



ABAP

LearnSAP

Your SAP Training Partner

www.LearnSAP.com

877-836-1700

SAP ABAP
A Step-by-Step Guide

LearnSAP

5101 Camden Lane, Pearland, TX 77584

Intentionally Left Blank

Table of Contents

1.	Introduction	6
2.	SAP Navigation	7
	a. Login On	
	b. Standard Toolbar Icons	
	c. Standard Exit Keys	
	d. New Session Icon	
	e. Login Off	
3.	History of ABAP	11
4.	SAP R/3 Architecture and ABAP	12
5.	ABAP Repository	14
6.	ABAP Workbench	16
	a. Transaction Codes	
7.	ABAP Workbench Tool Attributes	21
	a. Development Objects and Packages	
	b. Storing Development Objects	
	c. Transport Organizer	
8.	ABAP Keys	23
	a. ABAP Developer key	
	b. ABAP Access Key	
9.	Data Storage in SAP	26
10.	ABAP Dictionary	27
11.	Database Tables	31
	a. Table Attributes	
	b. Creating a New Database Table	
12.	Database Table Views	43
	a. Database View	
	b. Projection View	
13.	Parameter ID	63
	a. Display	
	b. Creating New Parameter ID	
14.	Transport Package	74

15.	Message Class	80
	a. Creating a New Message Class	
	b. Adding New Messages in Message Class	
	c. Calling Messages in Program	
16.	ABAP Function Module	94
	a. Overview	
	b. Create Function Group	
	c. Create Function Module	
17.	ABAP Editor and Program Attributes	104
18.	ABAP Reporting	
19.	Dialog Programming	164
	a. Screen & Menu Design	
	b. Tabstrip Control	
20.	ABAP Workbench Version Management	193
21.	ABAP Performance Tuning Tools	198
	a. ABAP Debugger	
	b. Runtime Analysis	
	c. Performance Trace	
22.	Data Transfer Methods	210
	a. Transaction Recorder	
	b. Call Transaction	
	c. Batch Input Session	
	d. LSMW	
23.	ABAP List Viewer (ALV)	231
	a. Features	
	b. Standard Functions for ALV	
24.	Saving and Printing of Reports	236
25.	List of Transaction Code	251
26.	Conclusion and Credits	286

1. Introduction

SAP stands for Systems, Applications and Products in Data Processing. Five German Engineers founded it in 1972. SAP is an ERP software which large organizations use to manage their business. SAP has several modules, each of which represents a business-process. Modules are usually abbreviated for the business process they represent. For instance, HCM is Human Capital Management, FI for Financial Accounting, MM for Materials Management and SD is Sales & Distribution and so on. All together there are some nineteen core modules.

These modules are highly integrated in real-time, which means, that if information is shared between modules then the data is entered only once. This reduces the chances of error arising from repetitive entry and also reduces the man-hours. Managers and decision makers always have information at their fingertips and this helps them in effective decision making.

SAP has been around for nearly four decades. Nine out of ten Fortune-500 companies have already implemented SAP (not counting the thousands of to-be Fortune-500 companies that have SAP). There are well over 10 million SAP users worldwide and jobs keep popping up all around the world.

SAP is the leading ERP (Enterprise Resource Planning) software. Because of it's liberal open-architecture, there are millions of programmers working around the world to provide interaction between thousands of major software and SAP.

SAP is usually implemented in phases. The first phase is when organizational structure and accounting components are configured, tested and then taken live. Gradually more modules are turned on.

ABAP Course

The purpose of this book is to learn step-by-step basics of SAP's programming language ABAP (Advance Business Application Programming). SAP's complete software is written in ABAP. The course is built to provide basic understanding and knowledge of ABAP's capabilities and the utilization of the programming language to meet needs of a business.

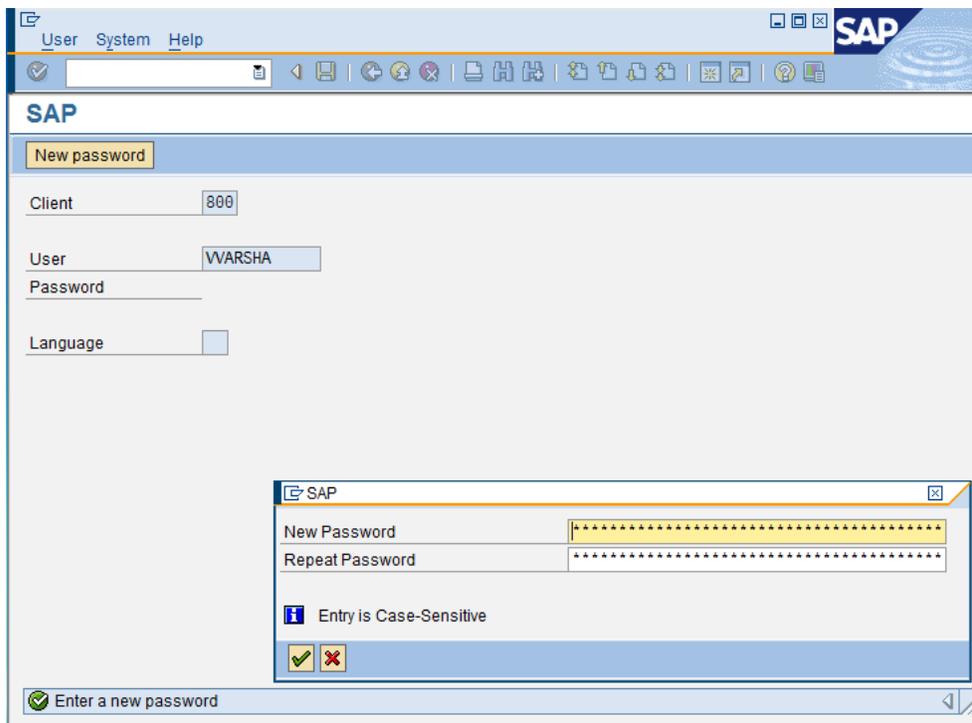
LearnSAP

LearnSAP strives to help students develop SAP skills and knowledge needed to complete in the employment market and adapt to future changes. The training course combines classroom theory of SAP technology with hands-on practice.

LearnSAP strives to evolve with the marketplace, delivering skills-based education that is sensitive to market needs and convenient to students. Our goal is to help people develop into employees who are equipped to meet the challenges of a marketplace where change is the one constant.

