PAW Functions

Für diese Seite existiert keine Übersetzung!

This page describes functions and object special to PAW and is meant for developers.
Most of the examples can directly be tested.

Basics

With PAW it is possible to write dynamic web pages which can use the functionality of your phone.
Have a look at the folder `/sdcard/paw/html/app` on your SD card.
Some of the HTML files contain Beanshell code (enclosed in <bsh></bsh> tags).

> **Note:** The directory `/sdcard/paw/html/app` will be deleted with new versions of PAW, so please put your own pages in a new directory below `/sdcard/paw/html`.

Here is an example how to retrieve information of the phone:

```
String[] opts = { "BOARD", "BRAND", "DISPLAY", "MODEL", "PRODUCT",
                  "TIME", "TYPE", "USER", "VERSION.INCREMENTAL",
                  "VERSION.RELEASE", "VERSION.SDK"};

for(o : opts) {
        print(o + ":" + eval("android.os.Build." + o));
}
```

Result:

Execute Script

Using the above example a simple xhtml web page could look like this:

```
<html>
 <body>
  <bsh>
        String[] opts = { "BOARD", "BRAND", "DISPLAY", "MODEL", "PRODUCT",
        "TIME", "TYPE", "USER", "VERSION.INCREMENTAL",
        "VERSION.RELEASE", "VERSION.SDK"};

        for(o : opts) {
         print("<b>" + o + ":</b>" + eval("android.os.Build." + o) + "<br>");
        }
  </bsh>

 </body>
</html>
```

To retrieve the PAW Android Service object you can use the following code:

```
service = server.props.get("serviceContext");
```

To get a request parameter the following code can be used:

```
parameter = parameters.get("parameterName");
```

Get and Post parameters are combined and multiple variables are stored into an `ArrayList`.

Deploying Web Pages

Web pages can be copied to the paw html folder of the SD card (`/sdcard/paw/html`).

Server Startup

Server startup scripts are located in the `/sdcard/paw/etc/init` directory. There are two runlevels 0 and 1. Runlevel 0 is for pre startup/shotdown scripts and 1 for post startup/shutdown sripts. Scripts with the prefix S_ will be processed on startup. Scripts prefixed by K_ will be processed on shutdown.

Note: The `server` variable is not available for pre-startup scripts.

Application Configuration

PAW Server supports multiple web applications.
Web applications can be configures in the `/sdcar/paw/webconf/apps` directory inside a `conf` file.
As example have a look at the standard PAW configuration file.

The `conf` file have the follwing structure:

```
name=<Application name>>
description=<Application description>
icon=<Path to application ion (should be 48x48px)>
href=<Application path>
```

Example:

```
name=Test Application
description=Test application
icon=app/images/android.png
href=app/
```

If more than one application is configured a menu will be displayed when `http:<ip-number>:<port>` is called:

Plug-ins

The webapp supports plug-ins. Plugins are located in the `/sdcard/paw/html/app/plugins` directory. Each plug-in contains a `plugin.conf` file. The structure of the file is the same as for webapps.
If plug-ins are detected they are available in a separate **Plug-ins** menu entry.

A sample plug-in can be downloaded here.

Autostart

The Server supports Autostart of scripts if enabled in the server settings.
Scripts are executed in alphabetic order. They reside inside the `/sdcard/paw/autostart` directory and have the file extension `bsh`.

A test script is available here. After renaming the script to have a `bsh` extension and placing it inside the autostart folder and enabling the server setting the script will be automatically started at next server startup.
The script starts a background thread that displays the serve uptime in the notification bar of the device.

Example script:

```
import de.fun2code.android.pawserver.PawServerService;

/*
 Test autostart script that displays the server's uptime as notification
*/

r = new Runnable() { public void run() {
        start = System.currentTimeMillis();
        notificationId = new Random().nextInt(1000);

        while(PawServerService.isRunning()) {
                uptime = (System.currentTimeMillis() - start) / 1000;

showNotification(com.android.internal.R.drawable.ic_menu_emoticons, "PAW Server
Info", "PAW Server", "PAW Server Uptime: " + uptime + " sec", notificationId,
true, "#FF0000", false, false);
                Thread.sleep(1000);
        }

        cancelNotification(notificationId);
}};
t = new Thread(r);
t.start();
```

Bootup Preference Injection

To make it easier to change app preferences without starting the app a mechnism was implemented to inject preference on bootup of the device.

Note: This is only done at bootup of the device an not on each start of the app.

Preferences that should be set can be specified inside the file `PAW_HOME/etc/preferences`.
The file follows the Java properties file definition. The types `String`, `Integer`, `Float` and `Boolean` are auto detected.

