Configuring Oracle Network Environment

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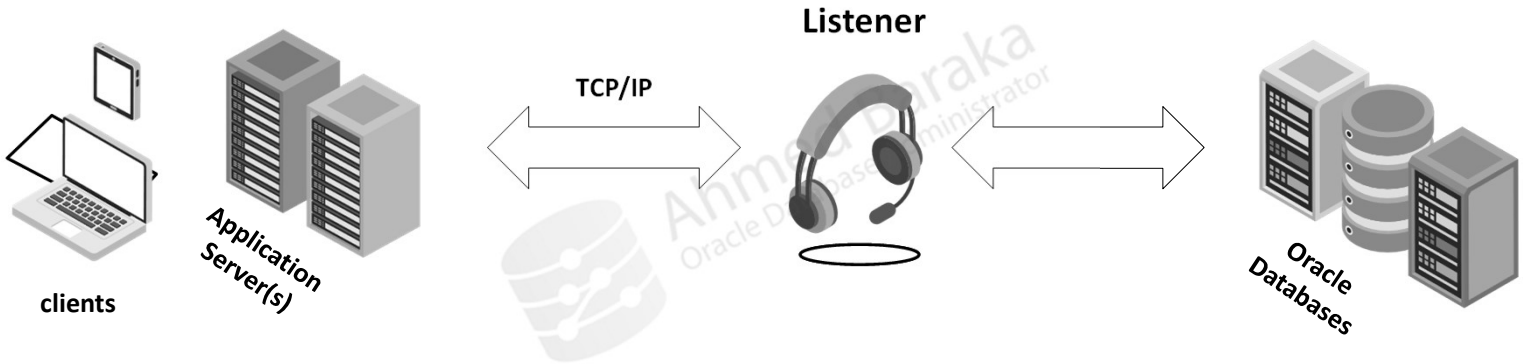
Objectives

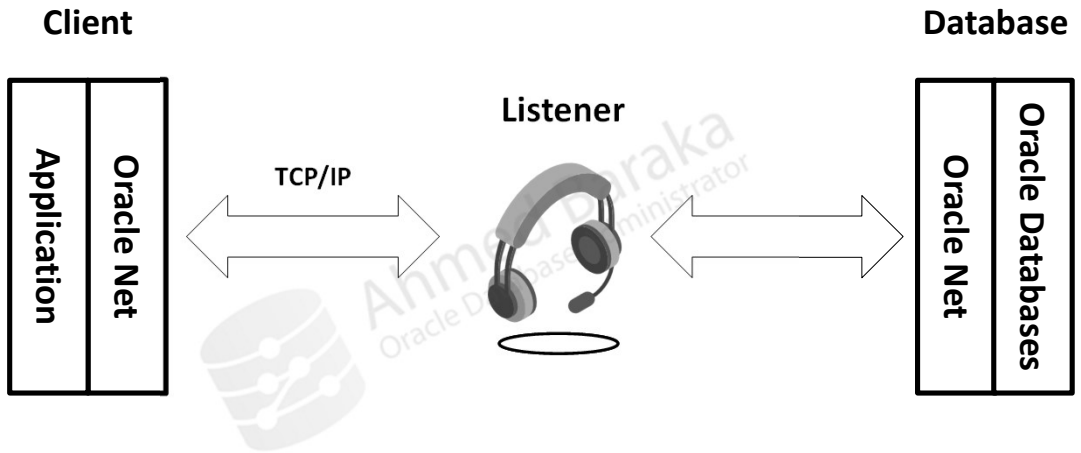
In this lecture, you will learn how to perform the following:

- Describe Oracle Net Listener
- Describe a database connection cycle
- Describe Oracle Net Configuration files
- Use Oracle Net Naming Methods
- Test Oracle Net Connectivity
- Use Oracle Net Configuration Assistant
- Use the Listener Control Utility
- Register database services in the listener

