SAP Adaptive Server Enterprise (ASE), SAP Replication Server and SAP IQ Roadmaps

Sumit Kundu, Product Management, Database and Data Management
May 31, 2017

The Digital Economy: Going to Extremes

Transaction-intensive, with more data, more users, more devices, more locations

6.1B
People using smartphones by 2020

Ericsson, 2015

$106B
Mobile payment transaction volumes by 2020

Ericsson, 2015

400M
In-store beacons by 2020

ABI Research, 2015

20.8B
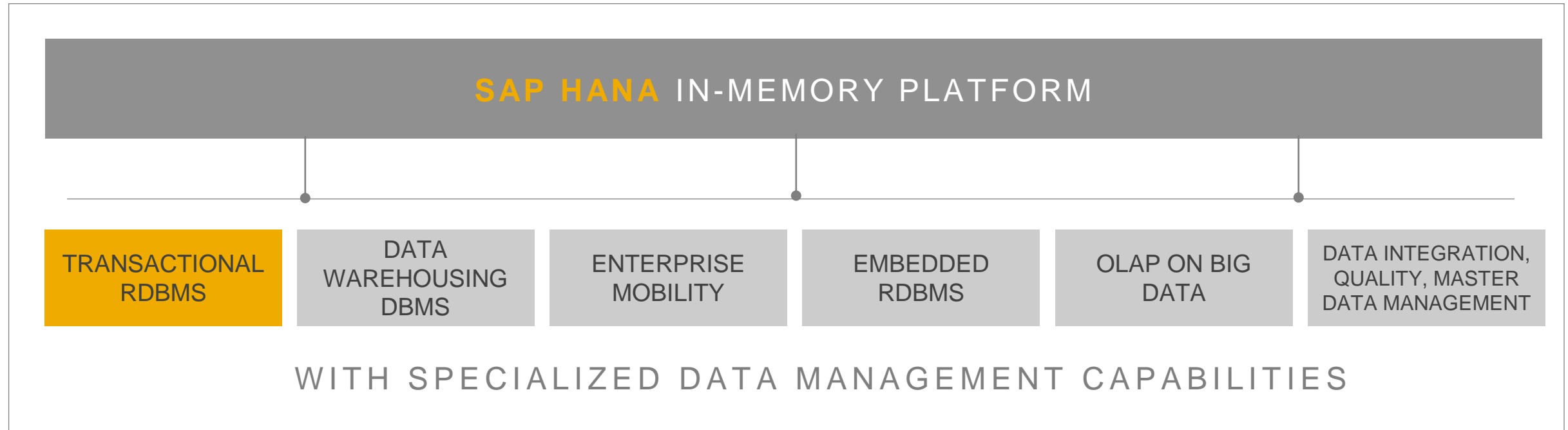Connected things will be in use worldwide by 2020.

Gartner Symposium/Itxpo, 2015

SAP Adaptive Server Enterprise (SAP ASE)
For faster, more reliable transaction-intensive applications

SAP Data and Database Management

SAP HANA IN-MEMORY PLATFORM

| TRANSACTIONAL RDBMS | DATA WAREHOUSING DBMS | ENTERPRISE MOBILITY | EMBEDDED RDBMS | OLAP ON BIG DATA | DATA INTEGRATION, QUALITY, MASTER DATA MANAGEMENT |

WITH SPECIALIZED DATA MANAGEMENT CAPABILITIES

Mission-Critical | Trusted | Low TCO

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SAP Adaptive Server Enterprise (ASE)
Product description

SAP ASE is a high performance relational enterprise database management system that is designed for mission-critical transactional intensive environments. It provides the most robust, high-performance platform for running custom developed applications, and for running SAP Business Suite applications.

High Performance Transactional Intensive Workloads

- Extreme Online Transaction Processing (XOLTP) focused database engine with in-memory techniques for linear scalability (scale-up vs. scale-out)
- Geographically distributed for low latency and autonomous operations
- #1 SD Benchmark 2, 4, 16 socket Linux x86

Highly Available

- Built-in resiliency, resource governors, workload management, online maintenance
- Integrated HADR clustering w/ multi site via external replication

Multi-Layer Secure

- Full database encryption as well as column encryption w/column obfuscation
- Row-level access controls/predicated privileges, granular permissions
- SSL & network encryption, login/password policies, LDAP/Kerberos/PAM

Low TCO

- Cloud support, ease of use
- Data/index partitioning & compression

Transactional Intensive

Highly Available

Multi-Layer Secure

Cloud Enabled

Global/Regionally Distributed

Low TCO

SAP Adaptive Server Enterprise (ASE)
In the Database & Data Management product portfolio

SAP ASE, platform edition

Secure deployment flexibility by incorporating SAP ASE, SAP IQ software, and SAP Replication Server in one licensing model.

SAP ASE, enterprise edition

Power mission-critical database management systems for a single node environment.

SAP ASE, Edge edition

Enable solutions for smaller database deployments and applications with a limitation of eight cores.

SAP ASE, express edition

Start building transactional applications on a free, full use license for development and deployment

- 50 GB disk
- 4 engines

SAP ASE, evaluation license

Take advantage of a free download for development environments (unlimited with all options available).

3-in-1 Solution **Large Enterprises** **Mid Market & ISVs** **Start-Ups/Small Business** **Developers/Education**

MemScale Option

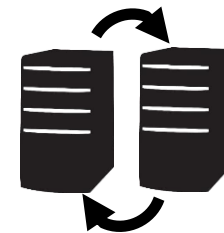Leverages in-memory and HW optimizations to achieve linear scalability for high concurrency XOLTP workloads

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
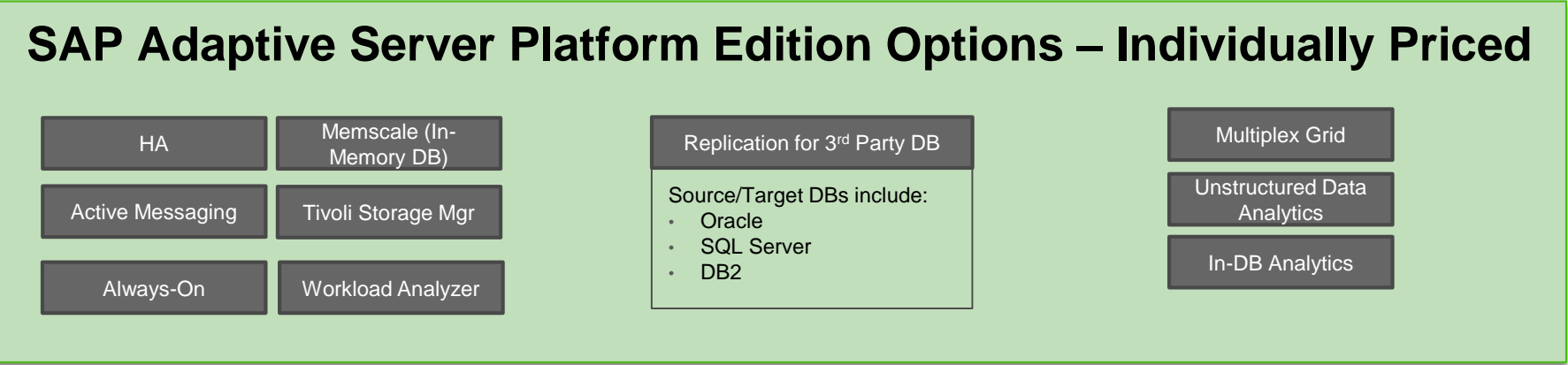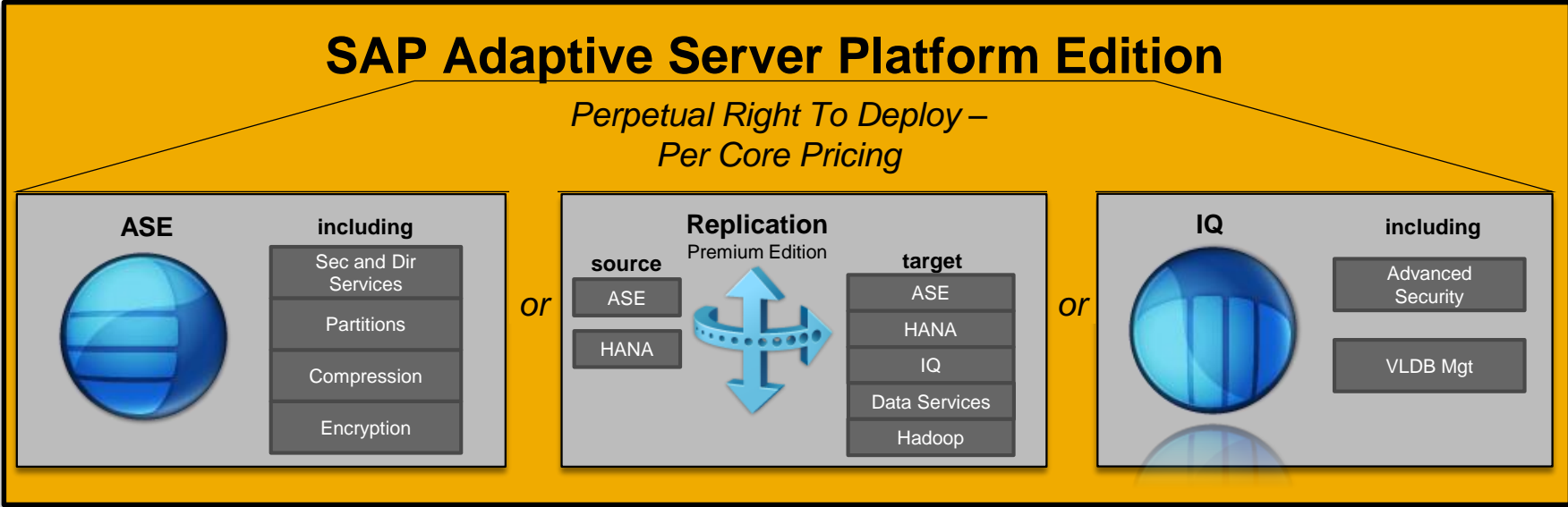
Always On Option

