1   Executive Summary

This paper provides an overview of licensing Oracle programs using Infrastructure as a Service (IaaS) on IBM Power/AIX LPARs in Skytap. There is much confusion about Oracle licensing, especially in virtualized or cloud environments. While a lot of the discussion and confusion centers around x86 virtualization, the same issues and principles apply to Power environments. Many of the references in this document point to discussion and legal challenges resulting from running virtualized x86 platforms. The information and precedents established in those forums apply directly to IBM Power as well. There just has not been the same level of scrutiny in the IBM Power community; so, we cannot point to the same types of instructional references.

The sections of this document provide an overview of Skytap's IBM Power/AIX LPAR environment for Oracle, education on the principles of Oracle licensing, and how those principles are applied to workloads running on IBM Power/AIX LPARs in Skytap.

The key takeaways from this paper are:

- Skytap is an effective option for IaaS, including for Oracle-based IBM Power/AIX applications.

- There are two primary methods for licensing Oracle workloads on the IBM Power platform:

    o   Hardware-based licensing

    o   Oracle's Partitioning policy

- Skytap provides support for Oracle licensing by allocating dedicated resources to Oracle workloads. This includes a multi-tenant architecture using LPARs as well as single-tenant hardware frames that are dedicated to a single client's workloads.

- Oracle licensing is defined by each individual license agreement and is based on the physical server hardware where Oracle is "installed and/or running." There is nothing prospective in this definition, meaning customers *do not* have to license where Oracle *might* run in the future.

- The use of IBM Power/AIX LPARs for Oracle workloads in Skytap ensures that Oracle workloads stay running only on licensed processors. There is log activity to validate historical usage of Oracle licenses.

- In an Oracle audit, usage of Skytap environments will be documented as if the LPARs or servers are part of the customer's on-premises environment. Even though the LPARs or servers are remotely located in a separate datacenter and are not owned by the licensee, that information is not required to be disclosed to Oracle.

1.1   Assumptions

The information presented in this document is based on House of Brick's lengthy experience with Oracle licensing, and on the architectural and operational nature of Skytap as presented to House of Brick. It is provided without guarantee of applicability or accuracy. All information contained herein should be validated with your legal advisors before applying it in practice. Unless otherwise noted, any references to Oracle software are considered to be Oracle Database Enterprise Edition, without any additional options or packs included. The third-party

products referenced in this document, including from Oracle, IBM, and Skytap and others are copyrighted to their respective owners.

2   Licensing Oracle on Skytap IaaS for IBM Power

For customers running Oracle workloads, AIX in Skytap was designed to be both powerful and license friendly. Since the Oracle Cloud Licensing policy has only listed two IaaS cloud providers (Microsoft Azure and AWS) and those are unique to x86, licensing LPARs with the Cloud policy in Skytap is not possible. Oracle does, however, publish a different policy document that describes how to license IBM Power LPARs. Skytap enables customers to apply their existing licenses to Oracle workloads using the Oracle Partitioning policy. Of course, Skytap clients can also deploy dedicated IBM Power frames in Skytap and apply their Oracle licenses to dedicated hardware. The Oracle Partitioning policy has the following considerations for Oracle licensing purposes:

The LPAR is dedicated to Oracle workloads for a single customer.

These LPARs will be reported to Oracle as if they are part of the customer's on-premises environment. Even though the servers are remotely co-located in a separate datacenter, that information is not required to be disclosed to Oracle.

Skytap uses IBM PowerVM as the underlying virtualization mechanism, and the implications of hosted LPARs are the same as on-premises.

The LPAR is configured as a capped partition and Live Partition Mobility (LPM) is disabled, these restrictions are listed in Oracle's Partitioning Policy.

Licensing individual LPARs (sum of all assigned processors) on shared hosts may result in higher licensing costs compared to licensing resources in a Skytap Dedicated Region where multiple LPARs may run on dedicated hardware that has all of its processors licensed.

Skytap LPARs and virtual machines never enter the inventory of their hypervisor, nor live on any compute infrastructure until they are explicitly run by a user. For AIX workloads, this would be PowerVM, and for x86 VMs, this would be VMware. Furthermore, LPARs and Virtual Machines are never stored on the compute nodes themselves.

Oracle Partitioning Policy

Licensing Oracle workloads using the Partitioning policy is a way to apply licenses based on virtual processors. The Partitioning policy is valid only for specified virtualization systems.

Oracle Partitioning Policy

"Oracle-approved hard partitioning technologies as listed in this section of the policy document are permitted as a means to limit the number of software licenses required for any given server or a cluster of servers. Oracle has deemed certain technologies, possibly modified by configuration constraints, as hard partitioning, and no other technology or configuration qualify. Approved hard partitioning technologies include: Physical Domains (also known as PDomains, Dynamic Domains, or Dynamic System Domains), Solaris Zones (also known as Solaris Containers, capped Zones/Containers only), IBM's LPAR (adds DLPAR with AIX 5.2), IBM's Micro-Partitions (capped partitions only), vPar (capped partitions only), nPar, Integrity Virtual Machine (capped partitions only), Secure Resource Partitions (capped partitions only), Fujitsu's PPAR. All approved hard partitioning technologies must have a capped or a maximum number of cores/processors for the given partition."

For PowerVM Micropartitioned LPARs there are further restrictions that need to be followed.

