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Oracle Database in the Cloud

Bill Hodak
Sr Product Manager

What Is Cloud Computing?

- Computing resources residing on Internet ('the cloud')
- Underlying physical resources not exposed
  - Abstracted at various levels (virtual machines, database as a service, etc.)
  - No direct hardware control
- Infinitely scalable
- Billed by consumption
  - Per hour, per GB, etc.
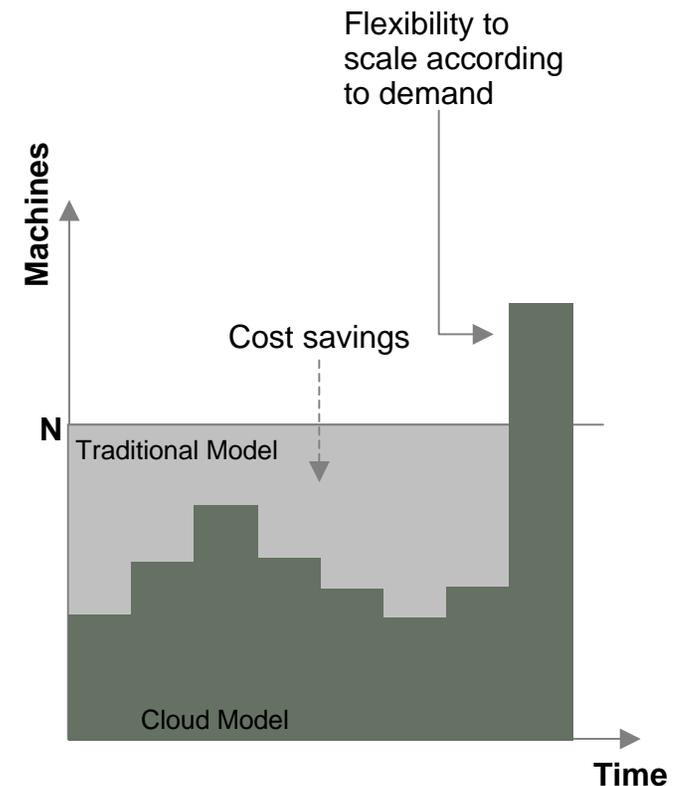- Typical Interface: Web Services
  - REST, SOAP

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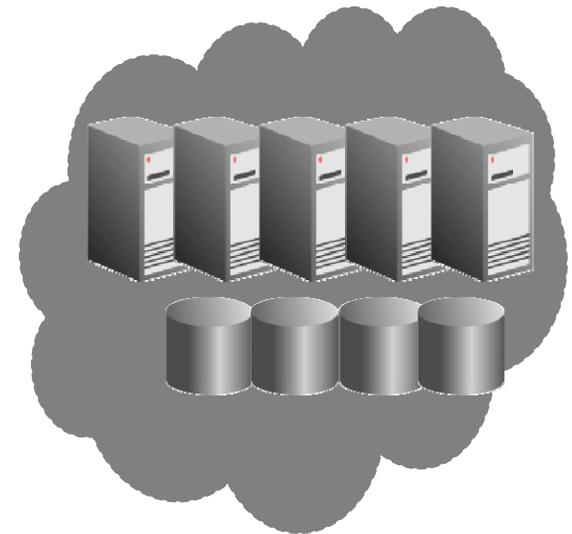
Why Cloud Computing?

Cost

- Cost Savings
  – Pay only for what you use and when you use it ($0.40/hour Vs. $700 per month+$800 set up)
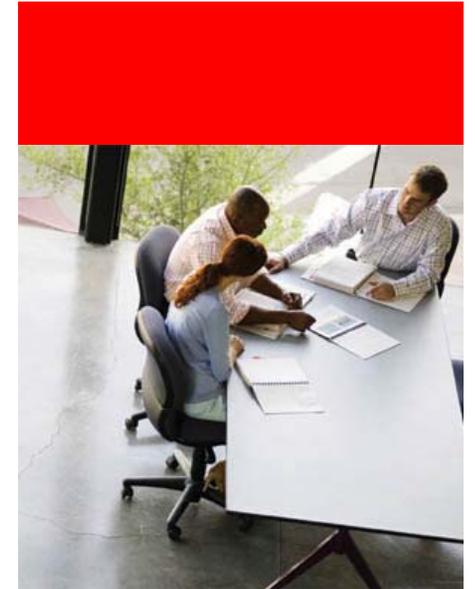 – Better per unit rates due to economies of scale

Flexibility & Agility

- Quick, Self-Service Provisioning
  – Developers no longer waiting on IT to respond
  – Eases and Speeds Up Application Development
- Elastic
  – Scale up and down rapidly

Machines

Flexibility to scale according to demand

Cost savings

N

Traditional Model

Cloud Model

Time

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Cloud Computing and Oracle

Cloud Computing and Oracle

- Cloud Computing today:
  - Developers are the primary users
  - Infrastructure not enterprise ready
  - Non-mission critical systems

- Oracle's goal is to make cloud computing relevant to enterprises by
  - Providing right set of products and services
  - Lead the industry efforts in developing Cloud standards, ensure data security, etc.

- Amazon is #1 Cloud Computing vendor & Oracle's 1st Partner

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Amazon Web Services (AWS)
Introduction

- Amazon Data Center in the Cloud
- Fast, easy, inexpensive renting of servers / storage
  - Elastic Compute Cloud (EC2) – Rent Linux virtual machines
    - 10-80 cents/hour
  - Simple Storage Service (S3) – Store files
    - 15 cents/GB/month (US)
    - 18 cents/GB/month (Europe)
  - Bandwidth Costs
    - 10 cents/GB incoming
    - 10 – 17 cents/GB outgoing (based on volume)
- Customers demand for Oracle products to run on AWS

http://aws.amazon.com

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EC2 Virtual Machine Configurations

	Small Instance	High CPU Medium Instance (~Single Socket DC Server)	Large Instance (~Single Socket DC Server)	Extra Large Instance (~Single Socket QC Or Dual Socket DC Server)	High CPU Extra Large Instance (~Dual Socket QC Server)
Virtual Cores	1 x 1.2 GHz	2 x 2.5 GHz	2 x 2.0 GHz	4 x 2.0 GHz	8 x 2.5 GHz
Memory	1.7 GB	1.7 GB	7.5 GB	15 GB	7 GB
Storage	160 GB	350 GB	850 GB	1.7 TB	1.7 TB
	Additional Shared Storage Available for Extra Cost				
I/O	Moderate	Moderate	Good	Good	Good
Target Application	Web Servers, Developer Sandbox		Databases (and other resource intensive applications)		
Cost	$0.10 / Hour ($72/Month)	$0.20 / Hour ($144/Month)	$0.40 / Hour ($288/Month)	$0.80 / Hour ($576/Month)	$0.80 / Hour ($576/Month)
	$.010 - $.17/GB/Month network bandwidth (in and out of Amazon Data Center)				