Leverages streaming replication to provide HADR clustering to support both High Availability and Disaster Recovery including Zero Down Time maintenance and major upgrades

XOLTP **TCO** **High Availability**

SAP Adaptive Server Platform Edition

SAP Adaptive Server Platform Edition

Perpetual Right To Deploy – Per Core Pricing

ASE

including

- Sec and Dir Services
- Partitions
- Compression
- Encryption

or

Replication
Premium Edition

source
- ASE
- HANA

target
- ASE
- HANA
- IQ
- Data Services
- Hadoop

or

IQ

including

- Advanced Security
- VLDB Mgt

SAP Adaptive Server Platform Edition Options – Individually Priced

- HA
- Memscale (In-Memory DB)
- Active Messaging
- Tivoli Storage Mgr
- Always-On
- Workload Analyzer

Replication for 3rd Party DB

Source/Target DBs include:
- Oracle
- SQL Server
- DB2

- Multiplex Grid
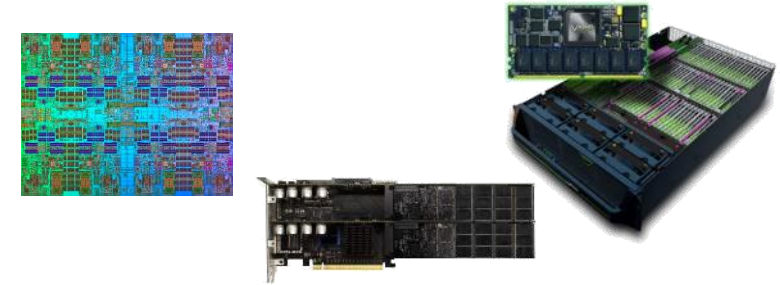- Unstructured Data Analytics
- In-DB Analytics

SAP Adaptive Server Enterprise (ASE)
Key trends and impacts in business and technology (1)

Hardware is rapidly evolving
- Very high core counts per socket (24+) & chip level API's (TSX, SIMD, etc.)
- Larger memory (>4TB) → in-memory processing
- Movement away from HDD to SSD (PCIe & AFA….NVMe/UltraDIMM next)

Cost, TCO & ROI are key factors
- Commodity hardware
- OpenSource → reduce acquisition costs for simpler/smaller systems
- Cloud → reduce data center & infrastructure costs for surge applications
- Limitations in data center power & cooling → denser platforms & virtualization

High concurrency – "WebScale"
- No longer a well defined environment with app servers & connection pools
  - Mobile devices, algorithmic trading, automated processing, "bots", etc
  - Sensor driven transactions/proximity marketing, smart devices, etc.
- Existing systems easily overwhelmed – "flash crashes"
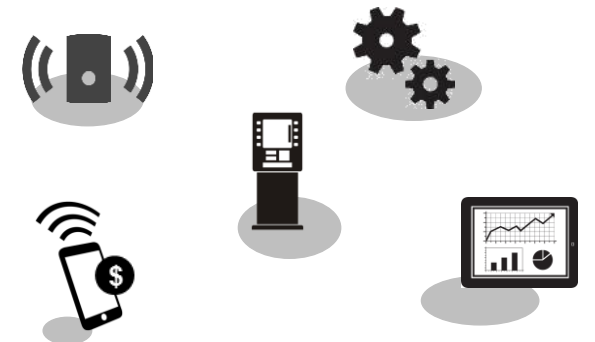
SAP Adaptive Server Enterprise (ASE)
Key trends and impacts in business and technology (2)

High Speed/Low Latency Execution
- Apps expect entire screen in sub-second – queries in milliseconds
- Real-time analytics

Architectures & Application development shifting
- JSON not only used for data interchange, but also schema simplification
- Shared nothing clusters for scalability
- Streaming replication for High Availability/Disaster Recovery
- Cloud for dev/test & common micro-services
  - Cloud backups, cloud DR, data tiering to cloud, etc.

Security is crucial
- Data and network protection from hackers
- Regulatory compliance for auditing/access controls
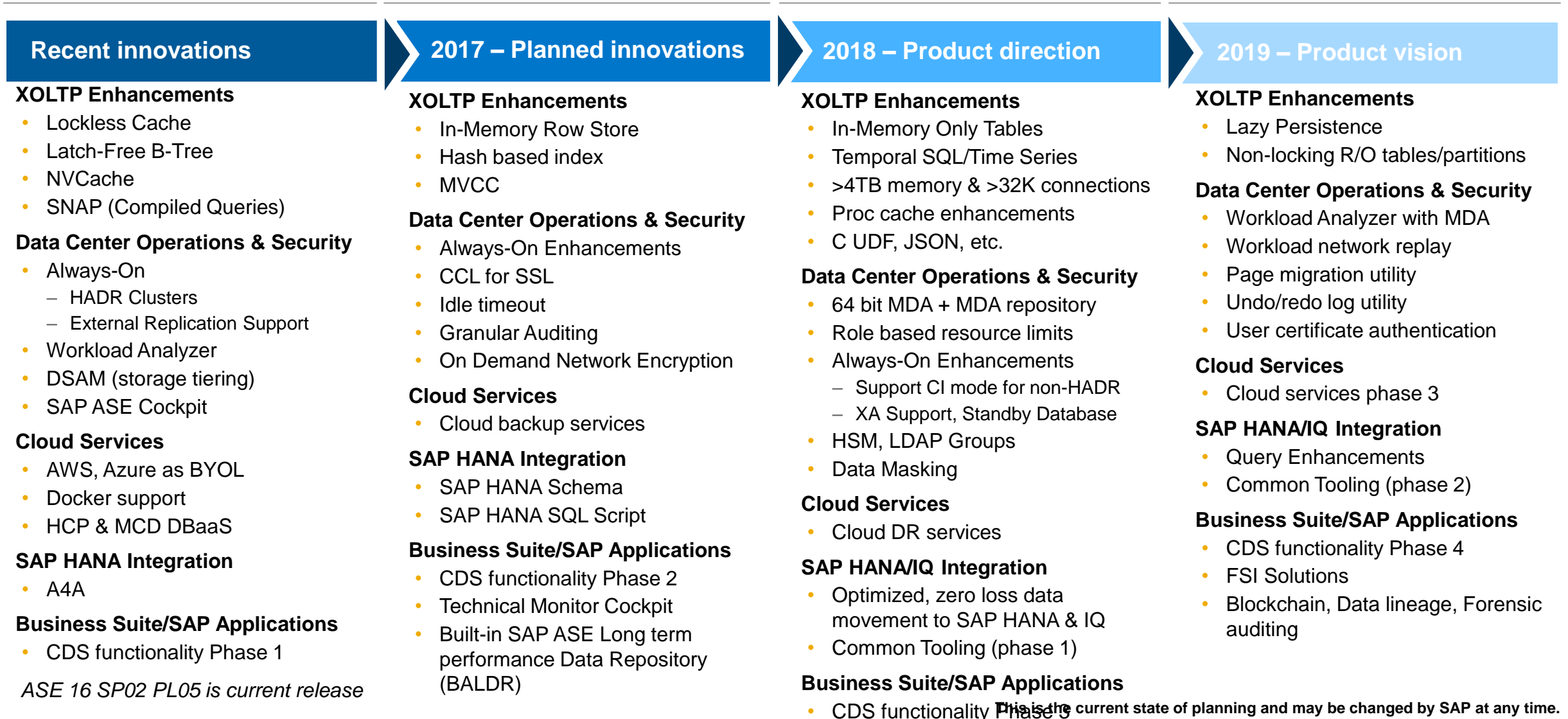- Data encryption & masking for cloud

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ASE Roadmap – Strategic Thrusts

	Innovation and Leadership	Today	Future
OLTP Performance		• Linear scaling on large SMP systems • Improved concurrency in systems with large user counts • Enhanced query execution speed with compilation to machine code	• In-memory processing with ACID property • Concurrency enhancements with Multi-version concurrency control support – in memory and on disk • Extreme performance with order of magnitude throughput increase on large core count machines
Datacenter Operations (Availability, Security, cost reduction)		• Built-in, unified solution for HA and DR using synchronous replication • Ease of tuning and upgrade with Workload Analyzer in ASE Cockpit • Full-text auditing of DDL commands	• Replication and XA support with HADR • 100% online utilities for max uptime • Data Masking and On-demand encryption • Audit repository & tracking data lineage • Performance monitoring analytics
Virtualization and Cloud Support		• DB-as-a-Service on SAP Cloud Platform and BYOL on AWS • Docker support	• Cloud services on AWS and other cloud providers for hybrid deployments • Cloud Foundry, SCP support for app dev
ASE and HANA, ASE for Business Suite		• Run reporting applications on HANA without any code change • Competitive "anydb" choice for Business Suite with builtin HADR, full DB encrypt	• Build new apps using SQLScript • Support Core Data Services • Common tooling for Business Suite and custom apps

Today ➜ **Future**

SAP Adaptive Server Enterprise (ASE)
Product road map overview - key themes and capabilities

Recent innovations

XOLTP Enhancements
- Lockless Cache
- Latch-Free B-Tree
- NVCache
- SNAP (Compiled Queries)

Data Center Operations & Security
- Always-On
  - HADR Clusters
  - External Replication Support
- Workload Analyzer
- DSAM (storage tiering)
- SAP ASE Cockpit

Cloud Services
- AWS, Azure as BYOL
- Docker support
- HCP & MCD DBaaS

SAP HANA Integration
- A4A

Business Suite/SAP Applications
- CDS functionality Phase 1

ASE 16 SP02 PL05 is current release

2017 – Planned innovations

XOLTP Enhancements
- In-Memory Row Store
- Hash based index
- MVCC

Data Center Operations & Security
- Always-On Enhancements
- CCL for SSL
- Idle timeout
- Granular Auditing
- On Demand Network Encryption

Cloud Services
- Cloud backup services

SAP HANA Integration
- SAP HANA Schema
- SAP HANA SQL Script

Business Suite/SAP Applications
- CDS functionality Phase 2
- Technical Monitor Cockpit
- Built-in SAP ASE Long term performance Data Repository (BALDR)

2018 – Product direction

XOLTP Enhancements
- In-Memory Only Tables
- Temporal SQL/Time Series
- >4TB memory & >32K connections
- Proc cache enhancements
- C UDF, JSON, etc.

