Developer's Guide to “ironcontrol for Android”

Project work "iron"*
Faculty IV – economy and computer science
Hochschule Hannover (Hannover University of Applied Sciences and Arts)

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summer semester 2013

Contents

1 Induction

During the course of studying applied informatics at Hochschule Hannover we decided to create a wonderful app, called ironcontrol as a part of the iron suite developed by Trust@FHH. It was created by a team of four students under the guidance of Prof. Josef von Helden and Bastian Hellmann. The development process was one year.

IF-MAP was defined by the Trusted Computing group (TCG) and is explained later in this document.

The compatibility is for Android 3.0 or greater and IF-MAP 2.0.

2 Objectives and motivation

An administrator of a MAP server should be able to control and test his environment from all over the world simply by using his phone. This gap in the iron suite is now closed by this project. We created this app to be a useful tool for MAP server administrators.

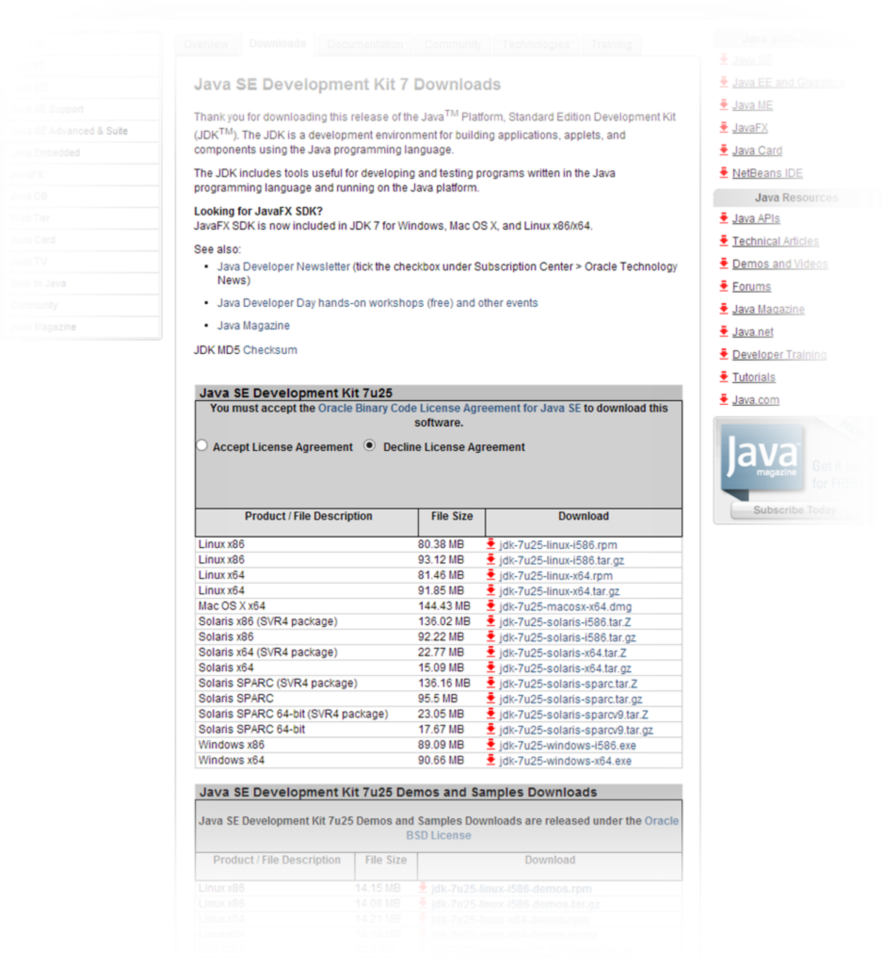
This app makes you able to test and influence the procedures on IF-Map servers from your Android Smartphone easily. You can connect to different MAP servers and manage the connections. Also it is possible to publish, search and subscribe IF-MAP data, including to save the requests for further use. When you receive poll results they are stored on your Android device and you get notifications like vibration and sound. All this functionality is explained later in greater detail.

3 Installation guide

In this installation guide we’re going to show you how to install the development environment and how to run ironcontrol from sources under Windows x64.

3.1 Java Development Kit (JDK)

First of all you need to download and install the JDK. You can find it under the following link[1].



Java SE Development Kit 7 Downloads

Thank you for downloading this release of the Java^{TM} Platform, Standard Edition Development Kit (JDK^{TM}). The JDK is a development environment for building applications, applets, and components using the Java programming language.

The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.

Looking for JavaFX SDK?
JavaFX SDK is now included in JDK 7 for Windows, Mac OS X, and Linux x86/x64.

See also:

- Java Developer Newsletter (tick the checkbox under Subscription Center > Oracle Technology News)
- Java Developer Day hands-on workshops (free) and other events
- Java Magazine

JDK MD5 Checksum

Java SE Development Kit 7u25

You must accept the Oracle Binary Code License Agreement for Java SE to download this software.

○ **Accept License Agreement** ● **Decline License Agreement**

Product / File Description	File Size	Download
Linux x86	80.38 MB	jdk-7u25-linux-i586.rpm
Linux x86	93.12 MB	jdk-7u25-linux-i586.tar.gz
Linux x64	81.46 MB	jdk-7u25-linux-x64.rpm
Linux x64	91.85 MB	jdk-7u25-linux-x64.tar.gz
Mac OS X x64	144.43 MB	jdk-7u25-macosx-x64.dmg
Solaris x86 (SVR4 package)	136.02 MB	jdk-7u25-solaris-i586.tar.Z
Solaris x86	92.22 MB	jdk-7u25-solaris-i586.tar.gz
Solaris x64 (SVR4 package)	22.77 MB	jdk-7u25-solaris-x64.tar.Z
Solaris x64	15.09 MB	jdk-7u25-solaris-x64.tar.gz
Solaris SPARC (SVR4 package)	136.16 MB	jdk-7u25-solaris-sparc.tar.Z
Solaris SPARC	95.5 MB	jdk-7u25-solaris-sparc.tar.gz
Solaris SPARC 64-bit (SVR4 package)	23.05 MB	jdk-7u25-solaris-sparcv9.tar.Z
Solaris SPARC 64-bit	17.67 MB	jdk-7u25-solaris-sparcv9.tar.gz
Windows x86	89.09 MB	jdk-7u25-windows-i586.exe
Windows x64	90.66 MB	jdk-7u25-windows-x64.exe

Java SE Development Kit 7u25 Demos and Samples Downloads

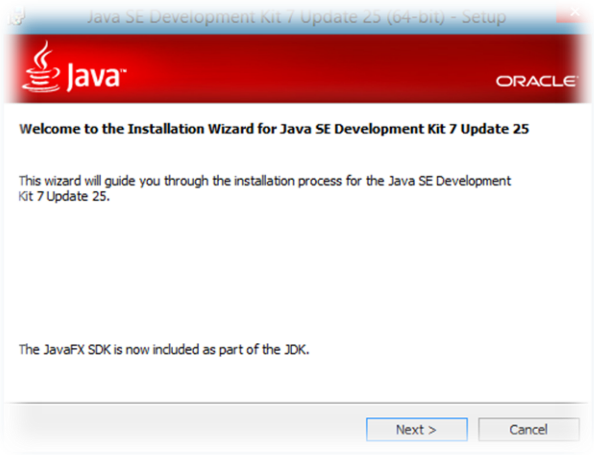
Java SE Development Kit 7u25 Demos and Samples Downloads are released under the Oracle BSD License

Product / File Description	File Size	Download
Linux x86	14.15 MB	jdk-7u25-linux-i586-demos.rpm
Linux x86	14.08 MB	jdk-7u25-linux-i586-demos.tar.gz
Linux x64	14.21 MB	jdk-7u25-linux-x64-demos.rpm

Figure 3-1 Oracle JDK download page

Choose the right package for your system architecture, accept the license agreement and download it. If you want to install the complete package with standard settings, you can walk through the installation by clicking next.

[1] http://www.oracle.com/technetwork/java/javase/downloads/index.html



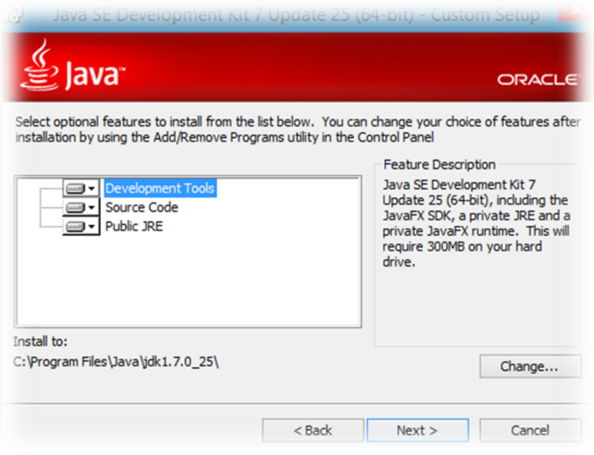
Java SE Development Kit 7 Update 25 (64-bit) - Setup

Welcome to the Installation Wizard for Java SE Development Kit 7 Update 25

This wizard will guide you through the installation process for the Java SE Development Kit 7 Update 25.

The JavaFX SDK is now included as part of the JDK.

Figure 3-2 JDK installing 1



Java SE Development Kit 7 Update 25 (64-bit) - Custom Setup

Select optional features to install from the list below. You can change your choice of features after installation by using the Add/Remove Programs utility in the Control Panel

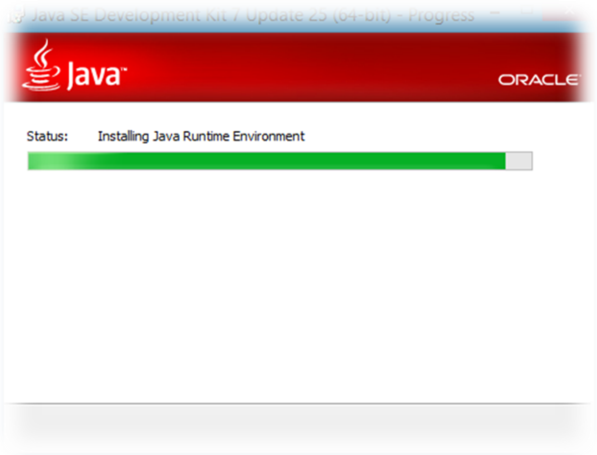
- Development Tools
- Source Code
- Public JRE

Feature Description
Java SE Development Kit 7 Update 25 (64-bit), including the JavaFX SDK, a private JRE and a private JavaFX runtime. This will require 300MB on your hard drive.

