openCRX Admin Guide

Version 2.13.0

www.opencrx.org

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1 About this Book

This book describes various configuration settings and tasks that make an openCRX administrator's life easier.

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.

1.2 What you need to know with this book

This book describes some of the settings and configurations an openCRX administrator can use to control the behavior of openCRX.

1.3 Tips, Warnings, etc.

We make use the following pictograms:

Information provided as a "Hint" 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.

Important

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

Warning

Warnings should not be ignored (risk of data loss, etc.). If things go wrong, remember that we told you so...

2 Prerequisites

This guide assumes that you have access to a properly installed instance of openCRX 2.13.0 (for installation instructions, please refer to the guides available from http://www.opencrx.org/documents.htm), for example the openCRX Server Installer guide (http://www.opencrx.org/server.htm).

3 Security

In this chapter we will present a high-level overview of openCRX security and discuss a few important issues.

We do **not** recommend learning about security with mission critical data. **Backup your data** **before** you make changes if you are not certain what the consequences are! The risk of you being locked out is real and the **resources required to fix broken security settings can not be overestimated!**
The default settings should work for virtually all users; the probability of getting yourself into trouble by changing default settings should not be underestimated. **Read and understand at least the basics of openCRX security BEFORE you make any changes.**

3.1 Introduction

3.1.1 Basic Concepts and Conventions

- Each "real user" is represented by a **Subject** (e.g. "guest"). Subjects are managed by the openCRX Root administrator (admin-Root).
- Each subject has an **Application Login Principal** (also called **login id**). Application login principals are managed by the openCRX Root administrator (admin-Root).
- Each application login principal is assigned to a subject (e.g. principal "guest" is assigned to subject "guest") and allows a "real user" to login.
- A "real user" can have one or more additional segment login principals. The **Segment Login Principal** has typically the same name as the application login principal (e.g. "guest") and grants a "real user" login access to a segment. Segment login principals are managed by openCRX segment administrators (admin-Standard for the Segment Standard).
- Each "real user" who has access to a segment (i.e. has a segment login principal) has (in addition to the segment login principal) a segment user principal, e.g. "guest.User". The **Segment User Principal** is required to assign objects to an **Owning User**. Each "real user" also has a Principal Group, e.g. "guest.Group".
- Each segment has a corresponding realm to manage Principals:
  - The application login principals are stored in the realm Default.
  - The segment login principals for segment <*segment name*> are stored in the realm <*segment name*> (e.g. principals for the segment *Standard* are stored in the realm *Standard*).
  - Each segment has a segment administrator principal (*admin-<segment name>*) (e.g. admin-Standard for the segment Standard).

The following figure shows the situation after the initial setup of openCRX:

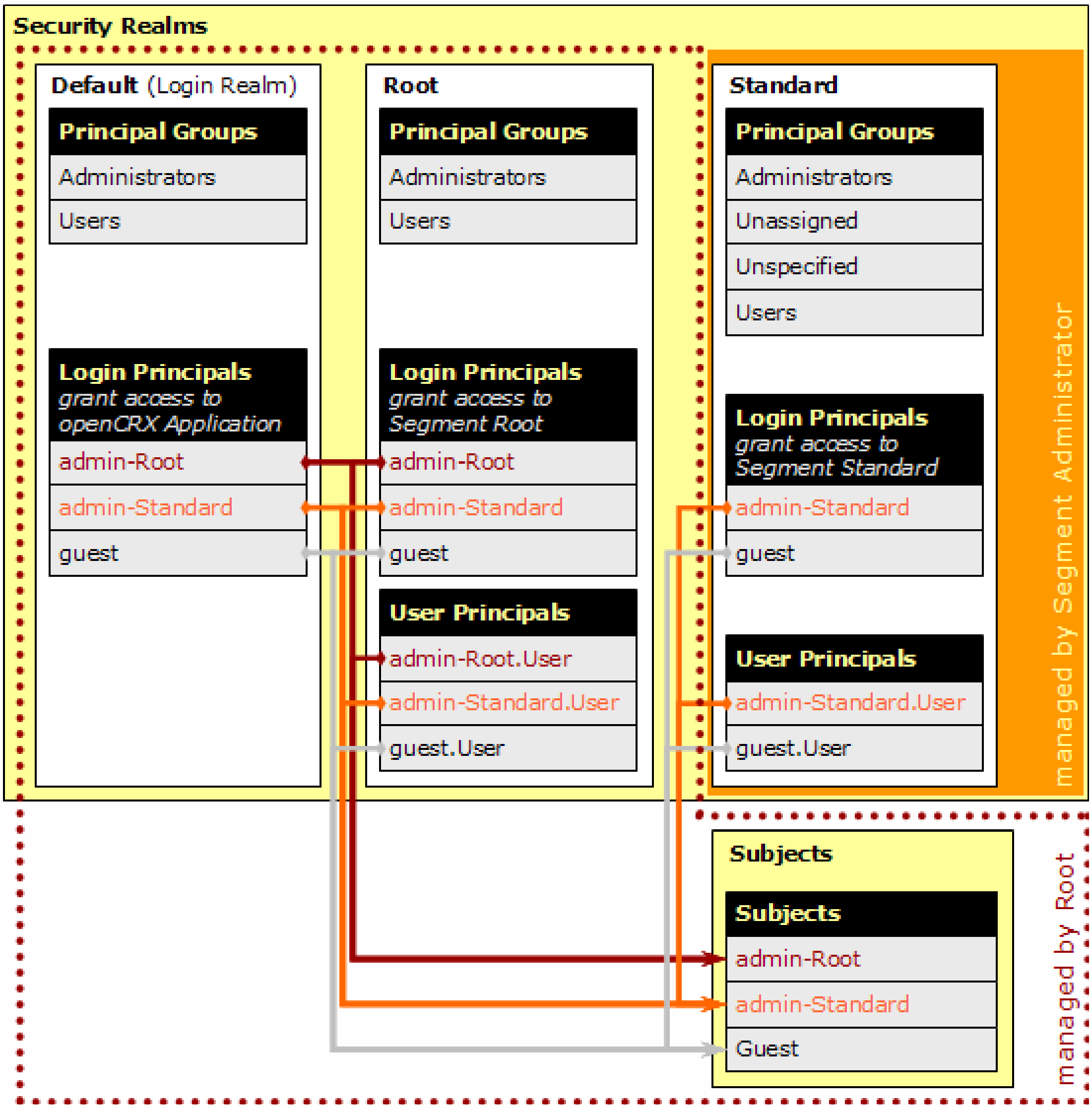
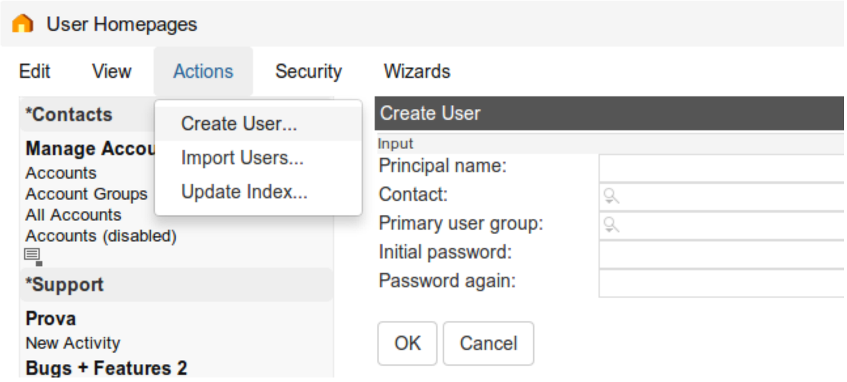


Figure 1: Security Realms, Principals and Subjects after Initial Setup

Summarizing the above:

- there is a realm for each segment (e.g. a realm Standard corresponding to the segment Standard)
- the realm Default acts as login realm; it contains all principals who are allowed to login to the openCRX application; PrincipalGroups in this realm are only used to configure **Granted Roles** by inheritance (in addition to configuring them directly in the appropriate grid).
- there is a subject for each "real user" and all principals of a user are assigned to the same subject; this allows openCRX to find all principals of a user (→ role selection drop down)

The segment administrator (e.g. admin-Standard) creates principals and User home pages with the operation **createUser**:



User Homepages

Edit View Actions Security Wizards

*Contacts

Manage Accou

Accounts

Account Groups

All Accounts

Accounts (disabled)

*Support

Prova

New Activity

Bugs + Features 2

Create User...

Import Users...

Update Index...

Create User

Input

Principal name:

Contact:

Primary user group:

Initial password:

Password again:

OK Cancel

Each segment login principal has a home page in the respective segment (qualifier of principal and home page must match!).

Each segment login principal is correlated with a contact. This correlation is for example required to find all activities and contracts assigned to the logged in principal.

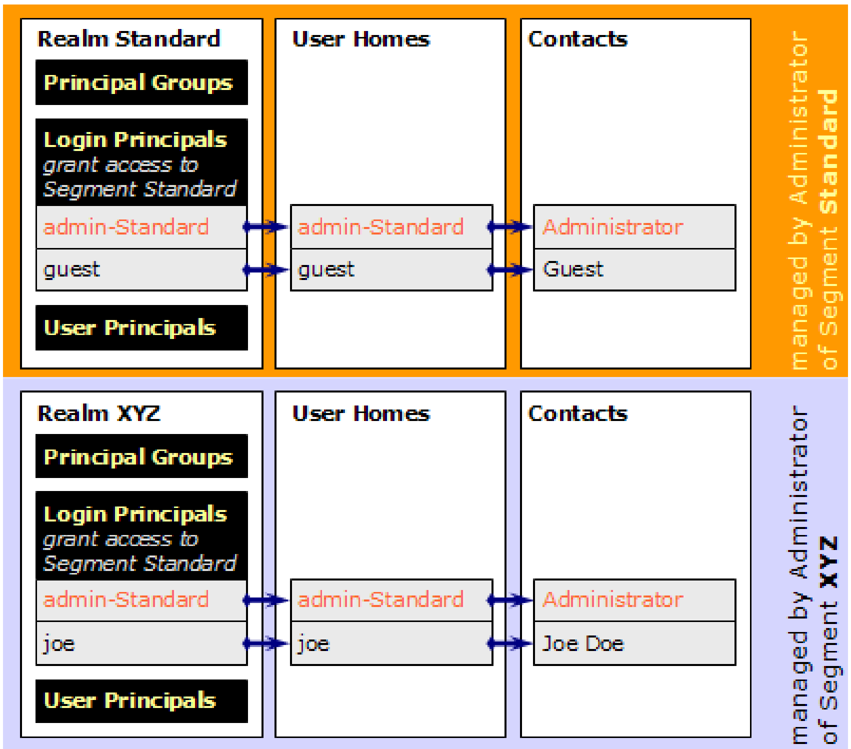


Figure 2: Segment Administration

While each "real user" (typically) has 1 application login principal only, "real users" may have multiple segment login principals (e.g. because a "real user" is allowed to access multiple segments or because a "real user" is allowed to access a particular segment in different roles like *Head of Sales* or *CFO*).

Available segment login principals are listed in the so-called Role Drop Down:

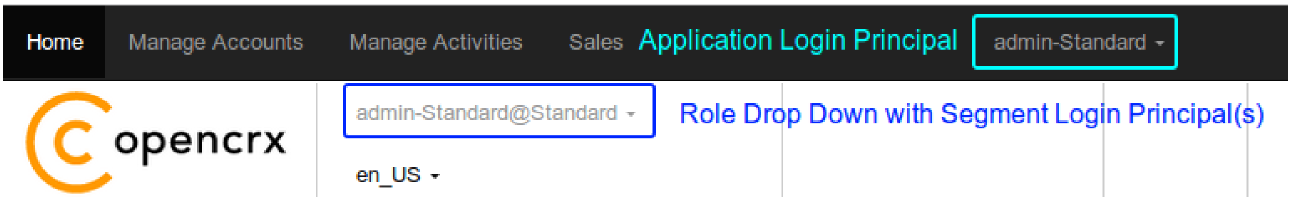
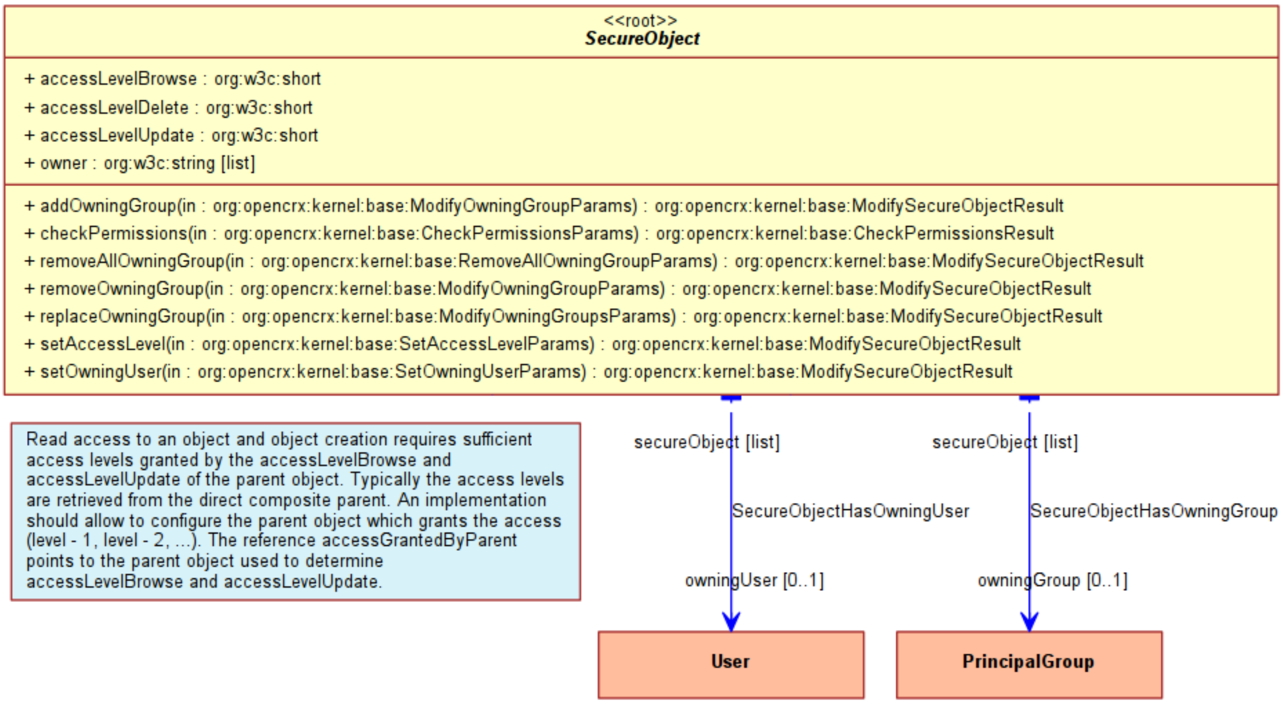


Figure 3: Role Drop Down with list of available Segment Login Principals

3.1.2 Permissions / Access Control

The openCRX security framework makes a clear distinction between **Ownership Permissions** (permissions granted on a particular object) and **Model Permissions** (permissions granted on a particular model element). As the latter are not implemented (yet) we only talk about Ownership Permissions in this guide. In addition to wwnership permissions there are also **GUI Permissions** (see the guide openCRX GUI – Getting Started).

Ownership permissions are used to control browse/update/delete access to openCRX objects by Users and UserGroups (i.e. **Ownership access control**). Every openCRX object is a SecureObject. The following figure shows an extract from the UML model (if you are interested in all the details and the formally correct and complete specifications you should refer to the latest openCRX UML models):



<<root>>
SecureObject
+ accessLevelBrowse : org:w3c:short
+ accessLevelDelete : org:w3c:short
+ accessLevelUpdate : org:w3c:short
+ owner : org:w3c:string [list]
+ addOwningGroup(in : org:opencrx:kernel:base:ModifyOwningGroupParams) : org:opencrx:kernel:base:ModifySecureObjectResult
+ checkPermissions(in : org:opencrx:kernel:base:CheckPermissionsParams) : org:opencrx:kernel:base:CheckPermissionsResult
+ removeAllOwningGroup(in : org:opencrx:kernel:base:RemoveAllOwningGroupParams) : org:opencrx:kernel:base:ModifySecureObjectResult
+ removeOwningGroup(in : org:opencrx:kernel:base:ModifyOwningGroupParams) : org:opencrx:kernel:base:ModifySecureObjectResult
+ replaceOwningGroup(in : org:opencrx:kernel:base:ModifyOwningGroupsParams) : org:opencrx:kernel:base:ModifySecureObjectResult
+ setAccessLevel(in : org:opencrx:kernel:base:SetAccessLevelParams) : org:opencrx:kernel:base:ModifySecureObjectResult
+ setOwningUser(in : org:opencrx:kernel:base:SetOwningUserParams) : org:opencrx:kernel:base:ModifySecureObjectResult
secureObject [list]
SecureObjectHasOwningUser
owningUser [0..1]
User
secureObject [list]
SecureObjectHasOwningGroup
owningGroup [0..1]
PrincipalGroup

Read access to an object and object creation requires sufficient access levels granted by the accessLevelBrowse and accessLevelUpdate of the parent object. Typically the access levels are retrieved from the direct composite parent. An implementation should allow to configure the parent object which grants the access (level - 1, level - 2, ...). The reference accessGrantedByParent points to the parent object used to determine accessLevelBrowse and accessLevelUpdate.

Figure 4: openCRX UML Model – Class Diagram SecureObject

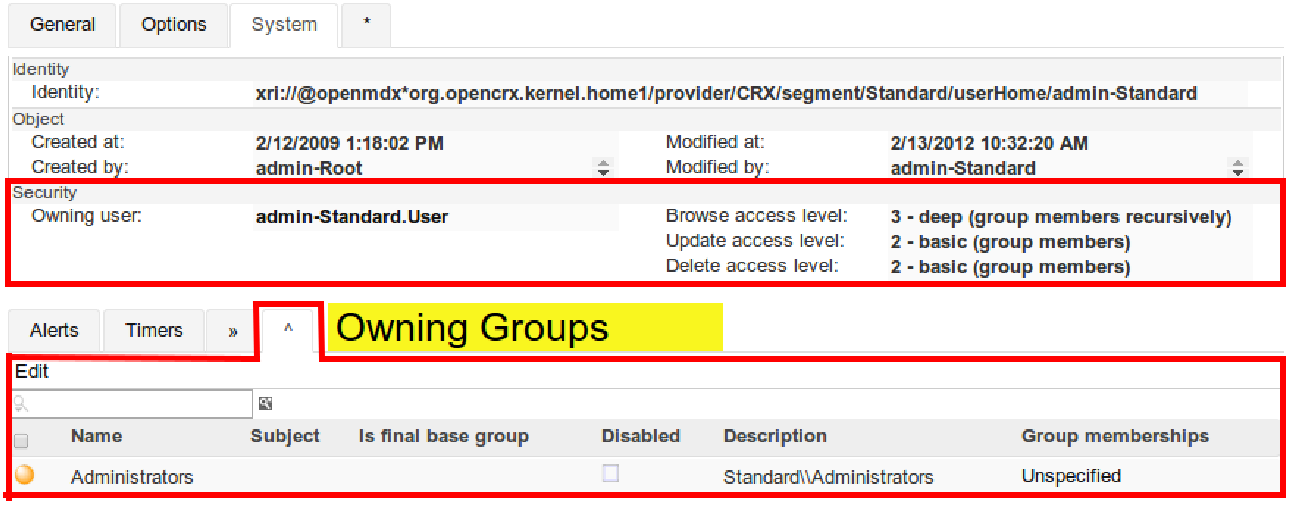
If you see **N/P** in a reference field instead of a more meaningful value you probably do not have browse access to the respective object (N/P stands for **No Permission**)

If you see **N/A** in a reference field instead of a more meaningful value the object cannot be retrieved (N/A stands for **Not Available**); maybe the object was deleted or the respective provider is not accessible/available.

The most important security attributes of an object X are discussed below:

- **Owning User**: this user "owns" object X; the Owning User can always browse/update/delete object X (unless the access level is set to 0 [in which case nobody has access – probably not a desirable situation]).
- **Owning Groups**: these groups might enjoy privileged treatment for browsing/updating/deleting object X depending on the relevant access level settings.
- **Access Granted by Parent**: this attribute is set by configuration and refers to the parent object that grants access to object X.
- **Browse Access Level**: this setting determines which users/user groups are granted browse access to direct composite objects of object X [i.e. who can view/inspect direct composite objects of object X (including all their attributes)].

  It is a common misconception that browse access level of an object X controls browse access to this object X – please read the above definition carefully!
- **Update Access Level:** this setting determines which users/user groups are granted update access to object X [i.e. who can change object X; this includes adding composite objects to object X].
- **Delete Access Level**: this setting determines which users/user groups are granted delete access to object X and all its composite objects (recursively!) [i.e. who can delete object X and all its composite objects (recursively!)].



Identity

Identity:	xri://@openmdx*org.opencrx.kernel.home1/provider/CRX/segment/Standard/userHome/admin-Standard		

Object

Created at:	2/12/2009 1:18:02 PM	Modified at:	2/13/2012 10:32:20 AM
Created by:	admin-Root	Modified by:	admin-Standard

Security

Owning user:	admin-Standard.User	Browse access level:	3 - deep (group members recursively)
		Update access level:	2 - basic (group members)
		Delete access level:	2 - basic (group members)

	Name	Subject	Is final base group	Disabled	Description	Group memberships
●	Administrators			□	Standard\\Administrators	Unspecified

Figure 5: System attributes of an openCRX object as shown in the GUI

The following **access levels** are available to control which users/user groups are granted permission to browse/delete/update a particular object X:

Access Level	Meaning
0 – N/A	no access
1 – private	access is granted if the user is owning user of object X
2 – basic	access is granted if at least one of the following conditions is true: (a) the user is owning user of object X (b) the user is member of any of the owning groups of object X (c) any of the owning groups of object X is a subgroup** of any group the user is member of
3 – deep	access is granted if at least one of the following conditions is true: (a) the user is owning user of object X (b) the user is member of any of the owning groups of object X (c) any of the owning groups of object X is a subgroup** of any group the user is member of (d) any of the owning groups of object X is a subgroup** of any supergroup* of any group the user is member of
4 – global	all users are granted access

* Owning group G_{super} is a supergroup of an owning group G if every user who is member of G is also member of G_{super}

** Owning group G_{sub} is a subgroup of an owning group G if every user who is member of G_{sub} is also member of G

3.1.3 Default Principal Groups

The figure on the right shows the openCRX default principal groups and their memberships:

- Unassigned
- Public
- Administrators
- Users
- Unspecified

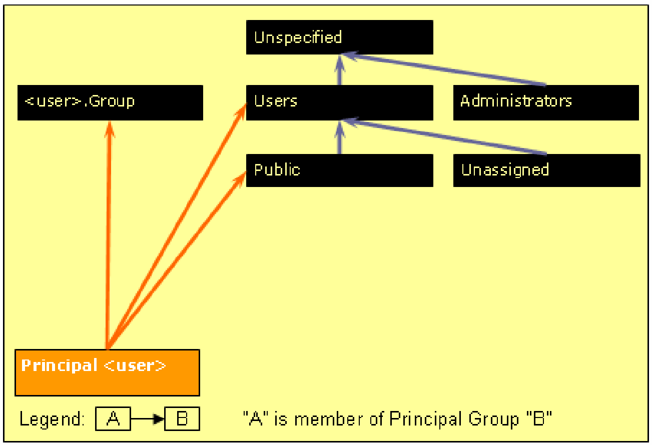


Figure 6: Default Principal Groups

3.1.4 The SQL approach to understanding security

If you are familiar with SQL, the following approach to understanding security might be helpful. Let's put ourselves into the role of the AccessControl Plugin; accessing an object (read mode) results in a SELECT statement as follows:

SELECT * FROM T WHERE owner IN (p1, p2, ...)

- owner is a column that is present in all (multi-valued) tables xACCOUNT_, xADDRESS_, etc.) and it contains a list of principals who are permitted to access the respective object in read-mode
- the set P = {p1, p2, ...} is calculated by the AccessControl Plugin before accessing the object and it corresponds to the principals who are assigned to the current user based on the object's AccessLevel as shown in the following table:

Access Level	Set P = {p1, p2, ...}
0 – N/A	P = {}
1 – private	$P = P_p$ where P_p = {all groups directly assigned to the principal p}
2 – basic	$P = P_p + P_{upper}$ where P_p = {all groups directly assigned to the principal p} P_{upper} = {all groups that contain at least one group contained in P_p}
3 – deep	$P = P_p + P_{upper} + P_{lower}$ where P_p = {all groups directly assigned to the principal p} P_{upper} = {all groups that contain at least one group contained in P_p} P_{lower} = {all groups contained in P_{upper}}
4 – global	the where-clause “WHERE owner IN (p1, p2, ...)” is not required, i.e. the SELECT statement reduces to SELECT * FROM T

You can mark PrincipalGroups as “Base group” to better control the inclusion of PrincipalGroups with Access Level 3.

3.2 Activating Security

Security (including Access Control) is not just a fancy add-on, rather it is an integral part of openCRX; **openCRX Access Control is always activated**.

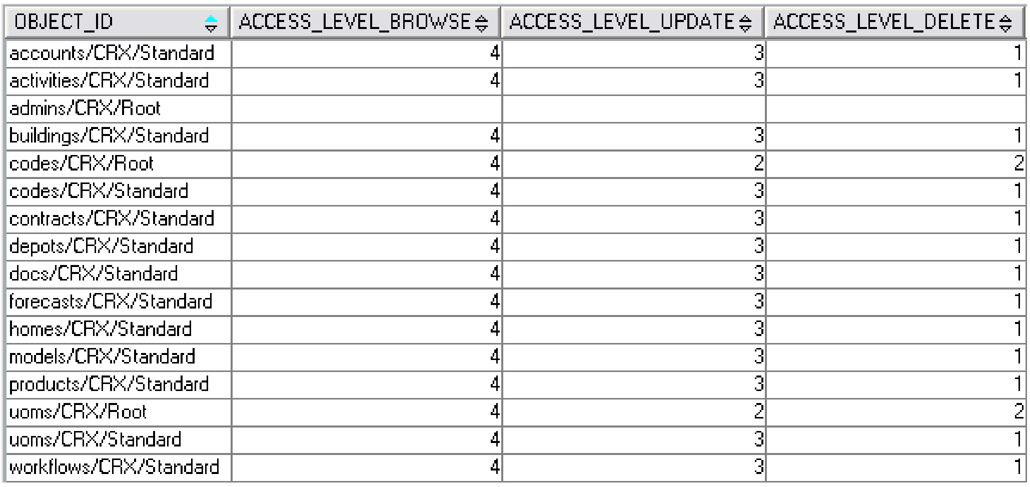
The openCRX security provider manages all security data and provides access control services for all requests through the openCRX API. Hence, you can rely on openCRX access control even if you write you own clients or adapters for openCRX.

The only "hardening" you might want to do is the one described in the following chapter: set browse access level to 3 for non-Root segments.

3.3 Default Settings

Default access level settings for non-Root segments (e.g. segment Standard) after a clean install are as follows:

Browse Access Level:	**4 – global**
Update Access Level:	**3 – deep**
Delete Access Level:	**1 – private**



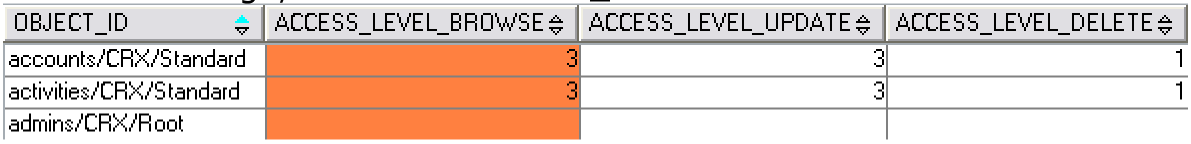
OBJECT_ID	ACCESS_LEVEL_BROWSE	ACCESS_LEVEL_UPDATE	ACCESS_LEVEL_DELETE
accounts/CRX/Standard	4	3	1
activities/CRX/Standard	4	3	1
admins/CRX/Root			
buildings/CRX/Standard	4	3	1
codes/CRX/Root	4	2	2
codes/CRX/Standard	4	3	1
contracts/CRX/Standard	4	3	1
depots/CRX/Standard	4	3	1
docs/CRX/Standard	4	3	1
forecasts/CRX/Standard	4	3	1
homes/CRX/Standard	4	3	1
models/CRX/Standard	4	3	1
products/CRX/Standard	4	3	1
uoms/CRX/Root	4	2	2
uoms/CRX/Standard	4	3	1
workflows/CRX/Standard	4	3	1

Figure 7: Table OOCKE1_SEGMENT after default installation

Due to the setting *access_level_browse = 4 (global)* **any user with access to a particular segment is allowed to browse top level objects** (i.e. any user can browse all accounts, all activities, all documents, etc.).

These default settings are suitable for test environments and deployments in smaller companies/teams with a generous access policy; for most real-world applications, however, it is more appropriate to set *access_level_browse = 3 (deep)* for non-Root segments. You can do this by changing the values in the **column access_level_browse** from 4 to 3 (table OOCKE1_SEGMENT).

After this change, the table OOCKE1_SEGMENT will look as follows:



OBJECT_ID	ACCESS_LEVEL_BROWSE	ACCESS_LEVEL_UPDATE	ACCESS_LEVEL_DELETE
accounts/CRX/Standard	3	3	1
activities/CRX/Standard	3	3	1
admins/CRX/Root			

Figure 8: Table OOCKE1_SEGMENT after modification

Segment security settings are loaded during the initialization of the openCRX servlet. Hence, if you change settings you must redeploy openCRX for the new settings to become active.

3.4 Security Settings of New Objects

New objects are by default created with the following security settings:

Browse Access Level:	**3 – deep**	
Update Access Level:	**2 – basic**	
Delete Access Level:	**2 – basic**	
Access Granted by Parent	in general:	**Parent object as modeled**
	exceptions:	there are some select exceptions, but they are all pre-configured
Owning User:	**User who is creating the object**	
Owning Groups:	**Primary User Group of the user who is creating the object and (meaning as well as) Owning Group(s) of the parent object of the new object (except Users, see below).**	

Please note that the User Group **Users** (e.g. Standard\\Users) is **not added** to the list of *Owning Groups* of newly created objects unless the creating user's **Primary User Group** is equal to **Users**.

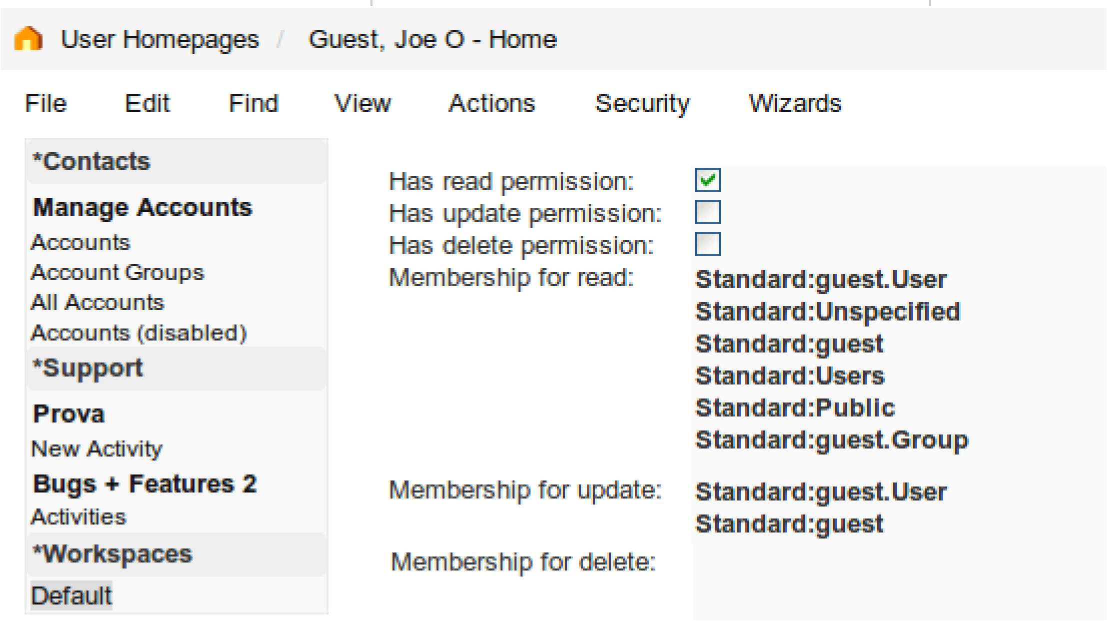
By default, a user's primary user group is **<user>.Group**. This group is created automatically when the segment administrator runs the wizard User Settings from a user's homepage (see chapter 4.1 Creating Users – Overview).

Please note that a User's **Primary User Group** can be set by the segment administrator with the operation *Create User*. To change an existing user's primary group, the segment administrator simply executes the operation *Create User* again with a new parameter for primary user group.

In the context of activity management there are various operations that set/change the Owning Groups of objects based on the settings of an assigned Activity Creator or assigned Activity Group and not based on the settings of the user who executes the operation.

3.5 Checking Permissions

You can check security permissions on any SecureObject with the operation Security > Check Permissions. Provide the principal name as a parameter. The following figure shows the result of the operation on a user's homepage:



Has read permission: ☑
Has update permission: □
Has delete permission: □
Membership for read: Standard:guest.User
Standard:Unspecified
Standard:guest
Standard:Users
Standard:Public
Standard:guest.Group

Membership for update: Standard:guest.User
Standard:guest

Membership for delete:

Figure 9: Result of Check Permissions

The meaning of the above result is as follows:

Has read permission: ☑ principal can browse this object
□ principal cannot browse this object

Has update permission: ☑ principal can modify/update this object
□ principal cannot modify/update this object

Has delete permission: ☑ principal can delete this object
□ principal cannot delete this object

Membership for read: principal has read permission if the intersection of the resulting list of groups and the list of owning groups of the respective SecureObject is not empty

Membership for update: principal has modify/update permission if the intersection of the resulting list of groups and the list of owning groups of the respective SecureObject is not empty

Membership for delete: principal has delete permission if the intersection of the resulting list of groups and the list of owning groups of the respective SecureObject is not empty

3.6 Login Procedure

The openCRX login procedure consists of 2 levels, the Servlet Container Login (e.g. Apache Tomcat) and the openCRX Segment Login (e.g. Standard).

3.6.1 Apache Tomcat / Application Server Login

The Apache Tomcat / application server login procedure depends on various parameters:

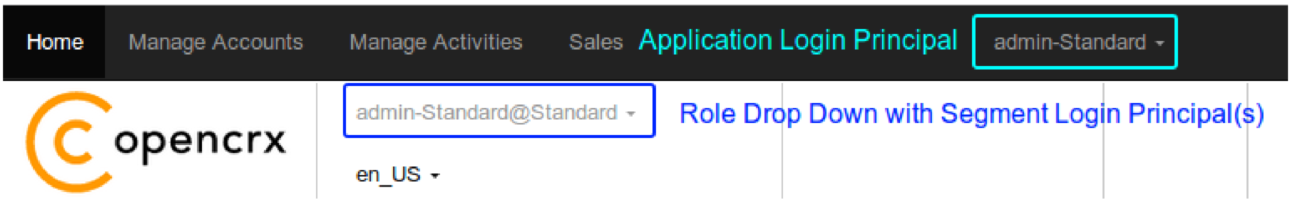
- Servlet container (Apache Tomcat, JBoss, BEA WLS, IBM WAS, etc.)
- configuration of Apache Tomcat / application server
  - file-based realm (e.g. **tomcat-users.xml** for Tomcat)
  - DB-based realm (e.g. DataSourceRealm Tomcat)
  - LDAP-based realm (e.g. JNDIRealm for Tomcat; see also chapter 18.4 Tomcat w/ openCRX and LDAP-based Authentication)
  - company-specific / custom-tailored realms

Please note that even though openCRX might be involved in managing some of the above-mentioned realms (e.g. DB-based realm) the login procedure is not really under control of openCRX. As a consequence, many login problems are related to incomplete/faulty configuration settings of the servlet container.

Detailed documentation about the many Realms supported by Apache Tomcat is available at http://tomcat.apache.org/tomcat-7.0-doc/realm-howto.html

3.6.2 Segment Login

Access to segments is managed/controlled by the *ObjectInspectorServlet*. The included *DefaultRoleMapper* identifies all Segment Login Principals of a given Subject and grants access to the respective segments through the Role Drop Down:



Application Login Principal

Role Drop Down with Segment Login Principal(s)

Figure 10: Role Drop Down with list of available Segment Login Principals

It is possible to deploy user-specific implementations of the DefaultRoleMapper so that you can adapt the segment login procedure to your requirements.

3.6.3 Disabling Login

Please refer to the chapter "Disable/Deactivate Users".

3.7 Resetting Security

If you get the setting of Update Access Level wrong you may not be able to change the respective object from the GUI anymore (and that includes the security settings of that object!). For example, the only way to recover from setting Update Access Level to 0 – N/A for a particular object is to edit the data directly in the database!

It is simply not possible to disable openCRX Security.

If you (or one of your users) managed to screw up the security settings in a major way you might be forced to reset all security settings to a well-defined state. Not an easy task – and it typically involves a lot of manual work.

Educate your users about openCRX security. You might also consider disabling some of the more powerful operations and/or security attributes in the default GUI.

4 Managing Users

Read through the chapter Basic Concepts and Conventions (Security) before reading this chapter. It is quite helpful to have a good understanding of the terms Subject, Application Login Principal, Segment Login Principal, User, etc. before you start reading here.

4.1 Creating Users – Overview

Even though you can create users with a variety of methods, "behind the scenes" the following steps are always required to create a new openCRX user:

Who	Steps
Root administrator admin-Root	● create a new Subject ▪ set the qualifier to the desired login id ● create a new Principal in the realm Default (--> Application Login Principal) ▪ set the qualifier to the desired login id ▪ link this Principal to the Subject created in the previous step ▪ make this Principal member of the appropriate Principal Group(s), e.g. *Users*
Segment administrator admin-<SegmentName>	● create a new Contact ● create a new User ▪ link this new User to the Contact created in the previous step ▪ the Segment Login Principal is created automatically ▪ the userhome is created automatically ● run the wizard Edit > User Settings from the new user's homepage
Newly created **user**	● run the wizard Edit > User Settings (to create the user's private objects)

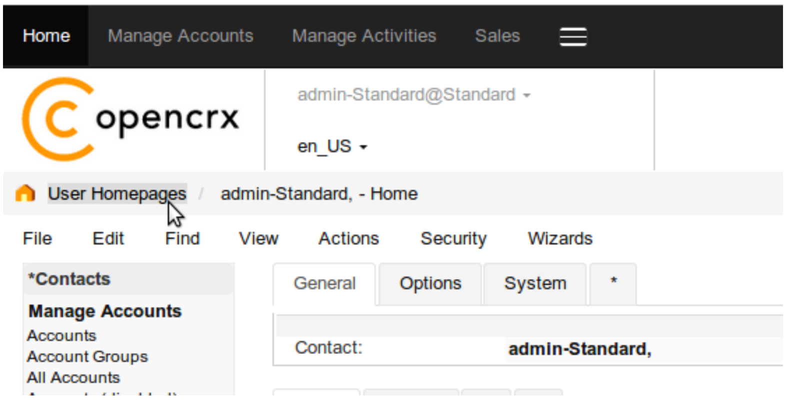
Depending on how you create a new user, some of the above steps might be taken care of by a wizard. If you want to have full control over the user creation process, however, then you can certainly create new users following the above instructions step by step.

Have a look at *Figure 1: Security Realms, Principals and Subjects after Initial Setup* and *Figure 2: Segment Administration* to see how this all fits together.

4.1.1 Create Users as Segment Administrator

The Segment administrator can create new users with the following steps:

- Login as Segment administrator (e.g. admin-Standard)
- Create a contact for the new user
- Click on the element "User Homepages" of the breadcrum:



Contact: admin-Standard,

Figure 11: New user guest – step 1

- Next you select the operation **Actions > Create User…** which allows you to create and initialize a new user:

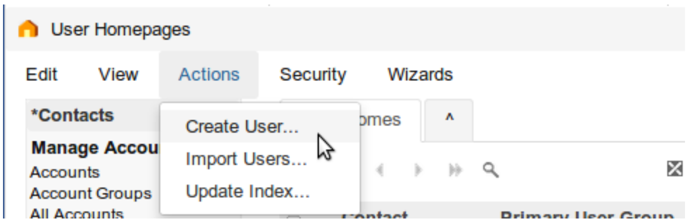
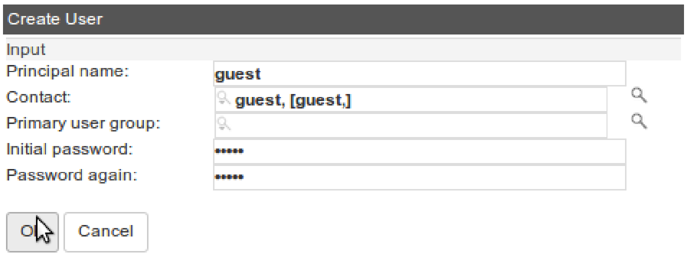


Figure 12: New user guest – step 2

- Type the new user's principal name (e.g. **guest**) into the field *Principal name*, use the Lookup Inspector or the auto-completer to fetch values for *Contact* and *Primary user group* (unless you have a good reason to provide a user group, leave Primary User Group empty and openCRX will automatically create a user group with name <principal name>.Group), and then type a password (e.g. **opencrx**) into the fields *Initial password* and *Password again*:

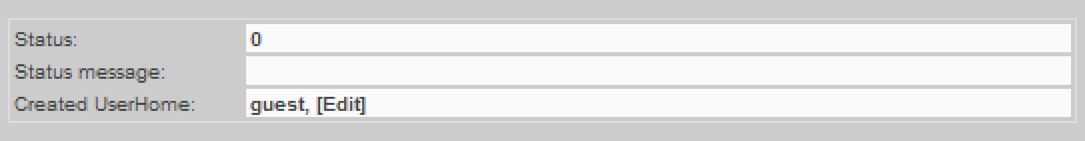

Create User

Input

Principal name:	guest
Contact:	guest, [guest,]
Primary user group:	
Initial password:	•••••
Password again:	•••••

Figure 13: New user guest – step 3

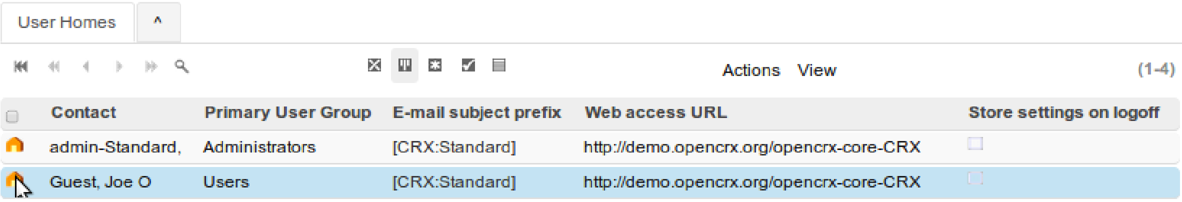
- Status 0 indicates that the user guest was created without errors:



Status:	0
Status message:	
Created UserHome:	guest, [Edit]

Figure 14: New user guest – step 4

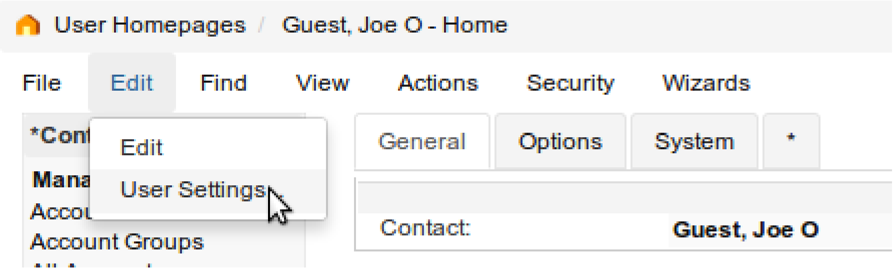
- Next we navigate to the homepage of the newly created user guest by clicking on the icon as show below:



	Contact	Primary User Group	E-mail subject prefix	Web access URL	Store settings on logoff
	admin-Standard,	Administrators	[CRX:Standard]	http://demo.opencrx.org/opencrx-core-CRX	□
	Guest, Joe O	Users	[CRX:Standard]	http://demo.opencrx.org/opencrx-core-CRX	□

Figure 15: New user guest – step 4

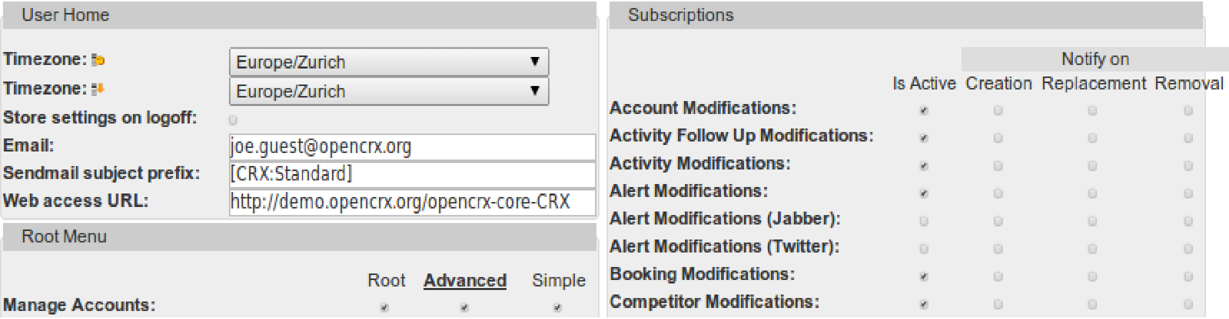
- Please note that we are still logged in as admin-Standard (as shown in the header of the application), but we are looking at the homepage of the user guest. Execute the operation **Edit > User Settings**:



Contact: **Guest, Joe O**

Figure 16: New user guest – step 5

- This will start the wizard User Settings. You can configure various settings with this wizard. At a minimum you should probably set the **timezone** and enter the new user's **e-mail address**. Once you're done you can click the button [**Save**]. The wizard will then create a bunch of objects and finalize the initialization of the user guest:



User Home

Timezone:	Europe/Zurich
Timezone:	Europe/Zurich
Store settings on logoff:	□
Email:	joe.guest@opencrx.org
Sendmail subject prefix:	[CRX:Standard]
Web access URL:	http://demo.opencrx.org/opencrx-core-CRX

Root Menu

	Root	Advanced	Simple
Manage Accounts:	☑	☑	☑

Subscriptions

		Notify on		
	Is Active	Creation	Replacement	Removal
Account Modifications:	☑	□	□	□
Activity Follow Up Modifications:	☑	□	□	□
Activity Modifications:	☑	□	□	□
Alert Modifications:	☑	□	□	□
Alert Modifications (Jabber):	□	□	□	□
Alert Modifications (Twitter):	□	□	□	□
Booking Modifications:	☑	□	□	□
Competitor Modifications:	☑	□	□	□

Figure 17: New user guest – step 6

- Click [**Close**] to leave the wizard.

The wizard User Settings creates a user group **<username>.Group**, in the above case **guest.Group**. The primary user group of the user guest was automatically set to this new user group guest.Group.

If you want to change the primary user group to anything else or if you ever must reset a user (lost password, etc.), you can re-execute the operation **Create User** as admin-Standard at any time.

If you want to reset a user without changing the user's password, you can simply leave the password fields empty when recreating the user.

- Logoff as admin-Standard and login as the newly created user (guest in our example)

- Execute the operation **Edit > User Settings** and click [**Save**]. This time (i.e. when executed by the newly created user) the wizard User Settings creates various user-specific/private objects.

For security and consistency purposes creating new users is a 3-phase process:

Phase 1	• The segment administrator (e.g. admin-Standard) executes createUser() and then enters the principal's name) • If the new principal name matches the name of an already existing principal, the new principal is not created and an alert (“CreateUserConfirmationRequest”) is created in all segments the already existing principal has access to.
Phase 2	• The user related to the already existing principal must accept in at least one segment the “CreateUserConfirmationRequest”
Phase 3	• once at least one “ CreateUserConfirmationRequest” has been accepted, the segment administrator can execute createUser() again with the respective principal name; this time the new user (i.e. UserHome) is created

4.1.2 Import Subjects and Application Login Principals

Creating large numbers of subjects/principals by hand can be quite a tedious job. If you prepare a text file containing the appropriate information in the file format as outlined below, the Root administrator (admin-Root) can use the operation Actions > Import Login Principals to create Subjects and Application Login Principals automatically.

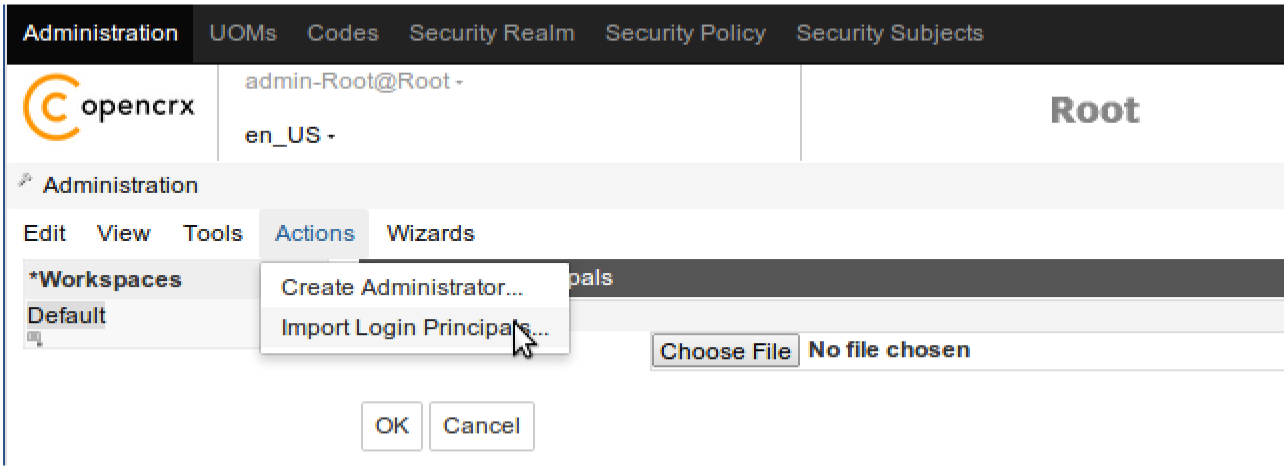


Figure 18: Operation Actions > Import Login Principals (admin-Root)

*Listing 1: File Format **Subjects** and **Application Login Principals***

```
Subject;<subject name>;<subject description>

Principal;<principal name>;<principal description>;<subject name>;<groups>
```

*Listing 2: Example File **Subjects** and **Application Login Principals***

```
Subject;joe;Doe, Joe
Subject;mark;Ferguson, Mark
Subject;peter;Lagerfeld, Peter
Principal;joe;Doe, Joe;joe;Users,Administrators
Principal;mark;Ferguson, Mark;mark;Users
Principal;peter;Lagerfeld, Peter;peter;Users
```

4.1.3 Import Users

Similarly to importing Subjects and Application Login Principals from a file you can also import Users from a file. If you prepare a text file containing the appropriate information in the file format as outlined below, the Segment administrator (admin-<SegmentName>) can use the operation Actions > Import Users to create Users automatically.

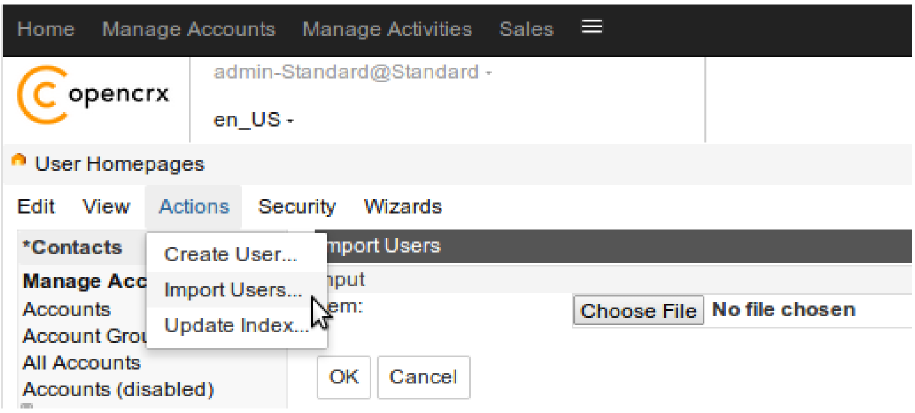


Figure 19: Operation Actions > Import Users (admin-Standard)

Listing 3: File Format ***Users***

```
User;<principal>;<account alias>;<account full name>;<primary group>;<password>[;<groups>[;<email>[;<timezone>]]]
```

Parameter	**Description**
<principal>	required, name of principal
<account alias>	at least one value per user must be provided, i.e. either the alias name of the contact, or then the full name
<account full name>	
<primary group>	optional, default is <principal>.Group
<password>	required, clear text value
<groups>	optional, comma separated list of memberOf principal groups, the user is made a member of each provided principal group
<email>	optional e-mail address, e.g. joe@opencrx.org
<timezone>	optional time zone, e.g. Europe/Zurich

Please note that a "-" value (a dash without the quotes) means empty in the context of a user file. Example: if you don't want to explicitly define a primary group, put a dash – the importer will then create the default primary group <principal>.Group.

Listing 4: Example File ***Users***

```
User;joe;JD;Doe, Joe;Users;2%jOd.IT;MGMT,SALES
User;mark;Fergi;Ferguson, Mark;Users;maFe&.3-;MGMT
User;peter;-;Lagerfeld, Peter;-;PlF*;ReGaL;SALES
```

Important

Contacts are not created automatically; existing Contacts are first searched by <account alias>. If no matching account alias is found, Contacts are search by <account full name>. If still no matching account is found, the UserHome is **not** created.
Users are only imported/created if the referenced Principals exist.

4.2 Disable/Deactivate Users

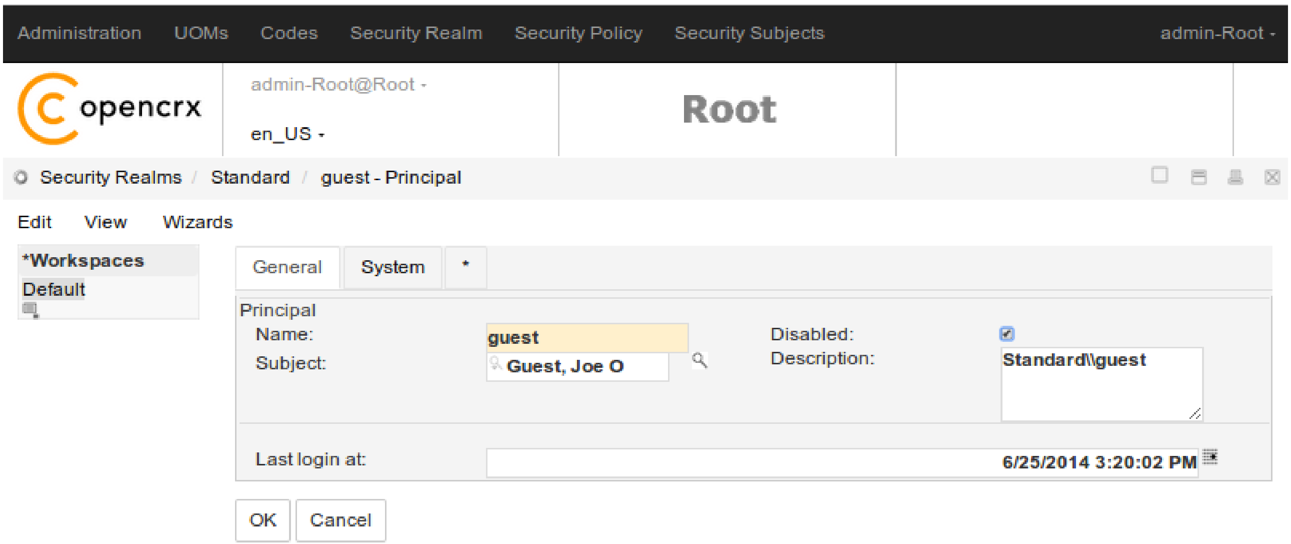
There are various ways of disabling/deactivating users. To fully understand your options it is helpful if you are familiar with the openCRX Login Procedure.

4.2.1 Disable Users at the level Tomcat /Application Server

Depending on the configuration of your application server you can disable users at that level. For example, if you rely on file-based realms, you can simply remove users from the file **tomcat-users.xml** (with Apache Tomcat) or **users.properties** (with JBoss) to prevent access to openCRX. If you block access at the level Tomcat / application server such users are locked out from accessing any application and any openCRX segment. However, as the servlet container's login procedure is not entirely controlled by openCRX you might have to consult the documentation of your respective servlet container (e.g. Tomcat or JBoss) or ask your administrator for details.

4.2.2 Disable Users at the level openCRX

The segment administrator (e.g. admin-Standard) can prevent a user from accessing a particular openCRX segment by either disabling the respective Segment Login Principal or by deleting it altogether. Disabling is the preferred option to prevent access temporarily. If a user has multiple Segment Login Principals you must disable all of them to prevent access to the openCRX application.



Principal

Name:	guest	Disabled:	☑
Subject:	Guest, Joe O	Description:	Standard\\guest
Last login at:	6/25/2014 3:20:02 PM		

*Figure 20: Disabling of Segment Login Principal **guest** by **admin-Standard***

You should **not** delete a particular Subject as long as it is referenced by any Principal. Otherwise you'll end up with "dangling" Subject references.

5 Deployment Scenarios

openCRX supports a multitude of deployment scenarios.