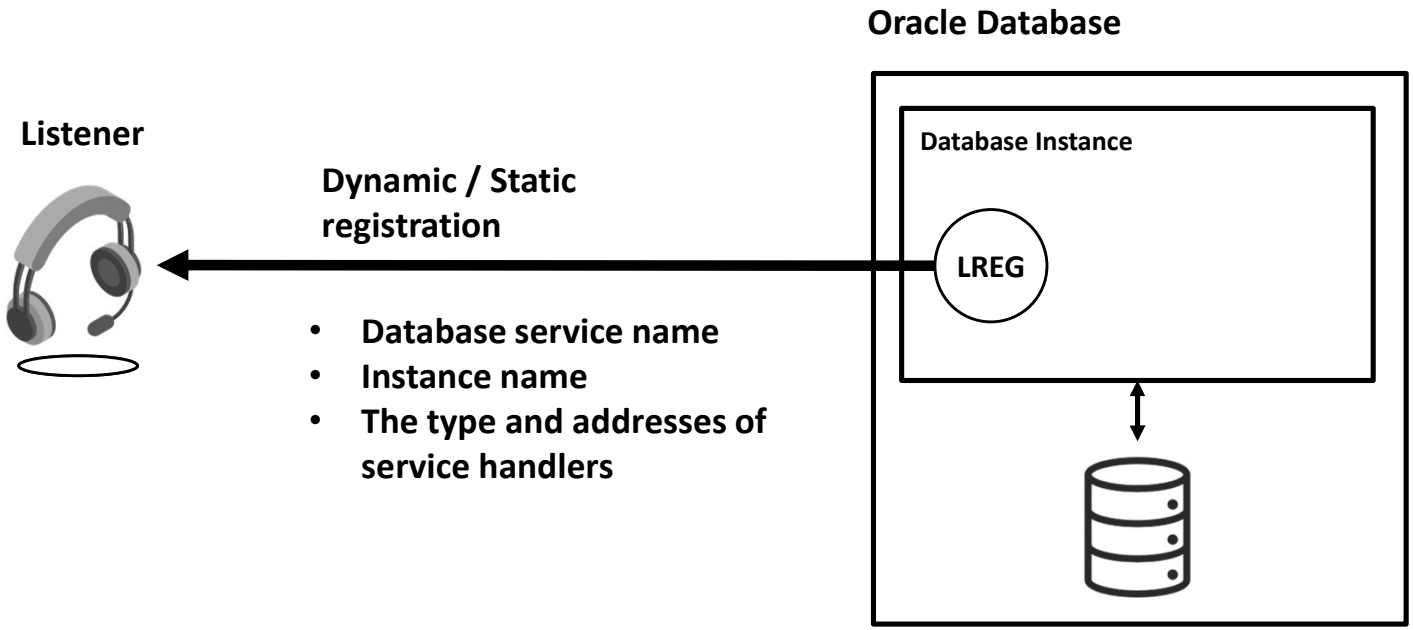
Oracle Net Listener



Oracle Net Services



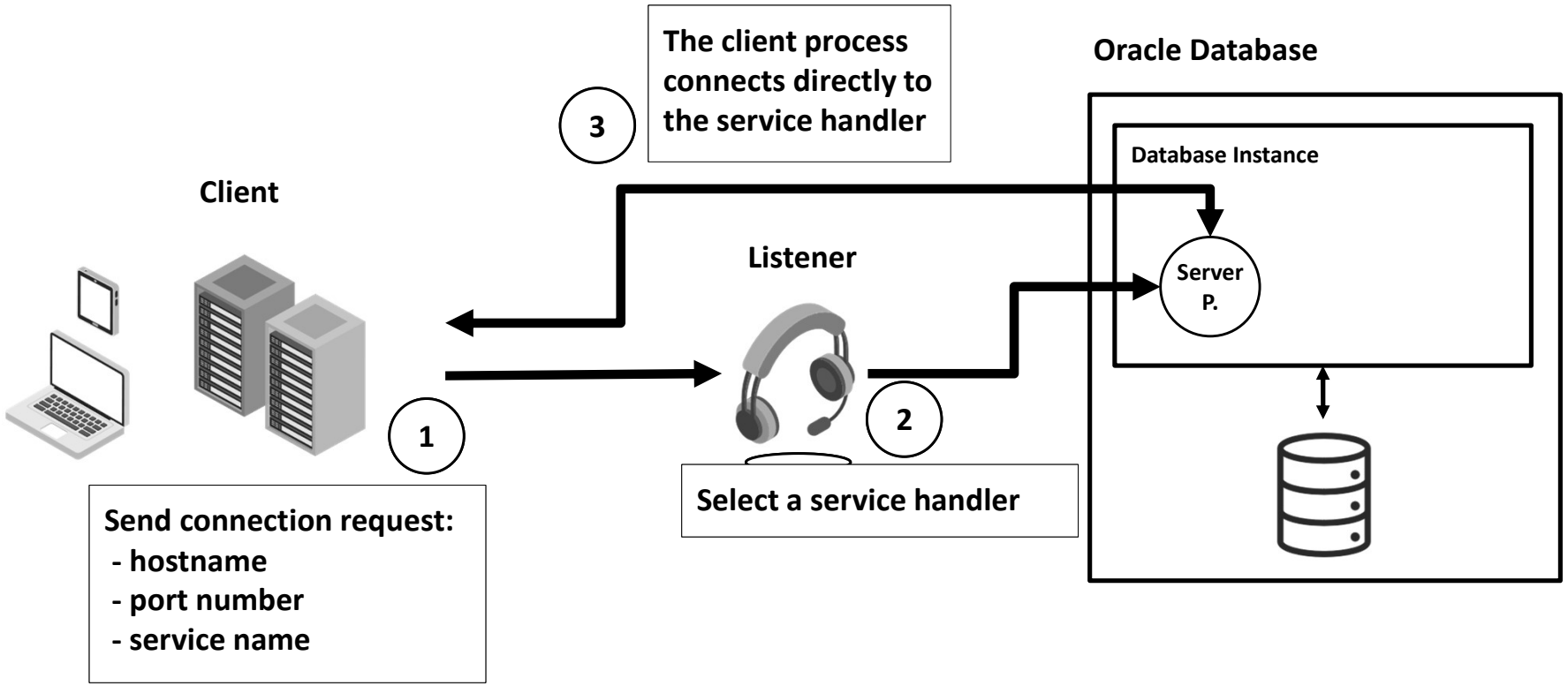
Database Service Registration



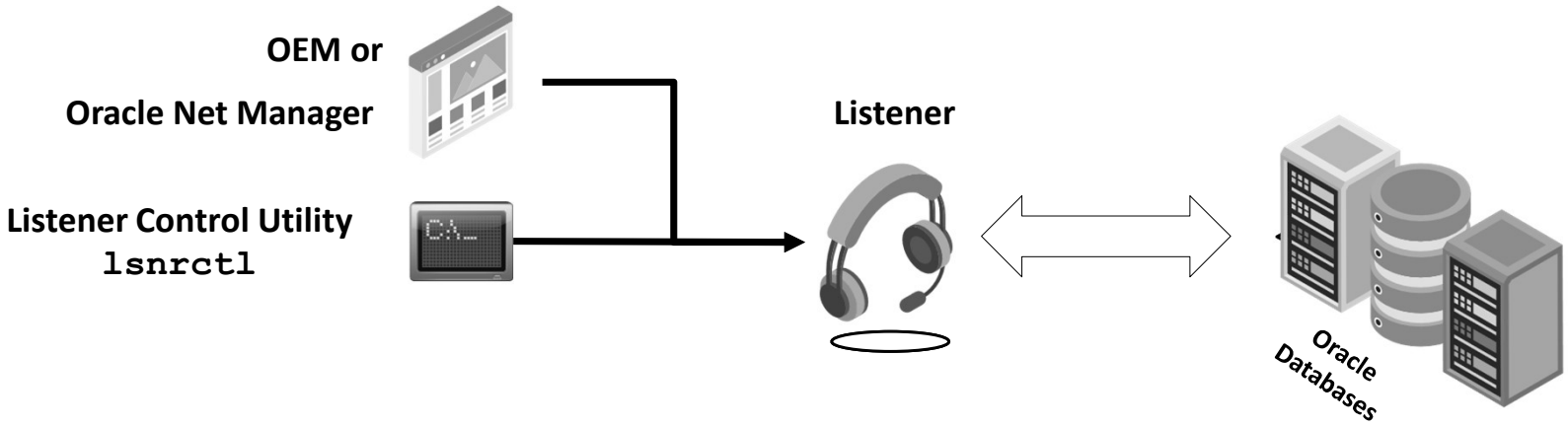
About Oracle Net Listener

- Is a server-side process that listens for incoming client connection requests and manages traffic to the database
  - It is not part of database processes and could run a separate machine
- Oracle Net Services enables network connections from a client or middle-tier application to the Oracle database server
  - Oracle Net (or its equivalent) must exist in the client side to establish a connection to the database
- Service registration provides information about the configured database services to the Listener
  - Dynamic: automatically by LREG process
  - Static: manually by the DBA

