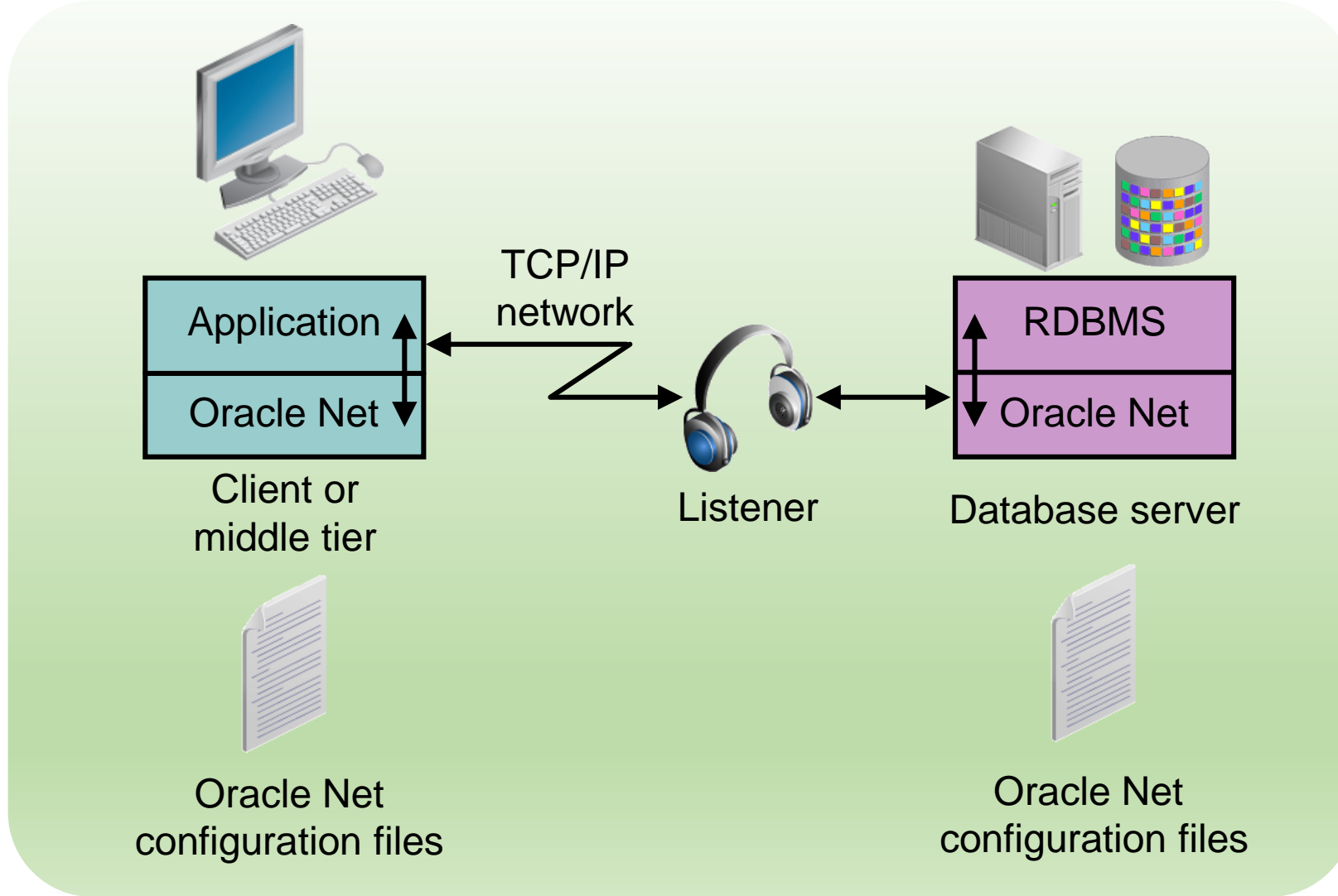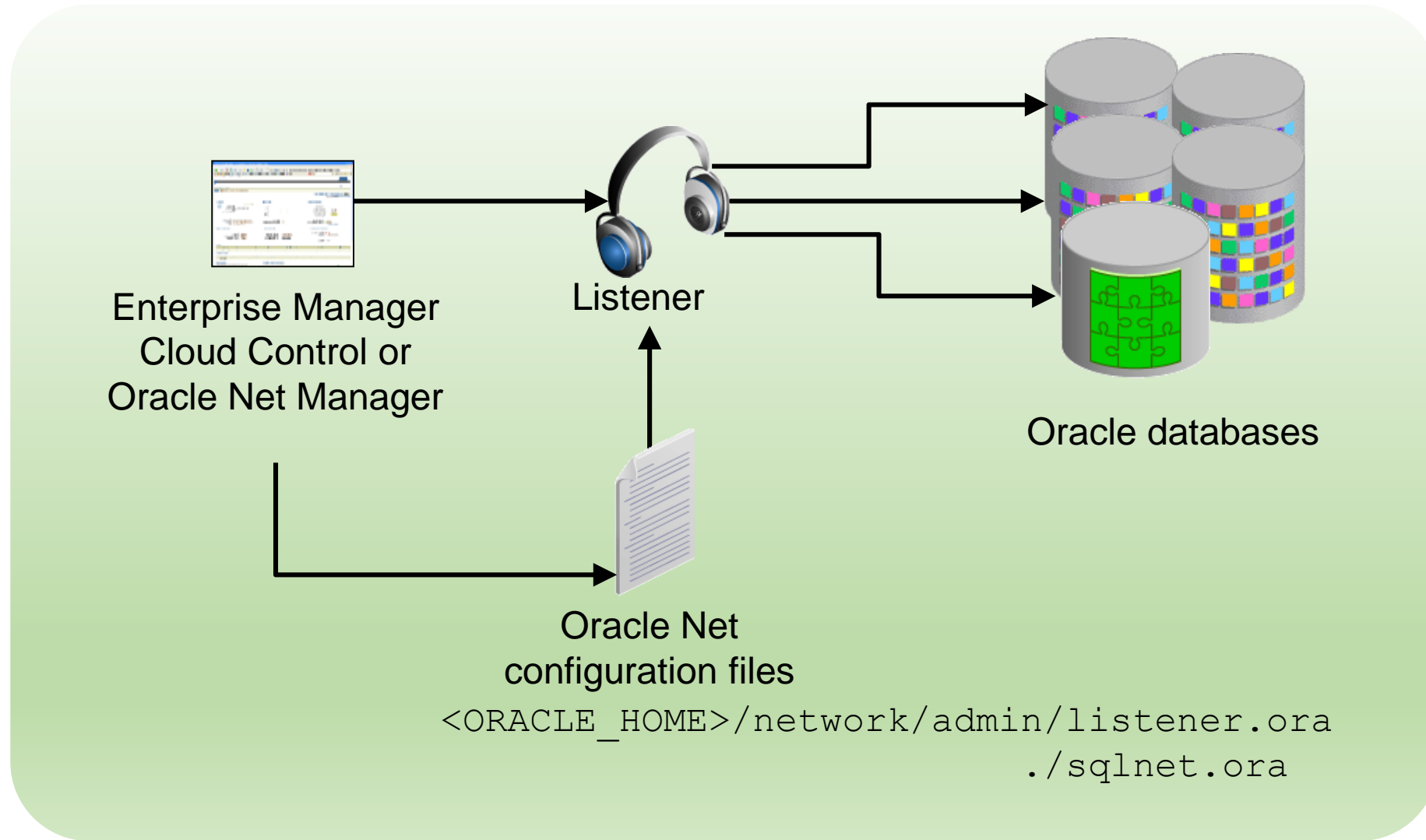# Oracle Net Services