5.1 Typical Deployment Scenarios

The following table lists some of the pros and cons of the most common openCRX deployment scenarios. Please note that the list is by no means complete:

3-Tier with Tomcat/OpenEJB

- Tomcat engine extended by openEJB (lightweight EJB 3.0 implementation) so that EARs with EJBs and WARs can be deployed
- simple setup and management (Server Installer)
- limited scalability and availability (no clustering)
- **highest performing 3-Tier deployment with full transaction service**

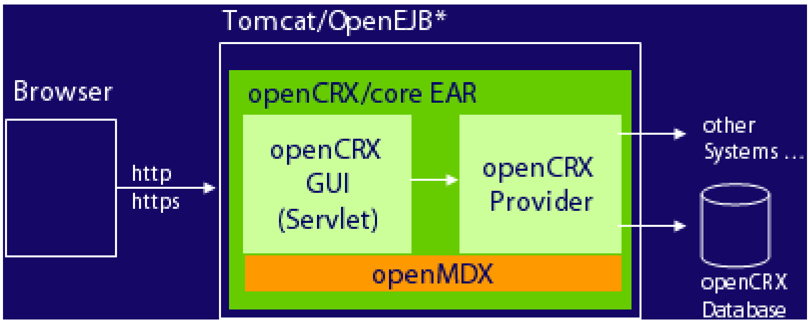


Figure 21: 3-Tier with Apache Tomcat / OpenEJB

4-Tier with Tomcat/OpenEJB

- Multiple Tomcat engines extended by OpenEJB and fronted by load balancer (subsequent session requests are sent to the same Tomcat instance)
- database cluster
- good scalability and availability
- **high performance 4-Tier deployment with full transaction service**

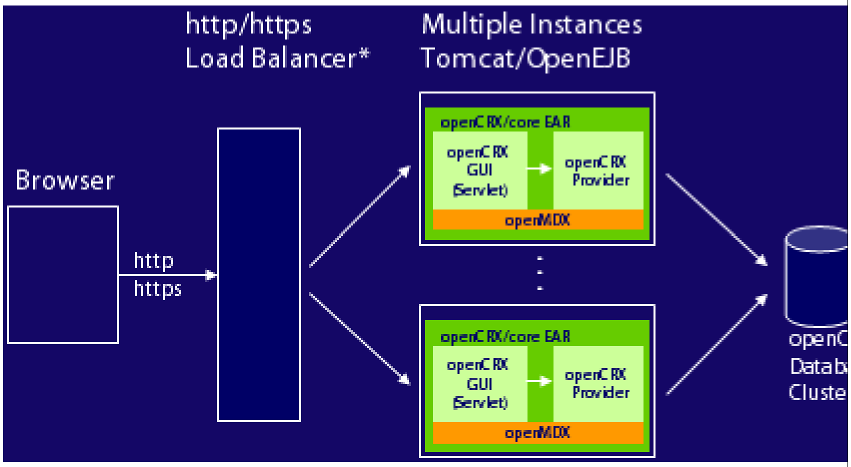


Figure 22: 4-Tier with multiple Tomcat / OpenEJB instances

3-Tier with AppServer

- J2EE-compliant Application Server (JBoss is supported out of the box)
- simple setup and management (one application server)
- limited scalability and availability (no clustering)
- Transaction Service

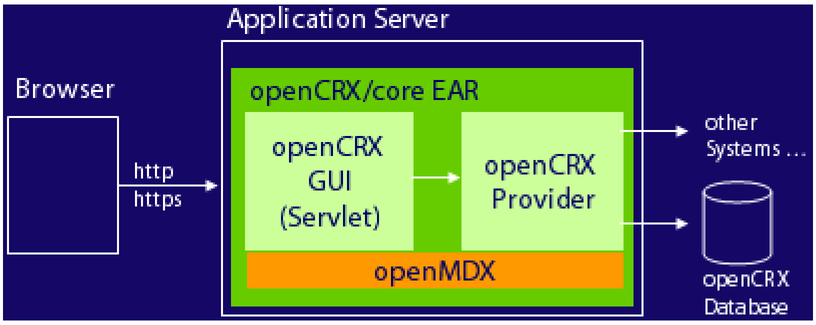
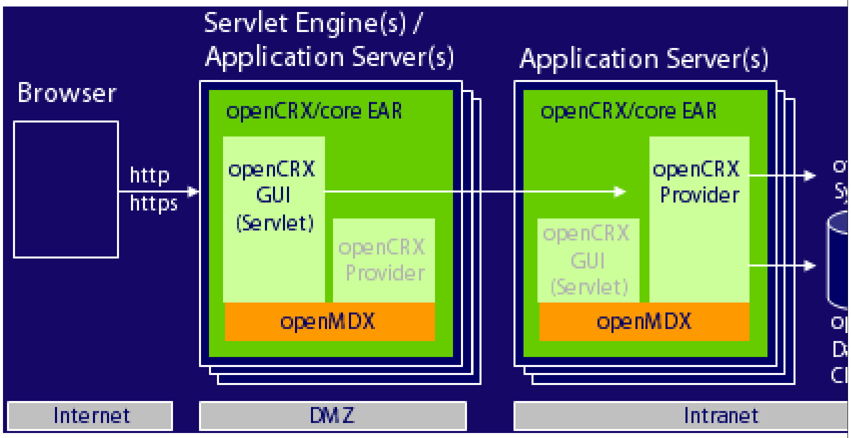


Figure 23: 3-Tier with J2EE-compliant Application Server

4-Tier with Clusters	 Servlet Engine(s) / Application Server(s) Application Server(s) Browser http https openCRX/core EAR openCRX GUI (Servlet) openCRX Provider openMDX openCRX/core EAR openCRX Provider openCRX GUI (Servlet) openMDX o Sy o D Cl Internet DMZ Intranet *Figure 24: 4-Tier with Clustered Application and DB Servers*
■demanding setup (four and more application servers) ■multiple security zones for **highest security** (Internet, DMZ, Intranet) ■**maximum availability** ■**fully fault tolerant** ■**unlimited scalability** ■Transaction Service	

5.2 Multi Entity Deployment Scenarios

The open source MDA platform openMDX supports a multitude of deployment scenarios and persistency configurations. The most common multi entity deployment scenarios are discussed in the following sections.

5.2.1 Multiple Data Segments in a single DB

The setup "Multiple Data Segments in a single DB" provides adequate security for many use cases and is relatively easy to manage. As all the data is stored in a single database, however, security configuration mistakes (e.g. principals linked to the wrong subject, etc.) might lead to situations where a user is granted access to the data of a particular company/client that should not be accessible (please note that **human error** is the real root cause here, not a malfunction of openCRX). Furthermore, this setup is not recommended if users can get direct access to the database, e.g. with third party reporting tools as those tools typically bypass the openCRX API (and hence openCRX security)!

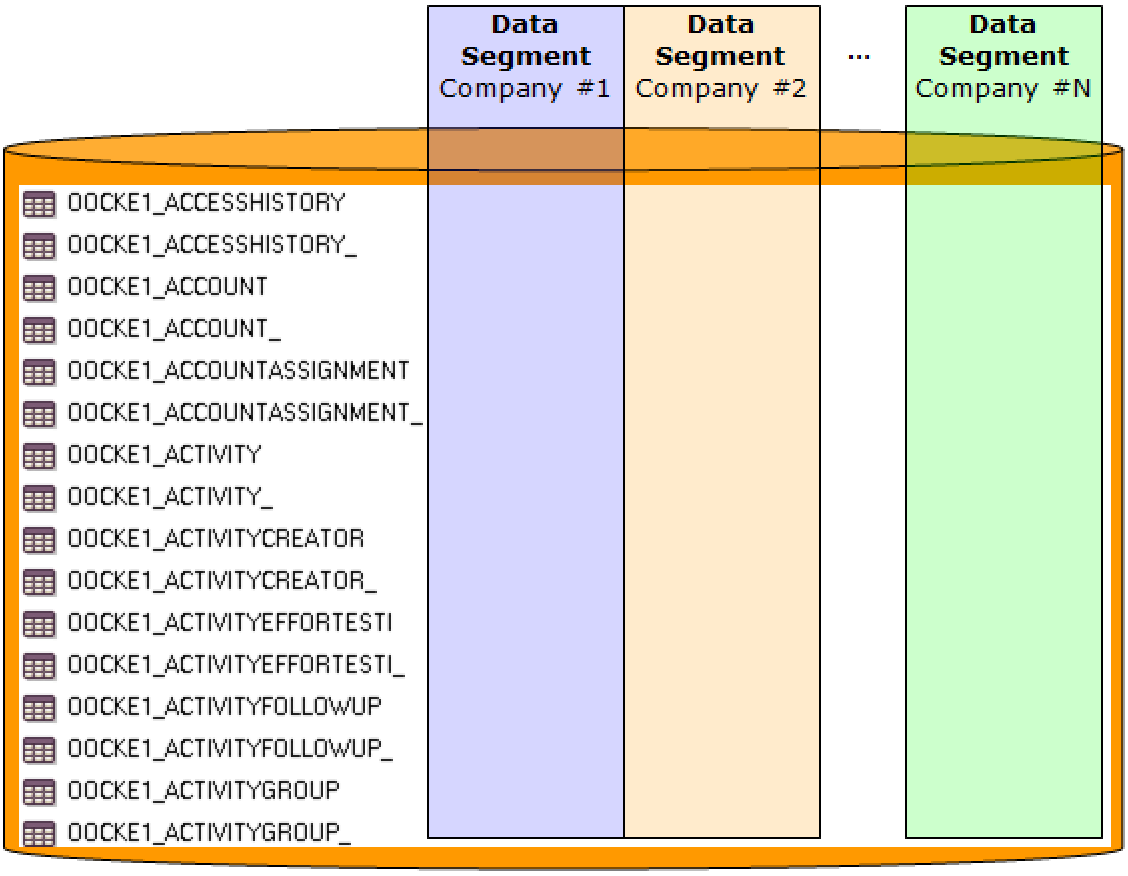


Figure 25: Multiple Data Segments in a single DB

5.2.2 Multiple DBs

The highest level of security is provided by setting up a dedicated database for each entity so that data sets of the various entities are physically separated:

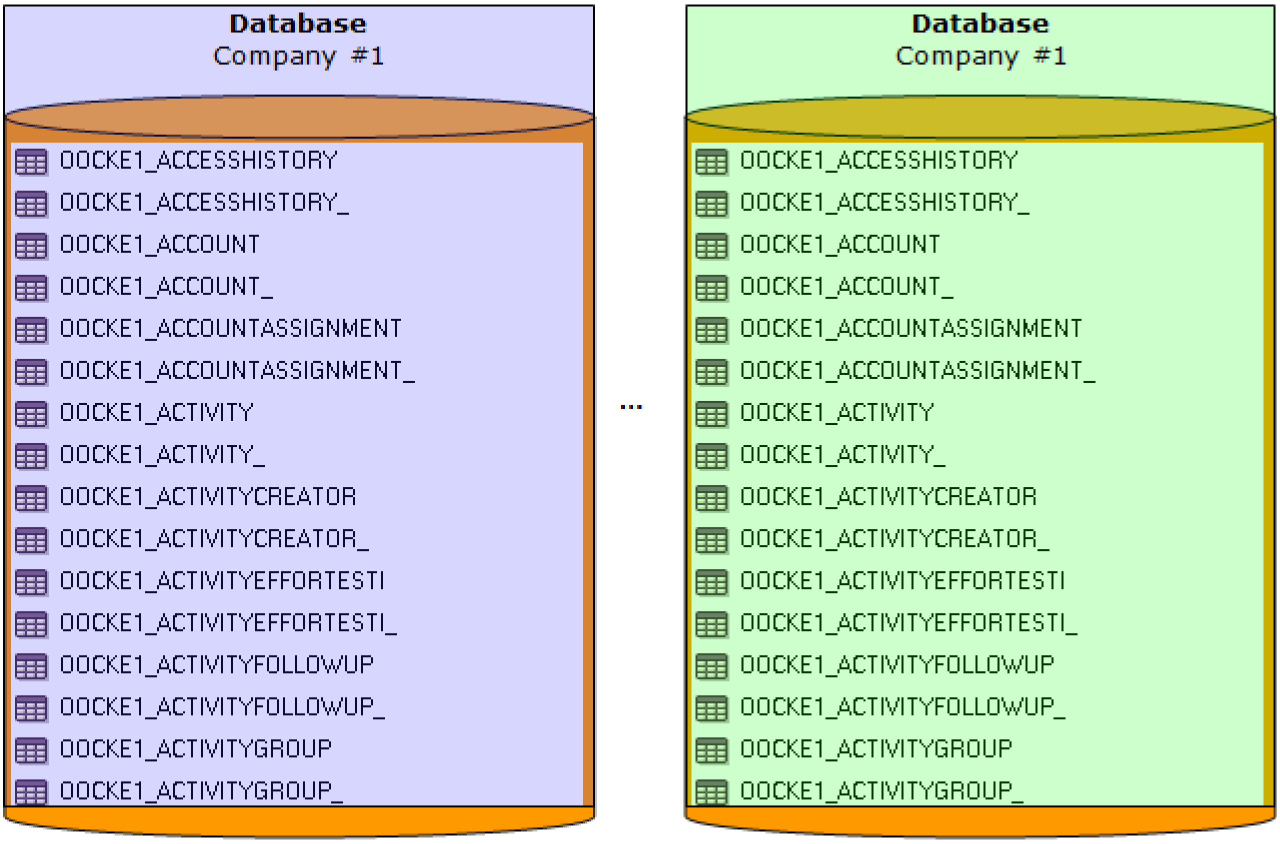


Figure 26: Dedicated DB for each Entity

5.3 openCRX Custom Applications

Information about openCRX custom projects is available from the openCRX wiki, e.g. http://sourceforge.net/p/opencrx/wiki/Sdk213.CustomProject/

6 Workflow Controller and Servlets

With the **Workflow Controller** the openCRX Root administrator (admin-Root) can enable/disable various servlets (configured in **web.xml**) included in the openCRX distribution. This chapter gives an overview over the currently available servlets and explains how to start/stop them.

You can access the Workflow Controller by navigating to the URL

http://127.0.0.1:8080/opencrx-core-CRX/WorkflowController

or starting the Workflow Controller Wizard as shown in the figure below:

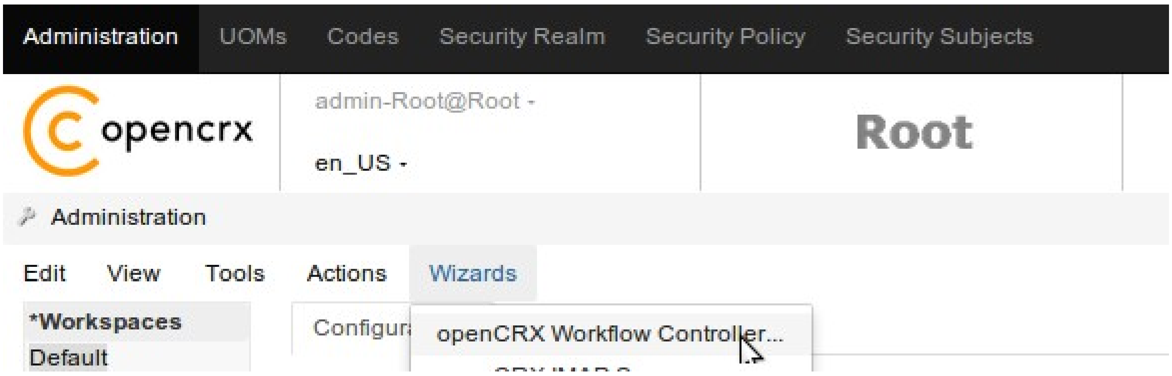
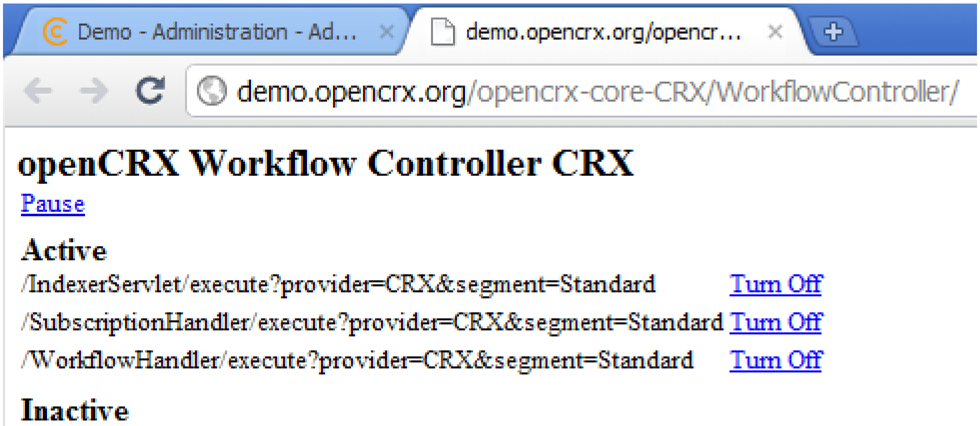


Figure 27: Accessing the openCRX Workflow Controller

You should **connect to the Workflow Controller with http**. If you use SSL-secured connections to start/stop servlets you must ensure that your server's certificate is available in cacerts.

The following figure shows the Workflow Controller of openCRX 2.13.0:


Demo - Administration - Ad...
demo.opencrx.org/opencr...
demo.opencrx.org/opencrx-core-CRX/WorkflowController/

openCRX Workflow Controller CRX

Pause

Active

/IndexerServlet/execute?provider=CRX&segment=Standard Turn Off

/SubscriptionHandler/execute?provider=CRX&segment=Standard Turn Off

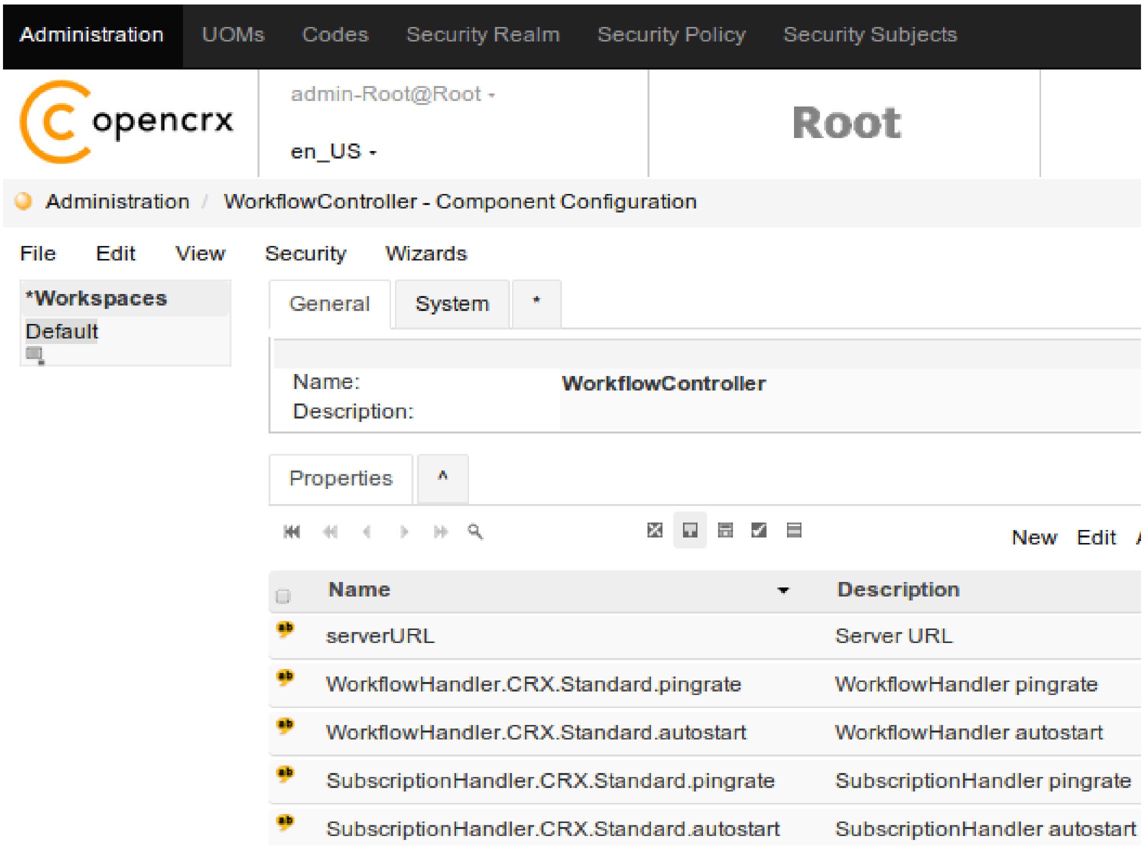
/WorkflowHandler/execute?provider=CRX&segment=Standard Turn Off

Inactive

Figure 28: openCRX 2.13.0 Workflow Controller

Please note that access is granted to the openCRX Root administrator (admin-Root) only. Hence, if you see the openCRX login screen instead of the Workflow Controller you must first login as Root administrator. Also, ensure that openCRX is properly initialized before you connect to the Workflow Controller.

The first time the Workflow Controller is started it will create a default configuration:



Name: WorkflowController
Description:

Name	Description
serverURL	Server URL
WorkflowHandler.CRX.Standard.pingrate	WorkflowHandler pingrate
WorkflowHandler.CRX.Standard.autostart	WorkflowHandler autostart
SubscriptionHandler.CRX.Standard.pingrate	SubscriptionHandler pingrate
SubscriptionHandler.CRX.Standard.autostart	SubscriptionHandler autostart

Figure 29: Default Configuration of WorkflowController

If you ever need to recreate this default configuration, you can do so with the following steps:

- stop the WorkflowController
- delete the Configuration with the name WorkflowController
- start the WorkflowController

You can manually start (stop) servlets that are managed by the Workflow Controller by clicking on "Turn On" ("Turn Off"). Please note that you can control servlets of each segment individually. For example, if you created a segment "OtherSegment" in addition to the segment "Standard" you can start/stop servlets of the segment "OtherSegment" without interfering with the servlets of the segment "Standard".

6.1 Workflow Controller Configuration

In addition to configuring the Startup option of the Workflow Controller you can also configure various options related to the servlets managed by the Workflow Controller. The configuration of the Workflow Controller is available to the openCRX Root administrator (admin-Root) by navigating to the tab [Administration] and then clicking on the icon of the WorkflowController:

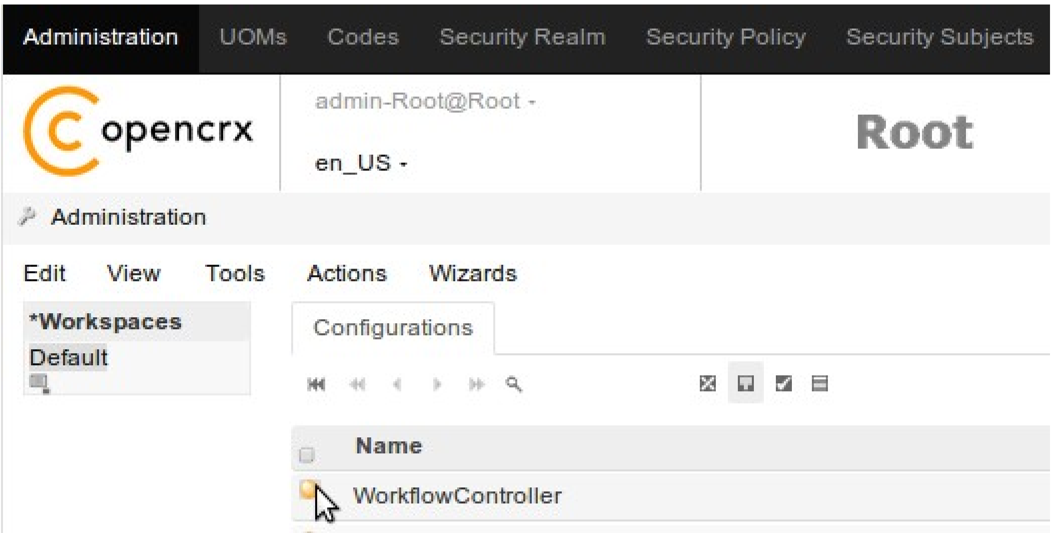


Figure 30: openCRX Administration – WorkflowController

In case you create the WorkflowController configuration manually, please note that both **name** and **qualifier** are equal to the string **WorkflowController**.

6.1.1 Startup Configuration in web.xml

You can start the Workflow Controller ***manually*** by navigating to the URL

http://127.0.0.1:8080/opencrx-core-CRX/WorkflowController

or starting the Workflow Controller Wizard. However, it is also possible to start the Workflow Controller ***automatically*** by activating the corresponding option in the file **web.xml**:

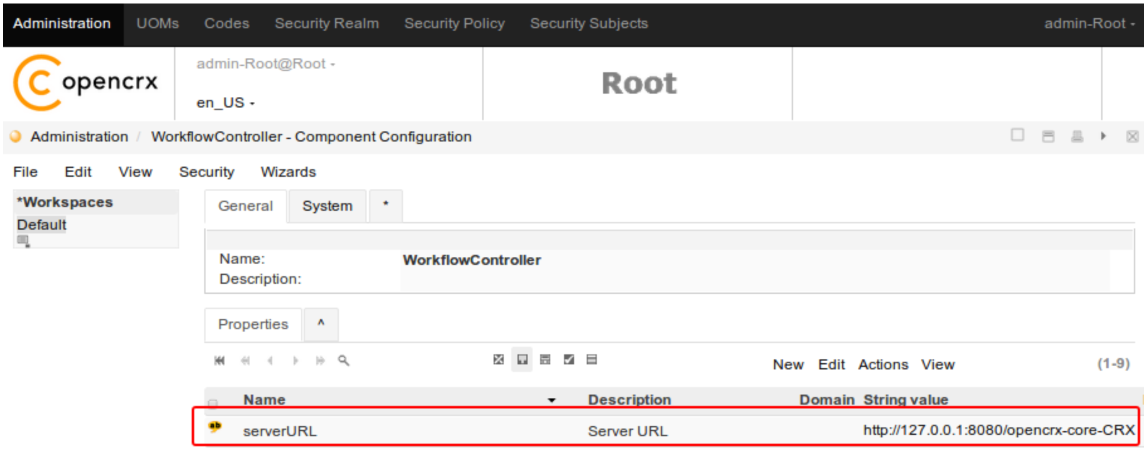
Listing 5: web.xml – auto startup of the Workflow Controller

```
<!-- WorkflowController -->
<servlet id="WorkflowController">
  <servlet-name>WorkflowController</servlet-name>
  <servlet-class>org.opencrx.kernel.workflow.servlet.WorkflowControllerServlet</servlet-class>
  ...
  <!-- activate if WorkflowController should be initialized at startup-->
  <load-on-startup>10</load-on-startup>
</servlet>
```

With the value of **load-on-startup** (10 above) you can control the order of starting up servlets in case there is more than one servlet.

6.1.2 ServerURL

Adapt the value of **serverURL** to your environment:



Name: WorkflowController
Description:

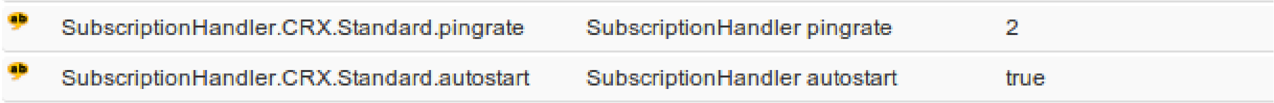
Name	Description	Domain	String value
serverURL	Server URL		http://127.0.0.1:8080/opencrx-core-CRX

Figure 31: Workflow Controller Configuration – serverURL

Use http for serverURL. If you use a nSSL-secured serverURL you must ensure that your server's certificate is available in cacerts.

6.1.3 Handler pingrate and autostart

Use **pingrate** to define the interval (in minutes) between successive calls of the respective handler and **autostart** (true/false) to indicate, whether the respective servlet/handler should be on/off after (re)starting openCRX:



SubscriptionHandler.CRX.Standard.pingrate	SubscriptionHandler pingrate	2
SubscriptionHandler.CRX.Standard.autostart	SubscriptionHandler autostart	true

Figure 32: Workflow Controller Configuration – pingrate and autostart

6.2 Servlet IndexerServlet

The openCRX IndexerServlet updates index entries (used for keyword/index based search) by indexing all objects which do not have an IndexEntry newer than the modification date of the object. The IndexerServlet creates an index by invoking the operation updateIndex() on the object to be indexed.

Please note that indexing can put some heavy load on your database server. Hence, you might consider turning off (or at least lowering the frequency of calling) the IndexerServlet during busy hours.

If you are looking for a way to define advanced schedules for calling the openCRX indexer you might consider cURL in combination with a scheduler provided by your operating system (e.g. Scheduled Tasks on Windows, cron on Linux).

The following example shows how to call the indexer for the provider CRX and the segment Standard:

```
curl "http://localhost:8080/opencrx-core-CRX/IndexerServlet/execute?provider=CRX&segment=Standard"
```

6.3 Servlet SubscriptionHandler

The openCRX SubscriptionHandler is the backbone of the openCRX Subscribe / Notify Services. The Subscription Handler does not require any configuration by the openCRX administrator other than setting the pingrate and autostart options, i.e. it is designed to work "out of the box".

Turning on the SubscriptionHandler of a particular segment is required if you want that segment to provide **Alerts**, **E-mail Notifications**, **Twitter Updates** (see chapter 12.1 Twitter) and **XMPP (Jabber) Messages** to its Users. The polling frequency can be set by the Root administrator (see Figure 32: Workflow Controller Configuration – pingrate and autostart).

The SubscriptionHandler checks openCRX audit entries on a regular basis and – if matching Subscriptions exist – executes the Workflow Process referenced by the Subscription using *Userhome.executeWorkflow()*.

Userhome.executeWorkflow() – implemented by the openCRX plugin – creates an entry in *Userhome.wfProcessInstance* (accessible through the grid Workflow Process Instances). **Synchronous workflows** are executed immediately, **asynchronous workflows** are left alone (the Servlet WorkflowHandler is specialized in dealing with asynchronous workflows – see below for details).

6.4 Servlet DocumentScannerServlet

The DocumentScannerServlet scans a file system directory and its subdirs for files and maps them to openCRX Documents and DocumentFolders. The DocumentScannerServlet is configured in the file **web.xml** as follows:

Listing 6: DocumentScannerServlet – init-param for WorkflowController

```
...
<!-- init-param for WorkflowController -->
<init-param>
  <param-name>path[3]</param-name>
  <param-value>/DocumentScannerServlet</param-value>
</init-param>
...
```

Listing 7: DocumentScannerServlet – Servlet Declaration

```
...
<!-- DocumentScannerServlet -->
  <servlet id="DocumentScannerServlet">
  <servlet-name>DocumentScannerServlet</servlet-name>
  <servlet-class>org.opencrx.application.document.DocumentScannerServlet</servlet-class>
</servlet>
...
```

Listing 8: DocumentScannerServlet – Mapping

```
...
<servlet-mapping>
  <servlet-name>DocumentScannerServlet</servlet-name>
  <url-pattern>/DocumentScannerServlet/*</url-pattern>
</servlet-mapping>
...
```

The servlet can be configured as **admin-Root** by adding entries to the WorkflowControll configuration (see chapter 6.1 Workflow Controller Configuration). The following options are supported:

- **scanDir:** directory to be scanned for documents
- **urlPrefix:** Document revisions are created of type ResourceIdentifier. The url of the resource identifier is set to urlPrefix + current directory name within scanDir + document name
- **groups:** List of principal groups. owningGroup of all created objects is set to the specified list of principal groups
- **upload**: if set to **true**, successfully uploaded documents are removed from the directory

All options are multi-valued, i.e. can have an optional index suffix [0]..[9]. All options must be prefixed with **{Provider name}.{Segment name}**., e.g. CRX.Standard.scanDir or MyProvider.MySegment.urlPrefix.

The openCRX administrator can set the pingrate and autostart options; alternatively, you can call the servlet with cron/cUrl.

6.5 Servlet WorkflowHandler

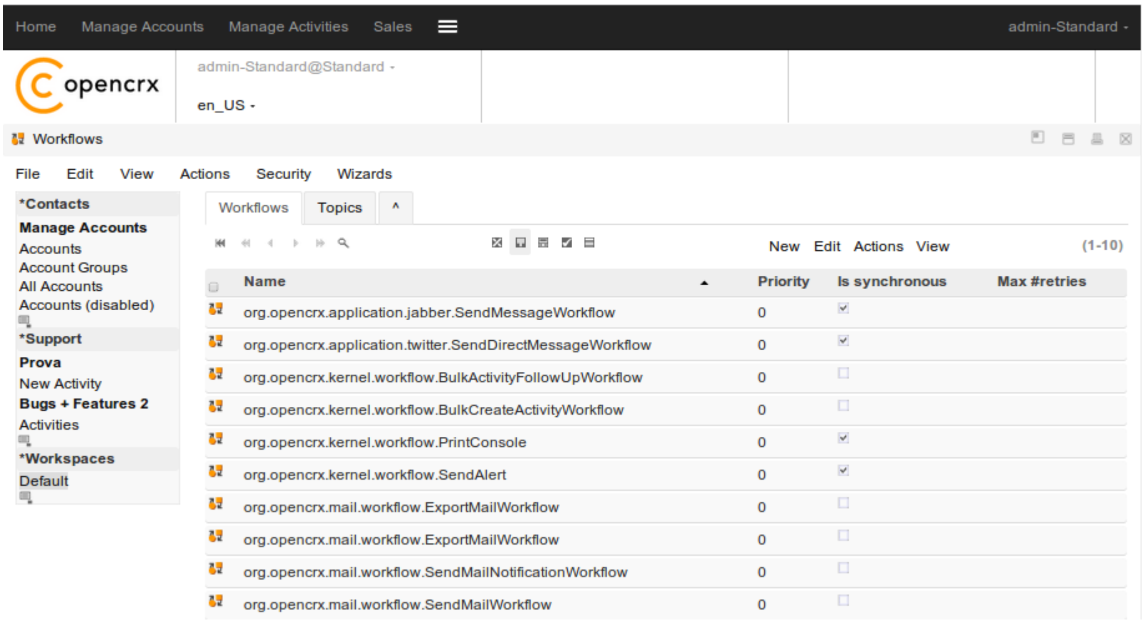
The openCRX WorkflowHandler executes Workflow Process Instances that have not been executed yet, which are based on **asynchronous** WfProcesses like:

- org.opencrx.mail.workflow.ExportMailWorkflow
- org.opencrx.mail.workflow.SendMailNotificationWorkflow
- org.opencrx.mail.workflow.SendMailWorkflow

The execution frequency can be set by the Root administrator (see Figure 32: Workflow Controller Configuration – pingrate and autostart).

Please note that the WorkflowHandler is required for outbound E-Mail Services.

The first time the WorkflowHandler is started it will create various default Workflow Processes:



Name	Priority	Is synchronous	Max #retries
org.opencrx.application.jabber.SendMessageWorkflow	0	☑	
org.opencrx.application.twitter.SendDirectMessageWorkflow	0	☑	
org.opencrx.kernel.workflow.BulkActivityFollowUpWorkflow	0	□	
org.opencrx.kernel.workflow.BulkCreateActivityWorkflow	0	□	
org.opencrx.kernel.workflow.PrintConsole	0	☑	
org.opencrx.kernel.workflow.SendAlert	0	☑	
org.opencrx.mail.workflow.ExportMailWorkflow	0	□	
org.opencrx.mail.workflow.ExportMailWorkflow	0	□	
org.opencrx.mail.workflow.SendMailNotificationWorkflow	0	□	
org.opencrx.mail.workflow.SendMailWorkflow	0	□	

Figure 33: Default Workflow Processes created by WorkflowHandler

If you ever need to recreate these default Workflow Processes, you can do so with the following steps:

- stop the Servlet WorkflowHandler
- delete the Workflow Processes that were originally created by the WorkflowHandler (or at least the ones that still exist)
- start the Servlet WorkflowHandler

All WfProcesses with undefined/unknown runtime length should be defined as asynchronous. This is particularly true for WfProcesses that might block. The default setup ensures that blocking WfProcesses cannot block openCRX.

6.6 Servlet MailImporterServlet

A sample configuration (which you need to adapt to you own environment) of the MailImporterServlet is contained in
TOMCAT_HOME**/apps/opencrx-core-CRX/opencrx-core-CRX/WEB-INF/web.xml**

You also need a ComponentConfiguration named MailImporterServlet. The following configuration options (String Properties) are supported:

- <provider>.<segment>.mailServiceName
- <provider>.<segment>.deleteImportedMessages
- <provider>.<segment>.mailbox

A sample ComponentConfiguration looks as follows:

Name	**Description**	**String value**
CRX.Standard.mailServiceName	Mail service name in web.xml	/mail/provider/CRX
CRX.Standard.deleteImportedMessages	Delete imported messages	false
CRX.Standard.mailbox	Mailbox name	INBOX

To activate the servlet, you also need to add the relevant entries to the WorkflowController (see chapter 6.1 Workflow Controller Configuration).

6.7 Trouble Shooting Servlets

All the openCRX servlets controlled by the Workflow Controller log their actions to the server log file (e.g. TOMCAT_HOME**\log\catalina.<date>.log**). The following log file extract shows, for example, that the three Servlets Indexer-Servlet, SubscriptionHandler, and WorkflowHandler seem to be working fine:

Listing 9: Servlets managed by Workflow Controller log to server.log

```
20:25:18,388 INFO  [STDOUT] Tue Mar 04 20:25:18 CET 2008: Indexer CRX/Standard
20:27:18,400 INFO  [STDOUT] Tue Mar 04 20:27:18 CET 2008: SubscriptionHandler CRX/Standard
20:27:18,400 INFO  [STDOUT] Tue Mar 04 20:27:18 CET 2008: WorkflowHandler CRX/Standard
```

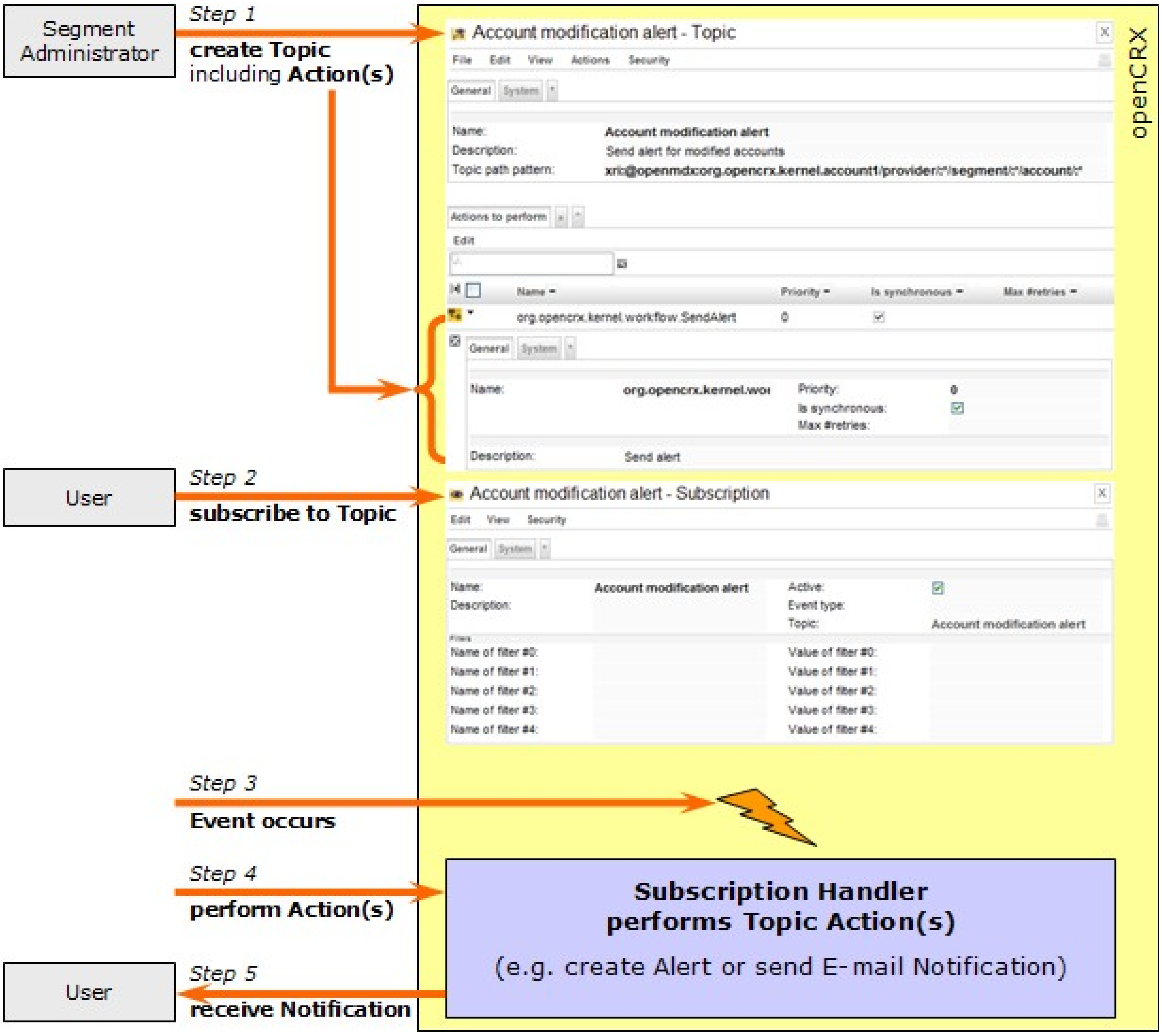
openCRX Exceptions (like NullPointers, etc.), however, are still logged to the application log file as configured during the installation.

It is always worth checking whether the Workflow Handlers actually are active; they must be started by the Root administrator. You can find out by connecting to the Workflow Controller (see *Figure 28: openCRX 2.13.0 Workflow Controller*).

After restarting the application server all servlets managed by the WorkflowController are inactive, i.e. the Root Administrator must explicitly turn them on again (if desired) unless the respective servlet's autostart option is set to true in the WorkflowController's configuration **and** the WorkflowController's Startup option is set to true in the file **web.xml**. The servlets do not automatically resume the state they were in before the application server was shut down.

7 Subscribe / Notify Services

openCRX features a powerful event subscription and notification service:



Account modification alert - Topic

Name: Account modification alert
Description: Send alert for modified accounts
Topic path pattern: xri:@openmdx:org.opencrx.kernel.account1/provider/:*/segment/:*/account/:*

Name	Priority	Is synchronous	Max #retries
org.opencrx.kernel.workflow.SendAlert	0	☑	

Name: org.opencrx.kernel.woı
Priority: 0
Is synchronous: ☑
Max #retries:
Description: Send alert

Account modification alert - Subscription

Name: Account modification alert
Description:
Active: ☑
Event type:
Topic: Account modification alert
Name of filter #0:
Value of filter #0:
Name of filter #1:
Value of filter #1:
Name of filter #2:
Value of filter #2:
Name of filter #3:
Value of filter #3:
Name of filter #4:
Value of filter #4:

Figure 34: Event and Notification Service

Once a topic is created, openCRX users can subscribe to it. Users manage their subscriptions individually on their UserHomes (with the Wizard UserSettings or by editing their subscriptions manually). If a topic has subscribed users and a monitored event occurs then the predefined actions are performed. If the action is set to – for example – creating an alert for subscribed users, then each subscribed user will receive an alert on the UserHome.

Important

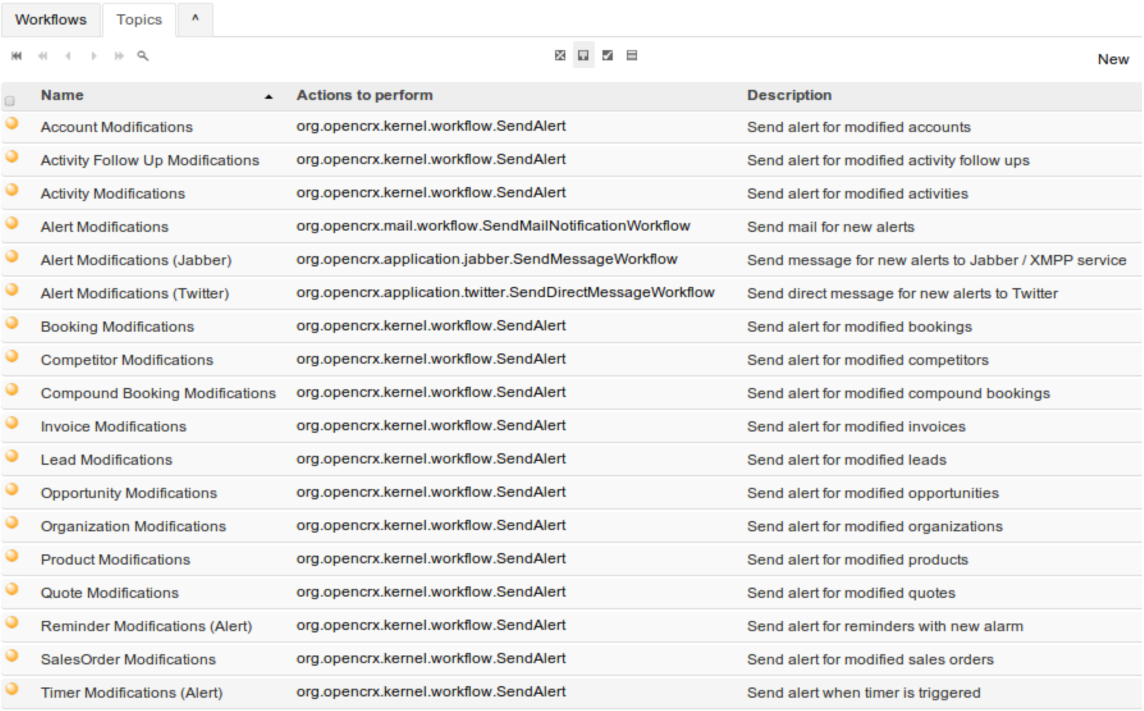
Please note that event and notification services depend on the Servlet SubscriptionHandler, i.e. **you must turn on the openCRX Subscription Handler** for the respective segment with the Workflow Controller, otherwise Topic Actions are not executed, i.e. no Alerts will be created and E-mail Notifications will not be delivered.

Furthermore, outbound E-Mail Services must be configured (see chapter 8.1 Install and Configure Mail Resource and E-Mail Services) and you must activate the Workflow Handler (see chapter 6.5 Servlet WorkflowHandler) to receive E-Mail Notifications.

The openCRX distribution includes quite a few default topics (see *Figure 35: Standard Topics included in the openCRX distribution*) to get you started:

- Topic **Account Modifications** sends an alert to subscribed users whenever an account is modified.
- Topic **Activity Follow Up Modifications** sends an alert to subscribed users whenever a Follow Up of an Activity is modified.
- Topic **Alert Modifications** sends an e-mail notification to subscribed users – assuming outbound e-mail services are configured correctly – whenever an Alert is created/modified.

Please note that newly created Segments do neither contain Workflow Processes nor Topics (i.e. the respective grids are empty). Both Workflow Processes and Topics can be created by the segment administrator with the wizard **Segment Setup**.



Name	Actions to perform	Description
Account Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified accounts
Activity Follow Up Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified activity follow ups
Activity Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified activities
Alert Modifications	org.opencrx.mail.workflow.SendMailNotificationWorkflow	Send mail for new alerts
Alert Modifications (Jabber)	org.opencrx.application.jabber.SendMessageWorkflow	Send message for new alerts to Jabber / XMPP service
Alert Modifications (Twitter)	org.opencrx.application.twitter.SendDirectMessageWorkflow	Send direct message for new alerts to Twitter
Booking Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified bookings
Competitor Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified competitors
Compound Booking Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified compound bookings
Invoice Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified invoices
Lead Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified leads
Opportunity Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified opportunities
Organization Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified organizations
Product Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified products
Quote Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified quotes
Reminder Modifications (Alert)	org.opencrx.kernel.workflow.SendAlert	Send alert for reminders with new alarm
SalesOrder Modifications	org.opencrx.kernel.workflow.SendAlert	Send alert for modified sales orders
Timer Modifications (Alert)	org.opencrx.kernel.workflow.SendAlert	Send alert when timer is triggered

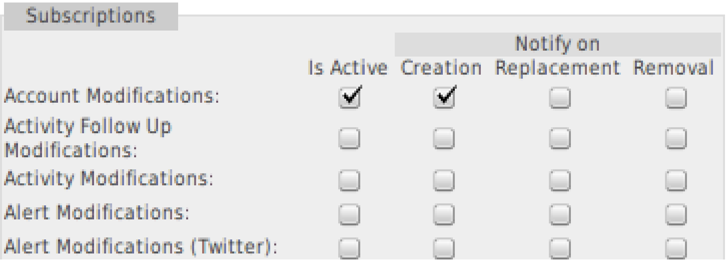
Figure 35: Standard Topics included in the openCRX distribution

Users can easily custom-tailor their subscriptions with filters and by selecting event types like *Object Creation*, *Object Replacement*, and *Object Removal*.

7.1 Example Subscription – Account Modifications

In this example we will create a subscription to the standard Topic Account Modifications for the user “guest”.

- Login as guest, and execute the operation Edit > User Settings to start the respective wizard. Check both “Is Active” and “Creation” as shown below:



Subscriptions

	Is Active	Notify on Creation	Replacement	Removal
Account Modifications:	☑	☑	□	□
Activity Follow Up Modifications:	□	□	□	□
Activity Modifications:	□	□	□	□
Alert Modifications:	□	□	□	□
Alert Modifications (Twitter):	□	□	□	□

Figure 36: Create a new Subscription

- Click the button [Save] to store your settings.

Please note that the Root administrator must start the Subscription Handler – otherwise you will not get any Alerts/Notifications.

7.2 Example Subscription – Activity Assignment Changes

With the following steps you can create a subscription to activity assignment changes:

- navigate to your Userhome and create a new Subscription
- populate the fields as follows:

Name:	Activities assigned to me
Description:	(any description you like)
Active:	checked
Event type:	(leave empty)
Topic:	select Activity Modifications
Name of filter #0:	assignedTo
Value of filter #0:	copy the Identity of the respective user's homepage

- save your subscription

To locate the identity of a user's homepage, you can navigate to the respective homepage and inspect the tab [System]. The pattern is as follows:

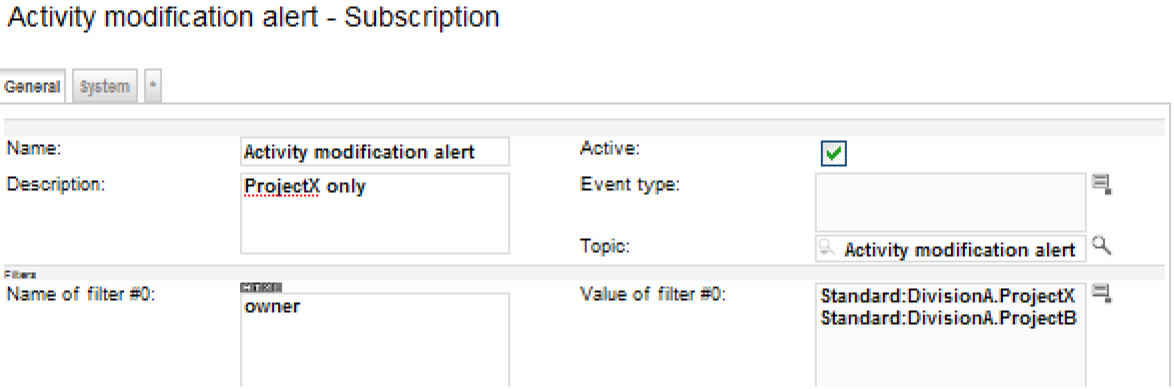
xri://@openmdx*org.opencrx.kernel.home1/provider/<providerName>/segment/<SegmentName>/userHome/<principal>

e.g. xri://@openmdx*org.opencrx.kernel.home1/provider/CRX/segment/Standard/userHome/guest

7.3 Example Subscription with Filtering

In combination with openCRX security the subscription filter feature enables you to provide highly specific subscriptions. Imagine the following situation: there are 2 Activity Trackers **DivisionA:ProjectX** and **DivisionA:ProjectY** and some of your users are interested in receiving notifications related to activities of ProjectX only, whereas some users want to receive notifications related to activities of ProjectY only. A third group of users wants to receive notifications from both projects. Such a situation could be handled as follows:

- create a PrincipalGroups **DivisionA.ProjectX** and **DivisionA.ProjectY**
- assign PrincipalGroup **DivisionA.ProjectX** to ActivityTracker **DivisionA:ProjectX**; like this new activities assigned to this Tracker will also be assigned the PrincipalGroup **DivisionA.ProjectX**
- assign PrincipalGroup **DivisionA.ProjectY** to ActivityTracker **DivisionA:ProjectY**; like this new activities assigned to this Tracker will also be assigned the PrincipalGroup **DivisionA.ProjectY**
- an Activity Modification subscription of a user wanting notifications related to ProjectX **and** ProjectY would look as follows:



Activity modification alert - Subscription

Name:	Activity modification alert	Active:	☑
Description:	ProjectX only	Event type:	
		Topic:	Activity modification alert

Filters

Name of filter #0:	owner	Value of filter #0:	Standard:DivisionA.ProjectX Standard:DivisionA.ProjectB

Figure 37: Create a Subscription with Filters

Enter the name of the attribute (owner in our example) into the name field and then enter the value(s) to match into the value field (in our case Standard:DivisionA.ProjectX and Standard:DivisionA.ProjectY)

Important

Multiple values of a named filter are combined with **OR**.

Multiple named filters are combined with **AND**.

7.4 Trouble Shooting Notification Services

The following table lists some of the common issues and how to fix them:

Problem	Solution
The grids Workflow Processes and/or Topics are empty.	■ verify that the Segment Administrator created Workflow Processes and Topics with the wizard Segment Setup ■ click the filter button ☒ to see all rows without filtering (maybe you defined a default filter in the past?)
I started the Subscription Handler but I never receive any Alerts / Notifications	■ verify that you started the correct Subscription Handler (each segment has its own Subscription Handler) ■ in case you upgraded to a new version of openCRX and forgot to delete Workflows and Topics provided by openCRX, stop the Subscription Handler, delete Workflow Processes and Topics, recreate Workflow Processes and Topics with the wizard Segment Setup, and then start the Subscription Handler again ■ check the openCRX log files to find out whether bad/corrupt data might be causing problems (e.g. NullPointer Exception during Workflow execution)
I receive Alerts triggered by my Subscriptions but no Notification E-mails	■ verify that JavaMail is properly installed and the mail service properly configured (see chapter 8.1 Install and Configure Mail Resource and E-Mail Services for more information) ■ verify your e-mail settings (see E-mail Services) ■ verify that the Servlet WorkflowHandler of the respective segment is actually turned on

8 E-mail Services

Please note that we have **no intention to duplicate mail server (MTA) or mail client (MUA) functionality in openCRX** as there are lots of excellent products available (Open Source and commercial). It is our goal, however, that **openCRX integrates with all the major products that adhere to the major standards and support standard protocols** like SMTP, POP3, IMAP, etc. This ensures that you can continue to use your favorite mail server (qmail, postfix, etc.) and your favorite mail client (Thunderbird, Outlook, etc.).

Important

Installation of JavaMail is required if you want to make use of E-mail Services (see chapter 8.1.1 Installation of JavaMail).

The following figure shows the possible flows of mail messages between openCRX, mail server, and mail client as it is supported with openCRX 2.13.0:

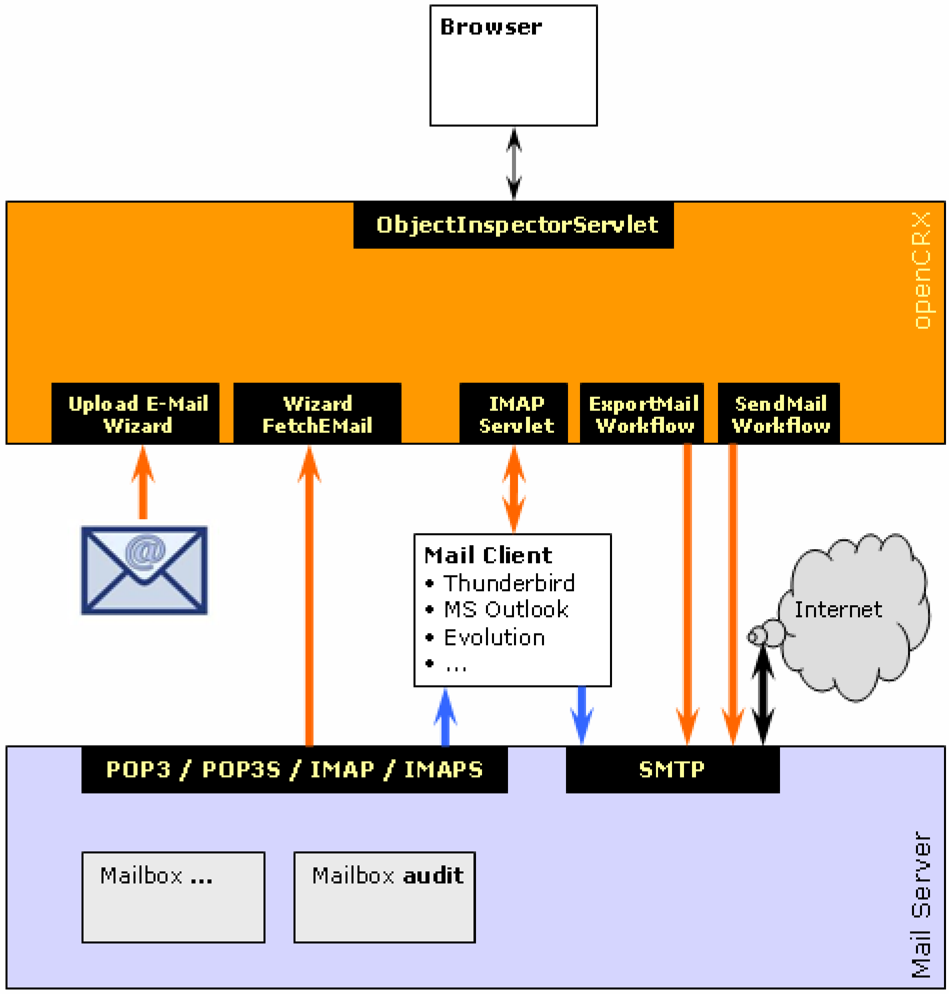


Figure 38: Flow of e-mail messages between openCRX, MTA and MUA

In this chapter we will first guide you through the required installation and configuration steps before we discuss various important use cases.

8.1 Install and Configure Mail Resource and E-Mail Services

The following chapters explain how to install JavaMail and how to configure the Java mail service and various in- and outbound E-mail services.

Please note that **E-Mail Services depend on JavaMail** (i.e. JavaMail must be installed) and outbound E-Mail Services depend on the Servlet WorkflowHandler of the respective segment being turned on.

8.1.1 Installation of JavaMail

Detailed installation instructions are provided at the JavaMail home:

http://www.oracle.com/technetwork/java/javamail/faq/index.html

And here is the short version:

- Download JavaMail (at least version 1.5.2) from https://java.net/projects/javamail/downloads
- Put **mail.jar** (or **javax.mail.jar**) into the directory TOMCAT_HOME**\lib**

If you have an installation based on our Server Installer, remove **geronimo-javamail_1.4_mail-*.jar**, which is part of the original TomEE distribution and replace it with mail.jar (or javax.mail.jar).

