



Quick answers to common problems

SAP ABAP Advanced Cookbook

Over 80 advanced recipes with excellent programming techniques that focus on the Netweaver 7.0 EHP2 and above

Rehan Zaidi

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BIRMINGHAM - MUMBAI

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I am very thankful to my parents, especially my mother, whose prayers are with me all the time. I am grateful to the many friends and well-wishers who have supported and encouraged me both through the duration of this project and throughout my life as a whole.

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I would like to thank my wife Milly and my daughter Kiara for all their support while I was doing this book's review.

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I would like to thank Vasily Kovalsky, a teacher at the SAP training center, for his patience and knowledge. In addition, I would like to thank my managers Vadim and Juri for the trust in me and my skills. Also I would like to thank all developers in the GS unit of SAP, who were open to share their knowledge and experience. Also, I would like to thank my girlfriend Olga Tupikina for her patience and understanding while I was working on several projects and had little time to share with her.

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Preface

Advanced Business Application Programming (ABAP) is SAP's proprietary 4th Generation Language (4GL). SAP core is written almost entirely in ABAP. ABAP is a high level programming language used in SAP for development and other customization processes. This book covers advanced SAP programming applications with ABAP. It teaches you to enhance SAP applications by developing custom reports and interfaces with ABAP programming. This cookbook has quick and advanced real world recipes for programming ABAP.

It begins with the applications of ABAP objects and ALV tips and tricks. It then covers design patterns and dynamic programming in detail. You will also learn the usage of quality improvement tools such as transaction SAT, SQL Trace, and the code inspector. Simple transformations and its application in Excel downloading will also be discussed, as well as the newest topics surrounding Adobe Interactive Forms and the consumption and creation of Web services. The book comes to an end by covering advanced usage of Web Dynpro for ABAP and the latest advancement in Floorplan Manager.

What this book covers

Chapter 1, ABAP Objects, introduces useful recipes related to the object-oriented programming. This will include useful design patterns, the shared memory, and the persistent object concept.

Chapter 2, Dynamic Programming, covers facets of dynamic programming as applied in ABAP, such as Dynamic Open SQL and usage of field symbols and references.

Chapter 3, ALV Tricks, shows how you can get the most out of ALV programs. Starting with a simple ALV program, we will add code in recipes to fulfill a variety of user requirements.

Chapter 4, Regular Expressions, guides you on how you can embed regex programming in your ABAP programs and solve complicated problems in the least possible time and with minimal code.

Chapter 5, Optimizing Programs, shows the newer feature of secondary indexes and the transaction SAT (runtime analyzer) along with valuable program optimization tips.

Chapter 6, Doing More with Selection Screens, discusses recipes based on less frequently applied functionality within ABAP programs' selection screens, such as the addition of tabstrips and placement of buttons on toolbar. In addition, we will see how to take folder and file names as input, followed by a recipe for writing code in search help exits.

Chapter 7, Smart Forms – Tips and Tricks, introduces various recipes based on Smart forms and fulfilling user's form printing requirements in the least possible time.

Chapter 8, Working with SQL Trace, provides lesser-known tricks related to the SQL Trace tool. This will include the performance optimization usage of the SQL trace tool as well as the use of finding data source of screen fields.

Chapter 9, Code Inspector, shows how to check the quality of custom programs using standard checks, along with the procedure for creating your own checks.

Chapter 10, Simple Transformations, discusses in detail the Simple Transformation language and the representation of data variables in it, the application for Excel download format will also be shown.

Chapter 11, Sending E-mail Using BCS Classes, covers the classes of the Business Communication Service (BCS) for e-mail generation. This chapter will cover everything from simple e-mails for SAP users to Internet e-mail addresses, and also the procedure for adding attachments of various formats.

Chapter 12, Creating and Consuming Web Services, covers the step-by-step procedure for the creation of Web services based on an ABAP function module using the Inside-Out approach. The steps required to create a consumer of the Web service will also be shown.

Chapter 13, SAP Interactive Forms by Adobe, shows how to create both print and interactive forms using the SAP Interactive forms technology. A number of scenarios such as Offline form processing will also be covered.

Chapter 14, Web Dynpro for ABAP, shows how to create simple and advanced Web Dynpro for ABAP (WD4A) applications. The advanced topics related to the Web Dynpro components will also be covered.

Chapter 15, Floorplan Manager, covers newer features of the Floorplan Manager design used for creating Web Dynpro applications quickly. Both the configuration and coding for useful Floorplans will also be covered.

What you need for this book


ECC 6 system with Netweaver 7.02 or higher. A trial version of ABAP Netweaver 7.02 or higher will also suffice.


Who this book is for

SAP Developers and Consultants who have at least a basic knowledge of ABAP.

Conventions

New terms and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: “clicking the **Next** button moves you to the next screen”.

 Warnings or important notes appear in a box like this.]