Data Center Operations & Security
- 64 bit MDA + MDA repository
- Role based resource limits
- Always-On Enhancements
  - Support CI mode for non-HADR
  - XA Support, Standby Database
- HSM, LDAP Groups
- Data Masking

Cloud Services
- Cloud DR services

SAP HANA/IQ Integration
- Optimized, zero loss data movement to SAP HANA & IQ
- Common Tooling (phase 1)

Business Suite/SAP Applications
- CDS functionality Phase 3

2019 – Product vision

XOLTP Enhancements
- Lazy Persistence
- Non-locking R/O tables/partitions

Data Center Operations & Security
- Workload Analyzer with MDA
- Workload network replay
- Page migration utility
- Undo/redo log utility
- User certificate authentication

Cloud Services
- Cloud services phase 3

SAP HANA/IQ Integration
- Query Enhancements
- Common Tooling (phase 2)

Business Suite/SAP Applications
- CDS functionality Phase 4
- FSI Solutions
- Blockchain, Data lineage, Forensic auditing

This is the current state of planning and may be changed by SAP at any time.

Adaptive Server Enterprise (ASE) 16 sp02
XOLTP Transaction Processing

Provide eXtreme OLTP transaction processing capabilities allowing customers to more efficiently scale-up applications linearly

Performance/XOLTP

- MemScale Option → leverages in-memory processing techniques, chipset API and recent OLTP developments such as natively compiled queries to provide XOLTP capabilities
- HANA Accelerator for ASE (A4A) → uses query pushdown and functional compensation to execute ASE based reporting applications using the HANA database engine

High Availability

- Always-On Option → leverages streaming replication to provide hardware agnostic/cloud friendly high availability and disaster recovery

Ease of Use/TCO

- Workload Analyzer Option → leverages capture/replay technology to mitigate risks during upgrades and provide faster optimization
- Cloud Readiness → incorporates many features such as dynamic IP to support cloud deployment environments

PERFORMANCE

In Memory Technology
(Database MemScale Option)

Report Acceleration
(SAP HANA Accelerator for SAP ASE)

AVAILABILITY

Replication Based HA
(Database Always-on Option)

EASE OF USE

Workload Analysis
(Workload Analyzer Option)

Cloud Readiness

SAP ASE 16 SP02 MemScale – High Performance Features

Simplified Native Access Plans (Compiled Queries)
- Compiled query plans – faster execution
- Transparent to applications and users

Latchfree B-Tree on Indexes
- Reduces contention on index pages
- Increases concurrency and performance

Lockless Buffer Manager
- Decreases cache contention on small, highly used tables
- Increases concurrency and performance

Transactional Memory
- Minimize contention leveraging hardware for identifying memory conflicts

Non Volatile Cache Management
- Leverage SSD for storing frequently accessed/updated pages

Diagram labels: ODBC, JDBC, T/SQL, Scripts, XOLTP QP, Parallel, Code Compile, Dynamic Threading, Main Memory, MVCC, In-memory Row Store, Lockless Metadata, Transaction Memory, Kernel Threading, Buffer Cache, Disk, Flash Disk

Legend: Upcoming, New In SP02, Available
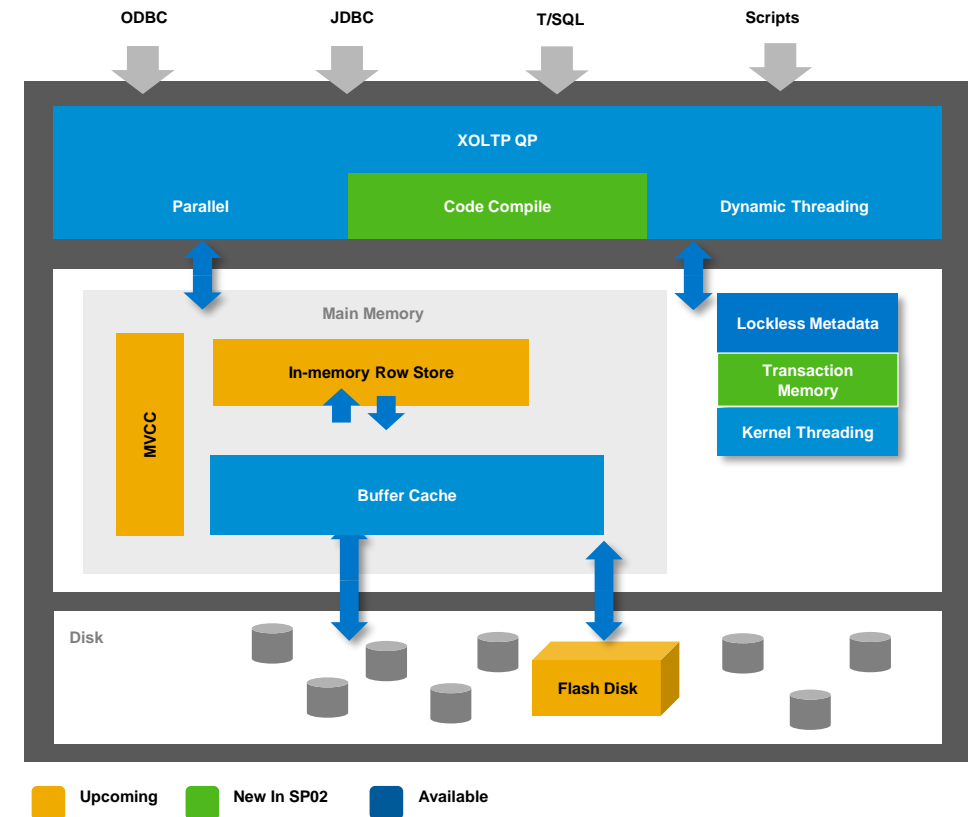
ASE with EMC XtremIO

XtremIO is 250% faster than HDD

If database is completely in SSD using XtremIO, the performance is 2.5x faster than HDD solution

NV Cache using XtremIO is 175-225% faster than HDD

As cache hit rates dropped, the NV Cache scaled to within 90% of the same performance as an all flash array implementation
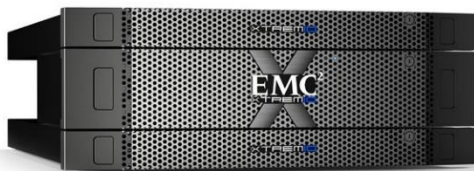
1-8 X-Bricks per rack
150K → 1.2M IOPS
20-320TB capacity
~$25/GB* ~$200K/10TB*

*anecdotal pricing for single X-Brick based on internet chatter
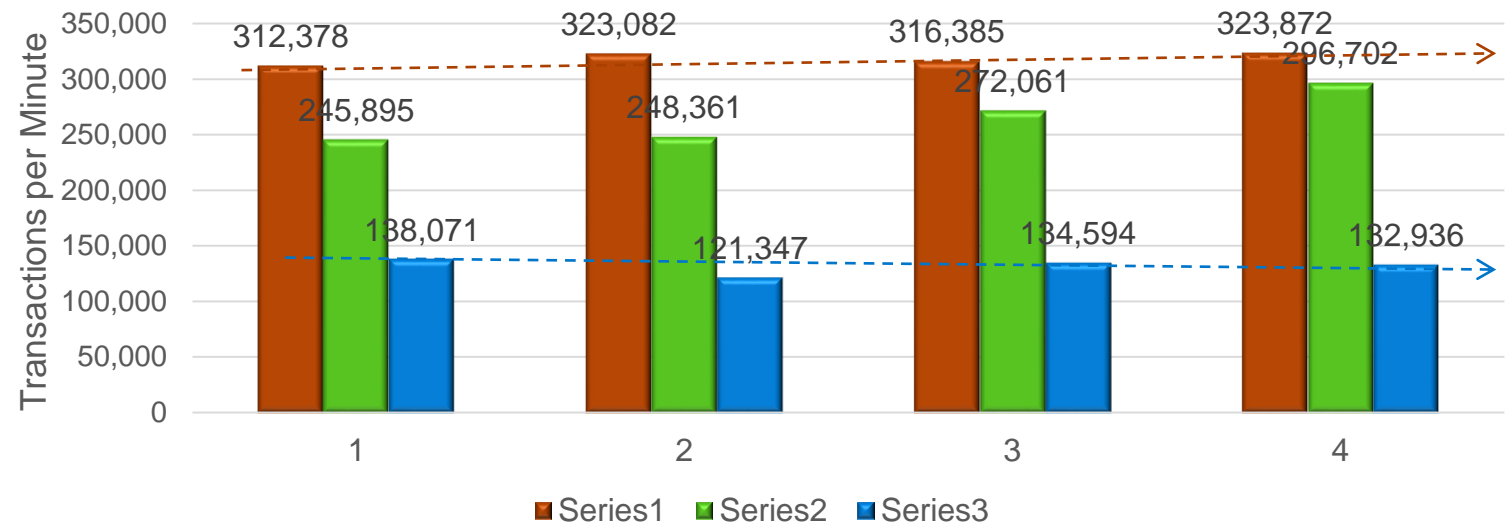
DB Scale	XtremIO-only (tpmC)	NVC+HDD (tpmC)	HDD only (tpmC)	XtremIO vs. HDD	NVC+HDD vs XtremIO-only	NVC+HDD vs HDD-only
120GB	312,378	245,895	138,071	226.24%	72.90%	178.09%
144GB	323,082	248,361	121,347	266.25%	83.91%	204.67%
168GB	316,385	272,061	134,594	235.07%	85.71%	202.13%
192GB	323,872	296,702	132,936	243.63%	90.84%	223.19%

Note: Preliminary Results – Final Results and collateral to follow Q1 2016

The larger the DB size vs. the ASE memory, the more obvious the impact

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SAP Business Suite on ASE

~10,000+ Instances

~3000+ new ASE customers

Prompting a large number of SAP customers to consider

standardizing on ASE for all apps

- Migrating off primarily Oracle & some MSSQL

Most are >>1TB

Smallest are 250GB+ (Solution Manager)

Norm is ~3TB

Largest is 13TB (in a single DB!)