Establishing a Connection to a Database Service



Oracle Net Listener Configuration Files



Oracle Net Configuration Files

```
$ORACLE_HOME\network\admin\tnsnames.ora
                        \sqlnet.ora
                        \listener.ora
```

Oracle Net Configuration Files

Command	Description
`listener.ora`	Listener configuration file. Located in the database server. It may contain the following: • Protocol addresses it is accepting connection requests on • Control parameters used by the listener • Database and non-database services it is listening for
`tnsnames.ora`	This file is used for the local naming method. Located in the database server and in the client machine
`sqlnet.ora`	Oracle Net configuration file. Located in the database server and in the client machine. It may include the following: • Client domain to append to unqualified service names • Order of naming methods • Logging and tracing features to use • Oracle security parameters and others

Locating Oracle Net Configuration Files

1. Net Configuration files are by default saved in:
   `$ORACLE_HOME/network/admin`
2. The directory specified by the **`TNS_ADMIN`** environment variable
   - **Linux**: /home/oracle/.bash_profile (or .bashrc files)

     ```
     export TNS_ADMIN=/u01/app/oracle/product/19.0.0/db_1/network/admin
     ```

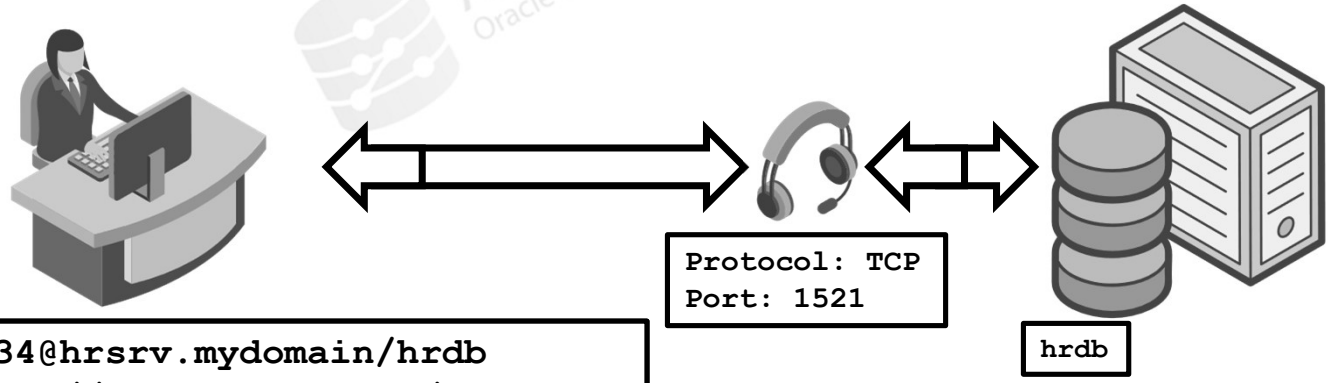
   - **Windows**: as an system or user environment variables or in the register
     `\HKEY_LOCAL_MACHINE\SOFTWARE\Oracle\Oracle_Home`
   - Can be set in the server and in the client

Oracle Network Connection: Naming Methods

- Supported naming methods:
  - **Easy Connect**: uses TCP/IP connect string
    - Easy Connect Plus (19c)
  - **Local naming/Network Service Name**: references a local `tnsnames.ora` file
  - **Directory naming**: uses a centralized LDAP-compliant directory server
  - **External naming**: uses a supported non-Oracle naming service