Objectives

- After completing this lesson, you should be able to:
    - Describe Oracle Net Services
    - Explain how listeners work
    - Configure listeners for dynamic or static service registration
    - Configure local naming for database connections
    - Test Oracle Net connectivity with `tnsping`
    - Configure communication between databases by creating database links
    - Explain the difference between dedicated and shared server configurations

Oracle Net Services: Overview

Oracle Net Listener: Overview

Enterprise Manager
Cloud Control or
Oracle Net Manager

Listener

Oracle databases

Oracle Net
configuration files

```
<ORACLE_HOME>/network/admin/listener.ora
                                ./sqlnet.ora
```

The Default Listener

- During an Oracle Database installation, Oracle Universal Installer launches Oracle Net Configuration Assistant and creates a local listener named `LISTENER`.
- `LISTENER` is automatically populated with available database services through a feature called dynamic service registration.
- `LISTENER` listens on the following TCP/IP protocol address:

  ```
  ADDRESS=(PROTOCOL=tcp)(HOST=host_name)(PORT=1521))
  ```
- Without any configuration, you can access your database instance immediately through `LISTENER`.
- If the listener name is `LISTENER` and it cannot be resolved, a protocol address of TCP/IP and a port number of 1521 is assumed.

Establishing Oracle Network Connections

- To make a client or middle-tier connection, Oracle Net requires the client to know the:
  - Host where the listener is running
  - Port that the listener is monitoring
  - Protocol that the listener is using
  - Name of the service that the listener is handling
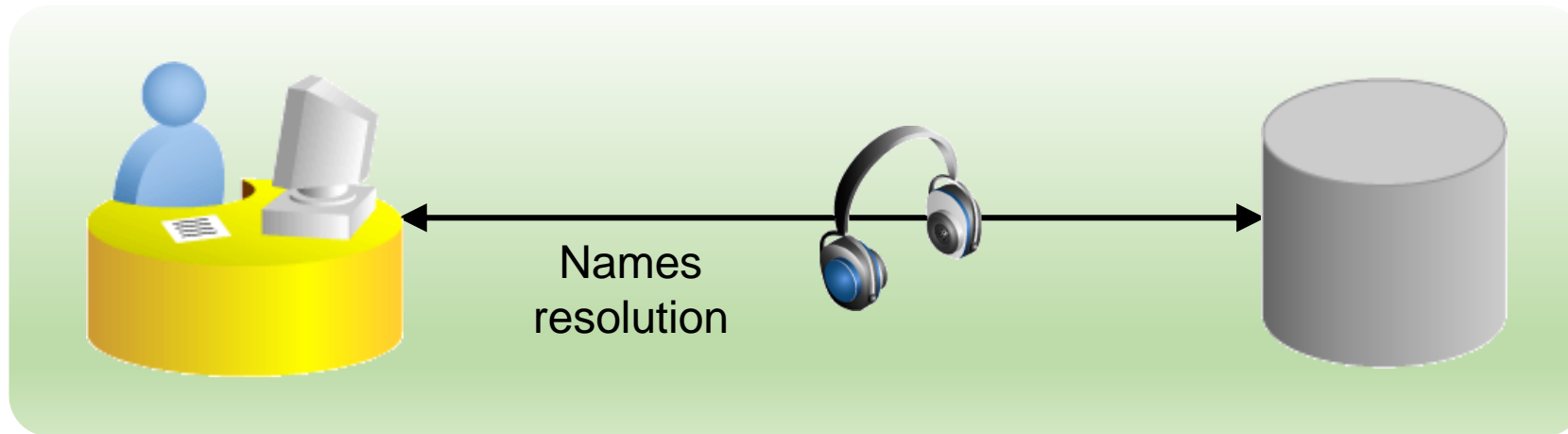
Names resolution

Connecting to an Oracle Database

Database server

finance.us.flowers.com
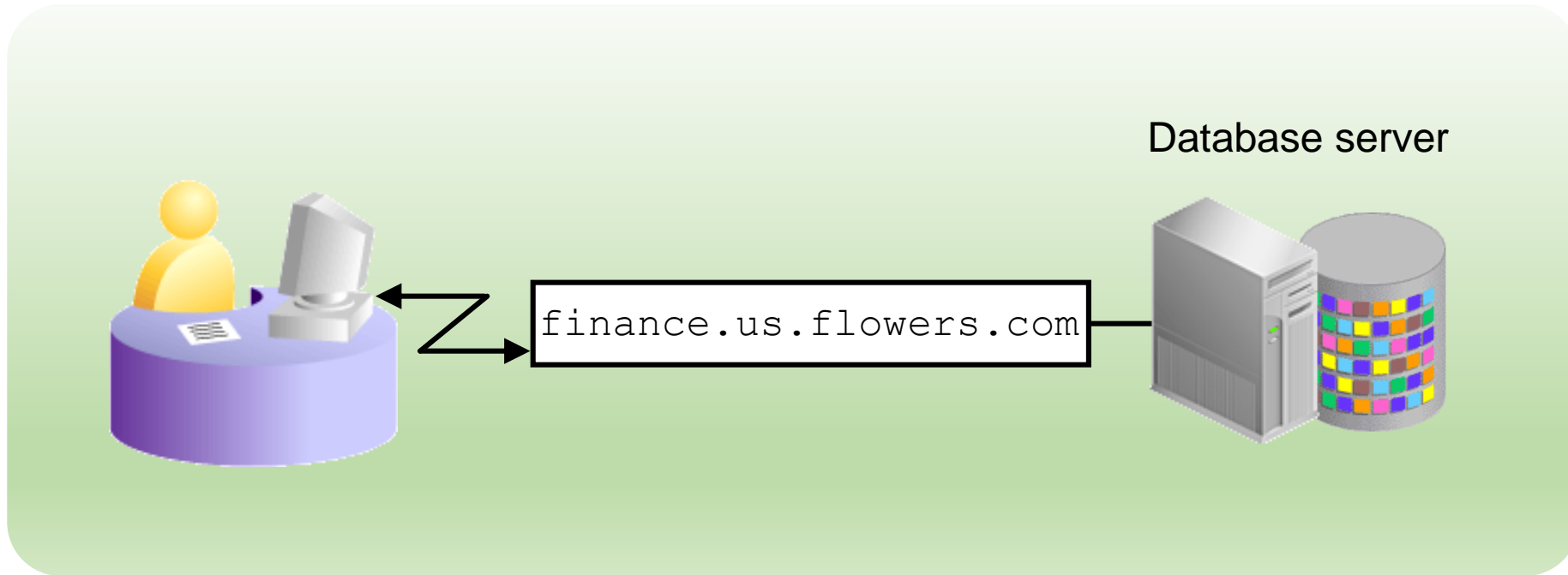
Name Resolution
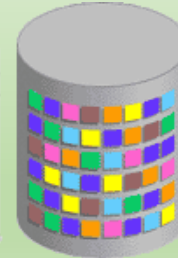
```
CONNECT jsmith/jspass@finflowers
```

