DMM300 - SAP Business Warehouse
Data Provisioning from SAP and Non-SAP Sources

Rainer Uhle
Product Management SAP EDW (BW/HANA)
Abstract

The operational data provisioning (ODP) framework has been greatly enlarged during the last releases of SAP Business Warehouse (BW) and offers new, optimized provisioning capabilities. Together with the SAP Landscape Transformation replication server implementation into ODP, fascinating real-time insights are now supported wherever needed.
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SAP Data Management Portfolio
End-to-End Data Management & App Platform for Real-Time Business

REAL-TIME APPLICATIONS
- Consumer Engagement
- Sense & Respond
- Planning & Optimization

REAL-TIME ANALYTICS
- Operational Analytics
- Big Data Warehousing
- Predictive, Spatial & Text Analytics

SAP HANA PLATFORM
Real-time transactions + end-to-end analytics

Extended Application Services
- Processing Engine
- Database Services
- Application Function Lib. & Data Models
- Integration Services

SAP ASE
SAP ESP
Replication Server
SAP SQL Anywhere
SAP IQ
SAP Data Services
Agenda

Introduction – Data Provisioning Aspects regarding SAP Business Warehouse
• Traditional understanding
• Provide BW Business Data for Big Data Scenarios

BW Operational Data Provisioning (ODP) Framework
• Operational Delta Queue (ODQ) for classic SAP ERP Extractors
• Realtime Replication via SLT and ODQ

Providing BW Business Data for Big Data Scenarios
• SAP HANA Spatial Analytics
• SAP HANA Sentiment Intelligence RDS
Introduction – Data Provisioning Aspects regarding SAP Business Warehouse

- Traditional understanding
  - Data movement into one central repository (ETL processing, Replication)
  - … for good reasons

- Involve BW Business Data into Big Data Scenarios
  - BW Business Data and HANA Spatial Services
  - Text Analysis results for BW purposes
BW 7.4 – Architecture Overview
Available with BW 7.4, SP5/SP6 on HANA

Enhanced Data Modeling
- New overall reference Architecture LSA++
  - BW/HANA Smart Data Access providing the logical EDW
  - Easy integration of external data models with Open ODS Layer
  - Composite Provider for enhanced support of “Mixed Scenarios”
  - Common Eclipse based Modeling environment

Push down further processing logic to HANA
- BW Analytic Manager
- HANA Analysis Processes
- BW Transformations

New class of Data Provisioning
- BW enhancements for Operational Data Provisioning (ODP) and Operational Delta Queue (ODQ)
  - PSA layer obsolete during Data Acquisition
  - Simplified SLT handling in BW
Gartner’s Logical Data Warehouse Reference Framework

- **Use-Case Access Semantics**
- **SLA Requirements**
- **Repositories**
- **Virtualization**
- **Distributed Process**

**Taxonomy/Ontology Resolution**
- Auditing and Management Statistics

**Data Provisioning**

**BW Core**
- Persistency
- Staging
- ETL/Replication

**Open ODS Layer**
- Open ODS Views

**Mixed Scenario Support**
- HANA Model generation for BW InfoProvider

Metadata
- DQ, MDM, Gov.
Operational Data Provisioning (ODP) Infrastructure

Provider
- SLT
- SAP ERP Extractors
- HANA Views
- Source SAP BW

Operational Data Provisioning
- ODQ

Subscriber
- SAP DataServices
- Target SAP BW
- Embedded Analytics
SAP HANA Spatial
The challenge: Silos of information create an incomplete picture…

- Transactional data
- Master data
- Analytical data

Geographic Information Systems (GIS)
- Geographical data
- Location-based data
- Maps and topologies

Engineering Systems
- Diagrams
- 2D/3D graphs
- Animations
SAP HANA Sentiment Intelligence RDS

**Current Customer Situation**
- Lack of insight into online channels like social media, wikis, blogs, forums, trader sites and more
- Can’t or extra effort to combine unstructured social media data with CRM data or other structured internal data

**Value Proposition**
- Understand the local demand for products and services
- Evaluate impact of marketing campaigns and events
- Get early warning of product defects and shortfalls
- Channel and market-specific customer concerns and delights
BW Operational Data Provisioning (ODP) Framework

- Operational Delta Queue (ODQ) for classic SAP ERP Extractors and SLT Replication
  - ODP infrastructure (with delta queues) takes over important services
  - Data is stored in a compressed state
  - Data is retained in the delta queue for a specified time period for recovery purposes

- Realtime Replication from external source systems via SLT and ODQ
If you use operational data provisioning, you can load the data directly into the InfoProviders bypassing the PSA layer by using Data Transfer Process (DTP).*

The ODP infrastructure (with delta queues) takes over important services such as monitoring data requests.

