

# **An Open Source Solution for Education Management - EduXes**

**V Master on Free Software Projects Development and  
Management 2011-2012**

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# Description of the practicum

The main objective of this Master Thesis consist in the development of an mobile application to be used int highschoools by teachers. It could allows teachers to carry on control students attendance, their behavior. Also it permits quick assessment by activity. Teachers would read students reports: weekly and daily assessment, by activity assessments and total marks.

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Working times (planned) : 300 hours. From 6th August, to 30 September, on an eight hours day basis.

Technologies involved:

- Java <sup>TM</sup>language.
- Android <sup>TM</sup>. The operatig skeleton application.
- PhoneGap <sup>TM</sup>(alias Cordova ) framework to develop multi-platform applications.
- JQuery and JQueryMobile to development of mobile oriented applications.
- JavaScript with Web Databases.
- Git for version control system.
- L<sup>A</sup>T<sub>E</sub>X for documentation.

Meetings:

- Technologies to be used were stated, work methodologies, first application windows (pages), Android version to be used (2.3.3) because is the most popular.
- Several emails and gtalk conversations about organization, general problems were written.

Teleworking is carried on

Materials and special equipment used:

- Hardware: Intel Quad, 6GiB RAM, 500GiB HD.
- Software: Debian GNU/Linux Wheezy (testing), Eclipse Juno, JQuery 1.8.1, jQueryMobile 1.1.1, and PhoneGap-Cordova 1.8.1, Android Virtual Manager 2.3.3, Git 1.7.10.4-1.
- Real testing: Sony-Ericsson Xperia V mobile phone, with USB cable and wifi.



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# Chapter 1

## Introduction

In a high school, there are classes which attendance, assessment and group dynamics is difficult to control. This is especially relevant for the technology workshop, this could be a noisy, annoying, even dangerous place, which requires teacher's supervision. This workshop requires a lightweight, reliable and complete software tool. A simple web solution is not enough, and even use a tablet can be heavy, it requires a new approach.

The development of a multiplatform tool, open source, for smart-phones, including tablets, for attendance monitoring and evaluation of students is suggested.

To achieve this goal a client-side application will be developed using a multiplatform framework: Phonegap (Cordova) [?]. Phonegap allows you to develop utilizing well-known languages as Javascript and HTML. It permit us to deploy an application for both Android, WebOS, iOS and others.

For data management, a built-in database, SQLite, will be employed.

The tool that enables rapid development of the application and integration of performance tests is Eclipse. It uses the Android virtual machine (AVM).



# Chapter 2

## Working plan

Description and objectives: A multi-platform management application for high school teachers is developed. It can be run on a smart-phone or tablet, or even a personal computer. The actual objectives of the applications are student's management: Attendance control. Misbehaviour control. Activities evaluation. Application should include this features: Data visualization. As table-like. Server synchronization with a custom application or Xade1. The final goal is to develop an application to make teacher's work easier and comfortable. Also an objective is to write extensible code, which allow another developers to take part into application development. Tasks: The current list of tasks are:

1. Study state-of-art solutions. a) Find out other solutions: PDAs and smart-phone or tablet related and web-based applications. b) Download to study and reuse graphical user interfaces, code or/and database structure.
2. Develop database structure: tables and relationships.
3. Preparation of development: a) Build development environment: install Eclipse, Android Virtual Machine, Aptana Plugin, JQuery, JQueryMobile and Phonegap. b) Choose application name and folder's policy. c) Make a simple application: only a blank page. d) Upload simple application into a git repository2
4. Development: a) Populate database with sample data. b) Groups: Make list of groups window. Groups management window. c) Students: Make list of students window. Students management window (insert-update-delete students) d) Timetable for actual date: list of groups for each day. e) Add attendance, misbehaviour for each student. f) Add error handling. g) Retrieve and insert data from and to database h) List of attendance, misbehaviour incidents. i) Add activities grades for each student. j) List students marks and final mark. k) Activities management window (add-update-remove activities) l) Management of student notes. m) List of student notes.
5. Test into real hardware: Android 2.3.3 mobile phone.
6. Save or download data from database to disk.
7. Xade web interface. a) Study Xade web interface. b) Develop an ad-hoc application for retrieve Xade's data.
8. Develop an ad-hoc application for store data.
9. Synchronization with a custom server or with Xade.

10. Test units. 11. User documentation. Manual with images. 12. Developer's documentation. 13. Find out a website to host a forum, a bug report system, documentation and application download. In the following table a broad estimation of time spent in each task are shown.

Tasks	Time (hours)
State-of-art solutions	10
Develop database	8
Preparation for development	40
Development.	

