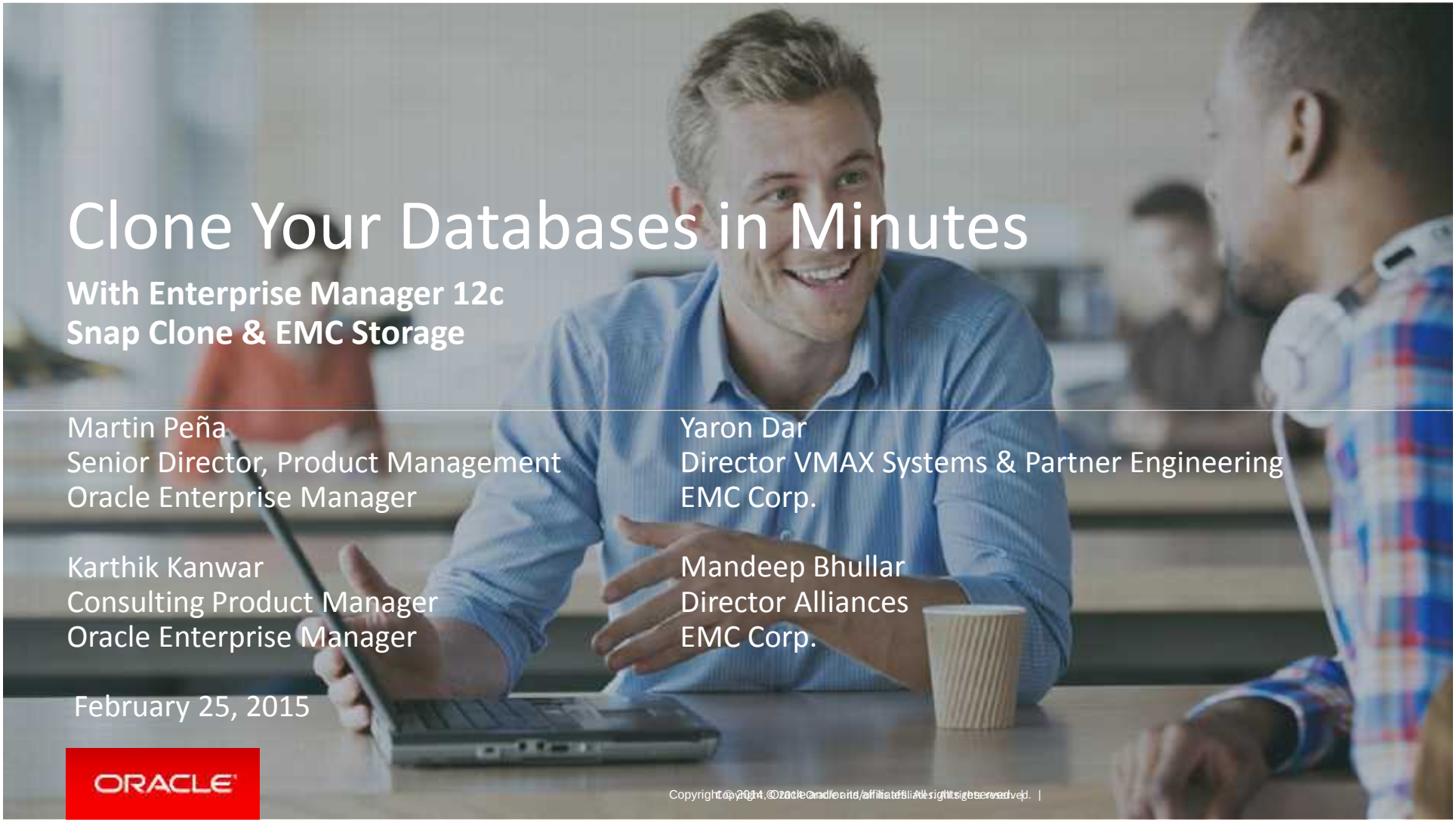

Clone Your Databases in Minutes

With Enterprise Manager 12c
Snap Clone & EMC Storage

Martin Peña
Senior Director, Product Management
Oracle Enterprise Manager

Karthik Kanwar
Consulting Product Manager
Oracle Enterprise Manager

Yaron Dar
Director VMAX Systems & Partner Engineering
EMC Corp.

Mandeep Bhullar
Director Alliances
EMC Corp.

February 25, 2015

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Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Program Agenda

