

# Exportar e importar datos de Oracle

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## 1. Exportar datos

- Se utiliza el comando `expdp`
  - Ayuda con `expdp help=yes`
  - Es necesario crear antes el **directory** de **Oracle**

```
Export: Release 12.1.0.2.0 - Production on Fri Dec 16 13:32:15 2016

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The Data Pump export utility provides a mechanism for transferring data objects
between Oracle databases. The utility is invoked with the following command:

    Example: expdp scott/tiger DIRECTORY=dmpdir DUMPFILE=scott.dmp

You can control how Export runs by entering the 'expdp' command followed
by various parameters. To specify parameters, you use keywords:

    Format:  expdp KEYWORD=value or KEYWORD=(value1,value2,...,valueN)
    Example: expdp scott/tiger DUMPFILE=scott.dmp DIRECTORY=dmpdir SCHEMAS=scott
              or TABLES=(T1:P1,T1:P2), if T1 is partitioned table

USERID must be the first parameter on the command line.

-----

The available keywords and their descriptions follow. Default values are listed within square brackets.

ABORT_STEP
Stop the job after it is initialized or at the indicated object.
Valid values are -1 or N where N is zero or greater.
N corresponds to the object's process order number in the master table.

ACCESS_METHOD
Instructs Export to use a particular method to unload data.
Valid keyword values are: [AUTOMATIC], DIRECT_PATH and EXTERNAL_TABLE.

ATTACH
Attach to an existing job.
For example, ATTACH=job_name.

CLUSTER
Utilize cluster resources and distribute workers across the Oracle RAC [YES].
```

COMPRESSION  
Reduce the size of a dump file.  
Valid keyword values are: ALL, DATA\_ONLY, [METADATA\_ONLY] and NONE.

COMPRESSION\_ALGORITHM  
Specify the compression algorithm that should be used.  
Valid keyword values are: [BASIC], LOW, MEDIUM and HIGH.

CONTENT  
Specifies data to unload.  
Valid keyword values are: [ALL], DATA\_ONLY and METADATA\_ONLY.

DATA\_OPTIONS  
Data layer option flags.  
Valid keyword values are: XML\_CLOBS.

DIRECTORY  
Directory object to be used for dump and log files.

DUMPFIL  
Specify list of destination dump file names [expdat.dmp].  
For example, DUMPFIL=scott1.dmp, scott2.dmp, dmpdir:scott3.dmp.

ENCRYPTION  
Encrypt part or all of a dump file.  
Valid keyword values are: ALL, DATA\_ONLY, ENCRYPTED\_COLUMNS\_ONLY, METADATA\_ONLY and NONE.

ENCRYPTION\_ALGORITHM  
Specify how encryption should be done.  
Valid keyword values are: [AES128], AES192 and AES256.

ENCRYPTION\_MODE  
Method of generating encryption key.  
Valid keyword values are: DUAL, PASSWORD and [TRANSPARENT].

ENCRYPTION\_PASSWORD  
Password key for creating encrypted data within a dump file.

ENCRYPTION\_PWD\_PROMPT  
Specifies whether to prompt for the encryption password [NO].  
Terminal echo will be suppressed while standard input is read.

ESTIMATE  
Calculate job estimates.  
Valid keyword values are: [BLOCKS] and STATISTICS.

ESTIMATE\_ONLY  
Calculate job estimates without performing the export [NO].

EXCLUDE  
Exclude specific object types.  
For example, EXCLUDE=SCHEMA:='HR'.

FILESIZE  
Specify the size of each dump file in units of bytes.

FLASHBACK\_SCN  
SCN used to reset session snapshot.

FLASHBACK\_TIME  
Time used to find the closest corresponding SCN value.

FULL  
Export entire database [NO].

HELP  
Display Help messages [NO].

INCLUDE  
Include specific object types.  
For example, INCLUDE=TABLE\_DATA.

JOB\_NAME  
Name of export job to create.

KEEP\_MASTER  
Retain the master table after an export job that completes successfully [NO].

LOGFILE  
Specify log file name [export.log].

LOGTIME  
Specifies that messages displayed during export operations be timestamped.  
Valid keyword values are: ALL, [NONE], LOGFILE and STATUS.

