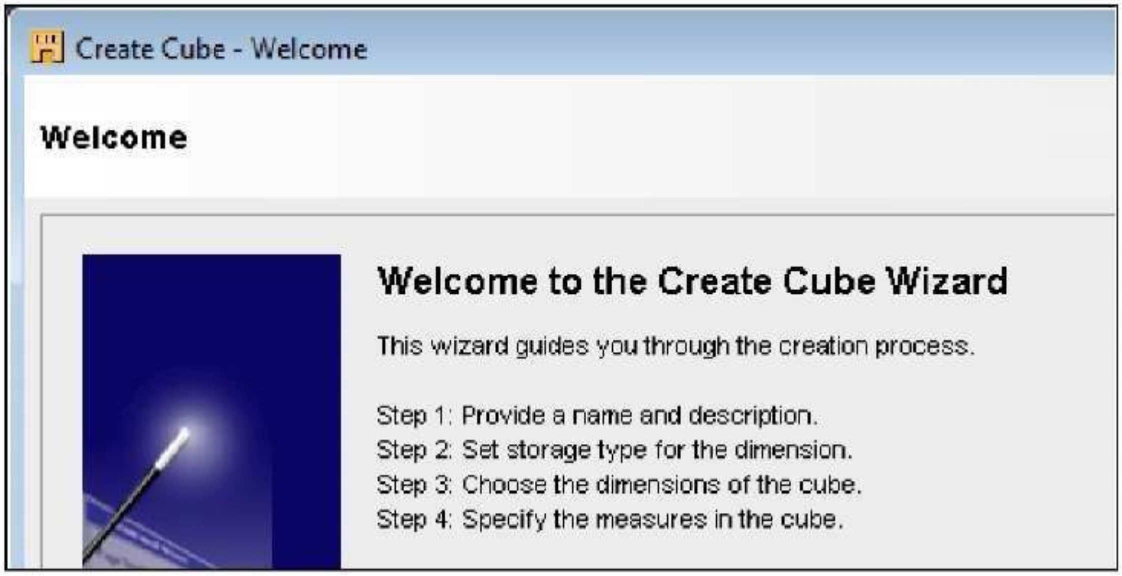
Now that we have our dimensions defined, we have one last step to cover and our design for our data warehouse will be complete. We need to define our cube, which is where our measures will be stored—the facts that users will want to query. We discussed the design of our cube and agreed that we would store two measures, namely the sales amount and the number of items sold. We have already designed our three dimensions, and their links and measures will go together to make up the information stored in our cube.

There is a wizard available to us for creating a cube that we will make use of to ease our task. So let's start designing the cube with the wizard.

Creating a cube with the wizard

We will start the wizard in a similar manner to how we started up the Dimension wizard. Right-click on the Cubes node under the ACME_DWH module in the Project Navigator, select New Cube to launch the cube-creation wizard. The first screen will be the welcome screen, which will summarize the steps it will lead us through as shown in the following image of the main part of the welcome dialog box:



Welcome to the Create Cube Wizard

This wizard guides you through the creation process.

