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# Automating Database Cloud Migration

How AT&T Is Making the Cloud a Reality

## Presenters

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# Agenda

## AT&T Using Oracle Cloud

- AT&T Cloud Infrastructure
- AT&T Challenges
- How ExaCM fits
- Migration Approach
- Issues and resolution
- Migration Status

## Oracle Presentation: AT&T Using Oracle Cloud

- AT&T's Drivers for Moving to Cloud
- The Journey to Cloud
- Oracle Consulting Studio
- AT&T's Anticipated Benefits
- Contact Information



# AT&T Cloud Infrastructure

AT&T Currently operates multiple cloud platforms.

The focus on this presentation will be the two that provide Oracle PaaS Services: General Purpose (GP) Cloud and ExaCM.

AT&T Cloud Platform	Virtualization Method	Usage	PaaS Services	# Oracle DBs	AT&T Oradata Limit (TB)	AT&T IOPS Limit (K)
General Purpose (GP) Cloud	Proprietary Virtualization	General Application	Multiple DB, J2EE, Web	~5,000	8	80 [300]
ExaCM – Large DB	Oracle VM + RAC Stacking	Fill gap - > 8T	Oracle only	In dev	100	
Open-Source Virtualization	OpenStack / KVM	Common Services	IaaS/ tenant builds PaaS	Open-source		
Network Services Cloud	Proprietary Virtualization	Software Defined Network	IaaS/ tenant builds PaaS	Open-source/ MySQL		



# AT&T Challenges



# AT&T Challenges

## Databases over 8T

Several months for detailed design and delivery of bare-metal servers

Time and labor to install and configure O/S, grid cluster, and database with limited automation

Application specific solutions do not have cost savings associated with elastic cloud environment

Scale up requires time for resource increase and re-configuration

Scale down rarely justified

Mean Time To Implement (MTTI) not in line with Agile methodology

# Anticipated Solution

## Databases over 8T

Pre-deploy robust solution to support any database from 8T-100T

Pre-deploy hardware and O/S  
Automate database deployment

Robust shared environment with usage based pricing provides elastic cloud benefits

Elastic environment and usage based pricing facilitates scale-up

Shared environment allows resources to be easily reallocated

Greatly reduced MTTI through pre-deployment and automation



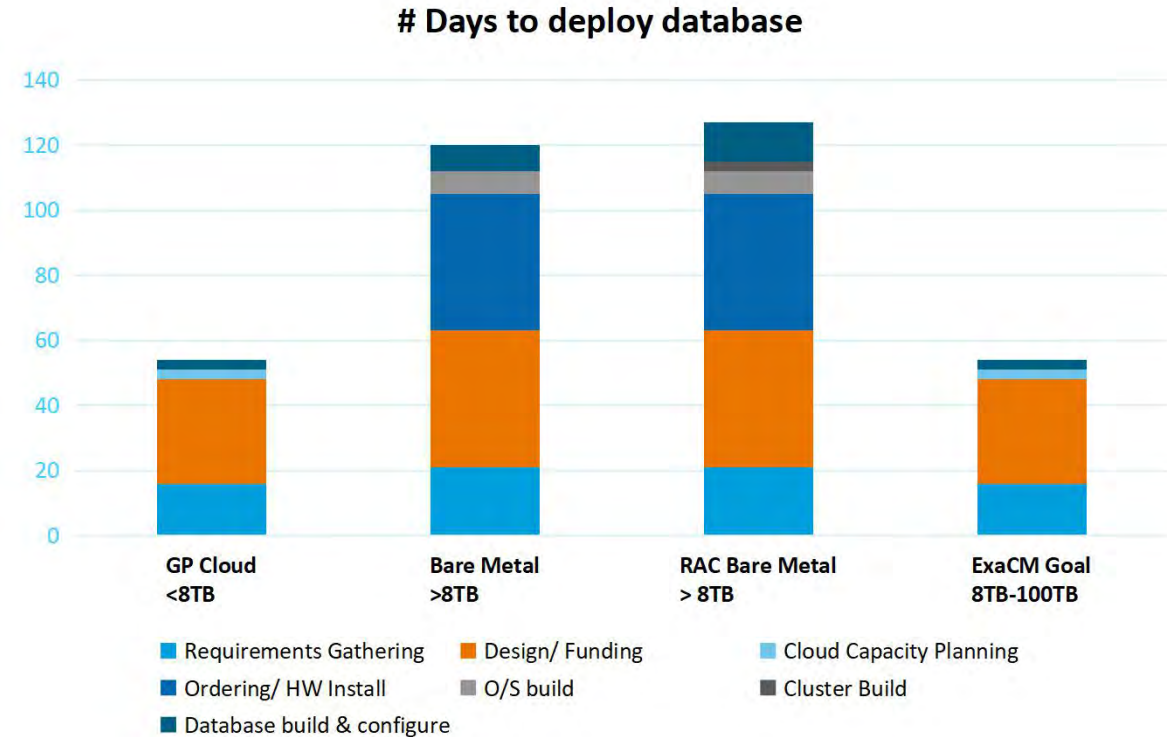
# AT&T Cloud Infrastructure – How ExaCM fits