8.1.2 Mail Resource for openCRX on Apache Tomcat

8.1.2.1 Add resource definition(s) to openejb.xml / tomee.xml

Open the file TOMCAT_HOME**\conf\tomee.xml** (with older versions the file is called **openejb.xml**) and add (or modify) the mail resource definition. Typically you would add one (smtp) mail resource definition per provider for outgoing mail and one mail resource definition for each segment that requires the MailImporterServlet. Below are some sample files which you can use as a starting point (adapt the highlighted strings to your own environment):

*Listing 10: File **tomee.xml/openejb.xml – mail resource outgoing mail***

```
...
<Resource id="mail/provider/CRX" type="javax.mail.Session">
  mail.transport.protocol smtp
  mail.smtp.user crx_mail_user
  mail.smtp.password crx_mail_user_password
  mail.smtp.starttls.enable true
  mail.smtp.ssl.trust *
  mail.smtp.auth true
  mail.smtp.host mail_server_name_or_ip_address
  mail.smtp.port 25
  mail.from noreply@opencrx.org
  mail.debug true
</Resource>
...
```

Please note that the above mail resource definition for provider “CRX” will apply to all segments (including “Standard”) of that provider.

Make sure that you set **mail.from** to a reasonable value as this value might be used in outgoing mails (see also chapter 8.2.3 Outgoing E-mail's FROM value).

If you set the option mail.smtp.ssl.trust to "*" then any smtp server will be trusted, even if you didn't import its certificate into your keystore. It is probably a good idea to replace * with the name of your mail server, e.g. mysmtp.mydomain.com.

The following mail resource definitions apply to the segment "Standard" (of the provider "CRX") and show default configurations for the various mail protocols supported by mail.jar (pop3, pop3s, imap and imaps):

*Listing 11:File **tomee/openejb.xml – mail resource incoming mail POP3***

```
<Resource id="mail/CRX_Standard" type="javax.mail.Session">
  mail.store.protocol pop3
  mail.pop3.host mail_server_name_or_ip_address
  mail.pop3.port 110
  mail.pop3.auth true
  mail.pop3.user crx_mail_user
  mail.pop3.password crx_mail_user_password
  mail.debug true
</Resource>
```

*Listing 12:File **tomee/openejb.xml – mail resource incoming mail POP3S***

```
<Resource id="mail/CRX_Standard" type="javax.mail.Session">
  mail.store.protocol pop3s
  mail.pop3s.host mail_server_name_or_ip_address
  mail.pop3s.port 995
  mail.pop3s.auth true
  mail.pop3s.user crx_mail_user
  mail.pop3s.password crx_mail_user_password
  mail.debug true
</Resource>
```

*Listing 13: File **tomee/openejb.xml – mail resource incoming mail IMAP***

```
<Resource id="mail/CRX_Standard" type="javax.mail.Session">
  mail.store.protocol imap
  mail.imap.host mail_server_name_or_ip_address
  mail.imap.port 143
  mail.imap.auth true
  mail.imap.user crx_mail_user
  mail.imap.password crx_mail_user_password
  mail.debug true
</Resource>
```

*Listing 14:File **tomee/openejb.xml – mail resource incoming mail IMAPS***

```
<Resource id="mail/CRX_Standard" type="javax.mail.Session">
  mail.store.protocol imaps
  mail.imaps.host mail_server_name_or_ip_address
  mail.imaps.port 993
  mail.imaps.auth true
  mail.imaps.user crx_mail_user
  mail.imaps.password crx_mail_user_password
  mail.debug true
</Resource>
```

Additional configuration options are available from the JavaMail FAQ: http://www.oracle.com/technetwork/java/javamail/faq/index.html

8.1.2.2 Mail Resource in web.xml

In the file **web.xml** in the directory <Tomcat Install Dir>\apps\opencrx-core-CRX\opencrx-core-CRX\WEB-INF you must uncomment the following section to activate outgoing mail:

Listing 15: Uncomment mail resource definition ***(outgoing mail)*** *in* ***web.xml***

```
...
<!-- Wizards, Workflows (e.g. MailWorkflow), etc. can use mail resources.
     Configure a mail resource for each used mail resource.
-->
<resource-ref id="mail_opencrx_CRX">
  <res-ref-name>mail/provider/CRX</res-ref-name>
  <res-type>javax.mail.Session</res-type>
  <res-auth>Container</res-auth>
</resource-ref>
...
```

Important

Please note that the **res-ref-name** must match the **id** of the respective mail resource definition in the file **openejb.xml**. (**tomee.xml** since TomEE v1.0).

The following steps are only required if you want to activate incoming mail (i.e. MailImporterServlet) for a particular segment (e.g. "Standard"):

- add mail resource definition to web.xml:

  Listing 16: add mail resource definition ***(incoming mail)*** *in* ***web.xml***

```
...
<!-- incoming mail for provider CRX segment Standard -->
<resource-ref id="mail_opencrx_CRX_Standard">
  <res-ref-name>mail/CRX_Standard</res-ref-name>
  <res-type>javax.mail.Session</res-type>
  <res-auth>Container</res-auth>
</resource-ref>
...
```

- add a path entry for the MailImporterServlet to the WorkflowController section in web.xml:

  Listing 17: add path name of MailImporterServlet to ***web.xml***

```
...
<!-- WorkflowController -->
<servlet id="WorkflowController">
  <servlet-name>WorkflowController</servlet-name>
  <servlet-class>org.opencrx.kernel.workflow.servlet.WorkflowControllerServlet</servlet-class>
  ...
  <init-param>
    <param-name>path[3]</param-name>
    <param-value>/MailImporterServlet</param-value>
  </init-param>
  <!-- activate if WorkflowController should be initialized at startup -->
  <load-on-startup>10</load-on-startup>
</servlet>
...
```

- add the class name of the MailImporterServlet to web.xml:

  *Listing 18: add class name of MailImporterServlet to **web.xml***

```
...
<!-- IndexerServlet -->
<servlet id="IndexerServlet">
  <servlet-name>IndexerServlet</servlet-name>
  <servlet-class>org.opencrx.kernel.workflow.servlet.IndexerServlet</servlet-class>
</servlet>
<!-- MailImporterServlet -->
<servlet id="MailImporterServlet">
  <servlet-name>MailImporterServlet</servlet-name>
  <servlet-class>org.opencrx.application.mail.importer.MailImporterServlet</servlet-class>
</servlet>
...
```

- add the servlet mapping of the MailImporterServlet to web.xml:

  *Listing 19: add servlet mapping of MailImporterServlet to **web.xml***

```
...
<servlet-mapping>
  <servlet-name>IndexerServlet</servlet-name>
  <url-pattern>/IndexerServlet/*</url-pattern>
</servlet-mapping>
<servlet-mapping>
  <servlet-name>MailImporterServlet</servlet-name>
  <url-pattern>/MailImporterServlet/*</url-pattern>
</servlet-mapping>
...
```

Important

See also chapter 6.6 Servlet MailImporterServlet for important information about the MailImoprterServlet.

Restart Tomcat for these changes to become active. Please note that additional steps are required to fully configure the MailImporterServlet (see chapter 8.3.4 Inbound E-mail with MailImporterServlet).

If you want to enable TLS/SSL connections to your mail server (smtp, pop3s, imaps) you must either set the value of **mail.smtp.ssl.trust** in openejb.xml (tomee.xml) or you **must** import the mail server's public key into the file cacerts of your JRE:

*Listing 20: Importing certificate into keystore **cacerts***

```
keytool -keystore cacerts -import -storepass changeit -file mailserver.cer
```

8.2 Outbound E-mail

If you followed the steps in chapter 8.1 Install and Configure Mail Resource and E-Mail Services you should already be able to send e-mail from openCRX using JavaMail (which connects to your mail server). If you are running openCRX on a Linux box you can use command line sendmail (or alternatives provided by postfix, etc.) instead of JavaMail.

8.2.1 Command line sendmail instead of JavaMail

If you add the system property

```
-Dorg.opencrx.usesendmail.{provider.name}=true
```

(e.g. -Dorg.opencrx.usesendmail.CRX.Standard=true for the provider CRX and the segmet Standard) the openCRX MailWorkFlow will use sendmail instead of JavaMail to send e-mails. Please note that you still need to deploy mail.jar (or javax.mail.jar); it is required by openCRX to create MIME-messages. However, you don't need to configure a JavaMail resource if this property is set. The openCRX MailWorkFlow will add the following header to outgoing mails:
X-Mailer: //OPENCRX//V2//{provider.name}/{segment.name}

8.2.1.1 Using nullmailer (e.g. with Debian/Ubunut/etc.)

Install/configure nullmailer (http://untroubled.org/nullmailer/) with the following steps:

- sudo apt-get install nullmailer
- configure nullmailer to use your smart MTA as relay by editing the file /etc/nullmailer/remotes, e.g.

```
smtp.domain.org smtp --port=25 --starttls --insecure --user=... --pass=...
```

- sudo service nullmailer reload

8.2.1.2 Using postfix (e.g. with CentOS/etc.)

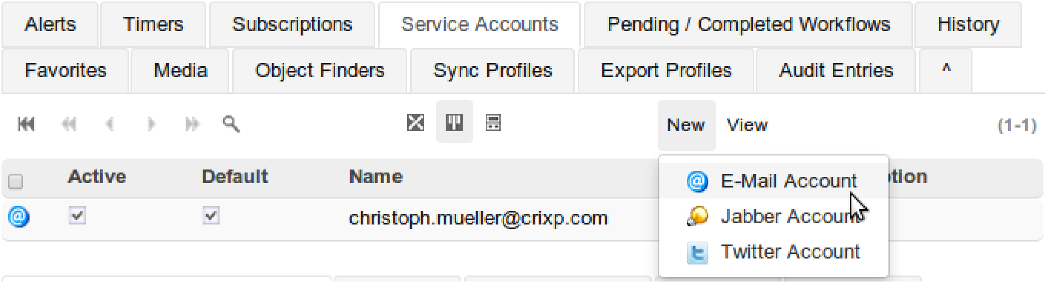
Install/configure postfix and then add the following to postfix's main.cf:

```
# settings for openCRX
myhostname = crxserver.mydomain.org
mydomain = mydomain.org
myorigin = $mydomain
masquerade_domains = $mydomain
#Set the relayhost to the smart SMTP server (port 25 or port 587)
relayhost = mailserver.mydomain.org:25
#Set the TLS options (if required)
smtp_tls_security_level = may
smtp_tls_mandatory_protocols = TLSv1
smtp_tls_mandatory_ciphers = high
smtp_tls_secure_cert_match = nexthop

#Check that this path exists -- these are the certificates used by TLS
smtp_tls_CAfile = /etc/pki/tls/certs/ca-bundle.crt
#Set the sasl options (if required)
smtp_sasl_auth_enable = yes
smtp_sasl_password_maps = hash:/etc/postfix/sasl_passwd
smtp_sasl_security_options = noanonymous
```

8.2.2 Outbound E-mail Configuration

openCRX users can configure e-mail accounts on their homepage indicating where they would like to receive e-mail notifications (e.g. generated by subscriptions):

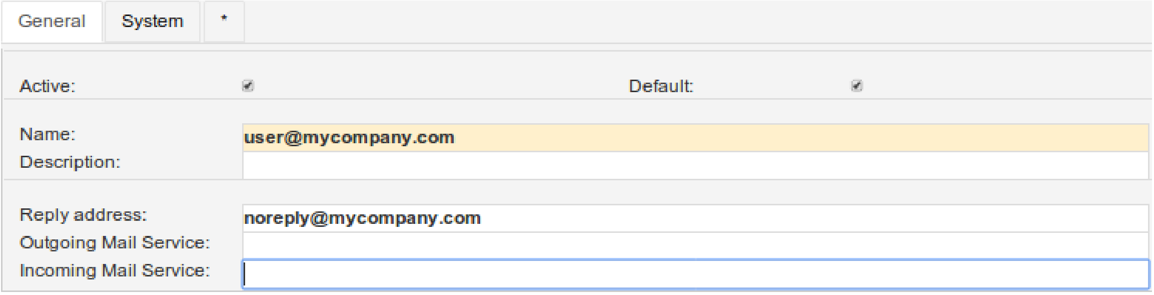
- Click on Home and select the grid Tab Service Accounts (you might have to click on [>>] to expand the hidden grid tabs).
- Next you click on the creator menu New > E-Mail Account to create a new E-mail Account:



□	Active	Default	Name	tion
@	☑	☑	christoph.mueller@crixp.com	

Figure 39: Create a new E-Mail Account – step 1

- Now you can configure your E-Mail Account for outbound e-mail service:



Active: ☑ Default: ☑

Name: user@mycompany.com

Description:

Reply address: noreply@mycompany.com

Outgoing Mail Service:

Incoming Mail Service:

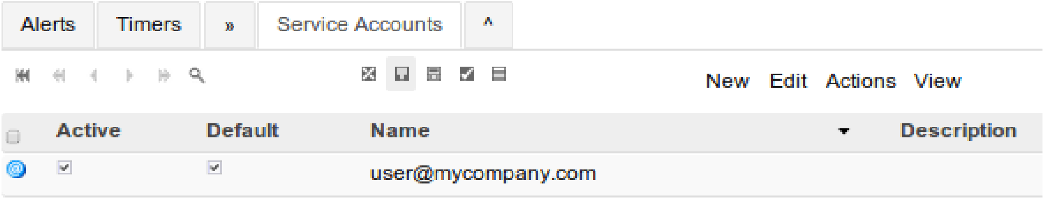
Figure 40: Create a new E-Mail Account – step 2

The various fields have the following meanings:

- **Name**: enter your e-mail address
- **Reply address**: is also used for the From field (leave empty to use the value of the segment admin's E-Mail Account)
- **Default**: check if this is your default e-mail address (notifications will only be sent to your default e-mail address)
- **Outgoing Mail Service**: leave empty (unless the default configuration does not suit you; the default name of the mail service is /mail/provider/<provider>)
- **Incoming Mail Service**: leave empty (unless the default configuration does not suit you; the default name of the mail service is /mail/<provider>_<segment>)

If a user does not define the name of the mail service in his E-Mail Account settings the default name /mail/provider/<provider>/segment/<segment> is used; if there is no resource with this name the fallback name /mail/provider/<provider> is used (and if this name does not exist either, then an error is logged).

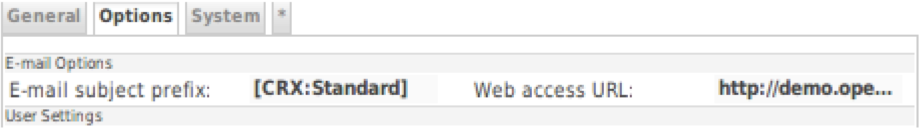
- Click the button [New] to commit the new E-Mail Account. The grid Service Accounts contains an entry for the new E-Mail Account:



□	Active	Default	Name	Description
@	☑	☑	user@mycompany.com	

Figure 41: Create a new E-Mail Account – step 3

- On your Homepage you can provide additional information related to E-Mail Notifications:



E-mail Options
E-mail subject prefix: [CRX:Standard] Web access URL: http://demo.ope...
User Settings

Figure 42: E-mail subject prefix and Web access URL

The meaning of the two fields is as follows:

  - **E-mail subject prefix**: enter a string that might help you identify or filter e-mails from your openCRX server (optional, i.e. you can also leave this empty) – the entered string is prepended to the subject line of generated e-mails.
  - **Web access URL**: enter the URL of the openCRX instance at hand, e.g. http://opencrx.yourdomain.com/opencrx-core-CRX; if entered correctly, generated e-mails will contain URLs that allow you to connect to your openCRX server with a single click.

You can easily test your e-mail settings if you create a subscription for Account Modifications (see Example Subscription – Account Modifications) and then work through the following steps:

- create a new account (e.g. a new contact)
- navigate to your Homepage and check whether you actually received an alert related to the newly created account
- next click on the Grid Tab Pending / Completed Workflows on your homepage (unhide it by clicking on [>>] if it is not visible)
- there should be (at least) two entries (you might have to sort the column Started on to locate recent entries):

  - org.opencrx.kernel.workflow.SendAlert (which generated the Alert)
  - org.opencrx.mail.workflow.SendMailNotificationWorkflow (which was responsible for sending the E-mail Notification)
- click on the icon of the respective grid icon to inspect the corresponding Workflow Process object
- the grid Action Log Entries contains the message body of the e-mail that was sent or an error message if the workflow failed (please note that even if you see a "timeout" error message the e-mail might have been sent; timeouts are typically caused by e-mail servers with high latency – try sending out notifications through a mail server that is responsive).

8.2.3 Outgoing E-mail's FROM value

The openCRX Workflow Handler uses the **mail.from** value in the file **openejb.xml** / **tomee.xml** (see chapter 8.1.2.1 Add resource definition(s) to openejb.xml / tomee.xml).

If mail is sent as an openCRX user, the FROM value of outgoing e-mails is determined as follows:

- if the user has configured an E-Mail Account for outbound e-mail service and the value of **Reply Address** is set (see chapter 8.2.2 Outbound E-mail Configuration, Figure 40: Create a new E-Mail Account – step 2), then this value is used; otherwise
- if the segment administrator has configured an E-Mail Account for outbound e-mail service and the value of **Reply Address** is set, then this value is used; otherwise
- if the **mail.from** value in the file **openejb.xml** / **tomee.xml** (see chapter 8.1.2.1 Add resource definition(s) to openejb.xml / tomee.xml) is set, then this value is used; otherwise
- the value noreply@localhost is used

Important

Please note that many mail servers reject incoming mails if the hostname contained in an e-mail's FROM value cannot be resolved. (and FROM: noreply@localhost is very likely to cause delivery issues). Hence, ensure that at least the value in **openejb.xml** / **tomee.xml** makes sense.

8.2.4 Export E-mails

Please refer to chapter 9.5 Mailstore / IMAP.

8.2.5 Send E-mails directly from openCRX

Any openCRX E-Mail Activity can be sent as e-mail directly from openCRX:

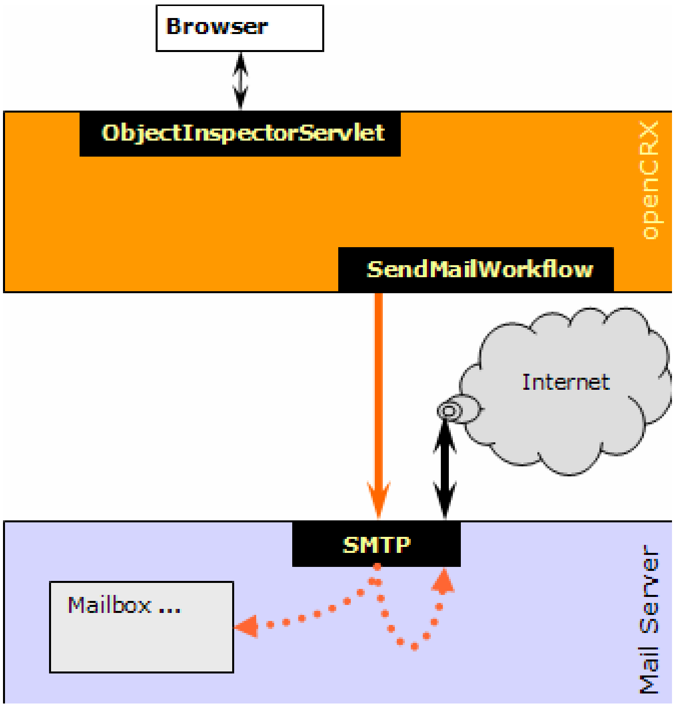
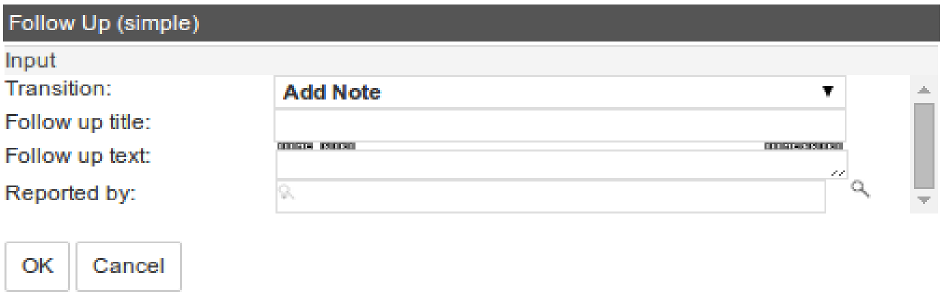


Figure 43: Send E-Mail from openCRX – Overview

The idea behind this functionality is less that you will use openCRX as a mail client (MUA), rather the SendMailWorkflow is an important element of the openCRX campaign management functionality. E-Mail Activities of type “E-Mails” are controlled by the Activity Process **E-mail Process**. Send E-Mail Activities to all recipients by executing the operation Actions > Follow Up and then selecting the Transition **Send as mail** as shown below:



Follow Up (simple)

Input

Transition: Add Note

Follow up title:

Follow up text:

Reported by:

Figure 44: Send E-Mail from openCRX with Actions > Follow Up

Please note that the transition “Send as mail” is only available after the Transition “Assign” has been executed.

Media attached to E-Mail Activities are sent as e-mail attachments.

8.2.6 Send E-mails as Attachments to your Mail Client

Any openCRX E-Mail Activity can be sent as an attachment to an e-mail. The idea behind this functionality is that you might want to put some finishing touches on an e-mail before you actually send it from your mail client (MUA):

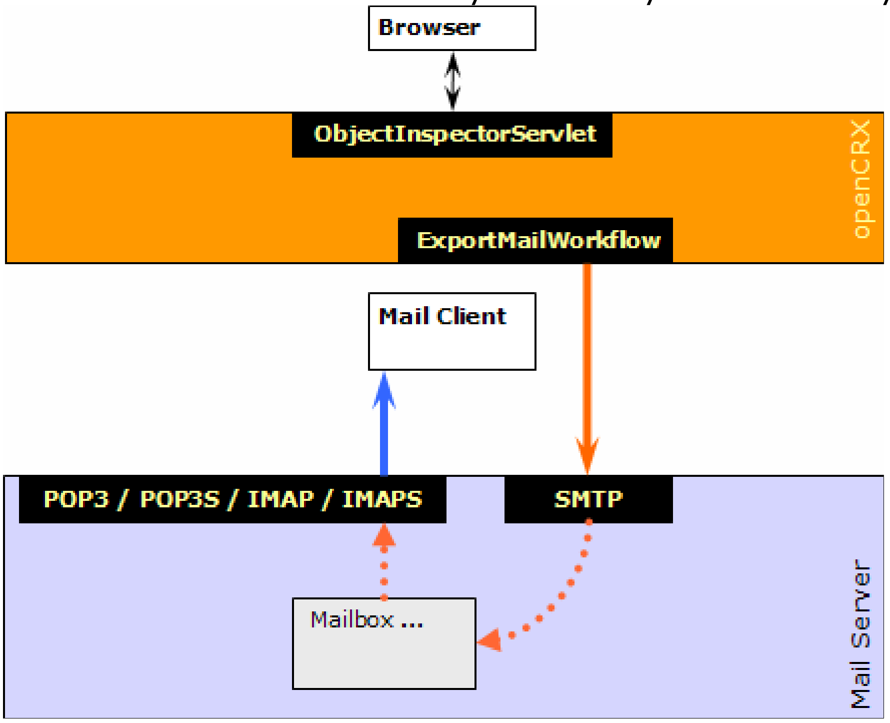
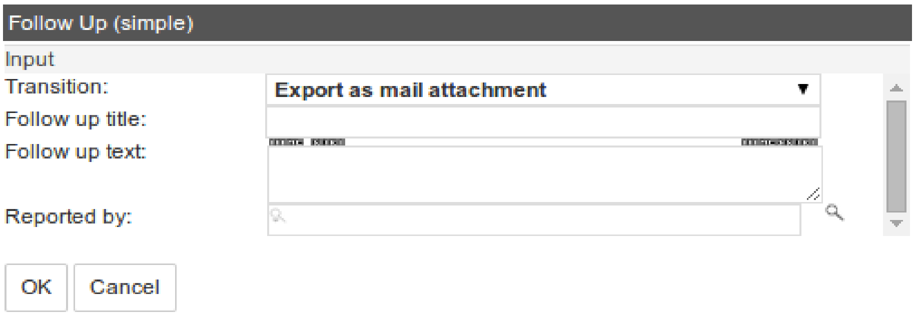


Figure 45: Send E-Mail as Attachment from openCRX – Overview

E-Mail Activities of type “E-Mails” are managed by the standard Activity Process **E-mail Process**, i.e. they can be exported to the user's default mail account by executing the operation Actions > Follow Up and then selecting the Transition **Export as mail attachment**:



Follow Up (simple)

Input

Transition: Export as mail attachment

Follow up title:

Follow up text:

Reported by:

Figure 46: Export E-Mail from openCRX with Actions > Follow Up

Important

Please note that the transition “Export as mail attachment” is only available after the Transition “Assign” has been executed.

Exported messages are sent as attachments to the user's default mail address. See Outbound E-mail Configuration for details.

8.2.7 Send E-mails to Fax-/SMS-Gateways

The SendMailWorkflow supports mail gateways if you set the attribute gateway of the respective e-mail activity. The gateway address is used for addresses which are not of type EmailAddress. For example, in the case of a phone number, the address is converted to an e-mail address as follows:

- take the address (e.g. phoneNumberFull in case of phone numbers)
- remove any characters other than digits and letters
- convert “+” (plus sign) to “_” (underscore)
- append domain part of gateway address

Example: if the domain address of an e-mail activity is set to the email address noreply@fax-gateway.opencrx.org, the phone number +41 (44) 111-2233 is converted to the email address _41441112233@fax-gateway.opencrx.org.

This conversion feature allows you to mix e-mail addresses and phone numbers in member lists of address groups. Depending on the recipient's type of addresss the SendMailWorkflow will either send an e-mail to the listed e-mail address as is (e-mail address) or first convert the recipient's phone number to an e-mail address so that the resulting e-mail can be handled by your fax-/sms-gateway.

If you are looking for reliable fax software, you might want to look into Hylafax+ http://hylafax.sourceforge.net/ (Linux only).

8.3 Inbound E-mail

Instead of offering platform-specific plugins for a multitude of mail clients like MS Outlook, MS Outlook Express, Thunderbird, Eudora, Elm, etc. openCRX features a platform-neutral IMAP adapter. The advantages are obvious:

- works with any IMAP client, or doesn't even require a mail client at all
- no installation of plugins required, i.e. you can get this to work on your company's laptop regardless of how “hardened” the system is
- supports single message import and bulk import
- imports headers, body, and attachments
- automatically creates links to sender and recipient(s) if the respective e-mail addresses are present in openCRX

In addition to the IMAP adapter there is also the possibility to import e-mails (previously saved as files) with a wizard (see Inbound E-mail with Wizard Upload E-Mail) or with the MailImporterServlet (see Inbound E-mail with MailImporterServlet).

8.3.1 Inbound E-mail with IMAP Adapter

The openCRX IMAP adapter is well-suited to import e-mails from your mail client (MUA) into openCRX. Importing an e-mail into openCRX is as easy as dragging/dropping it on an openCRX IMAP folder in your mail client.

Please refer to chapter 9.5 Mailstore / IMAP for information on how to setup/configure the openCRX IMAP adapter and your mail client.

Assuming you have configured your mail client to connect to the openCRX IMAP adapter and subscribed to the relevant folders (openCRX Activity Groups) you can import an e-mail message into openCRX as follows:

- in your e-mail client (e.g. Thunderbird, Outlook, ...) drag/drop the mail to be imported to the desired openCRX IMAP folder (must be a folder with a related activity creator that can actually create e-mail activities)

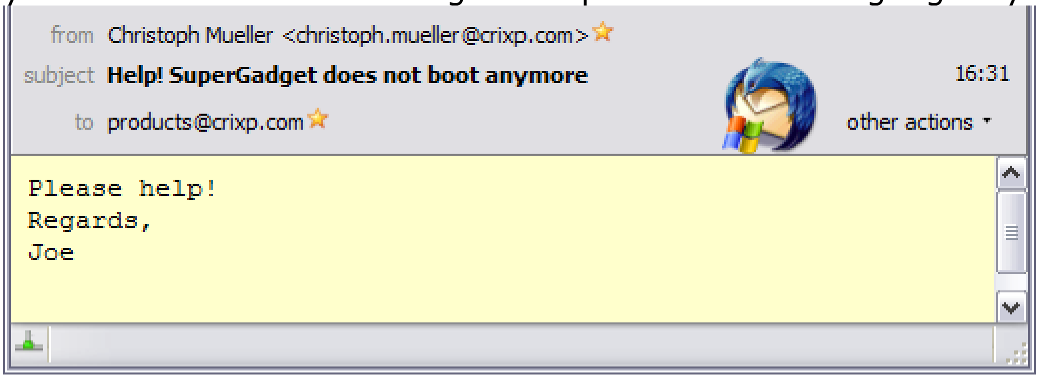
If you **move** an e-mail message from a non-openCRX IMAP folder to an openCRX IMAP folder and the target folder does not have a valid E-Mail Activity Creator defined, openCRX will not be able to create an EMailActivitiy in that folder. Due to the **move** operation the message is deleted from the source folder and your e-mail message is lost. Hence, it is good practice to **copy** (and not move) e-mails to openCRX IMAP folders. Only after verifying that the EMailActivitiy was actually created by openCRX in the target folder should you actually delete (if necessary) the message from the source folder.

- openCRX will either create a new EMailActivity or update an already existing EMailActivity with links to sender and recipients

Since openCRX v2.9.1, unknown e-mail addresses are created as composites of the segment administrator, e.g. admin-Standard.

The IMAP adapter features some advanced import functionality that helps you import mail messages and automatically link them with new or already existing activities including creation of follow ups. This functionality is quite powerful in the context of e-mail based support and incident management. Let's look at a simple example:

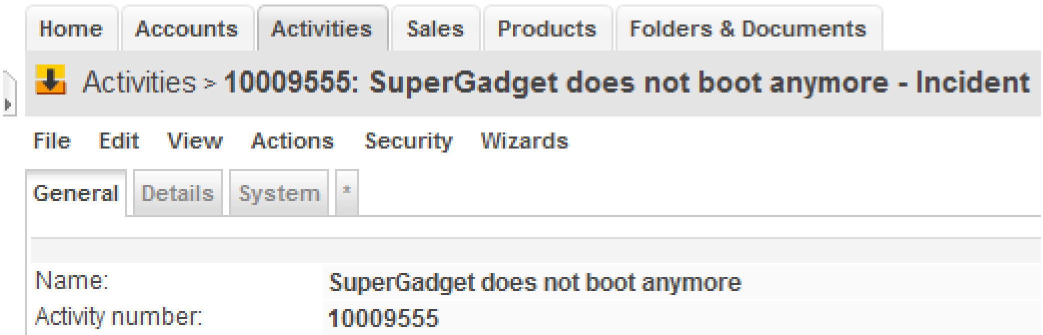
- you receive an e-mail asking for help with one of the gadgets you sell:



from Christoph Mueller <christoph.mueller@crixp.com>
subject **Help! SuperGadget does not boot anymore** 16:31
to products@crixp.com

```
Please help!
Regards,
Joe
```

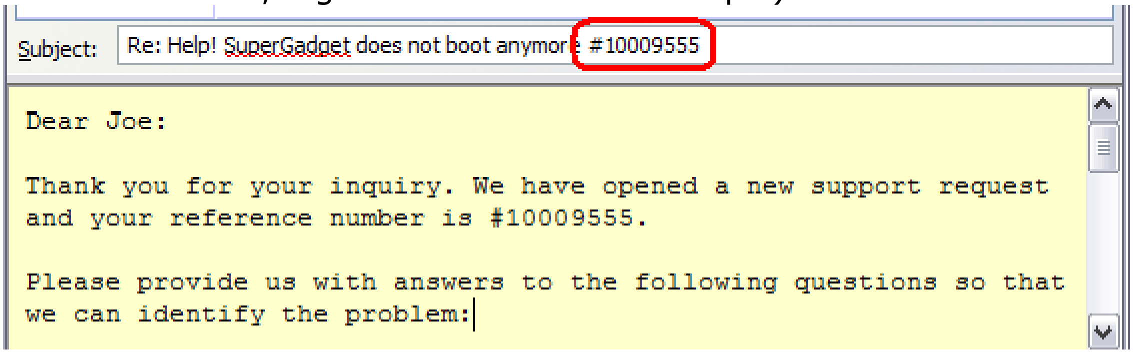
- create a new incident in your openCRX support system:



Activities > **10009555: SuperGadget does not boot anymore - Incident**

Name: SuperGadget does not boot anymore
Activity number: 10009555

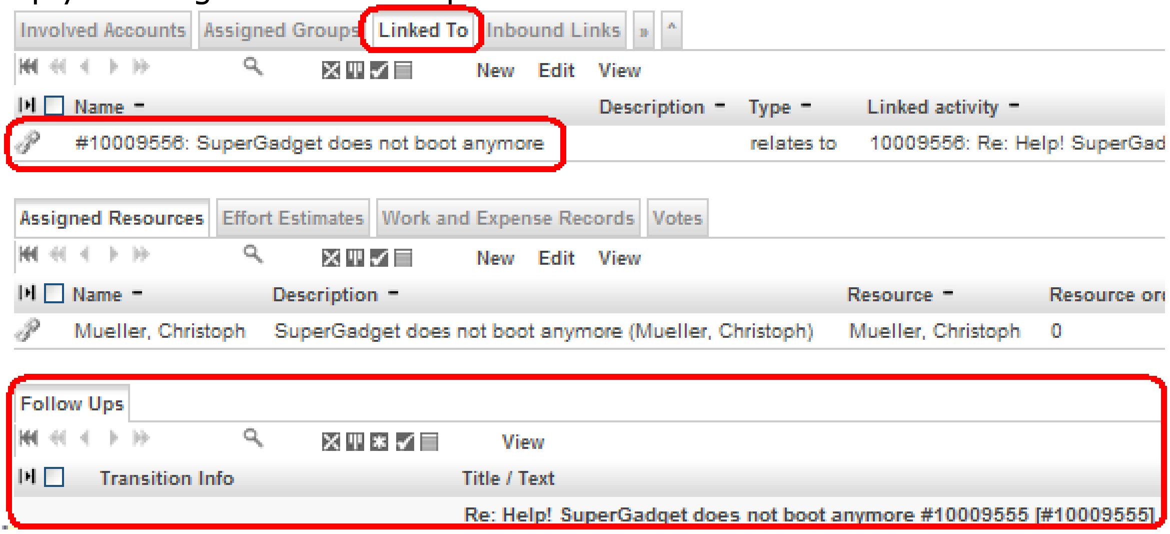
- reply to the support e-mail and add #<activity number> to the subject line (where <activity number> is the activity number of the newly created incident, e.g. 10009555 in our example):



Subject: Re: Help! SuperGadget does not boot anymore #10009555

```
Dear Joe:

Thank you for your inquiry. We have opened a new support request
and your reference number is #10009555.

Please provide us with answers to the following questions so that
we can identify the problem:
```

- once you've sent your reply message you can import it (with drag/drop) into the appropriate openCRX IMAP folder; the IMAP adapter will do the following:
  - create a new EMailActivity corresponding to your reply message complete with attachments and links to sender/recipient
  - link the existing incident #10009555 with the newly imported reply message (i.e. EMailActivity) and then add the message body of the reply message as a follow up to the incident #10009555:



Name	Description	Type	Linked activity
#10009556: SuperGadget does not boot anymore		relates to	10009556: Re: Help! SuperGad

Name	Description	Resource	Resource or
Mueller, Christoph	SuperGadget does not boot anymore (Mueller, Christoph)	Mueller, Christoph	0

Transition Info	Title / Text
	Re: Help! SuperGadget does not boot anymore #10009555 [#10009555]

If you import all the e-mails related to this support case you will have the complete history of your exchange with the client available as follow ups in your incident #10009555.

If you prefer, the IMAP adapter can even create new activities upon importing e-mails. All you have to do is provide the necessary information in the subject line of wrapper message. You can build a wrapper message by creating a new e-mail message and then adding the e-mail(s) to be imported as attachments; the subject line of the wrapper message is interpreted by the IMAP adapter.

If the subject line starts with "**>** " the message is treated as wrapper message. All attachments are treated as mime messages which are imported instead of the message itself. The subject line of the wrapper message has the following form:

```
> @<email creator name> [#<activity creator name or activity#>]  <subject>
```

Separate e-mail creator name, activity creator/numer and subject with at least 2 space characters to make sure the parser can correctly identify the information provided.

Example subject lines:

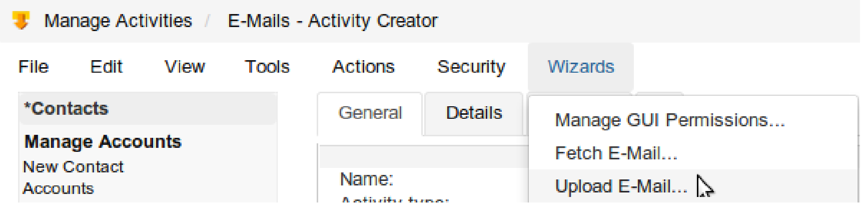
> @E-mails #10009555 log file with exception
> @E-mails #GadgetASupport does not boot
> @E-mails #10009555 log file with exception
> @E-mails #10009555 log file with exception

This allows the user to specify the email creator and an optional activity creator or an activity number. If an activity creator is specified, an activity is created (name = subject, detailed description = body) and the imported email(s) are linked with this activity using linkToAndFollowUp(). If an activity number is specified than the imported email(s) are simply linked with this activity using linkToAndFollowUp().

8.3.2 Inbound E-mail with Wizard Upload E-Mail

If you only want to import the occasional e-mail message you can save such messages as eml files (Thunderbird) or msg files (Outlook) and import them with the Wizard Upload E-Mail as follows:

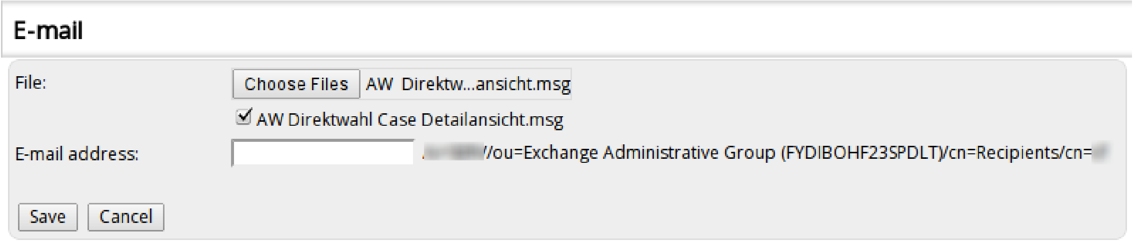
- navigate to any ActivityCreator that supports creation of E-mail Activities (i.e. Activities of type E-Mail), e.g. [Activities] > [Activity Creators] and then select the creator E-Mails
- start the wizard Upload E-Mail



- choose the eml/msg file containing the e-mail to be imported and then click the button [Save]
- if the import of the e-mail is successful you will be taken to the imported e-mail automatically

The wizard also supports imports with a wrapper message with the same functionality as the IMAP adapter if you launch it from the tab [Activities] (see chapter 8.3.1 Inbound E-mail with IMAP Adapter).

MSG-Files (produced by MS Outlook) sometimes do not contain SMTP-addresses, but rather they contain X.500-addresses. If the respective X.500-address is assigned to an account in openCRX that also has an SMTP-address, then the wizard automatically converts the address to the SMTP-address. In all other cases the wizard asks you to enter the SMTP-address that should be used as a mapping target:



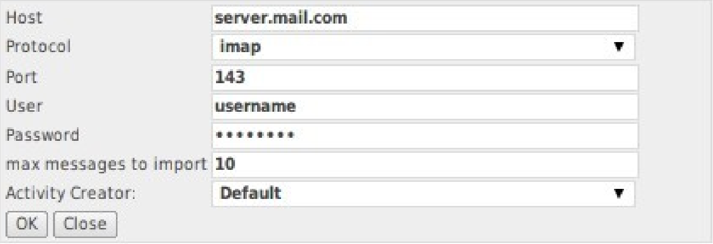
E-mail

File: Choose Files AW Direktw...ansicht.msg

☑ AW Direktwahl Case Detailansicht.msg

E-mail address: [redacted]/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=[redacted]

8.3.3 Inbound E-mail with Wizard FetchEMail.jsp



Host	server.mail.com
Protocol	imap
Port	143
User	username
Password	••••••••
max messages to import	10
Activity Creator:	Default

The wizard FetchEMail.jsp can retrieve e-mails from a mail store interactively; supported are the standard protocols pop3, pop3s, imap and imaps. You can call the wizard from the Activity Segment or any Activity Creator.

The following parameters can be set:

Host	IP address or host name of openCRX Server Examples: localhost, 127.0.0.1, myCrxServer.myCompany.com, etc.
Protocol	choose from imap, imaps, pop3, pop3s
Port	default ports: 143/imap, 993/imaps, 110/pop3, 995/pop3s
User	user name to access mailstore
Password	password to access mailstore
Max Messages	maximum number of messages to retrieve
Activity Creator	reference to activity creator for new e-mail activity (if not specified, the default e-mail creator will be used)

Alternatively, you can automate importing of inbound e-mail by setting up a cron job and have curl call the wizard WizardInvoker.jsp with the appropriate parameters, e.g.

```
curl "http://127.0.0.1:8080/opencrx-core-CRX/WizardInvoker.jsp?
wizard=/wizards/en_US/FetchEMail.jsp&provider=CRX&segment=Standard
&xri=xri://@openmdx*org.opencrx.kernel.activity1/provider/CRX/segment/Standard
&user=admin-Standard&password=pw_crx&para_0=Command=OK
&para_1=host=mail.mycompany.com&para_2=protocol=imap&para_3=port=143
&para_4=user=joe@opencrx.org&para_5=password=joespw&para_6=messageCount=10
&para_7=activityCreatorXri=xri://@openmdx*org.opencrx.kernel.activity1/provider/CRX/
segment/Standard/activityCreator/LASV1EAOIR1EO2O0JQG1L4NMI" &> /dev/null
```

Please note that the above command is on a single line (formatting was added for readability purposes only). Also, you have to adapt the parameters of the above call to your environment.

8.3.4 Inbound E-mail with MailImporterServlet

The following figure shows an overview of how you can import e-mails from your mail client (MUA) into openCRX:

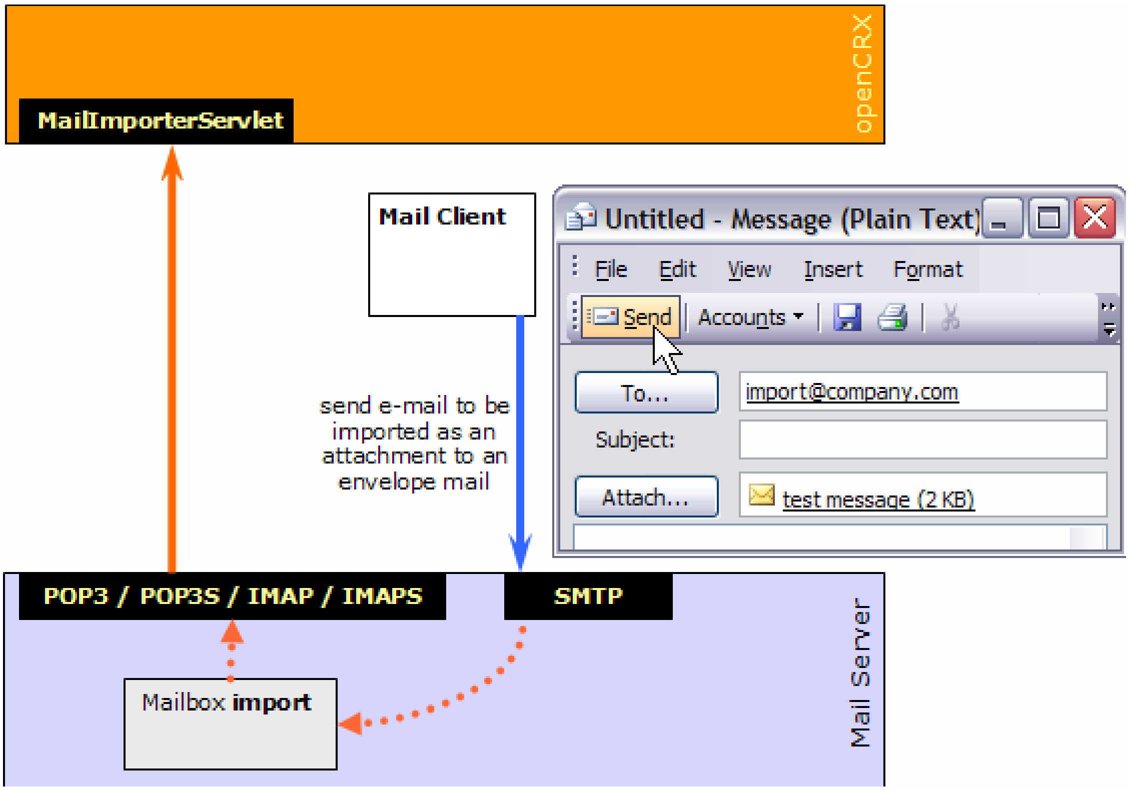

openCRX
MailImporterServlet
Mail Client
Untitled - Message (Plain Text)
File Edit View Insert Format
Send Accounts
To...
import@company.com
Subject:
Attach...
test message (2 KB)
send e-mail to be imported as an attachment to an envelope mail
POP3 / POP3S / IMAP / IMAPS
SMTP
Mailbox import
Mail Server

Figure 47: Import E-Mails from Mail Client

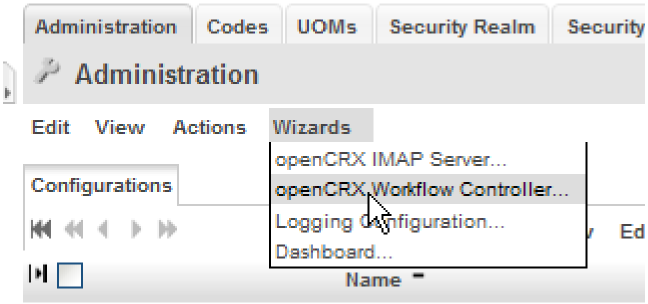
The whole setup is quite straightforward; in a first step you configure the MailImporterServlet so that it fetches e-mails from a mailbox, e.g. named "import". Optionally, you can create a custom-tailored Activity Creator to handle imported E-mails exactly the way you like, but in most cases the provided **Default E-mail Creator** is sufficient. To import an e-mail message from your mail client into openCRX, you create a new message to be sent to your importer mailbox, e.g. by entering import@company.com into the **TO** field of the new message. Optionally you can specify the name of the Activity Creator in the **Subject** of the new message. Next you **attach** the message(s) to be imported to that new message (yes, you can attach multiple e-mail messages and if those messages contain attachments themselves they will also be imported) and send it off. Once delivered to the appropriate mailbox (called "import" in our example) the MailImporterServlet will fetch it from there and then import the messages attached to that envelope message.

This process works for messages in any of your mail client's folders, e.g. Inbox, Outbox, Sent, Trash, etc.

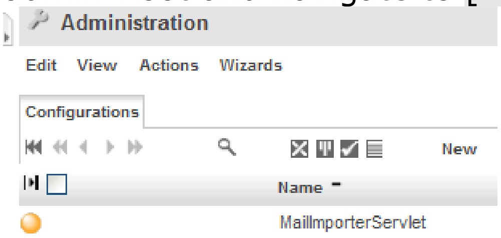
See chapters 8.1.2.1 (Add resource definition(s) to openejb.xml / tomee.xml) and 8.1.2.2 (Mail Resource in web.xml) for details on activating/configuring the

MailImporterServlet the MailImporterServlet. With the following steps you can configure the MailImporterServlet:

- log in as openCRX Root administrator (admin-Root)
- start the wizard openCRX Workflow Controller:



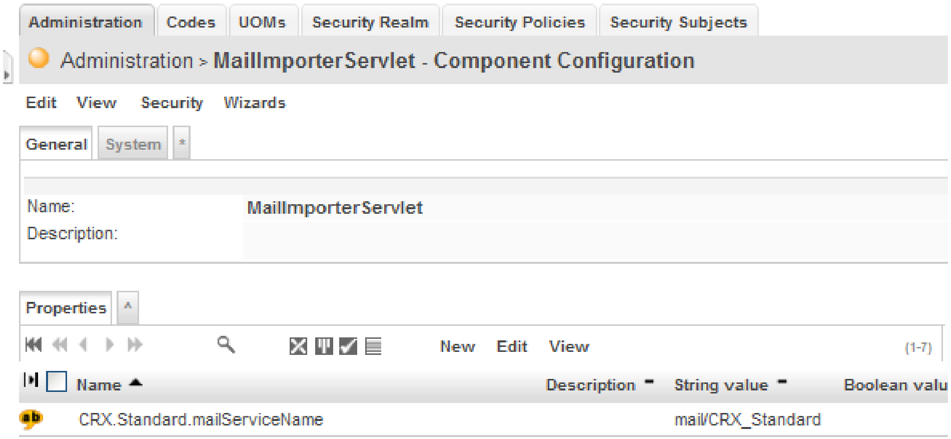
- start the MailImporterServlet (click on the respective "Turn on"); alternatively you can also enter the following URL into your browser to trigger the MailImporterServlet:
  http://<server>:<port>/opencrx-core-CRX/MailImporterServlet/execute?provider=CRX&segment=Standard
- with the first invocation the MailImporterServlet will automatically create a new Component Configuration name MailImporterServlet (login as admin-Root and navigate to [Administration] > [Configurations])



MailImporterServlet

- navigate to this automatically created Component Configuration and create a new String Property with the name
  `<provider>.<segment>.mailServiceName`
  and the value
  `mail/<provider>_segment`

  For example, create a new String property (as shown below) with name **CRX.Standard.mailServiceName** and value **mail/CRX_Standard**:

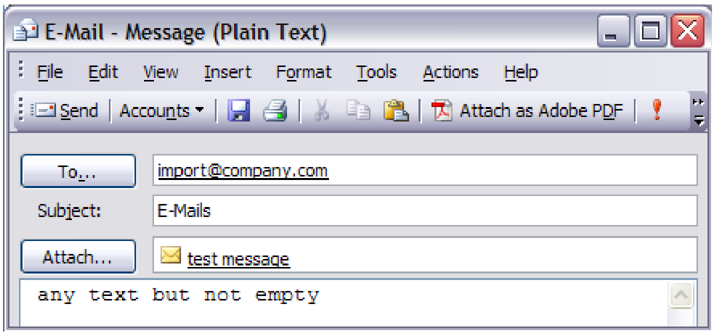


Name: MailImporterServlet
Description:

Name	Description	String value	Boolean valu
CRX.Standard.mailServiceName		mail/CRX_Standard	

There is no need to delete default entries (e.g. CRX.Standard.mailServiceName.Default) as they are ignored as soon there exists an entry with the same name without the suffix “.Default” (e.g. CRX.Standard.mailServiceName).

Test your settings by sending an e-mail to the account specified in the steps above (import@company.com). Attach the message to be imported to this “envelope” e-mail (please note that only the attached e-mail is imported by the MailImporterServlet, i.e. the wrapper message is not imported):


E-Mail - Message (Plain Text)
File Edit View Insert Format Tools Actions Help
Send Accounts
Attach as Adobe PDF

To... import@company.com

Subject: E-Mails

Attach... test message

any text but not empty

Figure 48: Envelope E-Mail with attached E-Mail to be imported

Please note that neither Subject nor message body should be empty. Use the subject to pass the name of the Activity Tracker you want the imported e-mail to be assigned to (by default imported e-mails are assigned to the Activity Tracker E-Mails).

Once the Workflow Controller triggers the MailImporterServlet you will see the debug output of the servlet on the console (or Tomcat's **catalina.log**):

Listing 21: Debug Output of MailImporterServlet

```
18:42:57,810 INFO  [STDOUT] DEBUG: setDebug: JavaMail version 1.3.3
18:42:57,826 INFO  [STDOUT] DEBUG POP3: connecting to host "mail.company.com", port 995, isSSL true
18:42:58,654 INFO  [STDOUT] S: +OK Dovecot ready.
18:42:58,654 INFO  [STDOUT] C: USER xxxxxxxx
18:42:58,670 INFO  [STDOUT] S: +OK
18:42:58,670 INFO  [STDOUT] C: PASS xxxxxxxx
18:42:58,701 INFO  [STDOUT] S: +OK Logged in.
18:42:58,717 INFO  [STDOUT] C: STAT
18:42:58,748 INFO  [STDOUT] S: +OK 1 3204
18:42:58,748 INFO  [STDOUT] C: NOOP
18:42:58,779 INFO  [STDOUT] S: +OK
18:42:58,842 INFO  [STDOUT] C: TOP 1 0
18:42:58,889 INFO  [STDOUT] S: +OK
...
```

- If the MailImporterServlet successfully imported your test mail it will be attached to the Activity Tracker **E-Mails**. Navigate to Activities > Activity Trackers and then click on the icon of **E-Mails**:

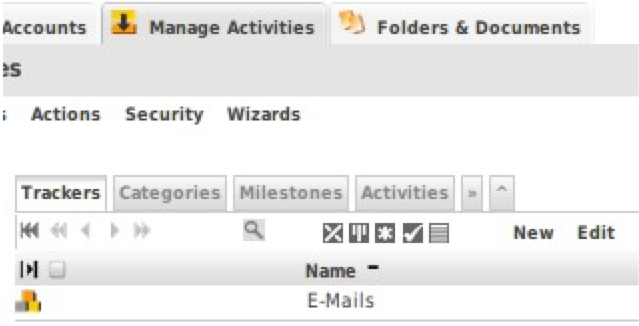
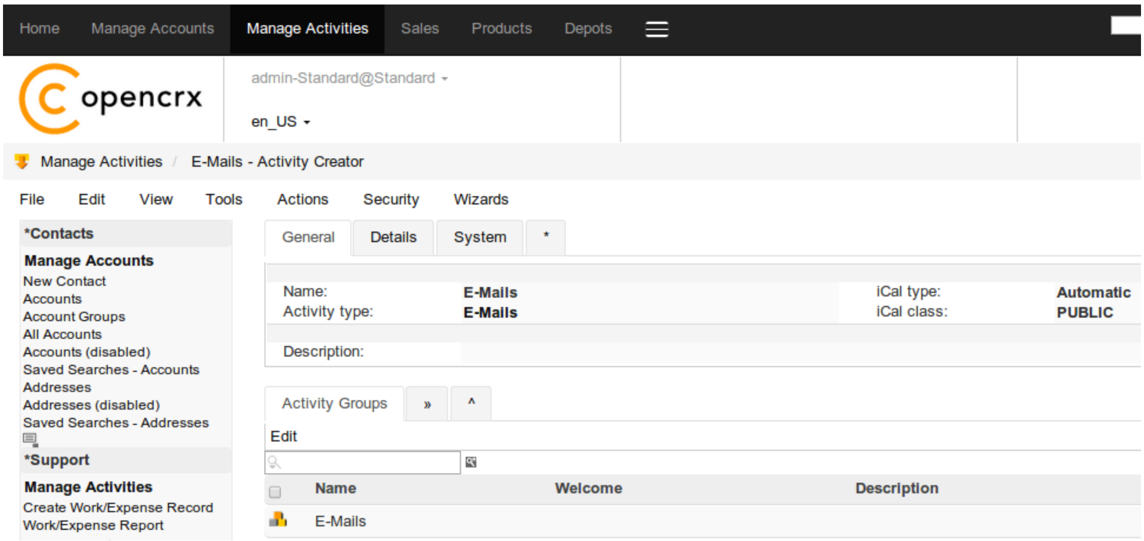


Figure 49: Activity Tracker E-Mail is created automatically

- By default, all imported e-mails are attached to the Activity Tracker **E-Mails** – you should also see the successfully imported test mail in the grid Activities
- Navigate to the newly imported e-mail to load it into the Inspector.
- The mail importer will automatically link imported e-mails with corresponding objects (if they exist in openCRX) and create various additional useful objects:
  - e-mail address of sender --> Sender
  - e-mail addresses of recipients --> Recipients
  - e-mail headers --> Notes
  - e-mail attachments --> Media

openCRX includes an Activity Creator **E-Mails** and an Activity Tracker **E-Mails**. The latter is referenced in the grid Activity Groups of the former:



Name:	E-Mails	iCal type:	Automatic
Activity type:	E-Mails	iCal class:	PUBLIC
Description:			

Figure 50: Activity Creator Default E-mail Creator

By default, the MailImporterServlet applies this Activity Creator to newly imported e-mails (which is the reason why they are shown in the grid Activities of the Activity Tracker **E-Mails**).

You can easily change the contents of the grid Activity Groups so that newly imported e-mails will be attached to different Activity Tracker(s). It is also possible to create additional Activity Creators with different behavior (just make sure that these Activity Creators create Activities of type **E-Mails**). With the the **subject line** of your envelope e-mail you can indicate which Activity Creator should be used to import your e-mail. If you omit the subject line the Activity Creator **E-Mails** is used.

Once the MailImporterServlet works as desired you can switch off the debugging output in the respective resource definition of the file openejb.xml /tomee.xml (see chapter 8.1.2.1 Add resource definition(s) to openejb.xml / tomee.xml).

8.4 Use openCRX as an E-mail Archive/Audit Tool

openCRX can easily keep track of all your in-/outbound e-mail traffic.