 Tips and tricks appear like this.]

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1

ABAP Objects

In this chapter, we start with recipes for ABAP objects. This chapter is designed to provide useful recipes related to the storage of ABAP objects in shared memory and the database (persistent objects), as well as some useful design patterns. In this chapter, we will look at ways of:

- ▶ Creating a shared memory object
- ▶ Creating a persistent object
- ▶ Creating classes based on factory methods
- ▶ Creating classes based on singleton design pattern
- ▶ Creating classes based on adapter pattern

Introduction

This chapter explores recipes related to ABAP objects. Two useful features of the object-oriented ABAP are storage options in the shared memory as shared objects, and in the database as objects of persistent classes. The details about both the prerequisites as well as the necessary steps needed to create shared memory-enabled objects and persistent objects will be discussed later in this chapter.

Moreover, design patterns are very important in object-oriented programming. In this chapter, we will see how to implement three of them using ABAP objects, namely the adapter, singleton, and the factory design. We will create a class with a `factory` method design. Later, we will show how this class may be modified in order to behave like a singleton class. Finally, we will see how an object of one class may be converted to that of another using an adapter class. The examples are kept simple in order to emphasize on the design pattern concept.

For this chapter, we assume that the reader has basic knowledge of the ABAP objects, and is familiar with the class-builder transaction.

Creating a shared memory object

This recipe shows how to store the instances of your classes in the shared memory of the application server. A number of programs may access these objects that reside on the application server shared memory.

Two classes are necessary for shared memory, namely the `area` class and the `area root` class. The `root` class is necessary for storing (encapsulating) the data that are to be stored in the shared memory. An `area` class may comprise of various instances that may consist of a number of versions.

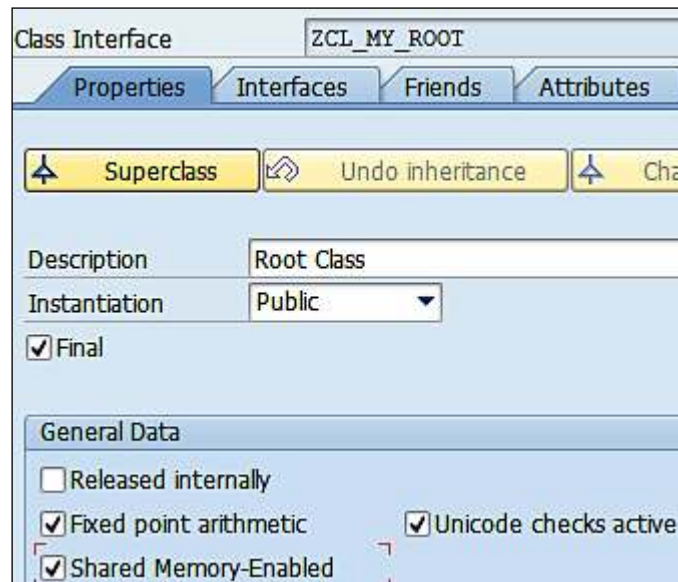
An important concept shown in this recipe is the `CREATE OBJECT` statement with the addition `AREA HANDLE`. This will create the object in the application server that is shared memory pointed to by the area handle `myarea`.

Getting ready

Prior to writing the code for storing objects in shared memory, an `area root` class must be created and a shared memory area be defined using transaction `SHMA`.

The steps required for creating a root class are:

1. Call transaction `SE24`; enter a suitable name to your `root` class, as shown in the following screenshot. On the **Properties** tab, we need to make sure that the `Shared-Memory` checkbox is switched on.



Downloading the example code



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- We have named it `ZCL_MY_ROOT`. We will then define two **Instance Attributes**, **NUMBER** and **NAME**, having private visibility, as shown in the following screenshot:

Class Builder: Change Class ZCL_MY_ROOT

Class Interface: `ZCL_MY_ROOT` Implemented / Active

Properties | Interfaces | Friends | **Attributes** | Methods | Events | Types

Attribute	Level	Visibility	Read-Only	Typing	Associated Type
NUMBER	Instance Attribute	Private	<input type="checkbox"/>	Type	PERSNO
NAME	Instance Attribute	Private	<input type="checkbox"/>	Type	EMNAM
			<input type="checkbox"/>	Type	

- Two suitable methods, **SET_DATA** and **GET_DATA**, are also added to the class. The **SET_DATA** method contains code that imports number and name and assigns to the attributes **NUMBER** and **NAME** of the class. The **GET_DATA** method does just the opposite, that is, it exports the **NUMBER** and **NAME** attribute for a given shared memory object.
- Next, the shared memory area should be created. This is done via transaction `SHMA`.

