Guided Exercise 1.1: Setting up your application development environment

Overview

In this Guided Exercise, you will prepare your development environment for writing, testing, and debugging an ABL application.

Important: You must complete this Guided Exercise to perform subsequent Try It Exercises in this course.

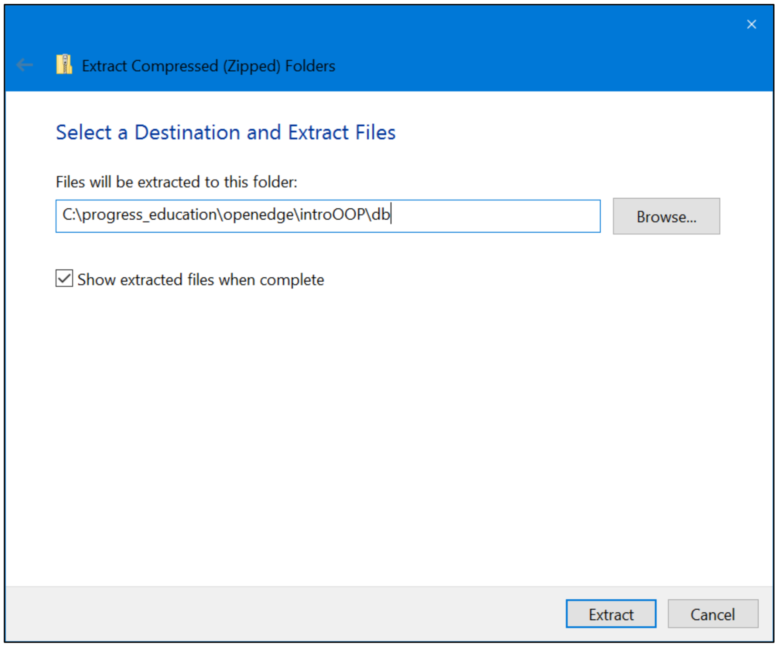
This exercise has 3 parts. The exercise steps take approximately 30 minutes to complete. You perform this exercise in your live version of Progress OpenEdge.

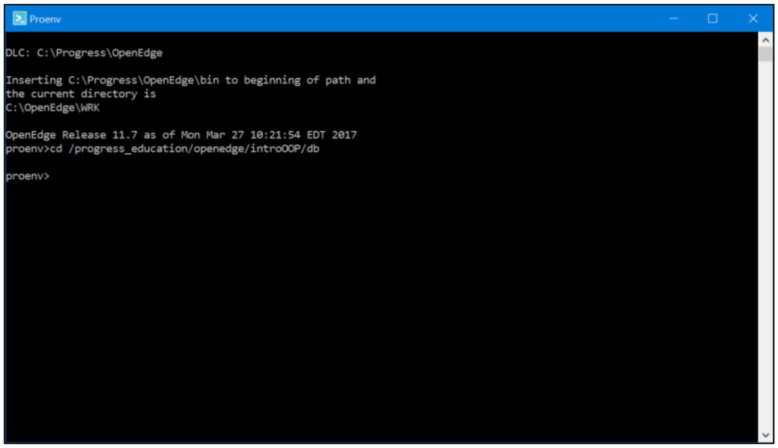
Before you begin, you must:

Step	Description
1.	Complete the exercise setup instructions, if you have not done so already.
2.	Install Progress Developer Studio for OpenEdge.

Part 1—Starting the Database Server

This course uses a database named sports3000. In this part of the Guided Exercise, you extract the database files and start the database server.

Step	Task
1.	Extract the files in Sports3000DatabaseFiles.zip to C:/progress_education/openedge/IntroOOP/db. The files extracted are the database files and a sub-folder of database triggers.  Extract Compressed (Zipped) Folders Select a Destination and Extract Files Browse... Extract Cancel Files will be extracted to this folder: C:\progress_education\openedge\introOOP\db ☑ Show extracted files when complete

2.	Open a Proenv window by selecting **Start** > **Progress** > **OpenEdge** > **Proenv** and navigate to **/progress_education/openedge/introOOP/db**.
	
	
	`DLC: C:\Progress\OpenEdge`
	
	`Inserting C:\Progress\OpenEdge\bin to beginning of path and`
	`the current directory is`
	`C:\OpenEdge\WRK`
	
	`OpenEdge Release 11.7 as of Mon Mar 27 10:21:54 EDT 2017`
	`proenv>cd /progress_education/openedge/introOOP/db`
	
	`proenv>`

3.	Set the database location as follows: **prostrct repair sports3000**

<table>
<tr>
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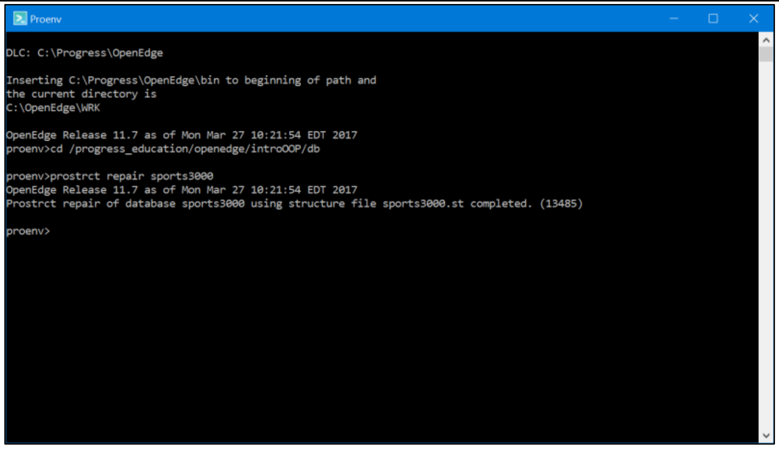
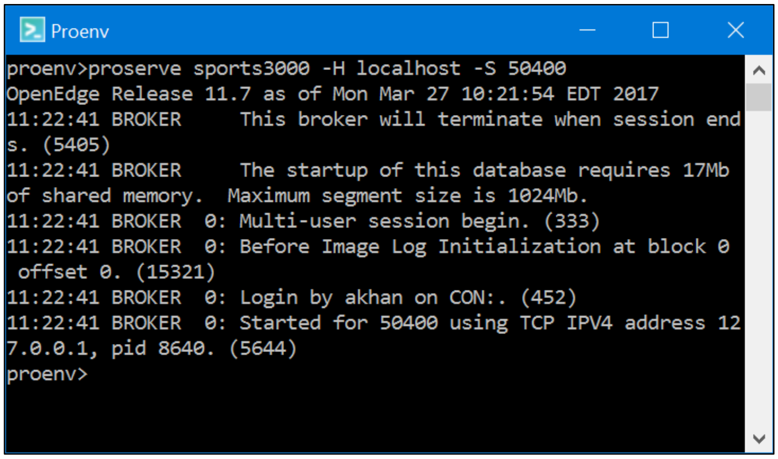


```
DLC: C:\Progress\OpenEdge

Inserting C:\Progress\OpenEdge\bin to beginning of path and
the current directory is
C:\OpenEdge\WRK

OpenEdge Release 11.7 as of Mon Mar 27 10:21:54 EDT 2017
proenv>cd /progress_education/openedge/introOOP/db

proenv>prostrct repair sports3000
OpenEdge Release 11.7 as of Mon Mar 27 10:21:54 EDT 2017
Prostrct repair of database sports3000 using structure file sports3000.st completed. (13485)

proenv>
```

</td>
</tr>
<tr>
<td>4.</td>
<td>

Start the database server for the sports3000 database as follows:

proserve sports3000 –H localhost –S 50400



```
proenv>proserve sports3000 -H localhost -S 50400
OpenEdge Release 11.7 as of Mon Mar 27 10:21:54 EDT 2017
11:22:41 BROKER     This broker will terminate when session end
s. (5405)
11:22:41 BROKER     The startup of this database requires 17Mb
of shared memory.  Maximum segment size is 1024Mb.
11:22:41 BROKER  0: Multi-user session begin. (333)
11:22:41 BROKER  0: Before Image Log Initialization at block 0
 offset 0. (15321)
11:22:41 BROKER  0: Login by akhan on CON:. (452)
11:22:41 BROKER  0: Started for 50400 using TCP IPV4 address 12
7.0.0.1, pid 8640. (5644)
proenv>
```

Note: If port 50400 is unavailable on your system, use a different port number.

</td>
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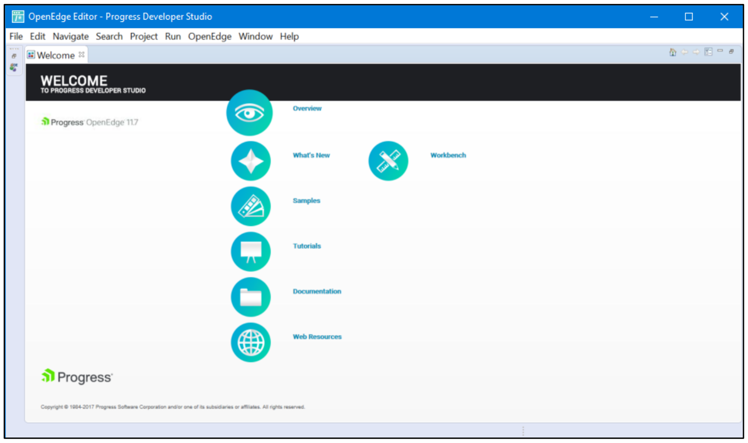
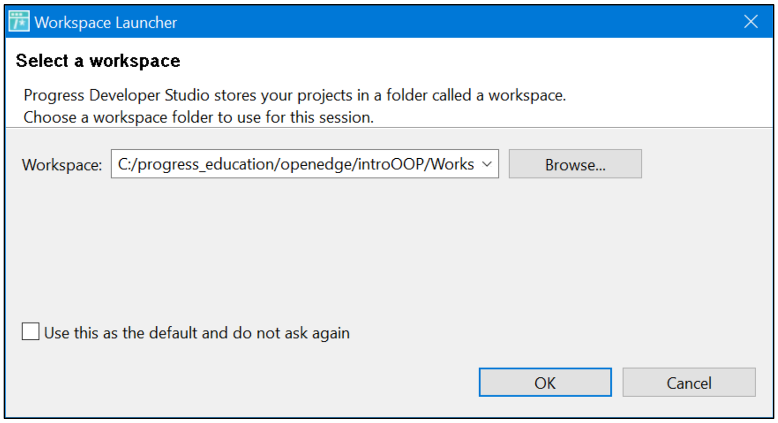
<tr>
<td>5.</td>
<td>Close the Proenv window.</td>
</tr>
</table>

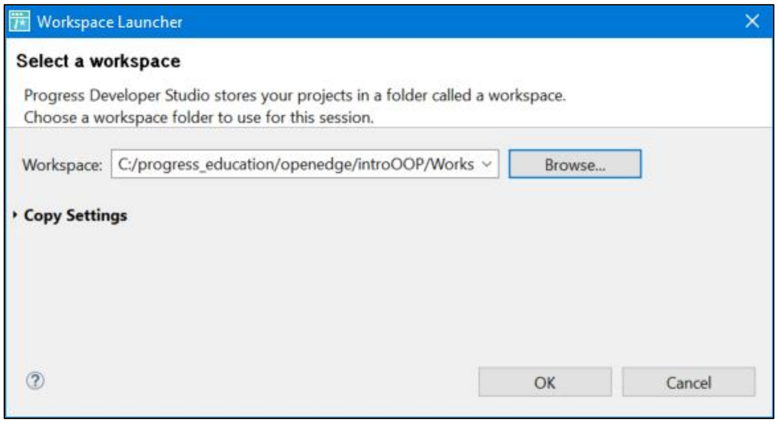
Part 2—Setting up a workspace in Developer Studio

Next, you will create a new Developer Studio workspace area that will be used for your ABL development in this course.

Step	Task
1.	Start Developer Studio by selecting **Start** > **Progress** > **OpenEdge** > **Developer Studio**.
2.	You may first see the Welcome screen, as shown here. Click the Workbench icon to continue to the workspace for Developer Studio.  OpenEdge Editor - Progress Developer Studio File Edit Navigate Search Project Run OpenEdge Window Help Welcome WELCOME TO PROGRESS DEVELOPER STUDIO Progress OpenEdge 11.7 Overview What's New Workbench Samples Tutorials Documentation Web Resources Progress Copyright © 1984-2017 Progress Software Corporation and/or one of its subsidiaries or affiliates. All rights reserved.
3.	If this is your first time using Developer Studio, the first dialog is for you to specify where your workspace is located. If you do not see this Select a workspace window, go to step 4. a. Specify **/progress_education/openedge/IntroOOP/workspace** as the workspace location.  **Select a workspace** Progress Developer Studio stores your projects in a folder called a workspace. Choose a workspace folder to use for this session. Workspace: C:/progress_education/openedge/introOOP/Works ☐ Use this as the default and do not ask again b. Click **OK**. c. Click the Workbench icon to start the workspace.
4.	If you have previously used Developer Studio for OpenEdge, you must switch to a new workspace.

a. Select **File** > **Switch Workspace** > **Other….**

b. Specify **/progress_education/openedge/IntroOOP/workspace** as the workspace location.



Select a workspace

Progress Developer Studio stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.

Workspace: C:/progress_education/openedge/introOOP/Works

c. Click **OK**. Developer Studio restarts.

d. Click the Workbench icon to start the workspace.

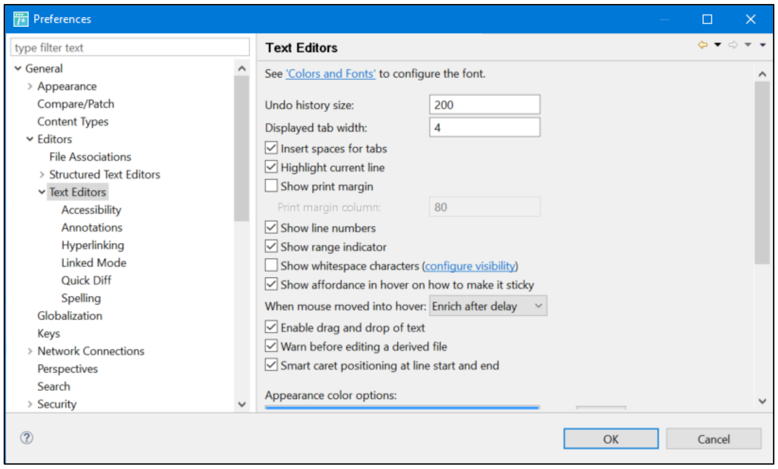
5. Modify these workspace preferences as follows:

a. Select **Window** > **Preferences**.

b. In the Preferences window, navigate to **General** > **Editors** > **Text Editors**.

c. Select **Show line numbers**.

d. Click **Apply**.



Text Editors

See 'Colors and Fonts' to configure the font.

Undo history size: 200
Displayed tab width: 4
☑ Insert spaces for tabs
☑ Highlight current line
☐ Show print margin
Print margin column: 80
☑ Show line numbers
☑ Show range indicator
☐ Show whitespace characters (configure visibility)
☑ Show affordance in hover on how to make it sticky
When mouse moved into hover: Enrich after delay
☑ Enable drag and drop of text
☑ Warn before editing a derived file
☑ Smart caret positioning at line start and end
Appearance color options:

e. Navigate to **Progress OpenEdge** > **Editor**.

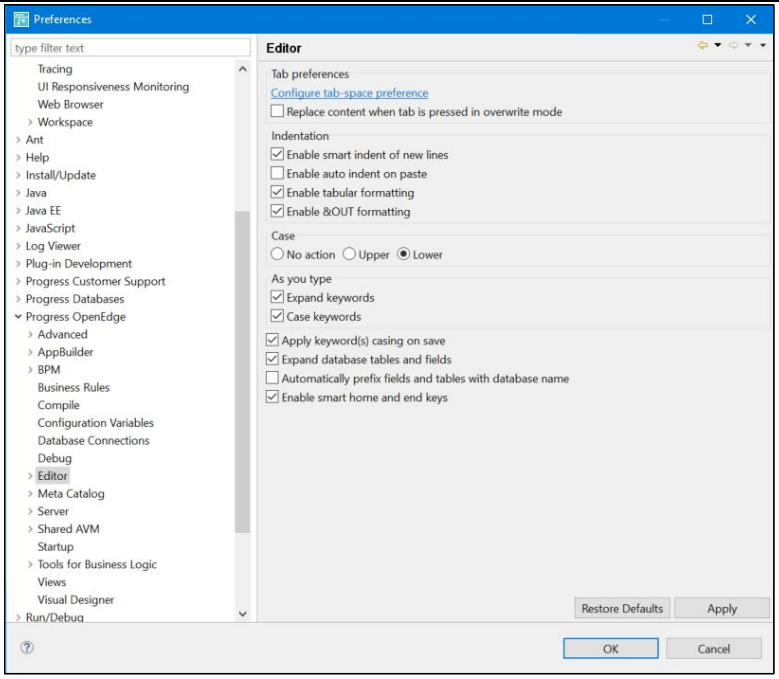
f. Select **Lower** in the **Case** area.

g. Select **Expand keywords** and **Case keywords** in the **As you type** area.

h. Select **Apply keyword(s) casing on save**.

i. Select **Expand database tables and fields**.

j. Click **Apply**.



Editor

Tab preferences

Configure tab-space preference

□ Replace content when tab is pressed in overwrite mode

Indentation

☑ Enable smart indent of new lines
□ Enable auto indent on paste
☑ Enable tabular formatting
☑ Enable &OUT formatting

Case

○ No action ○ Upper ● Lower

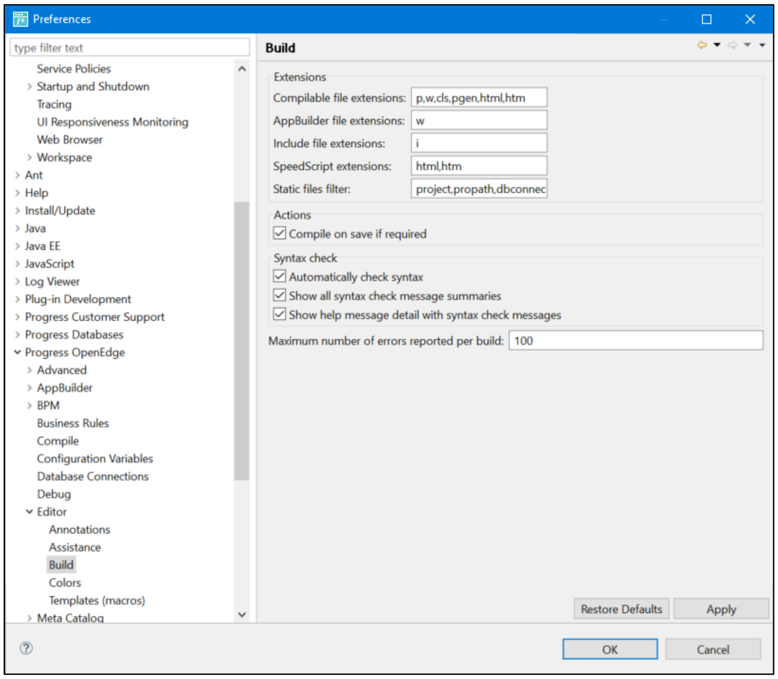
As you type

☑ Expand keywords
☑ Case keywords

☑ Apply keyword(s) casing on save
☑ Expand database tables and fields
□ Automatically prefix fields and tables with database name
☑ Enable smart home and end keys

k. Navigate to **Progress OpenEdge** > **Editor** > **Build**.

l. Select all the boxes in the **Actions** and **Syntax check** areas.



Build

Extensions

Compilable file extensions: p,w,cls,pgen,html,htm
AppBuilder file extensions: w
Include file extensions: i
SpeedScript extensions: html,htm
Static files filter: project,propath,dbconnec

Actions

☑ Compile on save if required

Syntax check

☑ Automatically check syntax
☑ Show all syntax check message summaries
☑ Show help message detail with syntax check messages

Maximum number of errors reported per build: 100

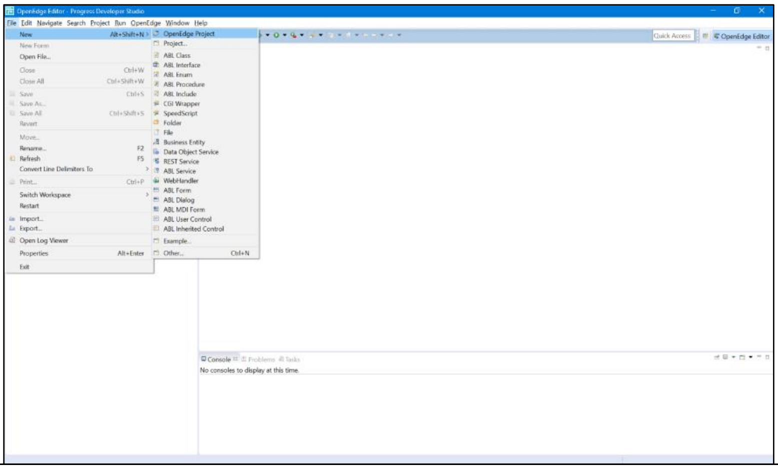
m. Click **OK**.

Part 3—Setting up the Server project

All server-side code resides in the Server project. It is from this project that the ABL code accesses the database. Follow these steps to create and configure this project to use the sports3000 database.

<table>
<tr><th>Step</th><th>Task</th></tr>
<tr><td>1.</td><td>

Select **File** > **New** > **OpenEdge Project**.



No consoles to display at this time.

</td></tr>
<tr><td>2.</td><td>

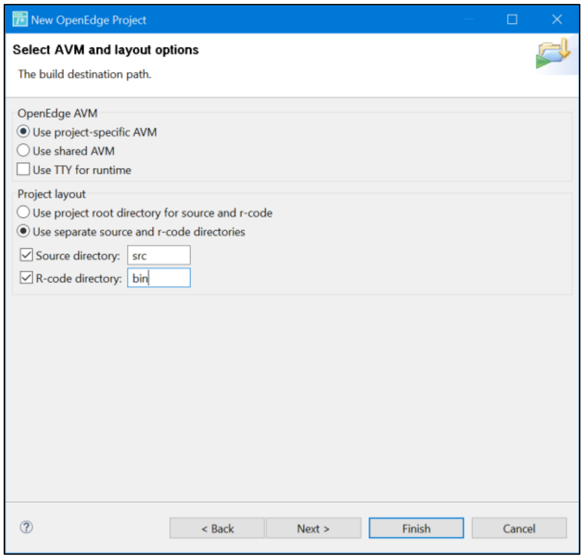
In the New OpenEdge Project wizard:

a. Enter **Server** for the project name.

b. Click **Next**.

c. In the Select AVM and layout options window, select **Use separate source and r-code directories**.

d. Change **rcode** to **bin**.



New OpenEdge Project

Select AVM and layout options

The build destination path.

OpenEdge AVM

● Use project-specific AVM

○ Use shared AVM

□ Use TTY for runtime

Project layout

○ Use project root directory for source and r-code

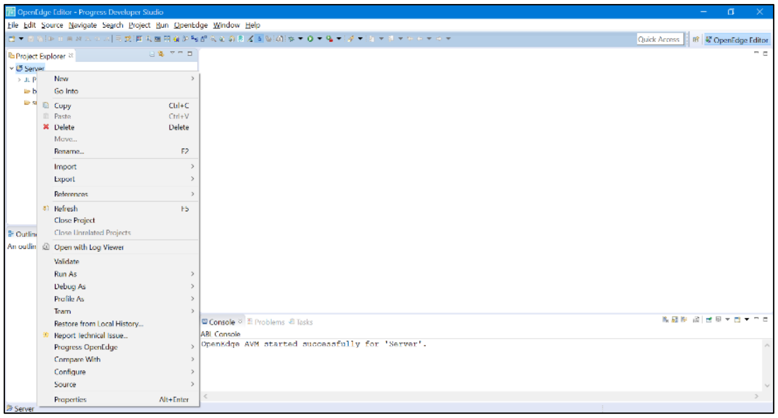
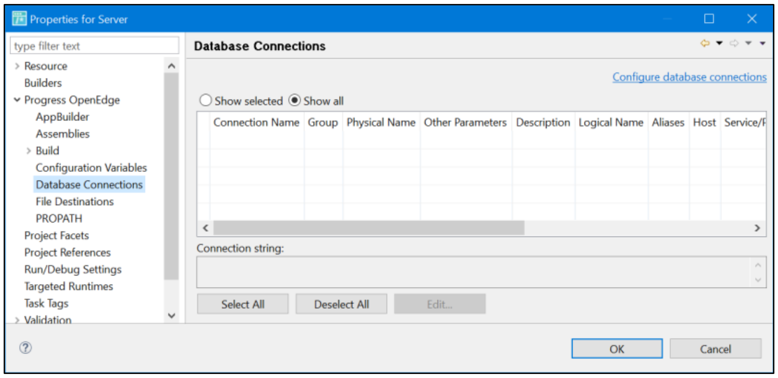
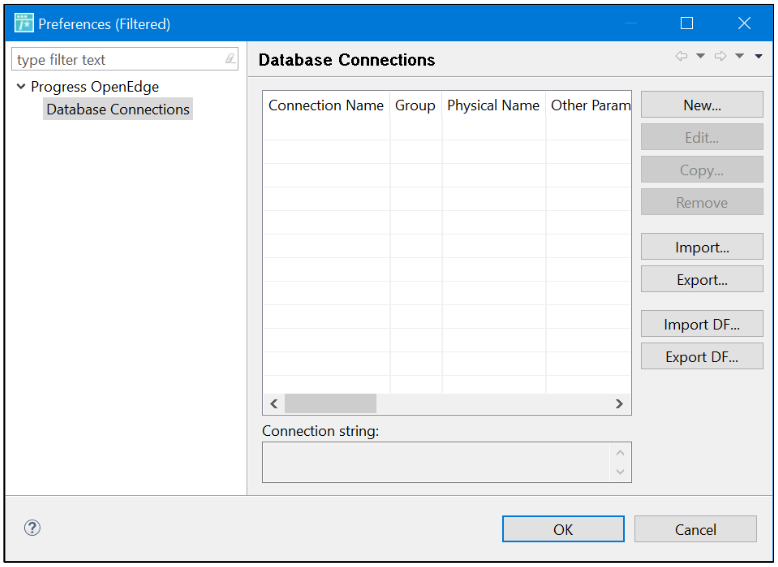
● Use separate source and r-code directories

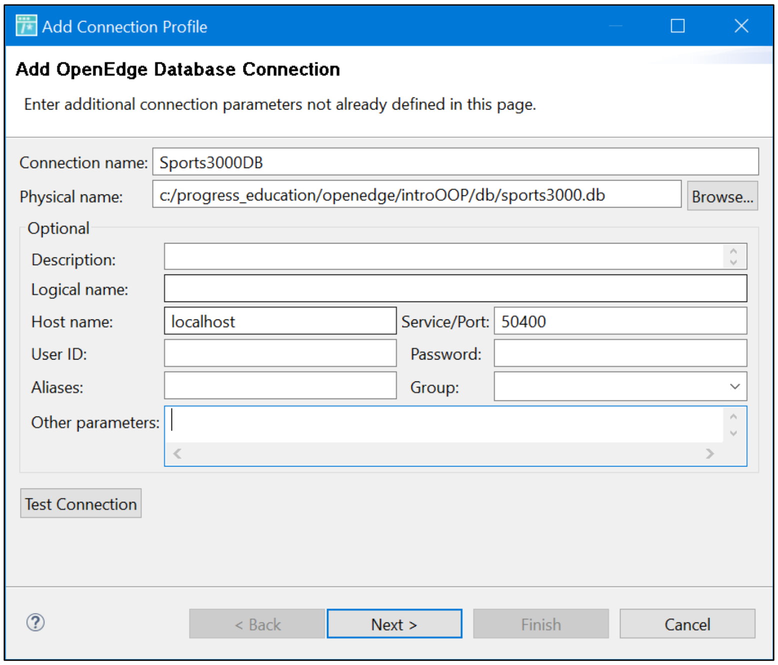
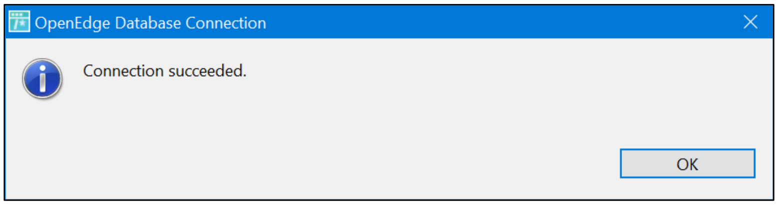
☑ Source directory: src

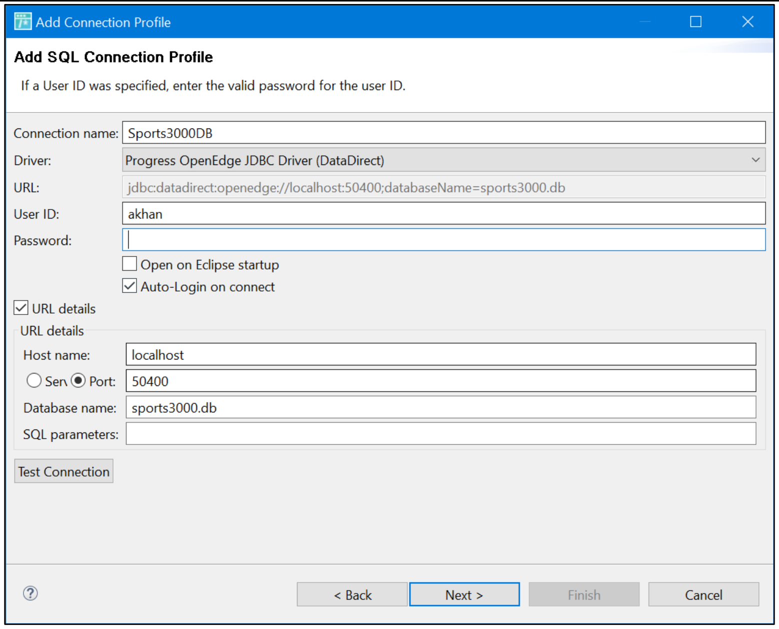
☑ R-code directory: bin

e. Click **Finish**.

</td></tr>
</table>

3.	Next, you will add the database connection to the workspace and associate it with the **Server** project. Right-click the **Server** project and then select **Properties**.  OpenEdge Editor - Progress Developer Studio File Edit Source Navigate Search Project Run OpenEdge Window Help Quick Access OpenEdge Editor Project Explorer Server New Go Into Copy Ctrl+C Paste Ctrl+V Delete Delete Move... Rename... F2 Import Export References Refresh F5 Close Project Close Unrelated Projects Open with Log Viewer Validate Run As Debug As Profile As Team Restore from Local History... Report Technical Issue... Progress OpenEdge Compare With Configure Source Properties Alt+Enter Outline An outline Console Problems Tasks ABL Console `OpenEdge AVM started successfully for 'Server'.`
4.	Navigate to **Progress OpenEdge** > **Database Connections**.  Properties for Server type filter text Resource Builders Progress OpenEdge AppBuilder Assemblies Build Configuration Variables Database Connections File Destinations PROPATH Project Facets Project References Run/Debug Settings Targeted Runtimes Task Tags Validation Database Connections Configure database connections ○ Show selected ● Show all Connection Name Group Physical Name Other Parameters Description Logical Name Aliases Host Service/I Connection string: Select All Deselect All Edit... OK Cancel
5.	Click the **Configure database connections** link.  Preferences (Filtered) type filter text Progress OpenEdge Database Connections Database Connections Connection Name Group Physical Name Other Param New... Edit... Copy... Remove Import... Export... Import DF... Export DF... Connection string: OK Cancel
6.	Click **New** to open the **Add OpenEdge Database Connection** wizard.

7.	Enter the connection name as **Sports3000DB**.
8.	Click the **Browse** button and then navigate to and select **c:/progress_education/openedge/introOOP/db/sports3000.db**.
9.	Specify the host name as **localhost**.
10.	Specify **50400** as the port number. If port 50400 is unavailable on your system, use a different port number. It must be the same port number that you specified when you started the Database Server.  Add Connection Profile Add OpenEdge Database Connection Enter additional connection parameters not already defined in this page. Connection name: Sports3000DB Physical name: c:/progress_education/openedge/introOOP/db/sports3000.db Host name: localhost Service/Port: 50400 Browse... Optional Description: Logical name: User ID: Password: Aliases: Group: Other parameters: Test Connection < Back Next > Finish Cancel
11.	Click the **Test Connection** button.
12.	The AVM runs the code to test the connection. After the test completes successfully, click **OK**. If the connection does not succeed, you will need to investigate why it failed. Is the Database Server for the database running?  OpenEdge Database Connection Connection succeeded.
13.	Click **Next**. The Define a SQL connection window opens.
14.	Click **Next**. The Add SQL Connection Profile window opens. Here, retain the values that have been automatically set for you by the wizard. **Note**: The Database name specified must be in lower case. If the name has upper-case letters, you must modify them to be lower case.

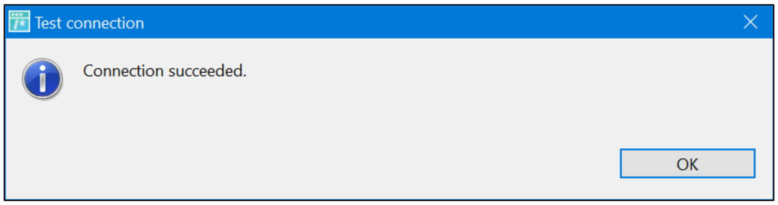

Add Connection Profile

Add SQL Connection Profile

If a User ID was specified, enter the valid password for the user ID.