The following figure shows a configuration where the mail server puts a copy of each received message (inbound traffic) and all sent messages (outbound traffic) into the mailbox audit; configuring such audit accounts can easily be done with most Mail Transport Agents (MTAs) like qmail, postfix, etc. With the appropriate configuration (see Inbound E-mail), the MailImporterServlet can import all messages from that audit mailbox and attach it to an Activity Tracker of your choice:

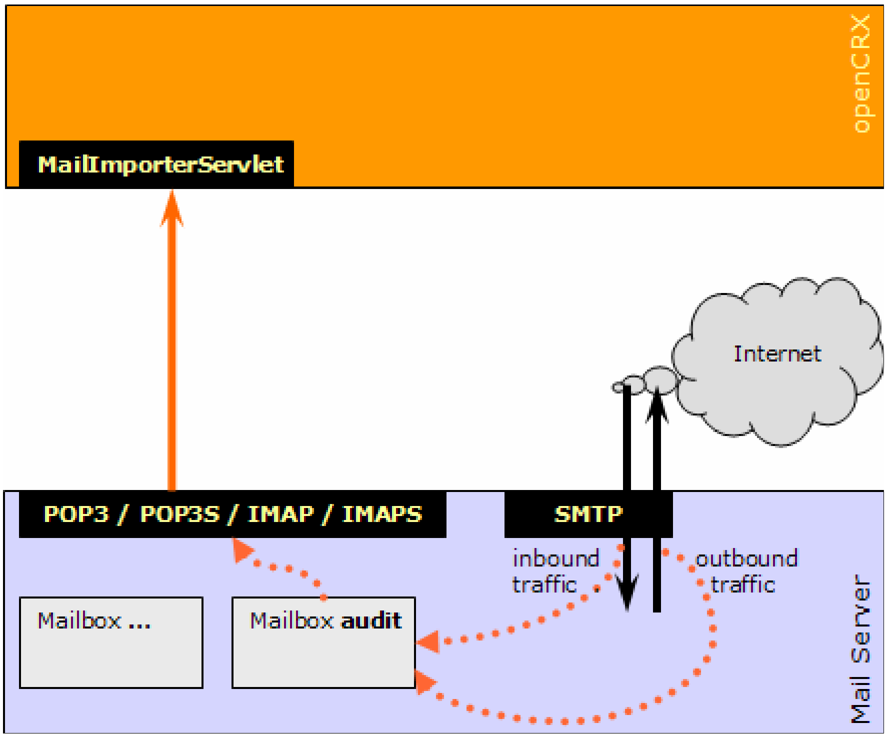


Figure 51: E-Mail Audit – import all inbound/outbound e-mail messages

8.5 Trouble Shooting E-mail Services

The following table lists some of the common issues and how to fix them:

Problem	Solution

openCRX does not initiate TLS session with mail server	It seems that JavaMail sometimes does not (even try to) establish a TLS session when connecting to a mail server (smtp) if the certificate of the mail server has not been imported into the keystore (e.g. cacerts). If the mail server requires TLS for authentication (e.g. SASL) and authentication is required to relay messages such failure to establish a TLS session will prevent openCRX from properly sending outbound mail.
	If you intend to use TLS/SSL to secure the connection to the outbound e-mail server (smtp) we recommend you import the mail server certificate into the keystore.
	Listing 22: Importing Certificate
	`cd $JAVA_HOME/lib/security`
	`keytool -import -alias <dom> -file <name>.cer -keystore cacerts`
	Replace <dom> with the domain of the mail server (e.g. mail.company.com) and <name> with the name of the certificate file.
	As a quick fix you can also try to set the following option in openejb.xml / tomee.xml:
	mail.smtp.ssl.trust *
	If you know the name of your mail server, you should replace "*" by that name, e.g.
	mail.smtp.ssl.trust mail.mycompany.com

I receive Alerts triggered by my Subscriptions but no Notification E-mails	▪ verify that JavaMail is properly installed and the mail service properly configured (see chapter 8.1 Install and Configure Mail Resource and E-Mail Services for more information) ▪ verify your e-mail settings (see E-mail Services for details) ▪ verify that the Servlet WorkflowHandler of the respective segment is turned on

9 Cloud Services

openCRX features the following cloud services:

Type of Service	Standard	Service Provider
Contacts	LDAP	openCRX/core (native provider **ldap**)
	VCF/vCard	openCRX/core (native provider **vcard**)
	CardDAV	openCRX/core (native provider **carddav**)
	ActiveSync	openCRX/core (native provider **airsync**)
Calendar	FreeBusy	openCRX/core (native provider **ical**)
	iCalendar (ICS)	openCRX/core (native provider **ical**)
	CalDAV	openCRX/core (native provider **caldav**)
	ActiveSync	openCRX/core (native provider **airsync**)
E-Mail	IMAP	openCRX/core (native provider **imap**)
	ActiveSync	openCRX/core (native provider **airsync**)
Documents	WebDAV	openCRX/core (native provider **webdav**)
News/Messages	XMPP (Jabber)	openCRX/core (Smack)

For information about over-the-air (OTA) synchronization of PDAs, mobile phones, pads, etc. with openCRX please refer to chapter 10 openCRX AirSync Server (ActiveSync compatible).

9.1 Directory Service / LDAP

openCRX provides LDAP Server functionality (get more information about LDAP or read what Wikipedia has to say about LDAP). In a nutshell this means that you can use any LDAP client to connect to openCRX and view openCRX accounts. openCRX LDAP supports SSL. Here is how to connect:

Host	IP address or host name of openCRX Server Examples: localhost, 127.0.0.1, myCrxServer.myCompany.com, etc.
Port	1389 (note that the LDAP standard port is 389); if your LDAP client supports SSL (Thunderbird does, MS Outlook does not), you can enable SSL for increased privacy/protection. With SSL enabled you might want to change the port from 1389 to 1689
BaseDN	ou=filter/[filter name],ou=Persons Example: **ou=filter/All Accounts,ou=Persons**
BindDN	<principal>@<segment name> Example: **guest@Standard**

9.1.1 Configuring the openCRX LDAP Port

The openCRX LDAP port is by default set to 1389 (to avoid conflicts with other LDAP daemons listening on the LDAP standard port 389). You can change this configuration in the file **web.xml** located in opencrx-groupware-CRX.ear\opencrx-ldap-CRX.war\WEB-INF\

Look for the param-name **port**.

If you build your own EARs you can change the openCRX LDAP port in your project's file **build.properties** (ldap.listenPort) or directly in your **build.xml**.

9.1.2 Enabling SSL Support for LDAP

With the following steps you can enable SSL support for LDAP:

- Create cert and key with OpenSSL (e.g. server.key, server.crt)
- Convert cert and key to PEM format using OpenSSL:
  - Key: openssl rsa -in server.key -out server-key.pem -outform PEM
  - Cert: openssl x509 -in server.crt -out server-cert.pem -outform PEM
- Use a Java Keytool which allows you to a) create a keystore, b) import a certificate, c) import a private key. The following tools allow you to easily manage Java keystores:
  - Portecle: http://sourceforge.net/projects/portecle/
  - KeyTool IUI: http://yellowcat1.free.fr/keytool_iui.html
- Add the following init-param tags to the **web.xml** of the LDAPServlet (but don't forget to adapt the values according to your environment):

  Listing 23: init-param tags required to enable LDAP SSL

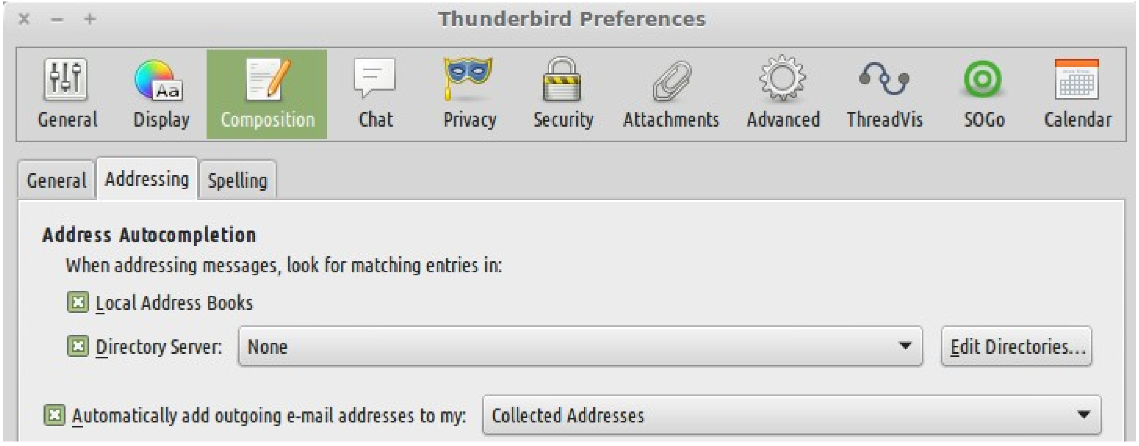
```
...
  <init-param>
    <param-name>sslKeystoreFile</param-name>
    <param-value>/var/ssl/keystore.jks</param-value>
  </init-param>
  <init-param>
    <param-name>sslKeystoreType</param-name>
    <param-value>JKS</param-value>
  </init-param>
  <init-param>
    <param-name>sslKeystorePass</param-name>
    <param-value>changeit</param-value>
  </init-param>
  <init-param>
    <param-name>sslKeyPass</param-name>
    <param-value>changeit</param-value>
  </init-param>
...
```

- to avoid confusion, you might also want to change the port from 1389 (LDAP for openCRX) to 1689 (LDAPS for openCRX) – see chapter 9.1.1 Configuring the openCRX LDAP Port for information on how to do that.

9.1.3 LDAP Configuration of Thunderbird

The following steps are required to configure Thunderbird 31 for LDAP:

- start Thunderbird and select the menu Tools > Options (on Windows) or Edit > Preferences (on Linux)
- select Composition and select the tab Addressing
- check Directory Server and click on the button [Edit Directories]



Address Autocompletion

When addressing messages, look for matching entries in:

☒ Local Address Books

☒ Directory Server: None

☒ Automatically add outgoing e-mail addresses to my: Collected Addresses

Figure 52: Thunderbird LDAP Configuration

- in the dialog window *LDAP Directory Servers* click on the button [Add]
- populate the *Directory Server Properties* dialog as follows (the example entries are assuming the openCRX Server is at localhost, the provider is CRX and the Segment is Standard, connecting with Username guest):

Field	**Entry**	**Example**
Name	any name you like	local-CRX.Standard [All Accounts]
Hostname	host name or IP address	localhost
Base DN	ou=filter/[filter name],ou=Persons	ou=filter/All Accounts,ou=Persons
Port number	**1389**	1389
Bind DN	<principal>@<segment name>	guest@Standard

- click [OK] to accept

9.1.4 LDAP Configuration of MS Outlook

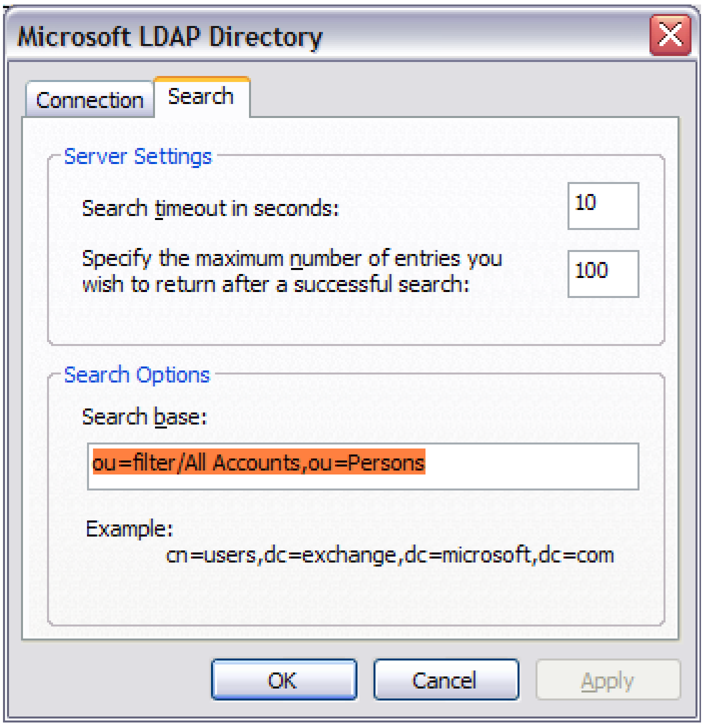
The following steps are required to configure MS Outlook 2007 for LDAP:

- start Outlook and select the menu Tools > Account Settings
- click on the tab Address Books
- populate the Add/*Change E-mail Account* dialog as follows (assuming the openCRX Server is at localhost, connecting with Username guest):

Server Name	localhost
This server...	check "This server requires me to log on"
User Name	<principal>@<segment name>, e.g. guest@Standard
Password	<enter your openCRX password for user guest>

- click on the button More Settings and select the tab Connection
- enter a display name (of your choice) and verify that port is set to **1389**
- select the tab Search
- in the field group Search Base click on Custom and populate as follows:

Custom	ou=filter/All Accounts,ou=Persons



Search timeout in seconds: 10

Specify the maximum number of entries you wish to return after a successful search: 100

Search base: ou=filter/All Accounts,ou=Persons

Example: cn=users,dc=exchange,dc=microsoft,dc=com

Figure 53: MS Outlook LDAP Configuration

- click OK, Next, Finish, and Close to conclude the configuration

9.2 openCRX vcard Servlet

The openCRX vcard servlet does for accounts what the openCRX ical servlet does for activities: it makes them available to third-party clients who access the openCRX server with the http protocol.

9.2.1 Account Selectors

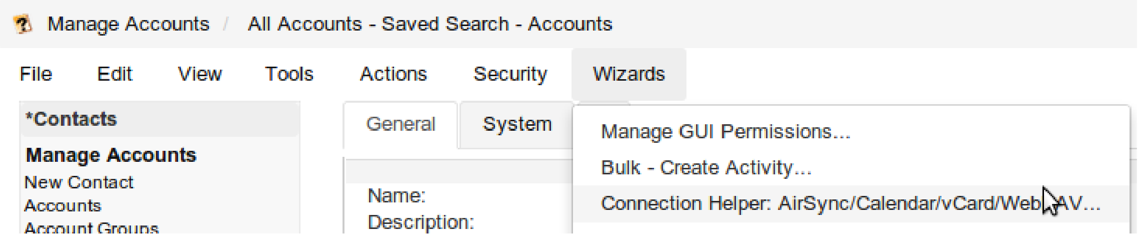
openCRX can map sets of accounts to a vcard file (a sequence of vcards). The resulting vcard file can be imported and/or processed by vcard-enabled clients like Outlook, Thunderbird, etc. At this time, account filters are the only supported account selectors. Account filters support reading and updating, but not creating of accounts (R=read, U=update):

Set of Accounts	RUC	vCard Selector
Account Filter	RU	**accounts?id=**<provider>**/**<segment>**/filter/**<account filter name>**&type=vcf**

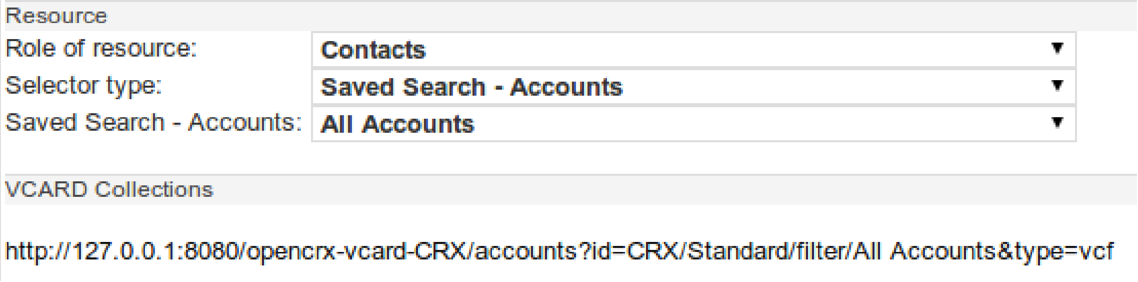
VCF Selector Examples:

accounts?id=CRX/Standard/filter/All+Accounts&type=vcf
accounts?id=CRX/Standard/filter/Accounts+with+missing+or+broken+vCard&type=vcf

Use the openCRX Wizard "Connection Helper" to generate valid VCF Selectors. You can start the wizard from your homepage:


Manage Accounts / All Accounts - Saved Search - Accounts
File
Edit
View
Tools
Actions
Security
Wizards
*Contacts
Manage Accounts
New Contact
Accounts
Account Groups
General
System
Name:
Description:
Manage GUI Permissions...
Bulk - Create Activity...
Connection Helper: AirSync/Calendar/vCard/WebDAV...

Choose the resource role "Contact" and the selector type "Saved Search - Accounts" and then select the desired saved search:


Resource

Role of resource: Contacts

Selector type: Saved Search - Accounts

Saved Search - Accounts: All Accounts

VCARD Collections

http://127.0.0.1:8080/opencrx-vcard-CRX/accounts?id=CRX/Standard/filter/All Accounts&type=vcf

9.2.1.1 Connecting MS Outlook to the openCRX vcard servlet

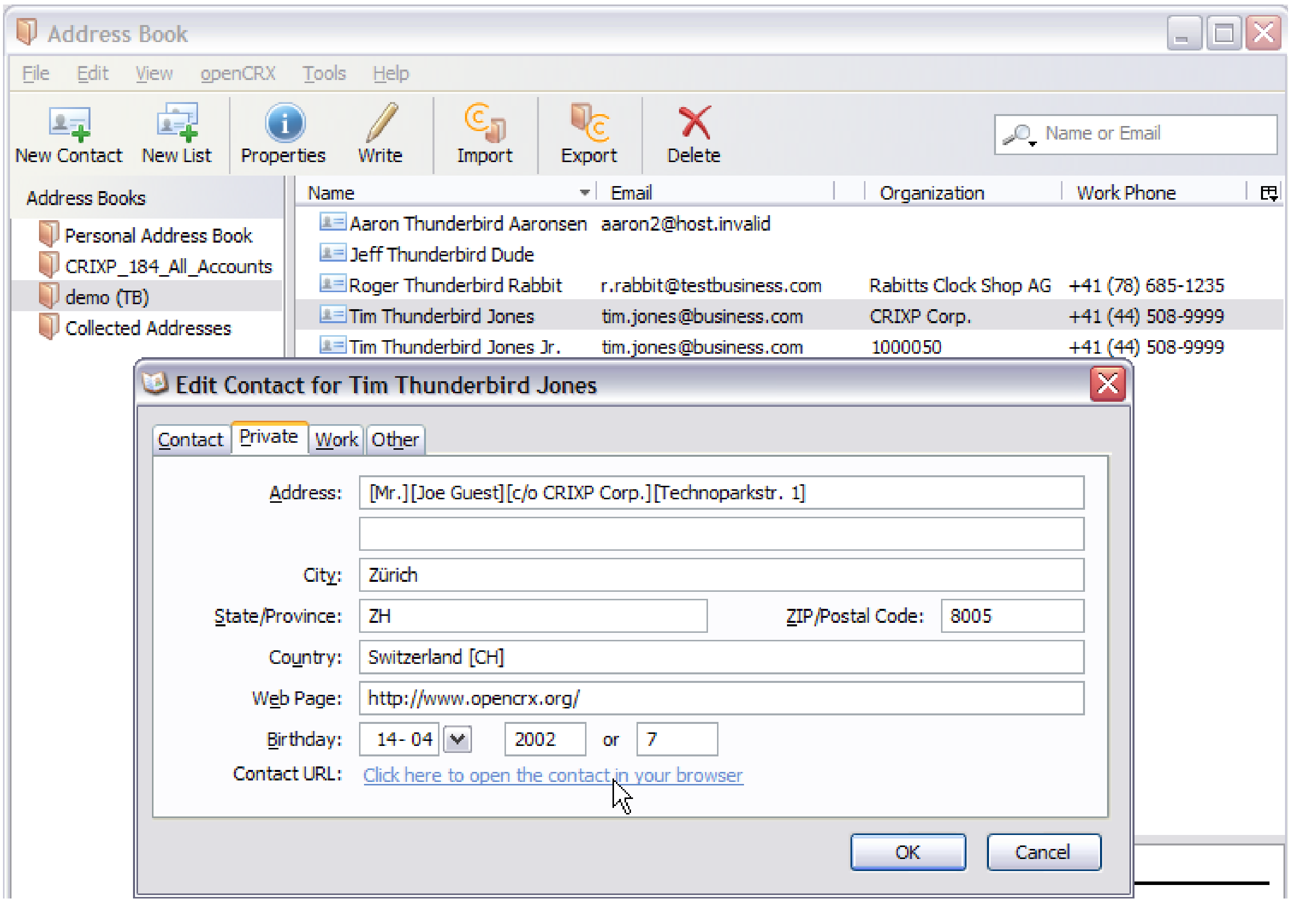
Detailed instructions on how to connect MS Outlook are available from http://www.opencrx.org/opencrx/2.4/Outlook_ICS_VCF_adapter.htm

Please note that this adapter is no longer supported/maintained...

9.2.1.2 Connecting Thunderbird to the openCRX vcard servlet

A Thunderbird add-on (supporting TB3 and newer) is available that enables you to map Thunderbird address books to openCRX account selectors:

http://www.opencrx.org/opencrx/2.10/Thunderbird_Contacts_Add-on.htm



Name	Email	Organization	Work Phone
Aaron Thunderbird Aaronsen	aaron2@host.invalid		
Jeff Thunderbird Dude			
Roger Thunderbird Rabbit	r.rabbit@testbusiness.com	Rabitts Clock Shop AG	+41 (78) 685-1235
Tim Thunderbird Jones	tim.jones@business.com	CRIXP Corp.	+41 (44) 508-9999
Tim Thunderbird Jones Jr.	tim.jones@business.com	1000050	+41 (44) 508-9999

Address: [Mr.][Joe Guest][c/o CRIXP Corp.][Technoparkstr. 1]

City: Zürich

State/Province: ZH ZIP/Postal Code: 8005

Country: Switzerland [CH]

Web Page: http://www.opencrx.org/

Birthday: 14- 04 2002 or 7

Contact URL: Click here to open the contact in your browser

Please note that this add-on is no longer supported/maintained... we recommend the SOGo Connector (for more information, see chapter 9.3.2 CardDAV Configuration of Thunderbird.

9.3 openCRX carddav Servlet / CardDAV Collections

openCRX provides CardDAV Server functionality (get more information about CardDAV from Wikipedia or check out the RFC).

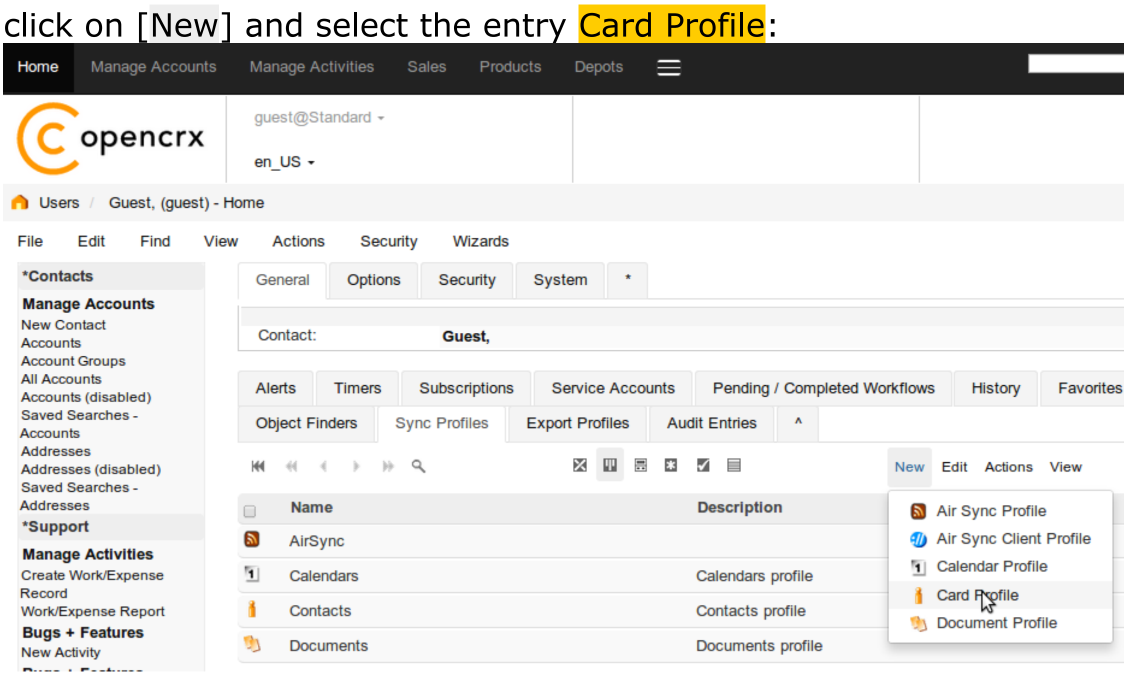
Once a user has created a Card Profile he/she can connect to openCRX with any CardDAV client to retrieve/manage contacts.

See http://www.opencrx.org/faq.htm#CardDAVClients for a list of clients tested with openCRX.

9.3.1 Account Selectors / Card Profiles

openCRX can map any account group to a CardDAV collection. Such a mapping is defined by an openCRX Card Profile. Each openCRX user has a default card profile called "Contacts" which maps the user's private account group <user>~Private (e.g. guest~Private) to a CardDAV collection. You can easily define additional CardDAV collections with the following steps:

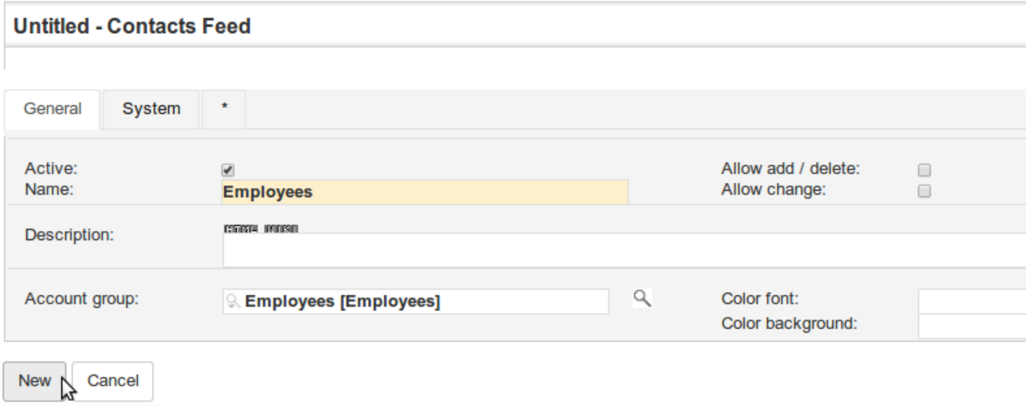
- login
- expand the grid tab row [Alerts] [Times] [>>] and then click on the tab [Sync Profiles]
- click on [New] and select the entry Card Profile:



Contact: Guest,

Name	Description
AirSync	
Calendars	Calendars profile
Contacts	Contacts profile
Documents	Documents profile

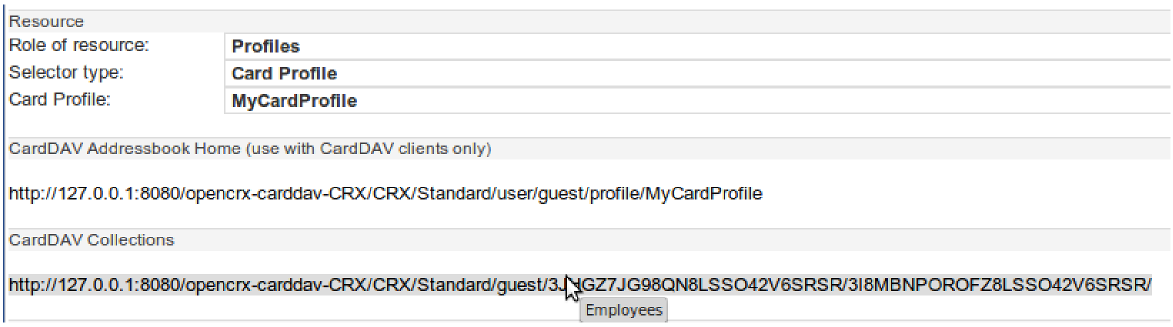
- enter a name (e.g. MyCardProfile) and click [New]
- in the grid [Sync Feeds], select New > Contacts Feed
- check the box Active, enter a name for your new feed and select the account group that should be mapped to a CardDAV collection:



Untitled - Contacts Feed

Active: ☑
Name: Employees
Description:
Account group: Employees [Employees]
Allow add / delete: ☐
Allow change: ☐
Color font:
Color background:

- with the wizard Connection Helper you can verify that your new feed is available:



Resource

Role of resource:	**Profiles**
Selector type:	**Card Profile**
Card Profile:	**MyCardProfile**

CardDAV Addressbook Home (use with CardDAV clients only)

http://127.0.0.1:8080/opencrx-carddav-CRX/CRX/Standard/user/guest/profile/MyCardProfile

CardDAV Collections

http://127.0.0.1:8080/opencrx-carddav-CRX/CRX/Standard/guest/3JHGZ7JG98QN8LSSO42V6SRSR/3I8MBNPOROFZ8LSSO42V6SRSR/

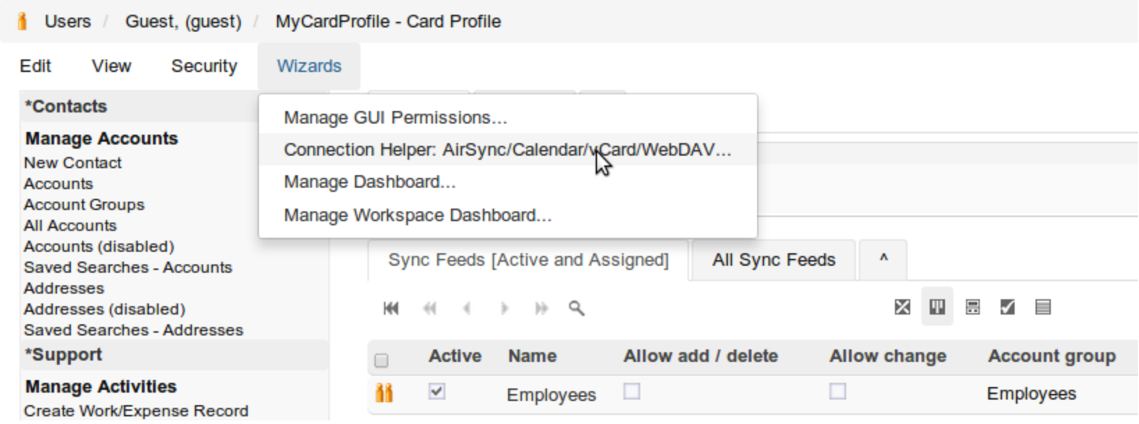
Account groups support reading and updating, but not creating of accounts (R=read, U=update):

Set of Accounts	RUC	CardDAV Collection Selector
Account Group	RU	<provider>/<segment>/<principal name>/<profile qualifier>/<feed qualifier>

Contact Feed Selector Examples:

CRX/Standard/guest/Card/3L826TVNTYZMSPL4GJ9OXM46K/
CRX/Standard/guest/3JHGZ7JG98QN8LSSO42V6SRSR/3I8MBNPOROFZ8LSSO42V6SRSR/

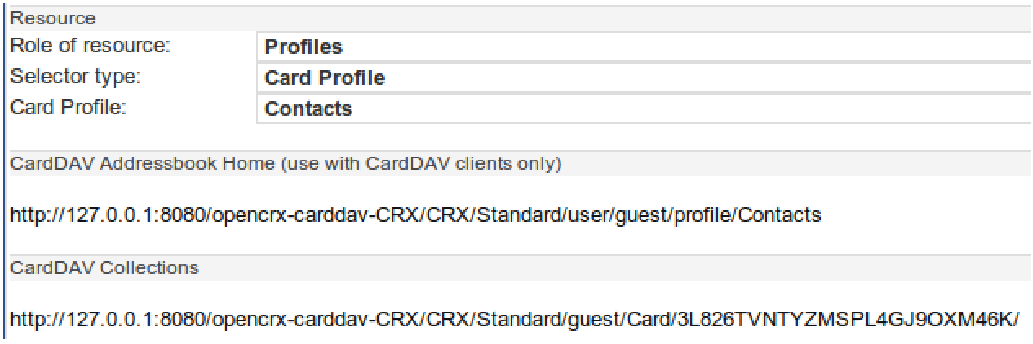
Use the openCRX Wizard “Connection Helper” to generate valid Contact Feed Selectors. You can start the wizard from any Card Profile or from your homepage:



Users / Guest, (guest) / MyCardProfile - Card Profile
Edit
View
Security
Wizards
Manage GUI Permissions...
Connection Helper: AirSync/Calendar/vCard/WebDAV...
Manage Dashboard...
Manage Workspace Dashboard...
*Contacts
Manage Accounts
New Contact
Accounts
Account Groups
All Accounts
Accounts (disabled)
Saved Searches - Accounts
Addresses
Addresses (disabled)
Saved Searches - Addresses
*Support
Manage Activities
Create Work/Expense Record
Sync Feeds [Active and Assigned]
All Sync Feeds
^

□	Active	Name	Allow add / delete	Allow change	Account group
	☑	Employees	□	□	Employees

Choose the resource role “Profile” and the selector type “Card Profile” and then select the desired card profile:



Resource

Role of resource:	**Profiles**
Selector type:	**Card Profile**
Card Profile:	**Contacts**

CardDAV Addressbook Home (use with CardDAV clients only)

http://127.0.0.1:8080/opencrx-carddav-CRX/CRX/Standard/user/guest/profile/Contacts

CardDAV Collections

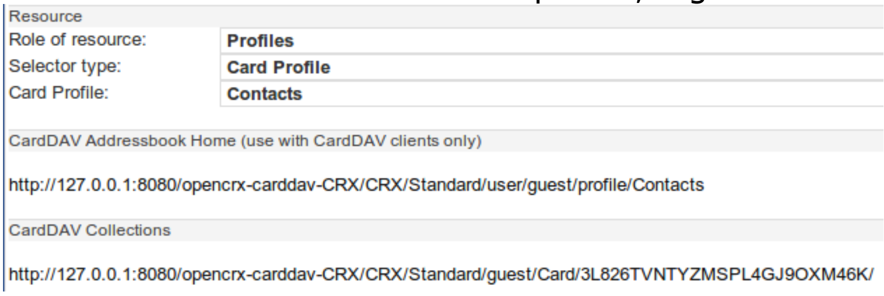
http://127.0.0.1:8080/opencrx-carddav-CRX/CRX/Standard/guest/Card/3L826TVNTYZMSPL4GJ9OXM46K/

9.3.2 CardDAV Configuration of Thunderbird

Thunderbird itself does not support CardDAV, but you can use the Inverse SOGo Connector (we tested version 24.0.5) . It is available directly from Inverse's web site at http://www.sogo.nu/downloads/frontends.html

Once this add-on is installed, you can configure the connector as follows:

- start your browser and connect/login to openCRX
- on your user home, expand the grid tab [Alerts] [Timers] [>>] and then click on the tab [Sync Profiles]
- start the Connection Helper Wizard (from the menu Wizards)
- Choose the resource role "Profile" and the selector type "Card Profile" and then select the desired card profile, e.g. "Contacts":



Resource

Role of resource:	**Profiles**
Selector type:	**Card Profile**
Card Profile:	**Contacts**

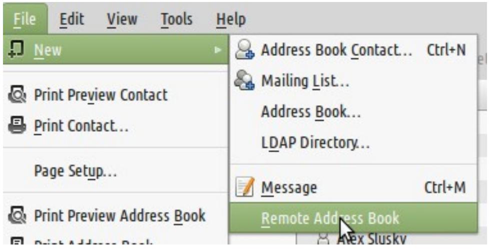
CardDAV Addressbook Home (use with CardDAV clients only)

http://127.0.0.1:8080/opencrx-carddav-CRX/CRX/Standard/user/guest/profile/Contacts

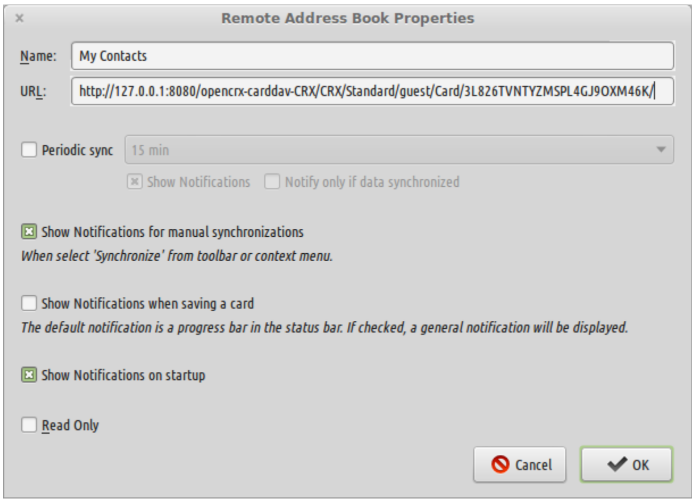
CardDAV Collections

http://127.0.0.1:8080/opencrx-carddav-CRX/CRX/Standard/guest/Card/3L826TVNTYZMSPL4GJ9OXM46K/

- start Thunderbird
- open Address Book and create a new Remote Address Book



- enter a name of your choice and then copy the CardDAV Collection URL from openCRX into the field URL (note that the Connection Helper Wizard shows the name of the card feed as a tooltip):



Remote Address Book Properties

Name: My Contacts

URL: http://127.0.0.1:8080/opencrx-carddav-CRX/CRX/Standard/guest/Card/3L826TVNTYZMSPL4GJ9OXM46K/

□ Periodic sync 15 min

☒ Show Notifications □ Notify only if data synchronized

☒ Show Notifications for manual synchronizations

When select 'Synchronize' from toolbar or context menu.

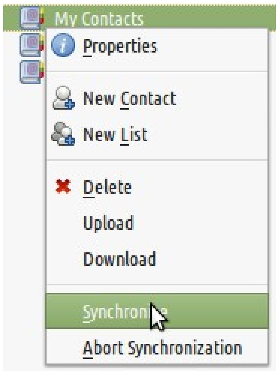
□ Show Notifications when saving a card

The default notification is a progress bar in the status bar. If checked, a general notification will be displayed.

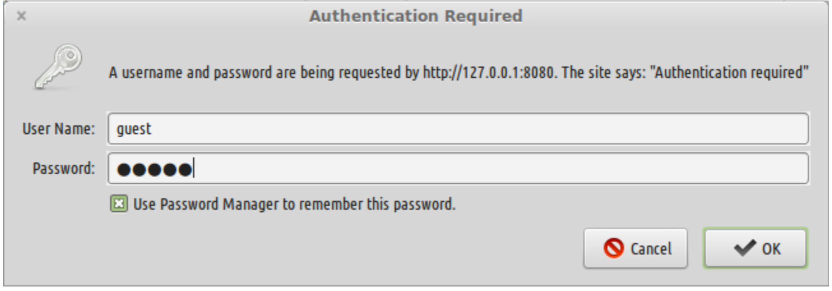
☒ Show Notifications on startup

□ Read Only

- click [OK]
- back in the list of address books, select any other address book than the new one just created
- next, select the newly created address book
- right-click the newly created address book and select "Synchronize" from the context menu:



- the first time you connect a pop-up window requests authentication credentials; enter your openCRX username and password:



Authentication Required

A username and password are being requested by http://127.0.0.1:8080. The site says: "Authentication required"

User Name: guest

Password: ●●●●●

☒ Use Password Manager to remember this password.

That's it. From now on your address book will be synchronized automatically every time you start Thunderbird.

The default formatting of contacts in the Thunderbird Address Book can be improved if you create a a file "userChrome.css" in the folder "chrome" (you might have to create this folder as well) in your Thunderbird profile (on Windows you should find your profile(s) in the folder %AppData%/Thunderbird/Profiles). Add the following to the file "userChrome.css":

```
/*
* Do not remove the @namespace line -- it's required for correct functioning
*/
@namespace url("http://www.mozilla.org/keymaster/gatekeeper/there.is.only.xul");
/* set default namespace to XUL */

.CardViewLink {
 max-width:300px;
 overflow:hidden;
}
```

Depending on your screen resolution you might change the value "300px" to something more suitable.

9.4 Calendaring

9.4.1 Calendar as a Set of Activities

openCRX supports a wide range of types of activities, including E-Mails, Tasks, Meetings, Phone Calls, etc. Even though all activities are kept in a flat structure (think of a box containing all activities, regardless of type), openCRX offers a multitude of ways to structure, filter, and group activities:

- every **activity can be assigned to activity groups**, which enables you to group activities by Tracker, Category, and Milestone
- **activities can be filtered** with predefined filters (e.g. activities filtered to a user's homepage, activities filtered by resource) and user-defined ActivityFilters (either at a global level or at the level of an activity group)

To fully understand the power of this approach, consider a large project X (e.g. building a power plant) with millions and millions of activities. With openCRX, a project is typically mapped to an activity tracker (e.g. all activities of project X are assigned to the activity tracker Project X). As a large project is often times structured, i.e. broken down into subprojects, milestones, etc., let us assume that the respective subset of activities related to a milestone of Project X is assigned to an activity group Milestone 2. With openCRX, it's a single click and you can browse all the activities assigned to Milestone 2, or you can view all these activities in a calendar application like Sunbird or MS Outlook:

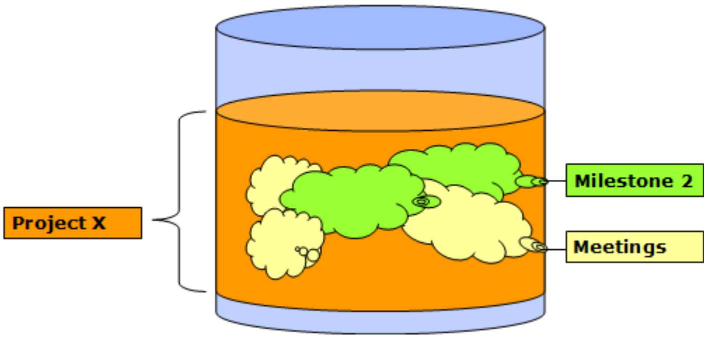


Figure 54: openCRX Activity Groups / openCRX Activity Filters

It goes without saying that different users have different needs. It is also quite natural that the needs change over time. With openCRX, it is easy to deliver as there are virtually unlimited possibilities to slice and dice the universe of activities. For example, instead of pulling a set of activities based on their assignment to activity groups, there are many use cases where one would like to define a filter to define a subset of activities. On the one hand, openCRX features lots of default filters, on the other hand, there are powerful tools to define custom filters virtually any way you like. For example: an auditor might be interested in all activities involving a particular subcontractor, another user could be interested in browsing through all the meetings related to Project X. Hence, in the context of calendaring it helps if you think of a calendar as a set of activities, nothing more and nothing less.

9.4.2 Calendar Selectors (ICS and CalDAV)

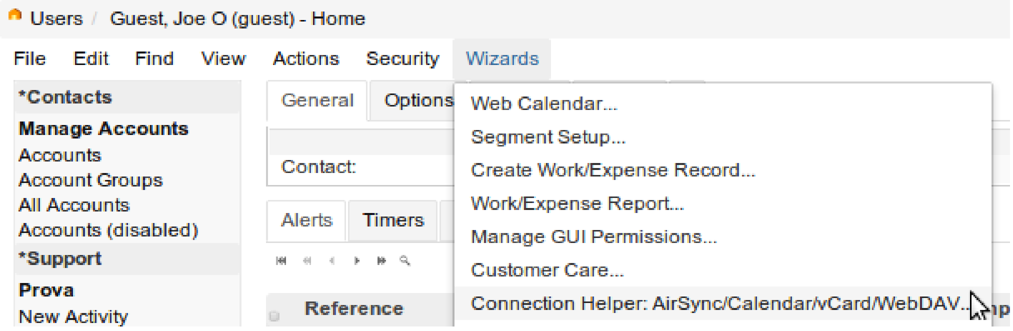
openCRX can map each of the above-mentioned set of activities to a calendar. Depending on the mapping, the resulting calendar can be presented in various formats, e.g. ICS calendar, Free Busy calendar, XML file, Timeline, etc. Some typical ICS calendar selectors are listed below (R=read, U=update, C=create):

Set of Activities	RUC	ICS Calendar Selector
Tracker	RUC	**activities?id=<provider>/<segment>/tracker/<name>&type=ics**
__ Filtered	RUC	**activities?id=<provider>/<segment>/tracker/<name>/filter/<filter name>&type=ics**
Category	RUC	**activities?id=<provider>/<segment>/category/<name>&type=ics**
__ Filtered	RUC	**activities?id=<provider>/<segment>/category/<name>/filter/<filter name>&type=ics**
Milestone	RUC	**activities?id=<provider>/<segment>/milestone/<name>&type=ics**
__ Filtered	RUC	**activities?id=<provider>/<segment>/milestone/<name>/filter/<filter name>&type=ics**
Global Filter	RU	**activities?id=<provider>/<segment>/globalfilter/<activity filter name>&type=ics**
Homepage	RU	**activities?id=<provider>/<segment>/userhome/<home qualifier>&type=ics**
Resource	RU	**activities?id=<provider>/<segment>/resource/<resource name>&type=ics**
Birthdays	R	**bdays?id=<provider>/<segment>/filter/<account filter name>&type=ics**
Anniversaries	R	**anniversaries?id=<provider>/<segment>/filter/<account filter name>&type=ics**
Dates of Death	R	**datesofdeath?id=<provider>/<segment>/filter/<account filter name>&type=ics**

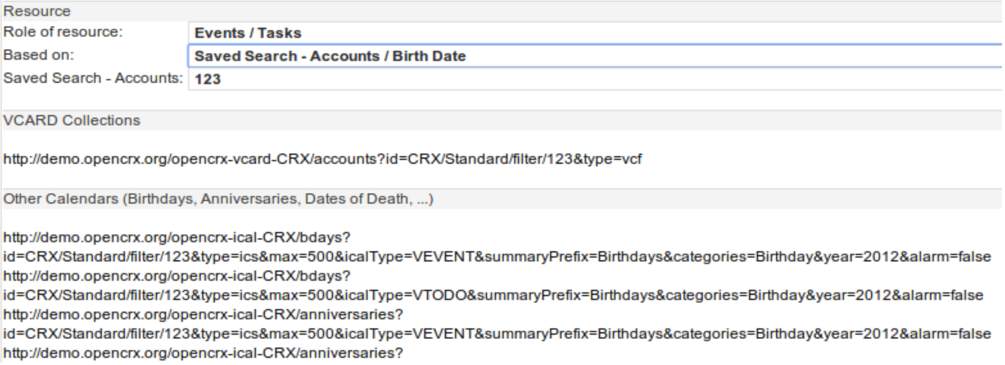
Example: http://demo.opencrx.org/opencrx-ical-CRX/activities?id=CRX/Standard/home/guest&type=ics

Tip

Use the openCRX Wizard "Connection Helper" from your Homepage to generate valid Calendar Selectors:



Choose the option "Events / Tasks" and then make your selections:



Resource

Role of resource:	Events / Tasks
Based on:	Saved Search - Accounts / Birth Date
Saved Search - Accounts:	123

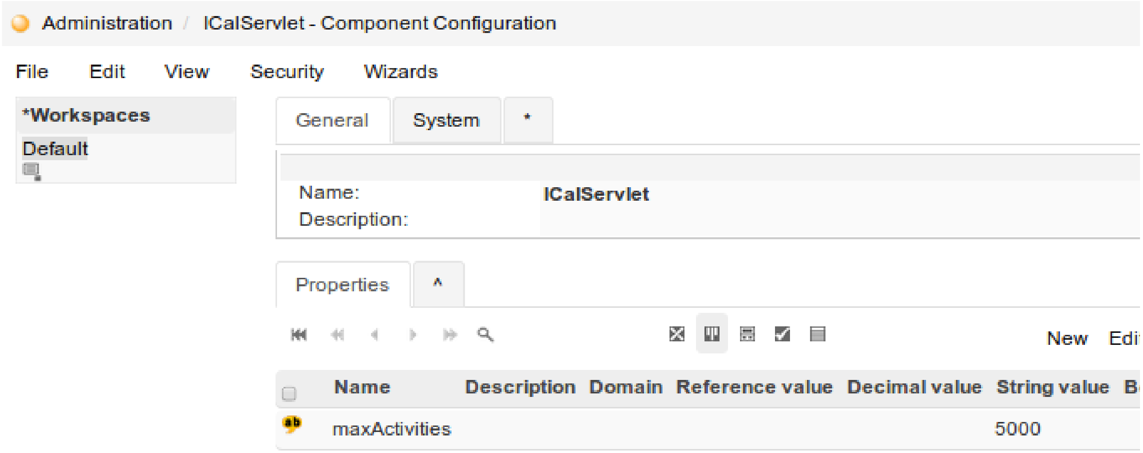
VCARD Collections

http://demo.opencrx.org/opencrx-vcard-CRX/accounts?id=CRX/Standard/filter/123&type=vcf

Other Calendars (Birthdays, Anniversaries, Dates of Death, ...)

```
http://demo.opencrx.org/opencrx-ical-CRX/bdays?
id=CRX/Standard/filter/123&type=ics&max=500&icalType=VEVENT&summaryPrefix=Birthdays&categories=Birthday&year=2012&alarm=false
http://demo.opencrx.org/opencrx-ical-CRX/bdays?
id=CRX/Standard/filter/123&type=ics&max=500&icalType=VTODO&summaryPrefix=Birthdays&categories=Birthday&year=2012&alarm=false
http://demo.opencrx.org/opencrx-ical-CRX/anniversaries?
id=CRX/Standard/filter/123&type=ics&max=500&icalType=VEVENT&summaryPrefix=Birthdays&categories=Birthday&year=2012&alarm=false
http://demo.opencrx.org/opencrx-ical-CRX/anniversaries?
```

By default, at most 500 activities (VEVENT or VTODO) are returned per request by the ical servlet. You can increase that limit by creating component configurations with **name** and **qualifier ICalServlet** (as admin-Root) and then adding a String property named **maxActivities** with the desired value, e.g. 5000 as shown below:



Name: ICalServlet
Description:

Name	Description	Domain	Reference value	Decimal value	String value	B
maxActivities					5000	

The CalDAV-Servlet does not have any such restriction.

CalDAV calendar selectors look as follows (R=read, U=update, C=create):

Set of Activities	RUC	CalDAV Calendar Selector
Tracker	RUC	<provider>**/**<segment>**/tracker/**<name>
__ Filtered	RUC	<provider>**/**<segment>**/tracker/**<name>**/filter/**<filter name>
Category	RUC	<provider>**/**<segment>**/category/**<name>
__ Filtered	RUC	<provider>**/**<segment>**/category/**<name>**/filter/**<filter name>
Milestone	RUC	<provider>**/**<segment>**/milestone/**<name>
__ Filtered	RUC	<provider>**/**<segment>**/milestone/**<name>**/filter/**<filter name>
Global Filter	RU	<provider>**/**<segment>**/globalfilter/**<activity filter name>
Homepage	RU	<provider>**/**<segment>**/userhome/**<home qualifier>
Resource	RU	<provider>**/**<segment>**/resource/**<resource name>

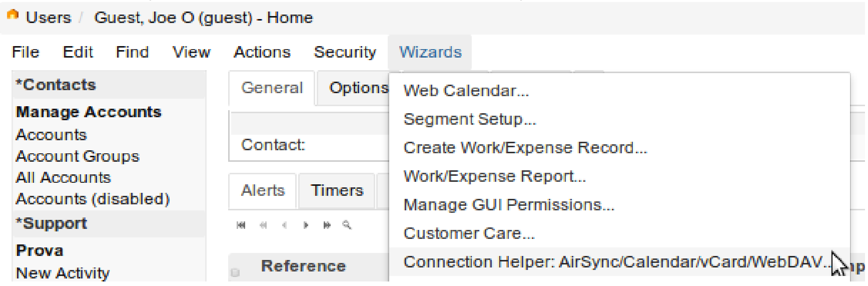
CalDAV calendar selectors return either only VEVENT items or only VTODO items – it is not possible for a CalDAV collection (by design) to contain both types at the same time. By default, openCRX returns VEVENT items, if you want to get VTODO items, you can append the suffix "**/VTODO**" to the above CalDAV calendar selectors. Example:

- VEVENT only: <provider>/<segment>/tracker/<name>
- VTODO only: <provider>/<segment>/tracker/<name>/VTODO

Also note that this behavior of CalDAV calendar selectors is different from the behavior of ICS calendar selectors. The latter can return both types of items, i.e. VEVENT and VTODO, as a reply to the same request, whereas the **CalDAV calendar selector can only return either VEVENT or VTODO** (by design of the CalDAV protocol, i.e. this is not a choice made by the openCRX developers).

One of the consequences is that if you work with CalDAV you need to define 2 calendars per selector with clients like Lightning (1 calendar for VEVENT and 1 for VTODO), whereas you get away with defining 1 calendar if you work with ICS (because it contains both VEVENT and VTODO items).

Use the openCRX Wizard "Connection Helper" from your Homepage to generate valid Calendar Selectors:



The wizard can also build URLs for CalDAV Event/Task collections that you can use to easily connect CalDAV clients capable of dealing with collections (e.g. iOS-devices, Android, etc.).

Set of Calendars	RUC	CalDAV Calendar Collection Selector
Collection	RUC	<provider>**/**<segment>**/user/**<principal name>**/profile/**<profile name>

Example: http://demo.opencrx.org/opencrx-caldav-CRX/CRX/Standard/user/guest/profile/MyCals

9.4.3 ActivityTracker/-Creators <username>~Private

Each openCRX user has a private Activity Tracker **<username>~Private** (e.g. guest~Private for the user named guest) and several private Activity Creators:

- **<username>~Private** (to create Incidents)
- **<username>~Private~E-Mails** (to create E-Mail Activities)
- **<username>~Private~Meetings** (to create Meetings)
- **<username>~Private~Tasks** (to create Tasks)

Activities created with one of the above Activity Creators are automatically assigned to the respective user's Activity Tracker **<username>~Private** and security is set such that only the respective user can browse/update such activities.

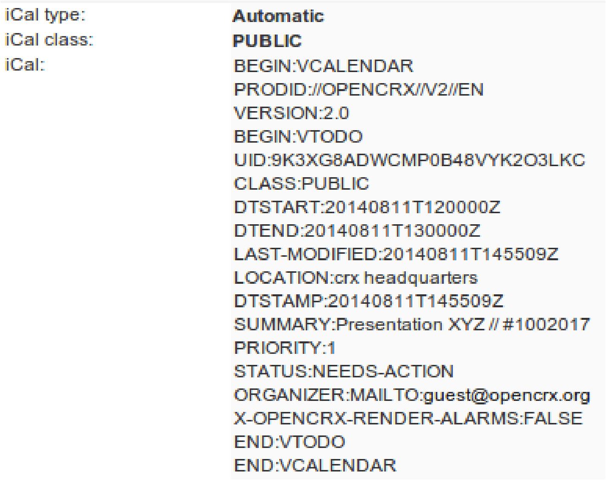
9.4.4 Mapping of Activities to Calendar Events and Tasks

Both the openCRX ical servlet and the openCRX caldav servlet map openCRX activities to calendar events (VEVENT) and tasks (VTODO) as follows based on the openCRX activity class and the iCal type at hand:

openCRX Activity Class	iCal Type	Mapped to
* (any)	VEVENT	VEVENT
* (any)	VTODO	VTODO
Incident	Automatic	VEVENT
Meeting	Automatic	VEVENT
Sales Visit	Automatic	VEVENT
Task	Automatic	VTODO
Phone Call	Automatic	VEVENT
E-Mail	Automatic	VEVENT
Mailing	Automatic	VEVENT
Absence	Automatic	VEVENT
External Activity	Automatic	VEVENT

The openCRX AirSync Adapter uses a different mapping (see chapter 10.2 Mapping of openCRX Objects to AirSync Objects for details).

Hence, all openCRX activities correspond to either calendar events (VEVENT) or tasks (VTODO). An openCRX activitiy's iCal representation is stored in the iCal attribute:

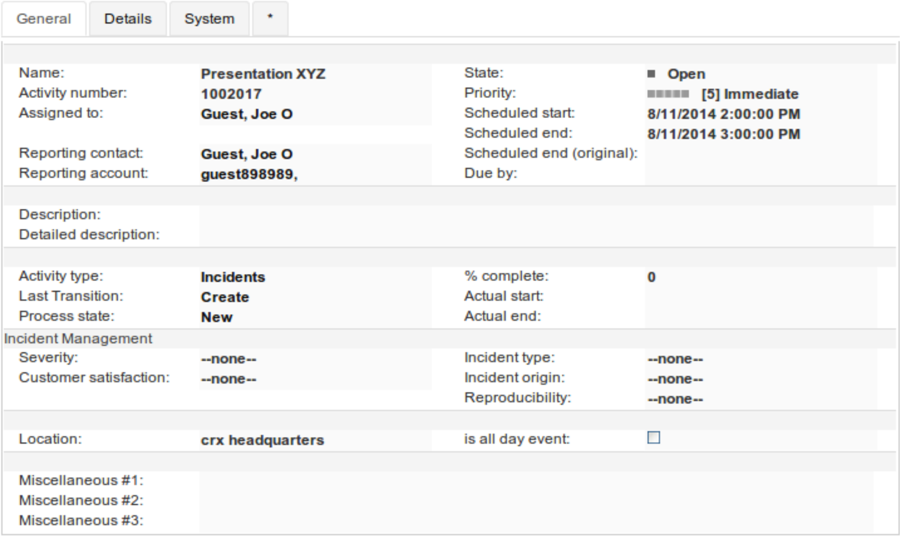


iCal type:	**Automatic**
iCal class:	**PUBLIC**
iCal:	

```
BEGIN:VCALENDAR
PRODID://OPENCRX//V2//EN
VERSION:2.0
BEGIN:VTODO
UID:9K3XG8ADWCMP0B48VYK2O3LKC
CLASS:PUBLIC
DTSTART:20140811T120000Z
DTEND:20140811T130000Z
LAST-MODIFIED:20140811T145509Z
LOCATION:crx headquarters
DTSTAMP:20140811T145509Z
SUMMARY:Presentation XYZ // #1002017
PRIORITY:1
STATUS:NEEDS-ACTION
ORGANIZER:MAILTO:guest@opencrx.org
X-OPENCRX-RENDER-ALARMS:FALSE
END:VTODO
END:VCALENDAR
```

Figure 55: An openCRX activity's iCal representation

In the openCRX standard GUI the same activity is presented as follows:

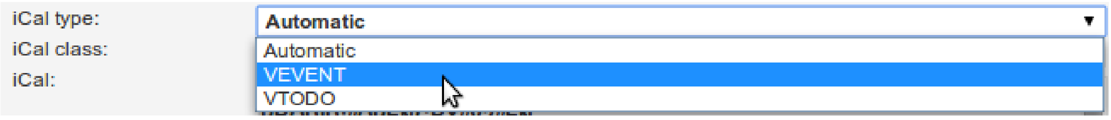


Name:	**Presentation XYZ**	State:	■ **Open**
Activity number:	**1002017**	Priority:	■■■■■ **[5] Immediate**
Assigned to:	**Guest, Joe O**	Scheduled start:	**8/11/2014 2:00:00 PM**
		Scheduled end:	**8/11/2014 3:00:00 PM**
Reporting contact:	**Guest, Joe O**	Scheduled end (original):	
Reporting account:	**guest898989,**	Due by:	
Description:			
Detailed description:			
Activity type:	**Incidents**	% complete:	**0**
Last Transition:	**Create**	Actual start:	
Process state:	**New**	Actual end:	
Incident Management			
Severity:	**--none--**	Incident type:	**--none--**
Customer satisfaction:	**--none--**	Incident origin:	**--none--**
		Reproducibility:	**--none--**
Location:	**crx headquarters**	is all day event:	□
Miscellaneous #1:			
Miscellaneous #2:			
Miscellaneous #3:			

Figure 56: An openCRX activity in the standard GUI

9.4.4.1 Conversions between VEVENT and VTODO

Many calendar applications differentiate between events (entries in a calendar with well-defined start and end date) and tasks or to-dos (entries in a task list with a well-defined due date). openCRX also supports this distinction and can even convert activities from VEVENT to VTODO and vice versa without loss of information. To convert an openCRX activity from one type to the other, edit the activity and change the value of the iCal type dropdown:



iCal type: **Automatic** ▾

iCal class:

iCal:

Figure 57: iCalendar conversion between VEVENT and VTODO

9.4.5 Calendaring / Free Busy

Free Busy is part of the **iCalendar standard** (RFC 2445) for calendar data exchange (see also Wikipedia). Many calendar clients rely on this information for group scheduling. openCRX can derive free busy information on-the-fly from the respective activities; as most clients do not support authentication the default configuration of the openCRX ical servlet does not require authentication to retrieve Free Busy information. However, the principal guest must exist (but you can disable the login):

Free Busy URL (without authentication, requires openCRX principal guest):
http://<crxServer>:<Port>/opencrx-ical-<Provider>/**freebusy**
?id=<Provider>/<Segment>/<Calendar Selector>

Example:
http://localhost:8080/opencrx-ical-CRX/freebusy?id=CRX/Standard/userhome/guest

Please note that free busy information is provided by the openCRX server in a **read-only** fashion (i.e. free busy clients cannot update such information).

