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Architectural Solutions for Scaling SAP BI Systems

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Abstract

The article discusses architectural solutions for scaling SAP Business Intelligence (BI) systems. SAP BI is a set of tools designed for managing and analyzing large amounts of data, which allows organizations to obtain useful information to optimize operations. The main aspects of scaling SAP BI systems include architectural approaches, the use of various components such as SAP Business Objects, SAP BW and SAP HANA, as well as the introduction of flexible methods and tools to ensure the sustainability and performance of systems. The stages of development of BI solutions are discussed, starting from simple integrations to complex data storage and analytics systems. Examples of the use of various architectural solutions are provided, depending on the scale and needs of organizations, as well as recommendations for improving data quality and reducing the load on the source systems. The article highlights the importance of a systematic approach to data management and analysis in order to achieve long-term efficiency and competitiveness in the market.

Keywords: SAP BI systems; SAP BI scaling;Azure AWS SAP Data Hub SAP Data Hub.

1. Introduction

SAP Business Intelligence, or SAP BI, is a program developed by SAP SE to simplify the management and analysis of large volumes of data. It provides users with the tools to collect, archive, prepare, and analyze information from multiple sources within an organization. The primary goal is to offer companies actionable insights that enable them to make more informed decisions and optimize operations. This allows businesses to enhance their operations, maximize resource utilization, and gain a competitive edge in the market.SAP BI assists companies in efficiently managing and analyzing data by using a comprehensive suite of tools. Companies can collect, store, transform, and interpret information from various sources to derive actionable insights that can improve future operations. Components of SAP BI include SAP Business Objects, SAP BW, and SAP HANA, which provide centralized administration and data analysis for enterprise applications. It helps various companies access real-time information and make well-founded decisions through data management and analysis. This enhances productivity, competitiveness, and resource efficiency for businesses [1].The aim of this article is to explore architectural solutions for scaling SAP BI systems.

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2. General Characteristics of SAP BI

In 2018, SAP introduced SAP Analytics Cloud (SAC), another significant milestone in its BI roadmap. This platform and its capabilities represent the current roadmap for SAP Business Intelligence visualizations, dashboards, planning, predictive analytics, and advanced analytical capabilities. However, this solution does not always meet the crucial BI needs—especially regarding data security, corporate reporting, and report distribution. To address this, SAP is launching SAP BusinessObjects 4.3 this year, integrating SAC with SAP BusinessObjects Enterprise. The stated goal of SAP BusinessObjects 4.3 is to enhance integration capabilities between SAC and SAP BusinessObjects Enterprise [1].

SAP BI mainly consists of reporting, analysis, and visualization tools. It provides real-time business information, aiding in making informed decisions, optimizing processes, and enhancing management efficiency, as well as improving competitiveness relative to other organizations. These tools and applications help businesses collect, analyze, and report on their business data. Figure 1 below illustrates the principle of how this system operates [2].

