SAP HANA

High Performance Analytical Appliance

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Abstract:Needs of enterprise applications became rather more stern. They need the computation of complicated reports on transactional information whereas thousands of users might browse or update records of constant information. These requirements of these enterprise applications are fulfill through the SAP HANA. The goal of the SAP HANA information is that the integration of transactional and analytical work among constant direction system.

To achieve this, a columnar engine exploits trendy hardware (multiple processor cores, massive main memory, and caches), compression of information content, most parallelization within the information kernel, and information extensions required by enterprise applications. The primary function of SAP HANA as database server is to store and retrieve data as requested by the applications. In addition, it performs advanced analytics (predictive analytics, spatial data processing, text analytics, text search, streaming analytics, graph data processing) and includes ETL capabilities as well as an application server.

Keywords: - Analytic appliance, SAP HANA, Reporting, OLAP, OLDB.

I. INTRODUCTION

Today's business users got to react far more quickly to ever-changing client and market environments. They demand dynamic access to data in real time. SAP HANA empowers users with versatile, on-the-fly knowledge modeling practicality by providing non-materialized views directly on careful info. SAP HANA liberates users from the wait time for knowledge model changes and info administration tasks, still as from the latency needed to load the redundant knowledge storage required by traditional databases. The elimination of aggregates and relative table indices and also the associated maintenance will greatly scale back the full price of possession.

Some use the term "in-memory" in the context of optimizing the I/O access with database management, centering on accessing data from the hard disk by pre-storing frequently accessed data in main memory. The term is additionally used for a conventional on-line database running on in-memory technology. Some solutions provide columnar storage on ancient hard-disk technology, whereas different platforms provide the choice of storing knowledge on solid state disks (SSD). Although these disks don't have any moving elements and access knowledge far more speedily than onerous disks, they're still slower than in-memory access.

Only SAP HANA takes full advantage of all-new hardware technologies by combining columnar knowledge storage, massively multiprocessing (MPP), and in-memory computing by mistreatment optimized computer code style. Many SAP customers have already with success deployed SAP HANA to drive innovations in IT and in business. In one state of affairs, SAP HANA supports knowledge marts for ultrafast analytics with extreme knowledge volumes, wherever users need a lot of careful info with access unrestricted by aggregations or caching of some of the data sourced from systems running SAP and non-SAP software.

In a second scenario, SAP HANA replaces traditional relational databases underneath SAP applications. The SAP Net Weaver Business Warehouse (SAP Net Weaver BW) component, a proven enterprise data warehouse solution, is the first application where SAP customers can migrate their existing database to an SAP HANA database.

In a third scenario, using a database connection (DB Connect),the SAP HANA database can be connected as a secondary database to the SAP ERP application, for example, and provide an accelerated data processing for existing SAP applications. SAPCO-PA Accelerator software is the first solution delivered to SAP customers using this functionality.

II.　　What is SAP?

SAP is Associate in Nursing word form for Systems, Applications, and Products in data processing. It was founded by five IBM engineers from the AI department (Dietmar Hop, Klaus Tschira, Hans-Werner Hector, HassoPlattner, and Claus Wellenreuther, all from Mannheim, Baden-Württemberg) were working in an enterprise-wide system supported this package, only to be told that it would no longer be necessary. Rather than abandoning the project, they decided to leave IBM Tech and start another company.
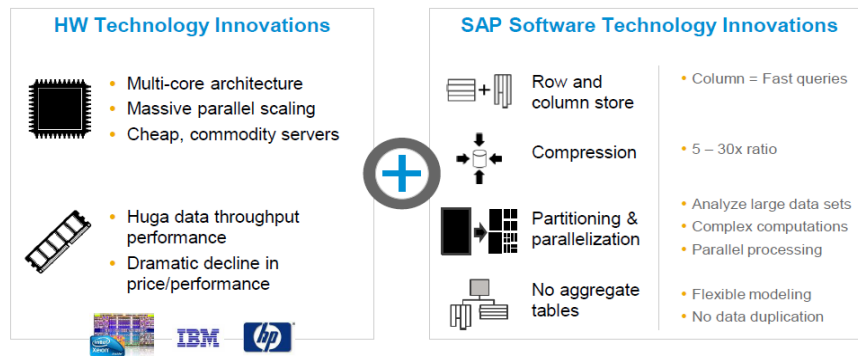
Figure 1: Difference between HW technology and SAP technology