Instead of the user name you can also provide the e-mail of the respective user, for example
http://localhost:8080/opencrx-ical-CRX/freebusy?
id=CRX/Standard/userhome/guest@opencrx.org

If you prefer authentication for Free Busy clients you can add the url-pattern /freebusy to the web-resource-collection (in the file **web.xml** of the ical servlet).

openCRX calculates/derives the free busy information for each activity on the fly based on the following algorithm:

If the requesting user has at least one resource assignment with workingUnitPercentage > 0 then TRANSP=OPAQUE, otherwise TRANSP=TRANSPARENT.

TRANSP is managed by the CalDAV, ICS and FREEBUSY servlets. The attribute TRANSP TRANSP is mapped to the activity's assigned resources.

See http://www.opencrx.org/faq.htm#FreeBusyClients for a list of clients tested with openCRX.

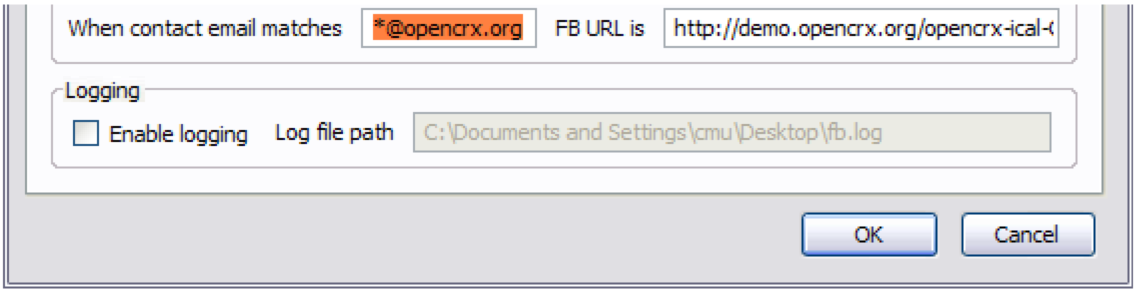
9.4.5.1 Free Busy Configuration of Thunderbird/Lightning

Thunderbird supports free busy if the following add-ons are installed:

- Lightning (at least v1.0)
- Free/Busy (at least v2.0)

For detailed information on how to configure Thunderbird's Free/Busy add-on, please refer to the information provided by the respective developer. With version 2.0 of this add-on one can specify a pattern for both e-mail addresses and URLs to retrieve the free busy data from:

<u>Example:</u>
e-mail address pattern: *@opencrx.org
URL pattern: http://demo.opencrx.org/opencrx-ical-CRX/freebusy?id=CRX/Standard/userhome/*



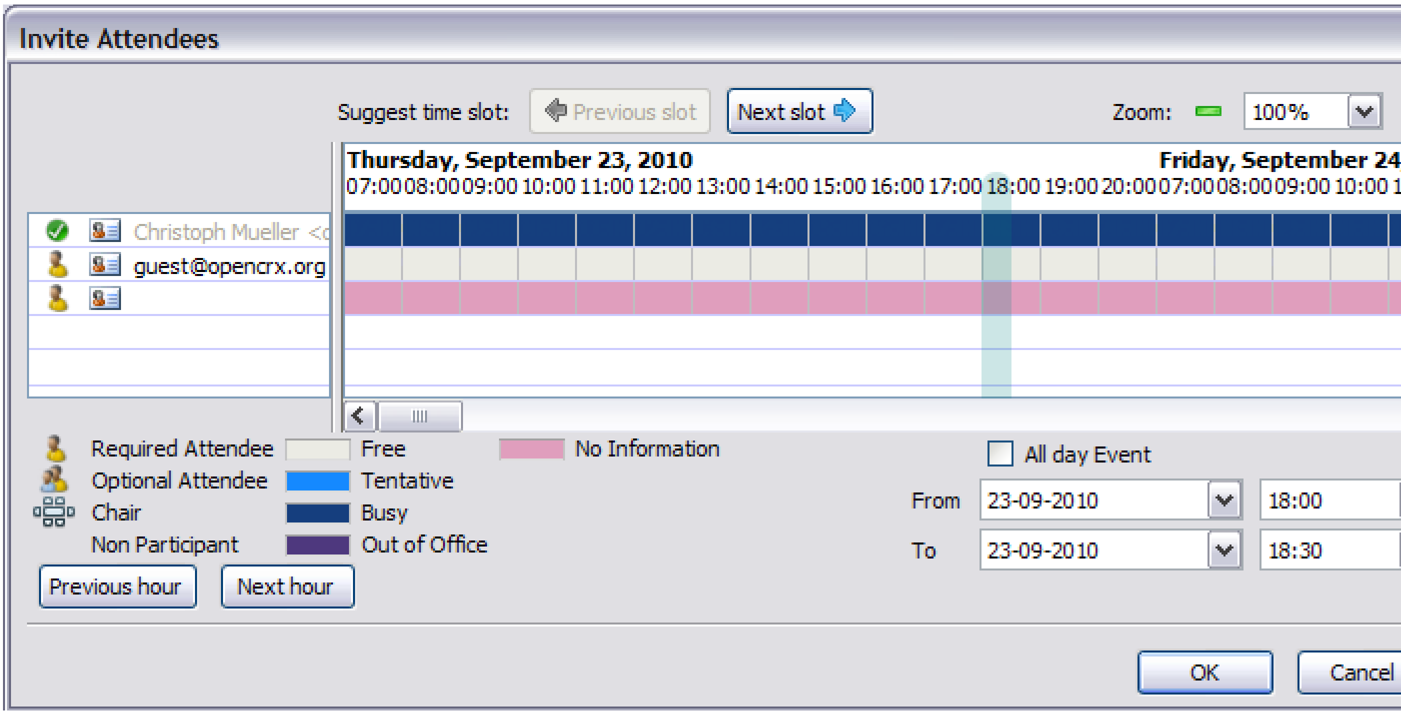
When contact email matches *@opencrx.org FB URL is http://demo.opencrx.org/opencrx-ical-(

Logging

☐ Enable logging Log file path C:\Documents and Settings\cmu\Desktop\fb.log

Figure 58: Configuration of Thunderbird's FreeBusy Add-on

Once the Free/Busy add-on is configured, it will retrieve free busy information directly from your openCRX server whenever you invite attendees:



Invite Attendees

Suggest time slot: Zoom: 100%

Thursday, September 23, 2010 Friday, September 24

07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 07:00 08:00 09:00 10:00 1

✓ Christoph Mueller <c
guest@opencrx.org

Required Attendee
Optional Attendee
Chair
Non Participant

Free
Tentative
Busy
Out of Office
No Information

☐ All day Event

From 23-09-2010 18:00

To 23-09-2010 18:30

Figure 59: Inviting Attendees with Thunderbird using free busy information

9.4.5.2 Free Busy Configuration of MS Outlook

See http://support.microsoft.com/kb/291621. Please note that Outlook does not support SSL with free busy.

9.4.5.3 Free Busy Information as an ICS calendar

It is also possible to view the free busy information in the form of an ICS calendar. This may be useful for users who frequently plan events on behalf of another user without access to the full calendar of that person. Given a free busy URL you simply add **&type=ics** to retrieve the respective ICS calendar:

Free Busy URL as an ICS calendar:

http://<crxServer>:<Port>/opencrx-ical-<Provider>/**freebusy**
?id=<Provider>/<Segment>/<Calendar Selector>**&type=ics**

Example:
http://localhost:8080/opencrx-ical-CRX/freebusy?id=CRX/Standard/userhome/guest&type=ics

The free busy ICS calendar is read-only and the title of events is set to ***, description and location are not available for privacy reasons.

9.4.6 Calendaring / iCalendar (ICS)

iCalendar is implemented/supported by a large number of products (see RFC 2445 or Wikipedia for information about the **iCalendar standard**, sometimes referred to as "**iCal**"). openCRX can derive iCalendar information on-the-fly from the respective activities. iCal clients must authenticate to read and/or write iCalendar data.

ICS URL (with authentication):

http://<crxServer>:<Port>/opencrx-ical-<Provider>/activities ?id=<Provider>/<Segment>/<Calendar Selector>&type=ics

Example:
http://localhost:8080/opencrx-ical-CRX/activities?id=CRX/Standard/tracker/main&type=ics

See chapter 9.4.2 Calendar Selectors (ICS and CalDAV) for information on how to construct calendaring URLs.

Please note that calendars without "C" (create) in the table provided in chapter 9.4.2 Calendar Selectors (ICS and CalDAV) do not support creation of new events/tasks with external ICS clients. The reason being that without a well-defined ActivityCreator associated with the respective calendar selector it is not possible to create an activity and assign it to the appropriate activity groups.

While the mapping of most of openCRX's activity attributes to iCal attributes is obvious, the following hints might still be helpful:

VEVENT:

- Activity.disabled==true --> STATUS:CANCELLED
- Activity.percentComplete==0 --> STATUS:TENTATIVE
- percentComplete>0 --> STATUS:CONFIRMED

VTODO:

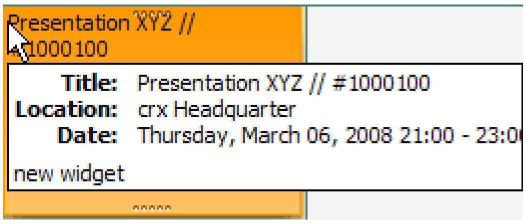
- Activity.disabled==true --> STATUS:CANCELLED
- Activity.percentComplete==0 --> STATUS:NEEDS-ACTION
- Activity.percentComplete>0 --> STATUS:IN-PROCESS
- Activity.percentComplete==100 --> STATUS:COMPLETED

Please note that Activity.percentComplete cannot be changed upon import of a vCard as openCRX activities are managed by activity processes. Hence, changing the status of an activity outside of openCRX does not change the status of this activity in openCRX (even if it is reimported).

9.4.6.1 ICS Configuration of Thunderbird/Lightning and Sunbird

Thunderbird with the Lightning add-on (or Sunbird, the stand-alone client) is a fully-fledged calendar client. Creating a remote calendar (hosted on your openCRX server) is rather straightforward:

- start Thunderbird/Lightning or Sunbird
- select the menu **File > New Calendar**
- in the dialog window *Create New Calendar* you select **On the Network**
- then you select **iCalendar (ICS)**
- enter an ICS URL into the field **Location**;
  example: the user guest would connect to this openCRX homepage with the URL
  http://127.0.0.1:8080/opencrx-ical-CRX/activities?id=CRX/Standard/userhome/guest&type=ics
  See chapter 9.4.2 Calendar Selectors (ICS and CalDAV) for information on ICS URLs
- give your calendar a name and pick a color of your choice
- That's it. You are connected to openCRX:



Presentation XYZ // #1000100

Title: Presentation XYZ // #1000100
Location: crx Headquarter
Date: Thursday, March 06, 2008 21:00 - 23:0

new widget

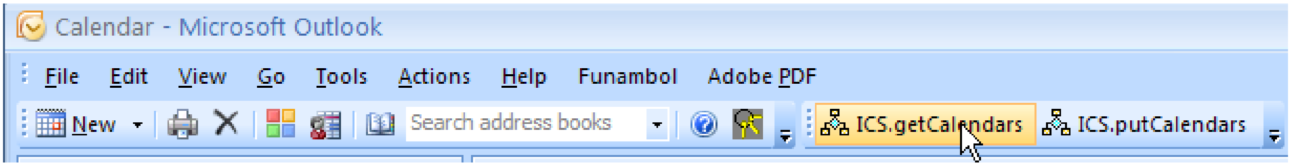
Thunderbird/Lightning and Sunbird require a life connection to openCRX (i.e. no support for offline viewing/editing) unless you enable the experimental Cache of Ligthning/Sunbird.

9.4.6.2 ICS Configuration of MS Outlook

Out of the box Redmond's “flagship” MS Outlook does not offer you much choice with ICS calendars. You are stuck with one of the following 2 options:

- *Published Calendars*
  are local calendars published to a remote location, but there is no sync with that remote calendar (i.e. changes to the remote calendar will never automatically make it back into your Outlook)
- *Internet Calendar Subscription*
  These calendars are striclty read-only in Outlook, i.e. not very useful...

Not to leave you out in the rain, we put together a bunch of VBA scripts that teach your Outlook a few new tricks. The scripts and detailed instructions for both MS Outlook 2003 and MS Outlook 2007 are available from http://www.opencrx.org/opencrx/2.4/Outlook_ICS_VCF_adapter.htm



9.4.6.3 ICS Configuration of iPhone

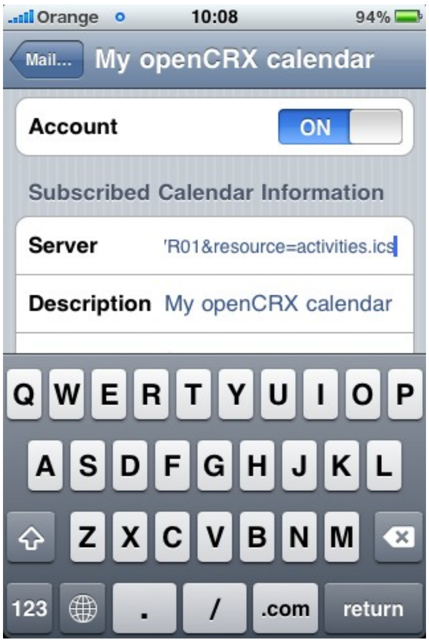
With iPhone OS3.0+ you can connect to any remote ICS calendar (read-only) as follows:

- on your iPhone home screen, tap the icon **Settings**
- tap on **Mail, Contacts, Calendars**
- tap on **Add Account...**
- tap on **Other**
- tap on **Add Subscribed Calendar**
- enter or paste the ICS URL into the field Server
- tap **[Next]** to verify the account information

If you get a message "Cannot Connect Using SSL" tap [No] to move on to the next screen where you can enter the connection details.

- verify/complete your subscription information as follows:

Name	Value / Description
Server	verify the ICS URL
Description	any text you like (default is the ICS URL)
Username	your openCRX user name
Password	your openCRX password
Use SSL	if you use SSL, set to [ON], otherwise [OFF]
Remove Alarms	as you prefer


Orange 10:08 94%

Mail... My openCRX calendar

Account ON

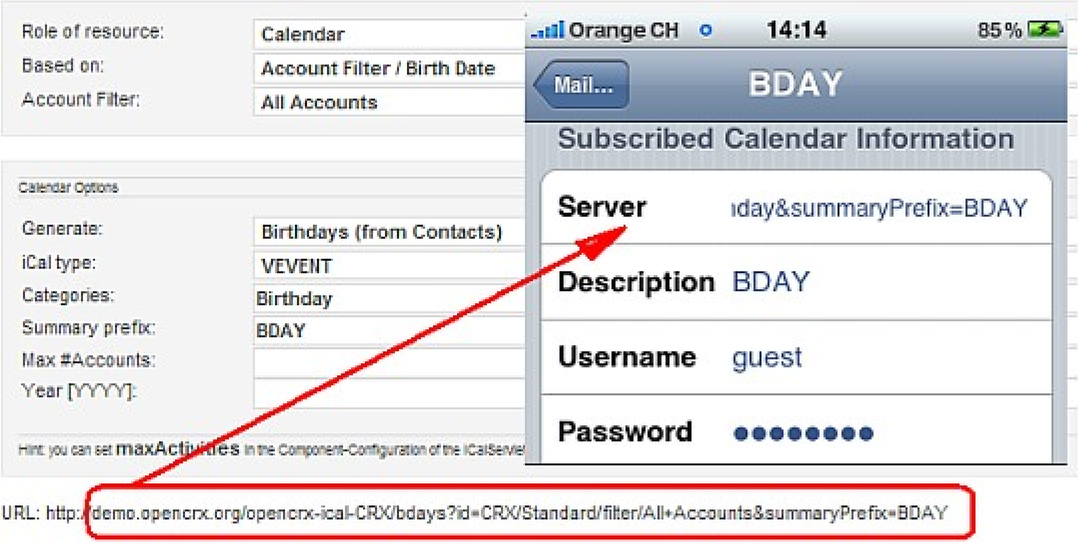
Subscribed Calendar Information

Server 'R01&resource=activities.ics

Description My openCRX calendar

- tap **[Next]**
- if you use SSL in combination with a self-signed certificate, you will get a message Unable to Verify Certificate --> tap **Accept**
- if everything works out, you can tap **Save** to store the settings and your calendar will be available in the Calendar App from the iPhone's home screen

This ICS calendar feature is particularly useful to connect your iPhone to a birthday calendar generated by openCRX (use the wizard "Connection Helper" to calculate the URL (server name respectively) for any desired Account Filter:



Role of resource: Calendar
Based on: Account Filter / Birth Date
Account Filter: All Accounts

Calendar Options

Generate: Birthdays (from Contacts)
iCal type: VEVENT
Categories: Birthday
Summary prefix: BDAY
Max #Accounts:
Year [YYYY]:

Hint: you can set maxActivities in the Component-Configuration of the ICalServle

URL: http://demo.opencrx.org/opencrx-ical-CRX/bdays?id=CRX/Standard/filter/All+Accounts&summaryPrefix=BDAY

Subscribed Calendar Information

Server ıday&summaryPrefix=BDAY
Description BDAY
Username guest
Password ●●●●●●●●●

9.4.6.4 Deleting Events

The openCRX ICS Adapter does not support deleting events (because deleting objects is typically not an acceptable operation in an enterprise environment). openCRX does support **disabling** of objects, however. If there is a need to disable events directly from your ICS Client, here is how to do it:

- Assuming you have a remote calendar CAL with the URL <U> defined in your ICS client, define a new remote calendar CAL-trash with the URL <U>**&disabled=true** (i.e. append the string "&disabled=true" to the URL); the name of the calendar is not important, we just call it "CAL-trash" to indicate that it contains disabled activities.

  example:
  existing calendar **CAL** (showing only events that are not disabled) with the URL
  http://127.0.0.1:8080/opencrx-ical-CRX/activities?id=CRX/Standard/userhome/guest&type=ics

  the URL of the calendar **CAL-trash** showing events that are disabled is
  http://127.0.0.1:8080/opencrx-ical-CRX/activities?id=CRX/Standard/userhome/guest&type=ics&disabled=true

- to delete an event of your calendar CAL, move the event from the calendar CAL to the calendar CAL-trash

9.4.6.5 iCalender Guard Event

If you retrieve an iCalender from the openCRX ICS Adapter, the very first event is a so-called Guard Event:

- the Guard Event is always the first event delivered by the ICS Adapter
- the attribute SUMMARY corresponds to the Calendar-ID (UID of the Guard Event)
- the attribute DTSTART is set to 19000101T000000Z

The openCRX ICS Adapter supports the creation of new events/tasks as long as a calendar's Guard Event is posted to the adapter together with the new event/task. The openCRX ICS Adapter also verifies the UID of the Guard Event.

9.4.7 Calendaring / CalDAV

CalDAV is implemented/supported by a growing number of products (see http://caldav.calconnect.org/ or Wikipedia for information about the **CalDAV standard**). openCRX is a fully-fledged CalDAV server; the functionality is implemented by a native CalDAV servlet. CalDAV clients must authenticate to read and/or write CalDAV data.

CalDAV URL for individual calendar:

http://<crxServer>:<Port>/opencrx-caldav-<Provider>/<Provider>/<Segment>/<Calendar Selector>

Example:
http://localhost:8080/opencrx-caldav-CRX/CRX/Standard/tracker/main

CalDAV URL for CalDAV calendar collection:

http://<crxServer>:<Port>/opencrx-caldav-<Provider>/<Provider>/<Segment>/user/<principal name>/profile/<Calendar Profile>

Example:
http://localhost:8080/opencrx-caldav-CRX/CRX/Standard/user/guest/profile/MyCals

See chapter 9.4.2 Calendar Selectors (ICS and CalDAV) for information on how to construct calendaring URLs. The easiest way to construct CalDAV URLs is to use the openCRX Wizard "Connection Helper" from your Homepage.

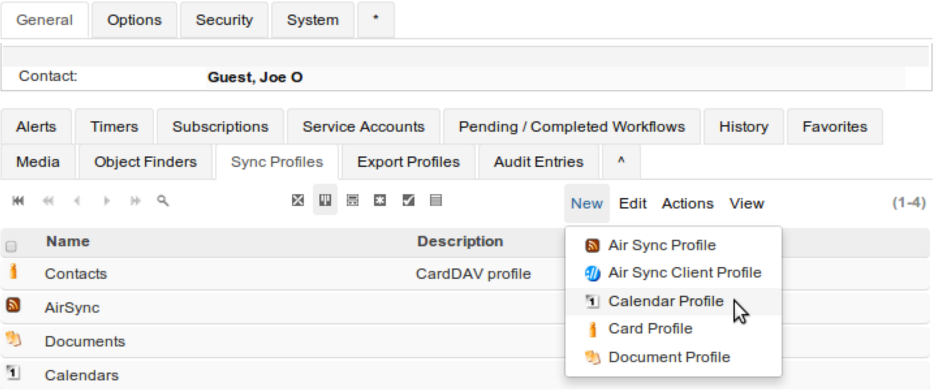
Please note that calendars without "C" (create) in the table provided in chapter 9.4.2 Calendar Selectors (ICS and CalDAV) do not support creation of new events/tasks with external CalDAV clients. The reason being that without a well-defined ActivityCreator associated with the respective calendar selector it is not possible to create an activity and assign it to the appropriate activity groups.
In the case of calendar collections/profiles, it depends on the feed whether the respective calendar supports activity creation or not. If openCRX can determine a well-defined ActivityCreator, activity creation is supported, otherwise not.

Beware of CalDAV clients that do not provide feedback if a write operation did not succeed (the iPhone is unfortunately not very user-friendly in that respect). If you create a new event (or change an existing one) with your CalDAV client and the write operation does not succeed, you might still see your new event (or the changes to the existing event respectively) in your CalDAV client but such data is not available on the server!

9.4.7.1 CalDAV Collections

Some CalDAV clients (e.g. Apple's iPhone, CalDAV-Sync for Android) support CalDAV collections. With openCRX you can define CalDAV collections as follows:

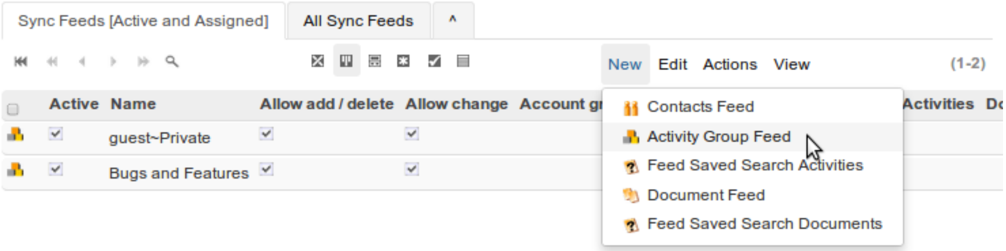
- navigate to a user's homepage
- click on the tab [Sync Profiles] and select New > Calendar Profile:



Contact: Guest, Joe O

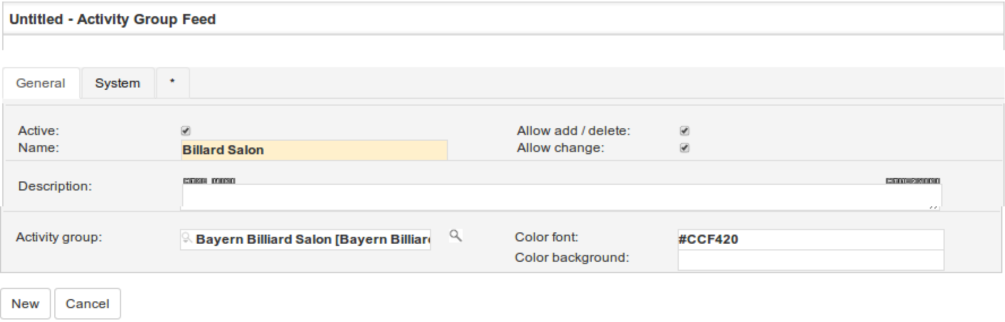
Name	Description
Contacts	CardDAV profile
AirSync	
Documents	
Calendars	

- enter at least a name for your new collection, e.g. MyCals, and then click [New]
- navigate to this new calendar profile and then add the desired feed(s), e.g. an Activity Tracker or an Activity Filter, as follows:
  - select New > Activity Group Calendar Feed as shown below:


Sync Feeds [Active and Assigned]
All Sync Feeds
^
New
Edit
Actions
View
(1-2)
Contacts Feed
Activity Group Feed
Feed Saved Search Activities
Document Feed
Feed Saved Search Documents

Active	Name	Allow add / delete	Allow change	Account gr	Activities	Do
☑	guest~Private	☑	☑			
☑	Bugs and Features	☑	☑			

  - select an activity group and enter at least a name for this feed and mark it as active (some CalDAV clients support coloring, i.e. you can optionally also enter color information):



Untitled - Activity Group Feed

Active: ☑
Name: Billard Salon
Allow add / delete: ☑
Allow change: ☑
Description:
Activity group: Bayern Billiard Salon [Bayern Billiar
Color font: #CCF420
Color background:

  - click [New]
  - optionally, add more feeds (you can also add additional feeds later)

9.4.7.2 CalDAV Configuration of Thunderbird/Lightning and Sunbird

Thunderbird 10.x with the Lightning add-on (at least version 1.2.1) is a fully-fledged calendar client. Creating a remote calendar (hosted on your openCRX server) is rather straightforward:

- start Thunderbird/Lightning
- select the menu **File > New Calendar**
- in the dialog window *Create New Calendar* you select **On the Network**
- then you select **CalDAV**
- enter a CalDAV URL into the field **Location**;
  example: the user guest would connect to this openCRX homepage with the URL
  http://127.0.0.1:8080/opencrx-caldav-CRX/CRX/Standard/userhome/guest
  See chapter 9.4.2 Calendar Selectors (ICS and CalDAV) for information on CalDAV URLs
  Note: Lightning does not support CalDAV Collections, i.e. you must create a new Lightning calendar for each openCRX calendar...
- give your calendar a name and pick a color of your choice
- that's it – you are connected to openCRX

9.4.7.3 CalDAV Configuration of MS Outlook

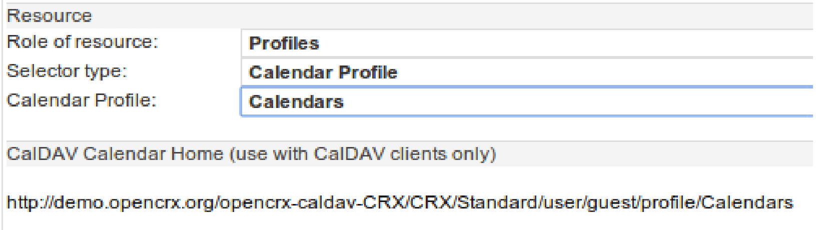
MS Outlook is a client for MS Exchange and as such does not support CalDAV. There are third-party extensions you might want to try. Some of them are listed at http://wiki.davical.org/w/CalDAV_Clients/Outlook.

See also http://www.opencrx.org/opencrx/2.4/Outlook_ICS_VCF_adapter.htm, although this adapter is not supported anymore.

9.4.7.4 CalDAV Configuration of iPhone (OS3.0+)

Connect to any openCRX calendar collection as follows with your iPhone:

- start the wizard Connection Helper: AirSync / Calendar / vCard from your openCRX homepage
- select "Profiles" and "Calendar Profiles" and then your CalDAV collection, e.g. "Calendars" - the wizard automatically "calculates" the CalDAV URL required to connect:



Resource

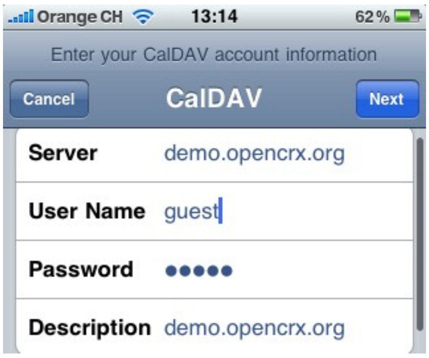
Role of resource:	**Profiles**
Selector type:	**Calendar Profile**
Calendar Profile:	**Calendars**

CalDAV Calendar Home (use with CalDAV clients only)

http://demo.opencrx.org/opencrx-caldav-CRX/CRX/Standard/user/guest/profile/Calendars

- copy the above URL (you'll need to paste it later)
- on your iPhone home screen, tap the icon **Settings**

- tap on **Mail, Contacts, Calendars**
- tap on **Add Account...**
- tap on **Other**
- tap on **Add CalDAV Account**
- and then enter or paste the CalDAV URL into the field Server and populate the fields User Name and Password as shown below:
- tap **[Next]** to verify the account information

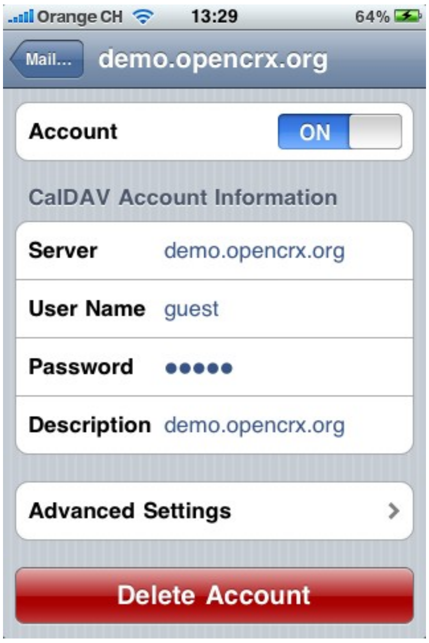


Server demo.opencrx.org
User Name guest
Password ●●●●●
Description demo.opencrx.org

If you get a message “Cannot Connect Using SSL” tap [No] to get to the next screen and then enter the connection details.

- verify/complete your subscription information as follows:

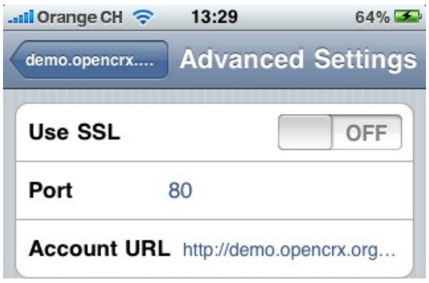
Name	Value / Description
Server	verify the server name
User Name	your openCRX user name
Password	your openCRX password
Description	any text you like
Use SSL	if you use SSL, set to [ON], otherwise [OFF]
Port	port number (Tomcat)
Account URL	the CalDAV URL



Account ON

CalDAV Account Information

Server demo.opencrx.org
User Name guest
Password ●●●●●
Description demo.opencrx.org



Use SSL OFF
Port 80
Account URL http://demo.opencrx.org...

- if you use SSL in combination with a self-signed certificate, you will get a message Unable to Verify Certificate --> tap **Accept**
- if everything works out, you can tap **Save** to store the settings and your calendar will be available in the Calendar App from the iPhone's home screen

9.4.7.5 CalDAV Configuration of Android devices

Android does not support CalDAV out of the box, but there are applications available from the Android Market (search for "CalDAV" in the Android Market to locate them). We have tested "CalDAV-Sync" and it works like a charm. It even supports CalDAV collections, so it's fairly easy to configure (see 9.4.7.1 CalDAV Collections for more information).

9.4.7.6 Deleting Events

The CalDAV protocol supports deletion of events/tasks. openCRX honors such requests, although the respective activity is disabled and not deleted. If you absolutely want to delete an activity you can do so with the openCRX standard GUI.

9.5 Mailstore / IMAP

Instead of offering platform specific plugins for a multitude of mail clients like MS Outlook, MS Outlook Express, Thunderbird, Evolution, Eudora, Elm, etc. openCRX features a platform neutral IMAP adapter (get more information about IMAP or read what Wikipedia is saying about IMAP). The advantages of such a standardized IMAP adapter are:

- works with any IMAP client (including your favorite one)
- no clumsy installation of plugins, i.e. you can get this to work on your company's laptop regardless of how "hardened" and locked down the system is
- supports single message import and bulk import
- imports headers, body, and attachments
- automatically creates references to sender and recipient(s) if the respective e-mail addresses are present in openCRX

In a nutshell this means that you can use any IMAP client to connect to openCRX and view openCRX EMailActivities. openCRX activity groups are mapped to IMAP folders. The folders contain openCRX EMailActivities.

Viewing/exporting of EmailActivities is always possible, creating/updating of EmailActivities requires that an E-Mail Activity Creator is defined for the respective Activity Group, and deleting of EmailActivities is not supported. Please refer to chapter 8.3.1 Inbound E-mail with IMAP Adapter for details.

If you **move** an e-mail message from a non-openCRX IMAP folder to an openCRX IMAP folder and the target folder does not have a valid E-Mail Activity Creator defined, openCRX will not be able to create an EMailActivitiy in that folder. Due to the **move** operation the message is deleted from the source folder and your e-mail message is lost.

Hence, it is good practice to **copy** (and not move) e-mails to openCRX IMAP folders. Only after verifying that the EMailActivitiy was actually created by openCRX in the target folder is it safe to delete the message from the source folder.

E-mail addresses should be unique!

If you import e-mails into openCRX with the IMAP Adapter, openCRX tries to match sender and recipients based on e-mail addresses. For obvious reasons, this will produce unexpected (if not undesired) results if e-mail addresses in openCRX are not unique.

You can test your openCRX database for duplicate e-mail addresses with the following query:

```
SELECT email_address, count(*)
FROM OOCKE1_ADDRESS
GROUP BY email_address HAVING count(*) > 1
```

Since openCRX v2.9.1, unknown e-mail addresses are created as composites of the segment administrator, e.g. admin-Standard.

The following information is required to connect an IMAP client to openCRX:

Host	IP address or host name of openCRX Server Examples: localhost, 127.0.0.1, myCrxServer.myCompany.com, etc.
Port	1143 (note that the IMAP standard port is 143)
User name	<login principal name>@<Segment> Example: **guest@Standard**
Password	principal's openCRX password

The openCRX IMAP adapter supports SSL. It is probably a good idea to make use of that feature and connect your IMAP client securely to openCRX. See chapter 9.5.3 Enabling SSL Support for IMAP.

9.5.1 Configuring the openCRX IMAP Port

The openCRX IMAP port is by default set to 1143 (to avoid conflicts with other IMAP daemons listening on the IMAP standard port 143). You can change this configuration in the file **web.xml** located in the directory opencrx-core-CRX\opencrx-imap-CRX\WEB-INF\

Look for the the param-name **port**.

If you build your own EARs you can change the openCRX LDAP port in your project's file **build.properties** (imap.listenPort) or directly in your **build.xml**.

9.5.2 Configuring the IMAP Maildir Cache

For increased performance the openCRX IMAP Adapter works with a cache. The location of this cache, the so-called Maildir, can be set as a JAVA_OPTS.

You can reset the cache by deleting it. The openCRX IMAP Adapter will recreate the cache automatically.

9.5.2.1 Maildir Configuration with Apache Tomcat

Add the option -Dorg.opencrx.maildir="%CATALINA_HOME%\maildir" to the JAVA_OPTS in your Tomcat start batch file (e.g. **tomcat.bat**, **run.sh**, etc.).

9.5.3 Enabling SSL Support for IMAP

With the following steps you can enable SSL support for IMAP:

- Create cert and key with OpenSSL (e.g. server.key, server.crt)
- Convert cert and key to PEM format using OpenSSL:
  - Key: openssl rsa -in server.key -out server-key.pem -outform PEM
  - Cert: openssl x509 -in server.crt -out server-cert.pem -outform PEM
- Use a Java Keytool which allows you to a) create a keystore, b) import a certificate, c) import a private key. The following tools allow you to easily manage Java keystores:
  - Portecle: http://sourceforge.net/projects/portecle/
  - KeyTool IUI: http://yellowcat1.free.fr/keytool_iui.html
- Add the following init-param tags to the **web.xml** of the IMAPServlet (but don't forget to adapt the values according to your environment):

Listing 24: init-param tags required to enable IMAP SSL

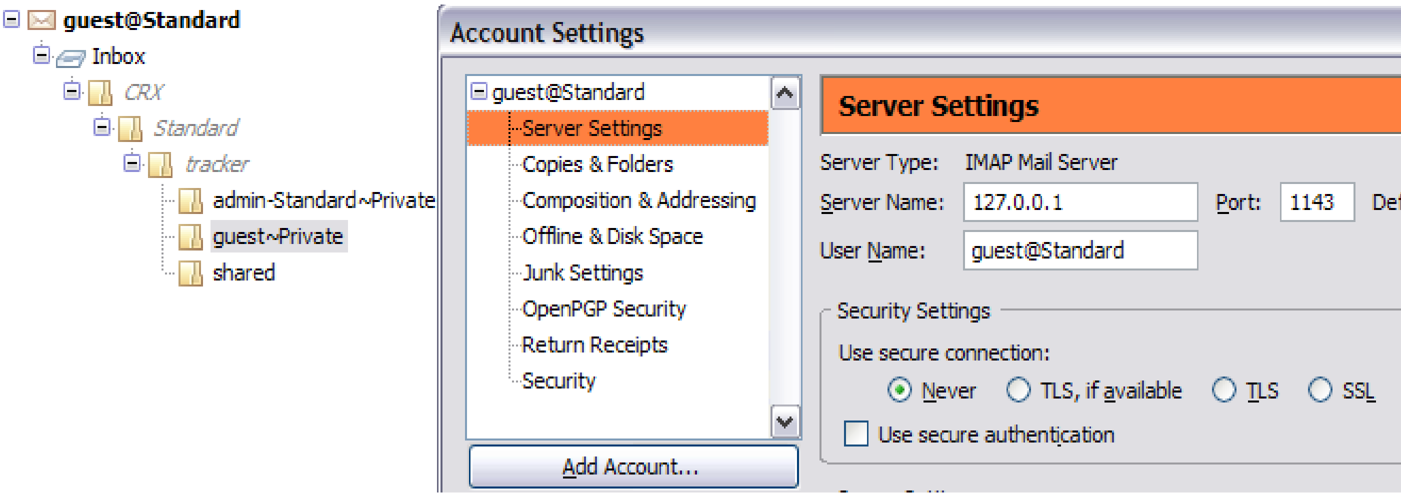
```
...
  <init-param>
    <param-name>sslKeystoreFile</param-name>
    <param-value>/var/ssl/keystore.jks</param-value>
  </init-param>
  <init-param>
    <param-name>sslKeystoreType</param-name>
    <param-value>JKS</param-value>
  </init-param>
  <init-param>
    <param-name>sslKeystorePass</param-name>
    <param-value>changeit</param-value>
  </init-param>
  <init-param>
    <param-name>sslKeyPass</param-name>
    <param-value>changeit</param-value>
  </init-param>
...
```

- to avoid confusion, you might also want to change the port from 1143 (IMAP for openCRX) to 1443 (IMAPS for openCRX) – see chapter 9.5.1 Configuring the openCRX IMAP Port for information on how to do that.

9.5.4 IMAP Configuration of Thunderbird

The following information is required to configure an IMAP account:

Email account	<login principal name>@<Segment> Example: guest@Standard
Password	openCRX password of the respective principal
Your name	<login principal name>@<Segment> Example: guest@Standard
Email Address	your e-mail address Example: guest@mycompany.com
Type of server	**IMAP**
Incoming Server Outgoing Server	name or IP address of your openCRX server Example: 127.0.0.1
Port	**1143**
Incoming User Name	<login principal name>@<Segment> Example: guest@Standard



Server Type: IMAP Mail Server
Server Name: 127.0.0.1 Port: 1143
User Name: guest@Standard

Security Settings
Use secure connection:
● Never ○ TLS, if available ○ TLS ○ SSL
□ Use secure authentication

Figure 60: Thunderbird IMAP Configuration

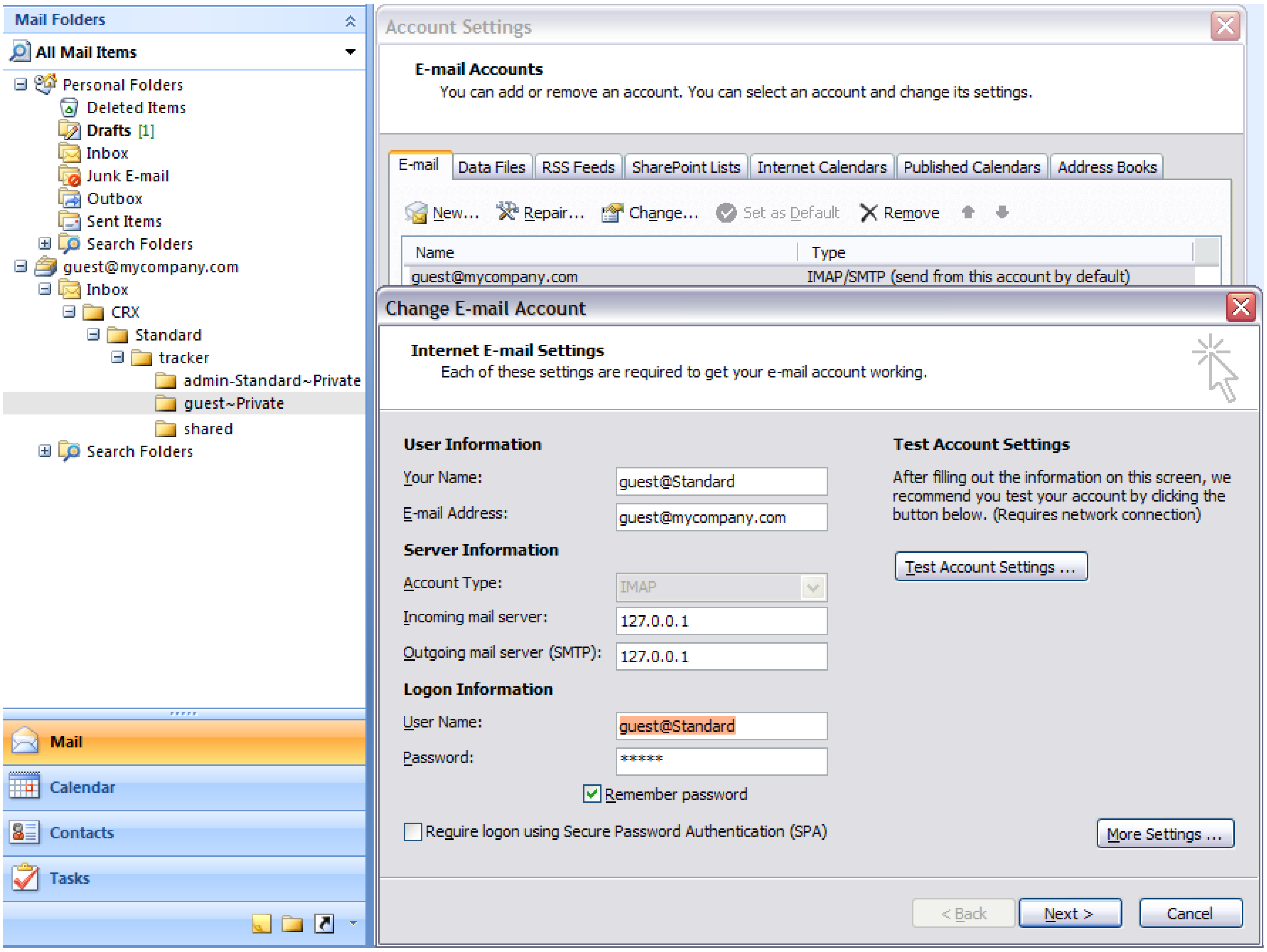
If you **move** an e-mail message from a non-openCRX IMAP folder to an openCRX IMAP folder and the target folder does not have a valid E-Mail Activity Creator defined, openCRX will not be able to create an EMailActivitiy in that folder. Due to the **move** operation the message is deleted from the source folder in your IMAP client and your e-mail message will be lost.

Hence, it is good practice to **copy** (and not move) e-mails to openCRX IMAP folders. Only after verifying that the EMailActivitiy was actually created by openCRX in the target folder is it save to delete the message from the source folder.

9.5.5 IMAP Configuration of MS Outlook

The following steps are required to configure MS Outlook 2007 for LDAP:

Email account User Name	<login principal name>@<Segment> Example: guest@Standard
Password	openCRX password of the respective principal
Your Name	<login principal name>@<Segment> Example: guest@Standard
E-mail Address	your e-mail address Example: guest@mycompany.com
Account type	**IMAP**
Incoming mail server Outgoing mail server	name or IP address of your openCRX server Example: 127.0.0.1
Incoming Port	**1143**
Incoming User Name	<login principal name>@<Segment> Example: guest@Standard



E-mail Accounts

You can add or remove an account. You can select an account and change its settings.

Name	Type
guest@mycompany.com	IMAP/SMTP (send from this account by default)

Change E-mail Account

Internet E-mail Settings

Each of these settings are required to get your e-mail account working.

User Information

Your Name: guest@Standard

E-mail Address: guest@mycompany.com

Server Information

Account Type: IMAP

Incoming mail server: 127.0.0.1

Outgoing mail server (SMTP): 127.0.0.1

Logon Information

User Name: guest@Standard

Password: *****

☑ Remember password

☐ Require logon using Secure Password Authentication (SPA)

Test Account Settings

After filling out the information on this screen, we recommend you test your account by clicking the button below. (Requires network connection)

Figure 61: MS Outlook IMAP Configuration

10 openCRX AirSync Server (ActiveSync compatible)

openCRX AirSync allows you to connect your ActiveSync-enabled PDAs and mobile phones (e.g. Apple's iPhone, Android-based devices, RIM's BlackBerry, Windows Mobile devices, etc.) with openCRX to synchronize e-mails, contacts, events and tasks, including push functionality:

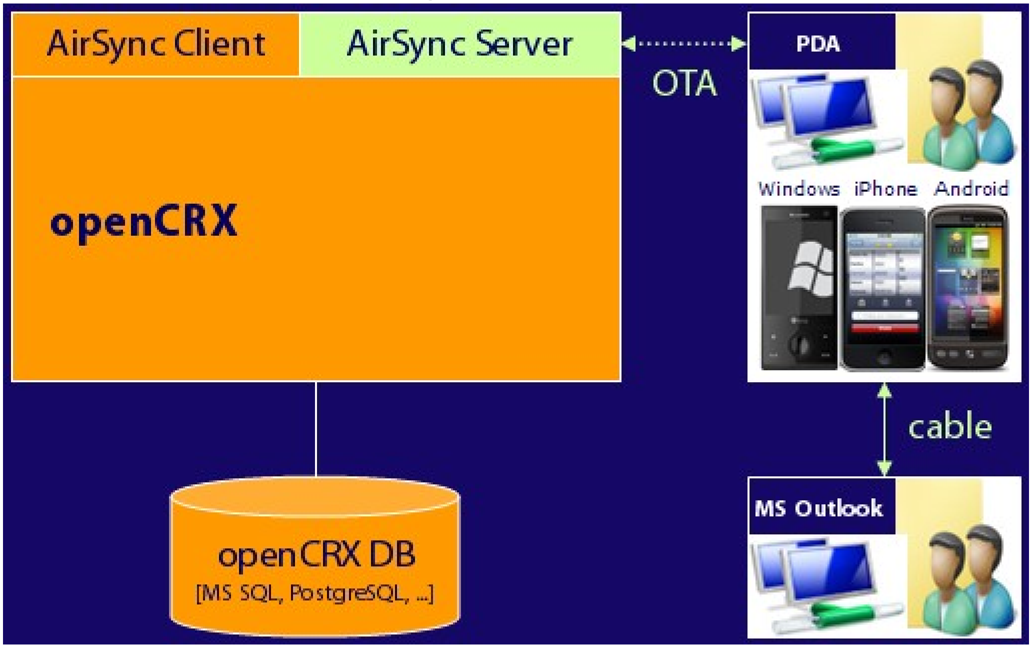


Figure 62: openCRX AirSync Server – Over The Air (OTA) Synchronization

Even though openCRX AirSync aims to be compatible with Microsoft's ActiveSync (see what Wikipedia has to say about ActiveSync), we are probably not quite there. Feel free to provide feedback, good or bad.

10.1 Configuring the AirSync Directory

The openCRX AirSync Adapter stores information about the "*Folders to be monitored*" in a directory on the server (one .ser file per ActiveSync client). The location of this AirSync directory can be set as a JAVA_OPTS (e.g. in a batch file like **tomcat.bat**, **run.bat**, **run.sh**, etc.):

Listing 25: Set org.opencrx.airsyncdir for Apache Tomcat

```
...
set JAVA_OPTS=%JAVA_OPTS% -Dorg.opencrx.airsyncdir="%CATALINA_HOME%\airsyncdir"
...
```

If the content of the AirSync directory gets lost, ActiveSync clients must renew the ping information (which recreates the respective .ser file). The iPhone, for example, does this if you enter/exit the respective Exchange Account settings.

10.2 Mapping of openCRX Objects to AirSync Objects

The openCRX AirSync servlet maps openCRX objects to ActiveSync objects (Contacts, Events, Tasks, Mails) as follows based on the openCRX object class and additional information at hand:

openCRX Object Class	Additional Requirement(s)	Mapped to	R=read
			U=update
			C=create

AccountGroup	referenced by ContactsFeed	**Contact Folder**	
ActivityGroup	referenced by CalendarFeed and with assigned ActivityCreator for Meetings	**Calendar Folder**	
	referenced by CalendarFeed and with assigned ActivityCreator for Tasks	**Task Folder**	
	referenced by CalendarFeed and with assigned ActivityCreator for E-Mails	**E-Mail Folder**	
ActivityFilter	referenced by CalendarFeed	**Calendar Folder** **Task Folder** **E-Mail Folder**	
Account	referenced by member of **AccountGroup** that is mapped to Contact Folder	Contact	**RUC**
Meeting	assigned to **ActivityGroup** that is mapped to Calendar Folder	Event	**RUC**
Incident, SalesVisit, PhoneCall, Mailing, Absence, ExternalActivity	assigned to **ActivityGroup** that is mapped to Calendar Folder	Event	RU
Task	assigned to **ActivityGroup** that is mapped to Task Folder	Task	**RUC**
EMailActivity	assigned to **ActivityGroup** that is mapped to E-Mail Folder	E-Mail	**RUC**
Meeting, Incident, SalesVisit, PhoneCall, Mailing, Absence, ExternalActivity	filtered by **ActivityFilter** that is mapped to Calendar Folder	Event	RU
Task	filtered by **ActivityFilter** that is mapped to Task Folder	Task	RU
EMailActivity	filtered by **ActivityFilter** that is mapped to E-Mail Folder	E-Mail	RU

The openCRX ical and caldav Adapters use a different mapping for activities (see chapter 9.4.4 Mapping of Activities to Calendar Events and Tasks for details).

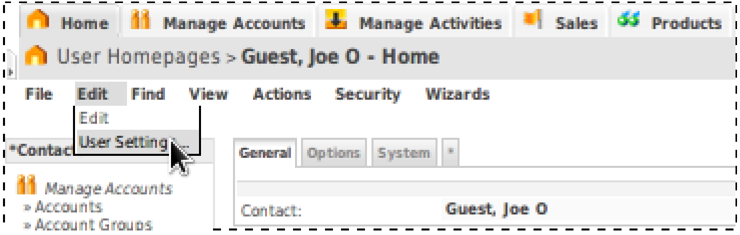
Creation of openCRX objects by an ActiveSync client requires that there is no ambiguity about the object class of the openCRX object to create and in the case of Activities an ActivityCreator must exist. That's the reason why it is not possible to create openCRX incidents or sales visits (Events are always mapped to openCRX Meetings).

10.3 A User's AirSync Profile

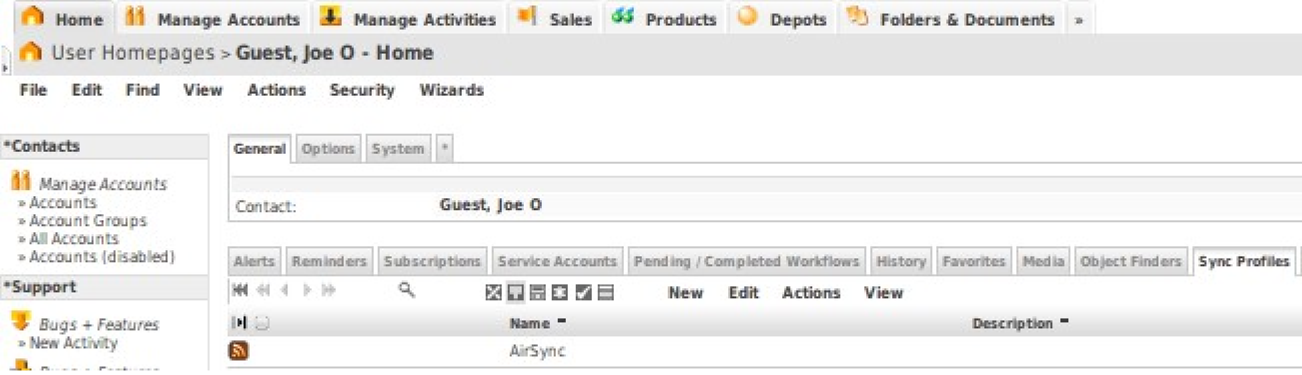
10.3.1 Creation of a User's AirSync Profile

openCRX users can create a personal AirSync profile as follows:

- login and start the wizard Edit > User Settings from your homepage:



- click the button [Apply] – the wizard will create a SyncProfile named **AirSync**; you can verify this by clicking [Cancel] in the wizard and then navigating to the Grid [Sync Profiles] of your homepage:



- navigate to the **AirSync** profile – the wizard User Settings created two Sync Feeds, a Calendar Feed and a Contacts Feed (both named with your username):

If the name of a feed does not end with the string "**~Private**" such a feed is considered a "user created" feed for ActiveSync purposes. Depending on your phone (or the implementation of the respective ActiveSync client) you will not be able to synchronize such feeds. Hence, if synchronizing with your device does not work, ensure that your feeds name ends with "~Private".

If you prefer device-specific profiles, you can create such profiles by naming them "**AirSync~<Device ID>**".

Examples: AirSync~HTCAnd922379b0, AirSync~Appl88922G1B3NA

Note: Stock Android (up to and including ICS) does not support device-specific profiles because the Android code is broken (during the signup negotiation a bad device id is sent to the server...).

10.3.2 Creating/Configuring an AirSync Calendar Feed

openCRX users have a private Activity Tracker **<username>~Private** (e.g. guest~Private for the user named guest) and several private Activity Creators:

- **<username>~Private** (to create Incidents)
- **<username>~Private E-Mails** (to create E-Mail Activities)
- **<username>~Private Meetings** (to create Meetings)
- **<username>~Private Tasks** (to create Tasks)

If the name of a feed does not end with "~Private" such a feed is considered a "user created" feed for ActiveSync purposes. Depending on your phone (or the implementation of the respective ActiveSync client) you will not be able to synchronize such feeds.

Activities created with one of the above Activity Creators are automatically assigned to the respective user's Activity Tracker **<username>~Private** and security is set such that only the respective user can read/write such activities.

If you only need one private "calendar" to manage your activities, the wizard User Settings does all the work for you, i.e. there is nothing more to configure.

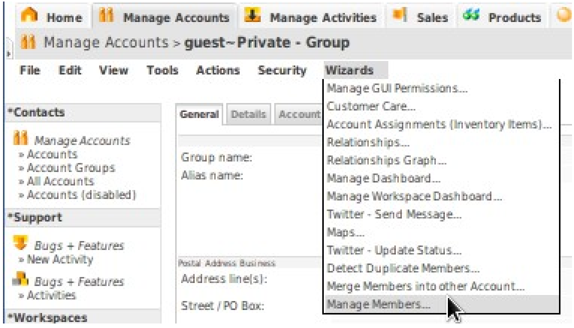
You can, however, add more calendar feeds (activity group calendar feeds or activity filter calendar feeds) to your AirSync profile just as you would add calendar feeds to a calendar profile (see chapter 9.4.7.1 CalDAV Collections).

10.3.3 Creating/Configuring an AirSync Contacts Feed

openCRX users have a private Account Group called **<username>~Private** (e.g. guest~Private for the user named guest). Any openCRX Account that is a referenced by a member of this Account Group is synchronized through your AirSync Contacts Feed. Think of a Contacts Feed as an Address Book.