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Amazon EC2 Features

- Elastic (Static) IP Addresses
  - Pre-assigned static IP addresses that can be associated with any EC2 instance
- Elastic Block Storage
  - Persistent "NAS" style storage
  - Allows users to create volumes and snapshots
  - Default EC2 storage is ephemeral – you loose everything the moment you shut down an instance
- Availability Zones
  - Spread your instances across multiple locations for business continuity
- Security
  - Private/Public key pair based, SSH-only administrator access
  - Ability to configure firewall and network port settings
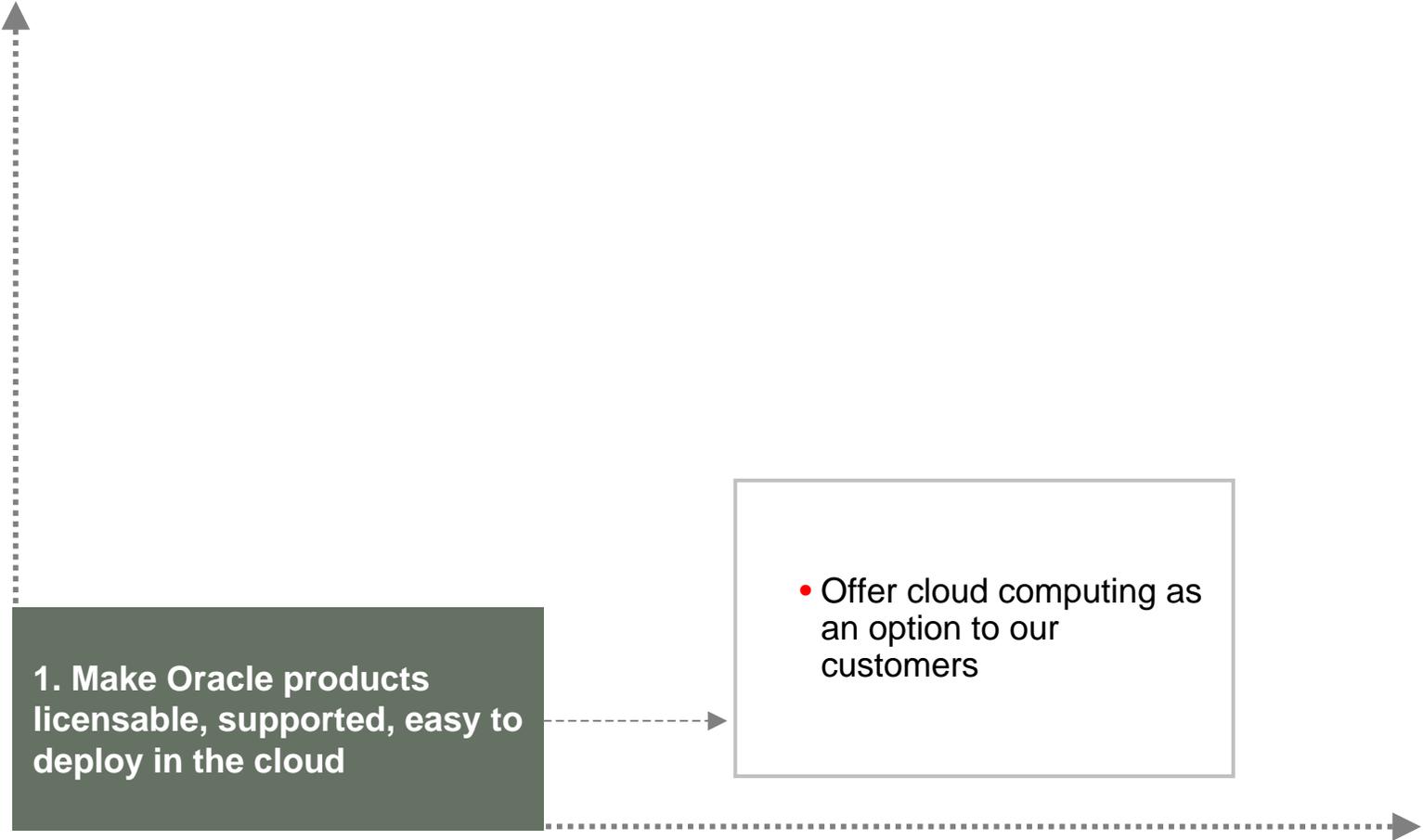
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Amazon Simple Storage Service (S3)

- S3 - store files on Amazon storage cloud
  - Primarily used for backups, images, virtual machine snapshots
- Asynchronously replicates data to several data centers for HA and scalability
  - Typically in minutes
  - Claim to never have lost any data, but no guarantees
  - 99.99% uptime SLA
- Pricing
  - Storage
    - $0.15 to $.18/GB/Month (Higher price for data stored in Europe)
  - Bandwidth – free if from EC2
    - $0.10 - $.017/GB Transferred/Month

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Oracle's Cloud Strategy – Cloud "enable" Oracle Software

1. Make Oracle products licensable, supported, easy to deploy in the cloud

- Offer cloud computing as an option to our customers

Oracle Software Cloud Licensing

- ## Oracle software can now be licensed for the Cloud
  - Amazon EC2 supported today
- ## Database, Middleware, Grid Control
  - EE: Each virtual core counted as a physical x86 core (EE)
  - SE/SE1 license based on the EC2 instance size
    - 0-4 virtual cores = 1 processor (socket)
    - >4 virtual cores = each 4 virtual core counted as a processor (socket)
- ## Oracle Enterprise Linux
  - Each EC2 instance is counted as a "System"
- ## Can buy new licenses or use existing ones
- ## Customers with ULAs can use EC2 without any additional license

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Deploying Oracle Software in the Cloud

