Native Android Development with Spring

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Introduction

- **What are the purposes of the Spring for Android and Spring Mobile projects?**
  - Spring for Android provides support for building native Android applications utilizing Spring technologies, where applicable.
  - In contrast, Spring Mobile provides support for building mobile web applications.

Spring for Android

- Android Overview
- Define the Problem
- Review of REST
- Basic Rest Template Example
- Rest Template Overview
- Maven Can Help
- Showcase and Demos
- Questions

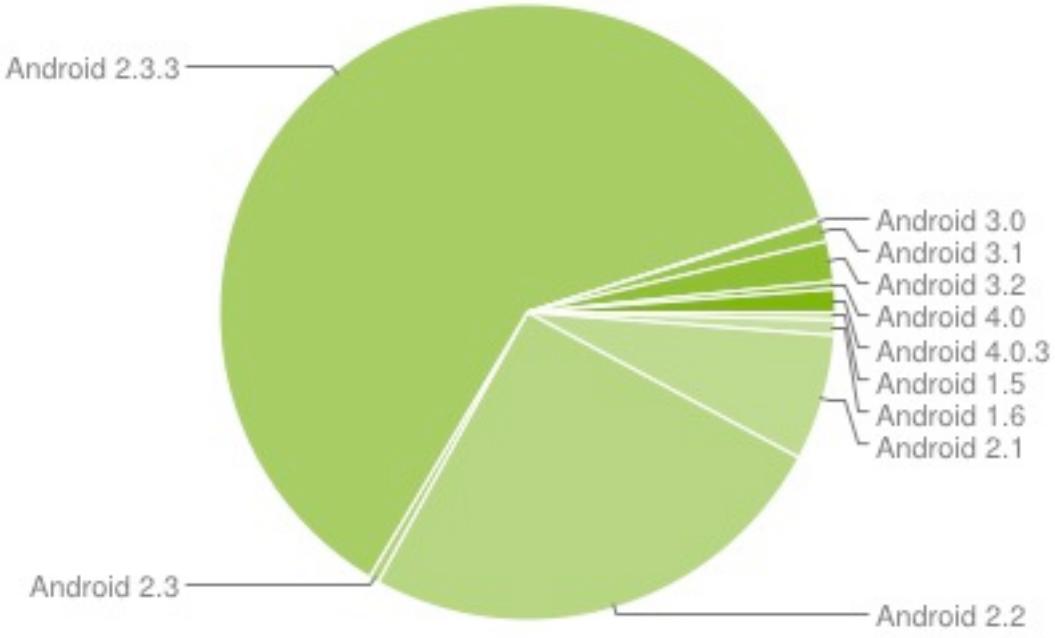
Android Adoption

- Year-on-year growth rate of more than 250%
- 850,000 new Android devices are activated each day
- Over 300 million devices around the world
- Over 450,000 apps available in Google Play
- Over 1 billion app downloads per month

http://googlemobile.blogspot.com/2012/02/androidmobile-world-congress-its-all.html

Android Fragmentation

- **Current Distribution**
  - Gingerbread 62%
  - Froyo 25.3%
  - Eclair 6.6%
  - Honeycomb 3.3%
  - Ice Cream Sandwich 1.6%



http://developer.android.com/resources/dashboard/platform-versions.html

Android is Familiar

Applications are written in Java!

(well, sort of)

But not *that* Familiar...

- **Class Files**
  - Android apps are compiled to class files.
- **DEX Format**
  - Classes are compiled into the Dalvik Executable (DEX) format.
  - DEX format is required to run on the Dalvik Virtual Machine.
- **Dalvik VM**
  - Not a true Java VM, because it does not operate on Java byte code.
  - Based on a subset of the Apache Harmony project.
  - Many of the classes from Java SE are available, but not all.

Isolation of an App

- **Unique Linux User ID**
  - Android OS assigns each app a unique Linux user ID.
- **Process Isolation**
  - Within the VM, each app runs in its own Linux process.
- **Managed Lifecycle**
  - The system manages the starting and stopping.

Components of an Android App

- **Activities** - An activity represents a single screen with a user interface.
- **Services** - A service is a component that runs in the background to perform long-running operations or to perform work for remote processes.
- **Content Providers** - A content provider manages a shared set of application data.
- **Broadcast Receivers** - A broadcast receiver is a component that responds to system-wide broadcast announcements.

http://developer.android.com/guide/topics/fundamentals.html

Android Manifest

- contains the permissions requested by the app
- Lists all of the components of an app

```
<uses-sdk android:minSdkVersion="10" />
<application
    android:icon="@drawable/ic_launcher"
    android:label="@string/app_name" >
    <activity
        android:name=".HelloAndroidActivity"
        android:label="@string/app_name" >
        <intent-filter>
            <action android:name="android.intent.action.MAIN" />
            <category android:name="android.intent.category.LAUNCHER" />
        </intent-filter>
    </activity>
</application>
```

A simple Activity

```
package org.springsource;

import android.app.Activity;
import android.os.Bundle;

public class HelloAndroidActivity extends Activity {

    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);
    }
}
```

STS and the ADT Plugin for Eclipse

HelloAndroid Demo

http://www.springsource.org/springsource-tool-suite-download

http://developer.android.com/sdk/eclipse-adt.html

How can Maven help?