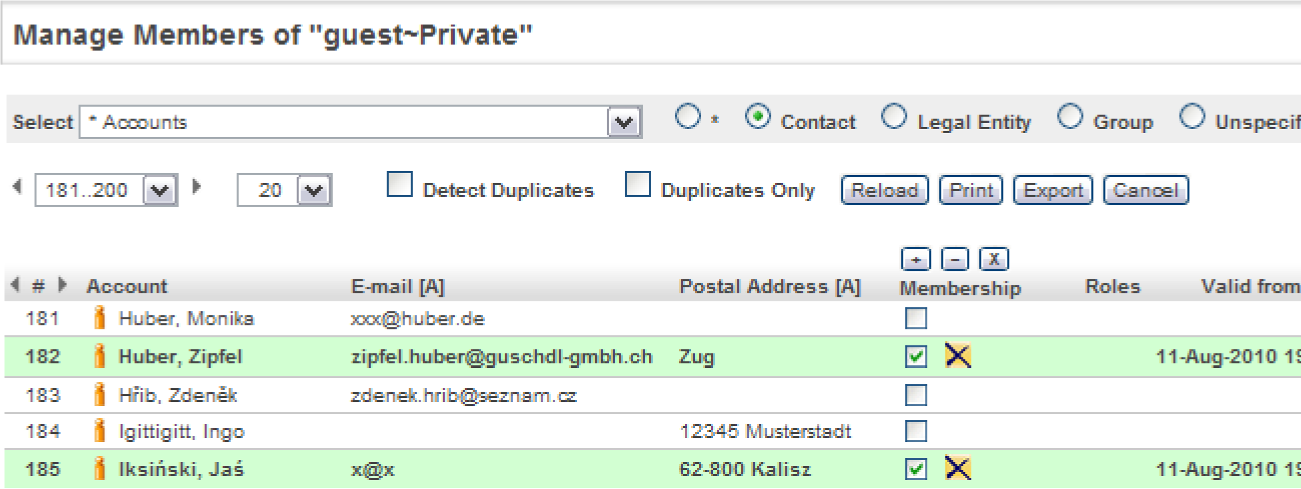
The private Account Group created by the wizard "User Settings" is empty initially, i.e. there are no members defined. You can add members to your private Account Group as follows:

- navigate to your private Account Group, e.g. guest~Private (or any other Account Group referenced in the Contacts Feed you want to configure)
- start the wizard Wizard > Manage Members:



- the wizard Manage Members allows you to select Accounts to be added (or removed) as members from various predefined sets:
  - all accounts (* Accounts)
  - members of the respective Account Group (Member)
  - filtered accounts of any Account Filter (Account Filter name)

  in addition, you can also restrict the choice to Contacts, Legal Entities, Groups, or Unspecified Accounts only:



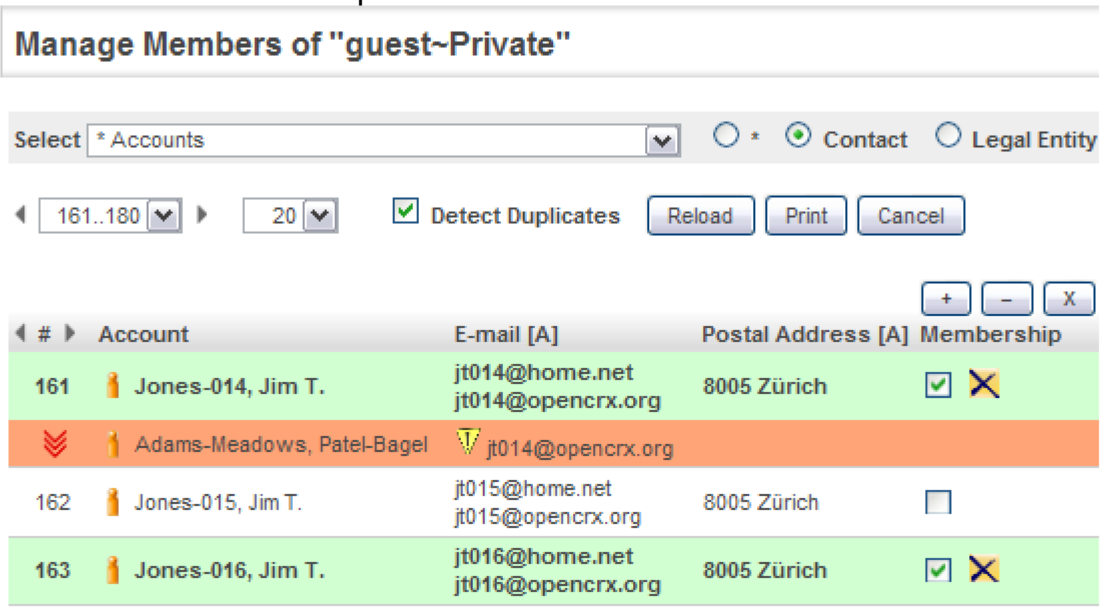
Manage Members of "guest~Private"

Select * Accounts ○ * ● Contact ○ Legal Entity ○ Group ○ Unspecif

181..200 20 □ Detect Duplicates □ Duplicates Only

#	Account	E-mail [A]	Postal Address [A]	Membership		Roles	Valid from
181	Huber, Monika	xxx@huber.de		□			
182	Huber, Zipfel	zipfel.huber@guschdl-gmbh.ch	Zug	☑	✗		11-Aug-2010 1
183	Hřib, Zdeněk	zdenek.hrib@seznam.cz		□			
184	Igittigitt, Ingo		12345 Musterstadt	□			
185	Iksiński, Jaś	x@x	62-800 Kalisz	☑	✗		11-Aug-2010 1

- you can add individual accounts as members (click the respective checkbox) or all the accounts that are visible on the current page (click the button [+] followed by [OK]; similarly you can disable (or delete) members individually or all members that are visible on the current page
- the wizard can also detect duplicates based on the following criteria (check the respective option to enable duplicate detection): a particular e-mail address is shared by more than one account or more than one member references a particular account:



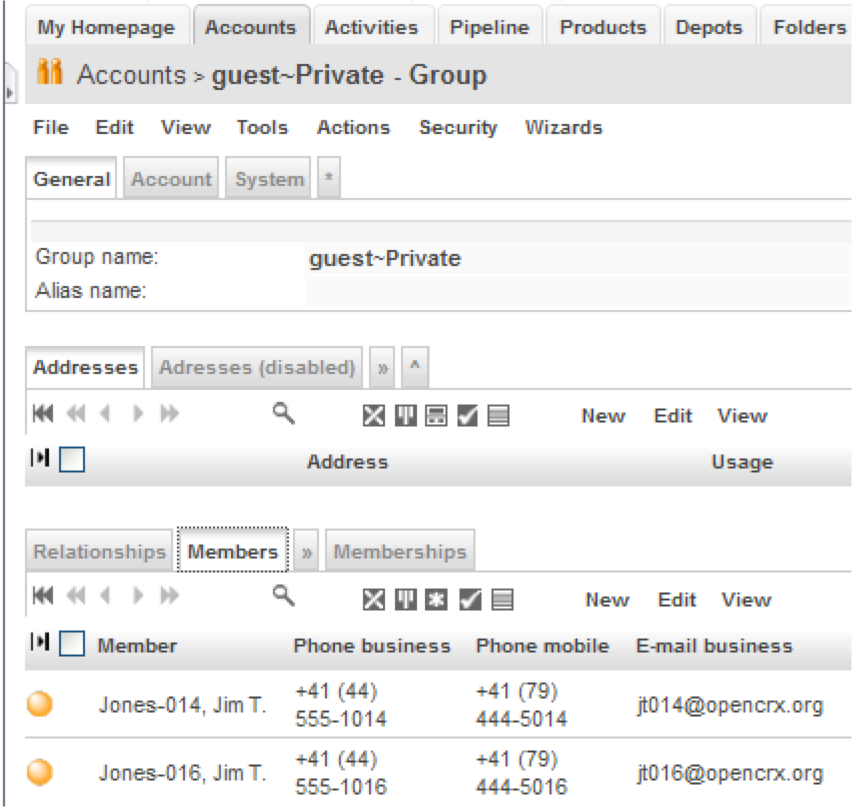
Manage Members of "guest~Private"

Select * Accounts ○ * ● Contact ○ Legal Entity

161..180 20 ☑ Detect Duplicates

#	Account	E-mail [A]	Postal Address [A]	Membership	
161	Jones-014, Jim T.	jt014@home.net jt014@opencrx.org	8005 Zürich	☑	✗
	Adams-Meadows, Patel-Bagel	jt014@opencrx.org			
162	Jones-015, Jim T.	jt015@home.net jt015@opencrx.org	8005 Zürich	□	
163	Jones-016, Jim T.	jt016@home.net jt016@opencrx.org	8005 Zürich	☑	✗

- once you're done with adding the desired accounts as members to your Account Group you can leave the wizard – in the grid [Members] you should see all the active members pointing to accounts that you will be able to synchronize with your AirSync Contacts Feed:



Group name: guest~Private
Alias name:

Member	Phone business	Phone mobile	E-mail business
Jones-014, Jim T.	+41 (44) 555-1014	+41 (79) 444-5014	jt014@opencrx.org
Jones-016, Jim T.	+41 (44) 555-1016	+41 (79) 444-5016	jt016@opencrx.org

Seeing an account (and being able to retrieve it through AirSync) does not imply that you can also update such an account. Whether you have update access to a particular account depends on the security settings of the respective account. Please note that certain ActiveSync clients do not notify the user when an update fails (the iPhone, for example, does not tell you that an update request failed).

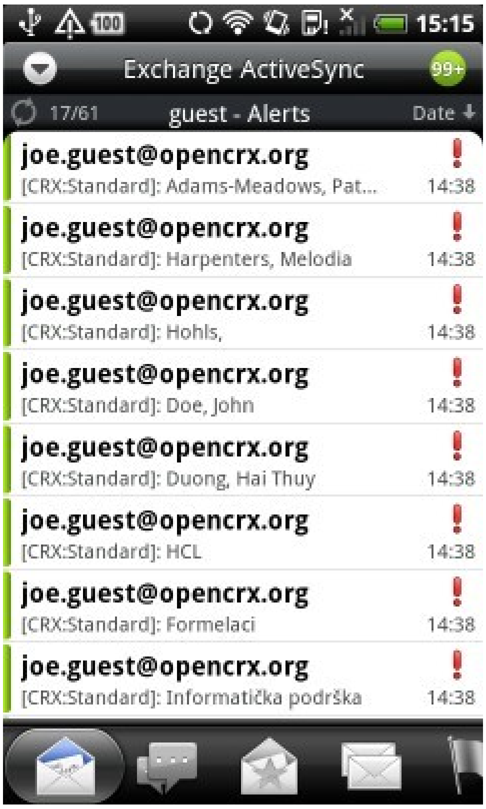
Deleting an account through AirSync does not really delete the account in openCRX, only the respective member of your Account Group (referenced in the respective Contacts Feed) is disabled. If required, you can reactive such a member, e.g. with the wizard Manage Members.

Please note that accounts in your private AirSync Contacts Feed are not necessarily private. Whether other openCRX users can see, update and delete such accounts depends on the security settings of the respective account.

10.3.4 Configuration of AirSync E-Mail

openCRX users have a private Activity Tracker called **<username>~Private** (e.g. guest~Private for the user named guest). E-Mail Activities assigned to this Activity Tracker will be synchronized with a corresponding E-Mail folder **<username> – Mails** (e.g. guest – Mails) in your ActiveSync client.

Furthermore, all the alerts on your homepage are mapped to E-Mails that are also synchronized with an E-Mail folder named **<username> – Alerts** (e.g. guest – Alerts):



joe.guest@opencrx.org
[CRX:Standard]: Adams-Meadows, Pat... 14:38

joe.guest@opencrx.org
[CRX:Standard]: Harpenters, Melodia 14:38

joe.guest@opencrx.org
[CRX:Standard]: Hohls, 14:38

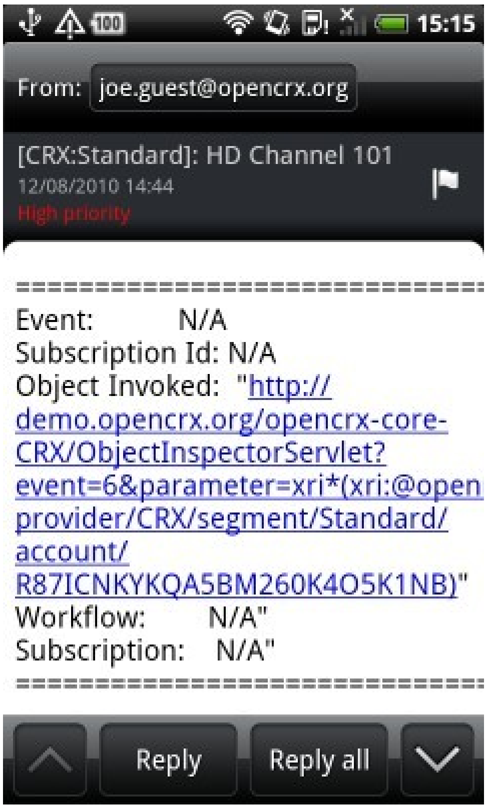
joe.guest@opencrx.org
[CRX:Standard]: Doe, John 14:38

joe.guest@opencrx.org
[CRX:Standard]: Duong, Hai Thuy 14:38

joe.guest@opencrx.org
[CRX:Standard]: HCL 14:38

joe.guest@opencrx.org
[CRX:Standard]: Formelaci 14:38

joe.guest@opencrx.org
[CRX:Standard]: Informatička podrška 14:38



From: joe.guest@opencrx.org

[CRX:Standard]: HD Channel 101
12/08/2010 14:44
High priority

```
================================
Event:          N/A
Subscription Id: N/A
Object Invoked:  "http://
demo.opencrx.org/opencrx-core-
CRX/ObjectInspectorServlet?
event=6&parameter=xri*(xri:@open
provider/CRX/segment/Standard/
account/
R87ICNKYKQA5BM260K4O5K1NB)"
Workflow:        N/A"
Subscription:    N/A"
================================
```

10.3.5 AirSync Security – Deleting Data on Devices

Some devices (like the iPhone, for example) feature built-in security (e.g. deletion of data if the pin or access codes is not entered correctly) and it is also possible to force deletion of data on the device as soon as the device synchronizes with openCRX. All you have to do is to **deactivate all the Sync Feeds of the respective device-specific AirSync Profile** (see the tip at the end of chapter 10.3.1 Creation of a User's AirSync Profile for details on how to create a device-specific profile).

Important

Unfortunately, as long as the device does not connect to openCRX there is not much that openCRX can do to force deletion of the data on the device...

10.4 Connecting ActiveSync Clients to an AirSync Profile

In principle, any ActiveSync client should be able to connect to an openCRX AirSync Profile. The following clients have been tested and confirmed to work:

- iPhone (iOS 3.0+, iOS4.0+, iOS5+)
- Error: Reference source not found
- Google Nexus S (Android 4.0.3 – ICS)

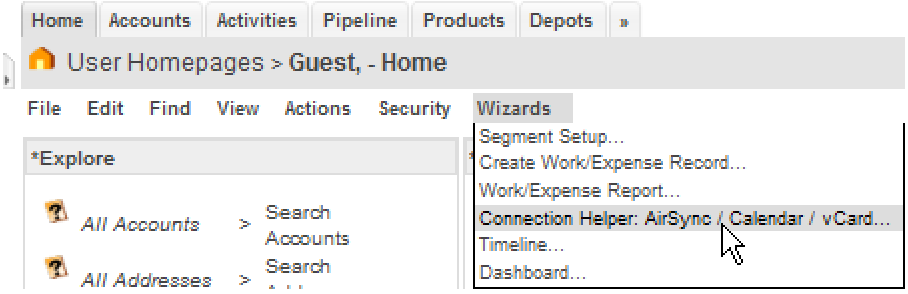
10.4.1 iPhone (iOS 3.0+, iOS4.0+, iOS5+)

Steps to configure your iPhone to connect to an openCRX AirSync Profile:

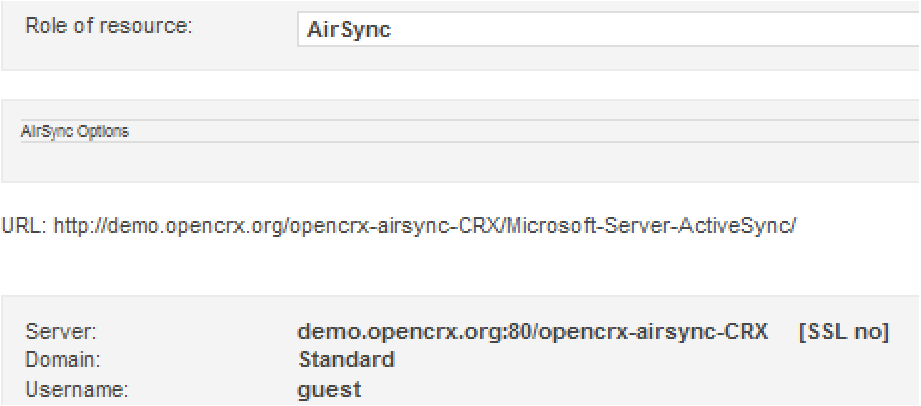
Please note that with iOS3.0+ the number of Exchange Accounts is limited to 1, i.e. if you want to connect to more than 1 account you need to upgrade your iPhone to at least iOS4.

10.4.1.1 Setting up an Exchange Account on the iPhone

- connect to openCRX and login
- start the wizard Connection Helper: AirSync / Calendar / vCard from your openCRX homepage:



- let the wizard “calculate” server and domain of your AirSync profile:



Role of resource: AirSync

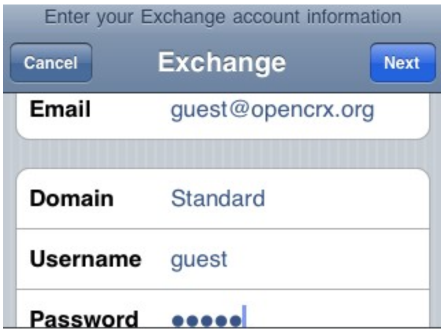
AirSync Options

URL: http://demo.opencrx.org/opencrx-airsync-CRX/Microsoft-Server-ActiveSync/

Server: demo.opencrx.org:80/opencrx-airsync-CRX [SSL no]
Domain: Standard
Username: guest

- copy the server info (you'll need to paste it later)
- on your iPhone home screen, tap the icon **Settings**

- tap on **Mail, Contacts, Calendars**
- tap on **Add Account...**
- tap on **Microsoft Exchange**
- and then enter your e-mail address (e.g. guest@opencrx.org) into the field Email and populate the fields Domain, Username and Password as shown to the right:
- tap **[Next]** to verify the account information



Enter your Exchange account information

Email guest@opencrx.org

Domain Standard

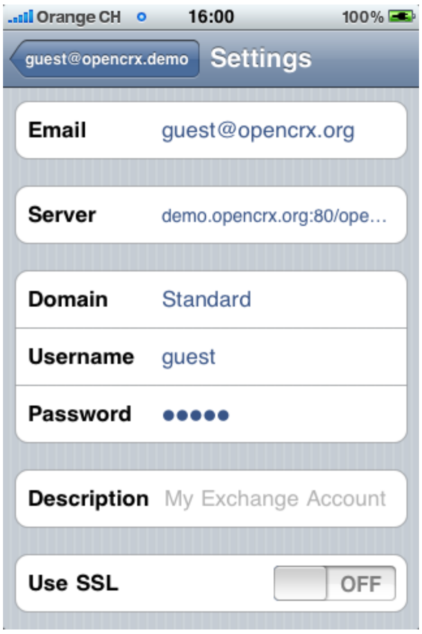
Username guest

Password •••••

If you get a message “Cannot Connect Using SSL” tap [No] to move on to the next screen where you can enter the connection details.

- verify/complete your subscription information (enter or copy the server info as calculated by the wizard “Connection Helper”) as follows:

Name	Value / Description
Email	your (openCRX) e-mail
Server	server info as calculated by the wizard “Connection Helper”, e.g. demo.opencrx.org:80/opencrx-airsync-CRX
Domain	openCRX domain as calculated by the wizard “Connection Helper”, e.g. Standard
User Name	your openCRX user name
Password	your openCRX password
Description	leave this empty (and let the iPhone calculate it)
Use SSL	if you use SSL, set to [ON], otherwise [OFF]



Email guest@opencrx.org

Server demo.opencrx.org:80/ope...

Domain Standard

Username guest

Password •••••

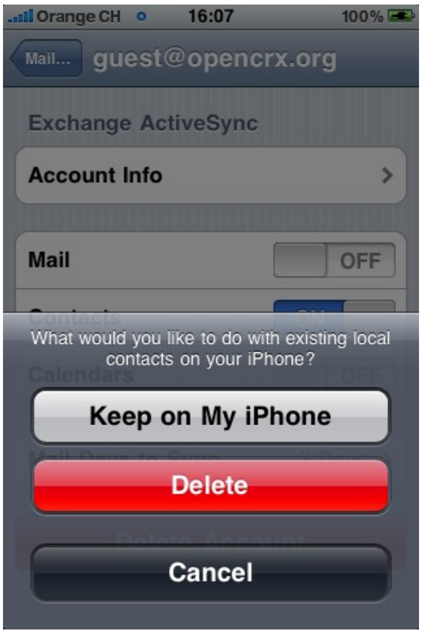
Description My Exchange Account

Use SSL OFF

- if you use SSL in combination with a self-signed certificate, you will get a message Unable to Verify Certificate --> tap **Accept**
- if everything works out, you can tap **Save** to store the settings

10.4.1.2 Setting up Synchronization for Contacts

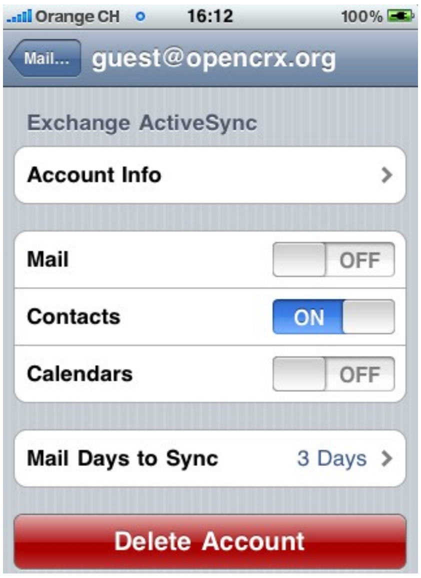
- tap on **Mail, Contacts, Calendars**
- tap on the Exchange Account, e.g. guest@opencrx.org
- enable synchronization of contacts by setting the ON/OFF button of **Contacts** to ON
- you are asked whether you want to keep your existing local contacts on your iPhone; that's probably a good idea, i.e. tap on **Keep on My iPhone**
- you are warned about duplicate entries, but just tap on **Keep on My iPhone** again



Mail OFF

What would you like to do with existing local contacts on your iPhone?

- now your Exchange Account settings should look similar to the screen shot on the right:



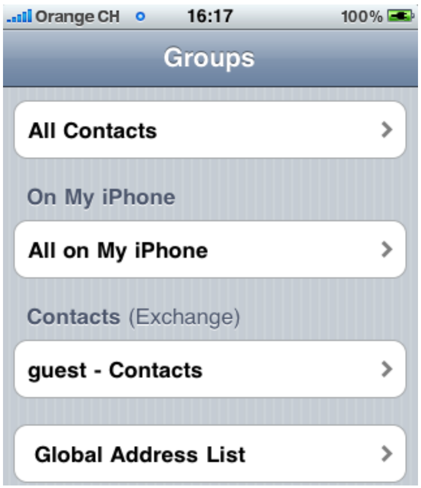
Mail OFF

Contacts ON

Calendars OFF

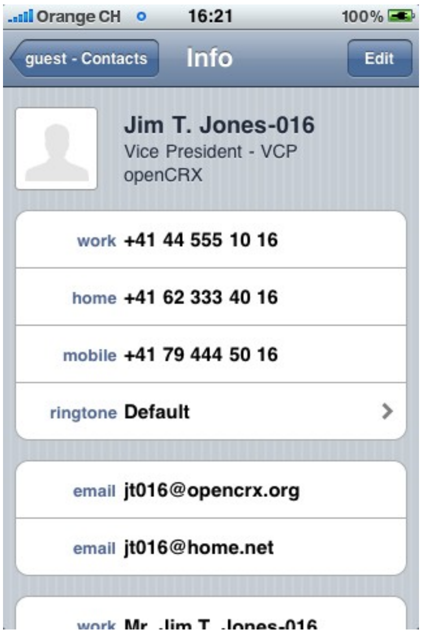
Mail Days to Sync 3 Days

- leave the Exchange Account settings (e.g. by pressing your iPhone home button) and start your Contacts app; you should see the following contacts groups of your Exchange account, similar to the screen shot on the right:
  - guest – Contacts
  - Global Address List



Search in the Global Address List is not implemented yet as of openCRX v2.9.1

- tap on **guest – Contacts** to open your openCRX Contact group; you should see all the accounts referenced by members of your Account Group in openCRX
- tap on one of the Contacts to see the details as shown on the right



Jim T. Jones-016
Vice President - VCP
openCRX

work +41 44 555 10 16
home +41 62 333 40 16
mobile +41 79 444 50 16
ringtone Default

email jt016@opencrx.org
email jt016@home.net

work Mr. Jim T. Jones-016

You can synchronize multiple iPhone Contact Groups by defining multiple AirSync Contacts Feeds in openCRX (each of them will be mapped to an iPhone Contacts Group).

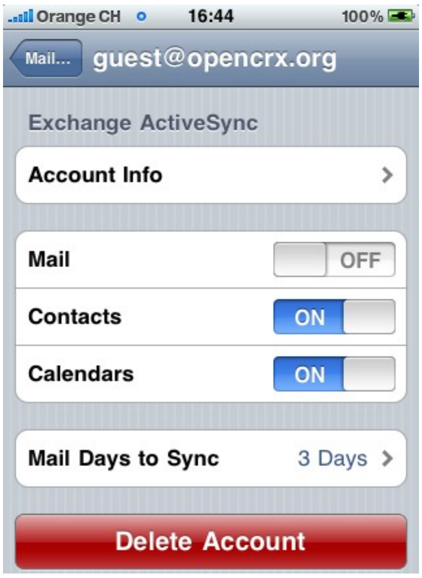
openCRX address information supports multiple lines (separated by EOL or CR LF) – the iPhone maps this to two consecutive blanks (i.e. a blank immediately followed by another blank).

Important

If you don't have update rights in openCRX for a particular openCRX account, you will not be able to update this contact with the iPhone either. Unfortunately, the iPhone does not tell you about failed update requests (the update fails "silently"), i.e. make sure that your updates actually make it to openCRX before spend too much time correcting data...

10.4.1.3 Setting up Synchronization for Calendars

- tap on **Mail, Contacts, Calendars**
- tap on the Exchange Account, e.g. guest@opencrx.org
- enable synchronization of calendars by setting the ON/OFF button of **Calendars** to ON
- you are asked whether you want to keep your existing local calendars on your iPhone; that's probably a good idea, i.e. tap on **Keep on My iPhone**
- you are warned about duplicate entries, but just tap on **Keep on My iPhone** again
- now your Exchange Account settings should look similar to the screen shot on the right:



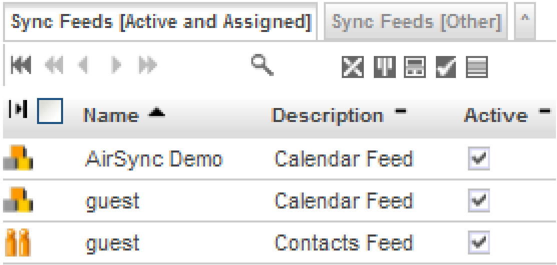
Exchange ActiveSync

Account Info

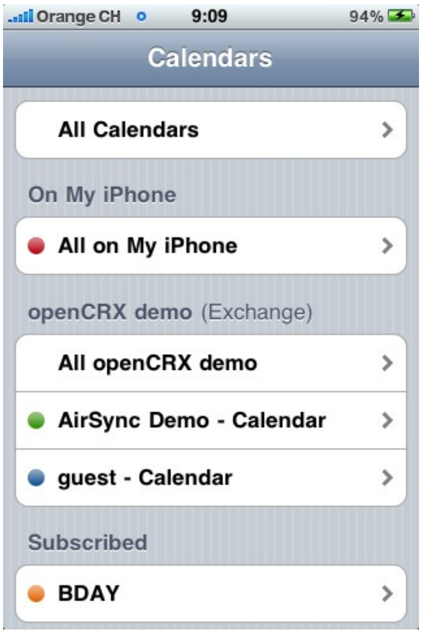
Mail	OFF
Contacts	ON
Calendars	ON

Mail Days to Sync: 3 Days

- leave the Exchange Account settings (e.g. by pressing your iPhone home button) and start your Calendar app; you should see an entry corresponding to your iPhone Exchange Account settings with subcalendars for each active calendar feed in your AirSync Profile (openCRX demo in the screen shot).



Name	Description	Active
AirSync Demo	Calendar Feed	☑
guest	Calendar Feed	☑
guest	Contacts Feed	☑



All Calendars

On My iPhone

- ● All on My iPhone

openCRX demo (Exchange)

- All openCRX demo
- ● AirSync Demo - Calendar
- ● guest - Calendar

Subscribed

- ● BDAY

Important

Neither iPhone OS 3.0+ nor iOS4.0+ synchronizes tasks through Exchange Account settings, i.e. you will see Events only (see also chapter 10.2 Mapping of openCRX Objects to AirSync Objects).

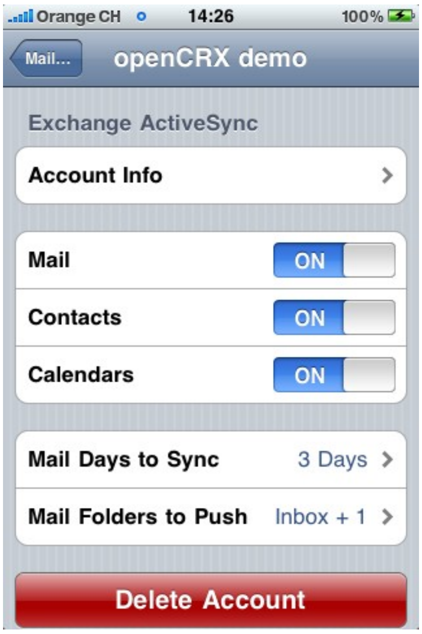
Important

If your Calendar Feed references an **Activity Group without a corresponding Activity Creator** for the required activity type (you can verify this by navigating to the Activity Group and checking the grid [Activity Creators]) you will not see a calendar corresponding to your Calendar Feed.

See also 10.2 Mapping of openCRX Objects to AirSync Objects).

10.4.1.4 Setting up Synchronization for Mail

- tap on **Mail, Contacts, Calendars**
- tap on the Exchange Account, e.g. guest@opencrx.org
- enable synchronization of mail by setting the ON/OFF button of **Mail** to ON
- now your Exchange Account settings should look similar to the screen shot on the right:



Mail ON

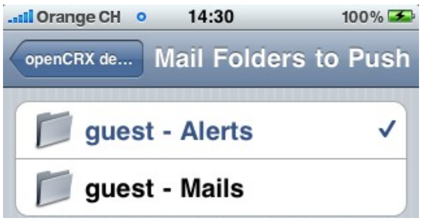
Contacts ON

Calendars ON

Mail Days to Sync 3 Days

Mail Folders to Push Inbox + 1

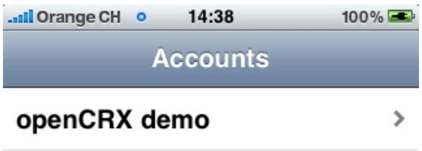
- to enable push mail you can tap on **Mail Folders to Push** and then select the desired folders by tapping; the screen shot on the right shows a push subscription for openCRX alerts sent to the user guest:

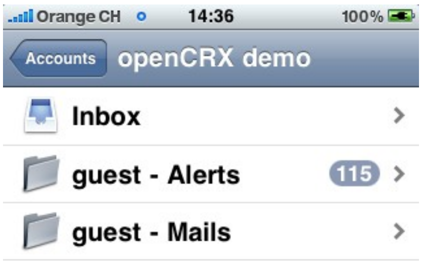


guest - Alerts ✓

guest - Mails

- leave the Exchange Account settings (e.g. by pressing your iPhone home button) and start your Mail app; you should see an entry corresponding to your iPhone Exchange Account settings. If you open up the respective account you will see your mail folders provided by openCRX:





Inbox

guest - Alerts 115

guest - Mails

E-Mails sent through this account will be created in openCRX if an appropriate Activity Creator for E-Mails is available. By default, the user's private E-Mail Activity Creator **<username>~E-Mails** will be used.

10.4.2 Google Nexus S (Android 4.0.3 – ICS)

Here are the steps to configure your Google Nexus S to connect to an openCRX AirSync Profile:

The stock Android ActiveSync client is quite limited: the server field does not accept URLs with port numbers or special characters like '/', i.e. you must front openCRX with an Apache server so that Android can connect to openCRX with a simple URL like airsync.opencrx.org.

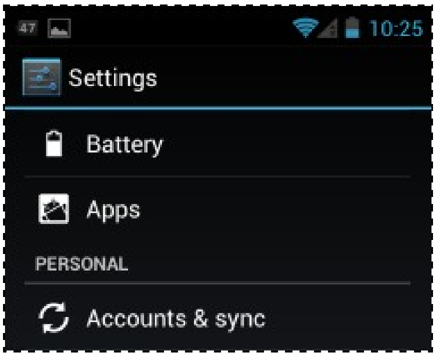
In your Apache config file (httpd.conf) you can do something like this:

Listing 26: Apache config file httpd.conf / fronting Tomat

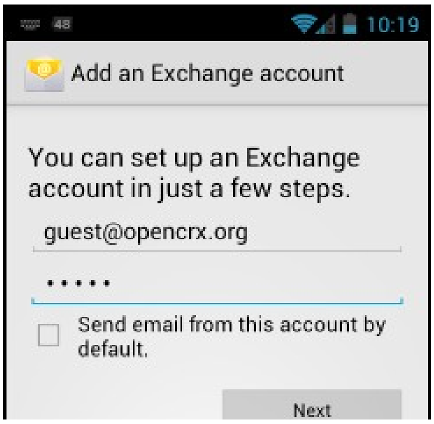
```
<VirtualHost *:80>
    ServerName airsync.opencrx.org
    DocumentRoot /var/www/html
    ServerAdmin admin@opencrx.org
    ErrorDocument 404 http://demo.opencrx.org/
    ProxyRequests Off
    ProxyPreserveHost On
    <Proxy *>
        Order deny,allow
        Allow from all
    </Proxy>
    ProxyPass / http://demo.opencrx.org:8080/opencrx-airsync-CRX/
    ProxyPassReverse / http://demo.opencrx.org:8080/opencrx-airsync-CRX/
    ProxyHTMLURLMap / /opencrx-core-CRX/
    <Location />
        Order allow,deny
        Allow from all
    </Location>
</VirtualHost>
```

10.4.2.1 Setting up an Exchange Account on the Google Nexus S

- once you have the fronting Apache (see above) configured, you're ready to setup your Google Nexus S device (we assume that the virtual host **airsync.opencrx.org** is fronting the openCRX AirSync servlet)
- on your device, tap the [MENU] button and select **System Settings**
- select **Accounts & sync** and tap the button **[Add account]**



- select **Corporate**
- and then enter your e-mail address (e.g. guest@opencrx.org) and your password
- **tap [Next] to continue**



You can set up an Exchange account in just a few steps.

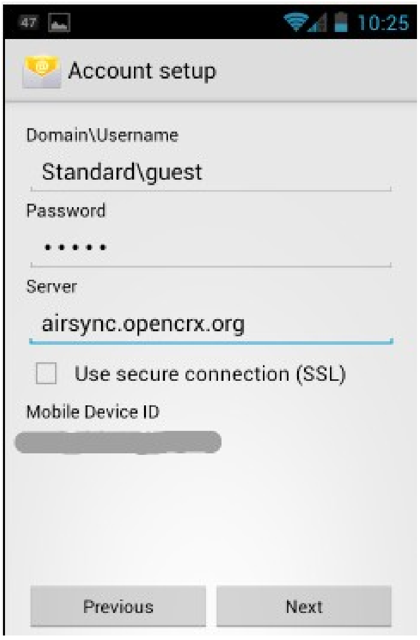
guest@opencrx.org

•••••

□ Send email from this account by default.

- verify/complete your account information as follows and then tap **[Next]** to continue:

Name	Value / Description
Domain	openCRX domain as calculated by the wizard "Connection Helper", e.g. **Standard**
User Name	your openCRX user name, e.g. **guest**
Password	your openCRX password
Server	name (or IP address) of the fronting Apache server, e.g. **airsync.opencrx.org**
Use SSL	if you use SSL, check it



Account setup

Domain\Username
Standard\guest

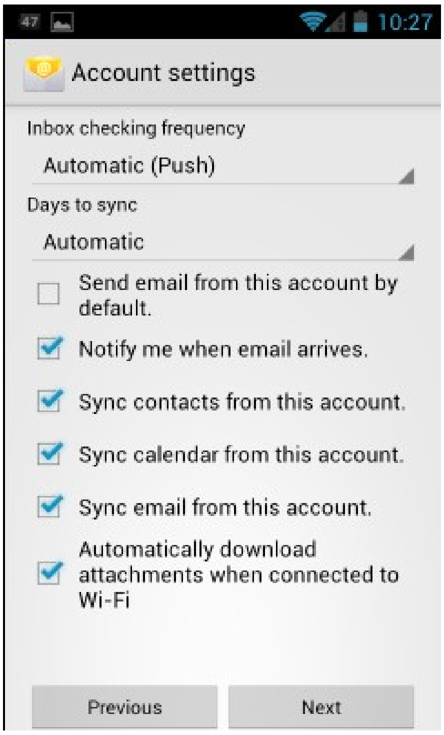
Password
•••••

Server
airsync.opencrx.org

□ Use secure connection (SSL)

Mobile Device ID
[redacted]

- if you use SSL in combination with a self-signed certificate, you will get a warning --> accept the certificate
- if everything works out, you'll get a screen as shown on the right – select the options you like and then tap **[Next]** to continue



Account settings

Inbox checking frequency
Automatic (Push)

Days to sync
Automatic

□ Send email from this account by default.

☑ Notify me when email arrives.

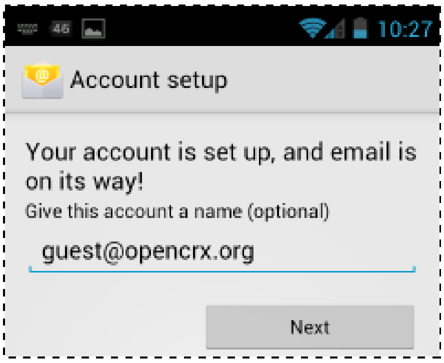
☑ Sync contacts from this account.

☑ Sync calendar from this account.

☑ Sync email from this account.

☑ Automatically download attachments when connected to Wi-Fi

- finally, name your account and then tap **[Next]** to finish



10:27

Account setup

Your account is set up, and email is on its way!

Give this account a name (optional)

guest@opencrx.org

Google Nexus S supports push for the folder Inbox only (which is not mapped to openCRX). Hence, you might as well save the battery and disable push until Google get their act together.

Search in the Global Address List is not implemented yet as of openCRX v2.9.1

Important

Google Nexus S / Android 4.0.3 do not support synchronization of tasks through Exchange Account settings. Hence, you will only be able to see Events.

Important

If your Calendar Feed references an **Activity Group without a corresponding Activity Creator** for the required activity type (you can verify this by navigating to the Activity Group and checking the grid [Activity Creators]) you will not see a calendar corresponding to your Calendar Feed.

See also 10.2 Mapping of openCRX Objects to AirSync Objects).

E-Mails sent through this account will be created in openCRX if an appropriate Activity Creator for E-Mails is available. By default, the user's private E-Mail Activity Creator **<username>~E-Mails** will be used.

11 openCRX AirSync Client (ActiveSync compatible)

The openCRX AirSync Client enables backend-synchronization of contacts and calendars between openCRX and MS Exchange. Thus, MS Outlook and PDAs connecting to MS Exchange get easy access to contacts and calendars that are managed in openCRX, without the need to install any additional software or changing the configuration:

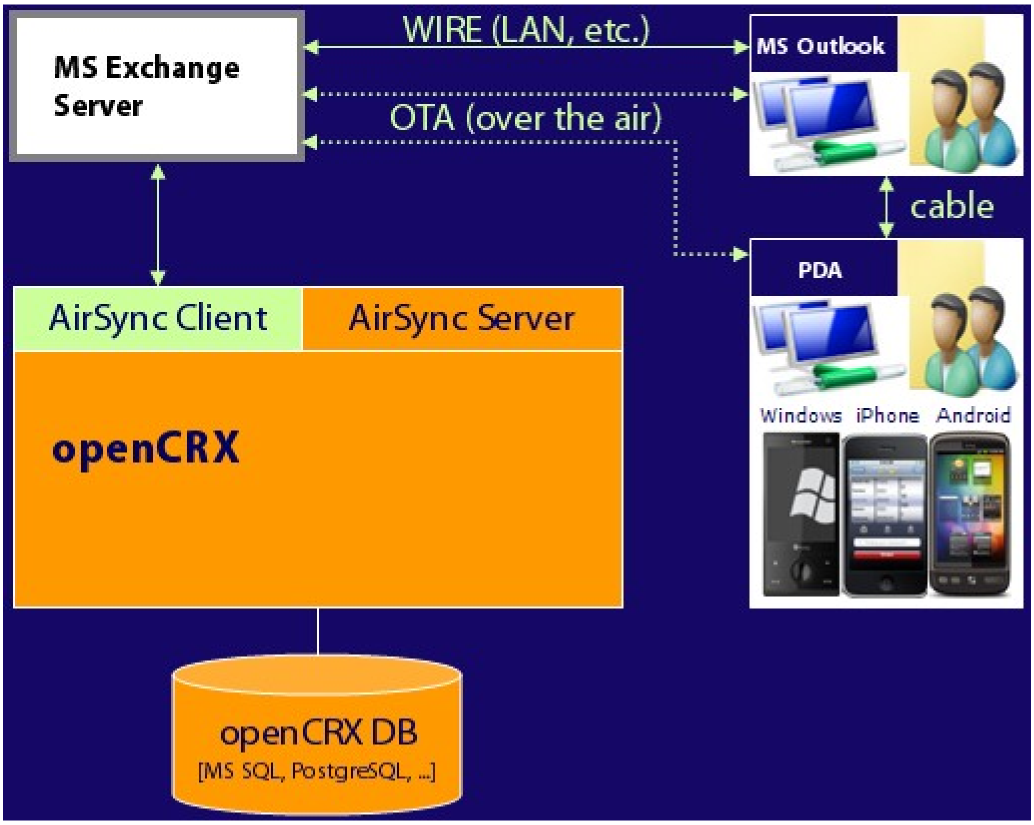


Figure 63: openCRX AirSync Client – backend-sync with Exchange

Even though openCRX AirSync aims to be compatible with Microsoft's ActiveSync (see what Wikipedia has to say about ActiveSync), we are probably not quite there (we have tested with MS Exchange 2003 and MS Exchange 2007), so feel free to provide feedback, good or bad.

Important

Due to the fact that Microsoft prevents the creation of E-Mails on the Exchange server through ActiveSync (unless you want to actually send e-mail) it is not possible to really synchronize e-mails between MS Exchange and openCRX.

We recommend IMAP to access openCRX E-Mails (see chapter 9.5 Mailstore / IMAP for more information).

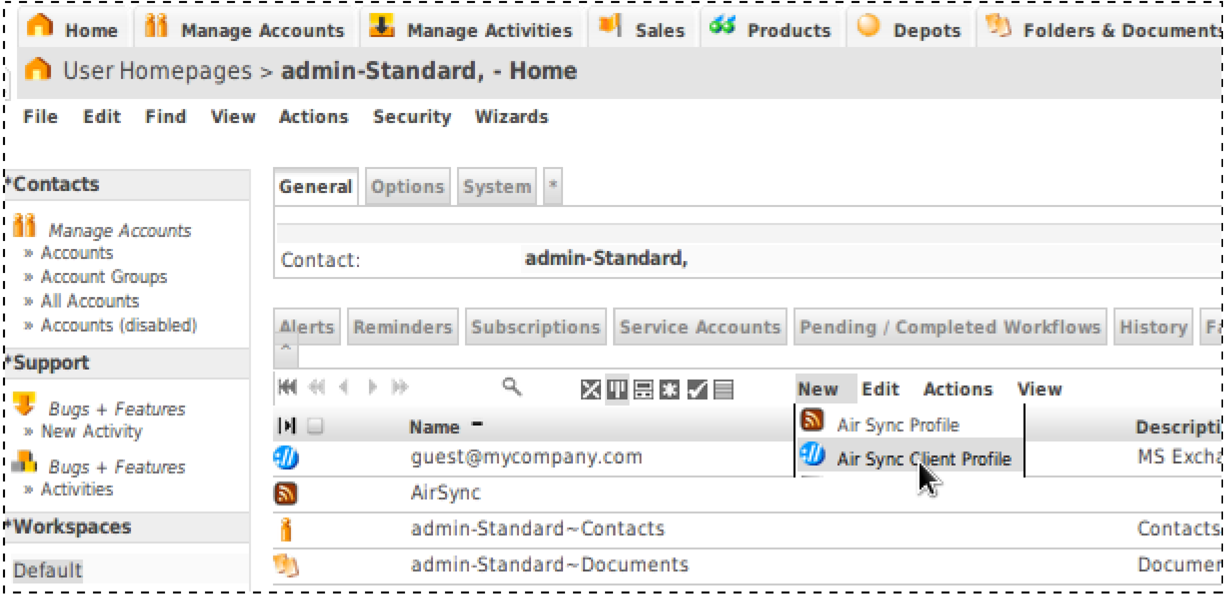
11.1 AirSync Client Profile

Each MS Exchange account that should be synchronized with openCRX requires an AirSync Client Profile.

11.1.1 Creation of an AirSync Client Profile

openCRX users can create an AirSync Client profile as follows:

- navigate to Home > Sync Profiles; select New > Air Sync Client Profile:

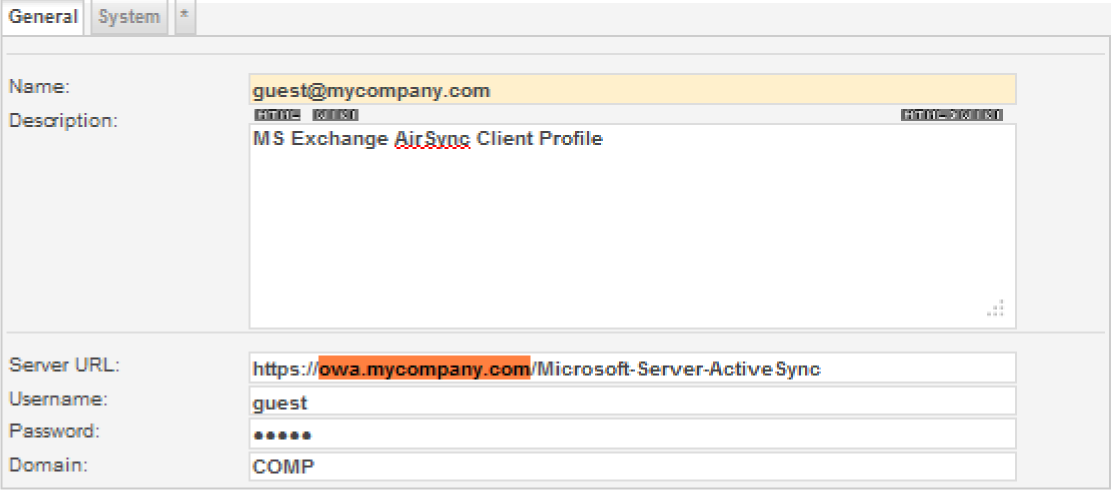


User Homepages > admin-Standard, - Home

Contact: admin-Standard,

Name	Descripti
guest@mycompany.com	MS Exch
AirSync	
admin-Standard~Contacts	Contacts
admin-Standard~Documents	Documer

- populate the fields as shown below (name and description are for informational purposes only, but Server URL, Username, Password and Domain must be adapted to your own environment):



Name: guest@mycompany.com

Description: MS Exchange AirSync Client Profile

Server URL: https://owa.mycompany.com/Microsoft-Server-ActiveSync

Username: guest

Password: •••••

Domain: COMP

Important

The string **Microsoft-Server-ActiveSync** is fixed (referring to a virtual directory on the Exchange server).

If you intend to use SSL to secure the connection to your Exchange server you must import the server's certificate into the keystore.

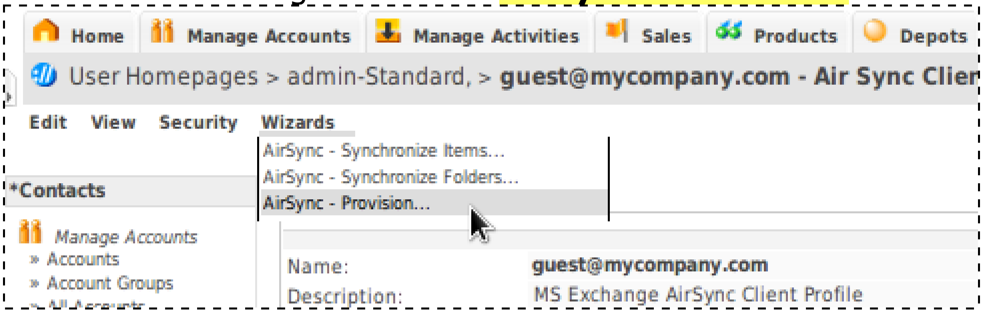
Listing 27: Importing Certificate

```
cd $JAVA_HOME/lib/security
keytool -import -alias <dom> -file <name>.cer -keystore cacerts
```

Replace <dom> with the name and domain of the mail server (e.g. owa.my.company.com) and <name> with the name of the certificate file.

11.1.2 ActiveSync Provisioning

ActiveySync Provisioning (see http://msdn.microsoft.com/en-us/library/dd299443(v=EXCHG.80).aspx) specifies an XML-based format to communicate security policy settings to client devices (in this case openCRX, acting as an ActiveySync client). Depending on the settings/configuration of your account on the MS Exchange server you might have to run the provisioning wizard to enable synchronization. You can fetch the provisioning information from the MS Exchange server by navigating to your AirSync Client Profile and running the wizard **AirSync – Provision**:



Name: guest@mycompany.com
Description: MS Exchange AirSync Client Profile

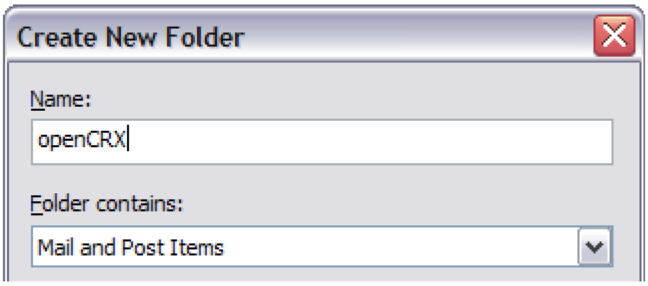
11.1.3 Synchronizing Folders

You can retrieve a list of all the synchronizable folders, converted to openCRX Sync Feeds, from the MS Exchange Server by navigating to your AirSync Client Profile and running the wizard **AirSync – Synchronize Folders**. Sync Feeds created by this wizard are initially set to inactive and the reference to Account group (for Contact Feeds), Activity group (for Activity Group Feeds) or Activity filter (for Activity Filter Feeds) respectively are not set. You will find such feeds in the tab [All Sync Feeds].

11.1.3.1 Prepare your MS Exchange Account

In principle you can synchronize any Exchange folder with openCRX. It might make sense, however, to create a set of special folders, i.e. prepare your Exchange account as follows (use your own openCRX username instead of guest):

- start MS Outlook (and connect to your Exchange server)
- create a folder for **Mail and Post Items** named openCRX:

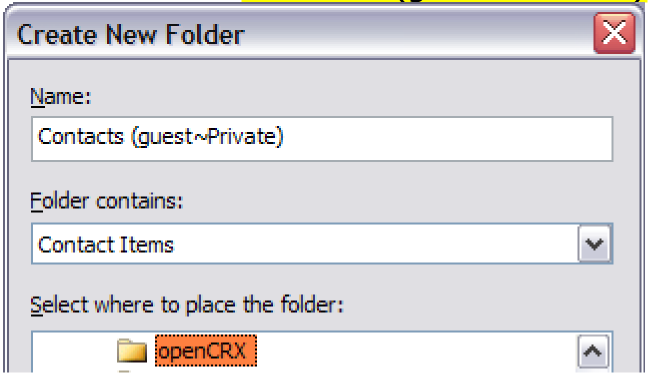


Create New Folder

Name: openCRX

Folder contains: Mail and Post Items

- select the folder openCRX and then create a subfolder for **Contact Items** named Contacts (guest~Private):



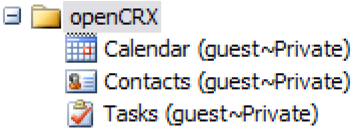
Create New Folder

Name: Contacts (guest~Private)

Folder contains: Contact Items

Select where to place the folder: openCRX

- similarly you create the folder Tasks (guest~Private) for **Task Items**: and the folder Calendar (guest~Private) for **Calendar Items**
- your folder openCRX should now contain three subfolders, Calendar (guest~Private), Contacts (guest~Private) and Tasks (guest~Private) as follows:

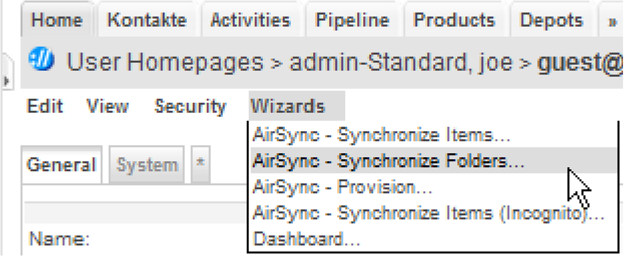


openCRX
Calendar (guest~Private)
Contacts (guest~Private)
Tasks (guest~Private)

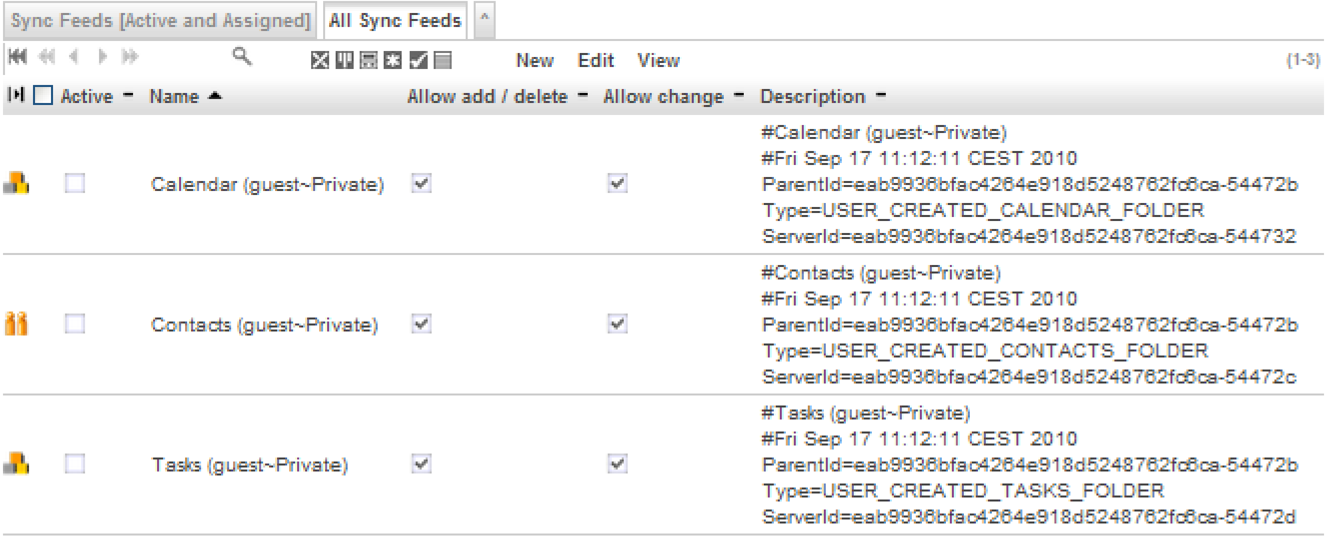
- synchronize Outlook with your MS Exchange server so that these new folders are available on the server as well before you proceed

11.1.3.2 Retrieve Synchronizable Folders / Sync Feeds

Now that your Exchange account is prepared you can navigate to your AirSync Client Profile and run the wizard **AirSync – Synchronize Folders** to retrieve the Sync Feeds:


Home
Kontakte
Activities
Pipeline
Products
Depots
»
User Homepages > admin-Standard, joe > guest@
Edit
View
Security
Wizards
AirSync - Synchronize Items...
AirSync - Synchronize Folders...
AirSync - Provision...
AirSync - Synchronize Items (Incognito)...
Dashboard...
General
System
*
Name:

In the tab [All Sync Feeds] you should now see various Sync Feeds including the following ones corresponding to the folders you created with MS Outlook:



Active	Name	Allow add / delete	Allow change	Description

□	Calendar (guest~Private)	✓	✓	#Calendar (guest~Private)
				#Fri Sep 17 11:12:11 CEST 2010
				ParentId=eab9936bfac4264e918d5248762fc6ca-54472b
				Type=USER_CREATED_CALENDAR_FOLDER
				ServerId=eab9936bfac4264e918d5248762fc6ca-544732

□	Contacts (guest~Private)	✓	✓	#Contacts (guest~Private)
				#Fri Sep 17 11:12:11 CEST 2010
				ParentId=eab9936bfac4264e918d5248762fc6ca-54472b
				Type=USER_CREATED_CONTACTS_FOLDER
				ServerId=eab9936bfac4264e918d5248762fc6ca-54472c

□	Tasks (guest~Private)	✓	✓	#Tasks (guest~Private)
				#Fri Sep 17 11:12:11 CEST 2010
				ParentId=eab9936bfac4264e918d5248762fc6ca-54472b
				Type=USER_CREATED_TASKS_FOLDER
				ServerId=eab9936bfac4264e918d5248762fc6ca-54472d

11.1.3.3 Synchronization with MS Exchange Contact Folders

In order to configure synchronization between an **MS Exchange contact folder** and an **openCRX Account Group** (see also 10.2 Mapping of openCRX Objects to AirSync Objects) follow these steps:

- navigate to the Contacts Feed corresponding to the desired MS Exchange Contact Folder; the folder name is contained in the description of the Sync Feed, usually on the first line, e.g. #Contacts (guest~Private)
- change to edit mode
- set Active to true and set the reference for the Account Group (use the auto-completer or the lookup inspector)
- optionally you can allow/prevent adding/removing/changing contacts
- save your changes

With the next execution of the wizard Synchronizing Items the synchronization will be initiated.

