

1 Introduction

One of the very first steps of this project, is to choose the device on which we are going to develop and test the application, that will enable interaction with the RFID Guardian. Some of the most important features that should be available on the device are the support of Bluetooth connectivity, secure protocols like SSL and/or TLS, and also the support of Java applications. Simple mobile phones do not support such features, so we turn to smartphones. A smartphone is a full-featured mobile phone with personal computer like functionality. An important feature of most smartphones is that applications for enhanced data processing and connectivity can be installed on the device. These applications may be developed by the manufacturer of the device, by the operator or by any other third-party software developer. "Smart" functionality includes any additional interface including a miniature QWERTY keyboard or a touch screen.

2 Selecting Operating System - Symbian OS

We started by taking a look at the operating systems for mobile devices, and more specifically for smartphones. The most common operating systems used in smartphones are Linux, Windows Mobile from Microsoft, Symbian, RIM BlackBerry and Palm OS. According to Canalys, a leading provider of consulting and market analysis for the converged high-tech industry, the worldwide total smartphone device market and market shares are presented in the following table.

OS vendor	Q4 2005	% share	Q4 2006	% share
Symbian	10.7m	69.6%	14.7m	72.5%
Linux	3.3m	21.6%	3.4m	16.9%
PalmSource	0.6m	3.9%	0.4m	2.0%
Microsoft	0.4m	2.8%	0.9m	4.6%
RIM	0.25m	1.6%	0.8m	3.8%
Others	0.06m	0.4%	0.0m	0.2%
Total	15.4m	100%	20.2m	100%

We see that seven out of ten devices run the Symbian OS. That is a good reason for us to choose a device that runs that OS, as we want to develop an application that could run on as many devices as possible. Besides, Linux is used as a basis for a number of different platforms developed by several

vendors which are mostly incompatible, Palm OS is less popular with developers in general because of the non standard Java Runtime Environment, while the other operating systems cover less than 5% of the total share.

The Symbian OS is the world-leading open operating system that powers the most popular and advanced smartphones today. Some of the world's leading handset manufacturers like Nokia, Samsung, Motorola, Panasonic and Sony Ericsson use this operating system on their devices. Symbian is an operating system optimized for mobile terminals and provides a reliable environment as it has been designed so that user data is never lost and the device running the operating system will never have to be rebooted. Some of the key features of Symbian that are of our interest, are

- Platform security - proactive system defense mechanism based on granting and monitoring application capabilities through Symbian Signed certification. Infrastructure to allow applications to have private protected data stores. In addition, full encryption and certificate management, secure protocols (HTTPS, SSL and TLS) and WIM framework.
- Communications protocols - wide area networking stacks including TCP/IP (dual mode IPv4/v6) and WAP 2.0 (Connectionless WSP and WAP Push), personal area networking support including infrared (IrDA), Bluetooth and USB
- Graphics - direct access to screen and keyboard for high performance; graphics accelerator API; increased UI flexibility
- Mobile telephony - Symbian OS v9.2 is ready for the 3G market with support for WCDMA (3GPP R4 and R5 IMS)

3 Selecting User Interface - S60 platform

Once we chose which operating system our device should run, we had to choose for the user interface it should come with. User interfaces designed for Symbian OS include Nokia's S60, NTT DoCoMo's MOAP user interface for the FOMA 3G network and the UIQ platform, designed by UIQ Technology. Judging by the results of another research from Canalys, on the worldwide total smart mobile device market, we decided that the Nokia's UI would be our choice, as Nokia seems to provide half of the world's mobile devices. Besides, the FOMA devices are only available in Japan and the UIQ platform is to be found on a very limited number of devices.