**METRICS**  
Report additional job information to the export log file [NO].

**NETWORK\_LINK**  
Name of remote database link to the source system.

**NOLOGFILE**  
Do not write log file [NO].

**PARALLEL**  
Change the number of active workers for current job.

**PARFILE**  
Specify parameter file name.

**QUERY**  
Predicate clause used to export a subset of a table.  
For example, QUERY=employees:"WHERE department\_id > 10".

**REMAP\_DATA**  
Specify a data conversion function.  
For example, REMAP\_DATA=EMP.EMPNO:REMAPPKG.EMPNO.

**REUSE\_DUMPFILES**  
Overwrite destination dump file if it exists [NO].

**SAMPLE**  
Percentage of data to be exported.

**SCHEMAS**  
List of schemas to export [login schema].

**SERVICE\_NAME**  
Name of an active Service and associated resource group to constrain Oracle RAC resources.

**SOURCE\_EDITION**  
Edition to be used for extracting metadata.

**STATUS**  
Frequency (secs) job status is to be monitored where  
the default [0] will show new status when available.

**TABLES**  
Identifies a list of tables to export.  
For example, TABLES=HR.EMPLOYEES,SH.SALES:SALES\_1995.

**TABLESPACES**  
Identifies a list of tablespaces to export.

**TRANSPORTABLE**  
Specify whether transportable method can be used.  
Valid keyword values are: ALWAYS and [NEVER].

**TRANSPORT\_FULL\_CHECK**  
Verify storage segments of all tables [NO].

**TRANSPORT\_TABLESPACES**  
List of tablespaces from which metadata will be unloaded.

**VERSION**  
Version of objects to export.  
Valid keyword values are: [COMPATIBLE], LATEST or any valid database version.

**VIEWS\_AS\_TABLES**  
Identifies one or more views to be exported as tables.  
For example, VIEWS\_AS\_TABLES=HR.EMP\_DETAILS\_VIEW.

-----

The following commands are valid while in interactive mode.  
Note: abbreviations are allowed.

**ADD\_FILE**  
Add dumpfile to dumpfile set.

**CONTINUE\_CLIENT**  
Return to logging mode. Job will be restarted if idle.

**EXIT\_CLIENT**  
Quit client session and leave job running.

**FILESIZE**  
Default filesize (bytes) for subsequent ADD\_FILE commands.

**HELP**  
Summarize interactive commands.

```
KILL_JOB
Detach and delete job.

PARALLEL
Change the number of active workers for current job.

REUSE_DUMPFILES
Overwrite destination dump file if it exists [NO].

START_JOB
Start or resume current job.
Valid keyword values are: SKIP_CURRENT.

STATUS
Frequency (secs) job status is to be monitored where
the default [0] will show new status when available.

STOP_JOB
Orderly shutdown of job execution and exits the client.
Valid keyword values are: IMMEDIATE.
```

## 1.1. directory de Oracle

- Algunos comandos de **Oracle** necesitan trabajar sobre directorios del disco
- A veces no interesa que los usuarios conozcan/decidan los directorios
  - para no llenar una partición
  - para no divulgar información de la base de datos
  - para no acceder a directorios donde **Oracle** puede, pero el usuario no

## 1.2. Definir un directorio

```
grant create any directory to unusuario;
create directory mi_directorio_de_backup as '/home/alumno/backups';
```

```
GRANT READ, WRITE ON DIRECTORY mi_directorio_de_backup TO usuario;
```

- Seguridad: es importante dar permisos a los procesos de **Oracle** para acceder y escribir al directorio
  - Pero no al resto de usuarios
  - Mejor setfacl que chmod

## 1.3. Caracteres de escape

- A veces hay que pasar parámetros con espacios u otros caracteres especiales
- En bash se haría con comillas "dobles." o 'simples'
- expdp maneja por sí mismo las comillas, así que hay que escaparlas en bash

```
expdp \'sys/alumno@localhost:1521/orclpdb1 as sysdba\' DIRECTORY=datos DUMPFILE=\'con espacios.dmp\'
```

