SAP Enterprise Portal Development Kit for Microsoft .NET 1.0 Beta

(PDK for .NET)

Ofer Feldman, Software Engineer, SAP Labs Israel
Tsufit Naor, Development Team Lead, .NET group, SAP Labs Israel
Yossi Pik, Development Manager, .NET group, SAP Labs Israel
Yoram Friedman, Product Definition, SAP Labs Israel
Thomas Meigen, Project Director CTSC, SAP AG
Daz Wilkin, SAP Program Manager, Microsoft Corp.

Executive Summary

The objective of the SAP PDK for .NET is to enable customers to develop components for SAP Enterprise Portal, using the .NET framework and writing in .NET languages (VB.NET, C#). The development environment of the PDK is seamlessly integrated into Microsoft Visual Studio .NET 2003.

Components developed with the PDK for .NET can leverage functionalities of the SAP Enterprise Portal, including services and client-side events. Integration with the SAP .NET Connector ensures that communication with SAP backend systems, including mySAP ERP, is now easier then ever.

Customers can take full advantage of the Microsoft .NET framework (e.g. use Web Services); they can easily achieve integration with Microsoft servers, including Microsoft SQL Server and Microsoft Content Management Server (CMS), and reuse existing .NET/COM code.

Applies to

- SAP Enterprise Portal 6.0 Service Pack 2 Patch 2 or Patch 3 (patch 4 is not supported)
- Microsoft Visual Studio .NET 2003
- Microsoft .NET Framework 1.1

Keywords

PDK for .NET , Visual Basic :NET, Visual C#, SAP Enterprise Portal, iView

Level of difficulty

Technical consultants, Developers

Contents

Business Overview

The Microsoft .NET platform is one of the two most common platforms for developing distributed applications. Organizations that adopted Microsoft .NET have already invested a large amount of resources in developer training and migration from other platforms.

The Microsoft development environment, Visual Studio .NET, is the most common development environment today, with a committed developer community focused on rapid development using C# and VB.NET. Adoption of the SAP PDK for .NET by .NET developers as the standard way for developing .NET based applications for SAP Enterprise Portal can benefit many SAP-centric organizations.

To increase productivity, the .NET environment offers a unified development environment and a standard set of tools common to all languages and developer tasks. A .NET programmer experienced in user interface development of a corporate Web site is able to use the same set of skills when creating self service applications, Web services, or any other Web based application. Using the SAP PDK for .NET, the development, testing, and deployment of SAP portal components becomes as easy as developing any other .NET Web application.

Preserving current knowledge and skill sets is an important goal for any organization. Succeeding in this lowers TCO significantly and helps an organization become more agile and competitive.

Since developing portal components (the “template” from which iViews are created) is a frequent task for the portal developer, the SAP PDK for .NET enables .NET developers to leverage their existing knowledge and be as productive when creating portal components as they are when creating any other .NET components.

Technical Overview

The PDK for .NET allows Microsoft Visual Studio .NET developers to build portal components for SAP Enterprise Portal. Once these portal components are added to portal pages by a content administrator they are called iViews. Therefore, for the purpose of this document, .NET portal components will be referred to as .NET iViews.

The process of creating iView projects is similar to that for ASP.NET projects. The SAP .NET Connector is leveraged by the PDK for .NET and provides access to the complete library of SAP business objects. SAP provides a library of SAP-specific .NET controls, including data entry fields, buttons, and data-grids, all of which may be used to ensure a consistent look and feel across .NET iViews and all other iViews, as well as fully supporting portal themes. Importantly, .NET iViews are able to draw upon the strengths of the .NET Framework and ASP.NET, and a key subset of SAP Enterprise Portal services. iViews may be deployed directly from Visual Studio to the portal. In summary, SAP customers using SAP Enterprise Portal and the SAP Portal Development Kit for .NET can make full use of SAP business processes and SAP NetWeaver technology while using Microsoft .NET based technologies and solutions.

.NET iViews may be written using any .NET language. SAP provides full language support for C# and VB.NET. The PDK for .NET exposes all the functionality that a .NET developer needs to develop SAP portal components efficiently, including:

- Portal archive project, a new type of project dedicated to creating a group of portal components, is available from the projects list
- Listing of available SAP Enterprise Portal systems in the Visual Studio Server Explorer
- SAP Unified Rendering, ensuring that iViews built with the .NET controls provide a consistent look and feel across the portal
- Access to SAP Enterprise Portal services through .NET
- Deployment of iViews to the portal directly from the Visual Studio SAP Menu or Solution Explorer
- Launching and debugging iViews from within Visual Studio

Architecture

The SAP PDK for .NET is comprised of these components: the SAP .NET Runtime Engine, an Interoperability Framework, a Visual Studio .NET Add-in, and the SAP .NET Connector 2.0.