2. SAP Overview and Navigation

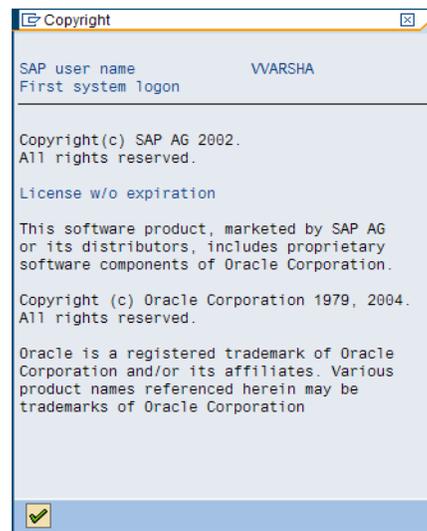
a. Login On:



Password

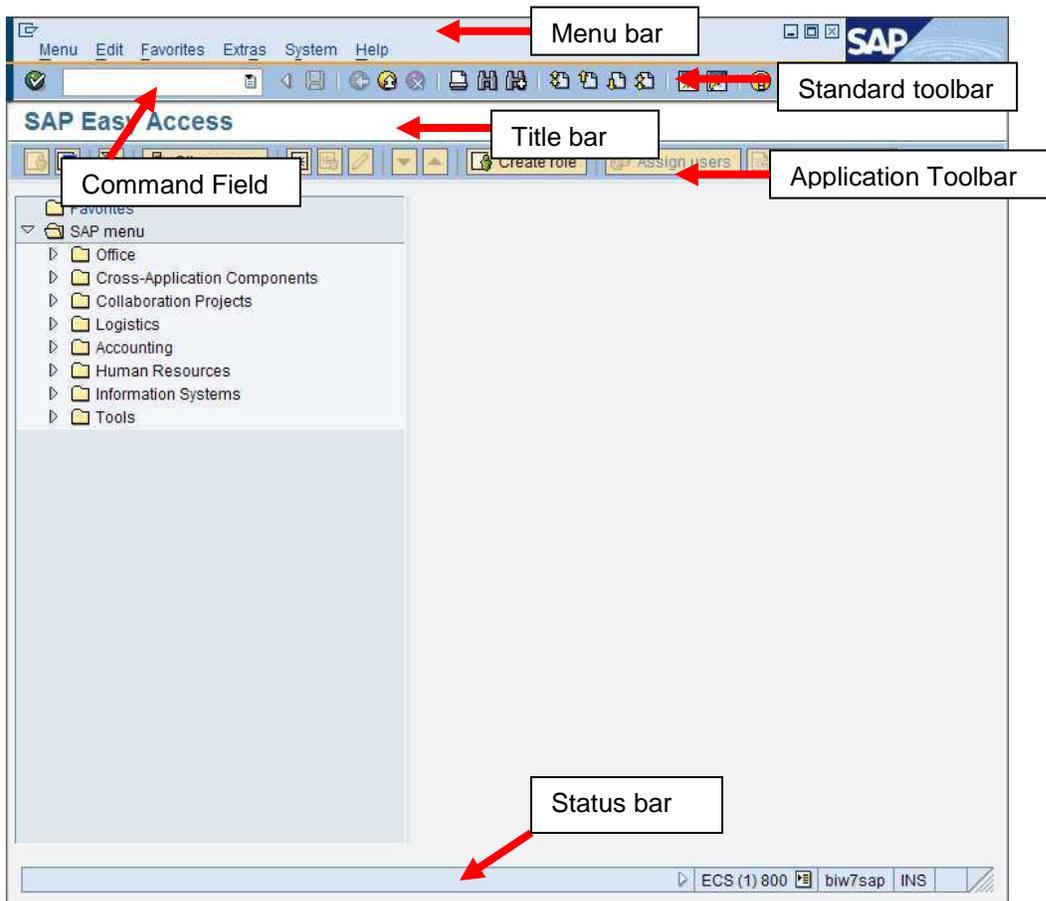
- The initial password is provided by system administrator
- Password is case sensitive
- System prompts for new password in a dialog box
- Click on “Enter” after reconfirming the new password.

On changing the password, the copyright information appears when you login for the first time, click on enter key here and you will be logged in the SAP System.



When logging on to an SAP system, you will be prompted to enter the user and password. You also have the option of specifying a client when logging on; the client field usually already contains an appropriate default value, you can also select a logon language supported by that system. SAP systems can support a large number of languages, the minimum being English and German language.

A SAP screen has following standard layout:



Menu bar:

The Menu bar is the top line of any dialog window in the SAP system.

Standard toolbar:

Standard functions that are available in displayed in this toolbar. The applications like save, top of page, end of page, page up, page down, print, etc.

Title bar:

Displays the name of the application/business process you are currently in.

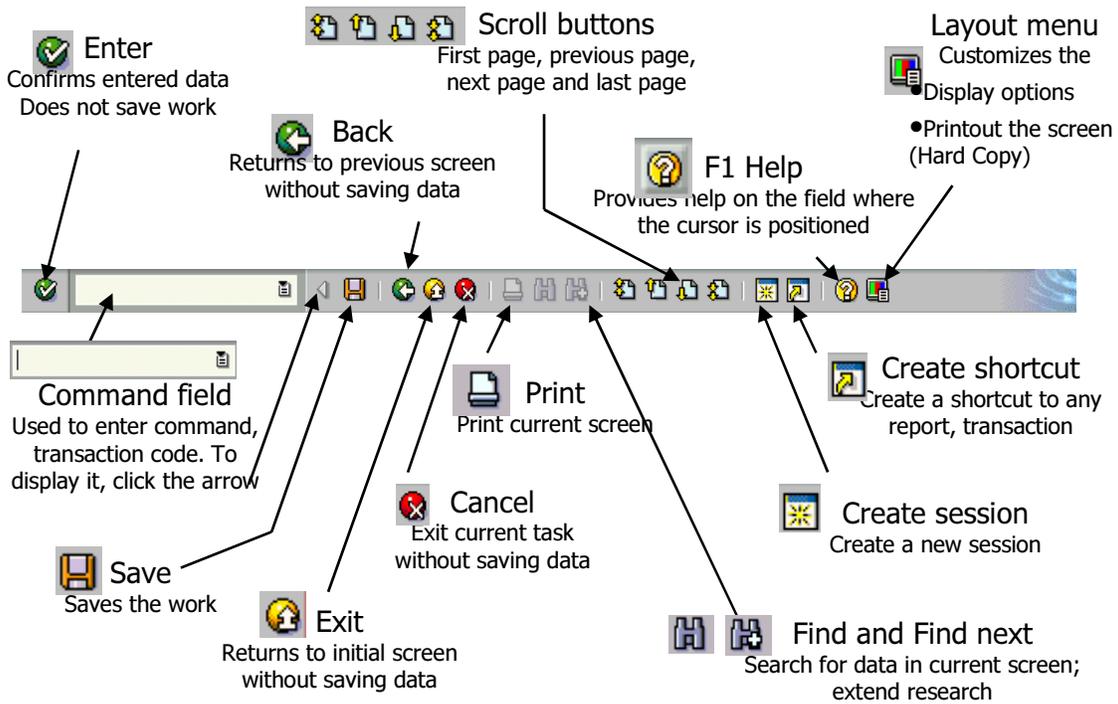
Application toolbar:

Application specific menu options are available on this toolbar.