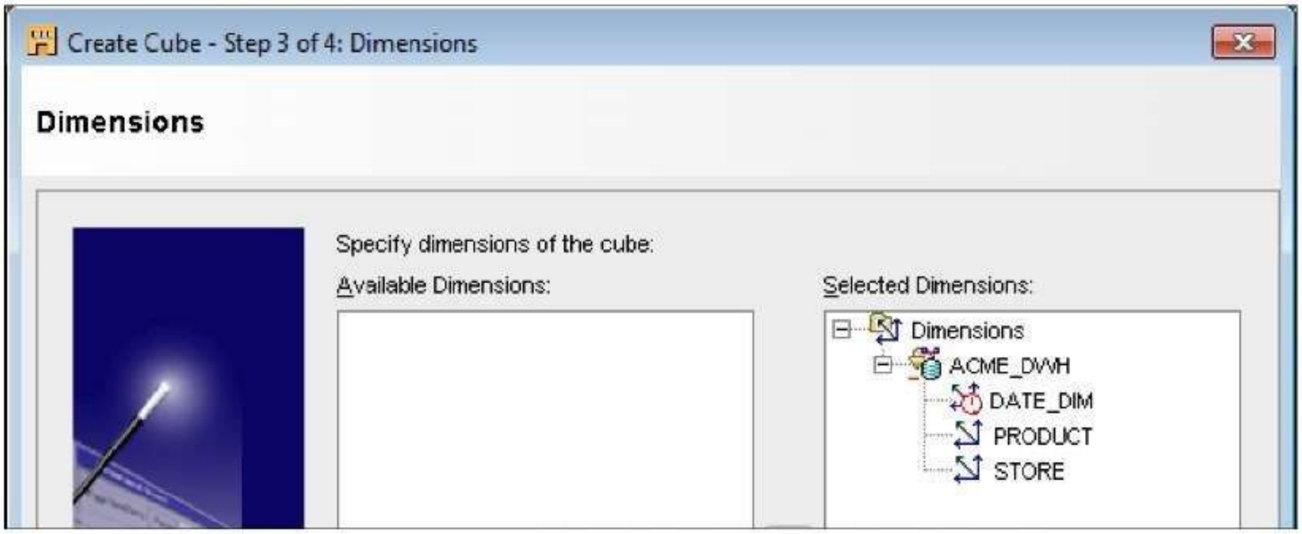
Step 1: Provide a name and description.
Step 2: Set storage type for the dimension.
Step 3: Choose the dimensions of the cube.
Step 4: Specify the measures in the cube.

The following are the steps in the creation process:

1. We proceed right to the first step where we give our cube a name. As we will be primarily storing sales data, let's call our cube SALES and proceed to the next step.

2. In this step, we will select the storage type just as we did for the dimensions. We will select ROLAP: Relational Storage to match our dimension storage option, and then move to the next step.

3. In this step, we will choose the dimensions to include with our cube. We have defined three, and want them all included. So, we can click on the double arrow in the center to move all the dimensions and select them. If we had more dimensions defined than we were going to include with this cube, we would click on each, and click on the single right arrow (to move each of them over); or we could select multiple dimensions at one time by holding down the Ctrl key as we clicked on each dimension. Then click the single right arrow to move those selected dimensions. This step looks like the following after we've made our selections:



Create Cube - Step 3 of 4: Dimensions

Dimensions

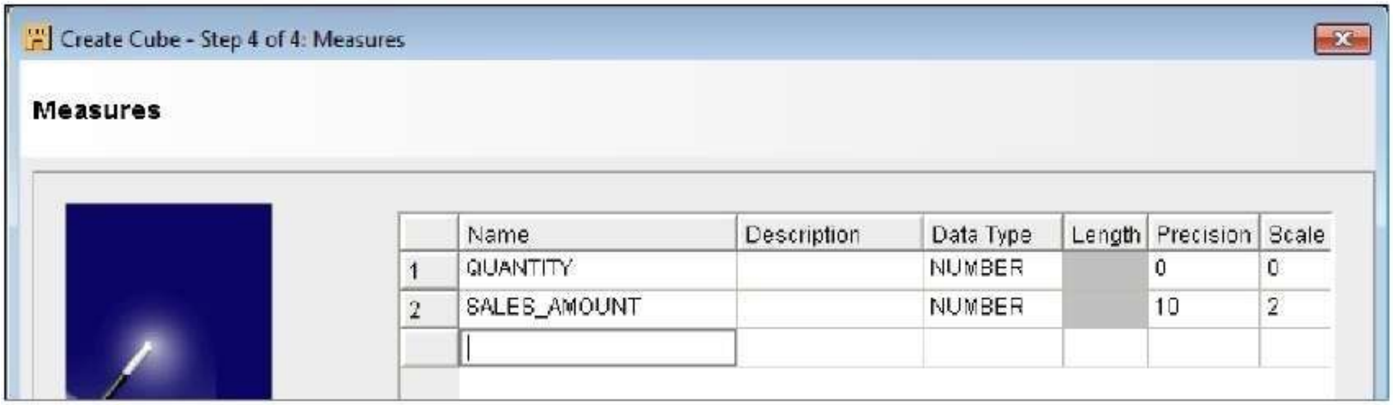
Specify dimensions of the cube:

Available Dimensions:

Selected Dimensions:

```
⊟ Dimensions
   ⊟ ACME_DWH
        DATE_DIM
        PRODUCT
        STORE
```

4. Moving on to the last step, we will enter the measures we would like the cube to contain. When we enter QUANTITY for the first measure with precision and scale set to zeros and SALES_AMOUNT with precision 10 and scale 2 for the second one, we end up with a screen that should look similar to this with the dialog box expanded to show all the columns:



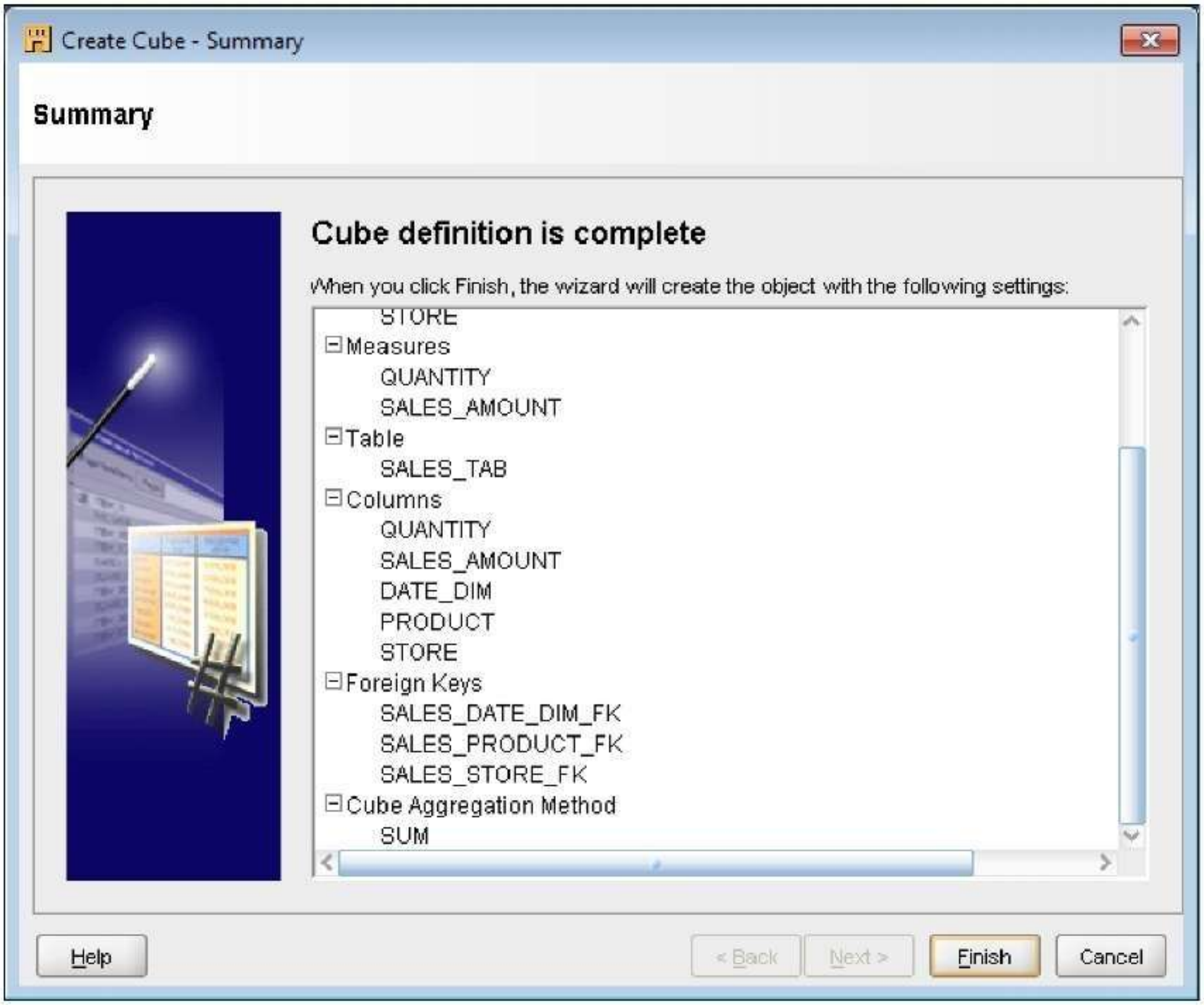
Create Cube - Step 4 of 4: Measures

Measures

	Name	Description	Data Type	Length	Precision	Scale
1	QUANTITY		NUMBER		0	0
2	SALES_AMOUNT		NUMBER		10	2

