Implementing the World's Largest Exalytics Program

Gary Crisci, Principal Data & Information Architect
General Electric

SAVE THE DATE

SAN ANTONIO
JUNE 25-29

ODTUG
Kscope17

"Great event, great content #Kscope16 many thanks #orclapex #letswreckthistogether"
- Simon Greenwood @APEXORADEV

"#kscope16 was a blast. On the way to the airport with a heavy heart. Thanks @odtug for making this event what it is: the best!"
- Christian Berg @Nephentur

www.kscope17.com

Introduction

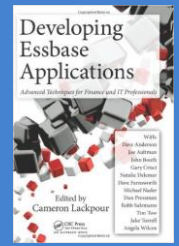
Biography

Gary Crisci

EPM Principal Technologist, GE Digital

- Oracle Ace (BI/EPM)
- Co-Author: *Developing Essbase Applications*
- 20 Years Finance/IT Experience
- ODTUG Director

Gary.Crisci@ge.com
http://garycris.blogspot.com
http://twitter.com/garycrisci



GENERAL ELECTRIC COMPANY

Energy Management

Capital

Healthcare

Oil & Gas

Transportation

Aviation

Power & Water

Lighting

Digital

Predix

Digital Industrial Transformation with Predix
The Industrial Internet of Things (IIoT)
http://www.predix.com

The Industrial Internet of Things (IIoT) differs greatly from the Internet of Things (IoT) touted by mass media .
The focus of the IIoT is not on connecting coffee pots to alarm clocks, but rather on connecting industrial assets, such as turbines, jet engines, and locomotives, to the cloud and to each other in meaningful ways.

GE is pioneering the industrial cloud computing space.
Predix represents the starting point of a journey that will yield increasingly important improvements in key industrial and business processes.
Aggregating the data and operational capabilities of intelligent devices enables industrial companies to significantly improve business processes. Whether turning to the industrial cloud for real-time asset optimization in power generation, improved analytics and diagnostics in healthcare delivery, or improved production management in large industrial factories, Predix is designed to support the future of business.

Introduction to EPM at GE

The GE Exalytics Shared Services program is built on state of the art, high performance, engineered systems for Oracle Enterprise Performance Management (EPM) software.

Exalytics delivers extreme in-memory analytic performance for business Intelligence and enterprise performance management applications. Built using best-in-class hardware, market- leading business intelligence software and in-memory database technology, Oracle Exalytics is an optimized system that provides speed-of-thought analysis with unmatched intelligence, simplicity, and manageability.

Enterprise Standards
EPM Shared Services

What is an Enterprise Standard?

A set of consistent principles, or standards, to be applied across GE globally for key operational and financial transactions. Enterprise Standards streamline processes and the global systems infrastructure to drive **simplification** and reduce complexity across the company.

Approach

- Provide guiding principles
- Share key tenets to drive standardization
- Formalize specific decisions

Platforms

- Identify preferred technology solutions
- Develop architecture that supports the regions
- Create transactional solutions
- Define data standards

Processes

- Ensure consistency across the company
- Document process flows
- Identify key activities and controls

Roles/Ownership

- Define organization structures and ownership
- Define roles and responsibilities
- Develop metrics, KPIs, SLAs

Enables profitable GE growth and creates a better way to do business

*"Simplification gives us an opportunity to do even more" – **John Rice***

Why Enterprise Standards?

Legacy

- GE is complex.
- Through acquisitions and/or growth, we've added complexity.
- Complexity adversely impacts our customers and our people.

- Numerous systems, processes and centers
- Multiple business units, locations and delivery models
- Numerous SOPs, SLAs, contracts and Statements of Work

Future

- Maximize use of shared services.
- Leverage our scale to be competitive in a fast paced world.
- Be more responsive to customers and the business.

- Formalized policies
- Leverage existing best practices
- Integrated GE master data
- Decreased platform(s) and tools enabling finance

Current Enterprise Standards

Source to Buy	➢ Includes the processes of setting up a supplier, negotiations with the supplier, approval of a supplier and requisitioning, and ends with a valid PO to hand off to the Accounts Payable process.
Buy to Pay	➢ **The processes for receipt of an invoice, matching it to a PO, and payment to the supplier.**
Fixed Assets	➢ Establishes standard processes for the initiation, acquisition, maintenance, disposition and reporting of the Company's property, plant and equipment assets.
Record-to-Report*	➢ **Describes the process to account for and report financial transactions initially recorded within Buy-to-Pay, Invoice-to-Cash, Fixed Assets, Source to Buy, Payroll, and other financial processes. Enhancements to this Standard will define standard process workflows and shared service components of the Record-to-Report activities.**
Invoice-to-Cash	➢ Includes the Accounts Receivables processes of invoice distribution, collections, dispute facilitation, cash application and reconciliation.
Stat & Tax	➢ **Defines common processes and platforms for the statutory accounts, corporate income tax (CIT) and value added tax/goods and services tax (VAT/GST) return preparation and filing processes.**
Customs	➢ Contains standards, policies and governance for the management of customs activities (administration and collection of the duties levied by a government on imported goods).Enhancements to this standard will define standard process workflows for exports.
Payroll	➢ **Describes standard processes for payroll processing, from transmission of employee data to payroll calculation and processing the employee payment, to tax reporting and accounting.**
Travel & Living	➢ A single GE-wide policy governing T&L expenditures and reporting.

Business Case

EPM Shared Services and Engineered Systems

The Risk of a Commodity Server Platform

- ✓ **Patching across a large server footprint**
  - ✓ Multiple operating systems (Windows, Linux, Solaris) require multiple skill-sets
  - ✓Patching and upgrades must be accomplished on a machine-by-machine basis resulting in greater system downtime and heavy IT involvement
- ✓ **Less adherence to the Oracle release schedule**
  - ✓Incentive to stay on current release rather than upgrade and run into hardware issues
  - ✓Exalytics provides streamlined upgrade activities because of a reduced server footprint which will allow the application stack to stay up-to-date
- ✓ **Challenges in ability to react to increased user/application demands**
  - ✓ Centralizing on an Exalytics framework will allow for both vertical and horizontal scaling
- ✓ **Application backups and restores across a multi-server deployment leads to complexity**
- ✓ **Lack of standardization reduces economies of scale**
- ✓ **Commodity environments have unstructured growth**
  - ✓Environments grow reactively out of need

3 main drivers

Performance

Centralization / Standardization

Server foot print reduction

Key Benefit Areas

Increased productivity

- Streamline backup, recovery and maintenance activities
- Decreased downtime, improved data latency and faster recovery

Improved decision making

- Exalytics will improve system performance
- Data will be in the hands of the business faster & more often…

Faster time to value

- Simplified installation, patching & upgrades
- Tuning and Optimization

Lower total cost of ownership

- Fewer ongoing resources for support and tuning
- Centralize Patching & Upgrades
- Reduce consulting costs

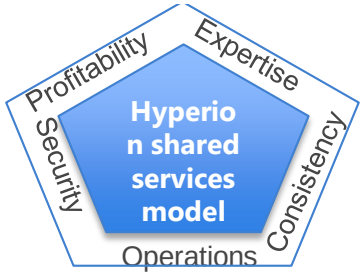
Future Proofing

- Roadmap of Exalytics optimizations, feature, etc.
- Gateway to cloud

Development, Support, and Maintenance

Change in Support Model | Corporate EPM Shared Services

Corporate EPM



Expertise … Hyperion experts to provide technical guidance

Consistency … Centralized processes to drive cross biz consistency

Efficiency … Cost savings insourcing deep tech expertise

Operationalize … 24X7 support from dedicated team

Risk … Intellectual property and expertise reside in-house

Engagement landscape

Business	Infrastructure	Architecture	Operations
Aviation	●	●	◍
Power and Water	●	●	◍
Transportation	●	●	◍
Energy Management	●	●	◍
Oil & Gas	●	●	◍
Healthcare	●	●	◍
Lighting	●	●	●
Corporate	●	●	●

● Full engagement ◍ Partial engagement ○ Potential engagement

Benefit drivers

Expertise
In-house Hyperion experts w/ relevant GE & external exp

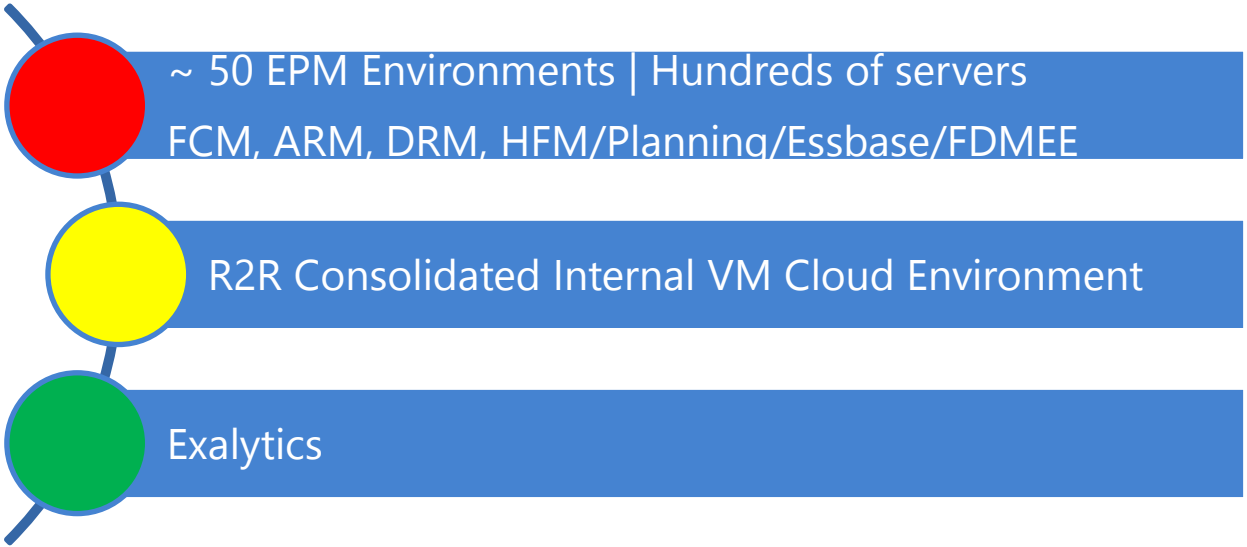
Cross biz standardization
Consistent processes design to drive better controllership

Holistic end to end service to drive standardization and cost efficiency

Infrastructure

Infrastructure Simplification

EPM Environment Evolution



Exalytics Benefits

Performance

Faster online response time

Faster consolidation time

Consolidation

IT Infrastructure reduced

Reduced TCO (Total Cost of Ownership)

