SAP SYBASE ROADMAP
2018

PRESENTED BY
SAP & DOBLER CONSULTING
AGENDA

- Welcome
- Presenter
  - Anthony Antonello - V.P. HANA Global Centre of Excellence SAP
- Moderator
  - Peter Dobler – Founder & CEO Dobler Consulting
- Agenda
  - Housekeeping
  - Introduction to Dobler Consulting
  - SAP Sybase Roadmap 2018
  - Q&A
Housekeeping

- Everybody is in listen only mode
- Please use the “raise hand” feature to gain attention from the moderator
- Session is being recorded and playback will be available
- Please enter all questions through the panel
- Questions will be answered at the end of the presentation
Introduction to Dobler Consulting

Dobler Consulting is a leading provider of database services and information technology support, servicing clients ranging from small businesses to FORTUNE 500 companies across multiple industry verticals.

Servicing our clients with SAP Sybase upgrade and migration project, database managed services and license sales and consulting.

Visit us online at www.doblerconsulting.com, or contact us at 813 322 3240, or pdobler@doblerllc.com.
IT Modernization SAP ASE Roadmap

Anthony Antonello
V.P. HANA Global Centre of Excellence
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Modernization and SAP ASE

1. Overview and Vision
2. ASE and XOLTP
   - Memscale
   - Workload Profiler
3. ASE for Data Centre Operations
   - Always-on
   - Security
   - Workload Analyzer
4. ASE for Cloud
5. ASE Integration with HANA
6. ASE Roadmap and Futures
# SAP ASE
## Editions and their Focus

<table>
<thead>
<tr>
<th>Edition</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP ASE, platform edition</td>
<td>Secure deployment flexibility by incorporating SAP ASE, SAP IQ software, and SAP Replication Server in one licensing model</td>
</tr>
<tr>
<td>SAP ASE, enterprise edition</td>
<td>Power mission-critical database management systems for a single-node environment</td>
</tr>
<tr>
<td>SAP ASE, Edge edition</td>
<td>Enable solutions for smaller database deployments and applications with a limitation of eight cores</td>
</tr>
<tr>
<td>SAP ASE, express edition</td>
<td>Start building transactional applications on a free, full use license for development and deployment</td>
</tr>
<tr>
<td>SAP ASE, evaluation license</td>
<td>Take advantage of a free download for development environments (unlimited with all options available)</td>
</tr>
</tbody>
</table>

### memScale option
Leverages in-memory and HW optimizations to achieve linear scalability for high-concurrency XOLTP workloads.

### Workload analyzer option
Employs capture/replay techniques to allow production workloads to be replayed in dev/test environments to mitigate upgrade risks and more accurate server tuning.

### Always-on option
Leverages streaming replication to provide HADR clustering to support both high availability and disaster recovery including zero downtime maintenance and major upgrades.

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Evaluation, Packaging and Licensing Changes

New evaluation license to evaluate ASE EE
For non-production environments only
Primarily for personal or independent consultants
No limits on engines, connections, memory and storage space
Valid for 90 days. Can be extended for an additional year.

Enhanced Xpress Edition – free for production
Added capacity to lower costs for small businesses - 4 cores and 50 GB limit only

User Friendly Licensing to Avoid Business Disruption
Customers can install upgrades/patches even if their support contracts have expired
• Warning notice to customers allows them to renew support and update their licenses
Customers that need to run on larger machines than what they are licensed will be allowed to do so
• Warning provided to customers will remind them to be adequately licensed
2018-2019: ASE Engineering Focus Areas

**OLTP Performance**
- >4TB and >64K connections
- In-memory only tables
- Non-locking RO tables/partitions

**Data Center Operations**
- Always-On Enhancements
- Data Masking
- Temporal SQL
- 64bit MDA tables

**Cloud Enablement**
- Additional Cloud Services - Workload Analyzer
- Dev/test

**ASE and HANA**
- Common tooling
- HANA SQL Script enhancements
- Optimized data movement
SAP ASE – Feature-Packed Releases
Feature Rich Releases in Quick Succession

