

# SAP HANA Accelerator for SAP ASE

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# Businesses are accelerating

*Pushing transaction processing systems to extreme speed & scale*



## Wall Street

Average number of transactions processed has increased from 53,000 to 500,000 per second since 2006. *Nasdaq*



## Telco

Global telecom service providers will reach 30 billion autonomously connected end points by 2020. IDC



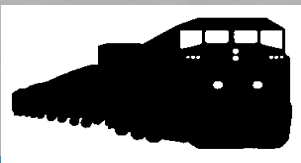
## Retail

36.8 million items ordered on Cyber Monday. *Amazon*



## Health Care

State websites buckle under massive signups for healthcare under Affordable Care Act.



## Transportation

9 million average daily tickets sold with multiple transactions per ticket. *China Academy of Railway Sciences*

# What is SAP HANA Accelerator for SAP ASE

HANA accelerator for ASE provides access to HANA capabilities for ASE custom built reports. ASE queries are transparently executed against HANA.

- No code changes / (or minimal) are required in ASE. Customer reports run unchanged.
- ASE reports are accelerated via A4A tens to hundreds\* of times in comparison to equivalent reports running against ASE reporting servers.

\* data based on customer POC results

# Sample Acceleration Tests Results

Test Query	Execution time in ASE (min)	Execution time in HANA (via ASE) (min)	Performance Improvement
Q02	13.90	0.38	36x
Q03	10.13	1.50	7x
Q07	6.78	0.62	11x
Q08	13.69	0.47	29x
Q09	22.83	10.71	2x
Q11	69.39	0.73	94x
Q16	1.92	0.64	3x
Q17	17.37	0.17	97x
Q19	4.77	0.13	36x
Q22	2.32	0.51	5x

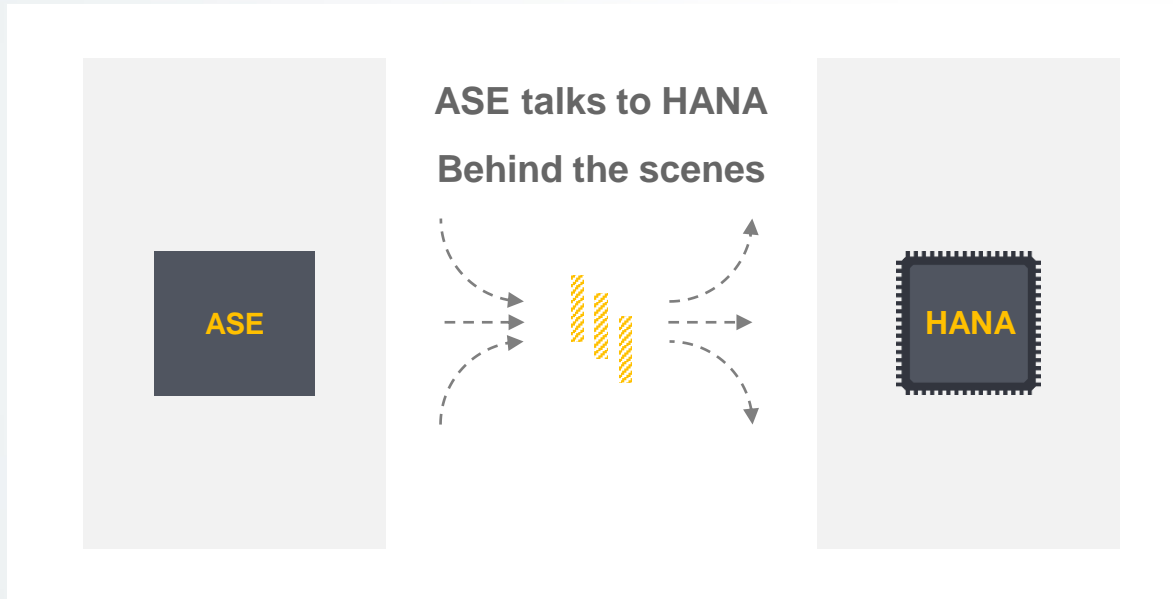
- Test results based on internal sample queries
- Query Execution Time = Time to ship query to HANA + **Execution time in HANA** + Time to return results to ASE
- Several show significant enhancement
- Key is to avoid bringing data back to ASE for execution, or executing logic in ASE

