openCRX Basic Customizing Guide

Version 2.4.0

www.opencrx.org

WORK in PROGRESS

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1 About this Book

This book describes various ways of customizing the openCRX Standard HTML GUI to adapt the look and feel to your personal tastes and preferences or to your company's CI (corporate identity).

openCRX is the leading enterprise-class open source CRM suite. openCRX is based on openMDX, an open source MDA framework based on the OMG's model driven architecture (MDA) standards. This guarantees total openness, standards compliance, a state-of-the-art component-based architecture, and virtually unlimited scalability.

1.1 Who this book is for

The intended audience are openCRX administrators and advanced users.

1.2 What do you need to understand this book

It is helpful to have a good understanding of the openCRX architecture. We assume that you are able to read/understand the openCRX UML models and the openCRX Javadoc (Java API). It is also assumed that you are familiar with XML files and you should know how to program JSPs.

1.3 Tips, Warnings, etc.

We make use the following pictograms:

Information provided as a "Tip" might be helpful for various reasons: time savings, risk reduction, etc. - it goes without saying that we advise to follow our guides meticulously

> **meticulous** \muh-TIK-yuh-luhs\, *adjective*:
> Extremely or excessively careful about details.

You should carefully read information marked with "Important". Ignoring such information is typically not a good idea.

Warnings should not be ignored (risk of data loss, etc.)

2 Prerequisites

To work through some of the examples and in particular to build your own customized openCRX, there as some prerequisites:

- openCRX Server (v2.4.0 or newer).

  You can either follow the openCRX Server Installer documentation at http://www.opencrx.org/server.htm or you can do a manual installation of openCRX following the QuickStart guide.

- openCRX SDK (v2.4.0 or newer).

  Follow the openCRX SDK Installer documentation at http://www.opencrx.org/sdk.htm.

- Many of the openCRX customizing files are UTF-8 encoded (see Wikipedia for information on UTF-8 encoding) and if you intend to edit such files you **must use an UTF-8 enabled editor**. Many simple text editors work fine (e.g. Notepad on Windows, or gedit on Linux), but make sure you test your editor of choice before you waste a lot of time with ruined files that are not properly encoded anymore.

- While you can manage all your changes "manually", we recommend the use of an openCRX custom project. If you manage your changes and extensions to the standard openCRX with a custom project, you will be able to build customized openCRX EARs. Instructions on how to create an openCRX custom project are available from the openCRX Wiki.

  Throughout this guide we assume that the custom project is called **sample** and the data directory is **org.opencrx.sample**. Hence, most of the files you will be changing/creating in this guide are contained in one of the subdirectories of the directory
  ...\opencrx-custom\sample\src\data\org.opencrx.sample

  If you decide to manipulate files directly in the apps folder, the same files are contained in one of the subdirectories of the directory
  ...\apache-tomcat-6\apps\opencrx-core-SAMPLE
  or – if you are working with the original application – in the directory
  ...\apache-tomcat-6\apps\opencrx-core-CRX

3 Adapting the openCRX HTML GUI to Your Needs

3.1 Overview openCRX GUI Types

openCRX is distributed with a generic HTML GUI (based on openMDX/portal) that connects to the openCRX API as shown below:

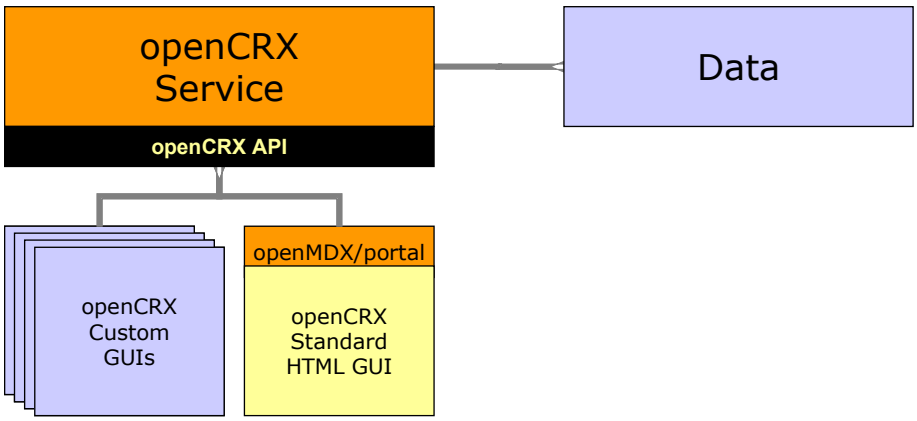


Figure 1: Types of openCRX GUIs

This Ajax-enabled HTML GUI supports a wide range of modern browsers, including Firefox, Opera, Safari, Google Chrome, KDE Konqueror, and IE.

It goes without saying that you can also program your own custom GUI. openCRX/store is an example DHTML GUI consisting of a set of manually programmed JSPs connecting to the openCRX API.

It is also possible to develop non-Java-based GUIs for openCRX. You could – for example – write an XML-RRC Adapter (see Apache XML-RPC):

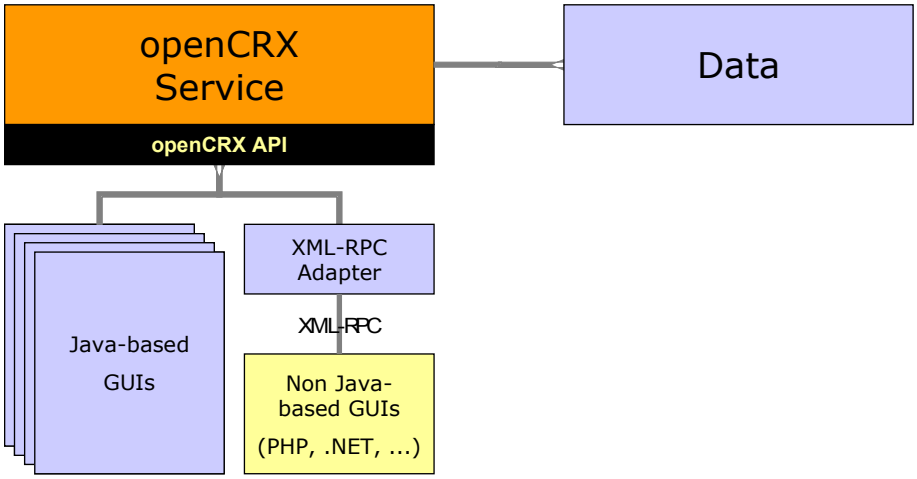


Figure 2: Non-Java GUIs for openCRX

Another option you might consider is REST (Representational State Transfer); see also http://www.opencrx.org/opencrx/2.3/new.htm#REST .

openCRX also includes a set of servlets (ical, imap, vcard, rest, news, ...) so that you can connect to openCRX with a wide range of specialized third-party clients like Mozilla Thunderbird, MS Outlook, KDE Kontact, and others:

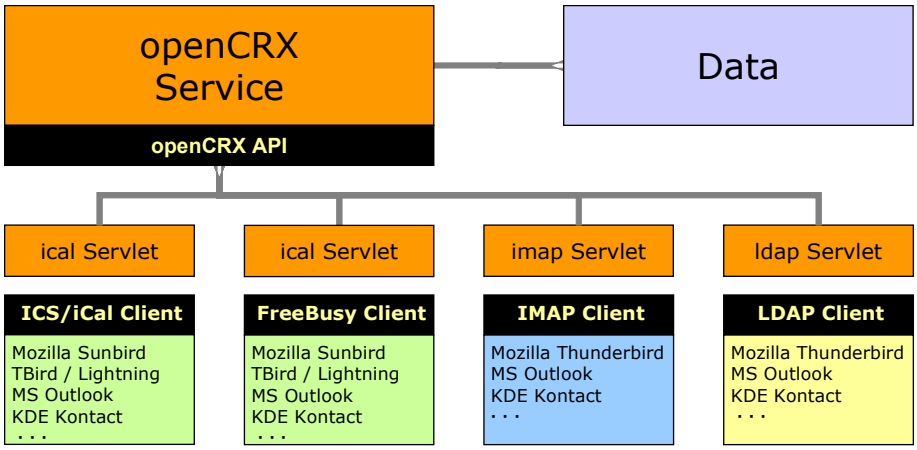


Figure 3: openCRX Servlets enabling access with third-party clients

3.2 Customizing Options openCRX HTML GUI

The openCRX Standard HTML GUI can be customized in many ways to suit your needs:

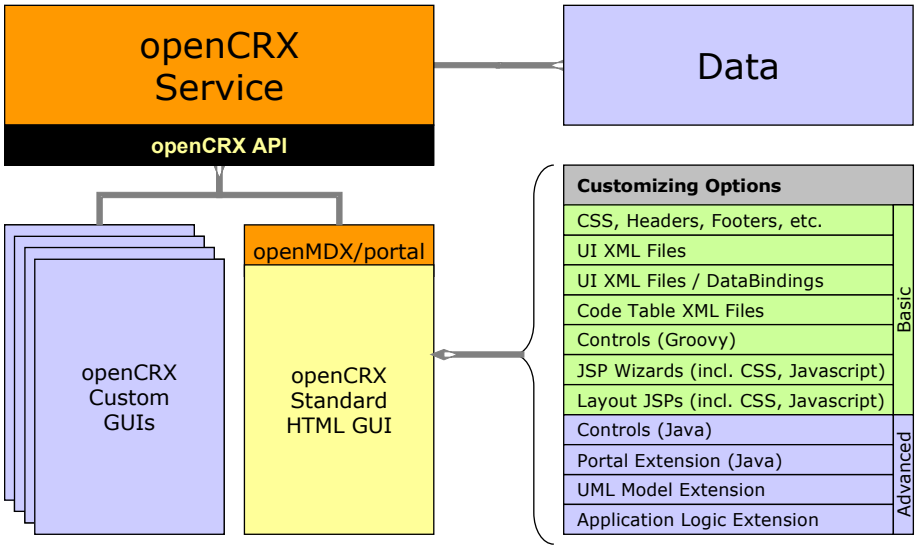


Figure 4: Customizing Options – openCRX Standard HTML GUI

Basic customizing options are relatively straight-forward and require no (or only moderate) programming know how. Advanced customizing options, however, require a good understanding of the openCRX architecture. This guide covers basic customizing options. If you're interested in advanced customizing options, have a look at the source code or consider attending an openCRX Developer Workshop (see www.opencrx.org for more information).

