Journey to SAP Intelligent Enterprise

Powered by Dell EMC and SUSE
Journey to SAP Intelligent Enterprise

Preparing IT for S/4HANA and SAP Leonardo

- Simplify: SAP Landscapes
- Migrate: To SAP HANA and S/4 HANA
- Run: SAP in a Cloud Operating Model
- Enable: Edge to Core Data
- Summary
SAP Framework for the Intelligent Enterprise
Preparing IT for SAP’s Next Act

1. Intelligent Suite of Application
2. Intelligent Technologies
3. Digital Platform

Intelligent ERP
Building Edge-to-Core data driven use cases
SAP Data Management Suite
Managing distributed structured and unstructured data

Source: SAP Journey to the Intelligent Enterprise
Modernize IT to Run SAP Intelligent Applications

The journey varies by business: paths - priorities - timing

@ the Core

- Applications on classic databases
  - Oracle Database
  - Microsoft SQL Server
  - IBM DB2

- Applications on SAP HANA databases
  - SAP HANA In-Memory Database

- Full Adoption of SAP S/4HANA
  - SAP HANA Platform "SAP Digital Core"

Common IT Objectives

1. Simplify
2. Migrate
3. Run
4. Enable Edge Data

SAP Leonardo

Intelligent Technologies

IoT, ML/AI & Block Chain

SAP Data Management Suite

Distributed Structured | Unstructured Data

Edge-to-Core Use Cases
Why Dell EMC

Trusted Partner – Experienced in Delivering Business and IT Outcomes for SAP

• 20-year+ history partnering with SAP
• Global SAP Center of Excellence near SAP in Waldorf, Germany
• Strategic partnerships with SAP SI’s and Service Providers
• Joint engineering and validation projects

Strategic Relationship

Dell EMC:
• #1 hyper-converged infrastructure ¹
• #1 converged infrastructure ²
• #1 in traditional and all-flash storage ³
• #1 virtualized data center infrastructure ⁴
• #1 performance benchmarks in SAP HANA

VMware: Leader for virtualizing SAP on x86
Virtustream: Premier HANA Enterprise Cloud partners

Market Leader

SAP Appliances: Scale-Up and Scale-out
SAP HANA TDI: Dell EMC Servers and Storage
• Dell EMC Converge Infrastructure
• Dell EMC Hyper-converged Infrastructure

Broad Portfolio

SAP Edge Gateway Devices
Solutions: Engineered solutions for SAP use cases

¹ DellEMC.com
² IDC WW Quartery Converged Systems Tracker, Q1 2017, June 2017, Vendor Revenue
³ IDC WW Quarterly Enterprise Storage Systems Tracker, September 2017, Vendor Revenue — EMC Q2 2017
⁴ Dell EMC Annual Report, 2015
Modern | Dynamic Infrastructure

Consolidate & Simplify IT for SAP Landscapes
Dell EMC Solution for SAP

Designed for SAP Landscape Consolidation

Challenge
- 80% of IT Budget Trapped in Operations | Maintenance
- Cost | Complexity Running SAP on *siloed* IT
- Long Maintenance | Upgrade Cycles for SAP
- Cost of Protecting *Large* SAP Footprints
- Long Running Batch Reports | ETL | Month Processing

Dell EMC Benefits
- Predictable Performance at Scale for Mixed Workloads
- Simplify SAP Maintenance & Upgrades
- Strive for *Always On* SAP in the Digital Era
- Application-driven Data Protection and Long Retention
- Enabling SAP in a Cloud Operating Model begins with Cloud-enabled Virtual Infrastructure

Invest in a modern infrastructure foundation invigorating legacy SAP ERP with reduced cost and ready to power the Intelligent Enterprise with S/4HANA.
Dell EMC Solution for SAP

Power SAP Landscape Management (LaMa) Software with Dell EMC Enterprise Storage

Challenge
SAP system clone, copy and refresh operation is ripe for simplification
The process can be time consuming with the average time to copy/refresh a system taking up to 10 business days
- Coordination among storage, server and virtualization teams
- Manual time-consuming complex post-processing steps
- Risk of manual errors and quality of copy/refresh
- Large data footprints leading to increased storage costs

