

# Evaluating Self-Management Features for Mobile Applications

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## ABSTRACT

With the increase in the number of smartphones, the use of mobile applications is growing dramatically in today's high-tech environment. With this high user demand, the quality of mobile applications is becoming a serious issue. With the perspective of quality enhancement, these applications must be smart enough so that they can handle any kind of issue automatically. Also, with the increasing complexity of these applications, they need to be more self-managed for better operability and interoperability. The self-management features allow handling issues such as error handling, optimization, resource utilization, configuration management etc. by its own. This will lead to the better functionality of mobile applications. The present research work proposes to incorporate autonomic capability as an attribute for assessing mobile applications. A multi-criteria decision-making approach named ELECTRE-TRI outranking method is used to evaluate the self-management aspect i.e. the autonomic capability of mobile applications to provide the quality estimation of mobile applications a better way.

## KEYWORDS

Autonomic Computing, Mobile Applications, Multi-Criteria Decision Analysis (MCDA), Quality Attributes

## INTRODUCTION

A mobile application refers to a kind of the software application, which is designed & developed for mobile devices (smartphones, tablets, notepads, etc.). Such an application may be of two types: - hybrid applications and native applications (Luntovskyy, 2018; Ma et al., 2018). Environment (platforms or hardware and operating systems) in which these applications run are very complex. With the continuously evolving technical world, mobile applications have become pervasive. Now we are in the time where millions of applications have been designed and developed which are making the life of the people easier in some way or another.

Mobile applications emerged due to the extended use and the popularity of many handheld devices such as tablets, smartphones other smart devices (Falaki et al., 2010). mobile applications are available in various varieties from traditional communication services to voice communication over the internet, gaming applications and much more. As a portable operating platform, a mobile software system plays an important role in providing a challenge to desktop software systems. It is a field that has become quite attractive for software developers. With the increasing number of applications, quality of the applications among the people has become a major issue. In digital sectors, these applications are growing dramatically, and developers are finding difficult to get benefit from

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their work as an ample number of applications providing same functionalities are available in the market but only a few are there that stands on the quality standards.

These applications have stringent quality requirements and attributes which help to define the quality attributes of the applications. Most common attributes considered are usability, security, reliability, maintainability, and performance (Abran, 2010; Nitze & Schmietendorf, 2015; Spielberg, 2009). The hardware and environment in which the mobile applications operate are the constraints for the development of such type of applications. Thus, mobile applications have to be developed and expressed by integrating an appropriate approach and methodologies that encompasses marketing, business and technical aspects (Ahmad et al., 2018). Developers should not neglect the significance of mobile applications as it directly affects the reputation of the company and developers developing the mobile applications.

With the analysis of the quality characteristics of such applications in great detail with reference to ISO 25010:2011 software quality model and other quality model proposed (Dehraj et al., 2018) the research work proposes to incorporate and evaluate other quality attribute named “autonomic capability” for mobile application development to meet the current stringent requirement of mobile applications with better consideration and results.

### **Autonomic Capability**

Autonomic is a term that reflects the same behavior as the nervous system of the human body behaves (Aggarwal et al., 2016). The nervous system of the human body regulates the whole body without providing any conscious input. Similarly, the autonomic system regulates a whole software system without having any input information from the user, providing self-management. IBM is the one who introduced “autonomic computing” to the world in 2001 to provide self-management software systems (Horn, 2001). Four characteristics were given to define autonomic computing:

1. Self-configuring: refers to a reconfiguration of the software system by itself with the help of an autonomic system.
2. Self-healing: that provides fixing of failures of the system according to some defined policies set by industry professionals by analyzing its cause.
3. Self-optimizing: this refers to the allotment of resources by an autonomous system to improve performance.
4. Self-protection: this prevents the system itself from various malicious activities providing various types of warnings to the user according to the malicious activities identified by the autonomous system.

Introducing autonomic feature in software system application allows the system to run themselves without any support from the user in any unconditional circumstances. Among the literature that exists (Nami & Bertels, 2007; Sterritt et al., 2005; Tianfield, 2003), various characteristics for autonomic have been described as:

1. Self-regulation: this allows a system to maintain some parameter regularly e.g. QOS
2. Self-learning: allow a system to learn from past events, in order to prepare for upcoming events in the future.
3. Self-awareness: a system must be aware of its advantages and disadvantages. That is, the extent to which its own resources are capable of and how the system internal and external components can behave in any situation. This can also be known as Self-inspection.
4. Self-creation: this is also known as self-assembly or self-replication. The systems which are developed for social reasons, without having any explicit pressure from outside (Tesauro et al., 2004).

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