A beginner's guide to entity state transitions with JPA and Hibernate

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Introduction

Hibernate shifts the developer mindset from *SQL* statements to entity state transitions. Once an entity is actively managed by *Hibernate*, all changes are going to be automatically propagated to the database.

Manipulating domain model entities (along with their associations) is much easier than writing and maintaining *SQL* statements. Without an ORM tool, adding a new column requires modifying all associated *INSERT*/*UPDATE* statements.

But *Hibernate* is no silver bullet either. *Hibernate* doesn't free us from ever worrying about the actual executed *SQL* statements. Controlling *Hibernate* is not as straightforward as one might think and it's mandatory to check all *SQL* statements *Hibernate* executes on our behalf.

The entity states

As I previously mentioned, *Hibernate* monitors currently attached entities. But for an entity to become managed, it must be in the right entity state.

First we must define all entity states:

- **New (Transient)**

  A newly created object that hasn't ever been associated with a *Hibernate Session* (a.k.a *Persistence Context*) and is not mapped to any database table row is considered to be in the **New (Transient)** state.

  To become persisted we need to either explicitly call the EntityManager#persist method or make use of the transitive persistence mechanism.
- **Persistent (Managed)**

  A **persistent** entity has been associated with a database table row and it's being managed by the current running *Persistence Context*. Any change made to such entity is going to be detected and propagated to the database (during the *Session* flush-time). With *Hibernate*, we no longer have to execute *INSERT/UPDATE/DELETE* statements. *Hibernate* employs a transactional write-behind working style and changes are synchronized at the very last responsible moment, during the current *Session* flush-time.
- **Detached**

  Once the current running *Persistence Context* is closed all the previously managed entities become **detached**. Successive changes will no longer be tracked and no automatic database synchronization is going to happen.

To associate a **detached** entity to an active *Hibernate Session*, you can choose one of the following options:

- **Reattaching**
  Hibernate (but not *JPA* 2.1) supports reattaching through the Session#update method.

  A *Hibernate Session* can only associate one *Entity* object for a given database row. This is because the *Persistence Context* acts as an in-memory cache (first level cache) and only one value (entity) is associated to a given key (entity type and database identifier).

  An entity can be reattached only if there is no other *JVM* object (matching the same database row) already associated to the current *Hibernate Session*.
- **Merging**
  The merge operaration is going to copy the **detached** entity state (source) to a managed entity instance (destination). If the merging entity has no equivalent in the current *Session*, one will be fetched from the database.

  The **detached** object instance will continue to remain detached even after the merge operation.

- **Removed**

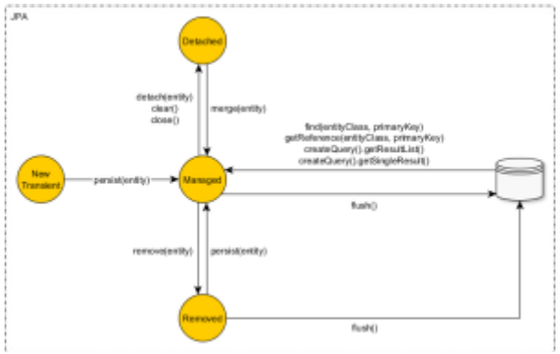
  Although *JPA* demands that managed entities only are allowed to be removed, *Hibernate* can also delete detached entities (but only through a Session#delete method call).

  A removed entity is only scheduled for deletion and the actual database *DELETE* statement will be executed during *Session* flush-time.