Lifecycle

Simplified deployments

Ability to scale with ease

Faster backups

Reduced patching downtime

Support

Reduced business disruptions

Reduced failure risk

Exalytics Details

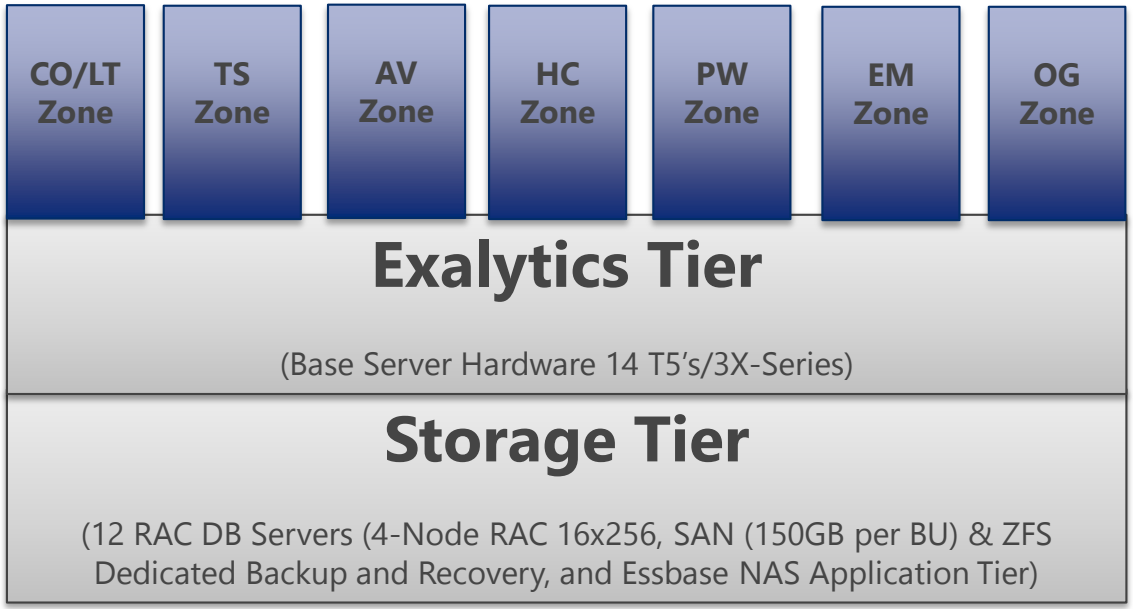
Oracle Exalytics In-Memory Machine T5-8 is a breakthrough engineered system that delivers the best speed-of-thought analytical in-memory performance for customers wanting to consolidate multiple analytic applications on a single platform.

In-Memory Analytic Hardware

Oracle Exalytics T5-8 features:

- 4 TB of RAM
- 6.4 TB of PCIe Flash memory
- 9.6 TB of raw disk capacity
- 128 CPU cores (1024 threads)

GE Enterprise Exalytics EPM Cloud



Soon to be Exadata!

Exalytics Tier

Physical Hardware

	Dev	Stage	Prod	Total
Exalytics T5	2	6	6	**14**
Exalytics X2-4	1			**1**
Exalytics X4-4		1	1	**2**
ZFS Appliance		2	2	**4**
Windows		9	9	**18**
Total Physical Hardware	**3**	**18**	**18**	**39**

*Development Windows environment consists of 8 virtual servers

Managed Hosts

	Dev	Lab	Stage	Prod	Total
Global Zones	2		6	6	**14**
Local Zones	16	4	31	31	**82**
Total T-5	18	4	37	37	**96**
X-Series	1		1	1	**3**
Total Exalytics Hosts	**19**	**4**	**38**	**38**	**99**
ZFS Appliance			2	2	**4**
Windows	9	2	9	9	**28**
Total Managed Hosts	**28**	**6**	**49**	**49**	**132**

Hardware Details

- There are 39 physical pieces of hardware that are segregated into 132 managed hosts within the Exalytics platform.
  - 14 x T5-8
    - Eight sixteen-core 3.6 GHz SPARC T5 processors = 128 Cores (1024 processor threads)
    - One hundred twenty-eight 32 GB DDR3 ECC Registered DIMMs = 4TB RAM
    - 6.4 TB PCIe Flash
    - 9.6 TB of raw disk capacity
- 1 x X2-4
  - Four Intel Xeon E7-4800 series processors = 40 CPU cores
  - 2TB RAM
  - 1 TB PCI Flash
  - 2.5 TB Hard disk
- 2 x X4-4
  - Four Intel Xeon E7-8895v2 processors running at 2.8 - 3.6 GHz = 8 - 60 cores (capacity on demand)
  - 2 TB RAM
  - 2.4 TB PCI flash
  - 7.2 TB Hard disk
- 4 x ZFS Appliances
- 18 x Windows Physical Servers (EPMA)

DB Tier

Dev

Type	OS	Nodes	DB	CPU	RAM
Virtual RAC	Linux OEL 5.9 64 bit	2	Oracle 12c	8	48GB

QA

Type	OS	Nodes	DB	CPU	RAM
Physical RAC	Linux OEL 6.0 64 bit	4	Oracle 12c	16	128GB

Prod

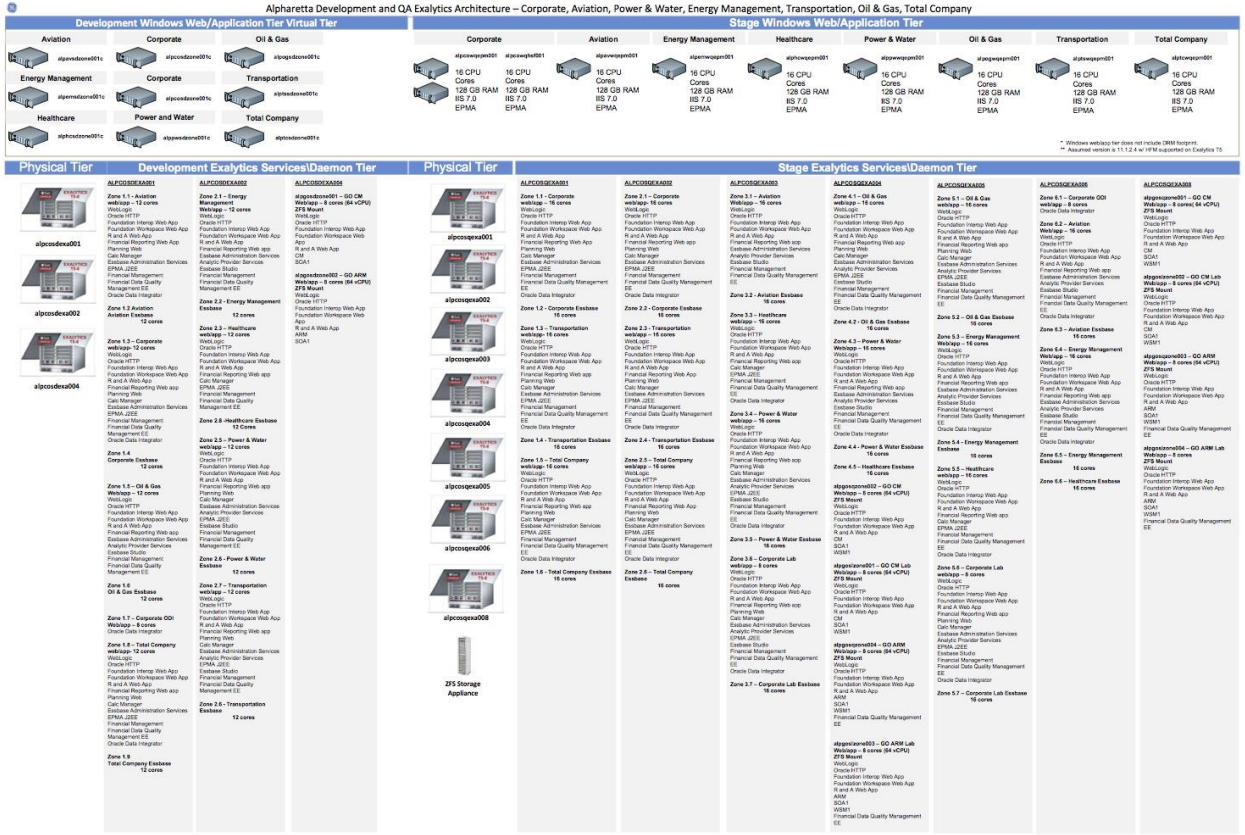
Type	OS	Nodes	DB	CPU	RAM
Physical RAC	Linux OEL 6.0 64 bit	4	Oracle 12c	16	128GB

Installed Software

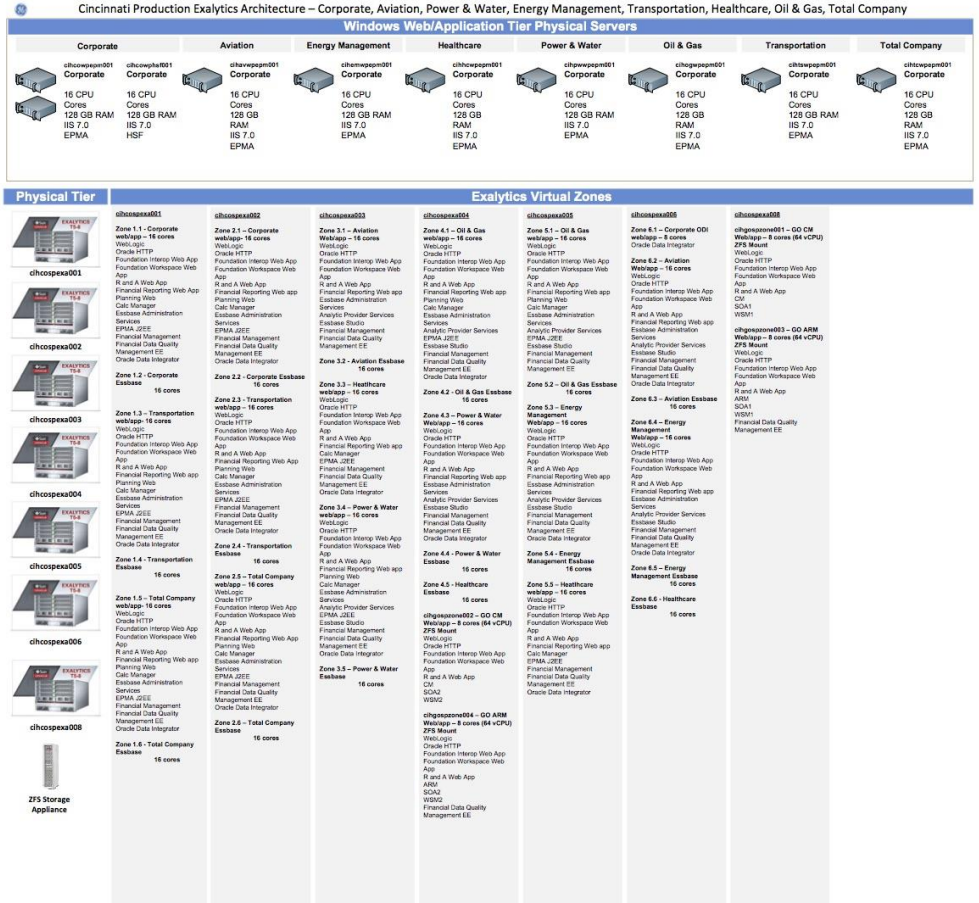
- The Exalytics environment has the following Oracle EPM software installed
  - Hyperion Financial Management (HFM)
  - Hyperion Planning (HP)
  - Oracle Essbase
  - Hyperion Financial Reports (HFR)
  - Oracle Data Integrator (ODI)
  - Oracle Business Intelligence, Enterprise Edition (OBIEE)
  - Financial Data Management (FDMEE)
  - Enterprise Performance Management Architect (EPMA)
  - Hyperion Shared Services

+ARM & FCM

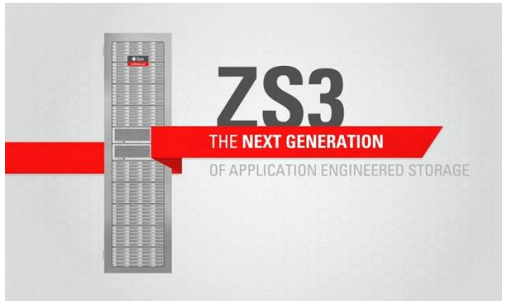
Exalytics Environment Diagram



Exalytics Environment Diagram



What is ZFS?