**ASE 15.7**
Reduce TCO
Support for SAP ERP

**ASE 16**
Scale, Speed
Security

**ASE 16 sp02:**
Acceleration
Availability, Agility

**ASE 16 sp03:**
Acceleration
HANA Compatibility

- Incremental reorg
- Incremental dump database
- Shrink DB
- Performance :
  - Insert, create index
  - Dump and Load
- Monitoring and Diagnosis

- Scale-up on large SMP systems
- Partition-level locking
- Index compression
- Full database encryption
- Residual data removal
- Multi-trigger support

- Extreme OLTP support
- Single HA and DR based on synchronous replication
- Workload Analyzer for easier troubleshooting and upgrade

- Extreme OLTP support (IMRS)
- Tooling and Packaging enhancements (SQLScript, WebIDE…)

2013
2014
2015
2017
ASE for XOLTP

ASE MemScale and Extreme Transaction Processing
What is SAP ASE Memscale?

ASE Memscale is a suite of ASE features designed to improve XOLTP Acceleration

The Memscale option in ASE 16 SP02, and SP03 leverages in-memory computing, intelligent data placement, atomic instructions as well as other hardware and software innovations.

The MemScale option is designed to significantly increases transaction throughput, concurrency and minimize latency.
What is SAP ASE Memscale?

Compiled Queries (SNAP)
Latch-Free B-Tree
Lockless Buffer Manager
What is SAP ASE Memscale?

Transactional Memory

Heat-Based Data Placement

Non Volatile Cache
What is SAP ASE Memscale?

In-memory Row Store (DRC)  Multi-Version Concurrency Control (MVCC)  Hash Cached B-Tree Index
# High-level MemScale Feature Applicability

<table>
<thead>
<tr>
<th>MemScale Feature</th>
<th>Resource Contention</th>
<th>Query Speed/ Latency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cache Mgmt Contention</td>
<td>OS memory concurrency controls</td>
</tr>
<tr>
<td>Lockless Data Cache (LLDC)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Simplified Native Access Plans (SNAP)</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Transactional Memory (TSX)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Latch-Free B-Tree (LFB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-memory Database (IMDB)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Non-Volatile Cache (NVCache)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Memory Row Store (IMRS)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Hash Cached B-Tree (HCB)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Multi-Version Concurrency Control (MVCC)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A Benchmark - Using Memscale Optimizations

MEMSCALE features tested
– Compiled Queries (SNAP)
– Lockless Buffer Manager
– Latch-free Btree

Benchmark Hardware (SAP Engineering)
– HP DL50 - 80 cores & 512GB memory each
– Each ASE configured identically – 80 engines, etc.
– Host #1 (red lines in graphs) → ASE 16 sp01
– Host #2 (blue lines in graphs) → ASE 16 sp02

The benchmark Suite
– An internal call center/case management system
  – Has similar profile to trading systems
  – Significant cache contention - users after the same data rows (e.g. current ticker prices)
– Benchmark scales from 1000 to 5000 users
Throughput

Response Time

Users #: 5000
16.0 SP02: 249638
16.0 SP01: 35038
Improved by: 7.1 times

Users #: 5000
16.0 SP02: 113
16.0 SP01: 24504
Improved by: 216.8 times
## E2E Performance SP01, SP02, SP03 with 64 engines & minimal tunings*