This mechanism can also be used within own web apps. The preferences are located inside the shared preferences within the PAW application. The preference is named `PawServer`.

Here is a sample `preferences` file with the available PAW preferences:

```
#-----------------------------------------------
# Allows to change PAW preferences upon boot.
#-----------------------------------------------
#AutoStart=true
#HideNotificationIcon=true
#ShowUrlInNotification=true
#ExecAutostartScripts=true
#UseWakeLock=true
#FreezeContent=true
```

Dynamic DEX Class Loading

Note: Due to a bug in Honeycomb, dynamic class loading might not work.

Class Loading on Startup

Classes in DEX format included in JAR and APK files can be dynamically loaded on startup.
All JAR and APK files present in the folder `paw/webconf/dex` will be added to a new classloader called `dexClassLoader`.
The `dexClassLoader` can be retrieved by calling `server.props.get("serviceContext").getDexClassLoader()`.
To use the classe loaded by this classloader simply use the BeanShell command `useDexClasses()`.

Dynamic Handler

There is a new Brazil Handler class called `org.paw.handler.AndroidDynamicHandler` that allows the wrapping of Handlers that are only available in external DEX format.
The Handler has two parameters:

- `handlerJars`: Colon separated list of JAR or APK files to load. This parameter is optional. If all necessary classes are available by the `dexClassLoader` (see "Dynamic DEX Class Loading"), this parameter is not necessary.
- `handlerClass`: The Handler class to use.

All other parameters defined in the Handler definition are passed to the Handler defined in the `handlerClass` parameter.

Dynamic Filter

Equivalent to the Dynamic Handler but for Filters. The class is called `org.paw.filter.AndroidDynamicFilter`. The Filter has two parameters:

- `filterJars`: Colon separated list of JAR or APK files to load. This parameter is optional. If all necessary classes are available by the `dexClassLoader` (see "Dynamic DEX Class Loading"), this parameter is not necessary.

- `filterClass`: The Filter class to use.

All other parameters defined in the Filter definition are passed to the Filter defined in the `filterClass` parameter.

Native Mapper

The Native Mapper allows to map URLs to native DEXed classes allowing for a much better performance than interpreted BeanShell code.
To use the Native Mapper, create a DEXed jar file and put it inside the `/sdcard/paw/webconf/dex` directory.

DEXed classes can be created by using the dx command form the Android SDK:
```
./dx --dex --output=out_dex.jar --positions=lines in.jar
```

The mapping file has the following format and has to be placed in the `/sdcard/paw/webconf/mapping` directory:

```
URL=DEX class name
```

All files present in that directory will be loaded by the Native Mapper.

Here is an example file content from the Web Application:
```
/app/get_app_icon.xhtml=de.fun2code.android.pawserver.external.webapp.graphics.FetchAppIcon
/app/graphics/contact_photo.xhtml=de.fun2code.android.pawserver.external.webapp.graphics.FetchContactPhoto
/app/get_scaled_image.xhtml=de.fun2code.android.pawserver.external.webapp.graphics.FetchScaledImage
/app/graphics/albumart.xhtml=de.fun2code.android.pawserver.external.webapp.graphics.FetchAlbumArt
/app/graphics/system_load_image.xhtml=de.fun2code.android.pawserver.external.webapp.graphics.DrawLoadImage
```

The class that is called must define a method with the name `response` and the following signature:
```
public void respond(Request request, Server server, Hashtable<String, Object> parameters)
```

Alle the variables available in BeanShell XHTML files are also passed to this method.

Scoping

The server noch supports two scopes. A Server and a Session scope.
Objects can be placed inside the scoped with the following commands:

```
serverPut(key, object);
serverGet(key);

sessionPut(key, object);
sessionGet(key);
```

BeanShell

BeanShell now has an additional variable `$$` which is an alias for the BeanShell interpreter.
This can be used to generate output without linebreak by using the `$$.print()` command.

To get request parameters the `paramters` *Hashtable* is provided. The till now uses statement `request.getQueryData()` is deprecated, because there were encoding problems with this function.
As an example: To get the parameter value of a parameter called `text` you would use: `parameters.get("text");`

Android Functions

In this vesion interacting with Android has been improved.
For some of these functions it is necessary that the PAW Server activity is active in the foreground. The activity is therefore automatically, if needed.

Below are examples which demonstrate these commands. To test them yourself you can change the code inside the text fields.

