

SAP IQ

Product strategy and roadmap

SAP IQ and HANA product management: February 2017



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Product Overview

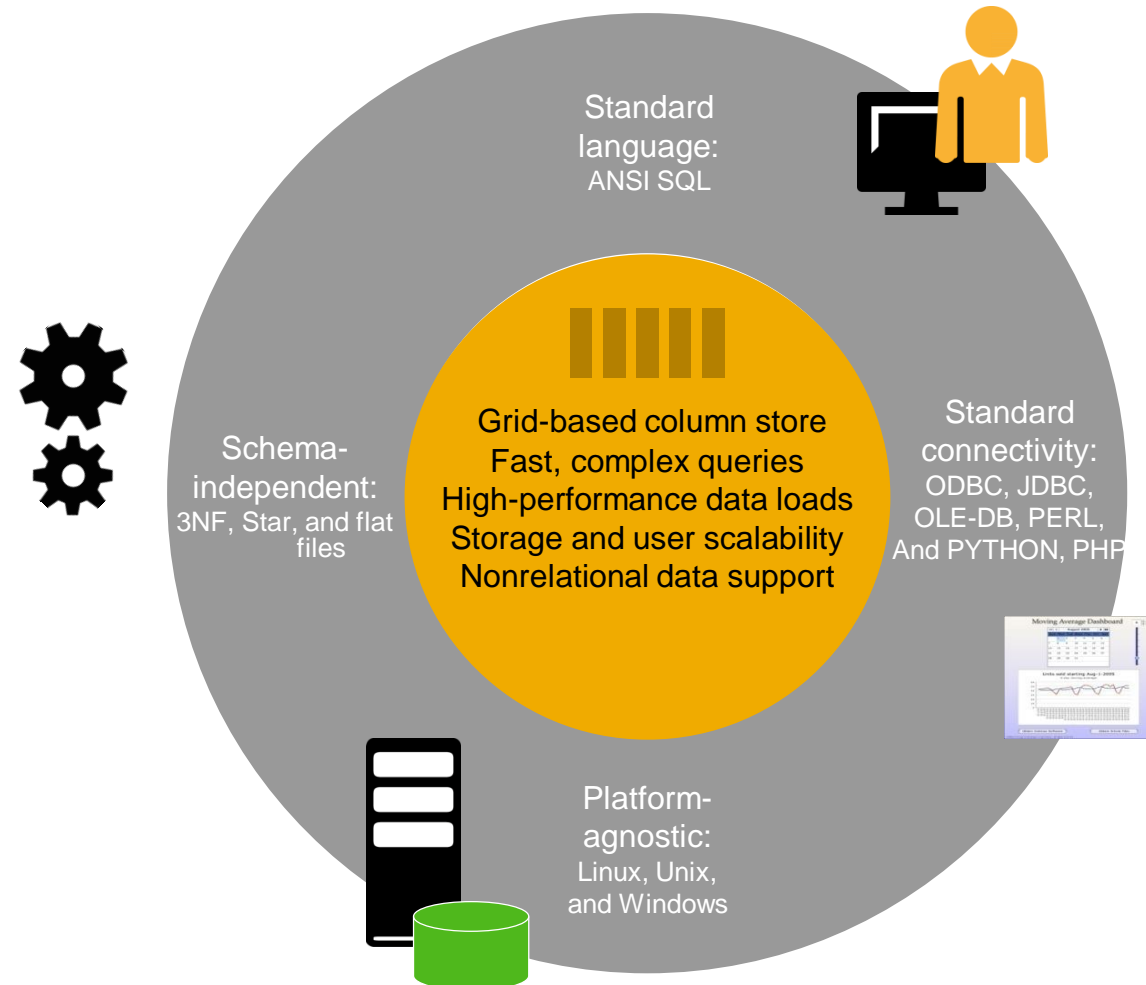
- Value proposition
- Key features

SAP IQ

Customer needs and the value propositions of the product

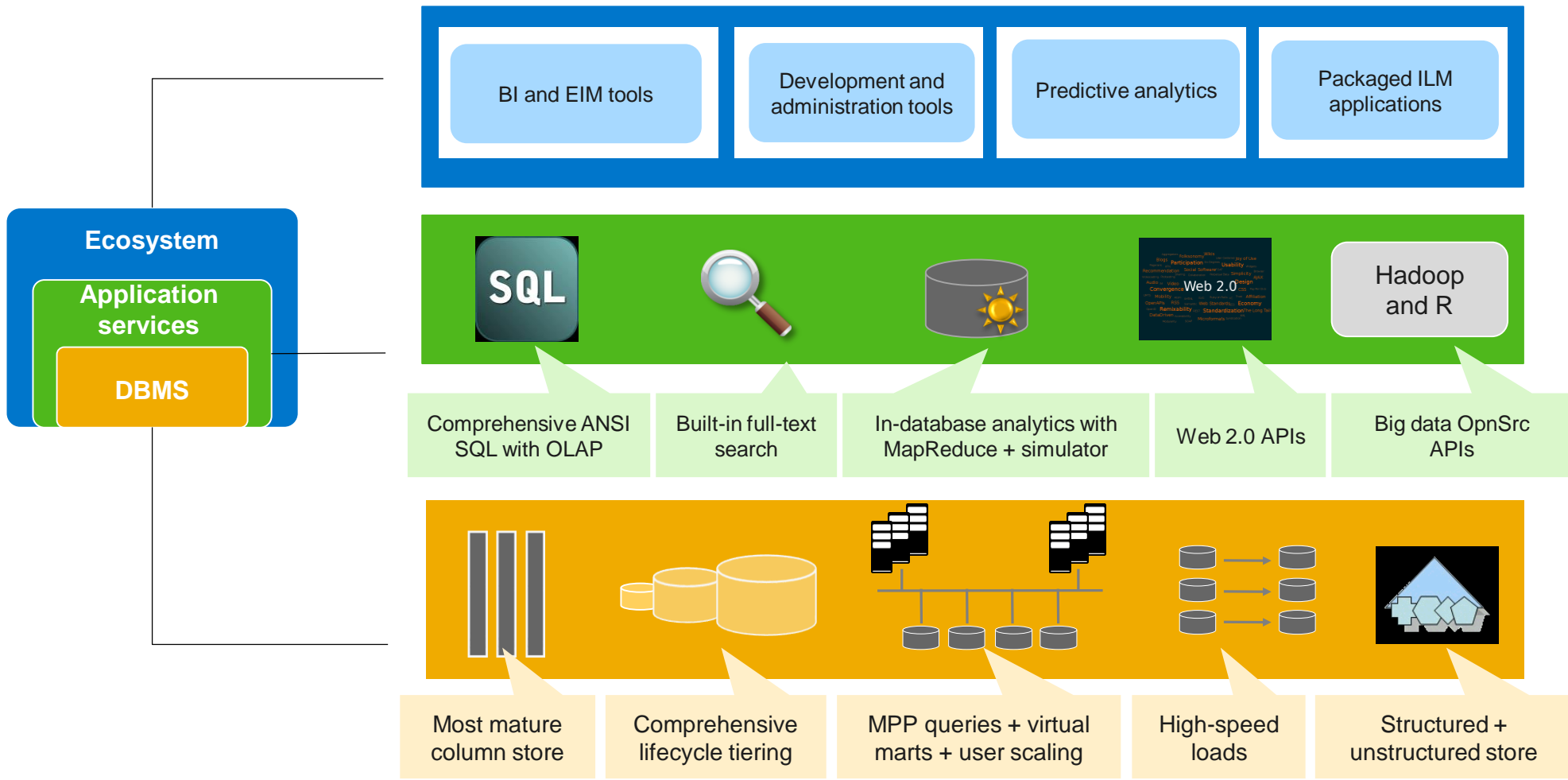
SAP IQ is particularly suited for applications that operate on large volumes of structured data, and that have low TCO and high performance requirements:

- Petabyte scale
- Fast loading
- 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



