Hyperion Focus 17

Cloud Wars: Avoid the pitfalls of hosting Oracle systems in the Cloud

Jonathan Stuart

Claremont

Today’s Agenda

- Introduction
- Clouds & Cloud Wars
- Cloud Hosting Pitfalls: 1 – 5, General
- Cloud Hosting Pitfalls: 6 – 10, Licensing
- Questions

Claremont, an Introduction

Jonathan Stuart

- Jonathan Stuart, Claremont's Managed Service Director
  - jonathan.stuart@claremont.co.uk
  - 07798 841226

- Joined Oracle Consulting in 1996
- Worked for various mid-size Oracle EBS & technology partners since leaving Oracle
  - Specialized in Managed Services for past 10+ years
- Joined Claremont in January 2011 to establish our Managed Services Practice
  - Responsible for the creation & delivery of our Oracle Managed Services capabilities: Hosting, DBA, technical & functional support for Oracle EBS, Hyperion & technology

Welcome to Claremont

Oracle Professional Services

Claremont are a leading independent Oracle specialist in the UK, dedicated to providing quality Oracle Services.

Company Background

- Established business, founded in 2004
- Oracle Gold Partner delivering Oracle solutions
- UK offices in Guildford and Newcastle
- Near shore development centre in Varaždin, Croatia
- Circa £10m Annual Revenues, UK headcount 60
- Focused on helping customers maximise their investment in Oracle technology