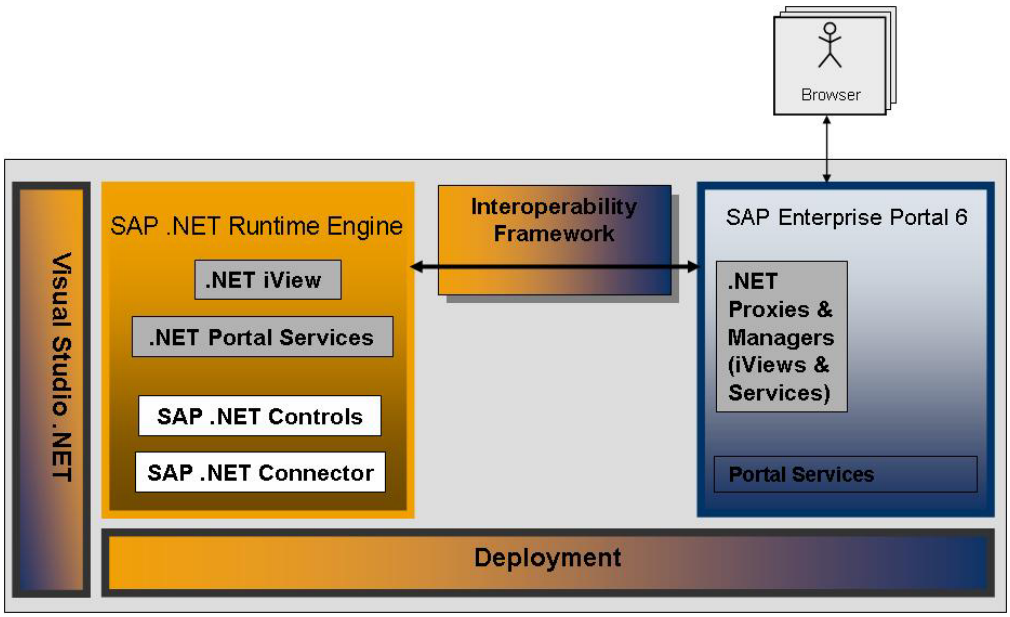


Figure 1 PDK Architecture

The SAP .NET Runtime Engine

To run .NET iViews created with the SAP .NET PDK, SAP Enterprise Portal uses a runtime engine called the SAP .NET Runtime Engine. The SAP Enterprise Portal acts as the only web server, therefore IIS is neither needed nor used. The SAP .NET Runtime Engine utilizes the ASP.NET Engine to process .NET iViews at runtime. All ASP.NET objects (request, response, and session), major portal objects (iView Profile, user context) and major portal services (Systems Landscape Service, User Management Service) are exposed to iView developers.

The SAP .NET Runtime Engine can run either as an NT service or as a console application. SAP Enterprise Portal has a special Java iView and Java portal service responsible for communication with the SAP .NET Runtime Engine.

The Interoperability Framework

The Interoperability Framework allows API calls between the Java and .NET stacks. The Interoperability Framework enables .NET developers to call Java-based portal services, and enables SAP Enterprise Portal to pass requests to the SAP .NET Runtime Engine. TCP/IP is the underlying communication protocol between the two components (Enterprise Portal and .NET Runtime Engine). On the .NET side, .NET Remoting is used.

The Runtime Process Flow

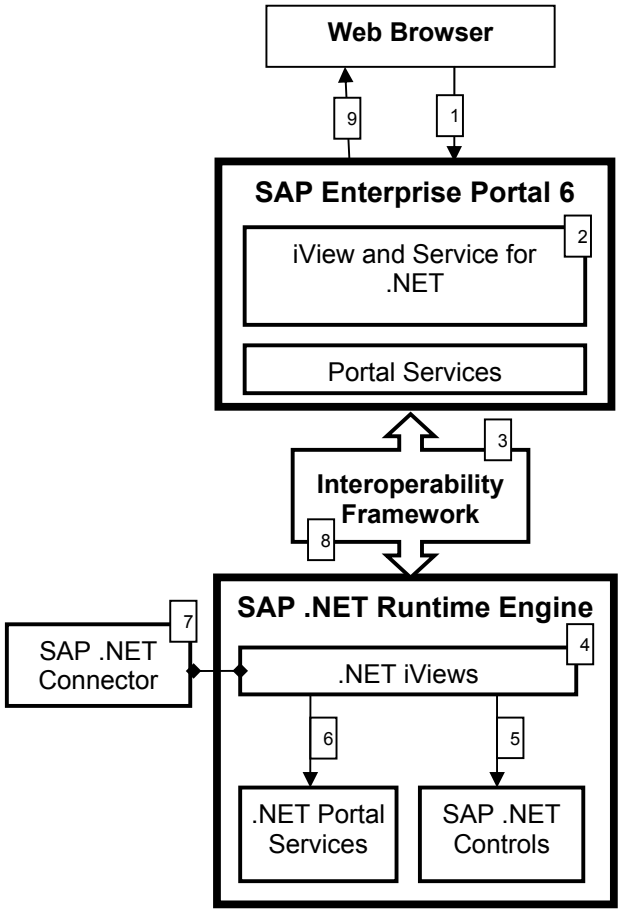


Figure 2 The Runtime Process Flow

1. SAP Enterprise Portal receives a request for a .NET iView.
2. The portal dispatches the request to the Java “Interoperability” iView responsible for communication with the SAP .NET Runtime Engine.
3. The interoperability framework passes the request to the SAP .NET Runtime Engine.
4. The SAP .NET Runtime Engine executes the appropriate .NET iView.
5. The SAP .NET Controls are rendered by the SAP .NET Runtime Engine, using the portal theme and other portal parameters.
6. The iView may call one or more portal services. Communication back to SAP Enterprise Portal services is accomplished through the interoperability framework.
7. The SAP .NET Connector connects to backend SAP systems and retrieves or updates data. The connection information is provided by the portal.
8. The response from the .NET iView is returned to SAP Enterprise Portal through the interoperability framework.
9. The result is returned to the user's browser.