## 1.4. Ejemplo de exportación

```
[alumno@centos-asgbd ~]$ expdp alumno/alumno directory=mi_directorio_de_backup schemas=alumno dumpfile=alumno.dmp logfile
↪ =alumno.log
Export: Release 12.1.0.2.0 - Production on Fri Dec 16 13:07:26 2016

Copyright (c) 1982, 2015, Oracle and/or its affiliates. All rights reserved.

Connected to: Oracle Database 12c Standard Edition Release 12.1.0.2.0 - 64bit Production
Starting "ALUMNO"."SYS_EXPORT_SCHEMA_01": alumno/***** directory=mi_directorio_de_backup schemas=alumno dumpfile=
↪ alumno.dmp logfile=alumno.log
Estimate in progress using BLOCKS method...
```

```

Processing object type SCHEMA_EXPORT/TABLE/TABLE_DATA
Total estimation using BLOCKS method: 192 KB
Processing object type SCHEMA_EXPORT/PRE_SCHEMA/PROCACT_SCHEMA
Processing object type SCHEMA_EXPORT/TABLE/TABLE
Processing object type SCHEMA_EXPORT/TABLE/GRANT/OWNER_GRANT/OBJECT_GRANT
Processing object type SCHEMA_EXPORT/TABLE/COMMENT
Processing object type SCHEMA_EXPORT/TABLE/INDEX/INDEX
Processing object type SCHEMA_EXPORT/TABLE/CONSTRAINT/CONSTRAINT
Processing object type SCHEMA_EXPORT/TABLE/INDEX/STATISTICS/INDEX_STATISTICS
Processing object type SCHEMA_EXPORT/TABLE/CONSTRAINT/REF_CONSTRAINT
Processing object type SCHEMA_EXPORT/TABLE/STATISTICS/TABLE_STATISTICS
Processing object type SCHEMA_EXPORT/STATISTICS/MARKER
. . exported "ALUMNO"."MATRICULAS"                6.523 KB      44 rows
. . exported "ALUMNO"."MULTAS"                    8.195 KB      35 rows
. . exported "ALUMNO"."PERSONAS"                  6.875 KB      47 rows
Master table "ALUMNO"."SYS_EXPORT_SCHEMA_01" successfully loaded/unloaded
*****
Dump file set for ALUMNO.SYS_EXPORT_SCHEMA_01 is:
/home/alumno/backups/alumno.dmp
Job "ALUMNO"."SYS_EXPORT_SCHEMA_01" successfully completed at Fri Dec 16 13:08:00 2016 elapsed 0 00:00:33

```

## 2. Importar datos

- Se utiliza el comando `impdp`
  - Ayuda con `impdp help=yes`

```

Import: Release 12.1.0.2.0 - Production on Fri Dec 16 13:31:18 2016

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The Data Pump Import utility provides a mechanism for transferring data objects
between Oracle databases. The utility is invoked with the following command:

    Example: impdp scott/tiger DIRECTORY=dmpdir DUMPFILE=scott.dmp

You can control how Import runs by entering the 'impdp' command followed
by various parameters. To specify parameters, you use keywords:

    Format:  impdp KEYWORD=value or KEYWORD=(value1,value2,...,valueN)
    Example: impdp scott/tiger DIRECTORY=dmpdir DUMPFILE=scott.dmp

USERID must be the first parameter on the command line.

-----

The available keywords and their descriptions follow. Default values are listed within square brackets.

ABORT_STEP
Stop the job after it is initialized or at the indicated object.
Valid values are -1 or N where N is zero or greater.
N corresponds to the object's process order number in the master table.

ACCESS_METHOD
Instructs Import to use a particular method to load data.
Valid keyword values are: [AUTOMATIC], CONVENTIONAL, DIRECT_PATH
and EXTERNAL_TABLE.

ATTACH
Attach to an existing job.
For example, ATTACH=job_name.

CLUSTER
Utilize cluster resources and distribute workers across the Oracle RAC [YES].

CONTENT
Specifies data to load.
Valid keywords are: [ALL], DATA_ONLY and METADATA_ONLY.

DATA_OPTIONS
Data layer option flags.
Valid keywords are: DISABLE_APPEND_HINT and SKIP_CONSTRAINT_ERRORS.

DIRECTORY
Directory object to be used for dump, log and SQL files.

DUMPFILE
List of dump files to import from [expdat.dmp].
For example, DUMPFILE=scott1.dmp, scott2.dmp, dmpdir:scott3.dmp.

```

**ENCRYPTION\_PASSWORD**  
 Password key for accessing encrypted data within a dump file.  
 Not valid for network import jobs.

**ENCRYPTION\_PWD\_PROMPT**  
 Specifies whether to prompt for the encryption password [NO].  
 Terminal echo will be suppressed while standard input is read.