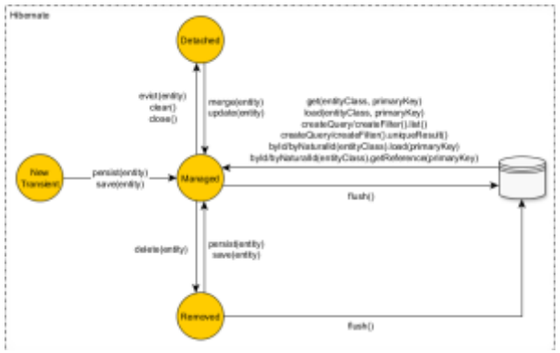
Entity state transitions

To change one *Entity* state, we need to use one of the following entity management interfaces:

- EntityManager



- Session



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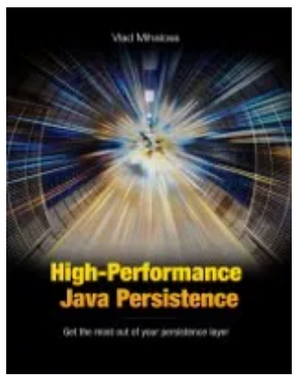

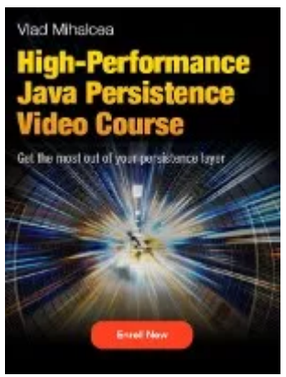

Conclusion

These interfaces define the entity state transition operations we must explicitly call to notify *Hibernate* of the entity state change. At flush-time the entity state transition is materialized into a database *DML* statement.

For more about how to use persist and merge effectively, you should read this article as well.

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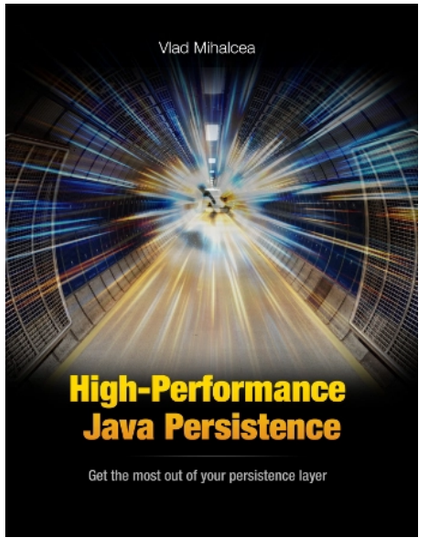

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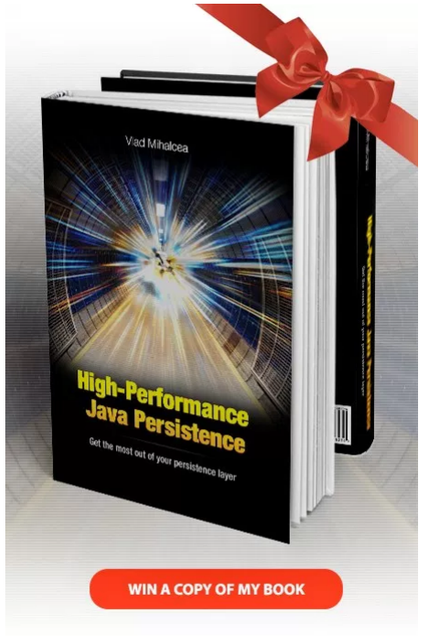

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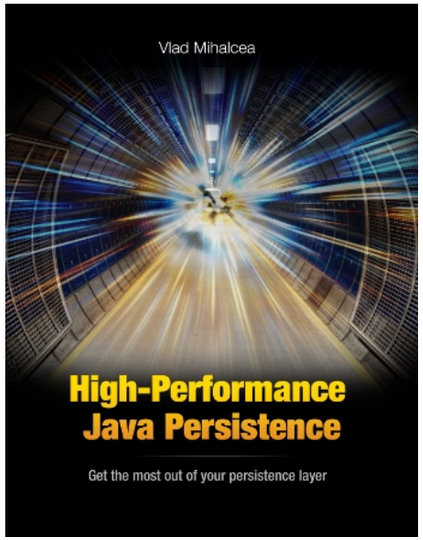

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