Dell EMC Benefits
- Increased productivity by enabling SAP BASIS Administrators to focus on higher value work versus time consuming, error prone manual tasks
- Fast delivery of high-performance copies with minimal-to-no impact on production
- Lower costs by reducing the size of storage footprints for SAP copies via highly efficient data-reduction intelligence
Dell EMC’s Integration with SAP LaMa

Sample Use Cases

Automation and Orchestration

SAP Landscape Management (SAP LaMa)

- **Dashboards and pods**: To get a quick high-level overview of your current landscape state.
- **Single/mass operations**: To centralize operations for your entire landscape using a single console.
- **Landscape visualization**: To visualize systems and underlying infrastructure and identify relationships.
- **Provisioning systems**: To automate complex provisioning activities such as system copy, refresh.
- **Post-copy automation**: To automate post copy and refresh processing tasks and customize the task lists.
- **Managing SAP HANA**: To automate management and provisioning of your SAP HANA systems.
- **Custom provisioning**: To integrate and use your own replication technology for system provisioning.
- **Custom operations/hooks**: To integrate your own procedures and tailor it to your specific needs.
- **Task scheduling**: To schedule and execute mass or sequential tasks during planned maintenance.
- **Housekeeping**: To automate housekeeping tasks such as apply kernel patches, security patches.
DELL EMC integration with SAP LaMa

DELL EMC validated use cases

- System cloning
- System copy/refresh
- Start, stop, relocate systems
- Landscape visualization
- End-to-end visibility and monitoring

Benefits with Dell EMC Storage Platforms

- Reduces TCO
- Automates and simplifies operations
- Simplifies management with infrastructure integration

DELL Technologies

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1 Planned Q1-Q2 FY20
Dell EMC Solution for SAP

Designed for SAP HANA Certified Infrastructure

IT Dilemma
Adopt a modern infrastructure foundation designed to;
• deliver the performance at scale for mixed SAP workloads
• run SAP as part of a shared IT model
• leverage existing skills of IT operations personnel

Dell EMC Benefits
• Choice of certified infrastructure options for SAP HANA
• One shop for infrastructure to run SAP from Edge-to-Core
• Market leader in data protection and availability for mission critical SAP
• Professional Services for SAP HANA deployment, migration, and re-platforming projects

Running SAP HANA on shared infrastructure provides more flexibility with lower TCO as you scale deployments.

SAP HANA Tailored Datacenter Integration (TDI)

Run Mixed SAP HANA and Non-HANA Workloads
SAP HANA Certified Hardware

SAP HANA Deployment Models

SAP HANA Appliance Model

- Application
- Database
- O/S
- Virtualization
- Server
- Storage

Scale-Up

PowerEdge Servers

Dedicated IT

SAP HANA Tailored Datacenter Integration (TDI) Model

- Servers†
  - PowerEdge
  - PowerEdge MX
- Storage Systems
  - PowerMax
  - SC Series
  - Isilon
  - XtremIO X2
  - VPLEX

Enterprise Storage

SAP HANA Server

Virtualization

Server

Network

Storage

Shared IT

Converged Systems

- VxBlock 1000

Hyper-Converged Infrastructure

- VxRail

XC

Run Mixed SAP HANA | non-HANA Workloads

Targeted HANA Workload

† Dell EMC PowerEdge MX certified for SAP HANA TDI use only // ‡ Dell EMC VxRack FLEX for SAP HANA HCI is Roadmap Q1 FY20

Hardware Certification Details: SAP HANA Hardware Directory

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SAP HANA Appliance Model

Scale-Up Appliance Solutions

Solution benefits

• Multiple configurations tuned to use case / need
• Get performance for SAP workloads
• Support future growth
• Easy analytics and applications upgrades
• Optional virtualized environment
• End-to-end appliance for fast, reliable implementation and support