Dialing a Number

Opens the dialer app, the user has to start the call manually.
The phone number is provided as parameter.
As a demo the below script calls the USSD code *100#. This code might not be available on all carriers.

```
dial("*100#");
```

Execute Script

Calling a Number

Calls the phone app on the phone and dials the number right away. The phone number is provided as parameter.
As a demo the below script calls the USSD code *100#. This code might not be available on all carriers.

```
call("*100#");
```

Execute Script

Scan Barcode

For this functionality to work, the Barcode Scanner application has to be installed.
If this is not the case, you can press the following button and the Android Market will be opened on your device: Install Barcode Scanner

```
res = scanBarcode();
```

Result:

Execute Script

Display Toast Message

As duration parameter `"short"` or `"long"` can be used.

```
makeToast("Test Toast message...", "short");
```

Execute Script

Display Alert Dialog

```
showAlert("Dialog Title", "The text message.");
```

Execute Script

Display Alert Dialog with Input

```
res=showInputAlert("Dialog Title", "Type in some text:");
```

Result:

Execute Script

Send an Email

```
sendMail("android@fun2code.de", "Test Mail from PAW Server", "Hello,\nThis is
```

Execute Script

Open an URI

```
openUri("market://search?q=pname:de.fun2code.android.pawserver");
```

Execute Script

Accelerometer Support

Accelerometer support has been added in this release.
The sensor instance can be obtained by calling `de.fun2code.android.pawserver.AndroidInterface.getSensorListener()`.
The SensorListener has the following methods:

- `getX()`
- `getY()`
- `getZ()`
- `getForce()`

Force calculation is experimental. The force is calculated like this:
`Math.abs(dataX + dataY + dataZ - last_x - last_y - last_z) / diffTime * 10000;`

There is also a web service (`/app/ws/sensor_data.xhtml`) which return a JSON array.

JSON output:

Example

The below example shows the orientation of your phone. Turn your phone and the image should turn as well.

Media Player support

It is now possible to get information from and control the Android Media Player.
This is using undocumented classes, so support might break in future Android releases.

To get the Media Player object the following code can be used:

```
import de.fun2code.android.pawserver.AndroidInterface;
AndroidInterface.getMediaPlayerService().getPlayBackService();
```

The Media Player object supports the following methods:

```
    void openfile(String path);
    void openfileAsync(String path);
    void open(in int [] list, int position);
    int getQueuePosition();
    boolean isPlaying();
    void stop();
    void pause();
    void play();
    void prev();
    void next();
    long duration();
    long position();
    long seek(long pos);
    String getTrackName();
    String getAlbumName();
    int getAlbumId();
    String getArtistName();
    int getArtistId();
    void enqueue(in int [] list, int action);
    int [] getQueue();
    void moveQueueItem(int from, int to);
    void setQueuePosition(int index);
    String getPath();
    int getAudioId();
    void setShuffleMode(int shufflemode);
    int getShuffleMode();
    int removeTracks(int first, int last);
    int removeTrack(int id);
    void setRepeatMode(int repeatmode);
    int getRepeatMode();
    int getMediaMountedCount();
```

Speech To Text

Checking for available Intents and speech to text support have been inplemented.
The commands are:

```
boolean istIntentAvailable(String intent)
String speechToText(String title)
```

Below are examples which demonstrate these commands. To test them yourself you can change the code inside the text fields.

```
import android.speech.RecognizerIntent;

if(isIntentAvailable(RecognizerIntent.ACTION_RECOGNIZE_SPEECH)) {
  res = speechToText("Text to speech");
}
else {
  res = "SpeechToText not supported!";
}
$$.print(res);
```

Result:

Execute Script

Save Bookmark

The `saveBookmark(String title, String url)` command saves a bookmark in the phones browser.

Below is an example that demonstrates this command. To test them yourself you can change the code inside the text fields.

```
saveBookmark("http://www.fun2code.de", "Fun2Code");
```

Execute Script

XML-RCP support

The server now supports XML-RCP from http://code.google.com/p/android-xmlrpc.
For an example have a look at the XML-RCP code snippet.

GPS

Functions for activating GPS have been added. The GPS has to be enabled manually by the user on the device before this can work. When the function `acivateGPS(true)` is used the GPS icon should appear in the statusbar.
The function `acivateGPS(false)` will stop the device from receiving GPS signals. The GPS icon should disappear in the statusbar.
To get the last GPS position the command `getGpsLocation()` which returns an Android `Location` object can be used.

Below code will start the GPS and stop it again after 5 seconds.

```
activateGps(true);
Thread.sleep(5000);
activateGps(false);
```

Execute Script

WiFi

To switch WiFi on and off use the command `enableWifi(boolean)` can be used.
This of course only makes sense if the PAW server is not running on WiFi.