- Pre-configured virtual machine images (AMIs) available for EC2
- Consists of Oracle Enterprise Linux + Oracle DB + APEX
  - No RAC support currently (EC2 does not support clusters)
- Fully configured hardware and Oracle environment in less than 30 minutes
  - For test, dev, QA, POC, and other short-term projects
  - Such projects otherwise often get bottlenecked by IT
  - Can also be used as "sandbox" to try out new releases/options
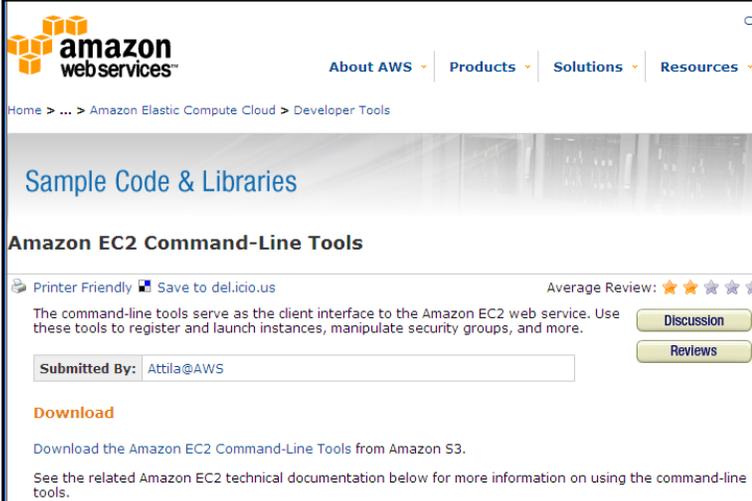- More AMIs to be released in the future

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Getting Started with Oracle on Amazon EC2
Set up Amazon EC2 account

- Sign up for Amazon Web Services and EC2

  http://aws.amzon.com

  – Can use your regular Amazon account

  – Create your secure X.509 certificate and create key pair for command line access to EC2

    - Using tools like SSH and PuTTY

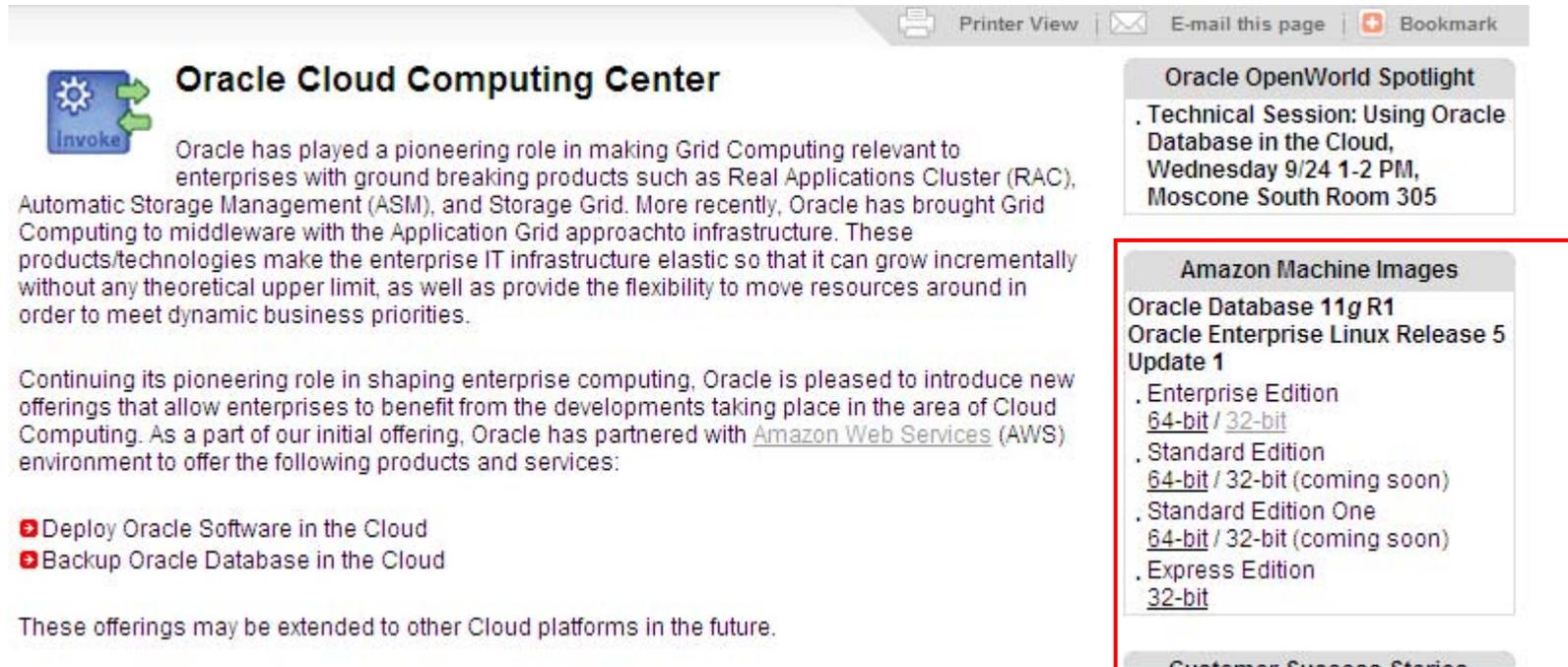- Download and install EC2 command line tools

Getting Started with Oracle on Amazon EC2
Pick an Oracle AMI

Oracle Cloud Computing Center

Oracle has played a pioneering role in making Grid Computing relevant to enterprises with ground breaking products such as Real Applications Cluster (RAC), Automatic Storage Management (ASM), and Storage Grid. More recently, Oracle has brought Grid Computing to middleware with the Application Grid approach to infrastructure. These products/technologies make the enterprise IT infrastructure elastic so that it can grow incrementally without any theoretical upper limit, as well as provide the flexibility to move resources around in order to meet dynamic business priorities.

Continuing its pioneering role in shaping enterprise computing, Oracle is pleased to introduce new offerings that allow enterprises to benefit from the developments taking place in the area of Cloud Computing. As a part of our initial offering, Oracle has partnered with Amazon Web Services (AWS) environment to offer the following products and services:

- Deploy Oracle Software in the Cloud
- Backup Oracle Database in the Cloud

These offerings may be extended to other Cloud platforms in the future.

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Oracle OpenWorld Spotlight
. Technical Session: Using Oracle Database in the Cloud, Wednesday 9/24 1-2 PM, Moscone South Room 305

Amazon Machine Images
Oracle Database 11g R1
Oracle Enterprise Linux Release 5 Update 1
. Enterprise Edition
64-bit / 32-bit
. Standard Edition
64-bit / 32-bit (coming soon)
. Standard Edition One
64-bit / 32-bit (coming soon)
. Express Edition
32-bit

http://www.oracle.com/technology/tech/cloud/index.html

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Getting Started with Oracle on Amazon EC2
Pick an Oracle AMI

Oracle Cloud Co...