Name resolution

```
finflowers =(DESCRIPTION=
   (ADDRESS=(PROTOCOL=tcp)(HOST=flowers-server)(PORT=1521))
   (CONNECT_DATA=
      (SERVICE_NAME=finance.us.flowers.com)))
```
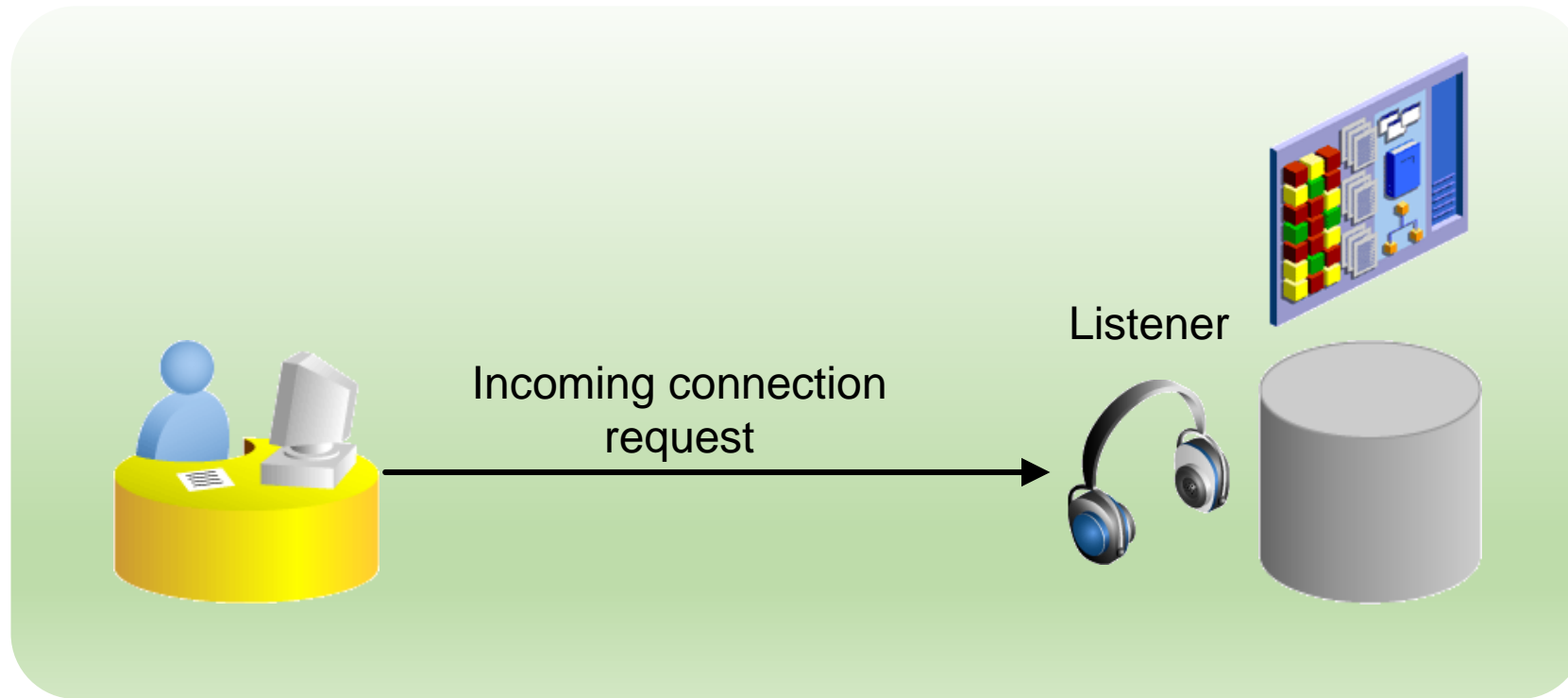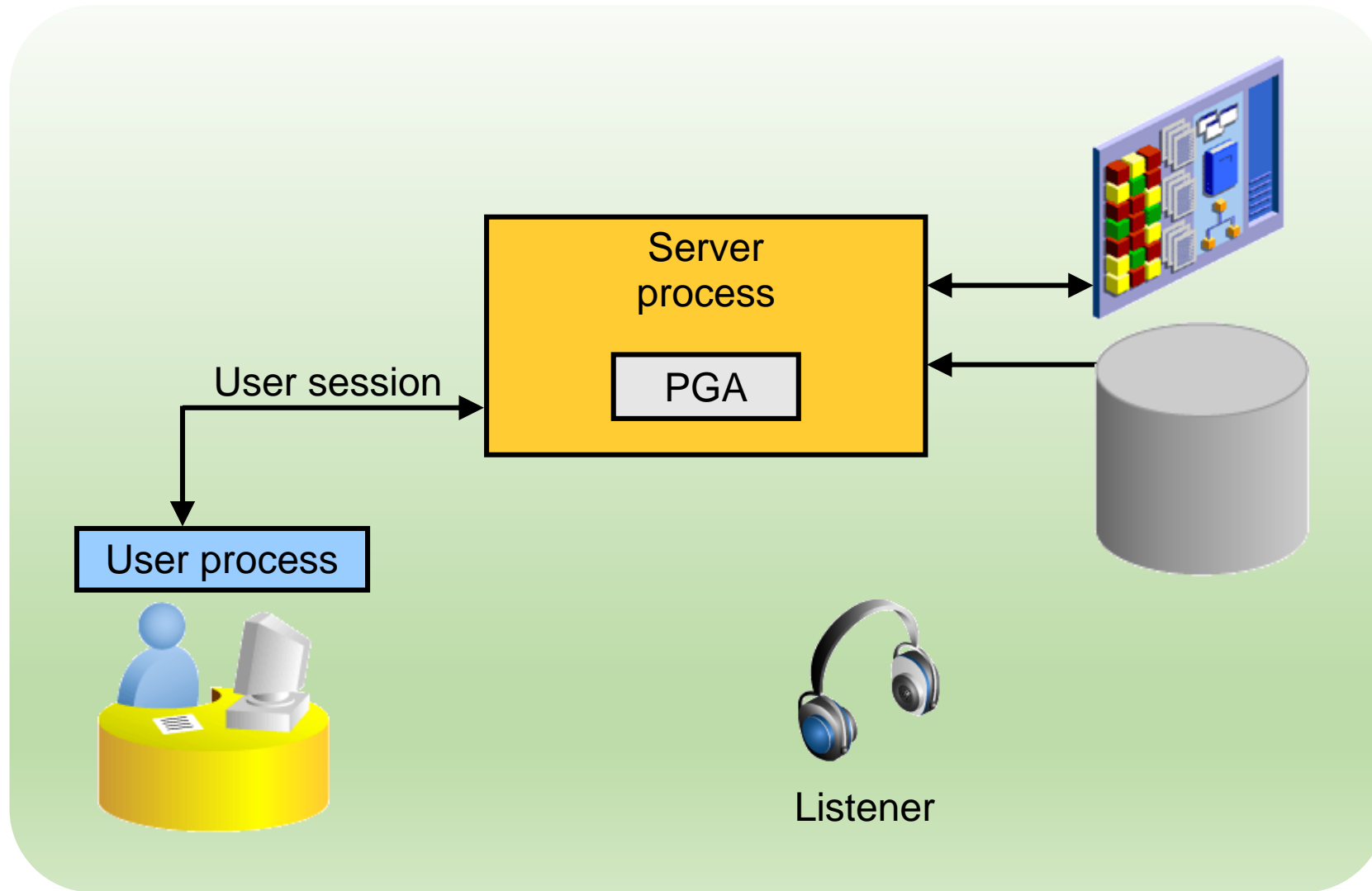
LISTENER
port 1521