Below code will stop WiFi and restart it after 2 seconds.

```
enableWifi(false);
Thread.sleep(2000);
enableWifi(true);
```

Execute Script

Orientation Sensor

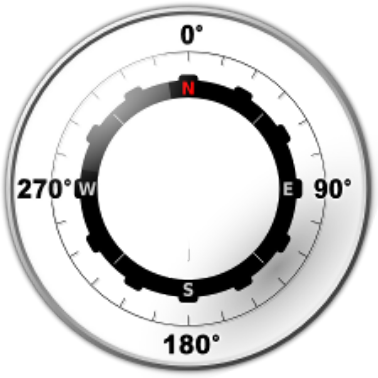
In addition to GPS functions the compass orientation can be queried.
The following script retrieves the current bearing every two seconds.

```
import de.fun2code.android.pawserver.AndroidInterface;

sensorListener = AndroidInterface.getSensorListener();
bearing = sensorListener.getOrientBearing();
$$.print(bearing);
```

Result:

Bearing of device:



The sensor listener provided the following orientation methods:

- `getOrientBearing()` - Returns the bearing
- `getOrientAccuracy()` - Gets the accuracy (0=unreliable, 1=low, 2=medium, 3=high)
- `getLastOrientTimestamp()` - Timestamp of last update in millis

Proximity Sensor

To get the value of the proximity sensor the method `getProximity()` is provided by the sensor listener.

```
import de.fun2code.android.pawserver.AndroidInterface;

sensorListener = AndroidInterface.getSensorListener();
$$.print( sensorListener.getProximity());
```

Result:

Execute Script

Light Sensor

To get the brightness in Lux of the ligh sensor the method `getBrightness()` is provided by the sensor listener.

```
import de.fun2code.android.pawserver.AndroidInterface;

sensorListener = AndroidInterface.getSensorListener();
$$.print( sensorListener.getBrightness());
```

Result:

Execute Script

Pressure Sensor

To get the pressure in hPa (millibar) of the pressure sensor (barometer) the method `getPressure()` is provided by the sensor listener.

```
import de.fun2code.android.pawserver.AndroidInterface;

sensorListener = AndroidInterface.getSensorListener();
$$.print(sensorListener.getPressure());
```

Result:

Execute Script

Gyroscope Sensor

Values from the Gyroscope sensor are provided by the following methods of the sensor listener:

- `getGyroX()`: Angular speed around the x-axis (radians/second).
- `getGyroY()`: Angular speed around the y-axis (radians/second).
- `getGyroZ()`: Angular speed around the z-axis (radians/second).

```
import de.fun2code.android.pawserver.AndroidInterface;

sensorListener = AndroidInterface.getSensorListener();
print("Gyro X: " + sensorListener.getGyroX());
```

Result:

Execute Script

Text To Speech

Text To Speech is now supported by the `speack(text, locale)` method.
Note: Text To Speech is only supported since Android 1.6.

```
speak("This is a test message", new Locale("en", "EN"));
```

Execute Script

Relative Humidity Sensor

To get the relative humidity of the humidty sensor (in %) the method `getRelativeHumidity()` is provided by the sensor listener.

```
import de.fun2code.android.pawserver.AndroidInterface;

sensorListener = AndroidInterface.getSensorListener();
$$.print(sensorListener.getRelativeHumidity());
```

Result:

Execute Script

Ambient Temperature Sensor

To get the ambient temperature of the temperature sensor (in °C) the method `getAmbientTemperature()` is provided by the sensor listener.

```
import de.fun2code.android.pawserver.AndroidInterface;

sensorListener = AndroidInterface.getSensorListener();
$$.print(sensorListener.getAmbientTemperature());
```

Result:

Execute Script

Camera Preview

Note: Works only on Froyo (Android 2.2) and up!

A simple script than demonstrates the use of the camera preview as public webcam can be found here. Just download it to your `/sdcard/paw/html` directory and change the file extension to `xhtml`.

The camera is not a shared resource, so the camera has to be stopped (closed) before it can be reused by another application!

The `CameraPreview` class in the `de.fun2code.android.pawserver.media` package provides the following methods:

`CameraPreview getInstance()`	Return the `CameraPreview` instance. Because the camera is not a shared resource this is a singleton.
`setFile(File file)`	Sets the output file.
`File getFile()`	Returns the output file.
`setBackupDirectory(File dir)`	Sets the backup directory which stores copies of the images. The directory must exist. File format is: `yyyyMMddHHmmss.<ext>`
`File getBackupDirectory()`	Returns the backup directory.
`setQuality(int quality)`	Sets the image quality in %. Has to be between 0 and 100. Defaults to 100.