- The LPAR is configured as capped to entitled capacity
- The LPAR has Live Partition Mobility (LPM) disabled

NOTE: IBM PowerVM Live Partition Mobility (LPM) is specifically forbidden in the Partitioning Policy document as a restriction. LPM has nothing to do with counting licenses. With LPM, the LPAR stops running and is quiesced on the original host before it begins running on the new host. This scenario constitutes a license migration. Migrating licenses from one host to another is perfectly acceptable with the Oracle contract. There are no restrictions on how frequent these license migrations occur. It is House of Brick best practice to disable LPM when using the Partitioning policy, even though it has nothing to do with counting licenses. Oracle will make an issue out of LPM during an audit if it is enabled.

Skytap does not currently support LPM but will in the future so will be relevant in future releases.

2.1   Dedicated vs. Multi-Tenant

Licensing Oracle on IBM Power in an AIX LPAR (or Multi-Tenant) environment is simply a matter of counting the amount of entitled capacity for each licensed LPAR. The IBM community has established that this number may be determined by running the command "`lparstat -i`" within the licensed LPAR.

When licensing multiple LPARs, and the total licensing requirement exceeds the count of processors in an individual physical server, customers could benefit from consolidation and oversubscription by licensing the entire frame. However, HA will be compromised unless two or more servers are licensed. Using this strategy, controls may be needed to keep LPARs on the licensed frames. Skytap supports this via LPAR pinning.

2.2   Licensing Physical IBM Power Servers

When using Power/AIX technology, a customer can choose to either license individual LPARs using the Partitioning policy or they can license entire Power frames – all cores, depending on which is most advantageous. In the latter scenario, customers can run any arbitrary number of LPARs on fully licensed frames while designating processor cycles and cores where they are needed. This supports the concept of oversubscription and has potential for reducing overall licensing costs.

2.3   Shared Processor Pools

IBM Power systems allow for subdividing the compute capacity of a frame by assigning physical processors to a Shared Processor Pool. By doing this, all LPARs running on these processor pools will only use the physical processors assigned. This is an acceptable way to limit licensing on an IBM Power frame. While creation of user defined Shared Processor Pools is not currently supported, capped processor sharing mode is supported in Skytap. Please see Oracle's Partitioning Policy.

2.4   Licensing the Primary Site

The term "Primary Site" is defined as the location that licensed products are running during the course of normal operations. This is a straightforward concept and Oracle software must be licensed wherever the software is installed. This applies to production and non-production environments.

2.5   Licensing Secondary Sites

The term "Secondary Site" is defined as a location that is configured to possibly run licensed products in the event that normal operations are disrupted. It is important to note that, as with the primary site, any time licensed products are installed and/or running, there is a license requirement. However, if either the Failover or Testing provisions are being used, there is no requirement to match processor quantities of the primary site at the secondary site. See Appendix B for details about these contract clauses. Rather, secondary sites can use entirely different processor quantities based on the actual usage and hardware at the site. If these provisions are not being used, then different license metrics and processor quantities may be used as long as there is adequate license entitlement to cover the deployment at the secondary site.

Again, this is a straightforward concept. Unfortunately, requirements for licensing Oracle software at a secondary site can be confusing because there is a fair bit of misinformation in the Oracle community—much of it attributable to Oracle itself.

2.5.1   Installed and/or Running

The simple truth that applies to secondary sites is the same that applies to any Oracle-licensed environment. Customers must account for and purchase licenses for all processors where Oracle is "installed and/or running". While "running" is easily demonstrable, "installed" is often subject to interpretation. Unfortunately, Oracle's (non-binding) policy documents are written as if "installed" means more than is commonly recognized within IT circles. At House of Brick, we contend that in order to prove software is installed, there must be a mechanism to test that assertion. We further contend that "installed" implies the software is presented in such a way that it can be executed _without any configuration changes_ to the system on which it is supposedly installed.

Such configuration changes might include:

- Mounting a file system
- Placing an LPAR into inventory
- Activating a replicated disk volume
- Instantiating and booting a placeholder or template LPAR/VM

Examples of what are NOT typically licensable events for secondary sites:

- The presence of Oracle software at a secondary site on a disk volume or replica from which the software CANNOT be executed without configuration changes (e.g., It is not stored on a file system that is mounted to a server capable of executing it).
- Existence of a copy of customer data contained in Oracle database structure that has been (or is actively being) replicated to the secondary site without executing Oracle software.
- Existence of a template, placeholder, or otherwise powered off LPAR.
- Creation of a Skytap template for an environment containing LPARs with Oracle software installed.
- Copying or Cloning a Skytap environment that contains LPARs with Oracle software installed because these events are not in hypervisor inventory.

In other words, just because the status of either "installed" or "running" can be changed from no to yes without a lot of effort does not imply that license is currently required. And, therefore, it does not mean that any relevant servers must be licensed prospectively.

2.6   HA and DR Scenarios

Regardless of whether a customer's secondary site is on-premises or makes use of an offering such as Skytap, the licensing implications are the same. There are ways to construct DR environments that do not require an Oracle license. Again, we come back to the concept of "installed and/or running". If Oracle data replication technology like GoldenGate or Data Guard is used, then the Oracle software is certainly installed at the secondary site. If lower-level data replication technologies are used, like storage array replication, then it is likely that the Oracle software is not installed at the DR site. Keep this in mind when designing your DR strategy.