SAP IQ

A comprehensive analytics platform

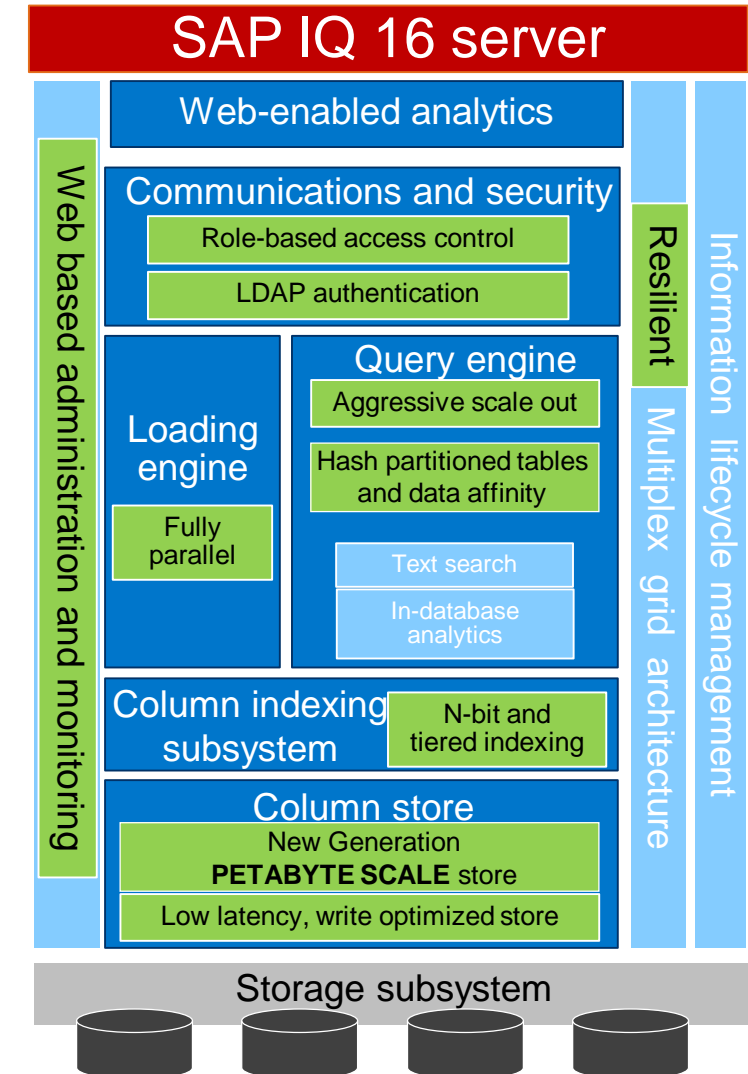


SAP IQ 16

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



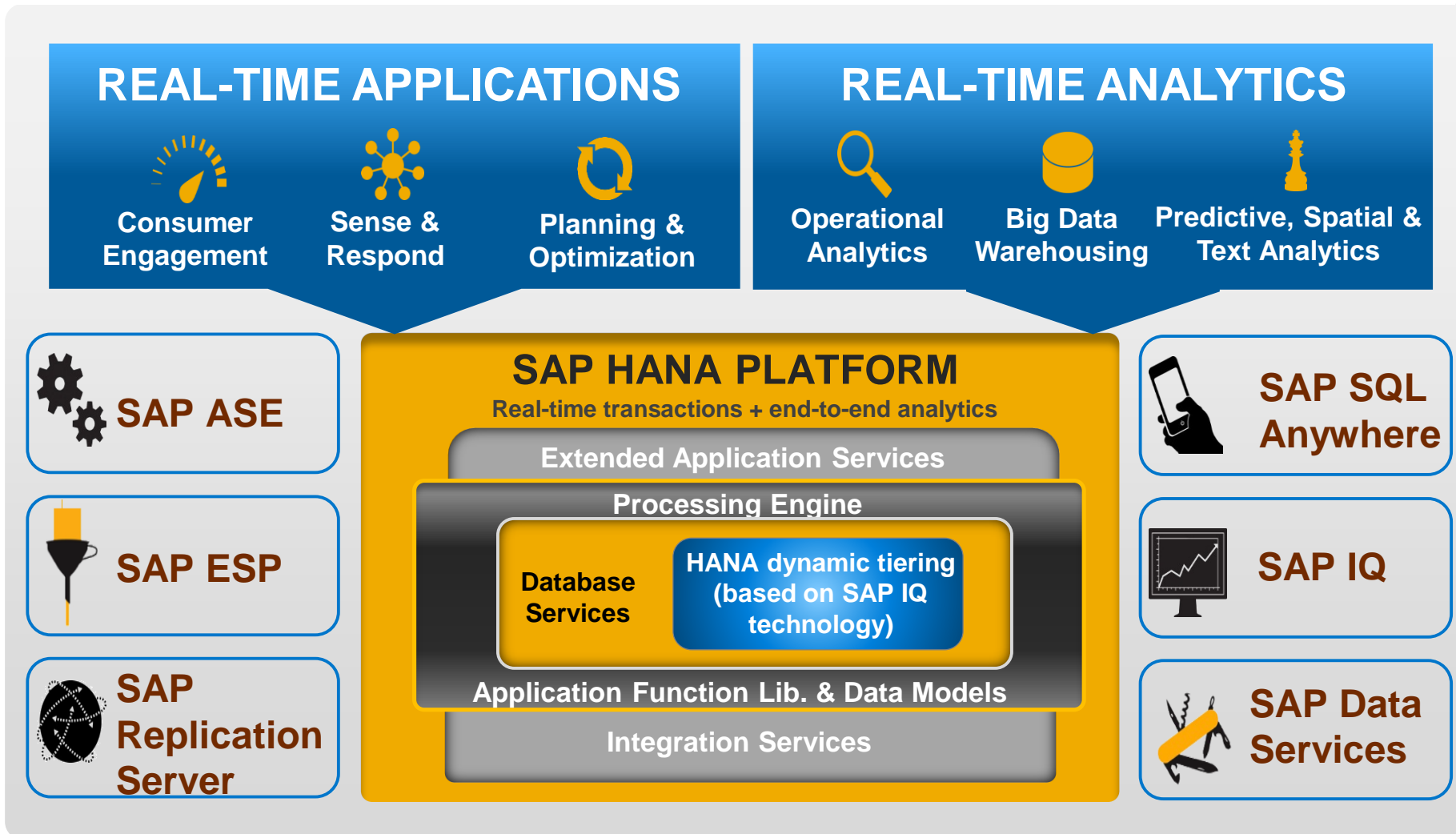


SAP IQ and SAP HANA

SAP IQ's value within the SAP HANA platform

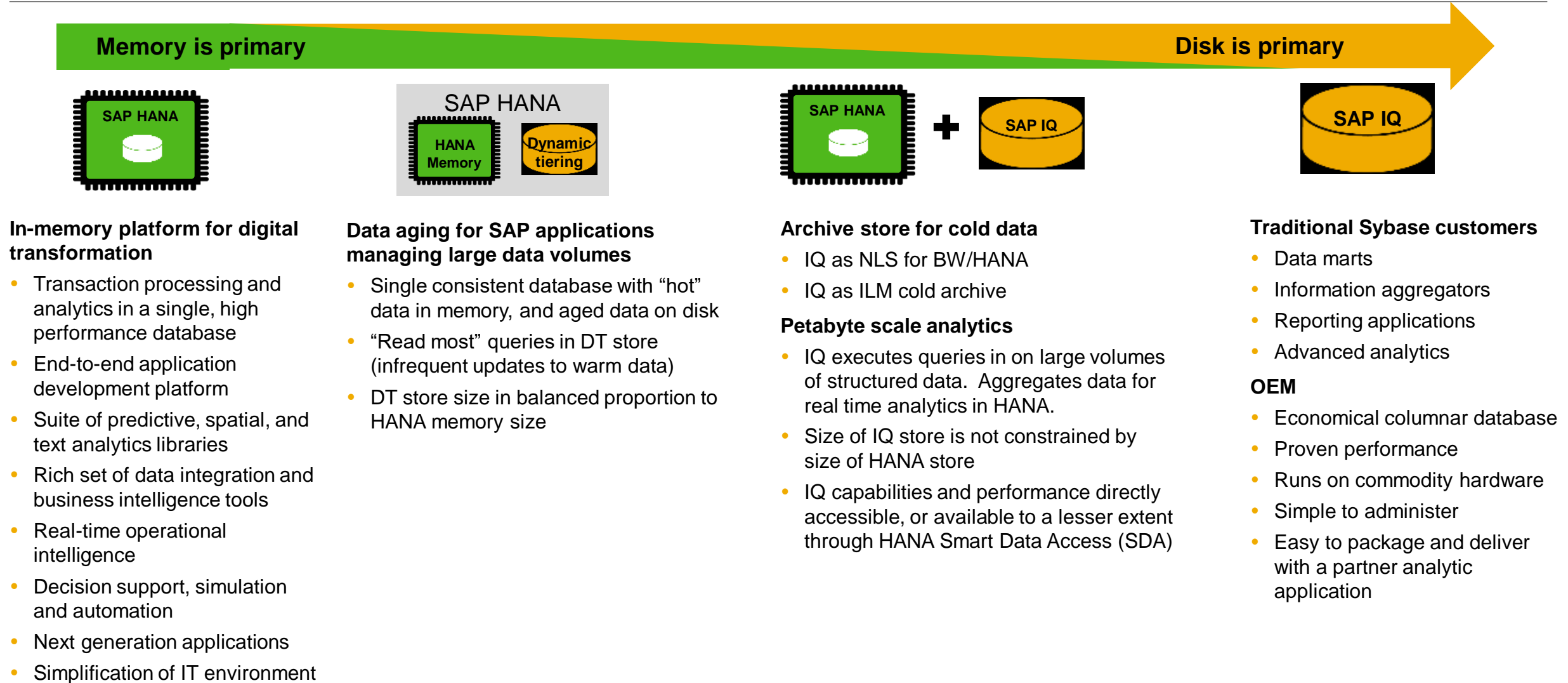
SAP IQ

In the SAP Data Management portfolio



SAP IQ within the HANA data platform

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



SAP HANA dynamic tiering

Key aspects at a glance

Add-on option to SAP HANA

Manage data of different temperatures

- **Hot** data (always in memory) – classical HANA
- **Warm** data (disk based data store)