Command Field:

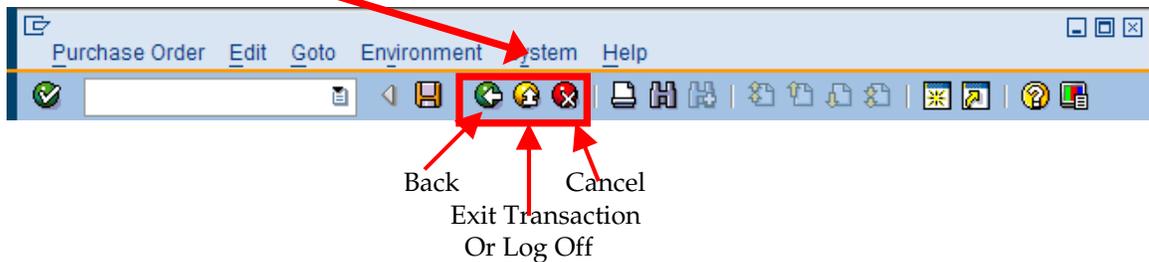
To start a business application without having to navigate through the menu transaction codes are assigned to the business processes. Transaction codes are entered in the command field to directly start the application.

b. Standard Toolbar Icons:



c. Standard Exit Keys:

Exit Keys



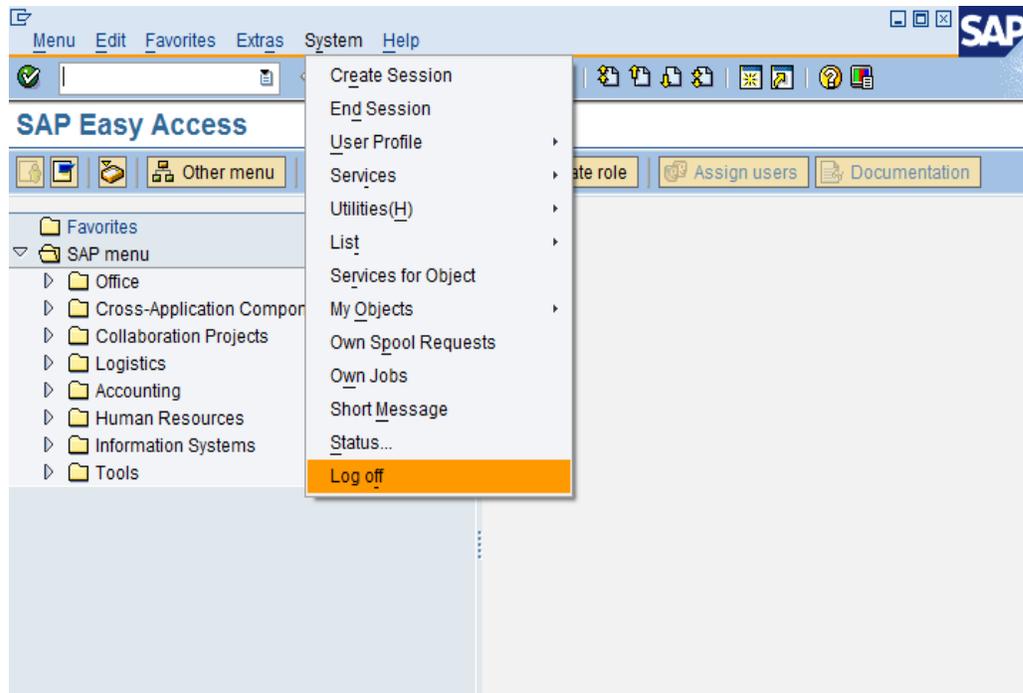
d. New Session Icon:



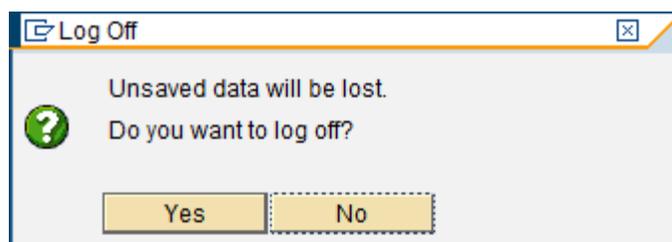
e. Login Off:

It is a good practice to log off from the SAP system when you finish your work. There are several ways of login off from the system:

- From Menu, select system -> log off
- Close the open sessions and the last session will log you off
- Enter /nex in the command field



Before the system logs you out, a dialog box is displayed to confirm you want to log off from the system, except for the option /nex in the command field.



3. History of ABAP

ABAP is a proprietary programming language of SAP and ABAP stands for “**A**dvanced **B**usiness **A**pplication **P**rogramming”.

Originally, known as Allgemeiner Berichts-Aufbereitungs-Prozessor, German for general report creation processor

ABAP is a 4th Generation Programming Language and was first developed in 1980s. By 1990s most of SAP's application software and systems were written in ABAP. In 1999 ABAP was extended to include Object Oriented Programming. SAP's most recent development is on ABAP as well as JAVA platform.

Attributes and Prerequisites:

- The language is fairly easy to learn for programmers but it is not easy for use by non-programmers.
- Knowledge of relational database design and preferably also of object-oriented concepts is necessary to create ABAP programs.
- The ABAP programming language allows SAP customers to enhance SAP application programs – customers can develop custom reports and interfaces with ABAP programming.
- SAP ABAP programs all are stored in the SAP database and not in form of separate external files like other program files eg Java, c++, etc.

RDBMS

A relational database management system (RDBMS) is a database management system (DBMS) that is based on the relational model as introduced by E. F. Codd. Most popular databases currently in use are based on the relational database model.

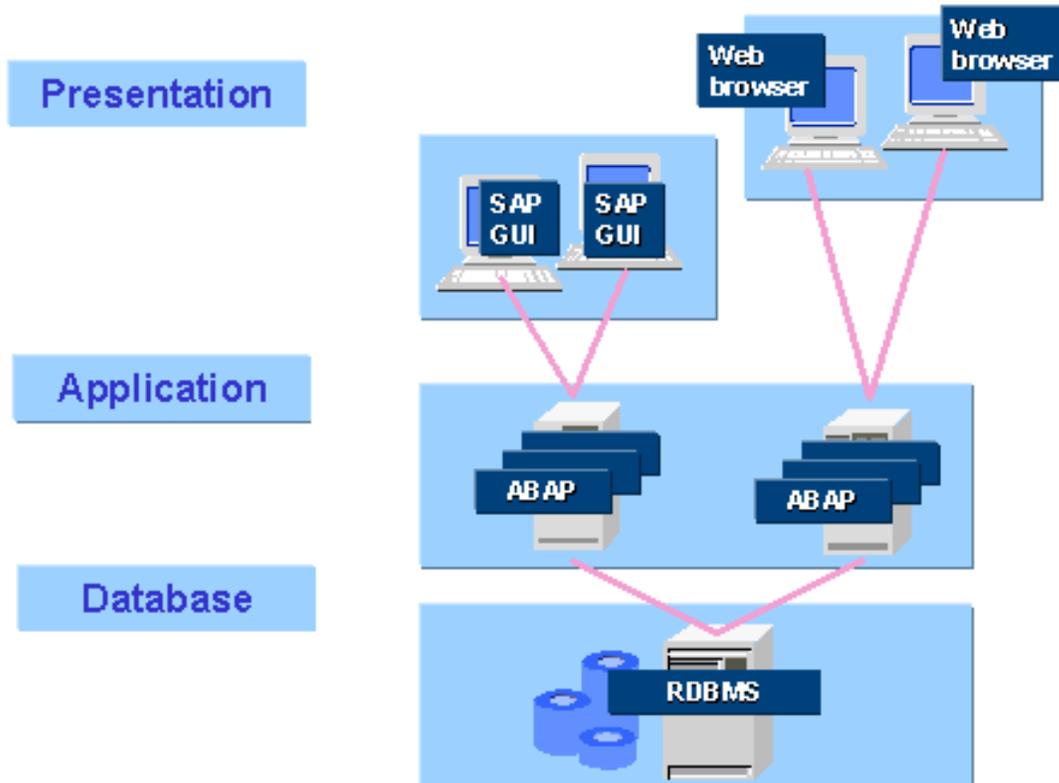
A short definition of an RDBMS is: a DBMS in which data is stored in tables and the relationships among the data are also stored in tables. The data can be accessed or reassembled in many different ways without having to change the table forms.