3   Summary

The key takeaways from this paper are:

- Skytap is an effective option for IaaS, including for Oracle-based IBM Power/AIX applications.

- Skytap provides options for Oracle licensing by allocating dedicated resources to Oracle workloads. This includes multi-tenant hosts as well as dedicated frames in single-tenant regions based on customer needs for applications running on AIX in Skytap.

- Oracle licensing is defined by each individual license agreement and is based on the physical server hardware where Oracle is "installed and/or running." There is nothing prospective in this definition, meaning customers *do not* have to license where Oracle *might* run in the future.

- Oracle's Partitioning Policy is a way to license individual LPARs instead of licensing the hardware.

- The use of Power/AIX LPARs for Oracle workloads in Skytap ensures that Oracle workloads stay running only on licensed processors. There is log activity to validate historical usage of Oracle licenses.

- In an Oracle audit, usage of Skytap will be documented as if the LPARs or servers are part of the customer's on-premises environment. Even though the LPARs or servers are remotely located in a separate datacenter, that information is not required to be disclosed to Oracle.

Oracle licensing is a complex topic which requires careful planning and monitoring. Skytap provides customers running Oracle on AIX a license-compliant offering with the tools necessary to track and report on Oracle usage. Furthermore, House of Brick, experts on the ins and outs of running Oracle, can provide assistance related to architecture review and development, license compliance analysis, software asset management, and audit defense.

4   Learn more about Skytap

Visit skytap.com to learn more about how Skytap helps enterprises migrate and run IBM Power (AIX, IBM i and Linux on IBM Power) together with x86 workloads in the public cloud. Skytap's cloud environment simplifies management, reduces IT costs, speeds up application development and allows organizations of all sizes to modernize at the pace of their business.

Get Hands-on today: Skytap on Azure is available in the Azure Marketplace. Open an account today and spin up your first LPAR within minutes.

4.1   House of Brick Can Help

House of Brick can provide consulting services for your planned deployment in Skytap. This includes architecture as well as licensing services. House of Brick Service offerings include:

- Architecture review and design, Including for license optimization
- Oracle license cost savings
- Oracle licensee compliance assessment
- Oracle Audit Defense
- ULA Certification and other Oracle negotiation consulting
- OpsCompass

Ask your Skytap representative or you can visit us at www.houseofbrick.com.

5 Appendix A: Oracle Database Licensing Fundamentals

Licensing Oracle programs in Skytap must be accounted for by using core-based licensing (Processor or Named User Plus metrics), rather than using Oracle's Cloud Computing Environment policy. Because Skytap is not included in the authorized Oracle Cloud Environment policy, which only addresses two x86 providers, they have created a license-compliant architecture to accommodate their Oracle on Power customers. This architecture was discussed in a previous section.

Let us consider different scenarios with a user's license estate and usage of Oracle programs, and how Oracle licensing will work in each case.

5.1 Processor Metric Licenses

As previously mentioned, the number of processors to be used as a basis for determining the number of required Oracle licenses can be established by running "`lparstat -i`" within a Skytap LPAR.

Example Output of "lparstat –I"
```
Node Name                           : localhost
Partition Name                      : vm-10950449-22118049
Partition Number                    : 14
Type                                : Shared-SMT-4
Mode                                : Uncapped
Entitled Capacity                   : 0.50
Partition Group-ID                  : 32782
Shared Pool ID                      : 0
Online Virtual CPUs                 : 4
Maximum Virtual CPUs                : 4
Minimum Virtual CPUs                : 4
...
```

In Skytap, the "Maximum Virtual CPUs" will never exceed "Online Virtual CPUs", so this number can safely be used, and it cannot be changed without manual intervention – at which point, it would be necessary to review licensing. The Maximum/Minimum Virtual CPUs reflects the bounds for DLPAR operations, which are manually executed. After a DLPAR operation on vCPUs completes the number of Online Virtual CPUs will be updated to reflect what's actually allocated to the LPAR.

5.1.1 Enterprise Edition Database

As discussed previously for the Processor metric, for Oracle Enterprise Edition Database (and its associated features, options, and packs) the number of licenses that are required is determined by how many physical processor cores are available to the LPARs where the database is installed and/or running. Users must count every processor core in each Skytap LPAR or single-tenant hardware frame where Oracle workloads will be running, and then allocate one Processor of Enterprise Edition license for every physical core in that count.

5.1.2 Standard Edition Database

Users can use Standard Edition licensing in Skytap but need to be careful that certain limitations are respected. Assuming Standard Edition 2 (SE2) licenses, instead of counting cores, the customer must count the number of sockets (full CPU chips) where the database is installed and/or running. Users must have an SE2 license for every socket. Users are limited to two sockets for SE2, but the number of processor cores within those sockets does not matter for licensing

purposes. Users are also limited to running on servers with a maximum capacity of only two sockets. SE2 may not be run on servers with four or more sockets. This is not an issue in Skytap since all hosts have only two sockets. Skytap does not provide the ability to disable a socket, so the use of Oracle Real Application Clusters (RAC) using the SE2 license, which requires two servers of one socket each, is not possible in Skytap. Users may have multiple servers running Oracle with SE2 in Skytap, even though all of those hosts have a total of more than two sockets. This is because the servers are not clustered, and each server contains only two sockets.