ZFS Storage Appliance

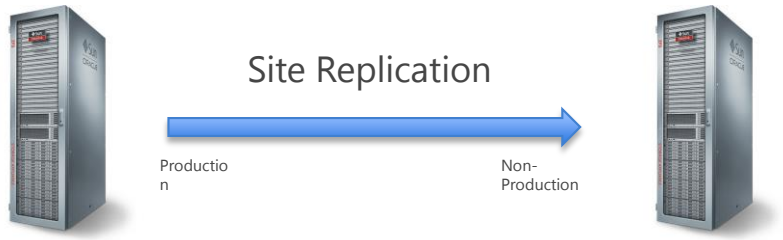
- High Performance Hardware Architecture
- Dual ZFS Controllers for Redundancy
- Able to expand/add Storage Racks as your environment grows.

ZFS Features

- Built in De-duplication to reduce capacity constraints and cost.
- Compression (10-50x) lowers storage footprint.
- Hybrid storage pools increase performance by serving up to 90% I/O from DRAM (1000x faster than flash)

Unified DR Strategy

- ✓ Zone Snapshots
  - ✓ OS and Application Directory Snapshots of entire environments are taken in seconds.
- ✓ ZFS Site – Site Replication
  - ✓ Snapshots are replicated from Production Data Center to Non-Production (DR) Data Center.



Implementation

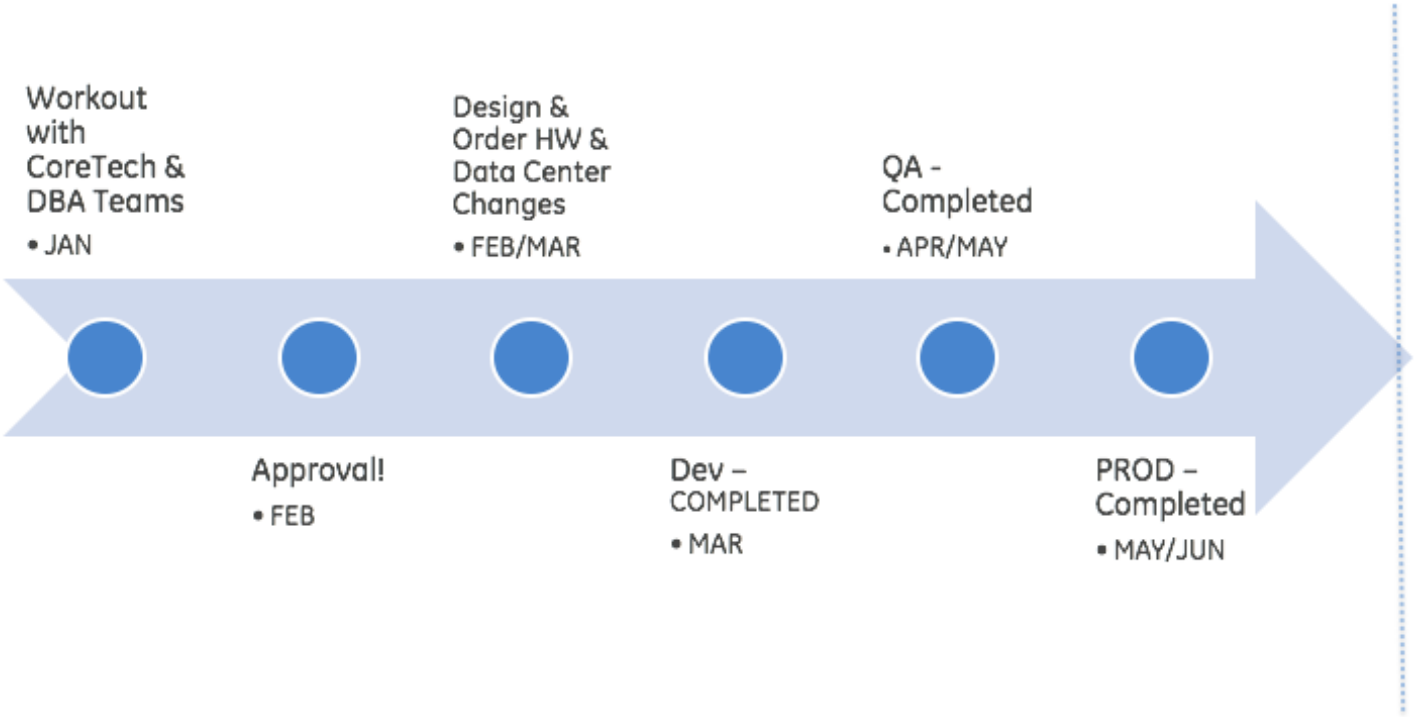
Oracle ACS Engagement

The build out of the world's largest Exalytics environment was a significant success in planning, execution, and utilization of resources across multiple teams. The goal was to build out a private cloud to support all EPM applications across all of GE. In less than 6 months GE, our partners, and Oracle resources installed

- 39 physical pieces of hardware and configured 132 hosts of which EPM software was installed on 95 of them.
- Over 400 URLs were configured to support all of the products.
- The core team consisted of approximately 20 individuals

Project Status

Timeline of the Environment Builds



Project Milestones

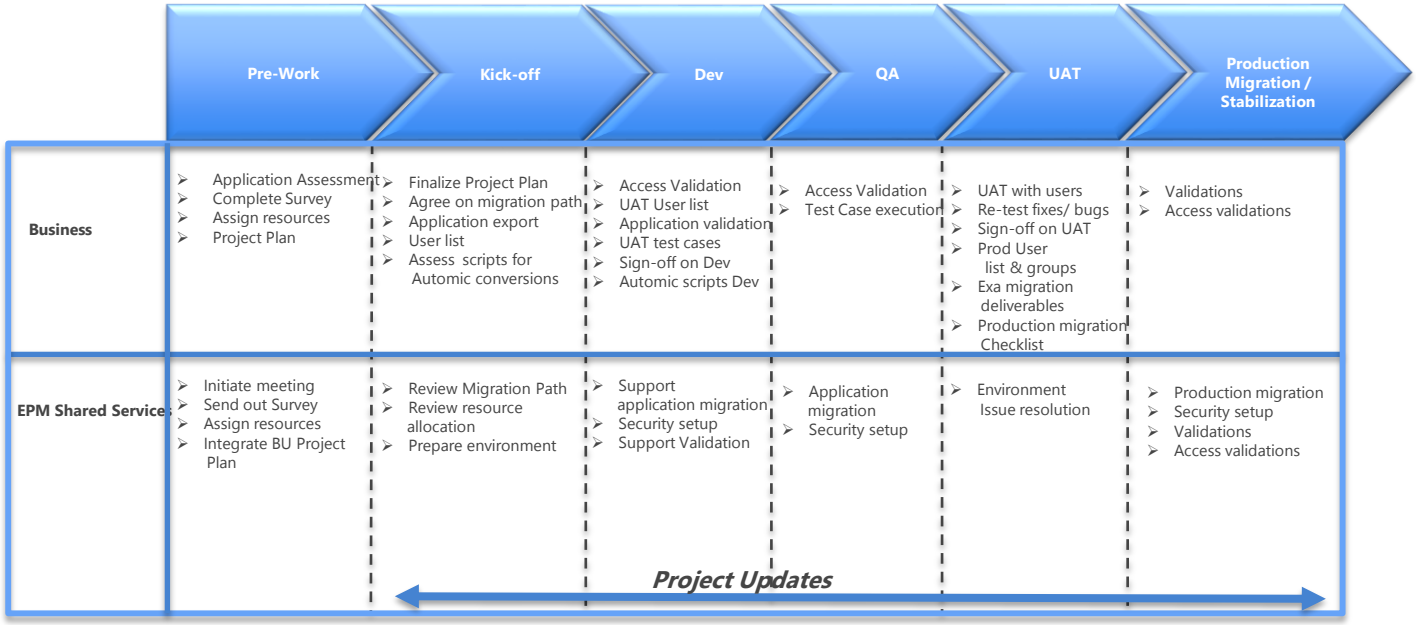
Week	Env	Location	Resources	Notes
2/2/15	ALL	REMOTE	1	Backoffice
2/9/15	ALL	REMOTE	1	Backoffice
2/16/15	ALL	REMOTE	1	Backoffice
2/23/15	ALL	REMOTE	1	Backoffice
3/2/15	ALL	REMOTE	1	Backoffice
3/9/15	ALL	REMOTE	2	QA Backoffice
3/16/15	DEV	GA	4	Infrastructure T5-8
3/23/15	DEV	MI	4	SW Install and Config
3/30/15	DEV	MI	4	SW Install and Config/Handover/Documentation
4/6/15	DEV & QA	REMOTE	2	QA Backofice
4/13/15	QA	GA	4	Infrastructure T5-8
4/20/15	QA	GA	4	Infrastructure T5-8
4/27/15	QA	MI	3	SW Install and Config
5/4/15	QA	MI	3	SW Install and Config, Handover, Documentation. - PROD Backoffice
5/11/15	PROD	OH	4	Infrastructure T5-8
5/18/15	PROD	OH	3	Infrastructure T5-8 & SW Install and Config
5/25/15	PROD	MI	3	SW Install and Config
6/1/15	PROD	MI	3	SW, Handover, Documentation

HFM 11.1.2.4

- HFM 11.1.2.4 was a major enhancement to the Oracle Financial Management product suite.
  - Prior versions of HFM were built only for Windows platform and heavily dependent on Microsoft technology. With 11.1.2.4 Oracle changed many of the backend components and consolidated them into a single Java agent. This was the first release that was able to run on a Unix based platform.
- The initial release was not supported for Solaris, which is the OS for the Exalytics T5, however GE worked with Oracle through the early adopter program to get pre-release builds of HFM that could run on Solaris.
  - As expected there were issues that needed to be worked through. As one of the first adopters of 11.1.2.4 and one of only two on Solaris, GE partnered with Oracle to flush out bugs and functionality issues.
- Officially, version 11.1.2.4.100 was the first release certified for Solaris. GE worked closely with Oracle HFM development and CEAL teams on numerous defects. The process was expedited by onsite workouts at GE locations as well as Oracle offices. **From July through November 2015 GE and Oracle have closed over 20 SRs, and Oracle has fixed over 30 defects resulting in 11.1.2.4.102 being the first stable version of HFM on Solaris.**
- GE's influence and strong relationship with Oracle enabled us to quickly work through the issues and stabilize the platform for GE development teams.

