

An Effective and Efficient Advanced Model for Testing Applications in Smart Services Global

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Abstract—Smart applications are multiplying day by day in a continuous spread. The diversity of these applications and means of promoting across several web sites , specialized companies and the sessions that supports this area , require in the midst of this globalization the urgent need for testing smart applications and quality assurance for products, in addition to the great importance of user acceptance for the widespread presented applications in smart services world . The research arose from the pressing necessitate of testing applications and quality assurance of products to have an advanced model in order to evaluate Smartphone applications with reprehensible high accuracy . This effort elaborate an indispensable approach among progressing software quality of imperative applications under International issues via adjusting validation and examination concepts for usage in mobile application development . A survey is done to appraise the efficiency of this proposed solution.

Keywords—QA(quality assurance); testing mobile application; smart application; smart services; cloud computing .

1. Introduction

The enormous progress nowadays for smart applications production and the marvelous acceptance from users for all categories [1] have become an amazing development in our life. This extensive increase in the number of applications in various fields besides the accreditation with smart devices inspire a qualitative leap on applications manufacture . Especially in the world of smart phones in general and in smart services specifically, which led competitions on application development in case of meeting basic needs of users and enabling them to access different services in all spheres of life. This conversion came with the strategic use of the latest information and communication technologies [11,12] achieving user satisfaction by providing flexible and interactive means of communication and intelligent features which work anywhere and anytime across many devices.

In the current era, there is an application for everything starting from games, passing through

configuration tasks to communications and GPS (Global Positioning System) applications. As a result, it becomes incumbent on anyone who tries to develop his own business and services in the area of internet to put smart phone applications in priority. Moreover, when developers devise an application, there are a number of important aspects, for instance: the idea, design and promotion besides consideration of difference between smart applications and software for traditional computers.

After this development and progress it has become an important issue to support smart devices by several kind of applications with high efficiency. This corresponds to the important role of this area of how we test these applications to represent an intelligent use in smart services [6,8]. For this we present an advanced model to test the range efficiency and quality assurance of applications in smart services frameworks.

II. RELATED WORK

Hammad and Emad [1] discuss the quality of mobile application from the user perspective. That's where the user reviews provide a well-heelled data source that can be leveraged to understand users concerns and get better prioritize for their quality assurance and recourses by developers. For this purpose the study uncovers twelve types of user complaints. Besides, providing developers' preview for users reported issues of IOS applications with their frequency and impact for each complaint . The search provided with clear and reasonable vision although it did not describe a particular model . The results need to be tested further by considering more applications across other mobile platforms.

E-Learning software has become a major field of interest in recent year [2]. Multiple approaches and solutions specifically in this domain have been developed. Conversely, testing in E-Learning software is the most important way of assuring the quality of the application in cause of preventing system from failing and proving that the program is free of errors. For this propose adducing a reliable code coverage technique which will ensure a bug free delivery of software development will be a solution. Besides, that it designed to be established that the software is working satisfactorily with its requirements. The study is useful in general but these manual tests are not executed. It needs to be automated tests which reduce effort and time during work. Considering few

points from the author overview that Automated test are very sensitive to software changes and do not handle unexpected behavior well. These drawbacks have to be overcome to achieve even high performance in the future.

Proper realization becomes decisive for high quality software in mobile applications lifecycles [3]. Conversely, a defective and inadequate or insufficient achievement can be a foundation of many tricky faults in planning mobile application lifecycle. In this vocation they establish that the prearranged lifecycle models and equivalent documentation with several mobile platforms are often incomplete, inconsistent and incorrect. For this propose an approach to reserve engineer application lifecycle of mobile platforms by testing is in attendance, which applied on several mobile platforms (Android, Java me and iOS). In addition to the developers modality of using outcomes to get acceptable lifecycle model for these platforms. The research tests the high quality for mobile applications lifecycle focusing in the different procedures related states of an application during runtime rather than software system development process. As future work they dispose to appraise the applicability of the accessible routine to further current mobile platforms and to check its compliance to platform changes.