5.2   Named User Plus Licenses

Calculating the required Named User Plus licenses (NUP) is similar to the Processor metric. First, count all of the hardware cores on each server where the Oracle programs are installed and/or running and multiply that by the Processor Core Factor (1.0 for newer Power processors in Skytap). Then, multiply this number by the per Processor Minimum. For Enterprise Edition Database with the associated features, options, and packs, the minimum is typically 25 NUP per processor (Number of cores times the Processor Core Factor). The following is the calculation for the minimum number of NUP licenses and the actual number of required NUP licenses for an organization.

Minimum NUP Licenses = Hardware Cores x Processor Core Factor x Per Processor Minimum
Required NUP Licenses = Greater of: Number of Human Users accessing the system(s) and previously calculated NUP minimum

5.2.1   Example NUP Calculation

The Scenario—A user would like to use Named User Plus licenses for their development operations. There is one server on-premises with 12 Power cores, and one LPAR in Skytap with 16 cores. Oracle Database Enterprise Edition will run on both servers. There are 300 people in the company who might access and use the database.

Calculating the Minimum—For the two servers, we count the cores (12 +16), multiply by the core factor of 1.0, then multiply by the per processor minimum of 25.

Minimum = (12+16) x 1.0 x 25 = 700

Since the minimum number of licenses is greater than the number of users, the customer would have to purchase 700 NUP licenses. If the same configuration had 750 users accessing the system, then 750 NUP licenses would have to be purchased to be compliant.

5.3   Unlimited License Agreement

Unlimited License Agreements (ULA) from Oracle seem quite attractive on the surface. In our experience at House of Brick, however, ULAs tend to cost the customer more than a well-designed and well-managed architecture would. If readers currently have a ULA, they should review it for privileges and/or restrictions for running Unlimited Deployment Right product in a public cloud environment such as Skytap. There may be language stating that the ULA only allows for deployments on servers that are owned or leased by the customer. In such cases, readers should consult with their legal advisors on whether the Skytap environment qualifies as owned or leased, and the impact of any other language that may be in the ULA agreement pertaining to public cloud deployments.

5.3.1   The ULA Value Assessment

During the (typically) three-year term of a ULA, <u>Oracle LMS has indicated</u> that they may perform two "Value Assessments" to "*help customers better understand their usage of Oracle products.*" One is done at mid-term and one at the end of the term. Oracle may refer to these as "friendly audits." Unless these so-called assessments are invoked under the terms of the audit clause in the customer's agreement with Oracle, it is House of Brick's opinion that the customer is under no obligation to respond.

5.3.2   Certifying off of a ULA

The process of exiting a ULA is called "certification." It is where customers certify usage of the Oracle programs, and the licensee claims that capped number of Processor metric licenses from Oracle to cover that usage going forward. In the certification process, users count all physical processors in servers where Oracle is installed AND running (note that the "or" is eliminated). A primary downside of a ULA is that it establishes a new minimum for the annual support payment that is required, called the "Total Support Stream." Even if users certify off of the ULA to convert to a Processor metric and reduce their usage, the support stream will not go down. The only way to reduce the annual support stream is to terminate support on all existing licenses. If the customer in this scenario needed Oracle support, they would have to purchase all new licenses for the smaller footprint. House of Brick has seen where the positive return on investment period for such a strategy can be relatively short with a large enough reduction in the license footprint justifying the change.

5.4   Development and Test Environments

Development and test environments must be licensed for Oracle usage. Customers can, however, use a more advantageous license metric if it will result in a lower cost. Many House of Brick customers use a Processor metric for production environments and have historically used the NUP metric for development and test environments. House of Brick best practice looks for opportunities to mix workload types on servers licensed with the Processor metric. With the appropriate architecture and operational controls, customers may find that they can put development and/or test environments on servers that are licensed for production workloads. The isolation and protection that IBM LPARs provide between workloads makes this a realistic option to consider.

6 Appendix B: Oracle Contract Primer

Licensing Oracle programs is a more straightforward exercise than most people believe. Amidst all of the confusion that is out there—from Oracle statements, to consultant guidance, to scary stories of audits on social media—licensing Oracle programs comes down to one overruling document, and that is the customer's contractual agreement with Oracle. If a binding contract says that a customer has to do something in order to use their purchased licenses, then they have to do it. Similarly, if customers want to deploy their licenses in a certain way, and the contract does not prohibit it, then they should feel empowered to do that.

So, let us first understand the Oracle contract, and how it determines customer obligations for Oracle licensing. In the following sections, we will explore how these contractual terms and other licensing principles will apply to workloads running in a Skytap environment.

6.1 The Contract is What is Binding

The agreement document that will be referenced in this paper is from Oracle's website and is OLSA version V1201013_Def_V122304. Customers should validate their own agreement for similar language, but should expect to find materially similar terms other than where we have noted.

In Section Q of that agreement, there is a definition for the word "Processor." This definition is the single most important element to understanding where licensing must be applied when running Oracle programs. It states, *"Processor: shall be defined as all processors where the Oracle programs are installed and/or running."* So, for those who are responsible for licensing and ensuring compliance in their organizations, there are two questions that must be asked:

- "Have we accounted for a license on servers where Oracle programs have been installed (past tense activity) or may currently be installed (present tense state)?"

- "Have we accounted for a license on servers where Oracle programs are currently running (present tense activity)?"