Migrations

Exalytics Migration : Engagement Model



Partnership from the onset will ensure successful transition to Exalytics Platform

Application Migration Strategies

Lift and Shift

- Move the application "as is"

Lift, Shift, and Tune

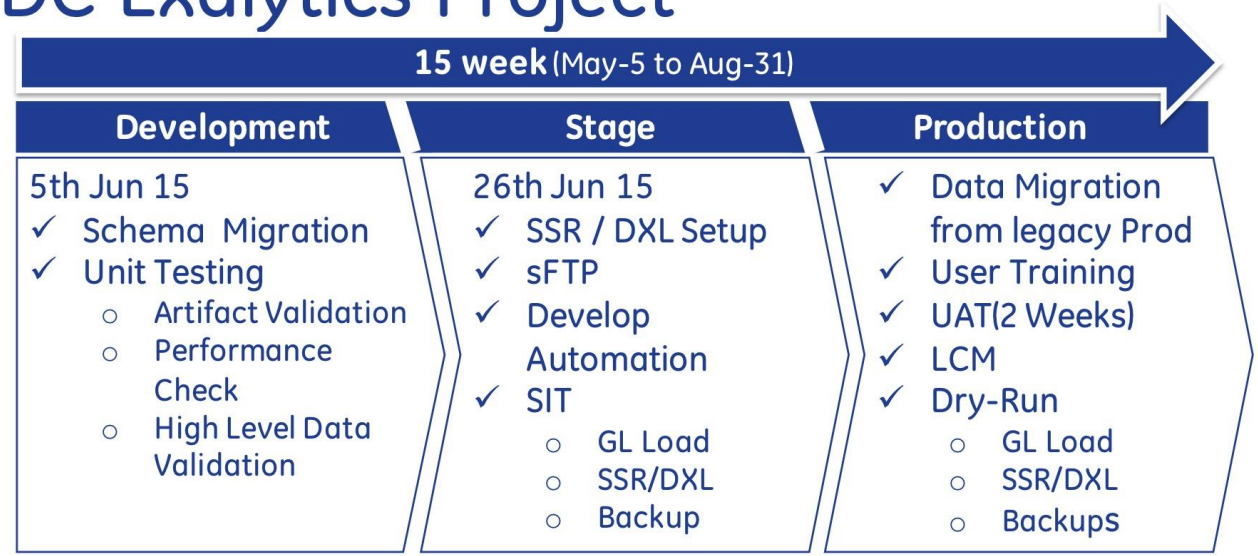
- Move application as is and then tune to optimize for Exa features

Redesign

- Revisit requirements
- Build to leverage full power of Exa

New Development

SDC Exalytics Project



What Went Well:

- Collaboration between DI, Infra, MARS, SDC Team
- Automation script Development
- DR Drill using LCM method
- User Communication
- Participation from Functional teams

Learnings:

- Server whitelisting at Genpact Firewall
- DR-Drill using ZFS replication
- Outage Communication
- Automic
- GAPC Alerts
- Pointing Legacy SmartView link to Exa
- Archive App Setups

imagination at work

SDC Legacy vs. Exalytics performance

Comparison

MARS Load	Legacy 11.1.2.1	Exalytics 11.1.2.4	V%	
SDC	**15.32**	**6.30**	**↓58%**	❶
Data Export	1.38	0.55	↓42%	❷
Data Import	0.10	0.05	↓50%	
Calc	13.41	5.30	↓60%	
INTL	**5.19**	**2.31**	**↓55%**	
Data Export	0.45	0.19	↓58%	
Data Import	0.04	0.03	↓25%	
Calc	4.25	2.09	↓51%	
Backup				
SDC	120.00	20.00	↓83%	❸
INTL	60.00	15.00	↓75%	❸
Rounding	3.00	1.00	↓67%	❸

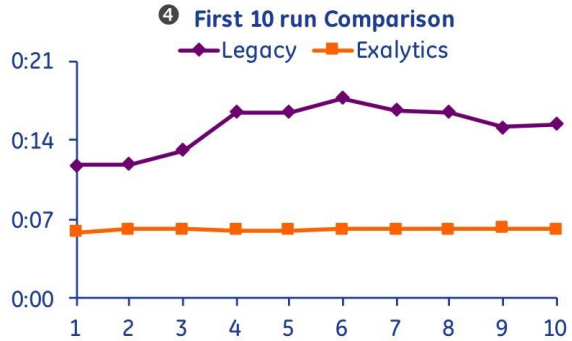
Key Update

❶ **SDC MARS Load :** Overall SDC MARS load performance reduced to half in Exalytics. Calc execution reduced by 60%

❷ **SDC Export :** Updated script to include FIXPARALLEL command

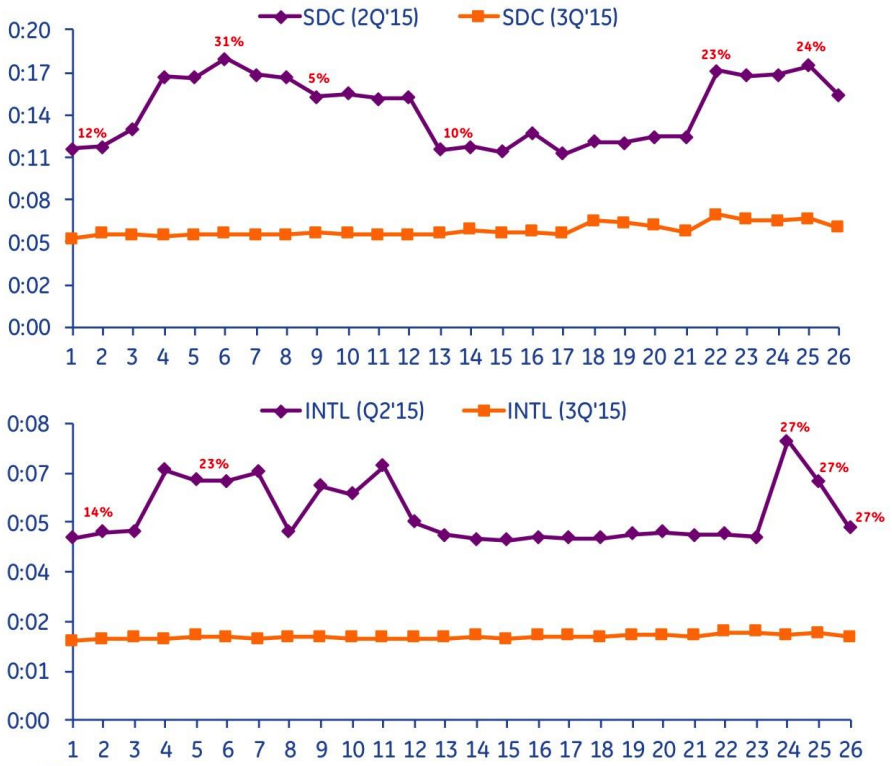
❸ **Backup Timings :** Significant time reduction in backup timings

❹ **Consistent MARS load Timings**



imagination at work

SDC MARS Data Load Timings



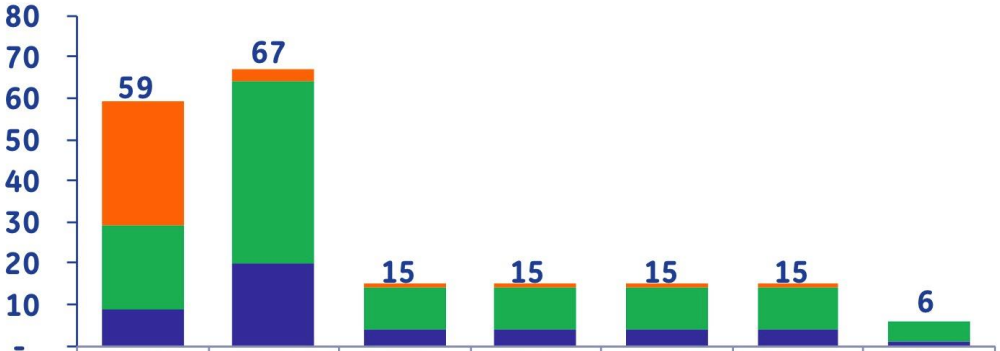
Observations:

- ✓ Consistent Load timings in Exalytics
- ✓ Fragmentation is always 0% in Exalytics
- ✓ Parallel processes do not interfere with GL load timings
- ✓ 40% faster form save timings
- ✓ Users do get logged out due to site minder (Exalytics do not use Site-mider)

imagination at work

XX% Fragmentation

SDC Over the Year



	1Q'14	2Q'14	3Q'14	4Q'14	1Q'15	2Q'15	3Q'15
Other	30	3	1	1	1	1	0
Calc Dim	20	44	10	10	10	10	5
Export	9	20	4	4	4	4	1

1Q'14: SDC GL load waiting for USDRQ / INTL level 0

2Q'14: Split File process Implemented

3Q'14: Export Optimized, Calc Dim optimized

3Q'15: Exa Migration

Voice of Customer

I executed the discop program tonight for all the MEs – it went pretty quick actually – I'd say it only took me about 10 minutes. So exalytics seems much faster.
- Katie Stevens (Capital)