finance

flowers-server

Establishing a Connection

Incoming connection request

Listener

User Sessions

Configuring Dynamic Service Registration

- By default, an Oracle database is configured to use dynamic service registration (service registration), which allows the Oracle database to identify its available services to listeners automatically.

- The LREG process polls the listeners to see if they're running and, if so, registers database service information to them.

- Dynamic service registration registers, by default, all PDB services to the same listener. If you stop that listener, you stop access to all the PDB services.

- General steps to configure dynamic service registration:
  - Make sure that the `INSTANCE_NAME`, `LOCAL_LISTENER`, `REMOTE_LISTENER`, and `SERVICE_NAMES` initialization parameters are properly configured.
  - Configure protocol addresses (end points) in the server-side `tnsnames.ora` file.

Configuring Static Service Registration

- Static service registration is a method for configuring listeners to obtain their service information manually.
    - You can create a listener for a particular PDB.
    - Static service registration might be required for some services, such as external procedures and heterogeneous services (for non-Oracle systems).
- With static registration, the listener has no knowledge of whether its database services exist or not. It only knows that it supports them. The Listener Configuration utility shows the services status as `UNKNOWN`.
- You can have both static listeners and dynamic listeners configured at the same time.
- General steps to configure static service registration:
    1. In `listener.ora`, define a listener and its protocol addresses.
    2. In `listener.ora`, also create a `SID_LIST_<listener name>` section that lists the database services for the listener.

Naming Methods

- Oracle Net supports several methods of resolving connection information:
  - Easy connect naming: Uses a TCP/IP connect string
  - Local naming: Uses a local configuration file
  - Directory naming: Uses a centralized LDAP-compliant directory server