#1 Performance for SD Benchmark*

Date	Hardware	CPU	OS	RDBMS	Users
9/15/2016	HPE Integrity Superdome with Gen9 blades	Intel Xeon E78890 v4 2.6GHz 24-core, 16 processors	RHEL 7.2	SAP ASE 16 SP02	117,611
6/6/2016	Dell PowerEdge R930	Intel Xeon E7-8890 v4, 2.2 GHz, 4 Processors	RHEL 7.2	SAP ASE 16 SP02	41,450
5/6/2016	Dell PowerEdge R730	Intel Xeon E5-2699 v4, 2.2 Ghz, 2 Processors	RHEL 7.2	SAP ASE 16 SP02	21,450

* comparisons on 2, 4 processor systems on Linux only

UZ Leuven: Delivering Better Care for More Patients with SAP® Adaptive Server Enterprise

Company
UZ Leuven (Universitaire Ziekenhuizen Leuven)

Headquarters
Leuven, Belgium

Industry
Healthcare

Products and Services
Patient care, medical research

Employees
9,000

Beds
2,000

Web Site
www.uzleuven.be

Use of SAP ASE

KWS is one of the largest systems of its kind anywhere, hosting **a 12-terabyte database** handled by **64 engines**. It supports more than **25,000 named users, with 6,000 active** at any one time. It's powered by more than **21,000 stored procedures and nearly 4,500 triggers**, comprising a 1.5 million line combined code base. Each day, KWS **processes 85 million transactions, with 150,000 rows inserted, updated, or deleted every second.**

Objectives
- Continue refining a clinical workstation system to enhance patient care
- Keep up with growing numbers of patients and an ever-expanding national network of hospitals
- Prepare for the next generation of healthcare sensors and devices

Resolution
- Incorporated high-performance in-memory processing by upgrading the underlying application database to the latest version of SAP® Adaptive Server® Enterprise (SAP ASE)
- Simplified application software with the built-in optimizations of the SAP ASE database server
- Created a single source of truth, enabling consistent, shared business procedures and patient data

"Upgrading to the latest version of SAP ASE has helped us meet our commitment to provide outstanding care to our patients, while expanding our network of hospitals throughout Belgium."

Reinoud Reynders, IT Manager of Infrastructure & Operations, UZ Leuven

300%
Query performance improvement

Expanded
Reach and scope of clinical trials

100%
Successful certification of network hospitals

SAP Adaptive Server Enterprise (ASE)
Product road map overview - key themes and capabilities

Recent innovations	2017 – Planned innovations	2018 – Product direction	2019 – Product vision

XOLTP Enhancements
- Lockless Cache
- Latch-Free B-Tree
- NVCache
- SNAP (Compiled Queries)

Data Center Operations & Security
- Always-On
  – HADR Clusters
  – External Replication Support
- Workload Analyzer
- DSAM (storage tiering)
- SAP ASE Cockpit

Cloud Services
- AWS, Azure as BYOL
- Docker support
- HCP & MCD DBaaS

SAP HANA Integration
- A4A

Business Suite/SAP Applications
- CDS functionality Phase 1

XOLTP Enhancements
- In-Memory Row Store
- Hash based index
- MVCC

Data Center Operations & Security
- Always-On Enhancements
- CCL for SSL
- Idle timeout
- Granular Auditing
- On Demand Network Encryption

Cloud Services
- Cloud backup services

SAP HANA Integration
- SAP HANA Schema
- SAP HANA SQL Script

Business Suite/SAP Applications
- CDS functionality Phase 2
- Technical Monitor Cockpit
- Built-in SAP ASE Long term performance Data Repository (BALDR)

ASE 16 sp03 is planned release

XOLTP Enhancements
- In-Memory Only Tables
- Temporal SQL/Time Series
- >4TB memory & >32K connections
- Proc cache enhancements
- C UDF, JSON, etc.

Data Center Operations & Security
- 64 bit MDA + MDA repository
- Role based resource limits
- Always-On Enhancements
  – Support CI mode for non-HADR
  – XA Support, Standby Database
- HSM, LDAP Groups
- Data Masking

Cloud Services
- Cloud DR services

SAP HANA/IQ Integration
- Optimized, zero loss data movement to SAP HANA & IQ
- Common Tooling (phase 1)

Business Suite/SAP Applications
- CDS functionality Phase 3

XOLTP Enhancements
- Lazy Persistence
- Non-locking R/O tables/partitions

Data Center Operations & Security
- Workload Analyzer with MDA
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- Page migration utility
- Undo/redo log utility
- User certificate authentication

Cloud Services
- Cloud services phase 3

SAP HANA/IQ Integration
- Query Enhancements
- Common Tooling (phase 2)

Business Suite/SAP Applications
- CDS functionality Phase 4
- FSI Solutions
- Blockchain, Data lineage, Forensic auditing

This is the current state of planning and may be changed by SAP at any time.

2017 Planned innovations
XOLTP Transaction Processing

Continue to enhance ASE's XOLTP capabilities by exploiting in-memory techniques to provide faster access and reduced contention when reading or modifying frequently accessed data

XOLTP Enhancements
- MemScale Option → gains extensive support from additional in-memory processing techniques to improve scalability in high concurrency environments

Data Center Operations & Security
- Always-On Option → achieves LTL RepAgent parity allowing advanced replication features to be used in Always-On deployments when replicating to external systems
- Security → replaces OpenSSL with CCL for SAP product standardization and reduced vulnerabilities in addition to non-SSL based on demand network encryption and other security enhancements

Cloud Services
- Backup to Cloud → provide certified approaches for backing up to cloud storage as well as a integrated cloud service for backing up directly to the cloud

SAP HANA Integration
- SQL Script support → Allow applications to be developed in a common language for deployment in either ASE or HANA as requirements dictate

XOLTP Performance

In Memory Row Store,
HCB, MVCC
(Database MemScale Option)

Data Center Operations

Always-On Enhancements
(Database Always-on Option)

Security Enhancements

Business Suite Enhancements

Cloud Enablement

Cloud Micro-Services

SAP HANA Integration

HANA SQLScript
Support

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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

OLTP APP

Build

ASE → HANA

Deploy

ASE → HANA

HANA → ASE

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ASE 16 sp04 is planned release   **This is the current state of planning and may be changed by SAP at any time.**

2018 Product direction

Adaptive Server Enterprise (ASE) 16 near-term general direction summary

- Increased XOLTP capabilities by
  - supporting larger memory systems and greater user concurrency
  - supporting temporal SQL and SQL Window query support common to time series data streams
  - supporting JSON data storage and parsing in ASE for developers
- Improved Data Center Operations & Security through
  - Enhancements to Always-On to handle XA transactions
  - Support native CI mode access for DR only or complicated HA environments
  - Support for a simplified standby database implementation to provide read-only access to the standby without additional setup/maintenance currently required
  - Exploiting Hardware Security Modules for faster network, full database and column encryption
- Provide cloud-based DR support as a service
- Improved HANA integration through
  - Provide streaming zero data loss replication from ASE to HANA or SAP IQ for low latency, real time analytics support

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- FSI Solutions
- Blockchain, Data lineage, Forensic auditing

ASE 16 sp05 or ASE 16.1 (TBD)

This is the current state of planning and may be changed by SAP at any time.

2019 Product vision

Adaptive Server Enterprise (ASE) 16 long-term general direction summary

- Continued enhancement of ASE's XOLTP capabilities
- Improved data center operations via more advanced capture/replay integration with monitoring API
- Utilities to facilitate storage infrastructure changes and isolated transaction recovery/undo capability
- Incorporation of technologies key to Financial Technology (FinTech) adoption such as blockchain

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SAP Adaptive Server Enterprise (ASE)
Moving to the digital world

Business Need / Capability	Product Today If you run this product today …	Go-to Product You might want to consider a move to …	Additional Information
OLTP + RealTime Analytics	ASE → SRS → ASE	a) ASE Platform Edition (ASE/PE) b) ASE/PE + HANA Accelerator for ASE (A4A)	ASE Platform Edition includes ASE, SRS, IQ with flexible deployment plus common security, partitioning and compression options
High Availability	ASE Cluster Edition (CE) ASE/HA option ASE Disaster Recovery Option	ASE Always-On Option	Always-On supports cloud/hardware agnostic deployments and removes limits on ASE functionality due to Cluster Edition
XOLTP	Multiple ASE instances in loose cluster	ASE Platform Edition + MemScale	MemScale may allow multiple sharded ASE instances be recombined into a single less complex deployment
Production workload simulation/testing	Ad-hoc manual test scripts	ASE Cockpit + Workload Analyzer	Leverage capture/replay to accurately capture production workloads to replay for testing to mitigate risks & improve performance tuning capability

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Evaluation, Packaging and Licensing Changes

- **New evaluation license to evaluate ASE EE**

  - For non-production environments only

  - No limits on engines, connections, memory and storage space

  - Valid for 90 days. Can be extended for an additional year.