- **Android4Maven**
  - This project compiles android.jar from source and pulls out source and resource files to replicate android.jar in the SDK
  - http://sourceforge.net/projects/android4maven/
- **Maven Android SDK Deployer**
  - If you need to use Google maps, then you have to go this route
  - https://github.com/mosabua/maven-android-sdk-deployer
- **Android Maven Plugin**
  - Provides support for Maven dependency management within Android projects
  - http://code.google.com/p/maven-android-plugin/

Android Maven Plugin Configuration

```
<packaging>apk</packaging>
```

```
<plugin>
    <groupId>com.jayway.maven.plugins.android.generation2</groupId>
    <artifactId>android-maven-plugin</artifactId>
    <version>3.1.1</version>
    <configuration>
        <sdk>
            <platform>${android-platform}</platform>
        </sdk>
        <deleteConflictingFiles>true</deleteConflictingFiles>
        <undeployBeforeDeploy>true</undeployBeforeDeploy>
    </configuration>
    <extensions>true</extensions>
</plugin>
```

https://repository.sonatype.org/index.html#nexus-search;quick~com.google.android

Maven Commands

Build your Android App

```
$ mvn clean install
```

Start the Emulator

```
$ mvn android:emulator-start
```

Deploy the app to the emulator

```
$ mvn android:deploy
```

Run the app

```
$ mvn android:run
```

http://maven-android-plugin-m2site.googlecode.com/svn/plugin-info.html

Maven Demo

m2eclipse Support

- **Android Configurator for M2E Maven Integration for Eclipse**
  - An Eclipse plugin that adds support for integrating m2eclipse, Android Developer Tools, and the Android Maven Plugin
  - http://rgladwell.github.com/m2e-android/
- **Maven Android archetypes**
  - This project provides several Maven archetypes for Android. These archetypes allow you to quickly bootstrap a Maven project to develop an android application.
  - https://github.com/akquinet/android-archetypes

This sounds too good!

@rgladwell

Spring for Android

What problem are we trying to solve?

- **Concerns**
  - REST has become a popular choice for architecting both public and private web services
  - The Android runtime provides HTTP clients capable of making HTTP connections and requests, but it does not have a fully featured REST client
- **Spring for Android Solution**
  - The goal of Spring for Android Rest Template is to provide an easy to use, and functional REST client that supports marshaling objects from XML and JSON.

REST

- **Origin**
  - The term Representational State Transfer was introduced and defined in 2000 by Roy Fielding in his doctoral dissertation.

- **His paper suggests these four design principles:**
  - Use HTTP methods explicitly.
    - POST, GET, PUT, DELETE
    - CRUD operations can be mapped to these existing methods
  - Be stateless.
    - State dependencies limit or restrict scalability
  - Expose directory structure-like URIs.
    - URI's should be easily understood
  - Transfer XML, JavaScript Object Notation (JSON), or both.
    - Use XML or JSON to represent data objects or attributes

Basic Rest Template Example

- Google search example

```
RestTemplate restTemplate = new RestTemplate();

String url =
"https://ajax.googleapis.com/ajax/services/search/web?v=1.0&q={query}";

String result = restTemplate.getForObject(url, String.class, "SpringSource");
```

- Multiple parameters example

```
RestTemplate restTemplate = new RestTemplate();

String url = "http://example.com/hotels/{hotel}/bookings/{booking}";

String result = restTemplate.getForObject(url, String.class, "42", “21”);
```

Google Search Demo

Spring for Android Rest Template

- **Based on SpringFramework**
  - Originated as a fork of RestTemplate from SpringFramework.
  - Modifications were made to support Android.

- **RestTemplate class is the heart of the library**
  - Entry points for the six main HTTP methods
    - DELETE - delete(...)
    - GET - getForObject(...)
    - HEAD - headForHeaders(...)
    - OPTIONS - optionsForAllow(...)
    - POST - postForLocation(...)
    - PUT - put(...)
    - any HTTP operation - exchange(...) and execute(...)

HTTP Clients

- **SimpleClientHttpRequestFactory**
  - Delegates to the standard J2SE facilities
- **HttpComponentsClientHttpRequestFactory**
  - Delegates to the native HttpComponents HttpClient
- **CommonsClientHttpRequestFactory** (deprecated)
  - Delegates to the Commons HttpClient which is not native to Android

Message Converters

- **MappingJacksonHttpMessageConverter**
  - object to JSON marshaling supported via the Jackson JSON Processor
- **SimpleXmlHttpMessageConverter**
  - object to XML marshaling supported via the Simple XML Serializer
- **SyndFeedHttpMessageConverter**
  - RSS and Atom feeds supported via the Android ROME Feed Reader

Spring for Android Showcase

- **Examples**
  - HTTP GET
    - JSON
    - XML
  - HTTP GET with Parameters
    - JSON
    - XML
  - HTTP POST
    - String
    - JSON
    - XML
    - MultiValueMap
  - RSS
  - ATOM

Rest Template Demos

Spring Social on Android

- **What is Spring Social?**
  - Spring Social is an extension of the Spring Framework that allows you to connect your applications with Software-as-a-Service (SaaS) providers such as Facebook and Twitter.
- **How does it relate to Spring for Android?**
  - Utilizes RestTemplate to make RESTful requests to providers.
- **How can Spring for Android help?**
  - Auth library in Spring for Android provides a SQLiteConnectionRepository for use with Spring Social.

Additional Resources

- **Slides:**
  - http://portal.sliderocket.com/vmware/Native-Android-Development-with-Spring
- **Project Home:**
  - http://www.springsource.org/spring-android
- **Sample Code:**
  - https://github.com/SpringSource/spring-android-samples
- **Webinar:**
  - http://www.springsource.org/node/3505
- **Blog Posts:**
  - http://blog.springsource.com/author/rclarkson/