

# *ODBMS's and ORM Tools*

Object-Oriented Databases and Object  
Relational Mapping Tools  
in the Persistence Layer

Pieter van Zyl

# *Overview*

- ⇒ Discuss what ODBMS's and ORM Tools are
- ⇒ Features
- ⇒ Advantages
- ⇒ Disadvantages
- ⇒ Issues surrounding these technologies
- ⇒ Interesting topics
- ⇒ Future Work

# *What is an ODBMS?*

- ⇒ ODMG defines an ODBMS to be a DBMS that integrates database capabilities with object-oriented programming language capabilities

# *History of ODBMS*

- ⇒ ODBMS's became available during the mid 1980's and early 1990's and were mainly used in Computer-Aided Design (CAD) and Computer-Aided Software Engineering (CASE) tools

# *Features of ODBMS*

- ⇒ Persistence of data
- ⇒ Indexing
- ⇒ Schema evolution
- ⇒ Transaction management
- ⇒ Query language
- ⇒ Some unique features:
  - Storing Objects
  - OML: Java and C++ bindings
  - ODL
  - OQL

# *Advantages of ODBMS*

- ➔ Model and store complex objects and relationships
- ➔ Code and methods are stored together and managed together
- ➔ Programming languages are used for data manipulation and no new language like SQL needs to be learned - solution to the impedance mismatch

# *Advantages of ODBMS*

- ⇒ There is one model
- ⇒ Fast retrieval of objects and related objects: the ODBMS stores the references to these objects in the database

# *Disadvantages of ODBMS*

- ⇒ ODBMS's are not based on the relation set theory in mathematics
- ⇒ No easy access to data for non technical people



# *Issues surrounding ODBMS*

- ⇒ Performance issues:
  - eBucks 2003: 700 000 users and 36 million transactions per day
- ⇒ Not many people are equipped with the knowledge or skills on ODBMS's

# *What are ORM Tools?*

- ➔ ORM map from the application object model to the relational model

# *Features of ORM Tools*

- ⇒ Mapping object and relationships: 1:m, n:m and m:1
- ⇒ Transaction and concurrency management
- ⇒ Queries: HQL/OQL
- ⇒ Performance:
  - Lazy Initialization
  - Batch Fetching
  - Caches

# *Advantages of ORM Tools*

- ➔ Developers work with objects and the mapping tools will enable data persistency transparently
- ➔ The programming code is reduced as the developer do not need to write all the mapping code
- ➔ The development time is reduced

# *Disadvantages of ORM Tools*

- ⇒ Knowledge of the relation model is still required:
  - Developer or mapper needs to know to which table to map (tables names can be different than class names)
- ⇒ Mapping *one-to-many*, *many-to-many*, *many-to-one* and even *one-to-one* is complicated

