SAP HANA® 2
NEXT-GENERATION PLATFORM for DIGITAL Transformation

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Agenda

Why SAP HANA Platform?

What is the SAP HANA Platform?

What is the new in SAP HANA Platform 2?

Q&A

Summary
The problem with current IT landscapes
Silos, delay, and complexity hinder business agility and innovation

Application silos
Multiple data copies
Batch processing

Partial business view
No real-time insights
Limited ability to innovate
Barriers to building a digital foundation
Balance between agility and stability

28% Drive Business Innovation
72% Keep the Lights On

AGILITY
- New app architectures
- Insight driven applications
- Agile development
- Continuous dev & delivery

STABILITY
- High performance
- High availability
- Scalability
- Security

TRANSITION FROM KEEPING LIGHTS ON TO INNOVATION

2013
2020

1: Forrester IT Survey, 2013 > Amount of time spent on innovation
The Motivating Idea

1.1 Information in Real Time – Anything, Anytime, Anywhere

Figure 1.1: Management Meeting of the Future [2]
There has been a revolution in hardware

<table>
<thead>
<tr>
<th>20 Years Ago</th>
<th>Now</th>
<th>Near Future</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Memory</strong></td>
<td>1GB</td>
<td>20 TB</td>
</tr>
<tr>
<td>X 6,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CPU</strong></td>
<td>4 x 50 Mhz</td>
<td>Intel EX E7 v4 (Broadwell)</td>
</tr>
<tr>
<td>X 1,800</td>
<td></td>
<td>Up to 6TB for 2socket systems</td>
</tr>
<tr>
<td><strong>Transistors (CPU)</strong></td>
<td>~ 1 million</td>
<td>Cores</td>
</tr>
<tr>
<td></td>
<td></td>
<td>768 (8 x 4 x 24)</td>
</tr>
</tbody>
</table>

Note: Figures are for single servers
HANA, works in a fundamentally different way to other systems, this initially looks complex, but is actually easy to understand.

Source: Intel
Enables Simplicity & Agility

Example – add a 3 line invoice

- Data must be added where you see the arrows
- Updates where you see the circles - this happens when you book a 3 line document

- Only 2 Boxes Remaining and accounting is done

- Now models and simulation for:
  - Cash Analysis
  - Cash Prediction
  - P&L Statement
  - Balance Sheet
  - Departmental data analysis
  - Etc.
Speed allows elimination of aggregates, indexes this alone can result in a 90%+ reduction in complexity
## SAP HANA Platform
The data management and application platform for all applications

### SAP HANA PLATFORM

<table>
<thead>
<tr>
<th>APPLICATION SERVICES</th>
<th>PROCESSING SERVICES</th>
<th>INTEGRATION &amp; QUALITY SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Server</td>
<td>Spatial</td>
<td>Data Virtualization</td>
</tr>
<tr>
<td>JavaScript</td>
<td>Graph*</td>
<td>ELT &amp; Replication</td>
</tr>
<tr>
<td>Fiori UX</td>
<td>Predictive</td>
<td>Data Quality</td>
</tr>
<tr>
<td>Graphic Modeler</td>
<td>Search</td>
<td>Hadoop &amp; Spark Integration</td>
</tr>
<tr>
<td>Application Lifecycle Management</td>
<td>Text Analytics</td>
<td>Remote Data Sync</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATABASE SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columnar OLTP+OLAP</td>
</tr>
<tr>
<td>Multi-Core &amp; Parallelization</td>
</tr>
<tr>
<td>Advanced Compression</td>
</tr>
<tr>
<td>Multi-tenancy</td>
</tr>
<tr>
<td>Multi-Tier Storage</td>
</tr>
<tr>
<td>Data Modeling</td>
</tr>
<tr>
<td>Openness</td>
</tr>
<tr>
<td>Admin &amp; Security</td>
</tr>
<tr>
<td>High Availability &amp; Disaster Recovery</td>
</tr>
</tbody>
</table>

### SAP HANA Features

- OLTP + OLAP
- Multi-tenancy
- Multi-Tier Storage
- Data Modeling
- Openness
- Admin & Security
- High Availability & Disaster Recovery

### Key Technologies

- Spatial
- Text Analytics
- Streaming Analytics
- Series Data
- Business Functions

### Integration & Quality Services

- Data Virtualization
- ELT & Replication
- Data Quality
- Hadoop & Spark Integration
- Remote Data Sync

### One Open Platform

- ONE Copy of the Data

* Graph is in controlled availability
Choose the right on-premise deployment option

**Appliance**

All in one box by certified partners
(1100+ configurations – 128 GB to 20 TB)

