Hibernate Query Language

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Topics

- Hibernate Criteria Query
- Hibernate Query Language (HQL)

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Hibernate Criteria Query

Sub-Topics of Hibernate Criteria Query

- What is Criteria query?
- How to use Criteria query API?
- Pagination
- Restrictions
- Ordering
- Aggregate functions
- Fetch modes
- Query By Example (QBE)

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What is Criteria Query?

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Three ways of retrieving data in Hibernate

- Criteria query API
  - The easiest way to retrieve data (from Java developer standpoint)
  - Pure Java language based
- Hibernate Query Language (HQL)
- Native SQL query

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Criteria Query API

- Uses a set of Java objects for constructing queries
  - Instead of SQL-like query language
- Lets you build nested, structured query expressions in Java programming language
  - Compile time syntax/type checking is possible
  - Polymorphic behavior – get instances of X & subclass(X)
- Supports Query By Example (QBE)
  - Performing a query by providing an example Java object that contain properties that need to be retrieved
- Supports aggregation methods (from Hibernate 3)
  - Count

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How to use Criteria Query API

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How to use Criteria Query API

- Create *org.hibernate.Criteria* object via *createCriteria()* factory method of the *Session*
  - Pass persistent object's class or its entity name to the *createCriteria*() method
- Call *list*() method of the *Criteria* object to perform a query

```
// Get all instances of Person class and its subclasses
Criteria crit = sess.createCriteria(Person.class);
List results = crit.list();
```


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Pagination

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Pagination through the Result Set

- Hibernate handles the pagination
  - Retrieving fixed number of rows
- Two methods of Criteria class
  - *setFirstResult()* - set the first row in the result
  - *setMaxResults()* - number of rows to retrieve

```
Criteria crit = sess.createCriteria(Person.class);
crit.setFirstResult(2);    // Starting from 3rd row
crit.setMaxResults(50); // Number of rows
List results = crit.list();
```


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Narrowing the Result Set via Criteria Restrictions

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Restrictions class

- Used to selectively retrieve objects
  - Example: Person objects whose age field's value is greater than 20
- Add restrictions to the *Criteria* query object with *add()* method
  - The *add()* method of the *Criteria* object takes an *org.hibernate.criterion.Criterion* object that represents an individual restriction
- You can have more than one restriction for a Criteria query

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Methods of Restrictions class

- *Restrictions.eq("name", "Mudassar")*
- *Restrictions.ne("name", "NoName")*
- *Restrictions.like("name", "Muda%")*
- *Restrictions.ilike("name", "mu%")*
- *Restrictions.isNull("name");*
- *Restrictions.gt("price",new Double(30.0))*
- *Restrictions.between("age", new Integer(2), new Integer(10))*
- *Restrictions.or(criterion1, criterion2)*
- *Restrictions.disjunction()*

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Add a restriction

- *Restrictions.like()* - pattern based restriction

```
// Retrieve person objects whose name has a pattern
Criteria crit = sess.createCriteria(Person.class);

// Create Criterion object first and then add it to Criteria
Criterion nameRestriction = Restrictions.like("name", "Mudassar%");
crit.add( nameRestriction );
List results = crit.list();
```


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Logical Grouping of Restrictions

- Restrictions can be logically grouped with *.and* and *.or*

```
// Retrieve Person objects whose name has a pattern
// and whose age is 10 or null
List people = sess.createCriteria(Person.class)
    .add( Restrictions.like("name", "Mudassar%") )
    .add( Restrictions.or(
        Restrictions.eq( "age", new Integer(10) ),
        Restrictions.isNull("age")
    ) )
    .list();
```


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Ordering the Result Set

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Ordering the results

- You may order the results using *org.hibernate.criterion.Order*

```
List cats = sess.createCriteria(Cat.class)
    .add( Restrictions.like("name", "F%")
    .addOrder( Order.asc("name") )
    .addOrder( Order.desc("age") )
    .setMaxResults(50)
    .list();
```


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Projections & Aggregates

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Aggregate functions available through Projections factory class

- *rowCount()*
- *avg(String propertyName)*
  - average of a property's value
- *count(String propertyName)*
  - number of times a property has a value
- *countDistinct(String propertyName)*
  - number of unique values the property contains
- *max(String propertyName)*
- *min(String propertyName)*
- *sum(String propertyName)*
  - sum of the property values