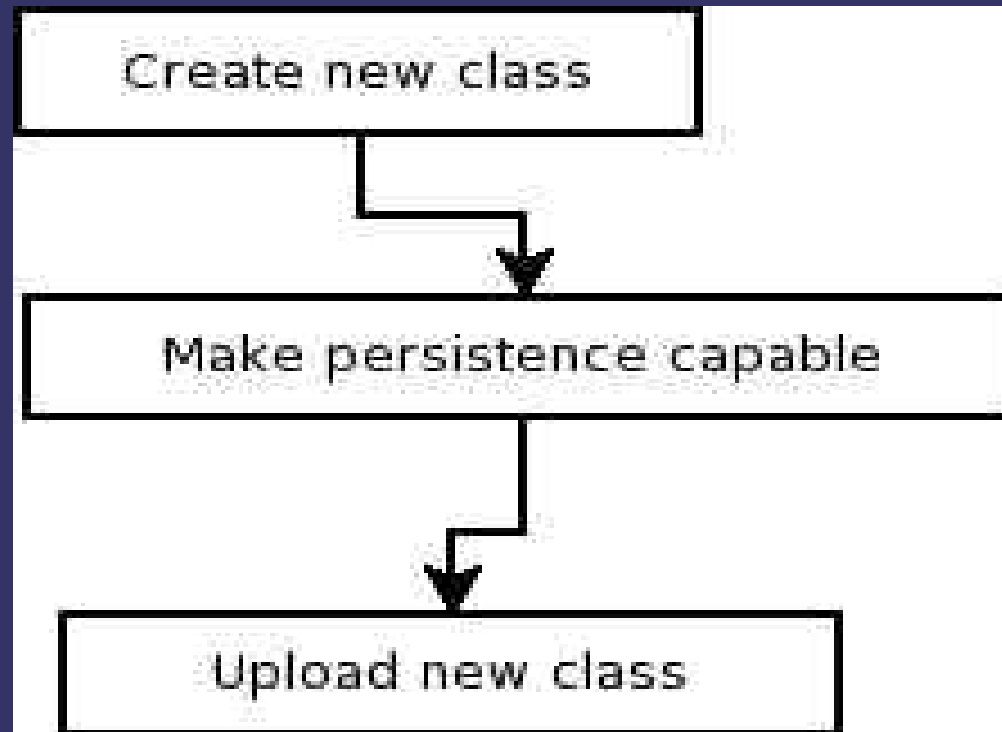
# *Issues surrounding ORM Tools*

- ⇒ Are the advantages really realized?
- ⇒ There is still a impedance mismatch

# *Interesting Topics*

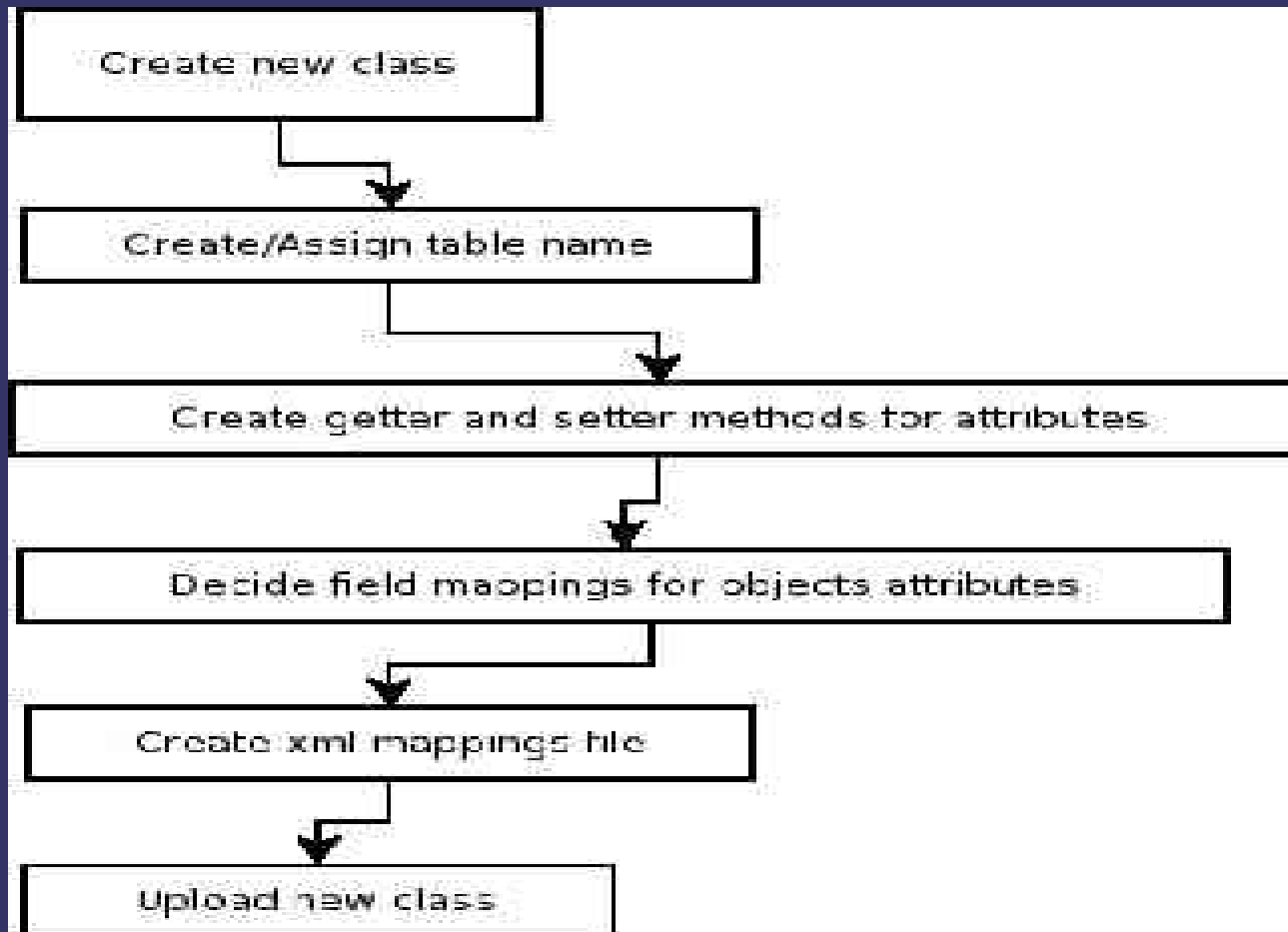
- ⇒ Indexing
- ⇒ Schema Evolution
- ⇒ Clustering
- ⇒ Benchmarking and performance
- ⇒ Caching
- ⇒ VM implementation and garbage collection
- ⇒ Standards: ODMG 2.0