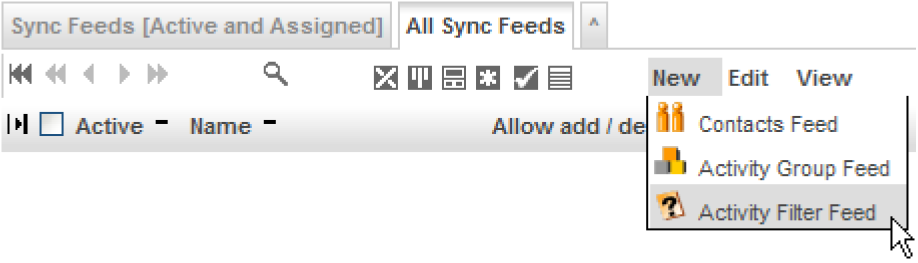
11.1.3.4 Synchronization with MS Exchange Calendar Folders

In order to configure synchronization between an **MS Exchange calendar** folder and an **openCRX Activity Group** (see also 10.2 Mapping of openCRX Objects to AirSync Objects) follow these steps:

- navigate to the Activity Group Feed corresponding to the desired MS Exchange Calendar Folder; the folder name is contained in the description of the Sync Feed, usually on the first line, e.g. #Calendar (guest~Private)
- change to edit mode
- set Active to true and set the reference for the Activity Group (use the auto-completer or the lookup inspector)
- optionally you can allow/prevent adding/removing/changing activities
- save your changes

In case you want to synchronize with an openCRX Activity Filter instead of an openCRX Activity Group, follow these steps:

- navigate to the Activity Group Feed corresponding to the desired MS Exchange Calendar Folder; the folder name is contained in the description of the Sync Feed, usually on the first line, e.g. #Calendar (guest~Private)
- change to edit mode and copy the content of the field description into your clipboard
- click [Cancel] to leave edit mode and navigate one level higher to the Air Sync Client Profile
- select New > Activity Filter Feed as shown below:



- paste the description from the clipboard to the field description and then enter a name for this feed (you can use the same name that was used for the Activity Filter Group if you wish)
- set Active to true and set the reference for the Activity Group (use the auto-completer or the lookup inspector)
- optionally you can allow/prevent adding/removing/changing activities
- save this newly created feed
- delete the Activity Group Feed that was created by the wizard AirSync – Synchronize Folders

With the next execution of the wizard Synchronizing Items the synchronization will be initiated.

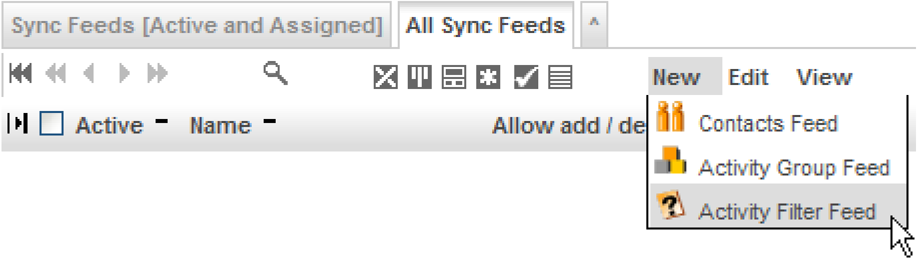
11.1.3.5 Synchronization with MS Exchange Task Folders

In order to configure synchronization between an **MS Exchange task folder** folder and an **openCRX Activity Group** or an **openCRX Activity Filter** (see also 10.2 Mapping of openCRX Objects to AirSync Objects) follow these steps:

- navigate to the Activity Group Feed corresponding to the desired MS Exchange Calendar Folder; the folder name is contained in the description of the Sync Feed, usually on the first line, e.g. #Tasks (guest~Private)
- change to edit mode
- set Active to true and set the reference for the Activity Group (use the auto-completer or the lookup inspector)
- optionally you can allow/prevent adding/removing/changing activities
- save your changes

In case you want to synchronize with an openCRX Activity Filter instead of an openCRX Activity Group, follow these steps:

- navigate to the Activity Group Feed corresponding to the desired MS Exchange Calendar Folder; the folder name is contained in the description of the Sync Feed, usually on the first line, e.g. #Calendar (guest~Private)
- change to edit mode and copy the content of the field description into your clipboard
- click [Cancel] to leave edit mode and navigate one level higher to the Air Sync Client Profile
- select New > Activity Filter Feed as shown below:



- paste the description from the clipboard to the field description and then enter a name for this feed (you can use the same name that was used for the Activity Filter Group if you wish)
- set Active to true and set the reference for the Activity Group (use the auto-completer or the lookup inspector)
- optionally you can allow/prevent adding/removing/changing activities
- save this newly created feed
- delete the Activity Group Feed that was created by the wizard AirSync – Synchronize Folders

With the next execution of the wizard Synchronizing Items the synchronization will be initiated.

11.1.3.6 Synchronization with MS Exchange E-Mail Folders

MS Exchange servers do not support pushing e-Mails from an ActiveSync client to a folder on the MS Exchange server (which is one of the reasons why you cannot store draft e-mails written on your iPhone to the MS Exchange server, for example). The only way to transfer e-mails from an ActiveSync client to an MS Exchange server is by actually sending the e-mail (which is not exactly what you want in order to synchronize).

On an experimental basis the import of e-mails from MS Exchange into openCRX using AirSync is implemented, but we actually recommend the use of the openCRX IMAP Adapter (see 9.5 Mailstore / IMAP for more information).

11.1.4 Synchronizing Items

The wizard **AirSync – Synchronize Items** synchronizes active Sync Feeds. Please note that per sync call up to 50 items are synchronized per feed, i.e. you might have to call this wizard multiple times for a full synchronization if there are a lot of changes.

11.1.5 Resync – Clear all items of a feed on server

Increasing the value of a feed's **Generation** by 1 leads to the removal of all items of that feed on the MS Exchange server. The wizard **Resync – Clear all items on the server** automates this task.

11.1.6 Resync – Replace all items of a feed on server

Increasing the value of a feed's **Generation** by 1 and setting the value of a feed's **SyncKey.Client** to 0 leads to the replacement of all items of that feed on the MS Exchange server followed by the removal of items on the MS Exchange server that are no longer included in the feed. The wizard **Resync – Replace all items on the server** automates this task.

11.1.7 Automating Synchronization

One way of automating synchronization is by setting up a cron job and have curl call the wizard WizardInvoker.jsp with the appropriate parameters, e.g.

```
curl "http://localhost:8080/opencrx-core-CRX/WizardInvoker.jsp
?wizard=/wizards/en_US/AirSyncSyncWizard.jsp&provider=CRX
&segment=Standard&xri=xri://@openmdx*org.opencrx.kernel.home1/
provider/OB/segment/Standard/userHome/guest/syncProfile/
9QF54GOKYPT5RD77B0UAW34NB&user=guest&password=guest" &> /dev/null
```

12 Social Media

12.1 Twitter

openCRX features to support/connect to Twitter:

- **OAuth** (see http://oauth.net/ for more information)
  Support for consumer key and consumer secret; a wizard to create access token and access key. The openCRX implementation is based on the library twitter4j (see http://twitter4j.org for more information).
- **Wizards** to send direct messages and status updates
- **Workflow** to send alert notifications via Twitter

12.1.1 Register with Twitter

1. Before openCRX can invoke the Twitter API, you need to register your instance of openCRX at http://twitter.com/oauth_clients/new to acquire a consumer key and a consumer secret. Register your openCRX instance as follows:
   - Application Name: name of your openCRX instance, e.g. 'openCRX of MyCompany'
   - Application Website: the URL users can access the openCRX instance, e.g. https://crm.mycompany.com/opencrx-core-CRX
   - Application Type: Client
   - Default Access type: Read/Write
   - Use Twitter for login: false

   If registration is successful you should get a 'Consumer Key' and a 'Consumer Secret' for your application.
2. Login as admin-Root and navigate to Administration > Configuration.
   - Create a new component configuration with
     - Name: Twitter
     - Qualifier: Twitter
   - Navigate to the newly created component configuration and add the following string properties:
     - CRX.OAuth.ConsumerKey: Twitter consumer key
     - CRX.OAuth.ConsumerSecret: Twitter consumer secret
3. Logout (Users are now able to setup Twitter accounts).

NOTE: segment-specific tokens are configured using the pattern

- <provider name>.<segment name>.OAuth.ConsumerKey
- <provider name>.<segment name>.OAuth.ConsumerSecret

12.1.2 Create Twitter Account

1. Login as user, e.g. guest
2. Twitter accounts are configured on a user's home in the tab [Service Accounts]. A Twitter account is created as follows:
   - Name: Twitter user display name
   - Active: true
   - Default: true
3. Invoke the wizard 'Twitter - Create access token'. The wizard shows an URL and a field to enter a PIN code. Open the URL in a new browser window. This redirects you to Twitter asking to grant access for the openCRX instance. If you grant access a PIN code will be displayed. Enter the PIN code and click OK. If all goes well, the fields 'Access token key' and 'Access token secret' are set now.

12.1.3 Using openCRX Wizards

On most objects the following two wizards are available:

- **Twitter – Send Message**

  This wizard allows to send a message to a list of Twitter users. In addition the message text is attached as note and if you are invoking the wizard on an activity a follow up is created. Note that the message is only visible to the recipients.

- **Twitter – Update Status**

  This wizard allows to for one of the configured Twitter accounts. Status updates are visible to all followers of the selected Twitter account.

12.1.4 Using the SendDirectMessageWorkflow

The SendDirectMessageWorkflow works much the same way as the SendMailNotificationWorkflow. However, instead of sending an e-mail to the user in case of alert updates, the alert title including a tiny url pointing to the underlying openCRX object is sent as direct message to the default Twitter account of the subscribing user. The SegmentSetupWizard (can be executed by the segment administrator, e.g. admin-Standard) creates the required entries for the workflow and topic. Users simply need to subscribe to the topic Alert Modifications (Twitter).

13 openCRX is a REST Service (Web Service)

The openCRX REST servlet allows easy 3rd party integration with openCRX. The full functionality of the openCRX API can be accessed via REST requests, i.e. you can use openCRX as a REST Service.

See http://code.google.com/p/rest-client/ for a REST client.

Sample REST requests are available from http://www.opencrx.org/opencrx/2.3/new.htm#REST

You might also want to look at the following Wiki page:

https://sourceforge.net/p/opencrx/wiki/Sdk213.Rest/

14 Data Import/Export

There are many ways of importing data (from other systems into openCRX) and exporting data (from openCRX to other systems). Generally speaking, there is no best way of doing imports/exports because depending on how much weight you put on the pros and cons of the various methods you may come to a different conclusion. Some issues to consider are:

- one-time import/export vs. multiple imports/exports
- file-based/batched vs. connection-based/real-time
- allow manual process steps vs. fully automated
- ...

In this chapter we will cover some of the basic options you can choose from, but there are obviously other (and sometimes better) options to consider.

While it may be tempting to connect to the openCRX database for "quick and dirty" imports/exports, you should really consider using the openCRX API. On the one hand, importers/exporters accessing the database directly are **bypassing openCRX security** (this is actually more of a warning than a tip...). On the other hand, the **openCRX database schema is subject to change** (whereas the API is stable).

14.1 Importing Data into openCRX

The task of importing data is handled by importers. In principle, you can import almost anything into openCRX, it's really only a matter of writing an appropriate importer.

You must ensure that (legal) values are assigned to all mandatory (i.e. non-optional) attributes of openCRX objects created/updated during the import; in particular, all code attributes are mandatory!

The Open Source distribution of openCRX includes importers for vCard (see Importing vCard Files)and iCalendar files (see Error: Reference source not found) in addition to the XML importer.

14.2 Importing XML Files

You can import virtually any data into openCRX as long as you provide it in the form of schema-compliant XML files. The openCRX schema files can be found in the file **opencrx-kernel.jar** (unzip and look for xmi1 subdirectories).

Alternatively, you can export example objects as XML files and look at the produced XML files (although the generated XML file also contains all the derived and optional attributes; hence, you will have to prune the generated XML file before you can use it as a template).

Some of the configuration information and data provided with openCRX are also provided in the form of XML files and imported during system setup (e.g. units of measurement are loaded from opencrx-core-CRX\opencrx-core-CRX\WEB-INF\config\data\ Root**101_uoms.xml**).

An XML import from a third party system might typically involve the following steps:

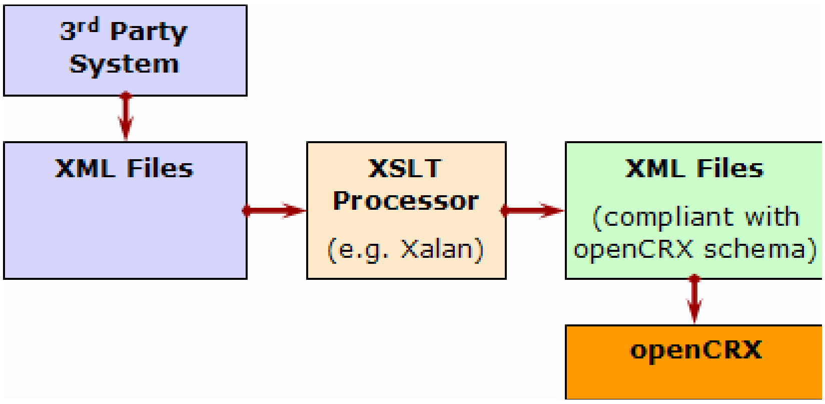
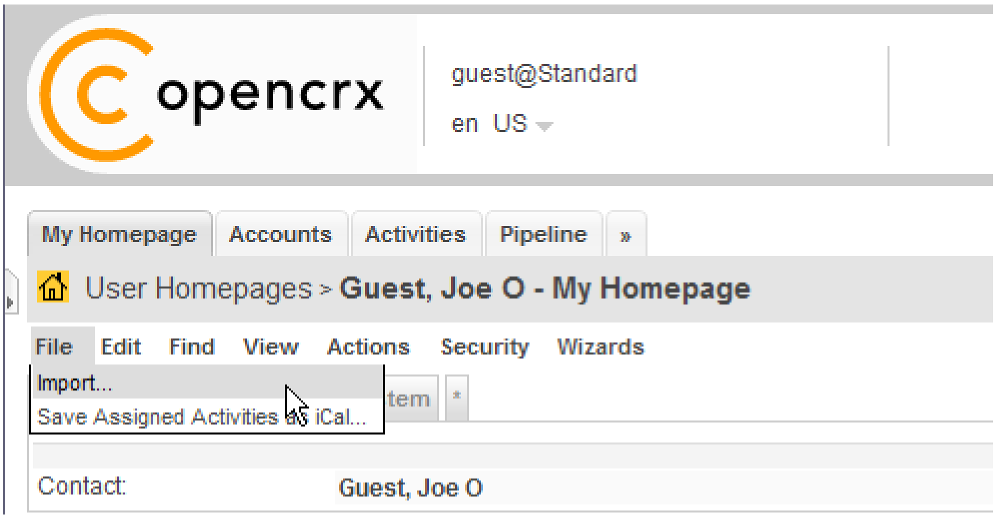


Figure 64: XML import from 3rd party system – overview

You can import schema-compliant XML files with the following methods:

- **Interactive / on-demand**

  Navigate to your user home and execute the operation File > Import:



Contact: Guest, Joe O

Figure 65: Interactive import of XML Files

Click on the button Browse... and navigate to XML file to be imported.

Next you click [OK] to to start the import. Please note that this method is very suitable for small XML files and *on-the-fly* imports. If you are dealing with larger XML files, however, you should consider the bulk import described below.

- **Bulk Import**

  Use the bulk import for large XML files or if you need to import multiple XML files in an automated fashion. Put your XML file(s) into the following directory (you might have to expand the EAR file to do so):

  opencrx-core-CRX\opencrx-core-CRX\WEB-INF\config\data\<SegmentName>

  where <SegmentName> can be Root, Standard, or whatever your Segment is named.

  Next you login as openCRX Root administrator (admin-Root) and execute the operation View > Reload. Click Yes to start the operation.

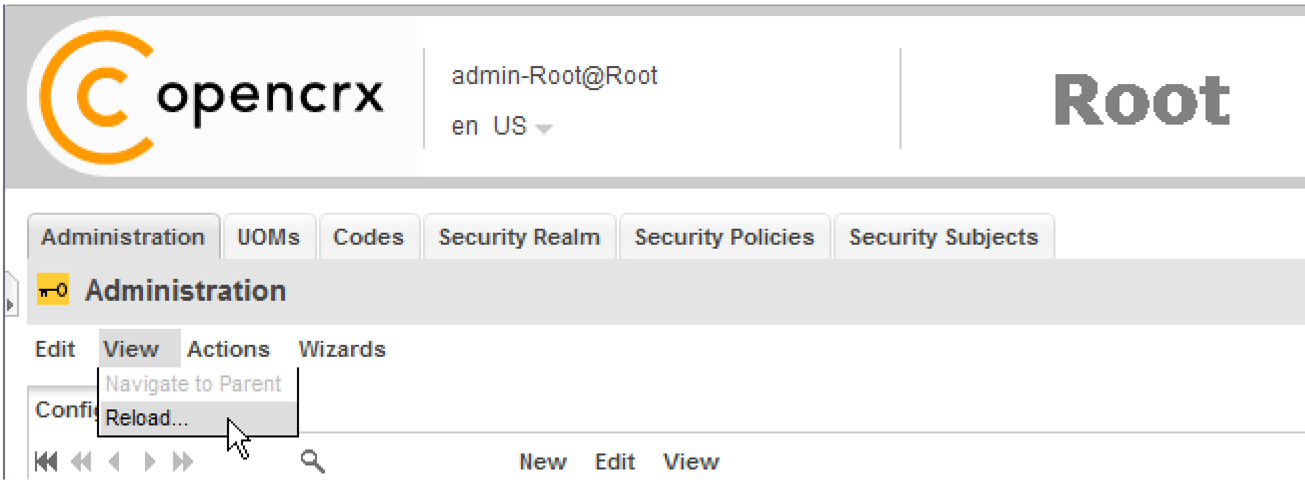


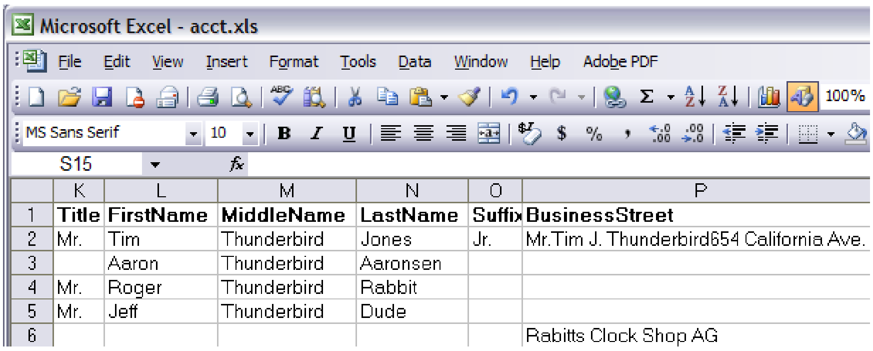
Figure 66: Interactive import of XML Files

Once the import is started you can close the browser, i.e. there is no need to keep the session alive until the import is completed. Some information regarding the progress of the import is written to the console.

In case you have data dependencies between/among your XML files (e.g. some files contain Contact data while others contain address data which is composite to Contact data) you should make sure that **parent data are imported before child data** gets imported. This should be relatively easy to achieve as XML files are imported in alphabetical order.

14.2.1 Importing Excel Files (→ openCRX Accounts)

You can directly import Excel Sheets that contain field names in the first row and then data in the rows 2, 3, ... An example sheet is shown below:


Microsoft Excel - acct.xls
File Edit View Insert Format Tools Data Window Help Adobe PDF
100%
MS Sans Serif
10
S15
fx

	K	L	M	N	O	P
1	Title	FirstName	MiddleName	LastName	Suffix	BusinessStreet
2	Mr.	Tim	Thunderbird	Jones	Jr.	Mr.Tim J. Thunderbird654 California Ave.
3		Aaron	Thunderbird	Aaronsen		
4	Mr.	Roger	Thunderbird	Rabbit		
5	Mr.	Jeff	Thunderbird	Dude		
6						Rabitts Clock Shop AG

Figure 67: Import Accounts from Excel Sheet – Sample Excel Sheet

The following field attributes are supported by the importer wizard:

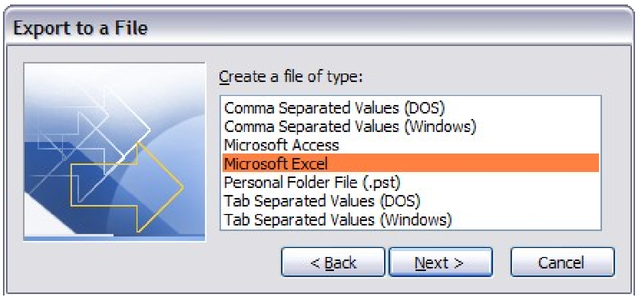
Field Name	openCRX Attribute / Description
XRI	(optionally) provide XRI of openCRX account to be updated; if there is no match with an existing account, a new one will be created
DTYPE	(optionally) provide the type of openCRX account; values are: CONTACT, LEGALENTITY, GROUP, and UNSPECIFIEDACCOUNT
TITLE	mapped to Contact.salutationCode (if the text can be located as a code value), otherwise mapped to Contact.salutation
SALUTATION	mapped to Contact.salutation (a text field)
FIRSTNAME	Contact.firstName
MIDDLENAME	Contact.middleName
LASTNAME	Contact.lastName
ALIASNAME	Contact.aliasName (multi-locale support)
NICKNAME	Contact.nickName
SUFFIX	Contact.suffix
COMPANY or COMPANY.en_US or COMPANY.de_CH etc.	based on the type of imported Account, the value is mapped to one of the following attributes (multi-locale support): - Contact.organization - LegalEntity.name - Group.name - UnspecifiedAccount.name if the imported account is of type Contact and a matching account with name equal to COMPANY is found, then the imported Contact is made a member of the matching account; furthermore, COMPANYROLE is mapped to Member.member-Role and JOBTITLE is mapped to Member.description
JOBTITLE	Contact.jobTitle
DEPARTMENT	Contact.department

BIRTHDAY	Contact.birthdate the following formats are recognized: dd-MM-yyyy, dd-MM-yy, MM/dd/yyyy, MM/dd/yy
HOMEPHONE	Account.PhoneNumber.fullNumber (with usage = home)
HOMEPHONE2	Account.PhoneNumber.fullNumber (with usage = other)
HOMEFAX	Account.PhoneNumber.fullNumber (with usage = fax home)
HOMEADDRESSLINE	Account.PostalAddress.postalAddressLine (usage = home) by default, this is the main address; change the column header to HomeAddressLine?isMain=(boolean)false if this is not the main address
HOMESTREET	Account.PostalAddress.postalStreet (usage = home)
HOMECITY	Account.PostalAddress.postalCity (usage = home)
HOMEPOSTALCODE	Account.PostalAddress.postalCode (usage = home)
HOMESTATE	Account.PostalAddress.postalState (usage = home)
HOMECOUNTRY or HOMECOUNTRYREGION	Account.PostalAddress.postalCountry (usage = home)
BUSINESSPHONE	Account.PhoneNumber.fullNumber (with usage = business)
BUSINESSPHONE2	Account.PhoneNumber.fullNumber (with usage = other)
BUSINESSFAX	Account.PhoneNumber.fullNumber (with usage = fax business)
BUSINESSADDRESSLINE	Account.PostalAddress.postalAddressLine (usage = business) by default, this is the main address; change the column header to BusinessAddressLine?isMain=(boolean)false if this is not the main address
BUSINESSSTREET	Account.PostalAddress.postalStreet (usage = business)
BUSINESSCITY	Account.PostalAddress.postalCity (usage = business)
BUSINESSPOSTALCODE	Account.PostalAddress.postalCode (usage = business)
BUSINESSSTATE	Account.PostalAddress.postalState (usage = business)
BUSINESSCOUNTRY or BUSINESSCOUNTRYREGION	Account.PostalAddress.postalCountry (usage = business)
MOBILEPHONE	Account.PhoneNumber.fullNumber (usage = mobile)
EMAILADDRESS	Account.EMailAddress.emailAddress (usage = business)
EMAIL2ADDRESS	Account.EMailAddress.emailAddress (usage = home)
EMAIL3ADDRESS	Account.EMailAddress.emailAddress (usage = other)
X500ADDRESS	Account.EMailAddress.emailAddress (usage = N/A, type X.500)
WEBPAGE	Account.WebAddress.webUrl (usage = business)
ASSISTANTSNAME	if a matching account with full name equal to ASSISTANTSNAME is found, then the matching account is made a member of the imported account; furthermore, ASSISTANTSNAMEROLE is mapped to Member.memberRole
MANAGERSNAME	if a matching account with full name equal to MANAGERSNAME is found, then the imported account is made a member of the matching account; furthermore, MANAGERSROLE is mapped to

	Member.memberRole
BUSINESSTYPE	Account.businessType you can provide a list of business types (each business type on a separate line) – see drop down / code table for valid values
NOTES	Account.description
<address>_AUTHORITY	the authority attribute allows you to define an "owner" of an address; this can be useful – for example – to designate the employer as the "owner" of an employee's addresses (e.g. while joe.doe@greatcompany.com is Joe's business e-mail address, the true "owner" is Joe's employer "great company" which also "owns" the domain greatcompany.com) the following column headers are supported: • HOMEPHONE_AUTHORITY • HOMEPHONE2_AUTHORITY • HOMEFAX_AUTHORITY • BUSINESSPHONE_AUTHORITY • BUSINESSPHONE2_AUTHORITY • BUSINESSFAX_AUTHORITY • MOBILEPHONE_AUTHORITY • EMAILADDRESS_AUTHORITY • EMAIL2ADDRESS_AUTHORITY • EMAIL3ADDRESS_AUTHORITY • X500ADDRESS_AUTHORITY • WEBPAGE_AUTHORITY • HOMEPOSTAL_AUTHORITY • BUSINESSPOSTAL_AUTHORTY
MEMBEROF	if a matching account with full name equal to MEMBEROF is found, then the imported account is made a member of the matching account; furthermore, MEMBERROLE is mapped to Member.memberRole (you can provide a semicolon-separated list of member roles (e.g. founder;owner;Board of Directors) note: with this powerful feature you can establish relationships between accounts right at the time of importing accounts it is possible to identify the parent account by specifying that account's extString0 content – simply prepend reference with the string "@#", for example @#443
MEMBERROLE	Member.memberRole (see MEMBEROF for more details)
MEMBER:userString0	Member.userString0
MEMBER:userString1	Member.userString1
MEMBER:userString2	Member.userString2
MEMBER:userString3	Member.userString3
MEMBER:userCode0	Member.userCode0
MEMBER:userCode1	Member.userCode1
MEMBER:userCode2	Member.userCode2
MEMBER:userCode3	Member.userCode3

MEMBER:userNumber0	MEMBER.userNumber0
MEMBER:userNumber1	MEMBER.userNumber1
MEMBER:userNumber2	MEMBER.userNumber2
MEMBER:userNumber3	MEMBER.userNumber3
CATEGORIES	Account.category you can provide a semicolon-separated list of categories (e.g. Business;Birthday;Xmas) and the importer will add all missing items to the list of categories contained in Account.category
NOTECREATEDAT	date when note was created (format YYYYMMDD)
NOTETITLE	creates or updates (if a note with the given title already exists) a note attached to the imported account; furthermore, NOTETEXT is mapped to the text attribute of the note
NOTETEXT	see NOTETITLE
generic / model-driven • String • Boolean • Short • BigDecimal	the importer can also handle single-valued attributes of the types listed in the left-hand column in a generic / model-driven fashion; examples are: • userString0, userString1, … , userString3 • userBoolean0, userBoolean1, …, userBoolean3 • userCode0, userCode1, …, userCode3 • userNumber0, userNumber1, …, userNumber3 • extString0, extString1, … • extBoolean0, extBoolean1, … • extCode0, extCode1, … • extNumber0, extNumber1, ... the importer also handles multi-valued code attributes: • extCode20, extCode21, … individual values for multi-valued attributes can be separated by a semicolon (“;”), e.g. 2;29;113;468 consult the openCRX UML Model for information on which attributes are available: http://www.opencrx.org/documents.htm#Doclatestuml
Properties	the importer can also handle properties; the syntax for column headers is as follows: <PropertyType>:<Name of PropertySet>!<Name of Property> where *PropertyType* is one of the following: BooleanProperty, IntegerProperty, DecimalProperty, StringProperty, UriProperty, DateProperty, DateTimeProperty or ReferenceProperty and both *Name of PropertySet* and *Name of Property* are strings Example: StringProperty:DOCSYS!FileNumber

Field names supported by MS Outlook match the names produced if you export Contacts from MS Outlook to an Excel Sheet:

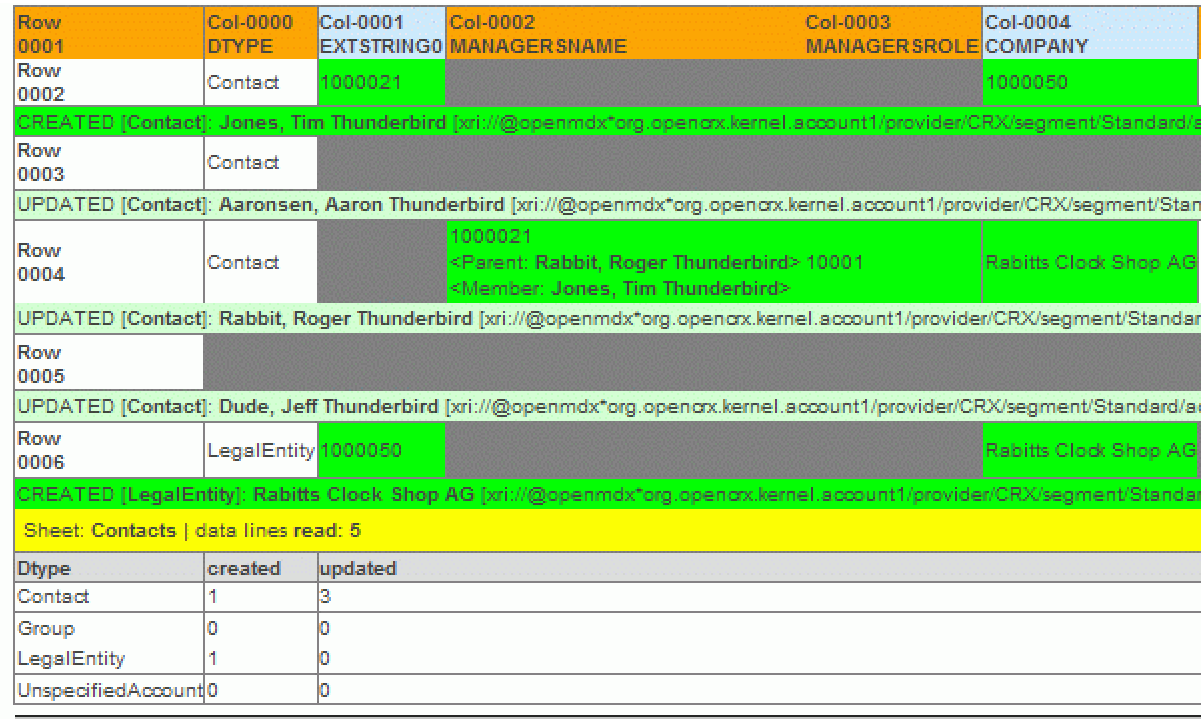


Export to a File

Create a file of type:

Comma Separated Values (DOS)
Comma Separated Values (Windows)
Microsoft Access
Microsoft Excel
Personal Folder File (.pst)
Tab Separated Values (DOS)
Tab Separated Values (Windows)

The Importer produces a detailed on-screen report with clickable links and a summary report stating the total number of created/updated accounts:



Row 0001	Col-0000 DTYPE	Col-0001 EXTSTRING0	Col-0002 MANAGERSNAME	Col-0003 MANAGERSROLE	Col-0004 COMPANY
Row 0002	Contact	1000021			1000050
CREATED [Contact]: Jones, Tim Thunderbird [xri://@openmdx*org.opencrx.kernel.account1/provider/CRX/segment/Standard/a					
Row 0003	Contact				
UPDATED [Contact]: Aaronsen, Aaron Thunderbird [xri://@openmdx*org.opencrx.kernel.account1/provider/CRX/segment/Stan					
Row 0004	Contact		1000021 <Parent: Rabbit, Roger Thunderbird> 10001 <Member: Jones, Tim Thunderbird>		Rabitts Clock Shop AG
UPDATED [Contact]: Rabbit, Roger Thunderbird [xri://@openmdx*org.opencrx.kernel.account1/provider/CRX/segment/Standar					
Row 0005					
UPDATED [Contact]: Dude, Jeff Thunderbird [xri://@openmdx*org.opencrx.kernel.account1/provider/CRX/segment/Standard/a					
Row 0006	LegalEntity	1000050			Rabitts Clock Shop AG
CREATED [LegalEntity]: Rabitts Clock Shop AG [xri://@openmdx*org.opencrx.kernel.account1/provider/CRX/segment/Standar					
Sheet: Contacts | data lines read: 5					

Dtype	created	updated
Contact	1	3
Group	0	0
LegalEntity	1	0
UnspecifiedAccount	0	0

Figure 68: Import Accounts from Excel Sheet – Import Report

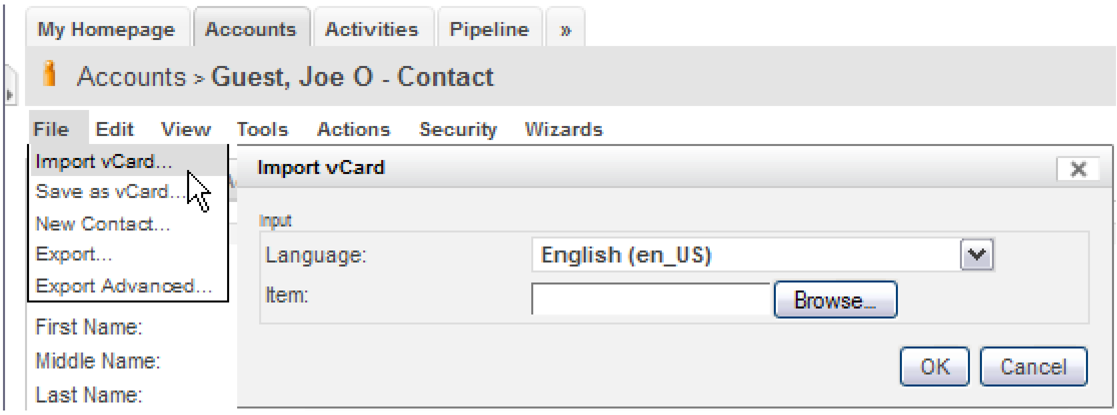
Before you launch an import of thousands of accounts, verify the structure of your Excel sheet with a few lines/accounts only.

14.2.2 Importing vCard Files (→ openCRX Contacts)

vCard is file format standard for personal data interchange, specifically electronic business cards (additional information is for example available from http://en.wikipedia.org/wiki/VCard).

These are the steps to import a vCard file:

- click on the provider Accounts and navigate to an existing Contact (or create a new one)
- select the operation File > Import vCard to unhide the import dialog:



Language: English (en_US)
Item:

Figure 69: Operation vCard Import

- select the appropriate language
- click the Browse button and navigate to the vCard file you want to import
- click the OK button to start the import operation

14.2.3 Importing E-Mails

Please refer to the Chapter 8 E-mail Services, in particular chapter Error: Reference source not found Error: Reference source not found.

14.2.4 Other Options

There are various other options to consider. You could for example develop a custom-tailored **JSP Wizard** to import data on demand or on a regular basis (e.g. controlled by the openCRX WorkflowController).

Sometimes it is more appropriate to develop a specific openCRX client to handle imports, and in a typical enterprise class environment you will probably consider developing adapters to connect/integrate openCRX with 3rd party systems on a real-time basis.

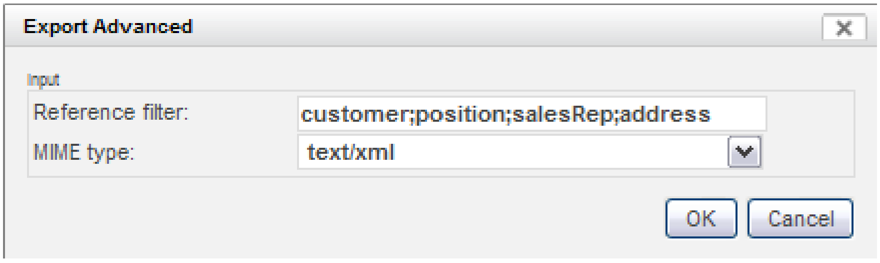
14.3 Exporting Data from openCRX

The task of exporting data is handled by exporters. The Open Source distribution of openCRX includes exporters for vCard and iCalendar files in addition to the XML exporter.

This allows you to export contacts and meetings/sales visits or any other object from openCRX. vCard and iCalendar files can be imported by a large variety of other applications, including Microsoft Outlook. This chapter shows how to export data.

14.3.1 Exporting XML Files

Navigate to the object to be exported as XML file and execute the operation File > Export Advanced as shown below:



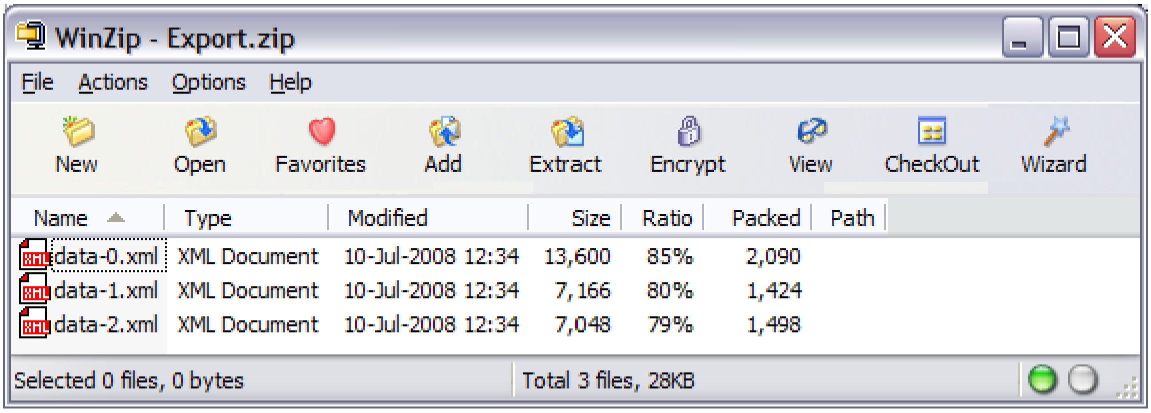
Reference filter: customer;position;salesRep;address

MIME type: text/xml

Figure 70: Exporting SalesOrder as XML File

In order to better control which additional objects (composites, referenced objects, ...) the XLM exporter should export together with the object loaded in the Inspector, you can (optionally) provide a **reference filter** (optionally with a **navigation level**). By default, only the current object will be exported. If you provide – for example when exporting a sales order – **customer;address** as a reference filter, the customer and all referenced addresses will be exported together with the main object. If you export a contact and provide the reference filter **member[1]** you will get direct members of this contact.

If the export is successful the exporter will terminate with status OK and you will be provided with a link to the file Export.zip containing the raw data:



Name	Type	Modified	Size	Ratio	Packed	Path
data-0.xml	XML Document	10-Jul-2008 12:34	13,600	85%	2,090	
data-1.xml	XML Document	10-Jul-2008 12:34	7,166	80%	1,424	
data-2.xml	XML Document	10-Jul-2008 12:34	7,048	79%	1,498	

Selected 0 files, 0 bytes

Total 3 files, 28KB

Figure 71: XML Exporter provides XML data file and code tables as ZIP file

The openCRX ICS Adapter can also export iCalendars in XML format:

ICS URL (to get XML file with authentication):
http://<crxServer>:<Port>/opencrx-ical-<Provider>/activities
?id=<Provider>/<Segment>/<Calendar Selector>&type=xml

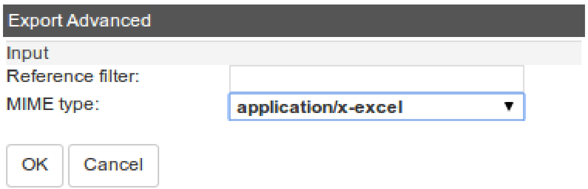
Example:
http://localhost:8080/opencrx-ical-CRX/activities?id=CRX/Standard/tracker/main&type=xml

See chapter 9.4.2 Calendar Selectors (ICS and CalDAV) for information on how to construct calendaring URLs.

You can also export the data contained in an openCRX grid to an XML file by executing **Actions > Export --> XML** on any grid.

14.3.2 Exporting Data to MS Excel / Open Office Calc Files

Navigate to the object to be exported as spreadsheet file and execute the operation File > Export Advanced as shown below:



Export Advanced

Input

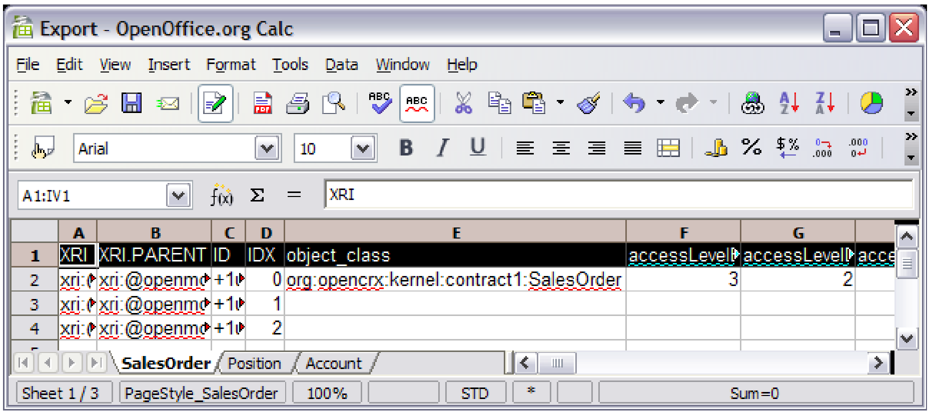
Reference filter:

MIME type: application/x-excel

Figure 72: Exporting SalesOrder as Spreadsheet File

In order to better control which additional objects (composites, referenced objects, ...) the XLM exporter should export together with the object loaded in the Inspector, you can (optionally) provide a **reference filter**. By default, only the current object will be exported. If you provide – for example – **:*/:*** as a reference filter, all composites up to 2 levels deep will be exported together with the main object (this should be sufficient for most use cases). You can also provide a reference filter to dereference and export referenced objects like the customer or the salesRep of a sales order.

If the export is successful the exporter will terminate with status OK and you will be provided with a link to the file Export.xls containing the raw data:



	A	B	C	D	E	F	G	
1	XRI	XRI.PARENT	ID	IDX	object_class	accessLevel	accessLevel	acce
2	xri:	xri:@openmo	+1	0	org:opencrx:kernel:contract1:SalesOrder	3	2	
3	xri:	xri:@openmo	+1	1				
4	xri:	xri:@openmo	+1	2				

Figure 73: Exported Spreadsheet File

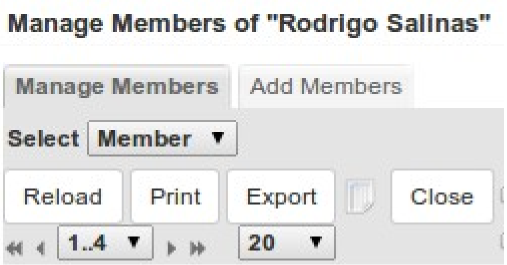
Based on such spreadsheet files end-users can easily create reports or do some ad-hoc data analysis without the need to know anything about Java or writing JSPs. The standard distribution of openCRX includes various example reports based on this technology.

You can also export the data contained in an openCRX grid to an Excel file by executing **Actions > Export --> XLS** on any grid.

14.3.3 Exporting openCRX Contacts (→ MS Excel Files)

These are the steps to manually export group of contacts to an Excel file:

- navigate to the account group you want to export
- start the wizard Wizards > Manage Members
- click the button [Export]



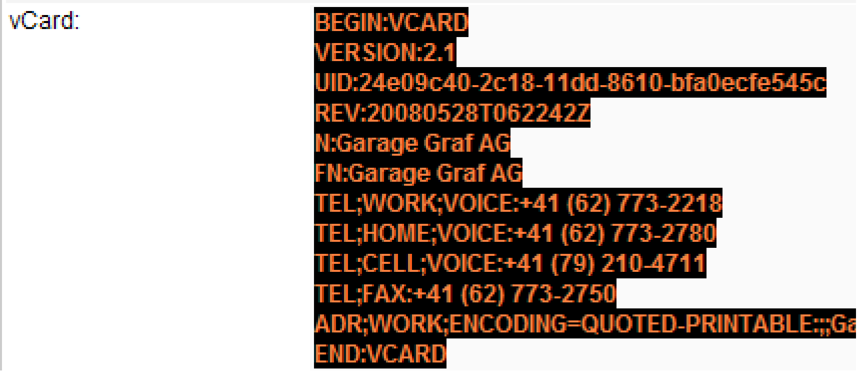
- click on the spreadsheet icon to download the Excel file containing the exported accounts

The exported MS Excel file can be imported again. Hence, if you want to make bulk changes (e.g. change to domain of an e-mail address, etc.) you can first export the relevant accounts to an Excel file, make the desired changes in Excel and then reimport the Excel file with the Importer wizard (see 14.2.1 Importing Excel Files (□ openCRX Accounts)).

14.3.4 Exporting openCRX Contacts (→ vCard Files)

These are the steps to manually export a contact to a vCard file:

- navigate to the contact you want to export
- click on the tab Account
- select the contents of the field vCard and copy it to an empty text file
- save the text file with any name and extension "vcf", e.g. contact.vcf:



vCard:

```
BEGIN:VCARD
VERSION:2.1
UID:24e09c40-2c18-11dd-8610-bfa0ecfe545c
REV:20080528T062242Z
N:Garage Graf AG
FN:Garage Graf AG
TEL;WORK;VOICE:+41 (62) 773-2218
TEL;HOME;VOICE:+41 (62) 773-2780
TEL;CELL;VOICE:+41 (79) 210-4711
TEL;FAX:+41 (62) 773-2750
ADR;WORK;ENCODING=QUOTED-PRINTABLE:;;Ga
END:VCARD
```

Figure 74: Manually Export Contact as vCard

There is also a wizard **vCard.jsp** available which allows you to export individual accounts or batches of accounts as vCards.

Navigate to an Account and select File > Save as vCard to start the export:

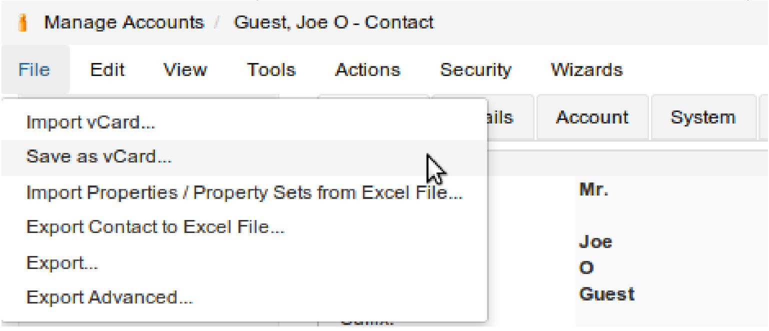


Figure 75: Export individual Contact as vCard with Wizard

In order to export multiple accounts as vCards, create a Saved Search that selects the desired accounts and then navigate to this Saved Search. Select File > Save Filtered Accounts as vCard:

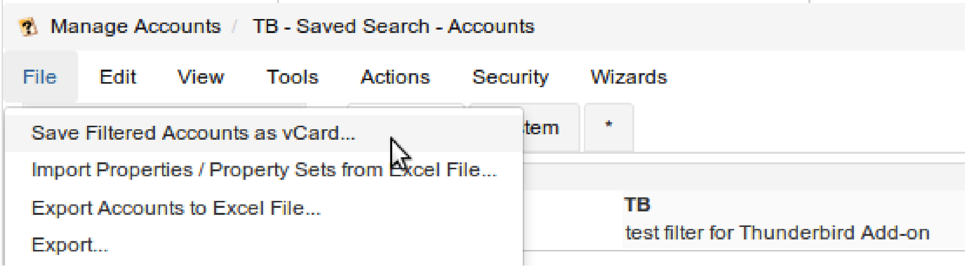
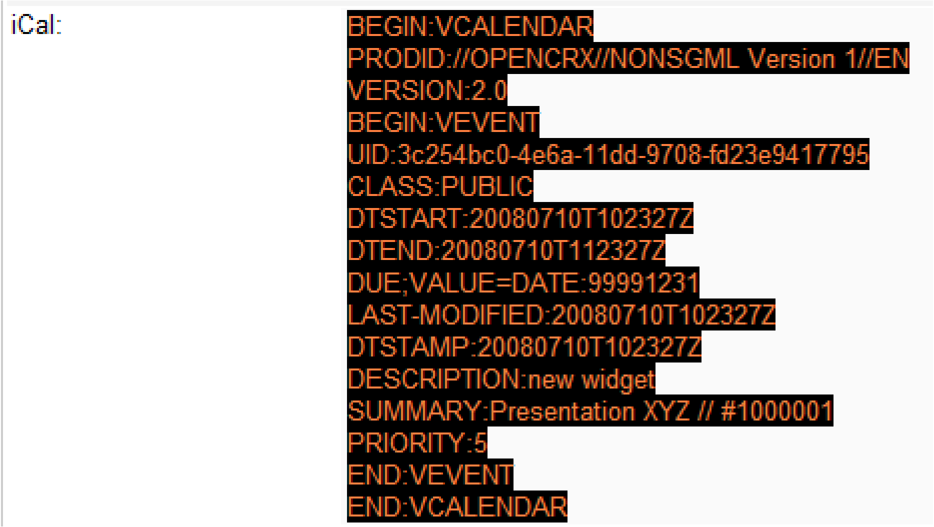

Manage Accounts / TB - Saved Search - Accounts
File
Edit
View
Tools
Actions
Security
Wizards
Save Filtered Accounts as vCard...
Import Properties / Property Sets from Excel File...
Export Accounts to Excel File...
Export...
tem
*
TB
test filter for Thunderbird Add-on

Figure 76: Export multiple Contacts as vCards with Wizard

14.3.5 Exporting openCRX Meetings (→ iCalendar Files)

These are the steps to export an individual activity (e.g. a meeting or a sales visit) to an iCalendar file:

- navigate to the meeting (or sales visit) you want to export
- click on the tab Details
- select the contents of the field iCal and copy it to an empty text file
- save the text file with any name and extension "ics", e.g. meeting.ics:



iCal:

```
BEGIN:VCALENDAR
PRODID://OPENCRX//NONSGML Version 1//EN
VERSION:2.0
BEGIN:VEVENT
UID:3c254bc0-4e6a-11dd-9708-fd23e9417795
CLASS:PUBLIC
DTSTART:20080710T102327Z
DTEND:20080710T112327Z
DUE;VALUE=DATE:99991231
LAST-MODIFIED:20080710T102327Z
DTSTAMP:20080710T102327Z
DESCRIPTION:new widget
SUMMARY:Presentation XYZ // #1000001
PRIORITY:5
END:VEVENT
END:VCALENDAR
```

Figure 77: Exporting Meeting / Sales Visit as iCalendar File

There is also a wizard **iCal.jsp** available which allows you to export individual activities or batches of activities as iCals.

Navigate to an Activity and select File > Save as iCal to start the export:

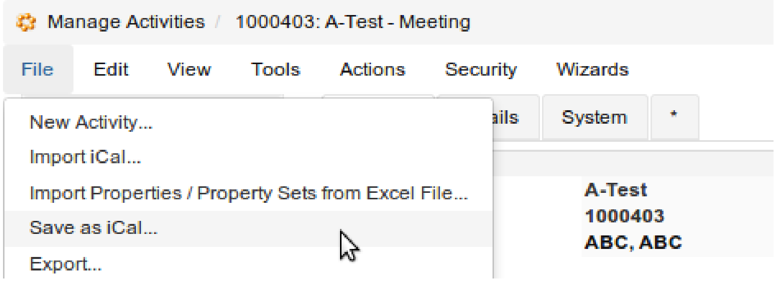


Figure 78: Export individual Activity as iCal with Wizard

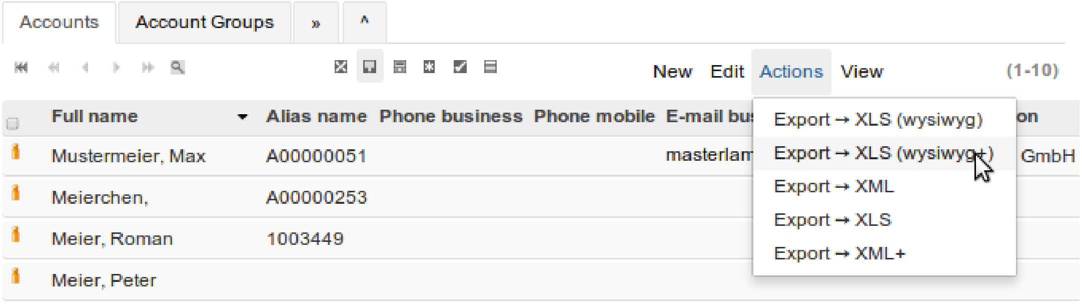
In order to export multiple activities as iCals, navigate to an Activity Group (Activity Tracker, Category, Milestone), to a Saved Search (or to any other object that features a list of assigned activities like Userhome) and then select File > Save Filtered Activities as iCal (Save Assigned Activities as iCal).

14.3.6 Exporting E-Mails

Please refer to the Chapter 8 E-mail Services, in particular chapter 8.2.4 Export E-mails.

14.3.7 Exporting openCRX Grids

Any openCRX Grid can be exported to an XML or an XLS file. The exporters are accessible through **Actions > Export → xxx**:



Full name	Alias name	Phone business	Phone mobile	E-mail bu	on
Mustermeier, Max	A00000051			masterlam	GmbH
Meierchen,	A00000253				
Meier, Roman	1003449				
Meier, Peter					

Export Target	Description
XLS	produces Excel Sheet that contains all the attributes of the exported objects
XLS (wysiwyg)	produces Excel Sheet that contains visible attributes (see chapter “Selection of Visible Attributes – showMaxMember” in the openCRX Customizing guide) of the exported objects
XLS (wysiwyg+)	produces Excel Sheet that contains filterable attributes (see chapter “Selection of Filterable Attributes – maxMember” in the openCRX Customizing guide) of the exported objects
XML	produces XML file that contains all the attributes of the exported objects
XML+	produces xml file that contains all the attributes of the exported objects and their composite objects

14.3.8 Other Options

There are various other options to consider. You could for example develop a custom-tailored JSP Wizard to export data on demand or on a regular basis (e.g. controlled by the openCRX WorkflowController).

Sometimes it is more appropriate to develop a specific openCRX client to handle exports, and in a typical enterprise class environment you will probably consider developing adapters to connect/integrate openCRX with 3rd party systems on a real-time basis.

If you have a REST client available, then exporting via REST is also a very viable option.

15 Customizing openCRX

Please refer to the guides available at http://www.opencrx.org/documents.htm for detailed information regarding UI customization and localization.

15.1 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.