Oracle has played a pione...
enterprises with ground b...
Automatic Storage Management (ASM), a...
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Continuing its pioneering role in shaping...
offerings that allow enterprises to benefit...
Computing. As a part of our initial offering...
environment to offer the following product...

🔴 Deploy Oracle Software in the Cloud
🔴 Backup Oracle Database in the Cloud

These offerings may be extended to other...

Amazon Machine Images (AMIs)

Oracle Database 11g Release 1 Enterprise Edition - 32 Bit

🖨 Printer Friendly 📑 Save to del.icio.us   Average Review: ⭐⭐⭐⭐⭐

This is an Oracle Corporation supplied and publicly available AMI that includes Oracle
Enterprise Linux Release 5 Update 1 and Oracle Database 11g Release 1 Enterprise
Edition - 32 Bit.

[Discussion]

[Reviews]

Submitted By:	William Hodak
AMI ID:	ami-cecb2fa7
AMI Manifest:	oracle-corporation/database-ami/32-bit/oracle_11106_EE_32Bit-image.manifest.xml
License:	Public

This AMI comes with Oracle Enterprise Linux Release 5 Update 1 and Oracle Database 11g Release 1
Enterprise Edition software pre-installed and configured on the 32 Bit platform. In a matter of minutes, you
can have a fully configured Oracle Database computing environment running on Amazon EC2 that includes the
web based management tool Enterprise Manager Database Control and the web based rapid development
tool Applications Express (APEX). For further information about Oracle Database in the Cloud or this Amazon
Machine Image, please visit http://www.oracle.com/technology/tech/cloud/index.html

http://www.oracle.com/technology/tech/cloud/index.html

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Getting Started with Oracle on Amazon EC2
Pick an Oracle AMI

Oracle Cloud Co[...]

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enterprises with ground br[...]
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Computing to middleware with the Applic[...]
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AMI ID:	ami-cecb2fa7
AMI Manifest:	oracle-corporation/database-ami/32-bit/oracle_11106_EE_32Bit-image.manifest.xml
License:	Public

This AMI comes with Oracle Enterprise Linux Release 5 Update 1 and Oracle Database 11g Release 1 Enterprise Edition software pre-installed and configured on the 32 Bit platform. In a matter of minutes, you can have a fully configured Oracle Database computing environment running on Amazon EC2 that includes the web based management tool Enterprise Manager Database Control and the web based rapid development tool Applications Express (APEX). For further information about Oracle Database in the Cloud or this Amazon Machine Image, please visit http://www.oracle.com/technology/tech/cloud/index.html

http://www.oracle.com/technology/tech/cloud/index.html

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Getting Started with Oracle on Amazon EC2

Start a New EC2 Instance with Oracle AMI

- Configure EC2 firewall settings to open the required network ports (one time operation)
    - 1521 (listener), 8080 (APEX), 1158 (EM), etc.

> ec2-authorize default –p 1158

- Start up an EC2 Instance with Oracle AMI

> ec2-run-instances ami-cecb2fa7 –k <keypair>

Oracle on Amazon EC2
First Reactions (From AWS website)

"Normally Oracle is a nightmare to install. However, what's amazing is how pain-free this was to get going. Oracle really did a good job."

"First class Database + linux available in 8 minutes!!. Don't you believe? Try this AMI and enjoy with APEX and is GUI for the administration. Specially amazing with EBS."

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Oracle in the Cloud
Customer Success Story – Harvard Medical School

- Clinical and drug simulation application
- Technical Challenges
  - Short development time
  - Unpredictable peaks and troughs
  - Limited capital budget
  - Minimal technical and administrative complexity
- Solution
  - Oracle on Amazon EC2
  - Participated in Oracle on EC2 beta program
  - Developed the entire application in 4 weeks

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Oracle in the Cloud
Customer Success Story – Harvard Medical School

http://ec2-75-101-221-79.compute-1.amazonaws.com:8080/web/guest/home

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Oracle in the Cloud
Customer Success Story – Harvard Medical School

Harvard Medical School

cbmi
Center for Biomedical Informatics

| LPM | Warfarin | Breast Cancer | Forums | NextBio | Harvard NB |

Welcome! ▾

> *"The combination of Oracle and AWS allowed us to focus our time and energy on simulation development, rather than technology, to get results quickly"*
>
> **- Dr. Peter Tonellato**

upcoming additions:
- Breast Cancer prediction/prevention simulation service

Forgot Password?

http://ec2-75-101-221-79.compute-1.amazonaws.com:8080/web/guest/home

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Oracle's Cloud Strategy – Cloud-based Services

2. Create cloud offerings and cloud based services

Cloud Offerings
- Development-As-A-Service
  - Apex.oracle.com

Cloud-based Services
- Database backup in the Cloud
- Content archival in the cloud

1. Make Oracle products licensable in the cloud

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Oracle Cloud Strategic Options – Cloud-based Services

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  - Apex.oracle.com

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1. Make Oracle products licensable in the cloud

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Oracle Database Development-as-a-Service

- Apex.oracle.com – Cloud based Oracle development platform

- 14000 users, 300 new users every week, 10M page views/month

- Free

Oracle Cloud Strategic Options – Cloud-based Services

2. Create cloud offerings and cloud based services

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Cloud-based Services
- Database backup in the Cloud
- Content archival in the cloud