Connection name: Sports3000DB
Driver: Progress OpenEdge JDBC Driver (DataDirect)
URL: jdbc:datadirect:openedge://localhost:50400;databaseName=sports3000.db
User ID: akhan
Password:
□ Open on Eclipse startup
☑ Auto-Login on connect
☑ URL details
URL details
Host name: localhost
○ Serv ● Port: 50400
Database name: sports3000.db
SQL parameters:

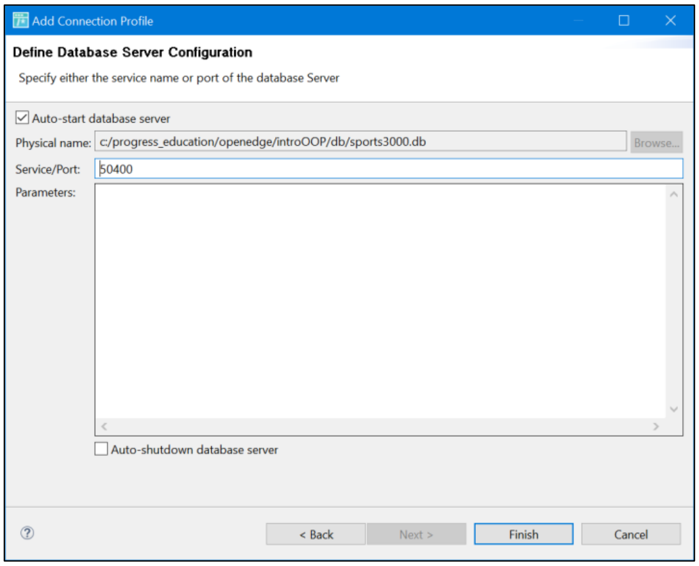
15. Click the **Test Connection** button. Then click **OK** when the connection succeeds.


Test connection

Connection succeeded.

16. Click Next.

17. In the Define Database Server Configuration page, retain the values and click **Finish**.

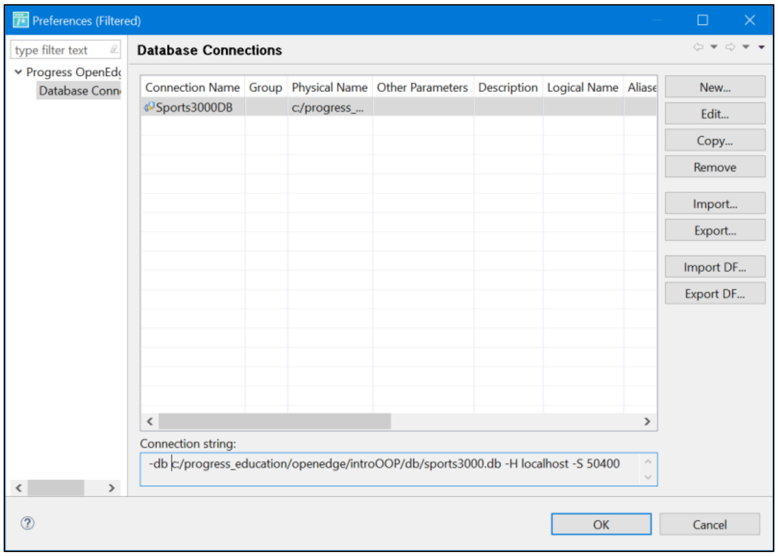

Add Connection Profile

Define Database Server Configuration

Specify either the service name or port of the database Server

☑ Auto-start database server
Physical name: c:/progress_education/openedge/introOOP/db/sports3000.db
Service/Port: 50400
Parameters:
□ Auto-shutdown database server

18. Back in the Database Connections window, click **OK**.



Database Connections

Connection Name	Group	Physical Name	Other Parameters	Description	Logical Name	Aliase
Sports3000DB		c/progress_...				

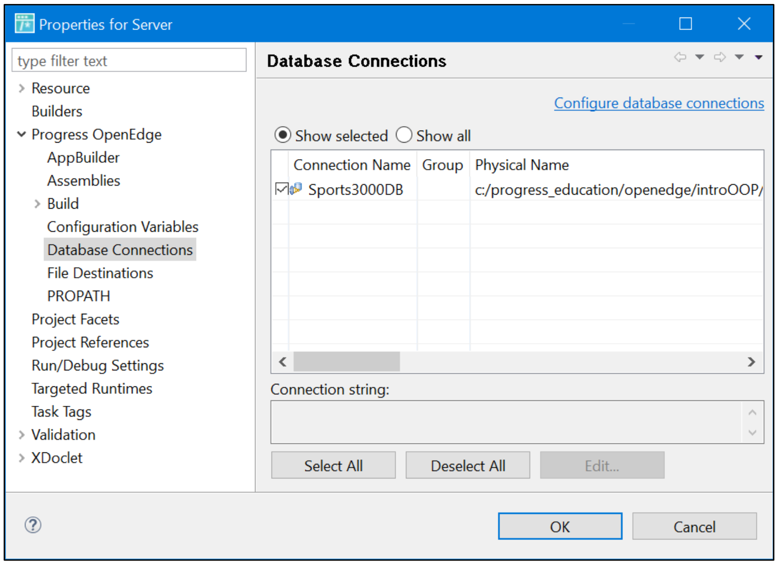
Connection string:

-db c:/progress_education/openedge/introOOP/db/sports3000.db -H localhost -S 50400

19. After the configuration is completed, the connection string is shown as:

-db c:/progress_education/openedge/introOOP/db/sports3000.db -H localhost -S 50400

20. Back in the Properties for the Server project, Database Connections window, select the Sports3000DB connection that you just created.



Database Connections

● Show selected ○ Show all

	Connection Name	Group	Physical Name
☑	Sports3000DB		c:/progress_education/openedge/introOOP/

Connection string:

21. Click **OK**.

<table>
<tr>
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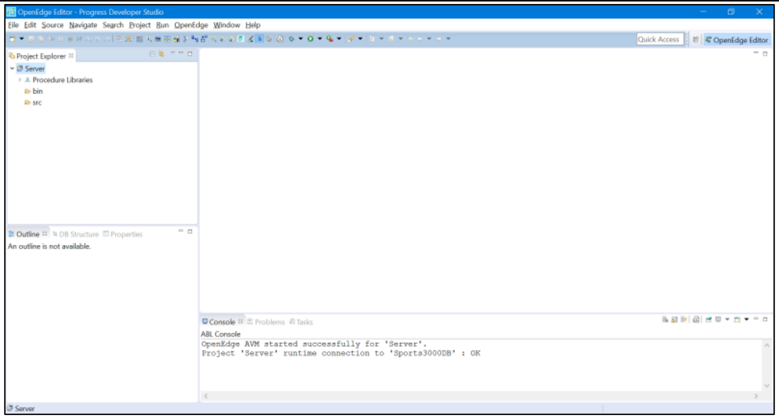
<td>


<pre>
OpenEdge AVM started successfully for 'Server'.
Project 'Server' runtime connection to 'Sports3000DB' : OK
</pre>
</td>
</tr>
</table>

Guided Exercise 1.1: Setting up your application development environment, Wrap-up

Exercise summary

You have set up your Developer Studio environment. You will use this environment to develop, debug, and test ABL code in the hands-on exercises of this course.

Notes

Try It 2.1: Defining classes

Overview

In this Try It, you will define data members, constructors, and methods for the *Emp* and *Dept* classes.

This exercise has 7 parts. The exercise steps take approximately 75 minutes to complete. You perform this exercise in your live version of Progress OpenEdge.

Before you begin

Before you begin, you must:

Step	Description
1.	Complete the Exercise Setup instructions, if you have not done so already.
2.	Complete the Guided Exercise 1.1.

Location of files:
Exercise files: **/progress_education/openedge/IntroOOP/Exercise/Lesson02**
Solution files: **/progress_education/openedge/IntroOOP/Solutions/Lesson02**

If at any time during this course, you need to restore your projects to match where you should have been prior to beginning a Try It, you can do the following:

1. Delete all projects in the workspace.
2. Import all projects in the archive (**.zip**) file for the previous Try It.
3. Ensure that Build Automatically is set for the workspace.

Part 1—Creating the Emp class

In this part of the Try It, you will create the *Emp* class. This class will contain data and functionality for an employee.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, in the Server project, create a new folder named **Enterprise** under the **src** folder.
2.	Under the **Enterprise** folder, create a new folder named **HR**.
3.	In Project Explorer, navigate to the **Enterprise/HR** directory.
4.	In this directory, create a class named *Emp*. This class will not have a destructor, but it will have a default constructor. **Hint**: Use the *New ABL class* wizard.

Part 2—Defining data members for the Emp class

Next, you will define the data members for the *Emp* class.

If you need help, view the Solution

Step	Task
1.	Define these properties that will be *public* with *private* setters: • *FirstName* as *character* • *LastName* as *character* • *JobTitle* as *character* • *EmpNum* as *integer* • *VacationHours* as *integer* **Hint**: Use the *Add Property* wizard.
2.	Define the *Address* property as *character*. It will be *public*.
3.	Define the *PostalCode* property as *character*. It will be *public* and will have an implementation for its setter.
4.	Define the *Phones* property as an array of size 3. It will be *public* and will have implementations for both of its accessors.
5.	Save your file. Ensure that it compiles without errors.

Part 3—Defining methods for the Emp class

Next, you will define the methods for the *Emp* class.

If you need help, view the Solution.

Step	Task
1.	Define the *public Initialize*() method, which returns *void*. The input parameters for this method will be values for each of the data members of the class.
2.	Define the *public SetVacationHours*() method, which returns *void*. It has a single *input* parameter, *pHours* of type *integer*
3.	Define the *public SetJobTitle*() method, which returns *void*. It has a single *input* parameter, *pJobTitle* of type *character*.
4.	Define the *public* method *GetInfo*(), which returns *character* and takes no parameters.
5.	Define the *private* method *GetName*(), which returns *character* and takes no parameters.
6.	Save your file. Ensure that it compiles without errors.

Part 4—Adding the include file for the ttEmployee temp-table

In this part of the Try It, you will create the *Dept* class. This class will contain data and functionality for a department.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, in the Server project, create a new folder named **Include** under the **src** folder.
2.	In this Include folder, import the ttEmployee.i file.

Part 5—Creating the Dept class

In this part of the Try It, you will create the *Dept* class. This class will contain data and functionality for a department.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, navigate to the **Enterprise/HR** directory.
2.	In this directory, create a class named *Dept*. This class will have a destructor. Also, specify the default constructor that you will later modify to take parameters. **Hint**: Use the *New ABL Class* wizard.

Part 6—Defining data members for the Dept class

Next, you will define the data members for the *Dept* class. The Dept class creates each of the Emp objects and populates the ttEmployee temp-table that represents the employees for the department.

If you need help, view the Solution.

Step	Task
1.	Define these properties that will be *public* with *private* setters: • *DeptName* as *character* • *DeptCode as character* • *ExpenseCode* as *character* • *NumEmployees as integer*
2.	Define the *private* temp-table by including the ttEmployee temp-table definition. **Hint**: Add this statement in the definitions part of the class: `{include/ttEmployee.i &ClassAccess = "private"}`
3.	Save your file. Ensure that it compiles without errors.

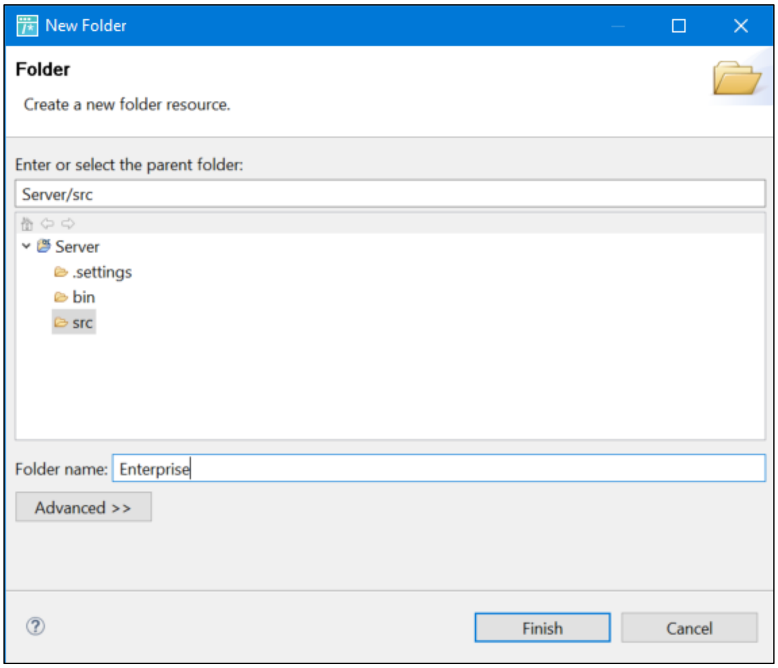
Part 7—Defining a constructor and methods for the Dept class

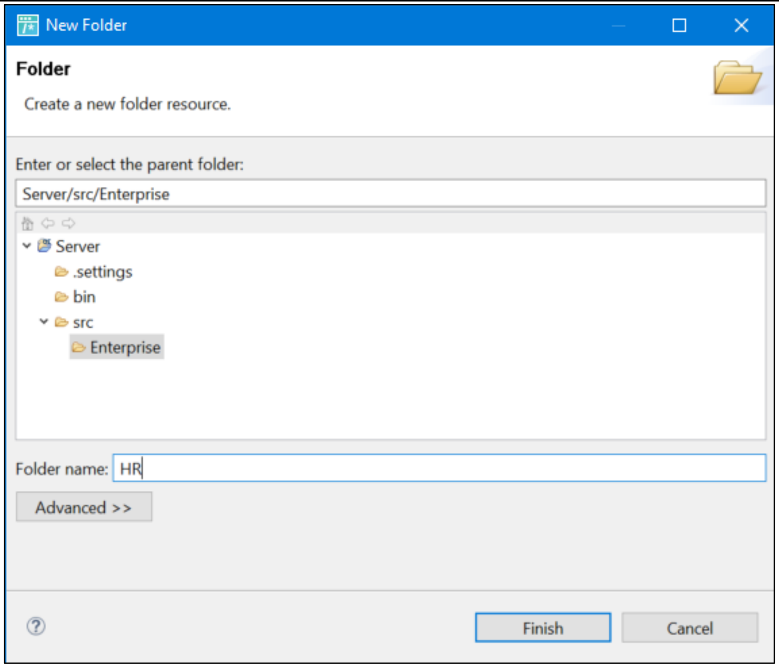
Next, you will modify the constructor and define the methods for the *Dept* class.

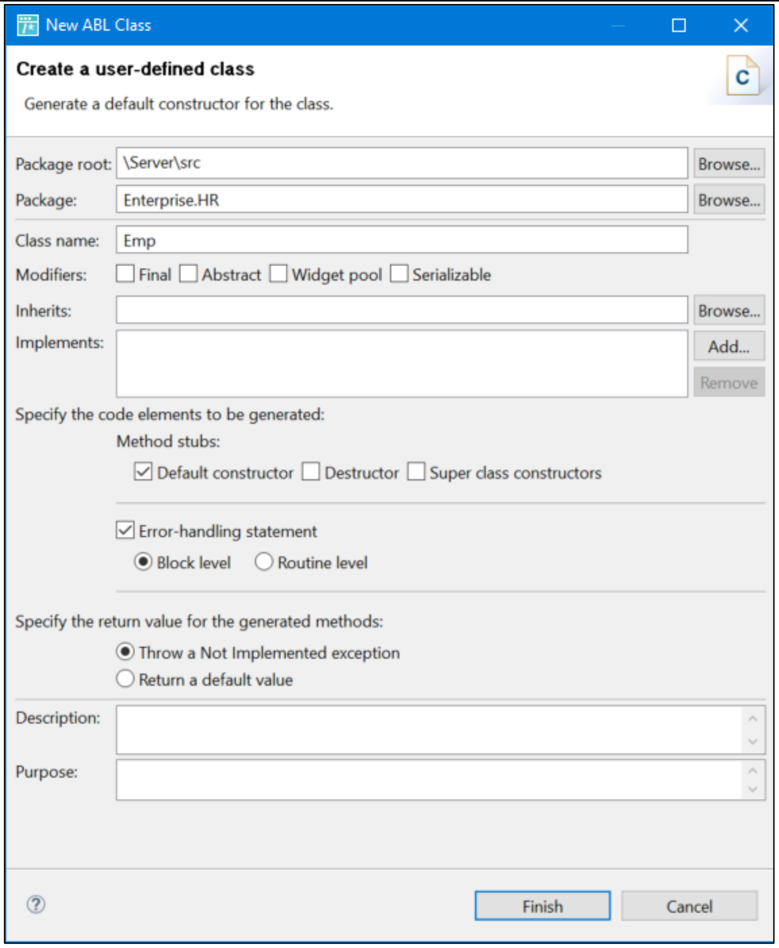
If you need help, view the Solution.

Step	Task
1.	Modify the default constructor to take as *input* parameters *pDeptName*, *pDeptCode*, and *pExpenseCode*.
2.	Since the Dept class uses instances of the Emp class, you must add a using statement for the Emp class at the beginning of the Dept class definition. Add this using statement as follows after the using Progress.Lang.* statement: `using Enterprise.Hr.Emp.` **Note**: You will learn more about using statements later in this lesson. Now, you will define the *public AddEmployee*() method that returns *void*. It takes a single *input* parameter, *pEmployee*, which is a reference to an *Emp* instance.
3.	Define the *public AddEmployee*() method that returns *void*. It has the same parameters you defined for the *Emp Initialize*() method. You will not be able to create this method with the Add Method wizard since there is already a method with the same name. Copy and paste the existing *AddEmployee*() method and then modify the parameters.
4.	Define the *public* method *GetEmployee*() that returns an *instance of Emp* and takes the first and last name parameters.
5.	Define the *public* method *GetEmployees*() that returns void, but has a ttEmployee table as an output parameter. **Hint**: The output table ttEmployee will be the parameter for this method. Having this as an output parameter, the entire ttEmployee temp-table is returned to the caller of this method.
6.	Save your file. Ensure that it compiles without errors.

Solution, Part 1—Creating the Emp class

Step	Solution instructions
1.	In Project Explorer, in the **Server** project, create a new folder named **Enterprise** under the **src** folder. a. Right-click **src**. b. Select **New** > **Folder**. c. Enter **Enterprise** for the Folder name.  Create a new folder resource. Enter or select the parent folder: Server/src Server .settings bin src Folder name: Enterprise d. Click **Finish**.
2.	Under the **Enterprise** folder, create a new folder named **HR**. a. Right-click **Enterprise**. b. Select **New** > **Folder**. c. Enter **HR** for the Folder name.

	 New Folder **Folder** Create a new folder resource. Enter or select the parent folder: Server/src/Enterprise Server .settings bin src Enterprise Folder name: HR Advanced >> Finish Cancel d. Click **Finish**.
3.	In Project Explorer, navigate to the **Enterprise/HR** directory.
4.	In this directory, create a class named *Emp*. This class will not have a destructor, but it will have a default constructor. **Hint**: Use the *New ABL class* wizard. a. Right-click **HR**. b. Select **New** > **ABL Class**. c. Enter **Emp** for the Class name. d. Select **Default constructor**. You can optionally add information to the description.



New ABL Class

Create a user-defined class

Generate a default constructor for the class.

Package root: \Server\src

Package: Enterprise.HR

Class name: Emp

Modifiers: □ Final □ Abstract □ Widget pool □ Serializable

Inherits:

Implements:

Specify the code elements to be generated:

Method stubs:

☑ Default constructor □ Destructor □ Super class constructors

☑ Error-handling statement

● Block level ○ Routine level

Specify the return value for the generated methods:

● Throw a Not Implemented exception

○ Return a default value

Description:

Purpose:

e. Click **Finish**. The **Emp.cls** file opens in the editor.

The generated file (without comments) should appear as follows:

```
using Progress.Lang.*.
block-level on error undo, throw.
class Enterprise.HR.Emp:
   constructor public Emp (  ):
      super ().
   end constructor.
end class.
```

Solution, Part 2—Defining data members for the Emp class

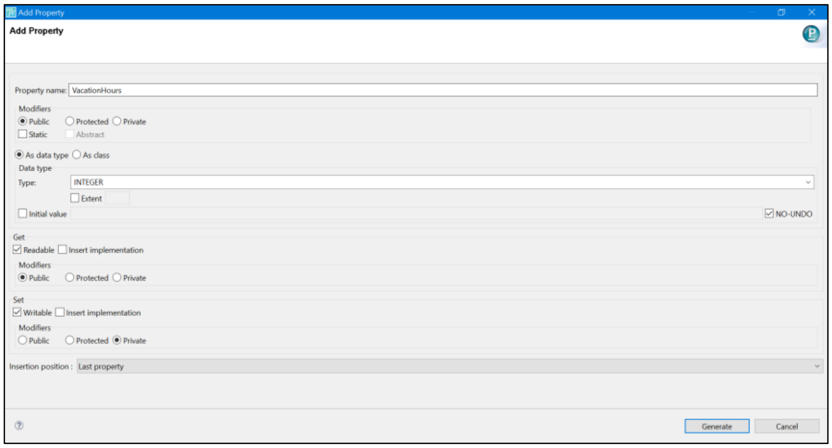
<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>

Define these properties that will be *public* with *private* setters:

- *FirstName* as *character*
- *LastName* as *character*
- *JobTitle* as *character*
- *EmpNum* as *integer*
- *VacationHours* as *integer*

Hint: Use the *Add Property* wizard.

a. In the editor, place the cursor anywhere in the source file.
b. **Right-click** and then select **Source** > **Add Property**. The Add Property wizard opens.
c. Enter **FirstName** for the Property name.
d. Select the **CHARACTER** data type for the property from the drop-down list.
e. Select **Private** for the Set accessor.
f. Select **Last property** for the insertion position.



Add Property

Property name: VacationHours

Modifiers: ● Public ○ Protected ○ Private
□ Static □ Abstract

● As data type ○ As class

Data type
Type: INTEGER
□ Extent
□ Initial value ☑ NO-UNDO

Get
☑ Readable □ Insert implementation
Modifiers: ● Public ○ Protected ○ Private

Set
☑ Writable □ Insert implementation
Modifiers: ○ Public ○ Protected ● Private

Insertion position : Last property

g. Click **Generate**.
Repeat these steps for the definition of the remaining properties, making sure you select the correct type for each property.

The generated code (without comments) should appear as follows:

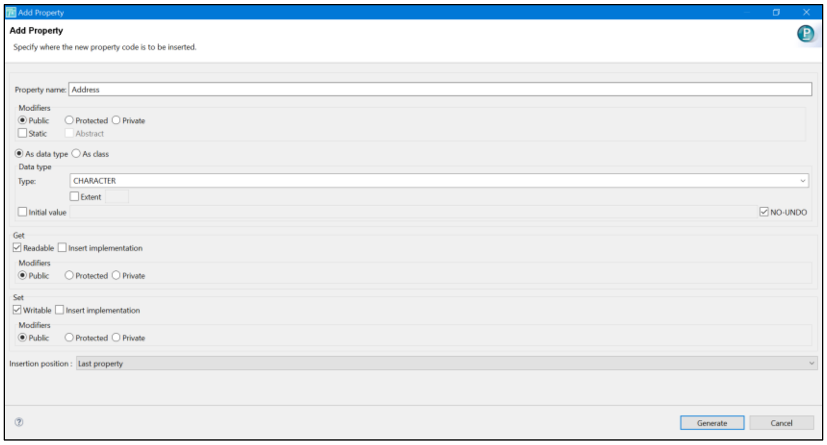
```
define public property FirstName as character no-undo
       get.
       private set.
define public property LastName as character no-undo
    get.
    private set.

define public property JobTitle as character no-undo
```

</td></tr>
</table>

```
       get.
       private set.
define public property EmpNum as integer no-undo
    get.
   private set.

define public property VacationHours as integer no-undo
    get.
    private set.
```

2. Define the *Address* property as *character*. It will be *public*.

a. In the editor, place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Property**. The Add Property wizard opens.
c. Enter **Address** for the Property name.
d. Select the **CHARACTER** data type for the property from the drop-down list.
e. Select **Last property** for the insertion position.



Add Property

Specify where the new property code is to be inserted.

Property name: Address

Modifiers
● Public ○ Protected ○ Private
□ Static □ Abstract

● As data type ○ As class

Data type
Type: CHARACTER
□ Extent
□ Initial value ☑ NO-UNDO

Get
☑ Readable □ Insert implementation
Modifiers
● Public ○ Protected ○ Private

Set
☑ Writable □ Insert implementation
Modifiers
● Public ○ Protected ○ Private

Insertion position : Last property

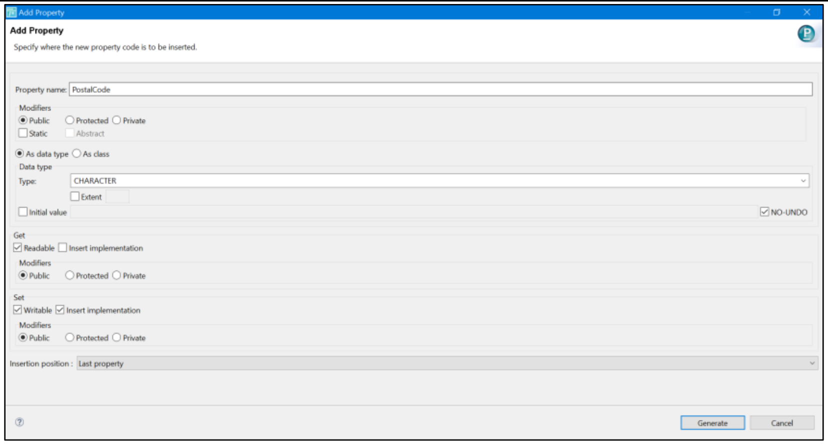
f. Click **Generate**.

The generated code should appear as follows:

```
define public property Address as character no-undo
  get.
  set.
```

3. Define the *PostalCode* property as *character*. It will be *public* and will have an implementation for its setter.

a. In the editor, place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Property**. The Add Property wizard opens.
c. Enter **PostalCode** for the Property name.
d. Select the **CHARACTER** data type for the property from the drop-down list.
e. Select **Insert implementation** for the Set accessor.
f. Select **Last property** for the insertion position.



Add Property

Specify where the new property code is to be inserted.

Property name: PostalCode

Modifiers: ● Public ○ Protected ○ Private

□ Static □ Abstract

● As data type ○ As class

Data type

Type: CHARACTER

□ Extent

□ Initial value ☑ NO-UNDO

Get: ☑ Readable □ Insert implementation

Modifiers: ● Public ○ Protected ○ Private

Set: ☑ Writable ☑ Insert implementation

Modifiers: ● Public ○ Protected ○ Private

Insertion position : Last property

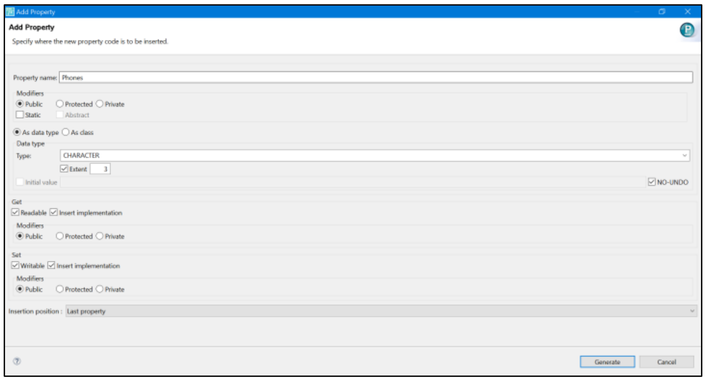
g. Click **Generate**.

The generated code should be as follows:

```
define public property PostalCode as character no-undo
  get.
  set(input arg as character):
end set.
```

4. Define the *Phones* property as an array of size 3. It will be *public* and have implementations for both of its accessors.

a. In the editor, place the cursor anywhere in the source code.
b. Right-click and then select **Source** > **Add Property**. The Add Property wizard opens.
c. Enter **Phones** for the Property name.
d. Select the **CHARACTER** data type for the property from the drop-down list.
e. Select **Extent** and then enter **3 i**n the box for the size.
f. Select **Insert implementation** for the Get accessor.
g. Select **Insert implementation** for the Set accessor.
h. Select **Last property** for the insertion position.



Add Property

Specify where the new property code is to be inserted.

Property name: Phones

Modifiers: ● Public ○ Protected ○ Private

□ Static □ Abstract

● As data type ○ As class

Data type

Type: CHARACTER

☑ Extent 3

□ Initial value ☑ NO-UNDO

Get: ☑ Readable ☑ Insert implementation

Modifiers: ● Public ○ Protected ○ Private

Set: ☑ Writable ☑ Insert implementation

Modifiers: ● Public ○ Protected ○ Private

Insertion position : Last property

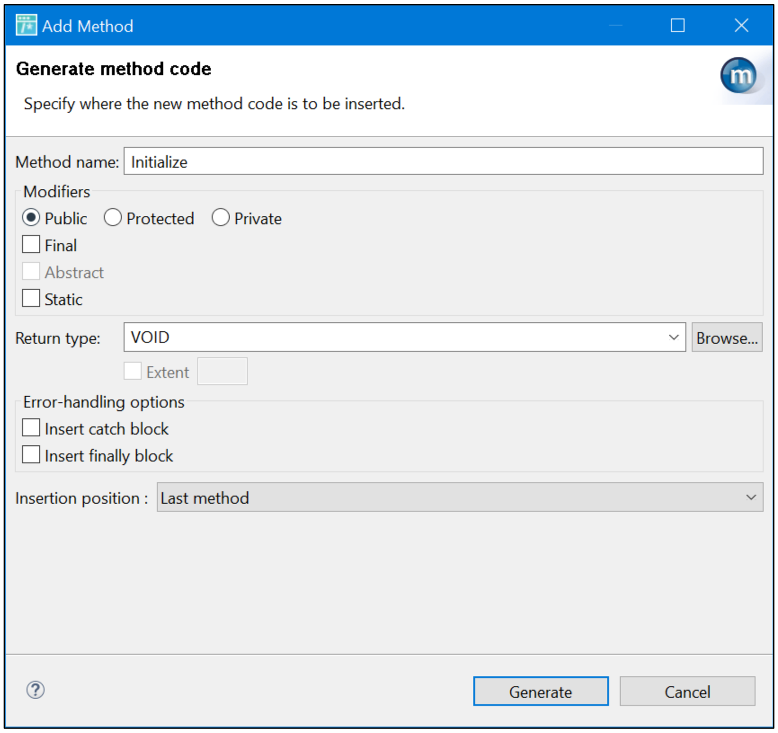
i. Click **Generate**.

The generated code should be as follows:

```
define public property Phones as character extent 3 no-undo
get(input idx as integer):
   return Phones[idx].
end get.
private set(input arg as character, input idx as integer):
   Phones[idx] = arg.
end set.
```

5.	Save your file. Ensure that it compiles without errors.

Solution, Part 3—Defining methods for the Emp class

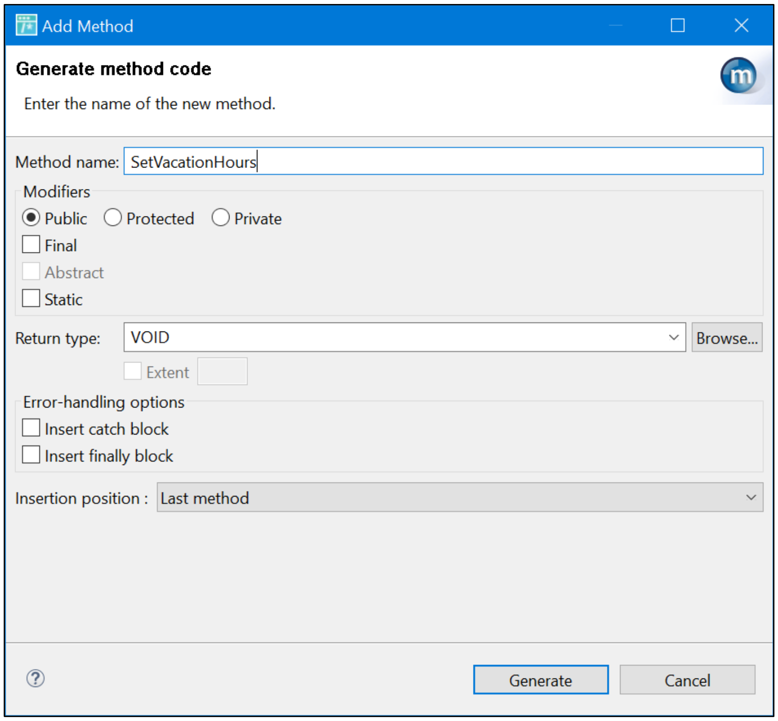
Step	Solution instructions
1.	Define the public *Initialize*() method, which returns *void*. The *input* parameters for this method will be values for each of the data members of the class. a. Place the cursor anywhere in the source file. b. Right-click and then select **Source** > **Add Method**. c. Enter **Initialize** for the method name. d. Select **Last method** for the insertion position.  Add Method **Generate method code** Specify where the new method code is to be inserted. Method name: Initialize Modifiers ● Public ○ Protected ○ Private □ Final □ Abstract □ Static Return type: VOID Browse... □ Extent Error-handling options □ Insert catch block □ Insert finally block Insertion position : Last method Generate Cancel e. Click **Generate**. You can enter information in the comment that precedes the method, or you can delete it. f. Modify the code in OpenEdge Editor to include the parameters for this method that correspond to the properties of this class. The definition of this method should be as follows:

```
method public void Initialize(input pEmpNum as integer,
                  input pFirstName as character,
                  input pLastName as character,
                  input pAddress as character,
                  input pPostalCode as character,
                  input pPhones as character extent 3,
                  input pVacationHours as integer,
                  input pJobTitle as character  ):
```

```
   return.
end method.
```

2. Define the *public SetVacationHours*() method, which returns *void*. It has a single *input* parameter, *pHours* of type *integer*.

a. Place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Method**.
c. Enter **SetVacationHours** for the method name.
d. Select **Last method** for the insertion position.