A relational database is a database that conforms to relational model theory. The software used in a relational database is called a relational database management system (RDBMS). Colloquial use of the term "relational database" may refer to the RDBMS software, or the relational database itself. A relational database is the predominant choice in storing data, over other models like the hierarchical database model or the network model.

A relation is usually described as a table, which is organized into rows and columns. All the data referenced by an attribute are in the same domain and conform to the same constraints.

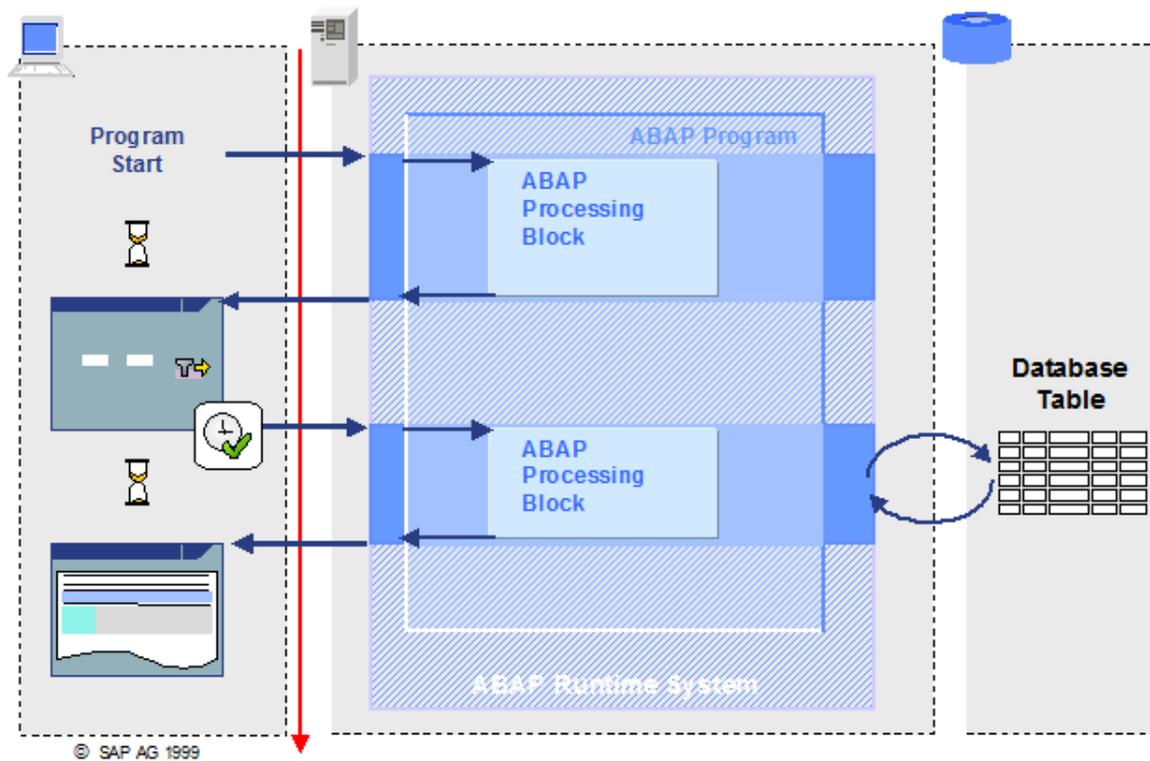
4. SAP R/3 Architecture and ABAP

SAP R/3 is based on Client Server Architecture and the model is based on three-tier hierarchy.



- The presentation layer - User Interface (users interact with the system with help of SAP GUI or through web-GUI)
- The Application layer - All the programs related to business applications written in ABAP are executed here.
- The Database layer - Data is stored in this layer in a RDBMS.

Interaction between the different layers and ABAP:



The interaction between the user and the ABAP programs which are executed in the Application layer is the main goal of this step by step. ABAP programs are processed or executed in the application server. The design of user interaction with the database is carried out via the ABAP programs.

User accesses the application programs through the SAP GUI which is installed on the presentation server.

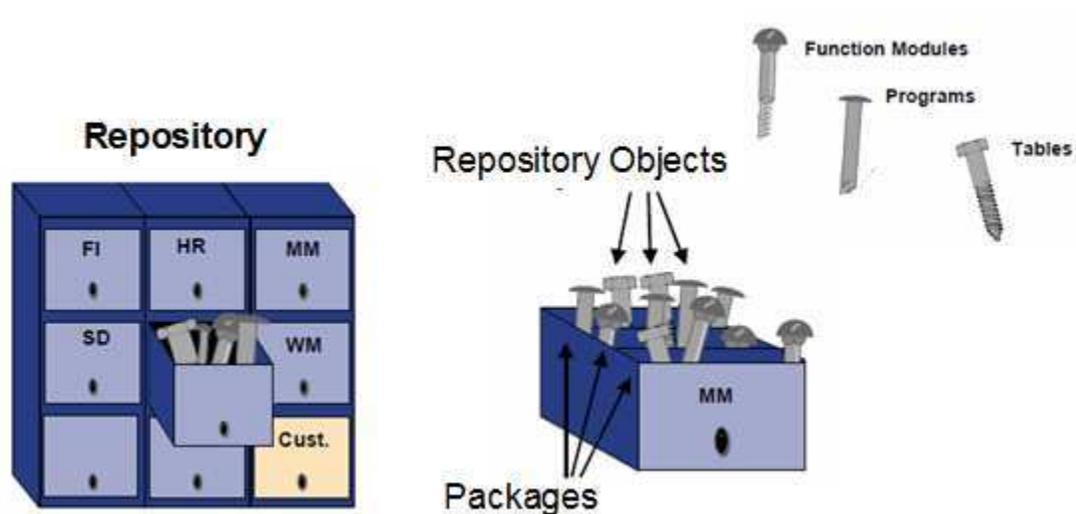
- User action like clicking on <Enter> or <Function> key, the control is passed from the presentation server to the application server.
- In the application Server, the ABAP program is processed based on the user action and if needed further dialog is triggered with the user by passing the control to the Presentation server, else if the application needs access to the "data" to either retrieve data or store date, the control of the program is passed to the Database Server.
- On retrieving the data or saving the data, the Database passes the control to the Application server and then the ABAP program passes the information to the user when control is transferred back to the Presentation Server.