Install to:
C:\Program Files\Java\jdk1.7.0_25\

Figure 3-3 JDK installing 2

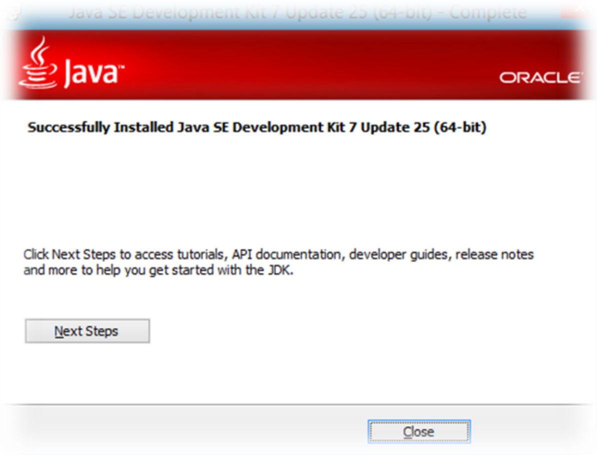
As you can see you alternatively can choose what components you want to install.



Java SE Development Kit 7 Update 25 (64-bit) - Progress

Status: Installing Java Runtime Environment

Figure 3-4 JDK installing 3



Java SE Development Kit 7 Update 25 (64-bit) - Complete

Successfully Installed Java SE Development Kit 7 Update 25 (64-bit)

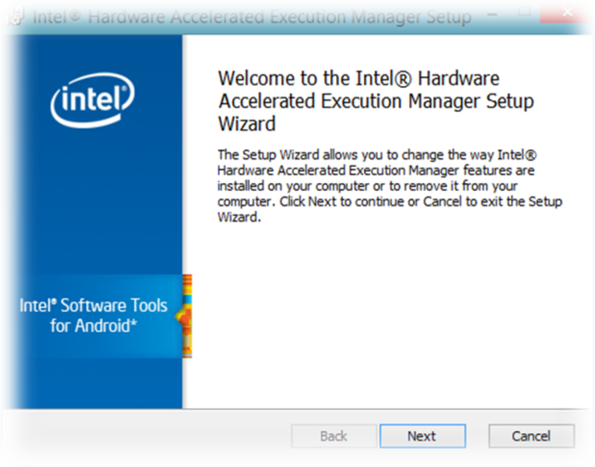
Click Next Steps to access tutorials, API documentation, developer guides, release notes and more to help you get started with the JDK.

Figure 3-5 JDK installing 4

When the installation is finished just confirm by clicking close.

3.2 Intel HAXM

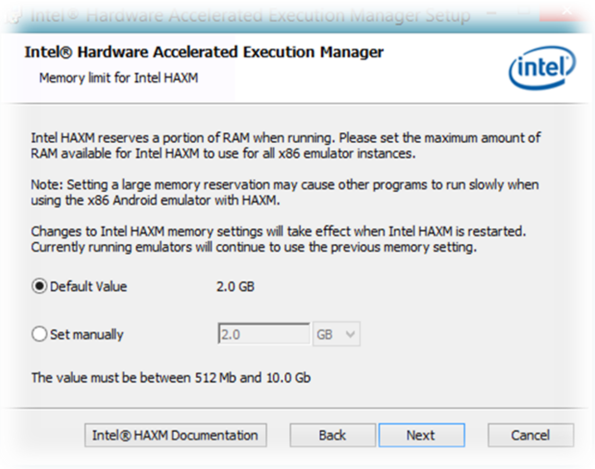
If you want to have a very fast virtual Android device and your device has an Intel Core-I Processor, you can boost your virtual device by installing the Intel HAXM drivers. Those drivers are forwarding the CPU extensions directly to the virtual device. Just download them from Link[2] and install them.


Intel® Hardware Accelerated Execution Manager Setup
intel
Intel® Software Tools for Android*
Back
Next
Cancel

Welcome to the Intel® Hardware Accelerated Execution Manager Setup Wizard

The Setup Wizard allows you to change the way Intel® Hardware Accelerated Execution Manager features are installed on your computer or to remove it from your computer. Click Next to continue or Cancel to exit the Setup Wizard.

Figure 3-6 Intel HAXM installing 1


Intel® Hardware Accelerated Execution Manager Setup
intel
Intel® HAXM Documentation
Back
Next
Cancel

Intel® Hardware Accelerated Execution Manager
Memory limit for Intel HAXM

Intel HAXM reserves a portion of RAM when running. Please set the maximum amount of RAM available for Intel HAXM to use for all x86 emulator instances.

Note: Setting a large memory reservation may cause other programs to run slowly when using the x86 Android emulator with HAXM.

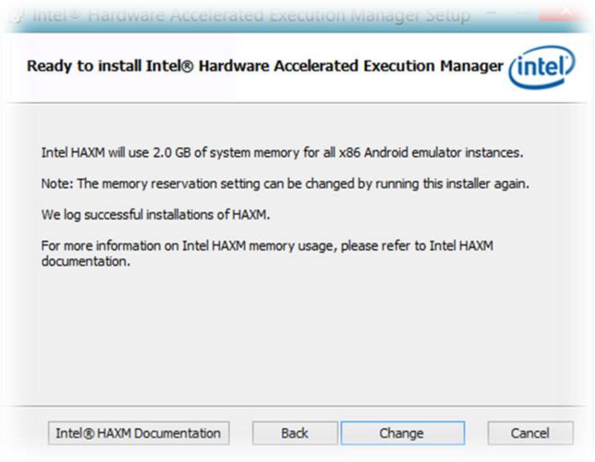
Changes to Intel HAXM memory settings will take effect when Intel HAXM is restarted. Currently running emulators will continue to use the previous memory setting.

● Default Value 2.0 GB

○ Set manually 2.0 GB

The value must be between 512 Mb and 10.0 Gb

Figure 3-7 Intel HAXM installing 2


Intel® Hardware Accelerated Execution Manager Setup
intel
Intel® HAXM Documentation
Back
Change
Cancel

Ready to install Intel® Hardware Accelerated Execution Manager

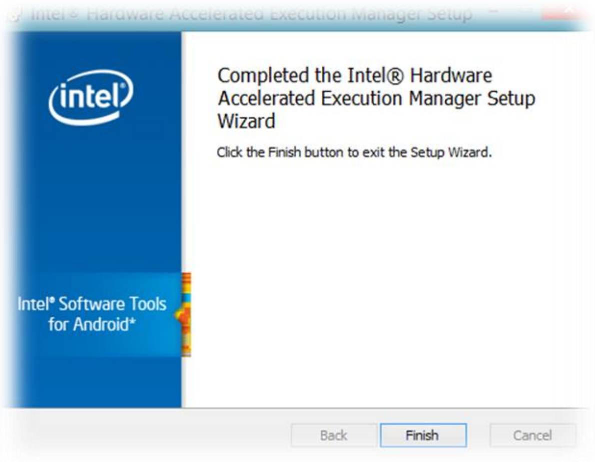
Intel HAXM will use 2.0 GB of system memory for all x86 Android emulator instances.

Note: The memory reservation setting can be changed by running this installer again.

We log successful installations of HAXM.

For more information on Intel HAXM memory usage, please refer to Intel HAXM documentation.

Figure 3-8 Intel HAXM installing 3


Intel® Hardware Accelerated Execution Manager Setup
intel
Intel® Software Tools for Android*
Back
Finish
Cancel

Completed the Intel® Hardware Accelerated Execution Manager Setup Wizard

Click the Finish button to exit the Setup Wizard.

Figure 3-9 Intel HAXM installing 4

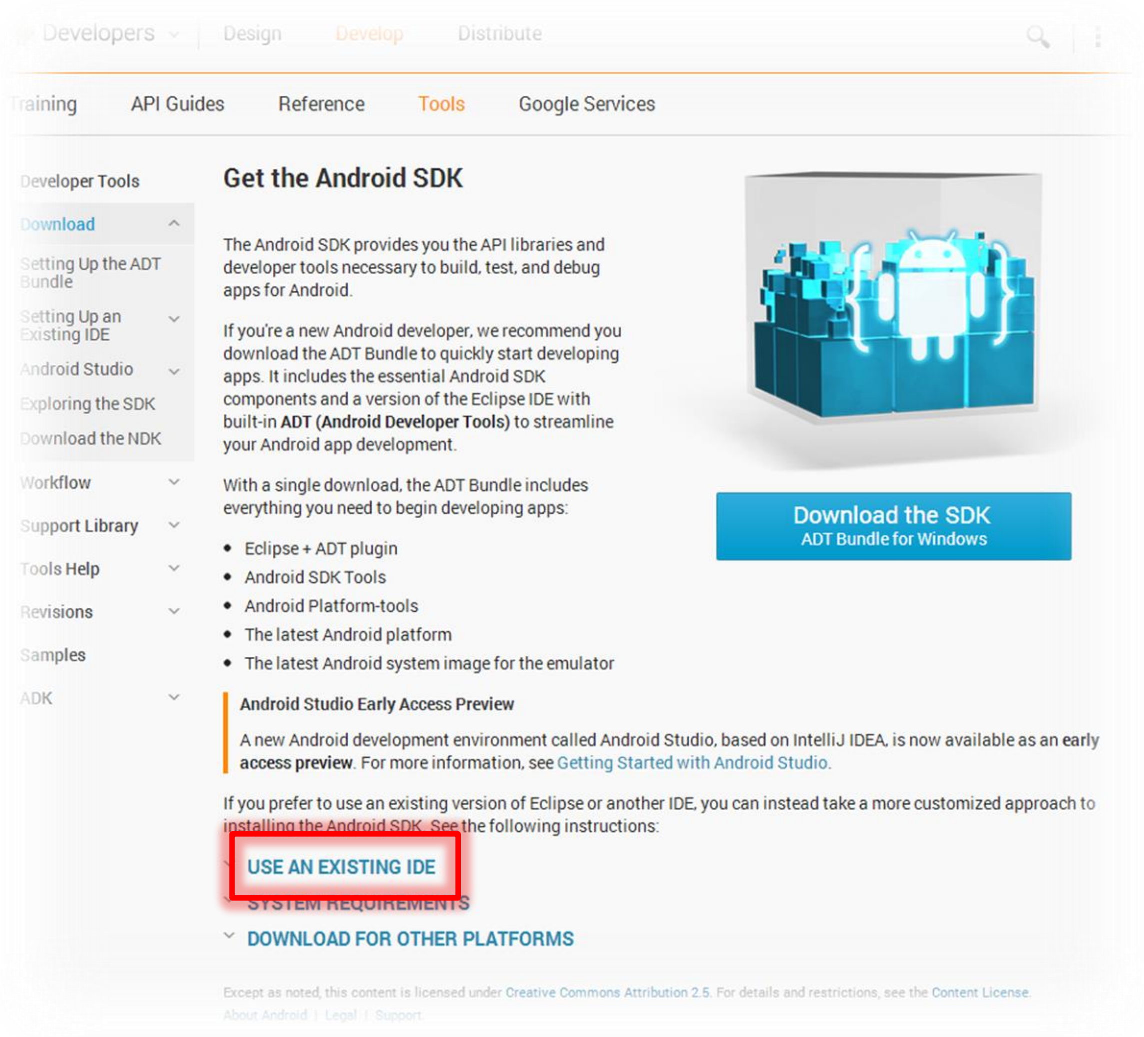
When finished you can choose in the Android SDK-Tools the x86 image to run.