The Visual Studio .NET Add-in

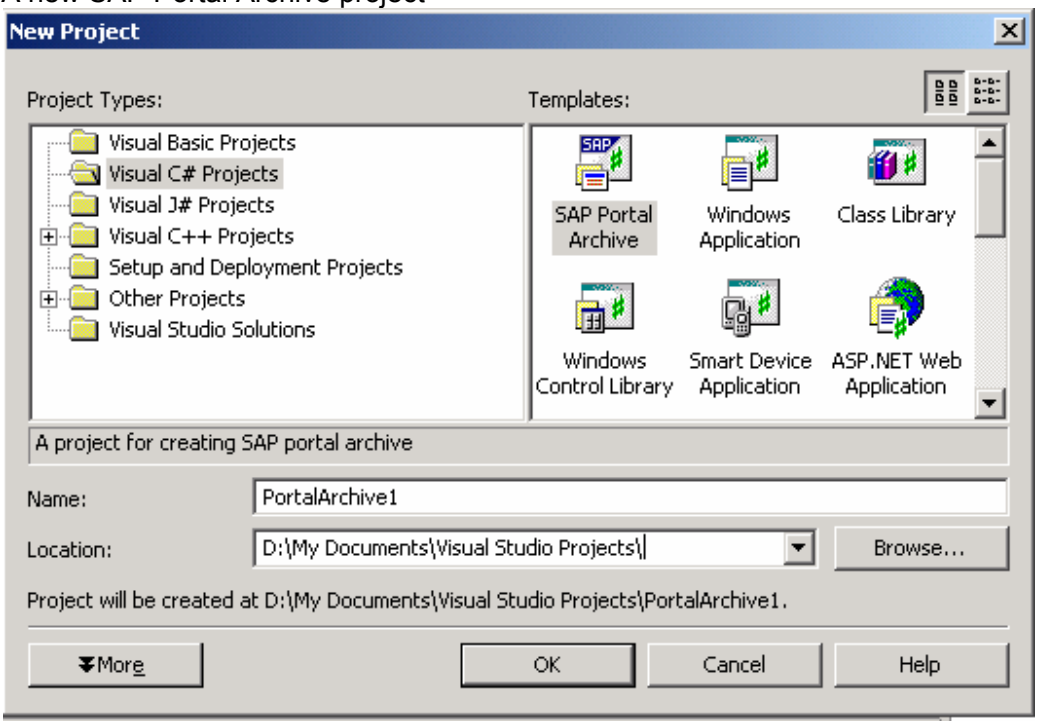
The PDK for .NET provides, within Visual Studio, everything that a developer needs in order to develop, deploy, and test iViews. Developing iViews allows a developer to use the same set of skills acquired developing other .NET applications.

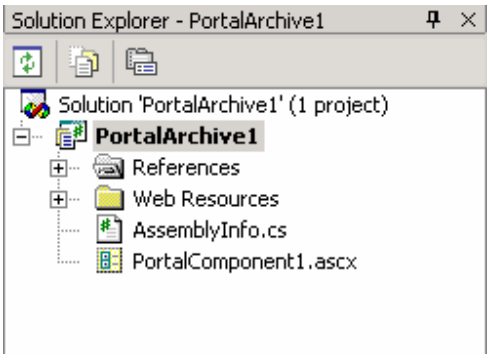
The Visual Studio Add-in allows .NET developers to build and write iViews visually, without requiring a running portal. A running portal is only needed for previewing and debugging iViews, and this can be done using a local or remote portal.

The SAP .NET Portal Development Kit 1.0 Add-in extends the functionality of Visual Studio 2003, creating a development environment for iView developers.

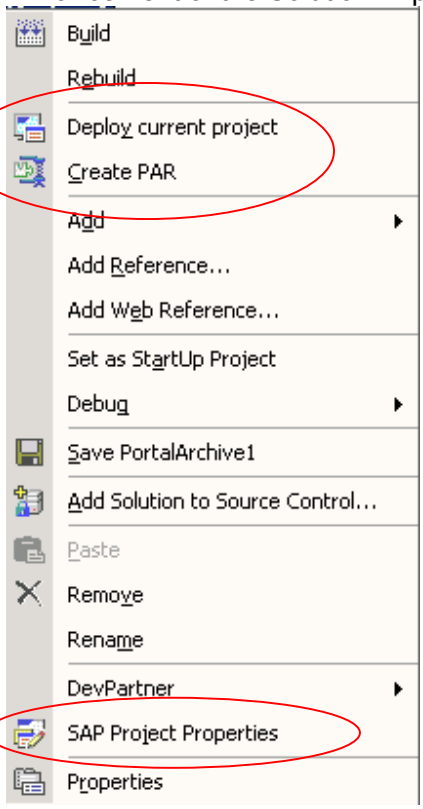
Among the new functionalities which can be found:

1. A new SAP Portal Archive project

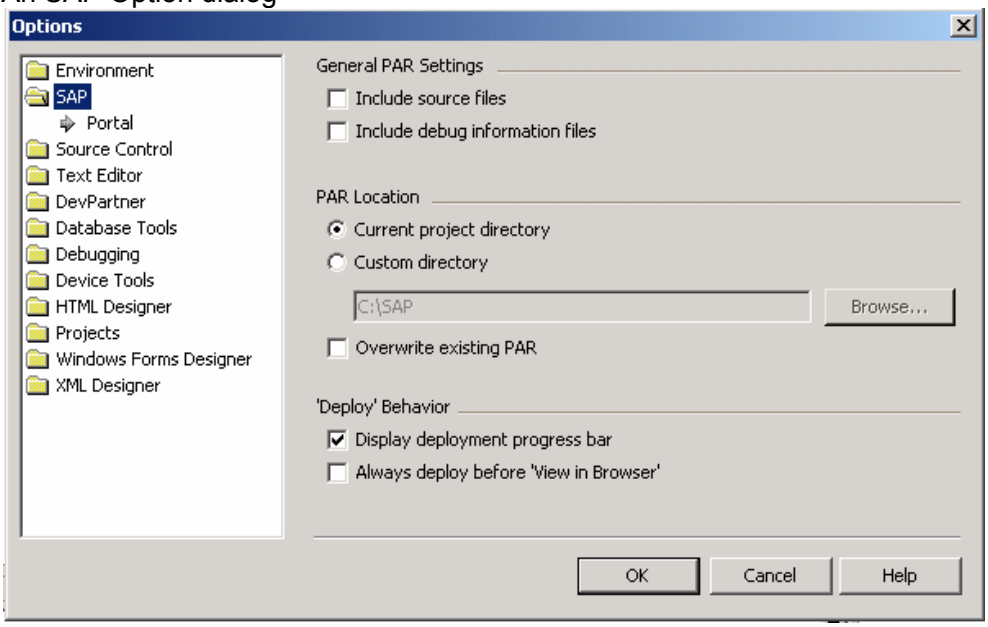




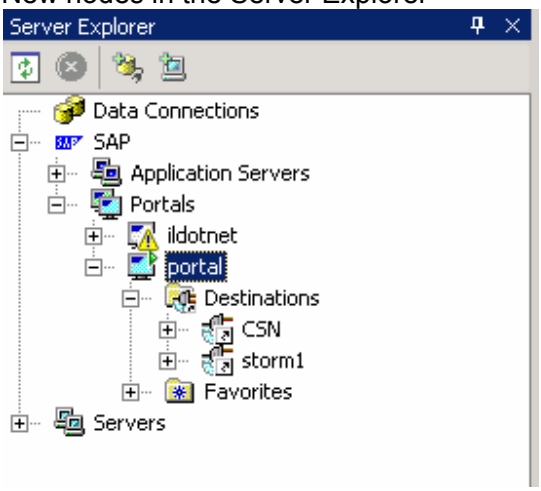
2. Enhancement of the Solution Explorer menu



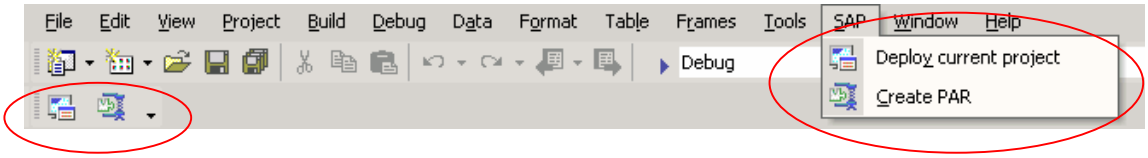
3. An SAP Option dialog



4. New nodes in the Server Explorer



5. An SAP Menu and Toolbar



The SAP .NET Connector

The SAP .NET Connector 2.0 connects .NET applications with business processes running in SAP systems, including ERP (R/3), CRM, and BW. The connector exposes the entire SAP business API through either SAP's binary transport protocol (RFC) or via Web Services. The connection information to the backend system can be retrieved automatically from the portal system landscape (a storage of systems connection information) and from the user management repository, thus applying the benefits of administrative system management, user mapping and single sign-on. In conclusion, developers using the SAP .NET Connector within the PDK for .NET can build .NET iViews that interact seamlessly with back-end SAP systems.

Development Process

iView development begins with the creation of a new SAP Portal Archive project in Visual Studio. Portal services are exposed by the PDK to be used as necessary. The SAP NetWeaver controls are available through the Visual Studio Toolbox, and ensure that the theme of the iView user interface will be consistent with the other iViews running in the portal. Access to SAP systems data is provided by the SAP .NET Connector that receives relevant connection information through the PDK from the portal. Once the development of an iView is finished, the iView can be deployed directly to the portal from within Visual Studio. Developers can choose to view and even debug the iView directly from Visual Studio.

Portal Component

One way to add content to the portal is by developing .NET iViews. The development of .NET iViews is similar to the development of ASP.NET Pages. A new class, `SAP.Portal.Web.UI.PortalComponent`, is introduced for this purpose. All developed iViews should inherit from it in order to be displayed in the portal and to obtain the expected functionality of such components.
.NET attributes are used to define iView properties. The deployment process converts these attributes to iView properties.
Context objects are available through the properties of the portal component class, such as:

- The Profile object – provides runtime information about the instance of the iView that is currently running
- Logger – a logging object providing a mechanism for logging errors and messages in the portal
- Other information from the portal – User information, Paths to resources, etc.

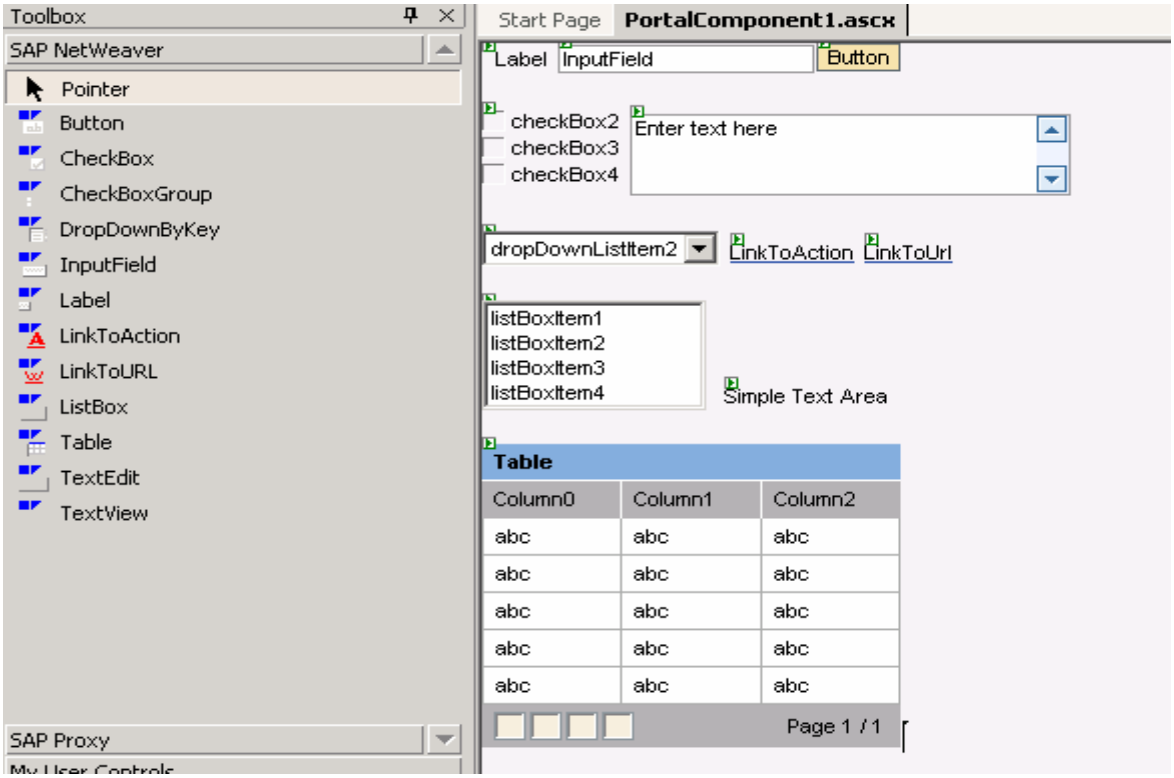
Portal Services

The SAP PDK for .NET gives the developer the ability to use Java portal services from the .NET environment. The exposed services are available through the interoperability framework.
The following portal services are supported in the current version of the PDK:

- System Landscape – a portal service for accessing the portal system landscape. It contains classes used to get connection information for all the systems that are accessed from the portal, and to determine the user credentials that are required to access this system
- User management – a portal service for accessing the User Management Engine (UME), which provides basic user management functionality

SAP NetWeaver Controls

SAP PDK provides a set of .NET controls that may be used as the building blocks of an iView's UI. These SAP NetWeaver controls are available through the Visual Studio Toolbox. They support the same features as standard controls, but there are some differences (e.g. property names) and additions. They use SAP's unified rendering (UR) to render and support all SAP-supported browsers. They may be bound to data sources including tables retrieved from SAP backend systems through the SAP .NET connector.



This screenshot shows the SAP NetWeaver controls in the toolbox and also when added to the iView

Deployment

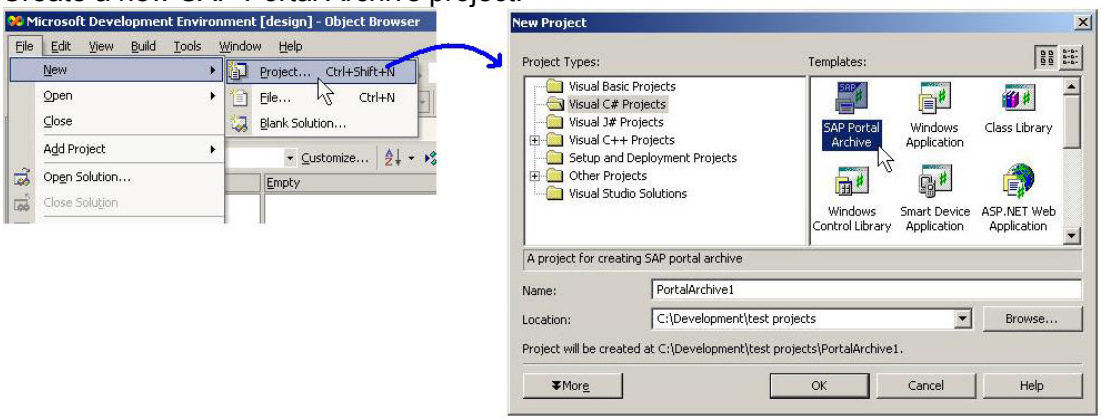
.NET iViews are packed in Portal Archive (PAR) files. The structure of PAR files is the same for both .NET iViews and Java iViews, so the existing portal deployment mechanism is also used to deploy .NET PAR files. The assemblies and the files are kept in a repository called the Portal Content Directory (PCD), and they are copied locally to each node of the cluster on demand. The same runtime directory structure is used for both Java and .NET PARs. The SAP PDK for .NET enables the developer to deploy to a remote server from within Visual Studio.

Step-by-Step Development Example

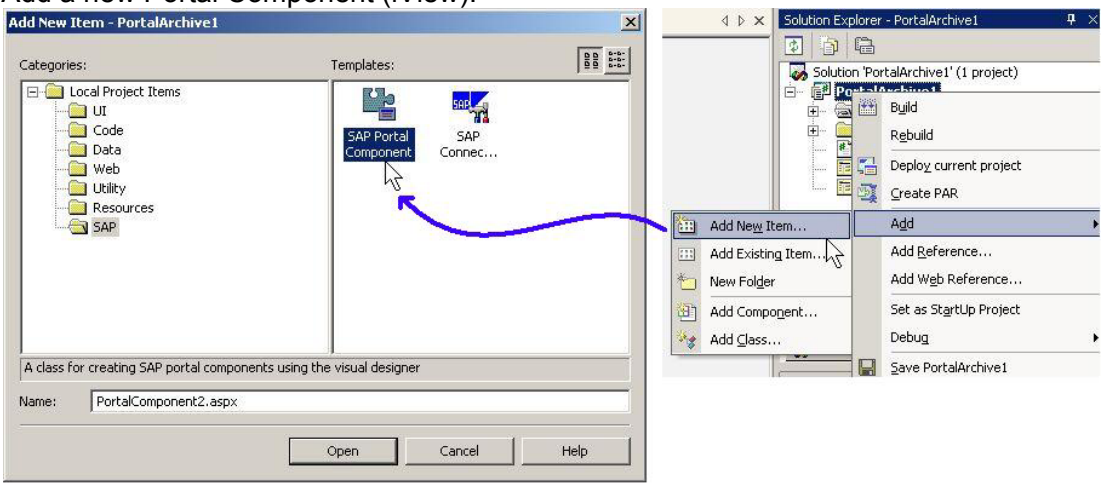
This section demonstrates the development process in the PDK for .NET. It shows the various development actions a developer will encounter using the PDK. This example is of an iView that lets the user search for a list of books according to author name. The information will be retrieved from Microsoft SQL Server, from the Pubs database.

