Virtual SAP HANA Disaster Recovery (DR) on VMware vSphere (session ID 4211)

- Cloud ServiceFabric (CSF) a private cloud solution accelerator
- Business Continuity for virtualized SAP HANA on VMware
Agenda

- HANA and Virtualization driving value of SAP solutions across industries
- Cloud ServiceFabric (CSF) a Private Cloud solution accelerator from Deloitte bringing ITaaS to SAP deployments
- Overview of Project RUBICON
  - Virtualized HANA – Benefits and Key Highlights
  - Cisco UCS and Nexus components – Key Benefits
  - RUBICON Architecture, Use cases and Demos
  - Key results of Project RUBICON
- Summary
- Evening Reception at ‘The Rocks at Hyatt Regency’
- Q&A
Combining speed and innovations of SAP HANA with flexibility and efficiency of virtualization for preconfigured SAP solutions enables clients a faster time to value at a lower cost while ensuring high quality. Here is a high level example of life sciences industry.

**Life sciences Industry Themes**
- Convergence and Expansion of the Ecosystem
- Real World Evidence & Data
- Health Outcomes & Value
- Global Governments as a Catalyst
- Embracing Strategic Risk
- Scale to Prosper

**Universal Business Themes**
- Innovation
- Performance
- Growth
- Business Analytics
- Putting Emerging Technology to Work
- Risk & Security
- Sustainability

**Life Sciences Trends**
- Restructuring operations to achieve cost efficiencies
- Need for enhanced risk management
- Growing role of consumer
- Increased regulatory scrutiny and enforcement
- Need for continued innovation
- Increased importance of liquidity and cash
- Increasing significance of global markets and competitors

**Life Sciences Issues**
- Growing Externally
- Engaging the Market
- Make & move safe product
- Technology Transformation
- Analytics to actionable insights
- Innovation & ROI
- Finance Transformation

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Accelerating virtualized HANA based SAP Industry solution deployments using Cloud ServiceFabric (CSF), a private cloud accelerator reduces complexity and time to value, improves quality and agility. The CSF also covers organization and process challenges in the journey to true ITaaS capability.
Business & IT drivers & challenges in Cloud adoption

Business and IT understand and seek cloud capabilities but adoption related challenges like time to implement, skills, know-how are stopping our clients in realizing full potential of true private cloud capabilities in their journey to ITaaS.

### Business and IT Issues

- **Business-IT Misalignment**
- **Manual Change Management**
- **Inconsistent Quality of Service**
- **YoY Cost Improvement**
- **Velocity & Unpredictability of Change**
- **Slow Time to Market**
- **High Touch Delivery Processes**
- **Overarching Security**

### Current IT Ecosystems

**Private Cloud is a logical solution**

### Barriers and challenges to adoption

- Improvements can be achieved with public Cloud solutions but security, control & integration is concern.
- Organizations want on premise cloud functionality for several workloads like mission critical apps hence private cloud is the way forward.
- Organizations lack skills and foundations to deploy capabilities like Software Defined Data Center & IT as a Service (ITaaS) and can leverage help from partners.
- Implementation of private cloud is time consuming, complex & costly therefore a comprehensive and flexible solution can jumpstart the adoption.
- Transformation to private Cloud impacts the organization’s people, processes & governance therefore needs to be part of any true cloud solution.
- Most cloud offering in the marketplace do not meet all the criteria of true cloud offerings like self-service, full automation, monitoring, pay as you go model while covering people and process aspects.

Deloitte’s Cloud ServiceFabric™ is a private cloud deployment accelerator that reduces adoption complexity and accelerates the journey to true ITaaS.
Deloitte Cloud ServiceFabric™ Differentiation
-a pre-configured comprehensive technology solution

Cloud ServiceFabric™ features are critical for jumpstarting clients on the journey to IT as a Service (ITaaS). It provides core Operating Model, Governance, and Organization playbook that can be rapidly deployed to achieve benefits in less time, with reduced risk, and lower cost.

1. **PRECONFIGURED PLATFORM**
   IT platform enabling the delivery of business-relevant capabilities (e.g., Big Data) and easily pluggable in the client’s environments – estimated deployment time: 6 to 10 weeks.

2. **MORE THAN TECHNOLOGY**
   IaaS and PaaS capabilities bundled with operating model, governance, and organization to drive change necessary for successful adoption.

