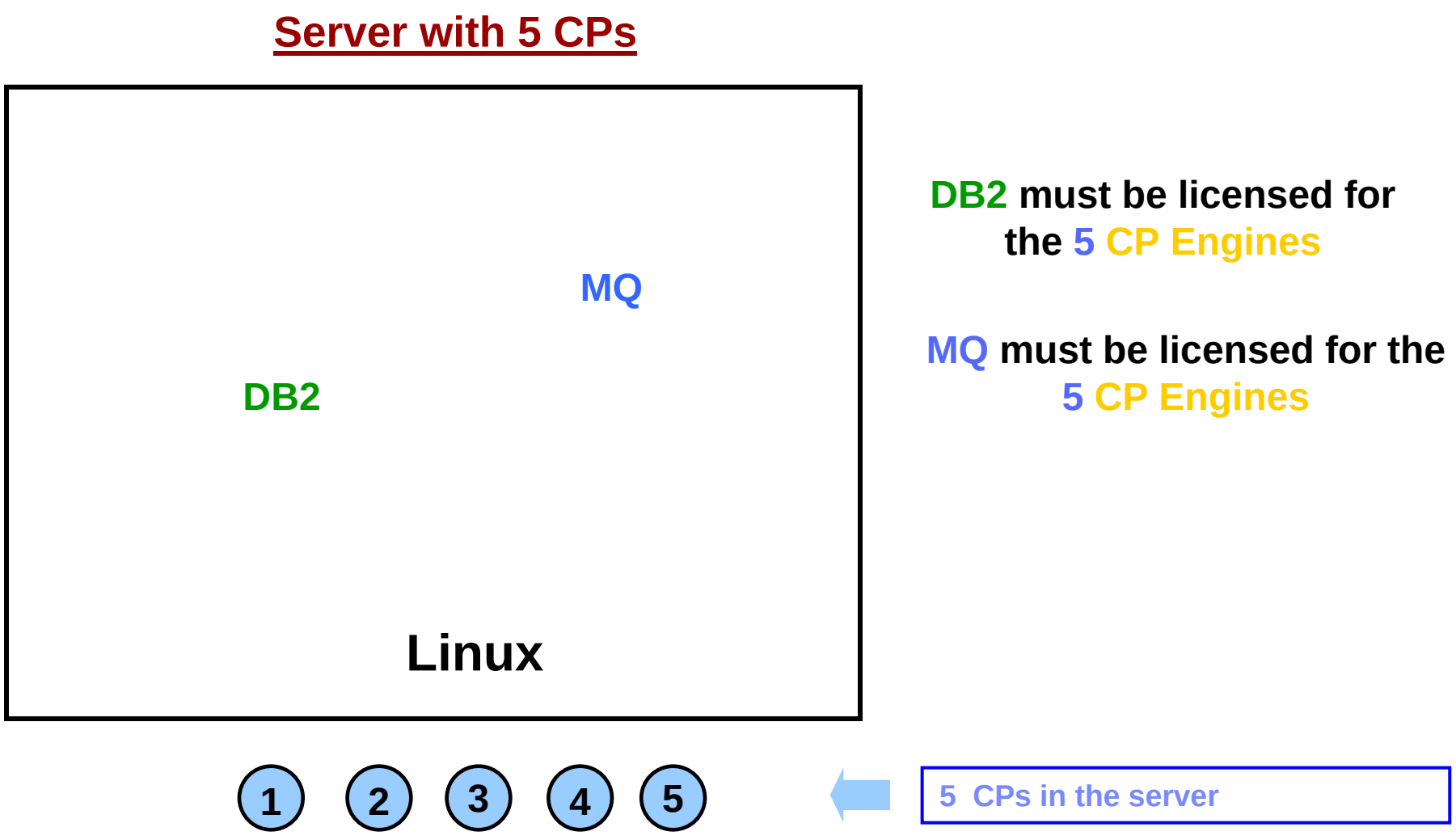
License Rule: The lower of the sum of each partition for a product, or the engine capacity of the shared pool. The licenses will not exceed the number of activated engines in the server.

