

# EOF-Using EOF-Delegates and Notifications

## EO Change Notifications

### Pierre Bernard

To invalidate cached versions of derived values, you might want to use this:

```
/** Utility class. Provides for a way to watch for changes in EOs. The main use of this would be to
 * be able to safely keep cached/computed/derived values that get cleared once out of sync.
 *
 * @author bernard
 * @version ChangeNotificationCenter.java,v 1.1 2003/03/11 16:26:59 bernard Exp
 */
public class ChangeNotificationCenter
{
    // Public class constants

    /** Name of the posted notification
     */
    public static final String OBJECT_CHANGED = "MBSObjectChanged";

    /** Possible type of change a notification is posted for
     */
    public static final String INVALIDATION = "Invalidation";

    /** Possible type of change a notification is posted for
     */
    public static final String DELETION = "Deletion";

    /** Possible type of change a notification is posted for
     */
    public static final String UPDATE = "Update";

    // Private class constants

    /** Key in the posted notification's userInfo dictionary.
     */
    private static final String OBJECT = "MBSObject";

    /** Key in the posted notification's userInfo dictionary.
     */
    private static final String TYPE = "MBSType";

    /** Selector used for calling the watcher object upon a change
     */
    private static final NSSelector watchedObjectChangedSelector =
        new NSSelector("watchedObjectChanged", new Class[] { NSNotification.class });

    // Private class variables

    /** Reference holding the shared singleton instance.
     */
    private static ChangeNotificationCenter defaultCenter = null;

    // Constructor

    /** Singleton class
     */
    private ChangeNotificationCenter()
    {
        super();

        Class[] notificationArray = new Class[] { NSNotification.class };
        NSSelector objectsChangedIInEditingContextSelector =
            new NSSelector("objectsChangedInEditingContext", notificationArray);
    }
}
```

```

NSNotificationCenter defaultCenter().addObserver(
    this,
    objectsChangedIInEditingContextSelector,
    EOEditingContext.ObjectsChangedInEditingContextNotification,
    null);
}

// Public insatnce methods

/** Method called when a change notification is received.
 *
 * The notification is split and redispached for all updated objects.
 */
public void objectsChangedInEditingContext(NSNotification notification)
{
    NSArray updated = (NSArray) notification.userInfo().objectForKey(EOObjectStore.UpdatedKey);

    if (updated != null)
    {
        int count = updated.count();

        for (int i = 0; i < count; i++)
        {
            Object object = updated.objectAtIndex(i);
            NSDictionary userInfo =
                new NSDictionary(new Object[] { object, UPDATE }, new Object[] { OBJECT, TYPE });
            NotificationCenter defaultCenter().postNotification(OBJECT_CHANGED, object, userInfo);
        }
    }

    NSArray invalidated = (NSArray) notification.userInfo().objectForKey(EOObjectStore.InvalidatedKey);

    if (invalidated != null)
    {
        int count = invalidated.count();

        for (int i = 0; i < count; i++)
        {
            Object object = invalidated.objectAtIndex(i);
            NSDictionary userInfo =
                new NSDictionary(new Object[] { object, INVALIDATION }, new Object[] { OBJECT, TYPE });
            NotificationCenter defaultCenter().postNotification(OBJECT_CHANGED, object, userInfo);
        }
    }

    NSArray deleted = (NSArray) notification.userInfo().objectForKey(EOObjectStore.DeletedKey);

    if (deleted != null)
    {
        int count = deleted.count();

        for (int i = 0; i < count; i++)
        {
            Object object = deleted.objectAtIndex(i);
            NSDictionary userInfo = new NSDictionary(new Object[] { object, DELETION }, new Object[] { OBJECT, TYPE
});
            NotificationCenter defaultCenter().postNotification(OBJECT_CHANGED, object, userInfo);
        }
    }

    /** Method to be called when one creates a cached value that depends on the attributes of a given object.
 *
 * Upon registration the object is watched and the watchedObjectChanged() is called once it changes, thus
 providing an
 * oppurtunity to invalidate the cached value.
 *
 * @param watcher the watching object which should unregister before disposing
 * @param object the object to watch
 * @see #unregisterCacheDependancy
 * @see #unregisterCacheDependancies