Method name: SetVacationHours

Modifiers

● Public ○ Protected ○ Private

□ Final

□ Abstract

□ Static

Return type: VOID

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

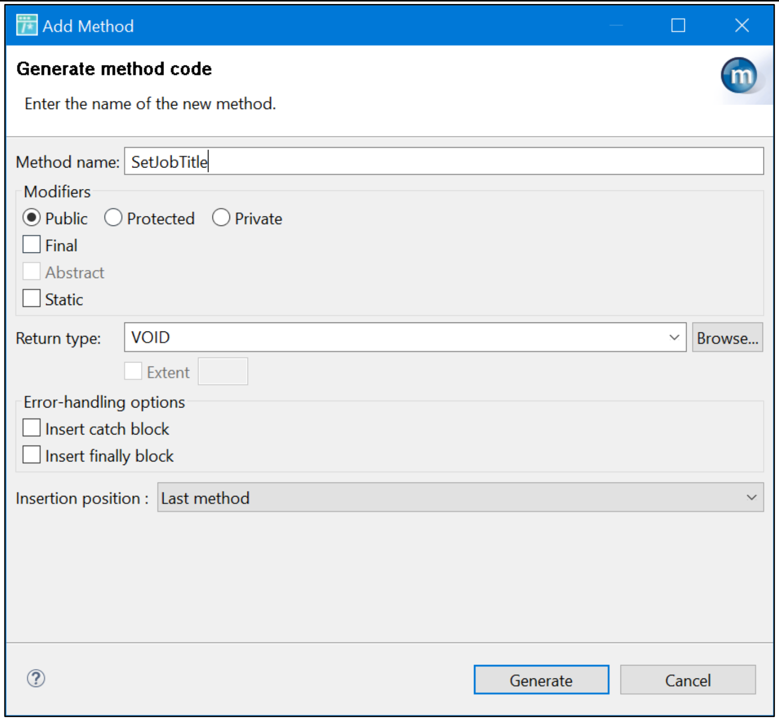
Insertion position : Last method

e. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.
f. Enter the parameter as:

```
method public void SetVacationHours(input pHours as
integer):
return.
end method.
```

3. Define the *public SetJobTitle*() method, which returns *void*. It has a single *input* parameter, *pJobTitle*, of type *character*.

a. Place the cursor cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Method**.
c. Enter **SetJobTitle** for the method name.
d. Select **Last method** for the insertion position.



Enter the name of the new method.

Method name: SetJobTitle

Modifiers

● Public ○ Protected ○ Private

□ Final

□ Abstract

□ Static

Return type: VOID Browse...

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

Insertion position : Last method

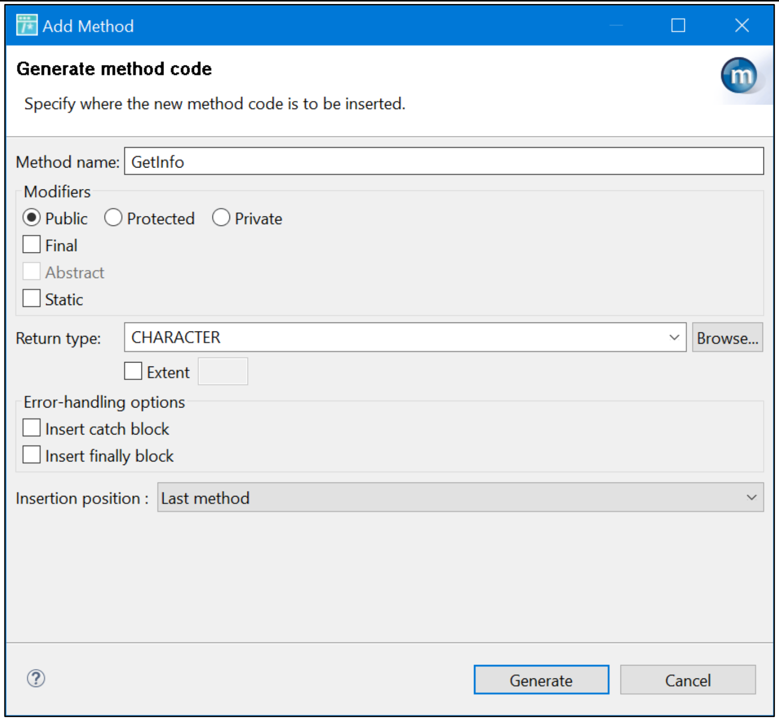
e. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.

f. Enter the parameter as:

```
method public void JobTitle(input pJobTitle as
character):
return.
end method.
```

4. Define the *public* method *GetInfo*(), which returns *character* and takes no parameters.

a. Place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Method**.
c. Enter **GetInfo** for the method name.
d. Select the return type of **character**.
e. Select **Last method** for the insertion position.



Add Method

Generate method code

Specify where the new method code is to be inserted.

Method name: GetInfo

Modifiers

● Public ○ Protected ○ Private

□ Final

□ Abstract

□ Static

Return type: CHARACTER

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

Insertion position : Last method

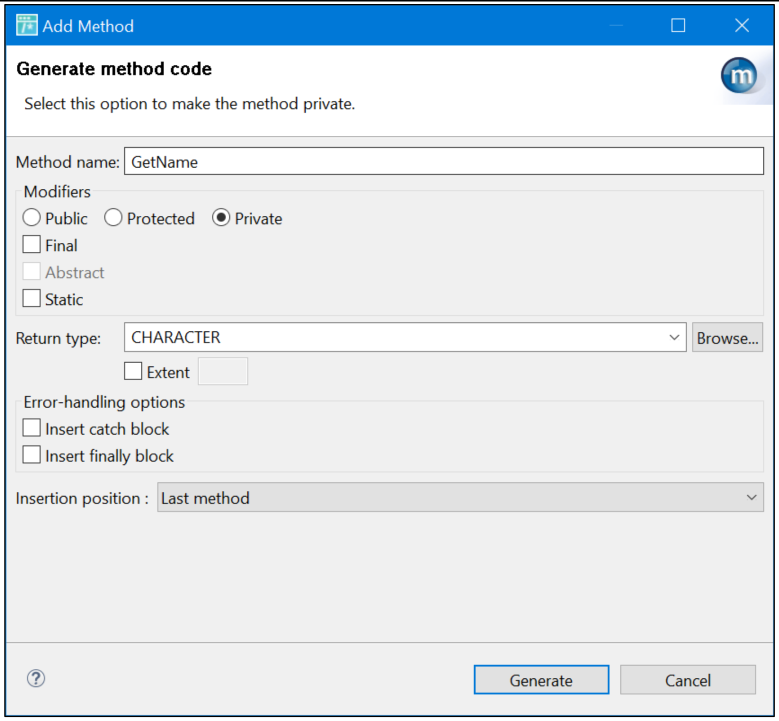
f. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.

The code should appear as follows:

```
method public character GetInfo():
   define variable result as character no-undo.
   return result.
end method.
```

5. Define the *private* method *GetName*(), which returns *character* and takes no parameters.

a. Place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Method**.
c. Enter **GetName** for the method name.
d. Select **Private** for the modifier.
e. Select the return type as **character**.
f. Select **Last method** for the insertion position.



Generate method code

Select this option to make the method private.

Method name: GetName

Modifiers

○ Public ○ Protected ● Private

□ Final

□ Abstract

□ Static

Return type: CHARACTER

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

Insertion position : Last method

g. Click **Generate**.

You can enter information in the comment that precedes the method, or you can delete it.

The code should appear as follows:

```
method private character GetName():
   define variable result as character no-undo.
   return result.
end method.
```

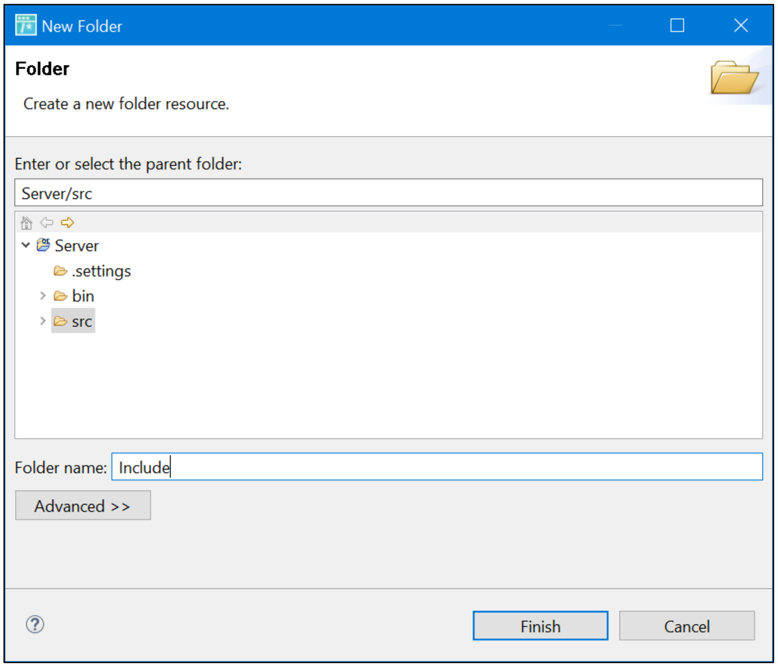
6. Save your file. Ensure that it compiles without errors.

Solution, Part 4—Adding the include file for the ttEmployee temp-table

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>

In Project Explorer, in the **Server** project, create a new folder named **Include** under the **src** folder.

a. Right-click **src**.
b. Select **New** > **Folder**.
c. Enter **Include** for the Folder name.


New Folder
Folder
Create a new folder resource.
Enter or select the parent folder:
Server
.settings
bin
src
Advanced >>
Finish
Cancel

Server/src

Folder name: Include

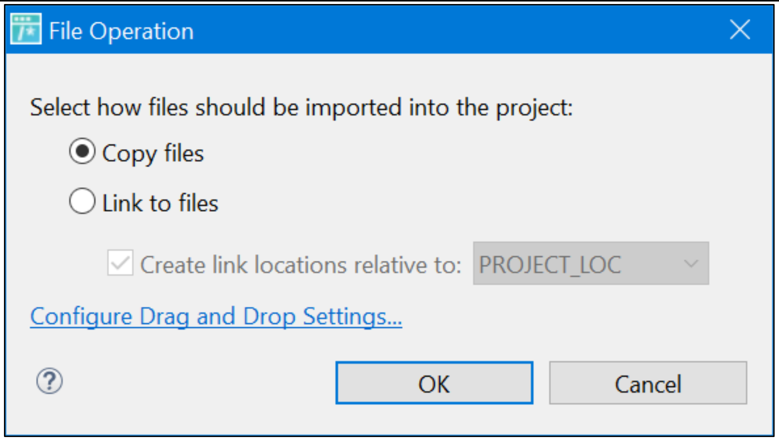
d. Click **Finish**.

</td></tr>
<tr><td>2.</td><td>

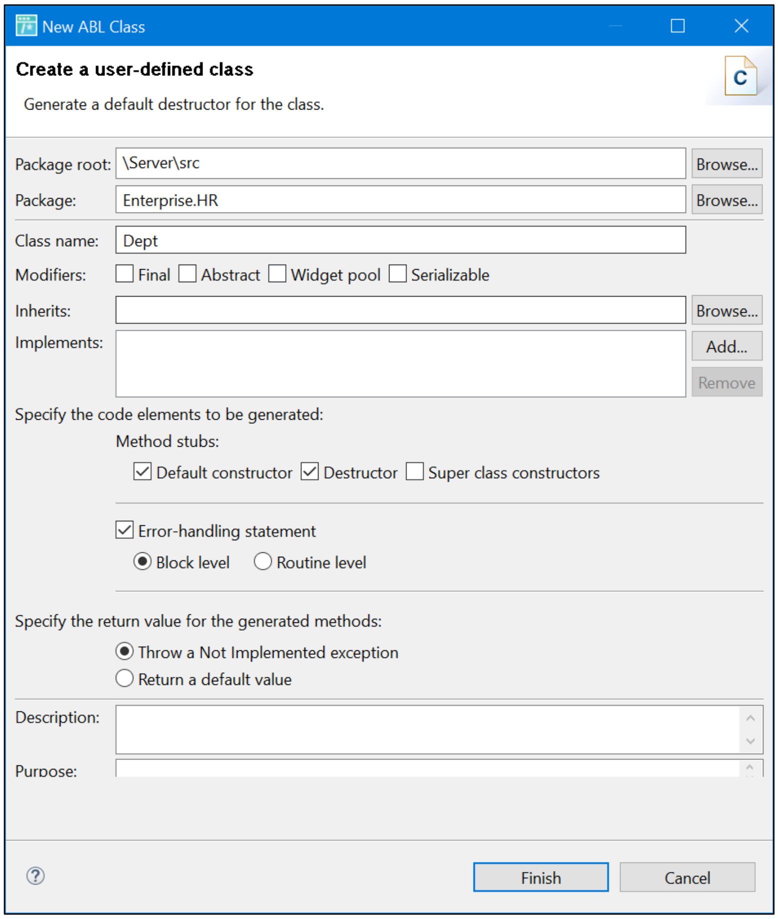
In this **Include** folder, import the **ttEmployee.i** file.

a. In Windows Explorer, navigate to the **C:/progress_education/OpenEdge/introOOP /Exercise/Lesson02** directory and select the **ttEmployee.i** file.
b. Drag and drop the **ttEmployee.i** file into the **Include** folder.
c. Ensure that **Copy files** is selected.

</td></tr>
</table>

	 File Operation Select how files should be imported into the project: ● Copy files ○ Link to files ☑ Create link locations relative to: PROJECT_LOC Configure Drag and Drop Settings... OK Cancel d. Click **OK**.

Solution, Part 5—Creating the Dept class

Step	Solution instruction
1.	In Project Explorer, navigate to the **Enterprise/HR** directory.
2.	In this directory, create a class named *Dept*. This class will have a destructor. Also, specify the default constructor that you will later modify to take parameters. **Hint**: Use the *New ABL Class* wizard. a. Select **Enterprise/HR**. b. Right-click **HR**. c. Select **New** > **ABL Class**. d. Enter **Dept** for the Class name. e. Select **Default constructor**. f. Select **Destructor**.  New ABL Class **Create a user-defined class** Generate a default destructor for the class. Package root: \Server\src Browse... Package: Enterprise.HR Browse... Class name: Dept Modifiers: □ Final □ Abstract □ Widget pool □ Serializable Inherits: Browse... Implements: Add... Remove Specify the code elements to be generated: Method stubs: ☑ Default constructor ☑ Destructor □ Super class constructors ☑ Error-handling statement ● Block level ○ Routine level Specify the return value for the generated methods: ● Throw a Not Implemented exception ○ Return a default value Description: Purpose: Finish Cancel You can optionally add information to the description. g. Click **Finish**. The **Dept.cls** file opens in the editor. The generated code should be as follows:

```
using Progress.Lang.*.

block-level on error undo, throw.

class Enterprise.HR.Dept:

   constructor public Dept ():
      super ().
   end constructor.

   destructor public Dept ( ):

   end destructor.

end class.
```

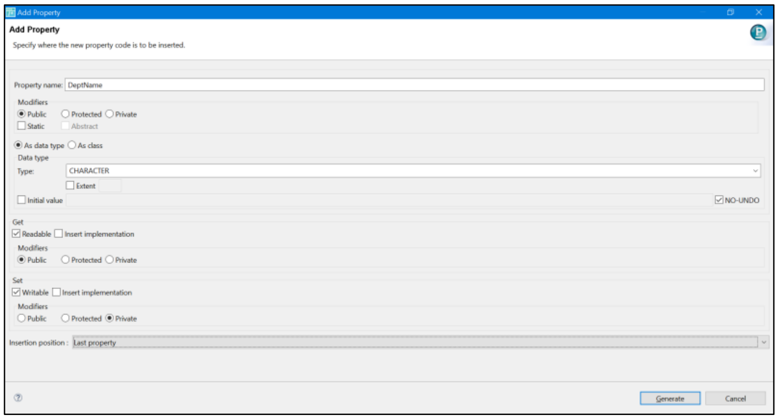
Solution, Part 6—Defining data members for the Dept class

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>

Define these properties which will be *public* with *private* setters:

- *DeptName* as *character*
- *DeptCode as character*
- *ExpenseCode* as *character*
- *NumEmployees as integer*

a. In the editor, place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Property**. The Add Property wizard opens.
c. Enter **DeptName** for the Property name.
d. Select the **CHARACTER** data type for the property from the drop-down list.
e. Select **Private** for the Set accessor.
f. Select **Last property** for the insertion position.



Add Property

Specify where the new property code is to be inserted.

Property name: DeptName

Modifiers
● Public ○ Protected ○ Private
□ Static □ Abstract

● As data type ○ As class

Data type
Type: CHARACTER
□ Extent
□ Initial value ☑ NO-UNDO

Get
☑ Readable □ Insert implementation
Modifiers
● Public ○ Protected ○ Private

Set
☑ Writable □ Insert implementation
Modifiers
○ Public ○ Protected ● Private

Insertion position : Last property

g. Click **Generate**.
h. Repeat these steps for the other properties.

The code should be as follows:

```
define public property DeptName as character no-undo
  get.
  private set.
define public property DeptCode as character no-undo
  get.
  private set.

define public property ExpenseCode as character no-undo
  get.
  private set.

define public property NumEmployee as
integer no-undo
get.
```

</td></tr>
</table>

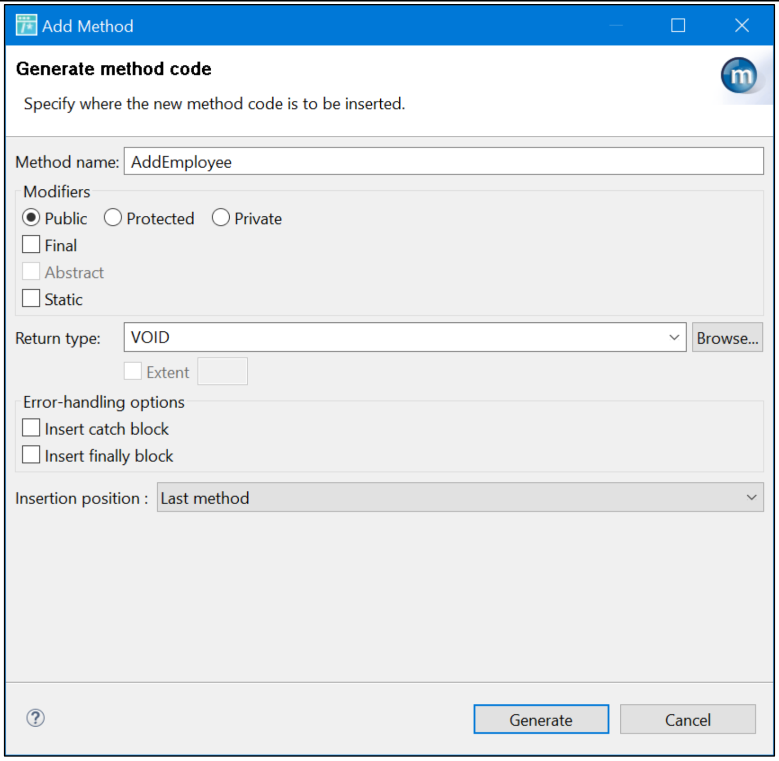
	`private set.`
2.	Define the *private* temp-table by including the ttEmployee temp-table definition. a. In the editor, place the cursor at a blank line before the constructor. b. Add this code to the class file: `{include/ttEmployee.i &ClassAccess = "private"}`
3.	Save your file. Ensure that it compiles without errors.

Solution, Part 7—Defining a constructor and methods for the Dept class

Step	Solution instruction

1.	Modify the default constructor to take as *input* parameters *pDeptName*, *pDeptCode*, and *pExpenseCode*.
	a. Place your cursor in the parameters area for the constructor.
	b. Add code for these parameters:
	`constructor public Dept(input pDeptName as character,`
	`input pDeptCode as character,`
	`input pExpenseCode as character):`
	`super ().`
	`end constructor.`

2.	Since the Dept class uses instances of the Emp class, you must add a using statement for the Emp class at the beginning of the Dept class definition. Add this using statement as follows after the using Progress.Lang.* statement: `using Enterprise.Hr.Emp.` **Note**: You will learn more about using statements later in this lesson. Now, you will define the *public AddEmployee*() method, that returns *void*. It takes a single *input* parameter, *pEmployee*, which is a reference to an *Emp* instance. a. Place the cursor anywhere in the source code. b. Right-click and then select **Source** > **Add Method**. c. Enter **AddEmployee** for the method name. d. Select **Last method** for the insertion position.



Add Method

Generate method code

Specify where the new method code is to be inserted.

Method name: AddEmployee

Modifiers

● Public ○ Protected ○ Private

□ Final

□ Abstract

□ Static

Return type: VOID Browse...

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

Insertion position : Last method

Generate Cancel

e. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.

f. Enter the parameter as:

```
method public void AddEmployee(input pEmployee as Emp):
return.
end method.
```

3. Define the *public AddEmployee*() method, which returns *void*. It has the same parameters you defined for the *Employee Initialize*() method. You will not be able to create this method with the Add Method wizard since there is already a method with the same name. Copy and paste the existing *AddEmployee*() method and then modify the parameters.

a. Select all the code in the *AddEmployee*() method and select copy.

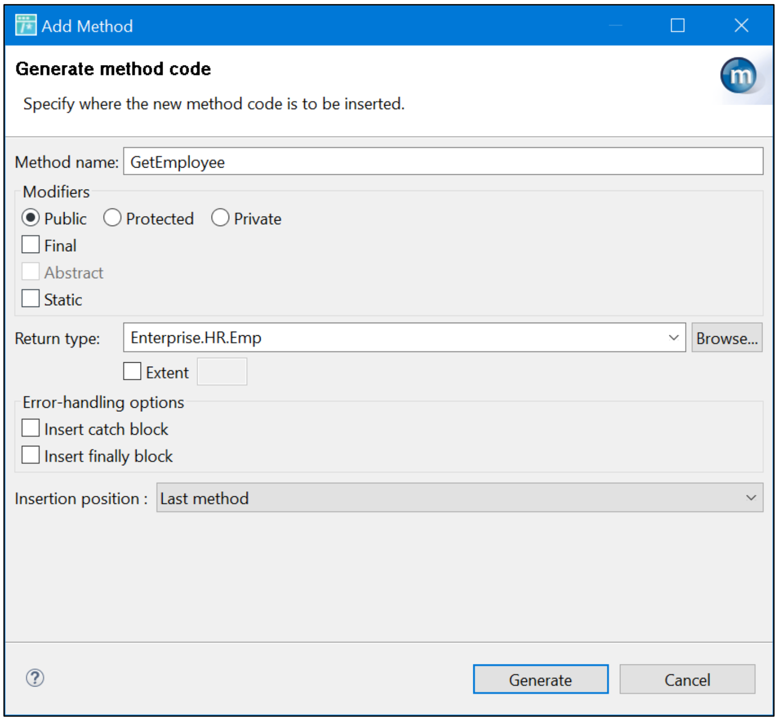
b. Paste the code below the existing *AddEmployee*() method. You will see an error, because the methods are defined twice.

c. Delete what is currently in the parameter area and enter the parameters as:

```
method public void AddEmployee(input pEmpNum as integer,
input pFirstName as character,
input pLastName as character,
input pAddress as character,
input pPostalCode as character,
input pPhones as character extent 3,
input pVacationHours as integer,
input pJobTitle as character):
return.
end method.
```

4. Define the *public* method *GetEmployee*() that returns an *instance of Emp* and takes the first and last name parameters.

a. Place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Method**.
c. Enter **GetEmployee** for the method name.
d. Select Browse and select the Enterprise.HR.Emp class.
e. Select **Last method** for the insertion position.



Generate method code

Specify where the new method code is to be inserted.

Method name: GetEmployee

Modifiers
● Public ○ Protected ○ Private
□ Final
□ Abstract
□ Static

Return type: Enterprise.HR.Emp
□ Extent

Error-handling options
□ Insert catch block
□ Insert finally block

Insertion position : Last method

f. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.
g. Add code for the input parameters.

The code should appear as follows. You can change Enterprise.Hr.Emp to simply Emp since you defined the using statement earlier.

```
method public Emp GetEmployee
(input pFirstName as character,
input pLastName as character):
define variable result as Emp
return.
end method.
```

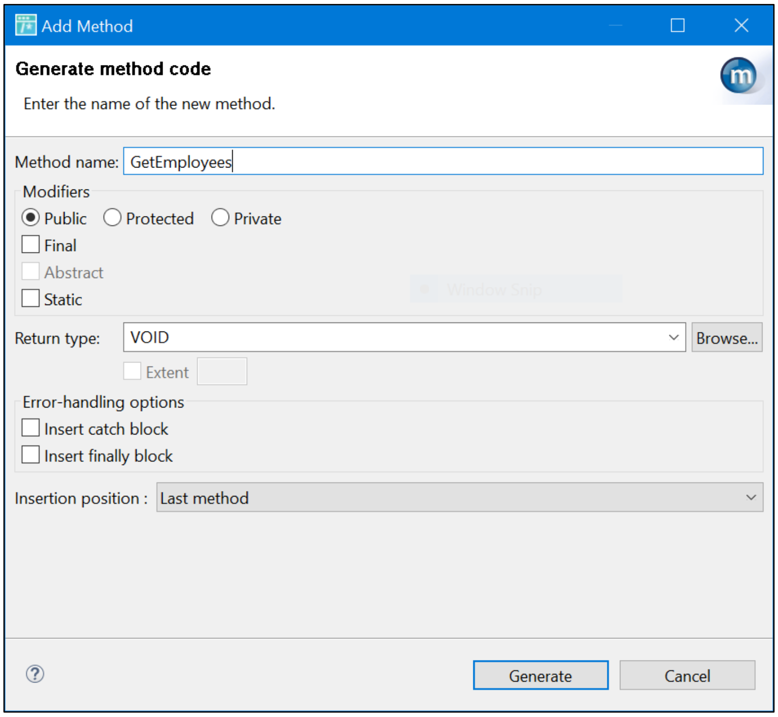
5. Define the *public* method *GetEmployees*() that returns void, but has a ttEmployee table as an output parameter.

Hint: The output table ttEmployee will be the parameter for this method. Having this as an output parameter, the entire ttEmployee temp-table is returned to the caller of this method.

a. Place the cursor anywhere in the source file.
b. Right-click and then select **Source** > **Add Method**.
c. Enter **GetEmployees** for the method name.

d. Select the return type **Void**.

e. Select **Last method** for the insertion position.



Add Method

Generate method code

Enter the name of the new method.

Method name: GetEmployees

Modifiers

● Public ○ Protected ○ Private

□ Final

□ Abstract

□ Static

Return type: VOID

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

Insertion position : Last method

f. Click **Generate**.

g. Add the parameter information, which is output table ttEmployee.

You can enter information in the comment that precedes the method, or you can delete it.

The code should be as follows:

```
method public void GetEmployees(output table ttEmployee):
   end method.
```

6. Save your file. Ensure that it compiles without errors.

Try It 2.1: Defining classes, Wrap-up

Exercise summary

In this Try It, you defined data members, constructors, and methods for the *Emp* and *Dept* classes.

Notes

Try It 2.2: Working with Classes

Overview

Now that you have learned some basics about developing code for the constructors, methods, and destructor for a class, you will implement the *Emp* and *Dept* classes.

This exercise has 2 parts. The exercise steps take approximately 1 hour to complete. You perform this exercise in your live version of Progress OpenEdge.

Before you begin

Before you begin, you must complete the steps for Try It 2.1.

Location of files:
Exercise files: **/progress_education/openedge/IntroOOP/Exercise/Lesson02**
Solution files: **/progress_education/openedge/IntroOOP/Solutions/Lesson02**

If at any time during this course, you need to restore your projects to match where you should have been prior to beginning a Try It, you can do the following:

1. Delete all projects in the workspace.
2. Import all projects in the archive (**.zip**) file for the previous Try It.
3. Ensure that Build Automatically is set for the workspace.

Part 1—Implementing the methods for the Emp class

In this part of the Try It, you add code to methods of the class that you have already defined.

If you need help, view the Solution.

Step	Task
1.	Implement the code for the *Initialize*() method. Assign the value of the *input* parameter to each of the data members. **Hint**: Use *Phones*[x] = *pPhones*[x] to initialize the three elements of the *Phoners* array.
2.	Implement the *SetVacationHours*() method to set *VacationHours* with the *input* parameter.
3.	Implement the *SetJobTitle*() method to set *JobTitle* with the *input* parameter.
4.	Implement the *GetInfo*() method as follows: • Set the value of *result* to be a concatenation of the value returned from *GetName*(), *Address*, *PostalCode*, *JobTitle*, and the *string* value for *VacationHours*
5.	Implement the *GetName*() method by returning the concatenation of *FirstName* and *LastName*.
6.	Save your file. Ensure that it compiles with no errors.

Part 2—Implementing the methods for the Dept class

Unlike the *Emp* class that uses the default constructor and then uses the *Initialize*() method to initialize, for the *Dept* class, all instance initialization is performed in the constructor. In addition, the constructor retrieves employee data from the database to create all of the Emp instances and populate the ttEmployee temp-table. Next, you will add code to the constructor and the methods of the *Dept* class.

If you need help, view the Solution.

Step	Task
1.	Add code to the constructor to: • Set *DeptName* from the *input* parameter. • Set *ExpenseCode* from the *input* parameter. • Set *DeptCode* from the *input* parameter.
2.	Implement the *AddEmployee*() method that takes the parameter with type *Emp* to perform the following: • Create a ttEmployee record. • Set the values of the ttEmployee record from the input parameter. • Increment NumEmployees by 1.
3.	Implement the *AddEmployee*() method, which takes multiple parameters that can be used to create an *Emp* instance as follows: • Define a variable named *Empl* of type *Emp*. • Create an *Employee* instance assigning it to *Empl*. • Call the *Initialize*() method using *Empl*, providing the parameters from the *input* to this method • Create a ttEmployee record • Set the values of the ttEmployee record from the input parameters and the Emp instance. • Increment NumEmployees by 1.
4.	Implement the *GetEmployee*() method to return the reference to the *Emp* instance using the *input* to this method. Add code to the *GetEmployee*() method to find an employee based on the first and last name in the ttEmployee temp-table. If an employee is found, it should cast the EmpRef field and return the Emp instance. If an employee is not found, it should return unknown. **Hint**: You will need to cast the temp-table field ttEmployee.EmpRef to the type Emp.
5.	Add code to the destructor for the class to delete all ttEmployee records and delete their corresponding Emp objects. **Hint**: You will need to cast the temp-table field ttEmployee.EmpRef to the type Emp in order to call the Emp destructor.
6.	Note that you need not implement the GetEmployees() method. The ABL will automatically return the ttEmployee temp-table. Save your file. Ensure that it compiles without error.

Solution, Part 1—Implementing the methods of the Emp class

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>Implement the code for the <i>Initialize</i>() method. Assign the value of the <i>input</i> parameter to each of the data members.
<b>Hint</b>: Use <i>Phones</i>[x] = <i>pPhones</i>[x] to initialize the three elements of the <i>Phones</i> array.
Add this code to the method:
<pre>
assign
          EmpNum = pEmpNum
          FirstName = pFirstName
          LastName = pLastName
          Address = pAddress
          PostalCode = pPostalCode
          Phones[1] = pPhones[1]
          Phones[2] = pPhones[2]
          Phones[3] = pPhones[3]
          VacationHours = pVacationHours
          JobTitle = pJobTitle
        .
</pre></td></tr>
<tr><td>2.</td><td>Implement the <i>SetVacationHours</i>() method to set <i>VacationHours</i> with the <i>input</i> parameter.
Add this code to the method:
<pre>
VacationHours = pHours.
</pre></td></tr>
<tr><td>3.</td><td>Implement the <i>SetJobTitle</i>() method to set <i>JobTitle</i> with the <i>input</i> parameter.
Add this code to the method:
<pre>
JobTitle = pJobTitle.
</pre></td></tr>
<tr><td>4.</td><td>Implement the <i>GetInfo</i>() method as follows:
• Set the value of <i>result</i> to be a concatenation of the value returned from <i>GetName</i>(), <i>Address</i>, <i>PostalCode</i>, <i>JobTitle</i>, and the <i>string</i> value for <i>VacationHours</i>
Add this code to the method before <i>result</i> is returned:
<pre>
result = GetName() + " " +
           Address + " " + PostalCode + " " +
          "Job Title: " + JobTitle + " " +
          "Vacation Hours: " + string(VacationHours).
</pre></td></tr>
</table>

5.	Implement the *GetName*() method by returning the concatenation of *FirstName* and *LastName*. Add this code to the method before *result* is returned: `result = FirstName + " " + LastName.`
6.	Save your file. Ensure that it complies with no errors.

Solution, Part 2—Implementing the methods for the Dept class

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>

Add code to the constructor to:

- Set *DeptName* from the *input* parameter.
- Set *ExpenseCode* from the *input* parameter.
- Size the *Employees* array using the *input* parameter.

Add this code to the constructor after the call to *super*():

```
assign
   DeptName = pDeptName
   DeptCode = pDeptCode
   ExpenseCode = pExpenseCode
   .
```

</td></tr>
<tr><td>2.</td><td>

Implement the *AddEmployee*() method that takes the parameter with type *Emp* to perform the following:

- Create a ttEmployee record.
- Set the values of the ttEmployee record from the input parameter.
- Increment NumEmployees by 1.

Add this code to the method:

```
create ttEmployee.
assign
  ttEmployee.FirstName = pEmployee:FirstName
  ttEmployee.LastName =
      pEmployee:LastName
  ttEmployee.EmpRef = pEmployee
  NumEmployees = NumEmployees + 1   .
```

</td></tr>
<tr><td>3.</td><td>

Implement the *AddEmployee*() method that takes multiple parameters that can be used to create an *Emp* instance as follows:

- Define a variable named *Empl* of type *Emp*.
- Create an *Emp* instance assigning it to *Empl*.
- Call the *Initialize*() method using *Empl*, providing the parameters from the *input* to this method
- Create a ttEmployee record.
- Set the values of the ttEmployee record from the input parameters and the Emp instance.
- Increment NumEmployees by 1.

Add this code to the method:

```
define variable Empl as Emp no-undo.
```

</td></tr>
</table>

```
Empl = new Emp().
Empl:Initialize(pEmpNum, pFirstName, pLastName,
               pAddress, pPostalCode, pPhones,
               pVacationHours, pJobTitle).
create ttEmployee.
assign
   ttEmployee.FirstName = pFirstName
ttEmployee.LastName = pLastName
ttEmployee.EmpRef = Empl
NumEmployees = NumEmployees + 1
.
```

4. Implement the *GetEmployee*() method to return the reference to the *Emp* instance using the *input* to this method. Add code to the *GetEmployee*() method to find an employee based on the first and last name in the ttEmployee temp-table. If an employee is found, it should cast the EmpRef field and return the Emp instance. If an employee is not found, it should return unknown.