# Why SAP HANA Accelerator for SAP ASE

- ASE customers run multiple copies of ASE for reporting.
- Data growth or SLAs have changed
- Rewriting these applications is not an option. { expertise / time/ money/ risk }
- SAP provides a solution that minimizes cost & effort, while accelerating SAP ASE reporting apps by leveraging SAP HANA
  - Minimal or No code changes is required
  - Fits into customers existing landscape without disruption
  - Provides a path to faster query and report acceleration
  - Provides a path for innovation



# Accelerating ASE Apps without changes



## Leverages ASE CIS Functionality

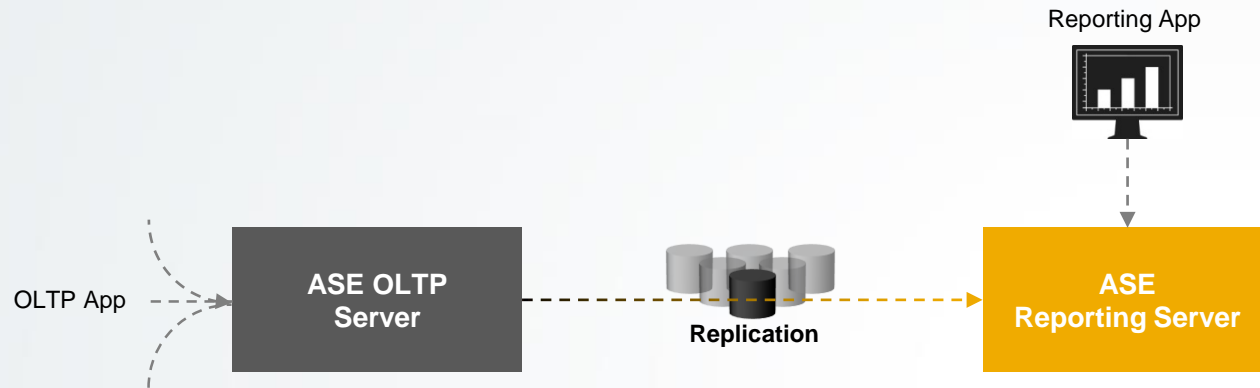
- CIS allows A4A to HANA access via ODBC
- ASE proxy tables, point to HANA physical tables
- ASE provides functional compensation, functional translation, and data type mapping (ASE-HANA, and HANA-ASE)

## A4A capabilities

- ASE-to-HANA pushdown, via transformation of ASE built-in function syntax to HANA (isnull, convert, char-Length, charindex, like, concatenation)
- More pushdowns of SQL, such as CASE, UNION with constants
- Enable temp table creation in HANA
- Enable full-push down via simple configuration
- Data in HANA can be kept in sync with ASE, via replicating from ASE to HANA using Smart Data Integration

# Accelerating ASE Apps using HANA, without changes

## Existing App

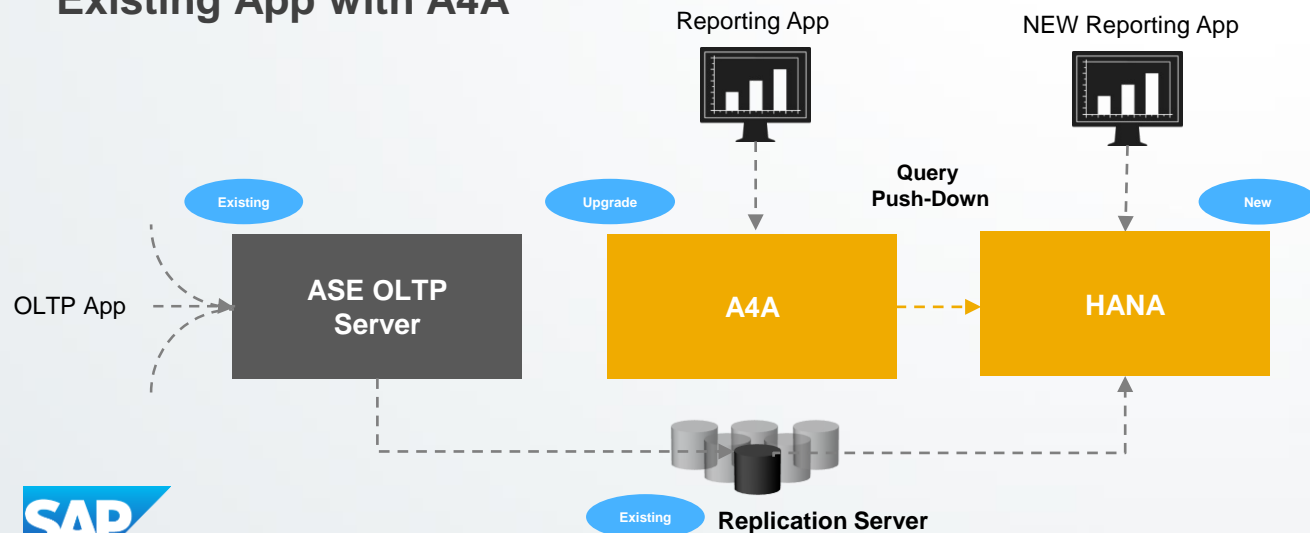


- HANA runs new OLAP apps
- Existing ASE reporting apps to run faster in HANA, with no code changes