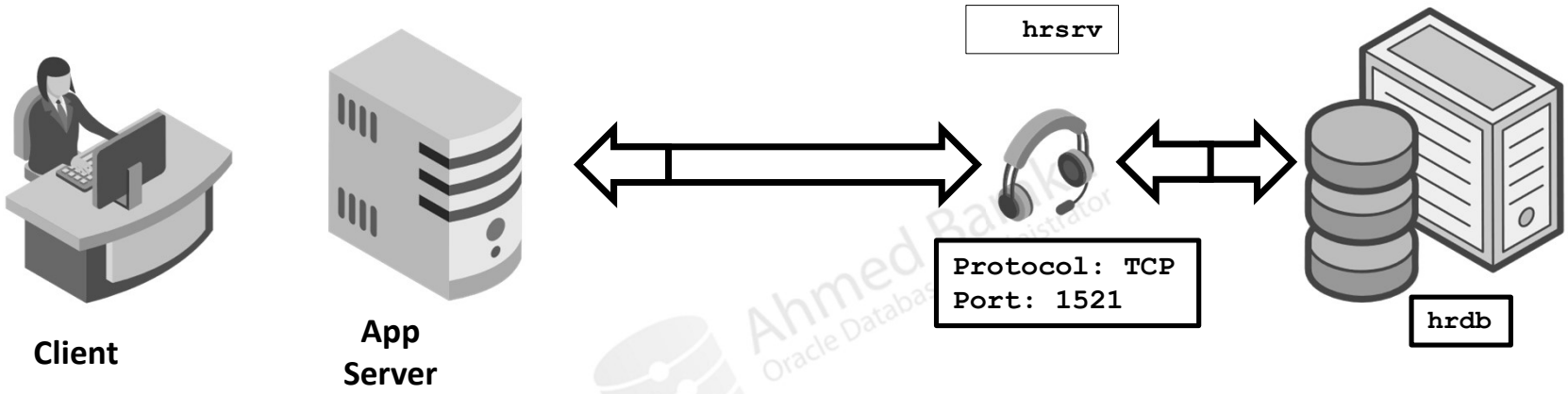
Using Easy Connect Naming Method

- Requires minimal user configuration.
- Supports only TCP/IP (with no SSL)
- Easy connect connection string format:
  `username/password@[//]hostname[:portnumber]/dbservice[:server_type]`




```
conn hr/ABcd##1234@hrsrv.mydomain/hrdb
conn hr/ABcd##1234@//hrsrv.mydomain/hrdb
conn hr/ABcd##1234@//192.168.15.15:1521/hrdb
```

Using Local Naming




```
conn hr/ABcd##1234@HRBASE
```

tnsnames.ora

```
HRBASE =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP)(HOST =hrsrv)(PORT = 1521))
    (CONNECT_DATA =
      (SERVER = DEDICATED)
      (SERVICE_NAME = hrdb)
    )
  )
```

About Local Naming Method

- Probably the most common method used in most production databases
- Network service names (aliases) are created in the tnsnames.ora file, each name contains connect descriptors
- The connect format: username/password@network-serive-name
- Multiple network service names can be configured in tnsnames.ora
- Easy to manage connections to database services
- tnsnames.ora can be configured in the client and the database
- tnsnames.ora is a text file that can be modified using text editor
- Supports advanced connection features

Which Method to Use

- Use Easy Connect when you want to quickly connect to a database service
- Use Local Naming for connecting applications to database services

Prioritizing Naming Methods

- The following command could refer to more than one naming method:

```
SQL> CONNECT USER1@HRDB
```

- Naming methods in a database can be prioritized in sqlnet.ora file:

```
NAMES.DIRECTORY_PATH= (TNSNAMES,EZCONNECT)
```

- Naming methods not mentioned in the parameter are not used
- sqlnet.ora file can be modified:
  - Manually using a text editor
  - Using Network Configuration Assistant
  - Using Oracle Net Manager

Testing Oracle Net Connectivity

- The **`tnsping`** utility that tests Oracle Net service aliases
- Can test local and directory naming:

```
$ tnsping oradb
Attempting to contact (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP)(HOST
= srv1)(PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED)
(SERVICE_NAME = oradb.localdomain)))
OK (2 msec)
```

- Can test Easy Connect Names resolution:

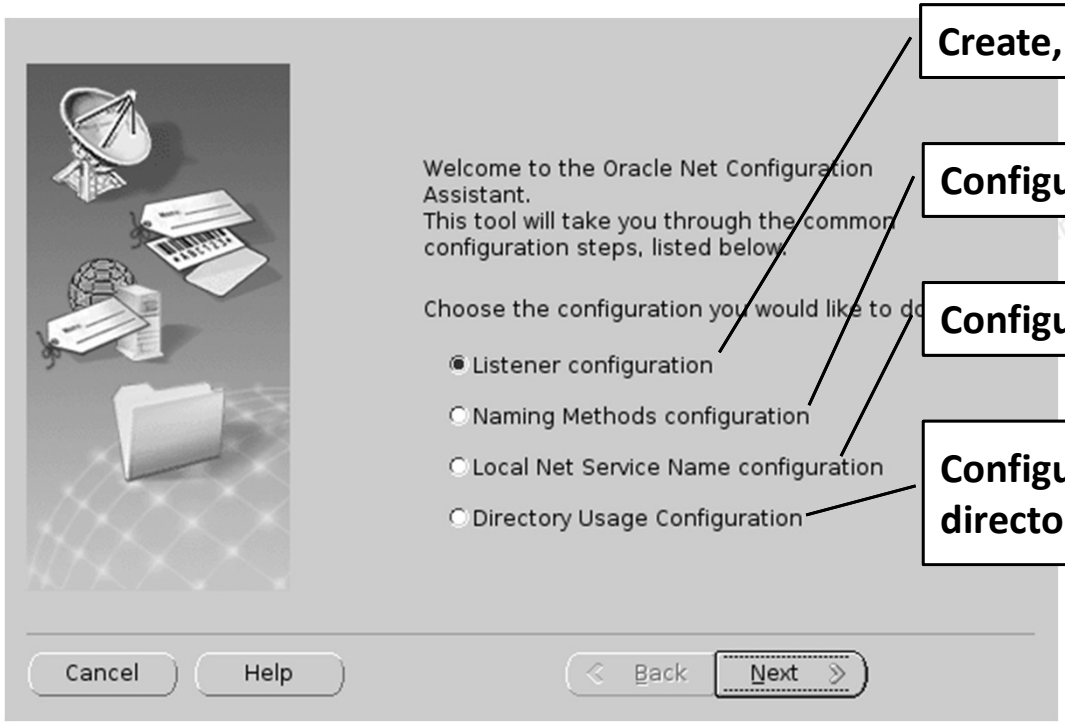
```
tnsping dbsrv:1521/oradb.localdomain
```

- It tests the connection to the listener, not the service

Tools for Configuring and Managing Oracle Net

- Oracle Net Configuration Assistant (**`netca`**)
- Listener Control Utility (**`lsnrctl`**)
- Oracle Net Manager (**`netmgr`**)
- OEM: Net Services Administration page

About Oracle Net Configuration Assistant



Create, reconfigure, or delete Lisetner

Configure allowable naming methods

Configure network service names in tnsnames.ora

Configure a directory server for directory-enabled features

Using netca in Command Line

- Oracle Net Configuration Assistant can be run in silent mode:

```
netca -silent -responsefile netca.rsp
```

- A sample response file is available:

  `$ORACLE_HOME/assistants/netca/netca.rsp`

- Useful to configure a listener in a non-GUI platforms

Using Listener Control Utility (`lsnrctl`)

- With the **`lsnrctl`** utility, you can:
  - Start the listener
  - Stop the listener
  - Check the status of the listener
  - Reinitialize the listener from the configuration file parameters
  - Dynamically configure many listeners
  - Set or change the listener password

```
[oracle@srv1 ~]$ lsnrctl

LSNRCTL for Linux: Version 19.0.0.0.0 - Production on **-**-2022
Copyright (c) 1991, 2019, Oracle.  All rights reserved.
Welcome to LSNRCTL, type "help" for information.
LSNRCTL>
```

Issuing `lsnrctl` Commands

- **`lsnrctl`** commands can be issued from the command line or from the **`lsnrctl`** prompt:

```
lsnrctl start
```

```
LSNRCTL> start
```

- Common commands:

Command	Description
`help`	display the lsnrctl commands
`stop`	Stop the Listener
`status`	Displays the status of the Listener
`service[s]`	Displays the services registered in the listener
`reload`	Read and load the **`listener.ora`** file

Listener configuration file `listener.ora`

- The **`listener.ora`** file, consists of the following elements:
  - Name of the listener (the default listener name is **`LISTENER`**)
  - Protocol addresses that the listener is accepting connection requests on
  - Port number
  - Database services (static service registration)
  - Control parameters
- Changes do not take effect until we reload or restart the Listener
- By default, stored in **`$ORACLE_HOME/network/admin`**, can be superseded by setting the environment variable **`TNS_ADMIN`**