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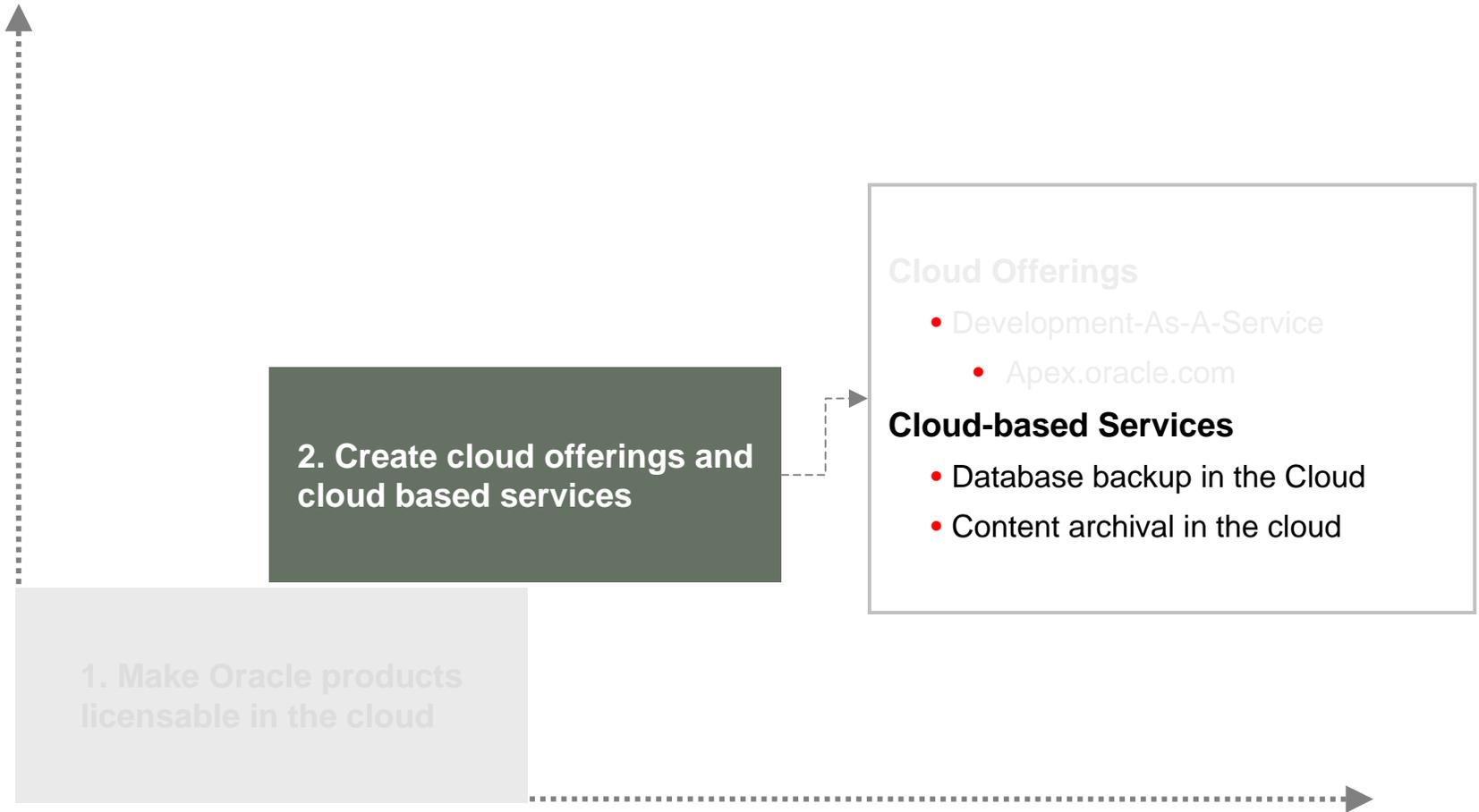
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Current Database Backup Best Practice

Database Files

RMAN Backup
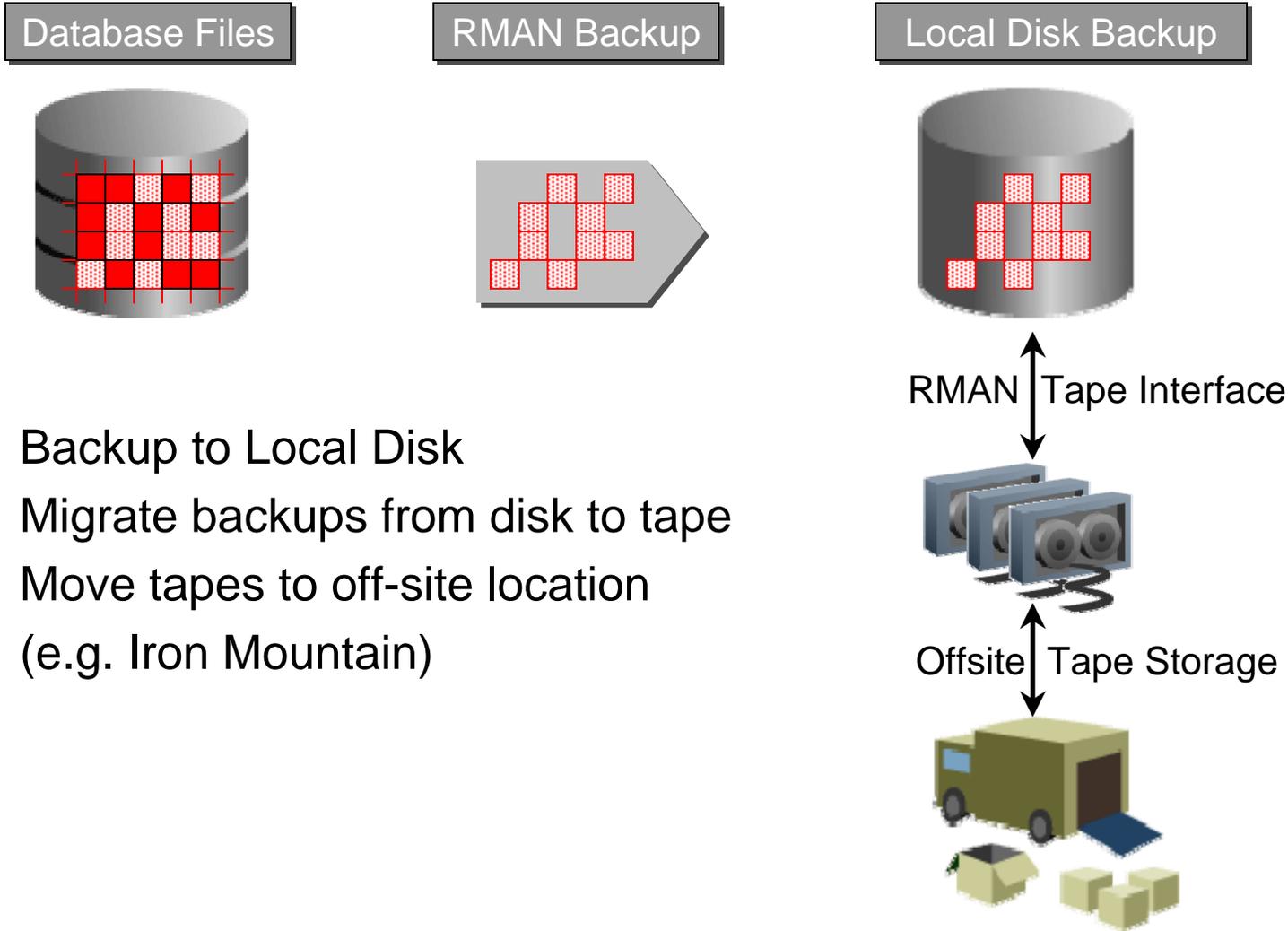
Local Disk Backup

- Backup to Local Disk
- Migrate backups from disk to tape
- Move tapes to off-site location (e.g. Iron Mountain)