## What's New

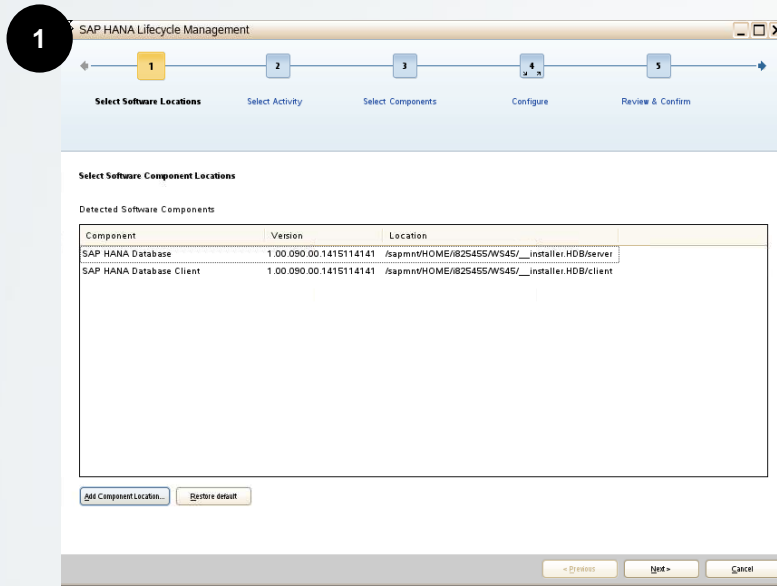
- More ASE-to-HANA pushdown, via transformation of ASE built-in function syntax to HANA (isnull, convert, char-length, charindex, like, concatenation)
- More pushdowns of SQL, such as CASE, UNION with constants
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- Enable full-push down via configuration
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## Existing App with A4A

