OpenSAP: Managing Business Systems Intelligently

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What is SAP SE & OpenSAP?

OpenSAP is an extension of the German-based company SAP SE, which makes enterprise software for business operations and customer relations. SAP stands for: "*Systeme, Anwendungen und Produkte in der Datenverarbeitung*." In English, this translates to: "Systems, Applications & Products in Data Processing." The company ranks on the Euro Stoxx 50 Index and is headquarted in Germany with offices in over 180 countries and over 335,000 customers worldwide. SAP creates Enterprise Resource Planning software (ERP), Cloud extensions, and SAP S/4HANA business suites.

OpenSAP is SAP SE's free informational site, offering Massive Open Online Courses (MOOCs) that help users become more familiar with their products and the evolving digital world. The courses combine concepts like machine learning, big data, digital transformation, data science, and the Internet of Things in order to better prepare users for SAP's products. OpenSAP also offers podcasts and a news blog for those who want to stay up to date on the company and the digital economy.

Technical Terms

ERP – *Enterprise Resource Planning.* Software that businesses use to manage daily operations including, but not limited to: accounting, procurement, sales, management, and manufacturing. ERP eliminates data duplication and ties all sections together into one system.

SAP S/4HANA – SAP's ERP for their HANA relational database management system.

The Relational Database Model – Developed by IBM engineer E.F Codd in the 1970s and uses relational algebra / algorithms. Industry standard for database management systems (DBMS).

Cloud computing – the delivery of: servers, DBMS, storage, networking, analytics, and intelligence over the Internet so as to reduce cost while increasing innovation, flexibility, performance, and scale. Security is often considered a risk.

PaaS / SaaS – Platform as a Service & Software as a Service. PaaS deals with on-demand environments for cloud computing. SAP uses their SAP Cloud Platform as a PaaS. SaaS is a method for delivering applications over the Internet, usually via subscription. SAP's SaaS is S/4HANA Cloud.

SAP HANA – SAP's DBMS that combines database servers, data processing, and application platform analytics and stores them for fast access.

Integration – The Key to the Intelligent Enterprise

This first course focuses on SAP's current and upcoming technologies that can help streamline the migration to an Intelligent Enterprise. The unit covers multiple topics: Integration Styles & Technologies, Cross-Technologies, and Integration Setup / Operations. At a minimum, SAP offers three basic applications that act as a central hub for business management and information systems. **SAP Fiori** works as an SAP-specific centralized hub for both Human Resource and S/4 HANA applications, allowing for a streamlined login process between the applications. A step up from Fiori, **SAP CoPilot** is an Intelligent Enterprise bot that manages multiple business applications and uses self-learning to tailor itself to the applications. CoPilot also employs text and speech recognition, so interaction between business applications becomes much easier. An up and coming software, **SAP InScribe**, will allow for pen and text recognition, specifically for big data calculations and analysis.

SAP's primary goals for their Integration applications, particularly for cloud-based applications, revolve around real-time processing, transactional integrity, and adaptability to and between SAP and non-SAP clients / applications. Integration between the Cloud, business partners, business & social networks, and public authorities is achieved through the **SAP Cloud Platform Integration** application and **Integration Content Advisor** server. The Integration Content Advisor unifies all the required tasks for creating integration content based on a comprehensive knowledge base and machine learning. The SAP Cloud Platform allows users way to build and connect all of their business applications, integrate cloud-based applications and on-premise applications for ease of access, and manage / analyze the applications' data directly from the platform.

SAP's Integration strategy is valuable due to its open integration and adaptability with non-SAP applications. The company uses a holistic approach in the development of their applications, meaning that they focus on an end-to-end servicing and digitalization for the client users. Their **Integration Solution Advisory Methodology** appeals to large-scale organizations because many of SAP's integration applications are open to a wide range of integration styles (partial, cloud-based, on-premise, etc.) and most applications support non-SAP clients. SAP employs extensive use of Artificial Intelligence and machine learning in order to promote the efficiency of their applications in regards to context-based recommendations and the simplification of the end-to-end user experience. According to SAP's statistics, nearly **75%** of Enterprise software and hardware development will include either Artificial Intelligence or machine learning.

SAP's Application Programming Interface Strategy includes two primary types of APIs: REST (representational state transfer) protocols, which are used with synchronous responses and use commands such as GET, POST, DELETE, and SOAP (Simple Object Access Protocol), which is preferred for asynchronous messaging and is a protocol for exchanging information in distributed environments.

