



## Research of Persistence Solution Based on ORM and Hibernate Technology

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**Abstract-** With the increase in information on web, it becomes difficult to search for specific queries. Moreover, it is a time consuming task. Programmers have to devote their time for database creation and maintenance. In this paper we have presented two techniques which solve our searching and mapping problems. Object relational mapping helps to encapsulate the database details from the programmer. Hibernate technique is used to search queries for specific patterns and queries. Two different models of ORM are studied. It is proved that with the use of object relational mapping, a persistence layer is added. Hibernate technique when used with other techniques prove to be an efficient method of searching patterns.

**Keywords:** ORM, Hibernate, JAVA, Object mapping, NoSQL, Search strategy.

### I. INTRODUCTION

Information on the websites and online application is going to be increased day by day. Many search engines are designed to extract relevant information as per the user's requirements. But problem is encountered whenever refined and relevant search that is complex queries are searched. Designing and programming of such modules is quite challenging.

All the applications need data to work. Database is the backbone of all applications working in a current scenario. The problem arises for programs that how to handle such a huge database accompanied with front end design. For front end view mainly Object Oriented Languages are used. To serve the purpose of backend mainly end fourth generation programming languages like Oracle, PL/SQL etc. are used. Coder faces the problem of incompatibility among different data types of variables so used. This problem is solved by ORM. ORM stands for Object Relational Model. The combination of the relational database and object-oriented programming is the best possible way to get rid of this problem. To map data among object oriented tool and relational tool we need a middleware. ORM performs this purpose. [1] [2]

Object Relational Mapping is a programming technique that is used to make types compatible in object oriented programming language and database programming language mainly between tables and objects. This framework takes the responsibility of retrieving objects and converting data between incompatible types. ORM creates a separation line between application code and database, which is shown in fig.1. ORM acts as translator for converting object to relational data when needed. [3]

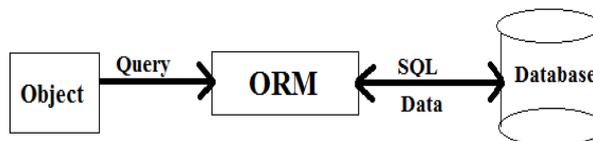


Figure 1. Object Relational Mapping

Many ORM frameworks are available free and some are available only for commercial purposes. We have discussed two models of ORM namely Object model and relational model.

Java introduced a stable release of ORM library named as Hibernate on November 24, 2016. This framework has resolved the problem of object-relational impedance mismatching by using itself as a persistence layer. Objects created in the form of POJO (Plain Old Java Objects) are mapped with relations or tables of the database using hibernate. It maps java class along with java data types with the rows and columns of the relational model tables. It uses high-level object handling functions over traditional persistence related databases access, which make it very easy to use. User queries the connected databases using HQL, which converts it into database and hence gives the desired results.

Another jaw dropping features of Hibernate is Lazy Initialization and Searching. Hibernate search is a full-text search support. We have described search medium of Hibernate named as Indexed Search along with fuzzy searching, which is a faster medium to make search. Technologies like NoSQL, Lazy Loading, are also taken in account. [4]

Rests of the sections are categorized as follows: In Section 2 ORM and its models are discussed. Traditional Hibernate and advanced hibernate with several other techniques is presented in section-3. This paper is concluded in section-4.

## II. OBJECT RELATIONAL MAPPING

An object relational mapping takes the form of a software layer or library that is mapping the objects to relational equivalents while hiding this process from the programmer.

The widely used models that are relational model and object model are totally different to describe an information. Both of them are fundamentally different in their representation way. This gap is filled by ORM by using it as a persistence layer. Object modeling is an approach to structure information into entities which are known as Objects. For visualization of object models modeling languages named as Unified modeling language is used. It contains a rich set of modeling and graphical notation which = used to express elements. Famous UML tool is UMLet [5].

### A. Object model

Each object is uniquely identifiable. Every object in a universe(information) can be distinguished from every other object resides in same universe, in spite of they have same state. That means rest of attributes have exactly same values. The state of an object stands for the values of the attributes from an object also known as internal state. [6]

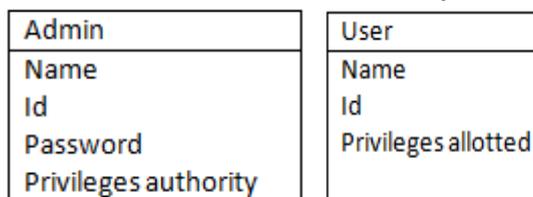


Figure 2. Object Model

It is impossible to directly implement the state of an object in object model. However, it is a necessary operation. Concept of behavior and encapsulation make it happen in an efficient way. Set of operation on an object is applied generally known as an interface. This defines behavior of an object. So, this way internal attributes of an objects are encapsulated inside the object hence defines its behavior.

The specification of an interface supported by an interface is called type (check). Object model uses the concept of class instead of type. Class gives a base implementation for an object. Class can be seen as a blueprint of an object of type.

Inheritance is another eyes catching feature of object model. Inheritance is based on code reusability; one class may acquire the properties of another class with the help of inheritance. We shall use implementation of base class.

### B. Relational model

The relational model is developed by E.F. Codd in early 70's. this model is emerged from predicate logic and set theory. True things in the real world re taken into account. This model is based on information principle in which all information is described as predicates and truth statements.