Performance Benchmarked and Certified by SAP for predictable results

Scales up to 3TB for Analytical Workloads and 6TB for Transactional Workloads

SAP HANA, Enterprise Edition

VMware vSphere (optional)

Dell EMC PowerEdge R940 Server

Dell OpenManage / iDRAC / Lifecycle Controller
SAP HANA TDI Model

Servers | Storage

Choose your preferred:
- Dell EMC PowerEdge Servers
- Dell EMC Storage System

Leverage Array for:
- High Availability
- Disaster Recovery
- Data Protection
- Lifecycle Management Tasks

Installation of OS and SAP HANA
- Leverage E_HANAINCXXX certified personnel

Certified Servers

PowerEdge Rack Servers
- PE R740
- PE R840
- PE R940

Certified Storage Systems
- PowerMax
- Unity
- VPLEX
- XtremIO X2
- SC
SAP HANA TDI Model
Converged System w/ Dell EMC VxBlock System

Business Ability
- Chose the right mix of resources and data services for SAP HANA and non-HANA applications when needed

Lifecycle Assurance | Simplified Operations
- Regularly stabilized and optimized infrastructure with firmware/software upgrades

Integrated Data Protection
- Choose precise level of protection you need per workload and business requirements
SAP HANA Appliance Model

Hyper-Converged Infrastructure w/ Dell EMC VxRail

Extend and simplify VMware environments
- Managed through VMware vCenter with tight integration and lifecycle management functionality

Lifecycle assurance and simplified operations
- Regularly stabilized and optimized infrastructure with firmware/software upgrades

Start small and grow
- Start small – with as few as three nodes – and grow incrementally, scaling capacity and performance easily and non-disruptively

Scales up to 1.5TB for Analytical Workloads and 3TB for Transactional Workloads

SAP HANA, Enterprise Edition
- VMware vSphere v6.5/6.7 and VSAN v6.6

Dell EMC VxRail P570F
- Form Factor: 2U Single Node or 1 Node 2U
- Processors: Dual Socket, minimum 8 cores per CPU
- Memory: 2U, Dual Socket Up to 3TB RAM
- Capacity: 76.8TB SSD

Architected to support SAP HANA with features such as Intel Xeon Scalable Processors

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SAP HANA Appliance Model

Hyper-Converged Infrastructure w/ Dell EMC XC

Ultimate Platform for Nutanix AHV

- Based on the Dell EMC PowerEdge Rack Server, the industry’s best selling server brand
- +27,000-nodes shipped
- +2,000-customers
- Broad ecosystem for Nutanix including reference architectures, deployment automation, network validation and HW/SW lifecycle management from Prism

Scales up to 3TB for Analytical Workloads and 6TB for Transactional Workloads

SAP HANA, Enterprise Edition

Dell EMC XC740xd-24

Dell EMC XC940-24

- Form Factor: Single-System 2U and 3U
- Processors: 2x and 4x Intel Xeon SP G6126+
- Memory: Up to 6TB RAM
- Connectivity: 10GbE and 25GbE available

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Data Protection and Availability

Application Driven Data Protection Continuum

Managing SAP event driven SLAs

12AM 6AM 8AM 12PM 6PM 8PM 12AM

ALWAYS AVAILABLITY

3:27PM

8AM 10AM 12PM 2PM 4PM 6PM 8PM 10PM 12AM

CONTINUOUS

1 Min

8AM 1PM 6PM 11PM

SNAPSHOTS

2+ Hrs

12AM 12AM 12AM

BACKUP

12+ Hrs

Disruption Occurs 3:28pm

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Continuous Availability and Data Protection

SAP HANA Protection Options by Time and Distance

Persistence
- Instance booting and fallback in case of in-memory data failure

High-Availability (HA)
- Integrated N+m host fault recovery

Disaster Tolerance (DT)
- Protecting the SAP HANA environment from complete cluster failure

