

# Object Relational Mapping Principles

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# Outline

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- ❑ The Problem
  - ❑ Solutions
  - ❑ ORM
  - ❑ Perl – Class::DBI
  - ❑ Summary
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# The Problem

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- ❑ Developers need to perform Create, Retrieve, Update, Delete (aka CRUD) operations on data inside an application.
  - ❑ The real world objects represented using a programming language needs to be stored in databases
  - ❑ Using relational databases to store object-oriented data leads to a semantic gap
  - ❑ RDBMS have fixed types, but OO can have more complicated user defined types.
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# Solutions

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## ❑ **Data Access Object (DAO)**

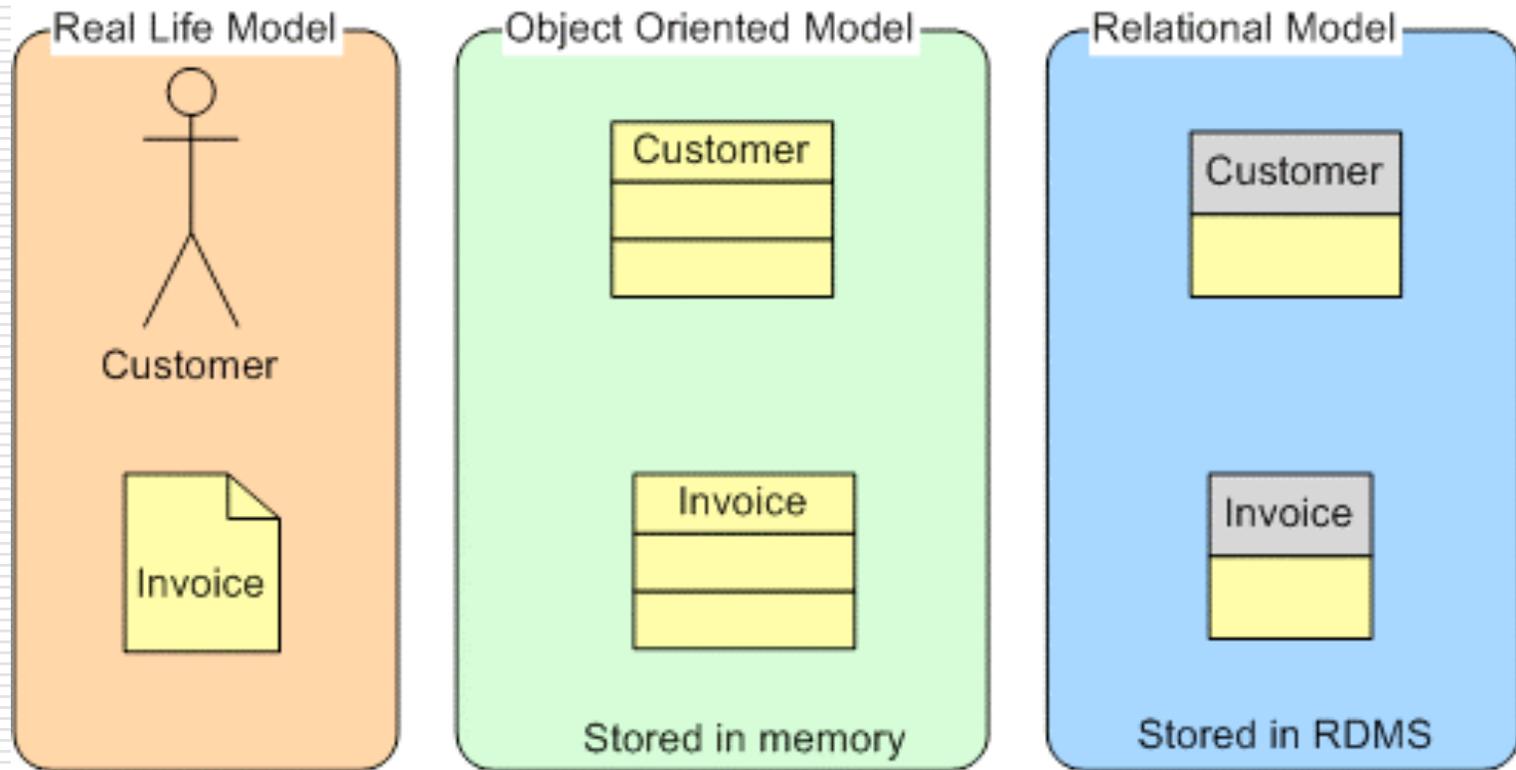
- Developer writes a class which contains one attribute for each field in the table
- Methods for CRUD typically contains JDBC/DBI code with the necessary SQL statements.

## ❑ **Object Relational Mapping (ORM)**

- “**ORM** is a programming technique that links databases to object-oriented language concepts, creating (in effect) a virtual object database.” - Wikipedia
  - Developer needs to configure the ORM
  - Less amount of manual coding
  - CRUD methods are automatically generated by the ORM layer
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# ORM

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# ORM solutions

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- Perl
    - Class::DBI
  - Java
    - EJB
    - Hibernate
    - JDO
    - iBatis
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# Perl - Class::DBI

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- ❑ Provides a simple interfaces for wrapping Perl classes around a database tables
  - ❑ Tables are mapped directly to objects
  - ❑ The table column name are mapped to the get/set methods
  - ❑ Can be used with transactions
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# Class::DBI

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- Defining a class in Class::DBI

| Cvterm     |
|------------|
| cvterm_id  |
| cv_id      |
| name       |
| definition |
| dbxref_id  |

```
package Chado::Cvterm;  
use base 'Chado::DBI';  
Chado::Cvterm->set_up_table(' Cvterm');
```

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# Class::DBI - CRUD

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## Create

```
$term_dbobj = Chado::Cvterm->create({  
    name      => "DUMMY TERM",  
    cv_id     => 1,  
    dbxref_id => 125  
});
```

## Retrieve

```
$term_dbobj = Chado::Cvterm->retrieve(2);
```

## Update

```
$term_dbobj->name( $term->name() );  
$term_dbobj->definition( $term->definition );
```

## Delete

```
$term_dbobj->delete();
```

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# Java - Hibernate

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- ❑ Hibernate maps Java Objects directly to database tables
  - ❑ Scalable
  - ❑ Works well for controlled Data model
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# Java - iBatis

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- ❑ iBATIS maps Java Objects to the results of SQL Queries
  - ❑ XML definitions for queries
  - ❑ Queries and managing Maps
  - ❑ Transactions
  - ❑ Good fit for existing database schema
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# Summary

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- ❑ ORM provides painless roundtrip of data between the application and database.
  - ❑ Reduces the amount of SQL code and allows a programmatic style interface to the RDBMS
  - ❑ Choice of ORM solution depends on the type of project
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