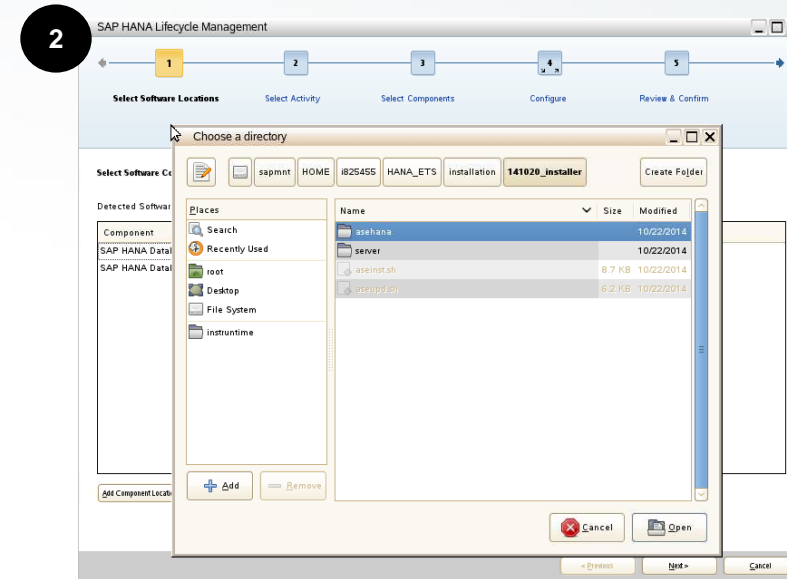


# Unified Installation

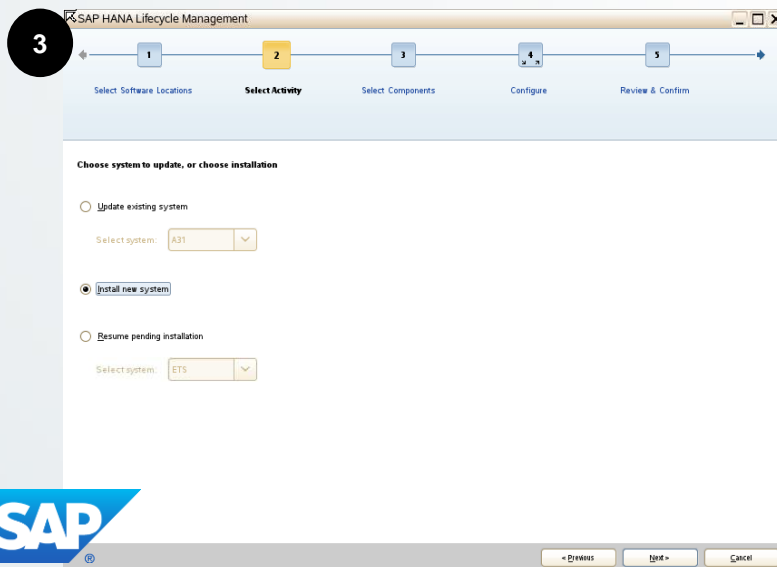
*Simplified and Integrated Installation for SAP HANA and SAP ASE*



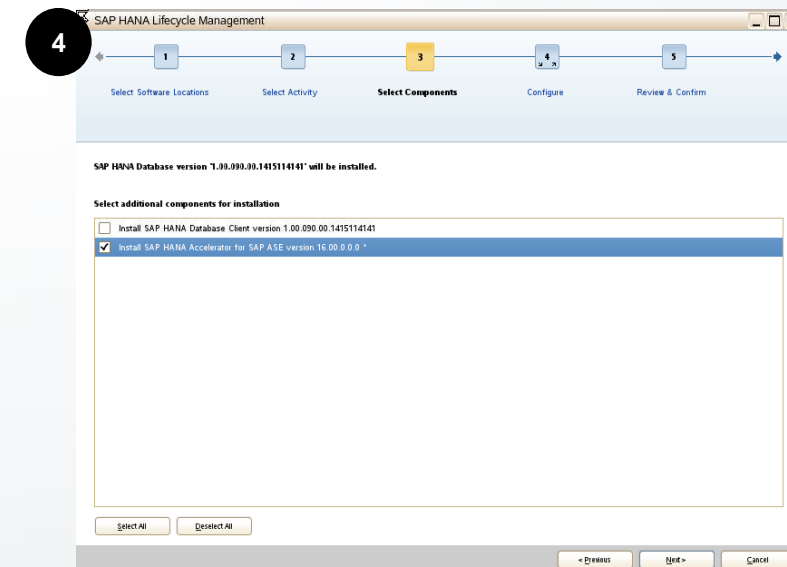
Selection of HANA related components to install – using HANA Lifecycle Management