Backup and Disaster Recovery (DR)
- Protecting SAP HANA data from complete disaster with orchestrated data backups
- DD Boost & Networker certified with SAP HANA

**Backup and Disaster Recovery (DR)**
- Dell EMC Data Domain with Data Domain Boost
- Dell EMC Networker

**Disaster Tolerance (DT)**
- SAP HANA System Replication
- Dell EMC PowerMax with Dell EMC SRDF
- Dell EMC VPLEX Local/Metro

**High-Availability (HA)**
- SAP HANA Host Auto-Failover
- Operating System Clustering

**Persistence**
- Dell EMC PowerMax
- Dell EMC XtremIO X2
- Dell EMC Unity
- Dell EMC SC
- Dell EMC FlexOS†/ VMware vSAN

† Planned 2019
Backup and Restore

Integrated Support

Data-owner Visibility and Control with SAP

Fully featured recovery - CLI or Native Tools
• Full granular and logs
• Relocated restore
• Point-in-time restore

Backups with SAP HANA
• Full, Online, Log
• Multi-node backup scalability
• Original, Directed Recovery, DR, P.I.T
• Backups over IP or FC

DBA Native Tools
• SAP HANA studio
• SAP HANA hdbsql CLI
• SAP DBA cockpit
• BR*Tools
SAP HANA Data Temperatures

Data Tiering

**Situation**
- Memory still relatively expensive
- Not all data has same value
- Need to tier data appropriately

Managing SAP HANA Data Temperatures

**SAP’s Solution for Data Temperatures**

- **SAP HANA Dynamic Tiering**
- **Near-Line Storage**

**PowerEdge Servers**

- **Hot Data** + **Warm**
  - PowerMax
  - Unity
  - XtremIO X2
  - SC

- **Cold | Frozen | Raw Data**
  - Isilon
  - Scale-Out NAS
On-Premises Cloud

Running SAP in a Cloud Operating Model

• Converged / Hyper-converged Infrastructure Foundation
• “Out of the Box” integration with VMware Software
• Unified Applications / Infrastructure Operations
• Business Continuity
• Security
Running SAP in Cloud Operating Model

On-Premises Solutions from Dell Technologies

Today’s Situation
• Increasing customers looking at cloud first strategy for SAP
• Consolidate, optimize & protect high value workloads
• Simplify lifecycle management across the entire IT stack

Dell EMC with VMware Benefits
Cloud Infrastructure Foundation
• Lifecycle assurance | simplified operations
• Unified SAP applications and Infrastructure Operations
• Automating SAP landscape management
• Security and mobility for SAP applications

† Organization for the Advancement of Structured Information Standards (OASIS)

Deploying a cloud operating model begins with a Cloud-enabled Infrastructure Foundation ready to run mixed workloads including SAP HANA.

Dell EMC + VMware in leadership position to Support On-Premise Cloud Aspirations for SAP
Running SAP in Cloud Operating Model

Off-Premises Solutions from Dell Technologies

Requirements

Mission-critical applications have specific business needs:

- Consistent high performance
- Very high-availability with guaranteed service levels
- Secure customer data
- Regulatory compliance certifications
- Geographic scalability
- Affordable economics

Why Virtustream

1st production SAP customer in a multi-tenant cloud

1st to run production SAP ECC on HANA in the cloud

1st to run production SAP S/4HANA in the cloud

According to the Forrester, enterprises looking to host their most challenging mission-critical packaged applications – especially SAP – should consider Virtustream.