Hint: You will need to cast the temp-table field ttEmployee.EmpRef to the type Emp.

Add this code to the method before it returns *result*:

```
find first ttEmployee where
ttEmployee.FirstName = pFirstName and
   ttEmployee.LastName = pLastName.
if available (ttEmployee)
  then
     result = cast(ttEmployee.EmpRef,Emp).
  else
     result = ?.
```

5. Add code to the destructor to delete all ttEmployee records and their corresponding Emp objects.

Hint: You will need to cast the temp-table field ttEmployee.EmpRef to the type Emp in order to call the Emp destructor.

Add this code to the destructor:

```
for each ttEmployee:
        delete object
cast(ttEmployee.EmpRef,Emp).
delete ttEmployee.
end.
```

6. Note that you need not implement the GetEmployees() method. The ABL will automatically return the ttEmployee temp-table. Save your file. Ensure that it compiles without error.

Try It 2.2: Working with classes, Wrap-up

Exercise summary

In this Try It, you wrote ABL code to implement the constructors and methods for the *Emp* and *Dept* classes. In the next lesson, you will learn how to test these classes.

Try It 2.3: Testing classes

Overview

In this Try It, you will develop simple test procedures to test the *Emp* class and the *Dept* class, and run them to ensure that the class code you have written executes correctly.

This exercise has 5 parts. The exercise steps take approximately 60 minutes to complete. You perform this exercise in your live version of Progress OpenEdge.

Before you begin

Before you begin, you must:

Step	Description
1.	Complete the Exercise Setup instructions, if you have not done so already.
2.	Complete Try It 2.2.

Location of files:
Exercise files: **/progress_education/openedge/IntroOOP/Exercise/Lesson02**
Solution files: **/progress_education/openedge/IntroOOP/Solutions/Lesson03**

If at any time during this course, you need to restore your projects to match where you should have been prior to beginning a Try It, you can do the following:

1. Delete all projects in the workspace.
2. Import all projects in the archive (.zip) file for the previous Try It.
3. Ensure that Build Automatically is set for the workspace.

Part 1—Setting up a Test Project

In this part of the Try It, you will create a *Test* project. This project will contain procedures to test the ABL classes.

If you need help, view the Solution.

Step	Task
1.	Create a new OpenEdge Project named **Test** specifying Sports3000DB as the database and ensuring that its PROPATH is set to the Server/src and Server/bin folders.
2.	In Project Explorer, in the Test project, create a new folder named **Enterprise** under the **src** folder.
3.	Under the **Enterprise** folder, create a new folder named **HR**.

Part 2—Writing the test procedure for the Emp class

You will write a procedure to create an Emp instance. You will then write statements to test each method of the *Emp* class. You will use *message* statements to write data to a file.

If you need help, view the Solution.

Step	Task
1.	In the **Enterprise/HR** directory of the Test project, create a *procedure* named **testEmp.p.**
2.	Add *using* statements after the error-handling statement. These *using* statements will ensure that the *Emp* class can be accessed.
3.	Define a variable named *EmpInstance* that will hold a reference to an instance of *Emp*.
4.	Define a variable named *Phones* as an extent with a type *character* and a fixed size of *3* with initial values.
5.	In the main block, add a statement to create an *Emp* instance, setting the reference of this instance to the *EmpInstance* variable.
6.	Add an *output to* statement in which you will write output from the test to a file named **testEmp.out**. It will be located in the **/progress_education/openedge/IntroOOP/log** directory. **Hint**: Use the full pathname of this file.
7.	Add a statement to initialize the *Emp* instance you just created with the constant values that have the same type as expected by the *Initialize*() method. For example, the employee number is 99, and the employee first name is "John". Use the *Phones* variable as input to this method.
8.	Add a *message* statement to write the employee data to the output file using the public data members and public methods of the class.
9.	Add a statement to call the *SetVacationHours*() method for the instance and set the vacation hours for this instance to *25*.
10.	Add a *message* statement to write the employee data to the output file.
11.	Add a statement to call the *SetJobTitle*() method for the instance and set the title for this instance as *Senior Architect*.
12.	Add a *message* statement to write the employee data to the output file.
13.	To test the GetInfo() method, add a *message* statement to write the employee data to the output file. You will call the *GetInfo*() method of the *Emp* class using the *EmpInstance* instance to do this.
14.	Add a statement to close the output file.
15.	Add a statement to delete the *Emp* instance.
16.	Save this file. Ensure that it compiles without errors.

Part 3—Testing the Emp class

You will run the test procedure you wrote and confirm that the *Emp* class that you implemented in the second Try-it of this lesson executes correctly.

If you need help, view the Solution.

Step	Task
1.	Run **testEmp.p**. Does it run correctly and does the *Emp* class execute properly? View the output file.
2.	Examine the value for *PostalCode* in the output file. Was it set? Recall that in the first Try-it in this lesson, you created the PostalCode property using the New Property wizard. You specified that the setter for this property would be implemented later. The generated code has no implementation, so the property is not set. If you examine the code in **Emp.cls**, you will notice that the *set*() implementation for this accessor has no body.
3.	As the *PostalCode* data member of the *Emp* class was not set properly, you must correct the code. Add a statement to the *PostalCode set*() accessor so that the property will be set.
4.	Save your changes, and re-test until it runs correctly.

Part 4—Writing the test procedure for the Dept class

Since the *Dept* class contains *Emp* instances, you will write code to retrieve data from the database and then initialize the *Emp* class instances, as you did earlier. You will write statements to test the constructor and each method of the *Dept* class. You will use message statements to write data to a file.

If you need help, view the Solution.

Step	Task
1.	In the **Test/Enterprise/HR** directory, create an ABL procedure file and name it **testDept.p**.
2.	In this procedure, you will be creating *Emp* instances and a *Dept* instance. Add *using* statements at the beginning of this file for the *Dept* and *Emp* classes.
3.	Define a variable named *DeptInstance*, which will be of type *Dept*. This variable will hold the reference to the *Dept* instance you create.
4.	Define the following other variables to the definition section. • EmpInstance as type Emp • retrievedEmp as type Emp • httEmployee as type handle
5.	Define a variable named *Phones* as an extent with a type *character* and a fixed size of *3*.
6.	Add a statement to include the ttEmployee temp-table.
7.	Add a statement to open a file for output. The name of the file you will be writing to is **testDept.out**. It will be located in the **/progress_education/openedge/IntroOOP/log** directory. **Hint**: Use the full pathname of this file.
8.	Write a statement to create an instance of a *Dept*, providing the three *input* values required by the constructor. You can specify them as these hard-coded values: • “Training” • 500 • “PROGRESS-3947” The name of the department is Training. It’s expense code is PROGRESS-3947. The department code is 500. Assign the reference to this instance to the *DeptInstance* variable.
9.	Next, iterate through the Employee table in the database to create a set of Emp instances to add to the department. Since the department number is 500, write a FOR EACH statement to iterate through all Employee records that have a DeptNum equal to 500.
10.	Within the FOR EACH block, add a message statement to write the number of employees before adding a new employee.

11.	Next, in the FOR EACH block, add the code for creating an Emp instance, assigning it to *EmpInstance*.
12.	Next, in the FOR EACH block, set the values the first and third elements of the Phones extent with the WorkPhone and HomePhone values from the current Employee record.
13.	Next, in the FOR EACH block, initialize the Emp instance by calling the Initialize() method, passing values from the current Employee buffer and the *Phones* extent.
14.	Next, in the FOR EACH block, add the created Emp instance to the DeptInstance. **Hint**: Use the AddEmployee() method that takes an Emp instance as a parameter.
15.	You are now done with the iteration through the Employee table and you will add code after the FOR EACH block. Next, you will add code to test the AddEmployee() method that creates and initializes the Emp instance using its parameters. First, add an *assign* statement to assign three phone numbers to each of the elements of the *Phones* extent. **Hints**: Use the index values 1,2,3 to access each element of the extent. Make sure the phone number values are in quotes as they are *character* types.
16.	Next, add a message statement to write the number of employees before adding a new employee.
17.	Add a statement to call AddEmployee() with the values for initializing the Emp instance. **Hint**: You can copy-paste the parameter values you used in testEmp.p for initializing the Emp instance.
18.	Add a message statement to write the number of employees (after adding an employee) to the output file.
19.	Next, you will test the *GetEmployee*() method. Add statements to get a particular employee by passing input values and assigning the value to retrievedEmp. Then display the retrieved employee name using the *GetInfo()* method of the Emp instance in a *message* statement. **Hint**: Get one employee that was created from the Employee table in the database and get another employee that you created manually.
20.	Next, you will test the *GetEmployees*() method. Add statements get all employees using the *GetEmployees()* method and then iterate through the *ttEmployee* temp-table to return the number of employees. **Hint**: You will need to use the cast function to call the DeptRef field of the temp-table.
21.	Add a statement to delete the *DeptInstance*. The destructor for this class also deletes the *Emp* instances.
22.	Add a statement to close the output file.
23.	Save this file. Ensure that it compiles without errors.

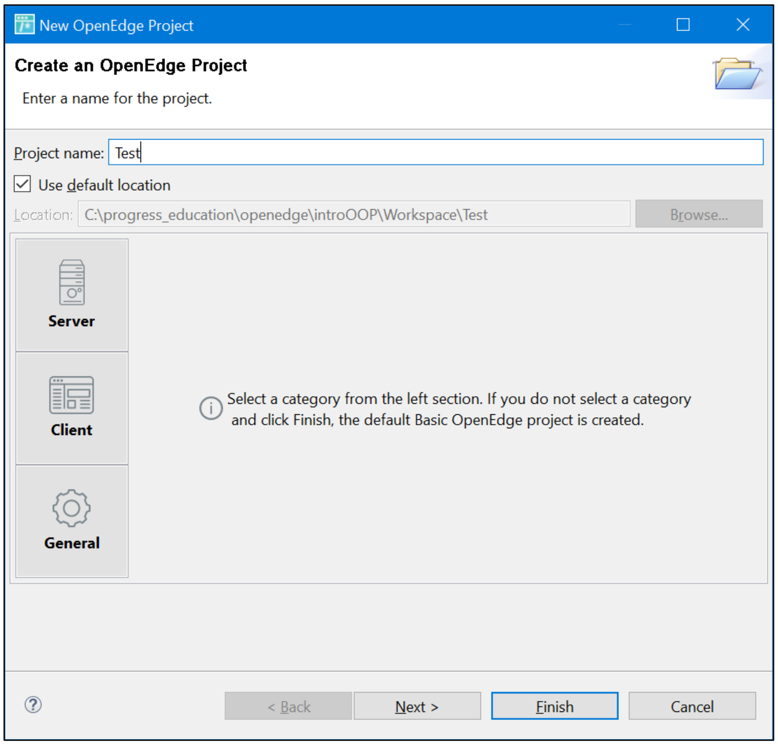
Part 5—Testing the Dept class

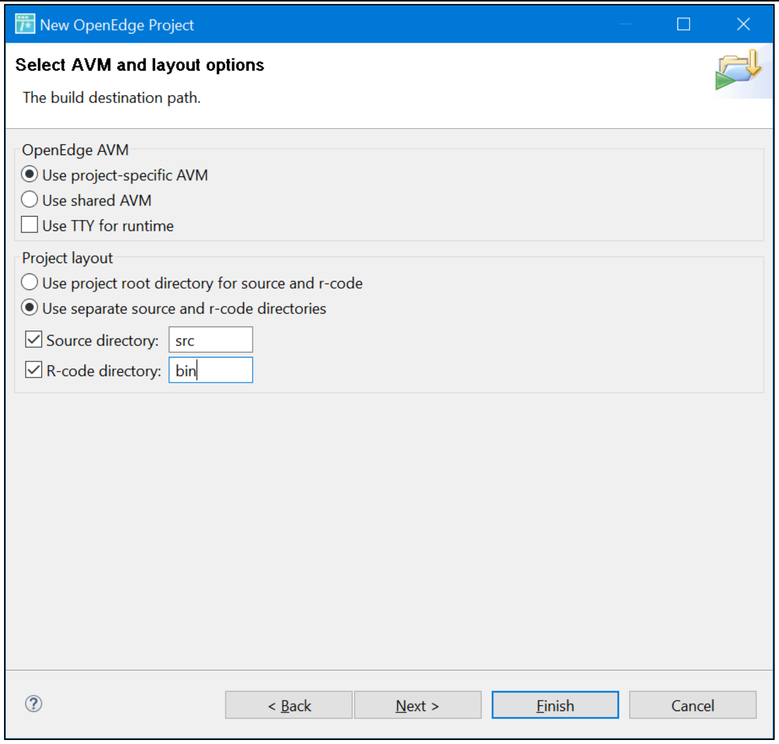
You will run the test procedure you wrote and confirm that the *Dept* class that you wrote executes correctly.

If you need help, view the Solution.

Step	Task
1.	Run **testDept.p**. Does it run correctly and does the *Dept* class execute properly? View the output file.
2.	If not, use the debugger to fix the problem, save your changes, and retest until it runs correctly.

Solution, Part 1—Setting up a Test project

Step	Solution instructions
1.	Create a new OpenEdge Project named **Test** specifying Sports3000DB as the database and ensuring that its PROPATH is set to the Server/src and Server/bin folders. a. Select **File** > **New** > **OpenEdge Project**. b. Enter **Test** for the project name.  New OpenEdge Project Create an OpenEdge Project Enter a name for the project. Project name: Test ☑ Use default location Location: C:\progress_education\openedge\introOOP\Workspace\Test Select a category from the left section. If you do not select a category and click Finish, the default Basic OpenEdge project is created. Browse... Server Client General < Back Next > Finish Cancel c. Click **Next**. d. Select **Use separate source and r-code directories**. e. Change **rcode** to **bin**.



New OpenEdge Project

Select AVM and layout options

The build destination path.

OpenEdge AVM

● Use project-specific AVM

○ Use shared AVM

□ Use TTY for runtime

Project layout

○ Use project root directory for source and r-code

● Use separate source and r-code directories

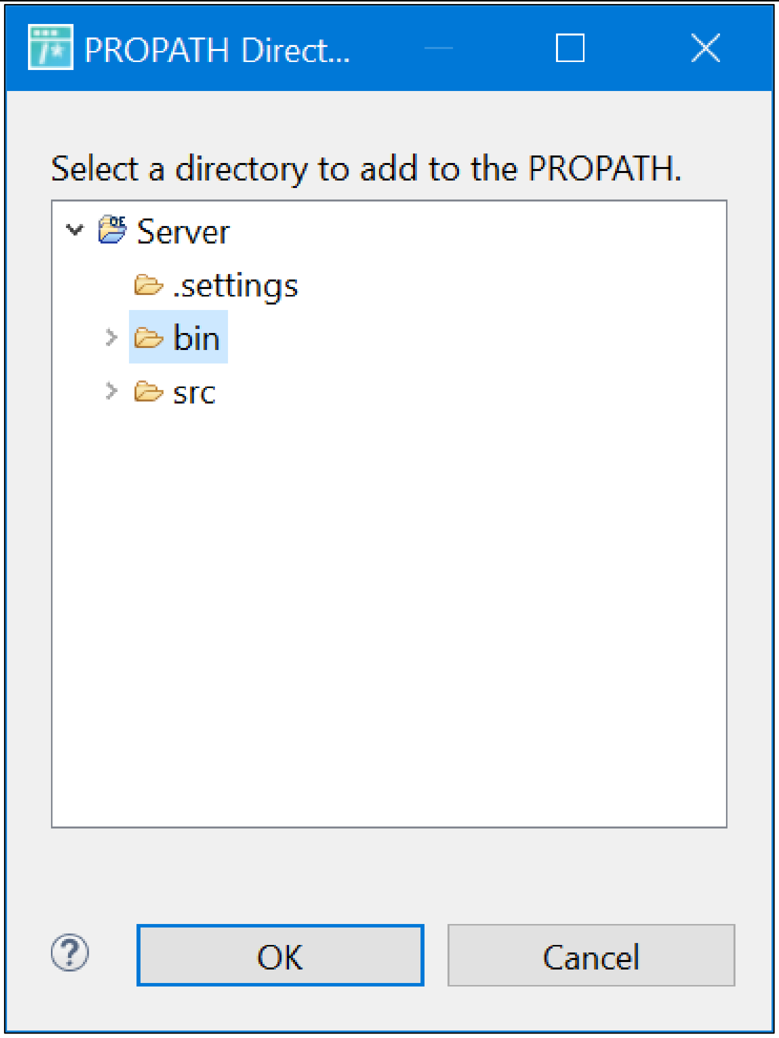
☑ Source directory: src

☑ R-code directory: bin

f. Click **Next**.

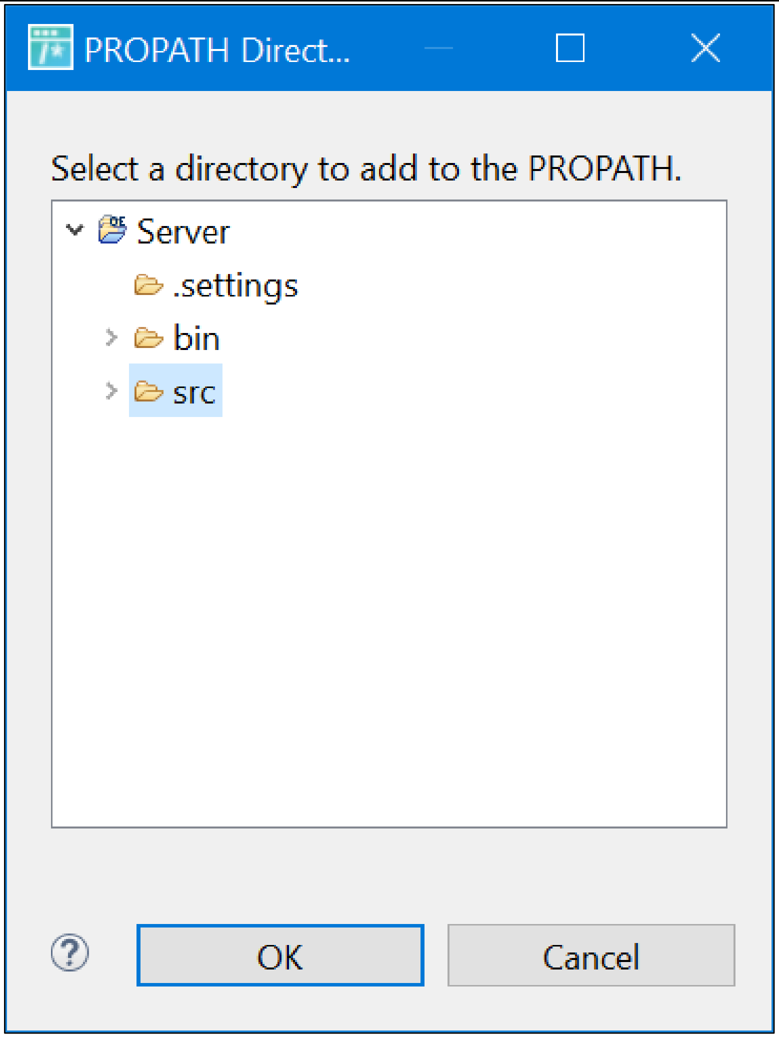
g. Click **Add Workspace Directory…**.

h. Select the **Server/bin** directory.



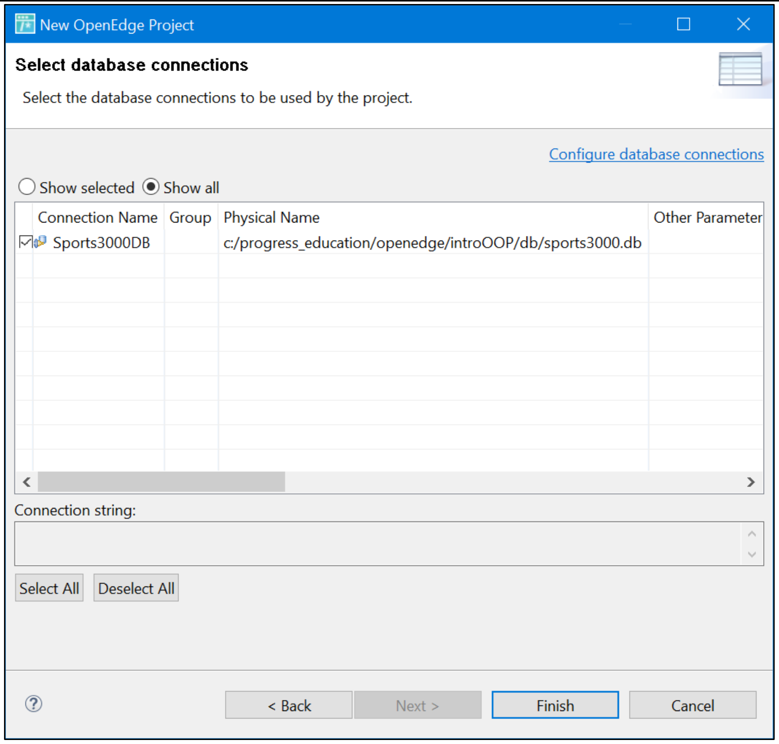
Select a directory to add to the PROPATH.

i. Click **OK**.
j. Click **Add Workspace Directory…**.
k. Select the **Server/src** directory.



Select a directory to add to the PROPATH.

l. Click **OK**.
m. Click **Next**.
n. Select the **Sports3000DB** database connection.



Select database connections

Select the database connections to be used by the project.

Configure database connections

○ Show selected ● Show all

	Connection Name	Group	Physical Name	Other Parameter
☑	Sports3000DB		c:/progress_education/openedge/introOOP/db/sports3000.db	

Connection string:

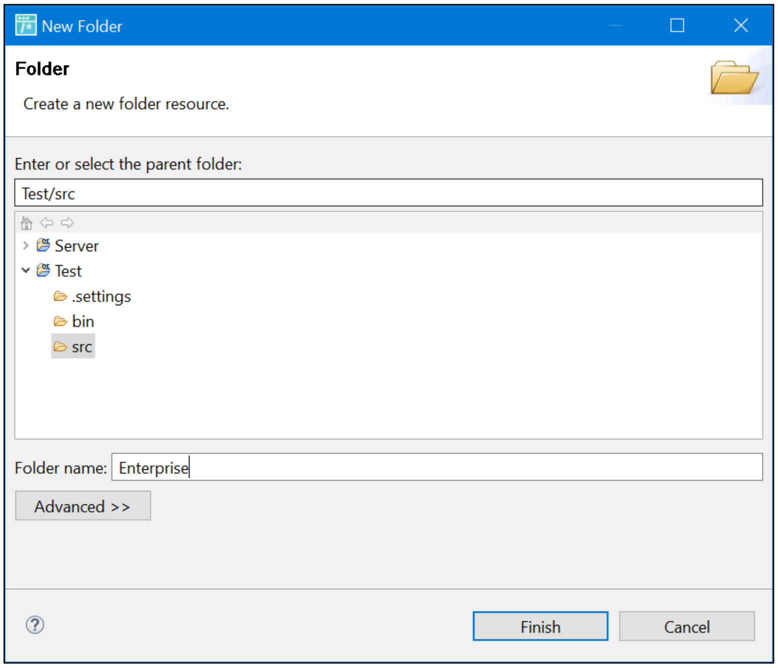
o. Click **Finish**,

2. In Project Explorer, in the **Test** project, create a new folder named **Enterprise** under the **src** folder.

a. Right-click **src**.

b. Select **New** > **Folder**.

c. Enter **Enterprise** for the Folder name.



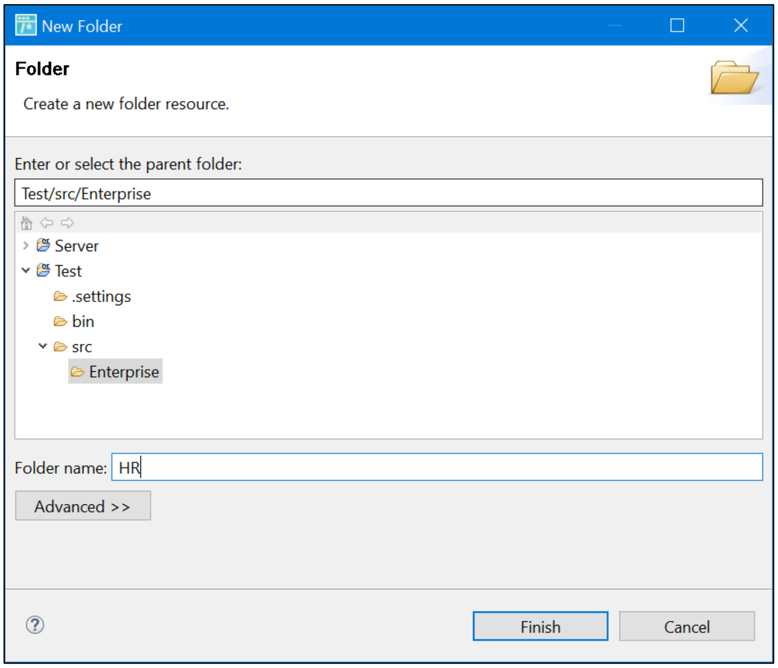
Folder

Create a new folder resource.

Enter or select the parent folder: Test/src

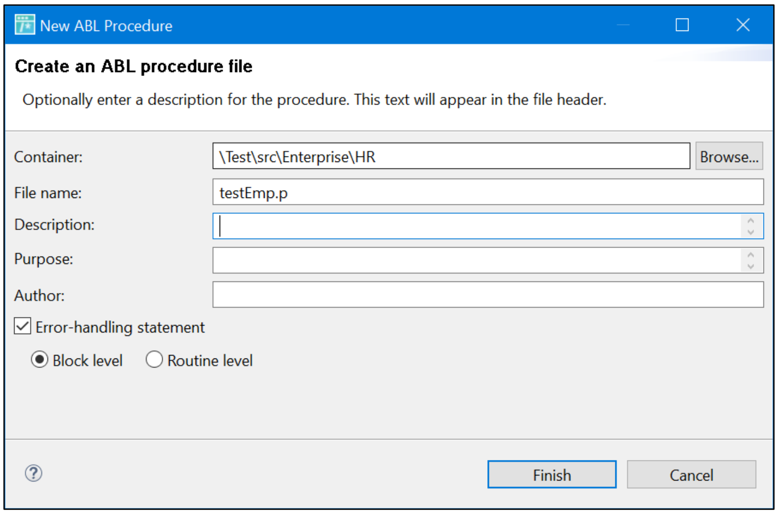
Folder name: Enterprise

d. Click **Finish**.

3.	Under the **Enterprise** folder, create a new folder named **HR**. a. Right-click **Enterprise**. b. Select **New** > **Folder**. c. Enter **HR** for the Folder name.  New Folder **Folder** Create a new folder resource. Enter or select the parent folder: Test/src/Enterprise Server Test .settings bin src Enterprise Advanced >> Finish Cancel Folder name: HR d. Click **Finish**.

Solution, Part 2—Writing the test procedure for the Emp class

Step	Solution instructions

1.	Create a new ABL procedure named **testEmp.p** in the **Enterprise/HR** directory of the Test project.
	a. Right-click the **HR** folder you created.
	b. Select **New** > **ABL Procedure**.
	c. Enter **testEmp.p** as the file name.
	d. Enter some descriptive information in the description field.
	New ABL Procedure
	Create an ABL procedure file
	Optionally enter a description for the procedure. This text will appear in the file header.
	Container: \Test\src\Enterprise\HR Browse...
	File name: testEmp.p
	Description:
	Purpose:
	Author:
	☑ Error-handling statement
	● Block level ○ Routine level
	Finish Cancel
	e. Click **Finish**.
	The generated code (without the heading comments) should be like this:
	`/* ****** Definitions ****** */`
	`block-level on error undo, throw.`

2.	Add *using* statements after the error-handling statement. These *using* statements will ensure that the *Emp* class can be accessed.
	Add these statements at the beginning of the file after the error-handling statement:
	`using Progress.Lang.*.`
	`using Enterprise.HR.Emp.`

3.	Define a variable named *EmpInstance*, which will hold a reference to an instance of *Emp*. Then add this statement in the definitions section: `define variable EmpInstance as Emp no-undo.`

4. Define a variable named *Phones* as an extent with a type *character* and a fixed size of *3* with initial values.

Add this statement:

```
define variable Phones as character extent 3 initial
["111-111-1111","222-222-2222","333-333-3333"] no-undo.
```

5. In the main block, add a statement to create an *Emp* instance, setting the reference of this instance to the *EmpInstance* variable.

```
/* create an Emp instance */
EmpInstance = new Emp().
```

6. Add an *output to* statement in which you will write output from the test to a file named **test_Emp.out**. It will be located in the **/Progress_education/openedge/IntroOOP/log** directory.

Hint: Use the full pathname to this file.

In the main block area, add this statement:

```
/* set up the file for writing data*/
output to
/progress_education/openedge/IntroOOP/log/testEmp.out.
```

7. Add a statement to initialize the *Emp* instance you created with the constant values that have the same type as expected by the *Initialize*() method. For example, the employee number is 99, and the employee first name is "John". Use the *Phones* variable as input to this method.

Add this code to the end of the procedure:

```
/* initialize the data members in the Emp instance */
EmpInstance:Initialize(99,
               "John",
               "Doe",
               "123 Main Street",
               "01730",
               Phones,
               50,
               "Senior Developer").
```

8. Add a *message* statement to write the employee data to the output file using the public data members and public methods of the class.

Add this code to the end of the initialize method:

```
message "*********testInitialize()************" skip
            EmpInstance:FirstName " "
            EmpInstance:LastName ", "
            EmpInstance:JobTitle skip
            "Emp # " EmpInstance:EmpNum "-  Vacation
hours: " EmpInstance:VacationHours skip
            EmpInstance:Address " "
EmpInstance:PostalCode skip
            "Phones: " EmpInstance:Phones[1] " "
EmpInstance:Phones[2] " " EmpInstance:Phones[3] " "
            .
```

9. Add a statement to call the *SetVacationHours*() method for the instance and set the vacation hours for this instance to *25*.

Add this code to the end of the procedure:

```
/* update the vacation hours for this employee */
EmpInstance:SetVacationHours(25).
```

10. Add a *message* statement to write the employee data to the output file.

Add this code to the end of the procedure:

```
message "*********testSetVacationHours()************"
skip
            "Vacation hours: "
EmpInstance:VacationHours
.
```

11. Add a statement to call the *SetJobTitle*() method for the instance and set the title for this instance as *Senior Architect*.

Add this code to the end of the procedure:

```
EmpInstance:SetJobtitle("Senior Architect").
```

12. Add a *message* statement to write the employee data to the output file.

Add this code to the end of the procedure:

```
message "*********testSetJobTitle()************" skip
            "JobTitle: " EmpInstance:JobTitle.
```

13. To test the GetInfo() method, add a *message* statement to write the employee data to the output file. You will call the *GetInfo*() method of the *Emp* class using the *EmpInstance* instance to do this.

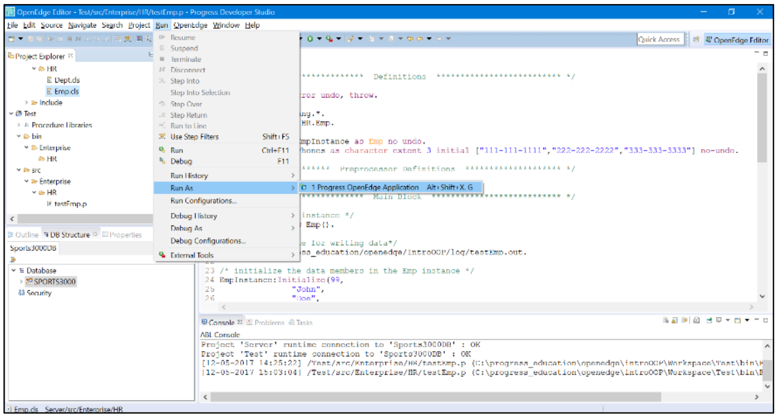
Add this code to the end of the procedure:

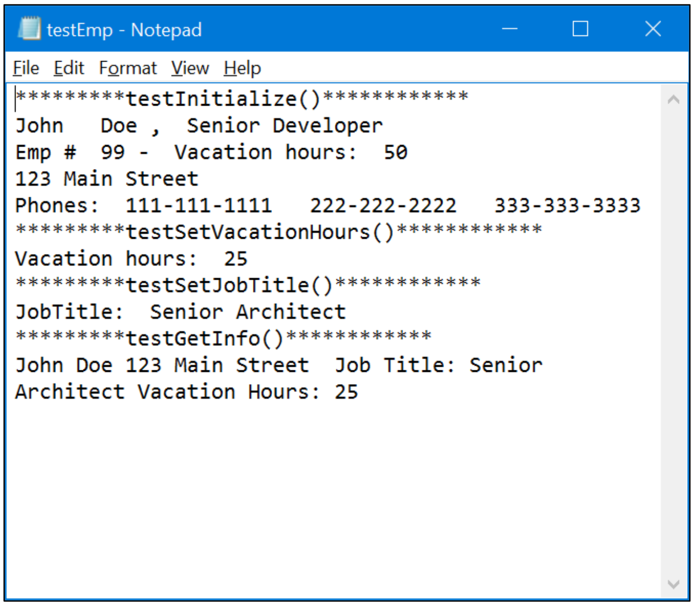
	`/* write data to the output file */`
	`message "*********testGetInfo()************" skip`
	`EmpInstance:GetInfo() .`

14.	Add a statement to close the output file. Add this code at the end of the procedure. `output close.`
15.	Add a statement to delete the *Emp* instance. Add this code to the end of the procedure: `/* delete the instance - freeing memory */`
16.	Save this file. Ensure that it compiles without errors.

