

Lab 02: Oracle 11g Basic Database Administration

Using an Oracle Database instance requires access. A database user must be authenticated first. That is, the database must determine that you are who you say that you are. Next, the user must be authorized. In this manner, the user has access to the database facilities that have been granted and only those facilities. In this lab, we will explore how tablespaces and users are created and controlled.

Learning Outcomes

- **TECHNICAL KNOWLEDGE** –You will achieve deep technical knowledge and comprehension about database management systems. You will develop the ability to apply these technologies to solve information problems at the individual and organizational levels. After completing lab, you will be able to:
 1. Explain database management system architecture
 2. Identify, describe, and categorize database objects
 3. Design and implement advanced queries using Structured Query Language
- **MANAGEMENT OF SOLUTION DEVELOPMENT** - You will achieve a deep level of knowledge and comprehension of the disciplines used in the development of information system solutions. You will develop the ability to apply these disciplines to the solution of organizational and business problems. After completing this course, you will be able to:
 1. Design, construct and maintain a database and various database objects using procedural language constructs, forms and reports to solve problems

Specifically, after completing this lab, you will be able to:

- Describe when and how to use the Administration tab in Oracle Enterprise Manager (OEM) for 11g
- Discuss the role of the database administrator (dba) in establishing and maintaining database security
- Debate the use of default user accounts
- Create database user accounts
- Create database objects

Access Control

Access controls are the security mechanisms that allow authorized or trusted users the capability to access the database and DBMS facilities they need to do their job. Access controls also prevent unauthorized users from accessing sensitive data or using powerful DBMS facilities. Access controls are comprised of two components: “authentication.” and “authorization.” After installation, because of its importance, establishing access control is one of the database administrator’s (DBA) first duties. In this lab you will be establishing access controls by setting up new user accounts in the Oracle 11g.

The following instructions are intended to assist you through the set up process. These instructions are intended for an Intel class machine running the Windows 2003 Server operating System. Your results may vary slightly depending on the computing platform you use.

1. The SYS DBA Account

Oracle’s “root” account is called SYS. This is the user the highest level of rights in the system. As you can imagine, with great power comes great responsibility, and thus you must exercise caution when using this account. Oracle *tries* to prevent you from “shooting yourself in the foot” with the SYSOPER and SYSDBA roles. These roles adjust what you can do with the SYS account in order to minimize the amount of accidental damage you can do when logged in.

As you will see in this class we only use SYS to perform DBA like activities. When developing databases, we simply use a different account with only access to the required schemas in place of the SYS account. This is a common DBA practice.

2. Logging into Oracle as the DBA

Oracle Enterprise Manager, or OEM is the main tool Database Administrators use to administer the system. In Oracle 11g you access OEM using your web browser. In your browser’s address line, enter the address of the OEM: **http://localhost:1158/em**; you should see a screen that looks like this:

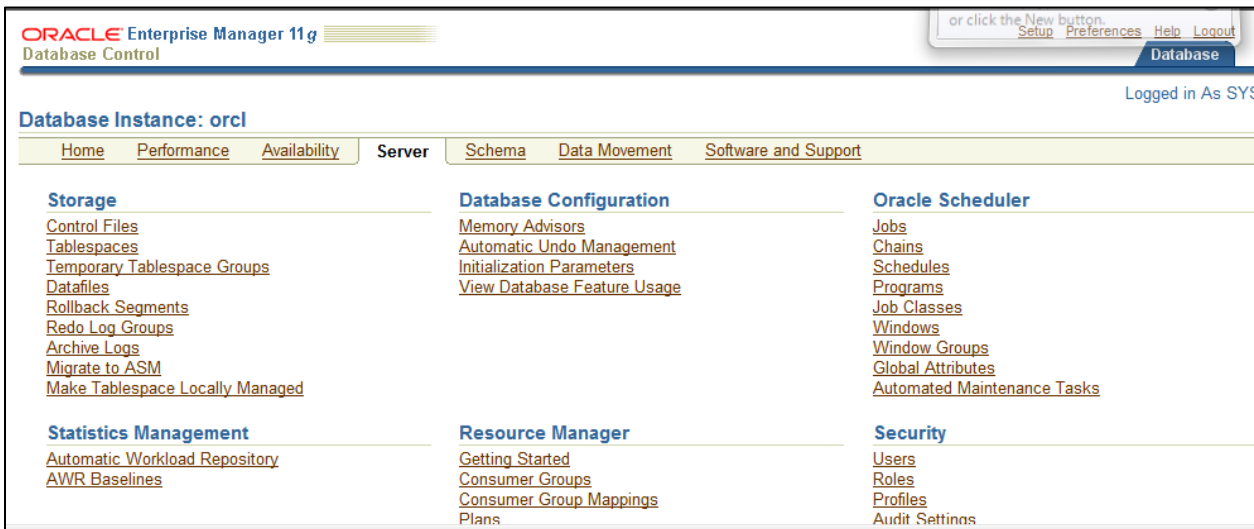
Sign on as username SYS, use the Password assigned during installation and Connect as: SYSDBA using the drop down box, then click OK.