There are certain things that customers should not feel like they have to worry about. These things may include:

- Wondering if they have to immediately buy licenses for hardware or cloud infrastructure that will be purchased during the coming year;

- Wondering if they have to buy licenses for servers that are technically precluded from allowing Oracle programs to run there; and,

- Wondering if they have to have a license now for a disaster recovery environment whose servers are not and may never be used.

These considerations are all *prospective* events—things that may or may not happen in the future. There is nothing in Oracle's definition of the word "Processor" that is prospective. It covers both past tense and present tense activities, but not what customers may or may not decide to do in the future.

Oracle often refers to certain documents to claim contractual restrictions. An example of this is Oracle's Partitioning Policy document that attempts to specifically restrict virtualization platforms from doing "soft partitioning" (limiting the number of licensed cores in a server through software means). The only problem is that these documents are all non-binding according to the contract's Entire Agreement clause. Section L of the OLSA referenced above contains the Entire Agreement clause. It states:

"You agree that this agreement and the information which is incorporated into this agreement by written reference (including reference to information contained in a URL or referenced policy), together with the applicable order, are the complete agreement for the programs and/or services ordered by you, and that this agreement supersedes all prior or contemporaneous agreements or representations, written or oral, regarding such programs and/or services."

According to this statement, the only things that are binding are:

 The agreement itself,

Anything incorporated into the agreement by written reference, and

The applicable order document.

Most customers understand the agreement, and the order document; but, what else is included in this agreement by written reference that would become part of the binding contract? The table on the right shows those documents that may impact licensing that are included by reference into the agreement. It also shows those common documents that are not contractually based.

With that foundational understanding, let us review the principles of how Oracle programs are licensed.

Oracle Document	Contractual?	
Applications Licensing Table	✔	Yes
New Purchase Order Documents	✔	Yes
Technical Support Policies	✔	Yes
Processor Core Factor Table-post 8/08	✔	Yes
Software Investment Guide	✘	No
Licensing Data Recovery Guide	✘	No
Technology Hosting	✘	No
Partitioning Policy	✘	No

6.2   Principles of Oracle Licensing

6.2.1   Oracle Licensing is Hardware-Based

Oracle licenses are hardware-based, meaning that they depend on the processor cores in the underlying server hardware. This is true for the Processor metric, as well as the Named User Plus (NUP) metric. Both require counting of physical processor cores in the server as the basis for determining how many licenses are required for programs running on that server.

In approximately August of 2008, the Processor Core Factor for newer Power servers was changed to 1.0. What this means is that for every physical Power core that Oracle programs run on, users have to account for one license. Except for one condition noted in the section on Oracle Licensing in a Cloud Computing Environment, multi-threading, including IBM Power SMT, does not factor into the core count for license purposes.

6.2.2   Oracle Licensing is Storage-Independent

One of the most frequent questions that House of Brick gets is if the storage presentation to a server running Oracle hardware impacts licensing. By recalling the definition of where Oracle programs need to be licensed (processors where Oracle programs are installed and/or running)

we see there is no contractual mention of storage. Oracle does mention storage in relation to the Failover Rule in contract template versions starting around Q4 of 2007. More detail on this is given in the section on Determining License-able Events.

6.2.3   Oracle Licensing is Agnostic to Virtualization, Hypervisors, and Partitioning

Many customers are surprised to learn that their Oracle agreements are completely devoid of language regarding virtualization and partitioning. There is, of course, language regarding virtual environments in the Partitioning Policy document. As we established earlier however, that document is not contractually-binding, being excluded by the contract's Entire Agreement clause as well as the footnote stating that it is for educational purposes only.

House of Brick contends that all forms of "partitioning", soft or hard, are a customer's contractual right – see our blog article on Oracle Licensing (Software Partitioning on VMware is Your Contractual Right) for an explanation of why that is. The reasoning applies to any Oracle platform.

Although the binding terms of the agreement are agnostic to virtualization, the policy documents are not. As previously explained, the policy documents are also not binding. While x86 customers have to review the information in our blog and elsewhere to make their own decision on the matter, Oracle explicitly recognizes LPARs as a form of hard partitioning and makes it a simpler evaluation for Power customers. Based on Oracle's offer of an extra-contractual right to license LPARs based on the number of cores available to the LPAR and not the entire host, Power customers have enjoyed this preferential treatment for decades.

In 2009, however, IBM introduced a new capability for LPARs called Live Partition Mobility or LPM. In 2013, Oracle seized on this as an opportunity to update their Partitioning Policy Document and attempted to restrict customer privileges by requiring not only licensing of an entire host but both hosts that are involved in an LPM migration of an LPAR. LPM functions similarly to VMware vMotion and we do not see that Oracle has any grounds for making such a distinction or attempting to restrict its use in a non-contractual policy document.

6.2.4   Oracle Licensing in a Cloud Computing Environment

There is one variation from the principle of hardware-based licensing that is worth noting, and that is Oracle's Cloud Computing Environment policy. This policy currently applies to only two cloud providers - Amazon Web Services (AWS) and Microsoft Azure. Neither provide IaaS offerings for IBM Power/AIX customers. In summary, it states that existing licenses can be used to cover Oracle programs running in the cloud infrastructure of the approved vendors. Instead of counting hardware processor cores, users can count virtual CPU's that are assigned to cloud instances. The license in these environments follows the virtual machine. In Azure, if hyper-threading is enabled, then two vCPUs are equivalent to one Oracle Processor license. If hyper-threading is disabled in Azure, then one vCPU is equivalent to one Oracle Processor license.