Client/application server

Oracle Net

Oracle Net
configuration files
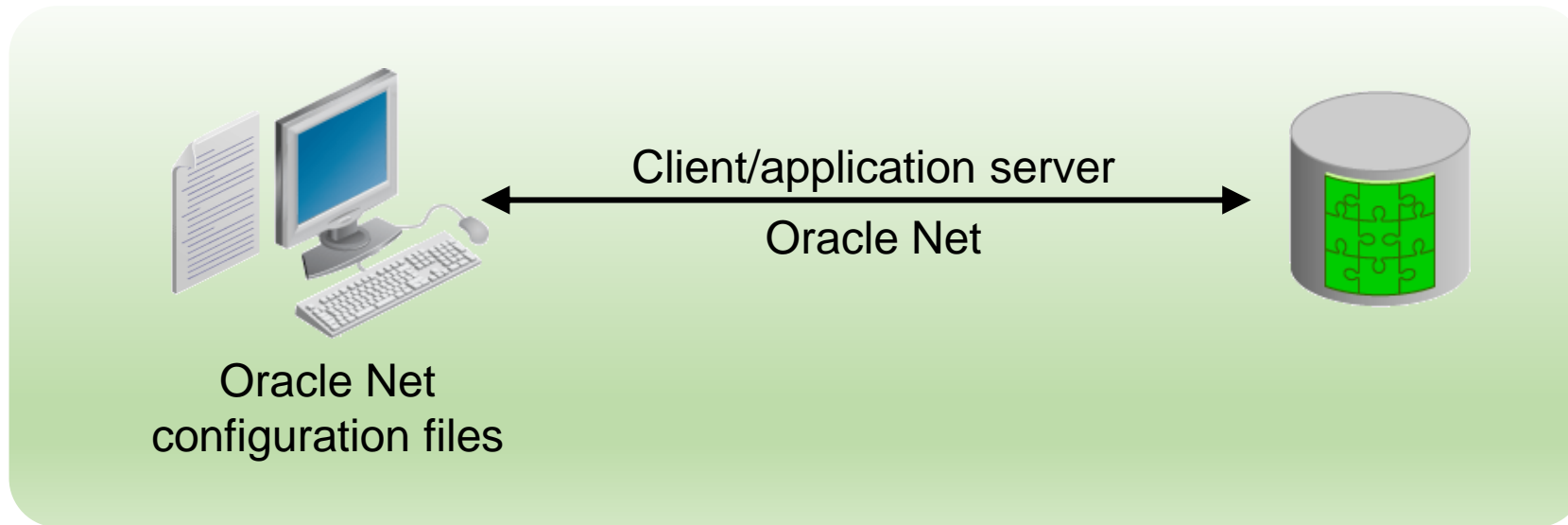
Easy Connect

- Is enabled by default
- Requires no client-side configuration
- Supports only TCP/IP (no SSL)
- Offers no support for advanced connection options such as:
  - Connect-time failover
  - Source routing
  - Load balancing


```
SQL> CONNECT hr/hr@db.us.oracle.com:1521/dba11g
```
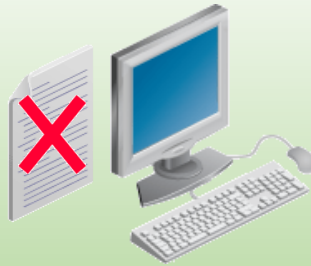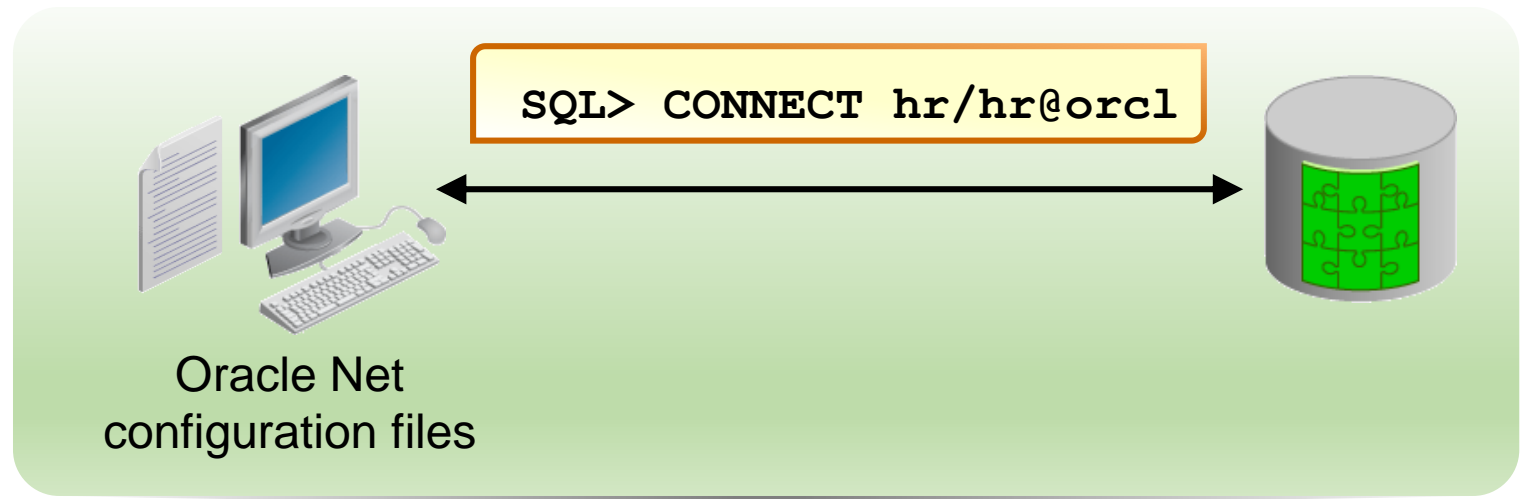
No Oracle Net
configuration files