The data is stored in a compressed state in the delta queue. A delta request transfers data records from the queue to the subscriber.

The data changes to a queue can also be requested by more than one subscriber.

The data is retained in the delta queue for a specified time period for recovery purposes.

* as of SAP BW 7.40
HANA BW – Operational Data Provisioning (ODP) Infrastructure

Overview about all new ODP based scenarios for BW 7.40

Main use cases available with BW 7.40:

1. ODP based Data Provisioning Aspects for SAP ERP Sources
2. SLT/ODP based real-time replication
3. ODP based data transfer between BW systems

- ODP is a NetWeaver based Framework, ODQ as persistency resides where the ODP is installed as source
  - Eg. If SLT is installed within the target BW the ODQ would of course also reside there
New explicit ODP Source System Types in BW 7.40
Business Content DataSources/Extractors: Customer Balances

... a never ending success story!

The extractor itself supports different options:
- Delta handling in various ways
- Direct Access capabilities
- Real-time Data Acquisition (RDA)
- ODP/ODQ Readiness
To start the replication for a table you have to enter transaction LTRC and execute the *Data Provisioning* function.
Operational Delta Queue (ODQ) Monitor - SAP ERP Example

ODP DataSource becomes visible in Operational Delta Queue with the request processing (InfoPackage/DTP) in the subscriber system.

Real-time mode can be switched on per subscriber.
SAP ERP ODQ Monitor (Transaction ODQMON)

Example from SAP ERP: ODQ in action …
ODP capable ERP extractors can be replicated under source system type ODP – SAP (Extractors)
BW Dataflow with DTP Extraction from ODP/ODQ
Simplification – Advanced DataStore Object
New with SAP BW 7.4 SP8 – Overview

Next generation of Data Store Object simplifies persistence management in SAP BW
- Combine InfoObject and field based modelling
- One type of InfoProvider with different settings to consolidate DataStore Objects and InfoCubes
- New intuitive eclipse based modelling UI

Optimized DataStore services
- High frequent and mass volume data loads – based on optimized request management
- Change of usage scenario without deletion of data
- Up to 120 key fields
- Optional SID entries for query performance optimization
ODP for data extraction from the SAP Business Suite – Results from internal performance testing

ODP allows to skip the PSA layer and load directly with DTP from the source system into a DSO

- Runtime is reduced by more than 40%
  - Scenario: loading from the Operational Delta Queue (TA ODQM) in the source system via DTP into a DSO compared to loading from BW Service API Delta Queue (TA RSA7) via InfoPackage into a PSA and then via DTP into a DSO

- Throughput of > 35 Mio records per hour is achieved w/o tuning (three times parallel processing)

ODP doesn’t change the implementation of application extractors

- If the extractor is the ‘bottle neck’ the throughput won’t change
ODP enabled Extractors

Requirements

**Provider**

The ODP interface you must use one of the following releases of ERP and PI_BASIS (or higher) in your ODQ system (e.g. ERP system as source system):

- PI_BASIS 2005_1_700 SP 24 (part of SAP NetWeaver 7.00 SP 24)
- PI_BASIS 2006_1_700 SP 14
- PI_BASIS 701 SP 9 (part of SAP NetWeaver 7.01 SP 9)
- PI_BASIS 702 SP 8 (part of SAP NetWeaver 7.02 SP 8)
- PI_BASIS 730 SP 3 (part of SAP NetWeaver 7.30 SP 3)
- PI_BASIS 731 SP 1 (part of SAP NetWeaver 7.03 SP 1 and 7.31 SP 1)

- ERP 6.0 SP 20
- ERP 6.0 EhP 2 SP 10
- ERP 6.0 EhP 3 SP 09
- ERP 6.0 EhP 4 SP 10
- ERP 6.0 EhP 5 SP 05

See SAP Note 1521883 - ODP Data Replication API for further details.