Introducing two new types of database table:

- **Extended table** – disk-based columnar table with all data on disk
- **Multistore table** – HANA partitioned table with some partitions in memory, and some on disk

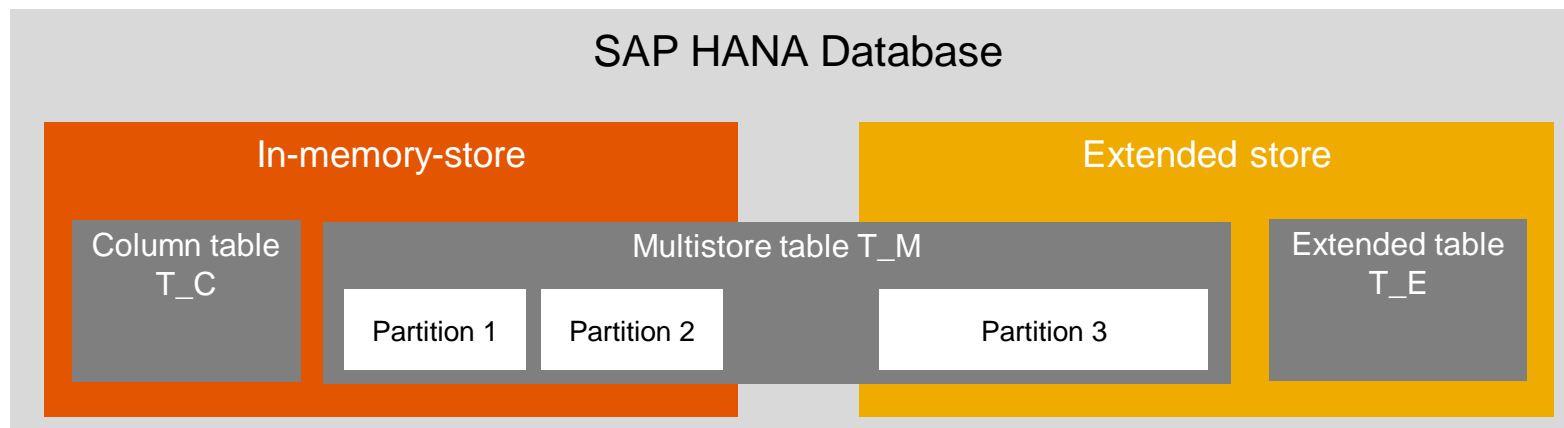
Extending the SAP HANA database

Deep integration

- Common installation, monitoring, administration
- Data backup and system replication for high availability
- Consistent transaction management
- Transparent query processing & optimization
- Encryption for data security

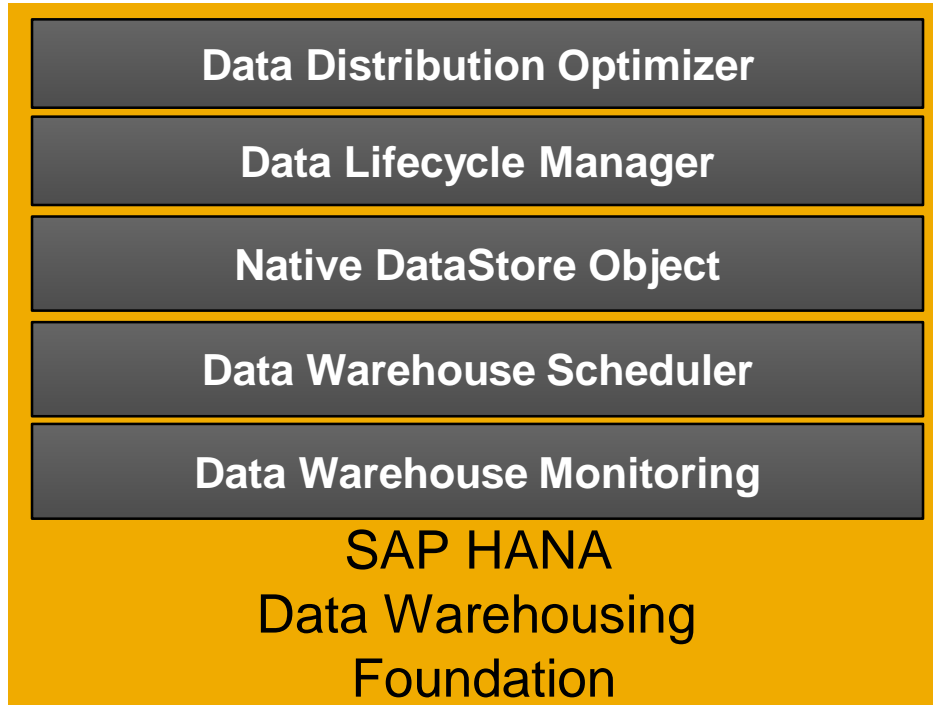
Target scenarios

Data warehousing, analytical applications



SAP HANA Data Warehousing Foundation (DWF)

Tools in detail



DWF 2.0 SP01 >= HANA 2.0 SP01

SAP HANA Data Warehousing Foundation 1.0 delivers specialized SAP HANA XS based applications

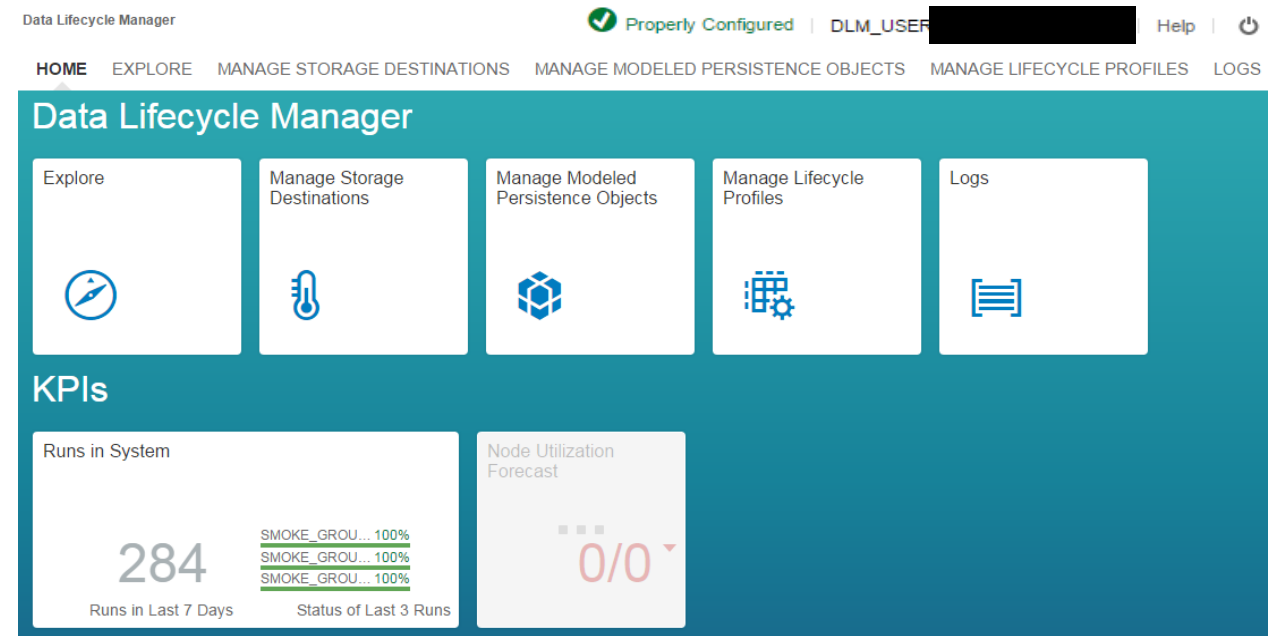
- **Data Distribution Optimizer** to plan, adjust and analyze landscape reorganizations for SAP HANA scale out systems
- **Data Lifecycle Manager** to deliver a possibility to archive / displace data from a SAP HANA persistency to Dynamic Tiering, SAP IQ or Hadoop
- **Native DataStore Object** to provide a central persistence object with the same capabilities of the BW standard advanced DataStore Object (ADSO models)
- **Data Warehouse Scheduler** to maintain dependencies between single processes with the focus to provision data warehouse models
- **Data Warehouse Monitoring** to provide a comprehensive overview about current and past activities in the data warehouse

