Some aspects regarding the implementation of a Web application in different SAP UI technologies

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Abstract. Currently, in the development and implementation of an web application, the software developers are turning to those technologies that satisfy the client's requirements, that can be easily extended and have optimal results in terms of execution time. This scientific paper addresses issues related to the development and implementation of the same application using three different web technologies, existing on the SAP NetWeaver platform. In this context, aspects related to the SAP NetWeaver technological platform and the SAP AS application server ABAP, the facilities offered by these for developing and implementing web applications, as well as the features specific to Web Dynpro ABAP, Floorplan Manager and WebClient UI technologies are highlighted.

1. Introduction

The SAP NetWeaver \cite{1,2,3} represents the complete platform for integration and applications, based on web services, which achieves the "global integration" of both technologies and business processes in all forms of organization, Figure 1. Currently, the platform is the technological foundation for almost all SAP applications from the SAP Business Suite \cite{4} and the solutions of the SAP partners and customer-developed applications. This platform providing also the support for Enterprise Services Architecture \cite{5}, the SAP concept for solutions directed towards business processes and based on Web service standards.

![Figure 1. The SAP NetWeaver platform \cite{6}](image)

![Figure 2. The SAP AS ABAP Architecture \cite{7}](image)
At the heart of the platform is the Application Server (SAP AS), which provides a complex infrastructure for developing and implementing applications in the ABAP and Java languages. As architecture, SAP AS ABAP consists of three levels, Figure 2 [7]:

- the persistence level or the level at which the data are stored in databases;
- the applications level or the logical level in which the programs are executed;
- the presentation level that is responsible for everything that means presenting data and receiving user input.

Regardless of the technological platform used for the implementation of the web applications, there are four basic principles that SAP promotes and adheres to [8]. These are:

- separating the logical part from the application part;
- designing the application so as to satisfy the user's needs;
- harmonization of the interface with the user (coherence and ease of use);
- creating an accessible interface for as many users as possible.

In this context, this paper brings to the reader three of the most used technologies created using the ABAP application server, on the NetWeaver platform, which respects these principles, namely: Web Dynpro, Floorplan Manager and WebClient UI (developed for the SAP CRM, for the ABAP language only).

2. Application Server ABAP technologies

2.1. Web Dynpro

Web Dynpro ABAP is the current technology based on the ABAP web application server, its own execution and design environment, with special tools that form a framework - the ABAP Workbench [9].

The design and implementation process of a Dynpro Web application is based on the Model View Controller paradigm [10] which facilitates the decoupling of the logical part from the application interface, Figure 3. The functioning on the MVC principle of the Dynpro Web framework [11], makes the whole structure to be composed from components, the separation of the design data materializing through the objects that generate data and the objects that consume data.

The Web Dynpro programming model [12] uses its own interpretation of the MVC paradigm. At the level of a WD component, the Model is made out of contexts, the View corresponds to the Layout and to the Controller at the View level, and the Controller role belongs to the ComponentController and to the Controller at the Windows level, Figure 3.

![Figure 3. The Web Dynpro component](image)

Technically, these components have well-defined tasks and interactions in the development environment. Practically, a Web Dynpro application is implemented as a succession of interconnected and integrated views in a Windows. The connections between the Views are made statically in the design phase.

From a technical point of view, the WD application has as starting point for execution an HTTP address generated by the Web Dynpro framework. This establishes the communication between the application interface and the application itself.
2.2. Floorplan Manager
The new UI applications of the SAP Business Suite solution [14] integrated on the SAP NetWeaver platform are made using the Floorplan Manager framework. The Floorplan Manager (FPM) framework is based on Web Dynpro ABAP technology, thus benefiting from all the advantages it offers. With its help it is possible to build web applications quickly and easily. The applications can be adapted by the customer to the needs, without changing the code. FPM provides floorplan models (templates) for building applications, which specify their general appearance and purpose [15].

FPM technology, as part of Web Dynpro technology, follows the same architectural line that is based on the MVC concept of separating the logical from the visual part. An FPM application is actually a common WD application that has as structure a model of floorplan [16] in which the FPM framework is called. This configuration, Figure 4, contains the real FPM application, made in the form of a set of UIBB blocks suitable for each template.

![Figure 4. The FPM application](image)

The WD application components that include GUIBB blocks communicate with the framework via FPM interfaces during a loop of events corresponding to that floorplan. This loop includes a feeding class-Feeder Class, which contains a series of predefined methods that will be triggered at the runtime.

2.3. WebClient UI
WebClient UI is a block interface (UIBB) provided by SAP through the Business Suite platform, which is designed to be used in the business environment, specifically for Customer Relationship Management. The WCUI technology combines the BSP technology with the functionalities and the comfort of the Dynpro Web technology from which it uses not only the concepts but also the programming model. The WebClient UI applications are executed through special Web CRM applications, which have their own navigation framework, the role concept and programming technique for user interfaces.

Architecturally, the CRM WebClient UI framework is divided into three levels Figure 5: the Database Layer, the Business Layer and the Presentation Layer [17].

![Figure 5. The CRM WebClient UI architecture](image)

![Figure 6. The concept of MVC in the CRM WebClient UI technology](image)
Because the three levels of the WebClient UI CRM architecture are completely separate from each other, it is allowed to connect any business application that falls within the WebClient UI framework, through the BOL layer and the GenIL layer at the presentation level.

At the heart of the presentation level that makes the display of the HTML pages, generated by BSP, in the Web browser possible, is CRM User Interface Framework (CRM UIF). This level is divided into 3 levels, known as MVC, Figure 6. Therefore [18]:

- the model contains information about the range of data structures used;
- the view contains an HTML file and is responsible for displaying the information of the model on the screen;
- the controller manages the logical interaction part and also ensures the connection between view and model.