3.3 Things to do before you start Customizing openCRX

Adapting openCRX to your needs typically involves the following steps:

1. **Collect the requirements** of the (customized) application – this step requires a solid understanding of the business domain:
   - your company's CI information (e.g. color schemes, fonts, etc.)
   - business objects and their attributes
   - mock screens or screen shots of existing applications
   - typical use cases, workflows, etc.
2. **Map the business requirements to openCRX** – this step requires know how across both your business domain and the openCRX domain:

   Note that openCRX objects are typically normalized, i.e. it is not uncommon that a single business object gets spread out across multiple openCRX objects. In other words, a single business object and its attributes often times do not map to a single openCRX object and its attributes.

   Example: mapping the data of a contact as it is available on a business card typically involves multiple openCRX objects like
   - Contact (first/name, ...) or LegalEntity (company name)
   - PostalAddress (street, city, zip code, ...)
   - PhoneNumber (country code, number, extension, ...)

   Hence, study the openCRX UML models before you start the mapping process. Take your time as the openCRX UML models are very comprehensive; focus on those aspects of the model that are most relevant to your project, e.g. account1, activity1.

   - map business objects to (possibly a list of) openCRX objects; depending on your business domain you might have to be a little inventive and maybe adapt/change the meaning of some of the openCRX objects
   - map each attribute of your business objects to an attribute of an openCRX object

   If you come to the conclusion that you need additional attributes in certain openCRX objects, do not jump at extending the openCRX UML model (such an undertaking requires a solid understanding of the openCRX architecture and the build processes). Instead, learn about and understand the following mechanisms for "adding" additional fields to an object:
   - User-definable attributes of CrxObject
   - DataBinding Property
3. **Customizing the openCRX Standard HTML GUI** – that is what this guide is all about...

Obviously, if you're only interested in changing some of the colors, there is not much to do in step 2 above. However, if you plan to capture your companies business processes, forms, etc. with openCRX, it pays off to spend some time on collecting the requirements and properly mapping them to openCRX before you get down to customizing...

It is a good idea to create an openCRX custom project before you get started with customizing openCRX. Like this you will be able to collect all your changes and enhancements in one place and it will be easy to create custom EARs which you can readily deploy.

Instructions for creating an openCRX custom project are available from the openCRX Wiki.

3.4 Limitations of the generic HTML GUI

Even though the openCRX HTML GUI is extremely flexible, we would like to point out a few limitations (not due to bad design, but rather we are looking at advanced features that have not been implemented yet).

3.4.1 Role-based UI

openCRX features UI perspectives, a mechanism that enables users to have different UI customizations based on the current role (e.g. one GUI for sales and another GUI for the back office). More information is available from http://www.opencrx.org/opencrx/2.3/new.htm#UIPerspectives.

Obviously, the same goal can also be achieved with multiple web applications. Simply create a custom project for each role / customization and then deploy multiple web applications.

3.4.2 Model Permissions

Model permissions are not implemented yet. Hence you cannot control access to individual attributes of an object with simple customization (the openCRX security plugin controls access to complete objects, not to individual attributes of an object). You can, however, deploy multiple web applications or work with Layout JSPs to achieve the same goal.

4 Important Hints

The following information is so important that it deserves its own chapter!

4.1 Overloading

Overloading is a concept that allows you to selectively enhance (or even replace) features of the standard distribution of openCRX with your own changes and/or extensions.

The architecture of openCRX is such that you should be able to add your own customizing and extensions without actually changing any of the core files of the distribution. The big advantage of leaving core files unchanged and keeping all your changes/extensions separate is **release capability**, i.e. instead of creating and then maintaining your own openCRX branch (which you should really try to avoid) you should keep your changes and extensions in a custom project.

The reason is the following one: **maintaining your own openCRX branch requires advanced know how**, i.e. it is difficult and very time-consuming, whereas **maintaining your own custom project is easy** because upgrading your custom project to a new openCRX version typically requires minor changes only (if any at all).

Do not go for quick fixes by changing files of the core distribution as you are guaranteed to run into problems down the road. Make use of **openCRX custom projects** and use the power and the flexibility of the openCRX SDK and the various **overloading concepts**.

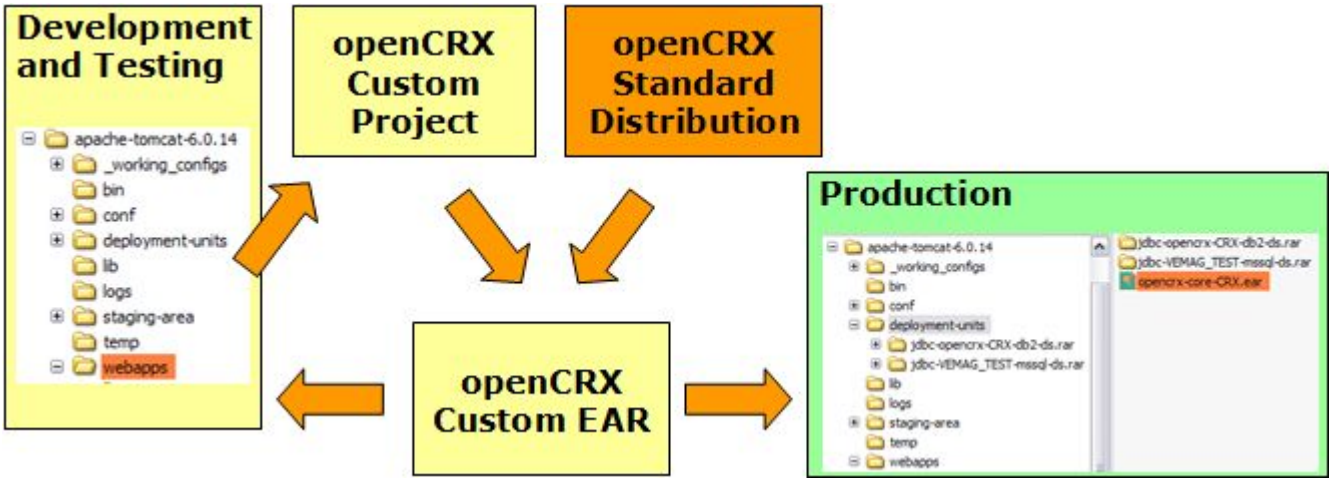


Figure 5: openCRX Development and Customizing with Custom Project

4.1.1 File Overloading at the Project Level

Typically, files in your custom project will be **added** to the custom EARs. However, if a file in your custom project has the same name as a file of the standard distribution, your file will actually **replace** the respective file of the standard distribution when you build custom EARs.

Example: Let's suppose you want to add some fancy CSS to openCRX. If you call your file myFancy.css and put it into the directory sample\src\data\org.opencrx.sample_style your css file will be **added** to the various css files that already exist when you build your custom EARs. If you call your file colors.css, however, your file will **replace** the file with the same name that is contained in the standard distribution of openCRX (and unless you know what your doing it is quite likely that the coloring of openCRX will look strange with your custom EARs...).

4.1.2 UI Configuration Overloading

It is likely that you want to change some of the default customizing. Quite possibly, however, (a) you want to make a few changes only and (b) you want to keep these changes if you upgrade to a new version of openCRX. This is where UI configuration overloading can add value. Instead of changing the original UI configuration files provided with the standard distribution you create a new configuration file (or multiple configuration files) containing all your changes. Make sure that you name your file(s) containing changed UI Element Definitions such that your changes are loaded AFTER the default configuration files, thereby overloading the original configuration.

More information is available in chapter 8.2 UI Configuration Overloading.

4.1.3 Code Table Overloading

Similar to UI configuration overloading, you can also overload code tables. Instead of changing original code tables you create new code table files that contain your changes/extensions. It is also possible to deactivate codes of the standard distribution. Make sure that you name your file(s) containing changed code tables such that your changes are loaded AFTER the default code tables, thereby overloading the code tables.

More information is available in chapter 9.2 Code Table Overloading.

UI configuration files and Code table files are loaded in **alphabetical order**. Hence, if the same element is defined multiple times, the definition contained in the file that is (in alphabetical order) loaded last wins.

4.2 "Adding" Fields / Extending Objects

Even though the openCRX UML Model covers a wide range of use cases, you may still come to the conclusion that you have to "add" a field to a particular object. While the newbie's approach would be to add a field to the appropriate database table and then patch the code a bit here and there, take our advice and make use of the advanced extension mechanisms provided by openCRX.