5. ABAP Repository

The Repository contains all of the development objects of the system. The Repository is used to store both objects – defined by SAP as well as objects defined by customers.

Attributes of Repository objects:

- The Repository is in the SAP system's central database
- The Repository objects are **client independent** – means that Repository objects can be accessed from any client.
- The Repository is sub-divided depending on application components called sub-objects.
- A Repository Object is always assigned to a development class called package from ECC.



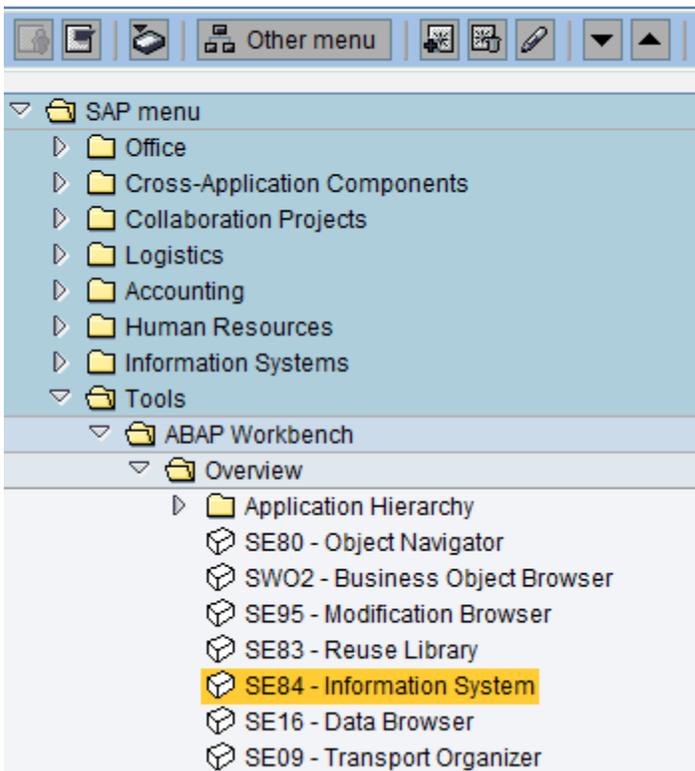
To reach the Repository the menu path is as follows:

Menu Path:

SAP Easy Access → Tools → ABAP Workbench → Overview → Information System

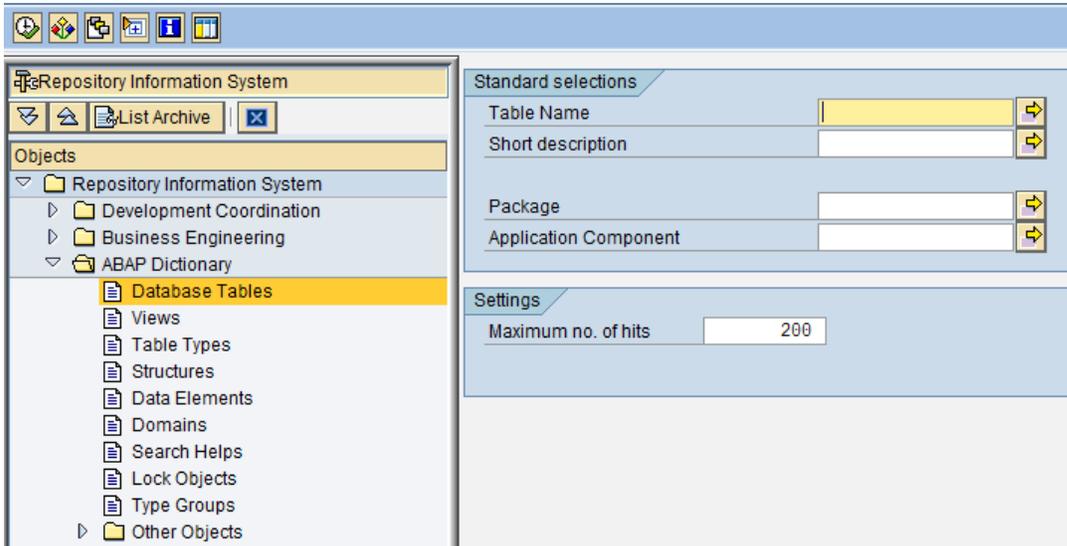
TCode = SE84

SAP Easy Access



The repository structure can be viewed by selecting a component from the tree structure.

Repository Info System: Find Tables



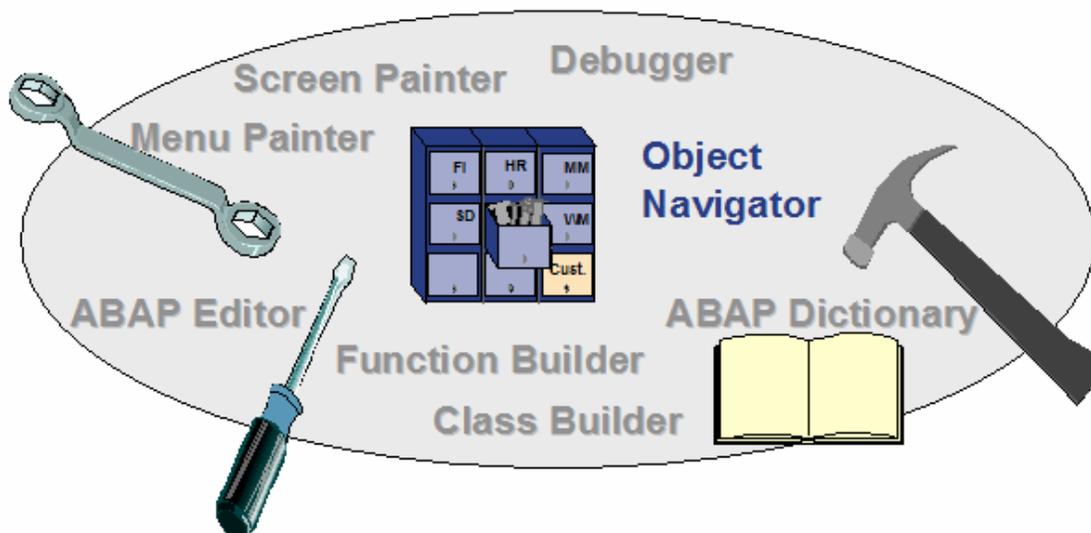
Double click on a object type you want information on, a selection screen will be displayed to help facilitate the search.

6. ABAP Workbench

The ABAP Workbench includes all the tools required for maintaining Repository Objects for development of application programs.

The various tools are:

- ABAP Editor
- Data Dictionary
- Menu Painter
- Screen Painter
- Function Builder
- Debugger
- Object Navigator



Each of the tools can be called explicitly and then a Repository object loaded for processing.