`int getQuality()`	Gets the image quality in %.
`setRotation(int deg)`	Sets the image rotation in degrees. 0 is the default rotation (device in landscape, camera to the left).
`int getRotation()`	Gets the image rotation in degrees.
`setSize(int width, int height)`	Sets the preview size. Has to be a valid size! Valid sizes can be retrieved by the `getSupportedSizes()` method.
`List getSupportedSizes()`	Returns a list of supported sizes.
`setFormat(Bitmap.CompressFormat format)`	Sets the image output format. Defaults to JPEG.
`Bitmap.CompressFormat getFormat()`	Returns the image output format.
`setInterval(Integer interval)`	Defines how often images are written. Defaults to 0.
`setPrintGeoLocation(boolean enable, String foregroundRGB, String backgroundRGB)`	Specifies if and in which color the geo location header is printed.
`setCameraId(id)`	Sets the camera ID. The default is 1. This might be useful if the front-facing-camera should be used instead of the default.
`int getCameraId()`	Gets the camera ID. The default is 1.
`Camera getCamera()`	Returns the camera object, or `null` if preview has not been started.
`boolean start()`	Aquires the camera and starts the preview. Returns `true` on success otherwise `false`.
`stop()`	Stops the preview and releases the camera.
`boolean isCameraIdSupported()`	Checks if camera IDs (since Gingerbread) are supported. Returns `true` on success, othewise `false`.
`int getBackCameraId()`	Returns the ID of the back facing camera. If no camera is found `-1` is returned.
`int getFrontCameraId()`	Returns the ID of the front facing camera. If no camera is found `-1` is returned.
`void setSurfaceEnabled(boolean state)`	The surface view can be enabled or disabled. Without surface, camera preview might not work on some devices! It's enabled by default.
`void setSurfaceSize(int width, int heigt)`	Sets the size of the surface view. Default is width=-1 and height=-1 which results in a full screen view.

The preview supports header and footer information. If specified the header contains geo information provided by the Google Geocoder. The footer contains the date if specified.

Below is a sample image:

The following script will create an image in the `/sdcard` directory with the name `webcam_test.jpg` with the size of 320x240 pixels, a geo header, date footer and the image quality of 50%.
It starts the camera preview, waits four seconds and stops the preview.

You can use the buttons below the script to view and delete the image.

```
import de.fun2code.android.pawserver.media.*;

cp = CameraPreview.getInstance();
cp.setSize(320, 240);
cp.setFile(new File("/sdcard/webcam_test.jpg"));
cp.setQuality(50);
cp.setPrintDate(true, "#ffffff", "#55000000");
cp.setPrintGeoLocation(true, "#ffffff", "#55000000");
cp.start();
Thread.sleep(4000);
cp.stop();
```

Execute Script

Show Image Delete Image

Notifications

Notifications are supported by three methods.

A Notification Builder is available in the *Code Snippets* section.

`showNotification(ticker, header, text)`	This is a simple function and generates a simple text message. It's equivalent to calling `showNotification(null, ticker, header, text, null, true, null, true, true)`. It returns the notification id.
`showNotification(icon, ticker, header, text, id, light, color, sound, vibrate)`	Generates a notification with the following parameters: • `icon`: Icon resource id. If `null` `de.fun2code.android.pawserver.R.drawable.notification` is used. • `ticker`: Ticker text. If `null` no notification will be displayed in the status bar. • `header`: Header text. If `null` no notification will be displayed in the status bar. • `text`: Text displayed beneath the header. If `null` no notification will be displayed in the status bar. • `id`: Notification id. If `null` a random id will be generated. • `light`: `true` if LED light should be used, otherwise `false`. • `color`: LED RGB color (#rrggbb). If `null` standard color will be used. • `sound`: `true` if sound should be used, otherwise `false`. • `vibrate`: `true` if vibration should be used, otherwise `false`. It returns the notification id.
`cancelNotification(id)`	Cancels the notification with the given id.

The below script will display two notifications, one with the simple and one with the extended method.
After 15 seconds the notifications will be cleared.

```
id1 = showNotification("Test Notification 1", "Notification Header",
"Notification Text");

id2 = showNotification(com.android.internal.R.drawable.ic_menu_notifications,
"Test Notification 2", "Notification Header", "Notification Text", null, true,
"#0000FF", true, true);

Thread.sleep(15000);

cancelNotification(id1);
cancelNotification(id2);
```

Execute Script

Vibration

Vibration is supported by the simple method `vibrate(millis)` which causes the device to vibrate for the given number of milliseconds.
The script below vibrates for 3 seconds.

```
vibrate(3000);
```

Execute Script

Image Filters

Image filters for grayscale and sepia are available.