It has been almost 40 years when SAP has started its own success story with introducing SAP R/1 System. The first version of SAP's flagship enterprise package was a money register named R/1 referred to as as YSR. This was replaced by R/2 at the top of the Seventies. SAP R/2 was terribly} mainframe based mostly business application package suite that was very flourishing within the Nineteen Eighties and early Nineties. It was notably popular massive transnational European firms UN agency needed soft-real-time business applications, with multi-currency and multi-language capabilities built in. With the arrival of distributed client–server computing SAP noble metal brought out a client–server version of the package referred to as SAP R/3 (The "R" was for "Real-time information processing" and three was for 3-tier). This new design is compatible with multiple platforms and in operation systems, such as Microsoft Windows or UNIX. This opened SAP to a full new client base SAP R/3 was formally launched on vi Gregorian calendar month 1992. It was renamed SAP ERP and later once more renamed error correction code (ERP Central Component). SAP came to dominate the big business applications market over consecutive ten years. SAP ECC 5.0 ERP is that the successor of SAP R/3 four.70. The newest version of the suite is SAP ERP vi.0 – the trail to SAP Business Suite seven.

III.   Why SAP HANA is appliance software?

SAP HANA, short for "High-Performance Analytic Appliance" is Associate in Nursing in-memory, column oriented, relational database management system developed by SAP. SAP HANA appliance software is a flexible, multipurpose, data source-agnostic, in-memory appliance that combines SAP software components optimized on hardware provided and delivered by leading SAP technology partners, such as Cisco, Dell, IBM, HP, and Fujitsu, using the Intel Xeon processor. The appliance includes variety of integrated SAP package parts, including the SAP HANA database, data and lifecycle management applications, support for multiple interfaces based on industry standards, and the SAP HANA studio, Associate in Nursing easy-to-use information modelling and administration tool.

1.3 Column v/s Row Data Storage

Relational databases typically use row-based data storage. However Column-based storage is a lot of appropriate for several business applications. SAP HANA supports each row-based and column-based storage, and is especially optimized for column-based storage. As shown within the figure below, a database table is conceptually a two-dimensional structure composed of cells arranged in rows and columns. Because storage device is structured linearly, there are two options for the sequences of cell values
stored in contiguous memory locations:

Row Storage- It stores table records in a very sequence of rows.

Figure2 : Partners of SAP

Column Storage- It stores table records in a very sequence of columns i.e. the entries of a column is keep in contiguous memory locations.

Figure 3 : Row Vs Column data storage

Traditional databases store data simply in rows. The HANA in-memory info stores information in each rows and columns. It is this mixture of each storage approaches that produces the speed, flexibility and performance of the HANA database.
Advantages of column-based tables:
•Faster Data Access: Only affected columns have to be read during the selection process of a query. Any of the columns will function Associate in Nursing index.
•Better Compression: Columnar data storage allows highly efficient compression because the majority of the columns contain only few distinct values. (Compared to number of rows).

Better Parallel Processing: - In a column store, data is already vertically portioned. This means that operations on completely different column will simply be processed in a parallel. If multiple columns have to be completed to be searched or aggregative , every of those operations is assigned to a unique processor core

LITERATURE REVIEW

I. During the first development of SAP HANA, variety of technologies were developed or noninheritable by SAP SE. These included TREX search engine (in-memory column-oriented search engine), P*TIME (in-memory OLTP Platform acquired by SAP in 2005), and MaxDB with its in-memory live Cache engine. The first major demonstration of the platform was in 2008: groups from SAP SE, the HassoPlattner Institute Associate in Nursingd Stanford University incontestable an application design for time period analytics and aggregation. Former SAP SE government, Vishal Sikka, mentioned this architecture as "Hasso's New Architecture". Before the name "HANA" stabilised, people referred to this product as "New Database". The computer code was antecedently known as "SAP superior Analytic Appliance".