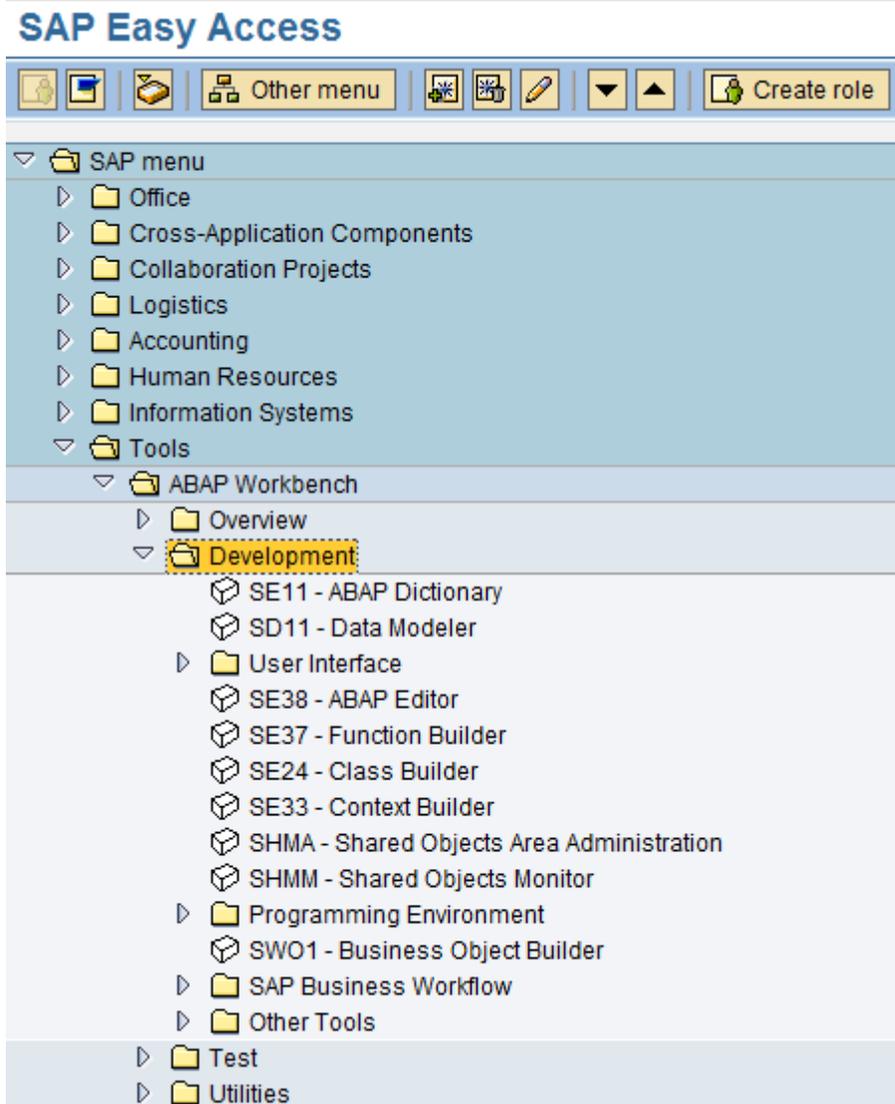
Object Navigator is a single point tool to access all the workbench objects.

To reach the **ABAP Workbench** for development, the menu path is as follows:

Menu Path:

SAP Easy Access → Tools → ABAP Workbench → Development

All the development objects, ABAP Editor, Data Dictionary, Function Builder, etc required for the maintenance of the Repository are under this menu option.



One can go to any application in the system by navigating through the menu path or by entering the transaction codes for the application in the "command" field.

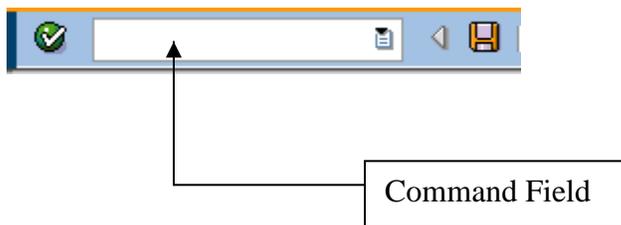
Transaction Codes:

Each function / application in the SAP system is assigned a transaction code. A transaction code consists of letters, numbers or both. You enter transaction code in the command field which will take you to the SAP application faster as against navigating via menu path.

- A transaction code can be up to 20 characters long
- A transaction code should begin with a letter
- Enter the transaction code in the “Command Field” and choose <<ENTER>>

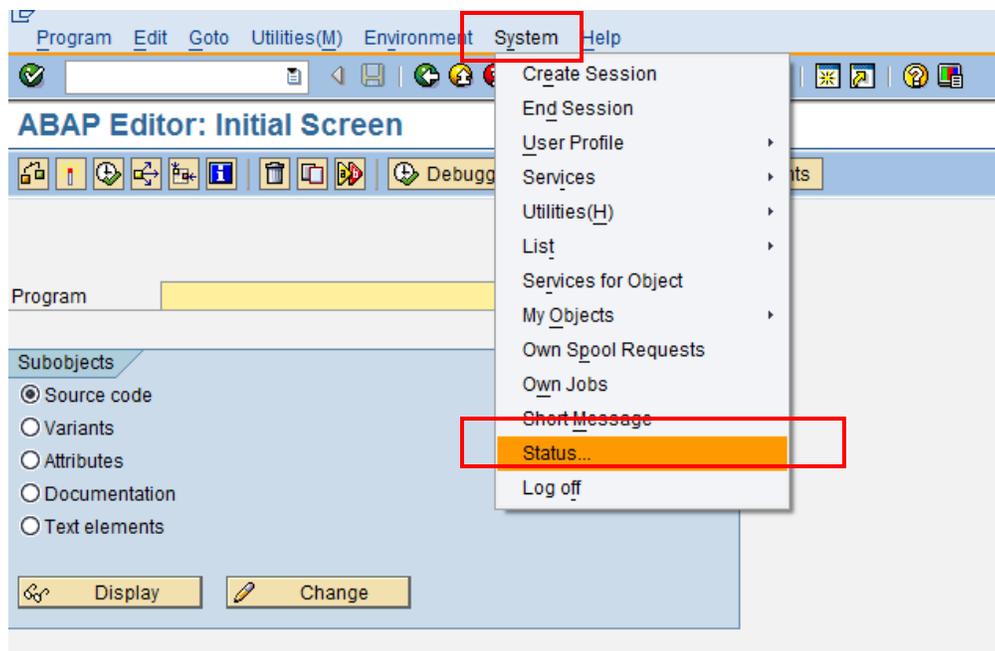
Command Field:

The command field is on the standard tool bar and you can either hide the command field or display it by choosing the arrow to the left of the “SAVE” icon.