The two methods `Graphics.filterBitmapSepia(String)` and `Graphics.filterBitmapGrayScale(String)` in the package `de.fun2code.android.pawserver.util.Graphics` take the filename (as String) and return a `android.graphics.Bitmap` as result.

Clipboard

With the methods `String readFromClipboard()` and `writeToClipboard(String)` it is now possible to read from and write to the the clipboard of the device.

The example will write a text to the clipboard of the device and read it afterwards.

```
writeToClipboard("Clipboard Text");
$$.print(readFromClipboard());
```

Result:

Execute Script

Send SMS Message

The following command sends a SMS message and stores it in the outbox. The return value indicates if the message could be sent.
`boolean sendSMS(String number, String message)`

To send a SMS message that is not stored in the outbox the following command with `silent` set to `true` can be used:
`boolean sendSMS(String number, String message, boolean silent)`

SMS Actions

SMS Actions are scripts that are executed when a SMS message with the correct **Name** and **PIN** combination arrives.
Actions can be registered with `SmsListener` available in the `de.fun2code.android.pawserver.listener` package.

The SMS has to have the following format to be processed by an action:
`ActionName:PIN:[Additional Arguments]`

The scripts have access to the following additional variables:

- `smsArgs`: Additional arguments that can be added after the last colon.
- `smsNumber`: The phone number of the SMS sender.

The `SmsListener` provides the following Action methods:

- `boolean registerAction(String name, String pin, String code)`: Registers a new Action. Returns `true` on success, otherwise `false`.
- `boolean updateAction(String name, String pin, String code)`: Updates an existing Action. Returns `true` on success, otherwise `false`.
- `boolean removeAction(String name)`: Updates an existing Action. Returns `true` on success, otherwise `false`.
- `TreeMap getActions()`: Returns all Actions as TreeMap.
- `clearActions()`: Clears all Actions.
- `testMessage(String phoneNumber, String smsBody)`: Tests an Action.

The example registers a SMS Action which displays the additional arguments of a SMS message as Toast message if the message has the following format:
`reply:123:Test arguments...`

The last command tests the message.

```
import de.fun2code.android.pawserver.listener.*;

SmsListener.registerAction("test", "123", "makeToast(\"Number: \" + smsNumber +
\" Args: \" + smsArgs, \"short\");");
SmsListener.testMessage("5463", "test:123:Test arguments...");
```

Execute Script

SMS Scripts

SMS Scripts are scripts that are executed in alphabetic order each time a SMS message arrives.
Scripts can be registered with `SmsListener` available in the `de.fun2code.android.pawserver.listener` package.

The scripts have access to the following additional variables:

- `smsMessage`: SMS body.
- `smsNumber`: The phone number of the SMS sender.

The `SmsListener` provides the following Script methods:

- `boolean registerScript(String name, String code)`: Registers a new Script. Returns `true` on success, otherwise `false`.
- `boolean updateScript(String name, String code)`: Updates an existing Script. Returns `true` on success, otherwise `false`.
- `boolean removeScript(String name)`: Updates an existing Script. Returns `true` on success, otherwise `false`.
- `TreeMap getScripts()`: Returns all Scripts as TreeMap.
- `clearScripts()`: Clears all Scripts.
- `testMessage(String phoneNumber, String smsBody)`: Tests the Scripts.

The example registers a SMS Scripts which displays the number and message as Toast message on the display of the device.
The last line is used to test the Script.

```
import de.fun2code.android.pawserver.listener.*;

SmsListener.registerScript("test", "makeToast(\"Number: \" + smsNumber + \"
Message: \" + smsMessage, \"short\");");
SmsListener.testMessage("5463", "SMS message...");
```

Execute Script

Sharing

The shared `Intents` are stored in a `HashMap<Long, Intent>` in the server scope.
The key of the map is a timestamp which can be used to display the date when the content has been shared.
To receive the map use the following code:

```
server.props.get("de.fun2code.andoid.pawserver.key.share")
```

Broadcast Listeners

The following methods are available in the `de.fun2code.android.pawserver.util.IntentUtil` class to handle broadcast events:

- `static Intent getIntentResultFromBroadcast(context, intentAction)` - Waits for a single `Intent` to accure and provides this as return value. The integer result code is available as extra data in the resulting intent ("result").
- `static Intent getIntentResultFromBroadcast(context, intentAction, millis)` - Waits for a single `Intent` for the specified amount of time and provides this as return value. The integer result code is available as extra data in the resulting intent ("result").
- `static List getIntentResultsFromBroadcast(context, intentAction, millis)` - Collects `Intent` tfor the specified amount of milli seconds and returns them as `List`. The integer result code is available as extra data in the resulting intents ("result").

