

# Experience of using the Django ORM for Migration, Redesign and Implementation of a Database of MySQL Data to Postgre SQL

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**Abstract:** *Currently, the use of Frameworks helps developers to generate systems more easily, making use of a uniform, consistent and identifiable project structure. Using the ORM it is possible to abstract data from an existing database, regardless of the DBMS to be used. This publication describes the use of the Django Framework and its ORM for the generation of the structure of classes that allow to achieve persistence towards an existing database, identifying and applying the necessary process for the corresponding migration towards a model file in a project of Django, as well as the identification of migrations and the generation of the tables in a physical database in the PostgreSQL Management System. The migration solution proposed in this thesis was implemented as an application case in the Records Management System of the books of the Judicial Power of the State of Tlaxcala, whose information was initially stored in MySQL. The results show the initial database implemented in MySQL. Likewise, the database migration process is outlined, using the Django Framework ORM, including the reconfiguration of the database and the migration to the final physical storage.*

**Keywords:** Framework, Django, ORM, Migration, Persistence

## 1. Introduction

Currently the use of information technologies is becoming more essential for human beings, for this reason the need arises to create systems that allow satisfying the needs of people in order to carry out various activities in daily life such as shopping online, offer a service or sell a product, being an extensive demand for software systems developers by Yumiseba & Gutierrez [4].

Once a software system is created, over time it becomes obsolete for interaction with people, and even the storage capacity in the database is exceeded by the increase in information. Similarly, various software development tools evolve to new versions, and sometimes some cease to exist.

For this reason, this research analyzes the necessary elements to carry out the migration and redesign of a MySQL Database to the PostgreSQL Database Management System, for a Records Management System, using the Framework of Django, making use of the various elements provided by its ORM (Object Relational Mapping), thus showing the elements and actions necessary to move from one Database Management System to another by Truhin, Balica & Kulev [5].

## 2. Methodology

The methodology used to carry out this research is described. Considering that the project to be developed has as one of the final results the creation of a process for the migration and redefinition of a data model based on the ORM of the Django Framework, with migration to the PostgreSQL manager, a set of activities related to Research and Technological Development, taking as a reference the proposal of De la Cruz Casaño [1], taking elements

established by Rincón [2] and García Cordova & Trejo [3]. Figure 1 shows the diagram of the technological research methodology used for the development of this research.



**Figure 1:** Diagram of the Technological Research Methodology (Own source)

**Problem statement:** A preliminary study was carried out to determine the information needs required by a user (Judicial Power of the State of Tlaxcala), in order to determine the necessary Database structure. As a result of this analysis, it was possible to obtain an initial version of a database implemented in the MySQL manager. However, it was found that it was necessary to add other data entities, establishing the appropriate relationships. At this point in the investigation, it was determined that the database manager to use was not MySQL, but PostgreSQL. In addition, the application to be developed would be a web solution developed in the Django Framework, requiring interaction with the Database Management System through its ORM, therefore, it was necessary to clarify the migration process from one manager to another, using said ORM as an intermediate migration tool.

**Elaboration of the theoretical framework:** The investigation of each of the necessary tools to be used for the elaboration of the database migration was carried out. The most important concepts are: the background of the use of database migrations and how effective they are, such as the use of migrations from the MySQL database management system to PostgreSQL to another in other projects. And the

use of each of the tools that are required to be able to make use of them, such as the handling of the Django Framework ORM using Python as a development tool by Delgado [6].

Establishment of the research question: Considering the problem raised, and considering the theoretical framework developed, the following research question is established:

Is it feasible to achieve persistence towards a database migrated from the MySQL Database Management System to the PostgreSQL DBMS, using the Object Relational Mapping (ORM) of the Django Framework, as an information base for a web application?

Definition of the Methodology to be used: This same section describes the methodology used to carry out the research. It should be noted that, as part of the implementation of the intervention project, and considering the participation in the development of the Electronic File Management System, software engineering and project management methodologies were used.

For the development of the software modules that made use of the implemented database, the SCRUM methodology was used, working together with a development team. In the case of project management, it was necessary to use the Kanban methodology.

Development of the intervention project: Based on an existing database prepared for the File Management System (SIEGEX) project for the Judicial Power of the State of Tlaxcala, carried out in MySQL, the migration to a project in the Django Framework using your ORM, making the appropriate settings in the Settings.py file. In order to carry out this migration, the *Inspecdb* command was used. This tool creates the models.py file with the tables of the entire database by Fernandez & Girarlo [7].

Subsequently, the database was migrated from the Django ORM to the PostgreSQL Database Management System using the *makemigrations* command. Once the *migration* was generated, the database was identified in PgAdmin 4 with the *migrate* command, which is responsible for creating and deleting the database tables.

### 3. Results

Through Figure 2, the database migration process is shown. Database in PostgreSQL

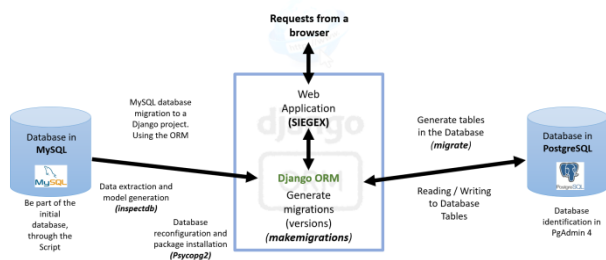


Figure 2 Migration process diagram (Own source)

To achieve the migration, it was necessary to understand at first the existing database structure and the requirements established by the end users of the web application that will consume the stored information.

The *inspectdb* tool allowed to extract the characteristics of each of the information tables in the database, generating a preliminary version of data models based on Python classes within a Django project, making a relational mapping of existing objects.

Subsequently, the necessary adjustments were made in the models.py file for each of the models required to achieve persistence to the database. Some of the required changes were the adaptation of field types, inheritance of models for class optimization and the increase of new data models.

Based on the set of classes designed under the Python structure, we proceeded to carry out the migrations in the project, that is, the different versions of data models in the Django project. For this, it was necessary to use the *makemigration* tool by Hidalgo, Guaiña & Ramos [8].

The next stage consisted of generating the physical database in the PostgreSQL DBMS, using the Django ORM tool. Using the *"related- name"* property it was possible to make the necessary adjustments to the model names in Django to recognize the data tables as they are identified in the MySQL DBMS.

Once the set of models based on Python class structures had been specified, and the migration to the PostgreSQL DBMS had been carried out, there was the opportunity to connect a web application developed in Django to the physical database, using at all times the ORM of the framework as an access tool for the implementation of create, read, edit and delete operations.

### 4. Conclusions

It can be concluded that it is possible to achieve persistence towards a database migrated from DBMS MySQL to DBMS PostgreSQL, using the Django Framework ORM and all its related tools for the specification of models based on Python classes.

It can be seen that the Django ORM and its *inspectdb* tool work well as an integration and migration bridge between a database of any DBMS to another Database manager, in this case to PostgreSQL. It should be noted that, in addition to the extraction of the models from the MySQL database, the additional configuration in the project's model and configuration files is essential, establishing additional criteria such as field definition, table renaming and method redefinitions.

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