SAP Data Warehousing Foundation (DWF)

Data Lifecycle Manager (DLM) – modern UI

Modern SAP UI5 based administration

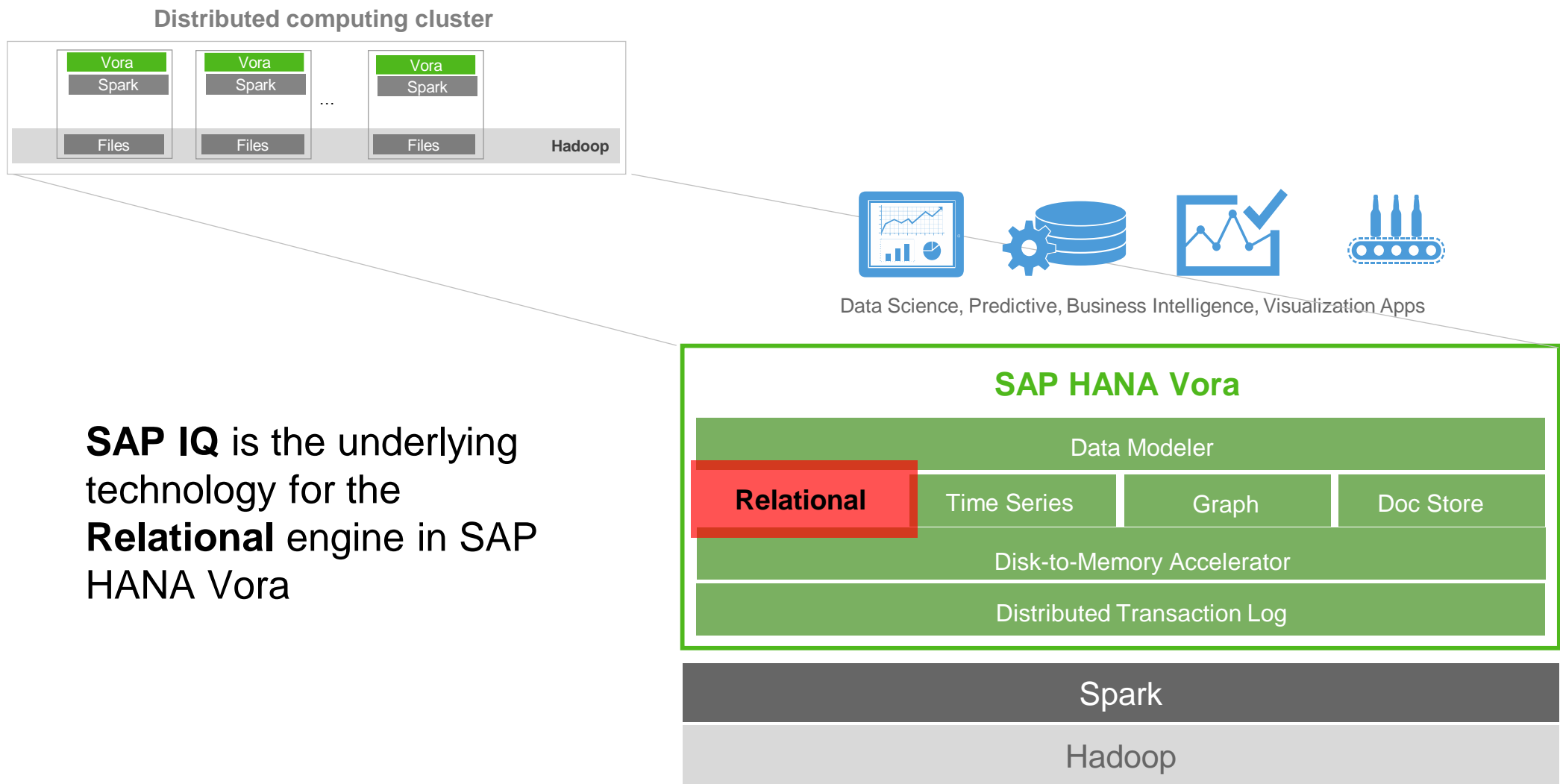
- Specify and manage Storage Destinations
 - HANA Extension Node support
- Create, adjust and manage Lifecycle Profiles
- Setup & Adjust Lifecycle Relocation Rule (via Rule Editor)
- Define Data Movement rules to move data between HANA-, Extended-, Hadoop- or SAP Sybase IQ-tables - in and out
- Define Modeled Persistence Objects (e.g Header-Item Dep.)
- Persistence criteria incl. Source Table w/o PK (Nominal Key)
- Data Movement rules generated into HANA Stored Procedures to perform mass data movement
- Validate Data Relocation Rule Proposal vs. Current Distribution
- Schedule and Execute Data Relocation Run using HANA tasks
- Analyze logs of executed Data Relocation Run



Prerequisites

- DWF 2.0 SP01: HANA Revision 2.0 SP01
- SAP HANA Dynamic Tiering, SAP Sybase IQ or HADOOP configured as storage destination

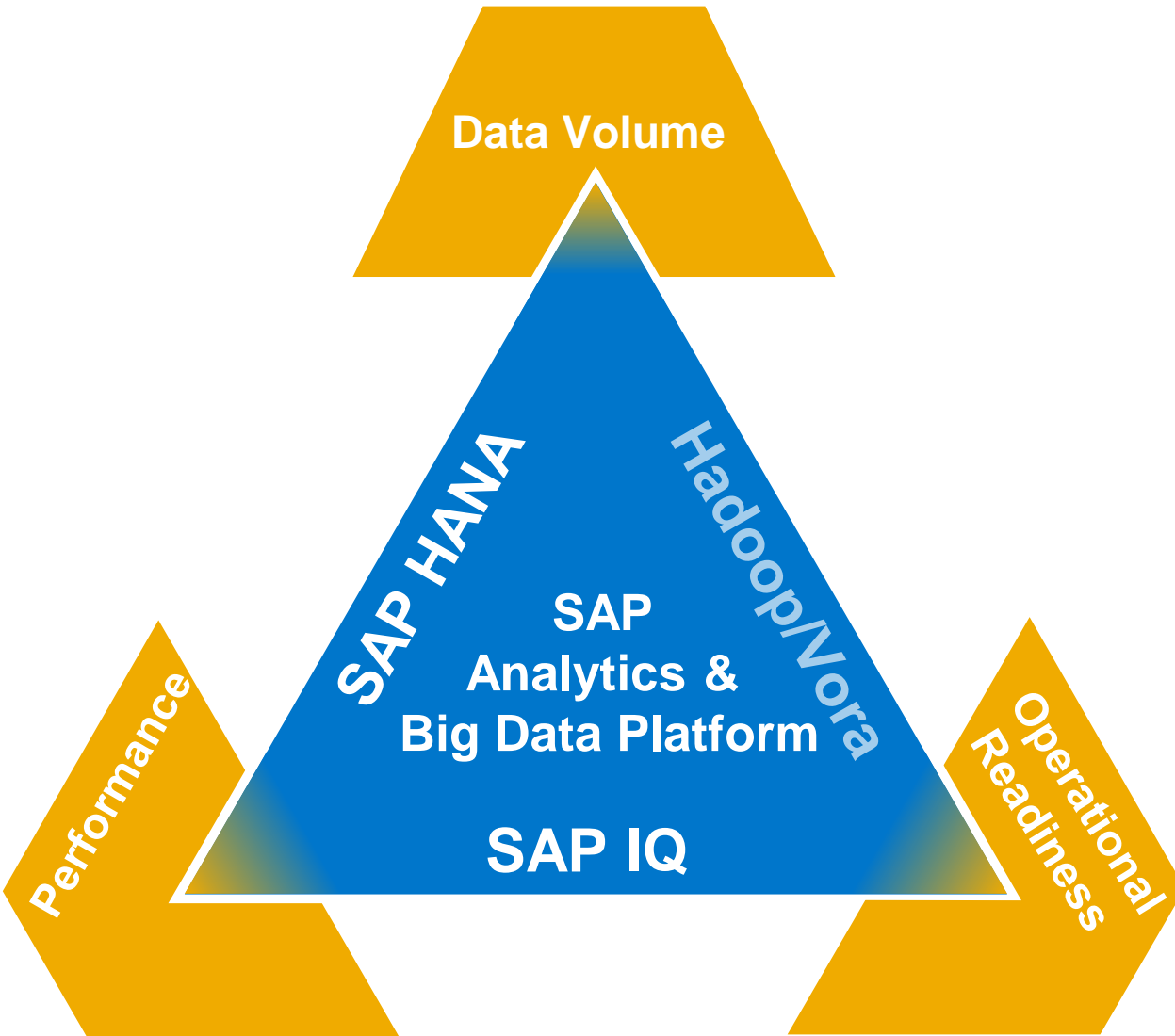
SAP IQ within HANA Vora + New Technologies



SAP IQ is the underlying technology for the **Relational** engine in SAP HANA Vora

Core components of the SAP Big Data platform

Application of a triad of technologies to build a petabyte-scale analytics solution



- **SAP HANA** and **SAP IQ**, along with **Hadoop/Vora**, form the core components of a large scale data analytics solution:
 - SAP HANA: Industry changing, in-memory data platform for **real-time analytics**.
 - SAP IQ: Proven disk based column database technology for interactive analytics on **very large volumes of structured data**.
 - Hadoop with Vora: Technology for storing and processing **massive volumes of raw data**.