Solution, Part 3—Testing the Emp class

Step	Solution instructions

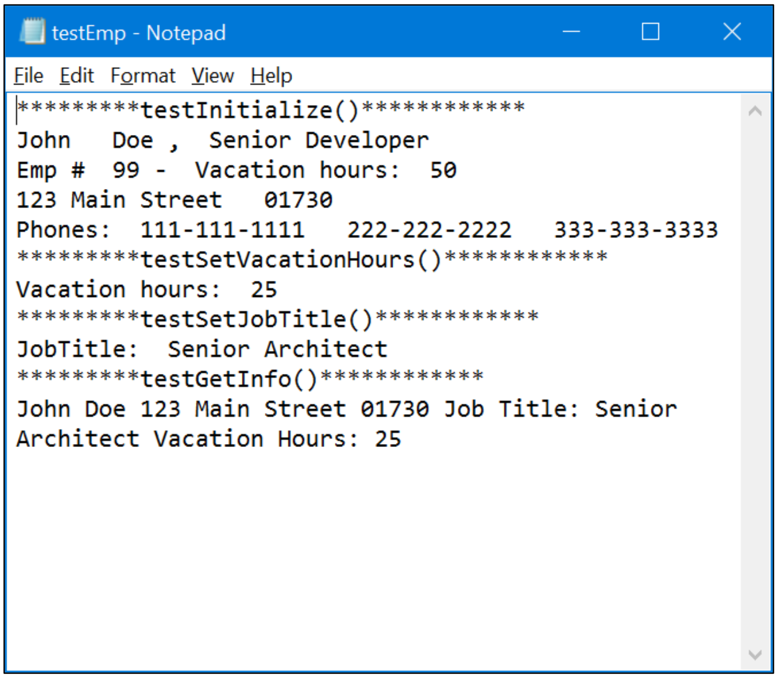
1.	Run **testEmp.p**. Does it run correctly and does the *Emp* class execute properly? View the output file.
	a. With **testEmp.p** open in the editor, click the **Run** icon drop down.
	b. Select **Run As** > **Progress OpenEdge Application**.
	
	`Project 'Server' runtime connection to 'Sports3000DB' : OK`
	`Project 'Test' runtime connection to 'Sports3000DB' : OK`
	`[12-05-2017 14:25:22] /Test/src/Enterprise/HR/testEmp.p (C:\progress_education\openedge\introOOP\Workspace\Test\bin\H`
	`[12-05-2017 15:03:04] /Test/src/Enterprise/HR/testEmp.p (C:\progress_education\openedge\introOOP\Workspace\Test\bin\E`
	c. Click **OK**.

2.	Examine the value for *PostalCode* in the output file. Was it set? Recall that in the first Try-it of this lesson, you created the PostalCode property using the New Property wizard. You specified that the setter for this property would be implemented later. The generated code has no implementation, so the property is not set. If you examine the code in **Emp.cls**, you will notice that the *set*() implementation for this accessor has no body.
	
	`*********testInitialize()***********`
	`John   Doe ,  Senior Developer`
	`Emp #  99 -  Vacation hours:  50`
	`123 Main Street`
	`Phones:  111-111-1111   222-222-2222   333-333-3333`
	`*********testSetVacationHours()***********`
	`Vacation hours:  25`
	`*********testSetJobTitle()***********`
	`JobTitle:  Senior Architect`
	`*********testGetInfo()***********`
	`John Doe 123 Main Street  Job Title: Senior`
	`Architect Vacation Hours: 25`

3. As the *PostalCode* data member of the *Emp* class was not set properly, you must correct the code. Add a statement to the *PostalCode set*() accessor so that the property will be set. Your updated property should be as follows:

```
define public property PostalCode as character no-undo
       get.
       set(input arg as character):
              PostalCode = arg.
end set.
```

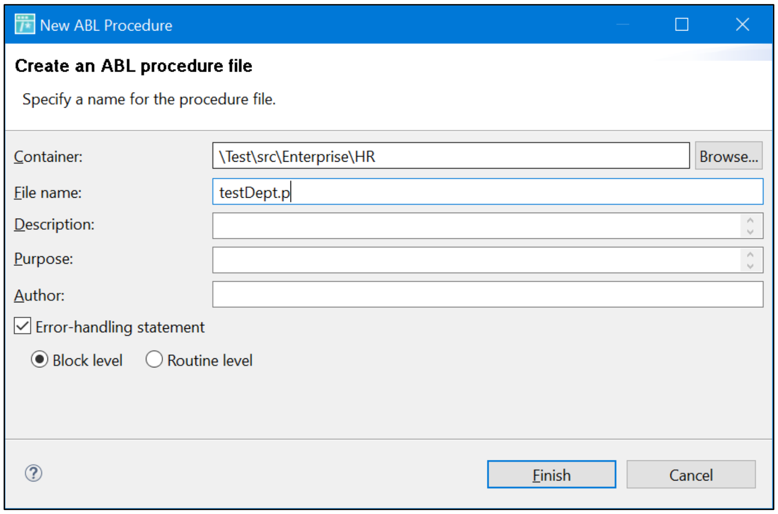
4. Save your changes, and re-test until it runs correctly.



```
*********testInitialize()************
John   Doe ,  Senior Developer
Emp #  99 -  Vacation hours:  50
123 Main Street   01730
Phones:  111-111-1111   222-222-2222   333-333-3333
*********testSetVacationHours()************
Vacation hours:  25
*********testSetJobTitle()************
JobTitle:  Senior Architect
*********testGetInfo()************
John Doe 123 Main Street 01730 Job Title: Senior
Architect Vacation Hours: 25
```

Solution, Part 4—Writing the test procedure for the Dept class

Step	Solution instructions

1.	In the **Test/src/Enterprise/HR** directory, create an ABL procedure file and name it **testDept.p**.
	a. Right-click the **HR** folder you created.
	b. Select **New** > **ABL Procedure**.
	c. Enter **testDept.p** as the file name.
	d. Enter some descriptive information in the description field.
	
	New ABL Procedure
	Create an ABL procedure file
	Specify a name for the procedure file.
	Container: \Test\src\Enterprise\HR Browse...
	File name: testDept.p
	Description:
	Purpose:
	Author:
	☑ Error-handling statement
	● Block level ○ Routine level
	Finish Cancel
	e. Click **Finish**.
	The generated code (without the header comments) should be like this:
	`/* ******  Definitions  ****** */`
	`block-level on error undo, throw.`

2.	In this procedure, you will be creating *Emp* instances and a *Dept* instance. Add *using* statements at the beginning of this file for the *Dept* and Emp classes.
	Add these statements at the beginning of the procedure, after the error handling statement:
	`using Progress.Lang.*.`
	`using Enterprise.HR.Emp.`
	`using Enterprise.HR.Dept.`

3.	Define a variable named *DeptInstance*, which will be of type *Dept*. This variable will hold the reference to the *Dept* instance you create. Add this statement after the using statements:

```
define variable DeptInstance as Dept no-undo.
```

4. Define the following other variables to the definition section.

- EmpInstance as type Emp
- retrievedEmp as type Emp
- httEmployee as type handle

Place your cursor after the definition of the *DeptInstance* variable to add these definitions.

```
define variable EmpInstance as Emp no-undo.
define variable retrievedEmp as Emp no-undo.
define variable httEmployee as handle no-undo.
```

5. Define a variable named *Phones* as an extent with a type *character* and a fixed size of *3*. Add the definition of the Phones variable to the end of the definitions section.

```
define variable Phones as character extent 3 no-undo.
```

6. Add a statement to include the ttEmployee temp-table.

```
{include/ttEmployee.i}
```

7. Add a statement to open a file for output. The name of the file you will be writing to is **testDept.out**. It will be located in the **/progress_education/openedge/IntroOOP/log** directory.

Hint: Use the full pathname of this file.

In the main block area, add this statement:

```
output to
/progress_education/openedge/IntroOOP/log/testDept.out.
```

8. Write a statement to create an instance of *Dept*, providing the three *input* values required by the constructor. You can specify them as these hard-coded values:

- “Training”
- “500”
- “PROGRESS-3947”

The name of the department is Training. It’s expense code is PROGRESS-3947. The department code is 500. Assign the reference of this instance to the *DeptInstance* variable.

Add this statement after the *output to* statement:

```
/* create a Deptinstance using hard-coded values for
initializing it */
DeptInstance = new Dept("Training",
                      "500",
                      "PROGRESS-3947").
```

9. Next, iterate through the Employee table in the database to create a set of Emp instances to add to the department. Since the department number is 500, write a FOR EACH statement to iterate through all Employee records that have a DeptNum equal to 500.

Add this code to the end of the procedure:

```
for each Employee where Employee.Dept = "500":
end.
```

10. Within the FOR EACH block, add a message statement to write the number of employees before adding a new employee.

Add this code to the FOR EACH block:

```
message
"************testAddEmployeeWithEmpInstance()************
" skip
     "Before adding employee, number of employees is: "
DeptInstance:NumEmployees.
```

11. Next, in the FOR EACH block, add the code for creating an Emp instance, assigning it to *EmpInstance*.

Add this code as the next statement in the block:

```
              EmpInstance = new Emp().
```

12. Next, in the FOR EACH block, set the values the first and third elements of the Phones extent with the WorkPhone and HomePhone values from the current Employee record.

Add this code next in the block:

```
assign
       Phones[1] = Employee.WorkPhone
       Phones[3] = Employee.HomePhone
       .
```

13. Next, in the FOR EACH block, initialize the Emp instance by calling the Initialize() method, passing values from the current Employee buffer and the Phones extent.

Add this code next in the block:

```
EmpInstance:Initialize(Employee.EmpNum,
Employee.FirstName,
Employee.LastName,
Employee.Address,
Employee.PostalCode,
Phones,
Employee.VacationDaysLeft * 8,
Employee.Position).
```

14. Next, in the FOR EACH block, add the created Emp instance to the DeptInstance.

Hint: Use the AddEmployee() method that takes an Emp instance as a parameter.

Add this code next in the block:

```
DeptInstance:AddEmployee (EmpInstance).
```

15. You are now done with the iteration through the Employee table and you will add code after the FOR EACH block. Next, you will add code to test the AddEmployee() method that creates and initializes the Emp instance using its parameters. First, add an *assign* statement to assign three phone numbers to each of the elements of the *Phones* extent.

Hints: Use the index values 1,2,3 to access each element of the extent. Make sure the phone number values are in quotes as they are *character* types.

Add this code after the FOR EACH block’s end statement:

```
/* Test add Employee with initialization values */
assign
  Phones[1] = "111-111-1111"
  Phones[2] = "222-222-2222"
  Phones[3] = "333-333-3333"
  .
```

16. Next, add a message statement to write the number of employees before adding a new employee.

Add this code to the end of the procedure:

```
message
"*************testAddEmployeeWithInitializationValues()**
**********" skip
     "Before adding employee, number of employees is: "
DeptInstance:NumEmployees.
```

17. Add a statement to call AddEmployee() with the values for initializing the Emp instance.

Hint: You can copy-paste the parameter values you used in testEmp.p for initializing the Emp instance.

Add this code to the end of the procedure:

```
DeptInstance:AddEmployee(999,
               "Jane",
               "Doe",
               "321 Main Street",
               "01730",
               Phones,
               40,
               "Instructor").
```

18. Add a message statement to write the number of employees (after adding an employee) to the output file.

Add this statement to the end of the procedure:

```
message "After adding employee, number of employees is: "
DeptInstance:NumEmployees.
```

19. Next, you will test the *GetEmployee*() method. Add statements to get a particular employee by passing input values and assigning the value to retrievedEmp. Then display the retrieved employee name using the *GetInfo()* method of the Emp instance in a *message* statement.

Hint: Get one employee that was created from the Employee table in the database (Luke Sanders) and get another employee that you created manually (Jane Doe).

Add this code to the end of the procedure:

```
retrievedEmp = DeptInstance:GetEmployee("Luke",
"Sanders").
if valid-object(retrievedEmp)
   then
     message
        "************testGetEmployee( ) for Luke Sanders
************"
       retrievedEmp:GetInfo().
retrievedEmp = DeptInstance:GetEmployee("Jane", "Doe").
if valid-object(retrievedEmp)
   then
     message
        "************testGetEmployee() for Jane Doe
************"
    retrievedEmp:GetInfo().
```

20. Next, you will test the *GetEmployees*() method. Add statements to get all employees using the *GetEmployees()* method and then iterate through the *ttEmployee* temp-table to write the employee names to the output file.

Hint: You will need to use the cast function to call GetInfo() for the EmpRef field of the temp-table.

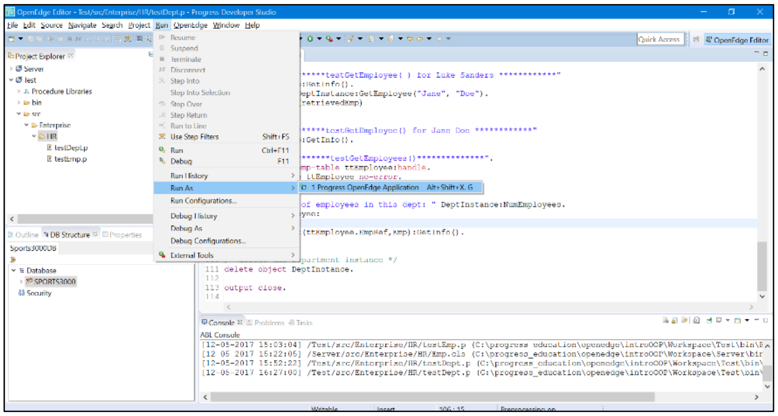
Add this code to the end of the procedure:

```
message "*************testGetEmployees()**************".
httEmployee = temp-table ttEmployee:handle.
empty temp-table ttEmployee no-error.
DeptInstance:GetEmployees(output table ttEmployee).
   message
        "Number of employees in this dept: "
DeptInstance:NumEmployees.
for each ttEmployee:
       message
            cast(ttEmployee.EmpRef,Emp):GetInfo().
end.
```

21.	Add a statement to delete the *DeptInstance*. The destructor for this class also deletes the *Emp* instances.
	Add this code to the end of the procedure:
	`/* delete the Department instance */`
	`delete object DeptInstance.`

22.	Add a statement to close the output file. Add this code to the end of the procedure: `output close.`
23.	Save this file. Ensure that it compiles without errors.

Solution, Part 5—Testing the Dept class

Step	Solution instructions
1.	Run **testDept.p**. Does it run correctly and does the *Dept* class execute properly? View the output file. a. With **testDept.p** open in the editor, click the **Run** icon drop-down. b. Select **Run As** >**Progress OpenEdge Application**.  c. Click **OK**.
2.	If not, use the debugger to fix the problem, save your changes, and re-test until it runs correctly.

```
*****testGetEmployee( ) for Luke Sanders ************"
:GetInfo().
eptInstance:GetEmployee("Jane", "Doe").
retrievedEmp)

*****testGetEmployee() for Jane Doe ************"
:GetInfo().

******testGetEmployees()**************".
mp-table ttEmployee:handle.
 ttEmployee no-error.

of employees in this dept: " DeptInstance:NumEmployees.
yne:

(ttEmployee.EmpRef,Emp):GetInfo().

partment instance */
delete object DeptInstance.

output close.
```

```
[12-05-2017 15:03:04] /Test/src/Enterprise/HR/testEmp.p (C:\progress_education\openedge\introOOP\Workspace\Test\bin\F
[12-05-2017 15:22:05] /Server/src/Enterprise/HR/Emp.cls (C:\progress_education\openedge\introOOP\Workspace\Server\bir
[12-05-2017 15:52:22] /Test/src/Enterprise/HR/testDept.p (C:\progress_education\openedge\introOOP\Workspace\Test\bin\
[12-05-2017 16:27:00] /Test/src/Enterprise/HR/testDept.p (C:\progress_education\openedge\introOOP\Workspace\Test\bin\
```

Try It 2.3: Testing classes, Wrap-up

Exercise summary

In this Try It, you wrote procedures that test the code you developed for the *Emp* and *Dept* classes. You must ensure that all code that you develop is thoroughly tested.

Notes

Try It 3.1: Using inheritance

Overview

In this Try It, you will use the *Emp* class as a super class for the *Manager* and *TeamMember* derived classes. First, you will modify a data member of the *Emp* super class so that it can be used by its derived classes. Then you will create and develop the code for the *Manager* class. Next, you will import existing code for the *TeamMember* and *Dept* classes, along with test procedures for testing your class hierarchy. Finally, you will test the inheritance hierarchy.

This exercise has 7 parts. The exercise steps take approximately 60 minutes to complete. You perform this exercise in your live version of Progress OpenEdge.

Before you begin

Before you begin, you must:

Step	Description
1.	Complete the Exercise Setup instructions, if you have not done so already.
2.	Complete the Guided Exercise 2.3.

Location of files:
Exercise files: **/progress_education/openedge/IntroOOP/Exercise/Lesson03**
Solution files: **/progress_education/openedge/IntroOOP/Solutions/Lesson03**

If at any time during this course, you need to restore your projects to match where you should have been prior to beginning a Try It, you can do the following:

1. Delete all projects in the workspace.
2. Import all projects in the archive (**.zip**) file for the previous Try It.
3. Do a clean build of the workspace.

Part 1—Modify the Emp class to support its derived classes

In this part of the Try It, you modify the *Emp* class, so that it can be used by its derived classes – *Manager* and *TeamMember* classes. You will change the *GetName*() method from private to protected to make it available to the derived classes.

If you need help, view the Solution.

Step	Task
1.	At the end of the definition section of the *Emp* class, define the *EmpType* public property as a character with a protected setter.
2.	Change the *GetName*() method to protected.
3.	Save your file. Ensure that it compiles without errors.

Part 2—Creating the Manager class

In this part of the Try It, you will create the *Manager* class. This class will inherit the data members, constructors, and methods from the *Emp* class.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, in the Server project, create a new folder named **Role** under the **src/Enterprise/HR** folder.
2.	In this folder, create a class named *Manager* that uses *Emp* as its super class. This class will have a default constructor and a destructor. **Hint**: Use the *New ABL class* wizard.
3.	Add a *using* statement after the error-handling statement. This *using* statement will ensure that the *TeamMember* class can be accessed. **Note**: You will see an error in this statement because you have not yet created the *TeamMember* class.

Part 3—Defining a constructor and a data member for the Manager class

Next, you will define the data member for the *Manager* class.

If you need help, view the Solution.

Step	Task
1.	Modify the default constructor to set the *EmpType property* to be *Manager*.
2.	Define the *private* temp-table by including the *ttEmployee* temp-table definition. **Hint**: Add this statement in the definitions part of the class.
3.	Save your file. Ensure that it compiles without errors (except for the error related to the reference to *TeamMember*).

Part 4—Defining methods for the Manager class

Next, you will define the methods for the *Manager* class. Recall that all the methods of the *Emp* super class are available for the *Manager* class. However, you will add two methods and override one inherited method.

If you need help, view the Solution.

Step	Task
1.	Define the public *AddTeamMember*() method that takes a *TeamMember* as input and returns *void*. **Note**: You will see an error in this statement because you have not yet created the *TeamMember* class.
2.	Define the public *GetManagerEmployees*() method that has an output parameter, which is the *ttEmployee* table, and returns *void*.
3.	Define the *public* method *GetInfo*(), which returns *character* and takes no parameters. It will override the method in the *Emp* class. **Hint**: Use the Override/Implement Members wizard.
4.	Save your file. Ensure that it compiles without errors. (except for the errors related to the *TeamMember* reference)

Part 5—Implementing the methods for the Manager class

In this part of the Try It, you add code to methods of the class that you have already defined. Here, you will override the *GetInfo*() method to add additional vales to the result string.

If you need help, view the Solution.

Step	Task
1.	Implement the *AddTeamMember*() method that takes a parameter with type *TeamMember* to perform the following: • Create a *ttEmployee* record. • Set the values of the *ttEmployee* record from the input parameter. **Note**: You will see errors in your code because you have not yet created the *TeamMember* class.
2.	Implement the *GetInfo*() override method as follows: • Define a *character* variable named *result*. • Set the value of *result* to be a concatenation of the value returned from *GetName*(), *"Manager"*, *Address*, *PostalCode*, *JobTitle*, and the *string* value for *VacationHours*. • Return the result.
3.	Add code to the destructor for the class to delete all *ttEmployee* records.
4.	Note that you need not implement the *GetManagerEmployees*() method. ABL will automatically return the *ttEmployee* temp-table. Save your file. It will have compilation errors because the *TeamMember* class has not yet been created. If you see other syntax errors not related to *TeamMember*, correct them.

Part 6—Importing the TeamMember and Dept classes

You have practiced creating one derived class. In this part of the Try It, to complete the inheritance hierarchy you will first import the *TeamMember.cls* file. This class will also inherit the data members, constructors, and methods from the *Emp* class.

Then, you will import a new version of the **Dept.cls** file to utilize *Manager* and *TeamMember* instances, rather than *Emp* instances. The new version of the **Dept.cls** has been updated to support the *Manager* and *TeamMember* classes.

If you need help, view the Solution.

Step	Task
1.	In the **Role** folder of the Server project, import the **TeamMember.cls** file.
2.	Clean and rebuild the Server project. Note that the compilation errors for **Manager.cls** should now no longer exist.
3.	In the **HR** folder of the Server project, import the **Dept.cls** file. **Note**: Click **OK** to replace the existing **Dept.cls** file.
4.	Clean and rebuild the workspace. You should have no compilation errors.

Part 7—Testing the inheritance hierarchy

In this part of the Try It, you will import the **testManager.p** and **testTeamMember.p** procedure files for testing the *Manager* and *TeamMember* classes. Then, you will import a new version of **testDept.p** to test the *Dept* class.

Next, you will run the test procedures to test the inheritance hierarchy and how the *Dept* class uses the derived classes.

If you need help, view the Solution.

Step	Task
1.	In the Test project, create a folder named **Role** in the Enterprise/HR directory.
2.	In the **Enterprise/HR/Role** directory of the Test project, import the procedure files named **testManager.p** and **testTeamMember.p.**
3.	Run **testManager.p**. Does it run correctly and was the *Manager* information added to the output file? View the output file.
4.	Run **testTeamMember.p**. Does it run correctly and was the *TeamMember* added with *Manager* information? View the output file.
5.	If the files did not run as expected, use the debugger to fix the problem, save your changes, and retest until it runs correctly.
6.	In the **Test/Enterprise/HR** directory, import an ABL procedure file **testDept.p**. View the file to see how each method is defined for testing. **Note**: You will replace the existing **testDept.p** file.
7.	Run **testDept.p**. Does it run correctly and does the *Dept* class execute properly? View the output file named **TestDept2.out**.
8.	If it does not run correctly, use the debugger to fix the problem, save your changes, and retest until it runs correctly.

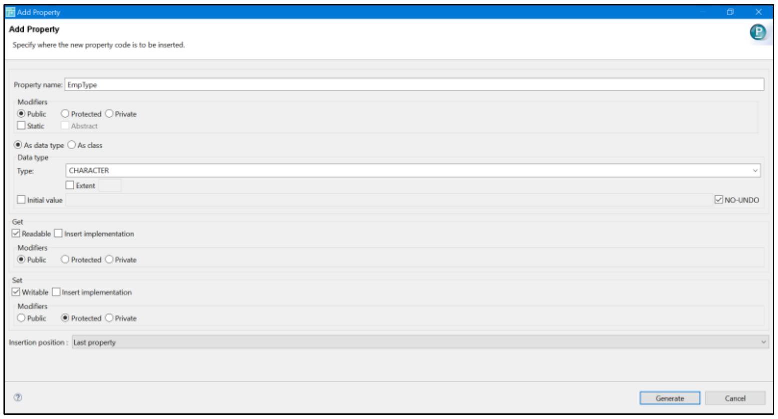
Solution, Part 1—Modify the Emp class to support its derived classes

<table>
<tr><th>Step</th><th>Solution Instructions</th></tr>
<tr><td>1.</td><td>

At the end of the definition section of the *Emp* class, define the *EmpType* public property as a character *EmpType* as *character* with a protected setter.

Hint: Use the *Add Property* wizard.

a. In the editor, place the cursor at a blank line before the constructor.
b. **Right-click** and then select **Source** > **Add Property**. The Add Property wizard opens.
c. Enter **EmpType** for the Property name.
d. Select **Character**.
e. Select **Public** for Get accessor.
f. Select **Protected** for the Set accessor.
g. Select **Last Property** for the insertion position.



Add Property
Specify where the new property code is to be inserted.
Property name: EmpType
Modifiers
● Public ○ Protected ○ Private
□ Static □ Abstract
● As data type ○ As class
Data type
Type: CHARACTER
□ Extent
□ Initial value ☑ NO-UNDO
Get
☑ Readable □ Insert implementation
Modifiers
● Public ○ Protected ○ Private
Set
☑ Writable □ Insert implementation
Modifiers
○ Public ● Protected ○ Private
Insertion position : Last property

h. Click **Generate**.

The generated code (without comments) should appear as follows:

```
define public property EmpType as character no-undo
    get.
    protected set.
```

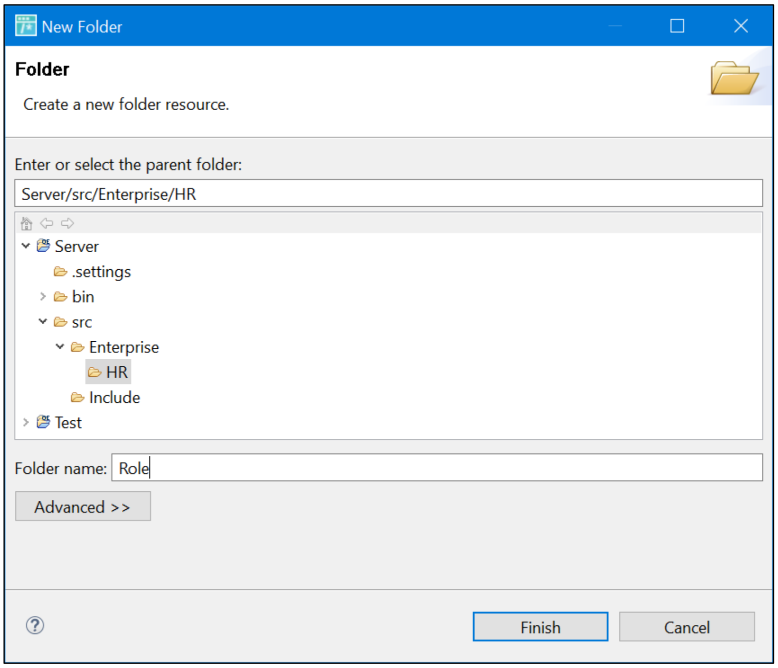
</td></tr>
<tr><td>2.</td><td>

Change the *GetName*() method from *private* to *protected*.

```
method protected character GetName(  ):
```

</td></tr>
<tr><td>3.</td><td>Save your file. Ensure that it compiles without errors.</td></tr>
</table>

Solution, Part 2—Creating the Manager class

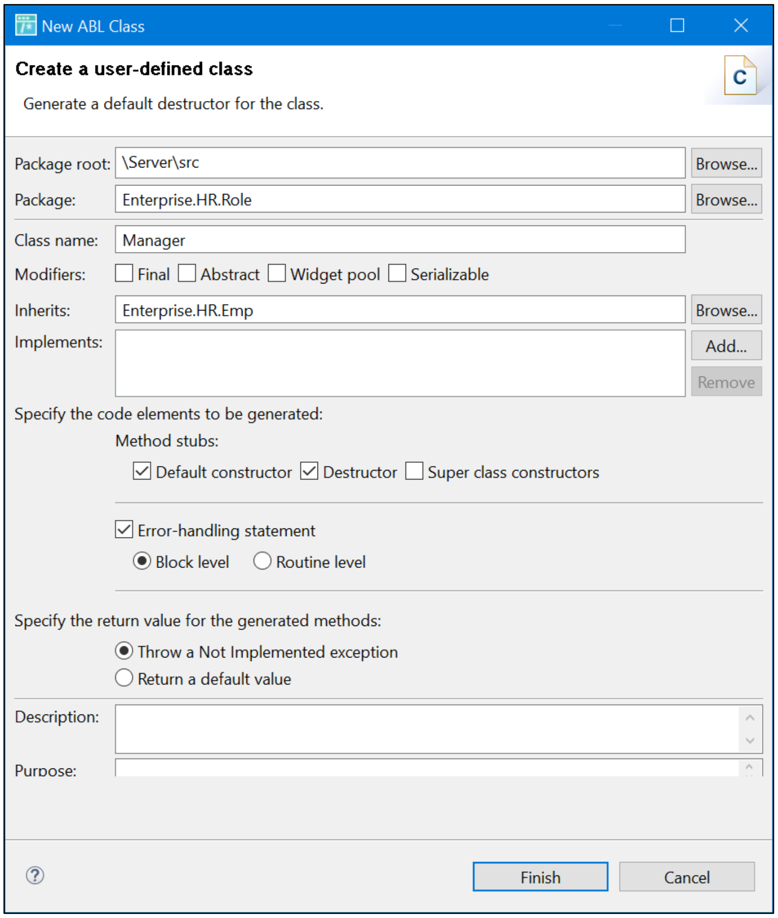
Step	Solution instructions
1.	In Project Explorer, in the **Server** project, create a new folder named **Role** under the **src/Enterprise/HR** folder. a. Right-click **HR**. b. Select **New** > **Folder**. c. Enter **Role** for the Folder name.  New Folder **Folder** Create a new folder resource. Enter or select the parent folder: Server/src/Enterprise/HR Folder name: Role Server .settings bin src Enterprise HR Include Test Advanced >> Finish Cancel d. Click **Finish**.

2.

In this directory, create a class named *Manager* that uses *Emp* as its super class. This class will have a default constructor and a destructor.

Hint: Use the *New ABL class* wizard.

a. Right-click **Role**.
b. Select **New** > **ABL Class**.
c. Enter **Manager** for the Class name.
d. Browse and select **Emp.cls (Enterprise.HR.Emp**) for the Inherits field.
e. Select **Default Constructor**.
f. Select **Destructor**.
g. You can optionally add information to the description.



New ABL Class

Create a user-defined class

Generate a default destructor for the class.

Package root: \Server\src

Package: Enterprise.HR.Role

Class name: Manager

Modifiers: □ Final □ Abstract □ Widget pool □ Serializable

Inherits: Enterprise.HR.Emp

Implements:

Specify the code elements to be generated:

Method stubs:

☑ Default constructor ☑ Destructor □ Super class constructors

☑ Error-handling statement

● Block level ○ Routine level

Specify the return value for the generated methods:

● Throw a Not Implemented exception

○ Return a default value

Description:

Purpose:

h. Click **Finish**.
The **Manager.cls** file opens in the editor.

The generated file should appear as follows:

```
using Progress.Lang.*.
using Enterprise.HR.Emp.
block-level on error undo, throw.
class Enterprise.HR.Role.Manager inherits Emp:
constructor public Manager():
super ().
end constructor.
destructor public Manager ():
end destructor.
  end class.
```

3.	Add a *using* statement after the error-handling statement. These *using* statements will ensure that the *TeamMember* class can be accessed. **Note**: You will see an error in this statement because you have not yet created class *TeamMember* class. Add this statements at the beginning of the file before the error-handling statement: `using Enterprise.HR.Role.TeamMember.`

Solution, Part 3—Defining a constructor and a data member for the Manager class

Step	Solution instructions

1.	Modify the default constructor to set the *EmpType* property to be *Manager*.
	Place your cursor in the parameters area for the constructor. Add code for these parameters:
	`constructor public Manager( ):`
	`super ().`
	`EmpType = "Manager".`
	`end constructor.`

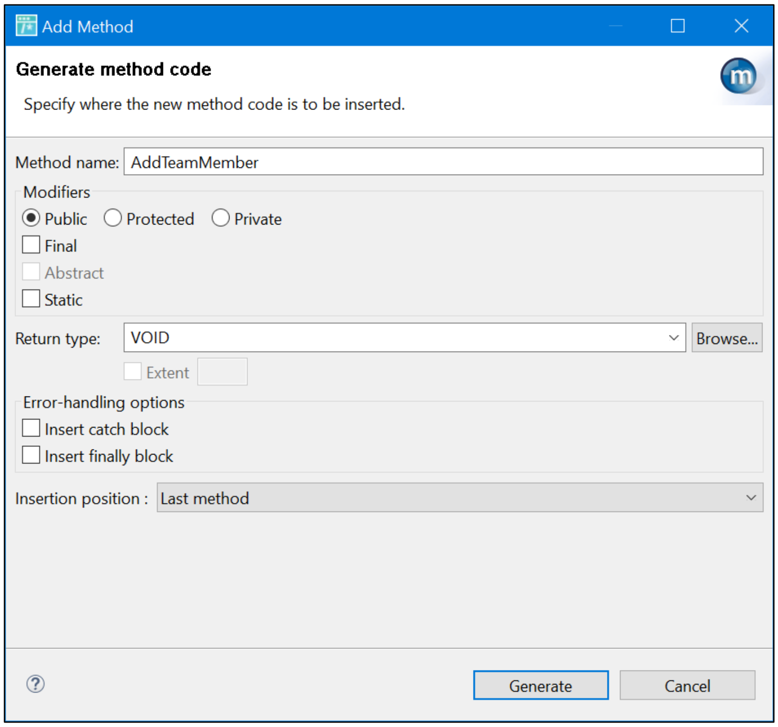
2.	Define the *private* temp-table by including the ttEmployee temp-table definition. a. In the editor, place the cursor at a blank line before the constructor. b. Add this code to the class file: `{include/ttEmployee.i &ClassAccess = "private"}`
3.	Save your file. Ensure that the code added compiles without errors (except for the using statement for *TeamMember* class).

Solution, Part 4—Defining methods for the Manager class

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>

Define the public *AddTeamMember*() method that takes a *TeamMember* as input and returns *void*.

a. Place the cursor just before the anywhere in the class.
b. Right-click and then select **Source** > **Add Method**.
c. Enter **AddTeamMember** for the method name.
d. Select **void** as the return type.
e. Select **Last method** for the insertion position.



Generate method code

Specify where the new method code is to be inserted.

Method name: AddTeamMember

Modifiers
● Public ○ Protected ○ Private
□ Final
□ Abstract
□ Static

Return type: VOID

□ Extent

Error-handling options
□ Insert catch block
□ Insert finally block

Insertion position : Last method

f. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.
g. Enter the input parameter as *ptm* with a type *TeamMember*.