### Common Industry Benchmark

<table>
<thead>
<tr>
<th>ASE version</th>
<th>New order transactions / min</th>
<th>CPU Utilization</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.7 SP64</td>
<td>42K</td>
<td>99%</td>
<td>Cache manager spinlock contention</td>
</tr>
<tr>
<td>16.0 SP01 GA</td>
<td>42K</td>
<td>99%</td>
<td>Same as above</td>
</tr>
<tr>
<td>16.0 SP02 GA (with LFB+LLDC+SNAP)</td>
<td>282K (6.5X vs. baseline)</td>
<td>45%</td>
<td>Buffer unpinning on data pages, leading to latch conflicts resulting in syslogs semaphore contention</td>
</tr>
<tr>
<td>16.0 SP03 with same features</td>
<td>315K (7.5X vs. baseline)</td>
<td>44%</td>
<td>LFB Improvements; data page latch contention remains</td>
</tr>
<tr>
<td>+ DRC</td>
<td>719K (17X vs. baseline)</td>
<td>95%</td>
<td>Datapage latch contention removed</td>
</tr>
<tr>
<td>+ HCB</td>
<td>771K (18X vs. baseline)</td>
<td>96%</td>
<td>Further codepath improvements with HCB</td>
</tr>
</tbody>
</table>

*Minimal tunings – in the past when running this benchmark, the system was aggressively tuned using schema techniques such as partitioning, max rows per page etc. to try to avoid contention. For these tests, only standard memory/proc cache and server configurations were tuned.

That's ~13K tps….
ASE Workload Profiler
ASE 16 SP03 has a rich and complementary collection of features to enable extreme transaction processing
- Lockless Data Caches
- Latch Free B-tree Indexes
- In-Memory Row Storage
- Data Row Caching
- MVCC / OD-MVCC
- Hashed Cached B-tree

Feature enablement can be DB-wide or table-wide
- Indexes may need to be altered to use new features
- In-memory features need additional memory resources to be configured
- New logging mechanism for in-memory features needs additional disk devices
ASE Workload Profiler methodology

Baseline Schema info, MDA Metrics Space
usage, row counts, configuration, monitor counters, transaction log counts

Gather start sample metrics
Sampling interval
Gather end sample metrics

Processing Phase
Generate Delta-Metrics
Analyze Metrics:
Schema Info, Metrics, Counters Growth Rates
Capture Findings
Report Selection, Sizing
Recommendations
Apply DDL, Configuration

Profiling Session
Gather start metrics
Sampling interval
Gather end sample metrics
Sampling interval
Sampling interval
Sampling interval
Sampling interval

Run Workload
Source ASE
Target ASE IMRS-based
User interface and commands

Installwlprofiler: install script which has the DDL & sproc code needed to run ASE Workload Profiler

**sp_wlprofiler**: Main interface used to drive the ASE Workload Profiler

**Basic Usage**

```
sp_wlprofiler "monitor", dbname
```

```
sp_wlprofiler "monitor", dbname
```

```
sp_wlprofiler "finish" [, Workload-ID ]
```

**Extended Usage**

```
sp_wlprofiler [ "help" ]
```

```
sp_wlprofiler "status"
```

```
sp_wlprofiler "show"
```

```
sp_wlprofiler "report | report config"
```

```
sp_wlprofiler "drop metrics"
```

```
sp_wlprofiler "uninstall"
```

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'finish' sample output

1> sp_wlprofiler 'finish'
2> go

Running plan for Workload Name='TPCC' affecting target db = 'tpcc' evaluating feature(s) 'default'

Tables which are likely to benefit from feature 'default' in Workload Name 'TPCC' (ID = 2) affecting database 'tpcc' are listed below:

<table>
<thead>
<tr>
<th>WLP_ID</th>
<th>DBName</th>
<th>Owner</th>
<th>TableName</th>
<th>NRows</th>
<th>RowsInIMRS</th>
<th>PctInIMRS</th>
<th>IMRSCache_MB</th>
<th>IMRSLog_MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>tpcc</td>
<td>dbo</td>
<td>warehouse</td>
<td>240</td>
<td>240</td>
<td>100.00</td>
<td>2.45</td>
<td>3540.69</td>
</tr>
<tr>
<td>2</td>
<td>tpcc</td>
<td>dbo</td>
<td>district</td>
<td>2400</td>
<td>2400</td>
<td>100.00</td>
<td>4.76</td>
<td>12668.65</td>
</tr>
<tr>
<td>2</td>
<td>tpcc</td>
<td>dbo</td>
<td>item</td>
<td>100000</td>
<td>83222</td>
<td>83.22</td>
<td>32.36</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>tpcc</td>
<td>dbo</td>
<td>new_order</td>
<td>4097610</td>
<td>2273127</td>
<td>55.47</td>
<td>892.76</td>
<td>8149.22</td>
</tr>
<tr>
<td>2</td>
<td>tpcc</td>
<td>dbo</td>
<td>stock</td>
<td>24000000</td>
<td>1200000</td>
<td>5.00</td>
<td>1051.14</td>
<td>13954.15</td>
</tr>
<tr>
<td>2</td>
<td>tpcc</td>
<td>dbo</td>
<td>history</td>
<td>30095938</td>
<td>1504796</td>
<td>5.00</td>
<td>3978.00</td>
<td>5595.91</td>
</tr>
<tr>
<td>2</td>
<td>tpcc</td>
<td>dbo</td>
<td>order_line</td>
<td>305135760</td>
<td>15256787</td>
<td>5.00</td>
<td>44880.35</td>
<td>66298.89</td>
</tr>
</tbody>
</table>

(7 rows affected)

Total IMRS Cache and IMRS log sizes needed for the workload:

<table>
<thead>
<tr>
<th>WLP_ID</th>
<th>DBName</th>
<th>IMRSCacheSizeMB</th>
<th>IMRSLogSizeMB</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>tpcc</td>
<td>51142</td>
<td>110208</td>
</tr>
</tbody>
</table>

(1 row affected)

(return status = 0)
'report config' sample output

```
1> sp_wlprofiler 'report config'
2> go

List of configuration changes needed to enable feature 'default' for the tables in the database 'tpcc' seen in the workload 'TPCC' (ID = 2):

/*
** BEGIN: ASE Configuration suggested by Workload Profiler for Workload 'TPCC' (ID = 2) to enable feature 'default'
**
** Configuration generated on : May 16 2017  8:44AM
**
** ASE Version: Adaptive Server Enterprise/16.0 SP03/EBF 27167 SMP/P/x86_64/SLES 11.3/asecoronabtrim/0/64-bit/OPT/Tue May 16 07:43:29 2017
**
** Installwlprofiler version:
**
<table>
<thead>
<tr>
<th>Script</th>
<th>Version</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>installwlprofiler</td>
<td>16.0 SP03/EBF 27167 SMP/P/x86_64/SLES 11.3/asecoronabtrim/0/64-bit/OPT/Mon May 15 01:59:27 2017 Complete</td>
<td></td>
</tr>
</tbody>
</table>
(1 row affected)
*/

USE master
go

-- We need an additional 51142 MB of max memory to accommodate
-- the In-memory Row Storage Cache.
--
sp_configure 'max memory', 0, '541214M'
go

-- Create In-memory Row Storage Cache.
--
sp_cacheconfig 'tpcc_imrs_cache', '51142M', row_storage
```

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ASE for **Data Center Operations**

ASE 16 Features for Availability, Security & Administration
Always-On

HADR Cluster
Single cluster is limited to 2 nodes
• Additional standby nodes via external replication
Log-based Logical Replication Based
• Synchronous, Near-Synchronous, Asynchronous
• Zero Data Loss in Synch (RPO=0)
Fast failover (<2 minutes normally)
• Planned failovers <1 minute
GUI (ASE Cockpit – replaces SCC)

Capabilities
Automated fault detection
Automated transparent client failover
• Planned and unplanned failover support
Companion can be read-only for reporting
Zero-down time major upgrades
Supports In-Memory XOLTP optimizations in ASE
External Replication (Replication into/out of HADR Cluster)

ASE 16sp02 pl05
CI mode RepAgent embedded in SRS to read off SPQ
Appears to external SRS as if a RepAgent from a database
Allows HADR cluster to be implemented without modifying existing replication topology
• E.g. no need to drop & recreate repdefs & subscriptions

Current restrictions on external replication:
External SRS version must match HADR SRS version
MSA & Stored Proc/SQLDML replication supported
Table level replication to be supported in later release
• Use table exclusion in db repdef as work-around for now.
Security

ASE 15.7 added a lot of security features
Granular permissions
Predicated privileges
Login profiles
No more null passwords (installs)
Etc.