`listener.ora` Example

- Here a `listener.ora` file generated by dbca:

```
LISTENER =
  (DESCRIPTION_LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = srv1)(PORT = 1521))
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1521))
    )
  )
```

- Listener default port number is 1521. Could be changed as part of best security practices.
- If external procedures are not being used, remove its settings from the file and restart the Listener

Registering Database Services in the Listener

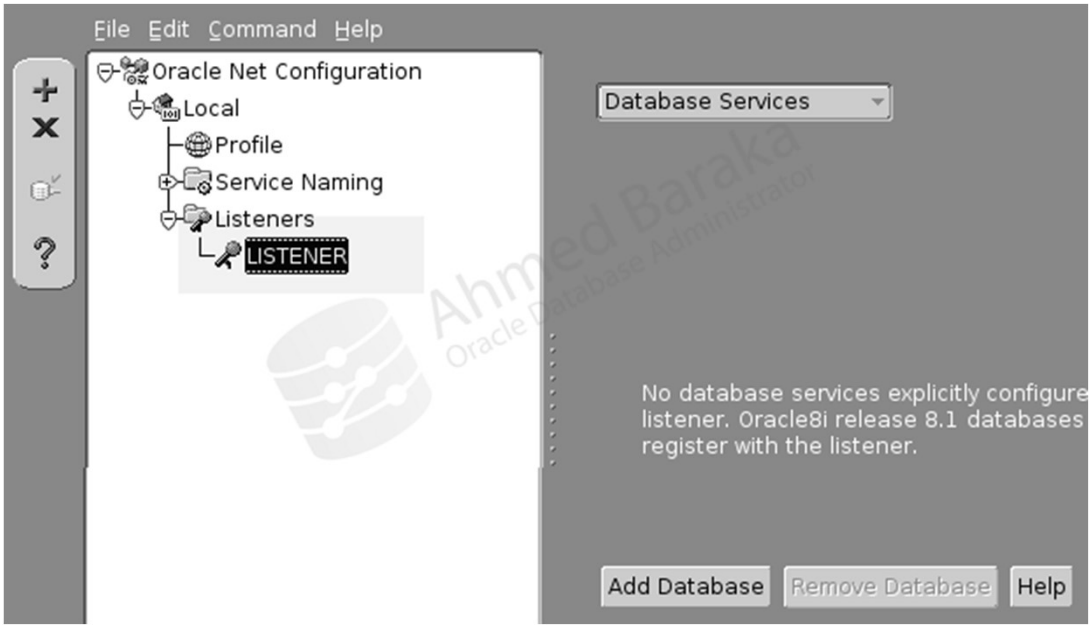
- **Dynamic**: the database or the PDB registers itself in the Listener using LREG process

```
lsnrctl service
```