II. The first product shipped in late November 2010. By mid-2011, the technology had attracted interest but the experienced business customers still considered it "in early days". HANA support for SAP Net Weaver Business Warehouse was announced in September 2011 for availability by November.

III. In 2012, SAP promoted aspects of cloud computing. In Oct 2012, SAP proclaimed a platform as a service giving known as the SAP HANA Cloud Platform and a variant known as SAP HANA One that used a smaller quantity of memory.

IV. In could 2013, a managed non-public cloud providing known as the HANA Enterprise Cloud service was proclaimed.

V. In could 2013, Business Suite on HANA became out there, enabling customers to run SAP Enterprise Resource coming up with functions on the HANA platform.

VI. S/4HANA, released in 2015, written specifically for the HANA platform, combines functionality for ERP, CRM, SRM and others into a single HANA system. S/4HANA is meant to be a simplified business suite, replacement earlier generation ERP systems. While it is likely that SAP will focus its innovations on S/4HANA, some customers using non-HANA systems have raised concerns of being locked into SAP products. Since S/4HANA requires an SAP HANA system to run, customers running SAP business suite applications on hardware not certified by SAP would need to migrate to a SAP-certified HANA database ought to they select the options offered by S/4HANA.

VII. Rather than versioning, the software package utilizes service packs, referred to as Support Package Stacks (SPS), for updates. Support Package Stacks are released every 6 months.

VIII. In Gregorian calendar month a pair of016 SAP proclaimed SAP HANA 2, that offers enhancements to multiple areas like management and application management and includes 2 new cloud services: Text Analysis and Earth Observation Analysis. HANA customers will upgrade to HANA a pair of from SPS10 and on top of. Customers running SPS9 and below should 1st upgrade to SPS12 before upgrading to HANA a pair of SPS01.

 IX. According to SAP customer will use SAP HANA because the SAP HANA platform can potentially save an organization 37% across hardware, software, and labor costs. By Apr twenty one, 2015, 370 customers had purchased S/4HANA. After the primary half 2015, positive growth was confirmed for SAP. In October 2015 SAP confirmed that S/4 HANA has exceeded over 1300 customer.

 X. Growth continued through the third quarter of 2015. Following its third quarter earnings announcement, SAP said the number of SAP S/4HANA customers had risen to 1,300. After fourth quarter shut of 2016, SAP announced that 5,400 customers had implemented SAP S/4HANA.