Note: The Connect as: as allows you to select between administrative and non-administrative connections. You must connect as SYSDBA

3. The Enterprise Manager Console

Once you logon you will see the Oracle Enterprise Manager console. This screen is the master console for nearly all the administration tasks performed on an Oracle database. Your screen will look something like this:

To create or maintain database users (including schema owners), roles, and profiles select the Server option. You will see a screen that allows you to maintain all of the database objects managed by this database instance.



If you select on **Users** under **Security** heading, you will see all of the users that were created during the installation process.

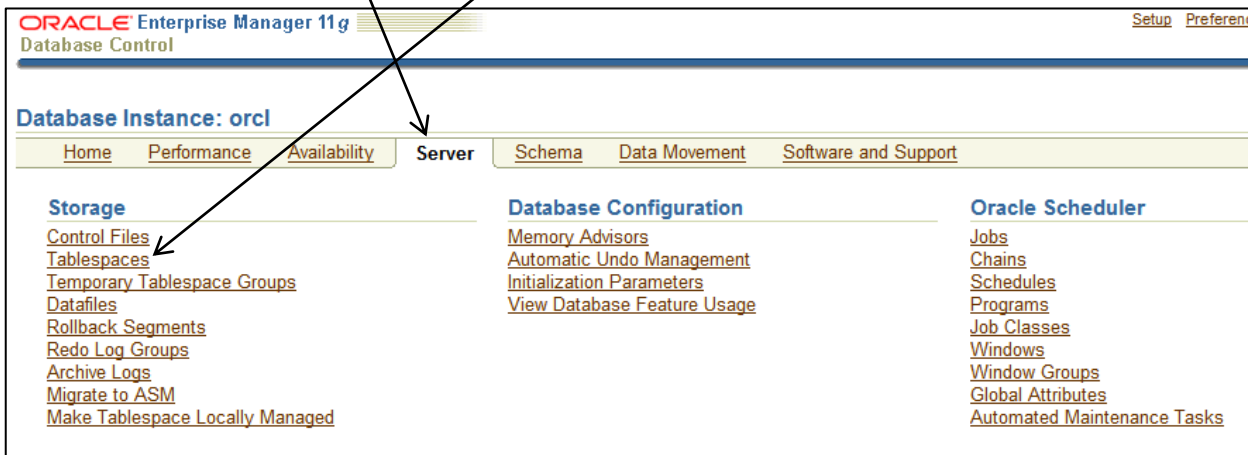
Select	UserName	Account Status	Expiration Date	Default Tablespace	Temporary Tablespace	Profile	Created	User Type
<input checked="" type="radio"/>	ANONYMOUS	EXPIRED & LOCKED	Apr 2, 2010 2:19:33 PM EDT	SYSAUX	TEMP	DEFAULT	Apr 2, 2010 1:36:53 PM EDT	LOCAL
<input type="radio"/>	APEX_030200	EXPIRED & LOCKED	Apr 2, 2010 2:19:33 PM EDT	SYSAUX	TEMP	DEFAULT	Apr 2, 2010 1:57:16 PM EDT	LOCAL
<input type="radio"/>	APEX_PUBLIC_USER	EXPIRED & LOCKED	Apr 2, 2010 2:19:33 PM EDT	USERS	TEMP	DEFAULT	Apr 2, 2010 1:57:16 PM EDT	LOCAL
<input type="radio"/>	APPQOSSYS	EXPIRED & LOCKED	Apr 2, 2010 1:27:34 PM EDT	SYSAUX	TEMP	DEFAULT	Apr 2, 2010 1:27:34 PM EDT	LOCAL
<input type="radio"/>	BI	EXPIRED & LOCKED	Aug 31, 2011 8:12:19 PM EDT	USERS	TEMP	DEFAULT	Aug 31, 2011 8:10:20 PM EDT	LOCAL
<input type="radio"/>	CTXSYS	EXPIRED & LOCKED	Apr 2, 2010 2:19:33 PM EDT	SYSAUX	TEMP	DEFAULT	Apr 2, 2010 1:36:06 PM EDT	LOCAL
<input type="radio"/>	DBSNMP	OPEN	Feb 27, 2012 8:13:01 PM EST	SYSAUX	TEMP	MONITORING_PROFILE	Apr 2, 2010 1:27:32 PM EDT	LOCAL
<input type="radio"/>	DIP	EXPIRED & LOCKED	Apr 2, 2010 1:20:19 PM EDT	USERS	TEMP	DEFAULT	Apr 2, 2010 1:20:19 PM EDT	LOCAL
<input type="radio"/>	EXFSYS	EXPIRED & LOCKED	Apr 2, 2010 1:35:51 PM EDT	SYSAUX	TEMP	DEFAULT	Apr 2, 2010 1:35:51 PM EDT	LOCAL
<input type="radio"/>	FLCWS_FILES	EXPIRED &	Apr 2, 2010 2:19:33	SYSAUX	TFMP	DFFAULT	Apr 2, 2010 1:57:16	LOCAI