In our lifetime software product progressively play a more central responsibility in a large issues [4]. Every software product faces a deposit of quality apparitions that concern us in contrastive conducts. For this case it's essential to dedicate further on the quality evaluation of smart phones application. This concern forced the author to improve a standard arguments with the mitigate of a quality model (ISO /IEC 9126) to estimate the quality of prototype designed actually on Android platform. The prototype was a time management application instituted on pormodoro technique. The research need to be more inclusive, it focus along with product quality in lieu of procedures quality of the product. In future work solutions are desirable in order to use the cache memory efficiency while user loses network connection. Besides, the research can be extended to adapt the metrics mapped to quality individuality for other mobile devices such as cellular phones and personal digital assistance (PDA) devices.

Measuring the service quality and customer satisfaction on smart phone trading services are classified in three categories: service contents, wireless network services and features of smart phones [5]. An extended model for measuring the smart phone trading services' quality is developed by using SERVQUAL and WebQual models. In addition, PLS model which is one of the Structural Equation Modeling is used to test research proposition and the reliability with validity that has been also hardened. Besides, wireless internet services that have insignificant impact on customer's contentment. The study submitted the research in interested view instead it needs to study the issue in more detail,

appropriate manner and general for all categories of people. Besides, it didn't consider the different of user's levels to be sure of the results. Rectifying past mistakes and more inclusiveness will give an advanced model on Smartphone trading services.

Under the recent proliferation and competition in mobile software market and what is remarkable on new technologies and new devices that germinates at exceptional speed [6]. Large quantities of mobile applications are strongly mounting day by day on the other hand. Quality factor is very importance and has a major role in such a scenario. There is pressing need for an improved quality model to provide guidelines for improvement and maintenance. A quality model is proposed for mobile application enlargement to provide high quality product to end users. It is written with good domain knowledge but it's not supported with validations. More specific characteristics and more needs of determination for quality models will improves mobile applications with fundamental validations.

A great number of mobile applications promotes software's quality turning into increasingly imperative concern in the technical empire [7]. In this case a proper mobile quality framework supply developers, as a principle for (QA) quality assurance. One of many solutions from the author overview is to provide a software quality framework for testing mobile application and present an approach for it. This framework is founded on mobile software quality model, defining basic quality means of mobile applications, providing instrumentations for mobile application development through metrics for testing it. The information that is presented in the study has good knowledge that can be useful although it's so general with non validations. An evidence adjusting validation for usage in mobile application improvement in more specific way beside testing concepts leads to high achievements on providing an enforceable framework for testing mobile among related activites.

Jerry and his colleagues [8] offers in this study an educational and perceptive dialogue about mobile testing - as - a service (MTaaS), including basic concepts, motivation, divergent properties and necessities, test environment and dissimilar approaches. In this case the paper proposes a model business test regarding into cloud infrastructure for mobile TaaS, discussing the required mobile test frameworks and its environments. Besides, many stratigies and factors which addresses existing issues, challenges, and emergent requirements. The study is very advanced even though it needs to be applied on a test model. In future as more constructions and deployments of mobile APPs and web applications on devices upon engineers that will need more quality validation researchs and tests automation tools to deal with the discussed issues and challenges.

Cloud computing is entering an explosive growth over the recent years [9]. consequently, Cloud testing

becomes searing investigate theme in cloud computing and software engineering community. In this regard ,this study provides an inclusive detailed tutorial on cloud-based application testing. It answers the numerous questions advanced by engineers and managers through providing obvious concepts during discussing special objectives, features, requirements, and needs in cloud testing . In addition, it scrutinizes the foremost challenges, issues and needs in testing cloud-based software applications. This study is detailed in a clear overview wanting basis on particular model.

Smart services in our humanity are expected to play a key roles [10]. Rising patterns for establishing services with 'smartness' characteristics leading as a

key constituent of smart services along with various types of contexts, including mobile and social contexts in this area. Moreover, with the initiation of sensor technology and availability in mobile devices, contexts become a key foundation of information from which situations can be contingent. However, fundamental technical issues remain unresolved matters, principally in software framework area for developing and deploying smart services. In this regard the authors inscribe a software framework for context-aware smart life services and Smart Service Framework (SSF). Profound in general nearby limited specifications need to be supported more with validations.