3. **TRUE CLOUD**
   Architecture capabilities designed to adhere to all five NIST tenets for cloud definition (on-demand self-service, resource pooling, rapid elasticity, measured service, broad network access).

4. **ITIL-ALIGNED**
   IT service management capabilities including self-service portal, service catalog, and showback enabling cost transparency and predictability.

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Deloitte Cloud ServiceFabric™ (CSF) - a holistic private cloud solution

Deloitte Cloud ServiceFabric™ - A Private Cloud Solution

Technology
- Pre-configured technology stack
- 100% Cloud capabilities
- Software Defined Data Center foundations
- Hardware agnostic

Process & Operating Model
- Self-service and on-demand model driven through service portal
- Pre-integrated with 4 key IT Service Management processes

Organization
- Cloud organization playbook
- Cloud roles and responsibilities framework

Governance
- Cloud governance framework
- Cloud Operating Model

Fast Deployment
- Accelerated deployment cycle (6 to 10 weeks versus more than 6-8 months)

Cloud ServiceFabric™ facilitates ITaaS providing clients with the agility of a fully functional holistic cloud environment upon which future business functionality can grow
Project Economics using CSF & preconfigures solution

**Faster Blueprint**
- Instant SBX Deployment
- Team starts with pre-delivered business processes
- Project earned value, Learning, Enablement from day 1

**Accelerated Realization**
- Rapid Prototyping and Design Validation
- Rapid Configuration completion
- Rapid system deployments
- Capacity on demand
- Cost transparency

**Compressed Training**
- More value-added time spent on key processes by the resources

**Earlier Go-live**

**Post Go-live**
- Consistent Industry Best practices as per Deloitte’s LS preconfigured solution
- Avoid HANA migration project
- On demand Capacity Expansion leveraging Cloud
- Operational Efficiency and consistency due to Cloud
- ITaaS service enablement

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Cloud ServiceFabric based deployment of SAP Preconfigured Suite on HANA

50% - 70% Starting Point

Traditional Implementation

Time, Cost, Risk Reduction

In addition to accelerating the implementation, it dramatically reduces the level of resources required

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Overview of Project RUBICON

With the recent SAP-VMware announcement for virtualized SAP HANA running on production environments on VMware vSphere, there has been great excitement and strong interest on the benefits of running SAP on a virtual platform:

- **Increased flexibility and agility to quickly adjust to changing demands**
- **Embedded high availability**,
- **Simplified disaster recovery – DR**

As a validation for Virtual SAP HANA DR, Deloitte, EMC, Cisco, and VMware are engaged in a collaborative proof of concept (POC) with ‘real time’ client based use cases that include:

- **Addressing the challenges of the SAP HANA Disaster Recovery over long distance (>100km)**
- **Measure and test the long distance performance of Virtual SAP HANA DR on VMware and EMC RecoverPoint**
- **Showcase the benefits of disaster recovery for HANA via data replication using VMware and EMC RecoverPoint at a distance over 500km**
- **Demonstrate the benefits of VMware working with RecoverPoint and the dramatic reduction of TCO**
KEY BENEFITS OF VIRTUAL SAP HANA DR

- Addresses the current SAP HANA DR challenges such as network bandwidth, cost and time to implement, loss of data, longer RPO and RTO

- Sequential restart of virtualized SAP HANA landscape at the remote site after DR can be automated with VMware SRM integration with EMC RecoverPoint

- Costs effective WAN connection can be established due to EMC RecoverPoint’s data compression capabilities over long distance

- Simulation of DR for testing purposes can be performed at the remote site without affecting the actual Production system
The SAP HANA Platform – Runs On The VMware vCloud Suite

- Run any database on vCloud® Suite
  - Big, medium, small data; any use cases
  - Structured or unstructured data

- SAP HANA
  - Next-generation in-memory database

- SAP Replication Server
  - Database replication/migrations into HANA

- SAP ASE
  - Extreme transaction processing with low TCO

- SAP IQ
  - Petabyte scale analytics database with low TCO; analyze structured & unstructured data

- SAP SQL anywhere
  - Mobile and embedded databases
SAP HANA Production Support – General Availability