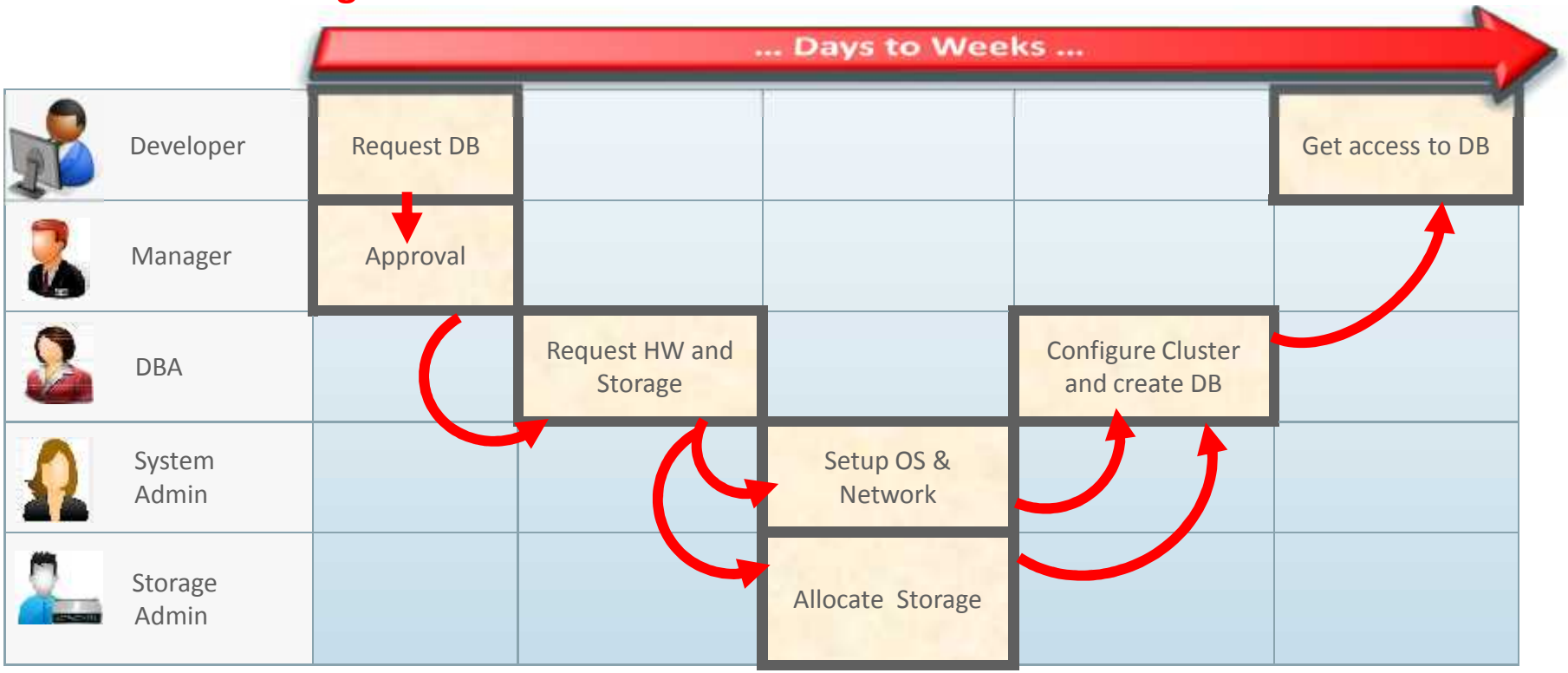
1. Current Challenges
2. EM 12c Snap Clone Solution
3. Snap Clone on EMC Storage
4. Live Demo
5. Summary

Database Cloning
Business Challenges

- Cloning Requirements
  - Critical for delivering high-quality, production applications
    - Development, Testing, QA
  - Facilitates faster time to market
- Cloning Challenges
  - Complicated Process
    - Multiple admins – e.g. system, storage administrators
  - Time Consuming
  - Resource intensive
  - Expensive – especially for large multi-terabyte databases.
- As a result of these challenges, DB Copies and Clones may not be created as often as required

Current Database Provisioning Process

Time Consuming and Inefficient



What is Snap Clone?

DBaaS approach to creating clones of large (multi-TB) databases

Space Efficient

Significantly reduce the storage footprint

Time Efficient

Clone DBs in minutes not days/weeks

Storage Agnostic

Supports ALL storage vendors (NAS & SAN)

Self Service

Empower the user to make adhoc clones

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Eliminating DB Storage Overhead Costs for Dev/Test

Business Value: 90%+ reduction in storage overhead via 'Snap Clone'

- Substantial DB storage overhead exists to support operations
  - For every DB in prod, 8-12 copies exist
  - Uses: Development, Test, Back-up, Archive
- DBaaS Snap Clone benefits:
  - 95% reduction in storage overhead, impact easily quantified
  - Storage growing 35-40% / year
  - Delivery time cut from 2 weeks to > 1 hour

Financial Customer Scenario

- 5 Prod DB = 30 TB
- 5 Standby DB = 30 TB
- *5 Masked DB = 30 TB*
- 6 Clones (6 * 5 * 2 GB of writable space)
  = ~~180TB~~ 60 GB

- Total ~~270~~ ~90 TB
- Time = ~~days/weeks~~ minutes

Supported Cloning Options

Full Clones	Snap (Thin) Clones

Database Native [Storage Agnostic]

RMAN Restore | RMAN Duplicate | Data Pump

- Leverage your existing investments
- Cater to both functional and stress testing needs
- Maximize for best performance

Use Snap Clone whenever you need >1 clones!

Software Solution [Vendor Agnostic]

ORACLE SOLARIS ZFS File System

Hardware Solution [Vendor Specific]