Figure 4: Components of SAP HANA

CHAPTER-3

SAP HANA MAIN COMPONENTS AND ARCHITECTURE

3.1 Components of SAP HANA
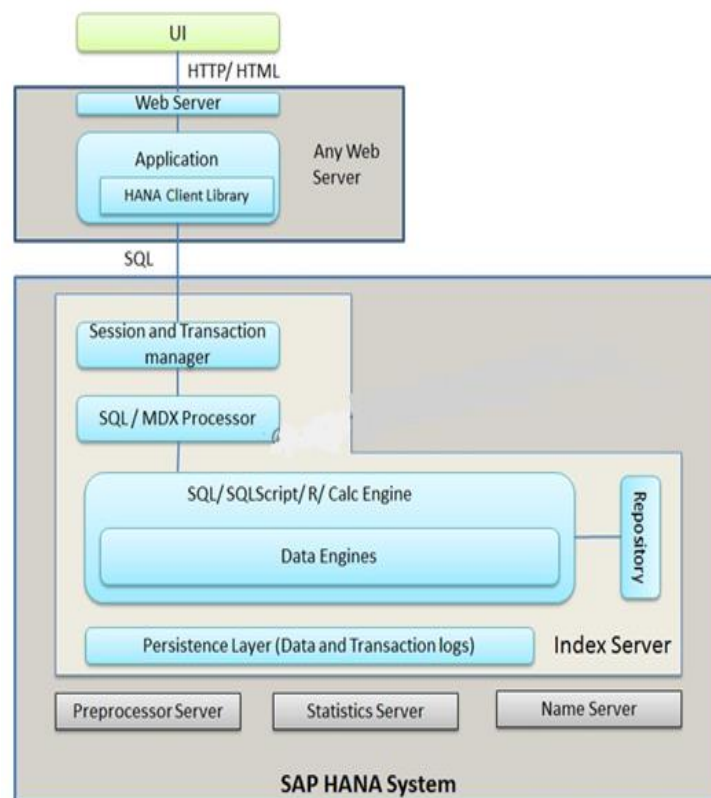
The SAP HANA info is developed in C++ and runs on SUSE UNIX Enterprise Server. SAP HANA info consists of multiple servers and also the most significant part is that the Index Server. SAP HANA database consists of Index Server, Name Server, Statistics Server, Preprocessor Server and XS Engine.snapdragon also launces various devices that improve Augmented and virtual reality. Snapdragon also support the improve version operating system.

    1.Index Server:- Index server is the main SAP HANA database component. It contains the particular knowledge stores and also the engines for process the information. The index server processes incoming SQL or MDX statements within the context of genuine sessions and transactions.

2. Preprocessor Server:- The index server uses the preprocessor server for analyzing text data and extracting the information on which the text search capabilities are based.In could 2013, a managed personal cloud giving known as the HANA Enterprise Cloud service was proclaimed.

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CHAPTER-4

Figure 5: Features of SAP HANA

ADVANTAGES & LIMITATIONS

4.1 Advantages

As we see in introduction SAP HANA is one of the fastest growing products in SAP's history and is viewed by the industry as a break through solution for in-memory databases. SAP HANA claims that it accelerates analytics and applications on one, in-

memory platform also as combining databases, processing, and application platform capabilities.
SAP HANA may be a next-generation business platform that brings along
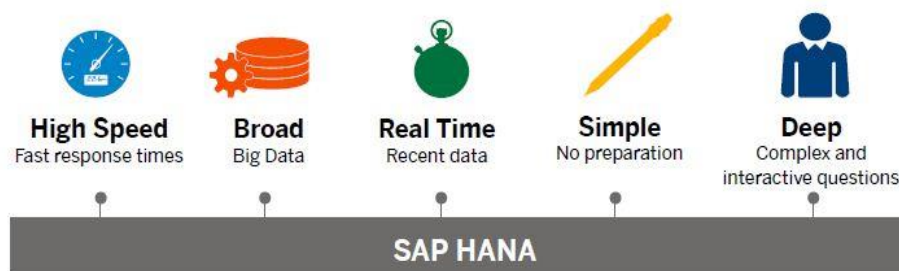
- Business transactions
- Advanced analytics
- Social media
- Mobile experience
- Collaborative business
- Design connections

You may be thinking, "So what?" or "How will this facilitate to their business?" or "How will SAP HANA facilitate company create a lot of money?"
so following are the reasons why many company's use SAP HANA or advantages over another database.
1.Speed: - The SAP HANA enables is sudden and significant and has the potential to transform entire business models. .
SAP HANA manages large knowledge volume at high speeds.
It delivers the "real" time period enterprise through the foremost advanced in-memory technology. SAP HANA provides a foundation on that to make a brand new generation of applications, enabling customers to analyze large quantities of data from virtually any source, in real time. A live analysis by a shopper merchandise company reveals however SAP HANA analyzes current location knowledge in real time-empowering this organization to review segmentation, selling, inventory management, and forecasting information at the speed of thought.