The steps the developer performs:

1. Create a new SAP Portal Archive project.

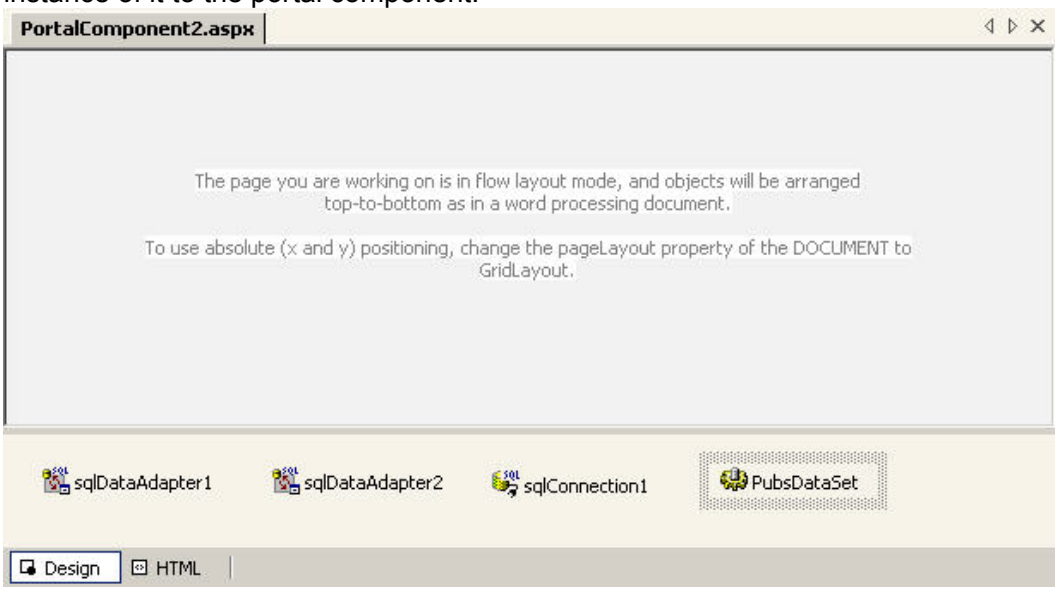


2. Add a new Portal Component (iView).

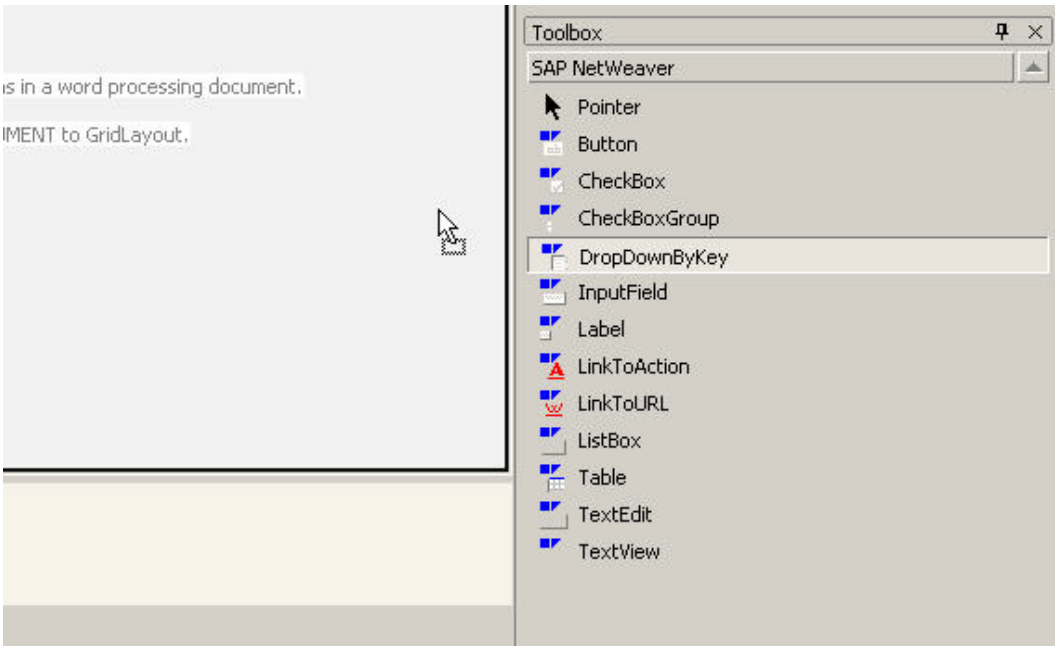


3. Using two SQL Data Adapters, create two queries to the database.
   One returns an authors table and the other returns a books table (using the parameter “author name”). This is all done easily with the Data Adapter connection wizard and the query builder wizard.

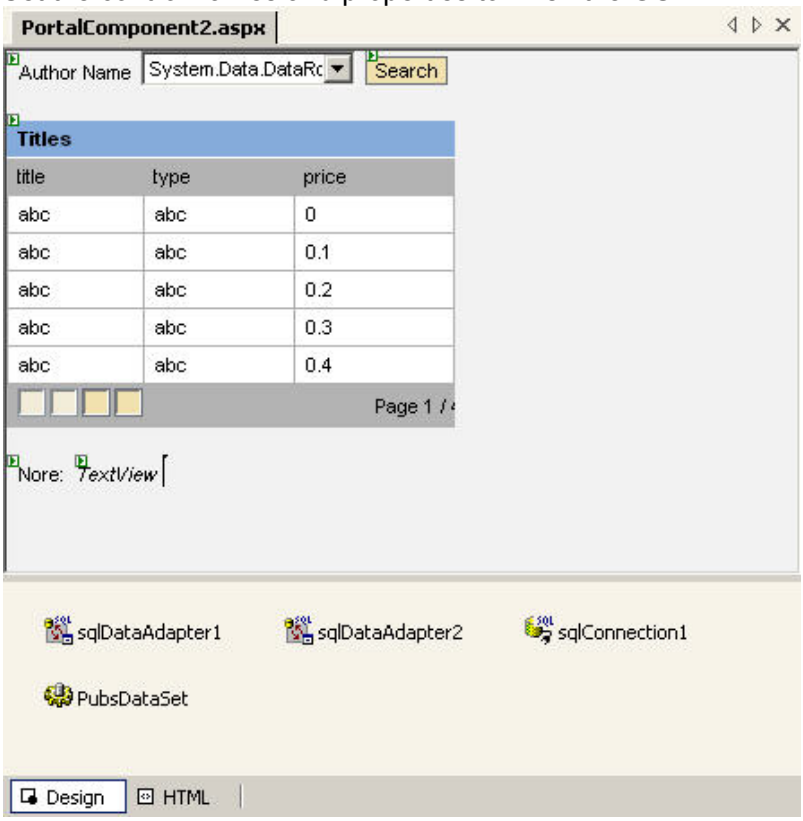
4. Finally, create a typed Dataset, based on these two SQL Data Adapters, and add an instance of it to the portal component.