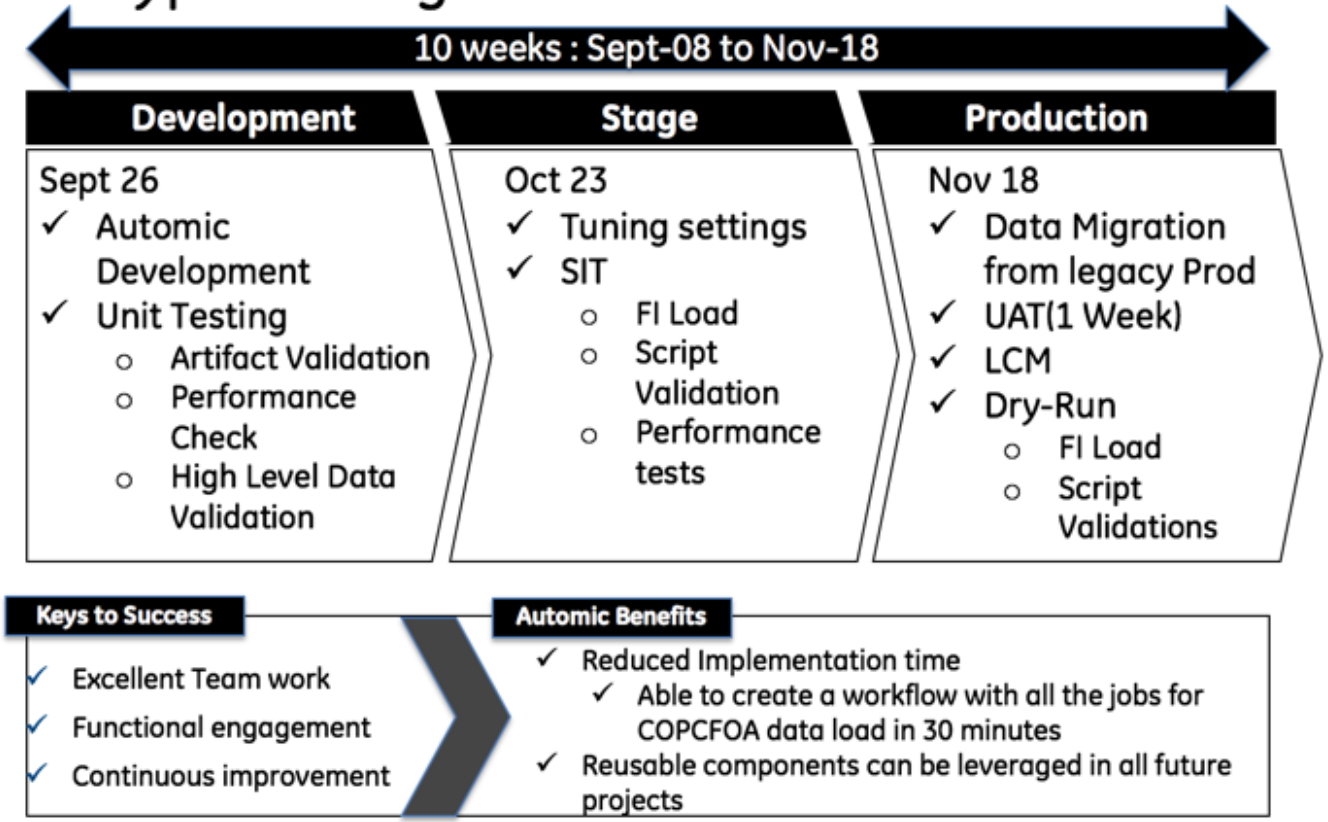
I like interface of new system its crisp
- Iris Chen (Corproate)

New System is very fast, I have personally saved 40% of my time tonight.
- Kshitiz (Capital, Genpact)

Completed for all those periods!!!!!! Impressive speed.
- Tony Pertocelli (Corporate)

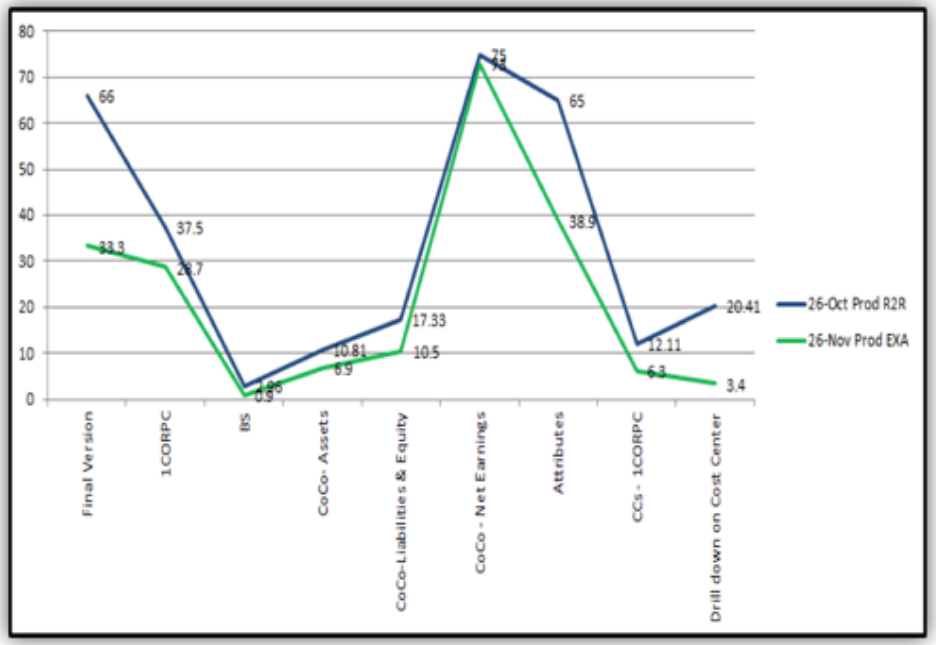
imagination at work

CCL Hyperion Migration



End User Experience : R2R Versus Exalytics

	26-Oct	26-Nov
Use Case - Retrieves	Prod R2R (In sec)	Prod EXA (In sec)
Final Version	66	33.3
1CORPC	37.5	28.7
BS	2.96	0.9
CoCo- Assets	10.81	6.9
CoCo-Liabilities & Equity	17.33	10.5
CoCo - Net Earnings	75	73
Attributes	65	38.9
CCs - 1CORPC	12.11	6.3
Drill down on Cost Center	20.41	3.4



Performance Improvements across all scenarios – Continue to Monitor and Tune

Process Timing Comparisons (R2R vs Exalytics)

Application	Process	R2R Prod(min:sec)	Exa Prod (min:sec)
COPGOPLN	Metadata Load	10.6	10:41
COPGOPLN	Backup	4:52	1:02
COPGOPLN	Plan LCM Backup	0:56	0:28
COPGOPLN	EPMA LCM Backup	1:48	NA
COEGORPT	Metadata Load	12:03	10:35
COEGORPT	Data Load	4:35	11:13
COEGORPT	Backup	7:50	2:19
COPCFOA	Metadata Load	10:00	8:37
COPCFOA	Data Load(Process changed from ODI/FDM to Essbase)	10:22	1:26
COPCFOA	Backup	1:00	0:13
COPCFOA	Plan LCM Backup	0:46	0:32
COPCFOA	EPMA LCM Backup	1:03	NA
All	EPMA LCM Backup		2:21
Total Time		**63.75**	**47.67**

Highlights

- 25 % savings on processing timing in Exalytics when compared to R2R
- Leveraged Automic scripting for all data loads & backup processing
- Continue to monitor and tune scripts for improved performance

TR's Essbase & Planning Migration to Exalytics

Project Plan

TR Essbase & Planning	Resources	Start	Finish
Sept 2nd			
• Automation Testing		Mon 8/03	Fri 9/11
• (1) MDX patch applied in Dev (Pend BI Confirm)		Mon 8/03	Fri 9/04
• (2) Command Deploy in Studio still in Issue (Need Oracle to provide patch)		Mon 8/03	Fri 9/11
✓ Exalytics Admin ID provisioned		Wed 9/02	Wed 9/02
• FSSO in QA		Wed 9/02	Fri 9/04
✓ QA Appworx agents installed (Exa/Win)		Mon 8/31	Wed 9/02
Sept 7th			
• Oracle on-site w/ Corp & HFM admin		Tues 9/8	Fri 9/11
• QA Migration Activities		Mon 9/7	Wed 9/9
• Remediate Automation activities		Mon 9/7	Fri 9/11
• Test Cases development		Mon 9/7	Fri 9/11
• UAT Defined & Documented		Wed 9/9	Fri 9/11
• User Group Provisioning		Mon 9/7	Fri 9/11
Sept 14th			
• Performance & Regression Test Cases deployed & results confirmed (TCOE)		Mon 9/14	Thur 9/17
• Remediate Performance		Mon 9/14	Thur 9/17
• UAT sessions & Sign Off (ess/pln)		Mon 9/14	Thur 9/17
• OBIEE Tests & Sign Off		Mon 9/14	Thur 9/17
• QA Tollgate (patches/appworx/OBIEE)*		Fri 9/18	Fri 9/18
Sept 21st			
• Essbase & PLN Production Migration (Go-Live*)		Mon 9/21	Wed 9/23
• Metrics & Parallel		Wed 9/23	Fri 9/25
• All Remediations		Wed 9/23	Fri 9/25
• Data Validations		Wed 9/23	Fri 9/25

Essbase Comparisons

Row Labels	Legacy	Exalytics	
GETS_HYP_AR_CUBE	9.9	7.3	26.26%
GETS_HYP_CM_CUBE	4.2	3.9	7.14%
GETS_HYP_FC_CUBE_BUILD	1.5	1.4	6.67%
GETS_HYP_GL_CUBE_BUILD	5.6	4.7	16.07%
GETS_HYP_ORDERS_CUBE	8.9	8.4	5.62%
GETS_HYP_SALES_CUBE	7.2	10.5	-45.83%

OBIEE Comparisons

Date: 10/05/2015	Scenario1			Scenario2			Scenario3		
Report Name	Filters used	PROD	DEV Exa	Filters used	PROD	DEV Exa	Filters used	PROD	DEV Exa
Income Statement	Default Filters	2 sec	14 sec	Year: 2014, Org:BSF, View:Monthly	60 sec	4 sec	Year: 2014, View:Monthly	200 sec	14 sec
Income Statement Vs Plan	Default Filters	8 sec	2 sec	Year: 2014, Qtr1, Qtr2	5 sec	4 sec	Year:2014, CC: OPINOP	2 sec (no data)	8 sec
Income Statement Variance Analysis	Default Filters	34 sec	10 sec	Year: 2014, 2013, May, Monthly, Measure: USD_QTD_RPT	137 sec	78 sec	Year: 2014, 2013, May, Monthly, Measure: USD_QTD_RPT, Org:BMS	207 sec	22 sec
Total Cost Report IC10000	Default Filters	5 sec	3 sec	From year: 2014, To Year: 2014, Month : Jan to May, View: Monthly	6 sec	3 sec	CO1710,CO2110, from year :2014, to year :2014, Apr to Jun, Expand to 51 Accounts	4 sec	2 sec
Total Cost Report by Org - Variance IC10000	Default Filters	2 sec	6 sec	Expense Type: RTS	8 sec	4 sec	2014, Qtr1 to Qtr4, Expense type: Base	7 sec	3 sec
Functional Cost by CC - Variance IC10000	Default Filters	92 sec	12 sec	Year: 2014, Expense Type: Program	390 sec	8 sec	2014, Qtr1 to Qtr2, Quarterly View, Expense Type: Variable, view results by Cost Center	80 sec	4 sec
GL Balances	Default Filters	1 sec	1 sec	Company: 20, From Year: 2014, To year: 2014, Qtr1, Qtr2,	4 sec	3 sec	Account: P00440, from year: 2015, to year: 2014, Qtr1, Qtr1	2 sec	1 sec
Supply Chain - Total Cost by 510000	Default Filters	3 sec	3 sec	Expense Type: Variable, FY: 2014, View by Cost Center	23 sec	3 sec	Cost Center: 0PROD2, Org: BCO, 2014, View by 51 Accounts Expense Type: Program	6 sec (no data)	9 sec
Net Working Capital	Default Filters	24 sec	8 sec	2014, Org :BFN	28 sec	7 sec	Org : BLO, Plan: IOP, year: 2014, View: Full Amount	18 sec	7 sec