ASE 16.0 has added more
Full database encryption
Residual data removal
OpenSSL → SAP CCL
Restrict owner access
Granular auditing
Full text auditing
Configuration history auditing/tracking
Resolve as owner
On Demand Encryption
Password random
Security → Coming Soon: Secure Password Store (SP03 PL04)

What it is
Local secure store for ASE login credentials
Stores user names & passwords for servers

What happens
User connection only supplies login name
Credentials are looked up by API in user store
Actual credentials forwarded to ASE

Advantages
No more –P on command line
Limits exposure of automated process login info
Allows DBA’s to have different passwords for different servers without having to track in unsecure spreadsheets.
**Coming Soon: HSM Secure Key Store (SP03 PL06)**

**What it is**
Allows ASE root keys to be stored in networked Hardware Security Device (HSM)

**What happens**
ASE master key is encrypted with HSM key instead of SSO supplied passphrase
Key management for HSM key is accomplished via HSM
One or more ASE’s can use the same HSM key

**Advantages**
Eliminates risk of single user with password
Alternative to 2PI (dual control) on master key
ASE Workload Analyzer

Use the SAP ASE workload analyzer option to:

• Identify problematic queries, such as queries with a long response time.
• Identify client activity patterns, such as the number of requests per IP address.
• Measure the performance of captured workloads in different server configurations.
• Evaluate database upgrades and understand benefits from new options.
• Diagnose production problems by replaying functionality in a controlled environment.
• Test new features and run them against a captured workload to verify performance.
Workload Analyzer Architecture Overview
ASE for **Cloud**

ASE support for cloud deployments and services
Vision:
- Market-leading XOLTP DBMS
- High-performance/low-TCO DBMS for SAP and custom applications

Recent areas of focus
- Core XOLTP functionality
- SAP Business Suite and SAP R/3 development compatibility

Next big steps to reach our vision
- Provide enterprise-class cloud enablement capabilities
- Common SAP tooling/framework adoption

Areas of investment and path forward
- Cloud/cloud enablement
- Ongoing XOLTP/scalability enhancements
- Continued support for SAP Business Suite development
# SAP ASE on Cloud Today

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Product Edition</th>
<th>Key Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon</td>
<td>Enterprise Edition on Linux and Windows</td>
<td>• IaaS with BYOL (Bring Your Own License)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Customers can run options</td>
</tr>
<tr>
<td>Amazon</td>
<td>Runtime Edition (for SAP Business Suite) on all platforms</td>
<td>• IaaS with BYOL (Bring Your Own License)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Runtime Edition itself contains options</td>
</tr>
<tr>
<td>Docker</td>
<td>Developer, Express and Enterprise Edition</td>
<td>• Certification</td>
</tr>
<tr>
<td>SAP Managed Services Cloud</td>
<td>Enterprise Edition</td>
<td>• Hosted services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fully managed environment</td>
</tr>
<tr>
<td>SAP Cloud Platform</td>
<td>Adaptive Server Platform Edition (ASP)</td>
<td>• Subscription</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Fully managed DbaaS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Not all options that are part of the ASP enabled</td>
</tr>
</tbody>
</table>
SAP ASE Cloud Backup through AWS Storage Gateway to S3

Advantages
• Gives elastic and geographically remote storage
• Removes storage purchase and management
• Only pay for what you use
• Data is secure and encrypted at rest and in transit
• Meets compliance retention requirements
• No changes required to existing backup scripts or schedules except for backup location

How it works
• AWS Storage Gateway is installed on premise
• AWS S3 storage is mounted on premise as an NFS file system directory managed by Gateway
• SAP ASE saves backup files to NFS file system directory
• AWS Storage Gateway manages data transfers and retrievals between on premise and AWS S3
Integration with HANA