A relational database is a collection of two dimensional table. When data is organized in rows and columns form, it is called logical view of database. a relation is defined together with its attributes. Attributes are the elements that participate in a relation. Every attribute has its name and value. [8] This value lies in a particular domain. Domain defines what values an attribute can have. Example:-Integer and Strings. In table 1, attribute name and department have string domain whereas roll no has integer domain.

Table 1: Example of Relational Database

Roll no.	Name	Department
2213456	Madhav	Computer Science
2213455	John	Electronics
2561489	Alisha	Mechanical

The complete set of all tuples that satisfied the relation is called the value of a relation. Variable that contains relation value is called relational variable or relvar. [8]

### C. Applications of ORM

1. Maintenance of application-The application maintenance becomes far easier with the help of ORM. While using ORM you do not need to worry about testing.
2. Design of application-Different design patterns are created with the help of ORM tool. Such patterns proved to be created by a skilled software architects. The architecture so created has clean and efficient separation as well as features of an effective design. All the layers of a software like business logic layer and application layers are properly separated. The development of the program is done independently and different modules are created simultaneously.
3. Reusability of code-when you create a class library for ORM based code then the objects created can be reused . Class library can be used even by an application without granting access privilege.

4. Productivity-ORM tool creates all the data access code. The access code includes business logic layers, data models and data access layers. This helps in saving a lot of time. It is observed that most of the time during program development is wasted in writing code. If we use ORM tool then our productivity increases in terms of writing an efficient code.

### III. HIBERNATE TECHNOLOGY

Hibernate technology is a novel and efficient means to access huge databases. It focuses on how to implement persistent features in object oriented system through it. [9] Hibernate is an object-relational mapping(ORM) library for the java language, providing a framework for mapping an object oriented domain model to traditional relational database. Collections, object relations, composite types are supported by hibernate. It has support of java management extensions (JMX).

Database is handled in efficient manner by using HQL (Hibernate Query language). Database supported by Hibernate are Oracle, DB2, Postgres2 and MySQL. It uses layered architecture which separates its internal programming interfaces from each other. It provides the persistence layer that interacts between application and database layer as given in figure 3.

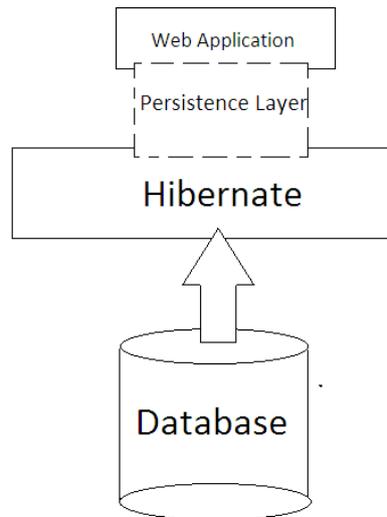


Figure 3. Architecture of Hibernate

Create java classes to represent the table in database. Map the instance variable of class with columns of database. Then database queries like select, insert, update, delete can be easily applied. To perform these operations query is created automatically by Hibernate. ORM of Hibernate is used to perform all their queries. Hibernate reads the state of variable of an object by getting object through session. Save() method. After getting object this method executes required query.

#### A. Hibernate search

Hibernate provides full text search for objects reside in Hibernate ORM. It finds words in the text. It can order the search results based on its relevance. Indexed based search medium is used for accessing the data. Fuzzy searching stands for searching in which words can be found by an approximation, which searches inputs given by users. Fuzzy() method is used. For example, re would search for repeat, are and many more. You have to mention limits of approximation to make a considerable impact on the performance of an application Hibernate can implement search by using clusters with the help of master slave architecture. It clusters indexes. Entities can be geo-localized if user wants to find results around certain location. Updating and using the index for search is very critical part, as you have to take care of termination of mismatching of data types, objects in ORM entities supports Hibernate to solve an issue. These synchronizes data automatically and fetches regular objects.

#### B. Enhanced searching in hibernate

Besides using hibernate with the combination of ORM, it itself devotes loading results in batches. Hibernate has enhanced the searching mechanism with the introduction of concepts like lazy loading and No SQL. With the use of such technologies hibernate is able to give outstanding performance for search on very large-scale enterprise application. [10] Hibernate itself provides this technology. Lazy Loading is a method by which Entities associated options are fetched only when there are actually requested or needed by the framework. You can enable the lazy loading by using "fetch=FetchType.LAZY". On the association on which you want to use, this line can be implemented when you are using hibernate annotations.

Example- if we search for "ri", it will result in ringtones, right, rise etc.You can use together mapped associations. For this purpose hibernate provides a proxy implementation. Calls to these associations are performed by using proxy implementation. In case requested information is not present, then it is loaded from database then control is granted to the parent control. By the use of NOSQL, you will get a mechanism to represent data in the form other than

traditional relational database. It provides simplicity and scalability to handle huge amount of data. That is why NoSQL is preferred to enhance the search-based application. Tools named as hibernate OGM (object grid mapping) is used to provide persistent support for SQL.

#### **IV. CONCLUSION**

ORM is used to generate an efficient code. Mapping of objects is hidden from the programmer. It acts as a persistence layer. The code so produced is complex but the performance gained due to the use of ORM makes it popular. We have also studied a novel tool, that is, hibernate. Hibernate is an excellent tool from object relational mapping point of view but it is unable to perform too good in case of connection management, and transaction management. So, generally Hibernate tool is implemented with the other connection and transaction management tools. Both of these techniques help in easy and efficient extraction of information as well as creation of code becomes easier.

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