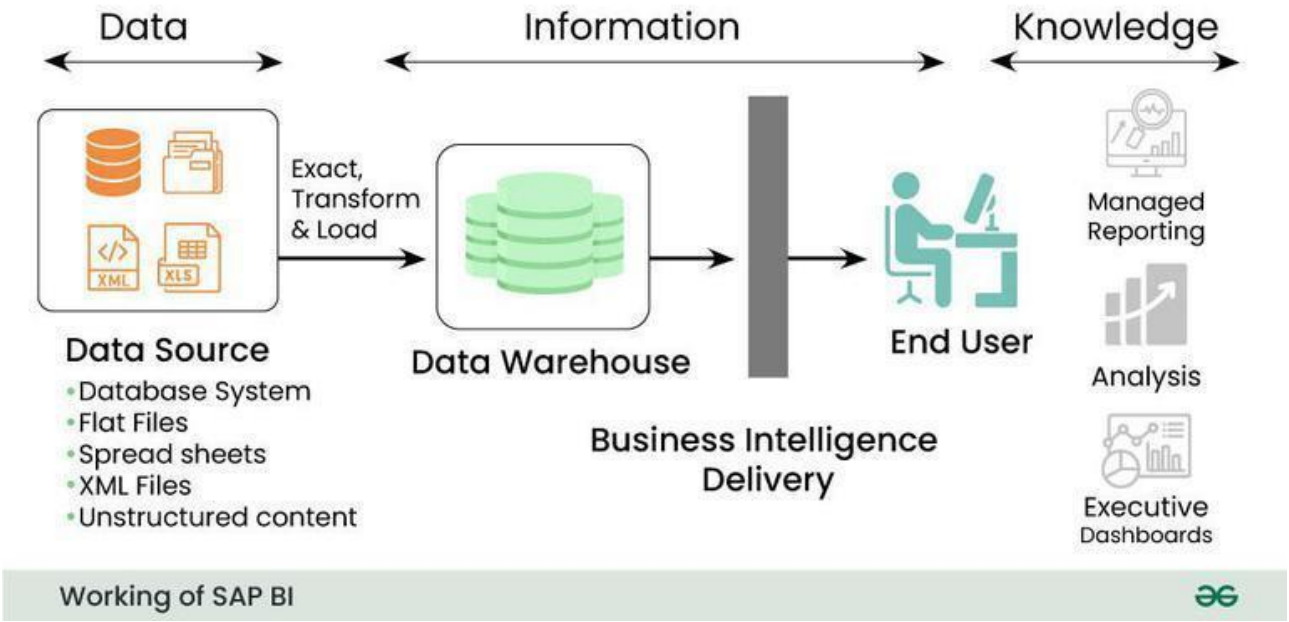

Figure 1: The principle of SAP BI operation [2]

As seen in Figure 1, the system works by connecting to databases, spreadsheets, and other data sources, transforming this information into actionable insights for decision-making and other purposes.

SAP BI initially collects data from various sources, such as transactional databases and spreadsheets. This is followed by data transformation, where the collected information is standardized into a common format and cleaned to ensure accuracy. It performs data cleansing to guarantee precision and completeness. Next, data modeling occurs, where a data model is created to illustrate how data and information will be stored and organized within the system. Following this is data analysis, offering various tools, such as dashboards, to help users understand and interpret the data. Finally, SAP BI provides tools to generate reports and distribute them to key

clients or stakeholders [3].

The key components of the SAP BI system are depicted in Figure 2 and include:

- Data Warehouse: Primarily involves extracting, transforming, and loading data from source systems.

- BI Platform: The BI platform level contains BI services to support complex analytical tasks and functions. It includes an Analytic Engine that processes data requested through BEx analysis navigation. Its interface allows data entry and processing within integrated BI planning. It also features specialized analysis tools such as Analysis Process Designer (APD) and Data Mining, providing analysts with tools for combining, mining, pre-processing, storing, and analyzing data.

- BI Suite: These tools help create reports for analysis purposes. It includes Business Explorer (BEx), offering flexible reporting and analysis tools [4].

