Migrating Software to Mobile Technology: A Model-Driven Engineering Approach

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ABSTRACT

Nowadays, software industry evolves to tackle new approaches aligned with new paradigms such as Ubiquitous Computing, Mobile Computing, Cloud Computing or IoT (Internet of Things). Future embedded and ubiquitous systems will operate continuously on mobile devices such as smartphones which come with a variety of sensors (GPS, accelerometer, digital compass, microphone, and camera) enabling a wide range of mobile applications related to the mentioned paradigms. Mobile computing originated advances in the electronic miniaturization and communication technology facilitating the development of distributed processing to create networks of billions of devices such as 3G, 4G and 5G. In summary, Mobile Computing is crucial to harnessing the potential of Ubiquitous Computing, Cloud Computing and IoT and, without the existence of smartphones these paradigms would not exist.

The development of Science & Engineering applications requires adapting desktop software components to these new paradigms. There are many of these desktop applications still critical and their complete replacement is dangerous. Model Driven Engineering (MDE) is a promising approach to solve this problem [1]. Technical frameworks for information integration and tool interoperability aligned to MDE can help to manage a huge diversity of new technologies and mobile platforms. On the other hand, new programming languages are thus emerging to integrate the native behaviors of the different platforms targeted in development projects. In this direction, the Haxe language easily allows adapting the native behavior of different platforms such as Android, iOS and BlackBerry, in a straightforward way [2].

Our goal focuses on the migration of non-mobile software to mobile platforms as a mean of software modernization. In this work, we describe a migration process from C/C++ software to new technologies that integrates MDE with the Haxe language. The process includes three phases: reverse engineering, restructuring/refactoring and forward engineering. It follows model-driven principles: all artifacts involved in the process are viewed as models that conform to standard metamodels and the migration process is divided in smaller steps focusing in specific activities that can be automated thanks to the chaining of model transformations. All the involved software artifacts share a common format allowing interoperability and can be reused, modified for evolution purposes or extended for other purposes. An important issue of our approach is to provide support for reasoning and verification in the modernization of systems that are critical to safety, security and economic profits. The approach was validated in the Eclipse Modeling Framework (EMF) that provides tools and run-time environments aligned with MDE principles [3]. Case studies in Science & Engineering domain that show the advantages of our approach were developed.

REFERENCES

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