# *Create and store new Class using an ODBMS*





# Create and store new Class using an ORM Tool



# *Future Work*

- ⇒ Comparing an ODBMS against an ORM with a RDBMS
- ⇒ Look at developer productivity
- ⇒ Find ways to provide new insight into ODBMS's
- ⇒ Investigate:
  - Clustering
  - Query
  - Indexing techniques and algorithms
  - Impact on performance
- ⇒ Create a tool for deciding which applications are suited for an ODBMS or an ORM Tool

# Questions

- ⇒ .....but first my questions:
  - Who are using ODBMS's or ORM Tools?
  - Have you looked at an ODBMS for your environment?
  - Do all applications really need a RDBMS as their persistent store?

# *ODBMS Vendors*

- Birdstep RDM Mobile, (Birdstep Technology, Inc.)
- Jasmine Object Database (Computer Associates International, Inc.)
- Xdb (Custom Microsystems, Inc)
- db4o - database for objects - open source (b4objects, Inc.)
- GemStone/S and GemStone Facets (GemStone Systems, Inc.)

# *ODBMS Vendors*

- Cache<sup>v</sup>Ž (InterSystems Corporation)
- JADE (Jade Software Corporation)
- JYD Object Database (JYD Software Engineering Pty Ltd.)
- VOSS (Logic Arts, Ltd.)
- Matisse (Matisse Software, Inc.)
- TITANIUM (Micro Data Base Systems, In)

# *ODBMS Vendors*

- GOODS - open source (Moscow State University)
- ObjectDB for Java/JDO (ObjectDB Software)
- Objectivity/DB (Objectivity, Inc.)
- Orient Enterprise Edition and Orient Just Edition (Orient Technologies)

# *ODBMS Vendors*

- ObjectStore, PSE Pro, and ObjectStore Event Engine (Progress Software Corporation)
- ODABA (Software-Werkstatt GmbH)
- Prevayler - open source (Sourceforge)
- EyeDB (Sysra)
- Versant Object DB (Versant Corporation -- Versant Corporation has merged with POET Holdings (FastObjects, Inc.))