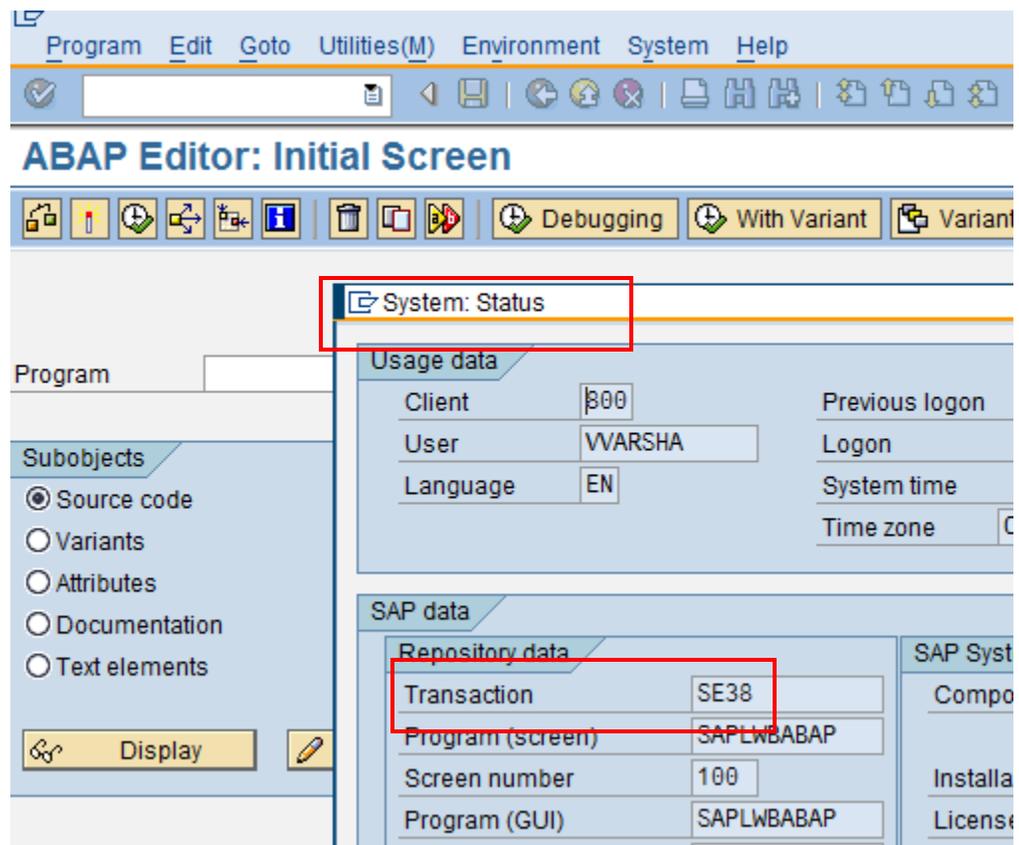


To display the transaction codes for the applications, there are 2 ways:

1. If you are in an application, and want to know the transaction code for the same, then from the menu bar, choose System -> Status and in the system status dialog box, the transaction code for the current application will be displayed.

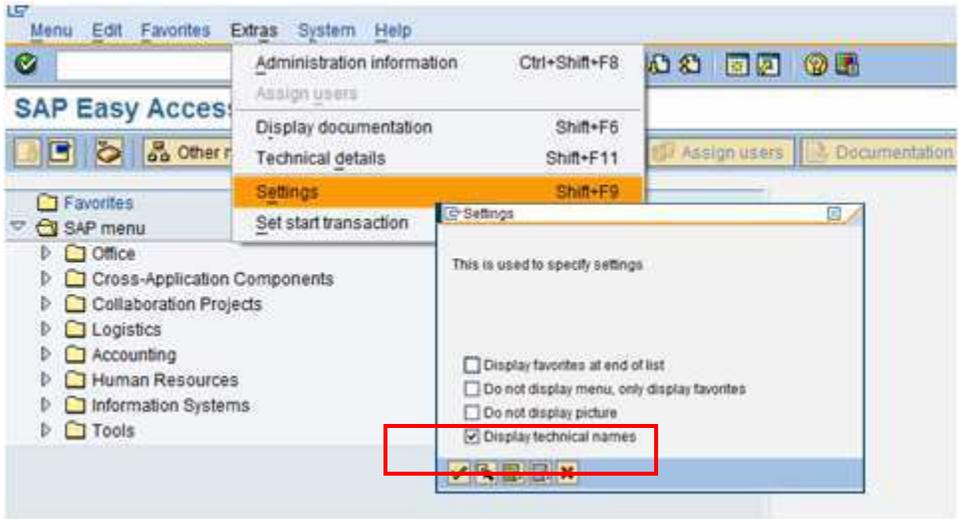


In the status, you will get the transaction code

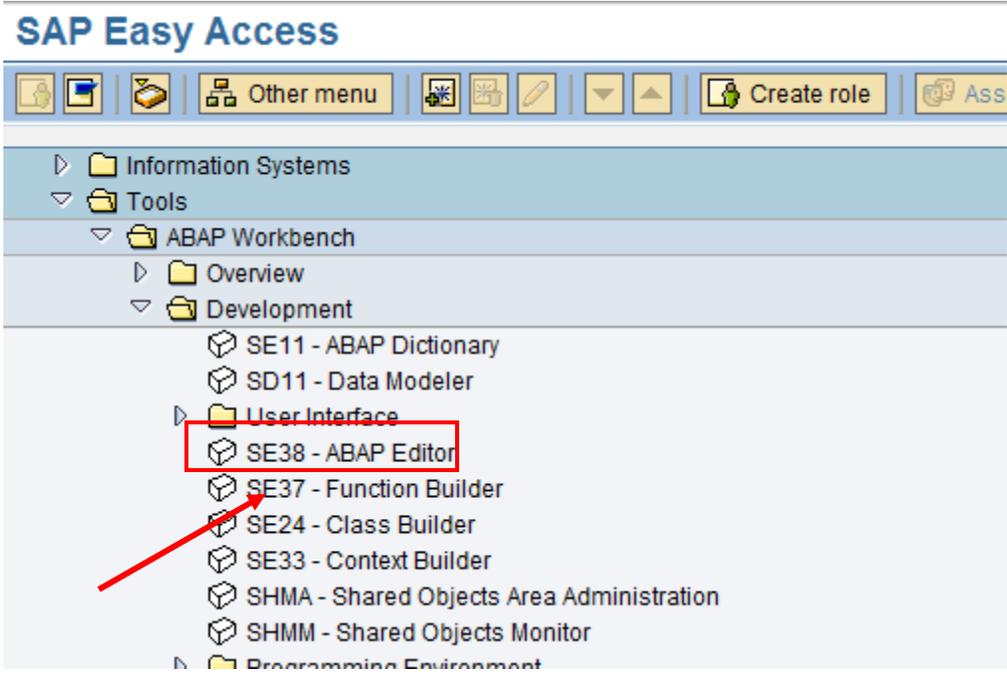


- 2. If you need to display transaction code against all application while navigating through the menu path.

Menu Path:
SAP Easy Access → Menu Bar → Extras → Settings



Check "Display Technical Names" in settings. Click on << Enter >>



You will see the transaction codes against the applications in the menu.