  - **http://www.sap.com/product/data-mgmt/sybase-ase.html**

SAP Adaptive Server
Enterprise Evaluation Edition

Drive faster, more reliable online transaction processing (OLTP) – for less – with SAP Adaptive Server Enterprise. Designed to meet the demands of the digital economy, this high-performance SQL database server uses a relational model to power transaction-based applications – on premise or in the cloud.

✓ Free for use in any non-production environment
✓ Unlimited engines, memory, users, and database size
✓ Runs on Linux
✓ Includes SAP ASE options
✓ 90-day evaluation period can be extended for 1 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

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Customer

Summary

Adaptive Server Enterprise

XOLTP focus
- Focus is to greatly improve the low-latency execution and scalability of ASE allowing customers to scale-up on today's & tomorrow's high density compute platforms
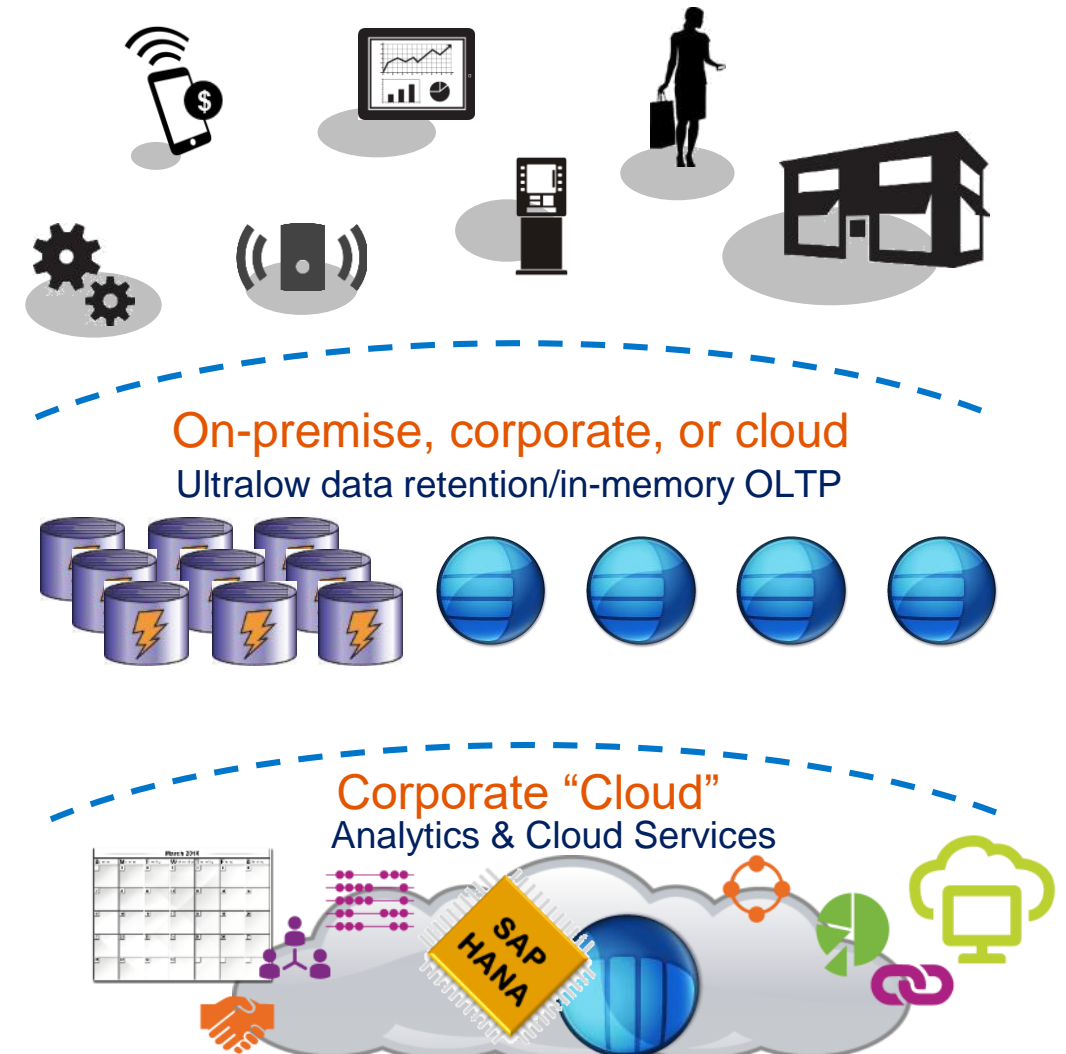
Data center operations eco-system
- High availability and security to protect and defend XOLTP systems from outages and attacks
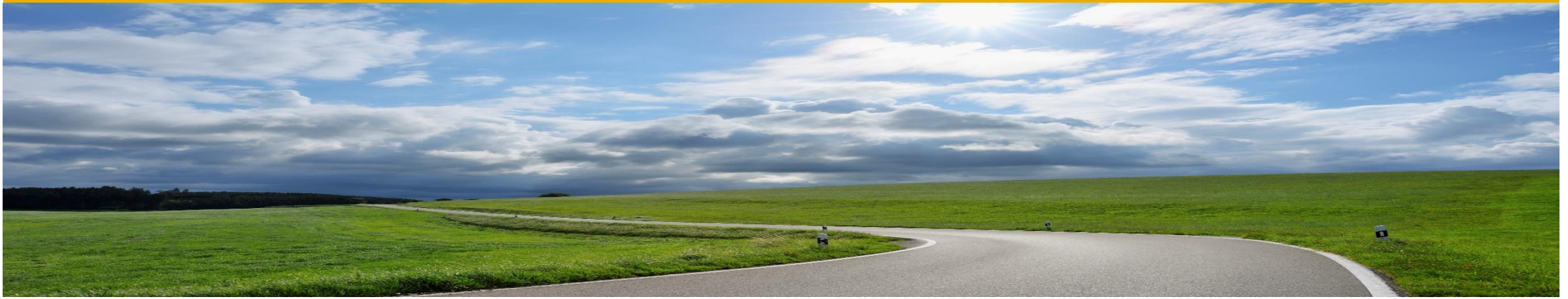
Cloud services
- Flexible on-premise or in cloud deployment options as well as leveraging the cloud for common services for on-premise systems

HANA integration
- Continued more tight integration with HANA providing XOLTP with Real Time Analytics on optimized platforms vs. brute force, less mature technologies and systems.

On-premise, corporate, or cloud
Ultralow data retention/in-memory OLTP

Corporate "Cloud"
Analytics & Cloud Services

This is the current state of planning and may be changed by SAP at any time.

SRS Road Map

SAP Replication Server
## Key trends and impacts in business and technology

ASE Replication

ASE-to-any and any-to-ASE

- Supports ASE replication to supported databases
- Supports supported databases to ASE replication
- Note: Replication to SAP HANA will be supported by SAP HANA smart data integration solution.

Performance and Reliability

Performance, Usability, Monitoring & Consistency
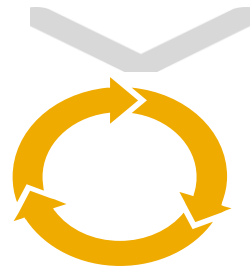
- Improved replication agent and server performance tuning
- Enhanced setup and configuration, and performance tuning support
- Enhanced management and monitoring support
- Data consistency and reconcilement from any supported source to any supported target
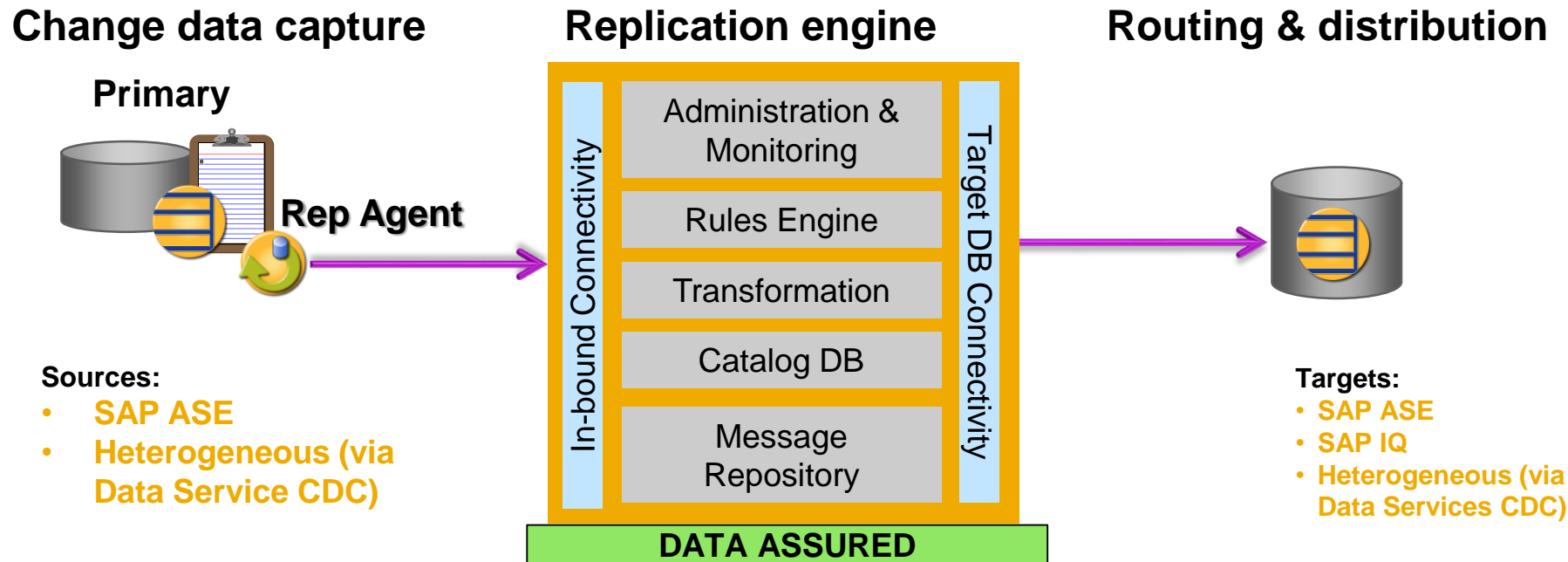
Cloud Deployment