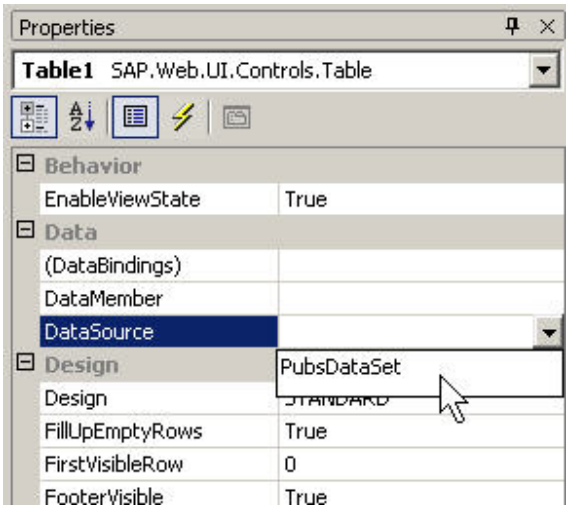
5. Now drag some SAP NetWeaver controls from the toolbox to the portal component to create the iView's GUI.



6. Set the control names and properties to finish the GUI.



7. Now bind the controls to the Dataset, using the Data properties.
   This will ensure that the iView will display the data with nearly no code needed to be written. Bind the dropdown control to the authors table in the Dataset, and the Table to the titles table.



8. Now add some code to handle user events, such as Page load, Button click, table row select (called LeadSelect).

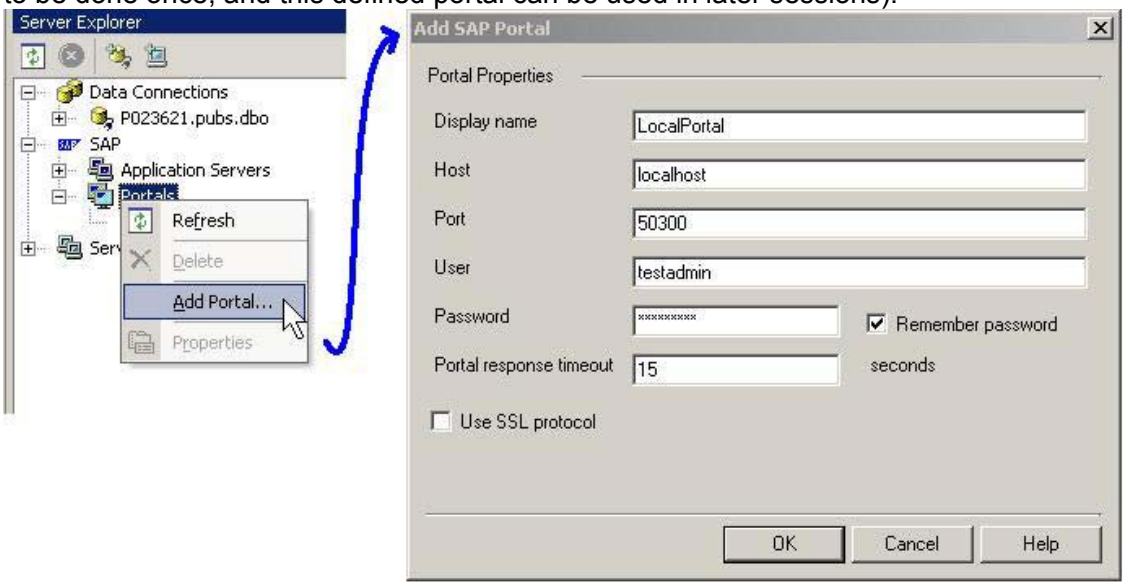
PortalComponent2.aspx.cs

PortalArchive1.PortalComponent2 | sqlDataAdapter1

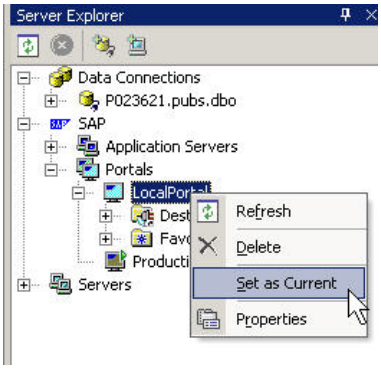
```
{
    /// <summary>
    /// Summary description for PortalComponent2.
    /// </summary>
    [PortalComponentClassProperty("DemoName","DemoValue", UserPersonalization = PersonalizationType.NoD
    [PortalComponentAttribute("PortalComponent2","PortalComponent2.aspx")]
    public class PortalComponent2 : SAP.Portal.Web.UI.PortalComponent
    {
        Web Form Designer generated code

        private void Page_Load(object sender, System.EventArgs e)
        {
            if (!Page.IsPostBack)
            {
                sqlDataAdapter1.Fill(dsBooks1.authors);
                Session["Data"] = dsBooks1;
            }
            else
            {
                dsBooks1 = (dsBooks)Session["Data"];
            }
            this.DataBind();
        }
        private void Search_Action(object sender, SAP.Web.UI.Controls.AbstractButton.ActionEventArgs e)
        {
            dsBooks1.titles.Clear();
            sqlDataAdapter2.SelectCommand.Parameters["@au_id"].Value = drpAuthor.SelectedKey.ToString()
            sqlDataAdapter2.Fill(dsBooks1.titles);
            tblBooks.DataBind();
        }
        private void Table1_LeadSelect(object sender, SAP.Web.UI.Controls.Table.LeadSelectEventArgs e)
        {
            txtNote.Text = dsBooks1.titles[e.Row][dsBooks1.titles.notesColumn.ColumnName].ToString();
        }
    }
}
```