Local Naming

- Requires a client-side names-resolution file

- Supports all Oracle Net protocols

- Supports advanced connection options such as:
  - Connect-time failover
  - Source routing
  - Load balancing

```
SQL> CONNECT hr/hr@orcl
```

Oracle Net
configuration files

Directory Naming

- Requires LDAP with Oracle Net names resolution information loaded:
  - Oracle Internet Directory
  - Microsoft Active Directory Services
- Supports all Oracle Net protocols
- Supports advanced connection options

LDAP directory

SQL> CONNECT hr/hr@orcl

Oracle Net configuration files
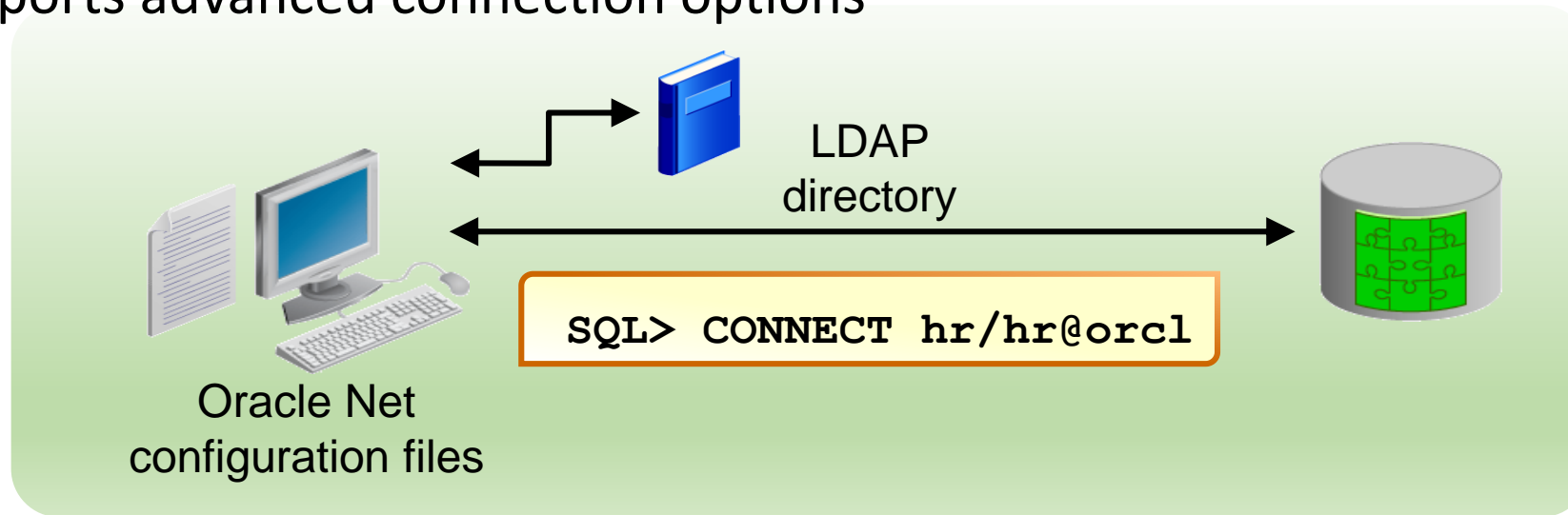
Tools for Configuring and Managing Oracle Net Services

- Enterprise Manager Net Services Administration page
- Oracle Net Manager
- Oracle Net Configuration Assistant
- Listener Control Utility

Defining Oracle Net Services Components

Component	Description	File
Listeners	A process that resides on the server whose responsibility is to listen for incoming client connection requests and manage traffic to the server.	`listener.ora`
Naming methods	A resolution method used by a client application to resolve a connect identifier to a connect descriptor when attempting to connect to a database service.	
Naming (net service name)	A simple name (connect identifier) for a service that resolves to a connect descriptor to identify the network location and identification of a service.	`tnsnames.ora` (local configuration)
Profiles	A collection of parameters that specifies preferences for enabling and configuring Oracle Net features on the client or server.	`sqlnet.ora`

Advanced Connection Options

- When a database service is accessible by multiple listener protocol addresses, you can specify the order in which the addresses are to be used.
- Oracle Net supports the following advanced connection options with local and directory naming:
  - Connect-time failover
  - Load balancing
  - Source routing

Testing Oracle Net Connectivity with `tnsping`

- The `tnsping` utility tests Oracle Net service aliases.
- It validates connectivity between a client and the Oracle Net Listener.
  - It validates that the host name, port, and protocol reach a listener.
  - It does not check whether the listener handles the service name.
  - It does not verify that the requested service is available.
- The `tnsping` utility also reveals the location of the configuration files. In a system with multiple `ORACLE_HOME` locations, this can be helpful.
- Examples:
  - `tnsping` supports Easy Connect names resolution:
    ```
    $tnsping host01.example.com:1521/orcl
    ```
  - `tnsping` also supports local and directory naming:
    ```
    $ tnsping orcl
    ```