Readers will notice from above that the Cloud Computing Environment policy document is not a part of the binding contract. While it is not contractual, it is fundamentally different than the other non-contractual documents cited. The difference is that the Cloud Computing Environment document grants additional privileges, while the other documents restrict privileges. In discussion with legal teams on this issue, it appears that Oracle's granting of additional privileges in a non-contractual way could be counted on by a user, and upheld in a legal setting, since Oracle widely and publicly published such a privilege. This would, of course, need to be discussed with your own legal advisors.

Since this paper focuses on Skytap, readers may wonder what this Cloud Computing policy means for Skytap customers. As far as Oracle is contractually concerned, Skytap using provisioned LPARs for Oracle software is *not* a cloud-computing environment like AWS or Azure where licenses are allowed to follow the virtual CPUs. To Oracle, Skytap will be viewed as if the LPARs are part of the customer's on-premises environment, even though they are remotely hosted or located on servers in a separate datacenter. These processors will be accounted for in the normal fashion in an Oracle Server Worksheet during audit time. More detail on applying Oracle licenses in Skytap will be presented in the Section on Oracle Database Licensing in a Skytap AIX Environment.

6.3   Common Non-Contractual Assertions

The whole issue of partitioning and what is, or is not, allowed was challenged in the documents of the Mars vs. Oracle lawsuit, specifically as it relates to VMware virtualization. The same questions (and answers), however, apply to IBM LPAR-based virtualization. In the House of Brick blog post reviewing this challenge, it is also noted that Oracle has been attempting to redefine the word "installed." This attempt may be viewed as a means to get around their own contractual limitation of licensing where programs are "installed and/or running." The blog post paraphrases from Oracle's claim in the filing documents as follows: *"Oracle programs are installed on any processors where the programs are available for use. Third-party VMware technology specifically is designed for the purpose of allowing live migration of programs to all processors across the entire environment."* (Declaration of Eloise Backer, exhibit 11—September 25, 2015 letter to Khaled Rabbani, Mars General Counsel, from Chad Russell, Oracle Corporate Counsel.) Oracle is attempting to declare that its software "could run" on additional processors and thus those processors must be licensed.

In House of Brick's experience defending against Oracle audits, this attempted re-definition falls short of legal muster. Several of our customers' legal teams have performed case law searches and have found no evidence of Oracle filing legal actions against their customers on this issue. Furthermore, House of Brick has never had an otherwise compliant customer have to pay audit fees based solely on this tactic from Oracle.

Remember, any assertion that processors must be licensed where Oracle is not installed and/or running is not contractually founded. They are only claims that Oracle may make in an effort to increase the size of their sales opportunity.

The following comic (which has become quite popular worldwide) was developed by House of Brick to illustrate how Oracle tends to think about how customers should license their software.

© House of Brick Technologies

Just like drivers only have to pay for the parking spots that they actually park their cars in, Oracle users only have to license those cores where they actually have Oracle programs installed and/or running.

While LPARs managed in a PowerVM infrastructure are used as the underlying technology in Skytap, under no circumstances is any infrastructure obligated to licensing of prospective events. The contractual statement, "installed and or running is the threshold for determining if a license is required.

For workloads running Oracle on Power in Skytap, LPARs are recognized by Oracle as hard partitioning for license purposes, so customers should not face arguments to the contrary. When using the Oracle Partitioning Policy for licensing Power VM capped LPARs, count the entitled capacity rounded up to the nearest whole number. The IBM community has established upon detailed review of the technology, that this number may be determined by running the "lparstat -i" command within the LPAR itself or this information can be accessed in the [Skytap VM settings](#).

6.4 Determining License-able Events

Whenever Oracle programs are installed on a server and/or running on that server, users must account for a license for those programs. In Skytap, whenever users migrate a virtual machine into the cloud, or if they install Oracle software on a new Skytap LPAR users create a license event that Oracle may audit at some time in the future.

Only a VM or LPAR **running** in Skytap is a licensable event. A **non-running** LPAR is not a licensable event. The following sections describe two such events—Failover (e.g., for disaster recovery) and

Backup Testing. In both scenarios, we will be talking about the possibility of running virtual machines that are replicated as part of a backup strategy. It should be noted that a backup of a virtual machine that is simply sitting in storage and not presented to a server, <u>does not constitute a license-able event</u>.

6.4.1 Failover

In a failover event, the primary licensed server running Oracle database or app server workloads becomes unavailable for whatever reason. Oracle allows you to run that workload "*on an unlicensed spare computer in a failover environment for a total of ten separate days in any given calendar year*" (OLSA Section Q, Licensing Rules, Failover). This privilege has traditionally been a very powerful component in each user's disaster recovery planning.