[2] http://software.intel.com/en-us/articles/intel-hardware-accelerated-execution-manager

3.3 Android SDK

Now we’re going to install the Android SDK. Here you can choose if you want to use an existing IDE or a preconfigured bundle from Google (called ADT Bundle). This guide only describes how to set up an existing IDE and how to configure the Eclipse IDE.

First you have to download the Android SDK tools from Google Link[3].



Get the Android SDK

The Android SDK provides you the API libraries and developer tools necessary to build, test, and debug apps for Android.

If you're a new Android developer, we recommend you download the ADT Bundle to quickly start developing apps. It includes the essential Android SDK components and a version of the Eclipse IDE with built-in **ADT (Android Developer Tools)** to streamline your Android app development.

With a single download, the ADT Bundle includes everything you need to begin developing apps:

- Eclipse + ADT plugin
- Android SDK Tools
- Android Platform-tools
- The latest Android platform
- The latest Android system image for the emulator

Android Studio Early Access Preview

A new Android development environment called Android Studio, based on IntelliJ IDEA, is now available as an **early access preview**. For more information, see Getting Started with Android Studio.

If you prefer to use an existing version of Eclipse or another IDE, you can instead take a more customized approach to installing the Android SDK. See the following instructions:

USE AN EXISTING IDE

SYSTEM REQUIREMENTS

DOWNLOAD FOR OTHER PLATFORMS

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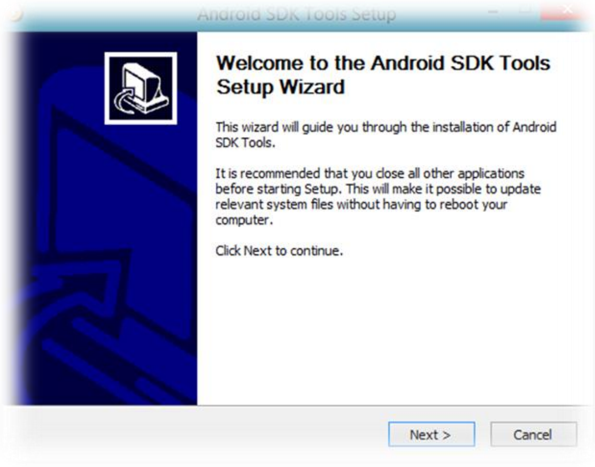
About Android | Legal | Support

Figure 3-10 Android SDK download page

When you’ve downloaded the SDK tools, run the installer.

[3] http://developer.android.com/sdk/installing/index.htm



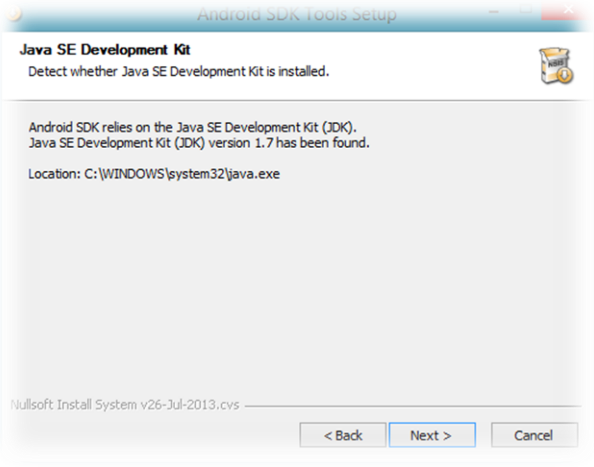
Welcome to the Android SDK Tools Setup Wizard

This wizard will guide you through the installation of Android SDK Tools.

It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.

Click Next to continue.

Figure 3-11 Android SDK installing 1



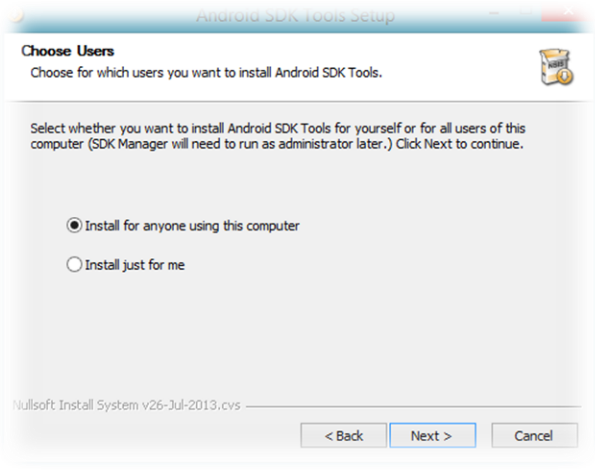
Java SE Development Kit

Detect whether Java SE Development Kit is installed.

Android SDK relies on the Java SE Development Kit (JDK).
Java SE Development Kit (JDK) version 1.7 has been found.

Location: C:\WINDOWS\system32\java.exe

Figure 3-12 Android SDK installing 2



Choose Users

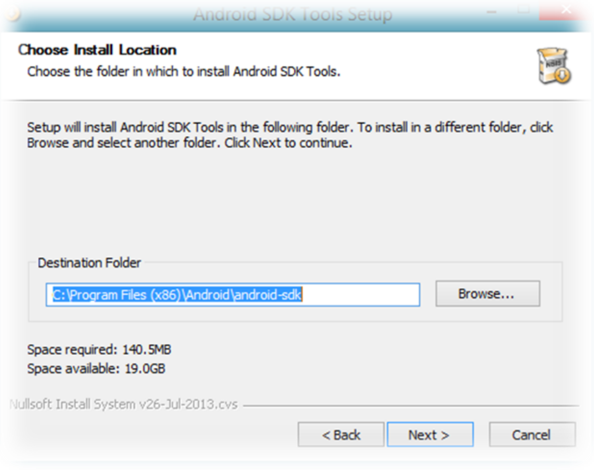
Choose for which users you want to install Android SDK Tools.

Select whether you want to install Android SDK Tools for yourself or for all users of this computer (SDK Manager will need to run as administrator later.) Click Next to continue.

● Install for anyone using this computer

○ Install just for me

Figure 3-13 Android SDK installing 3



Choose Install Location

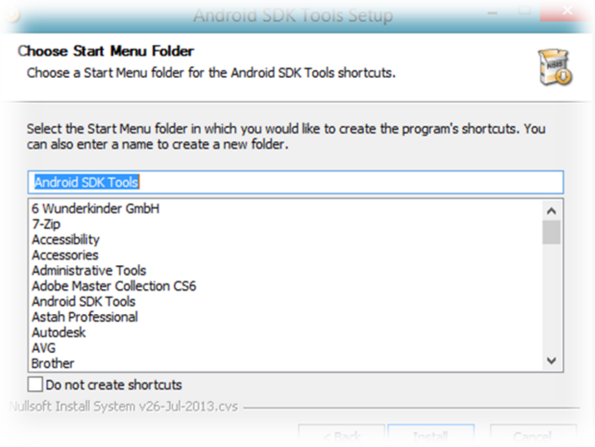
Choose the folder in which to install Android SDK Tools.

Setup will install Android SDK Tools in the following folder. To install in a different folder, click Browse and select another folder. Click Next to continue.

Destination Folder: C:\Program Files (x86)\Android\android-sdk

Space required: 140.5MB
Space available: 19.0GB

Figure 3-14 Android SDK installing 4



Choose Start Menu Folder

Choose a Start Menu folder for the Android SDK Tools shortcuts.

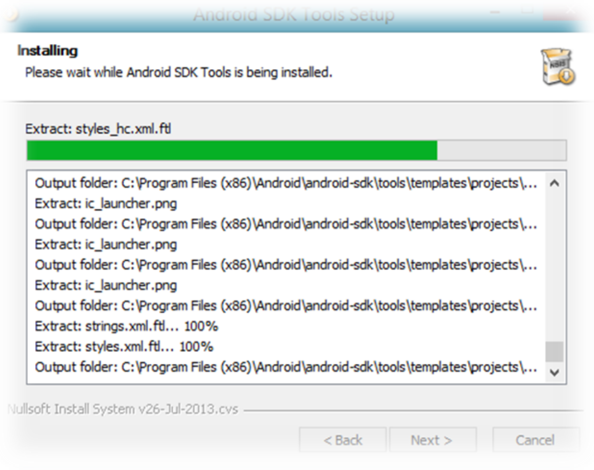
Select the Start Menu folder in which you would like to create the program's shortcuts. You can also enter a name to create a new folder.