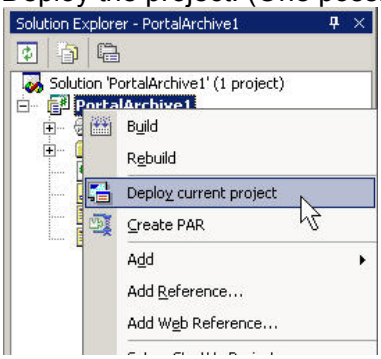
9. The iView is ready for testing. Define a portal to which to deploy. For this, use the Server Explorer window, and add a new portal under the “Portals” node (This needs to be done once, and this defined portal can be used in later sessions).



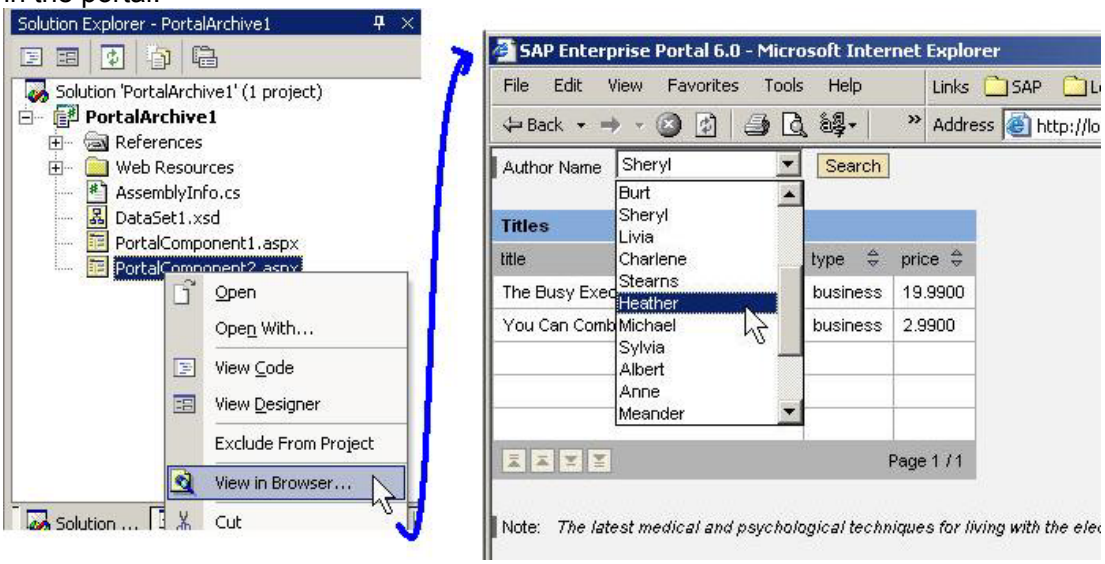
10. Set his portal as “Current”. This indicates that this is the portal the developer means to work with.



11. Deploy the project. (One possible way is to do it from the Solution Explorer window.)



12. Now you can view the iView in the portal. From here, you can see the running iView in the portal.



System Requirements

SAP .NET Runtime Engine 1.0

The beta version of the PDK for .NET requires one instance of the SAP .NET Runtime Engine for each instance of SAP Enterprise Portal. The SAP .NET Runtime Engine 1.0 is installed both as a console application and as an NT service. The system administrator can choose which mechanism to run in order to instantiate the SAP .NET Runtime Engine.

System Requirements

- Operating system of Windows 2000 (Service Pack 4 or above) or Windows 2003
- SAP Enterprise Portal 6.0 Service Pack 2 Patch 2 or Patch 3 (patch 4 is not supported)
- SAP Enterprise Portal 6.0 does not have to be on same machine as the SAP .NET Runtime Engine 1.0
- Microsoft .NET Framework 1.1

SAP Portal Development Kit for .NET 1.0

Install the SAP .NET Portal Development Kit 1.0 on a development machine. The installation adds the SAP PDK for .NET Add-in to Visual Studio .NET. After the installation is completed, you can start developing SAP portal components.

System Requirements

- Operating system of Windows 2000 (Service Pack 4 or above), Windows 2003, or Windows XP
- Microsoft Visual Studio .NET 2003
- Microsoft .NET Framework 1.1
- SAP Enterprise Portal is needed for some development activities (see the “Development Process” section above)

Note: To take advantage of the SAP .NET Connector during design time, you need to install the SAP .NET Connector 2.0 Beta separately, on the development machine.

Availability

SAP is running a beta (“early adopter”) program for the SAP PDK for .NET for a limited number of customers.

SAP will leverage customer feedback and will use commercially reasonable efforts to make the first version of SAP PDK for .NET generally available for download.

Summary

This paper describes the use of the SAP PDK for .NET. The PDK for .NET enables customers to use .NET languages (VB.NET, C#) to build iViews for SAP Enterprise Portal. The development environment is seamlessly integrated into Microsoft Visual Studio .NET 2003 and enables developers to leverage existing knowledge to reduce development time.

Developers using the PDK for .NET can leverage capabilities of the portal, including services and client side events. It is easy for developer to use the SAP .NET Connector to communicate with SAP backend systems. Because the development is done in .NET, developers can take full advantage of the Microsoft .NET framework, easily achieve integration with Microsoft Servers, and reuse existing .NET/COM code.