Choose location for installing



Choice of new installation or update of an existing one

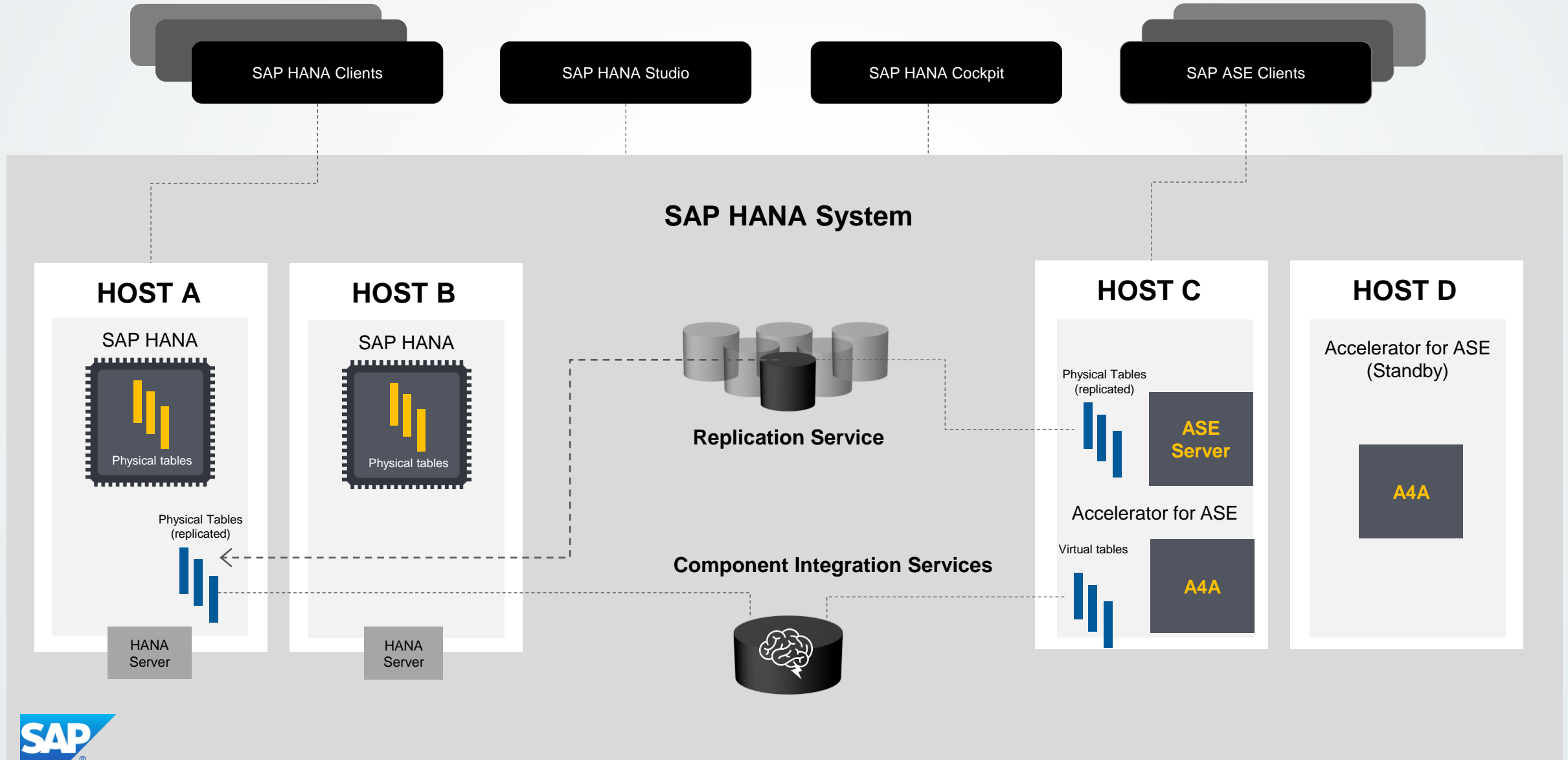


Additional components to be installed. In this case SAP HANA Accelerator for SAP ASE (SAP ASE) is chosen.



# SAP HANA Accelerator for SAP ASE

## Architecture



# Millennium Partners: Radical Acceleration of their Global Accounting With HANA Accelerator for ASE

## Company

Millennium Partners

## Headquarters

New York, New York

## Industry

Financial Services Capital Markets

## Products and Services

Hedge Funds, Portfolio Management

## Employees

2100

## Assets

Manages approximately \$34.42 billion in assets as of December 2016

## AE

Ed Cushing

## Web Site

[www.mlp.com](http://www.mlp.com)

## Objectives

- Millennium executes ~3 Million trades/day and wanted to calculate P&L in real-time for opportunistic insights into cash positions to better manage reserves
- Increase profitability on a daily basis
- Simplify their environment while enabling development of innovative applications without disruption.

## Resolution

- Enables scalability of a single source of truth while enabling innovation of new system capabilities and analytics
- Safeguards existing proprietary applications by enabling the automatic pushdown of existing procedure logic into HANA with < 1% code change.
- Provides an enterprise data management framework for visibility across the organization and the ability to develop intelligent, learning applications for deeper market penetration.
- Enables future scalability with reduced hardware, maintenance and overall risk.

## Benefits

- Real-time P&L permits better understanding of the balance sheet to facilitate trading / liquidity.
- Better pre-trade controls aligned with P&L
- More time for analysis to determine Fixed Income premiums / discounts in times of stress.
- Deeper analytics to assess risk-adjusted profitability against systemic risk in corporate bond credit spreads, pattern effects of global trade, emerging market performance, debt-financed investments, volatility of interest rates across maturities, frequencies, etc.

**> 15X +**

Application Performance Improvement

**Zero to < 1%**

Procedure Code Change



MILLENNIUM PARTNERS

THANK YOU

# HANA Studio

## Administration and Monitoring for SAP HANA Accelerator for SAP ASE

**A32 (SYSTEM) Accelerator for ASE**
oakl00532897a.dhcp.oak.sap.corp 32

Last Update: Nov 13, 2014 1:26:58 PM

Interval: 60 Seconds

Overview

Landscape

Alerts

Performance

Volumes

Configuration

System Information

Diagnosis Files

Trace Configuration

General Information

Operational Status: ■ All services started

System Usage: Custom System

Start Time of First Started Service: Nov 12, 2014 3:59:30 PM

Start Time of Latest Started Service: Nov 13, 2014 2:19:14 PM

Distributed System: Yes (2 hosts)