As in the Web Dynpro technology, the WCUI application consists of components. Each component consists of a two-class controller, which functions as a BSP controller. The first class inherits the base class for the Dynpro Web controller and contains WCUI generated code. She is responsible for processing the application and instantiating the appropriate context along with its links. The second class is made available to the developer for the effective implementation of the application [19].

Because the WebClient UI technology is developed for SAP CRM, the test applications will be based on the database structure used in CRM, therefore benefiting from a number of advantages that the framework provides.

3. The case study implemented through the web application

The case study underlying this paper consist of the implementation of the same web application using the three SAP technologies: Web Dynpro ABAP, Floorplan Manager and CRM WebClient UI. At the base of the application is an interface specialized in searching, displaying, adding and deleting customer data from the tables corresponding to the CRM database. The interfaces design and the operating logic of the application are the same for all three technologies [20].

3.1. Implementing the application in the Web Dynpro ABAP technology

The web application whose interface is analyzed and presented in Figure 7, is based on a component and a data model consisting of tables that contain general data about customers-business partners and their addresses.

![Figure 7. Interface applications in the WD ABAP technology](image)

![Figure 8. The structure of the Y_WD_BUCOMP component](image)

The implementation of the component Y_WD_BUCOMP- Figure 8, involves the implementation of the five Views (VDETAILS, VDISPLAY, VPOPUP_DELETE, VSEARCH_TEXT and VSTART), their linking and integration in the W_BUCOMP Window. From a technical point of view, these components have well-defined tasks and interactions in the development environment.
Using the visual tools of the framework, the five Views statically programmed in design mode, contain UI elements that are linked by contexts to the corresponding tables from the database. All methods corresponding to these UI elements are programmed at the ComponentController level which has the role of processing the data circulated from the interface in the database.

3.2. Implementing the application in the Floorplan Manager technology
Because the FPM technology is developed under the WD ABAP technology, the case study application follows the same MVC concept of separating the logical part from the data presentation part.

The development of the application starts from choosing the OVP floorplan model, which is supported by the FPM_OVP_COMPONENT component and which will be configured using the FLUID configuration editor according to the structure of the WD application. At the logical level, the configuration of the component is done in the feeder class in which the query is defined. This class implements interfaces that help define the catalog of fields and input parameters needed to build the visual part of the application, specifically the UI elements. The UIB communication with the catalog of fields and input parameters is done within the event loop of the floorplan and includes the definition of the Web Dynpro application with the corresponding data definitions and tables. The exit from the loop leads to the return to the WD application whose execution is shown in Figure 9.

Figure 9. The application interface implemented in FPM technology

3.3. Implementing the application in the WebClient UI technology
The case study application built using the CRM WebClient UI framework is based on the BSP component, BP_HEAD_SEARCH, which offers users multiple search possibilities. The page consists of two distinct areas: one for search and one for displaying the results. Through the Enhancement technique and with the help of the UI Configuration Tool, the views of this component will be specialized. This means that an application similar to the one made in Dynpro ABAP Web technology will be obtained. The new BSP application, YBP_SEARCH Figure 10, will inherit all the functionality of the basic BP_HEAD_SEARCH application, including the implementation part.

Figure 10. The application BSP YBP_SEARCH
Since the component consists of two views (MAINSEARCH and MAINSEARCHRESULT), the configuration of the component is done separately for each one of them, thus resulting the application.

4. Conclusions
Analyzing the three UI technologies of AS ABAP specific to the Business Suite platform, both from an architectural point of view and from the point of view of the programming model, it can be considered [20]:

- Web Dynpro as a technology is not only a programming model for user interfaces, but also a set of tools necessary for interface design, an execution environment for applications and also a technology for modularized software. Business applications can be developed using several techniques, each with its own advantages and disadvantages.
- FPM is a powerful design-centered framework based on Dynpro ABAP Web technology. FPM helps to create and configure user interfaces by providing several elements: floorplan models (structures of UI elements arranged in a certain order in an application) whose workspaces are automatically implemented by the FPM framework, generic UIBB blocks (UI templates for the display of the content) and a configuration editor - FLUID, which allows the configuration of the overall application structure, of the floorplan model and of the UIBB blocks.
- WebClient UI is the BSP-based online interface, provided by SAP for CRM only. The architecture of the framework allows the realization and connection of any application at the presentation level, through the two levels BOL and GenIL. The concept of component enhancement plays an important role in UI adaptation.

By implementing the application in all three SAP UI technologies at the ABAP server level, it is found that [20]:

- the suggested application is part of the category of applications used in all IT projects that contain specialized interfaces in searching, displaying, modifying and deleting data from the database;
- in the Web Dynpro technology, the application is made using a component based on the MVC structure. This architectural model involves linking the UI elements corresponding to the presentation level (View Layout) with the data model whose structure is represented by the database tables and with the logic implemented at the controller level;
- in the FPM technology, the application is based on the floorplan OVP model and a UIBB block, which at the level of the feeder class, which plays the role of Controller, implements the corresponding search and display logic. The construction of the visual part and the communication of the UIBB with the data model from the database is done through the interfaces corresponding to the feeder class, implemented within the event loop of the floorplan;
- in the WebClient UI technology, the application based on the search page component (the search page), configures the visual part, the search and display of data according to the database model is triggered at the framework level, by recognizing the parameter taken from the interface of the search page.

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[20] Berdie A D 2014 Contribuții privind evaluarea multicriterială a tehnologiilor SAP, University Politehnica Timișoara, România, PhD Thesis