

## Chapter 7.11

# Open Source for Mobile Devices and Mobile Learning

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### ABSTRACT

*Open source software is increasingly used for many types of mobile apps and wireless devices. A leading example is Funambol, the world's most popular mobile open source server project. This chapter discusses the background of the Funambol project and how it applies to mobile learning in three specific areas: wireless device compatibility, data and content synchronization, and mobile device management. The chapter also discusses major trends that are affecting mobile open source software for mobile learning, challenges that are confronting mobile software developers and content authors, and the benefits of using open source software for mobile learning systems.*

### INTRODUCTION

Open Source software is increasingly being used on a diverse spectrum of wireless devices, for a broad range of purposes. Examples include Google Android, a major mobile operating system, Web-Kit, a layout engine that is the basis of several mobile web browsers, and Funambol, a mobile cloud sync server that keeps data and content in sync between mobile devices and other systems.

This chapter describes Funambol open source and how it can benefit mobile learning. Funambol is the most popular mobile open source server project in the world. Funambol open source software has been downloaded more than four million times by 50,000 mobile developers in 200 countries. The open source project that Funambol is based on was started in 2001. Today, it has a vibrant worldwide community of developers and users who utilize open source for numerous projects on many types of wireless devices.

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Funambol's experience as the world's leading mobile open source server project can shed light on the utility of open source for mobile devices and mobile learning in three primary areas: device compatibility, data and content synchronization, and device management.

## **BACKGROUND**

The open source project behind Funambol, Sync4J, started in 2001. Its goal was to create an open source software server that could sync any type of data or content with any mobile device. It was called Sync4J because it was initially intended to provide synchronization for Java applications. Since then, although many components of Funambol software are written in Java, the software has expanded its scope to support billions of mobile devices and connected devices, as well as hundreds of backend systems, regardless of whether they use Java.

Funambol is the leading open source implementation of the SyncML (OMA, 2010a) standard and protocol that is built into more than one billion mobile handsets. SyncML is also known as the Open Mobile Alliance (OMA) Data Synchronization (DS) protocol. It is a data-neutral standard that is optimized to sync a wide array of data between mobile devices and servers. It is commonly used to sync mobile address books (contact information), calendars, and other personal information management (PIM) data (e.g. tasks and notes), although the standard supports practically any data. SyncML has also been used to synchronize email, files and rich media such as photos and videos. The standard was recently updated to support the syncing of large objects, such as video files, which can be important for mobile learning.

Beyond data synchronization, SyncML provides the ability to notify mobile clients when there is new information (using 'push' notifications), conflict resolution (e.g. what happens if the same

data is changed on both a device and server at the same time), and disconnected (or offline) use.

SyncML was developed by a consortium of organizations to promote mobile data interoperability. They wanted to avoid reinventing the wireless infrastructure wheel to sync data with diverse mobile devices. This is why Sync4J was based on SyncML. It is also why Funambol is the most popular open source implementation of SyncML and why Funambol is for those pursuing mobile learning.

Funambol has played an important role in evolving the SyncML protocol over time. The OMA, which is the governing body for OMA DS (SyncML), also provides a standard specification for mobile device management known as OMA DM (OMA, 2010b). Funambol also provides open source OMA DM software, consisting of both client and server software that can be used to build systems that remotely manage mobile devices. Typically, device management capabilities include over-the-air (OTA) provisioning, firmware and software updates, and diagnostics. This can also be important for mobile learning systems as they are often used remotely by users, which necessitates remote setup, monitoring, and diagnostics.

The Sync4J project became the Funambol company in 2006 when its headquarters relocated from Italy to Silicon Valley and the company received its initial venture capital. The majority of the company's R&D remains in Italy although there have been numerous software contributions from Funambol's worldwide community of mobile developers. Funambol acquired another open source company, Zapatec, for its AJAX (Wikipedia, 2010a) web 2.0 software framework in 2009. Zapatec had several developers in Ukraine who are now part of the Funambol R&D team.

Today, Funambol provides an open source mobile cloud sync solution and platform for billions of mobile phones and connected devices. It has three primary components, as illustrated by Figure 1.

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