# ExaCM Goal – Reduce deploy time for 8TB-100TB Databases

Typical deploy times on the right

- Currently, large DBs require application dedicated bare-metal servers
- Increased design and planning time for large DBs
- Significant time for ordering and HW install
- Additional time for O/S build, cluster build, database build
- Goal for ExaCM is to build DBs >8TB in same time as General Purpose (GP) cloud (<8T)



# Cloud Deployment Goals

## Current State

- Multiple orchestration engines based on cloud platform
  - General Purpose (GP)Cloud: Customized proprietary tool
  - Open-Stack Cloud: Horizon/ HEAT

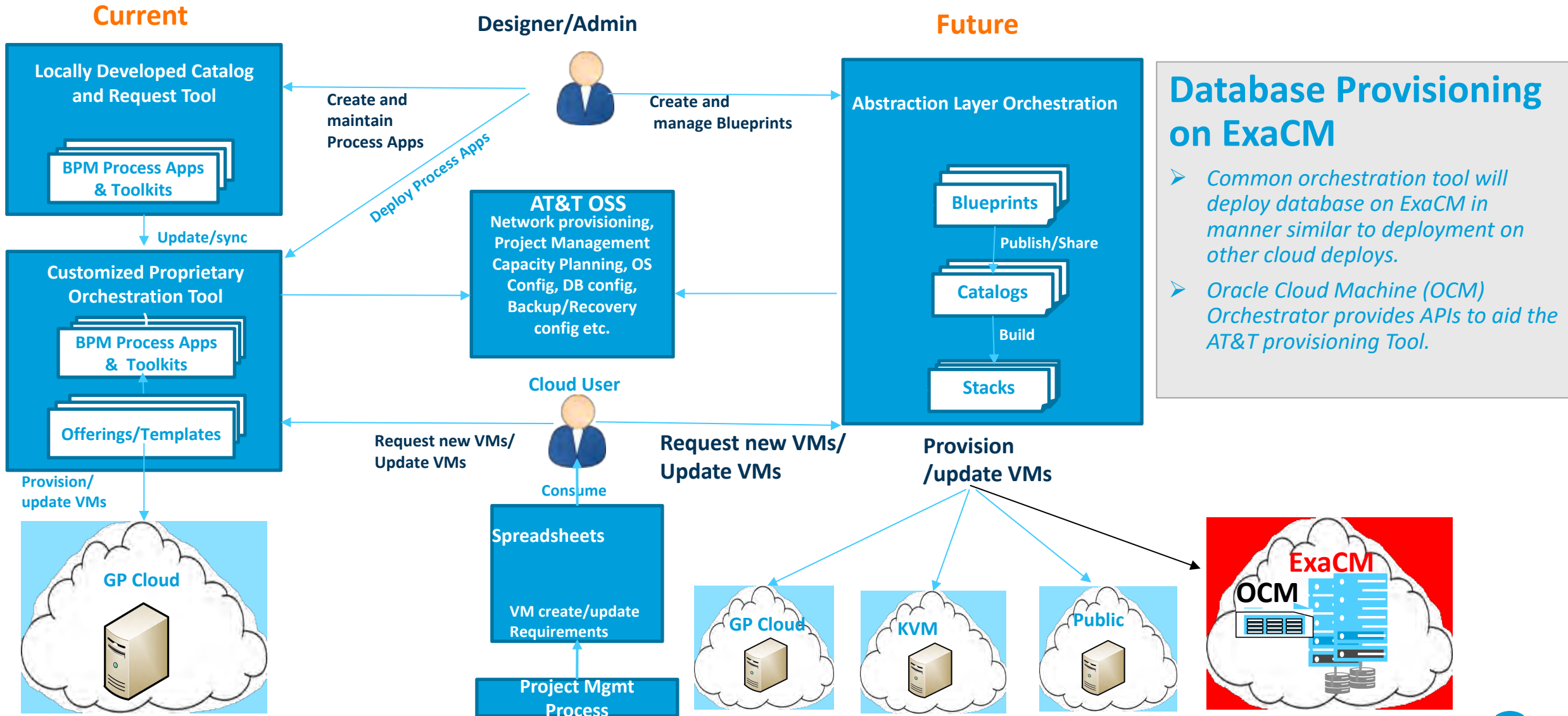
## Future State

- Common tool to deploy across cloud frameworks
  - Common tool to orchestrate and manage across multiple providers
  - Replace current orchestration engines
  - Working model of target architecture used for ExaCM database builds
    - Abstraction layer calls Oracle OCM APIs to create database instances across ExaCM Cluster Nodes





# Abstraction Layer Model



# Migration Approach



# Project Migration Process

## Project scope for migration to ExaCM

- Production databases with 8TB-100TB (oradata)
- Non-production databases supporting databases in scope for migration to ExaCM

## Migration Prerequisites

- Database inventory for database selection.
  - Database name, host name, database size, architecture such as O/S, configuration such as character set, etc.
- Capacity Planning Database – CPU, I/O, Network Metrics
- Application Database / sponsors etc.
- Install Oracle Consulting Studio – Integrate with Oracle Enterprise Manager (OEM)



# Migration Process

## Plan

- Database inventory provides metadata to select in-scope applications – import into Oracle Consulting Studio
- Capacity Planning data provides metrics for infrastructure placement
- Application inventory provides application support organization and application characteristics (PCI/ Mission Critical, etc.)

## Analysis

- Oracle Consulting Studio interface to Enterprise Manager for additional metrics to define tee-shirt size