SAP IQ at petabyte scale

Proof points

World's Largest Data Warehouse-Guinness World Record



Largest Data Warehouse

Audited Record: 12.1 PetaBytes

Tested Configuration	
25 x HP ProLiant DL580 G7 <ul style="list-style-type: none">- 4 x Intel® Xeon® E7-4870 @ 2.40GHz- 1TB RAM	SAP® IQ 16 (20 nodes)
20 x NetApp Storage Arrays E5460s <ul style="list-style-type: none">- 60/120 x 3TB 7.2Krpm HDD- 4 x Fibre Channel connections	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)

180 Trillion rows of mixed data types

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

12 PB of mixed data types

	Table Size (TB)	Row Count (Billion)	Row Size (byte)
eMail & SMS	129.9	109	1,307
Document Metadata	29.5	28	1,169
Full Document	3,247.8	0.71	5,034,296
Key-Value (2-Col)	5,148.0	138,056	41
Key-Value (4-Col)	1,202.7	40,073	33
Wide Row	2,673.7	2,132	1,379

12.1 Petabyte

180 Trillion Rows

- Real-world mix of sensor, message, email, document and transactional data, comparable to that found in:
 - Financial trading networks
 - Health payment systems
 - Oil exploration and production operations
 - Mobile device networks

SAP IQ ISV Huawei > China Mobile + Other Implementations

500TB Compressed + 400TB Compressed Big SQL DWs in Saudi Arabia

200+TB Compressed Big SQL DW in China



Company

Huawei Technologies Co. Ltd.

Headquarters

Shenzhen, China

Industry

Telecommunications

Products and Services

Information and communication technologies

Employees

170,000

Web Site

www.huawei.com

Objectives

- Manage extremely large databases with high data-ingestion rates
- Monitor and optimize network performance for customers like China Mobile Communications Corporation
- Improve network quality and the user experience

Why SAP

- Support for commodity hardware, ease of administration, rich Structured Query Language (SQL) dialect, and excellent performance and scalability
- Superior data-loading speed and high data-compression ratios

Resolution

- Embed SAP® IQ software as the database engine in Huawei's SEQ Analyst product
- Continuously ingest data with thousands of load streams
- Concurrently load data and execute queries across a 17-node multiplex cluster
- Run the latest release of SAP IQ, version 16

Benefits

- Achieved high rates of efficiency in report generation
- Managed extremely large data volumes quickly
- Attained significant data compression ratios for efficient storage utilization
- Scaled out easily with the flexible shared-everything architecture of SAP IQ

“SAP IQ exceeded our expectations for data-loading performance, report-generation efficiencies, data-compression ratios, and the ease of scaling out servers and storage for high-demand workloads.”

Li Guotao, DBA for SEQ Analyst, Huawei Technologies Co. Ltd.

>200 TB

Compressed size of China Mobile's SAP IQ database software

1.5 TB

Amount of data loaded daily into tables in SAP IQ

30%–40%

Compression ratio often attained using SAP IQ

80

Approximate number of SEQ Analyst customers

SAP Mobile Operator Services messaging business

Global Network & Operations

1040 carrier connections and 6.1 billion subscribers reaching 2 billion messages per day

Virginia (Sterling + Reston)

- Personal Messaging Interoperability Hub
- Managed Services (Americas)
- Network Operations (Americas)
- Personal Messaging and Interoperability Product Development
- MNP (Americas)

Chicago

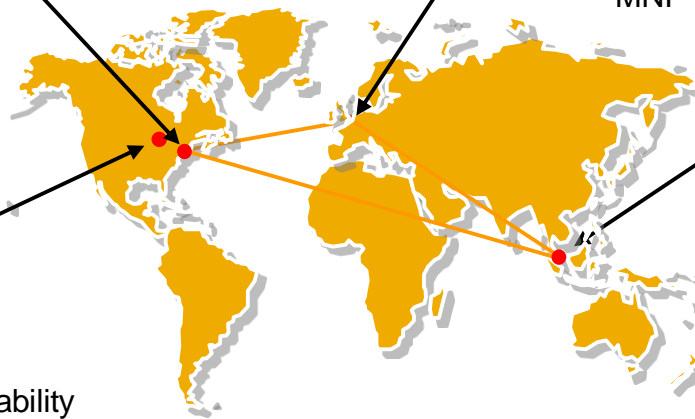
- MMS Personal Messaging Interoperability Hub
- MMSC Hosting Services
- Application Messaging Content Hosting

France/United Kingdom

- SS7 Personal Messaging Interconnect Hub
- SS7 Application Messaging Interconnect Hub
- Application Messaging Network Operations (Europe)
- MNP (Europe)

Singapore

- Application Messaging Interconnection Hub
- Global Billing Operations
- Application Messaging Content Operations
- Application Messaging Product Development
- Network Operations (Asia)
- MNP (Asia)

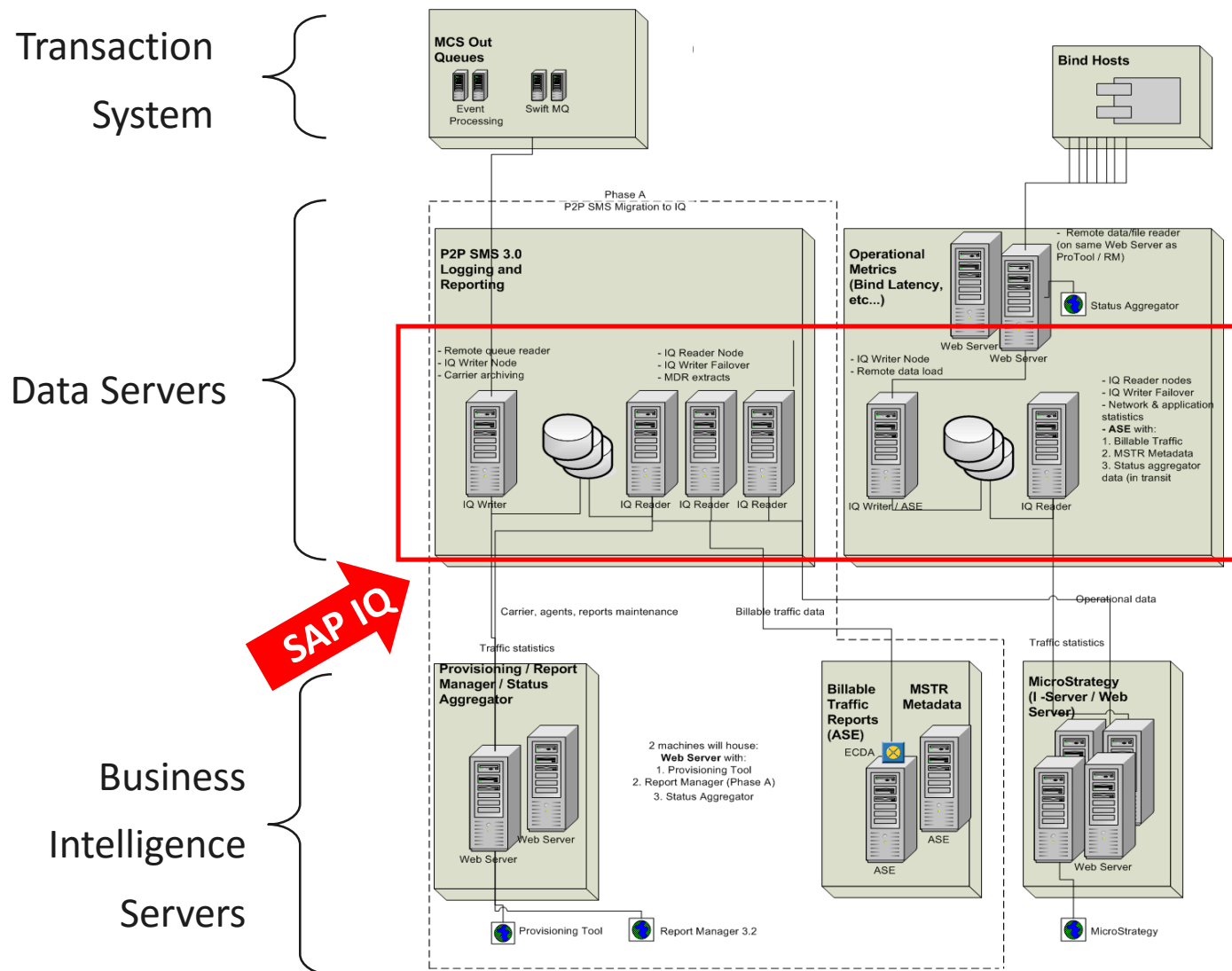


Dedicated SMPP and SS7 Links

Note: additional points of presence may be required due to regulatory constraints