**Subscriber / Consumer**

- Recommended starting release with BW 7.40
Enable Extractors for ODP framework

- The SAP Note Releasing ERP Extractors for ODP API together with SAP Note 1558737 - Data Sources released for ODP data replication API describes which Data Sources have been released for usage with ODP Data Replication API:
  - Examples: 0FI_GL_50, 0HR_PA_EC_03, 0MATERIAL_ATTR, 2LIS_11_V_ITM, '0BPARTNER_ATTR, '0CO_OM_CCA_1, 0EC_CS_3, 0CO_PC_ACT_1

- To use the ODP data replication API for any generic DataSource (extraction methods view extraction or domain extraction) you need to implement SAP Note 1585204.
  - Single Extractors can be released with RODPS_OS_EXPOSE
Example: One queue multiple consumers

Example showing the flexibility of ODQ

- Automated handling of one queue for multiple subscribers without multiplying the data
- Example: one ERP Extractor, many BW Subscribers (global/local instances)
- Retention period until all subscriber received the data successfully
Can ODP be deployed in parallel with the traditional delta queue approach?
Yes it is possible, but multiplies the data.

Should we change to ODP based extraction with all existing extractors?
No, but consider ODP as framework for all your future implementations of new data flows into you BW system for ECC and SLT extraction.
Reproduction of BW Extractors with SLT‘s View functionality

View-based SLT delta-transfer technology (with SP06):

BW Extractors can be rebuilt with Views, if the following prerequisites are fulfilled:

- Views need to be built which need to contain all relevant tables
- the view relations as well as the primary key of the view need to be designed
- there must be a hierarchy with one main table
- only this main table is triggered/recorded (means the line item tables attached to the main table are not triggered)
- Target is 1 transparent table (there is no data split after SLT transfer e.g. into two or more tables)

The capability is shipped as a framework; content is not part of the shipment!

Benefits compared to standard BW Extractors:

- Can go across clients, reducing number of running processes and setup efforts for each client
- enhances tables with delta capabilities, thus streamlines the dataflow from full to delta for transferred data.
Reproduction of View based BW Extractors in ABAP Environments

View-based SLT delta-transfer technology:

In the SLT Scenarios, BW Extractors can be rebuilt with Views

Steps:

- Rebuild view based extractor with Database View in source system
- Assign view to leading table in SLT system
- Subscribe with BW to the leading table

Prerequisites:

- Extractor must consist of a hierarchy with one main table
- only this main table is triggered/recorded (means the line item table(s) attached to the main table are not triggered)
- Target is 1 transparent table (there is no data split after SLT transfer e.g. into two or more tables)

The capability is shipped as a framework; content is not part of the shipment!
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BW Operational Data Provisioning (ODP) Framework
• Operational Delta Queue (ODQ) for classic SAP ERP Extractors

Realtime Replication from external source systems via SLT and ODQ
• Configuration setup for supported data bases
• Setup of SLT replication from BW system
Use Case for SLT with SAP BW

- SAP LT Replication Server is a database trigger based replication technology
- SLT enables real-time data replication into SAP BW via ODP framework
- Adding delta capabilities where no standard extractor or delta uploads are offered
- Reduce admin effort for high frequent master data updates
- Replacement of View-based BW Extractors, no “easy” replacement of complex standard extractors
**Real-Time Replication with SAP LT Replication Server**

**Architectural Details**

**New source system type ODP-SLT**
- SLT Real-Time push in Operational Delta Queue (ODQ)
- Direct Update to BW InfoProviders (Scheduled or real-time daemon)
- Set up of SLT replication from SAP BW

**Benefits**
- Simplified data flow → PSA no longer required
- Consumption by multiple subscribers
- Delta handling by SLT

**Real-time data < 1 min available in BW**
Given External Data Model – Sales Order Demo

Semantics „Master Data“

Semantics „Facts“

1

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Create SLT Configuration – HANA Sales Order Demo to SAP BW

Configuration and Monitoring Dashboard

Available Configurations

Connections

Source System
- Status: HANA
- Database System: HANA
- DB Connection: SALESORDERDEMO
- Schema Name: SALESORDERDEMO

Target System
- Status: URODPS
- RFC Destination: NONE
- Scenario for RFC Communication: ODQ
- Queue Alias: URODPS