Android SDK Tools

6 Wunderkinder GmbH
7-Zip
Accessibility
Accessories
Administrative Tools
Adobe Master Collection CS6
Android SDK Tools
Astah Professional
Autodesk
AVG
Brother

□ Do not create shortcuts

Figure 3-15 Android SDK installing 5



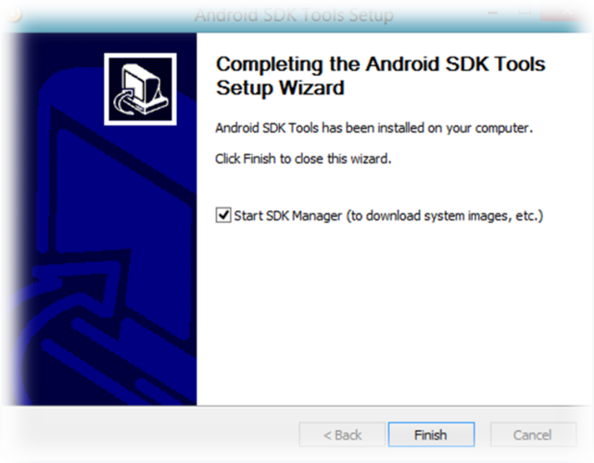
Installing

Please wait while Android SDK Tools is being installed.

Extract: styles_hc.xml.ftl

```
Output folder: C:\Program Files (x86)\Android\android-sdk\tools\templates\projects\...
Extract: ic_launcher.png
Output folder: C:\Program Files (x86)\Android\android-sdk\tools\templates\projects\...
Extract: ic_launcher.png
Output folder: C:\Program Files (x86)\Android\android-sdk\tools\templates\projects\...
Extract: ic_launcher.png
Output folder: C:\Program Files (x86)\Android\android-sdk\tools\templates\projects\...
Extract: strings.xml.ftl... 100%
Extract: styles.xml.ftl... 100%
Output folder: C:\Program Files (x86)\Android\android-sdk\tools\templates\projects\...
```

Figure 3-16 Android SDK installing 6



Android SDK Tools Setup

Completing the Android SDK Tools Setup Wizard

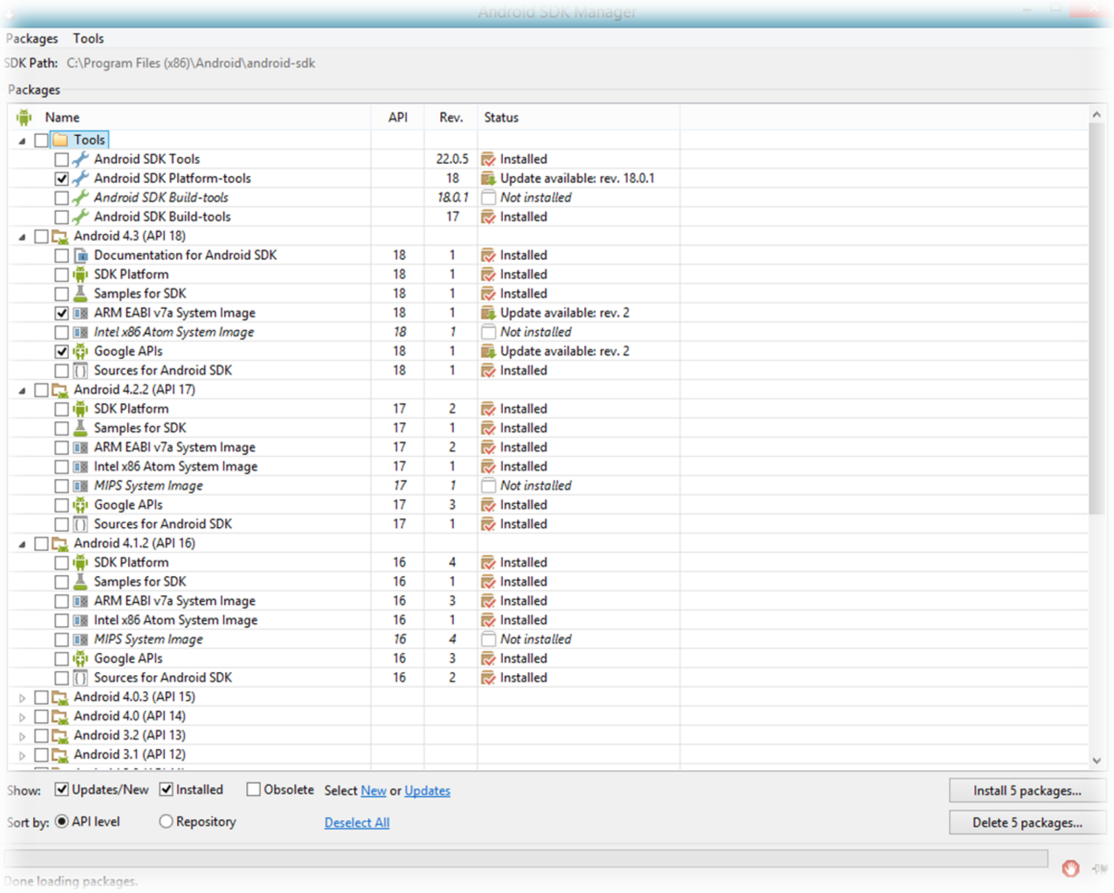
Android SDK Tools has been installed on your computer.

Click Finish to close this wizard.

☑ Start SDK Manager (to download system images, etc.)

Figure 3-17 Android SDK installing 7

When the SDK tools are installed you can choose to run the SDK manager, this would be an advantage, because if you start it right out of the installation, you don't have to run it as administrator. Every time you want to update or change the Android tools you have to run them as administrator. If you want to use the Android SDK with Eclipse don't start the manager now!



Android SDK Manager

SDK Path: C:\Program Files (x86)\Android\android-sdk

Packages

Name	API	Rev.	Status
□ Tools			
□ Android SDK Tools		22.0.5	Installed
☑ Android SDK Platform-tools		18	Update available: rev. 18.0.1
□ *Android SDK Build-tools*		*18.0.1*	*Not installed*
□ Android SDK Build-tools		17	Installed
□ Android 4.3 (API 18)			
□ Documentation for Android SDK	18	1	Installed
□ SDK Platform	18	1	Installed
□ Samples for SDK	18	1	Installed
☑ ARM EABI v7a System Image	18	1	Update available: rev. 2
□ *Intel x86 Atom System Image*	*18*	*1*	*Not installed*
☑ Google APIs	18	1	Update available: rev. 2
□ Sources for Android SDK	18	1	Installed
□ Android 4.2.2 (API 17)			
□ SDK Platform	17	2	Installed
□ Samples for SDK	17	1	Installed
□ ARM EABI v7a System Image	17	2	Installed
□ Intel x86 Atom System Image	17	1	Installed
□ *MIPS System Image*	*17*	*1*	*Not installed*
□ Google APIs	17	3	Installed
□ Sources for Android SDK	17	1	Installed
□ Android 4.1.2 (API 16)			
□ SDK Platform	16	4	Installed
□ Samples for SDK	16	1	Installed
□ ARM EABI v7a System Image	16	3	Installed
□ Intel x86 Atom System Image	16	1	Installed
□ *MIPS System Image*	*16*	*4*	*Not installed*
□ Google APIs	16	3	Installed
□ Sources for Android SDK	16	2	Installed
□ Android 4.0.3 (API 15)			
□ Android 4.0 (API 14)			
□ Android 3.2 (API 13)			
□ Android 3.1 (API 12)			

Show: ☑ Updates/New ☑ Installed □ Obsolete Select New or Updates

Sort by: ● API level ○ Repository Deselect All

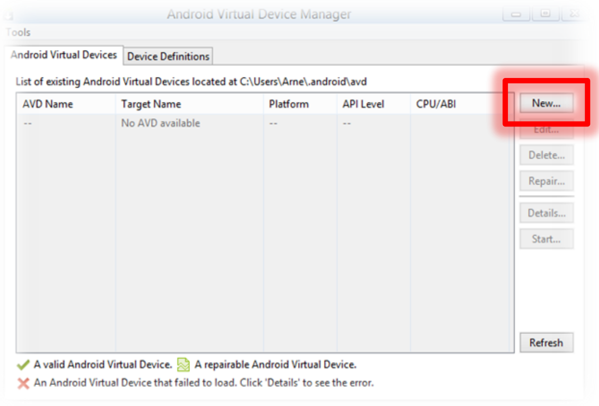
Done loading packages.

Figure 3-18 Android SDK Manager

Now you can choose which components you want to install. Confirm your selection by clicking install XX packages and accepting the license.

3.3.1 Setting up a virtual Android device

Start the AVD (Android Virtual Device) manager and click on New.



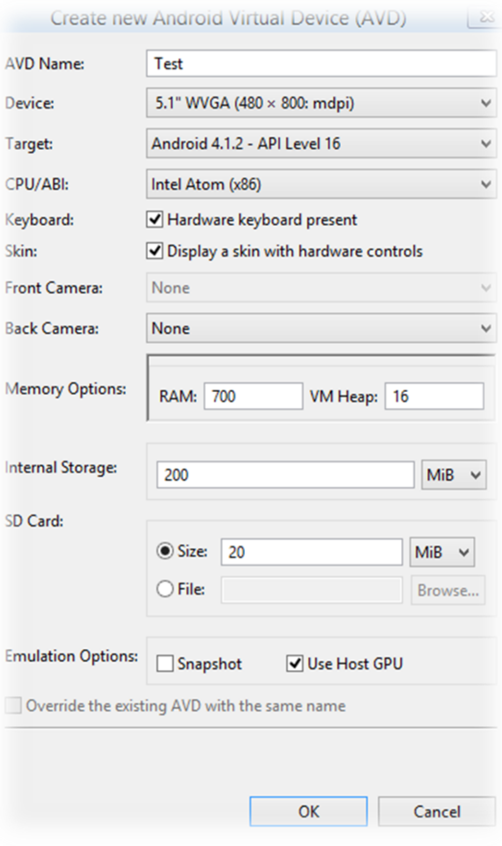
List of existing Android Virtual Devices located at C:\Users\Arne\.android\avd

AVD Name	Target Name	Platform	API Level	CPU/ABI
--	No AVD available	--	--	

✓ A valid Android Virtual Device. A repairable Android Virtual Device.
✗ An Android Virtual Device that failed to load. Click 'Details' to see the error.

