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MAPPING OBJECTS TO RELATIONAL DATABASE FOR OBJECT PERSISTENCE

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Abstract:

Object to relational mapping is necessary because there is a mismatch between the object and relational database paradigm to achieve object persistence. Object to relational mapping is the process of transforming between object and relational modelling approaches and systems that support those approaches. This paper discusses the concept of mapping object to relational database and ORM (Object to Relational Mapping) frameworks.

KEY WORDS:

Object, Relational, Mapping, Object persistence.

i.INTRODUCTION

Object to relational mapping (ORM) is the process of transforming between object and relational modelling approaches and systems that support those approaches. This object to relational mapping requires understanding of object modeling and relational modeling. The study about similarities and differences between these two is needed to make the object persistent. Object and relational modeling are different concerns but they are actually compatible. Hence there is a need of single integrated model that describes both approaches. Mapping between these two models requires deciding how the two models can refer to each other.

II LITERATURE SURVEY

This section describes about, professional literature on the subject of interconnection from journals, books, white papers etc., Foundations of Object-Relational Mapping v0.2 1997 Mark L.Fusel from Chimu.com. This document describes general concepts needed for object-relational mapping. Cayenne June 2004 presents a fast, scalable and easy-to-learn open source Object Relational Mapping (ORM) framework. This article shows how to quickly create an ORM application and discusses its core features and design principles.

III DATA MODELING

Data models provide a structure for data used within information systems by providing specific

definition and format. Object and relational are two Data modeling techniques used in the literature. The study of mapping object to relational data base modeling requires understanding of both data modeling.

A. Object Modeling

The goal of object-oriented design is to model a business process by creating real world objects with data and behaviour. Object modeling describes systems as build out of objects with their state and behaviour. The basic concepts of objects include their state, behaviour and encapsulation.

B. Relational Modeling

The goal of relational modeling is to eliminate redundant data from tables. It describes information as predicate login and truth statements. In the relational model of a database, all data is represented in terms of tuples, grouped into relations. A database organized in terms of the relational model is a relational database. In the relational model, related records are linked together with a "key". The purpose of the relational model is to provide a declarative method for specifying data and queries: users directly state what information the database contains and what information they want from it, and let the database management system software take care of describing data structures for storing the data and retrieval procedures for answering queries. Most implementations of the relational model use the SQL data definition and query language. A table in an SQL database schema corresponds to a predicate variable; the contents of a table to a relation; key constraints, other constraints, and SQL queries correspond to predicates.

IV Basics of Mapping Object to Relational

To map object to relational databases is start with the data attributes of a class. An attribute will map to zero or more columns in a relational database. Figure 2 depicts two models, a UML (Unified Modeling Language) class diagram and a relational data model which follows UML data modeling profile. Both diagrams depict a portion of a simple schema for an order system.

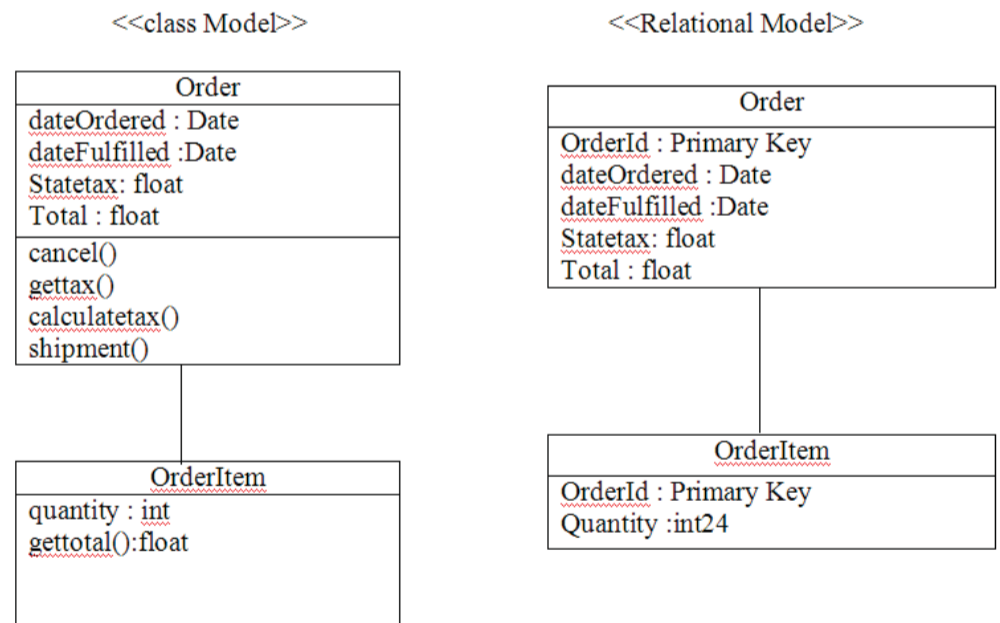


Figure 1. Simple Mapping Example

A. Shadow Information

It is any data that objects need to maintain, above and beyond their normal domain data, to persist themselves. This typically includes primary key information, timestamp and version numbers.

