DSE Beyond Relational Models
Fall 2016

Homework 1

Due Monday Oct 17, by email to TA, as PDF file

Consider an ODL schema modeling information about boats and their owners:

```
class Person (extent persons key ssn) {
        attribute string name;
        attribute string ssn;
        attribute Date dob;
}

class Boat (extent boats key name) {
        attribute string name;
        attribute int tonnage;
        attribute set<string> racesWon;
        relationship set<Ownership> belongedTo;
}

class Ownership (extent ownerships) {
        attribute Date begin;
        attribute Date end;
        relationship set<Person> coOwners;
        relationship Boat boat inverse Boat::belongedTo;
}
```

I.
Propose an SQL schema to model this data relationally. No need to provide SQL table declarations. Notation of the form

$$\text{RelationName } (\text{type}_1\ \text{attrib}_1, \ldots, \text{type}_n\ \text{attrib}_n)$$

suffices, complemented by explicit key and foreign key declarations.
List features of the ODL schema that cannot be captured in this way (if any).

II.
Express the following queries in OQL:

1.
For the boats who won the “Americas Cup” title, return the (boat, owner) object pairs. The query result should have type **set<struct** { Boat boat, Person owner }>.

2.
Find the boat(s) *ever* owned by “Jack Sparrow”. The query result should have type set<Boat>.

3.
Now assume that the definition of class Person is enriched with the declaration

relationship set<Ownership> ownerships **inverse** Ownership::coOwners;

and redo query II.2 exploiting this relationship.

4.
Find the boat(s) *most recently* owned by “Jack Sparrow”. The query result should have type set<Boat>.

5.
Dropping the assumption of point 3., find the owners (return the objects themselves) of *all* “Americas Cup”-winning boats.

III.
Express the queries II.1, II.2, II.4 and II.5 in QBE, on the schema of point I. Instead of returning objects, return the key of the corresponding entities.