SM59 Connection
Given DB Schema
BW/SLT Target
Set up SLT Replication from BW – Source System/DataSource

ODP Context
SLT~URODP SAP LT Queue Alias URODP
Source System Type & Release
Remote Tree
(not supported)

ODP Context
SAP LT Queue Alias URODP
Operational Data Provider

DataSource
ZDSUR1
Source System
UR01
DataSource Data Type
Transaction Data

ZDSAO_2014
JH_DEMO
Technical Content
Non-SAP Sources

Display Name
ZURCUSTOMERS
ZURCustomers2
ZURDEPARMENTS
ZUREMPLOYEES
ZURSO_HEADER
ZURSO_SORDERS
BW Data Transfer Process with direct extraction from SLT ODQ

Parameters of the DataSource

Data Extraction: Directly from source system. PSA not used.

Extraction Mode: Delta

Adapter: Extraction from SAP System by Operational Data Provisioning

ODP Context: SAP LT Queue Alias URODP

Operational Data Provider: ZURCUSTOMERS
Set up SLT Replication from BW – SLT Tables and ODQ Entries
# Technical Requirements for ODP/SLT Scenario with SAP BW

## Source Systems

### Installation:
- DMIS 2011 SP6 or
  - DMIS 2011 SP3/SP4/SP5 + Note 1863476
  - DMIS 2010 SP8/SP9 + Note 1863476

### Basic Configuration:
- Define RFC user with appropriate authorization
- Optional: define separate table space for logging tables

### System Requirements:
- All ABAP-based SAP Systems starting with R/3 4.6C, all supported OS/DB’s platforms
- OS/DB restrictions of SAP NetWeaver stack ([service.sap.com/pam](service.sap.com/pam))
- Non-SAP: all SAP supported DB versions (with respective SAP Kernel installed on LT Replication Server)

## SAP LT Replication Server

### Installation:
- **SAP_Basis** (min requirement):
  - 730 SP10 or SP5-9 + Note 1817467
  - 731 SP8 or SP3-7 + Note 1817467
  - 740 SP4 or SP0-3 + Note 1817467
- **PI_Basis** (min requirement):
  - 730 SP10 or SP8-9 + Note 1848320
  - 731 SP9 or SP5-8 + Note 1848320
  - 740 SP4 or SP2-3 + Note 1848320

### Basic Configuration:
- **SAP**: Define RFC connection to source system

### System Requirements:
- Sizing of the SLT system depends very much on the amount of data which is stored in ODQ and the planned retention periods.

## Subscriber SAP BW

### Installation:
- **PI_Basis**:
  - Recommended version (full functionality):
    - 740 SP5
  - Limited functionality with:
    - 730 SP10 or SP8-9 + Note 1848320
    - 731 SP9 or SP5-8 + Note 1848320
    - 740 SP4 or SP2-3 + Note 1848320
Key Points to take home

1. **BW 7.4 provides major enhancements** for Operational Data Provisioning (ODP) and Operational Delta Queue (ODQ) Handling. The ODP Framework supports all kind of Source System types.

2. **Highly efficient compression** enables data compression rates up to 90% in the Operational Delta Queue (ODQ) with **configurable data retention periods** per subscriber/consumer.

3. **Layer Reduction** in BW - PSA layer obsolete during Data Acquisition because DTP directly reads from ODQ persistence.

4. Runtime is **reduced by more than 40%** loading from the Operational Delta Queue in the source system via DTP into a DSO.

5. **Simplified SLT handling** for BW targets – SLT Replications addresses ODQ instance from where BW takes the data using DTPs and RDA Daemon.

6. **Delta handling also for non-SAP sources**, which are supported by SLT.
DMM300 - SAP Business Warehouse
Data Provisioning from SAP and Non-SAP Sources

Providing BW Business Data for Big Data Scenarios

- SAP HANA Spatial Analytics
  - Geo Referencing for BW master data
  - BW Model enhancements with HANA Spatial data types
  - Visualization of BW Business Data in new contexts

- SAP HANA Sentiment Intelligence RDS
Huge untapped potential!