TABLE 1. THE CONTRIBUTIONS AND LIMITATIONS IN RELATED WORK

Title of Paper	Contribution	Limitations
Discusses the quality of mobile applications from the user perspective.[1]	Uncover twelve type of user complaints and evaluate the frequency and impact for each complaint type.	Provided with clear and reasonable vision / but it did not describe a particular model.
Discusses the importance of testing the quality assurance of E- Learning software application.[2]	Adducing a reliable code coverage technique in software testing.	useful / but these manual tests is not executed it needs to be Automated tests which reduce effort and time during work
Discusses the high quality of mobile application lifecycle.[3]	Present a method to reserve developers application lifecycle of mobile platforms through testing.	The test of high quality for mobile applications lifecycle focus in the diverse procedures related states of application throughout runtime rather than software system development process.
Evaluate software product especially the quality of smart phone application . [4]	improve a standard arguments with the mitigate of ISO /IEC 9126 quality model to estimate a prototype quality which designed on Android platform.	The research need to be more inclusive it focus along with product quality in lieu procedures quality of the product.
Measuring service quality and customer contentment on smart phone trading services.[5]	An extensive model is given for mensuration smart phone trading services' quality.	interested view/ but it needs to study the issue in more detail, appropriate manner and general for all categories of people/ didn't consider the different of user's levels to be sure of the result.
The pressing need for the Quality factor .[6]	Mobile application development necessitates quality model that proposed to provide highly product quality to the end users.	good domain knowledge/ but no validations
The importance of software quality in mobile application.[7]	provide software quality framework for testing mobile application and presenting an approach for it.	useful / so general and there are no validations
The importance of mobile testing - as - a service (MTaaS).[8]	the paper proposes a model business test regarding into cloud infrastructure for mobile TaaS, discussing requisite mobile test frameworks and its circumscriptions.	The study is very advanced/but it needs to be applied on a test model
Cloud testing is entering an explosive growth over the recent years in cloud computing and software engineering community.[9]	paper present a comprehensive tutorial on cloud testing beside cloud-based application testing.	In term of excellence for a detailed study/ it was not based on a particular model.
amount of fundamental technical issues stay behind unresolved matters, principally in the area of developing and deploying smart services framework .[10]	By the author software framework is presenting for context-aware Smart Service Framework (SSF) and smart life services.	It's so general , in very limited specifications need to be supported more with validations.

After reviewing the previous work it is time to formulate the problem definition of this paper as following:

Smart applications are multiplying day by day in a continuous spread. The diversity of these applications and means of promoting across several web sites, specialized companies and the sessions that supports this area, require in the midst of this globalization the urgent need for testing smart applications and quality assurance for products, in addition to the great importance of user acceptance for the presented applications in smart services world. In this regard, these needs, challenges and issues presuppose considering of software testing method and techniques for quality assurance of smart applications. Subsequently, the objectives of the study cover several limitations of [1,8] and the lack of comprehensiveness in testing models [4,5] in terms of achieving service efficiency as well as flexibility, smoothly, credibility [16], availability and suitable characteristics during using this sort of applications and through working. Besides, announcing users feedbacks and experiences [1] which require high performance functionalities.

As a result, these limitations lead up to write this research as a case study in how to test application from various angles so as to be entitled under smart applications that serve smart services global. The main focus has been placed on giving a clear picture and insight of the importance of smart applications activities and the technical quality features in the technology world. In this regard, an advanced model is given in this research with the aid of two standards quality models (ISO 9241-11 and ISO 9126 QM) to evaluate the quality of applications that serves smart services through government jobs, health, education, politics and other several areas such as entertainment social communication, electronic traffic systems and Global Positioning System and many others.

III. THE PROPOSED SOLUTION

An advanced model is presented in this research to facilitate a different way of testing which would simultaneously ensure the quality of the application efficiently achieving high level of service during daily life. The test model is also inclusive of all aspects of service to ensure the validity of applications to be smart application p; meeting all conditions for users needs, challenges and issues. With user acceptance, the performance of service, smart features and other phases will illustrate more through the study. The idea is represented in improving a model testing (Taas) Testing as a service, where its composed of layers, each has a set of tests for evaluating the application by rating star for each one, to show the extent of passing the stage of success for every application to serve smart appliances. And thus guarantee the quality of the product to acquire user satisfaction and the quality of the application and its saleability. Hence, the proposed model gives a scientific overview of what

are the characteristics of smart applications that serve government issues as is illustrated in figure{ 1.}. Thereafter, it is supported by several objectives to be applied. In this regard, smart applications are represented to have several specifications as follows:

- The application should be unique compared with others and quite distinct from similar applications that perform the same purpose. Beside solving duplication challenges, other than that focusing on quality assurance plans for singles applications.
- Associated with administration databases and huge servers to save the vast amount of information that serves several ranges like: governmental, otherwise practical (educational and health areas), social even if it was for entertainment issues such as social communication, instagram and long games.
- Include Cloud Computing Technology where it has recently received significant attention for changing the way of computation and servers to customers, facilitating solution finding for the challenges and issues of security, privacy, buck up and recovery, the efficiency of applications performance and quality assurance anywhere and anytime.
- The containment of digital cameras beside multimedia properties (video and audio) where applications contain the property of capturing images and recording audio clips during run time.
- Systems guarantee the adaptability and upgradeability for applications constantly over application lifetime to insure the integrity and efficiency of application within the users need forever.
- The possibility for access from the same application to other effective applications in order to assist other services such as emails, Google, social communication and many more examples.
- Take the necessary precautions for security: such as creating accounts that are involved and other internal operations are also administrations responsibility.
- The availability to use, interact, communicate with contacts anytime.
- The reliability and efficiency is a conclusive issue at the maximum extent.
- The large dependability on telecommunications and in particular the wireless communication with the aim of smart grid technology.
- The importance of consciousness in issues of economic and financial return during the smart applications design and development that prefer high acceptance from professional users.

Therefore, the test achieve few points according to the efficiency of high level of quality, where the test is intended to determine the several emerging standards of characterization to be followed in determining the

presented services for the priority of resources and techniques that are used. In this regard the application meets the users' needs and immense desires, that are submitted for certain range besides flexibility, usability, privacy, safety and security during the usage of these kinds of applications. It tends to develop smart applications including the development of work functionalities within multiple platforms and APIs .

3.1 the layers of the model

Therefore, the model offers the measurement criteria of smart applications quality and their fundamentals in the following three layers:

3.1.1 Headmost Testing Layer (Wireless Connectivity & Smart Features):

At first, the headmost testing layer describes smart services features which is presented through applications and it describes superior intensity of quality for the provided services during functionalities at daily life such as intelligence, safety, security and recovery . In accordance with test requirements applications should be connected anytime and anywhere for a long- term with smart grid network and wireless connectivity. The interested scope for this model is Testing Cloud Computing Technology , where cloud computing is obtaining a major development and apparent changes in smart applications, besides becoming the next stage of internet evolution. Moreover, this technology supports a huge balance over the internet communications for user accesses at distributed locations as a result of offering on-demand application services at any time. One of the several benefits that it has reduced time, cost and effort . It is the most cost efficient method to use , maintain and upgrade as well as the unlimited storage capacity that it offers without warring about increasing current storage space availability in your own appliance. In this regard, it ensures the integrity and quality messages to and from distributed control equipment between users and their contacts in smart application and other communications. Today's smart systems require the use of an embedded smart database design. An embedded database can function in an environment where all aspects of deployment and administration can be either fully automated or programmatically addressed. Moreover, mass database is crucial in providing secure and reliable storage, while also providing fast and continuous access to the vast amounts of data collected by applications, processes, or sensors. In case of it being completely self-monitoring and self-administering, it requires minimal human intervention beside its presence is not known to the end user, whether it be a person, process, or device . In this regard, an embeddable database should be able to deploy a ready-to-use database instantly and easily. In this regard , there are several points as follows related to the role of databases in smart applications:

- All database functions must be programmatically accessible. To facilitate self-administration and self-healing, the database

must be equipped with capability to be fully programmatically managed .

- The database can be configured and maintained remotely .
- All functions of a running database must be accessible through a Structured Query Language (SQL) interface for smart applications.
- Applications can easily automate maintenance tasks and error handling without an intervention.
- The database integrates easily with other applications by supporting a wide range of standard communication mechanisms and application programming interfaces (APIs).

Therefore , smartness services with publics and inter-of things qualify extremely effectual communicability in an efficient and creative way, therefore, testing all of these features is necessary in this layer alongside with security especially in smart application development systems and its successful deployments.