HANA Accelerator for ASE: ■ Running

Version: 1.00.090.00.1415114141 (HANA\_WS, Weekstone2014.45.0)

Build Time: Nov 4, 2014 6:05:30 PM

Platform: SUSE Linux Enterprise Server 11.1

Linux Kernel Version: 2.6.32.59-0.15-default

Hardware Manufacturer: Hewlett-Packard

SAP HANA Used Memory

Used Memory/Peak Used Memory/Allocation Limit (GB)

All Hosts: 14.13/48.32 480.24

Host with Highest Used Memory (oakl00532897a.dhcp.oak.sap.corp): 11.08/14.78 240.12

[More Information](#)

Resident Memory

Database Resident/Total Resident/Physical Memory (GB)

All Hosts: 38.91/187.53 504.45

Host with Highest Total Resident Memory (oakl00532778a.amer.global.corp.sap): 19.54/159.70 252.22

[More Information](#)

CPU Usage

Database CPU Usage/Total CPU Usage/Maximum CPU Usage

All Hosts: 0/3 100

Host with Highest CPU Usage (oakl00532897a.dhcp.oak.sap.corp): 0/7 100

[More Information](#)

Current Alerts and Messages

↑

2 alerts with HIGH priority

[Show Alerts](#)

Disk Usage

Data Volume Size/Total Disk Usage/Total Disk Size (GB)

On Host oakl00532897a.dhcp.oak.sap.corp: 3.50/815.80 1086.35

Log Volume Size/Total Disk Usage/Total Disk Size (GB)

On Host oakl00532897a.dhcp.oak.sap.corp: 4.15/815.80 1086.35

Trace Volume Size/Total Disk Usage/Total Disk Size (GB)

All Hosts: 0.02/1631.59 2172.71

Disk with Highest Trace Usage (on Host oakl00532897a.dhcp.oak.sap.corp): 0.01/815.80 1086.35

[More Information](#)

# HANA Cockpit

## Database Administration for SAP HANA Accelerator

Database Administration

The screenshot displays the SAP HANA Cockpit Database Administration interface with several overlapping windows:

- Databases List:** A table showing the status of various databases. All are 'Online'.
- etsdb Details:** A window for the 'etsdb' database, showing its size (148 MB) and status (Online).
- Add User Database:** A window for adding a new user database, showing fields for Database Name, Durability Level, Data Compression, and For Load.
- Add Device:** A window for adding a new device, showing a list of devices and their sizes.
- demodb Details:** A window for the 'demodb' database, showing its size (24 MB) and status (Online).

Database Name	Size (MB)	Status
etsdb	148	Online
master	104	Online
model	24	Online
sybpcidb	384	Online
sybssystemdb	48	Online
sybssystemprocs	196	Online
tempdb	124	Online

Device Name	Total Size (MB)
demodb_data_device	50
ets_data	100
ets_log	50
master	208
sybpcidb_data	384
sybpcidb_log	24
sybpcidb_dev	196
systemdbdev	100