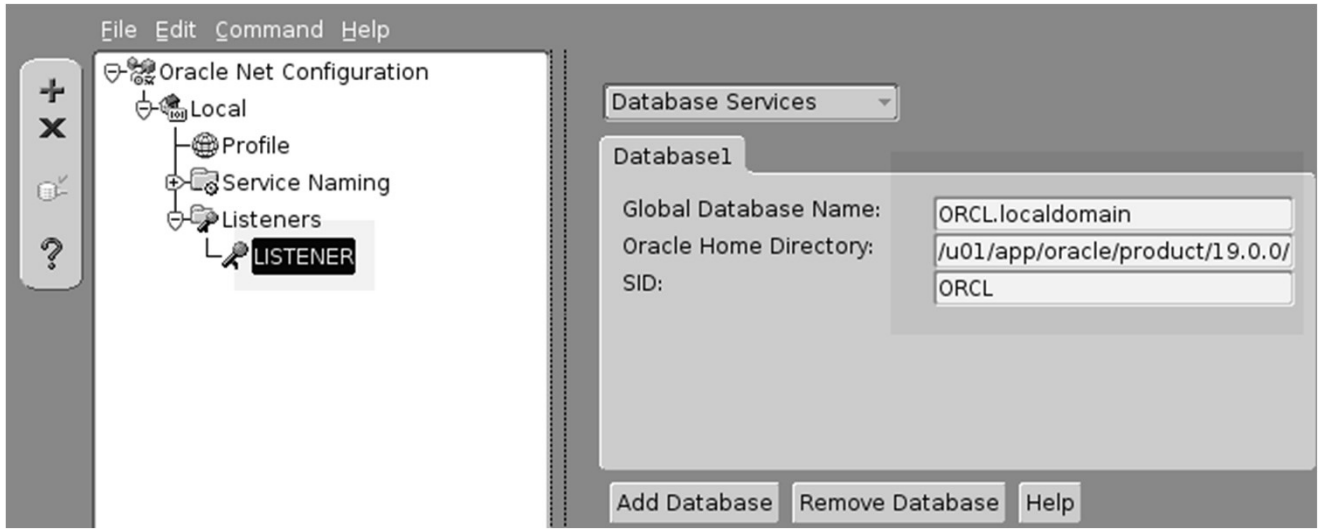
```
ALTER SYSTEM REGISTER;
```

- **Static**: manually register the database service in the listener.ora file. Required in the following cases:
  - Use of external procedure calls
  - Use of Oracle Heterogeneous Services
  - Use of Oracle Data Guard
  - Remote database startup from a tool other than OEM Cloud Control
  - Connections to Oracle databases earlier than Oracle 8i release 2 (8.1)

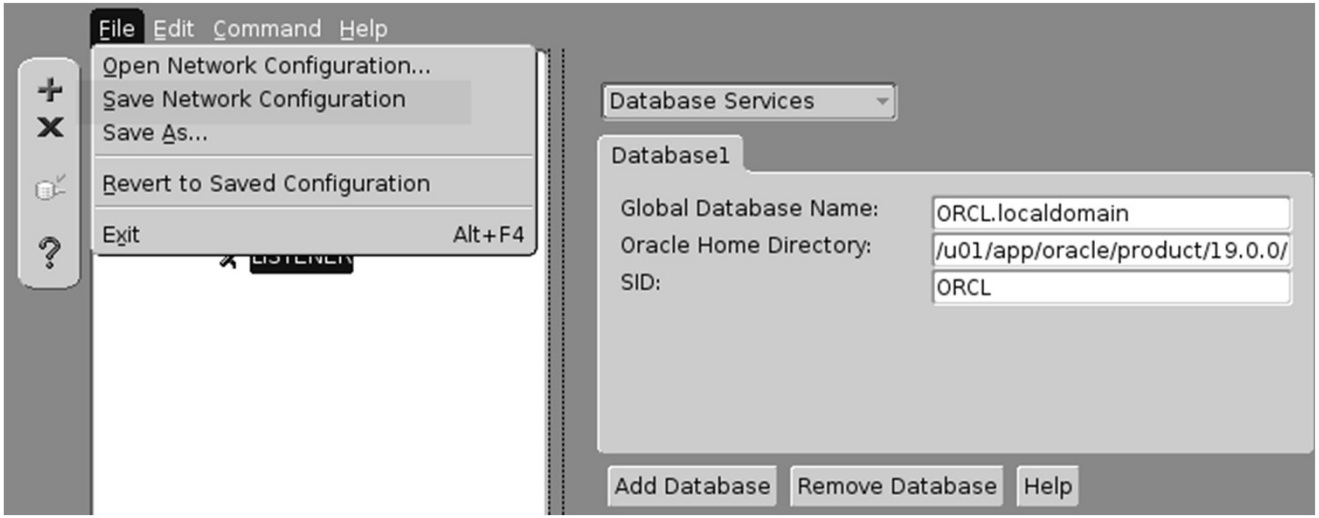
Database Service Static Registration using netmgr



Database Service Static Registration using netmgr



Database Service Static Registration using netmgr



Database Service Static Registration Example

```
...
SID_LIST_LISTENER =
  (SID_LIST =
    (SID_DESC =
      (GLOBAL_DBNAME = ORCL.localdomain)
      (ORACLE_HOME = /u01/app/oracle/product/19.0.0/db_1)
      (SID_NAME = ORCL)
    )
  )
```

Oracle Net Services Reference

- Oracle Database Net Services Administrator's Guide
- Oracle Database Net Services Reference

Summary

In this lecture, you should have learnt how to perform the following:

- Describe Oracle Net Listener
- Describe a database connection cycle
- Describe Oracle Net Configuration files
- Use Oracle Net Naming Methods
- Test Oracle Net Connectivity
- Use Oracle Net Configuration Assistant
- Use the Listener Control Utility
- Register database services in the listener