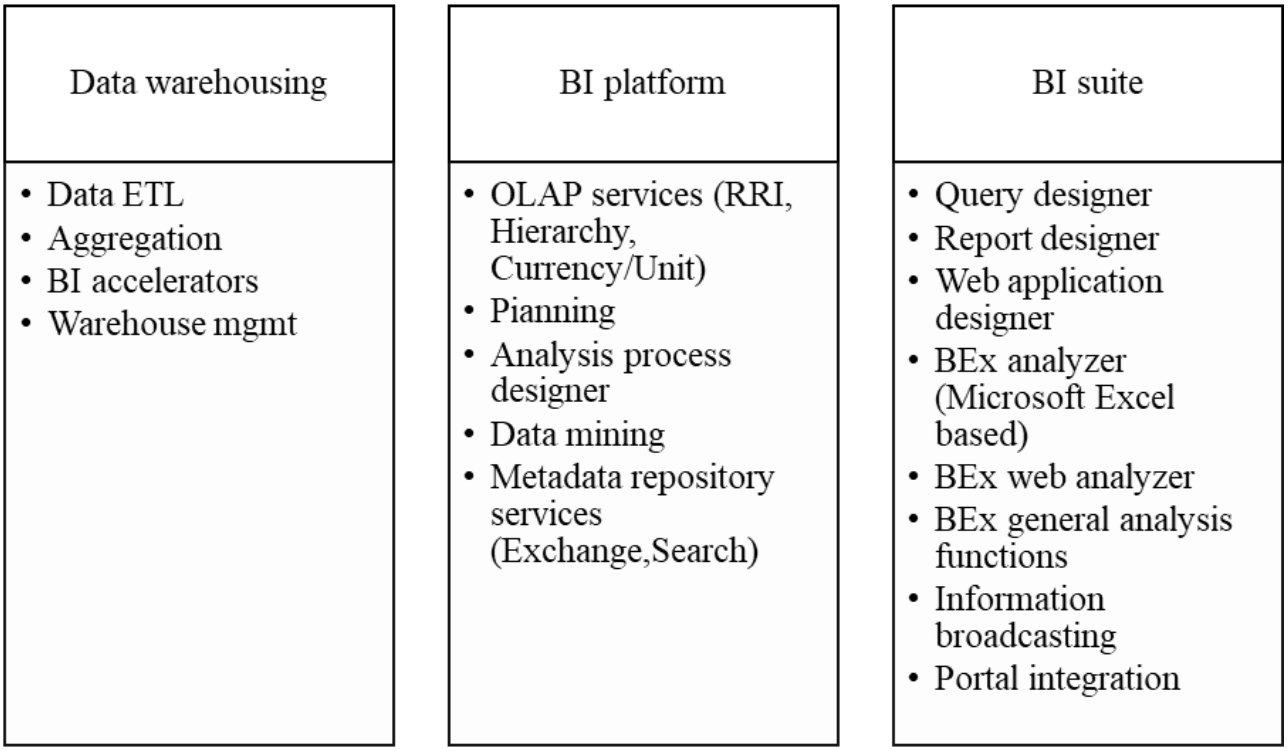

Figure 2: Components of the SAP BI system [4]

Below are general details about each level:

- Client Level. The client level contains all desktop client applications that interact with the business analytics platform to provide various types of reports, analytical, and administrative capabilities.
- Web Level. The web level contains web applications deployed on Java web application servers. These web applications deliver BI platform functionality to end-users via a web browser.
- Management Level. This level coordinates and controls all components that comprise the BI platform. It

includes the Central Management Server (CMS) and the Event Server, along with related services.

- Storage Level. The storage level is responsible for handling files, such as documents and reports. It also manages report caching to save system resources when users access reports.
- Processing Level. The processing level analyzes data, generates reports, and creates other types of output. It is the only level that has access to the databases containing report data.
- Data Level. The data level consists of database servers hosting the CMS system databases and the audit data repository.

The SAP BI Platform is comprised of a set of servers running on one or more hosts. It is crucial to select the right deployment strategy based on size, business needs, and the type of environment. For a small installation, such as for development or testing, a single Azure virtual machine can be used for the web application server, the database server, and all BI platform servers. When using Azure's Database-as-a-Service (DBaaS) offering, the database server operates separately from other components. For medium and large installations, servers can be run on multiple Azure virtual machines.

The diagram below shows the architecture of a large-scale deployment of the SAP BOBI platform on Azure virtual machines, with each component distributed. To ensure infrastructure resilience against service outages, virtual machines can be deployed using either a flexible scale set, availability sets, or availability zones.