NAS | SAN

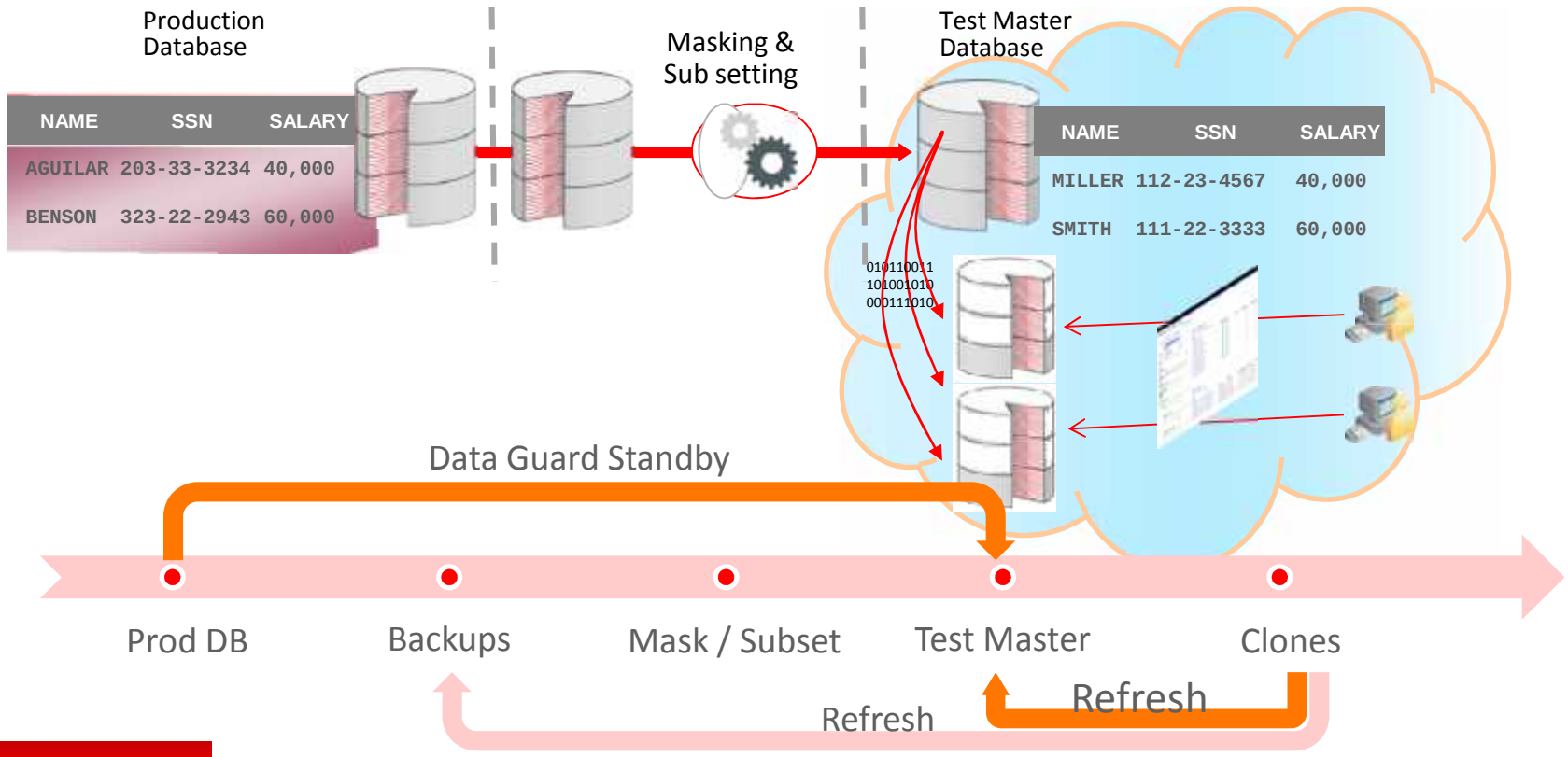
ORACLE SUN ZFS STORAGE APPLIANCE

NetApp

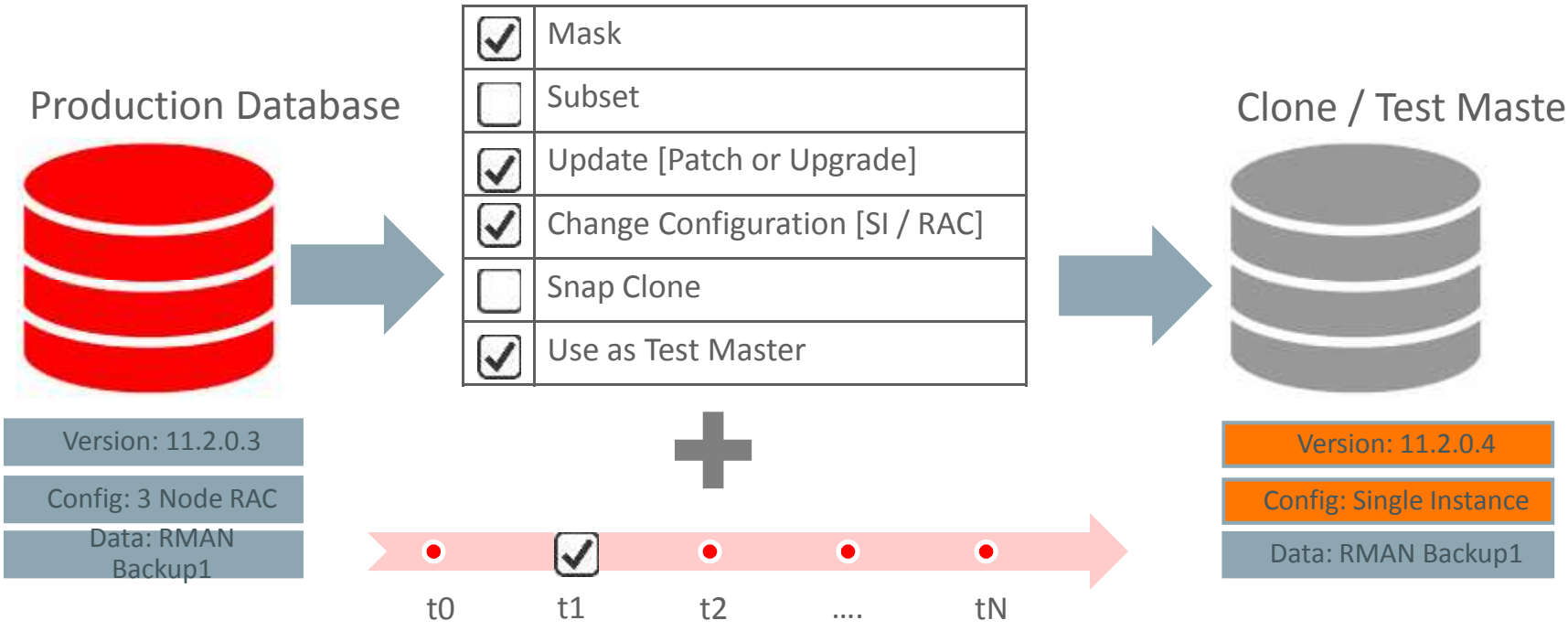
EMC²

ORACLE

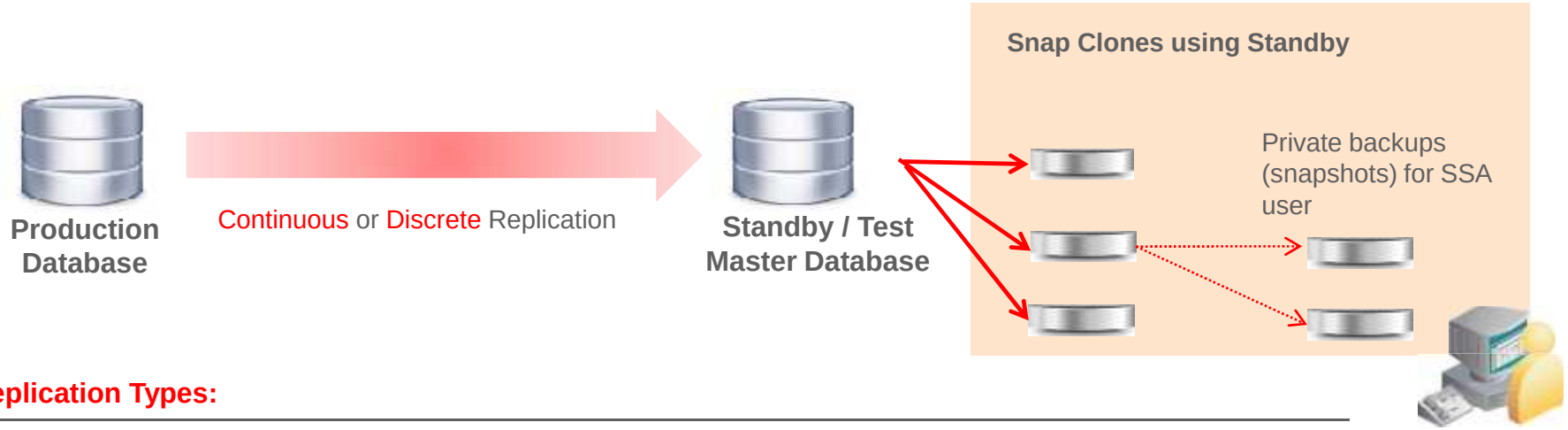
Data Movement



DB Clone and Refresh – Admin Flow



Deployment Scenarios



Replication Types:

	Continuous	Discrete
Technology	Data Guard, Golden Gate	RMAN, Snap Mirror, import/export …
Data Refresh	Automatic and instantaneous	Manual and at scheduled intervals
Masking and Subsetting	Not possible	At source (in production), or in place at test master

EMC Thin Provisioning and Local Replications

Yaron Dar

VMAX Systems & Partner Engineering

yaron.dar@emc.com

New EMC VNX Series with MCx

Six new VNX platforms

SIMPLE. EFFICIENT. POWERFUL. PROTECTED.

EMC VMAX Storage Arrays

Certified

VMAX 10K

1–4 Engines

Array Specifications
- 48 CPU Cores
- 512 GB Cache Memory
- 64 Fibre Channel Front-End Ports
- Dual Virtual Matrix
- 1,560 Drives, 1.5 PB Usable

Business Requirements
- Multi-Controller Architecture
- Tier 1 RAS For Integrated Block And File
- Ease Of Use Is Built In
- Scale-Up And Scale-Out Design