1 of 5 global premium suppliers of SAP HANA Enterprise Cloud

250+ SAP customers running production SAP in the cloud

1000+ SAP migrations to date
Running SAP in Cloud Operating Model

Simplifying the SAP Cloud Journey

End-to-End Solution

Virtustream Enterprise Cloud for SAP
Built to Meet Mission Critical SLA’s

Virtustream
Application Managed Services (Database & BASIS Services)

Virtustream
Application Orchestration and Automation

Virtustream
Cloud Infrastructure Powered by Dell EMC

Planning  Migration  Integration  Optimization

Performance  Availability  Security/Compliance

Managed Services  Cost Efficiency  Scalability

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Edge-to-Core

Innovating with SAP Leonardo

• Setting up Foundation Infrastructure to manage data
• SAP HANA on Certified Infrastructure
• Managing consolidated data in the Core
• Accelerate decision making at the Edge
• Day 2 Operations
Dell EMC’s Mission

Unlock the potential of the unconnected by bridging IT and OT

Dell EMC brings 30+ years of IT heritage, 15 years of customizing Dell technology for OT environments through OEM, and 50+ partners offering OT expertise

Information Technology
- Infrastructure
- Security
- Governance

Operational Technology
- Yield
- Quality
- Efficiency

Dell EMC OEM division
- 15+ years
- 4,000+ OT customers
- 40+ industries
Edge-to-Core

Setting IT Framework to Orchestrate Data Management

Situation
SAP Intelligent Applications | Business Process
- Data-driven from *Edge-to-Core*
- Leverage AI / ML / blockchain
- Work with varying data types from different sources

Dell EMC Benefits
- Data in SAP S/4HANA Platform
  - SAP-certified Infrastructure from Dell EMC
- Non-HANA Data Sources @ Core
  - Dell EMC Isilon Scale-Out NAS Storage
- Accelerate Decision Making @ Edge
  - SAP-certified Dell Edge Gateways for IoT

Orchestrate | Store | Protect Data
Across distributed complex IT landscapes

SAP Leonardo Framework

SAP S/4HANA Digital Core

SAP Data Hub

Dell EMC Core Infrastructure

Dell
Edge Gateways For IoT
**Connected: Everything from Dell Technologies**

**Repeatable Edge-to-Core IoT Framework**

### Sensors and Communication
- **1 Operational Environments**
  - Smart Systems
  - Smart Devices
  - Wearables
  - Sensors
- **Dell Edge Gateways for IoT**
  - Dynamic Edge Processing
  - Wired/Wireless Connectivity
  - Edge Analytics
  - CEP Engine
  - Edge Integration
  - VMware Pulse

### IoT and Cloud Integration
- **2 Data Center / Digital Core**
  - SAP Cloud Platform
  - SAP Data Hub
  - SAP HANA Data Lake
  - Dell EMC VxRail with VMware for SAP HANA TDI

### Data Consumer and End Users
- **3 End User Engagement and Security**
  - Web / Mobility / Wearable Apps
  - Digital Messaging & Collaboration
  - IoT Analytics
  - Service Management
  - Connected Components

**Color Key: Dell Technologies, Dell / Dell EMC, Boomi, Pivotal, Virtustream, VMware, SAP, Partners**

- **Connected Buildings**
- **Connected Healthcare**
- **Connected Manufacturing**
- **Connected Oil & Gas**
- **Connected Utilities**
- **Connected Workers**
Where do you start?
Modernizing your SAP Landscape – Application // Infrastructure → Automation → IoT

Consolidate & Simplify SAP Landscapes
- Consolidate & Simplify Management for “mixed SAP workloads”
- SAP Landscape Management (LaMa) integration

Adopting SAP HANA
- Choice of Infrastructure for SAP HANA
- SAP HANA Migration Services
- Certified Data Protection Solutions

Running SAP in the Cloud Operating Model
- Cloud-enabled Infrastructure
- Cloud Migration Services

Big Data & IoT
- Edge-to-Core SAP Certified / Validations Platforms
- Consolidating & Managing Business Data and IoT
Dell and SAP’s 20-year+ Global Partnership

- Over 15,000 Joint Customers
- Over 20 Joint Engineering Projects and Certifications yielding Best Practices
- Dell IT: 2015 SAP Innovation Award Winner
- EMC IT: Runs SAP Business Suite and SAP HANA
- #1 Industry Performance Benchmarked Server for SAP
- #1 Storage Provider for SAP

[Diagram showing major milestones in the partnership from 1996 to 2018]

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