RMAN Tape Interface

Offsite Tape Storage

Offsite Backups in the Cloud

Database Files	RMAN Backup	Local Disk Backup

RMAN | Tape Interface

**Secure
Backup Cloud
Module**

Compression

Encryption
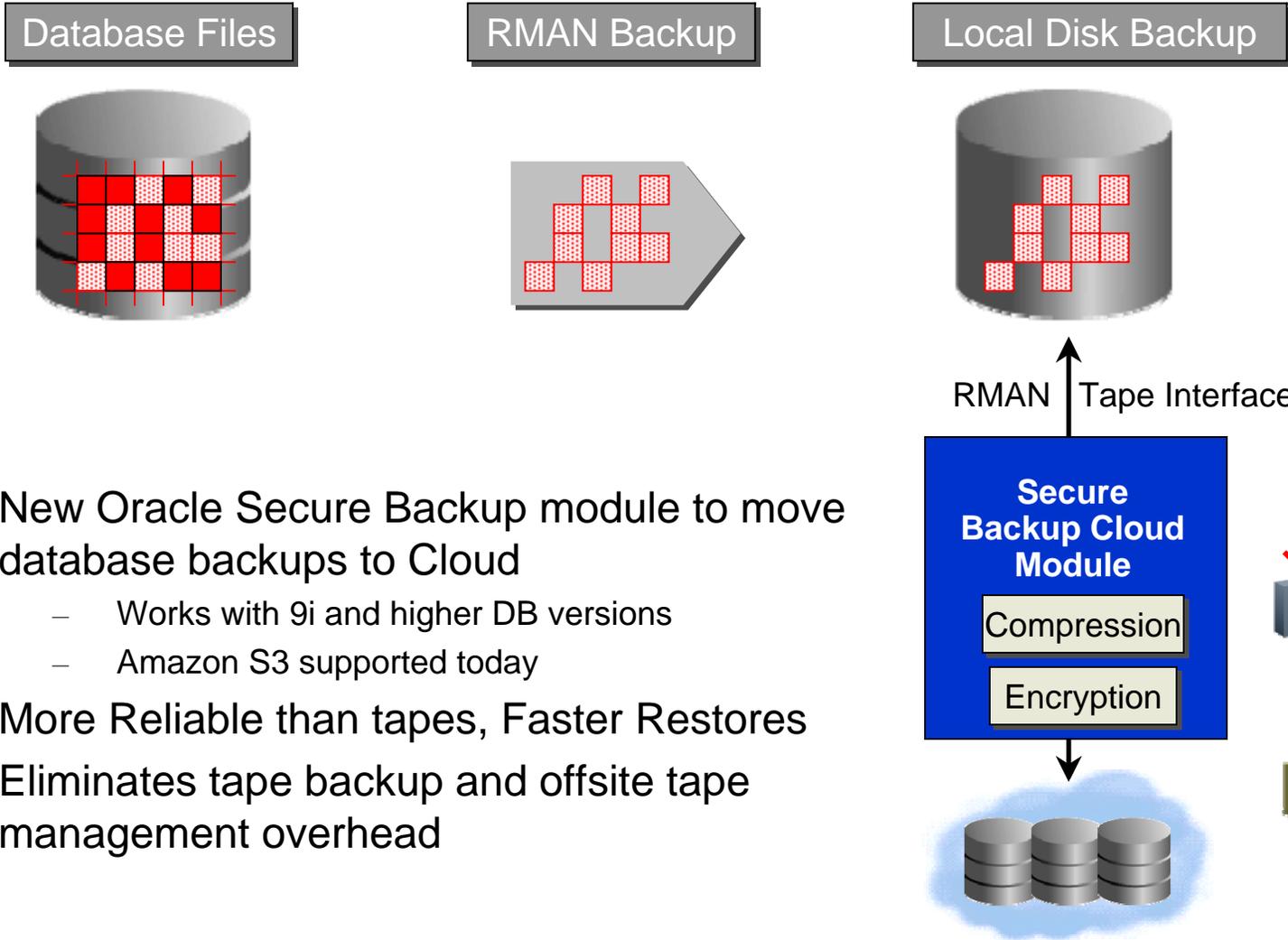
- New Oracle Secure Backup module to move database backups to Cloud
  - Works with 9i and higher DB versions
  - Amazon S3 supported today
- More Reliable than tapes, Faster Restores
- Eliminates tape backup and offsite tape management overhead

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Database Backups to Cloud – Benefits

- ## Always accessible, Faster restore
  - No need to call any one, ship tapes
  - Cloud backups can be used to quickly create test, dev DBs
- ## Better reliability
  - Disks are more reliable than tapes
  - S3 makes several redundant copies for data
- ## Cost effective
  - No capital expense
  - Compelling S3 storage costs
  - Can reduce tape backup software licensing and support costs
  - Eliminates need for additional offsite storage

Oracle Secure Backup Cloud Module

- A new library that interfaces with RMAN and Amazon S3
  - Using RMAN's SBT (Tape) Interface
  - Part of Oracle Secure Backup product family
  - Licensed based on number of concurrent parallel streams (RMAN channels)
  - Includes encryption and compression capability
- Currently available on Linux 32, Linux 64, Windows 32
  - Cloud Backup Installer included in Oracle AMIs
  - OTN download coming soon for on-premise databases
- Fully compatible with existing backup scripts and EM

See Cloud Backup TWP on OTN for details

Backup in the Cloud – Performance
Viable Even For Large Databases

DB Size (GB)	Full DB Backup Time	Incremental Backup Time	Monthly Amazon S3 Cost
500	4 Hours	30 Minutes	$200
300	2 Hours	15 Minutes	$125
100	40 Minutes	5 Minutes	$50