4.2.1 User-definable attributes of CrxObject

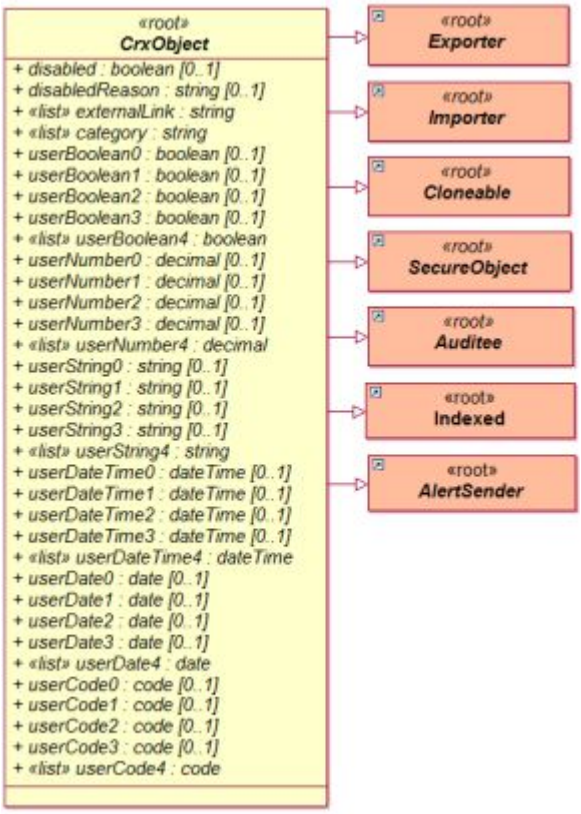


Figure 6: UML Model - CrxObject

The vast majority of openCRX's objects are CrxObjects, and hence they feature user-definable attributes as shown in the figure on the left. There are four single-valued attributes and one multi-valued attribute of each type:

- boolean
- decimal
- string
- dateTime
- date
- code

In the standard distribution of openCRX these attributes are disabled (i.e. set to <active>false</active>). You can verify this by looking at the UI customizing file **.../config/ui/Root/en_US.xml** (search for *CrxObject:user*).
Note that all of these user-definable attributes are already available in the DB schemas, i.e. they are ready to be used, you just have to enable them.

To make an example, let's assume your Contacts absolutely need another String field to store the Yahoo! Messenger Nickname as shown below:

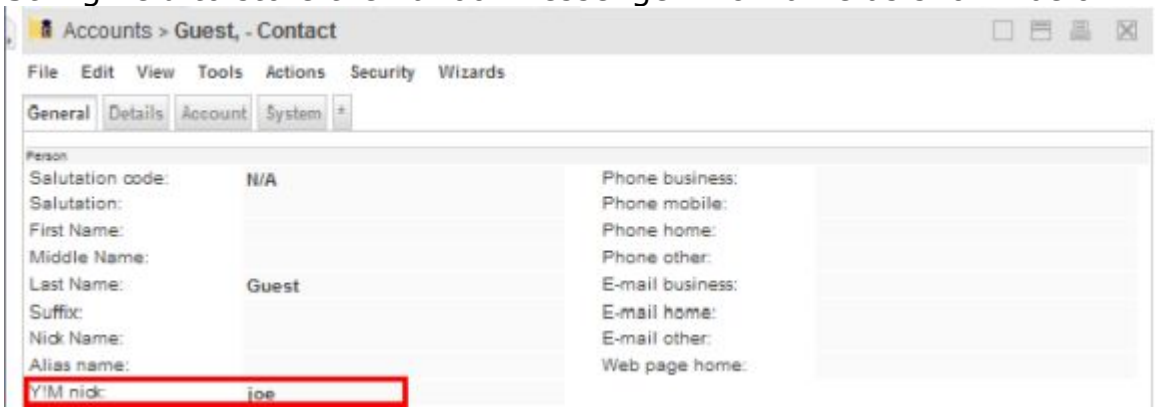


Figure 7: Add the string field Y!M nick to Contact objects

All you have to do to "add" the field Y!M nick to Contacts is to deploy the following UI customizing file **zorder_contact.xml** to the directory {TOMCAT_INSTALL_DIR}/apps/opencrx-core-CRX/opencrx-core-CRX/WEB-INF/config/ui/Root/en_US and then restart Tomcat.

Listing 1: UI Customizing File zorder_contact.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<org.openmdx.base.Authority xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" name="org:openmdx:ui1"
xsi:noNamespaceSchemaLocation="xri:+resource/org/openmdx/ui1/xmi/ui1.xsd">
  <_object/>
  <_content>
    <provider>
      <org.openmdx.base.Provider qualifiedName="CRX" _operation="null">
        <_object/>
        <_content>
          <segment>
            <org.openmdx.ui1.Segment qualifiedName="Root" _operation="null">
              <_object/>
              <_content>
                <elementDefinition>
                  <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:account1:Contact:userString0">
                    <_object>
                      <active>true</active>
                      <toolTip>
                        <_item>Y!M nick</_item>
                      </toolTip>
                      <label>
                        <_item>Y!M nick</_item>
                      </label>
                      <order>
                        <_item>0</_item>  <!-- tab         -->
                        <_item>0</_item>  <!-- field group -->
                        <_item>75</_item> <!-- position    -->
                      </order>
                    </_object>
                    <_content/>
                  </org.openmdx.ui1.ElementDefinition>
                </elementDefinition>
              </_content>
            </org.openmdx.ui1.Segment>
          </segment>
        </_content>
      </org.openmdx.base.Provider>
    </provider>
  </_content>
</org.openmdx.base.Authority>
```

The above file is – strictly speaking – not adding a field to the class Contact, it is rather activating the attribute userString0 of the class Contact (which it inherits from the class CrxObject). The field userString0 is already available in the standard distribution of openCRX, it's just not visible.

Mapping your special requirements to user-definable attributes is an extremely efficient way of "extending" the standard distribution of openCRX, also in terms of performance.

4.2.2 Property Data Bindings

What can you do if you need even more user-definable attributes, i.e. more than the ones provided by CrxObject? This is where the PropertyDataBinding concept comes in handy. With PropertyDataBindings you get access to a virtually unlimited pool of user-definable attributes. See chapter 8.7.1 PropertyDataBinding for a detailed introduction into this topic).

5 Managing Packages

5.1 Enabling/Disabling Packages at the Application Level

With the openCRX standard distribution all available packages are enabled. The openCRX administrator may wish to disable certain packages at the application level if they are not used. This chapter shows how you can achieve this.

In the custom project sample, the package list is contained in the file:
opencrx—custom\sample\src\data\org.opencrx.sample\WEB-INF**web.xml**
Once deployed on Tomcat, the package list is contained in the file
apps\opencrx-core-CRX\opencrx-core-CRX\WEB-INF**web.xml**
Look for the section <!-- Admin --> to find a list of available packages:

Listing 2: List of Packages in web.xml

```
<!-- Admin -->
<init-param>
 <param-name>rootObject[0]</param-name>
 <param-value>xri:@openmdx:org.opencrx.kernel.admin1/provider/CRX/segment/${SEGMENT}</param-value>
</init-param>
<!-- Home -->
<init-param>
 <param-name>rootObject[1]</param-name>
 <param-value>xri:@openmdx:org.opencrx.kernel.home1/provider/CRX/segment/${SEGMENT}/userHome/${USER}</param-value>
</init-param>
...
```

You can disable packages by commenting them out (<!-- to open a comment and --> to close a comment). The following example shows how to deactivate the package depot1:

Listing 3: Enabling/Disabling Packages in web.xml