- IBM i

VMAX 20K

1–8 Engines

Array Specifications
- 128 CPU Cores
- 1 TB Cache Memory
- 128 Fibre Channel Front-End Ports
- Dual Virtual Matrix
- 2,400 3.5” Drives, 2 PB Usable
- 3,200 2.5” Drives, 2 PB Usable

Business Requirements
- High Scale, Capacity, And Performance
- Standard And Virtual Provisioning
- Encryption
- Mainframe And IBM i

VMAX 40K

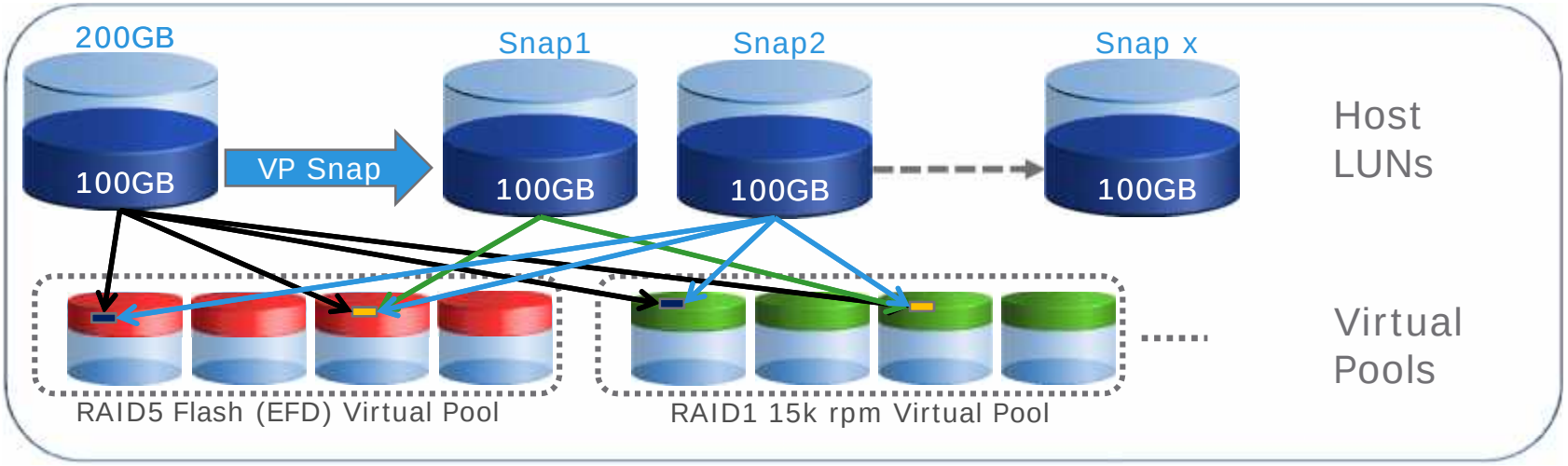
1–8 Engines

Array Specifications
- 192 CPU Cores
- 2 TB Cache Memory
- 128 Fibre Channel Front-End Ports
- QUAD Virtual Matrix, PCI Gen2
- 2,400 3.5” Drives, 4 PB Usable
- 3,200 2.5” Drives, 2.8 PB Usable

Business Requirements
- Highest Scale, Capacity, Performance
- Flexibility With System Bay Dispersion
- Standard And Virtual Provisioning
- Encryption
- Mainframe And IBM i

TimeFinder VP Snap

For VMAX 10K, 20K, and 40K



- Space-Efficient Writable Snapshots
- Up to 32 Snaps Per Source
- Data is always striped across Virtual Pools
- With FAST VP data is placed in the right Tier

http://www.emc.com/collateral/hardware/white-papers/h6210-symmetrix-vmax-srdf-timefinder-oracle-database-wp.pdf