4. Create new tablespace

Before we create a new user, let’s create a place for the user to store their database objects. Remember, in Oracle, once you allocate storage to a user, the user now becomes a schema owner. You allocate storage by assigning quota on a tablespace. Remember a tablespace stores related database objects. A tablespace is a data file that has an associated **.dbf** file. So, for example, the Users tablespace has a **users.dbf** file located in the directory on the Windows file system. You would place related meta-data (tables and other database objects) as well as data in the same tablespace. Suppose, for example, that you are creating a new database application for the Finance department. You might very well decide to create a Finance tablespace and then assign quota on this tablespace to the appropriate users.

You can create a tablespace using OEM or Structure Query Language (SQL). Let’s use OEM and then display the SQL that was generated for the new tablespace.

Do this: Log into OEM → **Server** → **Tablespaces**



Here we can use the graphical user interface to add a new tablespace. In this case, I have chosen to create a tablespace named IST469 that is similar to the USERS tablespace.

Do this: Enter Object Name: **IST469** → Action: **Create Like** → select **USERS** → click **Create**.

ORACLE Enterprise Manager 11g Database Control

Database Instance: orcl.localdomain > Logged in As SYS

Tablespaces

Object Type: Tablespace

Search

Enter an object name to filter the data that is displayed in your results set.

Object Name:

By default, the search returns all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You can use the wildcard symbol (%) in a double quoted string.

Selection Mode:

Actions:

Select	Name	Allocated Size(MB)	Space Used(MB)	Allocated Space Used(%)	Auto Extend	Allocated Free Space(MB)	Status	Datafiles	Type	Extent Management	Segment Management
<input type="radio"/>	EXAMPLE	100.0	78.4		78.4 YES	21.6	✓	1	PERMANENT	LOCAL	AUTO
<input type="radio"/>	SYSAUX	640.0	600.1		93.8 YES	39.9	✓	1	PERMANENT	LOCAL	AUTO
<input type="radio"/>	SYSTEM	700.0	693.1		99.0 YES	6.9	✓	1	PERMANENT	LOCAL	MANUAL
<input type="radio"/>	TEMP	20.0	1.0		5.0 YES	19.0	✓	1	TEMPORARY	LOCAL	MANUAL
<input type="radio"/>	UNDOTBS1	55.0	25.1		45.7 YES	29.9	✓	1	UNDO	LOCAL	MANUAL
<input checked="" type="radio"/>	USERS	6.2	4.9		79.0 YES	1.3	✓	1	PERMANENT	LOCAL	AUTO

Total Allocated Size (GB) 1.49 ✓ Online ✗ Offline 🛡 Read Only

Next, we need to add the tablespace name and the data file.

Do this: Enter table space name: **IST469** → Click **Add**

ORACLE Enterprise Manager 11g Database Control

Database Instance: orcl.localdomain > Tablespaces > Logged in As SYS

Create Tablespace

General Storage

Name: IST469

Extent Management

- Locally Managed
- Dictionary Managed

Type

- Permanent
 - Set as default permanent tablespace
 - Encryption [Encryption Options](#)
- Temporary
 - Set as default temporary tablespace
- Undo
 - Undo Retention Guarantee Yes No

Status

- Read/Write
- Read Only
- Offline

Datafiles

Use bigfile tablespace
Tablespace can have only one datafile with no practical size limit.