**ESTIMATE**  
 Calculate network job estimates.  
 Valid keywords are: [BLOCKS] and STATISTICS.

**EXCLUDE**  
 Exclude specific object types.  
 For example, EXCLUDE=SCHEMA:"='HR'".

**FLASHBACK\_SCN**  
 SCN used to reset session snapshot.

**FLASHBACK\_TIME**  
 Time used to find the closest corresponding SCN value.

**FULL**  
 Import everything from source [YES].

**HELP**  
 Display help messages [NO].

**INCLUDE**  
 Include specific object types.  
 For example, INCLUDE=TABLE\_DATA.

**JOB\_NAME**  
 Name of import job to create.

**KEEP\_MASTER**  
 Retain the master table after an import job that completes successfully [NO].

**LOGFILE**  
 Log file name [import.log].

**LOGTIME**  
 Specifies that messages displayed during import operations be timestamped.  
 Valid keyword values are: ALL, [NONE], LOGFILE and STATUS.

**MASTER\_ONLY**  
 Import just the master table and then stop the job [NO].

**METRICS**  
 Report additional job information to the import log file [NO].

**NETWORK\_LINK**  
 Name of remote database link to the source system.

**NOLOGFILE**  
 Do not write log file [NO].

**PARALLEL**  
 Change the number of active workers for current job.

**PARFILE**  
 Specify parameter file.

**PARTITION\_OPTIONS**  
 Specify how partitions should be transformed.  
 Valid keywords are: DEPARTITION, MERGE and [NONE].

**QUERY**  
 Predicate clause used to import a subset of a table.  
 For example, QUERY=employees:"WHERE department\_id > 10".

**REMAP\_DATA**  
 Specify a data conversion function.  
 For example, REMAP\_DATA=EMP.EMPNO:REMAPPKG.EMPNO.

**REMAP\_DATAFILE**  
 Redefine data file references in all DDL statements.

**REMAP\_SCHEMA**  
 Objects from one schema are loaded into another schema.

**REMAP\_TABLE**  
 Table names are remapped to another table.  
 For example, REMAP\_TABLE=HR.EMPLOYEES:EMPS.

```

REMAP_TABLESPACE
Tablespace objects are remapped to another tablespace.

REUSE_DATAFILES
Tablespace will be initialized if it already exists [NO].

SCHEMAS
List of schemas to import.

SERVICE_NAME
Name of an active Service and associated resource group to constrain Oracle RAC resources.

SKIP_UNUSABLE_INDEXES
Skip indexes that were set to the Index Unusable state.

SOURCE_EDITION
Edition to be used for extracting metadata.

SQLFILE
Write all the SQL DDL to a specified file.

STATUS
Frequency (secs) job status is to be monitored where
the default [0] will show new status when available.

STREAMS_CONFIGURATION
Enable the loading of Streams metadata [YES].

TABLE_EXISTS_ACTION
Action to take if imported object already exists.
Valid keywords are: APPEND, REPLACE, [SKIP] and TRUNCATE.

TABLES
Identifies a list of tables to import.
For example, TABLES=HR.EMPLOYEES,SH.SALES:SALES_1995.

TABLESPACES
Identifies a list of tablespaces to import.

TARGET_EDITION
Edition to be used for loading metadata.

TRANSFORM
Metadata transform to apply to applicable objects.
Valid keywords are: DISABLE_ARCHIVE_LOGGING, INMEMORY, INMEMORY_CLAUSE,
LOB_STORAGE, OID, PCTSPACE, SEGMENT_ATTRIBUTES, STORAGE, and
TABLE_COMPRESSION_CLAUSE.

TRANSPORTABLE
Options for choosing transportable data movement.
Valid keywords are: ALWAYS and [NEVER].
Only valid in NETWORK_LINK mode import operations.

TRANSPORT_DATAFILES
List of data files to be imported by transportable mode.

TRANSPORT_FULL_CHECK
Verify storage segments of all tables [NO].
Only valid in NETWORK_LINK mode import operations.

TRANSPORT_TABLESPACES
List of tablespaces from which metadata will be loaded.
Only valid in NETWORK_LINK mode import operations.

VERSION
Version of objects to import.
Valid keywords are: [COMPATIBLE], LATEST, or any valid database version.
Only valid for NETWORK_LINK and SQLFILE.

VIEWS_AS_TABLES
Identifies one or more views to be imported as tables.
For example, VIEWS_AS_TABLES=HR.EMP_DETAILS_VIEW.
Note that in network import mode, a table name may be appended
to the view name.

-----

The following commands are valid while in interactive mode.
Note: abbreviations are allowed.

CONTINUE_CLIENT
Return to logging mode. Job will be restarted if idle.

EXIT_CLIENT
Quit client session and leave job running.