### My Home

ASE User Database Backup  
Status ▲ Available



New Backup

ASE Database Administration  
Status ▲ Available



Manage Databases

ASE Login Administration  
Status ▲ Available



Manage Logins

ASE Database Device Administration  
Status ▲ Available



Manage Database Devices

SAP HANA Documentation  
accelerator for SAP ASE



ASE Server Configuration  
Status ▲ Available



Server Configure

# Summary

## **SAP HANA Accelerator for SAP ASE**

For ASE customers only

## **Enables Analytics for ASE Customers**

## **Integrated Experience**

Installation, configuration,  
monitoring

## **Easy Data Movement, Real-time**

Via SDA or Replication

## **Future Direction**

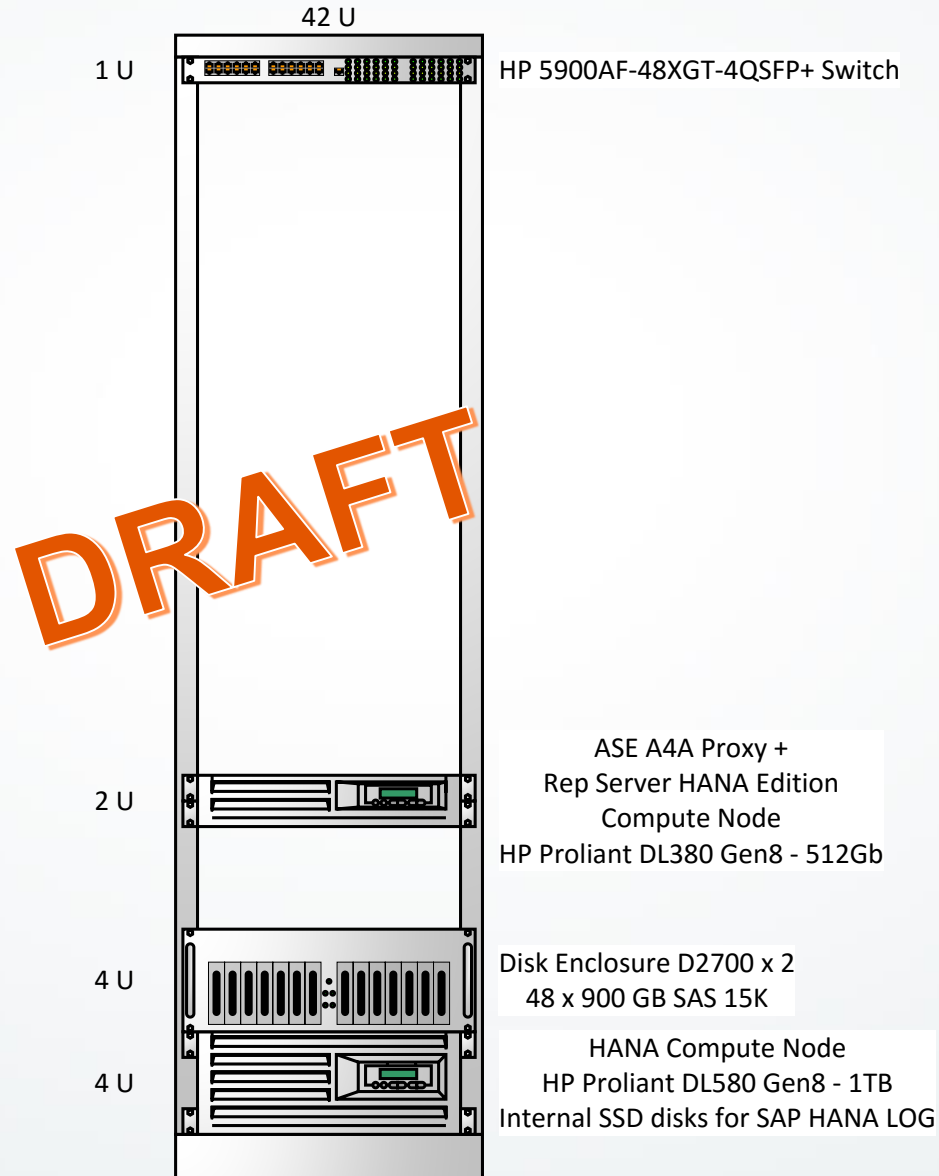
More seamless experience

- Data movement, security, etc

Easier application development



# A4A Proof of Concept – Reference Architecture



# APPENDIX

# SAP HANA Server Setup

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1. HANA Server and Table Configurations
  - Tables in HANA are configured as column tables
  - Temporary tables created in HANA (by ASE), are created as row tables

# Optimizations - Temporary Table Creation In HANA

## What is Executed in ASE

```
2> create procedure proc1
3> as
4> create table #tp01(i int, j varchar(10))
5> insert into #tp01 values (400, 'aaa')
6> select * from #tp01
7> select * from p1
8> select p1.c1, #tp01.i from #tp01, p1 where #tp01.j = p1.c1
```

1

2

3

## What is Sent to HANA

```
(
CREATE LOCAL TEMPORARY TABLE
"SYSTEM"."#tp01_1211425014"
(
i INTEGER NOT NULL,
j VARCHAR(10) NOT NULL
)

INSERT INTO "SYSTEM"."#tp01_1211425014" ( i , j ) VALUES (
400 , 'aaa' )

SELECT i , j FROM "SYSTEM"."#tp01_1211425014"
SELECT c1 FROM "SYSTEM".H1
SELECT T2.c1 , T1.i FROM "SYSTEM"."#tp01_1211425014" T1,
"SYSTEM".H1 T2 WHERE T1.j = T2.c1
DROP TABLE "SYSTEM"."#tp01_1211425014"
```

# Visualizing The Query Plan and SQL Statement Sent to HANA

1> Use traceflag to see what's sent to HANA - traceflag 11277

2> `dbcc traceon(3604,11277)`

DBCC execution completed. If DBCC printed error messages, contact a user with System Administrator (SA) role.