Figure 3-19 Android Virtual Device Manager

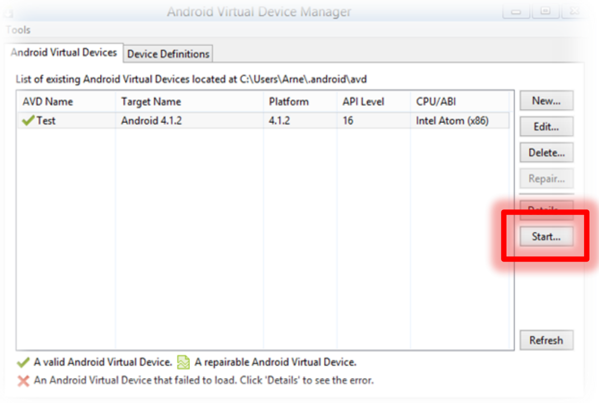
In the next dialog you can choose the settings of the AVD. If you’ve installed the HAXM drivers you have to choose the Intel Atom (x86) image, no more than 768 MB of RAM and, under emulation options, “Use Host GPU”. In addition to run ironcontrol you have to create a small SD-card for logging and certificate storage.



AVD Name: Test
Device: 5.1" WVGA (480 × 800: mdpi)
Target: Android 4.1.2 - API Level 16
CPU/ABI: Intel Atom (x86)
Keyboard: ☑ Hardware keyboard present
Skin: ☑ Display a skin with hardware controls
Front Camera: None
Back Camera: None
Memory Options: RAM: 700 VM Heap: 16
Internal Storage: 200 MiB
SD Card: ● Size: 20 MiB
○ File:
Emulation Options: □ Snapshot ☑ Use Host GPU
□ Override the existing AVD with the same name

Figure 3-20 Create new Android Virtual Device

When finished you can launch the AVD by clicking start and afterwards launch.



List of existing Android Virtual Devices located at C:\Users\Arne\.android\avd

AVD Name	Target Name	Platform	API Level	CPU/ABI
✓ Test	Android 4.1.2	4.1.2	16	Intel Atom (x86)

✓ A valid Android Virtual Device. A repairable Android Virtual Device.
✗ An Android Virtual Device that failed to load. Click 'Details' to see the error.

Figure 3-21 Android Virtual Device Manager 2

3.4 Eclipse IDE

To install Eclipse IDE just download the right version from this website Link[4]. During this process it is not necessary to install anything – just unzip the whole IDE and place it in a folder of your choosing! Afterwards you can start it by running the eclipse.exe file.

To set up Eclipse for working with the Android SDK you need to install the Eclipse ADT plugin. This set of instructions can originally be found on the Android website: [1]

1. Start Eclipse, then select Help > Install New Software.
2. Click “Add” in the top-right corner.
3. In the Add Repository dialog that appears, enter "ADT Plugin" for the Name as well as the following URL for the Location: https://dl-ssl.google.com/android/eclipse/
4. Click OK.
   If you have trouble acquiring the plugin, try using "http" in the Location URL, instead of "https" (https is preferred for security reasons).
5. In the Available Software dialog, select the checkbox next to Developer Tools and click Next.
6. In the next window, you'll see a list of the tools to be downloaded. Click Next.
7. Read and accept the license agreements, then click Finish.
   If you get a security warning saying that the authenticity or validity of the software can't be established, click OK.
8. When the installation completes, restart Eclipse. [1]

Configure the ADT Plugin

Once Eclipse restarts, you must specify the location of your Android SDK directory:

1. In the "Welcome to Android Development" window that appears, select Use existing SDKs.
2. Browse and select the location of the Android SDK directory you recently downloaded and unpacked.
3. Click Next. [1]

[4] http://www.eclipse.org/downloads

4 Use cases

In this chapter the primary tasks of ironcontrol are described. Ironcontrol is a MAP client, designed as a tool for administrative tasks in an IF-MAP environment. It allows the user to send requests such as publish, search and subscriptions to a MAP server and save these requests and also merge several requests into one via certain operations.

4.1 Publish

Ironcontrol enables the user to publish standard metadata from the TCG [2], or define his own vendor specific metadata.

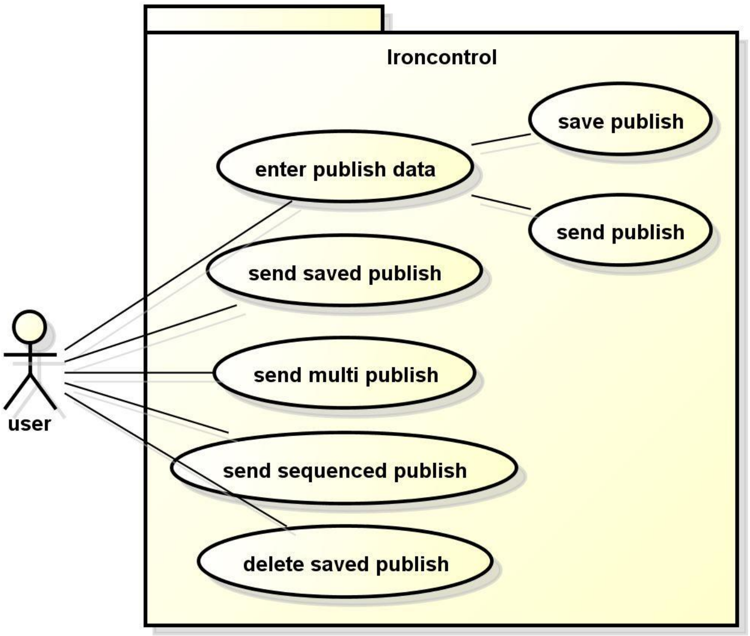


Figure 4-1 Use case: Publish

4.2 Search

Search is a further operation defined in IF-MAP allowing to search the MAP graph on the server, based on set filters. Since the user can also save searches, it is possible to repeat those searches and compare the obtained results. All results are presented in a list.

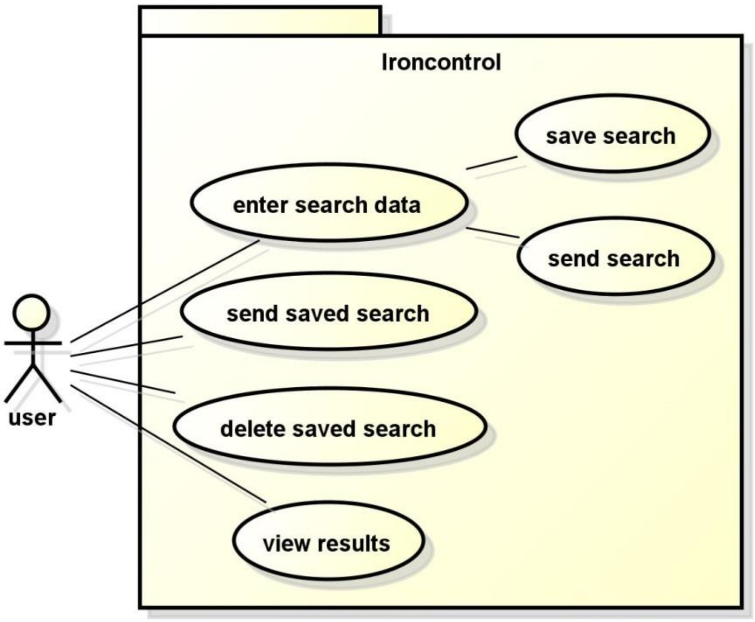


Figure 4-2 Use case: Search

4.3 Subscription

Through subscriptions the user of ironcontrol can choose to be informed about changes of subscribed metadata. As known from the previous requests all subscriptions can be saved, the results are shown in a list.

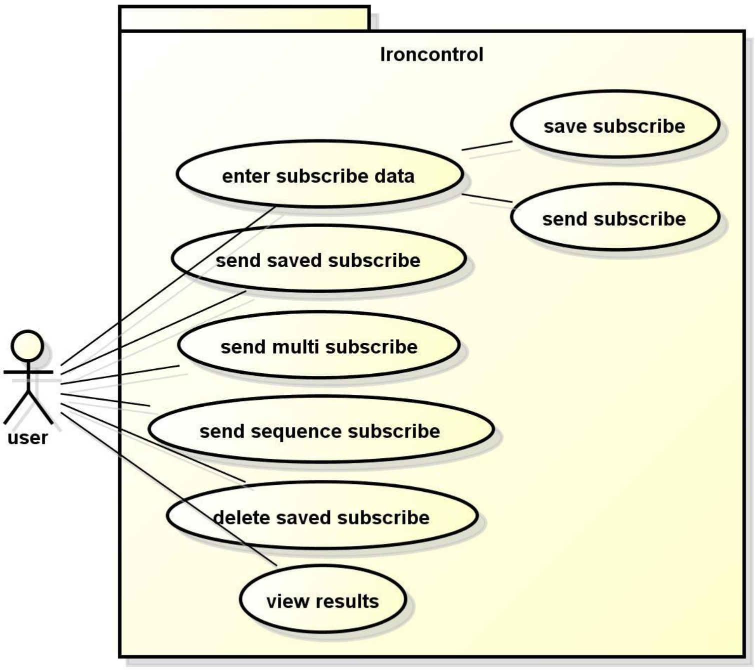


Figure 4-3 Use case: Subscription

5 Class-Diagram

The class diagram (Figure 5-1) below depicts a small section of ironcontrol’s class structure, thus highlighting possible interfaces; in this case including view, asynctask and logic.

The section titled view displays a short selection of ironcontroll’s control classes, a more detailed picture is outlined in chapter 8: “Surfaces”.

Asynctask is a data type specific to Android, it performs background operations which must not be performed via the main threads, such as network access. Crucial IF-MAP Operations are conducted with the help of especially programmed AsyncTask-interfaces. These are each designed for a specific IF-Map operation and are directly forwarded to the Logic via background processes.

Ironcontrol’s logic is an interface by itself. The static connection class allows the developer to access the connection directly, without applying Async Tasks. The request controller is also static, thus enabling the developer to gain direct access to the IF-Map functions of ironcontrol. Every Poll-Receiver is informed about new poll results by the Subscription-Poller, this process runs continuously and independently in the background. Incoming poll results are saved within the SQLite-database by a thread named “stored responses”.