The new VMAX3

1-2 ENGINES	1-4 ENGINES	1-8 ENGINES
48 CORES	128 CORES	384 CORES
2TB CACHE	8TB CACHE	16TB CACHE
1,440 2.5” DRIVES	2,880 2.5” DRIVES	5,760 2.5” DRIVES
500 TB	2PB	4PB
64 PORTS	128 PORTS	256 PORTS

Dual IB FDR 56 Gb/s Matrix, PCIe Gen3 Interconnects, SAS Backend

100K 200K 400K

http://www.emc.com/collateral/white-paper/h13844-oracle-deployment-guide-with-vmax3.pdf

HYPERMAX OS DATA SERVICES

MANAGEMENT

UNISPHERE

BLOCK

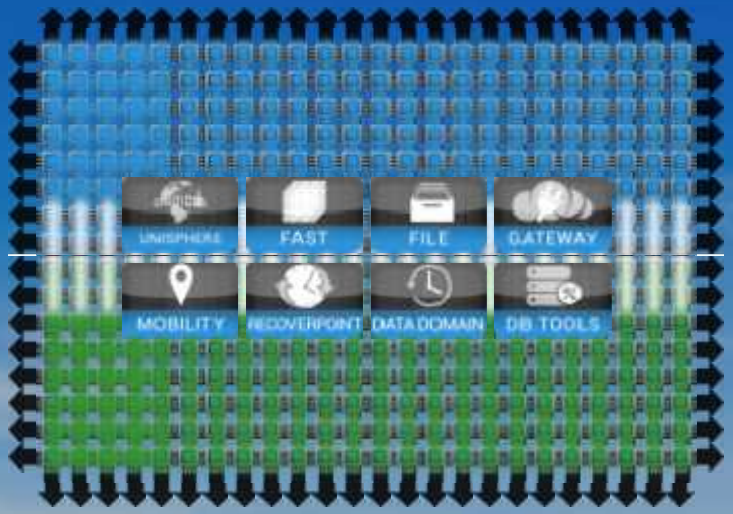
FAST

FILE

FILE

CLOUD ACCESS

GATEWAY



MOBILITY

MOBILITY

PROTECTION

RECOVERPOINT

BACKUP

DATA DOMAIN

ANALYTICS

DB TOOLS

* Not all shown services have been made available at this time

SNAPS REDEFINED

REDUCED IMPACT

- TARGET-LESS SNAPSHOTS

INCREASED AGILITY

- UP TO 256 SNAPS PER SOURCE
- UP TO 1024 LINKED TARGETS PER SOURCE

EASE OF USE

- USER-DEFINED NAMES/VERSIONS
- CREATE GROUP SNAPS IN ONE CLICK
- AUTOMATIC EXPIRATION

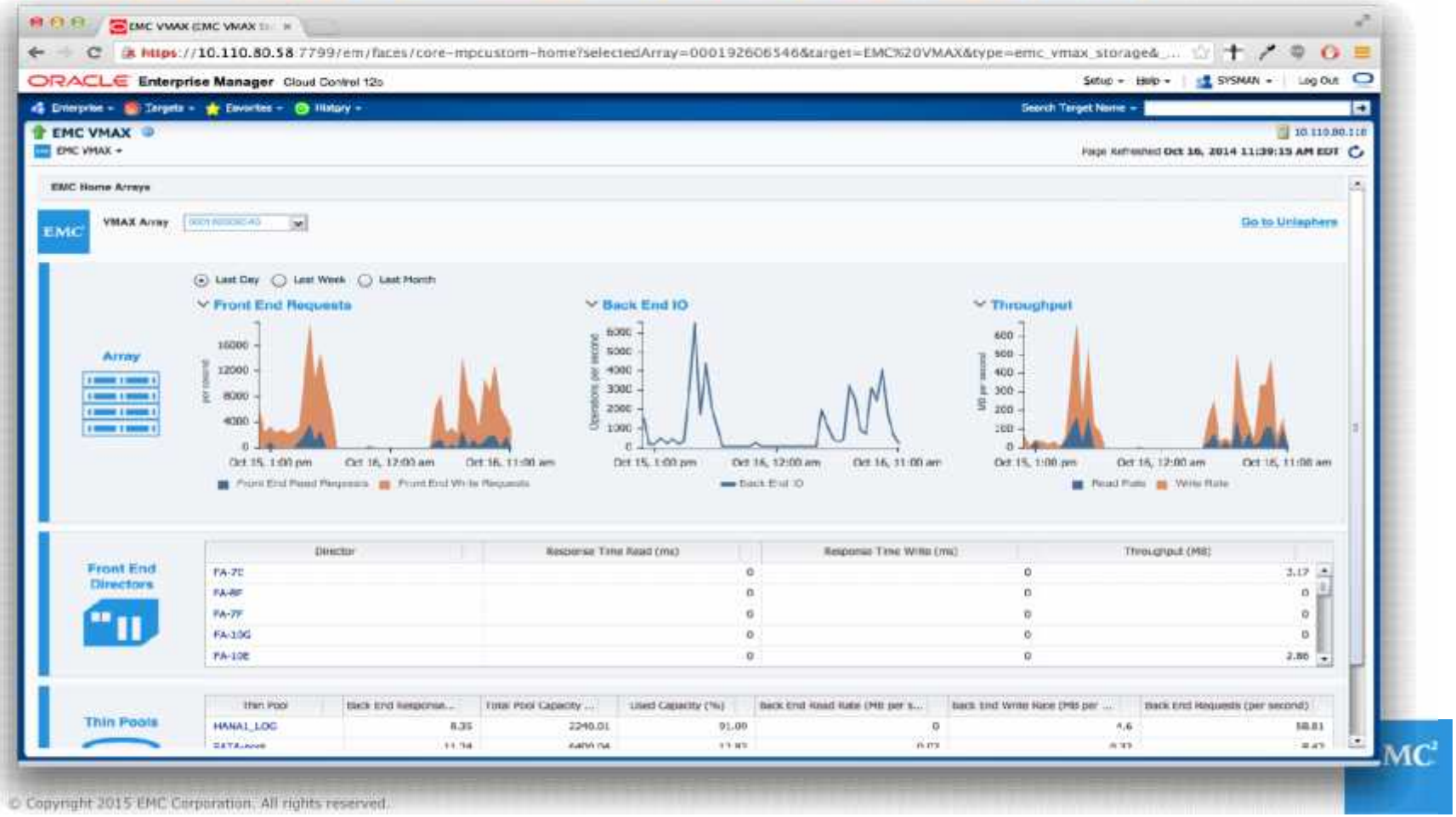
SNAPVX

Oracle EM 12c Performance Monitoring plugin for VMAX

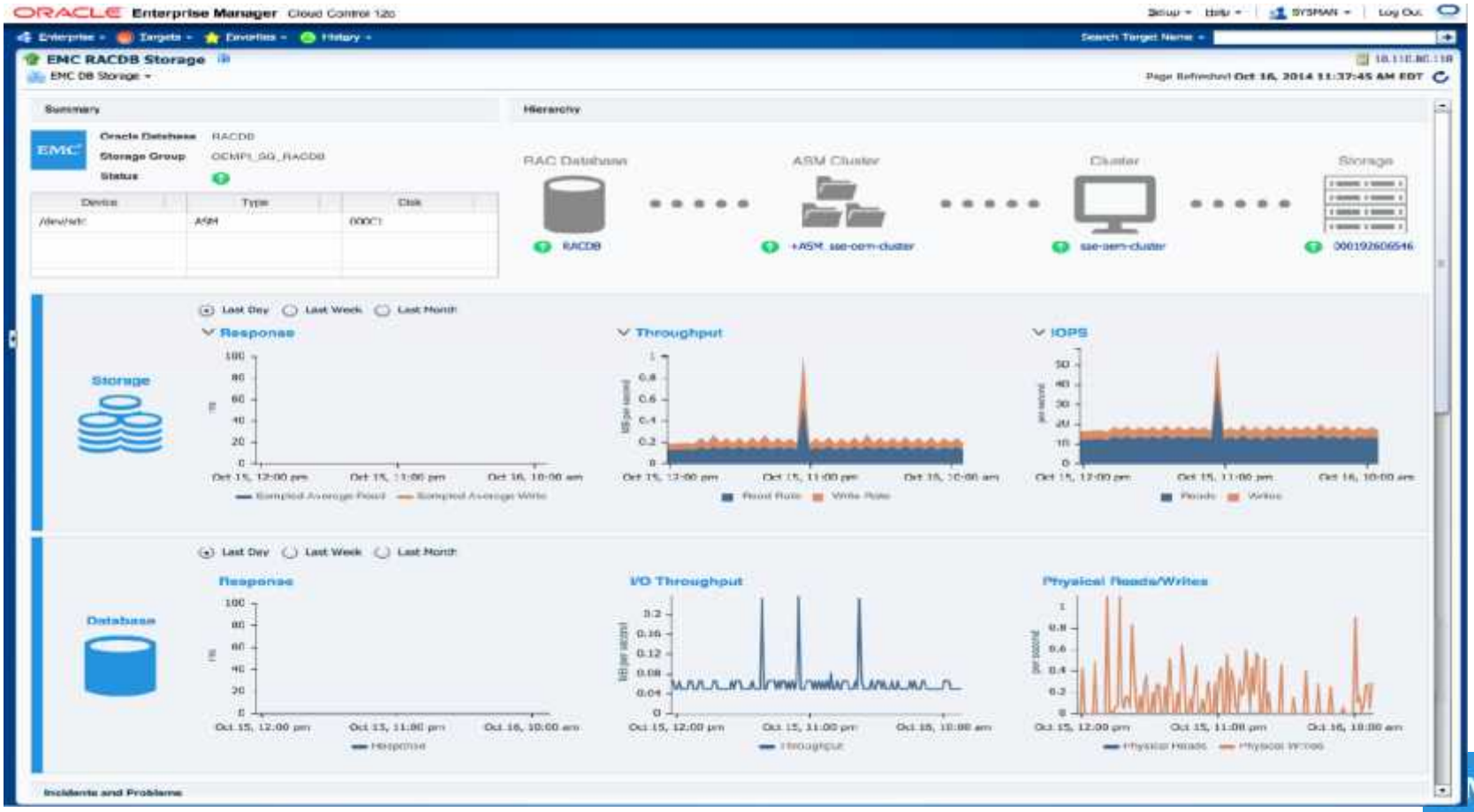
- A new EMC Storage plug-in for OEM 12c has been redesigned from the ground up to give better visibility and monitoring into your EMC Storage environment
- With release 12.1.0.1.0, the plug-in features heterogeneous monitoring of your VMAX Storage systems through the powerful capabilities of Oracle Enterprise Manager 12c
- Key features:
  - Centralized dashboard for EMC Storage and Oracle Database
  - VMAX Storage Performance metrics: FE Directors, Thin Pools, SRP, etc.
  - Simple setup
  - Performance RCA via storage to database device association, incidents, availability
  - Historic data analysis

https://community.emc.com/docs/DOC-40754

Oracle EM 12c Performance Monitoring plugin for VMAX



Oracle EM 12c Performance Monitoring plugin for VMAX




EMC²

Supported Cloning Options

Full Clones	Snap (Thin) Clones

Database Native [Storage Agnostic]

RMAN Restore | RMAN Duplicate (NEW) | Data Pump

Software Solution [Vendor Agnostic]

ORACLE SOLARIS ZFS File System

Hardware Solution [Vendor Specific]

NAS	SAN

ORACLE SUN ZFS STORAGE APPLIANCE

- Leverage your existing investments
- Cater to both functional and stress testing needs
- Maximize for best performance