To create `BroadcastListiner` which executes a BeanShell script in the `onReceive()` method when an `Intent` is received the method `buildReceiver` from the `de.fun2code.android.pawserver.util.BroadcastReceiverUtil` class can be used. The `intent` and `context` objects are available from within the script.

- `static BroadcatLister buildReceiver(script);`

The example shows how to uses the `IntentUtil.getIntentResultFromBroadcast()` to receive the battery status in a single `Intent` an prints the result. It also registers two BroadCastListeners by using `BroadcastReceiverUtil.buildReceiver()` for five seconds that will display and remove notifictions if power is plugged or unplugged.

```
import de.fun2code.android.pawserver.util.*;
import android.content.Intent;
import android.content.IntentFilter;

service = server.props.get("serviceContext");

// Get single Intent
intent = IntentUtil.getIntentResultFromBroadcast(service,
Intent.ACTION_BATTERY_CHANGED);
level = intent.getIntExtra("level", 0);
```

Result:

Execute Script

NFC

Reading of NFC tags is supported by the `AndroidInterface` class method `Intent getNfcIntent(int timeoutSec)`.
The method expects a timeout parameter in seconds.

Here is an example, that shows how to retrieve the Tag from the resulting Intent:

```
import de.fun2code.android.pawserver.AndroidInterface;
import android.nfc.NfcAdapter;

intent = AndroidInterface.getNfcIntent(5); // 5 secs timeout
if(intent != null) {
  tag = intent.getParcelableExtra(NfcAdapter.EXTRA_TAG);
  print(tag);
}
else {
  print("No Tag found!");
}
```

Result:

Execute Script

NDEF Records

Note:

The purpose of the NDEF record classes is to simplify reading and writing of NDEF messages.
A sample NFC reader/writer application is available as plugin.

The package `de.fun2code.android.pawserver.media.nfc.ndef` contain the following classes to support NDEF records:

`TextRecord`	NDEF Text record.
`URIRecord`	NDEF URI records.
`SmartPosterRecord`	NDEF Smart poster records.
`MimeMediaRecord`	NDEF Mime Media poster records.

All record types contain a `writeTag(Tag)` method which returns one of the following codes defined in the class `de.fun2code.android.pawserver.media.nfc.Constants`:

`SUCCESS`	Write was successful.
`ERROR`	An Error occured.
`MESSAGE_TOO_LARGE`	Message was too large, which means longer than the maximum NDEF message length.

TextRecord

Text NFEF record which takes text and language code as argument. The follwing methods are defined:

`TextRecord(String languageCode, String text)`	The constructor. Arguments are language code (e.g. "en") and text.
`String getText()`	Returns the text.
`String getLanguageCode()`	Returns the language code.
`static TextRecord parse(NdefRecord record)`	Parses a `NdefRecord` and returns a `TextRecord` instance.
`static boolean isText(NdefRecord record)`	Checks if the given `NdefRcord` is a NDEF Text record.
`static NdefRecord createRecord(String text, String languageCode)`	Creates a new Text `NdefRecord`
`int writeTag(Tag tag)`	Writes the tag and returns the result code (see `Constants` mentioned above.)

UriRecord

URI NFEF record which takes the URI as argument. The follwing methods are defined:

`UriRecord(Uri uri)`	The constructor. Arguments an URI.
`Uri getUri()`	Returns the URI.
`static UriRecord parse(NdefRecord record)`	Parses a `NdefRecord` and returns a `UriRecord` instance.
`static boolean isUri(NdefRecord record)`	Checks if the given `NdefRcord` is a NDEF URI record.
`static NdefRecord createRecord(URI uri)`	Creates a new URI `NdefRecord`
`int writeTag(Tag tag)`	Writes the tag and returns the result code (see `Constants` mentioned above.)

SmartPosterRecord

Smart Poster NFEF record which takes URI, text and language code as argument. The follwing methods are defined:

`SmartPosterRecord(URI uri, String languageCode, String text)`	The constructor. Arguments are URI, language code (e.g. "en") and text.

`Uri getUri()`	Returns the URI.
`String getText()`	Returns the text.
`String getLanguageCode()`	Returns the language code.
`static SmartPosterRecord parse(NdefRecord record)`	Parses a `NdefRecord` and returns a `SmartPosterRecord` instance.
`static boolean isSmartPoster(NdefRecord record)`	Checks if the given `NdefRcord` is a NDEF Smart Poster record.
`static NdefRecord createRecord(URI uri, String languageCode, String text)`	Creates a new Smart Poster `NdefRecord`
`int writeTag(Tag tag)`	Writes the tag and returns the result code (see `Constants` mentioned above.)

