Synthesis Lectures on Mobile and Pervasive Computing

Editor

Mahadev Satyanarayanan, Carnegie Mellon University Mobile computing and pervasive computing represent major evolutionary steps in distributed systems, a line of research and development that dates back to the mid-1970s. Although many basic principles of distributed system design continue to apply, four key constraints of mobility have forced the development of specialized techniques. These include unpredictable variation in network quality, lowered trust and robustness of mobile elements, limitations on local resources imposed by weight and size constraints, and concern for battery power consumption. Beyond mobile computing lies pervasive (or ubiquitous) computing, whose essence is the creation of environments saturated with computing and communication yet gracefully integrated with human users. A rich collection of topics lies at the intersections of mobile and pervasive computing with many other areas of computer science.

A Practical Guide to Testing Wireless Smartphone Applications Julian Harty

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A Practical Guide to Testing Wireless Smartphone Applications

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ABSTRACT

Testing applications for mobile phones is difficult, time-consuming and hard to do effectively. Many people have limited their testing efforts to hands-on testing of an application on a few physical handsets, and they have to repeat the process every time a new version of the software is ready to test. They may miss many of the permutations of real-world use, and as a consequence their users are left with the unpleasant mess of a failing application on their phone.

Test automation can help to increase the range and scope of testing, while reducing the overhead of manual testing of each version of the software. However automation is not a panacea, particularly for mobile applications, so we need to pick our test automation challenges wisely. This book is intended to help software and test engineers pick appropriately to achieve more; and as a consequence deliver better quality, working software to users.

This Synthesis lecture provides practical advice based on direct experience of using software test automation to help improve the testing of a wide range of mobile phone applications, including the latest AJAX applications. The focus is on applications that rely on a wireless network connection to a remote server, however the principles may apply to other related fields and applications.

We start by explaining terms and some of the key challenges involved in testing smartphone applications. Subsequent chapters describe a type of application e.g. markup, AJAX, Client, followed by a related chapter on how to test each of these applications. Common test automation techniques are covered in a separate chapter, and finally there is a brief chapter on when to test manually.

The book also contains numerous pointers and links to further material to help you to improve your testing using

automation appropriately.

Table of Contents / Introduction / Markup Languages / Testing Techniques for Markup Applications / AJAX Mobile Applications / Testing Mobile AJAX Applications / Client Applications / Testing Techniques for Client Applications / Common Techniques / When to Test Manually / Future Work / Appendix A Links and References / Appendix B Data Connectivity / Appendix C Configuring Your Machine

KEYWORDS

automation, mobile, test, wireless

Preface

Welcome to the first edition of the *A Practical Guide to Testing Wireless Smartphone Applications.* I hope you find this material useful as a technical introduction to the thorny subject of how to automate tests for mobile wireless applications that run on smartphones. Here you can learn about the basics of various practical techniques, then follow the links and references to learn more about topics of relevance to you. I encourage you to seek other examples and references, and to experiment with test automation, in order to test your applications more effectively.

I wrote this guide as I could not find anything similar when I started in the field of mobile wireless testing. After two years of adding material to my notes the content is still unfinished and incomplete; and I realize I am unlikely to ever "catch up" to cover the encyclopedia of topics, as the field of test automation for wireless smartphone applications continues to change and evolve. So, here is what I have written so far. I hope it will enable others to learn about the subject much more quickly.

I hope to publish updated versions as I learn more about the subject, and I welcome your contributions. Some draft material is also available online at http://sites.google.com/site/mobilewirelesstestautomation/

I currently work at Google. Some of the examples come from issues encountered at work, the rest come from a wide range of sources.

Please be aware that this work continues to evolve based on my experiences: for instance I would like to include information on test automation for the Android platform once I have the relevant experience, which is driven—in part—by my project assignments.

What Is Inside

Chapter 1	We start with an overview of the field of mobile wireless test automation: What is it? What are the challenges? And how will we approach the problem of test automation. I've included a summary of topics currently beyond the scope of this book, or my experience, others are welcome to provide material on these topics.
Chapter 2	Introduces markup languages and provides examples of two common languages: WML and xHTML.
Chapter 3	Introduces some test automation techniques for markup languages. The code is built up from very modest beginnings, and thankfully it remains compact and easy to comprehend after we have enhanced the scripts to do more.
Chapter 4	AJAX applications are starting to be developed specifically for mobile devices, e.g., for the iPhone. This chapter explains the fundamentals of AJAX mobile applications, how they behave, and explains some of the testing challenges.
Chapter 5	The testing strategy for mobile AJAX applications combines testing techniques for desktop AJAX applications with several tricks based on our work for markup applications.
Chapter 6	Introduces client applications and provides a high-level testing strategy for them.
Chapter 7	Includes the testing techniques for client applications.
Chapter 8	Includes common techniques which are broadly applicable across multiple applications.

Chapter 9	Provides some guidelines on when to test manually.
Chapter 10	Introduces future work: topics I'd like to include and cover in future versions of this book.
Appendix A	Contains lots of links and references which may help you in your testing exploits.
Appendix B	Provides an overview of data connectivity.
Appendix C	Describes how to configure your computer to use a mobile wireless connection, e.g., GPRS/3G.

Conventions

Text is in this font. Code examples have a shaded background, e.g.,

```
import urllib
```

Key lines of code will be in bold, and may be numbered, e.g.,

```
response = request.open("http://www.google.co.uk/m") (1)
```

1. Each numbered line would be described immediately after the example code.

Commands, system responses, and code within the main body of the text, etc., will be formatted in Courier (e.g., man minicom) which you can enter in a suitable terminal command window.

Hyperlinks are live in the electronic edition of this book e.g., http://google.com/m

What You Will Need

All the examples use freely available software. The main programs are: Python, Java, and the Firefox web browser. Recent versions of both tools (e.g., Python 2.4, Java 5, and Firefox 1.5) should be suitable, although I suggest you use the current versions of the programs.

Using Code Examples

All the code samples are available from the author or at http://code.google.com/p/mwta/. You are free to use and modify the code.

Alphabet Soup and the Half-life of Links

On reviewing my writings, I am overwhelmed by the number of acronyms and aware of how quickly the links decay, either by the target disappearing or because they are no longer the most suitable or the most current reference. When you meet an unfamiliar acronym please search the internet for the meaning and derivation. For old and decaying links—make notes on your copy of the book and add updated links and comments to keep your copy current.

Acknowledgments

Thank you to my colleagues at Google who have helped me understand many of the nuances of mobile wireless technologies. Greg Block contributed the material on image stitching. Mike Davis reviewed much of the book for technical content.

Michela Wrong also reviewed the entire book, at short notice and while on holiday. Her diligent notes enabled me to make the content more consistent, clearer, and more readable.

Thank you also to Google who hired me as a novice in the field of mobile wireless testing, they encouraged me to learn the technical nitty-gritty of the domain while I tried to contribute usefully in terms of testing our mobile applications. They also permitted me to release this material for public consumption which helps spread the knowledge and understanding of a fairly specialist field.

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