3 Linux Virtual Machines with 13 virtual engines

6 logical IFLs assigned to z/VM1 LPAR
2 logical IFLs assigned to z/VM2 LPAR

4 IFLs in the shared pool

Machine in Basic Mode – No Partitioning

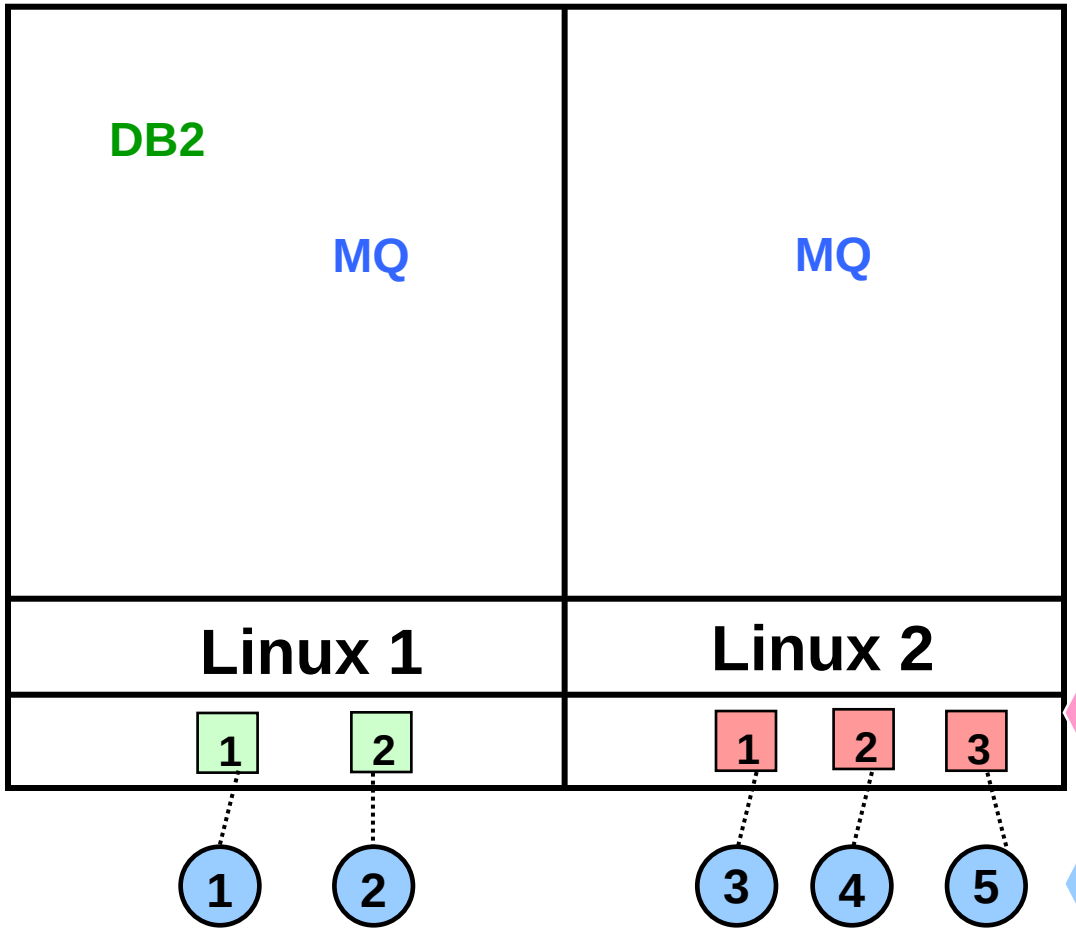


DB2 must be licensed for the 5 CP Engines

MQ must be licensed for the 5 CP Engines

Server with Dedicated LPARs

Server with 5 IFLs



Cores to be licensed

1 IFL or CP engine = 1 processor core

DB2	MQ	Partition
2	2	Linux 1
	3	Linux 2
2	5	Total IFLs for Partition
5	5	Capacity Limit
2	**5**	**Total IFLs**

License Rule: The sum of each partition for a product, or the physical capacity of the server

2 logical IFLs assigned to LPAR 1
3 logical IFLs assigned to LPAR 2

5 IFLs in the server

ILMT Licensing Counting Rules for Single Server EnvironmentS

- The lower of the sum of each partition for a product, or the engine capacity of the shared pool that the partition obtains its resources from. Note: This limit does not affect the additional licenses that might be required for dedicated partitions
  - Example: Maximum of 7 IFLs to be licensed for a shared pool with 7 IFLs.
  - For z/VM guests: The lower of the sum of the virtual engines available to each guest for a product, or the engine capacity of the z/VM LPAR that the guest obtains its resources from.
    - Example: Maximum of 5 IFLs to be licensed for a z/VM LPAR with 5 IFLs.
- The maximum licenses required for a program on a server, will not exceed the number of activated engines of the given type (IFL or CP engine) in the server, that are available to the program.
  - Example: Server with 4 IFLs and 3 CP engines. IFL capacity is available to DB2. CP capacity is not available to DB2. Maximum 4 IFL engines need to be licensed for DB2.

- 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 LPARs and z/VM guests for each product:

- for a Dedicated LPAR, the highest* number of logical engines or IFLs allocated to the LPAR for a product
- for a z/VM guest, the highest* number of virtual engines available to each guest for a product

***The greater of what the partition starts with or the result of an increase in capacity** (in whole cores)*

The PVU licensing requirement is based on the maximum number of virtual engines (cores) in the partitions available to a product.

The lower of the sum of the virtual engines or server capacity (number of activated engines of the given type { IFL or CP engine } in the server)

If you want to use sub-capacity licensing for any other IBM System z technology, including shared processor pool, 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 WEBSPHERE APPLICATION SERVER NETWORK DEPLOYMENT
Program Identification Number (57xx-xxx)	5724-H88
P/N Description	IBM WEBSPHERE 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