Market Requirements Document

Feature Name: Web Ontology Language (OWL) Support

Version: 1 **Date Submitted:** 11/29/2007 **Completed By:** Leon Guzenda

Description of the Problem

Background

"The Web Ontology Language (OWL) is a language for defining and instantiating Web ontologies. An OWL ontology may include descriptions of classes, along with their related properties and instances. OWL is designed for use by applications that need to process the content of information instead of just presenting information to humans. It facilitates greater machine interpretability of Web content than that supported by XML, RDF, and RDF Schema (RDF-S) by providing additional vocabulary along with a formal semantics. OWL is based on earlier languages OIL and DAML+OIL, and is now a W3C recommendation.

OWL is seen as a major technology for the future implementation of a Semantic Web. It is playing an important role in an increasing number and range of applications, and is the focus of research into tools, reasoning techniques, formal foundations and language extensions." – Wikipedia.

Example

See Appendix 1.

Problems

1. Objectivity/DB does not support the schema languages used by the various components of the semantic web stack.
2. Neither is it particularly efficient at storing and manipulating constructs that are primarily closely related text strings.
3. The internal schema representation is designed for relatively fixed structure languages, such as C++ and Java, rather than self-defining languages, such as Generalized Markup of Defined Objects (GDMO) and those used within the World Wide Web Consortium (W3C).

Impact

Customers wishing to store data from and for the Semantic Web will have to write their own metadata and data handling interfaces to Objectivity/DB, probably using Objectivity for Java. This is likely to be a considerable barrier to the adoption of Objectivity/DB in this rapidly evolving marketplace.

Description of the Requested Feature

The goal is to provide a high performance, scalable, distributed (grid-enabled), reliable database environment for Web Ontology Language (OWL) tools.

It must be possible to store the objects, relationships and other constraints defined in the W3C Web Ontology Reference - http://www.w3.org/TR/owl-ref/.

Part of an existing feature or does it require another feature, if so, which one?

This feature will add at least one optional, Objectivity products. It will require RDF support, described in the "Resource Description Framework (RDF) Support" MRD.

How is this problem being solved now, and why isn't that acceptable?

Customers who need to add support for the Semantic Web to existing products based on Objectivity/DB currently have to build their own metadata and data handling tools. Prospects are more likely to look elsewhere for COTS solutions. There is a danger that some existing customers may also look for alternative solutions, either COTS or Open Source.

What languages must support this capability?

- Java
- C#.

Which platforms must be supported?

- Tier 1 at first and all platforms eventually.

Do any competitors already have this feature?

- Oracle and IBM have a growing number of RDF/OWL tools.
- DATA-GRID is developing a fully compliant, Internet enabled OWL database for delivery in Spring 2008.
- Franz AllegroGraph is a high performance RDF Triple DBMS and a partnership with TopQuadrant, a vendor of a full suite of OWL tools.

Customers who require this feature

- The Intelligence Community.
- The manufacturing, petrochemical, telecom and financial markets.
- Boeing has recently expressed interest in storing RDF and OWL in Objectivity/DB.

Revenue at risk, or which could be won

- Analysts predict that the global Semantic Web market could be worth $75 Billion annually from 2010 onwards.

When is this required?

- Before 2009, if possible.

Additional Notes

1. We will also need:
- Marketing collateral.
- Updated Technical Publications.
- New QA material.

2. This feature relies on the RDF features defined elsewhere. It is not our aim to produce a complete OWL environment, but to guarantee compatibility with at least one open source and one commercial OWL schema development and ontology tool environment. Representative environments include:
- Jena 2,
- OWL API
- TopQuadrant's TopBraid Composer.

3. Ideally, new OWL schemas, instances, constructs (such as collections, constraints and relationships) should be able to incorporate, or be related to, schemas developed for use with other Objectivity/DB APIs and data produced using other APIs.

Appendix 1 – Extracts From An OWL Ontology

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
        xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
        xmlns:owl="http://www.w3.org/2002/07/owl#"
        xmlns="http://www.xfront.com/owl/ontologies/camera/#"
        xmlns:camera="http://www.xfront.com/owl/ontologies/camera/#"
        xml:base="http://www.xfront.com/owl/ontologies/camera/">

   <owl:Ontology rdf:about="">
      <rdfs:comment>
      Camera OWL Ontology
      Author: Roger L. Costello
      </rdfs:comment>
   </owl:Ontology>

    <owl:Class rdf:ID="Money">
        <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
    </owl:Class>

    <owl:DatatypeProperty rdf:ID="currency">
        <rdfs:domain rdf:resource="#Money"/>
        <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    </owl:DatatypeProperty>

    <owl:Class rdf:ID="Range">
        <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
    </owl:Class>

    <owl:DatatypeProperty rdf:ID="min">
        <rdfs:domain rdf:resource="#Range"/>
        <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#float"/>
    </owl:DatatypeProperty>

    <owl:DatatypeProperty rdf:ID="max">
        <rdfs:domain rdf:resource="#Range"/>
        <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#float"/>
    </owl:DatatypeProperty>

   <! – Some classes omitted →

    <owl:Class rdf:ID="PurchaseableItem">
        <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Thing"/>
    </owl:Class>

    <owl:ObjectProperty rdf:ID="cost">
        <rdfs:domain rdf:resource="#PurchaseableItem"/>
        <rdfs:range rdf:resource="#Money"/>
    </owl:ObjectProperty>

    <owl:Class rdf:ID="Body">
        <rdfs:subClassOf rdf:resource="#PurchaseableItem"/>
    </owl:Class>

    <owl:Class rdf:ID="Lens">
        <rdfs:subClassOf rdf:resource="#PurchaseableItem"/>
    </owl:Class>
```

```
    <owl:Class rdf:ID="Camera">
        <rdfs:subClassOf rdf:resource="#PurchaseableItem"/>
    </owl:Class>

    <owl:Class rdf:ID="SLR">
        <owl:intersectionOf rdf:parseType="Collection">
            <owl:Class rdf:about="#Camera"/>
            <owl:Restriction>
                <owl:onProperty rdf:resource="#viewFinder"/>
                <owl:hasValue rdf:resource="#ThroughTheLens"/>
            </owl:Restriction>
        </owl:intersectionOf>
    </owl:Class>

    <owl:DatatypeProperty rdf:ID="aperture">
        <rdfs:domain rdf:resource="#Lens"/>
        <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    </owl:DatatypeProperty>

    <owl:DatatypeProperty rdf:ID="focal-length">
        <owl:equivalentProperty rdf:resource="#size"/>
        <rdfs:domain rdf:resource="#Lens"/>
        <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    </owl:DatatypeProperty>

</rdf:RDF>
```

Jump Back to the Description of the Problem.