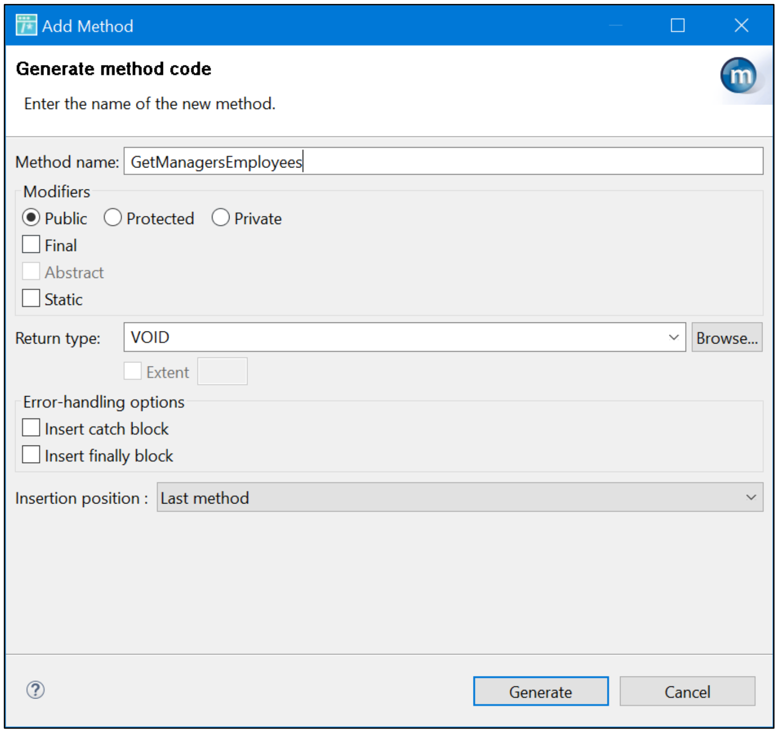
Your code should appear as follows:

```
method public AddTeamMember(input ptm as TeamMember)
return.
end method.
```

</td></tr>
</table>

2. Define the public *GetManagersEmployees*() method that has an output parameter, which is the *ttEmployee* table, and returns a *void*. Place the cursor anywhere in the class.

a. Right-click and then select **Source** > **Add Method**.
b. Enter **GetManagersEmployees** for the method name.
c. Select **void** as the return type.
d. Select **Last method** for the insertion position.



Add Method

Generate method code

Enter the name of the new method.

Method name: GetManagersEmployees

Modifiers

● Public ○ Protected ○ Private

□ Final

□ Abstract

□ Static

Return type: VOID

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

Insertion position : Last method

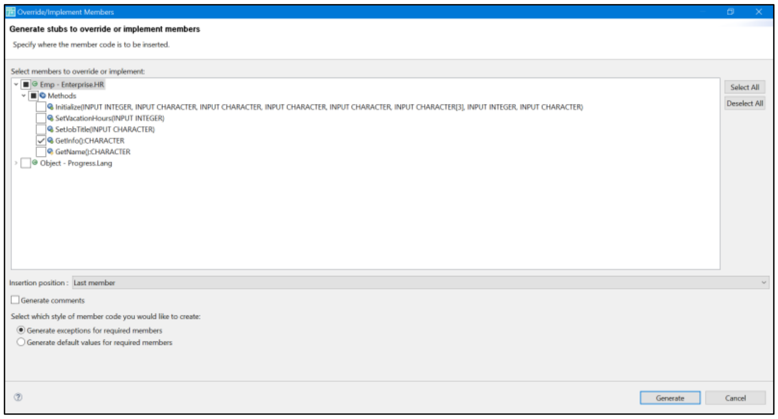
e. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.
f. Enter the output parameter as table *ttEmployee*:

Your code should appear as follows:

```
method public void GetManagersEmployees(output table
ttEmployee)
return.
end method.
```

3. Define the *public* method *GetInfo*(), which returns *character* and takes no parameters. It will override the method in the *Emp* class.

a. Place the cursor anywhere in the class.
b. Right-click and then select **Source** > **Override/Implement Members…**.
c. Navigate to and select the **GetInfo** method in the *Enterprise.HR.Emp* class.
d. Select **Last member** for the insertion position.



Override/Implement Members

Generate stubs to override or implement members

Specify where the member code is to be inserted.

Select members to override or implement:

- ■ Emp - Enterprise.HR
  - ■ Methods
    - □ Initialize(INPUT INTEGER, INPUT CHARACTER, INPUT CHARACTER, INPUT CHARACTER, INPUT CHARACTER, INPUT CHARACTER[3], INPUT INTEGER, INPUT CHARACTER)
    - □ SetVacationHours(INPUT INTEGER)
    - □ SetJobTitle(INPUT CHARACTER)
    - ☑ GetInfo():CHARACTER
    - □ GetName():CHARACTER
- □ Object - Progress.Lang

Insertion position : Last member

□ Generate comments

Select which style of member code you would like to create:

● Generate exceptions for required members

○ Generate default values for required members

e. Click **Generate**.
You can enter information in the comment that precedes the method, or you can delete it.

The code should appear as follows:

```
method override public character GetInfo():
   return super:GetInfo().
   end method.
```

4. Save your file. Ensure that the code added compiles without errors (except for the using statement for *TeamMember* class).

Solution, Part 5—Implementing the methods of the Manager class

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>

Implement the *AddTeamMember*() method that takes the parameter with type *TeamMember* to perform the following:

- Create a *ttEmployee* record.
- Set the values of the *ttEmployee* record from the input parameter.

This method should now appear as follows:

```
method public void AddTeamMember
(input ptm as TeamMember):
create ttEmployee.
assign
   ttEmployee.FirstName = ptm:FirstName
ttEmployee.LastName = ptm:LastName
ttEmployee.EmpRef = ptm.
return.
 end method.
```

</td></tr>
<tr><td>2.</td><td>

Implement the *GetInfo*() method as follows:

- Define a *character* variable named *result*.
- Set the value of *result* to be a concatenation of the value returned from *GetName*(), *" Manager"*, *Address*, *PostalCode*, *JobTitle*, and the *string* value for *VacationHours.*
- Replace the return statement (return super:GetInfo().) with return result.

The code for this method should now appear as follows:

```
method override public character GetInfo(  ):
define variable result as character no-undo.
result = GetName() + "Manager" +
           Address + " " + PostalCode + " " +
          "Job Title: " + JobTitle + " " +
           "Vacation Hours: "+ string(VacationHours).

return result.
end method.
```

</td></tr>
<tr><td>3.</td><td>

Add code to the destructor to delete all *ttEmployee* records.

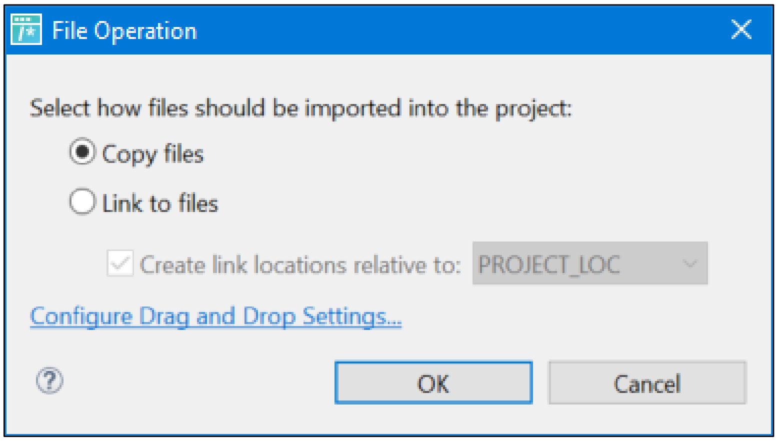
Add this code to the destructor:

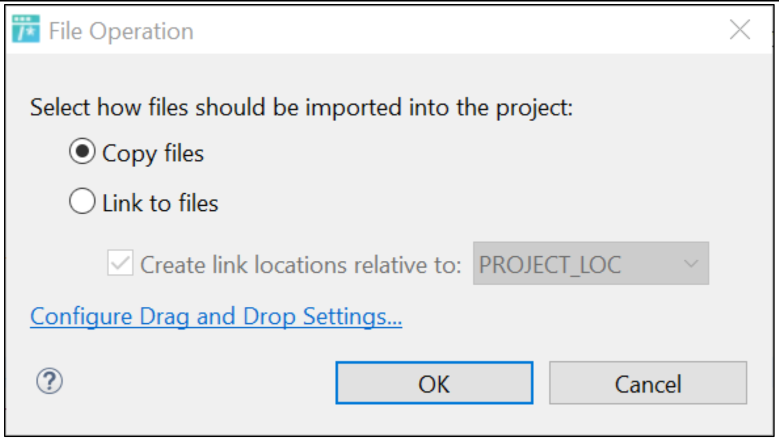
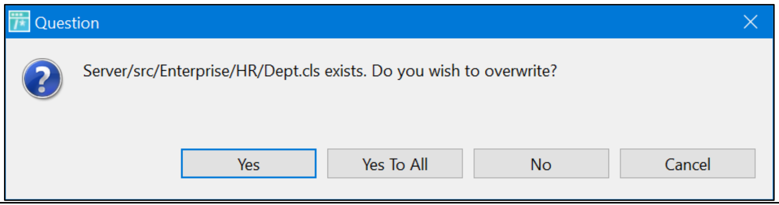
```
for each ttEmployee:
        delete ttEmployee.
end.
```

</td></tr>
</table>

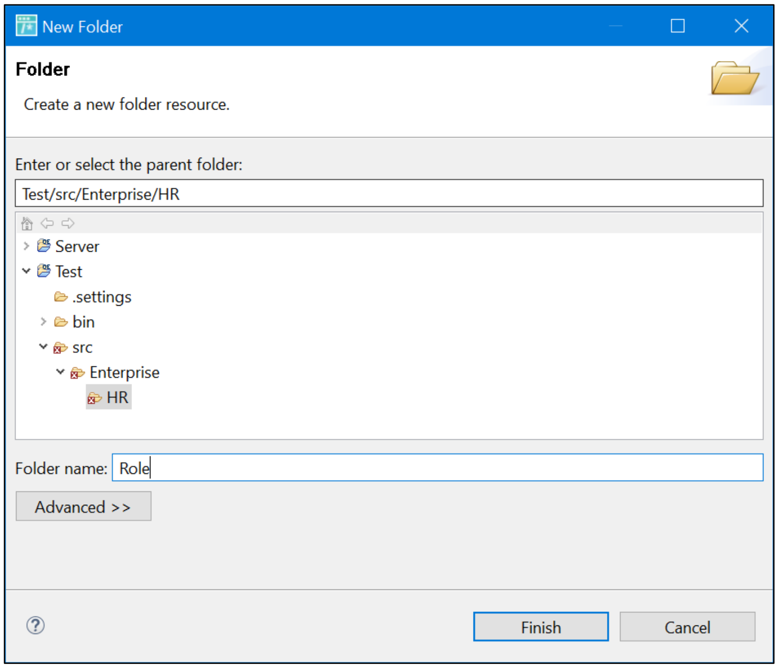
4.	Note that you need not implement the *GetManagersEmployees*() method. The ABL will automatically return the *ttEmployee* temp-table. Save your file. Ensure that it compiles without error (except for the using statement for *TeamMember* class).

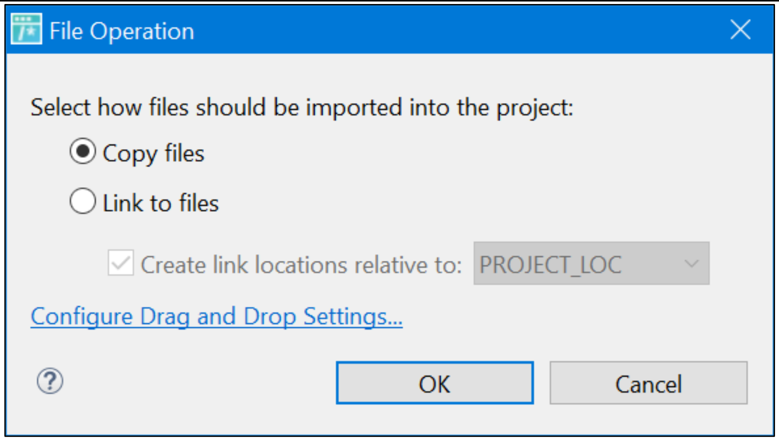
Solution, Part 6—Importing the TeamMember and Dept classes

Step	Solution instructions
1.	In the **Role** folder of the Server project, import the **TeamMember.cls** file. a. In Windows Explorer, navigate to the / **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **TeamMember.cls** file. b. Drag and drop the **TeamMember.cls** file into the **Role** folder. c. Ensure that Copy files is selected.  File Operation Select how files should be imported into the project: ● Copy files ○ Link to files ☑ Create link locations relative to: PROJECT_LOC d. Click **OK**.
2.	Clean and rebuild the Server project. Note that the compilation errors for the **Manager.cls** should now no longer exist.
3.	In the **HR** folder of the Server project, import the **Dept.cls** file. a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **Dept.cls** file. b. Drag and drop the **Dept.cls** file into the **HR** folder. c. Ensure that Copy files is selected.

	 File Operation Select how files should be imported into the project: ● Copy files ○ Link to files ☑ Create link locations relative to: PROJECT_LOC Configure Drag and Drop Settings... d. When asked if you want to replace the **Dept.cls** file, respond **Yes**.  Question Server/src/Enterprise/HR/Dept.cls exists. Do you wish to overwrite?
4.	Clean and rebuild the workspace. You should have no compilation errors in the Server project. **Note:** You will see an error in the Test project due to replacement of the **Dept.cls** file which can be ignored for now.

Solution, Part 7—Testing the inheritance hierarchy

Step	Solution instructions
1.	In the Test project, create a folder named **Role** in the Enterprise/HR directory. a. Right-click the **HR** folder of the Test project. b. Select **New>Folder**. c. Enter **Role** as the folder name.  New Folder **Folder** Create a new folder resource. Enter or select the parent folder: Test/src/Enterprise/HR Server Test .settings bin src Enterprise HR Folder name: Role Advanced >> Finish Cancel d. Click **Finish**.
2.	In the **Enterprise/HR/Role** directory of the Test project, import the procedure files named **testManager.p** and **testTeamMember.p.** a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **testManager.p** and **testTeamMember.p** files. b. Drag and drop the **testManager.p** and **testTeamMember.p** files into the **Role** folder. c. Ensure that Copy files is selected.



File Operation

Select how files should be imported into the project:

● Copy files

○ Link to files

☑ Create link locations relative to: PROJECT_LOC

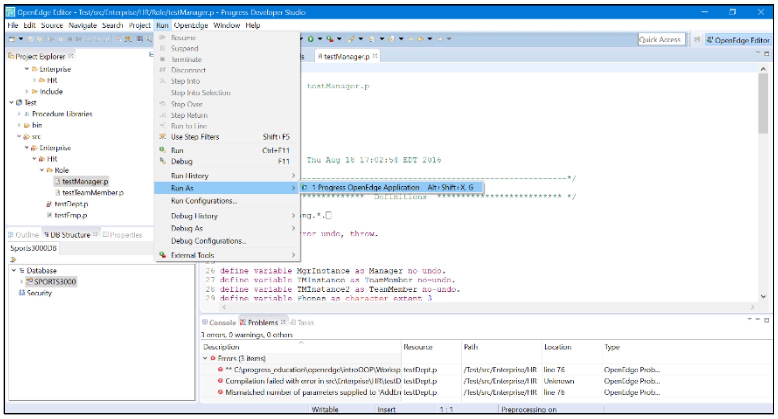
Configure Drag and Drop Settings...

d. Click OK.

3. Run **testManager.p**. Does it run correctly and was the *TeamMember* information added to the output file for each *TeamMember* under this *Manager*? View the output file.

a. With **testManager.p** open in the editor, click the **Run** icon.

b. Select **Progress OpenEdge Application**.

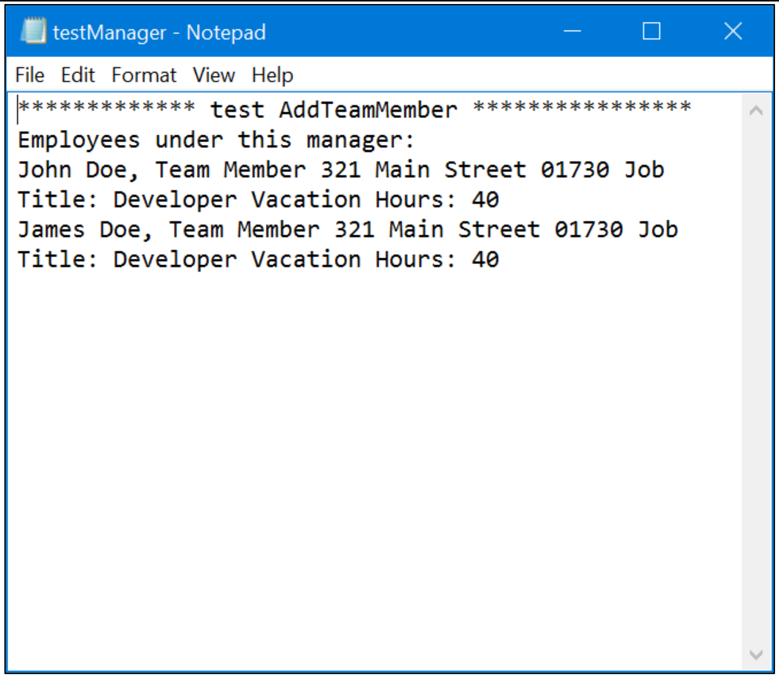


```
testManager.p

Thu Aug 18 17:02:54 EDT 2016

-------------------------------------------------------*/
*************  Definitions  ************************* */

ng.*.

ror undo, throw.

26 define variable MgrInstance as Manager no-undo.
27 define variable TMInstance as TeamMember no-undo.
28 define variable TMInstance2 as TeamMember no-undo.
29 define variable Phones as character extent 3
```

3 errors, 0 warnings, 0 others

Description	Resource	Path	Location	Type
Errors (3 items)				
** C:\progress_education\openedge\introOOP\Worksp	testDept.p	/Test/src/Enterprise/HR	line 76	OpenEdge Prob...
Compilation failed with error in src\Enterprise\HR\testD	testDept.p	/Test/src/Enterprise/HR	Unknown	OpenEdge Prob...
Mismatched number of parameters supplied to 'AddEn	testDept.p	/Test/src/Enterprise/HR	line 76	OpenEdge Prob...

c. Click **OK**.
Note: You will receive a message that the project has errors. This is because the **testdept.p** file needs to be updated (later in this try it). It does not impact the current test.

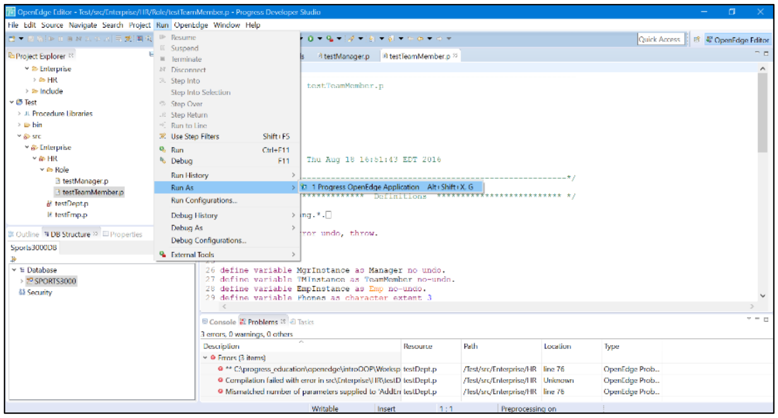


```
************* test AddTeamMember ****************
Employees under this manager:
John Doe, Team Member 321 Main Street 01730 Job
Title: Developer Vacation Hours: 40
James Doe, Team Member 321 Main Street 01730 Job
Title: Developer Vacation Hours: 40
```

4. Run **testTeamMember.p**. Does it run correctly and was the *TeamMember* added with *Manager* information? View the output file.

a. With **testTeamMember.p** open in the editor, click the **Run** icon.

b. Select **Progress OpenEdge Application**.

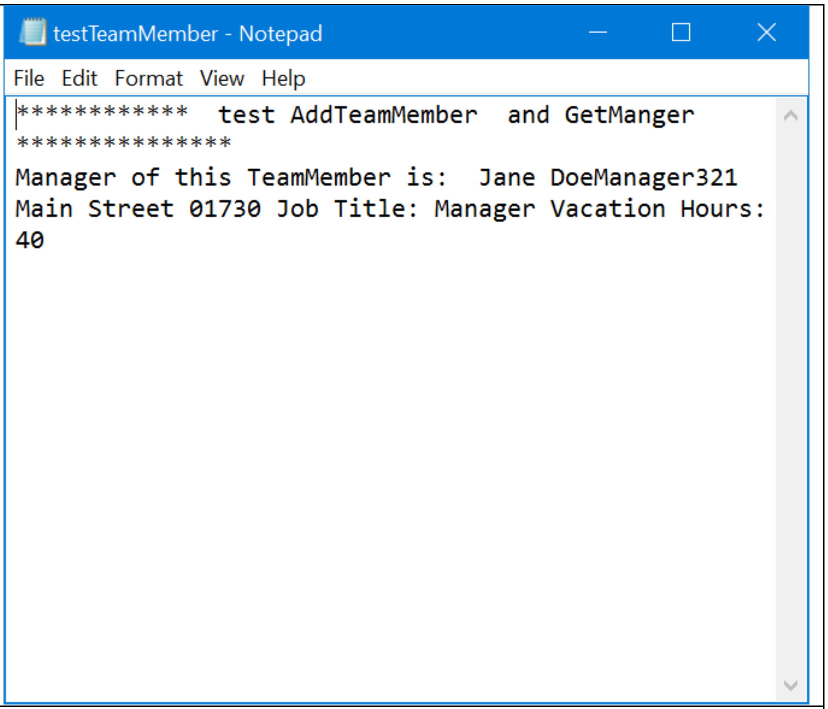
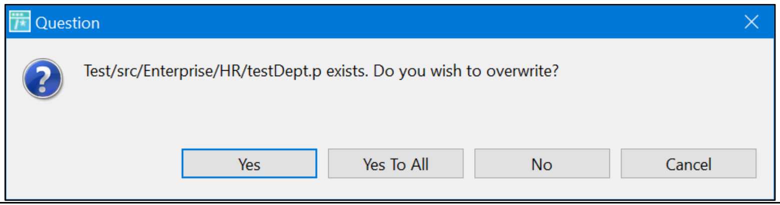


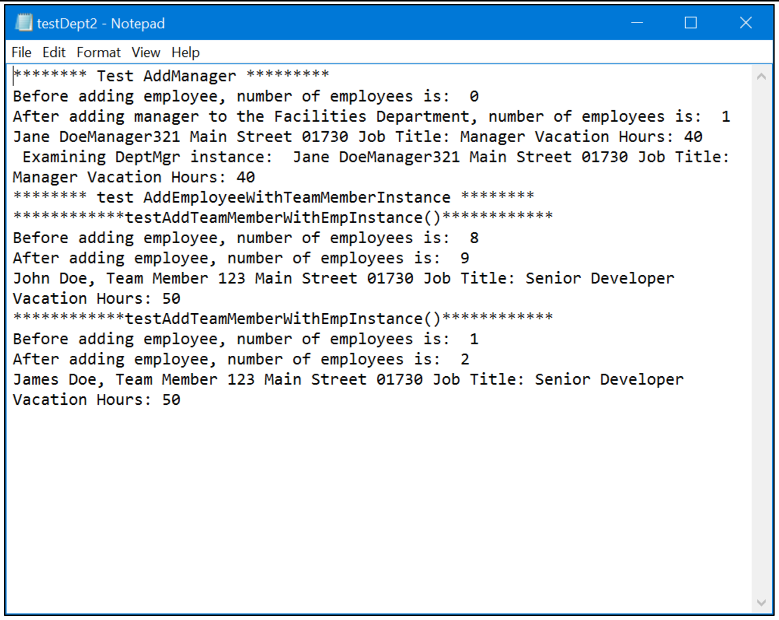
```
testTeamMember.p

Thu Aug 18 16:51:43 EDT 2016
------------------------------------------------------------*/
*************  Definitions  *************************** */
ng.*.
ror undo, throw.

26 define variable MgrInstance as Manager no undo.
27 define variable TMInstance as TeamMember no-undo.
28 define variable EmpInstance as Emp no-undo.
29 define variable Phones as character extent 3
```

3 errors, 0 warnings, 0 others

Description	Resource	Path	Location	Type
Errors (3 items)				
** C:\progress_education\openedge\introOOP\Worksp	testDept.p	/Test/src/Enterprise/HR	line 76	OpenEdge Prob...
Compilation failed with error in src\Enterprise\HR\testD	testDept.p	/Test/src/Enterprise/HR	Unknown	OpenEdge Prob...
Mismatched number of parameters supplied to 'AddEr	testDept.p	/Test/src/Enterprise/HR	line 76	OpenEdge Prob...

c. Click **OK**.
Note: You will receive a message that the project has errors. This is because the **testdept.p** file needs to be updated (later in this try it). It does not impact the current test.

	 ************ test AddTeamMember and GetManger *************** Manager of this TeamMember is: Jane DoeManager321 Main Street 01730 Job Title: Manager Vacation Hours: 40
5.	If the files did not run as expected, use the debugger to fix the problem, save your changes, and retest until it runs correctly.
6.	In the **Test/Enterprise/HR** directory, import an ABL procedure file **testDept.p**. View the file to see how each method is defined for testing. **Note**: You will replace the existing **testDept**.p file. a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **testDept.p** file. b. Drag and drop the **testDept.p** file into the **HR** folder. c. Ensure that Copy files is selected. d. Reply Yes when asked if you want to replace the existing file.  Test/src/Enterprise/HR/testDept.p exists. Do you wish to overwrite?
7.	Run **testDept.p**. Does it run correctly and does the *Dept* class execute properly? View the output file named **TestDept2.out**. a. With **testDept.p** open in the editor, click the **Run** icon. b. Select **Progress OpenEdge Application**. c. Click **OK**.
8.	If it did not run correctly, use the debugger to fix the problem, save your changes, and retest until it runs correctly.



```
******** Test AddManager *********
Before adding employee, number of employees is:  0
After adding manager to the Facilities Department, number of employees is:  1
Jane DoeManager321 Main Street 01730 Job Title: Manager Vacation Hours: 40
 Examining DeptMgr instance:  Jane DoeManager321 Main Street 01730 Job Title:
Manager Vacation Hours: 40
******** test AddEmployeeWithTeamMemberInstance ********
************testAddTeamMemberWithEmpInstance()************
Before adding employee, number of employees is:  8
After adding employee, number of employees is:  9
John Doe, Team Member 123 Main Street 01730 Job Title: Senior Developer
Vacation Hours: 50
************testAddTeamMemberWithEmpInstance()************
Before adding employee, number of employees is:  1
After adding employee, number of employees is:  2
James Doe, Team Member 123 Main Street 01730 Job Title: Senior Developer
Vacation Hours: 50
```

Try It 3.1: Using inheritance, Wrap-up

Exercise summary

In this Try It, you used the *Emp* class as a super class for the *Manager* and *TeamMember* derived classes. You then modified a data member of the *Emp* super class so that it can be used by its derived classes. Then, you created and developed the code for the *Manager* class. Next, you imported existing code for the *TeamMember* and *Dept* classes, along with test procedures for testing your class hierarchy. Finally, you tested the class hierarchy.

Try It 3.2: Using an interface class

Overview

The sample application you are working with in this course supports a Corporation that consists of a number of Business Units. Our application supports two types of Business Units – Company and Franchise.

In this Try It, you will create the *IBusinessUnit* interface class that defines the required methods of the *Company* and *Franchise* classes. You will then create the *Company* class and import the *Franchise* class. Next, you will test the classes.

This exercise has 7 parts. The exercise steps take approximately 45 minutes to complete. You perform this exercise in your live version of Progress OpenEdge.

Before you begin

Before you begin, you must:

Step	Description
1.	Complete the Exercise Setup instructions, if you have not done so already.
2.	Complete the Try It 3.1.

Location of files:
Exercise files: **/progress_education/openedge/IntroOOP/Exercise/Lesson03**
Solution files: **/progress_education/openedge/IntroOOP/Solutions/Lesson03**

If at any time during this course, you need to restore your projects to match where you should have been prior to beginning a Try It, you can do the following:

1. Delete all projects in the workspace.
2. Import all projects in the archive (**.zip**) file for the previous Try It.
3. Do a clean build of your workspace.

Part 1—Creating the IBusiness Unit interface class

In this part of the Try It, you will create the *IBusiness Unit* interface class.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, in the Server project, create a new folder named **BusinessUnit** under the **src/Enterprise** folder.
2.	In Project Explorer, navigate to the **Enterprise/BusinessUnit** directory.
3.	In this directory, create an interface class named *IBusinessUnit*. This class will define a set of properties and methods for the *Company* and *Franchise* classes. **Hint**: Use the *New ABL Interface* wizard.
4.	Add a *using* statement after the error-handling statement. This *using* statement will ensure that the *Dept* class can be accessed.

Part 2—Defining data members for the IBusiness Unit interface class

Next, you will define the data members for the *IBusiness Unit* interface class.

If you need help, view the Solution.

Step	Task
1.	Define these properties as *public* with *private* setters: • *Name* as *character* • *NumDepartments* as *Integer*
2.	Save your file. Ensure that it compiles without errors.

Part 3—Defining methods for the IBusiness Unit interface class

Next, you will define the methods for the *IBusiness Unit* interface class.

If you need help, view the Solution.

Step	Task
1.	Define the public *AddDepartment*() method with return type *void*. The input parameter for this method will be *pDept* of type *Dept*.
2.	Define the public *GetDepartment* method with return type *Dept*. It has a single *input* parameter, *pDeptCode*, of type *character*.
3.	Define the public *NumberEmployees*() method, which returns *integer* and takes no parameters.
4.	Save your file. Ensure that it compiles without errors.

Part 4—Creating the Company class

In this part of the Try It, you will create the *Company* class. This class will implement the *IBusinessUnit* class. Before you add the *Company* class, you will import the include file for the *ttDepartment* temp-table, which will be a data member in the *Company* class.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, navigate to the **Include** sub-folder under the **src** folder.
2.	In the **Include** folder, import the **ttDepartment.i** file.
3.	In Project Explorer, navigate to the **Enterprise/BusinessUnit** directory.
4.	In this directory, create a class named *Company*. This class will implement the *IBusiness* unit interface class and have a default constructor and destructor that you will later modify to take parameters. **Hint**: Use the *New ABL Class* wizard.
5.	Add a *using* statement before the error-handling statement that will ensure that the *Dept* class can be accessed.
6.	Define the *private* temp-table by including the *ttDepartment* temp-table definition.

Part 5—Implementing a constructor, a destructor, and methods for the Company class

Next, you will modify the constructor and the destructor, and define methods for the *Company* class.

If you need help, view the Solution.

Step	Task
1.	Modify the default constructor to take as *input* parameters *pCompanyName* which is of type *character*. In the constructor, assign the *Name* property from the value of *pCompanyName*. Assign *NumDepartments* a value of 0.
2.	Modify the *public AddDepartment*() method that returns *void*. Create a ttDepartment record in the temp-table and assign values to it using the input parameter. Increment the value of NumDepartments by 1. **Hint**: Replace the undo, throw statement with your own code.
3.	Modify the *public* method *GetDepartment*() that returns an instance of *Dept* and takes the department code input parameter. Use a find statement to find the department record in the *ttDepartment* temp-table based upon the input parameter. If the record is found, return a *Dept* instance. **Hints**: You will need to cast the *Object* in the temp-table to the *Dept* class. Replace the undo, throw statement with your own code.
4.	Modify the *public* method *NumberEmployees*() that returns *integer*. Add statements to: • Define an *integer* variable named *iNumEmployees*. • Iterate through each *ttDepartment* record to retrieve the number of employees for each department. You will need to cast the *DeptRef* field to the *Dept* class to call *NumEmployees*() for the instance. Add this number to *iNumEmployees*. **Hint**: Replace the undo, throw statement with your own code.
5.	Add code to the destructor to delete all the created *Department* objects and records in the *ttDepartment* temp-table.
6.	Save your file. Ensure that it compiles without errors.

Part 6—Importing the Franchise class

In this part of the Try It, you will import the **Franchise.cls** file. This class also implements the *IBusinessUnit* class.

If you need help, view the Solution.

Step	Task
1.	In the **Role** folder of the Server project, import the **Franchise.cls** file.
2.	Clean and rebuild the Server project.

Part 7—Testing the classes

In this part of the Try It, you will import the **testCompany.p** and **testFranchise.p** procedure files for testing the *Company* and *Franchise* classes. Then, you will test them one by one.

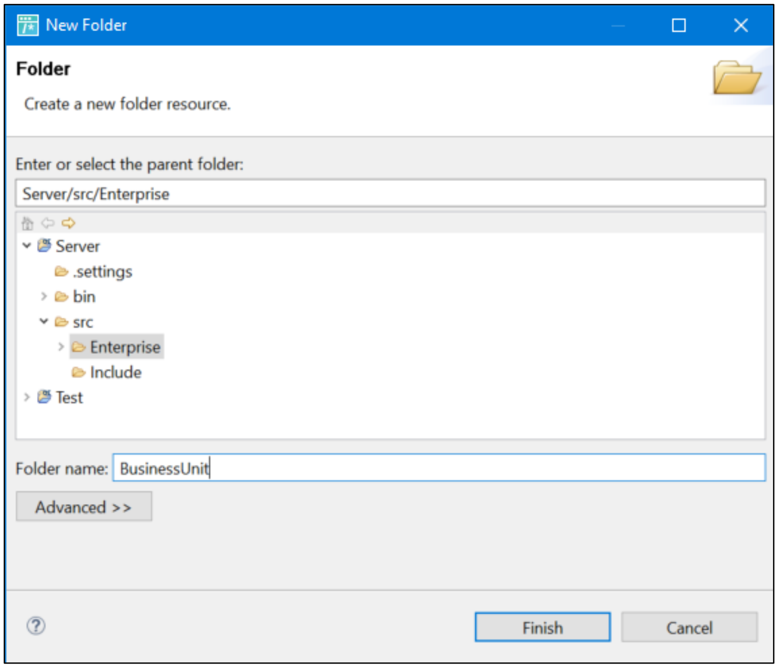
The **testCompany.p** file has a *Company* instance, *CompanyInstance*. This file tests the methods of the *Company* class and uses *message* statements to write data to a file. The **testFranchise.p** file has a *Franchise* instance, *FranchiseInstance*. This file tests the methods of the *Franchise* class and uses *message* statements to write data to a file.

