An Efficient Approach for Improving the Quality of E-Governmental Services

Ahmad Mosa, Hazem. M. El bakry, Samir M. Abd El-Razek

Information Systems Dept., Faculty of Computer and Information Sciences
Mansoura University, Mansoura, Egypt

Sajjad Q. hasan

University of Baghdad, IRAQ

Nikos Mastorakis

Technical University of Sofia, BULGARIA

Abstract:- E-government has a lack of investment over financial and organizational perspectives regards to the mechanism provided for supporting government services. There are many key challenges such as integrated database centers, interoperability, and quality of service. The proposed framework has great enhancement impact over investment including financial and organizational issues. Furthermore, the proposed framework setups different impacts to handle quality of service, service level agreement and pas as use based on cloud infrastructure. It is fully private for the government itself. In addition, it provides services to the general public through the instances. This results in a speedy and easy access to the services provided by the government at the lowest possible error ratio. Moreover, it allows various government units to increase efficiency, reduce costs, and provide potentially better customer service.

Keywords: *Service Oriented Architecture, E-government, Cloud computing, E-service, Cloud service.*

1. Introduction

E-government is a suite of services which have range of consumers range from selected people to reach big number of public people as service consumers. These consumers have to be satisfied with service performance, integrity, interoperability, security, notification and much more. General pattern in e-government improvement works for signed up administrations that are compelling, easy to utilize, formed around and reacting to the requirements of the resident, and not only orchestrated the supplier's accommodation[1]. Thusly, the clients need have no information of – nor direct collaboration with – the administration elements included [2]. Thus, services need to consider information and data to be traded and handled flawlessly crosswise through the process of advancement of current e-government services. Interoperability is considered as a key issue. Still in ref. [3], three levels of interoperability were divided into: technical, semantic and organizational which confirmed it's role, not just as a specialized matter worried about connecting up PC systems, additionally as a basic necessity to share and re-use information in the middle of systems, and redesign authoritative procedures to better backing the administrations themselves [4]. Technical interoperability refers to the subjects of defining standard protocols connecting systems and data formats. Semantic interoperability interested in the trading of data in a reasonable route, whether inside or between organizations, either local or crosswise over nations and the endeavor area [3]. The third one

alludes to empowering procedures to co-work, by revising rules for how Public Administrations (PAs) work inside, participate with their clients, and utilize Information and Communication Technologies (ICT). Containing set of service into a single portal is a key success feature that is known as integration. a basic requirement of PA portals is integration of services, which aims to assemble and change procedures that required for a specific resident's life occasion into one single administration and the comparing back-office rehearses. A promising arrangement is given by the one-stop portals of government [4,5,30-34] that are united on-line access points, where several PAs collaborate for the provision of integrated services.

The main goal of current paper is to propose a framework of e-government services that based on using pros of cloud computing environment. Which supports many features of quality of service, pay as you use, reliability, integration, notification etc. The proposed framework is evaluated on deep discussion relative to interoperability and integration. Next section explains basic information of most known service based system techniques of e-government which are used perfectly to provide services for citizens in e-government applications. In Section three, short term survey of recent researcher's activities and publications over service providing systems and applications especially based on cloud computing besides related applications. Section four is the presentation and discussion of the proposed systems and how can be applied and used. In turn a comprehensive discussion is maintained to evaluate the performance, explaining the impact of the proposed framework comparing their impact against other proposed systems via a strong discussion. Finally, paper is concluded with contribution statement rather than future works.

2. Preliminaries

Different common service architecture are used for providing e-service applications differ based on their mapping strategies and allocation techniques. The key mechanisms of service architecture are discussed because of their importance to derive the proposed system.

2.1 Web Service (WS) based architecture

Presently, there is no agreement on a definition of "e-government Web-based services". However, communication [6], "e-government" is known as "online government services", which can use interaction between users and government. If a meaning of "e-government Web-based services "is needed, according to this literatures, it can be known also as the services and information supplied to the citizen through government Web sites. In turn, it could be put a definition according to its several uses in this literature. McClure [7] defined e-government as government's utilization of innovation, especially Web-based Internet applications, to improve the entrance to and conveyance of government data and administration to nationals, business accomplices, and workers, different offices, and government elements [8]. Whereas, Golden et al. [9] argued that, electronic government comprises of utilizing innovation, especially the Internet, as a way to convey administrations to subjects, organizations and different substances with the reason for giving helpful access to administrations and government data. In a report from the Momentum Research Group of Cunningham, in order to provide services of e-government using web service architecture leads to many benefits which can be ensured. To provide services to the general public through the online might cause quicker and additional adequate access to government services with slight errors [10]. Additionally it implies that the units of government might notice exaggerated efficiencies, value reductions and probably higher client service. Attractiveness of those edges has been with success incontestable by numerous e-commerce initiatives within the non-public sector. Success in business surroundings doesn't mean that government agencies may have the benefit of the same initiatives by merely loading their services and data on the online. Web service