Populate database with sample data.	20
Groups. List and management	50
Students. List and management	30
Timetable for actual date	80
Add attendance, behaviour	50
Add error handling	2
Retrieve and insert data from and to database	30
List of attendance, misbehaviour incidents.	12
Add activities grades for each student.	12
List students marks and final mark.	14
Activities management window	14
Management of student notes.	20
List of student notes.	2
Test into real hardware	20
Save data into disk	10*
<b>Total</b>	<b>394</b>

Motivation: I am a Technologies teacher, in my daily work I have to evaluate students work such as working with tools, cooperative work, cooperative work with other classmates etc., besides usual activities as written exercises. It could used a long sheet, or an awkward long spreadsheet, but a portable device with a custom application should be desirable. This application increases teacher's productivity because teacher only has to write attendance, or unpunctuality two times (on official report and on application's window), and classroom notes and activity grades on very easy way. The most important feature is to be as easy, fast and intuitive as possible. It could be desirable to be platform independent (Android, iOS, Windows RT), but Android is preferred because it is open source, has a high market share, and to buy an Apple Macintosh computer is not mandatory. I wish to learn from this application how to develop a mobile application, and several technologies: JQuery, jQueryMobile, PhoneGap/Cordova, SQLITE, git repository management.

Methodology: This work was carried on building little blocks, also called pages, and make up it into final application. Database structure was separated from interface, and interface was also separated into dynamic and static. Each new functionality was written, tested, and polished. Each new function was written from previous one, and son on. Tools involved were Eclipse IDE (with plug-ins) and Android Virtual Manager (AVM) on Debian GNU/Linux Wheezy. When a new functionality was developed, application was tested on AVM, if it worked, source code was polished, applicable was tested again, if it was satisfactory a new change was committed into git repository. Work plan:

Several problems were faced: Eclipse environment: A stable, reliable and up-to-date IDE, with several plug-ins is needed. Download vanilla Eclipse Juno from its web-site is chosen because it is more stable, reliable, compatible with newer versions. Aptana



Javascript plugin was chosen because Aptana allows source code auto-completion in JQuery. PhoneGap and Android incompatibilities. Android 2.3.3 requires JQuery-1.8.1 and does not work on higher versions. Error handlers. I have had several problems with tx.executeSql(...) function, it confused me with db.transaction(...): tx.executeSql(sql, [parameters], successHandler, errorHandler) and db.transaction(queryFunction, errorHandler, successHandler) have up to four and three parameters respectively, only first one is mandatory. I rather use success and error handlers for tx.executeSql function, atomic error control could be better choice. Passing variables to functions: Only if another solution is not known or feasible, global variables are used: named after `global_*`, *and in block capitals*. *Deadline*. *Devel*



# Chapter 3

## State-of-art solutions

Only an open source application was found for study, Siestta , nevertheless there are a lot of educational software (Sixa2, Unisoft3) but they are privative, Microsoft Windows freeware or both (SAS académico4). Siestta was evaluated. Technically it is an GPL'ed old style PHP-based web application with Ajax, an interactive editor, fckeditor and fpdf to generate reports. From user point-of-view there are online documentation5. This application includes management of students, attendance, marks, tasks, incidents, general queries, letters to parents, interviews with parents, messages, appointments, exams and more. Several screen-shots were taken and will be reused in current application:

### 3.1 Siestta

This application (Siestta) are also available for PDAs, it could be a valid solution but it is server-side with outdated technologies. Data structure from Siestta is standard and fully functional, and it could be partially reused by EduXes. Source code are also shown: calendario.php. It shows us a PHP application which uses sessions variables and is not Model-View-Controller oriented.

All parts of this prealgebra textbook are copyrighted © 2009 in the name Department of Mathematics, College of the Redwoods. They are not in the public domain. However, they are being made available free for use in educational institutions. This offer does not extend to any application that is made for profit. Users who have such applications in mind should contact David Arnold or Bruce Wagner at [hidden email] or [hidden email].

text text

```
<?php
session_start();
require('config.php');
require('idioma/' . $idioma . '');
```

```

include('funciones_calendario.php');
$docente = $_SESSION['usuario_sesion'];
//recogemos variables
$mes_actual = $_POST['mes'];
$anyo_actual = $_POST['anyo'];
if($mes_actual || $anyo_actual) {
include('funciones.php');
conecta();
}
//si es la primera vez que entramos, cargamos la fecha actual
if(!isset($mes_actual)) $mes_actual = date('m');
if(!isset($anyo_actual)) $anyo_actual = date('Y');
//presentamos ahora el calendario del mes actual o cargado
//tabla con nombre mes y año y las flechas para navegar
echo '
<br />
<table class="tablacentrada_i">
<tr>
<td>
<a href="#" onclick="navegaMes(\'\'.$mes_actual.\'\' ,\'\'\'.$anyo_actual.
\'\'\' ,\'\'menos\'\' )" title="\'\'.$id_anterior.\'\'"></a>
\'';
$nombre_mes = numero_mes_a_nombre($mes_actual);

```

Develop database structure: tables and relationships. Data base structure looks like  
Illustration 5: EduXes Database structure

Basándose en artículos, libros, etc. que se os haya facilitado y de otros que estiméis oportuno, se hablará de:

## 3.2 Descripción del problema

...