Mobile Messages > Consumer Insights Architecture

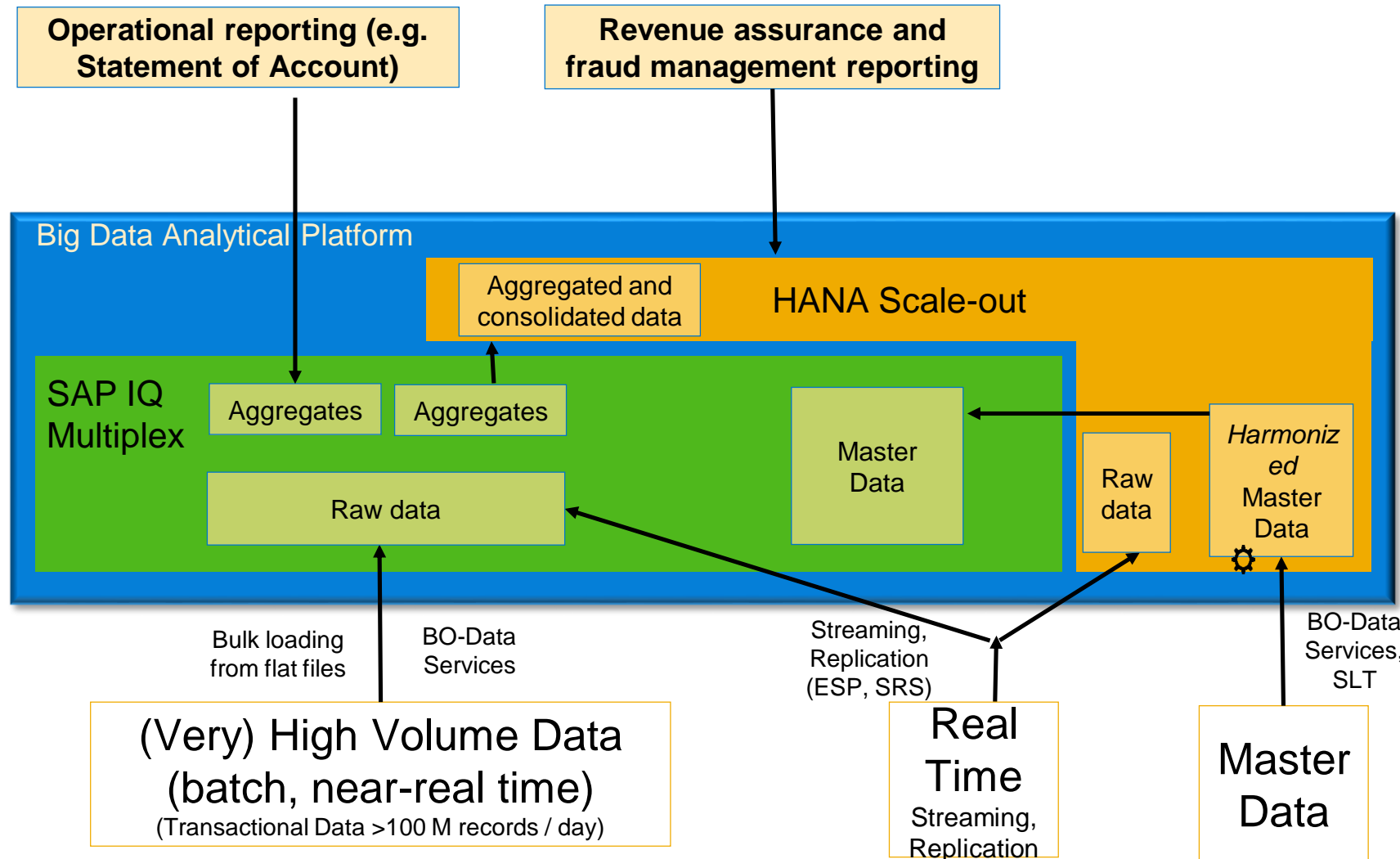
SAP IQ on MapR – ~400TB compressed data from 2-4 Petabytes raw



- Messages are de-queued from transaction system and passed to data management application
- Data management application runs error correction routines, data load process into IQ, and data cleanup
- Primary message table is called “MDR” for Message Data Record.
- MDR grows at a rate of about 2 billion rows per day. Data inbound speeds need to run between 2000 tps and 33,000 tps.
- Data is indexed by phone number.
- Mobile operators use BI application to report on message traffic statistics

HANA and IQ at large telco – 15PB of raw data and growing

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

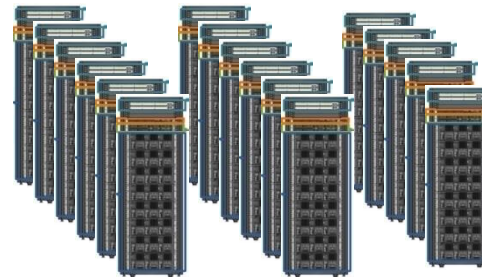
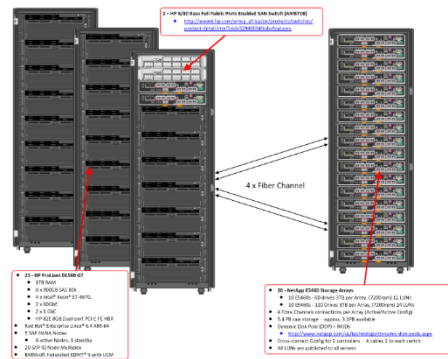


Description:

- 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 + HANA SQL DW to 20PB Size on Commodity Hardware

20PB Largest Source DW compared with Hadoop, 12PB Guinness World Record



Hadoop requires:

- **4X more racks**
- **32X more nodes**
- **6X more memory**
- **7X more cores**
- **3.5X more disks**
- **MapR Web-Scale Storage will make cheaper**
- **How much would electricity cost for 1,000 nodes?**
- **How much space in D.C. would 1,000 nodes take?**

Category	IQ HANA 20PB	Hadoop 20PB	X Times
Racks	8	32	4X
Nodes	28	900	32X
Cores	736	14,000	19X
Memory (TB)	14	80	~6X
Disks	3,400	11,392	3.5X
SANs	36		

Guinness World Record - Largest Data Warehouse

Posted by [Mike Hagman](#) in [Blog](#) on Mar 5, 2014 10:04:09 AM

SAP with the help of our partners BMMSOft, HP, Intel, NetApp, Red Hat, and MD&Profy set the **Guinness World's record for largest data warehouse at 12.1 petabytes (PB)**. It is an exciting milestone in SAP's big data strategy and proof of our leading industry technologies. View the press release [here](#).