**SAP HANA on vSphere Prod Support**

**Began 2013 Q3 – Announcement 4/28/2014**

**SAP HANA Production Support**
- Scale up support (Up to 1TB)
- OSS Note 1995460 – SAP HANA on VMware in production
- SAP/VMware best practices - Optimizations and guidance
- Requires certified hardware (same as physical)

**Supported VMware Technologies**
- vMotion – migrate live HANA database across hosts; zero downtime
- Distributed Resource Scheduler (DRS)
  - Balances SAP HANA Workloads for Optimal Performance
- High Availability (HA) – restart HANA databases; no dedicated standby server required
- Multi-VM supported (Controlled Availability)
- Rapid Deployment Using VMware Clones and Templates

**SAP/VMware Joint Support**
- SAP will provide support for SAP HANA issues
- VMware takes ownership of performance issues

**On-Going Certification Project**

**2014 and Beyond**

**Current Certification**
- Production use case vSphere 5.5
  - SAP HANA SP07 or greater – up to 4 sockets
- Non-Production use case vSphere 5.1
  - SAP HANA SP05 or greater – up to 8 sockets

**After Initial Certification**
- No lag – same release cycle as hardware vendors
- Priority - Larger virtual machines - Memory/vCPUs
- Multi-VM support for production scenarios
- Joint SAP HANA Scale Out testing underway
- Deeper testing and integration of VMware vCloud Suite
  - VMware vCenter Site Recovery Manager
  - VMware vCloud Automation Center
  - VMware vCenter Operations Management Suite
  - VMware vCloud Director

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Key Components Of DR Solution with VMware SRM

Disaster Recovery: Ensuring recovery or continuation of operations at an alternate site in the case of an outage at the primary site

Protected Site
- vCenter Server
- Site Recovery Manager

vSphere Replication Options
- vSphere Replication
- Array-Based Replication
SRM Supports Several DR Topologies

- **Active-Passive Failover**
  - Dedicated resources for recovery
  - Leverage recovery infrastructure for test/dev

- **Active-Active Failover**
  - Production applications at both sites
  - Each site acts as the recovery site for the other

- **Bi-directional Failover**
  - Many-to-one failover
  - Useful for Remote Office / Branch Office

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SRM Transforms Management of Recovery and Migration Plans

From Complex Runbooks…

- Weeks or months to set up recovery plans
- Unstructured and error-prone
- Quickly falls out of sync with apps and infrastructure changes

...to Simple Recovery Plans

- Simple set up in minutes
- Defined workflows eliminate errors
- Simple to keep in sync with changes
ARCHITECTURE – HIGH LEVEL

Deloitte DC in Suwanee, GA

SAP HANA on Vblock

EMC DC in Durham, NC

SAP HANA TDI

Data Replication
distance of 341 miles (550km)

Deloitte / EMC VPN Tunnel

Architecture Components
- Cisco Nexus
- EMC VMAX Storage
- VMware ESX, VMware SRM
- Cisco MDS SAN
- Cisco UCS Compute
- EMC RecoverPoint

This approach lowers bandwidth utilization and enables a fully automated & more aggressive recovery strategy by leveraging VMware SRM integration with EMC RecoverPoint
Cisco UCS and Nexus Benefits

Project RUBICON leverages critical Cisco Components

Cisco UCS and Cisco Nexus are key to Vblock and TDI set up

Here are some of their benefits:-

- **Fast and Consistent ESX Deployment with UCS Service Profiles**
- **Radical Simplification of Infrastructure** - fewer components and cables
- **Lower Management Cost** – fewer devices to manage, policy based management
- **High Speed, Low Latency Network** – superior App to App communication
- **Policy Based** – Changes are fast and easy to make
Cisco UCS and Nexus Benefits

Cisco UCS and Nexus – Continues benefits for SAP and vHANA

- Extend Network Policy down to VM
- Simplified Scalability – scale for bandwidth not connectivity
- Record Setting Performance – Cisco holds 4 records for SAP Sales and Distribution benchmarks
- IT Process Automation – automate SAP best practices
- Virtualized Interface Card (VIC)
  - Create dedicated any number of interfaces to support application needs
- All Products Generally Available Today
ARCHITECTURE – HANA AS DATAMART