```
...
</init-param>
<!-- Depots -->
<!--
<init-param>
  <param-name>rootObject[6]</param-name>
  <param-value>xri:@openmdx:org.opencrx.kernel.depot1/provider/CRX/segment/${SEGMENT}</param-value>
</init-param>
-->
<!-- Documents -->
<init-param>
  <param-name>rootObject[6]</param-name>
  <param-value>xri:@openmdx:org.opencrx.kernel.document1/provider/CRX/segment/${SEGMENT}</param-value>
</init-param>
<!-- Buildings -->
...
```

Please note that you must **renumber all the packages listed after the package you deactivated** so that the package numbering does not have any gaps (i.e. **numbering of active packets starts at 0 and it must be consecutive**).

It is also possible to change the order of the active packages by renumbering them. However, you must still ensure both that the numbering starts at 0 and that the numbering is consecutive.

5.2 Enabling/Disabling Packages at the User Level

Individual user can enable/disable root menu entries with the wizard User Settings (available on a user's Homage):

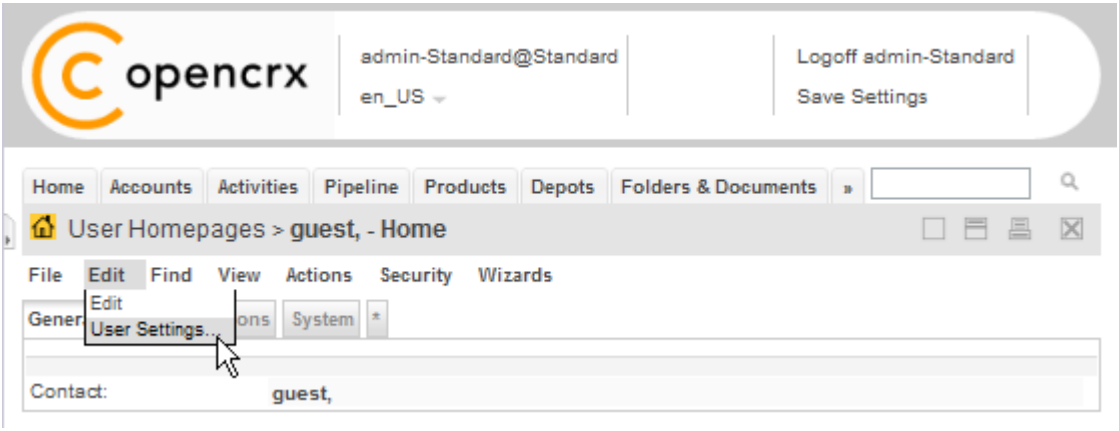


Figure 8: Launch Wizard User Settings

Once the wizard has loaded, uncheck entries you don't need:

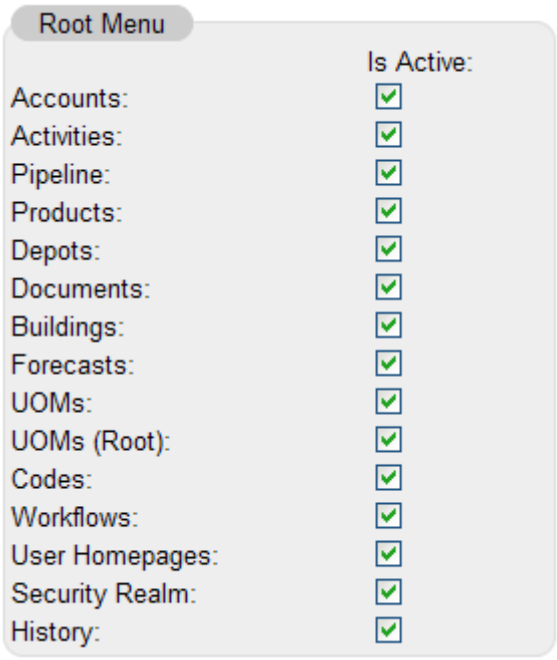


Figure 9: Wizard User Settings – enable/disable Root Menu Entries

Please note that entries corresponding to packages disabled by the openCRX administrator cannot be enabled with this wizard. Packages disabled in web.xml are not available at all!

Depending on the width of your screen you can adjust the number of items shown as tabs in the top-level navigation in the same wizard (fewer items for narrow screens, more items for wider screens).

6 Managing Locales

The default installation of openCRX activates all locales that are included in the Open Source distribution. The openCRX administrator may wish to deactivate certain locales from the locale list. This chapter shows how you can achieve this.

6.1 Enabling/Disabling Locales at the Application Level

The locale list is contained in the file

opencrx-core-CRX.ear\opencrx-core-CRX.war\WEB-INF**web.xml**

Look for the section <!-- locales --> to find a list of available locales:

Listing 4: Locales in web.xml

```
<!-- locales -->
<init-param>
  <param-name>locale[0]</param-name>
  <param-value>en_US</param-value>
</init-param>
<init-param>
  <param-name>locale[1]</param-name>
  <param-value>de_CH</param-value>
</init-param>
<init-param>
  <param-name>locale[2]</param-name>
  <param-value>es_MX</param-value>
</init-param>
...
```

You can deactivate locales by simply commenting them out. The following example shows how to deactivate the locale de_CH.

Listing 5: Activating/Deactivating Locales in web.xml

```
<!-- locales -->
<init-param>
  <param-name>locale[0]</param-name>
  <param-value>en_US</param-value>
</init-param>
<!--
<init-param>
  <param-name>locale[1]</param-name>
  <param-value>de_CH</param-value>
</init-param>
-->
<init-param>
...
```

Please note that you must **not** deactivate the base locale (that is the locale with the id 0, typically en_US) as the base locale contains a lot of customizing information not present in other locales.

As the Login page is displayed before the authentication of the user has taken place, Login.jsp cannot access the above information. That is why the list of

available and active locales are maintained in the file **localeSettings.jsp** as well. Changing the list of active locales is straightforward. Simply comment out the relevant statements in the following code segment of localeSettings.jsp:

Listing 6: Active Locales in Login.jsp