2.Real Time: - SAP HANA delivers the "real" real-time enterprise through the most advanced in-memory technology Pull up-to-the-minute data from multiple sources. Evaluate choices to balance monetary, operational, and strategic goals supported today's business.

3.Any data: - SAP HANA helps you to gain insights from structured and unstructured data. SAP HANA integrates structured and unstructured knowledge from internal and external sources, and may work on careful knowledge while not aggregations.

4.Any source: - SAP HANA provides multiple ways to load your data from existing data sources into SAP HANA. SAP HANA are often integrated into a good vary of enterprise environments, permitting it to handle knowledge from Oracle databases, Microsoft SQL Server, and IBM DB2.

5.Insight: – Unlock new insight with predictive, complex analysis:- Before SAP HANA, analytics meant:

•Preconfigured dashboards based on fixed business requirements.
•Long wait times to produce custom reports.
•Reactive views and an inability to define future expectations.

With SAP HANA, you can: Quickly and easily create ad-hoc views without needing to know the data or query type - allowing you to formulate your actions based on deep insights. Receive fast reactions to new articulated queries thus you'll be able to introduce new processes and business models to surpass the competition. Enable progressive, interactive analyses such as simulations and pattern recognition to create measurable, targeted actions.

6.Innovation: - The ultimate platform for business innovation:- SAP HANA is an early innovator for in-memory computing. Its configurability, easy integration, and revolutionary capabilities make it flexible enough for virtually anything your business requires.

Some examples of this include: Energy Management
Utility firms use SAP HANA to method and analyze immense amounts of information generated by good meter technology, improving customers' energy efficiency, and driving sustainability initiatives.
Real-time Transit Routing SAP HANA helps analysis corporations calculate best driving routes mistreatment time period GPS knowledge transmitted from thousands of taxis.
Software Piracy Detection and interference school firms use SAP HANA to research massive volumes of advanced knowledge to achieve business insights into software package piracy, develop preventive strategies, and recover revenue.

7.Simplicity: - Fewer layers, simpler landscape, lower cost:-Reduce or eliminate the data aggregation, indexing, mapping and exchange-transfer-load (ETL) needed in complex data warehouses and marts. Incorporate prepackaged business logic, in-memory calculations and optimization for multi core 64-bit processors. Spend less on real-time computing.

8.Cloud: - Step up to one of the world's most advanced clouds. SAP HANA powers SAP's next-generation enterprise cloud.

  Fast: -A single-location stack removes latency – sanctioning time period collaboration, processing, and planning.

Scalable: - A extremely strong cloud service permits fast preparation of current and next generation applications, scaled to your business needs.

Secure: -We secure your knowledge through the complete cloud answer with severally audited standards of information security and governance.

9.Cost: - SAP HANA reduces your total IT cost so you can increase spending on innovation.

10.Choice: - SAP HANA provides you choice at every layer to work with your preferred partners.

•Run on the hardware of your choice.
•Work with the software you prefer.

Collaboration with variety of partners implies that SAP will complete the computer code stacks of our various client base in configurations that add up for his or her business.
Plus, a range of various choices implies that you won't be barred in by one supplier.

4.2 Limitations

1.Currently only one big machine - which is not really perfect for HA scenarios (in some documentation you can read about a distributed system - like BWA) - no document tells me the truth about the HW architecture.
2.No PITR (point-in-time recovery - user errors -> deleting data accidentally or something like that).
3.No migration back to standard RDBMS, so SAP take your flexibility away (no R3load export possible?).
4.System copies - how they can be performed? (more interesting later for ERP systems).

CHAPTER-5

IMPLEMENTATION OF SAP HANA

As we say in our introduction more than 5,000 company has migrate their database in SAP HANA from previous versions like SAP BW or any other databases. Following are some examples of company who successfully migrate from their old database.
1. Siemens and Atos: - Atos' six-year contract with Siemens, Europe's largest engineering company, focuses on a platform running in the cloud and is built on the SAP HANA platform for data services to meet Siemens' growing business demands. The platform – supported bullion, the enterprise high-end x86 server from Bull – is deployed on a worldwide basis to support over a hundred,000 Siemens personnel across the whole Siemens Group. This is one among the largest SAP HANA migration comes within the world, hosting vital knowledge in additional than 1PB of aggregate memory.