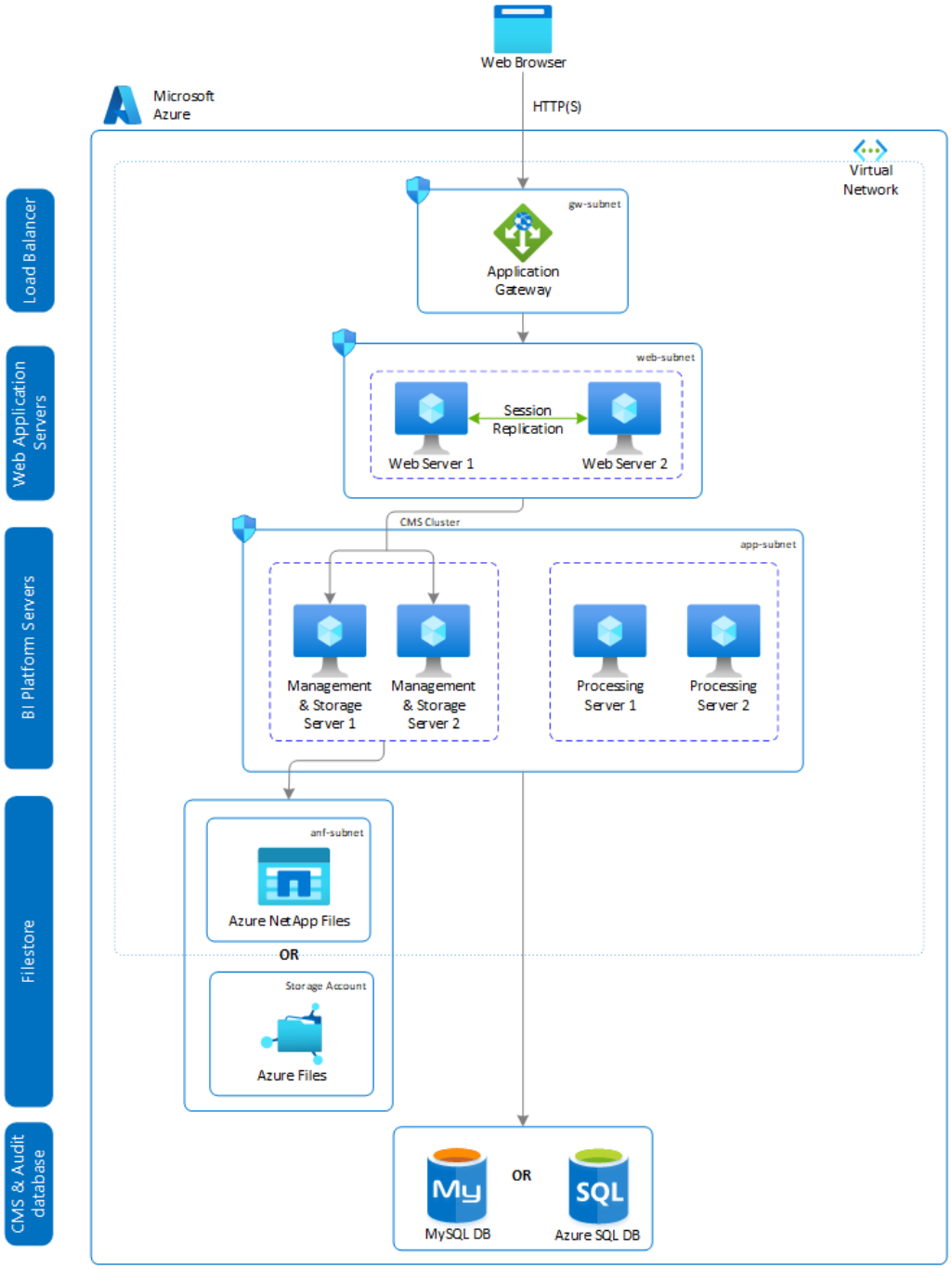

Figure 3: SAP BI architecture [6]

From Figure 3, the following elements can be observed:

Load Balancer. In a SAP BOBI deployment with multiple server instances, the web application servers (or web level) operate on two or more hosts. To evenly distribute user load across web servers, a load balancer can be used between end-users and web servers. In Azure, Azure Load Balancer or Azure Application Gateway can be utilized to manage traffic to web servers.

Web Application Servers. The web server hosts SAP BOBI Platform web applications, such as CMC and BI

Launch Pad. To achieve high availability of the web server, at least two web application servers must be deployed to manage redundancy and load balancing. In Azure, these web application servers can be hosted in either a flexible scale set, availability zones, or availability sets for better availability.

Tomcat is the default web application server for the SAP BI platform. To achieve high availability for Tomcat, enable session replication using the Static Membership Interceptor in Azure. This ensures that users can access the SAP BI web application even if the Tomcat service fails [5].

3. Architectural Solutions for Scaling SAP BI Systems

On the Azure platform, scaling SAP BI is achieved through virtual machines certified for SAP HANA, which can support both vertical scaling (increasing resources of a single machine) and horizontal scaling (adding new machines). Azure supports virtual machines with memory ranging from 192 GB to 6 TB for SAP HANA applications and up to 32 TB for BW/4HANA applications. For larger solutions, bare-metal instances are offered, which can reach up to 20 TB for HANA and 60 TB for BW/4HANA. These solutions allow enterprises to dynamically adjust resources based on current workloads, which is especially critical for SAP applications.

AWS provides capabilities for automatically scaling SAP BI through services like Amazon EC2 Auto Scaling and AWS Lambda. These services enable horizontal scaling of SAP application servers by adding or removing instances based on the current needs of the system. AWS uses SAP-specific metrics, such as the number of occupied and free work processes, to determine the need for scaling. This solution helps ensure system resilience to peak loads, such as during reporting periods or marketing campaigns, while minimizing costs by using resources as needed.

Hybrid architectures are often used to integrate on-premises and cloud SAP BI systems, allowing part of the infrastructure to remain on-site while providing the flexibility and scalability of cloud solutions. This approach enables enterprises to transition to cloud technologies gradually, minimizing risks and costs associated with a full migration. In such architectures, tools for data integration and management, such as SAP Data Hub and SAP Cloud Platform Integration, are critical for seamless operation between heterogeneous systems and platforms [6].

4. Conclusion

Based on the above, it can be concluded that architectural solutions for scaling SAP BI systems play a crucial role in ensuring effective data management and analysis within organizations. The use of various architectural approaches, such as SAP Business Objects, SAP BW, and SAP HANA, allows the creation of flexible and resilient systems capable of handling increasing data volumes and complex analytical tasks. The article emphasizes the importance of the initial data integration phase, systematic data quality control, and the use of different data storage levels to achieve optimal performance. The application of flexible methods for developing BI solutions allows organizations to adapt to changing needs and ensure the long-term sustainability of their information systems. Ultimately, successful scaling of SAP BI systems contributes to improved efficiency, productivity, and competitiveness of companies in the modern market.

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