Legacy	Exalytics
100 seconds	14 seconds
207 seconds	22 seconds
80 seconds	4 seconds

Observations

- *8 weeks project – Essbase & Planning*
- *Overall performance improvements in Exalytics*
- *Excellent partnership between Business & EPM Shared services*
- *Continue to tune apps for improvements*

New Development

Enterprise Standard HFM

Global Enterprise Standard HFM application(s)

- Centralized development based on collective set of core requirements for all GE businesses
- Standardized
  - COA from DRM
  - Business Rules
  - Data Integration Processes

Planning

- Enterprise Standard Guidelines for Planning apps in Shared Service Environment
- Leverages ES COA via DRM
- Integrated with ES HFM

ES ASO Reporting Cubes

- Leverages ES COA from DRM
- FDMEE / ODI integration to pull from HFM and Planning
- Extremely high performant on Exalytics platform

DevOps

24/7 Centralized Support Team

- One global support team for all EPM
- Standard backup and lifecycle management processes
- Routine Maintenance
- Segregation of duties
- Centralized risk management
- Standardized Security Model

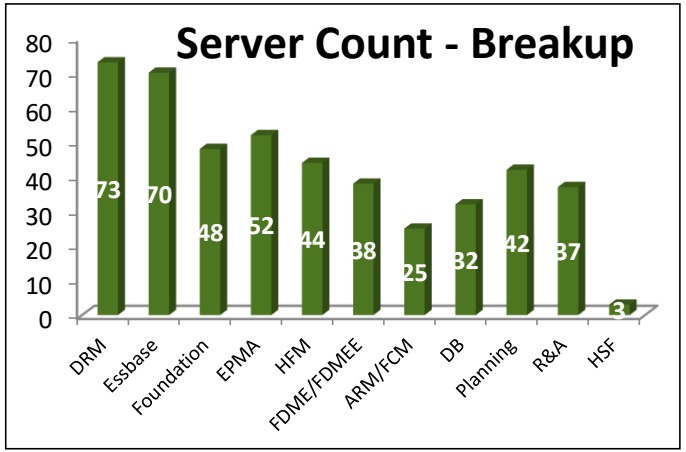
Support Team Overview

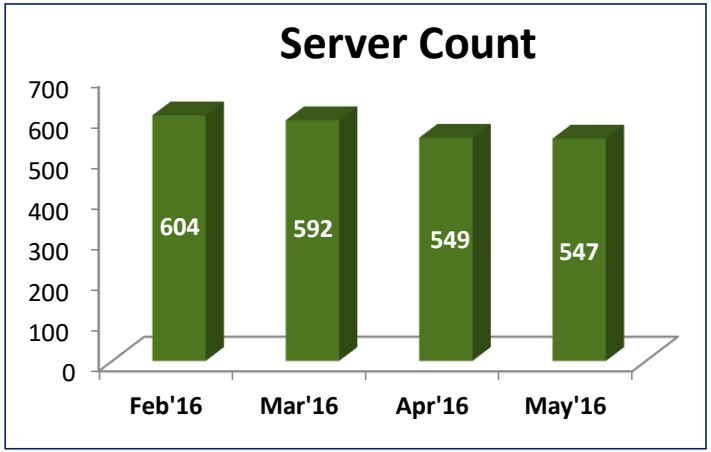
Staff

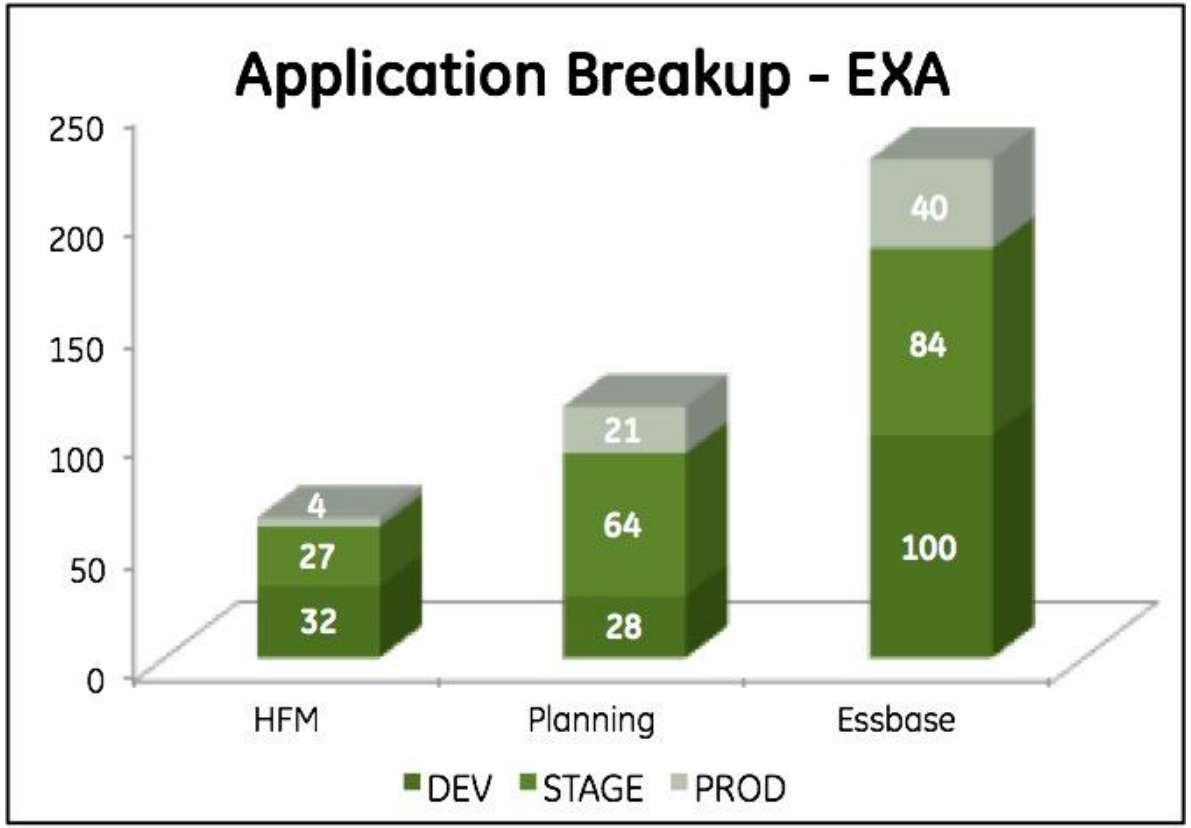
- 23 total headcount
- 24 / 7 support
- Staff in Mexico, India and U.S.
- Only level 3 and 4 support staff opens tickets with Oracle

Process

- Segregation of duties
- Proper use of tools
- Controlled escalation process
- Support from above






Application Breakup - EXA
250
200
150
100
50
0
4
27
32
21
64
28
40
84
100
HFM
Planning
Essbase
DEV
STAGE
PROD

Routine Activities

Daily

- Monitor daily jobs
- Scan logs
- Verify backups

Weekly

- Log rotation (as needed)
- Review disk usage
- Service restarts

Monthly

- LCM cleansing
- Server statistic trending analysis
- Purge temp logs
- Data Base checks (DBA Team)

Quarterly

- Review/upgrade patch sets
- Security audit assistance
- Capacity planning

Standardized Security Model

- Utilizes Shared Services LDAP groups only
- Engage with EPM Shared Services Security team for guidance
- Follows standard naming conventions

Cool Stuff

Knowledge Management - Confluence Wiki

Confluence Spaces People Calendars Browse Create

Search

- A - Administration
- B - Infrastructure
- C - Program
- D - Resources
- E - Knowledge Management
- X - Success Stories
- Z - Frequently Asked Questions (FAQ)

EXALYTICS

Exalytics@GE

Edit Watch Share

Created by Jennifer Tran (Admin), last modified by Crisci, Gary C on Feb 18, 2016

Shortcuts

End User URLs

Open a Support Ticket in ServiceNow

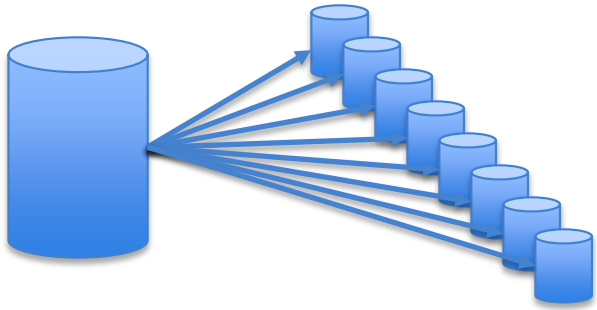
FAQ

*** Please note this site is continuously updated. Please check back often and consider following this wiki by clicking the "Watch" button at the upper right corner of this page and selecting 'watch all content in this space'.**

Distributed Command Line Interface (DCLI)

The dcli utility executes commands on multiple Oracle Engineered servers in parallel, using the InfiniBand (bondib0) interface to make the connections.

You can run the utility from any server.