ASE functionality for integration with HANA
ASE and HANA: HANA SQLScript Support

- **Overview**
  - Support HANA SQLScript procedure
  - Support HANA SQL in ODBC, JDBC applications
  - SQLScript and TSQL parser co-exist but mutually exclusive
  - Database level separation

- **Phased implementation**
  - SQLScript core (ASE 16.0 SP03) is the first release followed by enhancements in future releases

Use Case 1: Build on ASE, deploy on ASE and then HANA

Use Case 2: Workload Management – Offload low-priority or low-margin OLTP apps to ASE
SQLScript Overview - Common language interface

Client

T-SQL Language

T-SQL databases

ASE

SQLScript Language

SQLScript databases

Client

HANA System
What is SAP HANA Accelerator for SAP ASE

- SAP HANA accelerator for SAP ASE provides native access to HANA capabilities from ASE.
  - SAP ASE T-SQL queries and stored procedures are executed against data in HANA

- This provides significant reporting performance improvements by pushing down the query processing to HANA

- HANA benefits are more than just speed
  - Customers can leverage all of the features of SAP HANA including HANA’s many specialized engines (spatial, text, predictive etc.) for new development.
Accelerating Legacy ASE Apps using HANA

- HANA runs Legacy ASE 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, charLength, charindex, like, concatenation)
- More pushdowns of SQL, such as CASE, UNION with constants
- Enable temp table creation in HANA
- Enable full-push down via configuration
- Data in HANA can be kept in sync with ASE, via replicating from ASE to HANA using Smart Data Integration
What is A4A? (Accelerator for ASE)
What is A4A? (Accelerator for ASE)
What is A4A? (Accelerator for ASE)
What is A4A? (Accelerator for ASE)
What is A4A? (Accelerator for ASE)
CREATE LOCAL TEMPORARY TABLE A4A_DEMO.#TS_713965909
(       TRADING_SYMBOL VARCHAR(15) NOT NULL,
       TRADESIZE INTEGER NOT NULL)
CREATE LOCAL TEMPORARY TABLE A4A_DEMO.#TRADERANK_729965966
(       RANKING INTEGER NOT NULL,
       TRADESIZE INTEGER NOT NULL)
INSERT INTO A4A_DEMO.#TS_141824751 (TRADESIZE, TRADING_SYMBOL)
SELECT SUM(T2.TRADE_SIZE ) , T2.TRADING_SYMBOL
FROM A4A_DEMO.STOCK_TRADE T2,A4A_DEMO.INSTRUMENT T3,A4A_DEMO.SCND_IDST_CLS T4
WHERE T2.TRADE_DATE  >= '2005-11-01' AND T2.TRADE_DATE  <= '2005-11-15' AND
T3.SCND_IDST_CLS_ID = T4.SCND_IDST_CLS_ID AND T4.SIC_NAME  = 'FINANCIAL' AND
T3.INSTRUMENT_ID = T2.INSTRUMENT_ID
GROUP BY T2.TRADING_SYMBOL
INSERT INTO A4A_DEMO.#TRADERANK_157824808 (TRADESIZE, RANKING)
SELECT  T3.*, A4A_DEMO.SEQ_#TRADERANK_157824808.NEXTVAL
FROM (SELECT DISTINCT T2.TRADESIZE  AS TRADESIZE
FROM A4A_DEMO.#TS_141824751 T2
ORDER BY 1 DESC )  T3
SELECT T1.TRADING_SYMBOL , T1.TRADESIZE , T2.RANKING
FROM A4A_DEMO.#TS_141824751 T1, A4A_DEMO.#TRADERANK_157824808 T2
WHERE T1.TRADE_DATE = T2.TRADE_DATE ORDER BY 3
DROP TABLE A4A_DEMO.#TS_713965909
DROP TABLE A4A_DEMO.#TRADERANK_729965966
Repatriating ASE T-SQL Procedures as HANA SQL Script Stored Procedure
2018 ASE Roadmap

State of current planning & ASE lifecycle
SAP ASE
Product road map overview – key themes and capabilities (cloud and Ops/Sec)