MimeMediaRecord

Mime Media NFEF record which takes a mimetype and byte array data as argument. The follwing methods are defined:

`MimeMediaRecord(String mimeType, byte[] data)`	The constructor. Arguments are mimetype and byte array.
`String getMimeType()`	Returns the mimetype.
`byte[] getData()`	Returns the binary data.
`static MimeMediaRecord parse(NdefRecord record)`	Parses a `NdefRecord` and returns a `MimeMediaRecord` instance.
`static boolean isMimeMedia(NdefRecord record)`	Checks if the given `NdefRcord` is a NDEF Mime Media record.
`static NdefRecord createRecord(String mimeType, byte[] data)`	Creates a new Mime Media `NdefRecord`
`int writeTag(Tag tag)`	Writes the tag and returns the result code (see `Constants` mentioned above.)

WebSockets

PAW supports WebSockets with a `WebSocket` handler that can be inserted into the `handler.xml` file.
The handler has two parameters, `config` and `basedir`. The `config` parameter defines where the WebSocket configuration is located, the `basedir` parameter defines the root directoty for BeanShell scripts.

Here is a sample handler configuration, which should be located before the authentication handler:

```
  <handler status="active">
    <name>WebSocket Handler</name>
    <description>WebSocket Handler</description>
    <removable>true</removable>
    <id>websocket</id>
    <files/>
    <params>
      <param name="websocket.class" value="org.paw.handler.android.websocket.WebSocketHandler" />
      <param name="websocket.basedir" value="[PAW_HOME]" />
      <param name="websocket.config" value="[PAW_HOME]/webconf/websocket.conf" />
    </params>
  </handler>
```

WebSocket Configuration

The WebSocket configuration file is a simple textfile whith the following format:

```
<WebSocket protocol>:<BeanShell file (extension .bsh) or native class>
```

The first parameter is the WebSocket protocol which defined by the `sec-websocket-protocol` header field. Regular Expression are supported as protocol name.
The second is a BeanShell script with the extension `.bsh` or a native class.

Sample configuration file:

```
# Format:
# Protocol:Bsh script (.bsh extension) or class name
#
chat.*:webSocketTest.WebSocketTest
echo:html/websocket_echo.bsh
```

BeanShell Scripts

The easiest way to use WebSockets are BeanShell scripts. These are quite slow, so in a production environmant you should consider using native classes.
The following variables are passed: `action`, `protocol`, `socket`, `sockets`, `message`.

The `action` variable can be `"connect"`, `"disconnect"` or `"text"`. The value `"connect"` is set if a client connects to a socket and `"disconnect"` if a client disconnects. In addition the used protocol name and the *Socket* are passed. The `sockets` and `message` variables are not present in these cases.

If a text message is received, the `message` and `sockets` variables are passed. The variable `message` contains the text message as *String*. All sockets belonging to the protocol are stored inside the `sockets` variable which is a *List of Sockets*.

To send a message to a socket, the following call can be used:
`de.fun2code.android.pawserver.websocket.WebSocketMessage.sendMessage(message, socket)`

Here is a sample scripts, which sends the received message to all connected clients:

```
if(action.equals("text")) {
    for(sock : sockets) {
        try {
            de.fun2code.android.pawserver.websocket.WebSocketMessage.sendMessage(message, sock);
        }
        catch(e) {}
    }
}
```

Native Classes

Using native classes significantly increases performance, but they are not as easy to use in comparison to BeanShell scripts.

To get started, put the following JAR file to the classpath of your project: pawWebSocket.jar

After the code is compiled, you have to convert the calses into DEX format and put them into the `PAW_HOME/webconf/dex` directory.
A detailed description can be found inside the following blog post: PAW - Dynamic DEX Class Loading

Here is a sample Java classfile that does exactly the same as the BeanShell sample above:

```
import java.io.IOException;
import java.net.Socket;
import java.util.List;

import de.fun2code.android.pawserver.websocket.WebSocketListener;
import de.fun2code.android.pawserver.websocket.WebSocketMessage;

public class WebSocketTest implements WebSocketListener{

        @Override
        public void onConnect(Socket socket, String protocol) {
        }

        @Override
        public void onDisconnect(Socket socket, String protocol) {
        }

        @Override
        public void onMessage(String message, Socket socket, String protocol,
                        List connectedSockets) {
                for(Socket sock : connectedSockets) {
                        try {
                                WebSocketMessage.sendMessage(message, sock);
                        } catch (IOException e) {
                                e.printStackTrace();
                        }
                }
        }

}
```