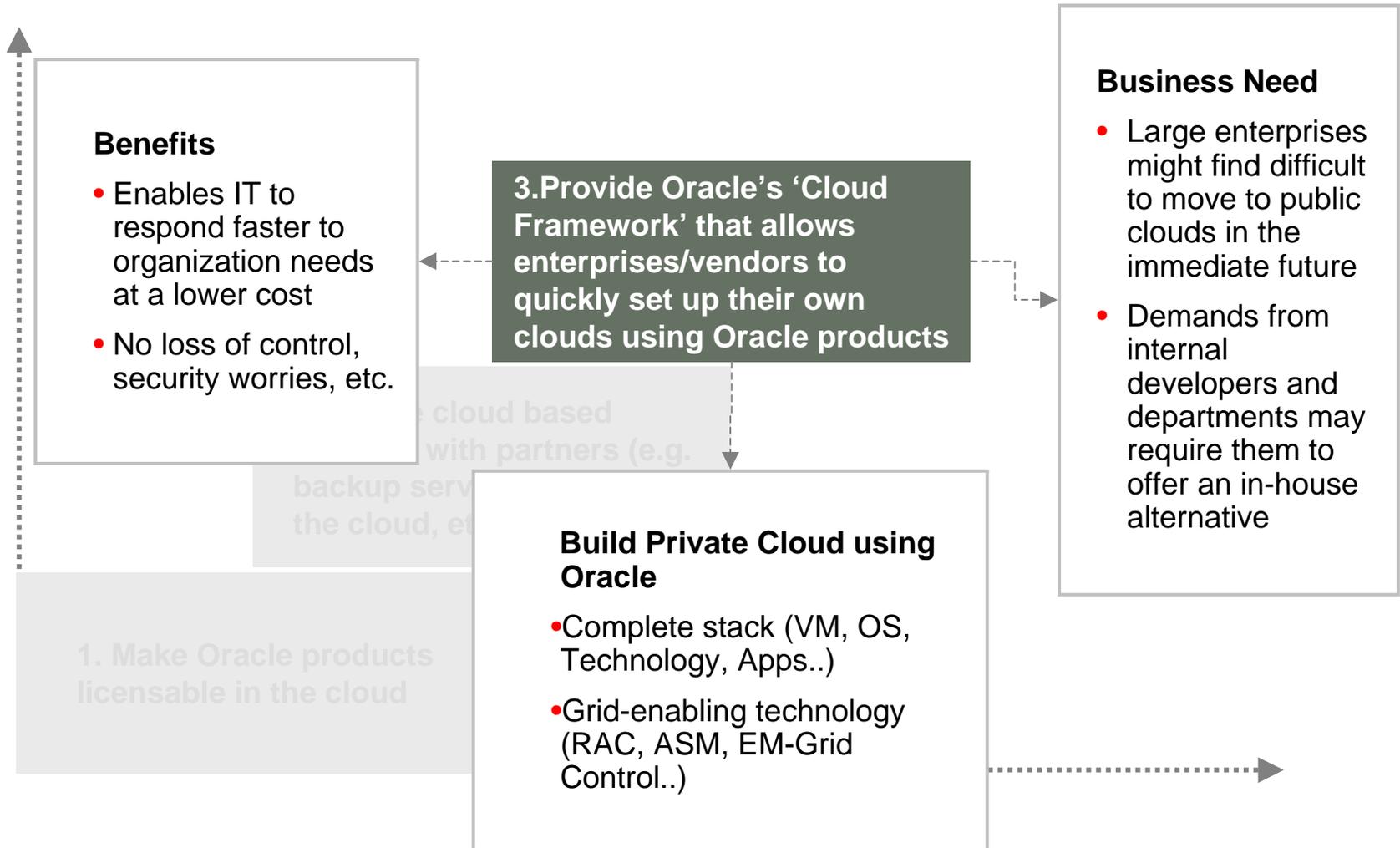**On-premises DB; Compressed Parallel Backups**

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Backup in the Cloud - Roadmap

- ## Reporting Portal
  - Provides summary and drill down reports regarding backups stored in cloud, performance, billing, etc.
- ## Automatic periodic backup validation and test restores
- ## Automatic merging of incremental backups with full backup
- ## Backup file system

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Oracle Cloud Strategy – Enabling (Private, On-Premise) Clouds

Benefits

- Enables IT to respond faster to organization needs at a lower cost

- No loss of control, security worries, etc.

3.Provide Oracle's 'Cloud Framework' that allows enterprises/vendors to quickly set up their own clouds using Oracle products

Business Need

- Large enterprises might find difficult to move to public clouds in the immediate future

- Demands from internal developers and departments may require them to offer an in-house alternative

cloud based
with partners (e.g.
backup serv
the cloud, et

Build Private Cloud using Oracle

- Complete stack (VM, OS, Technology, Apps..)

- Grid-enabling technology (RAC, ASM, EM-Grid Control..)

1. Make Oracle products licensable in the cloud

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Oracle VM
Server Virtualization and Management

- ## Oracle VM contains…
  - Oracle VM Server
  - Oracle VM Manager

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VM

- ## Oracle VM Server
  - Open source server software tailored by Oracle
  - Installs on "bare-metal" servers from a single CD in about a minute
  - x86 and x86_64 based Intel and AMD Systems

- ## Oracle VM Manager
  - Web browser-based management console
  - Java-based management server
  - Database repository: XE (incl.), or SE, EE, or RAC

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Oracle VM Templates
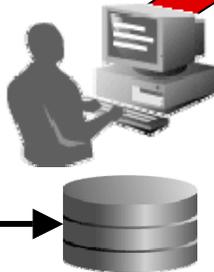## Rapid Application Deployment