HANA Developer Data Loading
HANA VM
10 vCPU x 512GB
SAP BOBJ Platform
Business Executive Report
Disaster declared initiating SRM Failover
VMware Site Recovery Manager 5.x
~ 550km (341 mi)
Site-to-Site VPN
EMC² RecoverPoint Storage Replication
EMC² VNX5300
SAN Storage Array
VCE vBlock System 300
Primary Site – Suwanee, GA
Deloitte Datacenter
Cisco UCS B440M2
4x Intel Xeon E7-4870
1024GB RAM (32x32GB)
Cisco UCS 5108 Chassis
Cisco UCS 6248UP Fabric Interconnects
EMC² VMAX 20K
SAN Storage Array
V+C+E TDI Infrastructure
Secondary Site (DR) – Durham, NC
EMC² Datacenter
Cisco UCS B440M2
4x Intel Xeon E7-4870
1024GB RAM (32x32GB)
Cisco UCS 5108 Chassis
Cisco UCS 6248UP Fabric Interconnects
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ARCHITECTURE – SAP SUITE on HANA

MRP Run → After DR Failover

SAP Suite HANA VM
10 vCPU x 512GB

Deloitte Cloud ServiceFabric™
Self-Service Portal

Disaster declared initiating SRM Failover

VMware vCenter Server 5.5

VCE vBlock System 300
Primary Site – Suwanee, GA
Deloitte Datacenter

Cisco UCS B440M2
4x Intel Xeon E7-4870
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Cisco UCS S108 Chassis

Cisco UCS 6248UP
Fabric Interconnects

EMC² VNX5300
SAN Storage Array

EMC² RecoverPoint Storage Replication

~ 550km (341 mi)
Site-to-Site VPN

SAP Suite HANA VM
10 vCPU x 512GB

Deloitte CSF™ End-Point

VMware vCenter Server 5.5

V+C+E
TDI Infrastructure
Secondary Site (DR) – Durham, NC
EMC² Datacenter

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TEST SCENARIO

- Virtual HANA, ramping up memory on the fly
  - Increase the memory of virtual HANA during memory contention, without any downtime

- Automated recovery of virtualized SAP HANA data mart & Suite on HANA
  - Perspective of Business Executive
    - RTO: how fast can login be performed into HANA at DR site to restart report?
    - RTO: how fast or slow is report running at DR site as compared to baseline?
    - RPO: how recent is the loaded data viewed in the report?
  - Perspective of SAP HANA developer
    - RTO: how fast can login be performed into HANA to resume data load
  - Perspective of IT/Basis team: validate that all systems are stable at DR site
### Results of Project RUBICON Tests

<table>
<thead>
<tr>
<th>From Whose Perspective</th>
<th>What We Looked At:</th>
<th>Results or Outcomes Achieved from Data Mart Use Case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CEO</strong></td>
<td>How long did it take to log into HANA at the DR site and to Restart a report? <em>(RTO)</em></td>
<td><strong>Under 15 minutes</strong></td>
</tr>
<tr>
<td><strong>CEO</strong></td>
<td>How fast was a report running at the DR site as compared to the baseline?</td>
<td>Initially <strong>29 secs</strong> and after load into memory <strong>18 secs</strong> compared to <strong>10 secs</strong> in primary site</td>
</tr>
<tr>
<td><strong>CEO</strong></td>
<td>How recent was the loaded data that can be used in the report <em>(RPO)</em>?</td>
<td>Disaster caused less than 5% of in-flight data loss</td>
</tr>
<tr>
<td><strong>HANA Developer</strong></td>
<td>How fast was login performed into HANA to resume data load?</td>
<td><strong>Under 15 minutes</strong></td>
</tr>
<tr>
<td><strong>IT/Basis Team</strong></td>
<td>Could we validate that all systems were stable at DR site?</td>
<td>Yes, environment is very stable and all validation tests passed</td>
</tr>
</tbody>
</table>

*See White Paper for clarifying context to these results*
Technical Lessons Learned

• VMware SRM fail over should be manually initiated after business declares a disaster
• Using a 3\textsuperscript{rd} party site for DR is possible over a VPN but requires careful consideration of security policies to protect each site
• Using a VPN over an existing Internet connection is viable and proved to be a cost-effective solution
• Care must be given to ensure adequate bandwidth of link as well as supporting devices such as firewalls
Business Lessons Learned

• Frequent HANA data commits ensures optimal RPO
• DR for business critical applications requires considerable planning to ensure consistent results
• Proper planning of snapshot intervals of the HANA database helps ensure optimal RTO
• Ensure that any unwanted data is not saved on the HANA Linux virtual machine
You are invited for an evening Reception
The Rocks at Hyatt Regency' at 5:30 PM

Join SAP customers, Deloitte and EMC for an invitation only reception at The Rocks in the Hyatt Regency Orlando to enjoy cocktails and conversation.