The locale list is contained in the file

opencrx-core-CRX\opencrx-core-CRX\WEB-INF\web.xml

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

Listing 28: 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 29: 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>
...
```

Warning

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.

15.2 Managing Packages

The default installation of openCRX activates all packages that are included in the Open Source distribution. The openCRX administrator may wish to deactivate certain packages if they are not used. This chapter shows how you can achieve this.

The package list is contained in the file

opencrx-core-CRX\opencrx-core-CRX\WEB-INF\web.xml

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

Listing 30: 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/${USER}</param-value>
</init-param>
<!-- Accounts -->
<init-param>
 <param-name>rootObject[2]</param-name>
 <param-value>xri:@openmdx:org.opencrx.kernel.account1/provider/CRX/segment/${SEGMENT}</param-value>
</init-param>
...
```

You can deactivate packages by simply commenting them out. The following example shows how to deactivate the package depot1:

Listing 31: Activating/Deactivating 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 -->
...
```

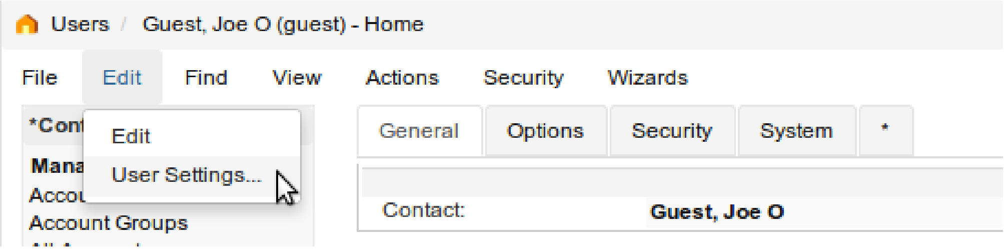
Warning

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. **package numbering 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.

15.2.1 Enabling/Disabling Root Menu Entries

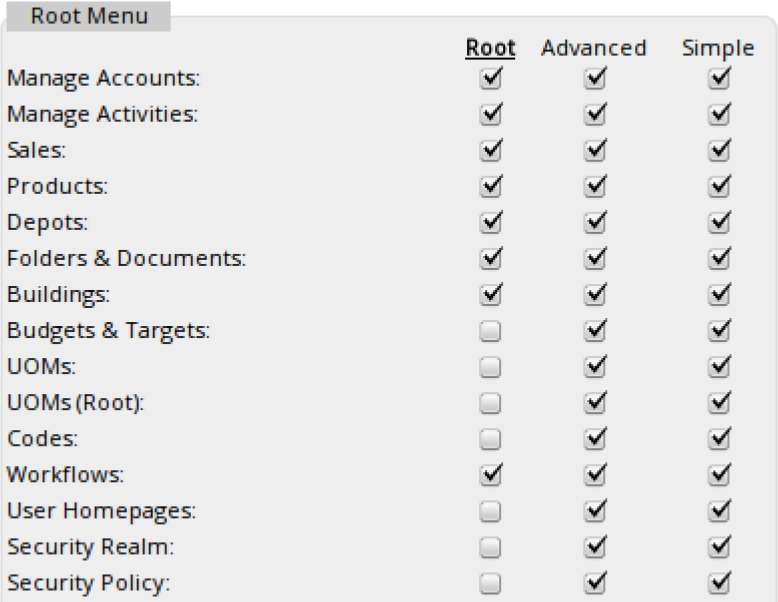
Individual user can enable/disable root menu entries with the wizard User Settings (available on a user's Homage):



Contact: Guest, Joe O

Figure 79: Launch Wizard User Settings

Once the wizard has loaded, uncheck entries you don't need (note that the settings can be different for different perspectives):



Root Menu

	Root	Advanced	Simple
Manage Accounts:	☑	☑	☑
Manage Activities:	☑	☑	☑
Sales:	☑	☑	☑
Products:	☑	☑	☑
Depots:	☑	☑	☑
Folders & Documents:	☑	☑	☑
Buildings:	☑	☑	☑
Budgets & Targets:	□	☑	☑
UOMs:	□	☑	☑
UOMs (Root):	□	☑	☑
Codes:	□	☑	☑
Workflows:	☑	☑	☑
User Homepages:	□	☑	☑
Security Realm:	□	☑	☑
Security Policy:	□	☑	☑

Figure 80: 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 by changing the value of ***Show max items in top navigation*** (fewer items for narrow screens, more items for wider screens).

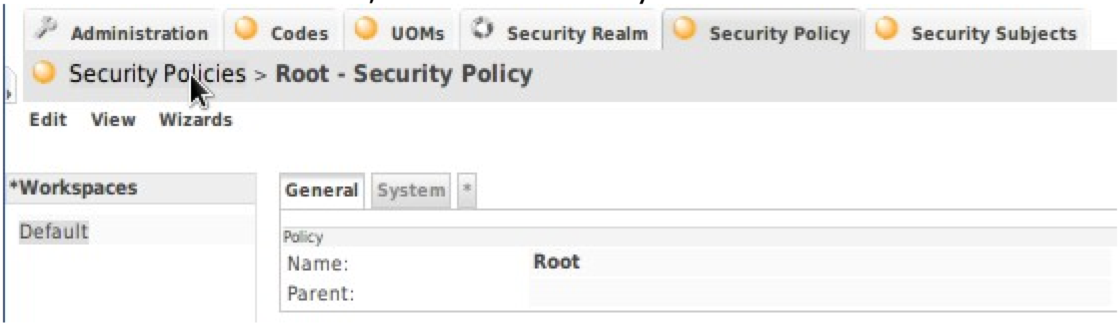
If you uncheck ***Show top navigation sub-levels*** the top-level tabs will not contain menus for sub-levels.

15.3 Role-based GUI / GUI Permissions

15.3.1 Activating GUI Permissions

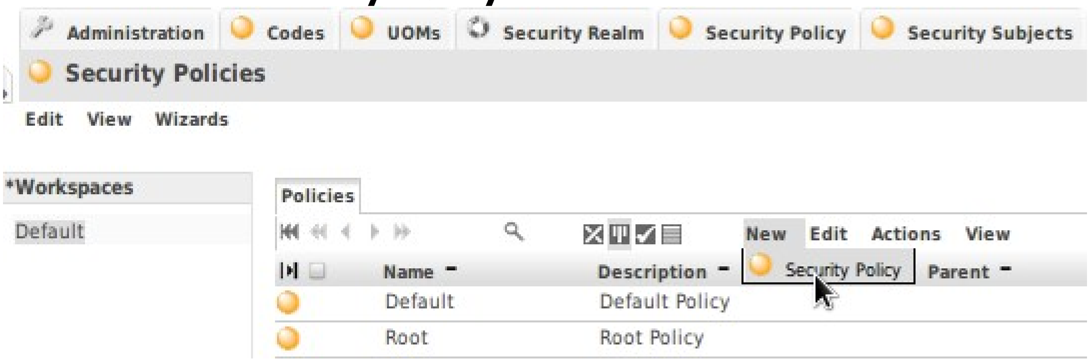
With the following steps you can active GUI permissions:

- login as admin-Root
- click on the tab [Security Policy]
- in the bread-crum title, click on Security Policies as shown below:



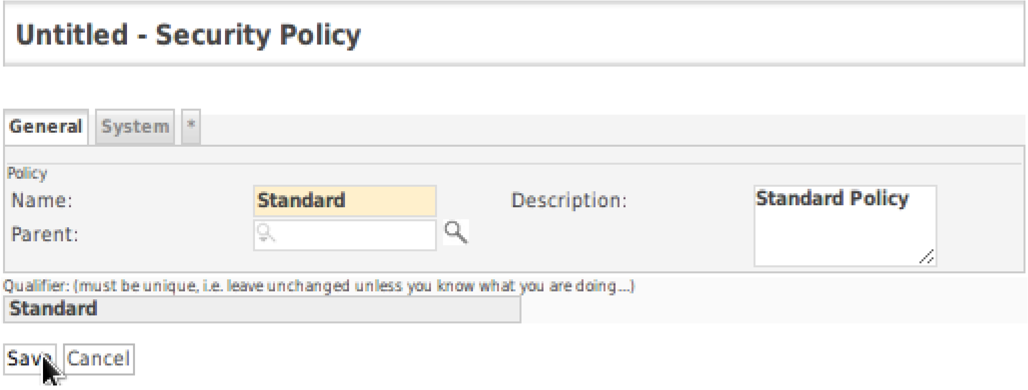
Name: Root
Parent:

- select **New > Security Policy**:



Name	Description	Parent
Default	Default Policy	
Root	Root Policy	

- set both the **name** and the **qualifier** to Standard and enter Standard Policy as **description** as shown below – then click the button [Save]:

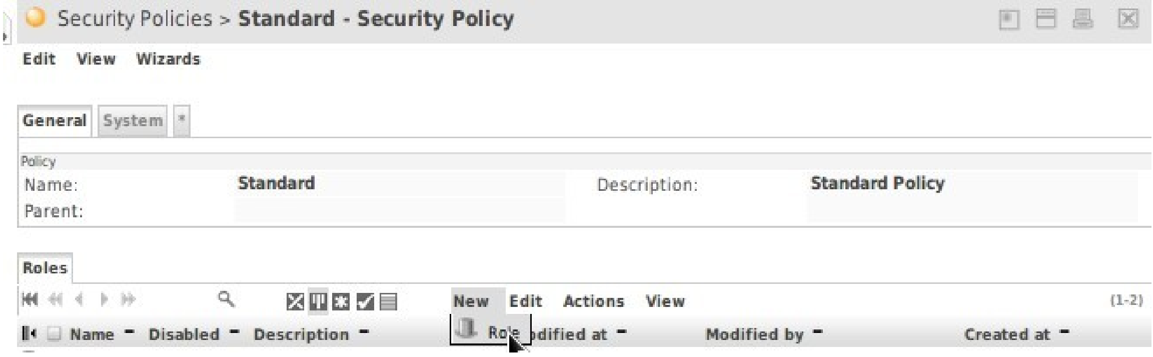


Name: Standard
Parent:
Description: Standard Policy

Qualifier: (must be unique, i.e. leave unchanged unless you know what you are doing...)
Standard

- logoff and login as admin-Standard
- click on the tab [Security Policy]

- in the grid [Roles], select **New > Role**:



Policy

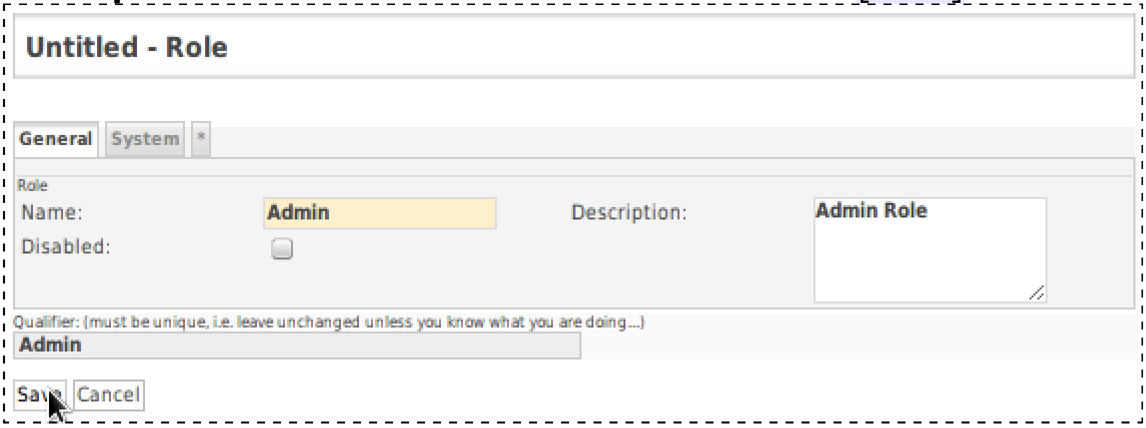
Name: Standard

Description: Standard Policy

Parent:

Name ▾ Disabled ▾ Description ▾ Modified at ▾ Modified by ▾ Created at ▾

- set both the **name** and the **qualifier** to Admin and enter Admin Role as **description** as shown below – then click the button [Save]:



Role

Name: Admin

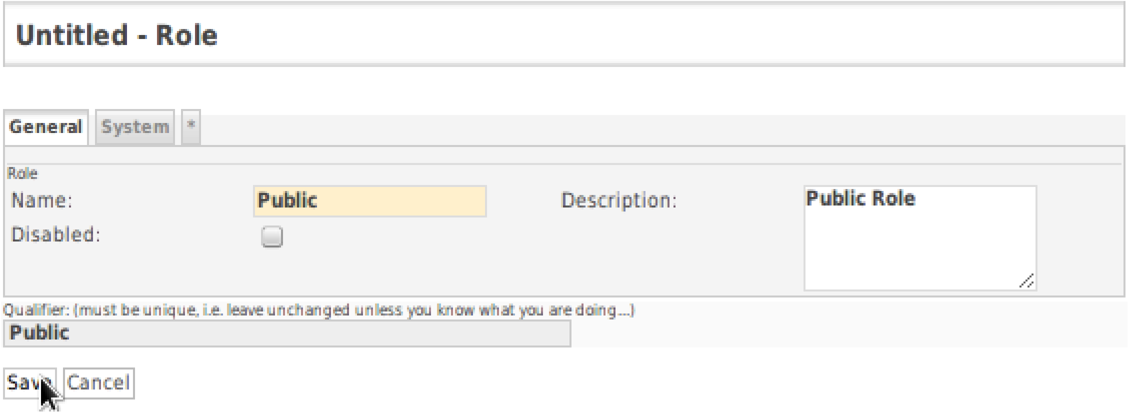
Description: Admin Role

Disabled: □

Qualifier: (must be unique, i.e. leave unchanged unless you know what you are doing...)

Admin

- in the grid [Roles], select **New > Role** again set both the **name** and the **qualifier** to Public and enter Public Role as **description** as shown below – then click the button [Save]:



Role

Name: Public

Description: Public Role

Disabled: □

Qualifier: (must be unique, i.e. leave unchanged unless you know what you are doing...)

Public

- your default Security Policy **Standard** should now contain the 2 roles **Admin** and **Public**; this concludes the base configuration of GUI element security

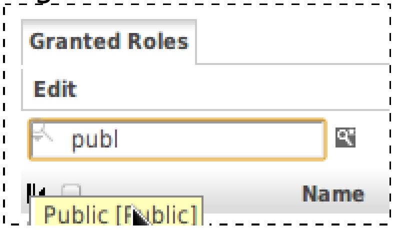
15.3.2 Managing GUI Permissions

Only segment administrators (e.g. admin-Standard) can manage GUI permissions.

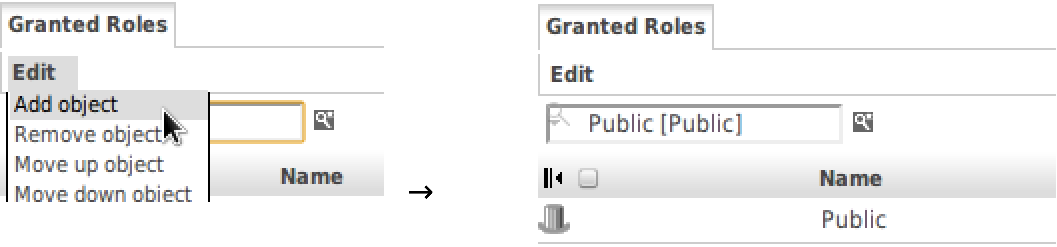
15.3.2.1 Granting a role to an openCRX user

With the following steps you can grant a role to an openCRX user:

- login as segment administrator (e.g. admin-Standard)
- select the top-level tab [Security Realm]
- click on the tab [Principals] and locate and then navigate to the principal whom you want to grant a new role.
- the grid [Granted Roles] contains the (ordered) list of roles currently granted to the respective principal
- start typing the name of the role to be granted into the input box just below the menu **Edit** (as show below) and then select the desired role, e.g. Public:



- select the menu **Edit > Add object** to grant the role:



If permissions granted to roles contradict each other, the last role in the list of granted roles “wins”, i.e. the order in which roles are granted to a principal matters!

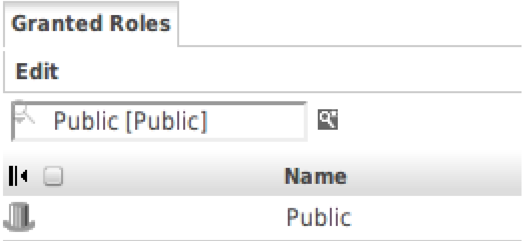
You can use **Edit > Move up object** and **Edit > Move down object** to change the order of roles in the grid [Granted Roles].

Grant the role **Public** to all users (including segment administrators), but grant the role **Admin** to segment administrator only, to make it easy to disable certain GUI elements for normal users.

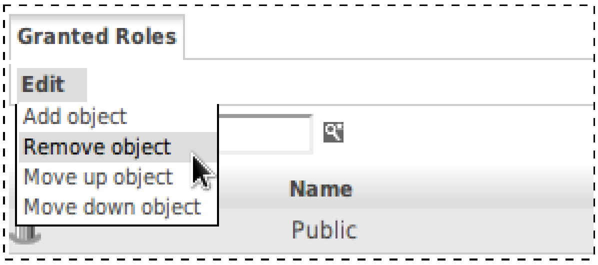
15.3.2.2 Revoking a role previously granted to an openCRX user

With the following steps you can revoke a role previously granted to an openCRX user:

- login as segment administrator (e.g. admin-Standard)
- select the top-level tab [Security Realm]
- click on the tab [Principals] and locate and then navigate to the principal whom you want to grant a new role.
- the grid [Granted Roles] contains the (ordered) list of roles currently granted to the respective principal:



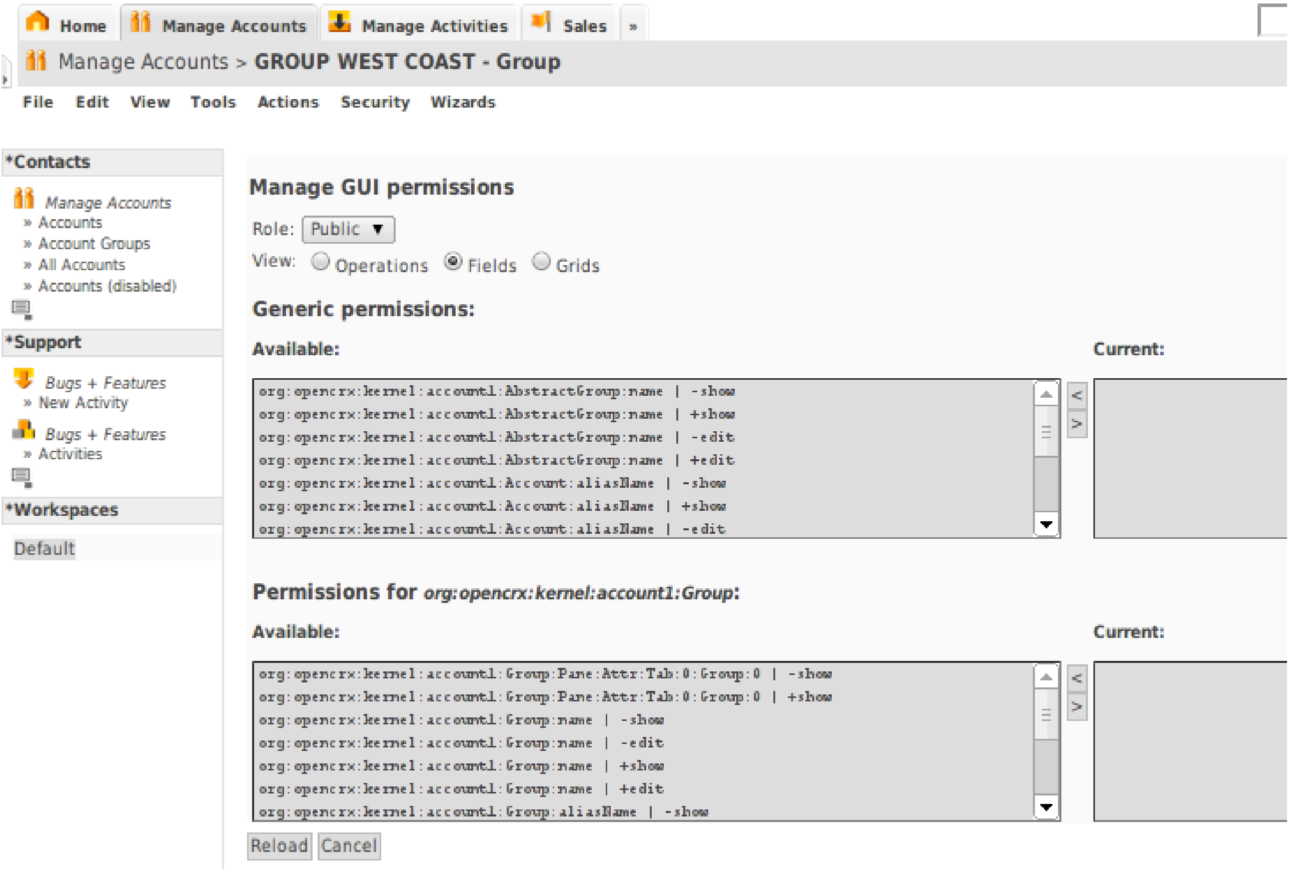
- click on the line of the role to be revoked to select it (the selected line turns grey) and then select the menu **Edit > Remove object** to revoke the role:



15.3.2.3 Enabling/Disabling GUI elements

With the following steps you can disable a GUI element:

- login as segment administrator (e.g. admin-Standard)
- navigate to the screen that contains the GUI element you want to disable
- start the wizard **Wizards > Manage GUI Permissions**:



Manage GUI permissions

Role: Public ▼

View: ○ Operations ● Fields ○ Grids

Generic permissions:

Available:

```
org:opencrx:kernel:account1:AbstractGroup:name | -show
org:opencrx:kernel:account1:AbstractGroup:name | +show
org:opencrx:kernel:account1:AbstractGroup:name | -edit
org:opencrx:kernel:account1:AbstractGroup:name | +edit
org:opencrx:kernel:account1:Account:aliasName | -show
org:opencrx:kernel:account1:Account:aliasName | +show
org:opencrx:kernel:account1:Account:aliasName | -edit
```

Current:

Permissions for *org:opencrx:kernel:account1:Group*:

Available:

```
org:opencrx:kernel:account1:Group:Pane:Attr:Tab:0:Group:0 | -show
org:opencrx:kernel:account1:Group:Pane:Attr:Tab:0:Group:0 | +show
org:opencrx:kernel:account1:Group:name | -show
org:opencrx:kernel:account1:Group:name | -edit
org:opencrx:kernel:account1:Group:name | +show
org:opencrx:kernel:account1:Group:name | +edit
org:opencrx:kernel:account1:Group:aliasName | -show
```

Current:

- select the role you want to manage permissions for (e.g. Public)
- select the type of GUI element you want to enable/disable (e.g. Operations, Fields, Grids)
- use the buttons [>] and [<] to add/remove permissions
- once you're done, click the button [Apply] to persist your changes

It usually takes a few seconds before the new permissions are applied by the GUI rendering engine.

15.4 Custom Layout JSPs

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

- **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 (it is provided by openMDX/portal) and it can handle any object.

- **edit-Default.jsp**

  Similarly, this layout JSP renders all pages that are used to edit objects.

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.

16 Integration with Office Application

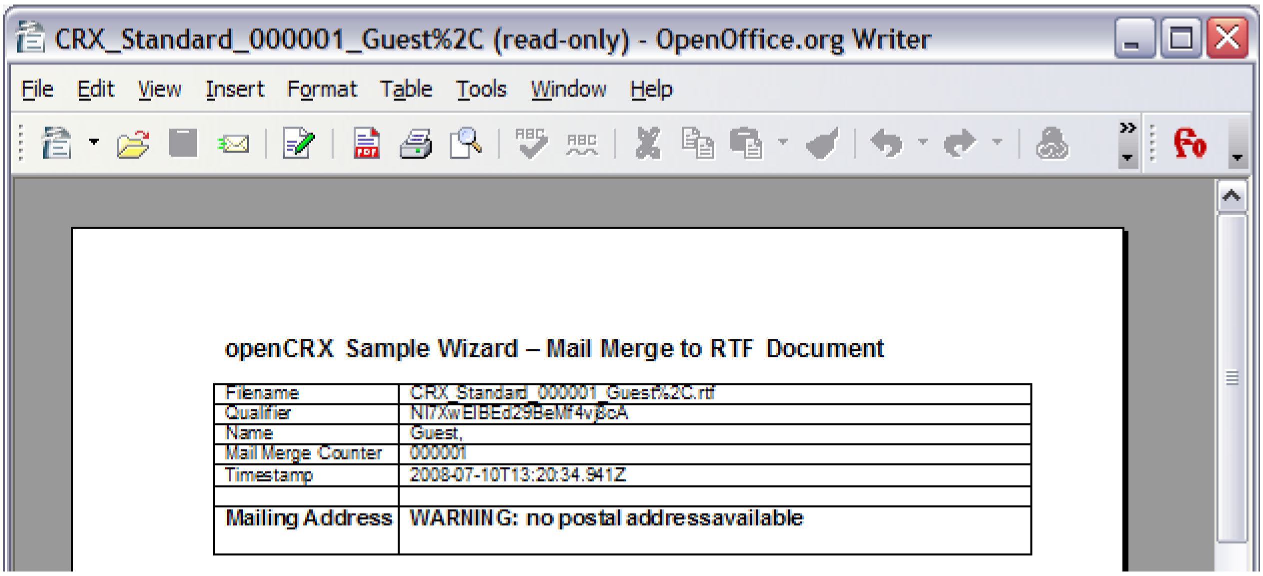
openCRX provides various technologies that enable you to easily integrate common office suites like Open Office or Microsoft Office.

16.1 MS Word, LibreOffice Writer, OpenOffice Writer, etc.

openCRX supports the JSP-wizard-based generation of RTF documents. You can generate RTF documents from scratch or merge data with existing RTF templates. The RTF documents are generated on the fly and can be opened with any RTF-compatible word processor including OpenOffice Writer and MS Word.

You can test this feature on our demo server (or on your own installation if you installed the openCRX Server) with the following steps:

- connect and login as user **guest**
- navigate to any contact and execute the operation **Tools > Mail Merge --> RTF Document**
- the wizard will provide a list of suitable templates and then generate the RTF document on the fly


CRX_Standard_000001_Guest%2C (read-only) - OpenOffice.org Writer
File
Edit
View
Insert
Format
Table
Tools
Window
Help

openCRX Sample Wizard – Mail Merge to RTF Document

Filename	CRX_Standard_000001_Guest%2C.rtf
Qualifier	NI7XwElBEd29BeMf4vβcA
Name	Guest,
Mail Merge Counter	000001
Timestamp	2008-07-10T13:20:34.941Z
Mailing Address	WARNING: no postal addressavailable

Figure 81: RTF Document generated by merging live data with template

If you installed the openCRX SDK you will find the templates and the JSP wizard in the following locations:

- <SDK_Install_Dir>\opencrx-2.9.1\core\src\data\org.opencrx\documents
- **<SDK_Install_Dir>\opencrx-2.9.1\core\src\data\org.opencrx\wizards\en_US\MailMerge.jsp**

With this approach it is quite easy to generate all kinds of documents, including letters, invoices, purchase orders, etc.

17 Reporting

openCRX provides various technologies that enable you to create reports of a wide variety, anything from simple ad-hoc reports to large scale bulk reports.

17.1 Large Scale Reporting

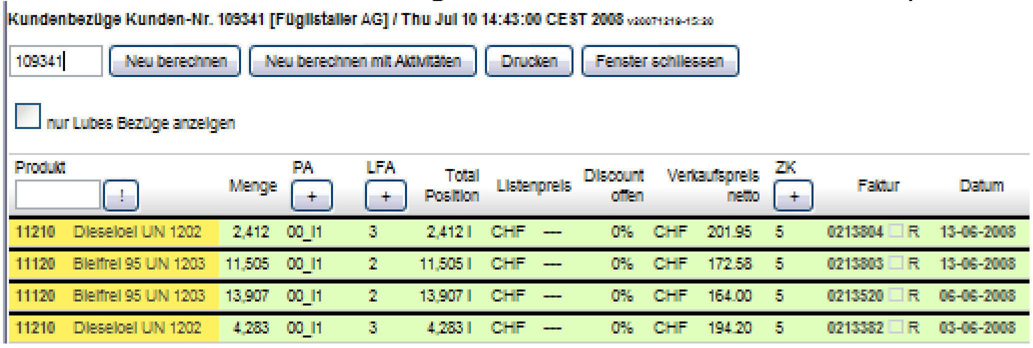
If your task is to produce a large number of reports (e.g. monthly reporting for all your clients) or reports based on large amounts of data, spreadsheet-based reporting is probably not the way to go. Maybe you want to generate reports in a format other than XLS. On the one hand, openCRX already includes libraries to generate reports and documents in various formats, on the other hand you can easily add additional libraries to openCRX.

Format	Library / Additional Information
XLS	Apache POI / http://poi.apache.org/
PDF	iText / http://www.lowagie.com/iText/
RTF	Simple RTF Writer / org.opencrx.kernel.utils.rtf

Obviously, there are many more possibilities, like for example exporting data in XML format and then doing some kind of fancy transformation.

In terms of how to generate your reports, there are also various options available depending on your preferences:

- <u>JSP-Based Reporting</u>
  This approach is typically recommended if you need on-demand reporting and the generation of the report does not put an undue burden on the server. The following screen shot shows an example HTML-report:



Kundenbezüge Kunden-Nr. 109341 [Füglistaller AG] / Thu Jul 10 14:43:00 CEST 2008 v20071218-15:30

109341

□ nur Lubes Bezüge anzeigen

Produkt		Menge	PA	LFA	Total Position	Listenpreis	Discount offen	Verkaufspreis netto	ZK	Faktur	Datum
11210	Dieseloel UN 1202	2,412	00_l1	3	2,412 l	CHF —	0%	CHF 201.95	5	0213804 □ R	13-06-2008
11120	Bleifrei 95 UN 1203	11,505	00_l1	2	11,505 l	CHF —	0%	CHF 172.58	5	0213803 □ R	13-06-2008
11120	Bleifrei 95 UN 1203	13,907	00_l1	2	13,907 l	CHF —	0%	CHF 164.00	5	0213520 □ R	06-06-2008
11210	Dieseloel UN 1202	4,283	00_l1	3	4,283 l	CHF —	0%	CHF 194.20	5	0213382 □ R	03-06-2008

- <u>Java Program</u>
  Large-scale batch reporting can be done with a Java Program (basically an openCRX client programmed in Java that prepares the desired reports).

- BI-Reporting Suite
  If you plan to use a BI-Reporting Suite (e.g. Crystal Reports, Pentaho, BIRT, etc.), you should keep in mind that **directly accessing the openCRX database is not a very good idea**. We strongly recommend you either retrieve data through the openCRX API (e.g. with REST) or set up a dedicated reporting DB (the process to populate such a reporting DB should retrieve data from the openCRX DB through the openCRX API). The reason for not accessing the openCRX database directly is the following one: while the openCRX API is stable, the OO-to-relational mapping is not and hence the schema of the openCRX DB is subject to change over time. Hence, if you access the openCRX DB directly you will have to adapt your reports if the DB schema changes, a potentially expensive proposition. Furthermore, whenever you access the openCRX DB directly there is no access control...

18 Miscellaneous Topics

18.1 Configuration of AutoCompleter

The AutoCompleter works by default with objects in the current segment. To determine the so called 'lookup object' it also considers the 'root objects' configured in web.xml. By default, web.xml has two configured UOM segments:

- xri:@openmdx:org.opencrx.kernel.uom1/provider/CRX/segment/${SEGMENT}
- xri:@openmdx:org.opencrx.kernel.uom1/provider/CRX/segment/Root

If there are multiple root objects of the same type, the AutoCompleter takes the first (see org.openmdx.portal.servlet.DefaultPortalExtension.getLookupObject() for details).

Hence, if you want to give the root UOMs priority you can switch the orders of the UOM XRIs in the web.xml. If you want to have some more sophisticated logic you can override the method getLookupObject() or getAutoCompleter().

18.2 Extended Service for openCRX/Tomcat Management

18.2.1 Multiple Instances of Tomcat

Extended Service is a Tomcat extension which allows to start multiple Tomcat instances with the same configuration and allows to stop / start the connectors of these instances individually.

The class **org.openmdx.catalina.core.ExtendedService** allows to handle the requested scenario. Adapt the server.xml as follows:

```
...
<Server port="${tomcat.server.port}" shutdown="SHUTDOWN">
...
<Service name="Catalina" port="${tomcat.service.port}" className="org.openmdx.catalina.core.ExtendedService">
...
```

The system properties are set per Tomcat instance, e.g.

Instance A	• `-Dtomcat.server.port=8005` • `-Dtomcat.service.port=8006`
Instance B	• `-Dtomcat.server.port=8105` • `-Dtomcat.service.port=8106`

If instance A and instance B have to run with different versions of EARs/WARs, create a Tomcat directory for each instance.

* Start instance A. The connectors are started.
* Start instance B. The connectors can not be started because of port conflicts.

Switch from instance A to B as follows:
* telnet localhost 8006 and enter command stopConnectors
* telnet localhost 8106 and enter command startConnectors
If the property **org.openmdx.catalina.core.ExtendedService.autostartConnectors** is unset or the property is set to true then the connectors will be started at startup of Tomcat. Otherwise the connectors are not started.

18.2.2 IMAPServer: pause / resume

The IMAPServlet (opencrx-imap-CRX/IMAPServlet) provides a GUI which allows to pause and resume the IMAPServer. The Wizard IMAPServer.jsp available as admin-Root redirects to the IMAPServlet. The IMAPServlet accepts the system property **org.openmdx.catalina.core.ExtendedService.autostartConnectors**. If unset or set to true, the IMAPServer is started at startup. If set to false, then the IMAPServer has to be started manually.

18.2.3 WorkflowController: pause / resume

The WorkflowControllerServlet accepts the new commands pause and resume. Pause stops pinging the controlled WorkflowServlets. The new commands are available via the GUI. The WorkflowControllerServlet accepts the system property **org.openmdx.catalina.core.ExtendedService.autostartConnectors**. If it is unset or set to true the WorkflowController is activated on startup. If set to false the WorkflowController has to be started/resumed manually.

18.3 SNMP Monitoring (with Sun JVM)

The SNMP agent for the Sun JVM can be enabled as described at http://java.sun.com/j2se/1.5.0/docs/guide/management/SNMP.html and http://www.ilikespam.com/blog/monitoring-the-jvm-with-snmp.

1) Put snmp.acl in TOMCAT_LWC_HOME/bin and give read access to the file for the owner only.

```
#The communities public and private are allowed access from the local host.
acl = {
  {
    communities = public, private
    access = read-only
    managers = localhost
  }
}
# Traps are sent to localhost only
trap = {
    {
      trap-community = public
      hosts = localhost
    }
  }
```

2) Add the following options to tomcat.sh

```
-Dcom.sun.management.snmp.port=8161
-Dcom.sun.management.snmp.acl.file=TOMCAT_LWC_HOME/bin/snmp.acl
```

3) After startup the variables can be retrieved with

```
snmpwalk -c public -v2c localhost:8161 .1.3.6.1.4.1.42.2.145.3.163.1.1.4.1.
```

   See http://support.ipmonitor.com/mibs/JVM-MANAGEMENT-MIB/oids.aspx for a list of all OIDs supported by the JVM.

A simple cron-based monitoring environment can invoke snmpwalk periodically and send mail if a monitored parameter violates a predefined constraint. Use gkrellm with the snmp extension (see http://triq.net/gkrellm_snmp.html) or OpenNMS (see http://www.opennms.org/) for more advanced monitoring.

This approach only works for the Sun JVM.

18.4 Tomcat w/ openCRX and LDAP-based Authentication

You can connect Tomcat w/ openCRX with OpenLDAP as follows:

- replace the JDBC Realm entry in the file opencrx-core-CRX\opencrx-core-CRX\META-INF\context.xml with the following entry:

```
 <Realm
  className="org.apache.catalina.realm.JNDIRealm"
  debug="99"
  connectionName="cn=Manager,dc=opencrx,dc=org"
  connectionPassword="secret"
  connectionURL="ldap://localhost:389"
  userPassword="userPassword"
  userPattern="cn={0},ou=people,dc=opencrx,dc=org"
  roleBase="ou=groups,dc=opencrx,dc=org"
  roleName="cn"
  roleSearch="(uniqueMember={0})"
/>
```

- Users must be entered into your LDAP server as follows (userPattern):

```
# Users
dn: cn=guest,ou=people,dc=opencrx,dc=org
objectClass: organizationalPerson
sn: guest
cn: guest
userPassword: opencrx

dn: cn=admin-Root,ou=people,dc=opencrx,dc=org
objectClass: organizationalPerson
sn: admin-Root
cn: admin-Root
userPassword: opencrx

dn: cn=admin-Standard,ou=people,dc=opencrx,dc=org
objectClass: organizationalPerson
sn: admin-Standard
cn: admin-Standard
userPassword: opencrx
```

- Groups must be entered into your LDAP server as follows (roleBase, roleName, and roleSearch):

```
# Groups
dn: ou=groups,dc=opencrx,dc=org
objectClass: organizationalUnit
ou: groups

dn: cn=OpenCrxRoot,ou=groups,dc=opencrx,dc=org
objectClass: groupOfUniqueNames
cn: OpenCrxRoot
uniqueMember: cn=admin-Root,ou=people,dc=opencrx,dc=org

dn: cn=OpenCrxAdministrator,ou=groups,dc=opencrx,dc=org
objectClass: groupOfUniqueNames
cn: OpenCrxAdministrator
uniqueMember: cn=admin-Standard,ou=people,dc=opencrx,dc=org

dn: cn=OpenCrxUser,ou=groups,dc=opencrx,dc=org
objectClass: groupOfUniqueNames
cn: OpenCrxUser
uniqueMember: cn=guest,ou=people,dc=opencrx,dc=org
```

18.5 OpenEJB / Reestablishing dropped DB Connection

Add the 3 highlighted lines (TimeBetweenEvictionRunsMillis, ValidationQuery, TestWhileIdle) to the datasource definition in the file **openejb.xml** (or **tomee.xml**) so that dropped database connections are reestablished automatically:

```
<?xml version="1.0" encoding="UTF-8"?>
<openejb>
...
<!-- openCRX with PostgreSQL, DB: CRX_CRX -->
<Resource id="jdbc_opencrx_CRX" type="DataSource">
 ...
 ValidationQuery select object_id from oocke1_segment where dtype = 'org:opencrx:kernel:account1:Segment'
 TestWhileIdle true
 TimeBetweenEvictionRunsMillis 10000
</Resource>
...
</openejb>
```

More information is available from http://openejb.apache.org/3.0/containers-and-resources.html.

18.6 Running openCRX as a service on Redhat/CentOS

Follow these steps to run openCRX as a service on a Redhat/CentOS box (it is assumed that openCRX already runs from a shell, i.e. openCRX is properly installed and it is possible to start/stop openCRX with the scripts provided):

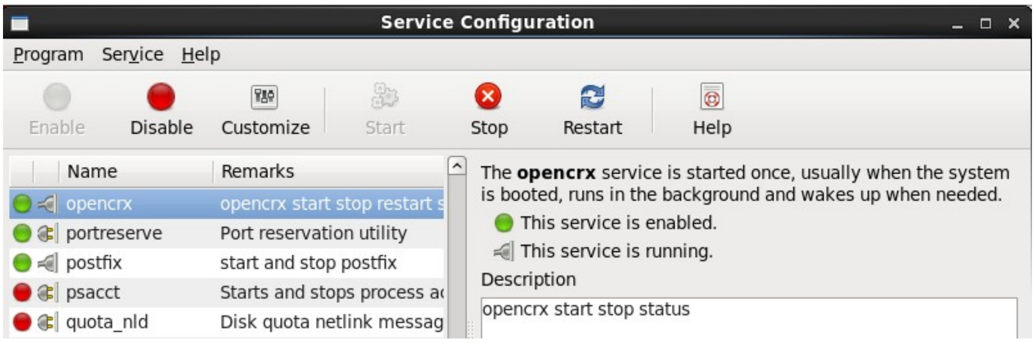
- create a new text file **opencrx** in the directory /etc/init.d/ with the following content (adapt TOMCAT_USER, BASEDIR, TOMCAT_LOG, DB_HOST and DB_PORT to your environment):

```
#!/bin/bash
#
# chkconfig: - 80 20

### BEGIN INIT INFO
# Provides: opencrx
# Required-Start: $local_fs $remote_fs $syslog $network
# Required-Stop: $local_fs $remote_fs $syslog $network
# Default-Start: 345
# Default-Stop: 0 1 2 6
# Description: opencrx start stop status
# Short-Description: opencrx start stop restart status
### END INIT INFO

## Source function library.
#. /etc/rc.d/init.d/functions
# Source LSB function library.
if [ -r /lib/lsb/init-functions ]; then
    . /lib/lsb/init-functions
else
    exit 1
fi

DISTRIB_ID=`lsb_release -i -s 2>/dev/null`

NAME="$(basename $0)"
unset ISBOOT
if [ "${NAME:0:1}" = "S" -o "${NAME:0:1}" = "K" ]; then
    NAME="${NAME:3}"
    ISBOOT="1"
fi

# For SELinux we need to use 'runuser' not 'su'
f [ -x "/sbin/runuser" ]; then
    SU="/sbin/runuser -s /bin/sh"
else
    SU="/bin/su -s /bin/sh"
fi

# Get instance specific config file
if [ -r "/etc/sysconfig/${NAME}" ]; then
    . /etc/sysconfig/${NAME}
fi

# Set Tomcat environment.
TOMCAT_USER=crx
export BASEDIR=/home/crx/opencrxServer/apache-tomee-webprofile-1.6.1/
export TOMCAT_HOME=$BASEDIR

# Path to the tomcat launch script
TOMCAT_SCRIPT="${TOMCAT_HOME}/bin/catalina.sh"

# Tomcat program name
TOMCAT_PROG="${NAME}"

# Define the tomcat log file
TOMCAT_LOG="/home/crx/opencrxServer/apache-tomee-webprofile-1.6.1/logs/catalina.out"

DB_HOST=dbserver.mydomain.com # 10.10.10.30
DB_PORT=5432 # postgreSQL

SHUTDOWN_WAIT=5

RETVAL="0"

function version() {
      #$SU - $TOMCAT_USER -c "${TOMCAT_SCRIPT} version" >> ${TOMCAT_LOG} 2>&1 || RETVAL="4"
      $SU - $TOMCAT_USER -c "${TOMCAT_SCRIPT} version"
}

# See how we were called.
function start() {

   echo -n "Starting ${TOMCAT_PROG}: "

   if [ "$RETVAL" != "0" ]; then
     log_failure_msg
     return
   fi
   if [ -f "/var/lock/subsys/${NAME}" ]; then
        if [ -f "/var/run/${NAME}.pid" ]; then
            read kpid < /var/run/${NAME}.pid
#           if checkpid $kpid 2>&1; then
```

```
            if [ -d "/proc/${kpid}" ]; then
                log_success_msg
                if [ "$DISTRIB_ID" = "MandrivaLinux" ]; then
                    echo
                fi
                RETVAL="0"
                return
            fi
        fi
    fi

    # test whether pg running
    DB_UP=`nmap -sT -p$DB_PORT $DB_HOST|grep open|wc -l`
    if [ $DB_UP -ne 1 ]; then
        echo "waiting for database to come up..." >> $TOMCAT_LOG
        sleep 30
        DB_UP=`nmap -sT -p$DB_PORT $DB_HOST|grep open|wc -l`
    fi
    if [ $DB_UP -ne 1 ]; then
        echo "waiting for database to come up..." >> $TOMCAT_LOG
        sleep 30
        DB_UP=`nmap -sT -p$DB_PORT $DB_HOST|grep open|wc -l`
    fi
    if [ $DB_UP -ne 1 ]; then
        echo "waiting for database to come up..." >> $TOMCAT_LOG
        sleep 60
        DB_UP=`nmap -sT -p$DB_PORT $DB_HOST|grep open|wc -l`
    fi
    if [ $DB_UP -ne 1 ]; then
        echo "database not available at $DB_HOST:$DB_PORT - cannot start openCRX..." > $TOMCAT_LOG
        RETVAL="1"
        log_failure_msg "no database at $DB_HOST:$DB_PORT"
        echo "database not available at $DB_HOST port $DB_PORT - cannot start openCRX..."|/bin/mail -s "openCRX
not started / database error" root
    else
      cd $TOMCAT_HOME
      rm -Rf temp
      mkdir temp
      chown $TOMCAT_USER:$TOMCAT_USER temp
      rm -Rf work

      # fix permissions on the log and pid files
        export CATALINA_PID="/var/run/${NAME}.pid"
      touch $CATALINA_PID 2>&1 || RETVAL="4"
      if [ "$RETVAL" -eq "0" -a "$?" -eq "0" ]; then
        chown ${TOMCAT_USER}:${TOMCAT_USER} $CATALINA_PID
      fi
      [ "$RETVAL" -eq "0" ] && touch $TOMCAT_LOG 2>&1 || RETVAL="4"
      if [ "$RETVAL" -eq "0" -a "$?" -eq "0" ]; then
        chown ${TOMCAT_USER}:${TOMCAT_USER} $TOMCAT_LOG
      fi


      echo " " >> $TOMCAT_LOG
      echo "/*-----------------------------------------------------------+" >> $TOMCAT_LOG
      echo "| database running at $DB_HOST:$DB_PORT" >> $TOMCAT_LOG
      echo "| starting openCRX..." >> $TOMCAT_LOG
      echo "\*-----------------------------------------------------------+" >> $TOMCAT_LOG
      echo " " >> $TOMCAT_LOG

      mount /home/crx/pebble
      mount /home/crx/music
      mount /var/supersonic

      $SU -p -s /bin/sh $TOMCAT_USER -c "${TOMCAT_SCRIPT} start" > /dev/null || RETVAL="4"
      if [ "$RETVAL" -eq "0" ]; then
          log_success_msg
          touch /var/lock/subsys/${NAME}
      else
          log_failure_msg "Error code ${RETVAL}"
      fi
    fi
}

function stop() {
    echo -n "Stopping ${TOMCAT_PROG}: "
    if [ -f "/var/lock/subsys/${NAME}" ]; then
      touch /var/lock/subsys/${NAME} 2>&1 || RETVAL="4"
       [ "$RETVAL" -eq "0" ] && $SU - $TOMCAT_USER -c "${TOMCAT_SCRIPT} stop" >> ${TOMCAT_LOG} 2>&1 || RETVAL="4"

      count="0"
      if [ -f "/var/run/${NAME}.pid" ]; then
             read kpid < /var/run/${NAME}.pid
             until [ "$(ps --pid $kpid | grep -c $kpid)" -eq "0" ] || \
                   [ "$count" -gt "$SHUTDOWN_WAIT" ]; do
                 if [ "$SHUTDOWN_VERBOSE" = "true" ]; then
                    echo "waiting for processes $kpid to exit"
                 fi
                 sleep 1
                 let count="${count}+1"
             done
             if [ "$count" -gt "$SHUTDOWN_WAIT" ]; then
                 if [ "$SHUTDOWN_VERBOSE" = "true" ]; then
                    log_warning_msg "killing processes which did not stop after ${SHUTDOWN_WAIT} seconds"
                 fi
                 kill -9 $kpid
             fi
             log_success_msg
      fi
      rm -f /var/lock/subsys/${NAME} /var/run/${NAME}.pid
    else
      log_failure_msg
      RETVAL="4"
    fi
    umount /home/crx/pebble
    umount /home/crx/music
    umount /var/supersonic
}

function status()
{
   checkpidfile
   if [ "$RETVAL" -eq "0" ]; then
      log_success_msg "${NAME} (pid ${kpid}) is running..."
   elif [ "$RETVAL" -eq "1" ]; then
      log_failure_msg "PID file exists, but process is not running"
   else
      checklockfile
      if [ "$RETVAL" -eq "2" ]; then
         log_failure_msg "${NAME} lockfile exists but process is not running"
      else
         pid="$(/usr/bin/pgrep -d , -u ${TOMCAT_USER} -G ${TOMCAT_USER} java)"
         if [ -z "$pid" ]; then
             log_success_msg "${NAME} is stopped"
             RETVAL="3"
         else
             log_success_msg "${NAME} (pid $pid) is running..."
             RETVAL="0"
         fi
      fi
  fi
}

function checklockfile()
{
   if [ -f /var/lock/subsys/${NAME} ]; then
      pid="$(/usr/bin/pgrep -d , -u ${TOMCAT_USER} -G ${TOMCAT_USER} java)"
# The lockfile exists but the process is not running
      if [ -z "$pid" ]; then
         RETVAL="2"
      fi
   fi
}

function checkpidfile()
{
   if [ -f "/var/run/${NAME}.pid" ]; then
      read kpid < /var/run/${NAME}.pid
      if [ -d "/proc/${kpid}" ]; then
# The pid file exists and the process is running
          RETVAL="0"
      else
# The pid file exists but the process is not running
         RETVAL="1"
         return
      fi
   fi
# pid file does not exist and program is not running
   RETVAL="3"
}

function usage()
{
   echo "Usage: $0 {start|stop|restart|condrestart|try-restart|reload|force-reload|status|version}"
   RETVAL="2"
}
```

```
# See how we were called.
RETVAL="0"
case "$1" in
    start)
        start
        ;;
    stop)
        stop
        ;;
    restart)
        stop
        start
        ;;
    condrestart|try-restart)
        if [ -f "/var/run/${NAME}.pid" ]; then
            stop
            start
        fi
        ;;
    reload)
        RETVAL="3"
        ;;
    force-reload)
        if [ -f "/var/run/${NAME}.pid" ]; then
            stop
            start
        fi
        ;;
    status)
        status
        ;;
    version)
      version
#        ${TOMCAT_SCRIPT} version
        ;;
    *)
      usage
      ;;
esac

exit $RETVAL
```

- make the file executable
- try to start the service with
  `service opencrx start`



	Name	Remarks
🟢	opencrx	opencrx start stop restart s
🟢	portreserve	Port reservation utility
🟢	postfix	start and stop postfix
🔴	psacct	Starts and stops process a
🔴	quota_nld	Disk quota netlink messag

The **opencrx** service is started once, usually when the system is booted, runs in the background and wakes up when needed.

🟢 This service is enabled.

This service is running.

Description

opencrx start stop status

- you may want to add logrotation: create a new text file **opencrx** in the directory /etc/logrotate.d/ with the following content (adapt paths to your environment):

```
/home/crx/opencrxServer/apache-tomee-webprofile-1.0.0/logs/*log
 /home/crx/opencrxServer/apache-tomee-webprofile-1.0.0/logs/*out {
      daily
      rotate 14
      compress
      delaycompress
      copytruncate
      ifempty
}
```

18.7 Media BLOBs on the File System

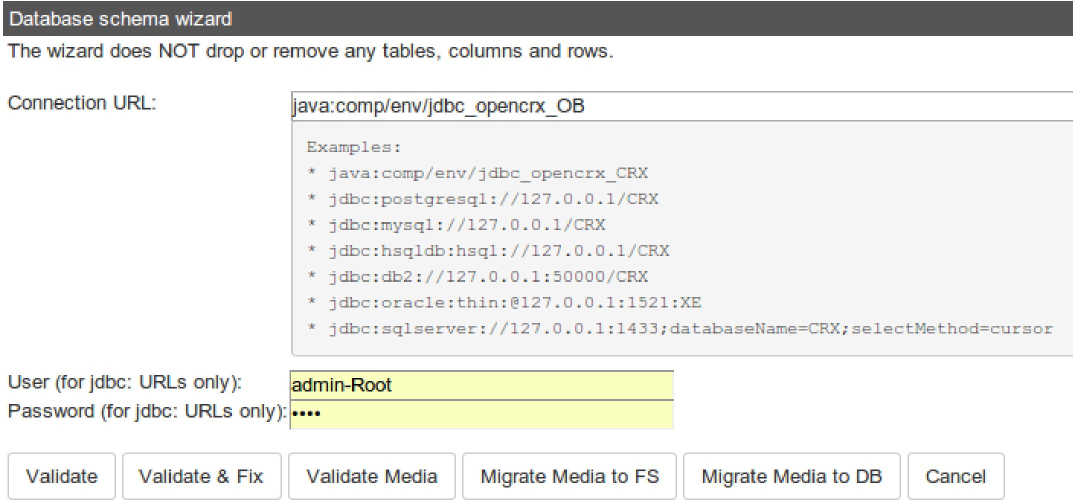
By default, openCRX keeps all media blobs in the database, in the column "content" of the table "oocke1_media". While this approach guarantees data consistency and transactional integrity (assuming your database supports this), the drawback is that database backups can get very big and backing up and/or restoring the database can take a long time if you have a lot of (large) media attachments in openCRX.

If you prefer to manage your media blobs on the file system (e.g. to make fast backups with rsync) you can configure openCRX to do just that.

18.7.1 Migrate Media BLOBs from DB to File System

You can migrate from "BLOBs in the DB" to "BLOBs on the file system" with the following steps:

- stop Tomcat
- uncomment and/or configure the Java Option **-Dorg.opencrx.mediadir,** e.g. -Dorg.opencrx.mediadir.CRX=$CATALINA_BASE/mediadir
- start Tomcat
- login as admin-Root
- start Wizards > Database schema wizard
- note the new buttons: [Validate Media], [Migrate Media to FS] and [Migrate Media to DB]



Database schema wizard

The wizard does NOT drop or remove any tables, columns and rows.

Connection URL: java:comp/env/jdbc_opencrx_OB

```
Examples:
* java:comp/env/jdbc_opencrx_CRX
* jdbc:postgresql://127.0.0.1/CRX
* jdbc:mysql://127.0.0.1/CRX
* jdbc:hsqldb:hsql://127.0.0.1/CRX
* jdbc:db2://127.0.0.1:50000/CRX
* jdbc:oracle:thin:@127.0.0.1:1521:XE
* jdbc:sqlserver://127.0.0.1:1433;databaseName=CRX;selectMethod=cursor
```

User (for jdbc: URLs only): admin-Root

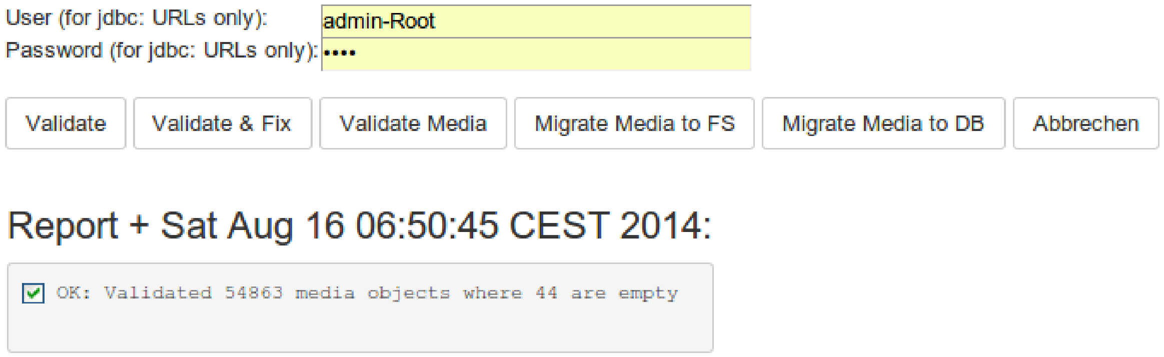
Password (for jdbc: URLs only): ••••

- click the button [Migrate Media to FS] and wait for the process to finish (note that the time required to complete the migration can be quite long; it depends on various factors, including the number and size of the media attachments)

18.7.2 Validate Media

After migrating media BLOBs from the DB to the file system you should validate the media as follows:

- login as admin-Root
- start Wizards > Database schema wizard
- click the button [Validate Media] and wait for the process to finish (note that the time required to complete the validation can be quite long; it depends on various factors, including the number and size of the media attachments)



User (for jdbc: URLs only): admin-Root
Password (for jdbc: URLs only): ••••

Report + Sat Aug 16 06:50:45 CEST 2014:

☑ OK: Validated 54863 media objects where 44 are empty

You can also validate the media manually. On Linux, for example, you can generate a list of objects with

```
find . -type f | rev | awk -F'/' '{print $1 "_" $3}' | rev
```

With PostgreSQL, for example, you can generate a list of objects with

```
select  object_id,
        reverse(split_part(reverse(object_id), '/', 2)) || '_' ||
        reverse(split_part(reverse(object_id), '/', 1))
from oockel_media
where not content is null
```

Please not that you should NOT DELETE MEDIA BLOBs from your database before making a backup of your database and validating the media you migrated from the database to the filesystem.

If the validation of the media completed without errors you can delete the media BLOBs from the DB with the following SQL:

```
update oocke1_media
set content = null
```

18.7.3 Migrate Media BLOBs from File System to DB

You can migrate from “BLOBs on the file system” to “BLOBs in the DB” with the following steps:

- ensure that during the migration process no new media BLOBs are created/changed as they are written to the file system (and not to the database) but might not get migrated to the database with the migration process (because the respective media object was processed by the wizard before the create/update was executed...)
- login as admin-Root
- start Wizards > Database schema wizard
- click the button [Migrate Media to DB] and wait for the process to finish (note that the time required to complete the migration can be quite long; it depends on various factors, including the number and size of the media attachments)
- stop Tomcat
- remove the Java Option **-Dorg.opencrx.mediadir**
- start Tomcat

18.8 Java Options

The following Java Options are set by default for openCRX:

```
export JAVA_OPTS="$JAVA_OPTS -Xmx800M"
export JAVA_OPTS="$JAVA_OPTS -XX:MaxPermSize=256m"
export JAVA_OPTS="$JAVA_OPTS -Dfile.encoding=UTF-8"
export JAVA_OPTS="$JAVA_OPTS -Djava.protocol.handler.pkgs=org.openmdx.kernel.url.protocol"
export JAVA_OPTS="$JAVA_OPTS -Dorg.opencrx.maildir=$CATALINA_BASE/maildir"
export JAVA_OPTS="$JAVA_OPTS -Dorg.opencrx.airsyncdir=$CATALINA_BASE/airsyncdir"
# export JAVA_OPTS="$JAVA_OPTS -Dorg.opencrx.usesendmail.CRX=false"
# export JAVA_OPTS="$JAVA_OPTS -Dorg.opencrx.mediadir=$CATALINA_BASE/mediadir"
# export JAVA_OPTS="$JAVA_OPTS -Dorg.openmdx.persistence.jdbc.useLikeForOidMatching=false"
# export JAVA_OPTS="$JAVA_OPTS -Dorg.opencrx.security.enable=true"
# export JAVA_OPTS="$JAVA_OPTS -Dorg.opencrx.security.realmRefreshRateMillis=120000"
# export JAVA_OPTS="$JAVA_OPTS -Djavax.jdo.option.TransactionIsolationLevel=read-committed"
export CLASSPATH=$CLASSPATH:$CATALINA_BASE/bin/openmdx-system.jar
```

Option	Description
-Xmx	the maximum size, in bytes, of the memory allocation pool – you might have to increase this value if you get out of memory exceptions **800M** is fine for testing, but most likely too small for production environments see also java and Garbage Collector Ergonomics
-XX:MaxPermSize	the maximum PermGen space in bytes – **256m** – should be fine in most cases, but you might have to increase this value if you get OutOfMemoryError: PermGen Space
-Dfile.encoding	default value: **UTF-8** do not change unless you have a good reason to do so
-Djava.protocol.handler.pkgs	leave this value at **org.openmdx.kernel.url.protocol**
-Dorg.opencrx.maildir	base directory that contains all mail directories managed by the IMAP servlet – the default value is **$CATALINA_BASE/maildir**
-Dorg.opencrx.airsyncdir	base directory that contains all mail directories managed by the airsync servlet – the default value is **$CATALINA_BASE/airsyncdir**
-Dorg.opencrx.usesendmail.<provider> e.g. -Dorg.opencrx.usesendmail.CRX	see chapter 8.2.1 Command line sendmail instead of JavaMail

-Dorg.opencrx.mediadir	base directory that contains all directories managed by the openCRX persistence layer to store media attachments – the default value is **$CATALINA_BASE/mediadir** for more information, see chapter 18.7 Media BLOBs on the File System

-Dorg.openmdx.persistence.jdbc.useLikeForOidMatching	default value is **true**
	As "object ID matching" (OID matching) is a frequent operation it is absolutely crucial that it can be done in a very efficient way, otherwise openCRX will suffer from a heavy performance hit. The openCRX database plugin does OID matching with SQL statements containing comparisons like
	`(object_id > id_pattern_0) and`
	`(object_id < id_pattern_1)`
	Given the issues that exist with PostgreSQL prioro to version 9.3 the default configuration of the openCRX database plugin resorts to a comparison based on LIKE. We are aware of the implications – a severe performance hit – as prepared statements with LIKE comparisons typically don't use indices (see openCRX PostgreSQL guide for more information).

-Dorg.opencrx.security.enable	leave this value at **true** unless you want to turn off access control (which is not recommended)
-Dorg.opencrx.security.realmRefreshRateMillis	with the default value of **120000** the security configuration is refreshed every 2 minutes; if you need a higher refresh rate or can live with a lower refresh rate, feel free to adapt the value
-Djavax.jdo.option.TransactionIsolationLevel	default value: **read-committed** do not change unless you have a good reason to do so

19 Next Steps

You might want to have a look at some of the additional documentation published at http://www.opencrx.org/documents.htm.