```

```

HELP
Summarize interactive commands.

KILL_JOB
Detach and delete job.

PARALLEL
Change the number of active workers for current job.

START_JOB
Start or resume current job.
Valid keywords are: SKIP_CURRENT.

STATUS
Frequency (secs) job status is to be monitored where
the default [0] will show new status when available.

STOP_JOB
Orderly shutdown of job execution and exits the client.
Valid keywords are: IMMEDIATE.

```

## 2.1. INCLUDE/EXCLUDE una tabla

- INCLUDE y EXCLUDE son filtros, como condiciones de where
- Mejor utilizar TABLES

```

impdp USERNAME/PASSWORD schemas=USERNAME directory=backup dumpfile=full.dmp EXCLUDE=TABLE:"like 'IMG_%'%" EXCLUDE=TABLE
  ↳ :\"IN \('EMP', 'DEPT'\)\"

```

## 2.2. Importar un schema en otro schema

- Importar un fichero del usuario profesor en el usuario alumno

```

impdp system/alumno SCHEMAS=alumno remap_schema=alumno:profesor \
  directory=EXPORTDIR \
  dumpfile=profesor.dmp

```

```

[alumno@centos-asgbd backups]$ impdp system/alumno schemas=profesor remap_schema=profesor:alumno directory=
  ↳ mi_directorio_de_backup dumpfile=profesor.dmp

Import: Release 12.1.0.2.0 - Production on Fri Dec 16 13:23:38 2016

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Connected to: Oracle Database 12c Standard Edition Release 12.1.0.2.0 - 64bit Production
Master table "SYSTEM"."SYS_IMPORT_SCHEMA_01" successfully loaded/unloaded
Starting "SYSTEM"."SYS_IMPORT_SCHEMA_01": system/***** schemas=profesor remap_schema=profesor:alumno directory=
  ↳ mi_directorio_de_backup dumpfile=profesor.dm
p
Processing object type SCHEMA_EXPORT/PRE_SCHEMA/PROCTACT_SCHEMA
Processing object type SCHEMA_EXPORT/TABLE/TABLE
Processing object type SCHEMA_EXPORT/TABLE/TABLE_DATA
  . . imported "ALUMNO"."MATRICULAS"          6.523 KB          44 rows
  . . imported "ALUMNO"."MULTAS"              8.195 KB          35 rows
  . . imported "ALUMNO"."PERSONAS"            6.875 KB          47 rows
Processing object type SCHEMA_EXPORT/TABLE/GRANT/OWNER_GRANT/OBJECT_GRANT
Processing object type SCHEMA_EXPORT/TABLE/INDEX/INDEX
Processing object type SCHEMA_EXPORT/TABLE/CONSTRAINT/CONSTRAINT
Processing object type SCHEMA_EXPORT/TABLE/INDEX/STATISTICS/INDEX_STATISTICS
Processing object type SCHEMA_EXPORT/TABLE/CONSTRAINT/REF_CONSTRAINT
Processing object type SCHEMA_EXPORT/TABLE/STATISTICS/TABLE_STATISTICS
Processing object type SCHEMA_EXPORT/STATISTICS/MARKER
Job "SYSTEM"."SYS_IMPORT_SCHEMA_01" successfully completed at Fri Dec 16 13:23:58 2016 elapsed 0 00:00:19