Select Name	Directory	Size (MB)
No items found		

General Storage

Buttons: Show SQL, Cancel, OK, Add

Now notice the actual data file which will store the table space must be added.

Do this: Enter file name: **IST469** → Check option to auto-extend → add increment of **100** KB → Click **Continue**

The screenshot shows the 'Add Datafile' dialog box in Oracle Enterprise Manager 11g Database Control. The dialog is titled 'Add Datafile' and has a 'Cancel' button and a 'Continue' button. The fields are as follows:

- File Name: IST469
- File Directory: C:\APP\ADMIN\ORADATA\ORCL\
- Tablespace: IST469
- File Size: 100 MB
- Reuse Existing File:
- Storage: Automatically extend datafile when full (AUTOEXTEND)
- Increment: 100 KB
- Maximum File Size: Unlimited
- Value: MB

Arrows from the text above point to the 'File Name' field, the 'File Size' field, and the 'Continue' button.

At the bottom of the screen you should now see the file added to the tablespace.

ORACLE Enterprise Manager 11g Database Control

Database Instance: orcl.localdomain > Tablespaces >

Logged in As SYS

Create Tablespace

Information: Modification to the datafile will not take effect until you click "OK" button.

General Storage

* Name: IST469

Extent Management: Locally Managed, Dictionary Managed

Type: Permanent, Temporary, Undo

Status: Read Write, Read Only, Offline

Datafiles: Use bigfile tablespace

Select	Name	Directory	Size (MB)
<input checked="" type="radio"/>	IST469	C:\APP\ADMIN\ORADATA\ORCL\	100.00

NOTE: Here is the SQL that was generated to create the above tablespace.

```
CREATE SMALLFILE TABLESPACE "IST469" DATAFILE 'C:\APP\ADMIN\ORADATA\ORCL\IST469' SIZE 100M AUTOEXTEND ON NEXT 100K MAXSIZE UNLIMITED LOGGING EXTENT MANAGEMENT LOCAL SEGMENT SPACE MANAGEMENT AUTO
```

Do This: Click **OK** to create this tablespace. You should see the following:

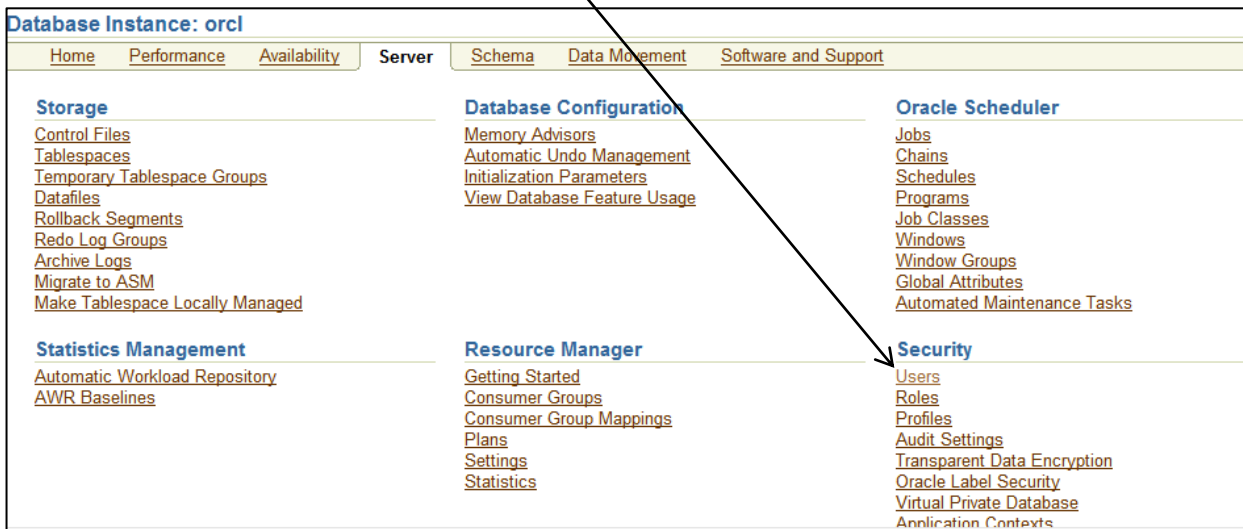
Select	Name	Allocated Size(MB)	Space Used(MB)	Allocated Space Used(%)	Auto Extend	Allocated Free Space(MB)	Status	Datafiles	Type	Extent Management	Segment Management
<input checked="" type="radio"/>	IST469	100.0	1.0	<div style="width: 1%; background-color: #00b050;"></div>	1.0 YES	99.0	✓	1	PERMANENT	LOCAL	AUTO
Total Allocated Size (GB)		0.10	✓ Online ✗ Offline 📄 Read Only								
Total Used (GB)		0.00									
Total Allocated Free Space (GB)		0.10									

