

Modeling Parallel Applications on Mobile Devices

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Abstract. Nowadays more and more users have mobile devices with high computing power. This fact allows taking advantage of that processing power to design applications that allow users to interact remotely with the system simply using, for example, their cell phones. This requires having a modeling tool that allows incorporating the concepts of mobile computing and their particular domain characteristics. This work shows an extension to the UML profile called PROCODI (Concurrent and Distributed Processes), which adds the possibility of incorporating mobile devices as nodes within the model. This fact allows a quick visualization using a single diagram, of structural and behavioral aspects of the system, also including, now, mobile devices with their peculiarities.

Keywords: Mobile Computing, UML, Profile, Distributed Computing.

1 Introduction

The use of mobile devices in the field of Enterprise applications began several years ago. Initially it began by taking advantage of the capabilities of PDA (Personal Data Assistant) type devices like Palm, Symbian or Pocket PC. These devices had limited processing power, limited memory and their connectivity capabilities were not permanent. A little bit later other devices emerged that were able to combine the connectivity features of cell phones with multipurpose operating systems like, for example, windows mobile, creating the firsts smart phones. With these devices, despite of still lacking of computing power and memory, the users had a permanent connection, because of the capability of connecting to the cell phone network, opening the possibilities of making connected interactive applications, where the user

is capable of interacting with the system without a fixed location. However these devices were not massively used, and they were limited to some particular sectors.

Nowadays mobile technology has progressed considerably and continues with a fast growth every day. There are in the market a great diversity of cell phones with a processing power that far exceeds the power of Palm or Pocket PC devices, and that is close to a desktop computer. These new mobile devices are not limited to cell phone because Tablet PC devices are becoming popular with devices like Apple IPAD, Motorola Xoom, Blackberry Playbook, etc becoming a continuous growing's field. Most of these devices, cell phones and tables, have several ways of internet connectivity, like WIFI, GPRS, EDGE and 3G. The hardware's advance makes that, when designing applications, designers start thinking that it might be running on both a desktop and a mobile device, where, although it will require some adaptation for example for displaying on small screens, its processing capabilities allow considering more complex applications.

One of the main subjects that must be considered when designing an application is to take advantage of the multiprocessing capabilities of the new mobile operating systems, where, with or without the presence of multiple cores, it is possible to run several threads simultaneously, speeding heavy processing tasks in the applications. Therefore, when modeling a distributed and/ or parallel application, it should be considered that the application could also be used in a mobile device because it could be seen as one more processing node in a particular application with similar features of a fixed node.

2 Extension of UML Profile PROCODI

In 2010 the research team finished the design and building of a profile based on UML [2] which main goal was to model parallel and concurrent applications in an easy way by using a single diagram that allows identifying:

- The different nodes involved in the application
- The communication channels between the nodes
- Activities that run simultaneously by the specification of the tasks of each thread
- Generic parallelizable activities which are distributed automatically on different threads.
- Access to shared resources and signaling

This work shows and extension to PROCODI to allow modeling parallel and distributed applications that include mobile devices as some of the nodes. For that purpose the following characteristics have been added to the profile:

- Mobile device: represents the nodes that can change their location.