**Tailored Data Center Integration**

Choice of components that meet SAP requirements from different vendors
Choice of SAP HANA High Availability (HA) and Disaster Recovery (DR) options
Ensuring the most demanding service-levels

Supports campus, metro, and geo clusters

Host Auto-Failover (HA)
• Within one scale-out system
• N active nodes, M standby node(s)
• Automatically switch to standby node

System Replication (HA & DR)
• Across multiple systems/locations
• Continuous data transfer from memory
• Fast switch-over on system failure

Storage Replication (DR)
• Across multiple systems/locations
• Transfer data using storage mirroring
• Low cost option

SAP HANA Node 1
Node 2
Standby
Storage

SAP HANA (Primary) Node
Storage

SAP HANA (Secondary) Node
Storage

Secondary system can be used for Dev/QA

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Run all applications on SAP HANA Platform

- SAP applications run better on and are architected for SAP HANA
- Custom applications are easier to build and run more rapidly on SAP HANA
- Third-party applications run faster and unchanged on SAP HANA
SAP HANA Platform common use cases

- **Optimizing Business Operations**
  Get instant insights into real-time transactions to optimize business operations

- **Operational Reports, Dashboards, and Analytics**
  Analyze and visualize operational details to support your day-to-day activities

- **Real-time Operational Intelligence**
  Run queries against operational data, streams and events to deliver real-time insights

- **Data Warehouse and Data Mart**
  Deliver actionable insights on enterprise-wide or departmental data

- **Big Data**
  Uncover the value in large, complex and rapidly growing data sets

- **Decision Support, Simulation and Automation**
  Streamline and automate business processes with advanced analytics
Customers: SAP solutions powered by SAP HANA

- **1,721x**
  Faster daily production control report
  SAP Business Suite powered by SAP HANA, SAP HANA Live

- **96%**
  Reduction in data extract, processing, and load times
  SAP BW powered by SAP HANA

- **45%**
  Growth of fantasy football platform using SAP HANA Cloud Platform and SAP Lumira Cloud powered by SAP HANA

- **3 days**
  To migrate to SAP Business Suite powered by SAP HANA, SAP HANA Enterprise Cloud

- **70%**
  Reduction in IT total cost of ownership
  SAP Suite on SAP HANA, SAP HANA Enterprise Cloud

- **<3 seconds**
  Render 500 million rows of data graphically to the user
  SAP Lumira powered by SAP HANA

- **Unified**
  Picture of sales, profits, and share targets, all in one system
  SAP S&OP powered by SAP HANA

- **400%**
  Faster reporting speed for accelerated analysis and planning cycles, time to action
  SAP BPC powered by SAP HANA, SAP BW powered by SAP HANA
Announcing SAP HANA innovations
Digital foundation to transform business

SAP HANA

- Next-generation SAP HANA platform
- New release optimized for innovation
- Deliver modern IT with agility and stability

SAP HANA, Express Edition

- Streamlined version of SAP HANA for rapid application development
- Download for free to PCs or personal servers to get started quickly

SAP HANA Microservices

- Cloud microservices that leverage SAP HANA processing in the cloud to deliver analytic insights to applications
- Pay-as-you-go on SAP Hybris as a Service (YaaS) marketplace
Transition to SAP HANA 2
Adopt Innovation at your own pace

SAP HANA SPS12

- Digital foundation to run applications without maintenance upgrade disruptions
- No new support package stacks (SPS)
- Maintenance revisions for SAP HANA SPS12 is provided until May 2019

SAP HANA® 2

- Digital foundation to build next-generation applications using the latest technology innovations
- Twice-a-year support package stacks (SPS)
- Maintenance for SPS provided until next 2 SPSs are released (Example: SPS00 supported until SPS02 is released)
Transform IT with SAP HANA 2
Modernize IT to Enable Innovation

Free IT to **Focus** on Innovation
Database Management Transformed

Leverage All Data to **Foster** Innovation
Data Management Transformed

Discover Insights to **Drive** Innovation
Analytical Intelligence Transformed

Develop Solutions that **Power** Innovation
Application Development Transformed
SAP HANA 2

Database Management Transformed
Database Management Transformed
High availability and disaster recovery

System Replication
• “Active / Active read-enabled” to utilize the secondary systems to offload read intense workloads

SAP Landscape Management*
• Expand support with automated orchestration for HA/DR processes (like takeover, zero-downtime updates, …)