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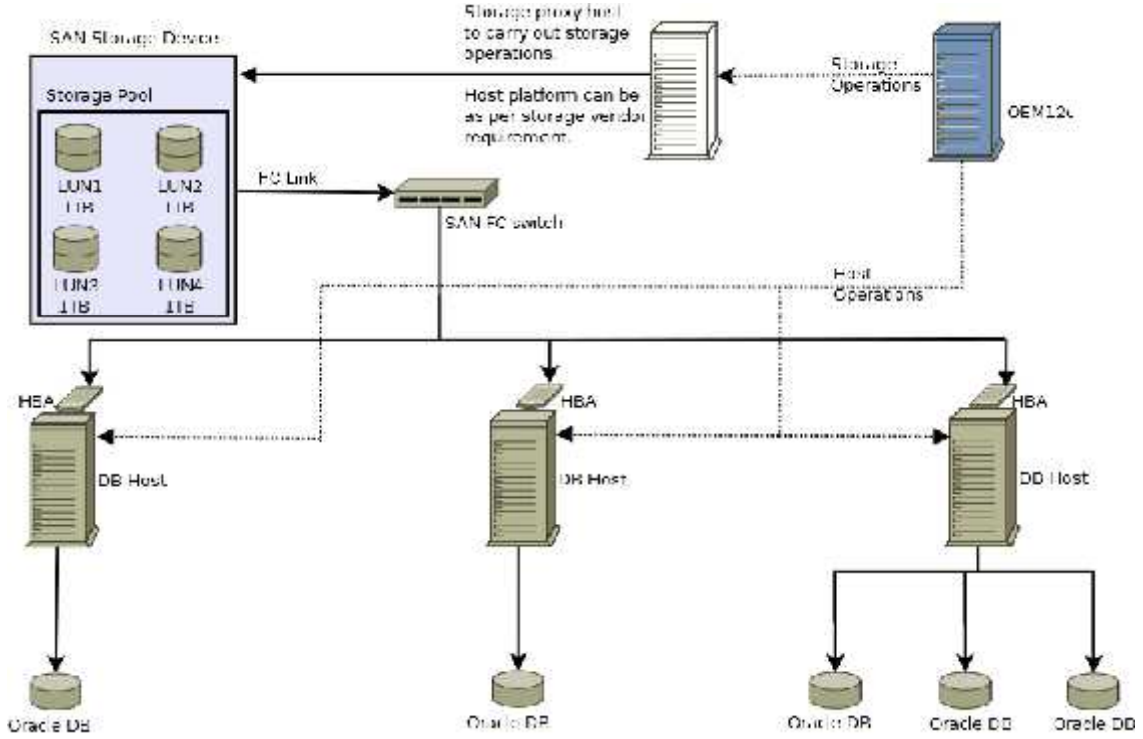
Snap Clone on ASM + EMC Storage

- Ability to create 'live' thin clones of databases on ASM
- *Live clone of the DB,* NOT snapshot based
- Clone can be within the same or on a different cluster
- EMC VMAX2 (with Time Finder VPSnap) and VNX storage appliances
- Supports SI and RAC databases
- Supported Versions: DB = 10.2.0.5 or higher; GI = 11.2 and higher



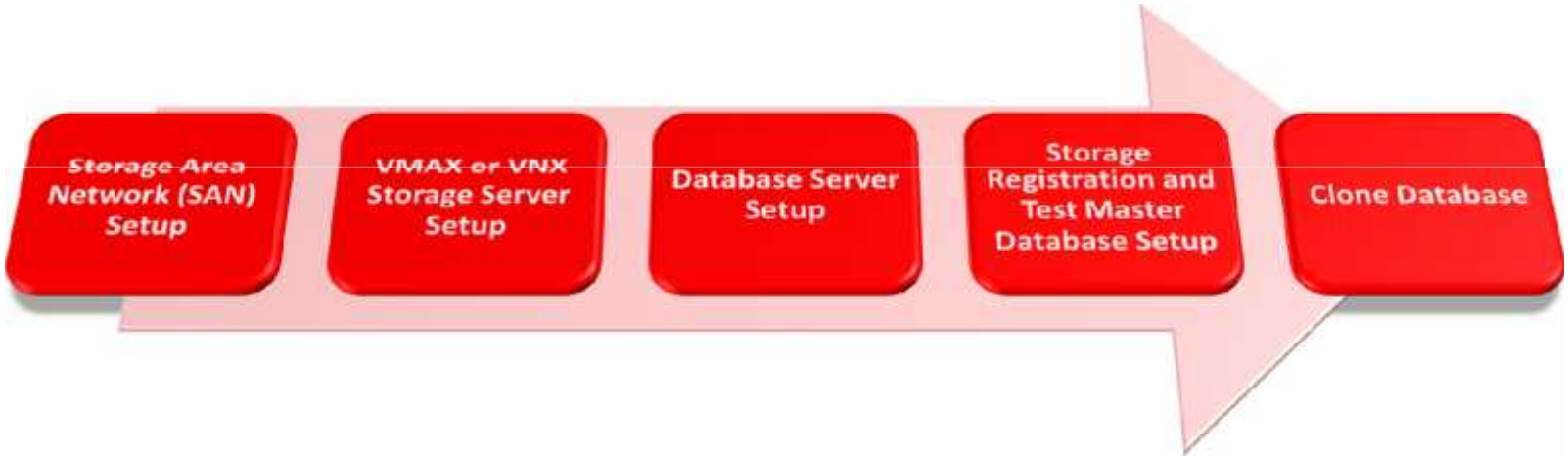
Enterprise Manager - Setup

- Install EM12c R4 release – VM or Physical server
- Plug-ins (EM12c R4 Plug-in Update 1) can be installed through Enterprise Manager Self Update feature. Following plug-ins are required for Snap Clone

Plug-ins
Enterprise Manager for Cloud
Enterprise Manager for Oracle Cloud Framework
Enterprise Manager for Storage Management
Enterprise Manager for Oracle Database
Enterprise Manager for Consolidation Planning and Chargeback

Snap Clone on EMC Storage

Setup Steps



EMC Storage Servers – Supported Configurations

- Certification:
  - EMC VMAX 10K and VNX 5300
    - Higher models in the same series are expected to work
  - VMAX3 storage servers not supported yet
  - Linux and Solaris operating systems are supported
- EMC PowerPath, and Solaris MPxIO multi-pathing solutions are supported
- Switched fabric is supported (Brocade Switches)
- Emulex (LPe12002-E) host bus adapters are certified to use
  - Other adapters are expected to work
- SCSI over Fibre Channel is supported. iSCSI, NAS are not yet supported