3.1.2 Posterior Testing Layer (User Experience and Acceptance of Smart Services):

The second layer is Posterior Testing Layer, which tests the extent of reaching users satisfaction and achieving their requirements and experience at the fullest extent during developing quality features of applications. However, this purpose is represented on users acceptance of the presented service through the portable appliances. In this regard , it is important to identify users current satiations and their experience fully as possible to understand what services are required by them as well as the selection of appropriate technologies that boost smart services for applications. And that constrain on a service-oriented architecture (SOA) to standardize loosely united services supported with functions to fasten them and manage their life cycle among deployment and updating of services. These key countenance are vital for service interaction devolves into a configuration of independent services with well defined interfaces, technologies and tools that focus on the modality of improving accessibility , availability and feasibility of services to skillful users of smart applications in dynamic smart interfaces with smart grid connectivity . Further, it is a major feature for smart application to have an interactive interface with clear and understandable easily functions to prefer using specially with including a single service for each application as well as the maturity of performance tasks during runtime , which also includes varied features as handling new (GUIs) interfaces and touch-screens. Computers touch screens nowadays spread in several aspects of generality communications , performing critical functions in various areas including education and training, home and entertainment, medicine, and work . The significance of computers makes human-computer interaction a single majority of critical factors in systems design. Moreover, model test techniques

require brain-computer interfaces (BCIs) that will thrust applications beyond human-computer interfaces beside modality of interacting with computers and their environment including necessary needs for smart applications to be supported with different multimedia (video and audio) technologies in term of several benefits. Subsequently, smart application recently talented to act upon number of functionalities including connectivity with other devices, ability to have resolution photographs and also video recording . Accordingly, testing all the previously reported characteristics in this layer is not sufficient several points are more important for the Posterior Testing Layer, such as:

- The feasibility of applications is an extremely important issue , while effective and feasible smart application provide a longer time period, cost and effort during daily life. In the meantime, smart existence services provides an amplified level of productivities for permeating several activities, so testing the feasibility is the main feature for applications development .
- The economic and financial return of smart applications depends on smart economy framework which improves it to a high quality in our technical environment.
- The model inspects key transport and technology challenges and issues that related to accessibility; which is defined as immediacy or facility for spatial interaction. Many respondents indicated that decisions about accessibility is not in developers control. Professionals are creating nowadays information and communication technologies (ICT) considering accessibility through their work , For testing interactive programs of user experience (UX) and human computer interaction.

3.1.3 The Eventual Testing Layer (Performance of Functionalities):

The last layer is the Eventual Testing Layer. It tests the performance of functionalities with the aim of the standard model (ISO 9126 QM) as is shown in figure{2}. At this high time, it has become crucial to have standard specifications to serve developers as principles for quality assurance . The previous model testing tend to focus on various activities and goals that can be decomposed into five different factors including understandability , learnability , operability , attractiveness and usability compliance besides the basic quality characteristics such as functionality, usability, efficiency, maintainability, Data integrity and portability that effect smart applications quality. In this regard , the Eventual Testing Layer evaluates the internal and external consistency of applications . The design are an important factor as well as structures, interactions and behaviors which match the user experience along with the natural features in applications where it prefers the automatically familiar and easy using of applications. Therefore, usability of smart applications is one of the most important issues that improves user experience and

response about any particular application as well as characterization such as flexibility and simplicity to achieve accuracy of smart application at a high level in the first attempt during runtime , often with less options to achieve efficiency and reliability features during using smart applications and eventually accomplishing high level tasks at a given time .

3.2 The Evaluating Phase of the Proposed Model:

After the testing phase the Proposed Model requires commitment to the outcome of the test, where a given flow chart in this research tests the result of the proposed model using rating stare shown in figure { 3}. In the evaluation phase according to star rating evaluating , we measure the level of acceptance that application has achieved. If the insufficiency is more than 40% the application planning of the presented applications is rejected . On the other hand , if the insufficiency is less than 40% the application planning is under measure and development till it is 5%, to be able to be entitled under smart application with the same specifications that real proposed model is required to enhance results of applicatios with agents, components and such smart appliances in this testing system . In addition, taking into account that this model test is in the planning phase for new smart applications and for the distinctive existing smart applications that was currently circulating . Thereafter, comes the dynamic adaptability phase which has a method in installing several operating system on the primordial operating system of the same devices as portable appliances particularly. Further , this method reduces problems of adaptability between appliances platforms and the numerous installed smart applications . The adaptability testing here in this phase is between applications and the appropriate operating system rather than propotion different appliance platforms with smart applications directly. This method will be detailed in the future work.