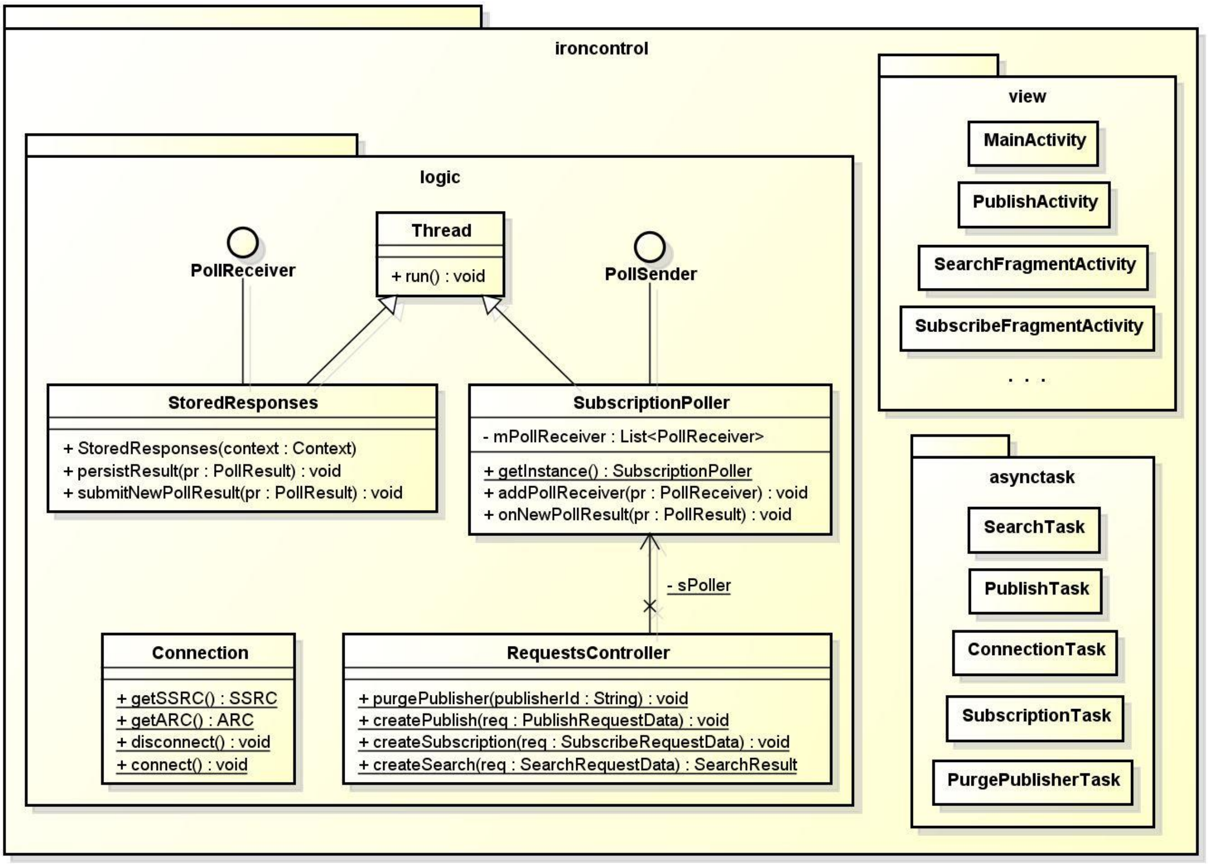

ironcontrol
logic
PollReceiver
Thread
+ run() : void
PollSender
StoredResponses
+ StoredResponses(context : Context)
+ persistResult(pr : PollResult) : void
+ submitNewPollResult(pr : PollResult) : void
SubscriptionPoller
- mPollReceiver : List<PollReceiver>
+ getInstance() : SubscriptionPoller
+ addPollReceiver(pr : PollReceiver) : void
+ onNewPollResult(pr : PollResult) : void
- sPoller
Connection
+ getSSRC() : SSRC
+ getARC() : ARC
+ disconnect() : void
+ connect() : void
RequestsController
+ purgePublisher(publisherId : String) : void
+ createPublish(req : PublishRequestData) : void
+ createSubscription(req : SubscribeRequestData) : void
+ createSearch(req : SearchRequestData) : SearchResult
view
MainActivity
PublishActivity
SearchFragmentActivity
SubscribeFragmentActivity
. . .
asynctask
SearchTask
PublishTask
ConnectionTask
SubscriptionTask
PurgePublisherTask

Figure 5-1 Class-Diagram

6 Databases

This chapter describes the data management of ironcontrol. The Android class SharedPreferences is used to save app settings. To save functional data the Android SQLite database is used.

6.1 SQLite-DB

Ironcontrol utilizes the Android interface of the content provider to save data to the SQLite database. Relevant classes are stored in the package database, as well as the content provider of ironcontrol. In Figure 6-1 an overview of all tables is given. The corresponding classes are located in the package *database.entities*.

Within the database the self-created metadata are separated to the found metadata over search or subscription. A request can be publish, search or subscription. To every entry a various number of attributes can be saved based on which metadata type was chosen. To every request the responses are saved and they have a hierarchic structure with result items, result metadata and result metadata attributes.

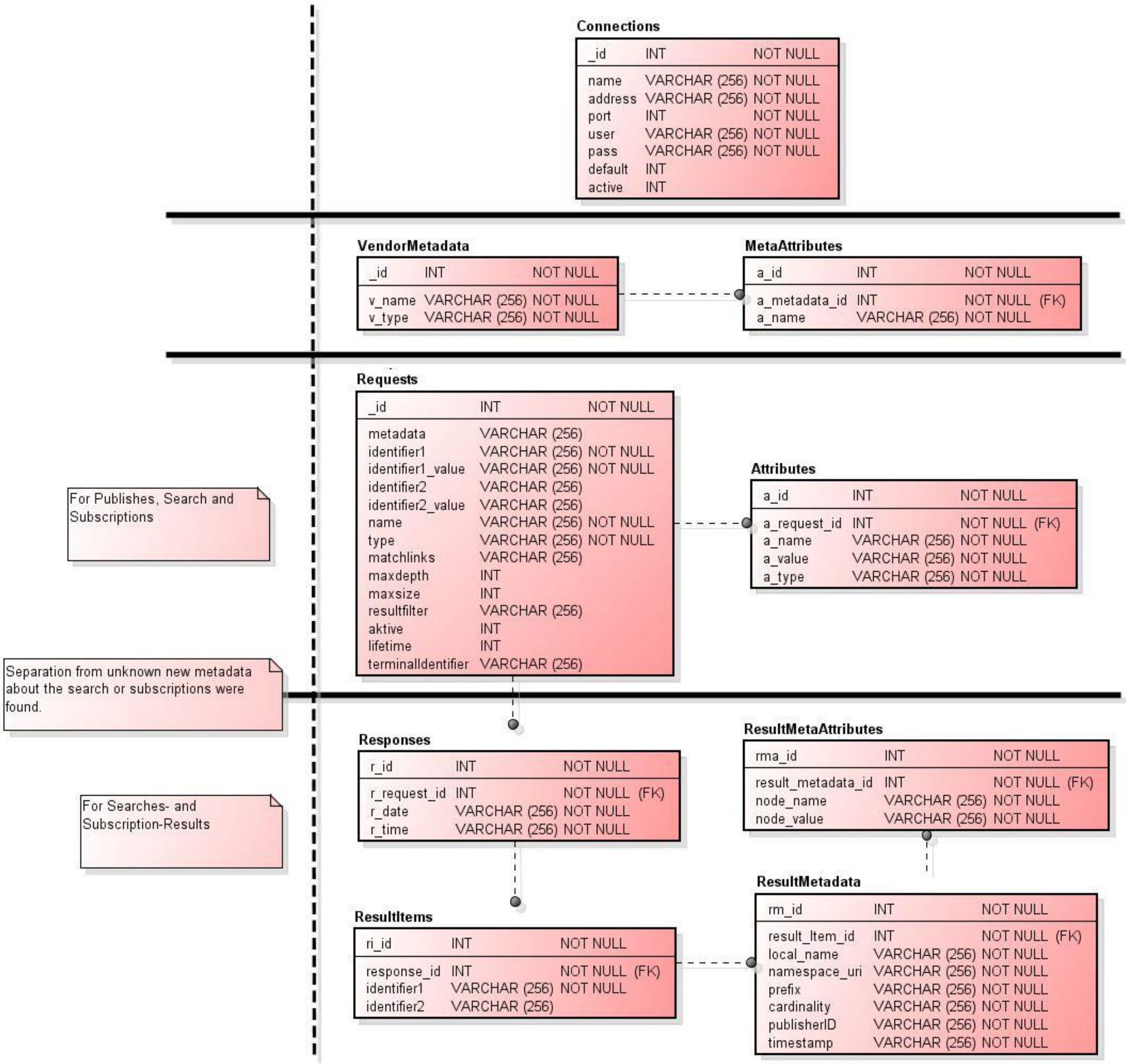

Connections
_id INT NOT NULL
name VARCHAR (256) NOT NULL
address VARCHAR (256) NOT NULL
port INT NOT NULL
user VARCHAR (256) NOT NULL
pass VARCHAR (256) NOT NULL
default INT
active INT
VendorMetadata
_id INT NOT NULL
v_name VARCHAR (256) NOT NULL
v_type VARCHAR (256) NOT NULL
MetaAttributes
a_id INT NOT NULL
a_metadata_id INT NOT NULL (FK)
a_name VARCHAR (256) NOT NULL
Requests
_id INT NOT NULL
metadata VARCHAR (256)
identifier1 VARCHAR (256) NOT NULL
identifier1_value VARCHAR (256) NOT NULL
identifier2 VARCHAR (256)
identifier2_value VARCHAR (256)
name VARCHAR (256) NOT NULL
type VARCHAR (256) NOT NULL
matchlinks VARCHAR (256)
maxdepth INT
maxsize INT
resultfilter VARCHAR (256)
aktive INT
lifetime INT
terminalIdentifier VARCHAR (256)
Attributes
a_id INT NOT NULL
a_request_id INT NOT NULL (FK)
a_name VARCHAR (256) NOT NULL
a_value VARCHAR (256) NOT NULL
a_type VARCHAR (256) NOT NULL
For Publishes, Search and Subscriptions
Separation from unknown new metadata about the search or subscriptions were found.
For Searches- and Subscription-Results
Responses
r_id INT NOT NULL
r_request_id INT NOT NULL (FK)
r_date VARCHAR (256) NOT NULL
r_time VARCHAR (256) NOT NULL
ResultMetaAttributes
rma_id INT NOT NULL
result_metadata_id INT NOT NULL (FK)
node_name VARCHAR (256) NOT NULL
node_value VARCHAR (256) NOT NULL
ResultItems
ri_id INT NOT NULL
response_id INT NOT NULL (FK)
identifier1 VARCHAR (256) NOT NULL
identifier2 VARCHAR (256)
ResultMetadata
rm_id INT NOT NULL
result_Item_id INT NOT NULL (FK)
local_name VARCHAR (256) NOT NULL
namespace_uri VARCHAR (256) NOT NULL
prefix VARCHAR (256) NOT NULL
cardinality VARCHAR (256) NOT NULL
publisherID VARCHAR (256) NOT NULL
timestamp VARCHAR (256) NOT NULL

Figure 6-1 Database of ironcontrol

7 Test

7.1 Test Cases

7.1.1 Connection Data

Add:
→ *Connection* → *menu(add)* to input the connection-settings.
Save to create a new connection.