Ensure business continuity and availability to meet the most demanding SLAs

* License Separately
Backup and Recovery

- Consolidate output files from SAP HANA to simplify workload for certified 3rd party backup tools
- Option to define location of backup catalog (independent of redo logs) to allow choice of backup catalogs for recovery and improve performance
- Recover a backup from a singleDB (non-MDC) system to a tenant database from an MDC system to support testing scenarios in a transition from single to MDC
- Restore SAP HANA 1.0 (needs to be SPS10+) backup to SAP HANA 2.0 system
Database Management Transformed
Enhanced data security and compliance enablement

Data Encryption
- Full native data at rest encryption (including redo logs, DT data volume, etc.)
- Enhanced encryption key management (i.e. changing the root key of the application encryption service that is used)

User and Role Management
- Authorization management in SAP HANA based on LDAP groups to lower operation cost
- Additional authentication and user management capabilities for XS Advanced scenarios, e.g. app-to-app SSO

Integrated security framework with authentication, SSO, user/role management, data and communication encryption, audit logging, secure configuration and secure application development for comprehensive protection
Database Management Transformed
Capture and replay / workload analyzer

Workload Capture and Replay
- Compare several replays coming from the same capture with each other for baseline analysis
- Resource consumption reporting allows comparison of workload on system level after replay
- Comparison of results of view-based queries based on row counts offers new insights into replay performance

Workload Analyzer
- Analyze historical sampling-based workload data in a visual form, making it easier to evaluate and draw conclusions
  - Timeline-based view, with statements structured in an execution hierarchy based on application and statement level, for better analysis and navigation
  - Analyze captured workloads, visualizing system load based on engine Instrumentation

SQL Analyzer
- Analyze individual query runtimes by providing execution overview as well as several performance details.
  - Shows multiple KPI, e.g. used tables for query or SQLScript statement execution statistics

Simulate and analyze workloads to reduce time and cost when implementing change
Workload Management

- Initial admission control offering to automatically reject requests from the database (applications, analytics, ...) if thresholds are exceeded to avoid system-overload situations
- New option for clients to define a query timeout parameter in order to avoid run-away queries
- Support BI clients enabling workload classes at the session level for improved workload management by non-SAP clients
- Simplified enabling / disabling workload classes via the SAP HANA Cockpit to manage business processes

Influence dynamic resource consumption according to workload classifications to improve performance for users and applications
Database Management Transformed
Administration and monitoring

SAP HANA Cockpit

• Re-architected for optimized administration in order to
  – Unify individual, multiple database, and tenant management
  – Run without dedicated SAP HANA instance and separate administration environment from production system
  – Support on-premise or cloud implementations
• Integrated database explorer for catalog browsing, SQL console, and trace file management capabilities to increase DBA productivity
• Enhanced performance analysis of SQL plan that has been executed with related statistics to analyze the execution plan of a SQL statement in a graphical view

Simplify administration and monitoring for the digital core to improve IT efficiency
Data Management Transformed
Data Management Transformed
SAP Enterprise Architecture Designer, Edition for SAP HANA

SAP Enterprise Architecture Designer, Edition for SAP HANA*

- Web-based enterprise architecture modeling tool for comprehensive end to end modeling experience
- Support business process modeling
- Provide landscape, application and business capability modeling
- Provide analysis of linked items across perspectives to drive decisions for digital transformation
- Architect and plan physical data models targeting new and/or migrations to SAP HANA
- Support requirements modeling/documentation

* 5 user license with SAP HANA.

Create and integrate enterprise, landscape, process, and data models to manage information and systems effectively
Data Management Transformed
Smart data integration, Smart data quality, and Smart data access

Smart Data Integration (SDI)
- Virtual procedure support (via BAPIs) to enable read/write scenarios with ABAP-based systems
- Support parallel data load to optimize memory consumption and improve data load performance
- Automatic recovery of real-time replication, if source system becomes unavailable, to simplify operations
- Additional data sources: MS Access and MS Sharepoint for data virtualization and integration scenarios

Smart Data Quality (SDQ)
- SDQ cleanse transform support for address suggestions to improve accuracy of address data

Smart Data Access (SDA)
- SDA Remote metadata sync via refresh command to easily maintain changing schemas

Data integration and transformation for advanced and rich processing of business data
Data Management Transformed
Tiered storage

Dynamic Tiering

- Multi-store table is a partitioned SAP HANA column table with partitions distributed between memory and extended store to simplify management of large volumes of data
  - With the ability to bi-directionally move partitions between memory and extended store as the business value of data changes (like aging)
  - With runtime partition pruning, ensure query optimizer accesses only the pertinent partitions
- Support system replication for two-tier synchronous SAP HANA and extended stores for high availability
- Delta backups now support systems with both in-memory and extended store to reduce backup times and storage requirements
- Encrypt extended store for better security