```

```

*/
public void registerCacheDependency(ObserverInterface watcher, EOEnterpriseObject object)
{
    NSNotificationCenter.defaultCenter().addObserver(watcher, watchedObjectChangedSelector, OBJECT_CHANGED,
object);
}

/** Method to be called when one abandons or clears a cached value that depended on attributes of a given
object.
*
* @param watcher the watching object
* @param object the object to watch
* @see #registerCacheDependency
*/
public void unregisterCacheDependency(ObserverInterface watcher, Object object)
{
    NSNotificationCenter.defaultCenter().removeObserver(watcher, OBJECT_CHANGED, object);
}

/** Unregisters all of the callers dependencies. To be used sparingly as it may break unknown but required
* dependencies. Usually called when disposing the calling object.
*
* @param watcher the watching object
* @see #registerCacheDependency
* @see #unregisterCacheDependency
*/
public void unregisterCacheDependencies(ObserverInterface watcher)
{
    NSNotificationCenter.defaultCenter().removeObserver(watcher, OBJECT_CHANGED, null);
}

// Public class methods

/** Gets or lazily instantiates the shared instance of the ChangeNotificationCenter
*
* @return the unique instance
*/
public static ChangeNotificationCenter defaultCenter()
{
    if (defaultCenter == null)
    {
        createDefaultCenter();
    }

    return defaultCenter;
}

/** Utility method. Allows for retrieving the changed object from a notification
* that results of registering interest in a change.
*
* @param notification the received notification
* @return the object that triggered the notification
*/
public static EOEnterpriseObject objectFromNotification(NSNotification notification)
{
    return (EOEnterpriseObject) notification.userInfo().objectForKey(OBJECT);
}

/** Utility method. Allows for retrieving the type of change that occurred from a notification
* that results of registering interest in a change.
*
* @param notification the received notification
* @return the type as one of the class constants defined in ChangeNotificationCenter
*/
public static String typeFromNotification(NSNotification notification)
{
    return (String) notification.userInfo().objectForKey(TYPE);
}

// Private class methods

```

```

/** Creates the singleton instance ensuring there is no existing instance.
 */
private static synchronized void createDefaultCenter()
{
    if (defaultCenter == null)
    {
        defaultCenter = new ChangeNotificationCenter();
    }
}

// Inner interface definition

/** Interface to be implemented by objects that need to listen to changes.
 *
 * CAVEAT: in most cases it is recommended to not directly implement the interface,
 * but rather create an inner class that implements the interface or better yet
 * extends the default implementation. Indeed if an object (e.g. an EO) which
 * participates in an inheritance hierarchy is used as receiver for notifications,
 * registering or unregistering might break functionality in a parent class.
 */
public static interface ObserverInterface
{
    /** Method called when an object on which locally cached values depend is modified.
     *
     * This hook is provided as an opportunity to clear locally cached values. It's a good idea not to recreate
     * the cached values immediately, but on an as-needed basis. You should refrain from changing persisted EO
     * attributes from within this method as this might kick off another chain of notifications.
     *
     * Once the caches cleared, it would be a very good idea to unregister from further notifications until
     * the cache is recreated.
     *
     * @see lu.bcl.enterprise.entity.ChangeNotificationCenter#objectFromNotification
     * @see lu.bcl.enterprise.entity.ChangeNotificationCenter#registerCacheDependency
     * @see lu.bcl.enterprise.entity.ChangeNotificationCenter#unRegisterCacheDependency
     */
    public void watchedObjectChanged(NSNotification notification);
}

// Inner class

/** Convenience class for implementing ObserverInterface.
 *
 * The recommended way of registering for change notifications is to create an inner
 * class extending this one.
 */
public abstract static class Observer implements ObserverInterface
{
    /** Method to be called by subclasses when the create a cached value that depends on the attributes of a
     given object.
     *
     * Upon registration the object is watched and the clearCachedValues() is called once it changes, thus
     providing an
     * opportunity to invalidate the cached value.
     *
     * You need to register for each object your locally cached values depend on. E.g. if you build a cached
     value from
     * attributes of EOs in a too-many relationship, your cache depends on each of the objects in the
     relationship as well
     * as on the source of the relationship.
     *
     * N.B. Extend the dispose() method to unregister any dependency you might be registered for.
     *
     * @param object the object to watch
     * @see #unregisterCacheDependency
     * @see #clearCachedValues
     */
    protected void registerCacheDependency(EOEnterpriseObject object)
    {
        ChangeNotificationCenter.defaultCenter().registerCacheDependency(this, object);
    }
}

```

```

/** Method to be called by subclasses when they abandon or clear a cached value that depended on attributes
 * of a given object.
 *
 * @param object the object to watch
 * @see #registerCacheDependency
 * @see #clearCachedValues
 */
protected void unregisterCacheDependency(EOEnterpriseObject object)
{
    ChangeNotificationCenter.defaultCenter().unregisterCacheDependency(this, object);
}

/** Unregisters all of the callers dependencies. To be used sparingly as it may break unknown but required
 * dependencies. Usually called when disposing the calling object.
 *
 * @see #registerCacheDependency
 * @see #unregisterCacheDependency
 */
public void unregisterCacheDependencies()
{
    ChangeNotificationCenter.defaultCenter().unregisterCacheDependencies(this);
}

/** Overridden to unregister all cache dependencies
 */
public void finalize() throws Throwable
{
    ChangeNotificationCenter.defaultCenter().unregisterCacheDependencies(this);

    super.finalize();
}
}
}

```