Vendor	Q2 2005	% share	Q2 2006	% share
Nokia	6.695.800	54.9%	9.030.840	47.7%
Motorola	556.050	4.6%	1.586.870	8.4%
RIM	897.280	7.4%	1.183.430	6.2%
Sharp	29.840	0.2%	1.162.500	6.1%
Palm	1.057.420	8.7%	1.131.120	6.0%
Others	2.949.210	24.2%	4.849.550	25.6%
Total	12.185.600	100%	18.944.310	100%

Nokia's S60 Platform is a complete package of applications, user interface and development tools. It has been designed to run on various models of different manufacturer's devices. In other words, an application developed for S60 Platform will run smoothly on all devices that run the same platform. This is quite important for us, as after all we are not designing a device specific application with very limited applicability, but rather a platform specific one, which makes the application more applicable.

The S60 User Interface (UI) has been specifically designed for easy, one-handed use. From the user's point of view, probably the most important feature of the platform is its user interface: A large color screen (several resolutions) and the various input keys (two soft keys, five-way navigator and several dedicated keys). It is easy for any user with experience of mobile phones to grasp the basic idea of the UI. There are also a variety of applications to be found on S60 Platform. Important amongst these is the installation engine that allows the user to add or remove applications to and from the platform, either via PC Connectivity or Over-the-Air downloads. We plan to develop out application in Java, as Java is the leading mobile application development environment with more than 190 operators worldwide that have deployed Java services, more than 708 million mobile Java devices in the market of 635+ Java handset models, and around 23 million mobile Java downloads globally per month in 2005. S60 Platform provides support for applications written in the Java programming language. The Java platform implemented on S60 devices is the Java 2 Platform Mobile Edition (J2METM), which is designed for small mobile devices, such as smartphones. Any Java application can easily be delivered over the Internet, or any network, without operating system or hardware platform compatibility issues. Java technology components run on any kind of compatible device that supports the Java platform.

4 Selecting Device

We have chosen the operating system and the user interface of the device so far, but also the manufacturer (Nokia). The next step is to go through the set of those Nokia devices with the Symbian OS and the S60 user interface, and choose one for our project. There are a lot of devices that support the S60 platform, thus some necessary features for our application. As long as Bluetooth connectivity, SSL/TLS and Java applications are supported, the device is suitable for our purpose. A list of candidate devices is given below:

S60 1st	S60 2nd	S60 3rd
Nokia 3660	Nokia N70	Nokia 5700, Nokia N77
Nokia N-Gage	Nokia N90	Nokia E90, Nokia E65
Nokia 3650	Nokia 6680	Nokia N76, Nokia N93i
Nokia 7650	Nokia 6681	Nokia 6290, Nokia N95
Nokia N-Gage QD	Nokia 3230	Nokia E50, Nokia N73
	Nokia 6630	Nokia N93, Nokia N80
	Nokia 6670	Nokia N92, Nokia N71
	Nokia 7610	Nokia E70, Nokia E61
	Nokia 6260	Nokia E60, Nokia 3250
	Nokia 6660	Nokia N91, Nokia 5500 sport

First, we eliminated the devices that were not using the latest version of S60, as the newest version S60 3rd edition includes an improved look and feel, more features for multimedia and business applications, and better security. Then we decided we do not want to use on of the very latest models of Nokia, but we prefer to develop our application for a device that can be found already in the market. So Nokia 5700, N77, E90, E65 and N76 were out of the question. For the rest of the devices, we took into consideration the Java technology supported and found that Nokia N71, 6290, 5500 Sport, E50, N73, N93, N80, N92, 3250, N91 and N71 did not support the MIDP 2.0 specification with enhanced user interface and end-to-end security. Moreover, those devices had very limited standby/talk time, which is not desirable in our case, as we want the device constantly connected to the RFID Guardian. From the remaining devices, we chose E61 as it is the only one supporting both phone keypad and full (QWERTY) keyboard, it has the longest standby/talk time, a reasonable price and the best design. It may not have a camera, but this is not really what we are interested in.

5 S60 emulator

Before installing an application to a real device, we can view and test it on the S60 SDK emulator. The emulator provides a graphical interface of a real phone with the needed phone functionality to test an application. The emulator mimics the operation of an application on a real phone so accurately that application development can be done even before the required hardware, that is, an S60 smartphone, is available.

6 References

www.s60.com

www.nokia.nl

www.forum.nokia.com

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