NOTE: Here is the SQL syntax for creating a tablespace.

```
CREATE TABLESPACE [BIGFILE | SMALLFILE] TablespaceName (small file is the normal Oracle tablespace)
DATAFILE FileName (you can define one or more datafiles for this tablespace)
SIZE nnnn (where nnnn is the size such as 100m)
AUTOEXTEND ON|OFF (the datafile can be automatically extended up to the max size)
TEMPORARY|PERMANENT
EXTENT MANAGEMENT LOCAL|DICTIONARY (header in the tablespace or in the dictionary)
LOGGING|NOLOGGING (default behavior for logging certain types of data)
ONLINE|OFFLINE (if on-line the tablespace is available for use)
SEGMENT SPACE MANAGEMENT MANUAL|AUTO (to track usage blocks ; only applies to managed tablespaces)
```

5. Creating new users

Next we will learn how to create a user and give that user access to our newly created tablespace. So to create a new user, return to the Server tab. Then click on **Users** under Security heading.



Here you can select the necessary parameters for creating a new user. The create user screen has a number of options for permitting the user to perform all database tasks or restricting the user to very virtually nothing. With the SYS and SYSTEM accounts you have the “keys to the kingdom” that is, the power to control all users and all permissions.

So, let's create a user.

Do This: Select object type **User** → click **Create**.

The screenshot shows the Oracle Enterprise Manager 11g Database Control interface. At the top, it says 'ORACLE Enterprise Manager 11g Database Control' and 'Database Instance: orcl.localdomain >'. The 'Users' section is active, showing a search bar and a table of users. The 'Object Type' dropdown is set to 'User', and the 'Create' button is highlighted. Arrows from the 'Do This' instruction point to the 'Object Type' dropdown and the 'Create' button.

Select	UserName ▲	Account Status	Expiration Date	Default Tablespace	Temporary Tablespace	Profile	Created	User Type
<input checked="" type="radio"/>	ANONYMOUS	EXPIRED & LOCKED	Mar 30, 2010 11:05:19 AM EDT	SYSAUX	TEMP	DEFAULT	Mar 30, 2010 10:27:58 AM EDT	LOCAL

At minimum, when you create a new user account you must specify the following:

1. General information about the user account: **name, password, default** and **temporary tablespaces**.
2. System privileges the user has in the database. This can be set using the **Role** or **System Privileges** tab.
3. The user's tablespace quotas on the database server. This can be set using the **Quotas** tab.

As an exercise, let’s set up a new user for our IST469 table space. We will create a user named **IST469** and grant that user access to the **IST469** tablespace we created in the previous steps.

Do this: Fill out this form as seen below. Use when you’re done, click the **Roles** tab.

ORACLE Enterprise Manager 11g Database Control

Database Instance: orcl.localdomain > Users > **Create User**

General **Roles** System Privileges Object Privileges Quotas Consumer Group Privileges Proxy Users

* Name: IST469
 Profile: DEFAULT
 Authentication: Password
 * Enter Password: [masked]
 * Confirm Password: [masked]

For Password choice, the role is authorized via password.
 Expire Password now

Default Tablespace: IST469
 Temporary Tablespace: TEMP

Status: Locked Unlocked

Use **SU2orange** for the password.

6. Assigning Roles to the User

On the Role tab you should see a screen that displays the current roles for the user you’re about to create. By default the user is given the CONNECT role which allows them to only connect to the tablespace. We’d like to add the DBA role which will give the user full rights to the tablespace.

Do This: Click **Edit List** to modify the list of roles.