1>

2> `set showplan on`

1>

2> `select name + ' - ' + RTRIM(name) from proxycab`

Traceflag

Set showplan on

QUERY PLAN FOR STATEMENT 1 (at line 2).

STEP 1

The type of query is EXECUTE.

Executing a previously cached statement (SSQL\_ID = 1307709764).

Executed Query Plan

QUERY PLAN FOR STATEMENT 1 (at line 1).

Optimized using Parallel Mode

STEP 1

The type of query is SELECT.

1 operator(s) under root

| ROOT:EMIT Operator (VA = 1)

|

| | REMOTE SCAN Operator (VA = 0)

| | SERVER: odbchana

| | SELECT (name || ' - ' ) || (RTRIM(name) ) FROM "SYSTEM".h1

| | 1

SQL Statement Sent  
to HANA

`SELECT (name || ' - ' ) || (RTRIM(name) ) FROM "SYSTEM".h1`

-----  
aaa - aaa

# Enable Temporary Table Creation In HANA

- **Using the `sp_hana_admin` system procedure enables automatic creation of remote temporary tables in SAP HANA.**

`sp_hana_admin <remote_server_name>, sds_temp, {enable | disable}`

Step 1: Enable temp table creation in HANA

`sp_hana_admin <remote_server_name>, sds_temp_schema, <schema_name>`

Step 2: Specify the HANA schema where temp table can be created

## Where:

`<remote_server_name>` – is the name of the remote HANA server in which you are creating the temporary tables.

`sds_temp` – indicates you are creating a remote temporary table.

`sds_temp_schema` – identifier for a specific table schema.

`<schema_name>` – name of the HANA schema.

`enable | disable` – enables or disables the remote temporary table creation.

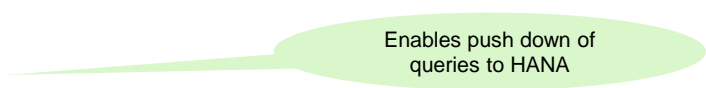
## Example”:

1. Enable the remote temporary table creation on SAP HANA: `sp_hana_admin HANA_server_name, sds_temp, enable`
  2. Add the table schema: `sp_hana_admin HANA_server_name, sds_temp_schema, HANA_schema`
- Restart the accelerator for SAP ASE server.
  - Subsequent queries that use the temporary tables pass the query directly to SAP HANA
  - After enabling automatic creation of remote temporary tables, enable cis pushdown for HANA.



# Optimizations - Enable Pushdown For HANA

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- **Enable HANA Pushdown Optimization**
- Use `sp_configure` to enable HANA pushdown optimization for SAP ASE to SAP HANA mapping.
- Once HANA pushdown optimization is enabled, SAP ASE maps the SAP ASE functions, expressions, and operators to their SAP HANA equivalents.
- **The syntax is: `sp_configure 'cis pushdown for HANA', [1 | 0]`**  Enables push down of queries to HANA
- By default, `cis pushdown for HANA` is disabled. You must restart the accelerator for SAP ASE server, to enable the change.
- **ASE does function mapping, expression mapping, SQL dialect mapping, etc.**

# Function Mapping

- Transact-SQL functions that are not supported in SAP HANA are mapped to equivalent SAP HANA functions
- SAP ASE maps the following SAP ASE functions to their SAP HANA equivalents

SAP ASE Function	Equivalent SAP HANA Function
abs	abs
ascii	ascii
atan	atan
cast	cast
ceiling	ceiling, ceil
char_length	length
charindex	locate
convert	cast
cos	cos
exp	exp
floor	floor
isnull	ifnull
lower	lower, lcase
ltrim	ltrim
month	month
power	power
right	right
round	round
rtrim	rtrim
sign	sign
sin	sin
sqrt	sqrt
substring	substring
tan	tan
upper	upper, ucase
year	year

# Expression Mapping

- SAP ASE expressions that are not supported in SAP HANA are mapped to an SAP HANA equivalent
- Once you enable optimization, SAP ASE maps the following SAP ASE expressions to their SAP HANA equivalents

SAP ASE Expression	SAP ASE Example	SAP HANA Expression	SAP HANA Example
+	select '123' + '32243'		select '123'    '32243' from dummy
like	like '%h_' like 'a[_]%' like 'a[^0-9]%'	like	like '%h_' like_regexpr 'a[_].*\$' like_regexpr 'a[^0-9].*\$'
case	select case when i>0 then 1 else -1 end from tb01	case	SELECT CASE WHEN i > 0 THEN 1 ELSE -1 END FROM tb01