B. Mapping Inheritance Structures

Relational databases do not basically support inheritance. Instead, mapping the inheritance structures within object to data is possible. There are four methods to mapping inheritance structures into relational databases. These methods are, map the entire class hierarch to a single table, map each concrete class to its own table, map each class to its own table and map the classes into a generic table structure. Multiple inheritances occur when a subclass has two or more direct super classes. The figure 2 depicts the data model for the class hierarchies of figure 1 mapping to a single table.

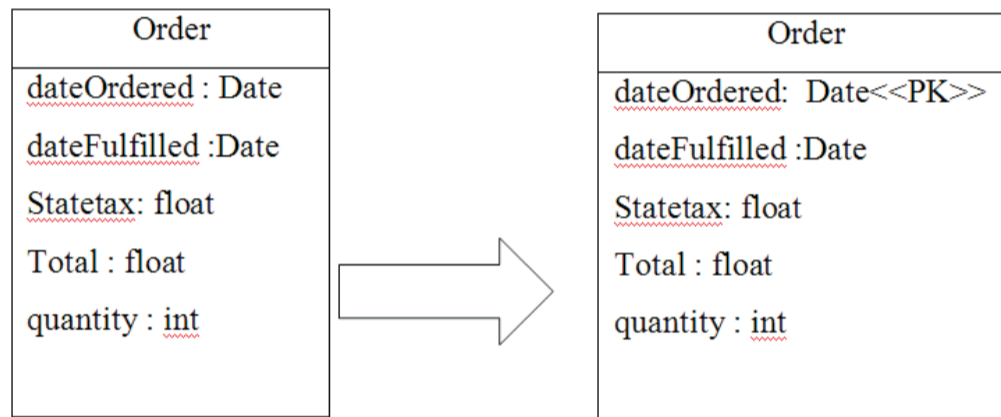


Figure 2 Mapping to a single table

C. Mapping Object relationships

There are three types of object relationships that user need to map: association, aggregation and composition. The types of relationships include one-to-one relationships, one-to-many relationships and many-to-many relationships.

V. Object to Relational Mapping (ORM) Frameworks

ORM Frameworks provides architecture for mapping object to relational mapping. There are various ORM Frameworks like DataObjects.NET, Hibernate, TopLink, LLBLGen Pro and Java Data Objects (JBO) that have been proposed in the literature.

DataObjects.NET is a persistence framework written in .net framework designed for software projects written in .net framework. Hibernate is very popular open-source persistent framework in java community and it expands to .net world as well. TopLink is suitable for java projects. It persists plain java objects as well as EJB (Enterprise Java Beans). It is ale to transparently persist objects to XML. It is able to work with all J2EE servers a supports every database for that JDBC driver exists. LBLGen Pro is suitable for

persisting of objects in .net environment. The table 1 shows the comparison of different ORM frameworks.

Table 1. Comparison of ORM frameworks

Frameworks	Environment/ Platform	Supported Databases	features
DataObjects.NET	.net	MS SQL 2000/2005,MSDE 2000 , MS Access , Oracle , Firebird, MaxDB/SapDB	Enables persistence objects to be serialized
Hibernate	Java	Oracle,DB2,MS SQL, Sybase, MYSQL, PostgreSQL, TimesTen, HypersonicSQL and SAP DB	High performance , J2EE integration
TopLink	Java	Oracle,DB2,MS SQL, MY SQL	Suitable for large projects
LBLGen Pro	.net	MS SQL,ORACLE, FIRE BIRD, MS Access, IBM DB2,Mysql and SQLServerCE	More than one database in one project
Java Data Objects	Java	Oracle, IBM DB2, Microsoft SQL Server, Sybase	Standardized ORM mapping descriptors

The performance of ORM frameworks may differ from their documentation and support, dependencies, supported platforms, portability, maintainability of model, usability, configuration vs automation and constraints on design of domain model.

CONCLUSION AND FUTURE WORK

In this paper the basics of mapping objects to relational database is discussed for achieving object persistence. It is possible to successfully and easily store objects in relational database for making object persistence. ORM frameworks have good object-relational capabilities with large databases support. The performance of ORM frameworks may also be tested with different databases as a future work.

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