Against the backdrop of dramatic settings and live musical entertainment, this energetic local hotspot offers beers from around the world, inventive cocktails, and decadent appetizers.

Please RSVP to this event no later than May 31 by emailing Meghan.mcgowan@emc.com with your confirmation.

We look forward to enjoying your company.

VENUE: The Rocks at the Hyatt Regency
9801 International Drive, Orlando, FL
DATE: Wednesday, June 4, 2014
TIME: 5:30pm – 7:30pm
RSVP: Please RSVP to Meghan McGowan no later than May 31 with your confirmation.

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Q & A

Thank you!
THANK YOU FOR PARTICIPATING

Please provide feedback on this session by completing a short survey via the event mobile application.

SESSION CODE: 4211

For ongoing education on this area of focus, visit www.ASUG.com
Deloitte Cloud ServiceFabric™ is a holistic solution covering technology, process, operations, organization and governance aspects.

Comprehensive effect of HANA platform and Cloud Service Fabric based deployment on the Project economics.

Benefits of SAP HANA Virtualization.

Benefits of Cisco UCS, Nexus components.

Business Continuity Implementation for Suite on HANA using EMC Recoverpoint and VMware SRM tools.

HANA deployments leveraging Vblock & TDI infrastructure use cases.

Stay tuned for more Cloud ServiceFabric use cases in near future.
Deloitte Cloud ServiceFabric™ Use Case – Rapid Infrastructure and Application Provision

Infrastructure and application environment set-up goes from weeks to minutes

Pre-Deloitte Cloud ServiceFabric™

1. Business Wants a New Change
2. Business Request Sent to IT
3. IT Decides a New Server Is Needed
4. Request for New Server
5. Request Acknowledged
6. Wait for Approval
7. Approval
8. Server Ordered
9. Allocation of Space and Power
10. Server Arrives
11. Server Configuration
12. Server Ready
13. 2 weeks
14. 10 weeks
15. 3 weeks

Post-Deloitte Cloud ServiceFabric™

1. Business Wants a New Change
2. Request for New Server
3. Select Environment and Submit
4. Available Host Located
5. Pre-acquired and Configured
6. Server Configuration
7. Server Ready
8. 10 min
9. 0 min
10. 5 min

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Deloitte’s Preconfigured Solution (e.g. SAP Certified Life Sciences)

- Level 1 and Level 2 process decomposition
- Source of business requirements
- Many sample user requirements

- ASAP or Enterprise Value Delivery

- Existing role-based process courses coupled with transaction-based exercises

- Reference communication strategies
- Template timelines and deliverable structure

- ASAP or Enterprise Value Delivery

- Use as reference to look at how SAP automates the business process to resolve variances
- SAP best practice building blocks
- SAP configuration objects & Ready-to-run scenarios

- IndustryPrint™ embedded
- Deliverables and Enablers
- SAP transaction assignments

- Business roles with segregation of duty considerations
- Predefined process and IT controls

- Useful for validation and regulatory practices that must be part of a process
- Key prepopulated deliverables

SAP platform Simplification – Reduced DB size, Reduced data footprint
Leverages hardware Tech innovations
Real time reporting and analytics of live data in the OLTP system
Open platform for new applications
Real time end to end processes- Planning, Execution, Reporting, Analysis, Simulation

Powered by HANA
Deloitte Cloud ServiceFabric™ empowers enterprises to attain IT as a Service capabilities

Cloud ServiceFabric™ Benefits for Clients

**Efficiency**
- Reduce IT CapEx by 75% and OpEx by 56%*

**Control**
- Reduce downtime for tier 1 applications by 36%*

**Agility**
- Increase IT productivity by 67%*

**Choice**
- Support for pre-built and configured industrialized SaaS, PaaS and IaaS solutions

* Taenja Group Research 2014
** Future CSF Releases

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