- Migration Plan selected based on attributes (size, endian, downtime windows)
- Migration method based on AT&T Unix to Linux experience
- Initial Snapshot
  - RMAN Duplicate
  - Datapump export/ import
- Synchronization for minimum downtime
  - GoldenGate
  - DataGuard

## Migration

- Build database instances based on tee-shirt size
- Initial snapshot of source database
- Synchronization method to catch-up and maintain until cutover
- Cutover:
  - Redirect application connections, incoming replication (GoldenGate, DBLinks)
  - Application Validation
- Reverse synchronization for fallback.



# Challenges and Resolutions



# Issues and Resolution - Hardware

Issue	Resolution
Some AT&T datacenters limited to 8KW / rack due to heat management	Reduce planned full racks to half-rack



# Issues and Resolutions - Network

Issue	Resolution
<p>ExaCM Generation x5 uses Layer 2 protocol to customer switch.</p> <p>ExaCM Generation x6 uses Layer 3 protocol to customer switch.</p>	<ul style="list-style-type: none"><li>• Split traffic from ExaCM Top of RAC (TOR) switch to AT&amp;T intranet switches.<ul style="list-style-type: none"><li>• General Purpose Network (GPN) traffic to switch for WAN Routing</li><li>• Data Center infrastructure traffic for switch to backup/recovery and extended storage on NAS</li></ul></li><li>• Allocate traffic based on expected breakdown between GPN and backup/recovery</li></ul>
<p>Oracle requires forward command in all DNS servers for each &lt;cloudID&gt;.oraclecloudatcustomer.com</p>	<ul style="list-style-type: none"><li>• Update all DNS servers to forward *.oraclecloudatcustomer.com to a small number of DNS servers sufficient for access to the OCM</li><li>• Manage forward of specific &lt;cloudID&gt;.oraclecloudatcustomer.com from small number of DNS servers.</li></ul>



# Issues and Resolutions - Security

Issue	Resolution
Common instance owner account (oracle:dba) hampers granular support team mapping with sudo.	Short Term: All instances on a VM must be supported by same DBA support team.