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Projections

- Projections.rowCount()

```
// The result will contain one object, an Integer that
// contains the results of executing COUNT SQL
// statement
Criteria crit = sess.createCriteria(Person.class);
crit.setProjection( Projections.rowCount() );
List results = crit.list();
```


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Multiple Projections

- Projections.projectionList()

```
// You will get a List with an Object array
// as the first element. The Object array
// contains all the values in order
Criteria crit = sess.createCriteria(Product.class);
ProjectionList projectList = Projections.projectionList();
projectList.add(Projections.avg("price"));
projectList.add(Projections.sum("price"));
crit.setProjection( projectList );
List results = crit.list();
```


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Fetch Modes

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Fetching Modes (How it is fetched)

- FetchMode.DEFAULT
  - Default to the setting configured in the mapping file.
- FetchMode.JOIN
  - Hibernate retrieves the associated instance or collection in the same SELECT, using an OUTER JOIN.
- FetchMode.SELECT
  - A second SELECT is used to retrieve the associated entity or collection.
  - Unless you explicitly disable lazy fetching by specifying *lazy="false"*, this second select will only be executed when you actually access the association.

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Setting the Fetch Mode

- *setFetchMode("permissions", FetchMode.JOIN)*

```
User user = (User) session.createCriteria(User.class)
            .setFetchMode("permissions", FetchMode.JOIN)
            .add( Restrictions.idEq(userId) )
            .uniqueResult();
```


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Query By Example (QBE)

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What is Query By Example (QBE)?

- Provides another style of query
- How to perform QBE based query
  - Partially populate an instance of an object
  - Let Hibernate build behind the scene a criteria using the instance as an example
- *org.hibernate.criterion.Example* class implements *Criterion* interface
  - You can use it like any other restrictions

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Query By Example

- Use *Example.create()* to create a restriction

```
// Retrieve person objects via example object
Criteria crit = sess.createCriteria(Person.class);
Person person = new Person();
person.setName("Mudassar");
Example exampleRestriction = Example.create(person);
crit.add( exampleRestriction  );
List results = crit.list();
```


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Hibernate Query Language (HQL)

Sub-Topics of HQL

- What is HQL?
- “from” clause
- Associations and join
- “select” clause
- “where” clause
- Named query
- Polymorphic query

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What is HQL?

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Hibernate Query Language (HQL)

- Very similar to SQL but less verbose
- Understands OO – inheritance, polymorphism, association
  - Selection: *from, as*
  - Associations and joins: *inner join, outer join, right outer join, full join*
  - Projection: *select, elements*
  - Constraints: *where*
  - Other constructs: *aggregate functions, expressions, order by clauses, group by clauses, polymorphic selections, sub-queries*

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Differences of HQL from SQL

- HQL is fully object-oriented, understanding notions like inheritance, polymorphism and association
- Queries are case-insensitive, except for names of Java classes and properties

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“from” clause

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“from” clause

- Return all instances of the class, package.Cat.

  from package.Cat

- Usually don't need to qualify the class name, since auto-import is the default.

  from Cat is same as *from package.Cat*

- Most of the time, you will want to assign an alias, since you will want to refer to the Cat in other parts of the query

  from Cat as cat (“cat” is the alias of “Cat”)

  from Cat cat (“as” can be omitted)

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“from” clause for multiple classes

- Multiple classes may appear, resulting in a Cartesian product or "cross" join.

  from Formula, Parameter

  from Formula as form, Parameter as param

- Local variable naming recommendation - Name query aliases using an initial lowercase, consistent with Java naming standards for local variables

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Associations and joins

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join

- We may also assign aliases to associated entities, or even to elements of a collection of values, using a join

```
from Cat as cat
    inner join cat.mate as mate
    left outer join cat.kittens as kitten
from Cat as cat
    left join cat.mate.kittens as kittens
```


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“where” clause

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where clause

- The *where* clause allows you to narrow the list of instances returned.
- If no alias exists, you may refer to properties by name

  from Cat where name='Fritz'
- If there is an alias, use a qualified property name:

  from Cat as cat where cat.name='Fritz'