5. Enter a suitable name and click on the **Create** button. We have typed the name `ZCL_MY_EMP_AREA`. On the screen that appears, enter the description of the area. Also, enter the name of the `root` class created earlier in the **Root Class** field. You may leave the **Client-Specific Area** checkbox unchecked as it is not required for our recipe. Now, save your entries. Refer to the following screenshot:

Change Area ZCL_MY_EMP_AREA

Area

Name: ZCL_MY_EMP_AREA

Description: Employee Area

Attributes | History

Basic Properties

Root Class: ZCL_MY_ROOT

Client-Specific Area

Aut. AreaStructuring

Transactional Area

Fixed Properties

With Versioning

6. This will also generate an area class by entering the same name `ZCL_MY_EMP_AREA`.



7. This area class will contain the necessary methods used for reading, changing, and creating the area, such as **ATTACH_FOR_UPDATE**, **ATTACH_FOR_READ**, and **ATTACH_FOR_WRITE**.

How to do it...

For creating the set of code that writes object's contents to the shared memory, follow these steps:

1. Two object references `my_handle` and `my_root` are defined, one for area class and the other for root class.
2. The static method `attach_for_write` of the area class `zcl_my_emp_area` is called.
3. The `CREATE OBJECT` with the area handle, `my_handle` must then be called.
4. The root and the created area instance must be linked using the `set_root` method of the handle.
5. The `set_data` method is called with the relevant number and name.

6. The `detach_commit` method of the `area` class is then called.

```
data : my_handle type ref to zcl_my_emp_area .
data : my_root type ref to zcl_my_root.

try .
  CALL METHOD zcl_my_emp_area=>attach_for_write
    EXPORTING
      inst_name = 'INST_NAME'
    RECEIVING
      handle    = my_handle.

  CREATE OBJECT my_root area handle my_handle.

  CALL METHOD my_handle->set_root
    EXPORTING
      root = my_root.

  CALL METHOD my_root->set_data
    EXPORTING
      number = '00000024'
      name   = 'John Reed'.

  CALL METHOD my_handle->detach_commit.

catch cx_shm_attach_error.
  write :/ 'Error in Writing to Area' .
endtry.
```

How it works...

In the shared memory-writing program, the statements collectively make the writing of object in the shared memory. Let us see how the program code works.

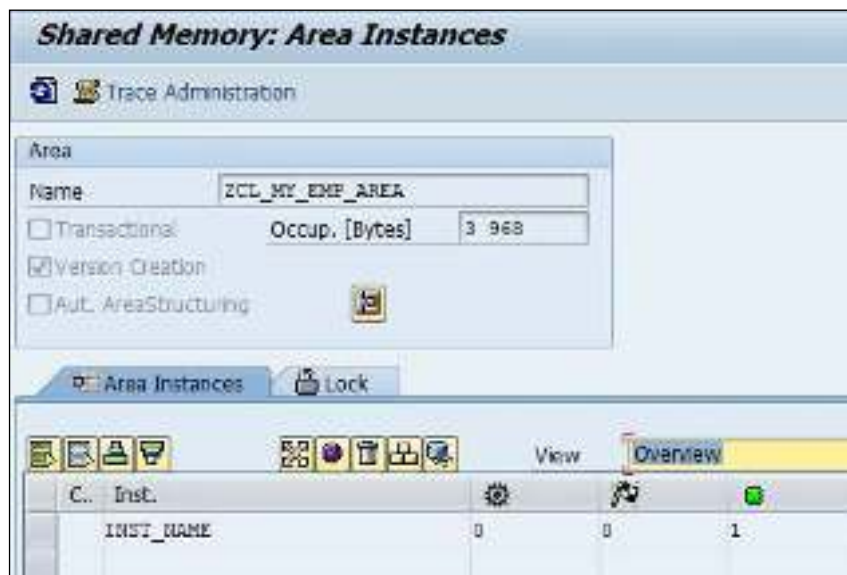
An area instance version needs to be created before any data may be written in the shared memory on the application server. The `attach_for_write` static method is used for this purpose and returns a handle to the area instance created in the application server memory. This imposes `write` lock on the version.

The `CREATE OBJECT` statement is then called with the name of the created handle. This creates a `root` object in the area instance of the shared memory. The link between the area instance and the `root` class is created using the `set_root` method. The `set_data` method is then called for the root reference `my_root` and supplied with the name and number of the employee, which are then stored in the shared area. Finally, the `detach_commit` method is called and the `write` lock is released.

Once the program has run successfully, you may see the created object in the shared memory using the shared memory transaction SHMM. This will appear as your **area** class name **ZCL_MY_EMP_AREA**. Refer to the following screenshot:



Double-click on the name of area to view the details, as shown in the following screenshot:



There's more...

The read program is somewhat similar. However, instead of the `attach_for_write` method used earlier, we will use `attach_for_read`. The same instance name is passed and the handle is received. The method imposes a `read` lock on the area instance. Then, the `get_data` method of the `root` object is called using the area handle, `my_handle`. This returns the employee name and number stored earlier into the variables `name` and `number` respectively.

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