Specifying the Cache Mode Settings to Improve Performance

To adjust the cache mode settings for a persistence unit, specify one of the cache modes as the value of the `shared-cache-mode` element in the `persistence.xml` deployment descriptor (shown in **bold**):

```
<persistence-unit name="examplePU" transaction-type="JTA">
  <provider>org.eclipse.persistence.jpa.PersistenceProvider</provider>
  <jta-data-source>jdbc/__default</jta-data-source>
  <shared-cache-mode>DISABLE_SELECTIVE</shared-cache-mode>
</persistence-unit>
```

Note - Because support for a second-level cache is not required by the Java Persistence API specification, setting the second-level cache mode in `persistence.xml` will have no effect when using a persistence provider that does not implement a second-level cache.

Alternatively, the shared cache mode may be specified by setting the`javax.persistence.sharedCache.mode` property to one of the shared cache mode settings:

```
EntityManagerFactor emf =
    Persistence.createEntityManagerFactory(
        "myExamplePU", new Properties().add(
            "javax.persistence.sharedCache.mode", "ENABLE_SELECTIVE"));
```

Setting the Cache Retrieval and Store Modes

If the second-level cache has been enabled for a persistence unit by setting the shared cache mode, the behavior of the second-level cache can be further modified by setting the`javax.persistence.cache.retrieveMode` and`javax.persistence.cache.storeMode` properties. These properties may be set at the persistence context level by passing the property name and value to the`EntityManager.setProperty` method, or may be set on a per-`EntityManager`operation (`EntityManager.find` or `EntityManager.refresh`) or per-query level.

Cache Retrieval Mode

The cache retrieval mode, set by the `javax.persistence.retrieveMode` property, controls how data is read from the cache for calls to the `EntityManager.find` method and from queries.

The `retrieveMode` property can be set to one of the constants defined by the`javax.persistence.CacheRetrieveMode` enumerated type, either `USE` (the default) or`BYPASS`. When it is set to `USE`, data is retrieved from the second-level cache, if available. If the data is not in the cache, the persistence provider will read it from the database. When it is set to `BYPASS`, the second-level cache is bypassed and a call to the database is made to retrieve the data.

Cache Store Mode

The cache store mode, set by the `javax.persistence.storeMode` property, controls how data is stored in the cache.

The `storeMode` property can be set to one of the constants defined by the`javax.persistence.CacheStoreMode` enumerated type, either `USE` (the default),`BYPASS`, or `REFRESH`. When set to `USE` the cache data is created or updated when data is read from or committed to the database. If data is already in the cache, setting the store mode to `USE` will not force a refresh when data is read from the database.

When the store mode is set to `BYPASS`, data read from or committed to the database is **not**inserted or updated in the cache. That is, the cache is unchanged.

When the store mode is set to `REFRESH`, the cache data is created or updated when data is read from or committed to the database, and a refresh is forced on data in the cache upon database reads.

Setting the Cache Retrieval or Store Mode

To set the cache retrieval or store mode for the persistence context, call the`EntityManager.setProperty` method with the property name and value pair:

```
EntityManager em = ...;
em.setProperty("javax.persistence.cache.storeMode", "BYPASS");
```

To set the cache retrieval or store mode when calling the `EntityManger.find` or`EntityManager.refresh` methods, first create a `Map<String, Object>` instance and add a name/value pair as follows:

```
EntityManager em = ...;
Map<String, Object> props = new HashMap<String, Object>();
props.put("javax.persistence.cache.retrieveMode", "BYPASS");
String personPK = ...;
Person person = em.find(Person.class, personPK, props);
```

Note - The cache retrieve mode is ignored when calling the `EntityManager.refresh`method, as calls to `refresh` always result in data being read from the database, not the cache.

To set the retrieval or store mode when using queries, call the `Query.setHint` or`TypedQuery.setHint` methods, depending on the type of query:

```
EntityManager em = ...;
CriteriaQuery<Person> cq = ...;
TypedQuery<Person> q = em.createQuery(cq);
q.setHint("javax.persistence.cache.storeMode", "REFRESH");
...
```

Setting the store or retrieve mode in a query or when calling the `EntityManager.find` or`EntityManager.refresh` method overrides the setting of the entity manager.

Controlling the Second-Level Cache Programmatically

The `javax.persistence.Cache` interface defines methods for interacting with the second-level cache programmatically. The `Cache` interface defines methods to check whether a particular entity has cached data, to remove a particular entity from the cache, to remove all instances (and instances of subclasses) of an entity class from the cache, and to clear the cache of all entity data.

Note - If the second-level cache has been disabled, calls to the `Cache` interface's methods have no effect, except for `contains`, which will always return `false`.

Checking Whether an Entity's Data Is Cached

Call the `Cache.contains` method to find out whether a given entity is currently in the second-level cache. The `contains` method returns `true` if the entity's data is cached, and`false` if the data is not in the cache.

```
EntityManager em = ...;
Cache cache = em.getEntityManagerFactory().getCache();
String personPK = ...;
if (cache.contains(Person.class, personPK)) {
  // the data is cached
} else {
  // the data is NOT cached
}
```

Removing an Entity from the Cache

Call one of the `Cache.evict` methods to remove a particular entity or all entities of a given type from the second-level cache. To remove a particular entity from the cache, call the`evict` method and pass in the entity class and the primary key of the entity:

```
EntityManager em = ...;
Cache cache = em.getEntityManagerFactory().getCache();
String personPK = ...;
cache.evict(Person.class, personPK);
```

To remove all instances of a particular entity class, including subclasses, call the `evict`method and specify the entity class:

```
EntityManager em = ...;
Cache cache = em.getEntityManagerFactory().getCache();
cache.evict(Person.class);
```

All instances of the `Person` entity class will be removed from the cache. If the `Person` entity has a subclass, `Student`, calls to the above method will remove all instances of `Student`from the cache as well.

Removing All Data from the Cache

Call the `Cache.evictAll` method to completely clear the second-level cache:

```
EntityManager em = ...;
Cache cache = em.getEntityManagerFactory().getCache();
cache.evictAll();
```