```
...
List activeLocales = new LinkedList();
activeLocales.add("en_US");
activeLocales.add("cs_CZ");
activeLocales.add("de_CH");
activeLocales.add("es_CO");
activeLocales.add("es_MX");
// activeLocales.add("fa_IR"); this locale is not active
activeLocales.add("fr_FR");
activeLocales.add("it_IT");
activeLocales.add("ja_JP");
// activeLocales.add("nl_NL"); this locale is not active
activeLocales.add("pl_PL");
activeLocales.add("pt_BR");
activeLocales.add("ro_RO");
activeLocales.add("ru_RU");
activeLocales.add("sk_SK");
activeLocales.add("sv_SE");
activeLocales.add("tr_TR");
activeLocales.add("zh_CN");
...
```

The above example shows how to disable the locales fa_IR and nl_NL in the Login page of openCRX.

Please note that you **must use an UTF-8 enabled editor to change the file Login.jsp**. Using an editor that breaks the UTF-8 encoding of this file results in a locale drop down with strange symbols...

6.2 Setting the Default Locale at the User Level

A user's default locale can be set by choosing/activating the desired locale and then clicking on [Save Settings] in the header of the application as shown below:

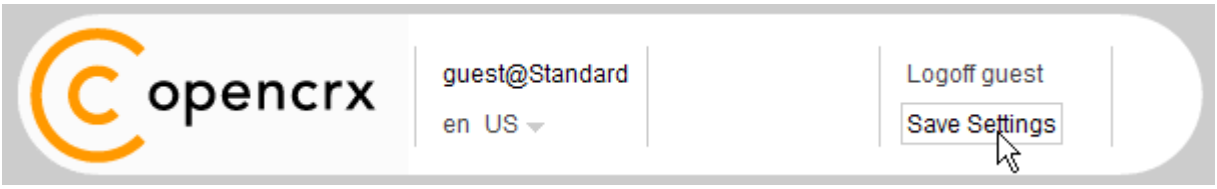


Figure 10: Set Default Locale by Saving User Settings

If the login page supports a user's preferred locale xx_YY, you can request the login page in that locale xx_YY by appending the string "**?locale=xx_YY**" to the default login URL.

Example: the following URL loads the German login page:
http://demo.opencrx.org/opencrx-core-CRX/Login?locale=de_CH

7 CSS, Headers, Footers, etc.

7.1 Cascading Style Sheets

The directory ...\opencrx-core-CRX_style contains various CSS files:

CSS File	Purpose / Comments
calendar-small.css	customizing of the DHTML calendar [http://www.dynarch.com/projects/calendar/]
colors.css	various color settings (fonts, backgrounds, etc.)
default.css	none – legacy file
dummy.css	none – repository placeholder
header.css	customizing of the header
infovis.css	customizing of the JavaScript Information Visualization Toolkit (JIT) [http://blog.thejit.org/javascript-information-visualization-toolkit-jit/]
logconsole.css	customizing of the openMDX LogConsole
n2default.css	customizing of openMDX/portal (the default openCRX GUI)
ssf.css	customizing of the Suckerfish menus (http://www.htmldog.com/articles/suckerfish/dropdowns/)

Hints on Cascading Order (source: Introduction to CSS / w3schools)

Multiple Styles Will Cascade Into One

Style sheets allow style information to be specified in many ways. Styles can be specified inside a single HTML element, inside the <head> element of an HTML page, or in an external CSS file. Even multiple external style sheets can be referenced inside a single HTML document.

Cascading Order

What style will be used when there is more than one style specified for an HTML element? Generally speaking we can say that all the styles will "cascade" into a new "virtual" style sheet by the following rules, where number four has the highest priority:

1. Browser default
2. External style sheet
3. Internal style sheet (inside the <head> tag)
4. Inline style (inside an HTML element)

So, an inline style (inside an HTML element) has the highest priority, which means that it will override a style declared inside the <head>

tag, in an external style sheet, or in a browser (a default value).

Depending on the width of your screen you can adjust the number of items shown as tabs in the top-level navigation in the same wizard (fewer items for narrow screens, more items for wider screens).

As most of the styles used by openCRX are defined in external style sheets, your options to override defaults are intact.

Adding (internal and/or external) style sheets to all pages is easy as all pages are generated by the following 2 Layout JSPs:

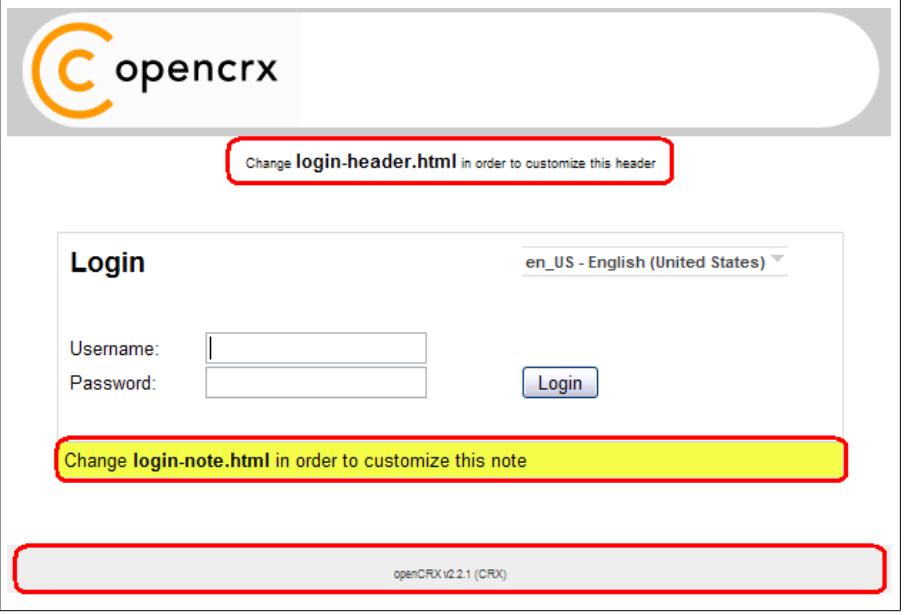
...\opencrx-core-CRX\WEB-INF\config\layout\en_US\edit-Default.jsp

...\opencrx-core-CRX\WEB-INF\config\layout\en_US\show-Default.jsp

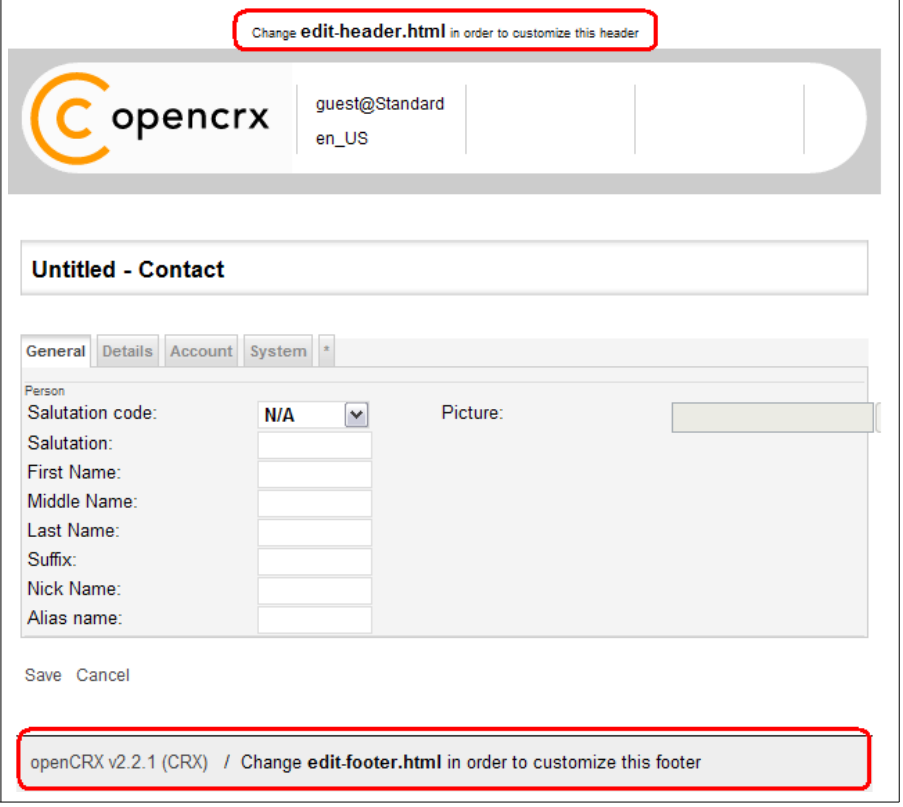
See also chapter 13 Layout JSPs for additional information.

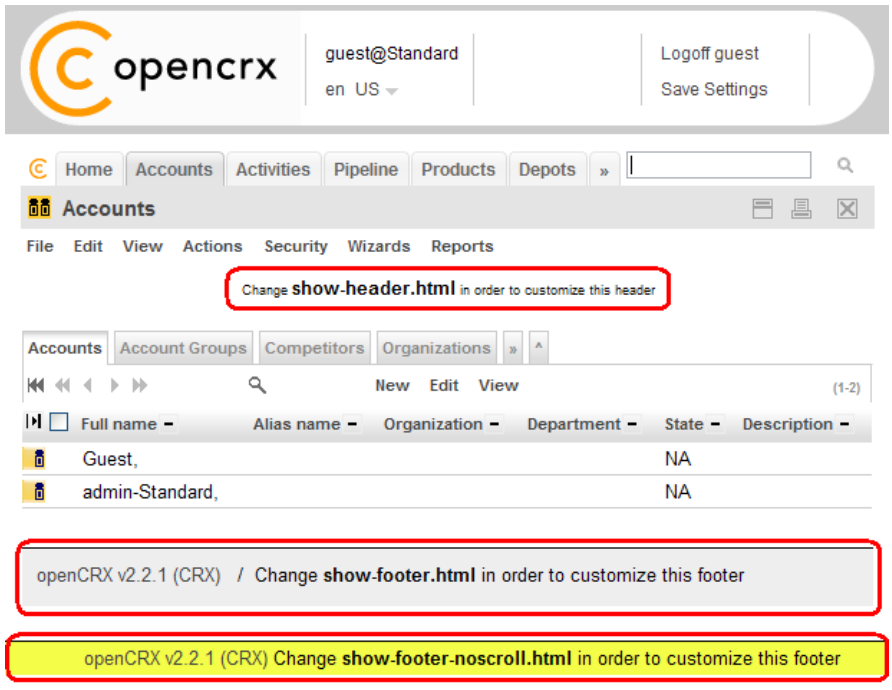
7.2 HTML Header and Footer Files

The Layout JSPs and the login page (Login.jsp) by default include various HTML files. They are located in the directory ...\opencrx-core-CRX and you can adapt them to your liking:

HTML File	Screen Shot /point of insertion
login-header.html login-note.html login-footer.html	

See also chapter 13 Layout JSPs for additional information.

HTML File	Screen Shot /point of insertion
edit-header.html edit-footer.html	

HTML File	Screen Shot /point of insertion
show-header.html show-footer.html show-footer-noscroll.html	

8 UI XML Files

8.1 Overview

8.2 UI Configuration Overloading

8.3 Inspector

8.3.1 Elements of an Inspector

8.3.2 Labels / Tooltips

8.3.3 Icons

8.4 Attribute Pane

8.4.1 Tabs

8.4.2 Field Groups

8.4.3 Fields / Attributes

8.4.3.1 Enabling/Disabling Attributes

8.4.3.2 Positioning of Attributes (order, orderFieldGroup)

8.4.3.3 Column Breaks

8.4.3.4 AlternateElementDefinition

8.5 Grid Panes

8.5.1 Tabs

8.5.1.1 Positioning of Tabs in a Grid Pane

8.5.1.2 Expanding/Collapsing Tabs

8.5.1.3 AdditionalElementDefinition

8.5.1.4 XML Filter Definitions

8.5.2 Object Row Attributes

8.5.2.1 Ordering of Attributes (order, orderObjectContainer)

8.5.2.2 Selection of Visible Attributes (showMaxMember)

8.5.2.3 Selection of Filterable Attributes (maxMember)

8.5.2.4 Advanced Attribute Selection (showMemberRange)

8.6 Various XML Tags Explained

8.6.1 active

8.6.2 backColor

Purpose	Set the background color of an attribute.
Examples	<backColor>**#FF0000**</backColor> <backColor>**inherit**</backColor>

8.6.3 changeable

8.6.4 color

Purpose	Set the (font) color of an attribute.
Examples	<color>**#FFFFFF**</color> <color>**inherit**</color>

8.6.5 columnBreak

Purpose	Add column break so that the current element is the first element of a new column.
Examples	<columnBreak>**true**</columnBreak> <columnBreak>**false**</columnBreak>

8.6.6 defaultValue

Purpose	Default value of an attribute when a new object is created.
Examples	<defaultValue>**true**</defaultValue> <defaultValue>**7**</defaultValue>

8.6.7 eventHandler

8.6.8 filterable

8.6.9 iconKey

8.6.10 inPlace

8.6.11 label

8.6.12 mandatory

Purpose	Make an attribute mandatory or optional.
Examples	<mandatory>**true**</mandatory> <mandatory>**false**</mandatory>

8.6.13 minValue

8.6.14 maxMember

8.6.15 maxValue

8.6.16 order

8.6.17 orderFieldGroup

8.6.18 orderObjectContainer

8.6.19 showMaxMember

8.6.20 showMemberRange

8.6.21 skipRow

8.6.22 spanRow

8.6.23 sortable

8.6.24 toolTip

8.7 DataBindings

8.7.1 PropertyDataBinding

PropertyDataBindings provide you with access to a virtually unlimited pool of user-definable attributes to extend CrxObjects. From a performance point of view, PropertyDataBindings are not quite as efficient as the User-definable attributes of CrxObject because the latter are always stored in the same table as the extended object, whereas attributes based on PropertyDataBindings are stored in a separate table (leading to additional SELECT statements). Nevertheless, whenever you need additional attributes that cannot be mapped to user-definable attributes, you should still consider PropertyDataBindings before you jump at extending the openCRX core model.

If you need additional attributes, approach the issue as follows:

1. Map your requirements to User-definable attributes of CrxObject (see chapter 4.2.1).
2. If you run out of attributes, use PropertyDataBindings.
3. Only as a last resort should you consider extending the openCRX UML Model as such an extension requires expert knowledge and is not suitable for the faint-hearted.

Extending the openCRX UML Model is for experts only!

8.7.1.1 A comprehensive example with PropertyDataBindings

The following UI customizing file demonstrates how to extend the Product class with a set of attributes, one of each type. Deploy the file **zorder_product.xml** to the directory {TOMCAT_INSTALL_DIR}/apps/opencrx-core-CRX/opencrx-core-CRX/WEB-INF/config/ui/Root/en_US and then restart Tomcat.

Listing 7: UI Customizing File zorder_product.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<org.openmdx.base.Authority xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" name="org:openmdx:ui1"
xsi:noNamespaceSchemaLocation="xri:+resource/org/openmdx/ui1/xmi/ui1.xsd">
  <_object/>
  <_content>
   <provider>
    <org.openmdx.base.Provider qualifiedName="CRX" _operation="null">
     <_object/>
     <_content>
      <segment>
        <org.openmdx.ui1.Segment qualifiedName="Root" _operation="null">
          <_object/>
          <_content>
           <featureDefinition>
```

```
          <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:product1:Product:Extension!myBoolean">
            <_object>
              <type>org:w3c:boolean</type>
              <multiplicity>0..1</multiplicity>
              <changeable>true</changeable>
            </_object>
            <_content/>
          </org.openmdx.ui1.StructuralFeatureDefinition>

          <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:product1:Product:Extension!myInteger">
            <_object>
              <type>org:w3c:integer</type>
              <multiplicity>0..1</multiplicity>
              <changeable>true</changeable>
            </_object>
            <_content/>
          </org.openmdx.ui1.StructuralFeatureDefinition>

          <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:product1:Product:Extension!myDecimal">
            <_object>
              <type>org:w3c:decimal</type>
              <multiplicity>0..1</multiplicity>
              <changeable>true</changeable>
            </_object>
            <_content/>
          </org.openmdx.ui1.StructuralFeatureDefinition>

          <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:product1:Product:Extension!myString">
            <_object>
              <type>org:w3c:string</type>
              <multiplicity>0..1</multiplicity>
              <changeable>true</changeable>
            </_object>
            <_content/>
          </org.openmdx.ui1.StructuralFeatureDefinition>

          <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:product1:Product:Extension!myDate">
            <_object>
              <type>org:w3c:date</type>
              <multiplicity>0..1</multiplicity>
              <changeable>true</changeable>
            </_object>
            <_content/>
          </org.openmdx.ui1.StructuralFeatureDefinition>

          <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:product1:Product:Extension!myDateTime">
            <_object>
              <type>org:w3c:dateTime</type>
              <multiplicity>0..1</multiplicity>
              <changeable>true</changeable>
            </_object>
            <_content/>
          </org.openmdx.ui1.StructuralFeatureDefinition>

          <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:product1:Product:Extension!myReference">
            <_object>
              <type>org:opencrx:kernel:account1:Account</type>
              <multiplicity>0..1</multiplicity>
              <changeable>true</changeable>
            </_object>
            <_content/>
          </org.openmdx.ui1.StructuralFeatureDefinition>

        </featureDefinition>


        <elementDefinition>

          <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Pane:Attr:Tab:0:Group:5">
            <_object>
              <active>true</active>
              <toolTip>
                <_item/>
              </toolTip>
              <label>
```

```
            <_item>Extended Attributes (PropertyDataBinding)</_item>
          </label>
        </_object>
        <_content/>
      </org.openmdx.ui1.ElementDefinition>

      <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Extension!myBoolean">
        <_object>
          <dataBindingName>org.opencrx.kernel.portal.BooleanPropertyDataBinding</dataBindingName>
          <active>true</active>
          <toolTip>
            <_item>My boolean</_item>
          </toolTip>
          <label>
            <_item>My boolean</_item>
          </label>
          <order>
            <_item>0</_item>
            <_item>5</_item>
            <_item>10</_item>
          </order>
        </_object>
        <_content/>
      </org.openmdx.ui1.ElementDefinition>

      <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Extension!myInteger">
        <_object>
          <dataBindingName>org.opencrx.kernel.portal.IntegerPropertyDataBinding</dataBindingName>
          <active>true</active>
          <toolTip>
            <_item>My integer</_item>
          </toolTip>
          <label>
            <_item>My integer</_item>
          </label>
          <order>
            <_item>0</_item>
            <_item>5</_item>
            <_item>20</_item>
          </order>
        </_object>
        <_content/>
      </org.openmdx.ui1.ElementDefinition>

      <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Extension!myDecimal">
        <_object>
          <dataBindingName>org.opencrx.kernel.portal.DecimalPropertyDataBinding</dataBindingName>
          <active>true</active>
          <decimalPlaces>4</decimalPlaces>
          <hasThousandsSeparator>true</hasThousandsSeparator>
          <toolTip>
            <_item>My decimal</_item>
          </toolTip>
          <label>
            <_item>My decimal</_item>
          </label>
          <order>
            <_item>0</_item>
            <_item>5</_item>
            <_item>30</_item>
          </order>
        </_object>
        <_content/>
      </org.openmdx.ui1.ElementDefinition>

      <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Extension!myString">
        <_object>
          <dataBindingName>org.opencrx.kernel.portal.StringPropertyDataBinding</dataBindingName>
          <active>true</active>
          <toolTip>
            <_item>My string</_item>
          </toolTip>
          <label>
            <_item>My string</_item>
          </label>
          <order>
            <_item>0</_item>
            <_item>5</_item>
            <_item>40</_item>
          </order>
        </_object>
        <_content/>
      </org.openmdx.ui1.ElementDefinition>
```