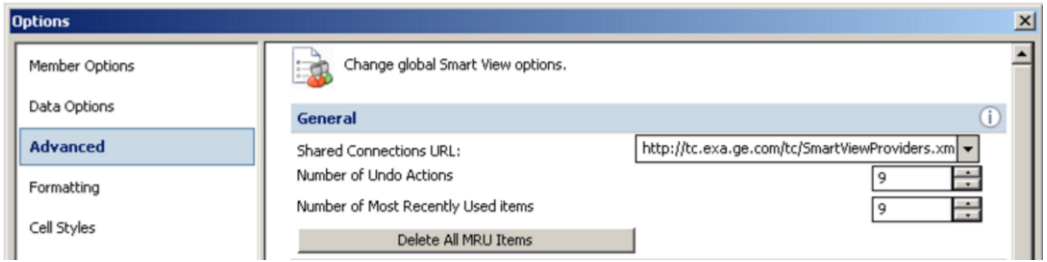
Smartview Shared Connections

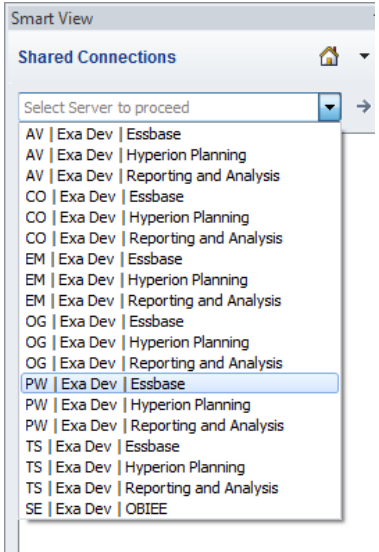
Oracle Hyperion Smartview is the MS Office client for interacting with Oracle Hyperion EPM applications. Smartview has many URLs for each product across all (Dev, Stage, and Prod) environments. Historically users would modify options to point to different environments or as an alternative many would set up Private Connections. This is a time consuming process and keeping track of all the URLs can be challenging.

As an alternative in the Exalytics shared service platform, we have created web based xml files with the appropriate connections for each BU.

By following a few simple steps you can point to one of the hosted xml files to simplify your management of host URLs.

This approach also has the benefit of being centrally managed so in the event a connection changes, the shared service team can update the file in a single location and all users will get the updated connection info the next time they connect.





Automic

Automic manages workflows across all of an organization's critical finance applications, ensuring a repeatable, fully auditable end-to-end process.

Automic's EPM Workload Automation solution integrates with

- HFM (GA)
- FDMEE and EPMA (Beta)
- Essbase and Planning (in development)

Cooperative partnership with GE to build EPM adapters.

What Automic offers

- Provide visibility, management and control over financial processing
  - Automation makes their current process more efficient, reducing latency, and giving IT transparency
  - Removes silo based in Finance ERP, FDMEE, HFM and manual instigation today
  - Provide dynamic “Point of View”

- Extends reach of workload automation to HFM processing needs
  - Business event detection, business outcome checking, IT success

- Integrates HFM processing into enterprise wide processes
  - Reduces manual effort
  - Removes human error
  - Provide an auditable solution for finance (what happened, where, when and why)
  - Enforces consistency of execution, every month and every entity

Automic Product Overview

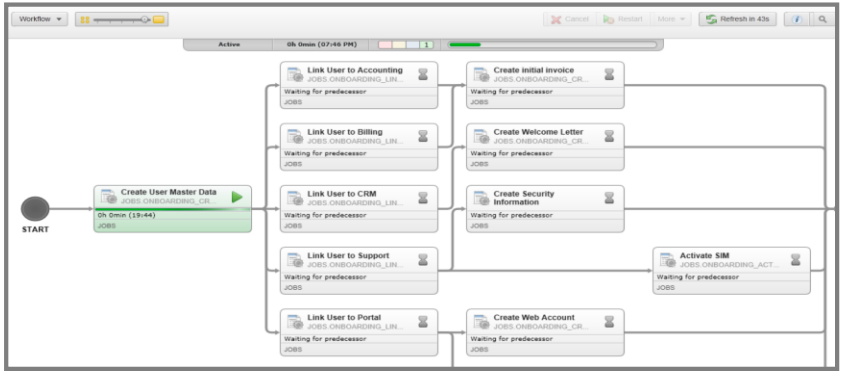
- New agent that enables our workload automation story to be extended to Hyperion Financial Management environments
- Covers processing of both HFM and FDMEE processing
- Combined with broad application coverage including SAP and Oracle enables and key business milestone detection within finance
- Script free – point and click interface enables workflow to be easily assembled and then managed.

Automic Built in facilities for FDMEE and HFM

- Allocate
- Calculate
- Calculate Contribution
- Clear Data Slice
- Close Period
- Consolidate
- Copy Data
- Extract Data to Database
- Extract Data to Flat file
- Extract Journals
- Extract Member Lists
- Extract Metadata
- Extract Rules
- Extract Security
- Load Data
- Load Journals
- Load Member Lists
- Load Metadata
- Load Rules
- Load Security
- Translate
- Load Data Rules
- Load Metadata Rules
- Run Batch Process
- Write Back

Automic Centralized Control

- Monitor entire financial processes from a single console, **gain a complete view of your operational processing**



- Built in Health, Usage, Business / IT SLA reporting and Root Cause Analysis allows **service levels to be managed for entire business processes**

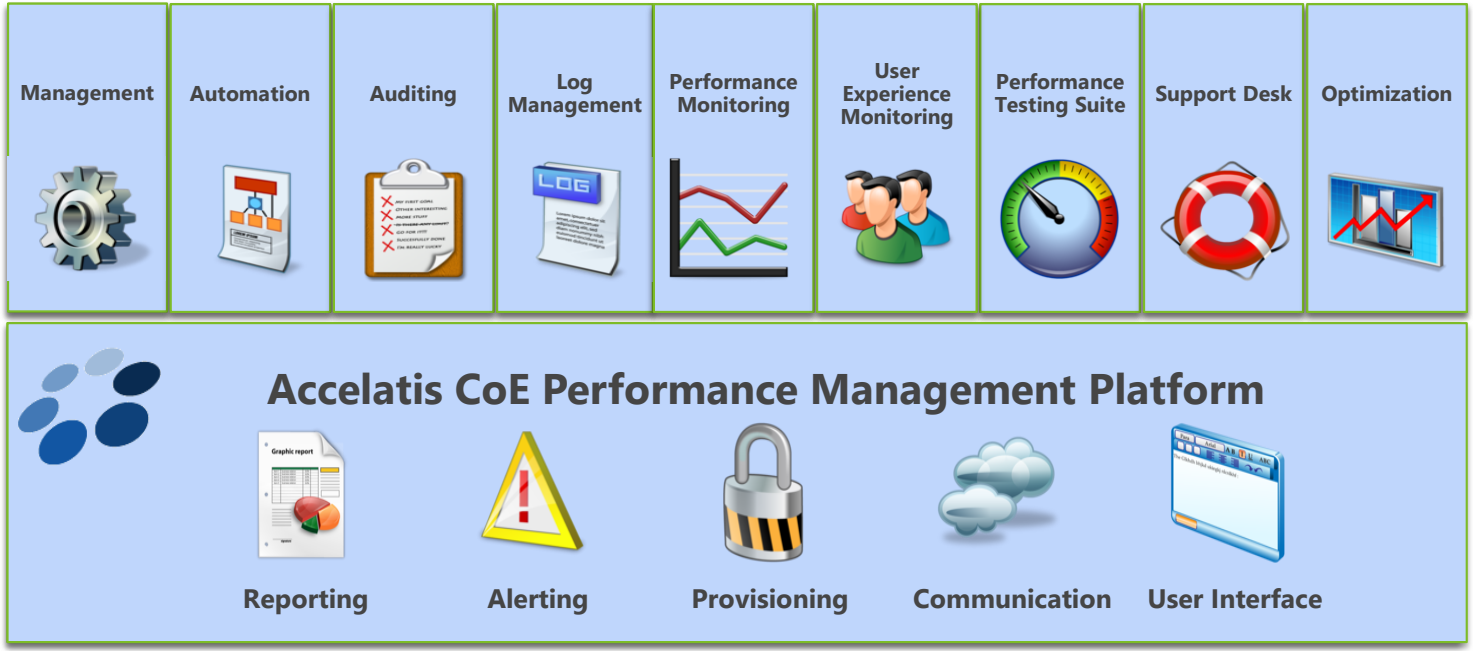
Accelatis

Accelatis is a cloud-enabled Application Performance Management Solutions company. They provide both IT and Business users insight and control they need to effectively manage their enterprise software systems

Differentiators

- Accelatis was built from the ground up for use by **both Finance and IT**.
- The Accelatis platform is based on the Center of Excellence methodology and the integration of **multiple APM disciplines** such as monitoring, automation, auditing, performance testing, and optimizing into a single holistic system.
- **Integrated at the Product API** layer for uniquely powerful insight and control unavailable in generic performance management software.

Accelatis Performance Management Platform



Accelatis use at GE

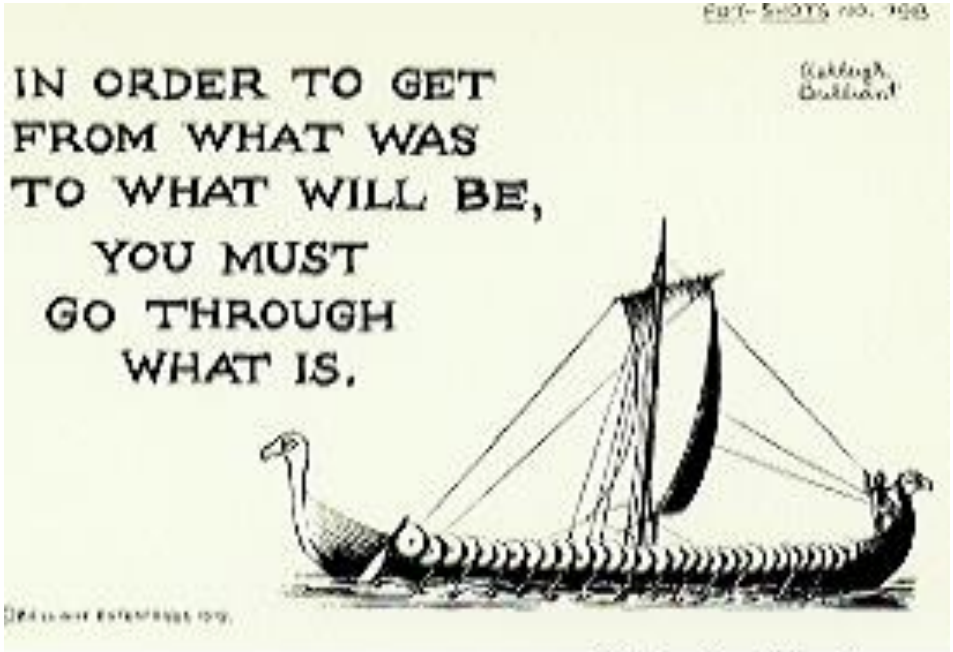
1. Monitoring at both Infrastructure and Application Level
2. Help Keep Servers and Environments Synchronized
3. Automated Environment Documentation and Change Tracking
4. Track Changes to Business Objects: Metadata, Rules, Reports, etc…
5. On-Demand Performance Testing by a Broad Audience

(Some) Lessons Learned

Lesson 1

- **Bite off more than you can chew, then chew it**
- **Plan more than you can do, then do it**

Lesson 2



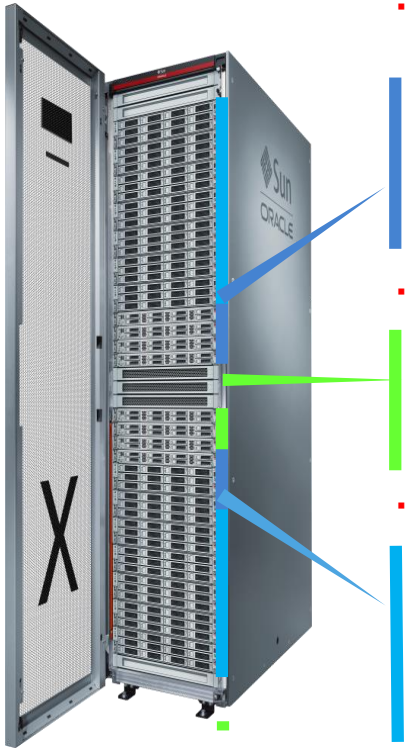
www.ashleighbrilliant.com

1. Each condition of your life *right now*, good or bad, is the end-product of the process that preceded it
2. The world is not a place of chaos; it's a logical collection of individual systems. Examined separately, each makes sense
3. *Seeing* and then separating these individual systems delivers enormous personal control
4. If a step is to be taken, take it NOW

What's Next?