Setting Up Snap Clone on EMC Storage

Demonstration

EMC Snap Clone – Demo Flow

1. Self Service User Flow
   - How to create a Snap Clone database?
2. Admin Flow
   - Host SAN Information
   - EMC Storage Registration
   - Test Master Creation
   - Service Template

Summary

Conclusion

Snap Clone with Oracle Engineered Systems

Exadata

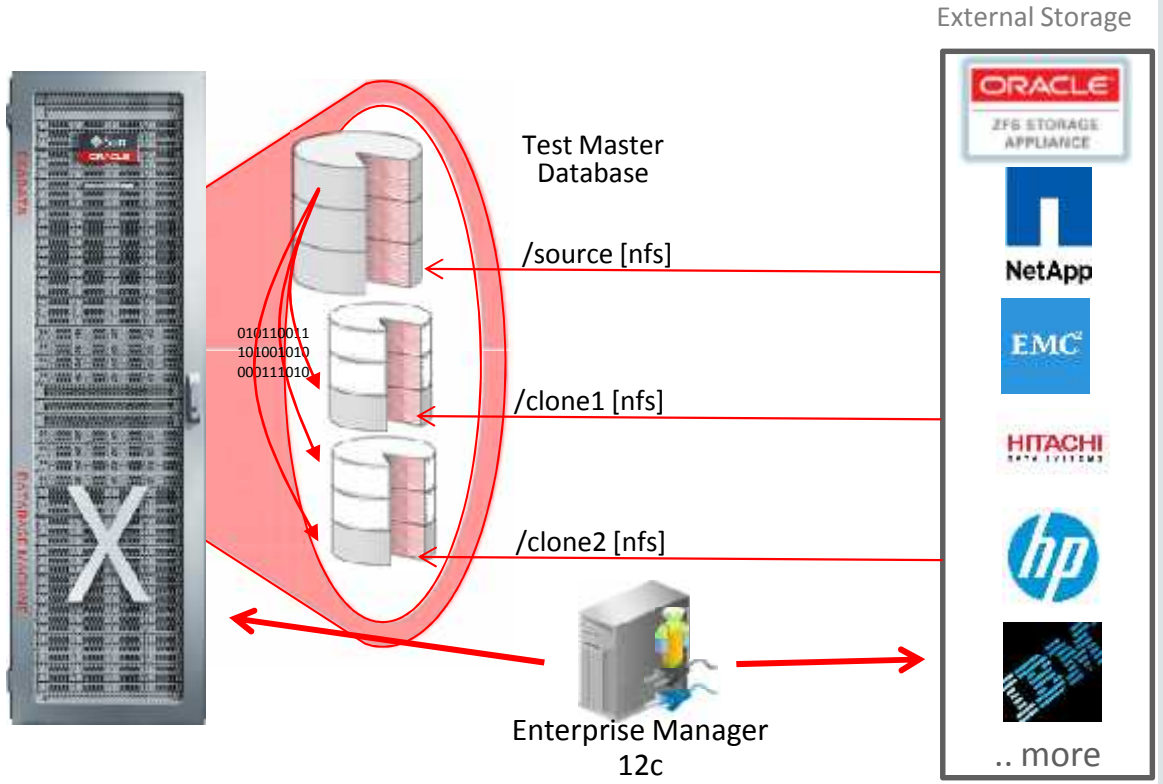
- Compute nodes are used to run snap clone databases
- The storage is external to Exadata and served over NFS
- In case of ZS3 storage, all traffic over infiniband

SuperCluster

- Solaris Zones or LDOMS used to run snap clone databases
- Embedded ZS3-ES storage served over infiniband

Oracle Virtual Compute Appliance

- Oracle VMs used to run snap clone databases
- Embedded ZS3-ES storage served over infiniband



Snap Clone Vs Competition

- Scale, Scale, Scale
  - Supports 1 to 1000s of clones
- Protects your existing investments
  - Choice between hardware and software solution
  - Use of trusted technologies like data guard for test master refresh
- Part of Enterprise Manager 12c
  - Oracle's flagship management product for all your database needs
  - In sync with DB releases (support for PDBs on 'Day 1')
  - Secure and role based access control; used by Fortune 1000 customers
  - Protection from unnecessary point tools; reduce TCO


ORACLE®

Hardware and Software
Engineered to Work Together

Setup Storage (storage administrators)

- Redundancy at Storage, Switch and Server level
- Multiple paths from the storage to the server
- Configure gatekeepers on EMC SMI-S provider host
- Configure HBA or switch

Setup VMAX/VNX Storage (Storage admins)

- VMAX
  - All Host Initiator Ports should be available from Storage side
  - Create one initiator group per host with corresponding initiators
  - Create a Port Group called “ORACLE_EM_PORT_GROUP” to be used by Oracle Enterprise Manager for creating Masking Views
  - Create Thin Pool
  - TimeFinder license is enabled to perform VP Snap
- VNX
  - All host initiator ports should be available from the storage side
  - Initiators belonging to one host are grouped and named after the Host on the EMC VNX storage
  - One storage group with one host for each of the hosts registered in Enterprise Manager

Database Server Setup

- Source and target servers have to be setup System/Storage administrators
- Solution supported only on physical servers (no VMs)
- Database Servers have to be configured. This includes install of PowerPath, ASM/Clusterware, ASMlib(Linux) etc.

Storage Registration and Test Master Database Setup

- Storage has to be registered on Enterprise Manager
- Volumes have to created on the registered storage
- Once storage is registered and volumes created, Test Master Database can be created
- Easy method to create a Test Master database is through Enterprise Manager
- Above actions are typically performed by database administrator

Clone Database

- Database administrator creates a service template based on the test master
- Clone database can be created on any ASM cluster as long as it is part of the same SAN fabric
- Clone database is requested by a Self Service User