Mark Vivian, CEO

Quality and accreditation

Gold Partner Cloud Standard

Oracle E-Business

Database

Managed Services

VertexFusion

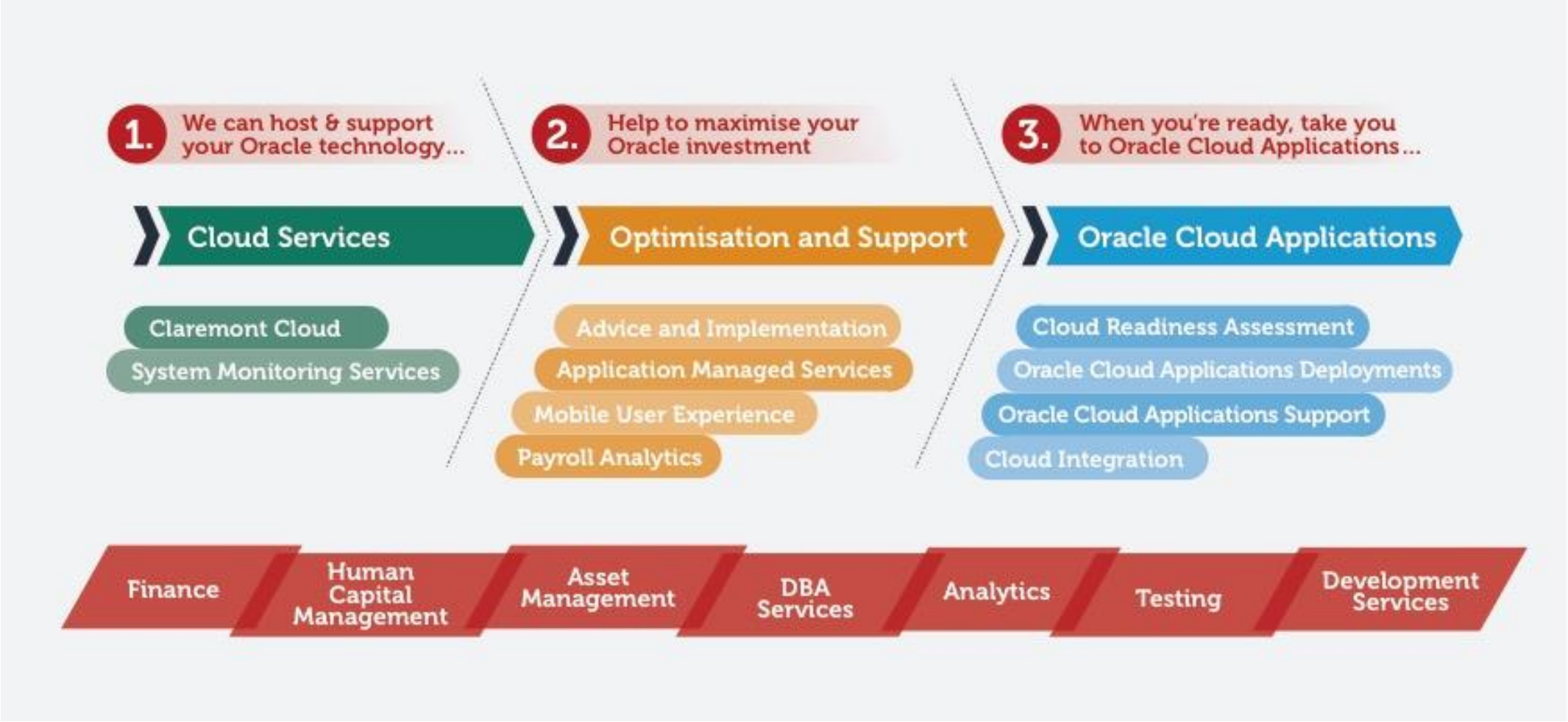
ISO 9001 REGISTERED FIRM

INVESTORS IN PEOPLE | Gold

ITIL

Claremont.

Claremont's Services



Clouds & Cloud Wars

Hosting Models & Options

On-premise

- Internal data centre
- I.T. responsible for everything: hosting, hardware, networks

Co-location

- Hosting moved to 3rd party data centre
- Delegation of hosting responsibilities

Dedicated Hardware

- Hosting provider leases & supports hardware
- Further delegation optional, e.g. OS & DBA

"Conventional" Hosting

Increased Delegation from I.T. to Hosting Provider / Reduced Control

IaaS

- Bare infrastructure managed by provider
- I.T. configures & manages resources

PaaS

- Provides a *platform* or *applications* for I.T. to manage: OS, software & management tools