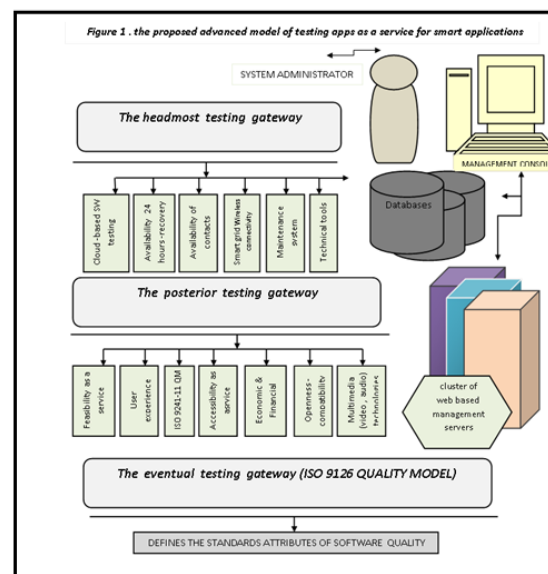


Fig. 1. The proposed advanced model of testing apps as a service for smart applications

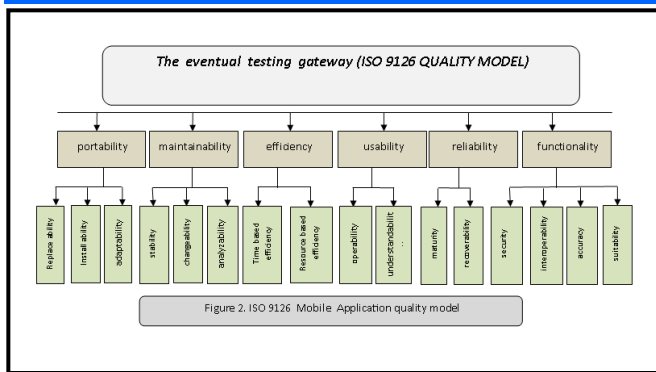


Fig. 2. ISO 9126 mobile Application quality model

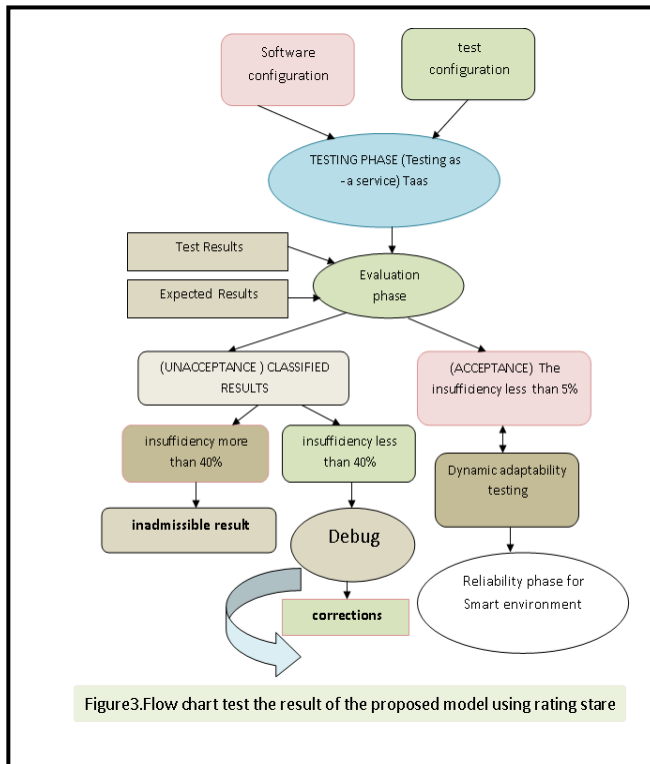


Fig. 3. Flow chart test the result of the proposed model using rating stare

Conclusion

smart services aid human beings in daily life activities with a high productivity of compassing several activities , an enhanced quality of committed services and an effective communications with people and things .The popularity of wireless technologies in daily life is increasing, leading to increasing research interest in the quality assurance and testing model. the test achieve few points according to the efficiency of the high level of quality, where the test is intended to determine the several emerging standards of characterization to be followed in determining the presented services for the priority of resources and techniques that is used. In this regard dose the application meets the users' needs and immense desires, that is submitted for certain range beside flexibility, usability, privacy, safety , security with major

specifications such as cloud computing and moreover technologies during the usage of these sort of applications . This system is going to be built as future work and new feature can be added with the adaptability of operating system environment of smart applications as is illustrated in proposal model.

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