Setting the stage for a new type of business applications

Addressing the whitespace between just maps and GIS.
- Spatially enabled applications to operate a company

Integrating back spatial into the business system.
- after the re-union of OLTP and OLAP spatial is added

Enabling real-time locational awareness.
- new business models driven by location and time
Demo
HANA Spatial with Luciad Lightspeed Technology
PoC Results
SAP HANA
Develop and deploy spatially-enabled analytics and applications

Real-time high-performance spatial processing
Store, process, manipulate, retrieve and share spatial data
Unified modeling platform
Combine spatial with business data
Geo-content and services

OLTP  Analytics  Planning  Predictive  Text  Spatial
BUSINESS DATA
SPATIAL DATA
REAL-TIME DATA

Transaction Data  Unstructured Data  Location Data  Machine Data
Geo-Services  Geo-Content  Columnar Spatial Processing
Calc Model / Views  Spatial Functions  Spatial Data Types

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## Building a Native Spatial Application in SAP HANA with XS and Mapping Content & Services

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Load Spatial Data</td>
</tr>
<tr>
<td>2</td>
<td>Create Model</td>
</tr>
<tr>
<td>3</td>
<td>Configure XS</td>
</tr>
<tr>
<td>4</td>
<td>Configure App</td>
</tr>
<tr>
<td>5</td>
<td>Deploy</td>
</tr>
</tbody>
</table>
SAP Data Services: Global address cleansing functionality

Global coverage of address directories

Coverage levels

- Basic Address Cleansing: All-World Directory includes Last Line Assignment and Address Line Parsing and Standardization
- Enhanced Address Cleansing: 36+ country-specific Address Directories, Address Line Assignment
Where are we now in BW with Geo-Reference Data?

Load Spatial Data

1.
How to get there: Automatic generation of HANA models
Available with BW 7.4, SP5/SP6 on HANA

Enhanced Metadata interoperability between BW and HANA

HANA Model generation
Triggered from BW InfoProvider – push
- Complements BW model import from HANA Modeler
- Analysis Authorization: Automatic sync between HANA and BW
- Object changes include HANA model impact analysis

Direct consumption of BW data via generated HANA views
- SAP Lumira, BO Explorer, SQL, Mapping Services

Scenario
Major footprint of scenario in BW
Usage of generated view in HANA Studio to build own data models using BW data and HANA native algorithms
Generated Attribute View for BW Address Data
Enhanced HANA SQL-View with new spatial Datatypes

- Provides the ability to answer an entirely new set of business questions with an additional location dimension
- Goes beyond just postal/zip codes for precise location intelligence
- Processes spatial data types and business data rapidly to deliver results to applications and BI tools in the form of maps, reports and charts
- GIS (Geospatial Information Systems) are becoming more common in most organizations and industries
Example:
Show all customers over 5 Mio. € revenue along my travel route (aka Traveling Salesman Problem – TSP)

```
SELECT "YURCUST", "0LONGITUDE", "0LATITUDE", location.st_distance(ST_GeomFromEWKT('SRID=4326;POINT(-94.1167 29.7000)')) 'kilometer'
FROM "BWGOESSPATIAL"."YURCUST_SPATIAL"
where location.st_distance(ST_GeomFromEWKT('SRID=4326;POINT(-94.1167 29.7000)')) < 170;
```
SAP HANA: Spatial Calculation Results

Statement 'SELECT "YURCUST", "0LONGITUDE", "0LATITUDE",...' successfully executed in 108 ms 86 µs (server processing time: 106 ms 618 µs) Fetched 15 row(s) in 0 ms 247 µs (server processing time: 0 ms 0 µs)
Server-side JavaScript with SQL Access
Mapping Service via XS Engine

SAP HANA Web-based Development Workbench

Configure XS

Editor
Create, edit, execute, debug and manage HANA XS artifacts

Catalog
Create, edit, execute and manage HANA DB SQL catalog artifacts

XS Engine

Editor
Content
- bwpkg
- images
- xsaccess
- xsapp
- getSpatialData.js
- marker.html

