C6. Importing and exporting data. DB Administration in APEX.

In APEX there are several options to import and export data and database structure.

1.1. Database Structure

Import/Export operations on database structure are useful for creating database backups or for migrating data from/to other servers or RDBMS (Relational Database Management System).

Attention: different RDBMS use different dialects of SQL and these are not interchangeable. If database structure/data is migrated between different RDBMS, both database structure and data must be translated into the destination SQL dialect, or into a standard format such as CSV.

1.1.1 Export Database Structure

For database structure exports APEX uses the menu "SQL Workshop->Utilities->Generate DDL". In this menu it can be seen a summary of the entire database and a new DDL (Data Definition Language) script can be created using the button "Create Script".

In the "Object Type" step it can be selected where to output the DDL instructions (inline [on screen] / saved as a file in script repository) and what objects to export. In the "Object Name" step a list with all the available objects of the selected types are shown, so DDL will be generated only for the required ones. The generated DDL file will contain all definitions for the selected objects.

ACTIVITY 1: Generate a DDL file for and only for your tables, triggers and sequences.

1.1.2 Export Database Structure

To import a database structure the DDL description of the structure can be directly copied in the SQL Workshop -> SQL Commands text input and "Run" from there. Another method is to upload the script with SQL Workshop -> SQL Scripts. The script file will appear as a file in a table and can be run using the the Run icon.

After the script is run, it is very important to check the results of the script execution using the link from the "Results" column. In our example we exported the definition of the table DEPARTMENTS and when we executed it back, the APEX reported the error "ORA-00955: name is already used by an existing object".

1.2. Data

Data refers to the content of the tables.

1.2.1 Data Export

There are several methods to export data in APEX:
- using the Download link situated below the selected table in SQL Workshop->Object Browser->Tables. This link will export data as a CSV file which will be downloaded.

- using the SQL Workshop->Utilities->Data Workshop, using the "Data Unload" tab. This menu provides many customizations for data export, such as saving it into a CSV file ("to Text") or to a XML file ("to XML"). In both cases the table to be exported must be selected first and after that the columns to be exported. An optional WHERE condition can be given to export only the records which satisfy that condition.

Attention: when exporting to CSV, extra care must be taken in order to select the fields delimiter and the optional enclosing char. These must be chosen so they are not used as chars inside the exported fields. For example, if the table contains a field "Address" which can contain commas (,), comma cannot be used as a field delimiter. In this case a TAB (\t) can be employed to separate the fields or, if none of the fields contain quotes ("or '), the quotes can be used as an enclosing char.

1.2.1 Data Import

There are several methods to import data in APEX:

- if the data is in SQL format (a list of INSERT statements), it can be run directly from SQL Workshop -> SQL Commands, or it can be uploaded using the SQL Workshop->SQL Scripts menu and run from there, checking its result.

- if the data is in CSV, XML or Spreadsheet format, it can be loaded in SQL Workshop->Utilities->Data Workshop, using the Data Load

tab. This menu allows to import data from a file or directly copy/paste and the data can be inserted into an existing table or into a new one. For CSV files extra care must be taken in order to correctly match the field delimiter and the optional enclosing char. Other options are also available, such as selecting the source encoding.

ACTIVITY 2: Generate CSV files for all your tables, taking care that the delimiters and the optional enclosing char are correctly chosen.
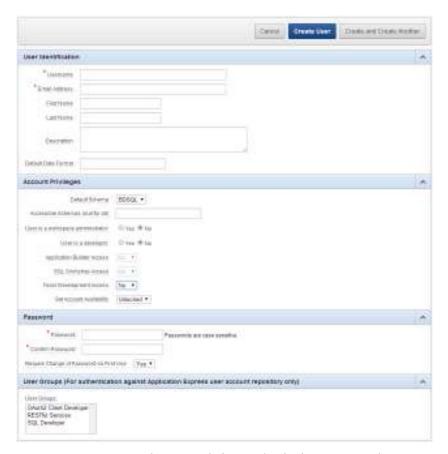
1.3. Administration

In the administration section the most common actions are:
- view and monitor the database and applications usage and statistics ("Monitor Activity" and "Dashboards"). In these sections detailed reports are available for applications pages usage, time of request, visitor's activity, etc.
- manage users and groups

Users and groups management Manage Users and Groups allows to create new users and assign them only limited rights. A new user can be created in Administration->Users->Create User.

If account privileges are given, the users can:
- "User is a workspace administrator" – the user has access into the Administration section

- "User is a developer" – the user can use Application Builder or SQL Workshop if these options are selected.

Once a new user is created, it can login into APEX into the same workspace, using its username and password.

To make an application private to only selected users, it must be edited in Application Builder->Application …-> Edit Application Properties.

In the Availability tab, the Status must be set to Restricted Access and a comma separated list of allowed users must be provided.

For these users to access the application, they must have the application link. This link is the one which appears in the browser when the application is launched.

📝 **ACTIVITY 3**: Create a user with the following characteristics:

- username: TEACHER
- password: TEACHER
- e-mail: CODRUTA.ISTIN@CS.UPT.RO

The user must not have administrator, developer or team development rights. After the user is created, it will be assigned to an application and the application link will be provided to the teacher.