CapEx to OpEx Business Transformation and Agility

- Reduce costs by deploying replication solutions in cloud
- Take advantage of SAP solutions for cloud deployment
- Streamline and integrate with enterprise cloud solutions
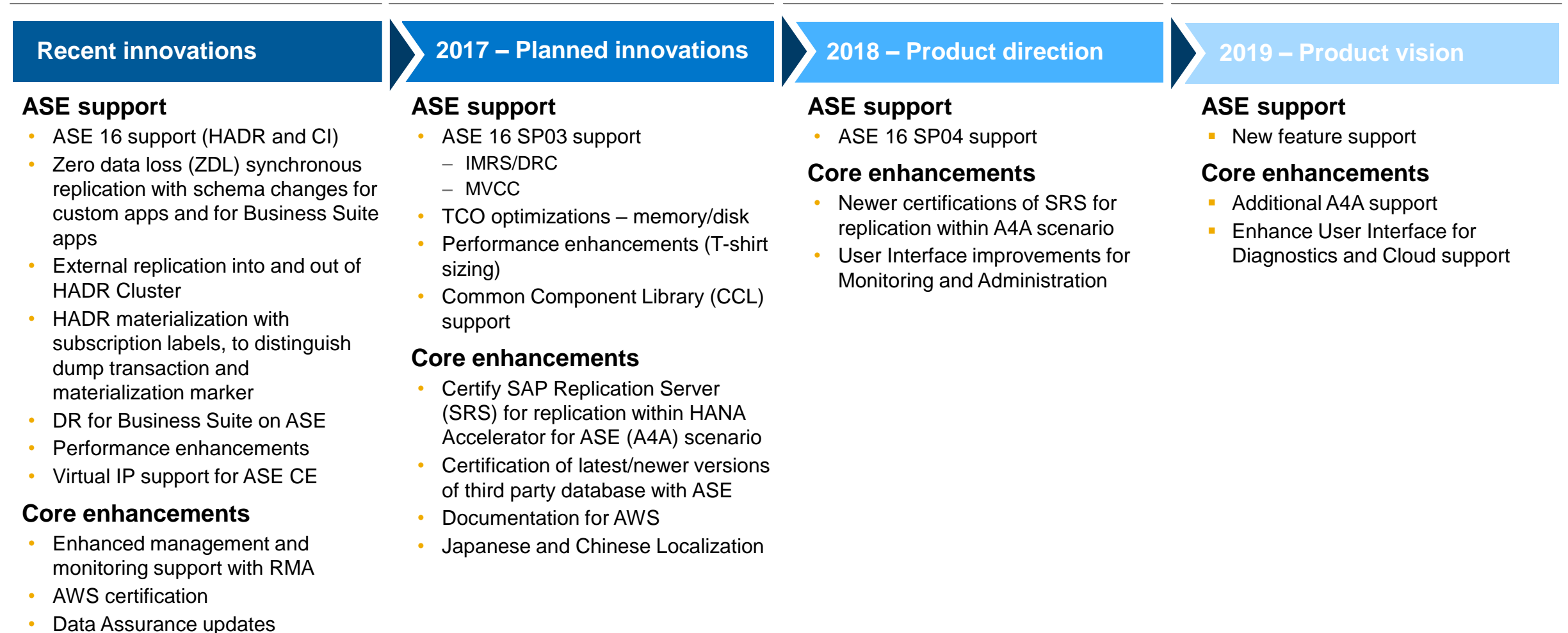
SAP Replication Server
In the EIM product portfolio

Change data capture

Primary

Rep Agent

Replication engine

In-bound Connectivity

Administration & Monitoring

Rules Engine

Transformation

Catalog DB

Message Repository

Target DB Connectivity

DATA ASSURED

Routing & distribution

Sources:
- **SAP ASE**
- **Heterogeneous (via Data Service CDC)**

Targets:
- **SAP ASE**
- **SAP IQ**
- **Heterogeneous (via Data Services CDC)**

Note: Replication to SAP HANA will be supported by SAP HANA smart data integration solution.

Exceptions and limitations apply. Please check user documentation for end-to-end source and target database certification.
See appendix for expansion of acronyms

SAP Replication Server
Product road map overview - key themes and capabilities

Recent innovations	2017 – Planned innovations	2018 – Product direction	2019 – Product vision

ASE support

- ASE 16 support (HADR and CI)
- Zero data loss (ZDL) synchronous replication with schema changes for custom apps and for Business Suite apps
- External replication into and out of HADR Cluster
- HADR materialization with subscription labels, to distinguish dump transaction and materialization marker
- DR for Business Suite on ASE
- Performance enhancements
- Virtual IP support for ASE CE

Core enhancements

- Enhanced management and monitoring support with RMA
- AWS certification
- Data Assurance updates

(SRS 15.7.1 SP 200 – 305)

ASE support

- ASE 16 SP03 support
  - IMRS/DRC
  - MVCC
- TCO optimizations – memory/disk
- Performance enhancements (T-shirt sizing)
- Common Component Library (CCL) support

Core enhancements

- Certify SAP Replication Server (SRS) for replication within HANA Accelerator for ASE (A4A) scenario
- Certification of latest/newer versions of third party database with ASE
- Documentation for AWS
- Japanese and Chinese Localization

ASE support

- ASE 16 SP04 support

Core enhancements

- Newer certifications of SRS for replication within A4A scenario
- User Interface improvements for Monitoring and Administration

---

ASE support

- New feature support

Core enhancements

- Additional A4A support
- Enhance User Interface for Diagnostics and Cloud support

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SRS Future: Canonical Interface (CI) for Replication

Canonical Interface (CI) is new method of replication by using a "Streaming" methodology. It has various advantages to RepServer's traditional Log Transfer Language (LTL) based replication.

Benefits of CI:

- **Faster processing of data packets:** In LTL, data packets are parsed and normalized before being written into inbound queue; whereas in CI, the records are immediately written to a special queue called Simple Persistent Queue (SPQ). This increases performance, but also increases buffering requirements and associated memory related operational costs.

- **Use of OS threading:** CI uses native OS threading. This makes CI threading faster than LTL's internal threading. However, since different OS implement threading slightly differently, there are small differences in how replication is processed.

- **Leverages Parallelization and Pipelining:** CI uses both parallelization and pipelining, with multiple buffers through the pipeline to reduce bottlenecks. As such, CI method is faster than LTL method of replication that mostly uses parallelization to increase performance. However, CI method also has higher memory (buffer/caching) requirements.
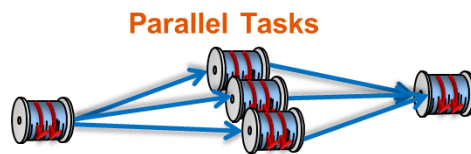
- **Improved Schema management:** CI parses the schema and stores it in RSSD the first time, compared to LTL that sends schema information in each package. As such, CI mode saves on amount of data transfer by simply sending raw log records. However, this means some functions of RepAgent processing in CI are done by SRS instead.
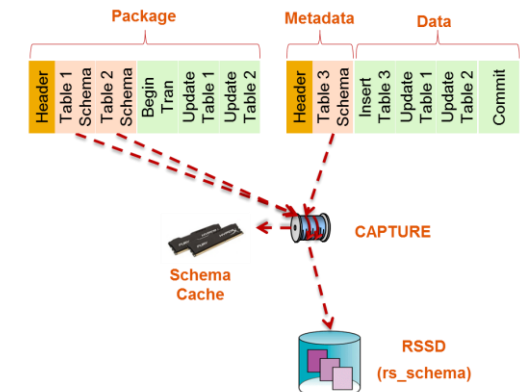
Fig: When a new Table 3 is replicated, only Table 3's schema is sent once with its first package

Multi-Year ASE, SRS Lifecycle

Legend:
- Stabilization state
- Innovation state
- Safe harbor state

Q3'16	Q4'16	Q1'17	Q2'17	Q3'17	Q4'17	Q1'18	Q2'18	Q3'18	Q4'18	H1'19	H2'19	H1'20	H2'20

ASE 15.7 — SP138 · SP139 · SP... — END

16.0 sp00 — END

16.0 sp01 — END

16.0 sp02 — PL05 · PL06 · PL...

16.0 sp03 — PL00 · PL01 · PL02 · PL... · PL...

SRS 15.7 — SP305 · SP306 · SP307 · SP...