Managed Cloud

- Cloud hosting & managed service for non-SaaS application

SaaS

"Cloud" Hosting – Public, Private or Hybrid

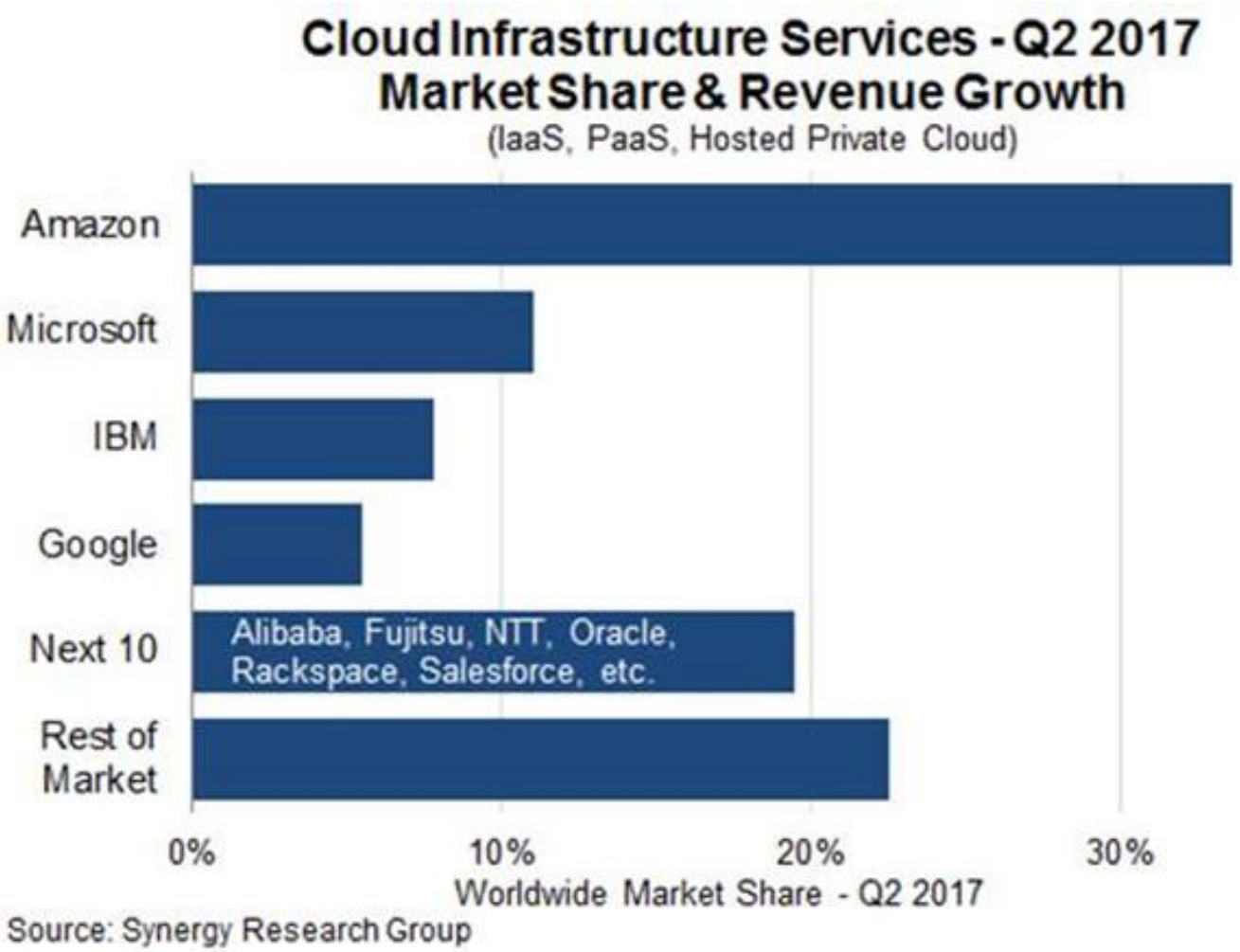
Clouds & Cloud Wars

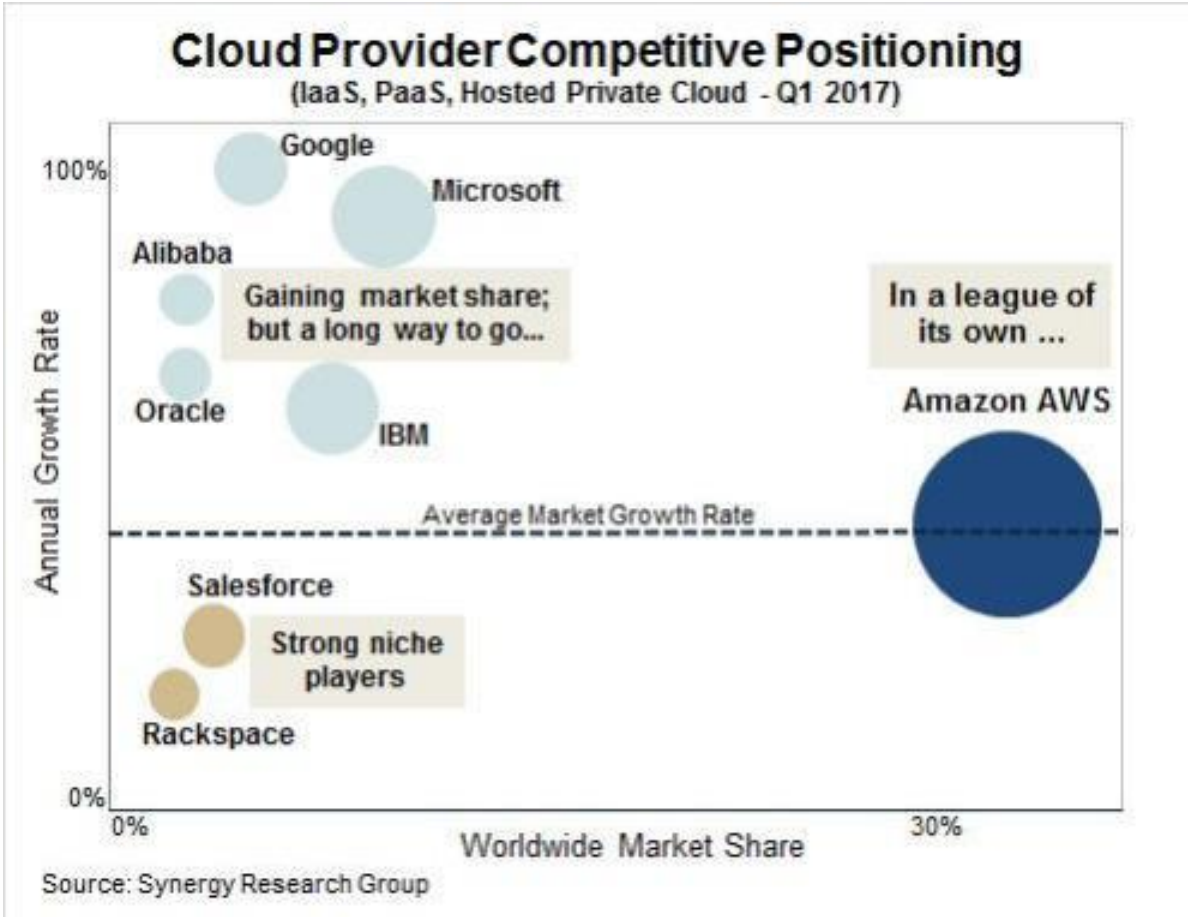
- "The Cloud" is an overused term; many different Clouds exist but, typically:
  - Ubiquitous & **flexible access** to **virtualized computing** resources that can be **quickly provisioned**
  - **Minimal up-front I.T. infrastructure costs** & reduced ongoing maintenance
  - A **"pay-as-you-go" model**: scale up & down
  - Businesses can focus on their core business, not expend resources on I.T. infrastructure & maintenance
- Clouds may be private (operated for a single organization) or public (open to all) or a hybrid
  - Technically there may be little difference but security, for example, may be substantially different

- Why Cloud Wars? Cloud providers are desperate to increase market share
  - Cloud hosting & applications delivers long-term Annual Recurring Revenue
  - Businesses want ARR & hosting is "sticky" – customers infrequently change hosting provider

- Clouds' flexibility & "Cloud Wars" causes some of the Cloud-hosting pitfalls