Clicking on Next in step 4 will bring us to the final screen where a summary of the actions it will take are listed. Selecting Finish on this screen will close the dialog box and place the cube in the Project Navigator.

The final screen looks like the following when scrolled all the way to the bottom:



Cube definition is complete

When you click Finish, the wizard will create the object with the following settings:

```
    STORE
⊟Measures
    QUANTITY
    SALES_AMOUNT
⊟Table
    SALES_TAB
⊟Columns
    QUANTITY
    SALES_AMOUNT
    DATE_DIM
    PRODUCT
    STORE
⊟Foreign Keys
    SALES_DATE_DIM_FK
    SALES_PRODUCT_FK
    SALES_STORE_FK
⊟Cube Aggregation Method
    SUM
```

This dialog box works in a slightly different way than the dimension wizard. This final screen is the second-to-last screen when creating a dimension. The dimension wizard will present us with the progress screen as the final step. For cubes, the process is not quite as involved. That's because at this point, the cube is basically done with nothing left to do afterwards. So we may think we missed a step, but not to worry. Clicking on Next on this screen will exit the dialog box, and the cube will be created and will be accessible in the Project Navigator window.

Just as with the dimension wizard earlier, we get to see what the cube wizard is going to create for us in the Warehouse Builder. We gave it a name, selected the dimensions to include, and specified the measures. The rest of the information was included by the wizard on its own. The wizard shows us that it will be creating a table named sales for us that will contain the referenced columns, which it figured out from the dimension and measures information we provided. At this point, nothing has actually been created in the database apart from the definitions of the objects in the Warehouse Builder workspace. We can verify that if we look under the Tables entry under our

ACME_DWH database node. We'll see a table named sales along with tables named product, store, and date_dim. These are the tables corresponding to our three dimensions and the cube.

You may have a slightly different table name. The wizard will not create a table with the same name as one already created, so it will append a unique number to the end to keep the table names from conflicting. This could happen if you've previously created a dimension with the same name, and then removed it and recreated it. It may not remove the associated table when you delete a cube or dimension object. The tables will appear in the Project Navigator under the Tables node. Expand that and you'll see the list of tables. Right-click a table and select Delete. The Warehouse Builder will ask if you really want to delete it, and will provide a checkbox to put the object in the recycle bin. Leave it checked just to be safe and click on OK, and the table will be removed.

The foreign keys we can see in the previous image are the pointers to the dimension tables. They will make the connection between our cube and our dimensions when they are deployed to the database.

There is one final item that we did not specify and that is the cube aggregation method to be used. We saw earlier in the topic how the multidimensional implementation contains behind-the-scenes functionality that we don't have to specify. Later we also saw how important it was to be aware of the aggregation of our measures, and whether they can be summed together at different levels and within the same level. The aggregation the cube will perform for us when we view different levels is one of those behind-the-scenes capabilities we would get with the OLAP feature.

When we view the region amounts, they will automatically be summed up from the amounts of the various stores in the region without us having to do anything extra. This is a nice feature the multidimensional implementation gives us, but aggregations are not created for the pure relational storage option. As we can generate either a relational or a multidimensional implementation, this had to be specified anyway and so it defaulted to sum. If we install the OLAP option or use a separate OLAP database in the future, we can change that aggregation method. But for now, we do not need it. It is possible to use aggregations with a pure relational implementation by creating separate summing tables, and there are OLAP data mining applications that can make use of them for more advanced implementations.

We click on the Finish button on this final screen and our sales cube is created. We'll save our work with the Ctrl+S key combination or from the design main menu. Our cube and dimensions are now complete. Let's take a look next at data object editors where we can view and edit our objects.