Catalog
- XS Engine
- Enhanced HANA View

3
Configure XS
Client-side HTML composing Maps and Map Objects

```
<script id="sap-ui-bootstrap" type="text/javascript"
src="/sap/ui5/resources/sap-ui-core.js"
data-sap-ui-libs="sap.ui.commons,sap.ui.table,sap.ui.ux3,sap.ui.demoKit"
data-sap-ui-theme="sap_goldreflection"></script>
<script src="/sap/hana/spatial/mapClient/ntApi/2.5.4/jsl.js?with-all" type="text/javascript" charset="utf-8"></script>
<script src="/sap/hana/spatial/mapClient/mapclient.js" type="text/javascript" charset="utf-8"></script>

// Get the DOM node to which we will append the map
var mapContainer = document.getElementById("mapContainer");
// Create a map inside the map container DOM node
var map = new nokia.maps.map.Dispaly(mapContainer, {
    // Initial center and zoom level of the map
    center: [40, -75.12],
    zoomLevel: 10,
    // We add the behavior component to allow panning / zooming of the map components:
    new nokia.maps.map.component.Behavior(),
    new nokia.maps
```

4 Configure App
Result: BW Customer Locations around Philadelphia
SAP HANA provides a powerful unified platform for all your analytic and application development needs:
- Predictive Analytics
- Unstructured Text Search and Analysis
- Spatial Processing

Spatial adds a new dimension to real-time analytics

Quickly develop spatial applications with native geo-content and mapping services via XS engine

IT Simplification – Reduces TCO and TCD by eliminating data redundancy, movement, and hardware servers/engines
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Providing BW Business Data for Big Data Scenarios
• SAP HANA Spatial Analytics

Text Analysis Scenarios
• SAP HANA Sentiment Intelligence RDS
Demo
SAP HANA
Sentiment Intelligence

SAP TechEd & d-code
SAP HANA Sentiment Intelligence RDS

Current Customer Situation
• Lack of insight into online channels like social media, wikis, blogs, forums,, trader sites and more
• Can’t or extra effort to combine unstructured social media data with CRM data or other structured internal data

Description
• Listen, monitor and gain insight of your most vocal customers around sentiments, requests, issues, context topics you haven’t thought of.
• Combine campaigns, promotions or service data residing in internal sources with social data

Value Proposition
• Understand the local demand for products and services
• Evaluate impact of marketing campaigns and events
• Get early warning of product defects and shortfalls
• Channel and market-specific customer concerns and delights

Result
• Creation of promotional campaigns to shape customer demand
• Intelligence about new product development, design, cross-sell, bundling and product introduction
• Selection, localization, allocation, distribution, and pricing of merchandise in all commerce channels
2012 Toyota Highlander, 1G1JF27W8GJ178227. Policy #456-788-99. $500 deductible. Insured are William Thomas Snow and Christine W. Snow. On 1/09/13, received via text message "In accident! Need tow truck." and "Corner of Winter & Cross Rd". Dr. Snow slid through a stop on the snowy road and hit the stop sign. Significant damage to front of the car. He was unhappy at tow truck response time. Contact wtsnow@medicalcenter.com or 651.772.1234. Advance Appraisals Inc. to come out at 8:30am Monday to make further assessment.
Native Text Data Processing on the Data Services platform with the **Entity Extraction** transform to extract:

- Predefined entities (like company, person, firm, city, country, …)
- Sentiment Analysis (e.g. Strong positive, Weak positive, Neutral, Weak Negative, Strong Negative)
- Custom entities (customized via dictionaries)

Automatically identifies Input text language

31 Languages supported

Binary documents content

Expanded support for Twitter content (handles, topics etc.)
Data Services for Text Data Processing and Hadoop
Access unstructured data via Hadoop Connector

Data Services connects to Apache Hadoop frameworks, HDFS, and Hive sources and targets

Read from Hadoop into SAP HANA, SAP Sybase IQ, etc. and Load into Hadoop from files, data stores, Web

TDP’s Entity Extraction transform supports pushdown to Hadoop as a MapReduce job, including HDFS delimited file formats

Enhances performance when processing massive amounts of structured and unstructured data by enabling Entity Extraction on each node in the cluster
Thank you

Contact information:

Rainer Uhle
Product Management SAP EDW (BW/HANA)

SAP SE Walldorf
Germany
UPCOMING:
openSAP - SAP Business Warehouse powered by SAP HANA course

- 4 Weeks of videos, demonstrations and explanation focused on SAP BW 7.4 powered by SAP HANA
- Free Participation & Record of Achievement
- https://open.sap.com/
Further Information

**SAP Public Web**

http://scn.sap.com/community/bw-hana

**SAP Education and Certification Opportunities**

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SAP Certified Application Specialist (Edition 2014) - SAP BW powered by SAP HANA

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