The Cloud Marketplace





Claremont Cloud Hosting Statistics – September 2017

176
Virtual Servers

957
CPU cores

250TB
Storage

6.4TB
Physical memory

234
Oracle databases (100 EBS envs)

100%
Availability

100%
Incident Response SLA

99.5%
Incident Resolution SLA

The Pitfalls – “General Issues”

Pitfall 1 – General Cloud Issues

Risk : MEDIUM
Impact : MEDIUM

- Not Oracle-specific but these are common concerns & can cause significant issues
- Claremont ran a survey of Oracle users who have migrated some systems to Cloud hosting:
  - The number expecting issues was greater than the number that experienced issues
  - However, almost just under half experienced issues with integration & cost
- **Mitigation**: Due diligence is still required despite the abstract nature of Cloud services

Risk / Disadvantage	Perceived Risk	Actual Disadvantage
Data Security / Privacy	69% (1st)	12% (-57%, 6th)
Integration Difficulties	59% (2nd)	38% (-21%, =1st)
Financial Cost	41% (4th)	38% (-3% =1st)
Loss of Flexibility & Control	34% (5th)	13% (-31%, 4th)
Performance & Availability	22% (6th)	25% (+3%, 3rd)
Connectivity	50% (3rd)	13% (-27%, 4th)