In the contract template that started being used in about Q4 of 2007, however, Oracle changed their failover terms to be more restrictive. This is illustrated in the diagram on the right. In addition to the language stated above, Oracle added the following restriction: "*The above right only applies when a number of machines are arranged in a cluster and share one disk array.*" It further restricts the number of failover environments by stating that "*only one failover node per clustered environment is at no charge for up to ten separate days even if multiple nodes are configured as failover.*" An example of this language can be found in [OLSA v110711](.).
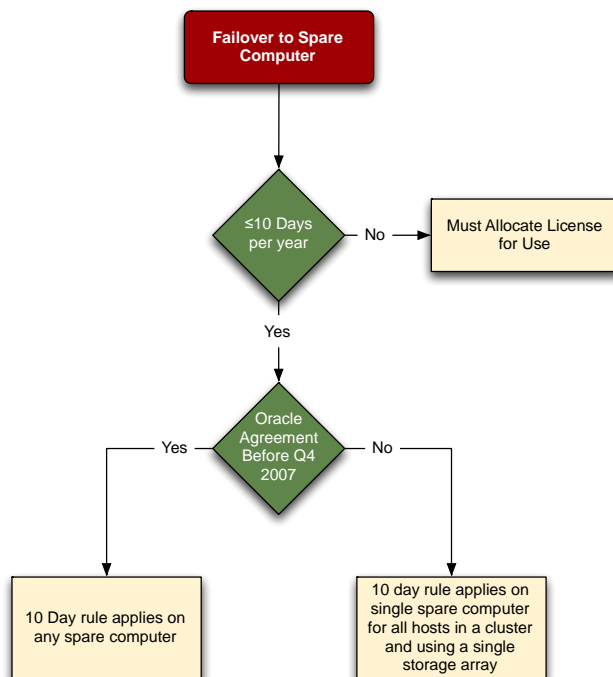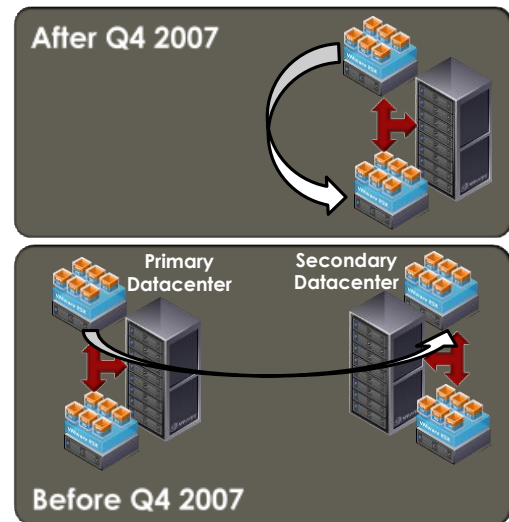
The flow diagram on the left helps with the decision process of whether the Failover rule (aka ten-day rule) can be applied to a particular environment. Users should discuss this architecture with their Skytap representative and their legal advisors to see if the cluster and shared disk array can be justified in using the Failover rule.

If users have an active contract from before about Q4, 2007, and have validated that it does not have the restrictive language in it, House of Brick highly recommends that they preserve that agreement in perpetuity. Users should still be able to make additional license purchases with the older agreement. In doing so, they should perform a legal review of all language that Oracle has added to the Order Document, being especially careful to strike all replacements of the Licensing Definitions and Rules section of the contract.

6.4.2   Backup Testing

The second privilege for running Oracle databases on an unlicensed computer is the Testing Rule for testing the recovery of backups. The Testing rule states, "*For the purpose of testing physical copies of backups, your license for the Oracle Database includes the right to run the database on an unlicensed computer for up to four times, not exceeding 2 days per testing, in any given calendar year*" (OLSA Section Q, Licensing Rules, Testing).

Similar to the Failover rule, in late 2011, Oracle changed the contract language for the Testing rule to be more restrictive. Users should validate their own contracts to see which provision applies. The more restrictive language adds the following, "*The aforementioned right does not cover any other data recovery method - such as remote mirroring - where the Oracle program binary files are copied or synchronized.*" An example of this more restrictive language can be found in OLSA v110711.

This newly added restriction seems to prevent the ability to launch a backed-up virtual machine, which may be considered a data recovery method where the Oracle program binary files are copied or synchronized in a manner that does not cause an immediate license event. In this case, users would need to launch a backed-up database into a pre-built virtual machine that was not replicated as part of the backup process. It appears that even though this pre-built backup server would fall under the "installed" state, that Oracle would allow for it to be designated as the backup test server, and thus remain unlicensed. Users should validate this with their legal advisors.

The flow diagram on the right helps with the decision process of whether the Testing rule can be applied to an environment. Users should discuss their backup procedures with their Skytap representative and their legal advisors to see if they are justified in using the Testing rule with backed-up virtual machines for contract language after late 2011.
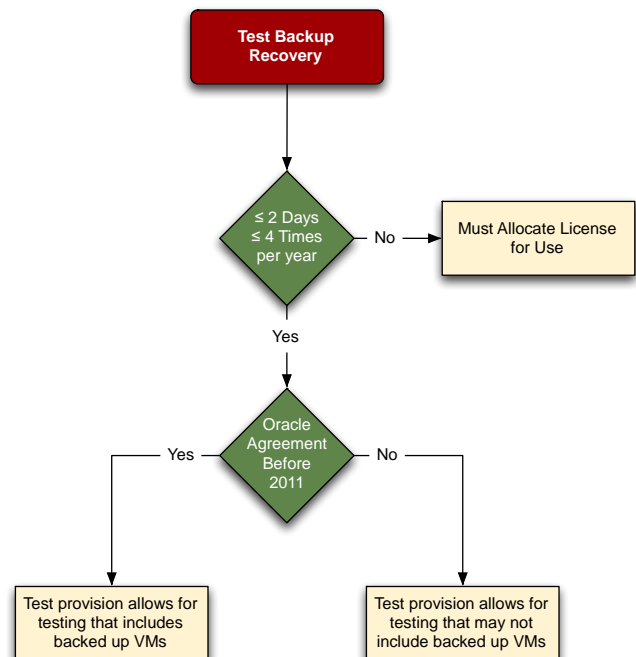
If users have an active contract from before late 2011 and have validated that it does not have the restrictive language in it, then we highly recommend that they preserve that agreement in perpetuity. Users should still be able to make additional license purchases with the older agreement. In doing so, they should perform a legal review of all language that Oracle has added to the Order Document, being especially careful to strike all replacements of the Licensing Definitions and Rules section of the contract.