# Issues and Resolution – Backup Recovery

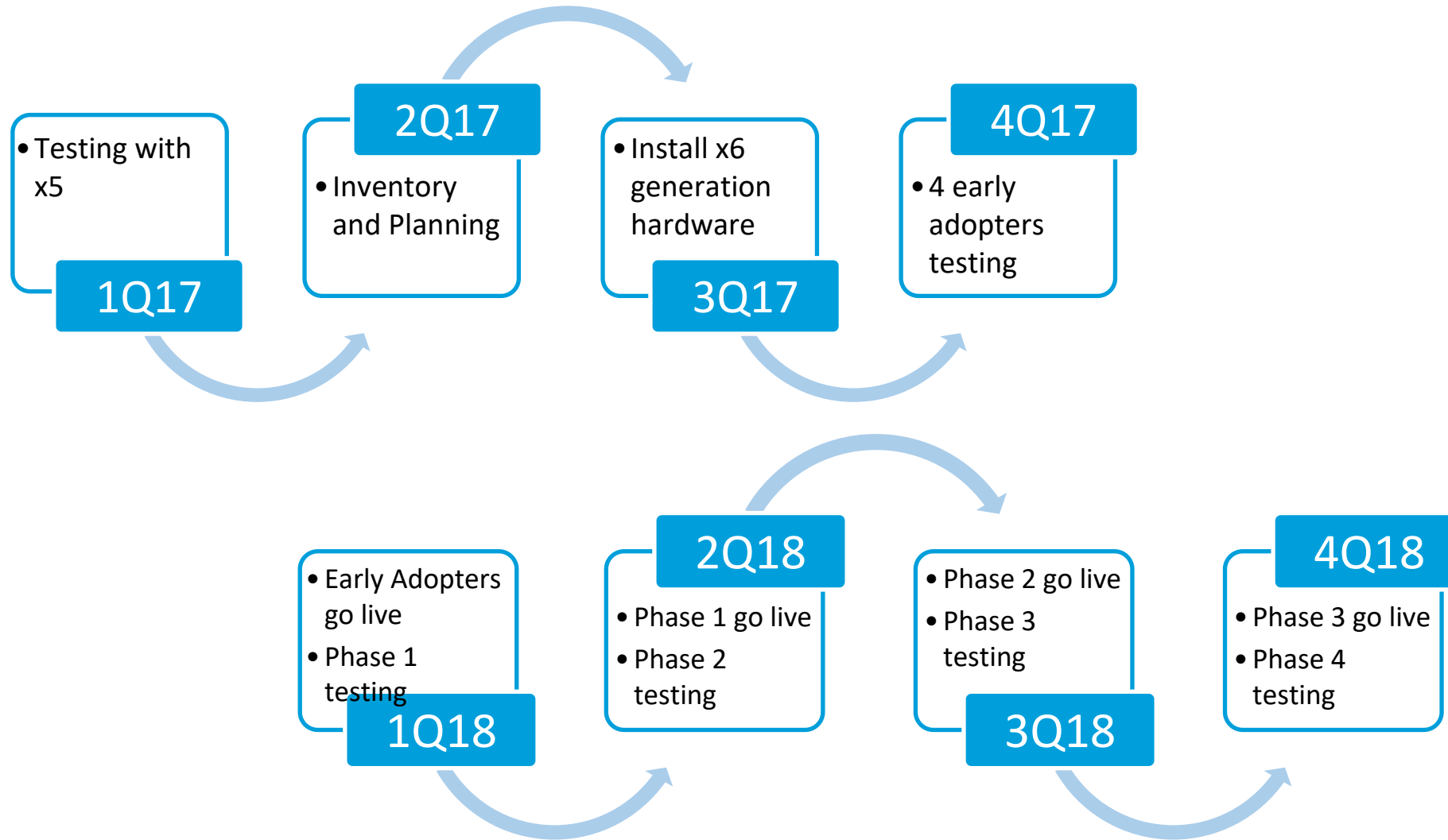
Issue	Resolution
Multiple large databases sharing common hardware such as network ports for backup/recovery	Reduce bandwidth requirements using incremental backups such as ZDLRA or deduplication technology



# Migration Status



# Planned Migration Status



# Automating Database Cloud Migration How AT&T is Making Cloud a Reality

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SAN FRANCISCO, CA

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# Agenda

- 1 AT&T's Drivers for Moving to Cloud
- 2 Oracle Consulting Studio
- 3 Contact Information