```

Permiso para cambiar schema

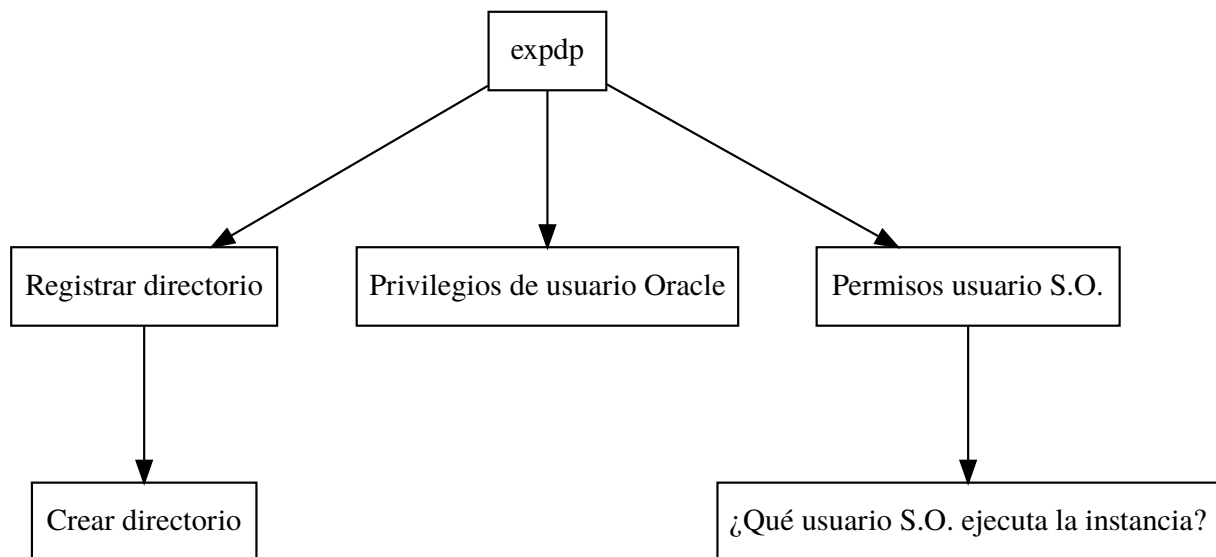
## 3. Ejercicio (1)

- Crea la base de datos de multas en el usuario multas (../1/sql/multas.sql)
- Exporta la base de datos al fichero /datos/exports/multas.dump

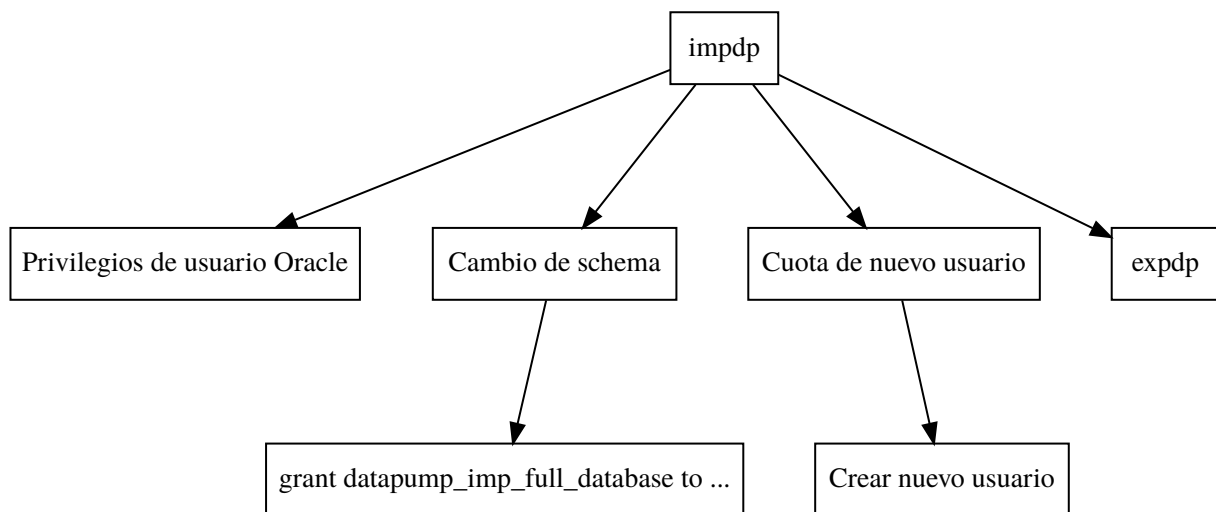


- Con el usuario `sys`
- Importa las tablas en el usuario `copiamultas`
  - Con un usuario que no sea `sys`