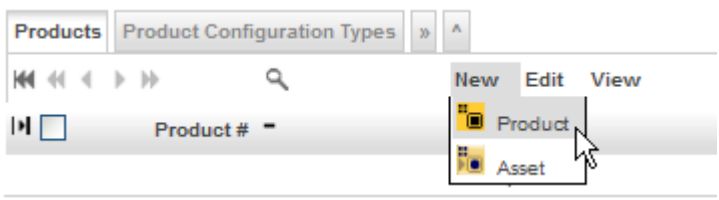
```
          <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Extension!myDate">
            <_object>
              <dataBindingName>org.opencrx.kernel.portal.DatePropertyDataBinding</dataBindingName>
              <active>true</active>
              <toolTip>
                <_item>My date</_item>
              </toolTip>
              <label>
                <_item>My date</_item>
              </label>
              <order>
                <_item>0</_item>
                <_item>5</_item>
                <_item>50</_item>
              </order>
            </_object>
            <_content/>
          </org.openmdx.ui1.ElementDefinition>

          <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Extension!myDateTime">
            <_object>
              <dataBindingName>org.opencrx.kernel.portal.DateTimePropertyDataBinding</dataBindingName>
              <active>true</active>
              <toolTip>
                <_item>My dateTime</_item>
              </toolTip>
              <label>
                <_item>My dateTime</_item>
              </label>
              <order>
                <_item>0</_item>
                <_item>5</_item>
                <_item>60</_item>
              </order>
            </_object>
            <_content/>
          </org.openmdx.ui1.ElementDefinition>

          <org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:product1:Product:Extension!myReference">
            <_object>
              <dataBindingName>org.opencrx.kernel.portal.ReferencePropertyDataBinding</dataBindingName>
              <active>true</active>
              <toolTip>
                <_item>My reference (to Account)</_item>
              </toolTip>
              <label>
                <_item>My reference (to Account)</_item>
              </label>
              <order>
                <_item>0</_item>
                <_item>5</_item>
                <_item>70</_item>
              </order>
            </_object>
            <_content/>
          </org.openmdx.ui1.ElementDefinition>
        </elementDefinition>

        </_content>
      </org.openmdx.ui1.Segment>
    </segment>
   </_content>
  </org.openmdx.base.Provider>
 </provider>
</_content>
</org.openmdx.base.Authority>
```

Once Tomcat is up and running, navigate to the tab [Products] and create a new product as shown below:



The screen for entering new products should now include a new field group labeled **Extended Attributes (PropertyDateBinding)** containing additional fields as shown below:

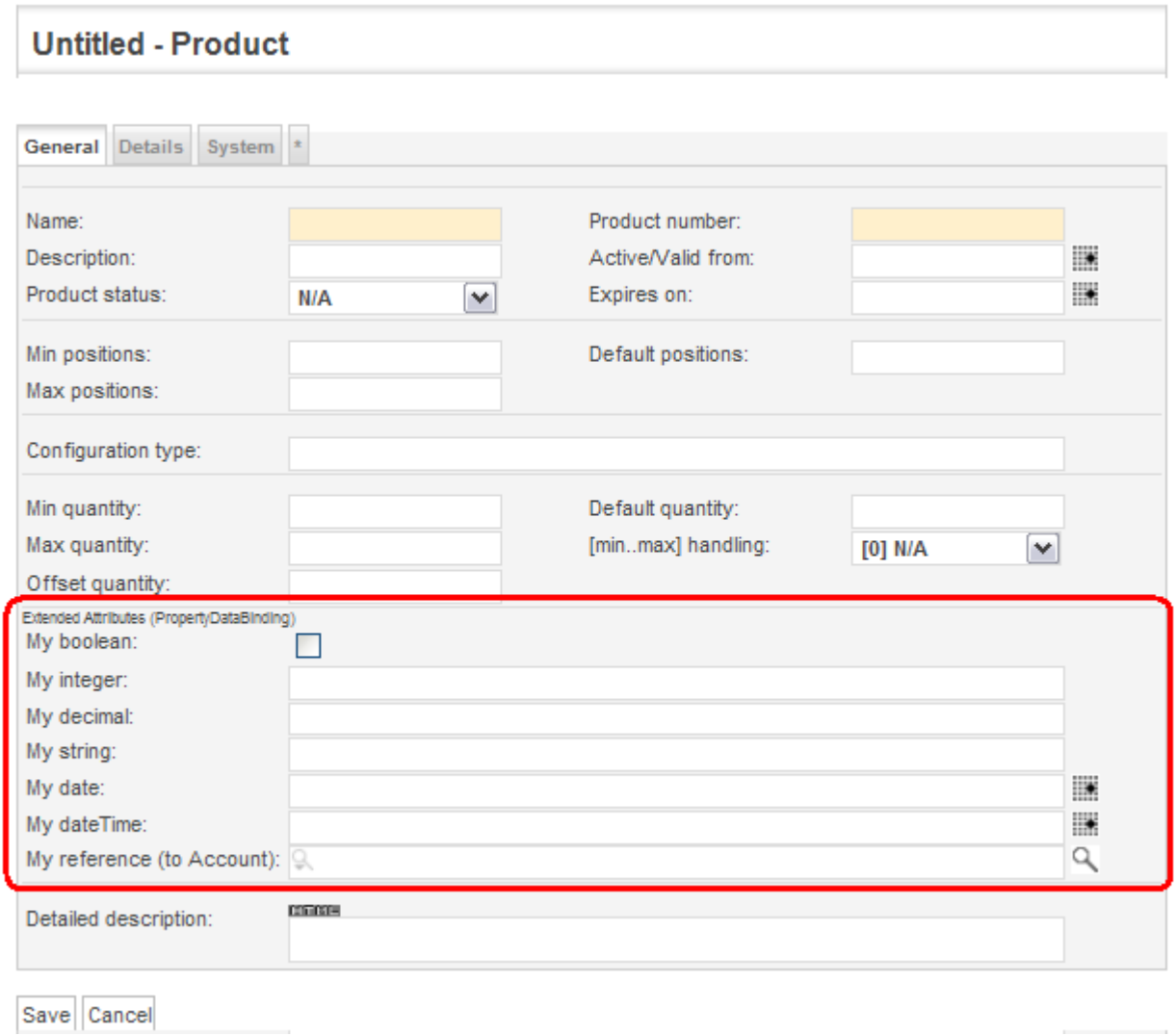


Figure 11: Sample Extension of class Product with PropertyDataBindings

Enter some data as follows:

- Name: **Sample Product**
- Product number: **P-1234**
- My boolean: **check it**
- My integer: **123**
- My decimal: **987654321.0123**
- My string: **sample string**
- My date: **1/23/2009**
- My dateTime: **1/23/2009 12:34:56 AM**
- My reference (to Account): **point to guest**

Save to new product and then navigate to it.

Expand the grid tabs in the first grid pane by clicking on the tab [>>]. You will see additional tabs like [Notes], [Folders], etc. Click on the tab [Property Sets] to see the entry Extension as shown below:

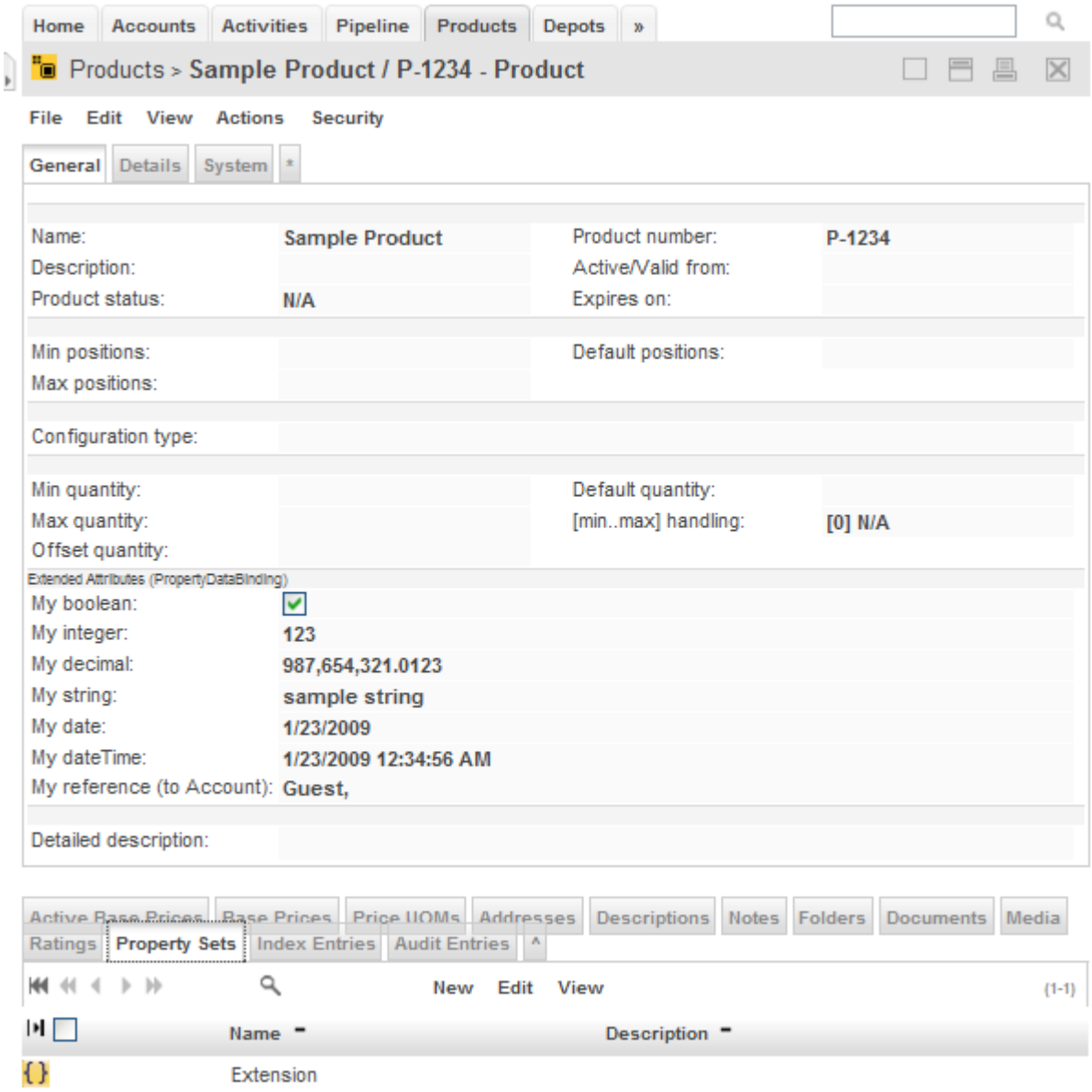


Figure 12: Sample Extension of class Product with PropertyDataBindings

The PropertySet Extension was created automatically when you saved the new product. It is called **Extension** because that is what was customized in the file **zorder_product.xml**. The PropertySet Extension contains all the attributes defined with PropertyDataBindings, i.e. *myBoolean*, *myInteger*, *myDecimal*, *myString*, *myDate*, *myDateTime*, and *myReference*. Let's verify this by clicking on the icon of the respective Property Set.

You should see the following:

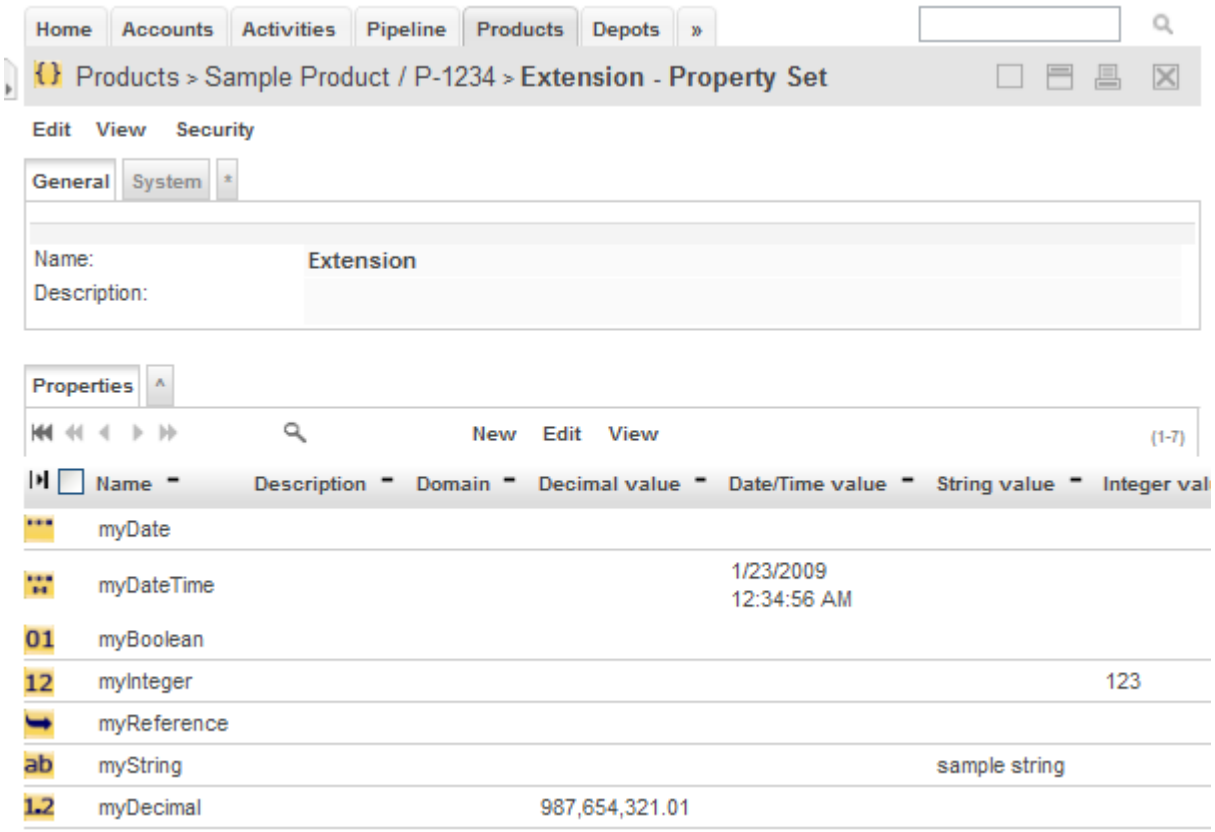


Figure 13: Property Set Extension

While all of these properties could be edited right within the Property Set, it is definitely more comfortable (and natural) to edit them within the attribute pane of products.

