

# Survey of Persistence Approaches

## PROJECT PLAN

Type: Diploma project  
Project period: 06/Jun/2005 to 30/Nov/2005  
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### 1. PROJECT DESCRIPTION

#### *Overview*

*Enterprise applications* are widely used in companies nowadays. One of the most important tasks that enterprise applications perform is storing and retrieving data; that is they deal with *long-lived* data. Since its introduction, the concept of object-oriented modeling has been used more and more to design new applications. Although IT systems are designed successfully using object-orientation, the object-oriented languages still do not offer good solutions to transparently persist objects.

To construct an enterprise application one can proceed in a top-down or bottom-up manner. A top-down approach is application centric (programming language); a bottom-up approach is data (database) centric. Most enterprise applications in industry use the bottom-up approach because, usually, there exists already databases and the new applications are built “on top of” them.

There are several technologies available for persisting objects.

- **Object Serialization:** The state of an object is converted to a stream of bytes. After the conversion of the object it can be stored in files or sent to another computer over the network.
- **Relational Database Interface:** The majority of the enterprise applications are using relational database management systems (RDBMS) to store data. Working with the relational data model of the database and the object model of the programming language at the same time means that programmers have to deal with the *impedance mismatch* and consequently have to map program classes to database tables.
- **Object Database Interface:** Object-oriented database management systems (OODBMS) prevent the occurrence of impedance mismatch by providing the same object model used by object-oriented programming languages.
- **Persistence Framework:** Persistence frameworks provide a large set of facilities to persist objects. In contrast to database interfaces they decouple the application from the actual storage technology used by providing their own range of persistence

facilities. Despite the flexibility gained at the application level persistence frameworks do not hide the underlying storage technology from the programmer. Most of the persistence frameworks are developed by the industry; so they are extensively used when bottom-up approach is used to design systems.

- **Persistent Programming:** Persistent programming approaches try to implement *transparent* persistence at the programming language level, meaning that they hide from the programmer how they achieve persistence. This approach is more suitable when using top-down approach to design systems.

### *Scope of the work*

My work basically aims at providing an assessment of existing object persistence frameworks and at generalizing from the assessment the ideal approach to achieve transparent object persistence at the programming language level. I will proceed as follows:

- Elaborate the *criteria* to be used to assess the frameworks/approaches
- Design a simple *example application* to be used to test the frameworks/approaches
- *Assessment* of each framework/approach based on the earlier defined assessment criteria. The frameworks/approaches (in order of priority) to assess are:
  - Hibernate
  - Db4objects
  - PJama
  - EPOM
  - Prevayler
  - TopLink
  - EJB
  - JDO
- Generalize from the assessment the ideal approach to achieve transparent object persistence at the programming language level. This will result in a set of *features* the ideal approach has to contemplate.
- *Document* the result of the assessment and the generalization.

### *Intended results*

At the end of my work I intend to have 2 main results:

- The survey and assessment of the frameworks/approaches
- A set of features that an ideal persistence approach should support

## **2. PROJECT MANAGEMENT**

### *Objectives and priorities*

The main objective of this project is to come up with a set of features that an ideal persistence framework/approach should have.

### ***Criteria for success***

The features for an ideal framework/approach should be provided.

### ***Method of work***

At first I will search for the criteria that will be used to assess the persistence frameworks/approaches. With the criteria in hand I will assess each persistence approach. The result of the assessment will be used to define the set of features that an ideal persistence framework should support.

### ***Quality management***

**Regular meetings with the supervisor will be held in order to get guidance.**

### ***Documentation***

A document will be written along with the work. I will write the document while I progress with the work and at the end of the work. I intend to take some time to review it before I release the final version.

## **3. PLAN WITH MILESTONES**

### ***Project tasks***

- Task 1: Introduction to the topic (Reading)
- Task 2: Frameworks/approaches selection
- Task 3: Formulation of a set of assessment criteria
- Task 4: Survey of the frameworks/approaches
- Task 5: Assessment of the frameworks/approaches
- Task 6: Generalization of the assessment criteria into persistence features
- Task 7: Documentation

### ***Deadline***

The deadline is 30<sup>th</sup> of November.

### ***Tentative schedule***

- Reading (06/Jun to 31/Jul)
- Selection (06/Jun to 31/Jul)
- Criteria (01/Jul to 31/Jul)
- Assessment (01/Aug to 15/Oct)
- Persistence features (16/Oct to 28/Oct)
- Documentation (16/Oct to 30/Nov)

	Jun 06- 10							Jul 25- 29										Oct 10- 14						Nov 21- 25	
Activity	W 23	W 24	W 25	W 26	W 27	W 28	W 29	W 30	W 31	W 32	W 33	W 34	W 35	W 36	W 37	W 38	W 39	W 40	W 41	W 42	W 43	W 44	W 45	W 46	W 47
Literature reading																									
Criteria elaboration																									
Assessment																									
Documentation																									

The assessment of the persistence techniques will be made following the schedule bellow.

Persistence technology	W31	W32	W33	W34	W35	W36	W37	W38	W39	W40	W41
Hibernate											
Db4objects											
PJama											
EPOM											
Prevayler											
TopLink											
JDO											
EJB											

**REFERENCES**

[1] Chair of Software Engineering: *Semester-/Diplomarbeiten*; Online at: <http://se.inf.ethz.ch/projects/index.html>, consulted in October 2002.

[2] Bertrand Meyer: *Object-Oriented Software Construction, 2nd edition*, Prentice Hall, 1997.