Input: *Connectionname, IP-Address, Port-Number, Username, Password*

Expected Result: *[name] is saved*

Expected Error:
1. When the Input is not complet → **not saved**
2. When the connection data are not correct → **connecting fail** (also disconnecting)

Edit:
→ *Connection → [connection] → edit to create a new connection.*

Precondition: *connection data is already existing.*

Expected Result: *[name] was updated*

Expected Error:
1. When the Input is not complet → not saved

Delete:
→ *Connection* → *[connection]* → *remove* to delete a new connection.

Precondition: *connection data is already existing.*

Expected Result: *connection was deleted.*

7.1.2 Publish

Add:
→ *Publish* and *Save* to create a new Publish.

Input:
- type of meta data
- type and name Identifiers
- lifetime
Expected Result: *You can add more publishes to use later and publish multiple together.*
→ *OK* to accept
→ *Cancel* to abort

Expected Error:
*1. When wrong combination of meta data/identifier was chosen →***Warning message**

Edit:
→ *Publish List* → *[ID][Meta data]* → *edit* to edit a publish.

Save to apply changes.
Input:
- type of meta data
- type and name Identifiers
- lifetime

Precondition: *publish is already existing (see also* ***add****).*

Expected Result: *You can add more publishes to use later and publish multiple together.*
→ *OK* to accept
→ *Cancel* to abort

Expected Error:
1. When wrong combination of meta data/identifier was chosen →**Warning message**

Delete:
Publish List → *[ID][Meta data]* → *remove* to delete a publish.

Precondition: *publish is already existing.*

Expected Result: *publish was deleted.*

Expected Error:
1. When wrong combination of meta data/identifier was chosen →**Warning message**

7.1.3 Publish Update

→ *Publish* → *Update* for Publish-Update.
OR
→ *Publish List* → *[ID][Meta data]* → *edit* → *Update* for Publish-Update.

Input: *(see also Publish)*

Expected Result: *Updating...* → *Publish received message*

Expected Error:
1. When no connection was selected → *Cummunication Exception*

7.1.4 Publish Notify

→ *Publish* → *Update* for Publish-Update.
OR
→ *Publish List* → *[ID][Meta data]* → *edit* → *Notify* for Publish-Notify.

Input: *(see also Publish)*

Expected Result: *Updating...* → *Publish received message*

Expected Error:
1. When no connection was selected → *Cummunication Exception*

7.1.5 Purge Publish

→ *Purge Publish*
→ *OK*

Precondition: Publisher-ID must be known.
Input: Publish-ID
Expected Result: *All Meta Data of the Publish-ID are deleted.*
Expected Error: *When Publish-ID is not specified* → ***Error-Message***

7.1.6 Search

Add:
→ *Search* and *Save* to create a new Search.

Input: see also Advanced/Simple Search

Expected Result: *You can save your Search to use later and show all Results for this.*
→ *OK* to accept
→ *Cancel* to abort

Expected Error:
1. When no connection was selected →**IfmapException CommunicationException**

Edit:
→ *Search List* → *[Max Depth][Access Request]-> Edit* to edit Search.

Input: see also Advanced/Simple Search

Precondition: *Search is already existing.*

Expected Result: *You can save your Search to use later and show all Results for this.*
→ *OK* to accept
→ *Cancel* to abort

Delete:
→ *Search* and *Save* to create a new Search.
→ *Save* to apply the changes.

Precondition: *Search is already existing.*

Expected Result: *Search was deleted.*

7.1.7 Simple Search / Advanced Search

→ *Search* → *search* to execute a Search.
OR
→ *Search List* → *[Max Depth][Access Request]* → *search* to execute a Search.

Input for simple Search:
- *name*
- *start identifier*

- max. depth

Input for advanced Search:
- …
- match-links
- max. Size
- result filter

***Expected Result:** Search... → NEW Search Result for [name] was saved*

Expected Error:
*1. When no connection was selected →***IfmapException CommunicationException**

7.1.8 Subscribe

Add:
→ *Subscribe* and *Save* to create a new Subscribe.

Input: see also Advanced/Simple Subscribe

***Expected Result:** …*
→ *OK* to accept
→ *Cancel* to abort

Edit:
→ *Subscribe List* → *[...][...]* → *Edit* to edit Subscribe.

Input: see also Advanced/Simple Subscribe

***Precondition:** Subscribe is already existing.*

***Expected Result:** …*
→ *OK* to accept
→ *Cancel* to abort

Delete:
→ *Search* and *Save* to create a new Search.
→ *Save* to apply the changes.

***Precondition:** Subscribe is already existing.*

***Expected Result:** Subscribe was deleted.*

7.1.9 Simple Subscribe / Advanced Subscribe

→ *Subscribe* → *subscribe* to subscribe data.
OR
→ *Search List* → *[Max Depth][Access Request]* → *search* to execute a Search.

Input for simple Subscribe:
- name
- start identifier

- max. depth

Input for advanced Subscribe:

- …

- match-links

- max. Size

- result filter

***Expected Result:** Subscribe... → …*

7.1.10 Authentification

First start

When the app is started two folders are created on the SD-card:

1. *ironcontrol/certificates → the x.509 certificates from the IF-MAP server should be copied in this folder. „irond„ is already integrated.*
2. *ironcontrol/keystore → In this folder the keystore (ironcontrol.bks) and the ironcontrol certificate (ironcontrol.pem) are stored.*

Without SD Card

If no SD-card is present or mounted an internal keystore is used → In this case the only possible connetion is to the IronD-server.

Automatically load certificates

At every startup the folder „ironcontrol/certificates„ is checked and unkonow certificates are added to the IronControl keystore.

Manual load certificates

Manual scanning of the „ironcontrol/certificates„ folder can be accessed over → connections settings → Menu Taste → Load certificates again.

7.1.11 Valid-Metadata-Check

→ *Publish* and check all valid and invalid combination of meta data/identifier

***Input:** meta data* and *identifier*

Expected Result:

*- When wrong combination of meta data/identifier was chosen →***Warning**

7.1.12 Vendor-Specific-Metadata

Add:
→ *Vendor-Specific-Metadata* →*menu* → *add* to add new vendor-specific-meta data

Input: *meta data, values* and *type of value (single/multi)*

Expected Result: *[name] is saved*

Edit:
→ *Vendor-Specific-Metadata* → *menu* → *edit* to edit the vendor-specific-meta data

Precondition: *meta data are already existing.*

Expected Result: *[name] is saved*

Delete:
→ *vendor-Specific-Metadata* → *menu* → *delete* to delete the vendor-specific-meta data

Precondition: *meta data are already existing.*

Expected Result: *vendor-specific-meta data was deleted.*

7.2 Test Procedure

Test Cases	Result	Comments	Date	Tester	Environment	SW-Version
Connection	***ok***		**12.06.13**	**AS**	**AVD Emulator 4.1.2/4.0**	**368/373**
Connection Data (add)	*ok*		12.06.13	AS	AVD Emulator 4.1.2/4.0	368/373
Connection Data (edit)	*ok*		12.06.13	AS	AVD Emulator 4.1.2/4.0	368/373
Connection Data (dete)	*ok*		12.06.13	AS	AVD Emulator 4.1.2/4.0	368/373
Publish	***ok***					
Publish (add)	*ok*		11.06.13	AL	AVD Emulator 4.0	368
Publish (edit)	*ok*		11.06.13	AL	AVD Emulator 4.0	368
Publish (delete)	*ok*		11.06.13	AL	AVD Emulator 4.0	368
Publish-Update			**04.06.2013**	**AL**	**AVD GalaxyNexsus4 Android 4.1.2 Intel Atom**	**357**
- access-request-device	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- access-request-ip	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- access-request-mac	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- authenticated-as	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- authenticated-by	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- capability	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- device-attribute	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- device-characteristic	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- device-ip	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- discovered-by	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- enforcement-report	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- event	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- ip-mac	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- layer2-information	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- location	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- request-for-investigation	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- role	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- unexpected-behavior	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
- wlan-information	*ok*		04.06.2013	AL	AVD GalaxyNexsus4 Android 4.1.2 Intel Atom	357
Publish-Notify	***ok***		**14.06.13**	**DW**	**Motorola XT910 Android 4.1.2**	**374**
Publish-Delete	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Purge-Publish	***ok***		**14.06.13**	**DW**	**Motorola XT910 Android 4.1.2**	**374**
Search (add)	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Search (edit)	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Search (delete)	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Simple/Advanced Search	***ok***		**14.06.13**	**DW**	**Motorola XT910 Android 4.1.2**	**374**
- access-request	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
- ip-address	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
- mac-address	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
- device	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
- identity	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Subscribe (add)	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Subscribe (edit)	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Subscribe (delete)	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Simple/Advanced Subscribe	***ok***		**14.06.13**	**DW**	**Motorola XT910 Android 4.1.2**	**374**
- access-request	*ok*	simple subscribe only	14.06.13	DW	Motorola XT910 Android 4.1.2	374
- ip-address	*ok*	simple subscribe only	14.06.13	DW	Motorola XT910 Android 4.1.2	374
- mac-address	*ok*	simple subscribe only	14.06.13	DW	Motorola XT910 Android 4.1.2	374
- device	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
- identity	*ok*		14.06.13	DW	Motorola XT910 Android 4.1.2	374
Authentification	***ok***		**04.06.13**	**AS**	**AVD Emulator 4.1.2/4.0**	**357**
- First start	*ok*		04.06.13	AS	AVD Emulator 4.1.2/4.0	357
- Start without SD Card	*ok*		04.06.13	AS	AVD Emulator 4.1.2/4.0	357
- Automatically load certificates	*ok*		04.06.13	AS	AVD Emulator 4.1.2/4.0	357
- Manual load certificates	*ok*		04.06.13	AS	AVD Emulator 4.1.2/4.0	357
- Connect to irond without server certificate	*ok*		04.06.13	AS	AVD Emulator 4.1.2/4.0	357
- Connect to irond after load the server certificate	*ok*		04.06.13	AS	AVD Emulator 4.1.2/4.0	357
Valid-Methadata-Check	***ok***		**04.06.13**	**DW**	**Samsung Galaxy Nexus (Android 4.2.2)**	**357**
- access-request-device	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- access-request-ip	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- access-request-mac	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- authenticated-as	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- authenticated-by	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- capability	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- device-attribute	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- device-characteristic	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- device-ip	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- discovered-by	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- enforcement-report	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- event	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- ip-mac	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- layer2-information	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- location	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- request-for-investigation	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- role	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- unexpected-behavior	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
- wlan-information	*ok*		04.06.13	DW	Samsung Galaxy Nexus (Android 4.2.2)	357
Vendor-Specific-Metadata			**11.06.13**	**AS**	**AVD Emulator 4.0**	**368**
Vendor-Specific-Metadata (add)	*ok*		11.06.13	AS	AVD Emulator 4.0	368
Vendor-Specific-Metadata (edit)	*ok*		11.06.13	AS	AVD Emulator 4.0	368
Vendor-Specific-Metadata (delete)	*ok*		11.06.13	AS	AVD Emulator 4.0	368