7 Frequently Asked Questions about Oracle Licensing (FAQ)

Q: Are my Oracle licenses portable and can I migrate them into Skytap?

A: The short answer is, probably. Most Oracle contracts are agnostic to where the licenses are applied. However, there are situations where Oracle licenses are "sticky" to the hardware environment. For example, House of Brick has seen Oracle contracts where the contract stated that the licenses could only be applied on ExaData hardware. These situations are rare but check your particular agreements for these exceptions. When in doubt, contact a licensing expert like House of Brick for a license review.

Q: Is Skytap just like AWS or Microsoft Azure when it comes to Oracle?

A: No. Only AWS and Azure are [Oracle Authorized Cloud Environments](#), and only offer x86 architectures. This means that Oracle authorizes customers to "bring your own license" (BYOL) into AWS or Microsoft Azure at rates specified in the document. In those environments, the license follows the virtual machine. Since Skytap is not an authorized cloud environment for Oracle, they have created an architecture that provides LPARs for customers to deploy their Oracle workloads on Power.

Q: Could there be advantages to Skytap compared to AWS or Microsoft Azure for running Oracle?

A: Yes, Skytap offers a Power architecture utilizing LPARs running on PowerVM in Multi-Tenant and Single-Tenant Regions.

Q: For purposes of asset protection, do I need to keep a number of licenses in reserve for future Oracle deployments?

A: No. Keeping unused licenses may be non-productive while still incurring annual support costs. If you need additional licenses in the future, you can acquire them at that time. Some customers who have planned growth in a well-defined period may choose to retain some licenses to cover that growth. A cost-benefit analysis should be performed.

Q: Do I really have to create a separate cluster for my Oracle workloads?

A: Not necessarily. Users have to account for a license for every processor where Oracle programs are "installed and/or running." If users can contain Oracle deployments to a subset of servers or processors in a cluster, then they only have to license that subset.

Q: What things do I need to look for in my own contract with Oracle?

A: Understanding the license agreement with Oracle is key to maximizing the benefit from the software, while controlling and minimizing the license footprint through architectural means. House of Brick can provide best-practice guidance for creating architectures that minimize the license footprint. Organizations should keep track of all contract documents with Oracle, including their master agreement, any purchase order documents, and all Software Update and License Support (SULS) renewal documents. Oracle puts additional contract terms that override the master agreement in the purchase order documents, so it is important to perform a legal review of those terms before each purchase.

Q: How do I license disaster recovery environments?

A: We have discussed several scenarios in this paper related to disaster recovery, including the Failover rule and the Testing rule. An important thing to remember in deciding if you

have to license a secondary or failover environment is this: are the Oracle programs installed and/or running at the secondary site? If so, then a license must be accounted for. If not, then they do not have to be licensed. In the event of a failover, then it will be installed and running, and you must account for a license (either through the ten-day Failover provision or through license entitlement). If the Failover rule does not apply, then users must determine if the primary licenses can be migrated, or if new licenses must be acquired.

Q: What happens if I cancel support on a subset of licenses in a single order, or a subset of licenses of a single product across all orders?

A: Many customers want to cancel support on certain licenses for different reasons. These reasons may include a plan to migrate to a different platform within an acceptable unsupported period, or to eliminate support on a set of unused licenses. Oracle has strict (and contractually binding) policies about canceling support. If you cancel support on a subset of a single order, then Oracle has the right to re-price support for the remaining products in that order. Customers should understand that if they cancel support on a subset of a single order that the resulting re-price may be the same as the original support amount (but not greater than list price).

When customers cancel support on a subset of a single product across all orders, then the "license set" rules apply. These rules state that canceling support on a subset of licenses of the same code base results in the cancellation of the entire license. Customers may no longer use those licenses for which support was canceled. As an example, if a customer had 100 processors of Enterprise Edition database across four separate orders of 25 each, and canceled support on one order of 25 licenses, they would only be entitled to use 75 licenses. The licenses for the 25 that support was not renewed for have now been completely canceled and can no longer be used.

Q: What should I do when I get audited?

A: In the contract, customers have agreed to allow Oracle to perform an audit of their usage of Oracle software. Most agreements state that customers agree to allow Oracle to audit them with 45 days written notice. Also, their audit may not unduly impact normal business operations (although every audit will undoubtedly be an impact). Once an audit is complete, customers have agreed that they will settle any fees due within 30 days of written notification. Oracle has become quite aggressive in performing audits and in claiming fees due with and without contractual merit, including from the non-contractual assertions discussed earlier in this paper. It is important to understand your contractual privileges and to be prepared to defend those. House of Brick provides audit defense services to help with this process.