Note that thi extension of the class Product did not require any modifications of the openCRX UML Model. We did not even have to modify the database schema. The whole extension is done with customizing features only!

8.7.1.2 BooleanPropertyDataBinding

8.7.1.3 IntegerPropertyDataBinding

8.7.1.4 DecimalPropertyDataBinding

8.7.1.5 StringPropertyDataBinding

8.7.1.6 DatePropertyDataBinding

8.7.1.7 DateTimePropertyDataBinding

8.7.1.8 ReferencePropertyDataBinding

8.7.2 DataBinding ProductConfigurationSet

8.7.3 DataBinding ProductConfigurationTypeSet

8.7.4 DataBindings with Referenced Objects

8.7.5 DataBindungs with Composite Objects

8.7.6 DataBindings for Addresses

8.7.6.1 EmailAddressDataBinding

8.7.6.2 PhoneNumberDataBinding

8.7.6.3 WebAddressDataBinding

8.7.7 DataBindings Example Grid:

```
<featureDefinition>
  <org.openmdx.ui1.StructuralFeatureDefinition
qualifiedName="org:opencrx:kernel:home1:UserHome:tracker!${USER}~Private!filteredActivity">
  <type>org:opencrx:kernel:activity1:Activity</type>
  <multiplicity>0..n</multiplicity>
  <changeable>false</changeable>
  <isReference>true</isReference>
  </org.openmdx.ui1.StructuralFeatureDefinition>
</featureDefinition>

<org.openmdx.ui1.ElementDefinition name="org:opencrx:kernel:home1:UserHome:tracker!${USER}~Private!
filteredActivity">
  <_object>
    <active>true</active>
    <changeable>false</changeable>
    <toolTip>
      <_item>Private Activities</_item>
    </toolTip>
    <label>
      <_item>Private Activities</_item>
    </label>
    <order>
      <_item>0</_item>
      <_item>0</_item>
      <_item>3</_item>
    </order>
    <maxMember>5</maxMember>
    <dataBindingName>org.opencrx.kernel.portal.FilteredActivitiesDataBinding</dataBindingName>
  </_object>
  <_content/>
</org.openmdx.ui1.ElementDefinition>
```

8.7.8 DataBinding AssignedActivityGroupsDataBinding

8.7.9 DataBinding FilteredActivitiesDataBinding

8.7.10 DataBinding FormattedNoteDataBinding

9 Code Table XML Files

9.1 Overview

9.2 Code Table Overloading

9.2.1 Adding Codes to Existing Code Tables

9.2.2 Disabling Existing Codes

9.2.3 Replacing Existing Code Tables

9.3 Segment-Specific Code Tables

10 Groovy Controls

10.1 MenuOps – openCRX Operations Menu

10.2 Navigation – openCRX Breadcrum

10.3 North – openCRX Header

10.4 RootMenu – openCRX Top Level Tabbed Menu

10.5 RootPanel – openCRX Top Level PopUp Menu

10.6 Search – openCRX Index-based Search

11 JSP Wizards

See the various examples in the directory ...\opencrx-core-CRX\wizards\en_US

12 Forms

Forms were introduced with openCRX v2.4. Have a look at the following examples included in the distribution:

- Form definitions are located in the directory ...\opencrx-core-CRX\WEB-INF\config\ui\Root\en_US
- Form wizards are located in the directory ...\opencrx-core-CRX\wizards\en_US

Form	Wizards making use of the Form
CreateActivityForm.xml	CreateActivityWizard.jsp
CreateActivityTrackerForm.xml	CreateAgendaWizard.jsp CreateBugTrackerWizard.jsp CreateCampaignWizard.jsp CreateProjectWizard.jsp
CreateContactForm.xml	CreateContactWizard.jsp
CreateCrontactForm.xml	CreateContractWizard.jsp
CreateLeadForm.xml	CreateLeadWizard.jsp
CreateProductForm.xml	CreateProductWizard.jsp
ScheduleEventForm.xml	ScheduleEventWizards.jsp

13 Layout JSPs

openCRX is distributed with 2 default layout JSPs located in the directory ...\opencrx-core-CRX\WEB-INF\config\layout\en_US.

13.1 show-Default.jsp

This layout JSP renders all pages that show information (typically an Inspector containing information about the current object and all the grids containing associated information). This layout JSP is generic and can handle any object. It is provided by openMDX/portal.

13.2 edit-Default.jsp

Similarly, this layout JSP renders all pages that are used to edit objects and create new objects. This layout JSP is generic and can handle any object. It is provided by openMDX/portal.

13.3 Custom Layout JSPs

If you have a need for specialized screens for a particular object in edit and/or show mode, you can write your own layout JSP and deploy it to the above-mentioned directory. The file name of your custom layout JSP determines which objects (or rather: objects of which class) will be handled by your custom layout JSP.

Example:

Let's assume you want to replace the default edit screen for openCRX Contacts (i.e. class **org.opencrx.kernel.account1.Contact**) with a custom layout JSP. Name your file

edit-org.opencrx.kernel.account1.Contact.jsp

and deploy it to the directory ...\WEB-INF\config\layout\en_US. After restarting Tomcat or your application server your new layout JSP will be active.

If you develop localized JSPs you can create new directories for the respective locales and then deploy your localized JSPs there. The fallback algorithms are comparable to those in ui customization.

You must provide a layout JSP for the base locale, by default the locale en_US.

14 Advanced Customizing Options

14.1 Workflows

14.2 Java Controls

14.3 Portal Extensions

14.4 UML Model Extensions

14.5 Application Logic Extensions

15 Other Customizing Options

A collection of useful configuration and customizing options.

15.1 web.xml

All of the following settings can be made in the file ...\opencrx-core-CRX\WEB-INF\web.xml

15.1.1 uiRefreshRate

By default, the UI configuration is loaded at startup only. If you are changing customizing files during a customization session you might want to reload the UI periodically to verify your changes without restarting the servlet container. You can do so by setting the respective value to something else than 0. The refresh period is measured in milliseconds, i.e. the following example would cause the UI configuration to reload once per minute:

Listing 8: uiRefreshRate in web.xml

```
...
<!-- ui refresh rate -->
<init-param>
  <param-name>uiRefreshRate</param-name>
  <param-value>60000</param-value>
</init-param>
...
```

15.1.2 load-on-startup

By default, the ObjectInspectorServlet is initialized with the first login (and hence the first login can take some time). If you prefer to initialize the ObjectInspectorServlet right after the deployment of the respective EAR, uncomment the following section in web.xml:

Listing 9: load-on-startup in web.xml

```
...
<!-- activate if ObjectInspectorServlet should be initialized at startup -->
<load-on-startup>1</load-on-startup>
...
```

15.1.3 session-timeout

By default, the session timeout is set to 30 minutes. If you want to shorten or lengthen the session timeout you can do so by changing the value of session-timeout (measured in minutes) in web.xml. The following example shows how to change the timeout to 2 hours:

Listing 10: sesstion-timeout in web.xml

```
...
<session-config>
  <session-timeout>120</session-timeout>
</session-config>
...
```

15.1.4 transport-guarantee

If you want to force your users to connect with SSL you can require a transport guarantee and replace the default value NONE with CONFIDENTIAL. The following example shows how to require the application admin (admin-Root) to connect with SSL:

Listing 11: transport-guarantee in web.xml

```
...
<security-constraint id="security_constraint-Root">
  <web-resource-collection id="c-Root">
    <web-resource-name>c-Root</web-resource-name>
    <url-pattern>/LogConsoleServlet/*</url-pattern>
    <url-pattern>/WorkflowController/*</url-pattern>
    <http-method>GET</http-method>
    <http-method>POST</http-method>
  </web-resource-collection>
  <auth-constraint id="auth_constraint-Root">
    <role-name>OpenCrxRoot</role-name>
  </auth-constraint>
  <user-data-constraint id="user_data_constraint-Root">
    <transport-guarantee>CONFIDENTIAL</transport-guarantee>
  </user-data-constraint>
</security-constraint>
...
```

16 Next Steps

You might want to have a look at some of the additional documentation published at http://www.opencrx.org/documents.htm. The openCRX Admin Guide might be of particular interest to you.