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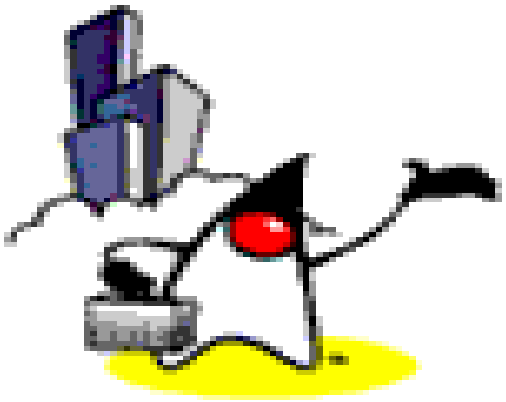

“select” clause

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select clause

- The select clause picks which objects and properties to return in the query result set

```
select mate
from Cat as cat
    inner join cat.mate as mate
```

- Compact form

```
select cat.mate from Cat cat
```


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select clause: Returning Properties

- Queries may return properties of any value type including properties of component type

select cat.name from DomesticCat cat

where cat.name like 'fri%'

select cust.domestic.firstName from Customer as cust

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select clause: Returning Multiple Objects as type Object[]

- Queries may return multiple objects and/or properties as an array of type Object[]

```
select mother, offspr, mate.name
from DomesticCat as mother
    inner join mother.mate as mate
    left outer join mother.kittens as offspr
```


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select clause: Returning Multiple Objects as a List, Map type

- Queries may return multiple objects and/or properties as a List

  select new list(mother, offspr, mate.name)

  from DomesticCat as mother

  inner join mother.mate as mate

  left outer join mother.kittens as offspr

- *select new list(p.price, p.name) from Product p*
- *select new map(p.price as price, p.name as name) from Product p*

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select clause: Returning a Java Object

- Returns a typesafe Java object

```
select new Family(mother, mate, offspr)
from DomesticCat as mother
    join mother.mate as mate
    left join mother.kittens as offspr
```


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where clause

- Return all instances of *Foo* for which there exists an instance of bar with a *date* property equal to the *startDate* property of the *Foo*

```
select foo
from Foo foo, Bar bar
where foo.startDate = bar.date
```

- Compound path expressions make the where clause extremely powerful.

```
from Cat cat where cat.mate.name is not null
```


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Named Query

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Named queries: xml mapping

- Get Named Native Sql Query from Mapping File

```
<sql-query name="findCourseNativeSQL">
  <return alias="courses_bckp1"
class="com.mudassar.myexample.domain.CoursesBckp"/>
 <![CDATA[select * from courses_bckp s where s.COURSE_ID
= :courseId]]>
 </sql-query>
```

- Get Named HQL Query from Mapping File

```
  <query name="findCourseHQL">
 <![CDATA[from CoursesBckp s where s.courseId =
:courseId]]>
  </query>
```


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Named queries: Annotation mapping

```
@NamedQueries({
@NamedQuery(name="CoursesBckp.findAllHQL",
query="SELECT e FROM CoursesBckp e"),
@NamedQuery(name="findCourseHQL",
query = "from CoursesBckp s "),
@NamedQuery(name="CoursesBckp.findAllCoursesHQL",
query="SELECT e.courseName FROM CoursesBckp e"),
@NamedQuery(name="CoursesBckp.findCourseHQL",
query = "from CoursesBckp s  where  s.courseId = :courseId")
})
@NamedNativeQueries({
@NamedNativeQuery( name = "findCourseNativeSQL",
query = "select * from courses_bckp s where s.COURSE_ID = :courseId"
,resultClass =  CoursesBckp.class)
})
```


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Named queries: Calling

- Calling the Native SQL Query

  Query qy = session.

  getNamedQuery("findCourseNativeSQL");

- *Calling HQL Query*

  Query qy=session.

  getNamedQuery("findCourseHQL");

- Setting the parameter in both the cases

  qy.setParameter("courseId", courseId);

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Polymorphic Query

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Polymorphic queries

- The query below returns instances not only of Cat, but also of subclasses like DomesticCat

  from Cat as cat

- Hibernate queries may name any Java class or interface in the from clause.
- The query will return instances of all persistent classes that extend that class or implement the interface.
- The following query would return all persistent objects

  from java.lang.Object o

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Thank you!

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