You can view the test procedure files to see how they are written.

If you need help, view the Solution.

Step	Task
1.	In the Test project, create a folder named **BusinessUnit** in the Enterprise directory.
2.	In the **Enterprise/BusinessUnit** directory of the Test project, import the procedure files named **testCompany.p** and **testFranchise.p.**
3.	Run **testCompany.p**. Does it run correctly and was the *Company* information added to the output file? View the output file.
4.	Run **testFranchise.p**. Does it run correctly and was the *Franchise* information added to the output file? View the output file.
5.	If the files did not run as expected, use the debugger to fix the problem, save your changes, and retest until they run correctly.

Solution, Part 1—Creating the IBusiness Unit interface class

Step	Solution instructions
1.	In Project Explorer, in the **Server** project, create a new folder named **BusinessUnit** under the **src/Enterprise** folder. a. Right-click **src>Enterprise**. b. Select **New** > **Folder**. c. Enter **BusinessUnit** for the Folder name.  New Folder Folder Create a new folder resource. Server .settings bin src Enterprise Include Test Advanced >> Finish Cancel Enter or select the parent folder: Server/src/Enterprise Folder name: BusinessUnit d. Click **Finish**.
2.	In Project Explorer, navigate to the **Enterprise/BusinessUnit** directory.
3.	In this directory, create an interface class named *IBusinessUnit*. This class will be a template with a set of properties and methods for the *Company* and *Franchise* classes that you will create later in this Try It. **Hint**: Use the *New ABL Interface* wizard. a. Right-click **BusinessUnit** b. Select **New** > **ABL Interface**. c. Enter **IBusinessUnit** for the Interface name. d. You can optionally add information to the description. e. Click **Finish**. The **IBusinessUnit.cls** file opens in the editor.

<table>
<tr><td>4.</td><td>

The generated file should appear as follows:

```
/*---------------------------------------
    File        : IBusinessUnit
    Purpose     :
    Syntax      :
    Description :
    Author(s)   : haribabu
    Created     : Fri Aug 26 11:07:43 IST 2016 --------
----------------------*/
using Progress.Lang.*.
interface Enterprise.BusinessUnit.IBusinessUnit:
end interface.
```

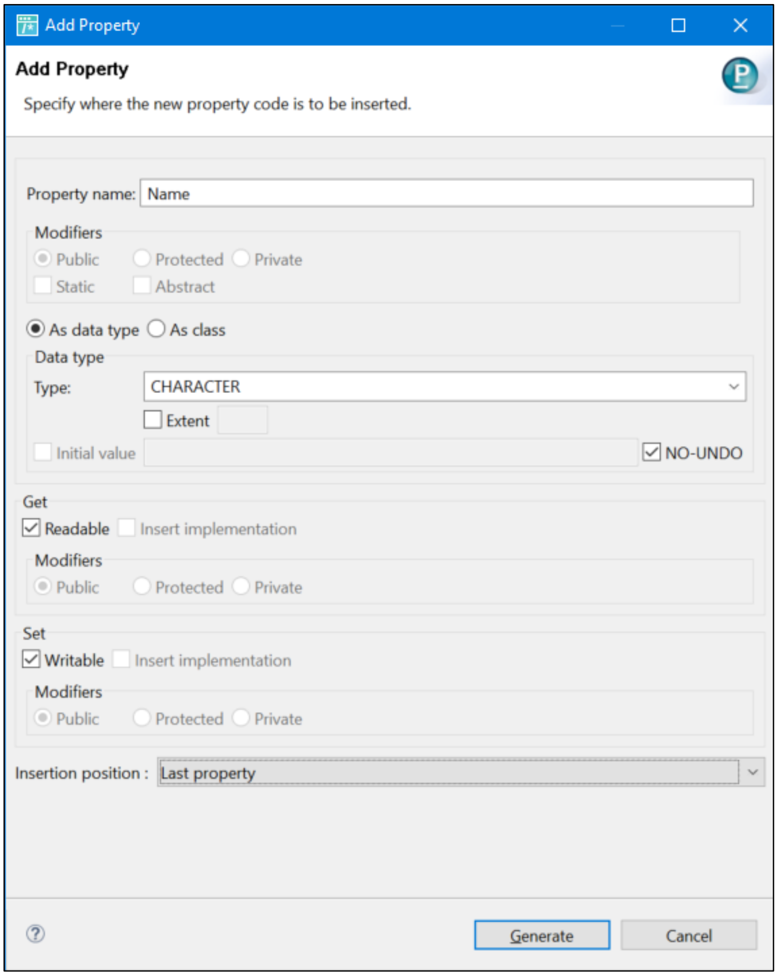
</td></tr>
<tr><td>5.</td><td>

Add a *using* statement after the error-handling statement. This *using* statement will ensure that the *Dept* class can be accessed.

```
using Progress.Lang.*.
using Enterprise.HR.Dept.
```

</td></tr>
</table>

Solution, Part 2—Defining data members for the IBusinessUnit interface class

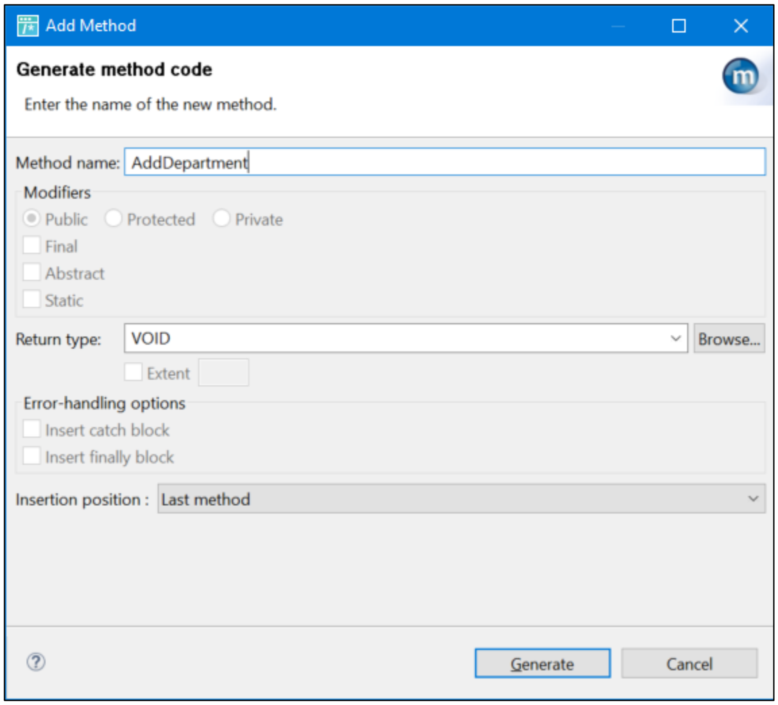
Step	Solution instructions
1.	Define these properties that will be *public*. • *Name* as *character* • *NumDepartments* as *integer* **Hint**: Use the *Add Property* wizard. a. **Right-click** anywhere in the **IBusinessUnit.cls** file and then select **Source** > **Add Property**. The Add Property wizard opens. b. Enter **Name** for the Property name. c. Select the **CHARACTER** data type for the property from the drop-down list. d. Select **Last Property** for the insertion position.  Add Property **Add Property** Specify where the new property code is to be inserted. Property name: Name Modifiers ● Public ○ Protected ○ Private □ Static □ Abstract ● As data type ○ As class Data type Type: CHARACTER □ Extent □ Initial value ☑ NO-UNDO Get ☑ Readable □ Insert implementation Modifiers ● Public ○ Protected ○ Private Set ☑ Writable □ Insert implementation Modifiers ● Public ○ Protected ○ Private Insertion position : Last property Generate Cancel e. Click **Generate**.

<table>
<tr><td></td><td>Repeat these steps for the definition of the <i>NumDepartments</i> property, making sure you select the <i>integer</i> type.

The generated code should appear as follows:
<pre>
define public property Name as character no-undo
       get.
       set.

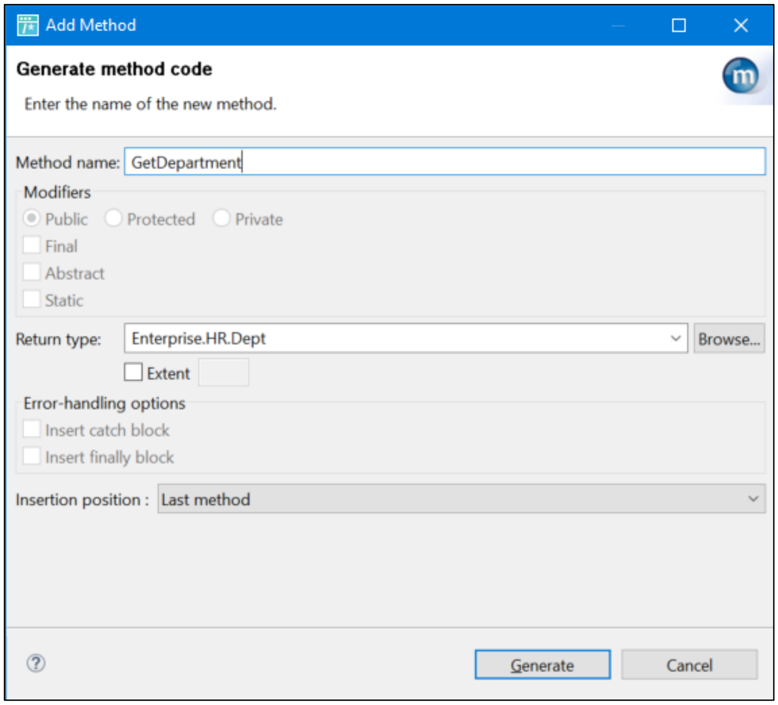
define public property NumDepartments as integer no-
undo
    get.
    set.
</pre></td></tr>
<tr><td>2.</td><td>Save your file. Ensure that it compiles without errors.</td></tr>
</table>

Solution, Part 3—Defining methods for the IBusinessUnit interface class

Step	Solution instructions
1.	Define the public *AddDepartment*() method with return type *void*. The input parameters for this method will be *pDept* of type *Dept*. a. Place the cursor anywhere in the file. b. Right-click and then select **Source** > **Add Method**. c. Enter the method name as **AddDepartment**.  Add Method **Generate method code** Enter the name of the new method. Method name: AddDepartment Modifiers ● Public ○ Protected ○ Private □ Final □ Abstract □ Static Return type: VOID Browse... □ Extent Error-handling options □ Insert catch block □ Insert finally block Insertion position : Last method Generate Cancel d. Click **Generate**. You can enter information in the comment that precedes the method, or you can delete it. e. Specify **input pDept** as **Dept** for the parameter. The definition of this method should be as follows: `method public void AddDepartment(input pDept as Dept).`

<table>
<tr><td>2.</td><td>
Define the public <i>GetDepartment</i> method with return type <i>Dept</i>. It has a single <i>input</i> parameter, <i>pDeptCode</i>, of type <i>character</i>.

a. Place the cursor anywhere in the source file.
b. Right-click and then select <b>Source</b> &gt; <b>Add Method</b>.
c. Enter the method name as <b>GetDepartment</b>.
d. Browse and select <b>Dept (Enterprise.HR.Dept)</b> as return type.



Add Method

Generate method code

Enter the name of the new method.

Method name: GetDepartment

Modifiers
● Public ○ Protected ○ Private
□ Final
□ Abstract
□ Static

Return type: Enterprise.HR.Dept
□ Extent

Error-handling options
□ Insert catch block
□ Insert finally block

Insertion position : Last method

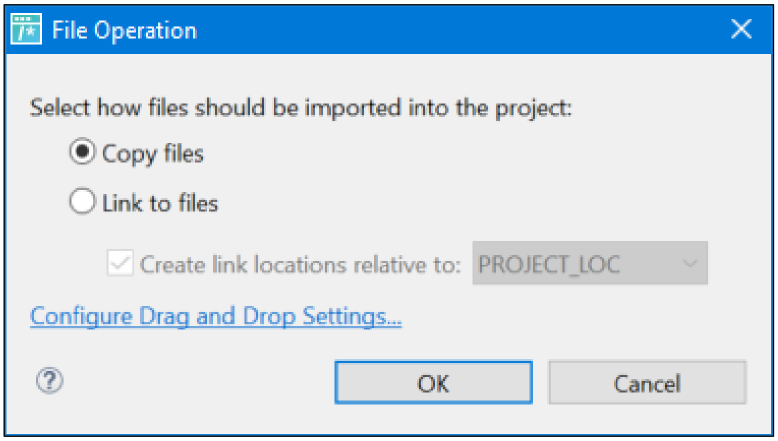
e. Click <b>Generate</b>.
You can enter information in the comment that precedes the method, or you can delete it.
f. Specify <b>input pDeptCode as character</b> for the parameter.

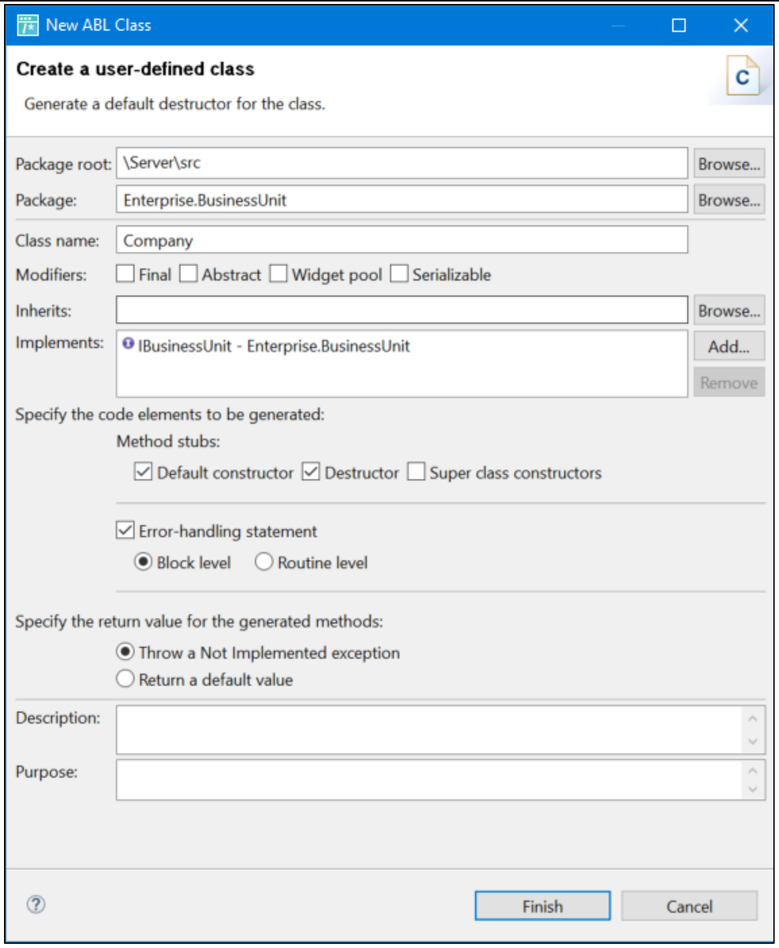
The definition of this method should be as follows:

```
method public Enterprise.HR.Dept GetDepartment(input
pDeptCode as character).
```
</td></tr>
<tr><td>3.</td><td>
Define the public <i>NumberEmployees</i>() method, which returns <i>integer</i> and takes no parameters.

```
method public integer NumberEmployees().
```
</td></tr>
<tr><td>4.</td><td>Save your file. Ensure that it compiles without errors.</td></tr>
</table>

Solution, Part 4—Creating the Company class

Step	Solution instructions
1.	In Project Explorer, navigate to the **Include** sub-folder under the **src** folder.
2.	In this Include folder, import the **ttDepartment.i** file. a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP /Exercise/Lesson03** directory and select the **ttDepartment.i** file. b. Drag and drop the **ttDepartment.i** file into the **Include** folder. c. Ensure that Copy files is selected.  File Operation Select how files should be imported into the project: ● Copy files ○ Link to files ☑ Create link locations relative to: PROJECT_LOC Configure Drag and Drop Settings... OK Cancel d. Click **OK**.
3.	In Project Explorer, navigate to the **Enterprise/BusinessUnit** directory.
4.	In this directory, create a class named *Company*. This class will implement the *IBusiness* unit interface class and have a default constructor and destructor that you will later modify to take parameters. **Hint**: Use the *New ABL Class* wizard. a. Select **Enterprise/BusinessUnit**. b. Right-click **BusinessUnit**. c. Select **New** > **ABL Class**. d. Enter **Company** for the Class name. e. Add **IBusinessUnit** interface class in the **Implements** field. f. Select **Default constructor**. g. Select **Destructor**. You can optionally add information to the description.



Create a user-defined class

Generate a default destructor for the class.

Package root: \Server\src

Package: Enterprise.BusinessUnit

Class name: Company

Modifiers: □ Final □ Abstract □ Widget pool □ Serializable

Inherits:

Implements: IBusinessUnit - Enterprise.BusinessUnit

Specify the code elements to be generated:

Method stubs:

☑ Default constructor ☑ Destructor □ Super class constructors

☑ Error-handling statement

● Block level ○ Routine level

Specify the return value for the generated methods:

● Throw a Not Implemented exception

○ Return a default value

Description:

Purpose:

h. Click **Finish**. The **Company.cls** file opens in the editor.

4. The generated code should be as follows:

Note: The methods are implemented from the IBusinessUnit interface class. However, the methods need to be implemented.

```
using Progress.Lang.*.
using Enterprise.BusinessUnit.IBusinessUnit.
block-level on error undo, throw.
class Enterprise.BusinessUnit.Company implements
IBusinessUnit:
       define public property Name as character no-undo
       get.
       set.
define public property NumDepartments as integer no-undo
       get.
       set.
       constructor public Company (  ):
              super ().
       end constructor.
       method public void AddDepartment( input pDept as
Enterprise.HR.Dept )
              undo, throw new
Progress.Lang.AppError("METHOD NOT IMPLEMENTED").
       end method.
       method public Enterprise.HR.Dept
GetDepartment(input pDeptCode as character ):
       undo, throw new Progress.Lang.AppError("METHOD NOT
IMPLEMENTED").
       end method.
       method public integer NumberEmployees(  ):

              undo, throw new
Progress.Lang.AppError("METHOD NOT IMPLEMENTED").
       end method.
       destructor public Company ( ):
       end destructor.
end class.
```

5. Add a *using* statement before the error-handling statement. This *using* statement will ensure that the *Dept* class can be accessed.

```
using Enterprise.HR.Dept.
```

6. Define the *private* temp-table by including the ttDepartment temp-table definition.

a. In the editor, place the cursor at a blank line before the constructor.

b. Add this code to the class file:

```
{include/ttDepartment.i &ClassAccess = "private"}
```

Solution, Part 5—Implementing a constructor, a destructor, and methods for the Company class

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>

Modify the default constructor to take as *input* parameter *pCompanyName*, which is of type *character*. In the constructor, assign the *Name* property from the value of *PCompanyName*. Assign *NumDepartments* a value of 0.

a. Place your cursor in the parameters area for the constructor.
b. Add code for this parameter:
c. Add an assign statement to set the *Name* and *NumDepartments* properties.

The code for the constructor should appear as follows:

```
constructor public Company (input pCompanyName as
character):
             super ().
              assign
         Name = pCompanyName
         NumDepartments = 0
           .
end constructor.
```

</td></tr>
<tr><td>2.</td><td>

Modify the public *AddDepartment*() method that returns *void*. Create a *ttDepartment* record in the temp-table and assign values to it using the input parameter. Increment the value of *NumDepartments* by 1.

Hint: Replace the undo, throw statement with your own code.

The code for this method should appear as follows:

```
method public void AddDepartment( input pDept as
Enterprise.HR.Dept ):
             create ttDepartment.
             assign
                ttDepartment.Name = pDept:DeptName
                ttDepartment.DeptCode = pDept:DeptCode
                ttDepartment.DeptRef = pDept
                NumDepartments = NumDepartments + 1.
              .
     return.
end method.
```

</td></tr>
<tr><td>3.</td><td>

Modify the *public* method *GetDepartment*() that returns an instance of *Dept* and takes the department code input parameter. Use a *find* statement to find the department record in the *ttDepartment* temp-table based upon the input parameter. If the record is found, return a *Dept* instance.

Hints: You will need to cast the *Object* in the temp-table to the *Dept* class. Replace the undo, throw statement with your own code.

The code for this method should appear as follows:

</td></tr>
</table>

```
method public Enterprise.HR.Dept GetDepartment( input
pDeptCode as character ):
find ttDepartment where ttDepartment.DeptCode =
pDeptCode no-error.
if available(ttDepartment)
             then return.
cast(ttDepartment.DeptRef,Dept).
             else return ?.
end method.
```

4. Modify the *public* method *NumberEmployees*() that returns *integer*. Add statements to:

- Define an *integer* variable named *iNumEmployees*.
- Iterate through each *ttDepartment* record to retrieve the number of employees for each department. You will need to cast the *DeptRef* field to the *Dept* class to call *NumEmployees*() for the instance. Add this number to *iNumEmployees*.

Hint: Replace the undo, throw statement with your own code.

The code for this method should appear as follows:

```
method public integer NumberEmployees(  ):

       define variable iNumEmployees as integer no-undo
initial 0.
       for each ttDepartment:
                  iNumEmployees =
cast(ttDepartment.DeptRef,Dept):NumEmployees +
iNumEmployees.
        end.
        return iNumEmployees.
end method.
```

5. Add code to the destructor to delete all the created Department objects and records in the *ttDepartment* temp-table.

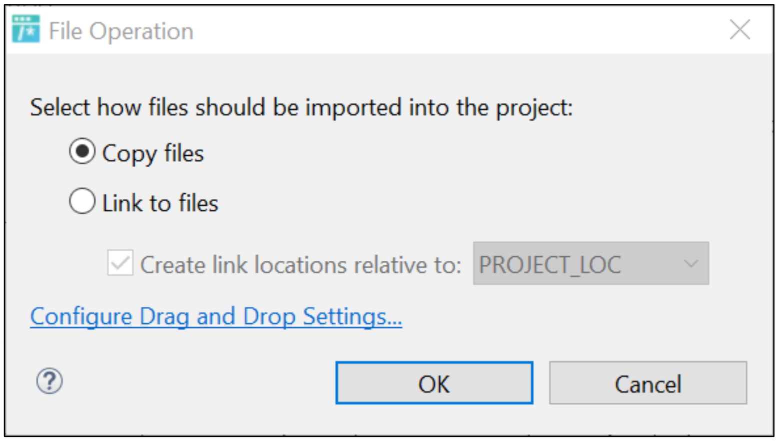
The code for the destructor should appear as follows:

```
destructor public Company ( ):
       /* delete all the Department objects */
       for each ttDepartment:
          delete object
cast(ttDepartment.DeptRef,Dept).
          delete ttDepartment.
       end.
end destructor.
```

6. Save your file. Ensure that it compiles without errors.

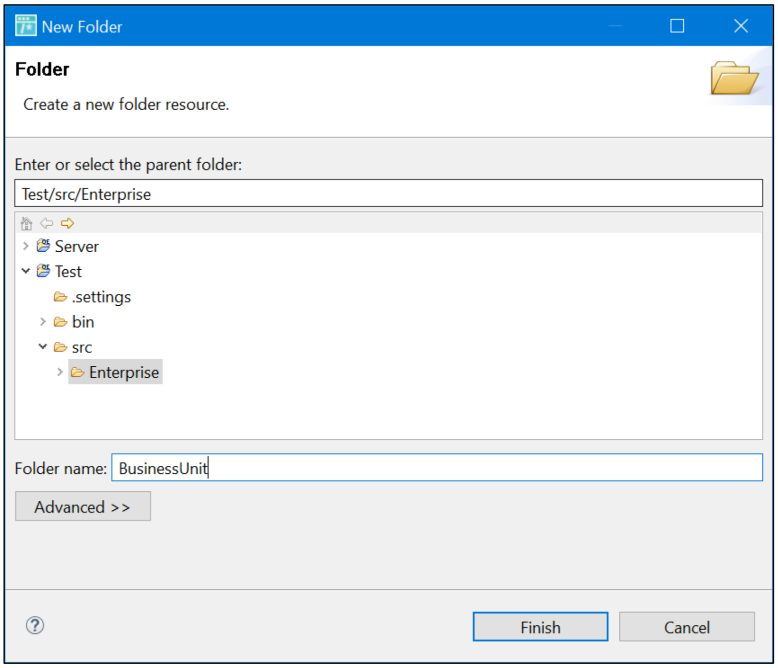
Solution, Part 6—Importing the Franchise class

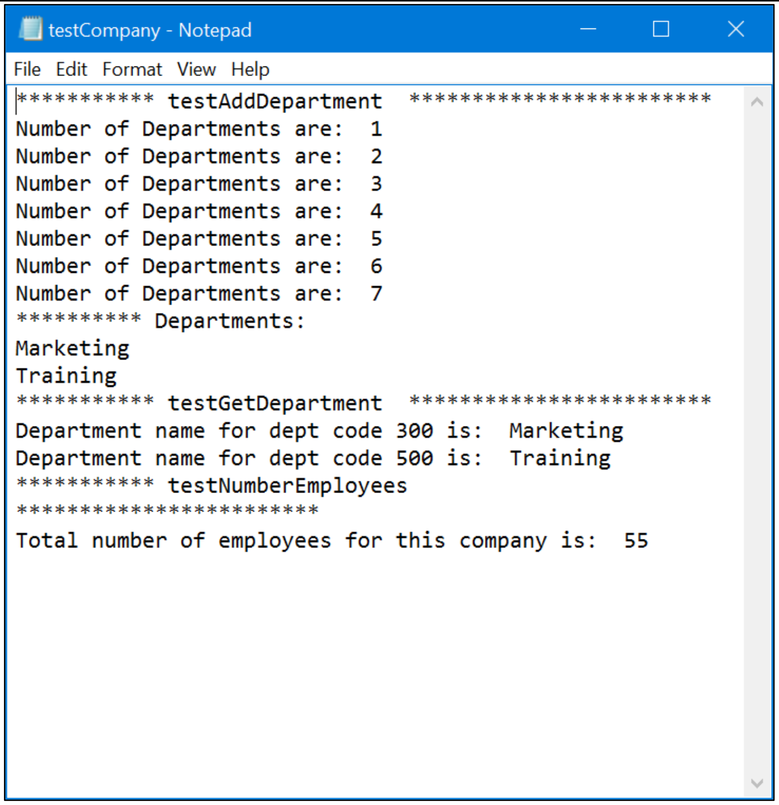
Step	Solution instructions

1.	In the BusinessUnit folder of the Server project, import the Franchise.cls file.
	a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **Franchise.cls** file.
	b. Drag and drop the **Franchise.cls** file into the **BusinessUnit** folder.
	c. Ensure that Copy files is selected.
	
	File Operation
	Select how files should be imported into the project:
	● Copy files
	○ Link to files
	☑ Create link locations relative to: PROJECT_LOC
	
	d. Click OK.
	Note: This is what the beginning of the file should look like.
	`/*----------------------------------------`
	`    File         : Franchise`
	`    Purpose      :`
	`    Syntax       :`
	`    Description  :`
	`    Author(s)    :`
	`    Created      : Fri Aug 19 14:45:07 EDT 2016`
	`---------------------------------------*`
	`block-level on error undo, throw.`
	`using Enterprise.BusinessUnit.Franchise from propath.`
	`using Enterprise.BusinessUnit.IBusinessUnit from propath.`
	`using Enterprise.HR.Dept from propath.`
	`using Enterprise.HR.Emp from propath.`
	`class Enterprise.BusinessUnit.Franchise implements`
	`IBusinessUnit:`

2.	Clean and rebuild the Server project.

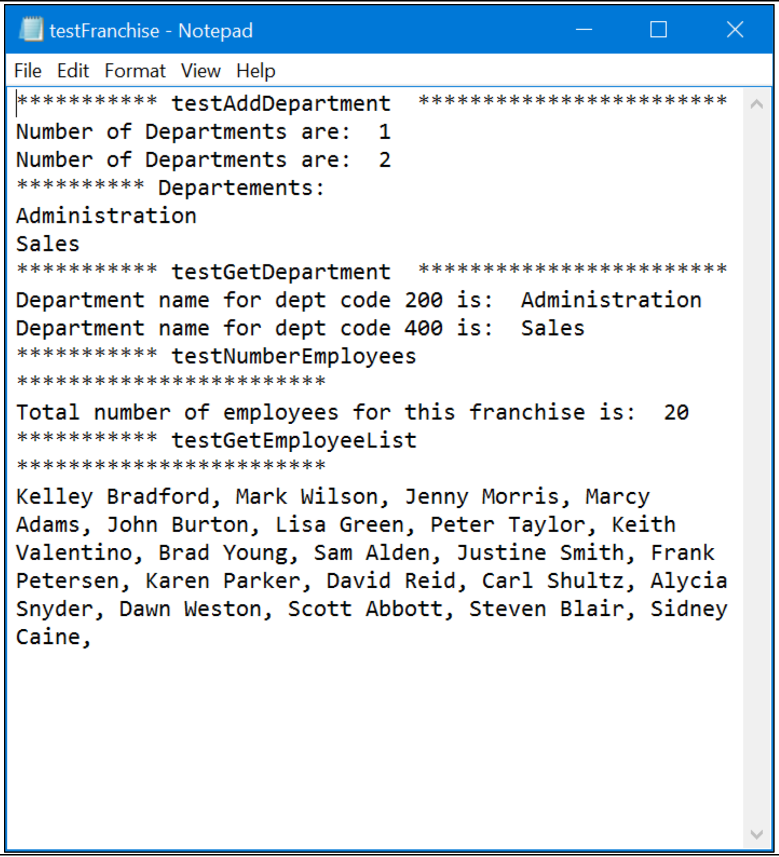
Solution, Part 7—Testing the classes

Step	Solution instructions
1.	In the Test project, create a folder named **BusinessUnit** in the Enterprise directory. a. Right-click the **Enterprise** folder of the Test project. b. Select **New>Folder**. c. Enter **BusinessUnit** as the folder name.  Folder Create a new folder resource. Enter or select the parent folder: Test/src/Enterprise Folder name: BusinessUnit New Folder Server Test .settings bin src Enterprise Advanced >> Finish Cancel d. Click **Finish**.
2.	In the **Enterprise/BusinessUnit** directory of the Test project, import the procedure files named **testCompany.p** and **testFranchise.p.** a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **testCompany.p** and **testFranchise.p** files. b. Drag and drop the **testCompany.p** and **testFranchise.p** files into the **BusinessUnit** folder. c. Ensure that Copy files is selected. d. Click **OK**.
3.	Run **testCompany.p**. Does it run correctly and was the *Company* information added to the output file? View the output file. a. With **testCompany.p** open in the editor, click the **Run** icon. b. Select **Progress OpenEdge Application**. c. Click **OK**.



```
*********** testAddDepartment  ************************
Number of Departments are:  1
Number of Departments are:  2
Number of Departments are:  3
Number of Departments are:  4
Number of Departments are:  5
Number of Departments are:  6
Number of Departments are:  7
********** Departments:
Marketing
Training
*********** testGetDepartment  ************************
Department name for dept code 300 is:  Marketing
Department name for dept code 500 is:  Training
*********** testNumberEmployees
************************
Total number of employees for this company is:  55
```

4.	Run **testFranchise.p**. Does it run correctly and was the *Franchise* information added to the output file? View the output file. a. With **testFranchise.p** open in the editor, click the **Run** icon. b. Select **Progress OpenEdge Application**. c. Click **OK**.



```
*********** testAddDepartment  ************************
Number of Departments are:  1
Number of Departments are:  2
********** Departements:
Administration
Sales
*********** testGetDepartment  ************************
Department name for dept code 200 is:  Administration
Department name for dept code 400 is:  Sales
*********** testNumberEmployees
************************
Total number of employees for this franchise is:  20
*********** testGetEmployeeList
************************
Kelley Bradford, Mark Wilson, Jenny Morris, Marcy
Adams, John Burton, Lisa Green, Peter Taylor, Keith
Valentino, Brad Young, Sam Alden, Justine Smith, Frank
Petersen, Karen Parker, David Reid, Carl Shultz, Alycia
Snyder, Dawn Weston, Scott Abbott, Steven Blair, Sidney
Caine,
```

5. If the files did not run as expected, use the debugger to fix the problem, save your changes, and retest until they run correctly.

Try It 3.2: Using an interface class, Wrap-up

Exercise summary

In this Try It, you created the *IBusinessUnit* class as an interface class that defines the required methods of the *Company* and *Franchise* classes. You then created the *Company* class and imported the *Franchise* class which use the interface class and tested them.

Try It 3.3: Using a singleton and creating classes dynamically

Overview

In this Try It, you will import the *Corporation* class and add a static data member and a static constructor to it so that it can be used as a singleton. Then, you will add code to the *Corporation* class to create the business unit instances (of types *Company* and *Franchise*) of the corporation dynamically. The *Corporation* instance will be created automatically when the AVM detects the first use of *Corporation*.

This exercise has 5 parts. The exercise steps take approximately 30 minutes to complete. You perform this exercise in your live version of Progress OpenEdge.

Before you begin

Before you begin, you must:

Step	Description
1.	Complete the Exercise Setup instructions, if you have not done so already.
2.	Complete the Try It 3.2.

Location of files:
Exercise files: **/progress_education/openedge/IntroOOP/Exercise/Lesson03**
Solution files: **/progress_education/openedge/IntroOOP/Solutions/Lesson03**

If at any time during this course, you need to restore your projects to match where you should have been prior to beginning a Try It, you can do the following:

1. Delete all projects in the workspace.
2. Import all projects in the archive (**.zip**) file for the previous Try It.
3. Do a clean build of the workspace.