2.Ashok Leyland with Capgemini: - Ashok Leyland is an Indian automotive-manufacturing company. Founded in 1948, it's the second-largest manufacturer of economic vehicles, like trucks and buses, also as emergency and military vehicles. With a inheritance spreading over it's virtually seventy years, the corporate enjoys a powerful presence within the Indian business vehicle section and additionally a powerful world presence. To manage its in depth network of suppliers and distributors, Ashok Leyland determined to upgrade to SAP war on HANA platforms from its existing SAP war system. Ashok Leyland's knowledge warehouse was designed on multi-layered knowledge storage approach by multiple vendors at completely different points in time. The inheritance system was serious in terms of redundant knowledge and also the time to report. Hence, Ashok Leyland wished to migrate its knowledge to HANA for augmented optimization. And Capgemini helps them in this migration.

3.Lenovo: - Lenovo is leading brand in laptops, tabs and all other different appliances. Lenovo have been migrate their database into SAP HANA. And they get their best results. Like reduce planning time from 10 hours to 10 minutes. The reporting speed is also improved by 50 times. And because of real-time analytics they can get feedback and complaints from customers.

4.Usha: - Usha International Limited has been providing everyday household products to consumers in India since 1935. One of Usha's foremost objectives is to continue its outstanding record and reputation for customer satisfaction. The company realizes that to do so, it must react nimbly to market changes. That is why Usha moved to SAP® Business Suite powered by SAP HANA® to run the company.
A system that operates at the speed of thought changes how people work, do business, and innovate. By utilizing the game-changing speed of SAP HANA, Usha accelerated its reporting and business processes by factors that range from 4 to 1,480. For example, Usha's invoice list report, which details information like sales value and cash discounts, can be executed in 2 seconds instead of the 4.5 hours it used to take. The stock transfer detail report that used to take 2 hours now runs in 3.5 seconds.

5.SHS Group: - SHS Group, an Irish company producing beverages, spices and desserts, needed a deeper view into product performance, sales activity, and market trends. Unfortunately, slow data load times and inflexible reporting made it cumbersome to access detailed sales information. SHS so desired to determine AN IT platform that facilitates innovation, streamlines operations, and speeds growth. Ideally, it ought to improve overall IT performance and scale back maintenance prices and energy and modify quicker, more flexible reporting for sales and finance.
      After moving its SAP war application from AN Oracle info to the SAP HANA platform, reporting is now more than 100 times faster than before, while report generation time went down from 3 minutes to but 2 seconds on the average. The result's a far better user expertise, increased user adoption, and greater business productivity, together with fewer system administration requirements and lower costs. At identical time, SHS's data footprint was reduced by a factor of 6, coming down from 661 GB with Oracle to 100 GB with SAP HANA. John McLarnon, Head of Information Systems and Technology at SHS Group said: "Given the huge success and immediate benefits realized by our migration of SAP BW to SAP HANA, I anticipate to consequent part of our knowledge analytics vision and strategy.

CHAPTER-6

CONCLUSION & FUTURE SCOPE

6.1 Conclusion

Through this report we can conclude that this is the future of database. Because it takes lower time for processing data by any other database and give a complete report in very short time which is useful for the business to make strategy for future enhancement.

6.2 Future Scope

1.More Flexible- As mention in limitation you cannot migrate back to standard RDBMS.

2.HANA creates a large amount of cache in the database and responsible for very fast processing but because of these the price of appliance is also increase. So, they try to reduce the cost.

3.The main aim of this project is to give the business data to the user as fast as possible hence working on HANA is efficient as compared to other database. But some of the company's are not afford so they think to make a data pooling.

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