### **3.3 Descripción de los trabajos anteriores que se han dedicado a resolverlo**

...



## Chapter 4

### Objetivo (5%)

4.1 Descripción, en un objetivo general, de la finalidad del proyecto.

...

4.2 Descripción de objetivos parciales que se necesitan cubrir para llegar al objetivo final

...

4.3 Descripción de alto nivel de las etapas que sigues en el desarrollo

...





# Chapter 5

## Descripción Informática (20-35%)

Para ello describirás:

**5.1** La base de datos coleccionada (si tiene sentido).

...

**5.2** Los algoritmos para el desarrollo de la solución

...

**5.3** qué quieres resolver

...

**5.4** cómo lo vas a hacer

...

**5.5** herramientas conceptuales necesarias

...

**5.6** herramientas utilizadas

...

ASD
-----

FFG

OVAL BOX

OVAL BOX shadowblock

**Contenido**

|, contenido ...

# Chapter 6

## Results

Application is evolving from list, edit students and groups, to its final goals. These objectives were fulfilled:

### 6.1 Objectives completed

- Access to any workday, any group and student.
- Management of attendance and misbehaviour of each student. The students information is still hard-coded into source files.
- 

### 6.2 Further objectives

- Links to student and group management. These pages were done but links are not missing into main application window.
- There are several objectives not fulfilled yet, but I am on the way to get those done, those are, in priority order:
- Data visualization. Student attendance and misbehaviour have to be shown in table-like window.
- Test into real hardware. EduXes.apk has to be copied into mobile phone.
- Activities evaluation per student. A window to display activities marks and final mark.
- Timetable management. A window to manage groups timetable. When a group has class with this teacher.

- Server synchronization with a custom application or

These objectives were not fulfilled because time and skills lack.

En este apartado deberán quedar reflejados los experimentos realizados. Para ello se mostrarán:

### **6.3 Resultados en forma de tablas, gráficas e imágenes donde se describa cuantitativa y cualitativamente el funcionamiento de la aplicación**

...

### **6.4 Análisis crítico de los resultados con el objetivo de decidir si el sistema implementado es válido**

...

# Chapter 7

## Conclusiones y trabajos futuros (5%)

Resumen de los logros principales conseguidos, destacando:

### 7.1 Implementación

...

### 7.2 Resultados

...

En futuros trabajos, a partir de una crítica constructiva del trabajo realizado, plantear mejoras y extensiones del mismo.



# Bibliography

- [NC97] Isaac Newton and Naomi Campbell. A re-formulation of gravity with respect to really cool models. *Jornal of Funny Physics*, 35:39–78, 1997.
- [Pes03] Mark D. Pesce. *Programming Microsoft DirectShow for digital video and television*. Microsoft Press, 2003.

Lo relativo al anexo 1 ...

Ejemplos de tratamiento de texto:

Probamos una cita [NC97]

Citamos un libro[Pes03]

Probamos a poner una nota al pié<sup>1</sup>

Probando: *cursiva* **negrita** subrayada enfatizar

*Tools used: Sqlfairy. Tranforms SQL language into a png image. LibreOffice 3.5.4.2 to write this document. 1 Gimp 2.8.2 to get screen-shots. GNU/ Debian Wheeze October 2012*

*References: Comparison among open source hosting facilities: [http://en.wikipedia.org/wiki/Comparison\\_of\\_open\\_source\\_hosting\\_facilities](http://en.wikipedia.org/wiki/Comparison_of_open_source_hosting_facilities) : <http://www.w3.org/TR/webdatabase/PhoneGapStorage> : <http://docs.phonegap.com/en/1.8.1/cordova-plugin-phongap/index.html> : <http://jquerymobile.com/demos/1.1.1/Query> : <http://docs.jquery.com/SergasApp> : <http://mrego.github.com/sergasapp/EduXes> : <https://github.com/joseantoniosa/EduXes/Siestta> : <http://siestta.sourceforge.net/doc/index.html> XadeWeb : <https://auth.edu.xunta.es/cas/login>*

*This document is hosted at: <https://github.com/joseantoniosa/EduXes/blob/master/docs/PhoneGapStorage.png>*

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<sup>1</sup>Mi primera nota al pié