Exadata Hardware Architecture

Complete | Optimized | Standardized | Hardened DB Platform



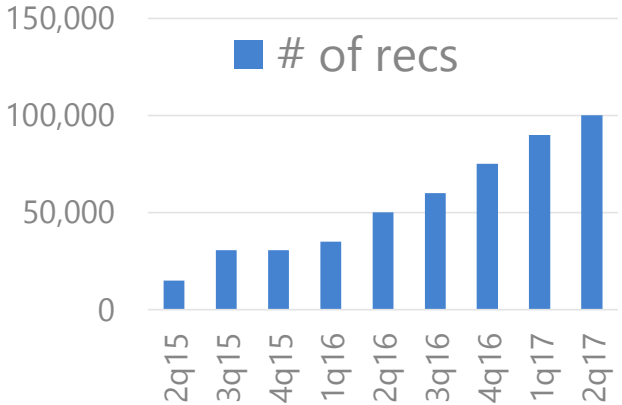
Fully Redundant

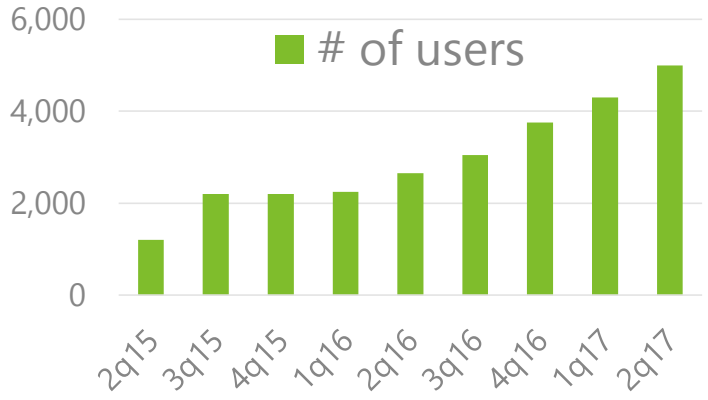
- **Standard Database Servers**
  - 2-socket server ➔ **36 cores**, up to **768GB DDR4 DRAM**
    Scalable to …
  - 8-socket server ➔ 120 cores, up to 12TB DRAM

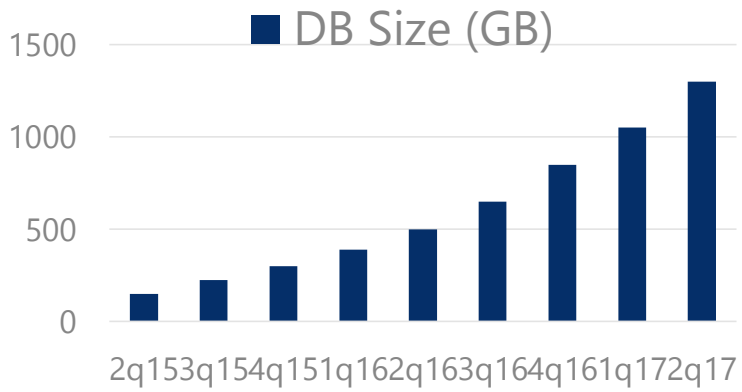
- **Unified Ultra-Fast Network**
  - 40 Gb InfiniBand internal connectivity
  - 10 Gb or 1 Gb Ethernet data center connectivity

- **Scale-out Intelligent Storage Servers**
  - **Extreme Flash Storage Server ➔ 12.8 TB NVMe Flash**
  - High Capacity Storage Server ➔ **6.4 TB NVMe Flash** + 48 TB SAS drives
  - 2-socket servers ➔ **16 cores per server**

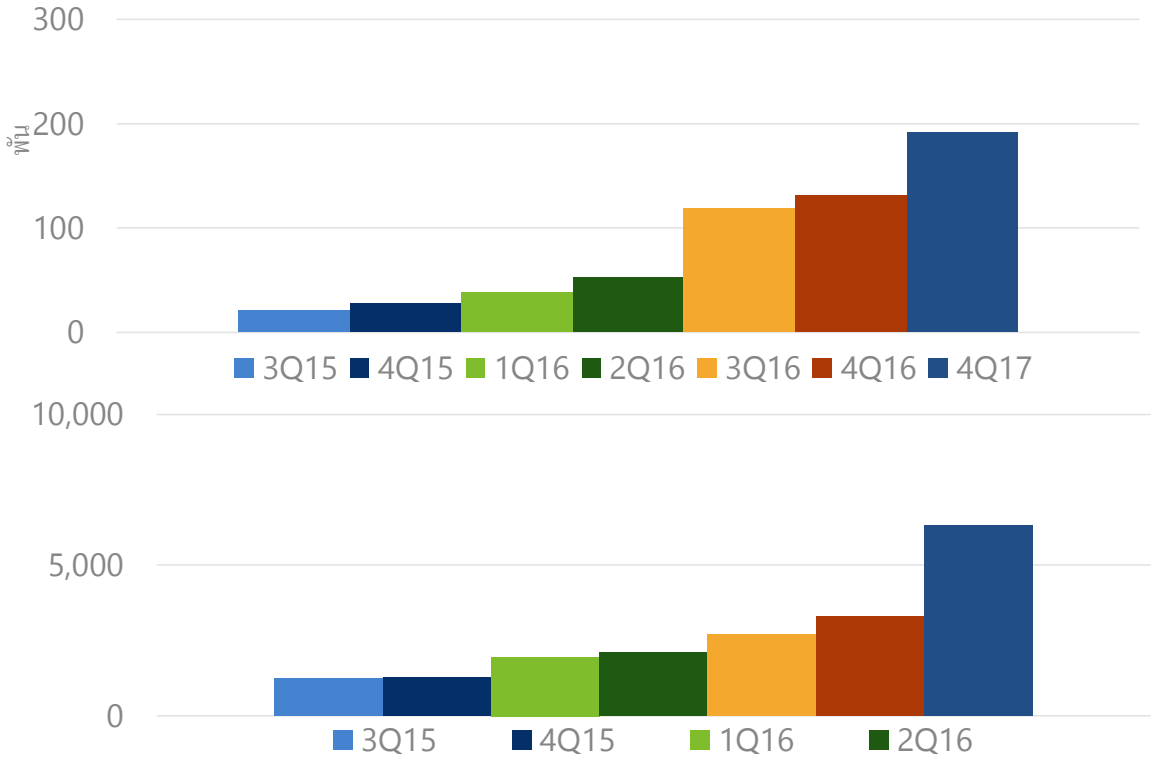
ARM Growth Plan







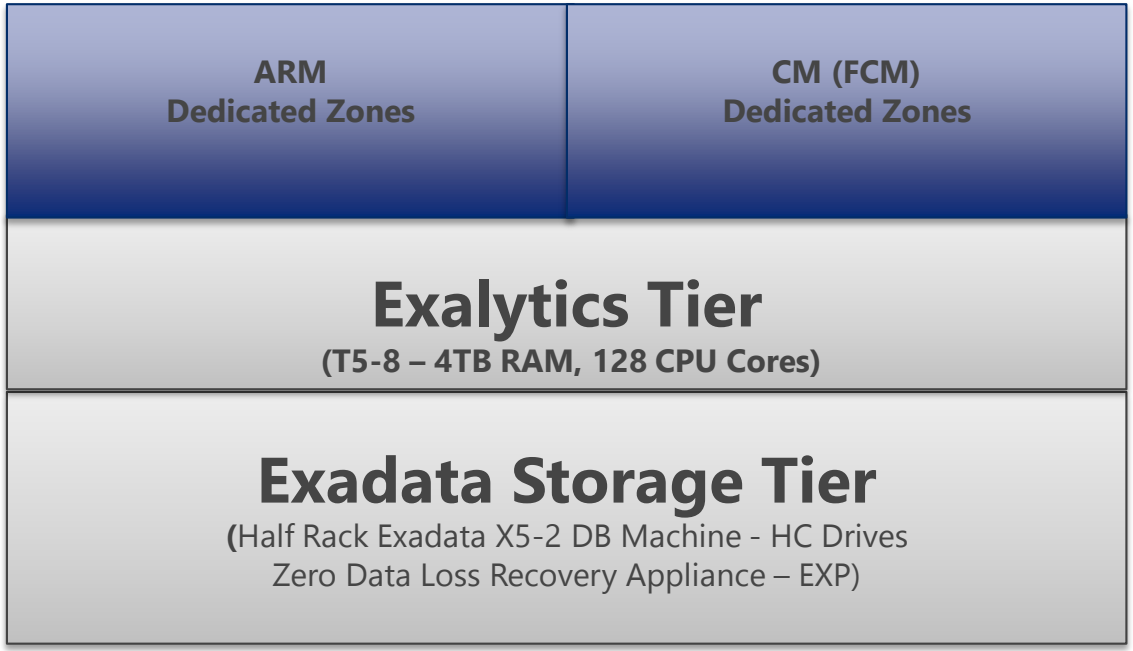
Projected FCM Task & User Totals



* 3Q16 includes expected addition of Alstom legacy activities (exact timing TBD)

** 4Q17 assumes approx. 50% growth in GOF, 400% growth business

FCM On-Premise Cloud



Comparisons – ARM/CM Combined

Metric	Current Commodity	Exalytics	Notes
Exalytic Servers	0	Three T5's	Dev/QA/Lab/Prod
Application Servers	13	0	
Total # of Servers	20	3 (16 zones)	
HW & EPM Install	$250K EPM $50K CoreTech	$250K EPM $15K CoreTech	
Annual Cost	$384	$305K	

imagination at work

Thank you.


BA
FRID
The
KING of
SWING
PATRICI
RUNCO