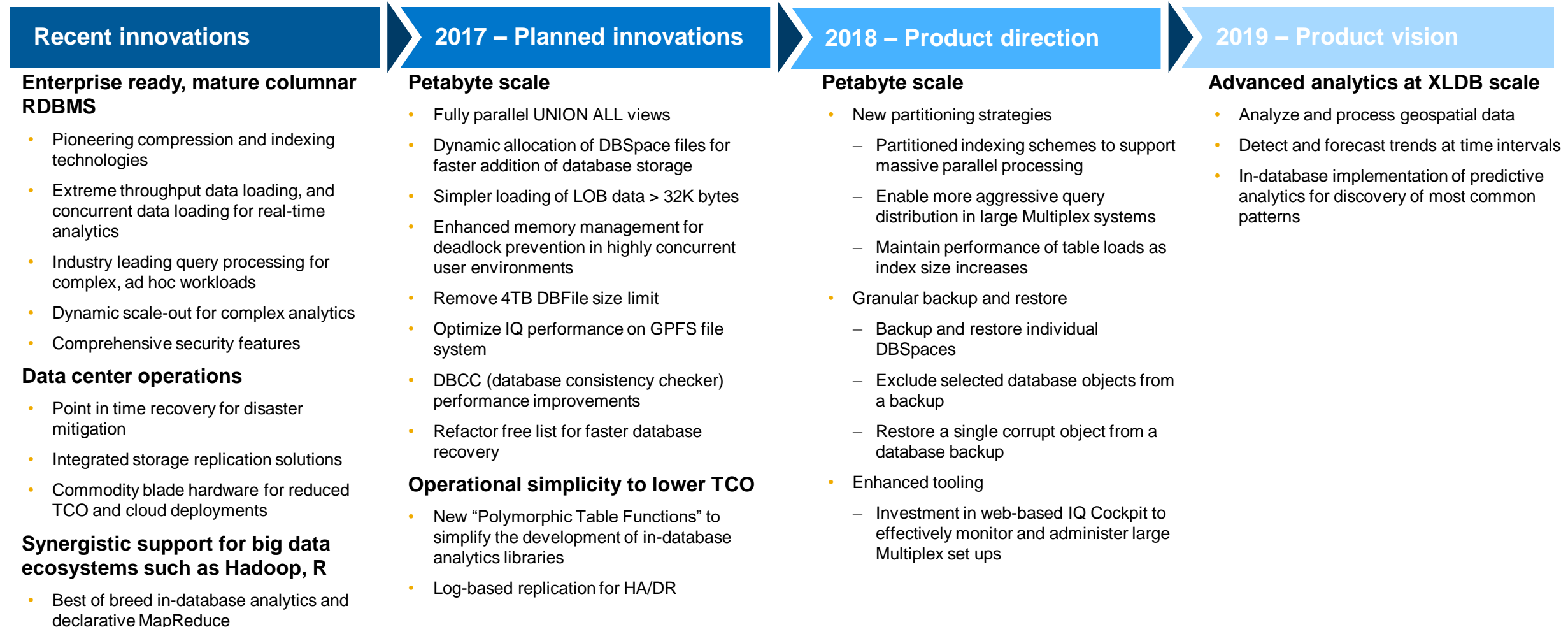
We started the project to see how we could cost-effectively handle big data, while pushing the boundaries of fast, ad hoc, and scalable analytics. The scale has turned out to be impressive.

The Guinness World Record Largest Data Warehouse was created in the SAP/Intel shared lab in Santa Clara, California. The data warehouse is 12.1PB of data running on 25 HP ProLiant DL580 G7 servers with Intel processors on a Red Hat® Enterprise Linux® 6.4 X86-64 operating system using SAP HANA and SAP IQ 16 with BMMsoft Federated EDMT® 9. The server environment is connected to a SAN comprised of 20 NetApp E5460 storage arrays through HP 8 Gb/s Fibre switches.



Product Road Map

- Direction and investment



IQ 16 SPS 11

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

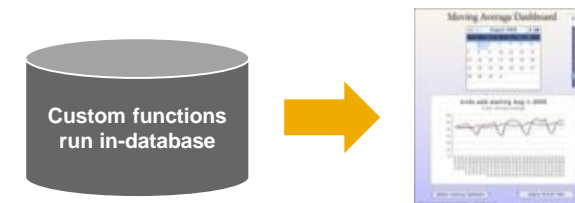
Enhanced XLDB and operational simplicity

Petabyte scale

- **Fully parallel UNION ALL views**
 - Improved performance of UNION ALL by applying thread pools to execute each arm of the view in parallel
- **DBSpace file management**
 - Faster DBFile creation using dynamic space allocation, instead of complete allocation and initialization up front
 - Increase the 4TB size limit of a DBFile to 128TB
 - IQ performance on GPFS file systems optimized to allow IQ to scale out on a distributed file system without the requirement for expensive SAN storage
- **Improved support for exporting and loading LOB data**
 - IQ's TEMP EXTRACT command extracts LOB data along with other data types to the same file, without requiring the use of the BFILE function
- **Enhanced memory management**
 - Emergency buffer pool (EBP) management improvements to prevent deadlocks in high user concurrency scenarios
 - IQ “free list” refactoring from a global structure to a set of localized structures to improve database recovery times for very large databases
- **Database consistency checking at very large scale**
 - Parallelized DBCC (database consistency checker) for superior performance

Operational simplicity to lower TCO

- **Polymorphic table function (PTF) – a new type of user defined function (UDF)**
 - Parameters for a PTF can be undefined at the time of declaration and dynamically used at runtime.
 - PTFs are simpler to use than traditional UDFs, because users do not need to declare separate functions for different function signatures (number and data types of arguments)
 - PTFs can consume multiple input table parameters to allow developers to implement algorithms that can process multiple input streams of data.
- **HA/DR innovation**
 - Log-based replication to a secondary site (IQ simplex only) for high availability

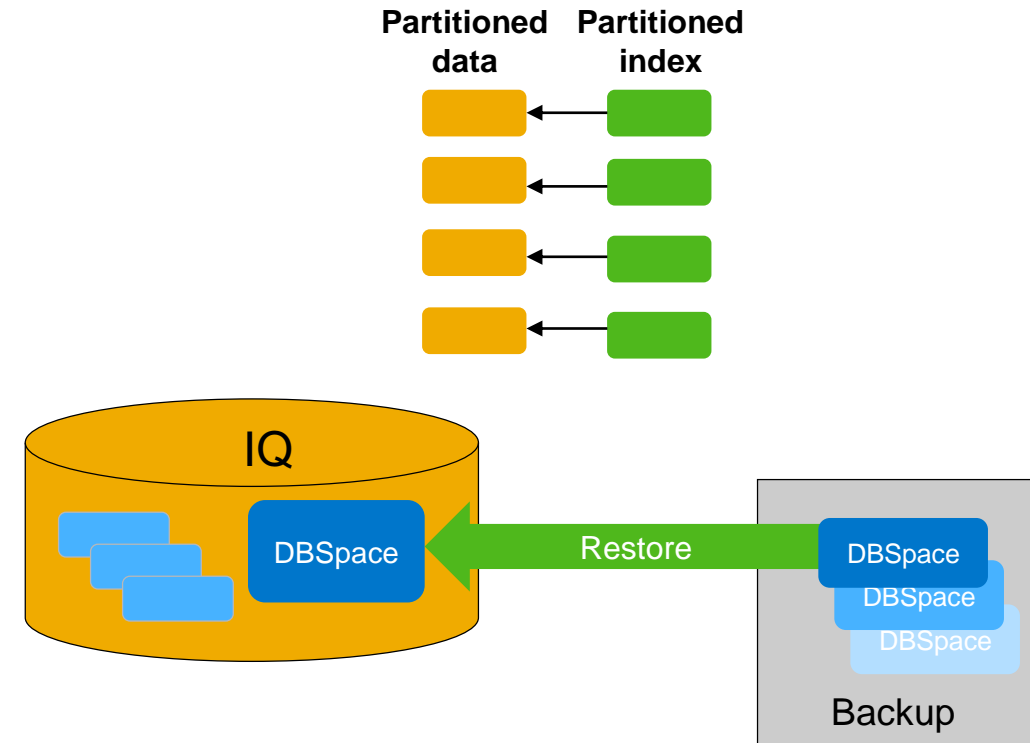


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Enhanced XLDB and operational simplicity

Petabyte scale

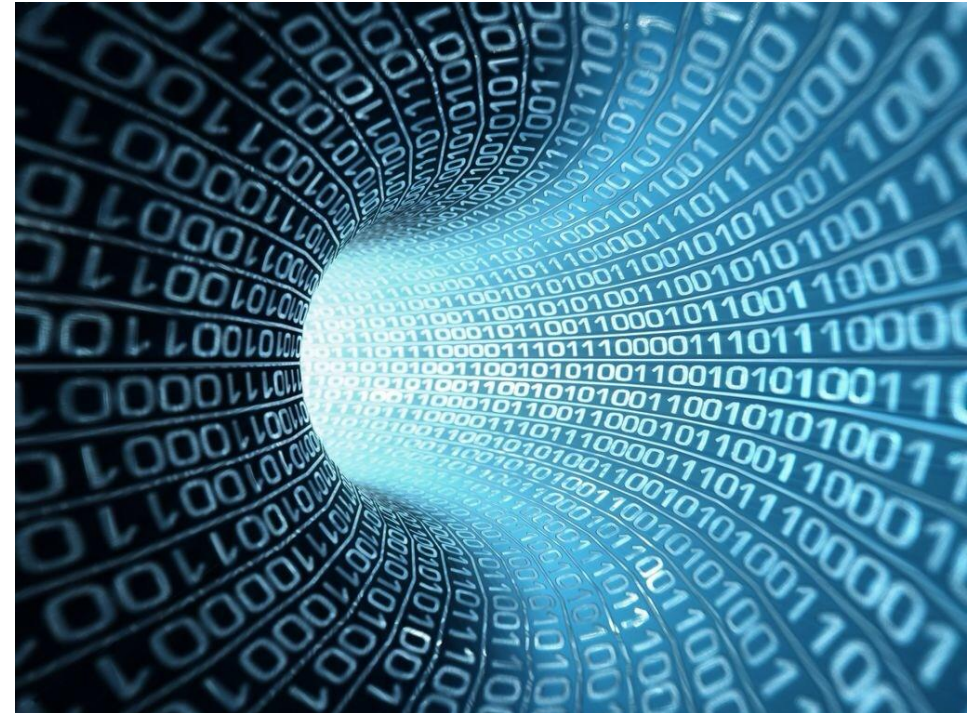
- New partitioning strategies
 - Partitioned indexing schemes to support massive parallel processing
 - Enable more aggressive query distribution in large Multiplex systems
 - Maintain performance of table loads as index size increases
- Granular backup and restore
 - Backup and restore individual DBSpaces
 - Exclude selected database objects from a backup
 - Restore a single corrupt object from a database backup
- Enhanced tooling
 - Investment in web-based IQ Cockpit to effectively monitor and administer large Multiplex set ups