ORACLE E-Delivery

Download from Oracle
- Pre-built, pre-configured VM
- Complete app, middleware, DB installation
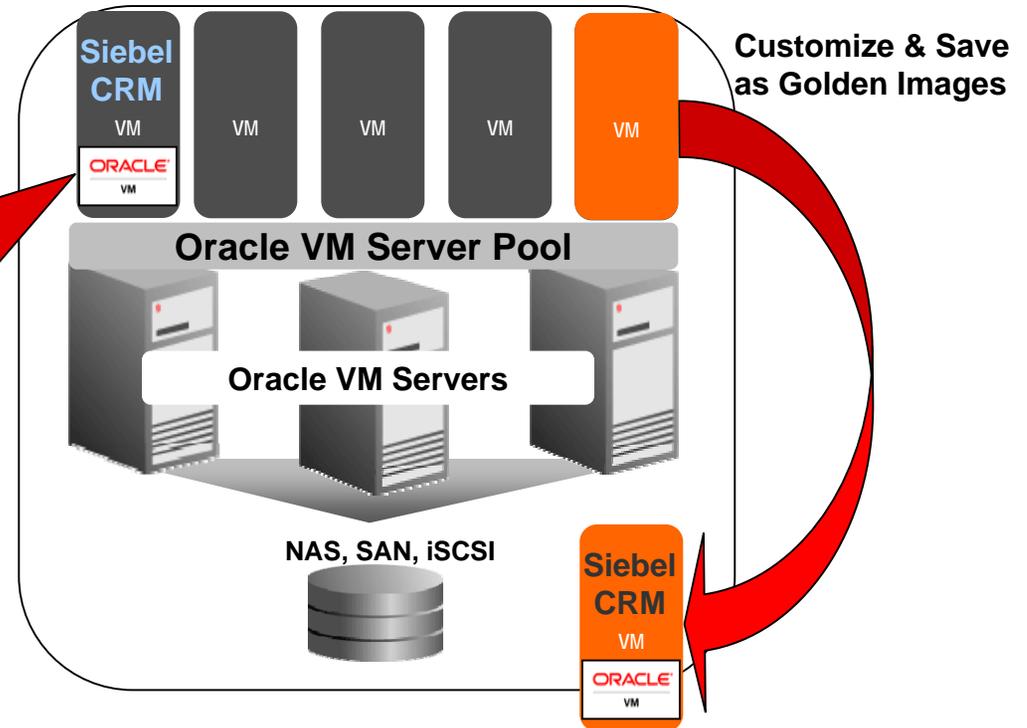- Complete Siebel CRM, Database 11g, Enterprise Manager…

Siebel CRM VM
ORACLE VM
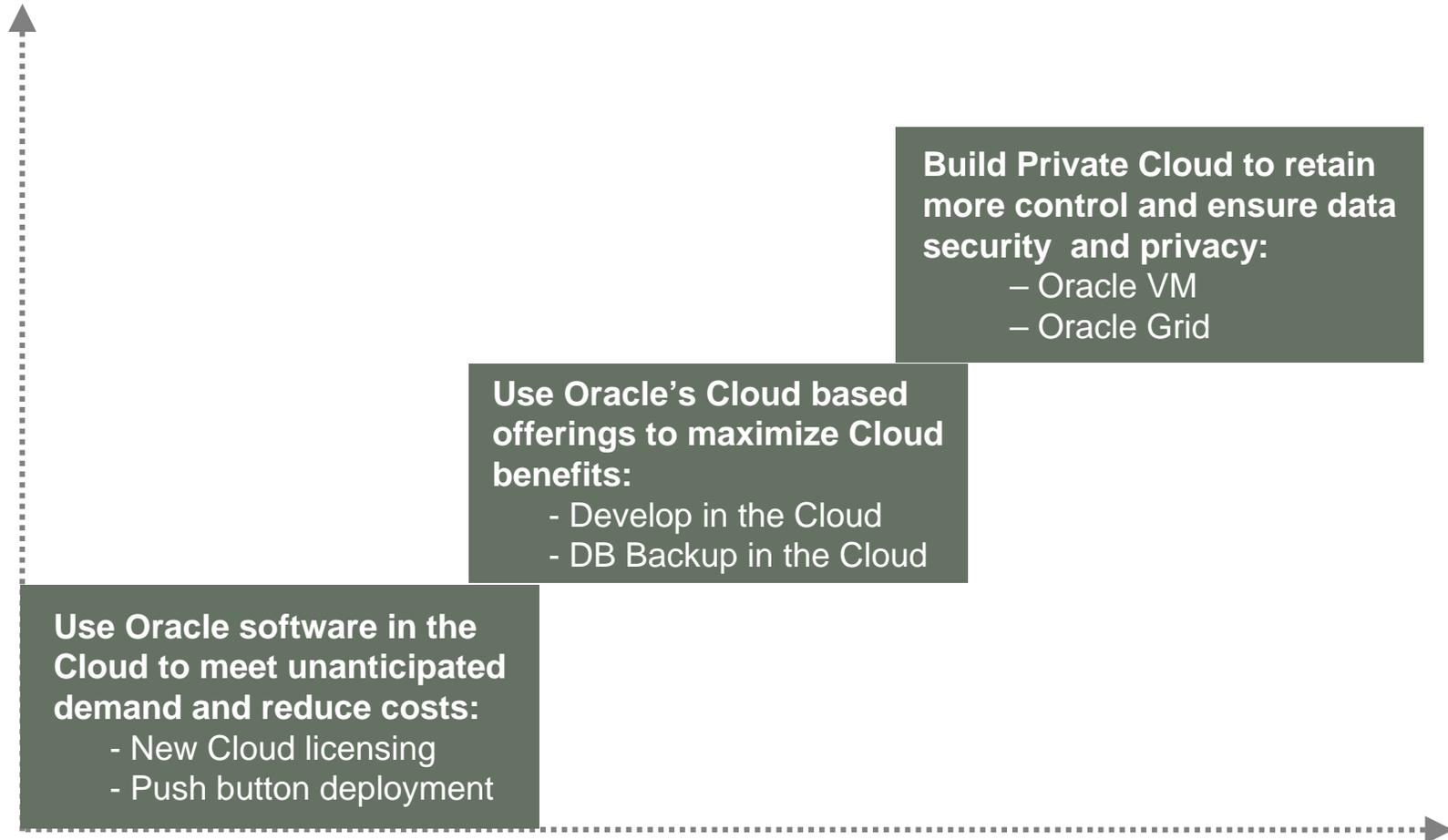
Import to Oracle VM Manager

Start-Up in Oracle VM Pool

Save days or weeks in installation and configuration time

Siebel CRM VM
ORACLE VM

VM   VM   VM   VM

Customize & Save as Golden Images

Oracle VM Server Pool

Oracle VM Servers

NAS, SAN, iSCSI

Siebel CRM VM
ORACLE VM

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Enterprise Cloud Computing with Oracle

Build Private Cloud to retain more control and ensure data security and privacy:
– Oracle VM
– Oracle Grid

Use Oracle's Cloud based offerings to maximize Cloud benefits:
- Develop in the Cloud
- DB Backup in the Cloud

Use Oracle software in the Cloud to meet unanticipated demand and reduce costs:
- New Cloud licensing
- Push button deployment
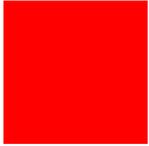
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Oracle in the Cloud

D E M O N S T R A T I O N

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Additional References and Contacts

- Oracle Cloud Computing Center (OTN)
  - http://www.oracle.com/technology/tech/cloud/index.html
  - Provide feedback and ask questions using the "Cloud Computing Discussion Forum"

- Amazon Web Services Website
  - http://aws.amzon.com

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