7. ABAP Workbench Tool

The tools in the Workbench are integrated. When you are working on a program, the ABAP Editor will also recognize objects created using other tools. This integration allows you to double-click an object, the Workbench automatically launches the tool that was used to create the object.

SAP's Object Navigator helps organize your application development in this integrated environment. It provides a context that makes it easier for you to trace the relationships between objects in a program. Rather than working with tools and packages separately, you work with objects and allow the Workbench to launch the appropriate tool for an object.

a. Development Objects and Packages

When you work with the Workbench, you work with development objects and packages.

Development objects are the individual parts of an ABAP application like reports, transactions, and function modules. Program components such as events, screens, menus, and function modules are also development objects. Objects that programs can share are development objects as well. These shareable objects include database fields, field definitions, and program messages.

A package is a container for objects that logically belong together; for example, all of the objects in an application. A package is also a type of development object. An example of a package might be General Ledger Accounting.

When you create a new object or change an existing object, the system asks you to assign the object to a package.

b. Storing Development Objects

The SAP system stores development objects in the Repository, which is a part of the database.

When you complete work on a development object like a program, screen, or menu, you generate a runtime version of the object. This runtime version is stored, along with the object, in the Repository. An application consists of several runtime objects that are processed by the work processes in the SAP System.

In a standard SAP installation, development and live operation take place in separate systems. New applications are created in the development system and transported to the production system. Daily work takes place in the production system which uses runtime versions created in the development system.

The division between production and development systems is recommended because changes to an existing ABAP application take immediate effect. To prevent disturbances in daily work flow in the production system, all developments are carried out in development systems designed especially for this purpose.

c. The Transport Organizer

The Transport Organizer is used to move applications from the development system to the production system. The Workbench Organizer also provides version control and tracking.

*(** Refer to chapter-14 for details)*

Naming Standards (Nomenclature):

- Any custom developed objects name should start with a letter “Z” or “Y”.
- SAP reserves the letters from “A” to “X” for naming their own objects.
- The rest of the naming convention will be client/organization specific.

ABAP Programming Syntax:

- ABAP Programs are made up of individual statement.
- Each statement begins with a “Keyword”.
- Each statement ends with a “period”.
- Words can be separated by at least one space.
- Statements can occupy more than one line
- Statements can be indented for readability purpose.
- ABAP Programs are interpreted, not compiled.
- The first time the program is executed, the system automatically generates a runtime object.

8. ABAP Keys:

There are 2 types of Keys in SAP ABAP:

1. Developer's Key
2. Access Key

a. ABAP Developer's Key:

A Developer key –

Allows a user to develop **custom objects** (can be new programs, database tables, functions, or any other work bench object).

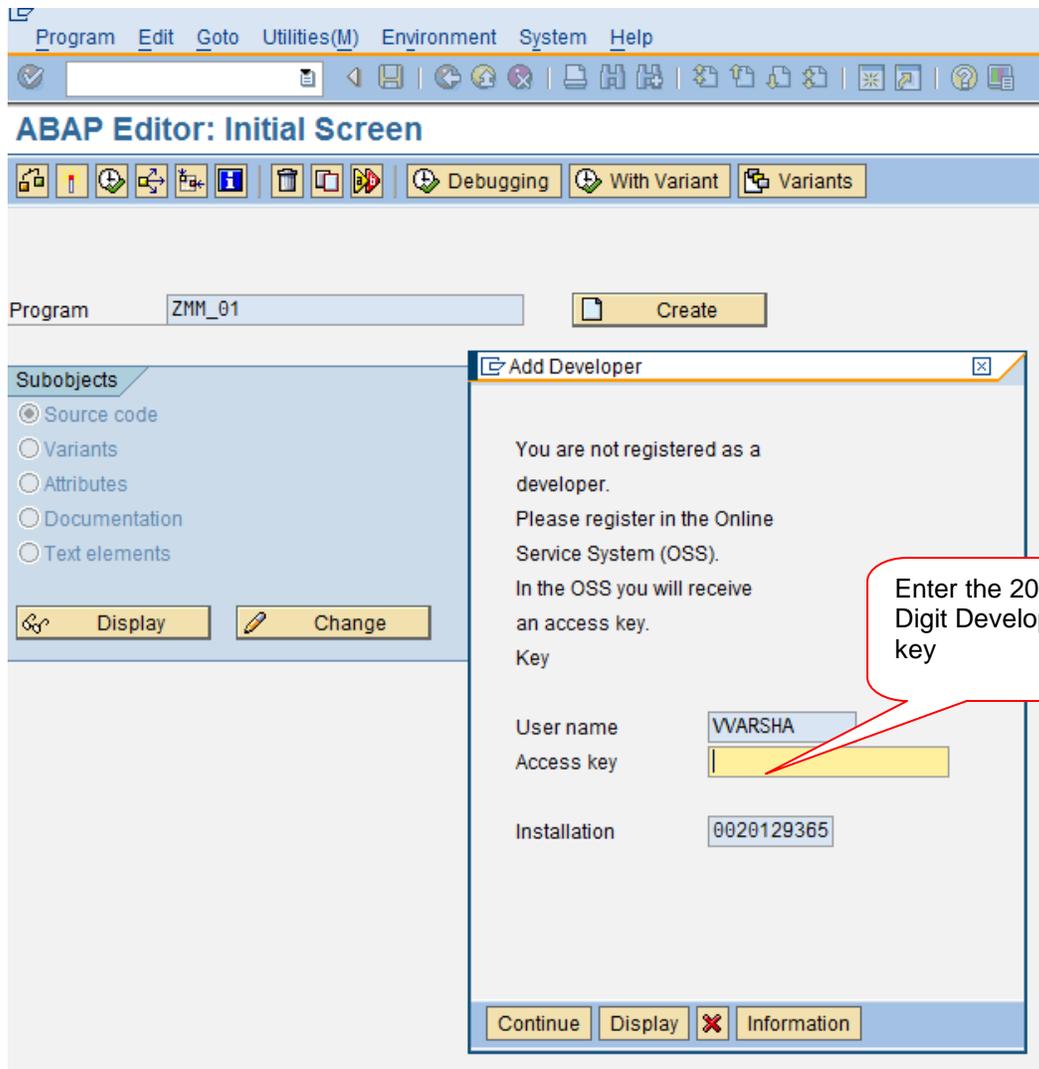
A SAP Developer requires 2 things to work on custom development object using ABAP Workbench and they are:

1. Authorization to work with ABAP Workbench object
2. Developer Access key

Above both, are assigned to the SAP user depending on their role, by the BASIS Team usually.

- Authorizations to work with ABAP Development objects, is provided by the BASIS team in the Developer's profile.
- The "Developer Key" is a 20 digit key associated with a user-name and is unique and assigned by BASIS team.
- The Developer key for the User-Id is requested in the SAP Service Market Place by the BASIS team,

Without the Developer Key, if a Developer tries to work on any custom workbench object, they will receive a message to register the developer and validate it by entering the Developer Key as displayed below:



Click on <<Continue>>, on entering a valid key, permission will be granted for working with the Workbench Objects.

The Developer Key is entered only one time and it registers the user-name for Development roles.