SRS 16 — PL01 · PL02 · PL... · PL...
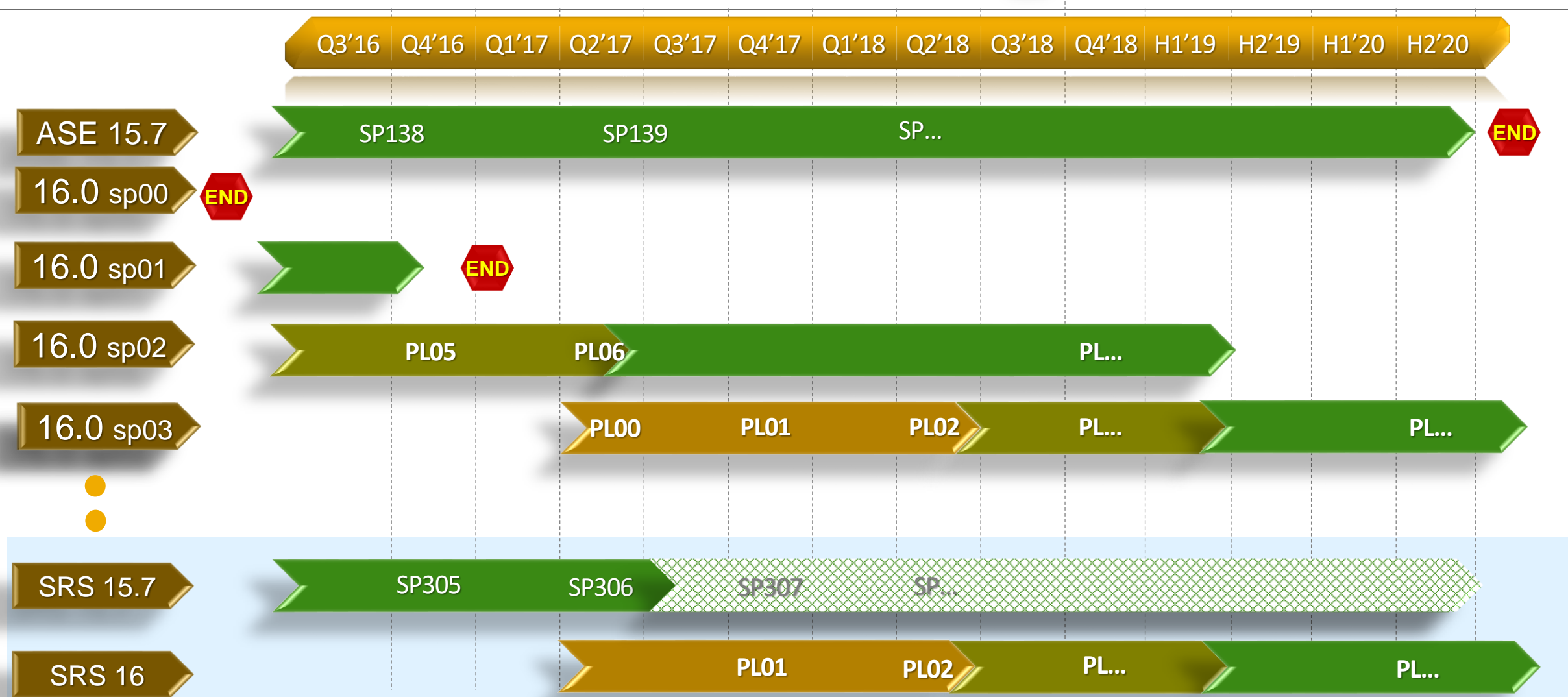
Summary

SAP Replication Server is an industry leader, providing non-intrusive transactions capture, flexible transformations, and high performance loading in heterogeneous environments without geographical limitation while maintaining transactional integrity

- Optimized and certified for SAP Business Suite on SAP ASE to support high availability and disaster recovery
- Enabling real time for SAP HANA platform with log-based, high performance, low latency replication
- Enabling real-time replication for big data targets and providing coverage with new sources
- Capable of powering the most demanding mission-critical systems, from Wall Street to Main Street and everywhere in between
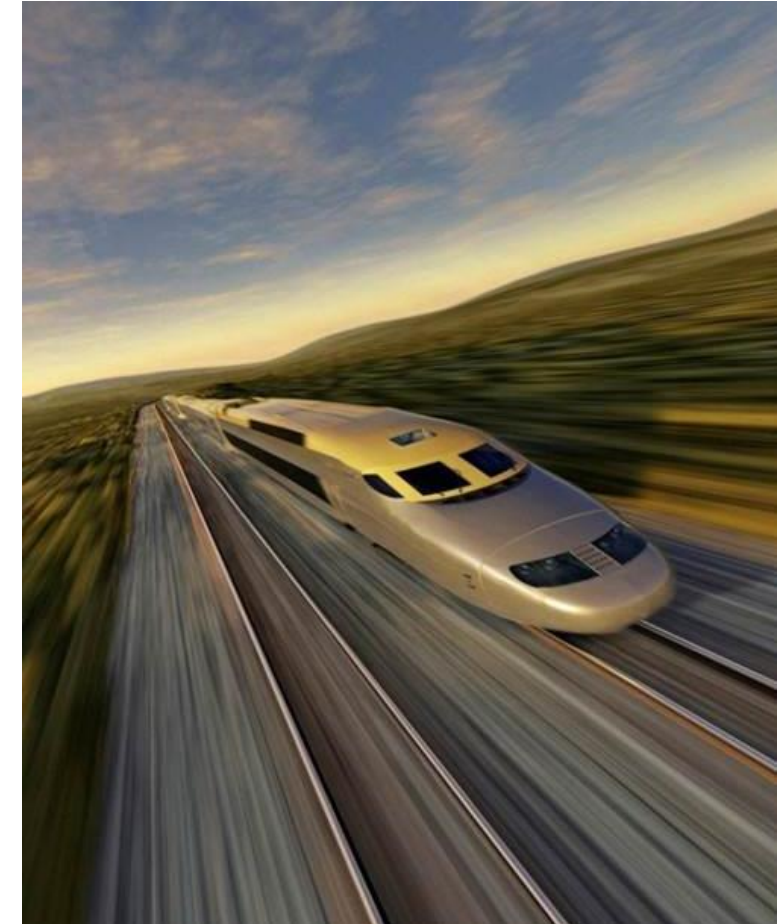
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SAP IQ Roadmap

- Value proposition
- Key features

SAP®

SAP IQ
Customer needs and the value propositions of the product

SAP IQ is particularly suited for applications that operate on large volumes of structured data, and that have low TCO and high performance requirements:

- Telco network analytics
- Risk minimization and fraud prevention
- Preventive maintenance
- Utilities monitoring and pricing
- IoT applications
- Information aggregators
- Large, enterprise data marts servicing diverse communities

Standard language:
ANSI SQL

Schema-independent:
3NF, Star, and flat files

Grid-based column store
Fast, complex queries
High-performance data loads
Storage and user scalability
Nonrelational data support

Standard connectivity:
ODBC, JDBC, OLE-DB, PERL, And PYTHON, PHP

Platform-agnostic:
Linux, Unix, and Windows
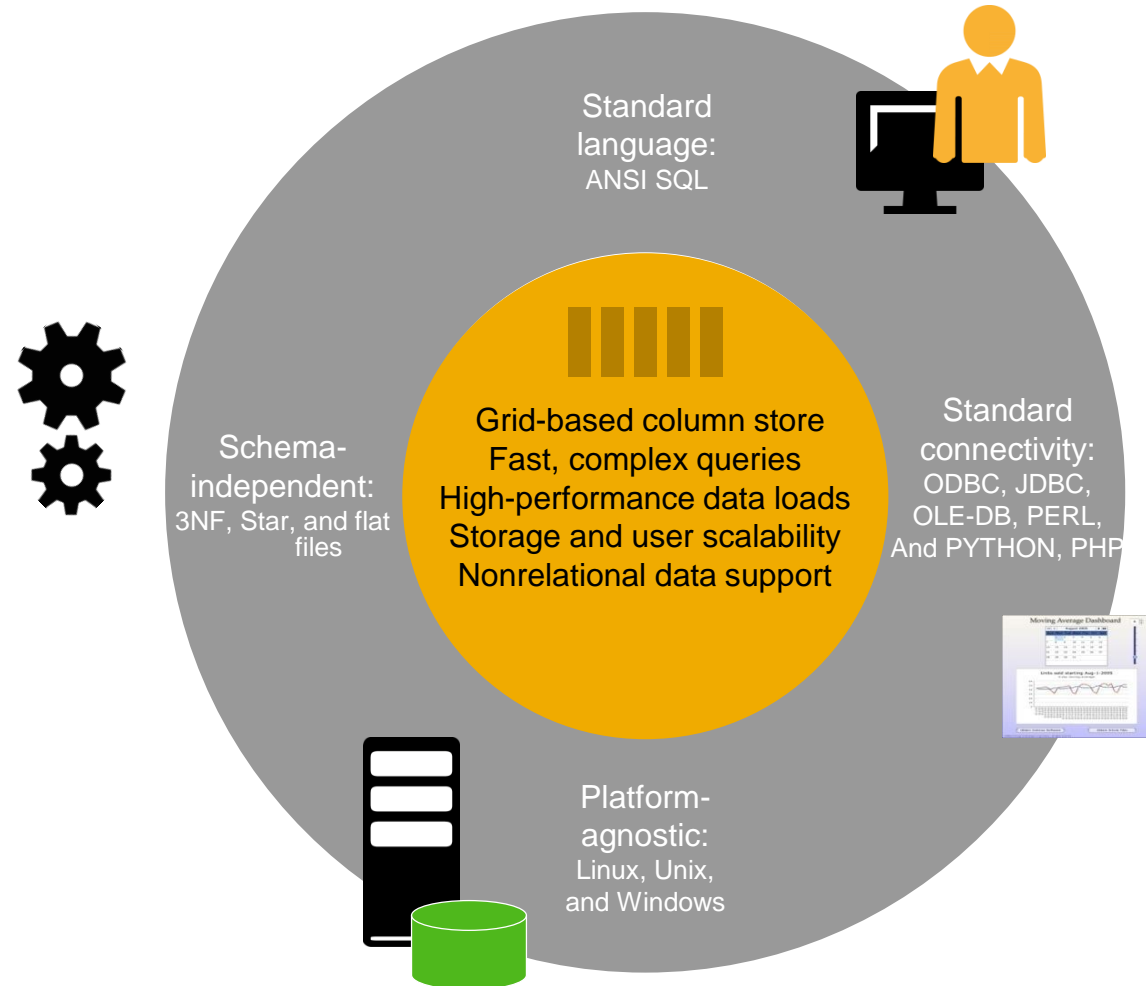
SAP IQ 16
High performance, disk backed columnar database