Create and Deliver Cloud-Native SAP S/4HANA Extensions

SAP S/4HANA is an ERP software that helps mid-size to large companies run daily business operations. S/4HANA is a two part term that refers to both the on-premise software **SAP S/4HANA** and the cloud-based software-as-a-service **SAP S/4HANA Cloud**. The on-premise software is managed personally by companies while the Cloud version is regularly maintained and updated by SAP. In-app extensions are available for the on-premise version, while flexible, they offer restricted extensibility due to the predefined fields and functions available. Side-by-side extensions are available for the Cloud and offer both a greater flexibility and extensibility because they're built via **SAP's Cloud SDK** platform-as-a-service through **Java Developer Toolkit, Apache Maven, GitHub, IteliiJ IDEA, and SAP Cloud Foundry CLI** and can be directly integrated into the on-premise S/4HANA via **Application Programming Interfaces (APIs – Odata, REST)**.

Building SAP S/4HANA extensions that integrate from SAP S/4HANA Cloud to SAP S/4HANA are useful for businesses who want to integrate external data into the ERP, gather additional information about customers, leverage data and functionality to achieve a quicker customer value, expand scope of SAP S/4HANA to include industry-specific requirements/processes, and integrate partner-build extensions as SaaS.

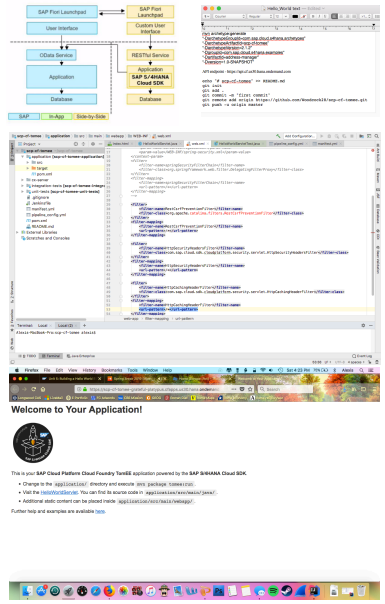
The first step in the process, after having installed the programs, was to boot one of SAP's Maven archetypes through Terminal (Command Prompt) via a **Secure Copy Protocol Cloud Foundry TomEE server**, or **SCP CF TomEE** for short. The second step was importing the archetype file created on the local host into IntelliJ IDEA, an **Integrated Development Environment (IDE)**, to make it easier to modify and manage files. IntelliJ IDEA also has Terminal integrated into the interface, making it easier to code. Third, after importing the project into IntelliJ, inspections are made on the *web.xml, index.html, servlet.java, servle_test.java , pipeline_config.yml,*and *manifest.yml* files. After modifying specific parts of code / security filters, the fifth step is to package and build the application locally via Terminal through the command **mvn clean install**, and then run the application on a TomEE server through the command **mvn tomee:run**.

After successfully running the application on a TomEE Server, Terminal's SAP Cloud Foundry CLI is then bound to SAP's Cloud Foundry through **cf login** and **API endpoints**. After logging into SAP, the application is pushed to the cloud, uploaded on SAP's servers, and is accessible through a trial account of SAP's Cloud Foundry. Finally, as a measure of precaution, an additional file is added to the application that ensures its delivery, and the entire source code is pushed into a GitHub respository via Terminal.

Want to learn more?

https://en.wikipedia.org/wiki/SAP_SE#SAP_S/4HANA
https://open.sap.com/pages/about
https://open.sap.com/news
https://www.oracle.com/applications/erp/what-is-erp.html
https://azure.microsoft.com/en-us/overview/what-is-cloud-computing/

Explaining The Process



A House of Cards

Intelligent Enterprise is a necessity in the modern world. With the Internet / Cloud transforming the global market, so many variables are now present that Intelligent Enterprise becomes critical to improving the efficiency and productivity of large-scale businesses. Upon learning about Intelligent Enterprise and upon building a Cloud-native extension, I have gained a newfound respect for the complexity of the Cloud environment. It takes an amazingly complex system of protocols, standards, and software applications to not only create a virtual application, but to deliver and host one in a virtual environment as well.

To give a sense of the complexity, Cloud programmers and application developers must be familiar with: **Cloud Environment standards / protocols, multiple coding languages, Cloud and Internet structure / interaction, Cloud and Cloud application interaction, Cloud application and web / desktop application interaction, cloud application and user software / hardware interaction.**