ORACLE Enterprise Manager 11g Database Control

Database Instance: orcl.localdomain > Users > **Create User**

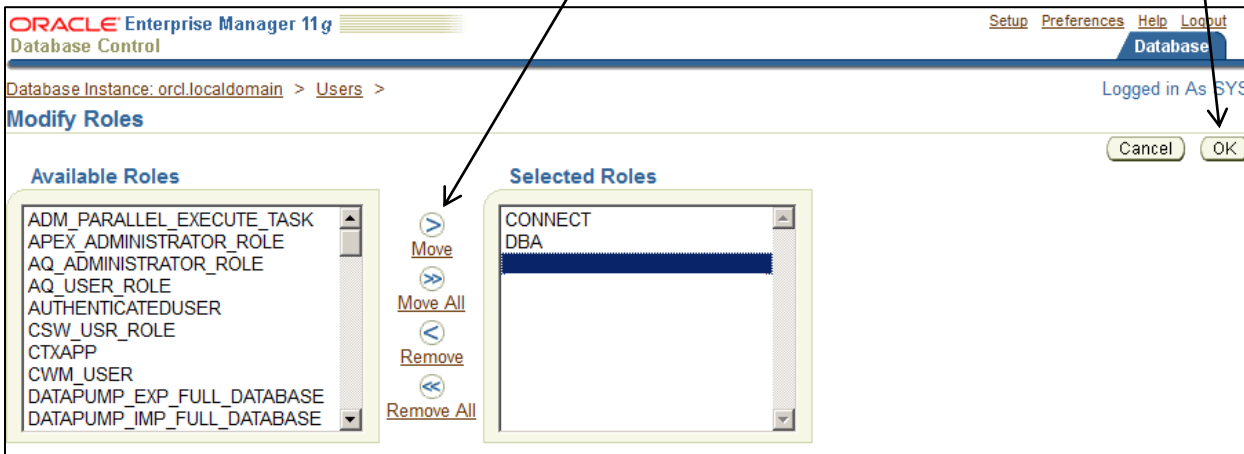
General **Roles** System Privileges Object Privileges Quotas Consumer Group Privileges Proxy Users

Role	Admin Option	Default
CONNECT	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Edit List

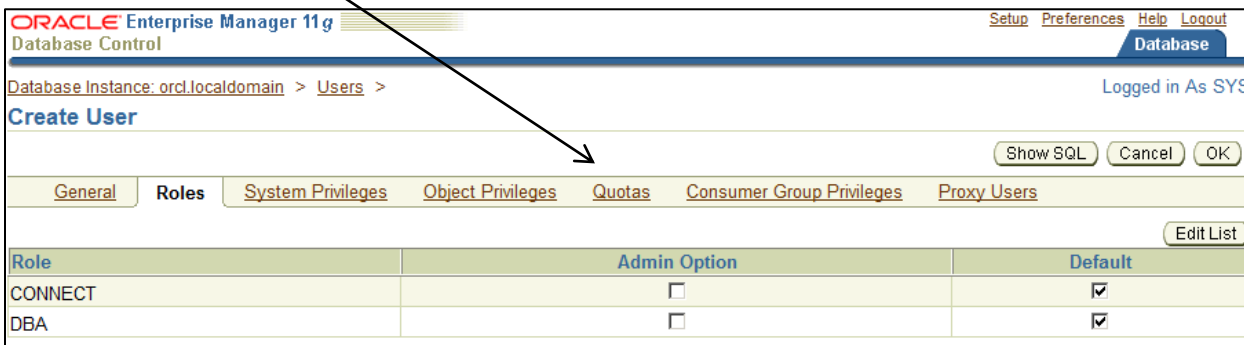
You will see the Modify Roles screen which should give you the ability to select additional roles for the user.

Do This: Select **DBA** in Available Roles → Click **Move** → After both roles are in Selected Roles, click **OK**



Now you're back at the Roles tab for the new user, and you should see both roles in the list. **NOTE:** The Admin option allows the user to give this role to other user accounts in the tablespace. Next, we'll configure the quotas for the user account.

Do This: Click on the **Quotas** Tab.



7. Assigning Quotas

Even with system and object privileges a user in Oracle will not be able to create database objects unless the account has been given an allocation of storage. To do this the account must be assigned a **Quota**. The default quota is zero. In our example, we will assign unlimited quota to the default tablespace, then make the user.

Do This: Select **Unlimited** for the IST469 tablespace → click **OK** to create the user.

ORACLE Enterprise Manager 11g
Database Control

Database Instance: orcl.localdomain > Users > Create User

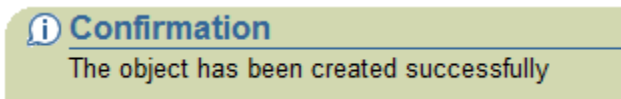
Logged in As SYS

Show SQL Cancel OK

General Roles System Privileges Object Privileges **Quotas** Consumer Group Privileges Proxy Users

Tablespace	Quota	Value	Unit
EXAMPLE	None	0	MBytes
IST469 (Default)	Unlimited	0	MBytes
SYSAUX	None	0	MBytes
SYSTEM	None	0	MBytes
TEMP	None	0	MBytes
UNDOTBS1	None	0	MBytes
USERS	None	0	MBytes

If it works you should see this message:



If you did not get it to work, re-trace your steps and see if you can get it to work!