Combine enhanced dynamic tiering and data lifecycle management to optimize the data management for multi temperature management
SAP HANA® 2

Analytical Intelligence Transformed
Analytical Intelligence Transformed
Predictive / machine learning

Predictive Analytics Library
• Expand existing library to include **8 new** algorithms to enable new analytical use cases
• Infrastructure enhancements (like metadata sharing) to enable SAP Predictive Analytics to easily consume new PAL functions
• Support parallel execution of PAL scoring functions to improve processing performance for large scale partitioned data

Streaming Analytics
• Guarantee message delivery via REST interface for real-time analysis use cases where data assurance is required
• New adaptors (ODATA, JSON, XML support) for greater flexibility

Rich set of native algorithms for in-database and in-memory processing exploiting analytic capabilities resulting in quicker insights and faster implementation
# SAP HANA In-Memory Predictive Analytics

**Predictive Analysis Library (PAL) – algorithms supported in SAP HANA 2**

## Classification Analysis
- CART
- C4.5 Decision Tree Analysis
- CHAID Decision Tree Analysis
- K Nearest Neighbour
- Logistic Regression Elastic Net
- Back-Propagation (Neural Network)
- Naïve Bayes
- Support Vector Machine
- Random Forests
- **Gradient Boosting Decision Tree**
- **Linear Discriminant Analysis (LDA)**
- Confusion Matrix
- Area Under Curve (AUC)
- Parameter Selection / Model Evaluation

## Regression
- Multiple Linear Regression Elastic Net
- Polynomial, Exponential, Bi-Variate Geometric, Bi-Variate Logarithmic Regression
- **Generalized Linear Model**
- Cox Proportional Hazards Model

## Cluster Analysis
- ABC Classification
- DBSCAN
- K-Means
- K-Medoid Clustering
- K-Medians
- Kohonen Self Organized Maps
- Agglomerative Hierarchical
- Affinity Propagation
- Latent Dirichlet Allocation (LDA)
- Gaussian Mixture Model (GMM)
- Cluster Assignment

## Time Series Analysis
- Single/Double/ Brown /Triple Exp.Smoothing
- Forecast Smoothing
- Auto - ARIMA/ Seasonal ARIMA
- Croston Method
- Forecast Accuracy Measure
- Linear Regression with Damped Trend and Seasonal Adjust
- Test for White Noise, Trend, Seasonality
- **Fast Fourier Transform (FFT)**
- **Correlation Function**

## Association Analysis
- Apriori
- Apriori Lite
- FP-Growth
- KORD – Top K Rule Discovery
- **Sequential Pattern Mining**

## Probability Distribution
- Distribution Fit/ Weibull analysis
- Cumulative Distribution Function
- Quantile Function
- Kaplan-Meier Survival Analysis

## Outlier Detection
- Inter-Quartile Range Test (Tukey’s Test)
- Variance Test
- Anomaly Detection
- Grubbs Outlier Test

## Link Prediction
- Common Neighbors
- Jaccard’s Coefficient
- Adamic/Adar
- Katzβ

## Statistic Functions
- Mean, Median, Variance, Standard Deviation, Kurtosis, Skewness
- Covariance Matrix
- Pearson Correlations Matrix
- Chi-squared Tests:
  - Test of Quality of Fit
  - Test of Independence
- F-test (variance equal test)
- Data Summary

## Data Preparation
- Sampling
- Binning
- Scaling
- Partitioning
- Principal Component Analysis (PCA) / PCA Projection

## Other
- Weighted Scores Table
- Substitute Missing Values

* New in SAP HANA 2 SPS0
Analytical Intelligence Transformed
Text data processing

Text Search
• Filter on a date data type be it partial (e.g. 2016/09), decimal or string in faceted navigation applications for additional flexibility when browsing unstructured data
• Dynamically configure rule sets that require system specific parameters when used for either development, testing or production environments
• Run in “batch mode” for rule sets to detect duplicates on a set of records; goes beyond limited single row inputs

Text Analysis
• Create, test iteratively and maintain their custom dictionaries and rules in Web IDE for SAP HANA
• Offer a native SQL interface to support simple integration of text scenarios into applications
• Expand sentence-/clause-level sentiment analysis to Arabic
• Extend tokenization and custom dictionary support to all whitespace-delimited languages in the world

Search and analyze text hidden in unstructured sources to uncover new insights
Spatial Data Processing

- Support spatial data type in Web IDE for SAP HANA
  - Calculated columns like calculate distance from home and office addresses
  - Output attributes to visualize spatial data in output like average revenue by region where the country boundary is in the output not the text of the region for visualization needs