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Advanced analytics at XLDB scale

- Analyze and process geospatial data
- Detect and forecast trends at time intervals
- In-database implementation of predictive analytics for discovery of most common patterns



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



SYBASE IQ 16.1 (SUPPORT PACKAGES AND PATCHES)

[Installations and Upgrades](#)[DOWNLOADS](#)[INFO](#)[ECCN INFO](#)

COCKPIT FRAMEWORK 4.0



SYBASE IQ CONTROL CNTR 16.0

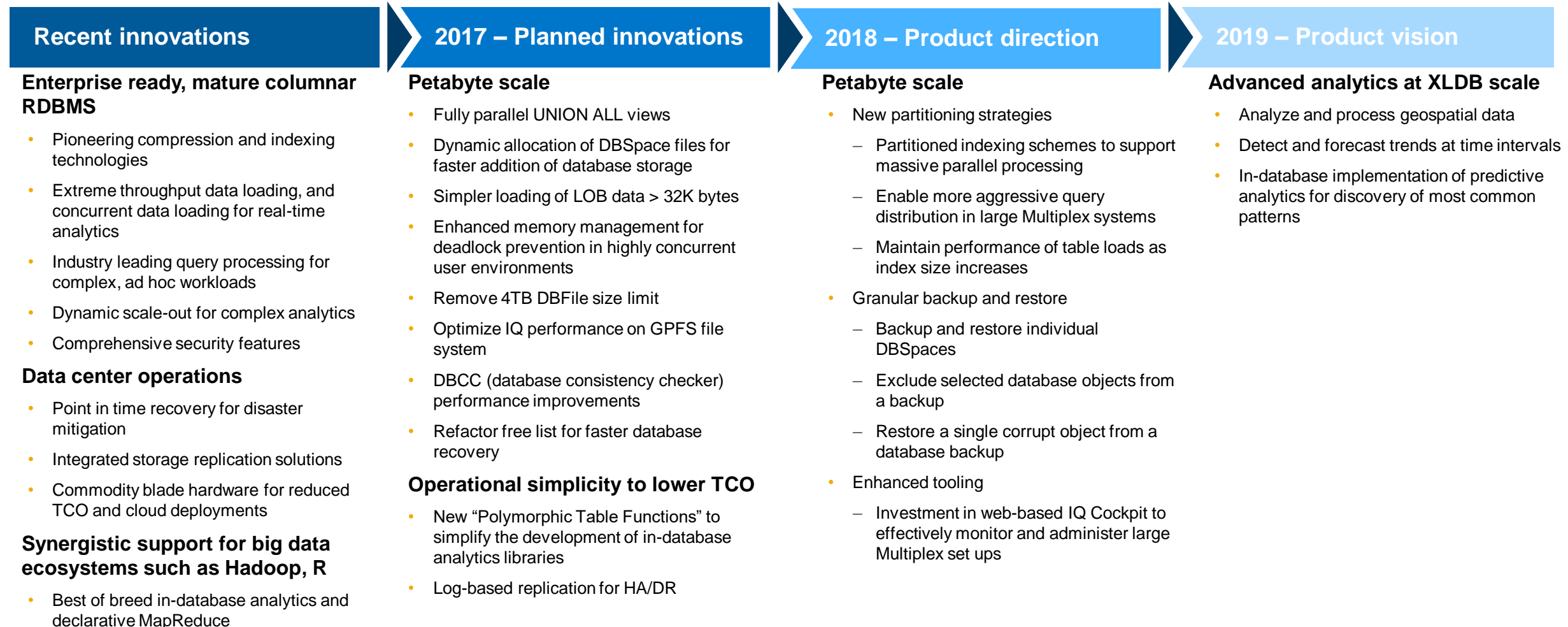


SYBASE IQ NETWORK CLIENT 16.1



SYBASE IQ SERVER 16.1





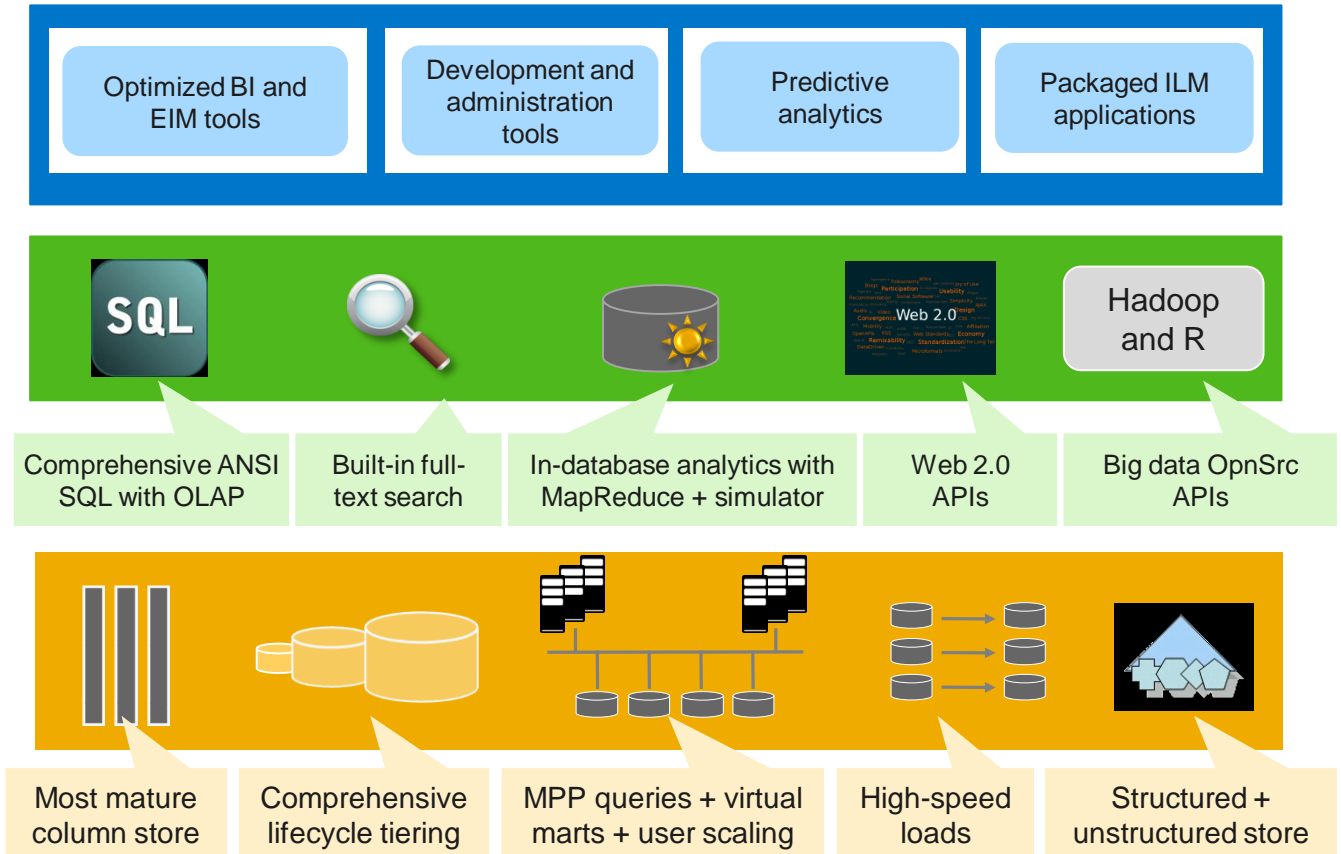
IQ 16 SPS 11

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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



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Thank you

Road map contacts for customers and partners

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SAP IQ and SAP HANA Go-To-Market Lead
SAP IQ and SAP HANA Product Management
SAP IQ and SAP HANA Product Management

Key links for more information

For customers and partners

Key links

- SAP Road Maps <http://www.sap.com/roadmaps>
- SAP Community Network <http://www.sap.com/community>
- 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>

Where to go to provide product feedback and ideas

- SAP Idea Place <https://ideas.sap.com>
- Influence programs <http://service.sap.com/influence>
- SAP User Groups <http://www.sapusergroups.com/>

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