NOTE: Here's the SQL we generated to create the user and assign roles and quotas.

```
CREATE USER "IST469" PROFILE "DEFAULT" IDENTIFIED BY "SU2orange" DEFAULT TABLESPACE
"IST469" TEMPORARY TABLESPACE "TEMP" QUOTA UNLIMITED ON "IST469" ACCOUNT UNLOCK
```

```
GRANT "CONNECT" TO "IST469"
```

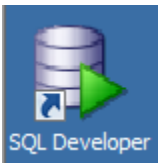
```
GRANT "DBA" TO "IST469"
```

8. Validate your User Account

To ensure that your User account is set up correctly, you should try to access the database using the **IST469** user account and **SU2orange** password using Oracle SQL Developer.

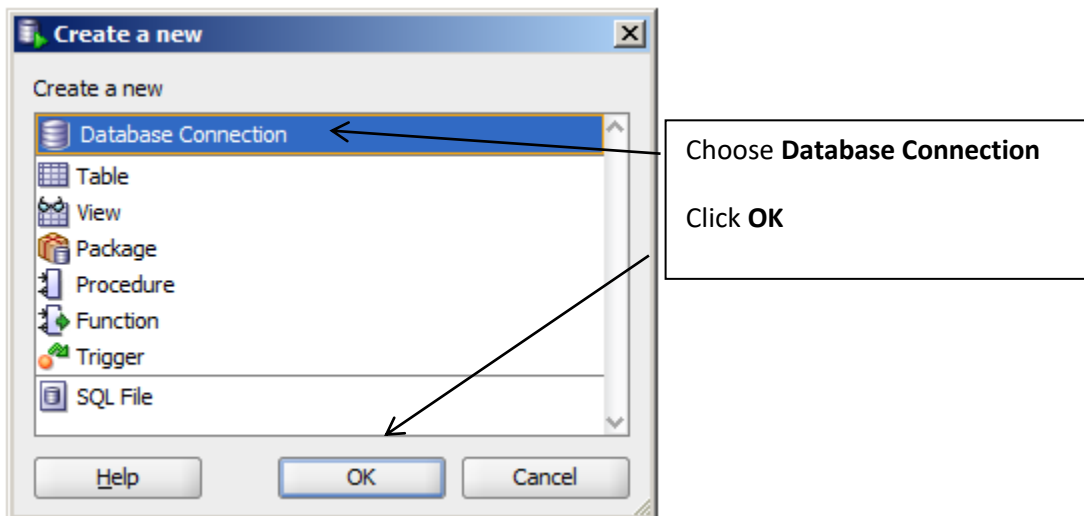
IMPORTANT! It is important to emphasize that you should be using your new IST469 DBA account not SYS or SYSTEM. This way all of the database objects you create will be stored in your schema not the SYS or SYSTEM schemas. It is very important to remember that the SYS schema is the active data dictionary and it maintains the status of the database. If you mess up the SYS schema you may find yourself uninstalling and reinstalling Oracle.

Launch SQL Developer from your computer:

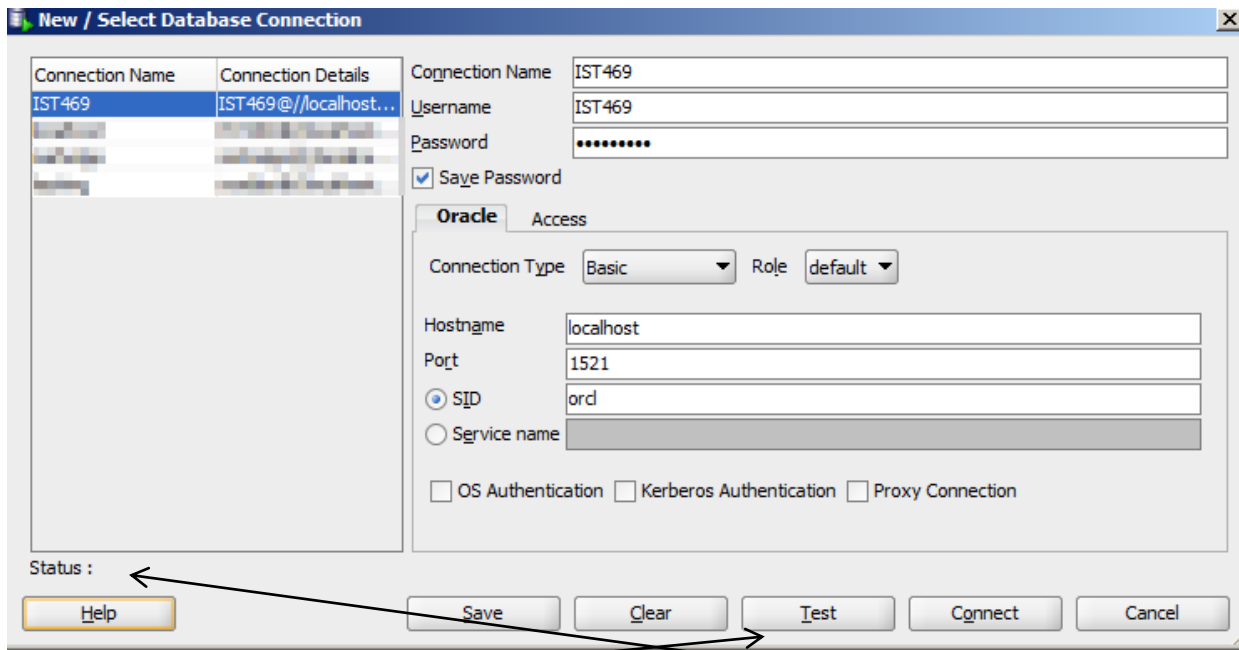


Once SQL Developer loads, let's create a new connection.

Do This: Menu **File** → **new**



Fill out the connection screen as follows. Remember your database name is **orcl** and the password for the **IST469** user is **SU2orange**

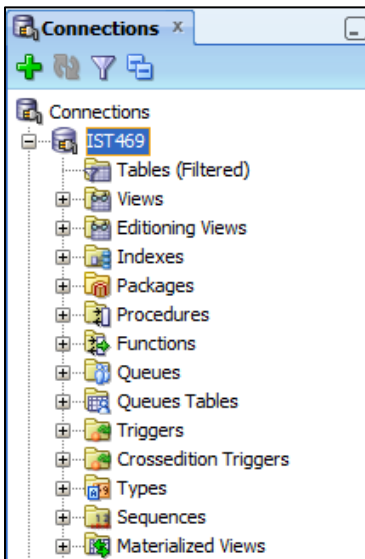


Do This: Click **Test** to verify your settings. If it works, you will see a status of **Success**

Once the test passes:

Do This: Click **Save** to save the connection → click **Connect** to connect.

If everything goes as planned you should be able to open the connection and see a tree of database object categories.



As a last step, try to create a table to make sure you have the appropriate permission in the tablespace:

Do This: From the SQL Developer menu **File** → **New** → Select **SQL File** → click **OK** → save file as **test.sql**

Type the following SQL code in the query window. When you're done click the **Run Script** button.

```
1 create table test
2 (
3     id number not null
4 );
```

If the script works, you should see **table TEST created** in the Script Output window.

On Your Own

In this part of the lab, you will take what you've learned and carry out various DBA-oriented tasks on your own. This portion of the lab will be turned in for a grade.

How to Hand in: Paste your answers into a MS Word document and then upload into Blackboard.

Fudgemart 2.0 (aka the spawn of Fudgemart)

1 – create the FUDGEMART tablespace

Use OEM to create a new tablespace called **FUDGEMART** with data file named FUDGEMART.DBF. The data file should have an initial size of 50 MB and be configured to auto extend in 1MB increments.

What to hand in: The SQL generated which creates the tablespace and a screenshot of the tablespace among the list of all tablespaces.

2 – make a FUDGEMART user with permissions to use the tablespace

Create a new user named FUDGEMART and give that user CONNECT and DBA roles. Make sure the user has Unlimited Quota on the default table space.

What to hand in: The SQL generated which creates the tablespace and a screenshot of the user among the list of users.

3 – connect the FUDGEMART user import tables and data.

Connect the new user to its tablespace in SQL Developer and then run the **fudgemart-v2.sql** script.

What to hand in: Screenshots showing the tables were created and there is data in them.

General Questions

Include your answers to these questions in your MS Word document

4 – Explain the relationship among a tablespace, data file and user.

5 – Explain the difference between a ROLE and a SYSTEM PRIVILEGE