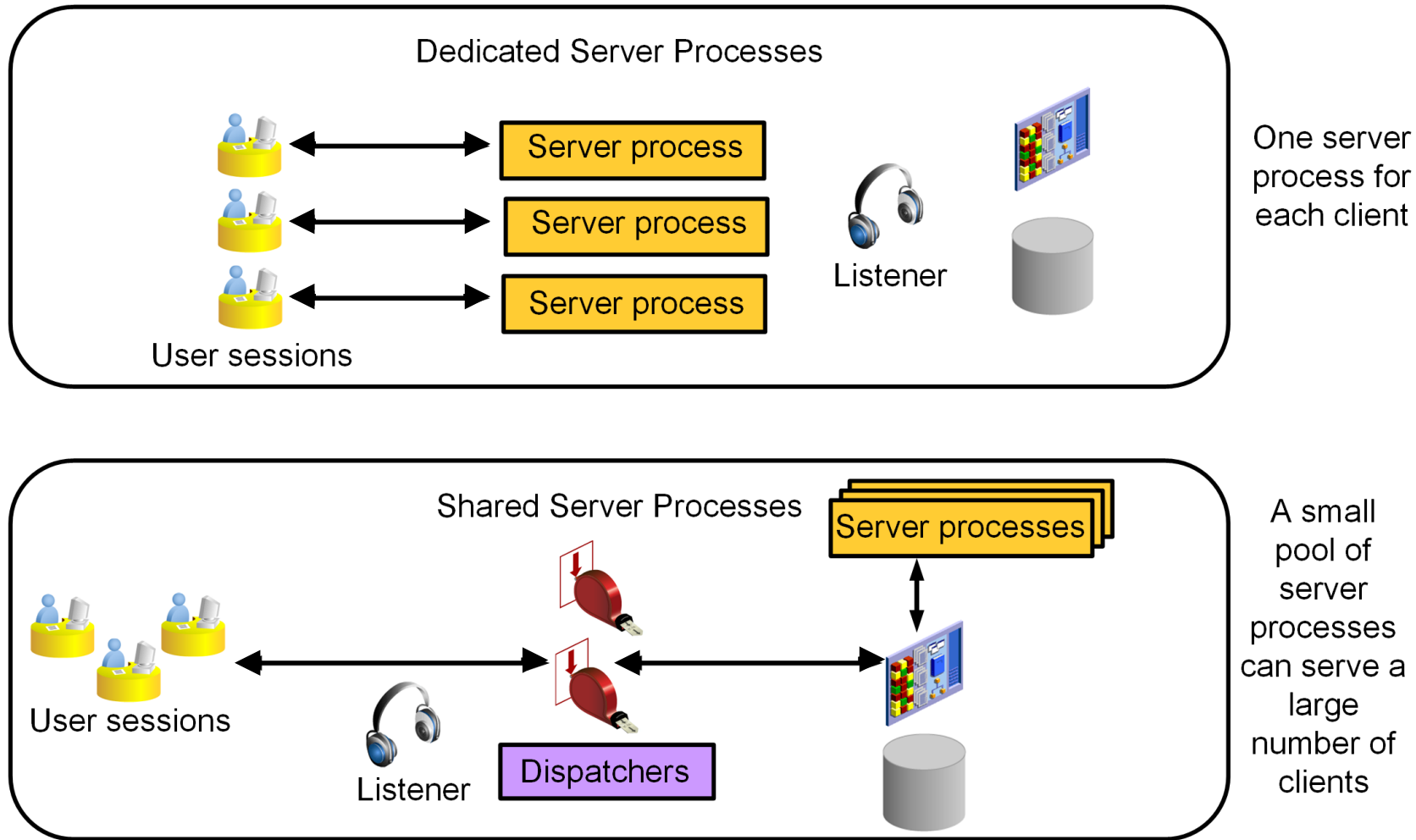# Configuring Communication Between Database Instances

- You must configure network connectivity (for example, `tnsnames.ora`) and a database link for database instance to database instance communication.

- A database link is a schema object that enables you to access objects on a different database.

- SQL command to create a fixed user, private database link:

```
CREATE DATABASE LINK <database_link_name>
CONNECT TO <user> IDENTIFIED BY <pwd>
USING '<connect_string_for_remote_db>'
```

- SQL command to query a table by using the database link:

```
SELECT * FROM employees@<database_link_name>
```

Comparing Dedicated and Shared Server Configurations

Dedicated Server Processes

Server process

Server process

Server process

Listener

User sessions

One server process for each client

Shared Server Processes

Server processes

User sessions

Listener

Dispatchers

A small pool of server processes can serve a large number of clients

Summary

- In this lesson, you should have learned how to:
    - Describe Oracle Net Services
    - Explain how listeners work
    - Configure listeners for dynamic or static service registration
    - Configure local naming for database connections
    - Test Oracle Net connectivity with `tnsping`
    - Configure communication between databases by creating database links
    - Explain the difference between dedicated and shared server configurations

Practice 8: Overview

- 8-1: Exploring the Default Listener
- 8-2: Creating a Static Listener for a PDB
- 8-3: Verifying the Net Service Name for MYPDB1