

An Approach for Developing Context-Aware Mobile Application

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ABSTRACT

Mobile applications run in dynamic environments characterized by huge contexts variability due to user mobility and limited device resources. Context awareness requires context monitoring and system adaptation, these two tasks are very expensive especially in mobile applications. This paper aims at developing a methodology that enables context-awareness techniques for mobile applications that allows adaptations to context changes so that the desired system quality is preserved.

1 INTRODUCTION

Context-aware systems must be aware of its surroundings and use this information to decide and act accordingly. A contextual situation can be defined by a group of context variables and their values, under which a system will eventually run. A contextual situation can be characterized by a group of environment, computing platform and users context variables [2]. This paper suggests a methodology for transforming an Android mobile application into context-aware application, that preserves the software quality under different contextual situations, by using an evolved version of CAPS environment. The CAPS environment, an architecture-driven modeling framework for the development of Situational Aware Cyber-Physical Systems [3], has valuable frameworks to model the contextual situations and the possible behavior adaptations, and to enable code generation for these adaptations.

2 METHODOLOGY

The general methodology, inspired from [1], sketched in Figure 1, is composed of three parts: i) In the middle of the Figure, it is sketched the context and adaptation definitions process that specifies the context variables and behaviors that will be used in the methodology. ii) The right side of the Figure, sketches the model-based analysis process that supports the design of the context-awareness and the adaptation to implement in the application. This process aims at selecting the context variables to monitor and a set of adaptive behaviors to inject into the mobile application that allows guaranteeing the required software quality [1, 4]. iii) The left side of the Figure, reports the suggested model-driven code transformation process based on a new version of CAPS that transforms the original code of the mobile application in the one embedding context-awareness and adaptation. It includes a modification to the original CAPS framework [3] to recognize sensor types that are well known in the android systems. These sensor types are: sensor axes, base sensors, and composite sensors (activity, attitude,

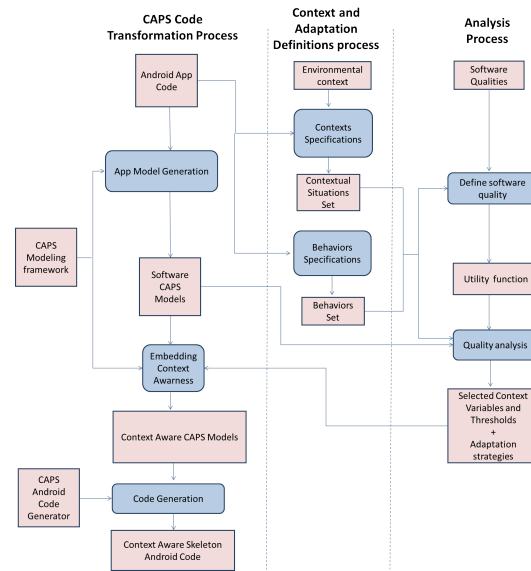


Figure 1: The General Methodology

uncalibrated, and interaction). Moreover, the later process includes Android code generator that is able to generate a skeleton Android code and files that facilitate the mobile application transformation into context-aware application. The methodology mitigates developers worries in producing context-aware Android mobile applications. It facilitates the conversion to context-aware application by providing Android skeleton code that includes the analyzed behavior adaptation.

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