Process spatial data and develop spatially-enabled applications to improve user insight and action
Graph Data Processing

- Enhanced visualization in Graph Viewer for improved exploration
- Support Cypher for pattern matching to leverage existing skillsets

Traverse vast amounts of connected data, without duplication, and combine transparently with enterprise data to discover and act upon meaningful relationships
Extended Application Server (XS)

- Bring Your Own language / runtimes to reduce TCO by running these applications within the XSA framework
- Token based authentication for job scheduling to support business users
- Improved enterprise supportability and TCO
  - Enhanced JAVA / JavaScript runtime supportability and trace features to reduce effort of supporting JAVA based applications
  - Extended web based application monitoring instead of command line for improved usability
  - Migration assistant to reduce effort of migrating existing Extended Application Services Classic (XSC) applications to XSA
  - Build native applications in MDC landscapes without restrictions
- SDI REST API to programmatically invoke a flow-graph and return the results at runtime from within an application.

Reduce application development cycles and deploy scalable applications on premise and cloud to support rapid innovation.
File Processor API

- Unlock, extract, and load tool for documents
- Embedded file filters to pull text out of binary documents (like PDF, MSOffice, ...)
- Extracts document metadata properties (like creation date, file type, author) for use in downstream processes
- Monitoring and error handling
- Fully scalable for extreme batch processing

API to enable developers to easily process, load and move documents from within applications
Application Development Transformed
Development and modeling tools

Web IDE for SAP HANA

- Full support for graphical data models
  - Unified model – calculation views supported in web based modeling tools for simplified modeling
  - Expanded support for spatial, graph, native data store objects, CDS, ...
- Advanced Git capabilities: version management, branch viewing, and more, for better source code management
- Improved syntax error troubleshooting
  - Expanded Impact and Lineage analysis

Comprehensive graphical modeling tools for streamlined development
Application Development Transformed
Languages

**SQL**

- SQL syntax to directly create and query hierarchies without dependency on the graphical modeler
- Xpath support for SQL based access to XML data structure

**MDX**

- MDX console: test and develop MDX based queries and statements against SAP HANA Views
- Leverage MDX via XML/A as a query language when building XSA applications
- Additional MDX capabilities
  - Develop custom/advanced calculated measures and sets
  - Flattened result sets, dynamic currencies, ...  

Reduce application development cycles and deploy scalable applications on premise and cloud to support rapid innovation
Additional Solutions for Innovation
SAP HANA, Express Edition
Jumpstart your SAP HANA application development journey

FREE SAP HANA
DOWNLOAD IT NOW!!!

SAP HANA, express edition, is a streamlined version of SAP HANA optimized for fast and continuous application development. It is available for free up to 32GB memory use on a laptop, personal computer, server, or available in the cloud with flexible development and deployment options.

SAP HANA Express Edition

- Based on SAP HANA SPS12
- Free – up to 32 GB memory use and expandable to 128GB for a fee
- Packed with essential SAP HANA features yet utilizes a smaller footprint
- No need for hardware certification – minimum 16GB memory recommended
- Community Supported and Downloadable from here
- Allows production use

Installation Options

- Virtual Machine packages for Windows, Mac OS X, or other VM supported OSs
- Binary package for Linux (SUSE and Red Hat)
- Cloud appliance library (CAL) available through cal.sap.com

Benefits for Developers

Free to access SAP HANA | Fast application development | Flexible to expand and upgrade
SAP HANA Microservice
Enhance apps with analytic insight

New SAP HANA Microservices
- Microservices powered by SAP HANA in the cloud that can easily be integrated into any application to deliver analytical insight
  - **Text Analysis** microservices, including entity extraction, fact extraction, and linguistic analysis
  - **Earth observation** microservices (Beta) to query a catalog of satellite images and metadata to monitor change on earth, such as vegetation, water, soil and other spectral indexes. Co-innovated with European Space Agency (ESA)
- Available on SAP Hybris as a Service (YaaS) with pay-as-you-go pricing model
- Highly available, auto scalable and fully managed services
- Leverage the power of SAP HANA advanced analytics without purchasing a SAP HANA license
Learn more about SAP HANA
Check out the saphana.com website, which has valuable resources for fast-tracking your knowledge of SAP HANA and a rich support section designed to help you get the highest quality answers quickly and easily from SAP experts

Read our blog
http://www.saphana.com/community/blogs

Developer trial
http://hana.sap.com/try.html

Customers
http://hana.sap.com/customers.html

Get involved in the discussion
Engage with community experts on the SAP Community program to accelerate the development of SAP HANA-powered solutions

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Connect with experts via email
Thank You