Pitfall 2 – Getting Stuck with a Cloud Provider

Risk : MEDIUM
Impact : HIGH

- Not Oracle-specific but risk & impact are proportional to system size & importance
  - Oracle databases are often large (750GB average in Claremont's hosting), complex & important
- Implementing on Cloud is easy, migrating away is as hard as any hosting migration:
  - Data volumes are often significant & business may not permit much downtime
  - Contracts make little provision for exit, e.g. extract from Claremont customer's previous contract:

"*Within seven (7) calendar days after the end of the services term, XXXX will deliver to you a final Decommission Tape containing your data.*" (Exit provision from Managed Cloud contract)

- Cloud hosting presents additional problems for hosting migrations:
  - Data access / migrations probably rely on the Internet (bandwidth limitations)
  - Cloud hosting provider's service may be limited, esp. with IaaS & PaaS – it's your problem
  - Managed Cloud provider's exit services may be inadequate but you have less control / access
- **Mitigation**: Have an exit plan. If required, include provision for *how* the exit will happen
  Only about 25% of customers ask us for an exit plan (we provide one anyway)
  Include provisions in the hosting contract – vendors will allow changes

Pitfall 3 – Oracle's Support for Software on VMWare

Risk : LOW
Impact : HIGH

- Many Clouds (and in-house virtualized platforms) use VMWare
- Oracle supports their products on VMWare, but they are not certified (MOS Doc ID 249212.1)

"Oracle will only provide support for issues that either are known to occur on the native OS, or can be demonstrated not to be as a result of running on VMware". "If the problem is determined not to be a known Oracle issue, we will refer the customer to VMware for support. When the customer can demonstrate that the issue occurs when running on the native OS, Oracle will resume support".

- Oracle Support may require you to "demonstrate" a problem's not a VMWare issue
  - Requires time & resources to replicate the problem outside VMWare
  - That would be a distraction for your business, costs time/money & delays incident resolution
- However, in practice we don't believe Oracle Support regularly enforces this
  - The benefits of VMWare often outweigh the risk, but understand the support terms

- **Mitigation**: I.T. should be aware of this policy if running Oracle on VMWare
  For critical systems, consider how an issue may be replicated outside VMWare

Pitfall 4 – Does Your Oracle Software Work in the Cloud?

Risk : LOW
Impact : HIGH

- Not all Oracle software will work in all Clouds, e.g. the following is not supported on AWS:
  - Oracle RAC
  - Oracle Multitenant in Oracle 12C
  - Ref. “Oracle Database Support for Amazon AWS EC2” (MOS Doc ID 2174134.1)
- Oracle RAC requires shared storage and additional network capabilities (e.g. multicast IP)
  - Workarounds are available but not supported or certified by Oracle
- This is a constantly changing and the latest status should be checked with Oracle
  - MOS Doc ID 2174134.1 is no longer accessible
  - http://www.oracle.com/technetwork/database/options/clustering/overview/rac-cloud-support-2843861.pdf *“This paper is currently under review. We apologize for the inconvenience.”*

- **Mitigation**: Don’t assume software runs in Clouds in the same way as on physical hardware
  Check Oracle’s support/certification matrixes & support Notes on My Oracle Support

Pitfall 5 – SLOs versus SLAs

Risk : MEDIUM
Impact : LOW?