<table>
<thead>
<tr>
<th>Recent innovations¹</th>
<th>2018 – Planned innovations¹,²</th>
<th>2019 – Product direction¹,²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data center operations and security</td>
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<tr>
<td>Always-on enhancements</td>
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<td>XA support for always-on</td>
</tr>
<tr>
<td>CCL for SSL</td>
<td>Security Enhancements</td>
<td>Role based resource limits</td>
</tr>
<tr>
<td>Idle timeout</td>
<td>• Application redirection list</td>
<td>Log analyzer</td>
</tr>
<tr>
<td>Granular auditing</td>
<td>• Backup server with SSL</td>
<td>SAP Business Suite</td>
</tr>
<tr>
<td>On-demand network encryption</td>
<td>• Secure password store</td>
<td>• TMC SAP ASE administration</td>
</tr>
<tr>
<td><strong>Cloud enablement</strong></td>
<td>• Secure key storage (HSM for root key)</td>
<td><strong>Cloud enablement</strong></td>
</tr>
<tr>
<td>SAP ASE backup to the cloud (AWS)</td>
<td>SAP Business Suite</td>
<td>Cloud sizing tool</td>
</tr>
<tr>
<td>Google Cloud SAP ASE certification</td>
<td>• FRUN-based SAP ASE monitoring</td>
<td>Cloud data migration tool</td>
</tr>
<tr>
<td>AWS Cloud Subscription Service (phase 0)</td>
<td>• DR (3rd node) with Always-On</td>
<td>Always-on administration for SAP managed cloud</td>
</tr>
</tbody>
</table>

SAP ASE 16 SP03 PL03 is the current release.

1. Potential Data Protection & Privacy features include: Simplified deletion of personal data; reporting of personal data to an identified data subject; restricted access to personal data; masking of personal data; read access logging to special categories of personal data; change logging of personal data; and consent management mechanisms.  
2. This is the current state of planning and may be changed by SAP at any time without notice.

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## SAP ASE

### Product road map overview – key themes and capabilities (XOLTP+)

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<td>XOLTP and SAP ASE adoption</td>
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<tr>
<td>SAP HANA schema</td>
<td>A4A IBM P Little Endian Linux</td>
<td>XOLTP TCO (SAP applications)</td>
</tr>
<tr>
<td>SAP HANA SQL script</td>
<td></td>
<td>&gt; 32K connections</td>
</tr>
<tr>
<td></td>
<td>XOLTP and SAP ASE adoption</td>
<td></td>
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<tr>
<td></td>
<td>IMRS/MemScale enhancements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Externalize ILM for cache warming/scan rows</td>
<td></td>
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<tr>
<td></td>
<td>• FKEY/DRI lookup for HCB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;4TB memory support</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SAP Business Suite support CDS/SSL</td>
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</tr>
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# SAP ASE 16 SP02 and SP03 Patch Levels Pending

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<td><strong>ASE 16 SP02</strong></td>
<td>PL08  Dec 18</td>
<td></td>
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<tr>
<td><strong>ASE 16 SP03</strong></td>
<td>PL04  May/Jun</td>
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<tr>
<td><strong>ASE 16 SP03</strong></td>
<td>PL05  Aug/Sep</td>
<td></td>
</tr>
<tr>
<td><strong>ASE 16 SP03</strong></td>
<td>PL06  Dec 18</td>
<td></td>
</tr>
<tr>
<td><strong>ASE 16 SP03</strong></td>
<td>PL07  Q2/Q3 19</td>
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Key Roadmap Takeaways

- SAP is committed to ASE and to our ASE customers
- SAP ASE 16 is the most significant ASE release in the last 10 years
- ASE is positioned as SAP’s high end XOLTP database
- Follow-up Technical Deep Dives into ASE 16’s Feature sets and Options available
  - ASE Memscale Technical Overview
  - ASE Always-on Technical Overview
  - ASE Workload Analyzer Overview
  - Accelerator for ASE (A4A) Overview
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Q & A

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