### 3.1. Tareas para la exportación



### 3.2. Tareas para la importación

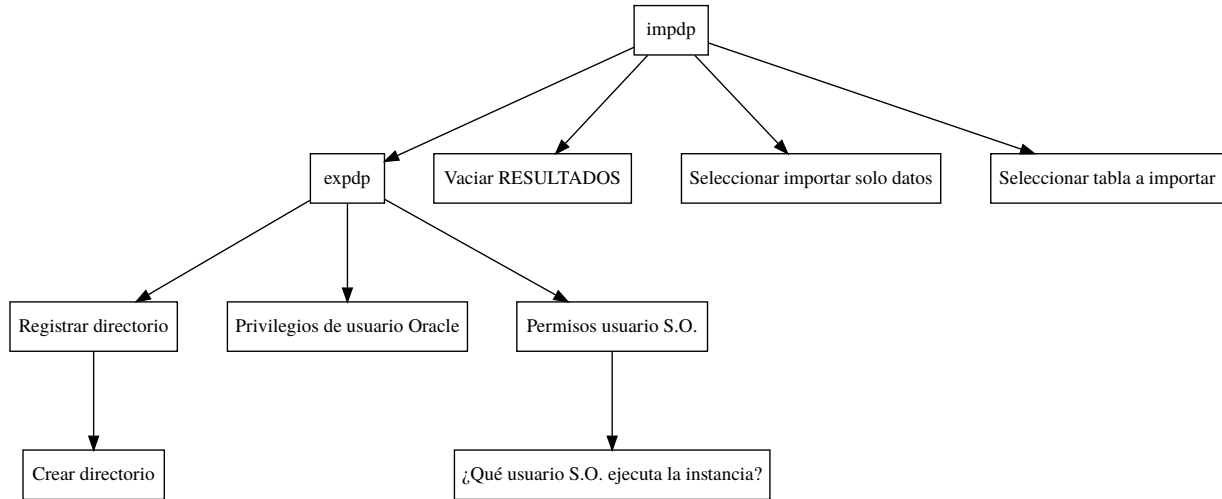


## 4. Ejercicio (2)

1. Crear la base de datos
  - Con la base de datos de carreras ([../1/sql/carreras-coches.sql](#))
  - Crear el usuario `CARRERAS` y ejecutar el *script* SQL
2. Exportar
  - Exportar las tablas del usuario `CARRERAS` al fichero `carreras.dmp`
3. Importar

- Borrar las filas de la tabla `CARRERAS.RESULTADOS`
- Importar los datos desde `carreras.dmp`

#### 4.1. Tareas



### 5. Otras soluciones

- RMAN
- Copias de *tablespaces*

#### 5.1. RMAN

- Solución de **Oracle para backups**
- Ventajas
  - Granularidad del backup: incrementales o totales
  - En línea
- Desventajas
  - Mayor complejidad

#### 5.2. Copias de *tablespaces*

- Los datos están en ficheros `dbf`
- Basta con hacer copias de esos ficheros
- Ventajas
  - Fácil, no se necesitan herramientas especiales
- Desventajas
  - Muchas veces es necesario parar Oracle para hacer la copia y la restauración

Fuente: [docs.oracle.com](https://docs.oracle.com)

### 5.2.1. Lista de ficheros a copiar

- El fichero pfile o spfile indica dónde está el fichero de control
  - Generalmente en `$ORACLE_HOME/dbs/spfile.ora`
  - `SHOW PARAMETER spfile;`
- El fichero de control indica dónde están los ficheros de datos
- Los tablespaces system tienen los metadatos necesarios para entender los tablespaces de datos

```
select 'datos', name from v$datafile
union
select 'temporal', name from v$tempfile
union
select 'redo', member from v$logfile
union
select 'control', name from v$controlfile
union
select 'spfile', value from v$parameter where name='spfile';
```

### 5.2.2. Arrancar la base de datos

Si solo se restauran los ficheros de datos (y se tienen suficientes ficheros de log)

```
SQL> startup mount
ORACLE instance started.

Total System Global Area  264241152 bytes
Fixed Size                  1286916 bytes
Variable Size              205524220 bytes
Database Buffers           54525952 bytes
Redo Buffers                2904064 bytes
Database mounted.
SQL> recover database until cancel;
Media recovery complete.
SQL> alter database open resetlogs;

Database altered.

SQL>
```

## 5.3. Ejercicio

1. Localiza los ficheros de datos de tu instancia
2. Apaga la instancia y haz una copia de los ficheros
3. Arranca la instancia, y realiza cambios en la base de datos
4. Apaga la instancia e intenta recuperar los ficheros de datos
5. Arranca la instancia, y comprueba que todo sigue como antes del paso 1

## 6. Referencias

- Formatos:
  - [Transparencias](#)
  - [PDF](#)
  - [EPUB](#)
- Creado con:
  - [Emacs](#)
  - [org-re-reveal](#)
  - [Latex](#)
- Alojado en [Github](#)