- An SLA is a commitment that service levels, e.g. availability, will meet a certain level over a certain period, and if it fails to do so then some kind of penalty will be paid.
- A Service Level Objective (SLO) (ITIL V3 Service Level Target) is just an objective, a target
- Cloud hosting SLAs are not always clear enough:
  - Cloud hosting providers often refer to SLOs, “Target System Availability” / “Target Uptime”
- It is important to understand the SLA (not SLO/target) and penalties/credits for breaches

- **Mitigation**: This pitfall mainly requires awareness & due diligence of SLAs
  If service levels matter, then understand the contracted SLAs & service credits

The Pitfalls – “Oracle Licensing”

Oracle Licensing Primer

- Most Oracle licensing is based on (or influenced by) the number of CPUs or CPU cores
  - Oracle Processor licences are directly related to the number of server CPU cores or CPUs
  - Named user (NUP) licensing must meet minimum thresholds depending on server cores: Enterprise database = 25 NUP per *Oracle Processor*, Standard 2 = 10 NUP per server
- An *Oracle Processor* = CPU cores x Oracle's "core factor" for the CPU (e.g. 0.5 for most Intel CPUs)
  - E.g. A server with 2X 4-core Intel CPU requires 4 *Oracle Processor* licenses (or 100 EE NUPs)
  - http://www.oracle.com/us/corporate/contracts/processor-core-factor-table-070634.pdf
- Many CPU are "multi threaded", e.g. Intel's "Hyperthreading" gives 2 threads per core
  - A thread looks like a CPU to the operating system, e.g. our 2X 4-core Intel CPU will look like 16 cores
  - Oracle ignores Hyperthreading – licenses are based on the physical cores not the threads

- While complicated, these rules are easy to apply to physical servers. However, Oracle has introduced further rules for licensing CPUs when Cloud hosting…
- **N.B. This section references various Oracle documents, but the only authority on Oracle licensing is the customer's relevant agreement signed with Oracle**

Pitfall 6 – Oracle Doesn't Cater for Hyperthreading on Azure

Risk : **HIGH**
Impact : **HIGH**

- Microsoft's Azure Cloud historically didn't use hyperthreading
  - One Cloud CPU core equalled one physical CPU core
- Oracle's Cloud licensing rules are based on this and treat every vCPU as a licensable CPU core
  - http://www.oracle.com/us/corporate/pricing/cloud-licensing-070579.pdf
- However, Microsoft is introducing Azure hosting that uses Hyperthreading: Dv3 & Ev3
- Oracle software hosted on Dv3 & Ev3 must be licensed on all vCPUs despite these being threads
  - Licensing will be twice as expensive as on comparable Cloud or physical hosting
  - Also a risk of unintended license compliance issues

- **Mitigation**: Unless you have spare/unlimited Oracle licenses, check Oracle's rules for updates and check whether they affect you before running run Oracle on Azure Dv3 or Ev3

Pitfall 7 – Beware of "Soft Partitioning"

Risk : **HIGH**
Impact : **HIGH**

- Virtualization allocates servers' CPUs to different virtual servers
  - E.g. one 8-core physical server may host 2X 2-core and 1X4-core virtual servers
- Oracle uniquely categorizes virtualization technologies as *soft* or *hard* partitioning:
  - Soft *includes (but is not limited to)*: Solaris 9 Resource Containers, AIX Workload Manager, HP Process Resource Manager, Affinity Management, Oracle VM, and VMware
  - Hard is *only*: Physical Domains, Solaris Zones[1], Oracle VM[1], IBM's LPAR & Micro-Partitions, HP vPar & nPar, Integrity Virtual Machine, Secure Resource Partitions, Fujitsu's PPAR
- "*Soft partitioning is not permitted as a means to determine or limit the number of software licenses required for any given server*" i.e. the **entire underlying server must be licensed**
  - http://www.oracle.com/us/corporate/pricing/partitioning-070609.pdf
- Many Clouds (and in-house virtualization platforms) use VMWare. VMWare = soft partitioning.
  - The underlying server (which may be substantially larger than the virtual server) must be licensed
  - License costs may be unpredictable (is the Cloud server spec known?) & substantial
- **Mitigation**: Understand & accept the potential risks / consequences of soft partitioning or avoid it