Part 1—Importing the Corporation class and the ttBusinessUnit include file

In this part of the Try It, you will import the *Corporation* class and the *ttBusinessUnit* include file that you will use in this exercise.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, navigate to the **Enterprise** directory and import the **Corporation.cls** file. **Note**: You will see compilation errors that will be resolved as you add code to the file.
2.	Navigate to the **Include** directory and import the **ttBusinessUnit.i** file. This file contains the temp-table definition for a set of business units. Each record in the temp-table will hold a reference to an instance of a business unit.

Part 2—Defining static data members for the Corporation class

Next, you will define the static data members for the *Corporation* class.

If you need help, view the Solution.

Step	Task
1.	Define static properties that will be *public* with *private* setters: • *CorpID* as *character* • *Instance* as *Enterprise.Corporation* **Hints**: Use the *Add Property* wizard. Each setter will have an implementation that enables the property to be set.
2.	Add code in the implementation for the set accessor for the *CorpID* property to set its value from the input *arg* parameter.
3.	Add code in the implementation for the set accessor for the *Instance* property to set its value from the input *arg* parameter.

Part 3—Defining a static constructor for the Corporation class

Next, you will modify the default constructor and define a static constructor for the *Corporation* class.

If you need help, view the Solution.

Step	Task
1.	Modify the default constructor to set the *CorpID* property to "*Progress Software Corporation"*.
2.	Define a static constructor for the *Corporation* class to create a new instance of *Corporation* and assign it to the *Instance* property.

Part 4—Adding code to the InitializeBusinessUnit() method to create instances dynamically

Next, you will add code to the *for each* block of the *InitializeBusinessUnits()* method to create *Company* or *Franchise* instances dynamically.

If you need help, view the Solution.

Step	Task
1.	Locate the public *InitializeBusinessUnits*() method and view the code that is there already. This code iterates through all business unit records in the *ttBusinessUnit* temp-table. It reads a department JSON file to initialize the departments for each business unit.
2.	In the *InitializeBusinessUnits*() method, add code at the beginning of the *for each* block to test if a business unit is of type *Company*. To do this, you will test the value of the type field in the *ttBusinessUnit* temp-table. If the business unit is of type *Company*, add a statement to create a new *Company* object dynamically. Otherwise, create a new *Franchise* object dynamically.
3.	Save your file. Ensure that it compiles without errors.

Part 5—Testing the Corporation class

The **testCorporation.p** file will test if the static *Corporation* instance is created automatically and if instances of *Company* and *Franchise* are accessible. The procedure file also uses message statements to write data to a file.

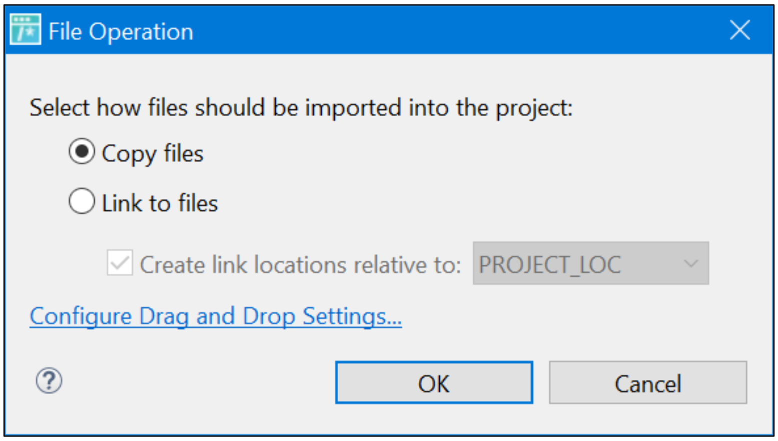
You can view the test procedure file to see how it is written.

If you need help, view the Solution.

Step	Task
1.	In the **Enterprise** folder of the Test project, import the procedure file named **testCorporation.p.**
2.	Run **testCorporation.p**. Does it run correctly and was the *Corporation* information added to the output file? View the output file.
3.	If the file did not run as expected, use the debugger to fix the problem, save your changes, and retest until it runs correctly.

Solution, Part 1—Importing the Corporation class and the ttBusinessUnit include file

Step	Solution instructions

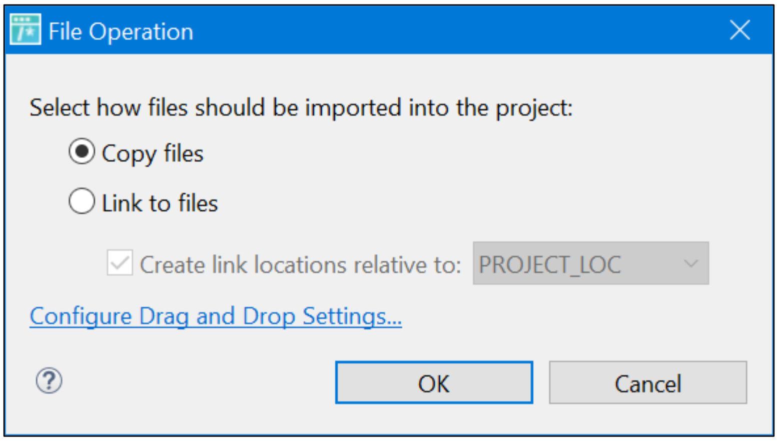
1.	In Project Explorer, navigate to the **Enterprise** directory and import the **Corporation.cls** file.
	a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **Corporation.cls** file.
	b. Drag and drop the **Corporation.cls** file into the **Enterprise** folder.
	c. Ensure that Copy files is selected.
	
	File Operation
	Select how files should be imported into the project:
	● Copy files
	○ Link to files
	☑ Create link locations relative to: PROJECT_LOC
	Configure Drag and Drop Settings...
	OK
	Cancel
	d. Click **OK**.
	Note: You will see compilation errors that will be resolved as you add code to the file.
	Note: This is what the beginning of the file should look like.
	`/*----------------------------------------`
	`    File        : Corporation`
	`    Purpose     :`
	`    Syntax      :`
	`    Description :`
	`    Author(s)   : haribabu`
	`      ------------------------------------*/`
	`block-level on error undo, throw.`
	`using Enterprise.BusinessUnit.IBusinessUnit from propath.`
	`using Enterprise.Corporation from propath.`
	`using Enterprise.HR.Dept from propath.`
	`using Enterprise.HR.Role.TeamMember from propath.`

2. Navigate to the **Include** directory and import the **ttBusinessUnit.i** file. This file contains the temp-table definition for a set of business units. Each record in the temp-table will hold a reference to an instance of a business unit.

a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **ttBusinessUnit.i** file.

b. Drag and drop the **ttBusinessUnit.i** file into the **Include** folder.

c. Ensure that Copy files is selected.



File Operation

Select how files should be imported into the project:

● Copy files

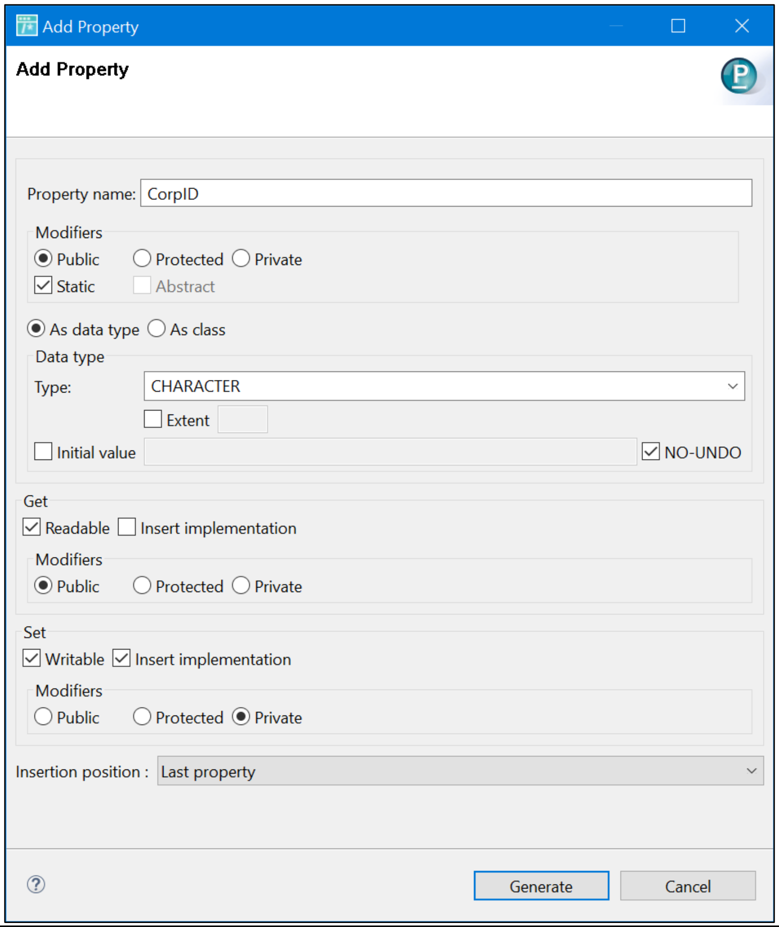
○ Link to files

☑ Create link locations relative to: PROJECT_LOC

Configure Drag and Drop Settings...

d. Click **OK**.

Solution, Part 2—Defining static data members for the Corporation class

Step	Solution instructions
1.	Define static properties that will be *public* with *private* setters: • *CorpID* as *character* • *Instance* as *Enterprise.Corporation* **Hints**: Use the *Add Property* wizard. Each setter will have an implementation that enables the property to be set. a. In the editor, place the cursor anywhere in the source file. b. **Right-click** and then select **Source** > **Add Property**. The Add Property wizard opens. c. Enter **CorpID** for the **Property** name. d. Select **Static** for the type of the property. e. Select **Character** for the property type. f. Set **Insert implementation** for the Set accessor. g. Select **Private** for the Set accessor. h. Select **Last property** for the insertion position.  Add Property **Add Property** Property name: CorpID Modifiers ● Public ○ Protected ○ Private ☑ Static □ Abstract ● As data type ○ As class Data type Type: CHARACTER □ Extent □ Initial value ☑ NO-UNDO Get ☑ Readable □ Insert implementation Modifiers ● Public ○ Protected ○ Private Set ☑ Writable ☑ Insert implementation Modifiers ○ Public ○ Protected ● Private Insertion position : Last property Generate Cancel

i. Click **Generate**.

Repeat these steps for the definition of the *Instance* property, making sure you type *Enterprise.Corporation* for the class for the property type.

The generated code should appear as follows:

```
define public static  property CorpID as character no-
undo
   get.
   private set (input arg as character):
            end set.
define public static property Instance as
Enterprise.Corporation no-undo
       get.
       private set(input arg as
Enterprise.Corporation):
       end set.
```

2. Add code in the implementation for the set accessor for the *CorpID* property to set its value from the input *arg* parameter.

The *CorpID* property should now appear as follows:

```
define public static property CorpID as character no-
undo
       get.
       private set(input arg as character):
          CorpId = arg.
       end set.
```

3. Add code in the implementation for the set accessor for the *Instance* property to set its value from the input *arg* parameter.

The Instance property should now appear as follows:

```
define public static property Instance as
Enterprise.Corporation no-undo
       get.
       private set(input arg as
Enterprise.Corporation):
          Instance = arg.
       end set.
```

Solution, Part 3—Defining a static constructor for the Corporation class

Step	Solution instructions

1.	Modify the default constructor to set the value for the *CorpID* property to “*Progress Software Corporation”*.
	The definition of the default constructor should be as follows:
	`constructor  Corporation():`
	`    super().`
	`    CorpID = "Progress Software Corporation".`
	`end constructor.`

2.	Define a static constructor for the *Corporation* class to create a new instance of Corporation and assign it to the Instance property.
	The definition of this constructor should be as follows:
	`constructor static Corporation():`
	`    Instance = new Enterprise.Corporation().`
	`end constructor.`

Solution, Part 4—Adding code to the InitializeBusinessUnit() method to create instances dynamically

<table>
<tr><th>Step</th><th>Solution instructions</th></tr>
<tr><td>1.</td><td>Locate the public <i>InitializeBusinessUnits</i>() method and view the code that is there already. This code iterates through all business unit records in the <i>ttBusinessUnit</i> temp-table. It reads a department JSON file to initialize the departments for each business unit.</td></tr>
<tr><td>2.</td><td>In the <i>InitializeBusinessUnits</i>() method, add code at the beginning of the <i>for each</i> block to test if a business unit is of type <i>Company</i>. To do this, you will test the value of the type field in the <i>ttBusinessUnit</i> temp-table.
If the business unit is of type <i>Company</i>, add a statement to create a new <i>Company</i> object dynamically. Otherwise, create a new <i>Franchise</i> object dynamically.
The beginning of this <i>for each</i> block should appear as follows:<pre>
   for each ttBusinessUnit:
        /* add code here to dynamically create the business
 unit depending on the Type value */
 if ttBusinessUnit.Type = "Company"
 then
 ttBusinessUnit.BusinessUnitRef = dynamic-new
(ttBusinessUnit.Classname) (ttBusinessUnit.Name).
else
ttBusinessUnit.BusinessUnitRef = dynamic-new
(ttBusinessUnit.Classname)
(ttBusinessUnit.Name,ttBusinessUnit.MaxNumDepartments).
empty temp-table ttDepartment.
</pre></td></tr>
<tr><td>3.</td><td>Save your file. Ensure that it compiles without errors.</td></tr>
</table>

Solution, Part 5—Testing the Corporation class

<table>
<tr><th>Step</th><th>Solution instruction</th></tr>
<tr><td>1.</td><td>

In the **Enterprise** folder of the Test project, import the procedure file named **testCorporation.p.**

a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **testCorporation.p** file.
b. Drag and drop the **testCorporation.p** file into the **Enterprise** folder.
c. Ensure that Copy files is selected.
d. Click **OK**.

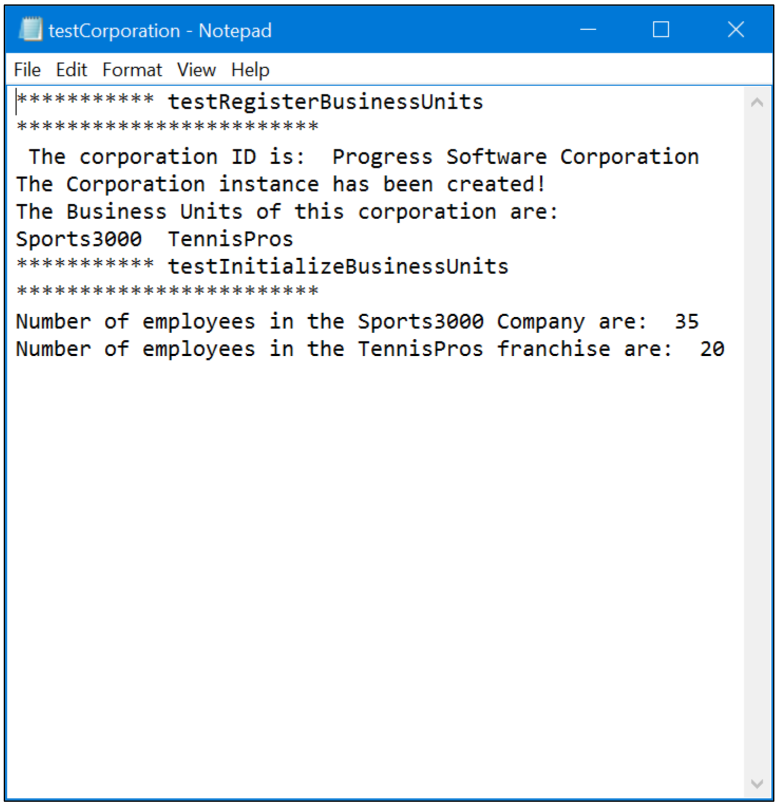
</td></tr>
<tr><td>2.</td><td>

Run **testCorporation.p**. Does it run correctly and was the *Corporation* information added to the output file? View the output file.

a. With **testCorporation.p** open in the editor, click the **Run** icon.
b. Select **Progress OpenEdge Application**.
c. Click **OK**.

</td></tr>
<tr><td>3.</td><td>

If the file did not run as expected, use the debugger to fix the problem, save your changes, and retest until it runs correctly.



```
*********** testRegisterBusinessUnits
************************
 The corporation ID is:  Progress Software Corporation
The Corporation instance has been created!
The Business Units of this corporation are:
Sports3000  TennisPros
*********** testInitializeBusinessUnits
************************
Number of employees in the Sports3000 Company are:  35
Number of employees in the TennisPros franchise are:  20
```

</td></tr>
</table>

Try It 3.3: Using a singleton and creating classes dynamically, Wrap-up

Exercise summary

In this Try It, you imported the *Corporation* class and added a static data member and a static constructor to it so that it can be used as a singleton. Then, you added code to the *Corporation* class to create the business unit instances (of types *Company* and *Franchise*) of the corporation dynamically.

Try It 3.4: Using events

Overview

In this Try It, you will define and publish an event in the *Manager* class and then subscribe to it in the *Dept* class. You will also write an event handler to handle the event. Finally, you will test your event handling code to ensure it executes correctly.

This exercise has 3 parts. The exercise steps take approximately 30 minutes to complete. You perform this exercise in your live version of Progress OpenEdge.

Before you begin

Before you begin, you must:

Step	Description
1.	Complete the Exercise Setup instructions, if you have not done so already.
2.	Complete the Try It 3.3.

Location of files:
Exercise files: **/progress_education/openedge/IntroOOP/Exercise/Lesson03**
Solution files: **/progress_education/openedge/IntroOOP/Solutions/Lesson03**

If at any time during this course, you need to restore your projects to match where you should have been prior to beginning a Try It, you can do the following:

1. Delete all projects in the workspace.
2. Import all projects in the archive (**.zip**) file for the previous Try It.
3. Do a clean build of the workspace.

Part 1—Defining and publishing an event in the Manager class

In this part of the Try It, you will define and publish an event in the *Manager* class. This event will be subscribed to by the *Dept* class later in this Try It.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, open the *Manager* class and define a new public event *DischargeEmployee*.
2.	In the *DischargeEmployee* event, define the following input parameters. • *pFirstname* as *character* • *pLastname* as *character*
3.	Define the *public DischargeTeamMember*() method with return type *void*.
4.	To the public *DischargeTeamMember*() method pass the following parameters. • *pFirstname* as *character* • *pLastname* as *character*
5.	Modify the public *DischargeTeamMember*() method to publish the *DischargeEmployee* event.
6.	Save this file. Ensure that it compiles without errors.

Part 2—Modify the Dept class to subscribe to the event

In this part of the Try It, you will modify the *Dept* class to subscribe to the *DischargeEmployee* event defined and published in the *Manager* class. You also write the event handler method that handles the event.

If you need help, view the Solution.

Step	Task
1.	In Project Explorer, open the *Dept* class; at the end of the *AddManager*() method, add a statement to subscribe to the *DischargeEmployee* event specifying the *DischargeEmployee_Handler* method. **Hint**: You will see an error in this statement because you have not yet created the *DischargeEmployee_Handler*() method.
2.	Define the public *DischargeEmployee_Handler*() method with return type *void*.
3.	To the public *DischargeEmployee_Handler*() method add the following input parameters. • *pFirstname* as *character* • *pLastname* as *character*
4.	Modify the public *DischargeEmployee_Handler*() method to find the discharged employee in the *ttEmployee* temp-table based on the first and last name.
5.	If an employee is found, you should add code in a *do* block to: • Add a statement to open a file for output. The name of the file you will be writing to is **Discharges.out**. It will be located in the **/progress_education/openedge/IntroOOP/log** directory. **Hint**: Use the full pathname of this file. • Add a *message* statement to write the number of employees terminated. • Delete the employee record by casting the *EmpRef* field and return the *Emp* instance. **Hint**: You will need to cast the temp-table field *ttEmployee.EmpRef* to the type *Emp*.
6.	In the *do* block, add a statement to delete the *ttEmployee* temp-table record that was found.
7.	In the *do* block, add a statement to decrease the employee count by 1.
8.	In the *do* block, add a statement to close the output file.
9.	Save this file. Ensure that it compiles without errors.

Part 3—Testing the Dept class event

You will run a test procedure to confirm that the *Dept* class event executes correctly.

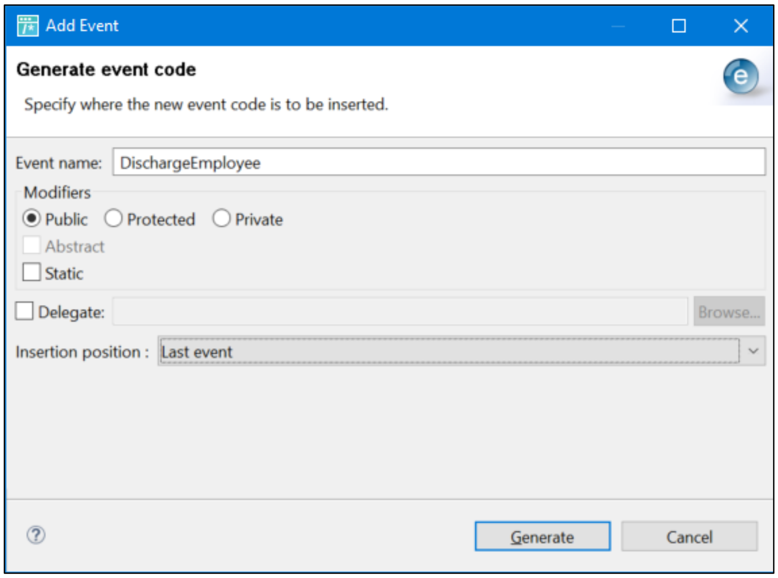
You can view the test procedure file to see how it is written.

If you need help, view the Solution.

Step	Task
1.	In the **Enterprise/HR** folder of the Test project, import the procedure file named **testEvents.p.**
2.	Run **testEvents.p**. Does it run correctly and was the discharged employee information added to the output file? View the output file.
3.	If the file did not run as expected, use the debugger to fix the problem, save your changes, and retest until it runs correctly.

Solution, Part 1—Defining and publishing an event in the Manager class

Step	Solution instructions

1.	In Project Explorer, open the Manager class and define a new public event *DischargeEmployee*.
	Hint: Use the *Add Event* wizard.
	a. In the editor, place the cursor anywhere in the file.
	b. **Right-click** and then select **Source** > **Add Event**. The Add Event wizard opens.
	c. Enter *DischargeEmployee* for the event name.
	d. Select **Last event** for the insertion position.
	
	Add Event
	Generate event code
	Specify where the new event code is to be inserted.
	Event name: DischargeEmployee
	Modifiers
	● Public ○ Protected ○ Private
	□ Abstract
	□ Static
	□ Delegate:
	Insertion position : Last event
	
	e. Click **Generate**.
	The generated code should appear as follows:
	`define public event DischargeEmployee signature void`
	`().`

2.	In the *DischargeEmployee* event, pass the following input parameter.
	• *pFirstname* as *character*
	• *pLastname* as *character*
	The modified event should appear as follows:
	`define public event DischargeEmployee signature void`
	`(input  pFirstname as character,`
	`input pLastName as character).`

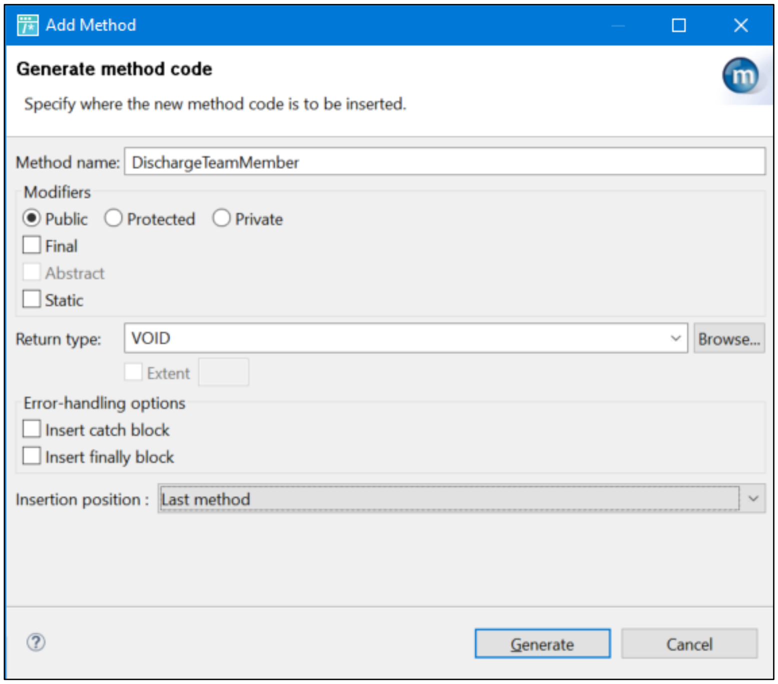
3. Define the public *DischargeTeamMember*() method with return type *void*.

a. Place the cursor anywhere in the file.

b. Right-click and then select **Source** > **Add Method**.

c. Enter the method name as **DischargeTeamMember**.

d. Select **void** as return type.



Add Method

Generate method code

Specify where the new method code is to be inserted.

Method name: DischargeTeamMember

Modifiers

● Public ○ Protected ○ Private

□ Final

□ Abstract

□ Static

Return type: VOID

□ Extent

Error-handling options

□ Insert catch block

□ Insert finally block

Insertion position : Last method

e. Click **Generate**.

You can enter information in the comment that precedes the method, or you can delete it.

The definition of this method should be as follows:

```
method public void DischargeTeamMember ():
            return.
end method.
```

4. To the public *DischargeTeamMember*() method pass the following parameters.

- *pFirstname* as *character*
- *pLastname* as *character*

```
method public void DischargeTeamMember (input
pFirstname as character, pLastname as character):
            return.
end method.
```

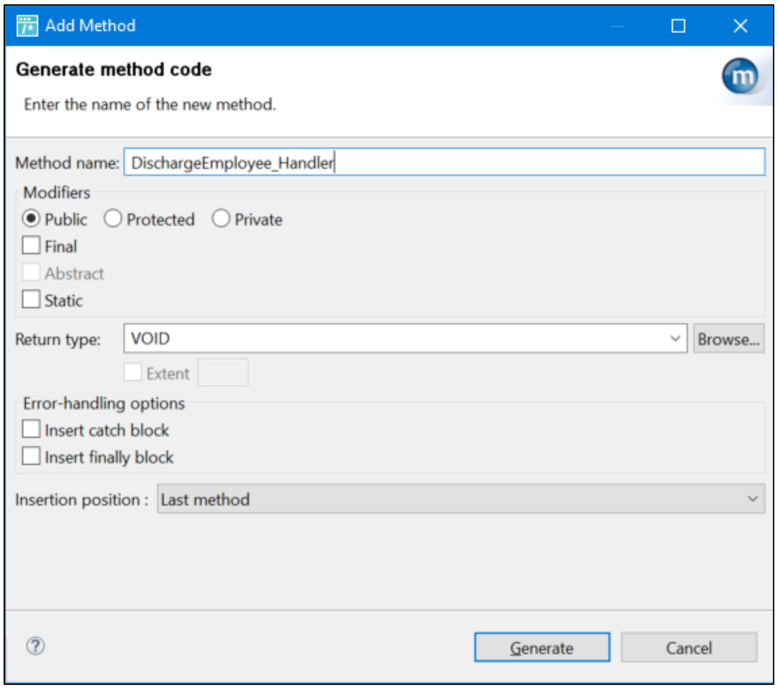
5.	Modify the public *DischargeTeamMember*() method to publish the *DischargeEmployee* event.
	The modified method should appear as follows:
	`method public void DischargeTeamMember (input`
	`pFirstname as character, pLastname as character):`
	`DischargeEmployee:Publish(pFirstname, pLastname) no-`
	`error.`
	`end method.`

6.	Save this file. Ensure that it compiles without errors.

Solution, Part 2—Modify the Dept class to subscribe to the event

Step	Solution instructions

1.	In Project Explorer, open the *Dept* class. At the end of the *AddManager*() method, add a statement to subscribe to the *DischargeEmployee* event specifying the *DischargeEmployee_Handler* method.
	Hint: You will see an error on this statement because you have not yet created the *DischargeEmployee_Handler* method.
	`DeptMgr:DischargeEmployee:`
	`Subscribe(DischargeEmployee_Handler).`

2.	Define the public *DischargeEmployee_Handler*() method with return type *void*.
	Hint: Use the *Add Method* wizard.
	a. In the editor, place the cursor anywhere in the *Dept* class.
	b. **Right-click** and then select **Source** > **Add Method**. The Add Method wizard opens.
	c. Enter *DischargeEmployee_Handler* as the event name.
	d. Select **Last method** for the insertion position.
	
	Add Method
	Generate method code
	Enter the name of the new method.
	Method name: DischargeEmployee_Handler
	Modifiers
	● Public ○ Protected ○ Private
	□ Final
	□ Abstract
	□ Static
	Return type: VOID
	□ Extent
	Error-handling options
	□ Insert catch block
	□ Insert finally block
	Insertion position : Last method
	
	e. Click **Generate**.
	The generated code (without comments) should appear as follows:
	`method public void DischargeTeamMember_Handler ():`
	`            return.`
	`end method.`

3. To the public *DischargeEmployee_Handler*() method add the following input parameters.

- *pFirstname* as *character*
- *pLastname* as *character*

```
method public void DischargeTeamMember_Handler (input
pFirstName as character,
input pLastName as character):
           return.
end method.
```

4. Modify the public *DischargeEmployee_Handler*() method to find the discharged employee in the *ttEmployee* temp-table based on the first and last name.

```
find ttEmployee where ttEmployee.FirstName =
pFirstName and ttEmployee.LastName = pLastName no-
error.
```

5. If an employee is found, you should add code in a do block to:

- Add a statement to open a file for output. The name of the file you will be writing to is **Discharges.out**. It will be located in the **/progress_education/openedge/IntroOOP/log** directory.

  Hint: Use the full pathname of this file.
- Add a *message* statement to write the number of employees discharged.
- Delete the employee record by casting the *EmpRef* field and return the *Emp* instance.

Hint: You will need to cast the temp-table field *ttEmployee.EmpRef* to the type *Emp*.

The code you add should appear as follows:

```
if available(ttEmployee)
        then do:
            output to "/progress_education/openedge/
introOOP/log/Discharges.out" append.
            message "Employee: " + pFirstName + " " +
pLastName +
                    " ("
cast(ttEmployee.EmpRef,Emp):EmpNum  ")"   +
                    "has terminated effective: "
today.
            delete object cast(ttEmployee.EmpRef,Emp).

end.
```

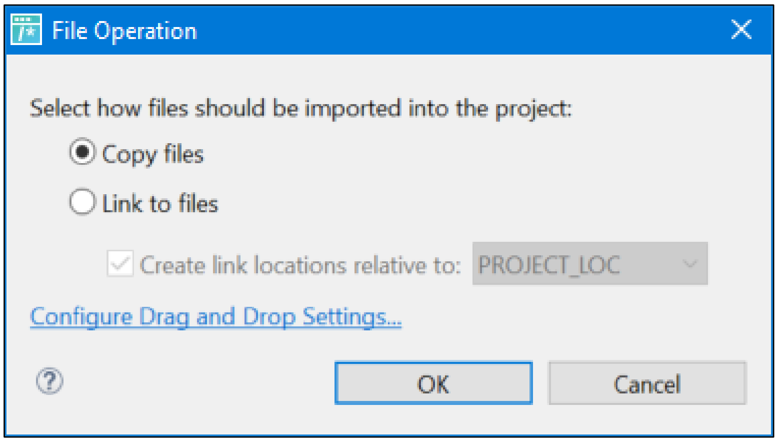
6. In the *do* block, add a statement to delete the *ttEmployee* temp-table record that was found.

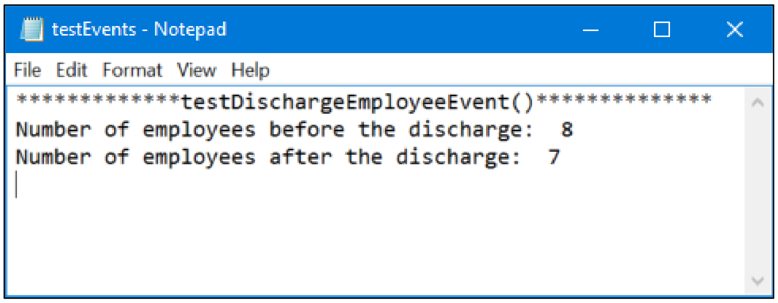
```
delete ttEmployee.
```

7. In the *do* block, add a statement to decrease the employee count by 1.

	`NumEmployees = NumEmployees - 1.`
8.	In the *do* block, add a statement to close the output file. `output close.`
9.	Save this file. Ensure that it compiles without errors.

Solution, Part 3—Testing the Dept class event

Step	Solution instructions
1.	In the **Enterprise/HR** folder of the Test project, import the procedure file named **testEvents.p.** a. In Windows Explorer, navigate to the **/progress_education/OpenEdge/introOOP/Exercise/Lesson03** directory and select the **testEvents.p** file. b. Drag and drop the **testEvents.p** file into the **Enterprise/HR** folder. c. Ensure that **Copy files** is selected.  File Operation Select how files should be imported into the project: ● Copy files ○ Link to files ☑ Create link locations relative to: PROJECT_LOC d. Click **OK**.
2.	Run **testEvents.p**. Does it run correctly and was the discharged employee information added to the output file? View the output file. a. With **testEvents.p** open in the editor, click the **Run** icon. b. Select **Progress OpenEdge Application**. c. Click **OK**.

3.	If the file did not run as expected, use the debugger to fix the problem, save your changes, and retest until it runs correctly.
	
	testEvents - Notepad
	
	`*************testDischargeEmployeeEvent()**************`
	`Number of employees before the discharge:  8`
	`Number of employees after the discharge:  7`

Try It 3.4: Using events, Wrap-up

Exercise summary

In this Try It, you defined and published an event in the *Manager* class and then subscribed to it in the *Dept* class. You also wrote an event handler to handle the event. Finally, you tested your event-handling code to ensure it executes correctly.