Enterprise ready, mature columnar RDBMS

- Extreme data compression
  - Optimized database page format for variable sized data with no wasted space
  - N-bit fast projection indexes
- Fast data loading
  - Fully parallel bulk loading to take advantage of machines with high CPU core counts
  - Row Level Versioned (RLV) store for concurrent loads into same database table
- Versatile query processing
  - Highly parallel query plans
  - Many access paths to indexes and columns
  - High level of user concurrency with elastic CPU and memory usage
- Comprehensive security
  - Transport layer, database, and column encryption
  - LDAP and Kerberos authentication
  - Role-based access control to decompose privileged operations into fine grained sets
- Sophisticated scale out features
  - Shared store or *shared nothing* scale out options
  - Distributed query processing

SAP IQ 16 server

Web-enabled analytics

Communications and security
- Role-based access control
- LDAP authentication

Query engine
- Aggressive scale out
- Hash partitioned tables and data affinity
- Text search
- In-database analytics

Loading engine
- Fully parallel

Column indexing subsystem
- N-bit and tiered indexing

Column store
- New Generation **PETABYTE SCALE** store
- Low latency, write optimized store

Web based administration and monitoring

Resilient

Multiplex grid architecture

Information lifecycle management

Storage subsystem

SAP IQ within the HANA data platform

Integration of memory and disk-backed column store technology for a variety of analytic use cases

Memory is primary ➔ **Disk is primary**

In-memory platform for digital transformation

- Transaction processing and analytics in a single, high performance database
- End-to-end application development platform
- Suite of predictive, spatial, and text analytics libraries
- Rich set of data integration and business intelligence tools
- Real-time operational intelligence
- Decision support, simulation and automation
- Next generation applications
- Simplification of IT environment

Data aging for SAP applications managing large data volumes

- Single consistent database with "hot" data in memory, and aged data on disk
- "Read most" queries in DT store (infrequent updates to warm data)
- DT store size in balanced proportion to HANA memory size

Archive store for cold data

- IQ as NLS for BW/HANA
- IQ as ILM cold archive

Petabyte scale analytics

- IQ executes queries in on large volumes of structured data. Aggregates data for real time analytics in HANA.
- Size of IQ store is not constrained by size of HANA store
- IQ capabilities and performance directly accessible, or available to a lesser extent through HANA Smart Data Access (SDA)

Traditional Sybase customers

- Data marts
- Information aggregators
- Reporting applications
- Advanced analytics

OEM

- Economical columnar database
- Proven performance
- Runs on commodity hardware
- Simple to administer
- Easy to package and deliver with a partner analytic application

World's Largest Data Warehouse-Guinness World Record

OFFICIALLY GUINNESS WORLD RECORDS™ **AMAZING**

Largest Data Warehouse

Audited Record: 12.1 PetaBytes

Tested Configuration	
25 x HP ProLiant DL580 G7 - 4 x Intel® Xeon® E7-4870 @ 2.40GHz - 1TB RAM **20 x NetApp Storage Arrays E5460s** - 60/120 x 3TB 7.2Krpm HDD - 4 x Fibre Chanel connections	**SAP® IQ 16 (20 nodes)** **SAP® HANA® (5 nodes)** **BMMsoft Federated EDMT® 9 with UCM** **Red Hat® Enterprise Linux® 6.4 X86-64**

SAP HANA

Running on 5 HP ProLiant DL580 G7 Servers

4 Active nodes with 1 standby

6.2TB of data

SAP IQ

SAP IQ multiplex running on 20 HP ProLiant DL580 G7 Servers

12.1PB of data (compressed into approx. 3.1PB of storage)

http://www.guinnessworldrecords.com/world-records/5000/largest-data-warehouse

HANA and IQ at large telco – 1PB of raw data and growing

λ-like Architecture – most of the data into IQ first

Operational reporting (e.g. Statement of Account)

Revenue assurance and fraud management reporting

Big Data Analytical Platform

Aggregated and consolidated data

HANA Scale-out

SAP IQ Multiplex

Aggregates

Aggregates

Master Data

Raw data

Raw data

Harmonized Master Data

Bulk loading from flat files

BO-Data Services

Streaming, Replication (ESP, SRS)

BO-Data Services, SLT

(Very) High Volume Data (batch, near-real time)

(Transactional Data >100 M records / day)

Real Time

Streaming, Replication

Master Data

Description:

- All transactional data flows into IQ first; harmonization and consolidation happens here. 'Hot' reporting data is then staged to HANA.

- Data required in real-time is loaded to HANA

- HANA is the primary store for Master Data; harmonization logic for Master data resides in HANA.

- Real-time reporting is handled by HANA, and operational reporting against large volumes of detailed data is handled directly by IQ.

SAP IQ
Product road map overview - key themes and capabilities

Recent innovations	2017 – Planned innovations	2018 – Product direction	2019 – Product vision

Enterprise ready, mature columnar RDBMS

- Pioneering compression and indexing technologies
- Extreme throughput data loading, and concurrent data loading for real-time analytics
- Industry leading query processing for complex, ad hoc workloads
- In-database analytics framework
- Dynamic scale-out for complex analytics
- Comprehensive security features

Data center operations

- Point in time recovery
- Integrated storage replication solutions
- Commodity blade hardware for low TCO

SAP ecosystem integration

- HANA dynamic tiering – integration of IQ with HANA database for aged data
- IQ serves as disk engine for SAP Vora

IQ 16.1 SP01

Petabyte scale

- Enhanced support for distributed file systems, such as GPFS.
- Additional server side diagnostics, and presentation of those diagnostics through IQ Cockpit.
- Performance improvements to operational utilities, such as DBCC (database consistency checker).

SAP ecosystem integration

- HANA dynamic tiering: support for HANA system replication for HA/DR.
- HANA dynamic tiering: BACKINT optimizations for faster backups

Petabyte scale

- Improved scale out query performance.
- New types of data sources to load from Hadoop into IQ.

SAP ecosystem integration

- HANA dynamic tiering performance optimizations for HANA scale out deployments.
- Improved end to end tracing and diagnostics for HANA dynamic tiering

The strategic goal and vision is the SAP SQL Data Warehouse, which addresses all data processing scenarios of our customers, regardless of size, on premise or cloud, analytical, or transactional.

SAP HANA, with its embedded data processing engines for predictive, text, spatial, graph, and streaming enables simplification of IT architecture by removing the need for a complex stack.

SAP HANA incorporates IQ technology for large volume relational data management, and integrates with Hadoop through SAP Vora.

SAP's SQL Data Warehouse accelerates analytic performance, reduces data latency and cost of ownership, and serves SQL-based analytic and application building needs of the Data Driven Enterprise.

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Summary

SAP IQ is a high performance, low TCO, disk-backed columnar database for XLDB analytics

- **Lower TCO** – excellent data compression, efficient use of commodity hardware, better price-performance

- **Administration** – lightweight, self maintaining indexing

- **Application services** – rich SQL dialect, extensibility framework for in-database analytics, Hadoop and R integration, Web 2.0 APIs

- **Parallel computing** – employs both SMP parallel and MPP distributed query processing

- **User scalability** – adding nodes is trivial, and SAP IQ automatically balances resource use, allowing many users to share node resources

- **Data lifecycle management** – widely used within the SAP product portfolio for cool/warm data management

Optimized BI and EIM tools | Development and administration tools | Predictive analytics | Packaged ILM applications

SQL | Web 2.0 | Hadoop and R

Comprehensive ANSI SQL with OLAP | Built-in full-text search | In-database analytics with MapReduce + simulator | Web 2.0 APIs | Big data OpnSrc APIs

Most mature column store | Comprehensive lifecycle tiering | MPP queries + virtual marts + user scaling | High-speed loads | Structured + unstructured store

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Thank you

Sumit Kundu

VP, SAP HANA Product Management,

sumit.kundu@sap.com

Key links for more information
For customers and partners

Key links

- SAP Road Maps
- SAP Community Network
- IT Planning Resources
- SAP Innovation Discovery
- Documentation
- Evaluation Software

http://www.sap.com/roadmaps

https://www.sap.com/community/topic/ase.html

https://wiki.scn.sap.com/wiki/x/ggvRGg

http://www.sap.com/innovationdiscovery

https://help.sap.com/viewer/product/SAP_ASE/16.0.2.0/en-US

http://www.sap.com/product/data-mgmt/sybase-ase.html

Where to go to provide product feedback and ideas

- SAP Idea Place
- Influence programs
- SAP User Groups

https://ideas.sap.com

http://service.sap.com/influence

http://www.sapusergroups.com/

Key links for more information
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- SAP Road Maps   http://sap.com/roadmaps
- SAP Community Network   http://www.sap.com/community
- IT Planning Resources   https://service.sap.com/~sapidb/011000358700001160122012E
- SAP ASE   http://www.sap.com/ase

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- IT Planning Resources   https://wiki.scn.sap.com/wiki/x/ggvRGg

- SAP Innovation Discovery   http://www.sap.com/innovationdiscovery

- SAP IQ Product Page   http://www.sap.com/product/data-mgmt/sybase-iq-big-data-management.html

- SAP IQ Community   http://www.sap.com/community/topic/iq.html

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- Influence programs   http://service.sap.com/influence

- SAP User Groups   http://www.sapusergroups.com/

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