Note 1 – Subject to being configured according to Oracle's rules

Pitfall 8 – Oracle “Core Factor” Removed for AWS & Azure

Risk : **HIGH**
Impact : **HIGH**

- In Jan-17 Oracle removed the core factor for “Authorized Cloud Environments” (AWS & Azure)
  - “*When counting Oracle Processor license requirements in Authorized Cloud Environments, the Oracle Processor Core Factor Table is not applicable.*”
  - http://www.oracle.com/us/corporate/pricing/cloud-licensing-070579.pdf
  - Document is not contractual but Oracle Master Agreements may be updated
- An Oracle Processor license is required for every vCPU (every 2 hyperthreaded vCPUs on AWS)
  - This **doubles the cost of licensing Oracle on AWS & Azure** vs other Clouds, e.g. Oracle’s. Cloud Wars?
- Does this apply retrospectively? We assume it applies to installs after 23-01-17…
  - …and where Oracle’s relevant agreement has updated
- However, this could force a choice between non-compliance, purchasing additional licenses or throttling the performance of your Oracle system

- **Mitigation**: Understand if this change affects your Oracle hosting

Pitfall 9 – Standard Edition Costs May Increase and / or Performance Falls

Risk : **HIGH**
Impact : **HIGH**

- Oracle Standard software (not just database) is licensed per CPU (not core)
  - Oracle has metrics to count nominal CPUs & limit vCPUs in Clouds (not hard/soft partitioned):

Cloud	CPU Equiv. (1 license)	Max vCPUs: Standard	Max vCPUs: Std One	Max vCPUs: Std 2
Azure	2 vCPUs	8 vCPUs	4 vCPUs	2 vCPUs
AWS	4 vCPUs	16 vCPUs	8 vCPUs	8 vCPUs
Oracle	8 vCPUs[1]	Unlimited	Unlimited	16 vCPUs
Other	Undocumented – understand Cloud's partitioning/threading & assume Azure/AWS metric			
Hard Partitioned[2]	16 vCPUs	Unlimited	Unlimited	16 vCPUs

- Standard license requirements vary between Clouds; AWS & Azure are particularly impacted
- Fewer vCPUs may be used on AWS & Azure, potentially reducing performance
- Further performance impact for Azure: assumes hyperthreading gives no benefit in AWS & Oracle
- **Mitigation**: Check how these rules apply to you before moving Standard editions to Cloud.

Note 1 – Oracle's metric is 4 "OCPUs", which is equivalent of equiv. of 4 cores / 8 threads / 8 vCPUs
Note 2 – For comparison. Assumes virtual server with 16+ vCPUs pinned to cores from a single CPU

Pitfall 10 – Oracle Licensing Doesn't Support Scaling Resources Up/Down

Risk : LOW
Impact : HIGH

- Oracle's licenses don't support "Capacity on demand"
  - E.g. scaling CPU allocations up and down over time to match demand & performance requirements
  - http://www.oracle.com/us/corporate/pricing/partitioning-070609.pdf
- Licensing is based on the maximum number of CPUs or cores used
  - The CPU "high water mark" is tracked in the Oracle database
- Temporarily increasing virtual CPUs/cores to accommodate high demand may cause compliance issues if this exceeds the licensed number
- New instances are easily created on Clouds & this may also lead to over-use of Oracle software.
  - Oracle software requires licensing anywhere it's "installed and/or running"

- **Mitigation**: Don't allocate, even temporarily, more CPUs than are licensed
  Manage (limit) the creation of new environments to remain within licensing constraints
  Education & processes should prevent administrators from over-allocating CPUs

Summary & Questions

- Cloud hosting has some unexpected challenges

- I believe 2 areas are critical:
  - Consider exit strategies for systems with long lifespans
  - Licensing rules are different and sometimes more restrictive when hosting in Cloud environments

- Oracle's licensing rules are published policies but not necessarily contractual. You may not be affected but it is important to check before migrating to the Cloud.
  - Beware if buying new licenses imposes new licensing rules

- **Any questions?**

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Thank you