8 Surfaces

This chapter gives an overview about the surfaces of ironcontrol and how they are structured. Figure 8-1 shows all surfaces of ironcontrol. Furthermore the areas requests, saved requests settings and tools are described. The focus is on which components they are compounded, this means which controller class is used and which view is used for it.

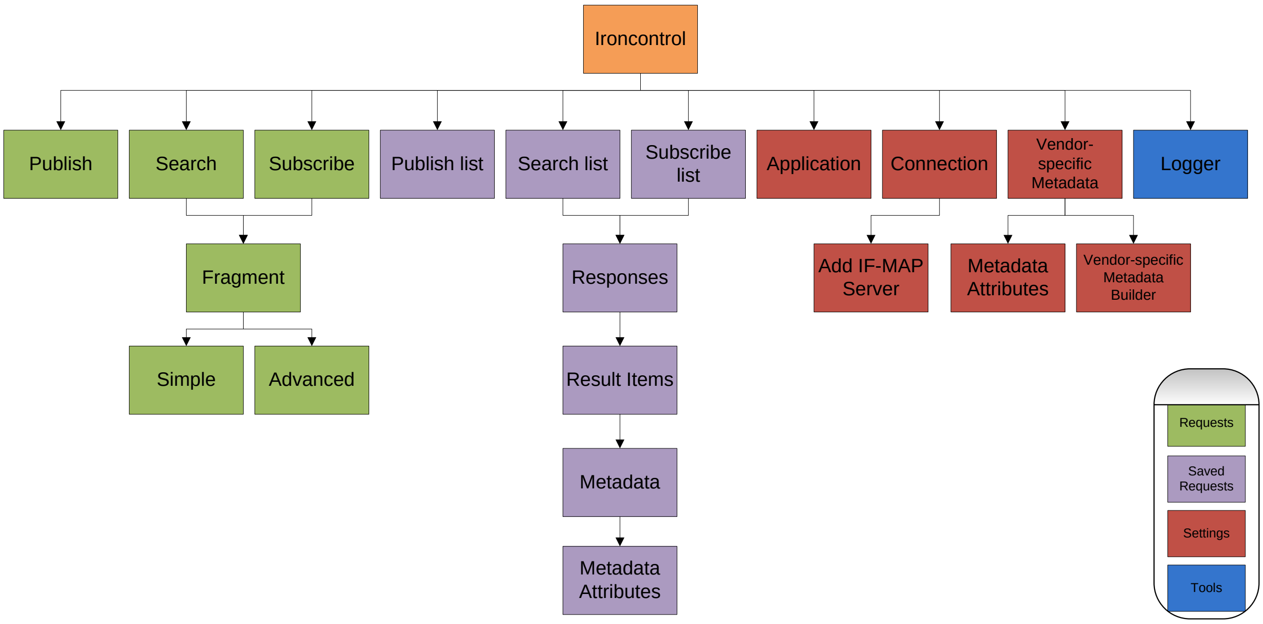


Figure 8-1 Overview surfaces

Table 1 give an overview of what components the individual surfaces are composed. The columns of the table are explained below.

- **Type** Describes the activity type used in the concrete surface.
- **Controller** The corresponding Java class.
- **Content View** This is an xml file, containing the information on which the GUI surface is build.
- **Options Menu** If the surface has an options menu the analogue XML file is shown here.
- **Context Menu** If the surface contains a context menu this is shown by yes.

Surface	Type	Controller	Content View	Options Menu	Context Menu
Ironcontrol	Activity	MainActivity.java	activity_main.xml	activity_main.xml	no
Publish	Activity	PublishActivity.java	activity_publish.xml	activity_ publish.xml	no
Search	FragmentActivity	SearchFragmentActivity.java	fragment_activity_search.xml	activity_search.xml	no
Subscribe	FragmentActivity	SubscribeFragmentActivity.java	fragment_activity_subscribe.xml	activity_subscribe.xml	no
Fragment	Fragment	TabFragment.java	fragment_tab.xml	-	no
Simple	Fragment	SimpleRequestFragment.java	fragment_simple_request.xml	-	no
Advanced	Fragment	AdvancedRequestFragment.java	fragment_advanced_request.xml	-	no
Publish list	ListActivity	ListSavedPublishsActivity.java	list_view.xml	activity_saved_publishs.xml	yes
Search list	ListActivity	ListOverviewActivity.java	list_view.xml	activity_saved_searches.xml	yes
Subscribe list	ListActivity	ListOverviewActivity.java	list_view.xml	activity_saved_subscription.xml	yes
Responses	ListActivity	ListResponsesActivity.java	list_view.xml	activity_saved_searches.xml activity_saved_subscription.xml	yes
Result Items	ListActivity	SubscribeFragmentActivity.java	list_view.xml	-	no
Metadata	ListActivity	SubscribeFragmentActivity.java	list_view.xml	-	no
Metadata Attributes	ListActivity	SubscribeFragmentActivity.java	list_view.xml	-	no
Application	PreferenceActivity	SettingsActivity.java	preference_application_settings.xml		no
Connection	ListActivity	ListSavedConnectionsActivity.java	activity_saved_connections.xml	activity_saved_connections.xml	no
Add IF-MAP Server	FragmentActivity	ConnectionFragmentActivity.java	activity_connection.xml	-	no
Vendor-specific Metadata	ListActivity	ListVendorMetadataActivity.java	list_view.xml	activity_vendor_metadata.xml	yes
Metadata Attributes	ListActivity	ListVendorMetadataActivity.java	list_view.xml	activity_vendor_metadata.xml	yes
Vendor-specific Metadata Builder	Activity	MetadataBuilderActivity.java	activity_metadata_builder.xml	-	no
Logger	ListActivity	MetadataBuilderActivity.java	list_view.xml	activity_logger_list.xml	no

Table 1 Overview Surfaces structure

9 Miscellaneous

9.1 Guide to Android Keystrore

Preparations:

- Installing JDK (Java Development Kit) version 6 or 7.
- Download the appropriate java provider library from the website “The Legion of Bouncy Castle” [3], actual version is “bcprov-jdk15on-148.jar”.
- Edit the file java.security, add the line „Security.Provider.7=org.bouncycastle.JCE.Provider.BouncyCastleProvider“

After the certificate is created and exported from the JKS key store by using the following commands:

```
keytool -genkey -keyalg RSA -alias ironcontrol -keystore
ironcontrol.jks -storepass password –validity 3650 -keysize
2048
```

```
keytool -keystore ironcontrol.jks -exportcert –alias
ironcontrol -file ironcontrol.pem
```

You can import it into the BKS key store using the command:

```
keytool -importcert -v -trustcacerts -file ironcontrol.pem -
alias ca -keystore ironcontrol.bks -provider
org.bouncycastle.jce.provider.BouncyCastleProvider -
providerpath other/bcprov-jdk15on-148.jar -storetype BKS -
storepass password
```

10 Issues

The following problems are well known at the application and they have to fix in the next version of ironcontrol:

1. Ironcontrol only supports a limited number of attributes at the following meta data:
    a. *location*: only one *location-information* type with type and value
    b. *wlan-information*: only one *ssid-unicast-security* and *ssid-management-security* and no *other-type-definition* for this and for *ssid-group-security*
2. Meta data are deleted by name without considering their attributes.
3. The detail view is not implemented at publish list.
4. Stored Subscriptions at Subscription List cannot be deleted as long a stored subscription contains responses. First please try to delete all responses and then remove the subscription.
5. The status bar shows information about active subscription even if no subscription is active, when this function is activated.
6. Advanced subscriptions cannot be edited. When you try to edit an Advanced Subscription, then the view of simple subscription will be displayed instead.
7. Advanced Search cannot be edited. When you try to edit an Advanced Search, then the view of Simple Search will be displayed instead.
8. Attributes of vendor-specific-meta data are not deleted, when using the function edit. Single-value attributes are displayed as multi-value-attributes.
9. The fields of attributes are still displayed in the publish view, when the meta data has some attributes and the selection is switched to none.

11 List of Figures

12 References

[1] “Installing the Eclipse Plugin,” [Online]. Available: http://developer.android.com/sdk/installing/installing-adt.html.

[2] Trusted Computing Group, 2013. [Online]. [Accessed Juni 2013].

[3] “The Legion of the Bouncy Castle,” [Online]. Available: http://www.bouncycastle.org/latest_releases.html.