systems have a key feature to facilitate interactions between the government agencies area unit and general public the directly associated with the come back on government's investment in delivering services on-line and developing websites. At a minimum, assume that the cost of delivered service is a smaller amount on a Website than several ancient ways, so every net interaction they put in their mind a value savings. , even while not value savings to the government agencies, so the value of access by voters is often the supply of profit, usually in reduced travel value. Therefore, to get the pursued advantages, government agencies ought to move their customers – voters – from the recent service delivery system (i.e. ancient service delivery methods) to the new net based mostly one. Since this kind of advantages area unit based mostly upon the dimensions of use, a lot of individuals use it, a lot of potential potency and price reduction are gained. If a government computing machine fails to help the interaction between the government and general public, the service delivery completed during this way won't be advantageous whereas competitor with the standard ways in which of service delivery. Such trade off of investment requires deep evaluation activity for guaranteeing returns from investments over time [11]. Monetary investment involves defrayal on instrumentation and technology necessary to deliver e-government Web-based services. Wherever government investments on delivering e-government Web-based services area unit sometimes monumental. For instance, the monetary investment for implementing ten to fifteen services on associate degree integrated portal will simply run to $100 million [12]. So as to form such investments worthy, government agencies should be able to justify some style of come back on investment, which usually needs analysis of the e-government Web-based services. Structure investment, on the opposite hand tends to be unperceivable, and contains the energy and time that government agencies ought to reorganizing, streamlining, and rethinking the service delivery system for the e-government initiatives [13].

The required raise in citizen's utilization of the Web-based services; either via iterate visit of a citizen, or via citizens' recommendation from one to another citizen concerning the new kind services. As a consequence, not solely the pursued interests can't be attained investment created by government agencies won't pay off too. it's visible that, via the analysis of e-government web-based services doesn't generate the value saving impact directly, it is substantial to ensure that the wanted cost-saving impact happens [14]. The presently enforced design of the database relies on replicating subsets of the government institutions databases into the Integrated Central Database. The main functionalities of the Integrated Central Database are replication and accessibility [15]. Both functionalities suffer from the lack of vital features which are: interoperability, flexibility and manageability which appears when work on replicating a government institution database with a different type database of the Integrated Central Database. The problem also appears when clients trying to access the Integrated Central Database over a transport, driver, or an API that is not natively supported by the Integrated Central Database. Another problem emerges from the inability to attain a central point of management for the operation of the Integrated Central Database. Service Oriented Architecture (SOA) is considered as technological solution adopted for integration purposes which enables combined use of preexisting applications, the standardized description, invocation, and retrieval [10].

2.2 Service Oriented Architecture

SOA gives an answer for shared and disseminated administrations and it accomplishes high interoperability, adaptability, and institutionalization by using the portrayal, disclosure, and conjuring of administrations [16]. To understand the concept of SOA model, one would utilize the (ESB) Enterprise Service Bus [17,18]. ESB represents the middleware paste foundation that holds SOA parts together and incorporates and deals with the correspondence among various Web Services, applications, and sources of data. The three elements: Web Services, SOA and ESB considered as the foundation for understanding the e-Government Central Database. In turn, SOA becomes able to architect framework for e-government integrated central database that achieves interoperability, flexibility, and manageability. In which, researchers have overcome above short comings by transforming WS architecture into a SOA.

Although, SOA have overcome major problems of the web service based applications for e-government, SOA have lack of many benefits of cloud computing architectures including save time, cost, scale etc. Next, cloud computing service basis is discussed explaining pros key features [15].

2.3 Cloud Computing Architecture

A cloud-based service provides through a shared pool of computing resources on-demand delivery of Information and Communication Technologies (ICT) services over a network, commonly over the internet, from. Cloud services are generally grouped into three types of offerings [19]:

- Infrastructure as a Service (IaaS), where storage, computing power, and networking are provided.
- Platform as a Service (PaaS), where applications can be developed and executed.
- Software as a Service (SaaS), where software application are delivered.

These services are generally standardized and configured by the provider to maximize economies of scale, and are delivered through four basic models: private, public, hybrid and community cloud. The differences relate to who provides the cloud services and how they are provided. Private cloud services are provided solely for the use of one organization, and are managed by that organization or a third party. Public cloud services can be used concurrently by a number of unrelated users, while the hybrid model shares attributes of both private and public cloud models. An example would be data stored in a private cloud or agency database that is manipulated by a program running in the public cloud. Community cloud services are shared by a number of organizations and support shared objectives, such as service delivery, security, policy, or compliance considerations [14, 19].

Cloud-based ICT services provide opportunities for agencies to achieve better value, flexibility and reliability, and make sustainable service delivery improvements [20,35-40]:

1. Cost – Moving from customizing and operating in house ICT to using the best available ‘off the shelf’ commodity solutions will reduce the total cost of ownership. Flexible, on-demand services enable solution testing without significant capital investment and provide transparency of usage charges to drive behavioral changes within agencies.
2. Consumption based pricing – The benefits of consumption based, pay as you go pricing enables an agency to move to a model that is aligned to actual demand.
3. Agility – On-demand, scalable and flexible services that can be implemented quickly provide agencies with the ability to respond to changing requirements and peak periods.
4. Innovation – Innovation will be facilitated by rapid and continuous system development.
5. Resilience – A large, highly resilient environment reduces the potential for system failure. The failure of one component of a cloud-based system will have less impact on overall service availability and reduce the risk of downtime.
6. Standardization – Adoption of cloud solutions by agencies will increase procurement of standard service offerings, providing opportunities for standardization and improved interoperability.
7. In-built upgrades – Future upgrades are removing the need for costly and lengthy upgrade cycles

3. Literature Review

Many proposals of net services composition ways have been discussed in last years. For a closed survey, we have a tendency to discuss with [21, 22]. In current section, we introduce a summarized overview of some different techniques that deal with automatic web service composition. We take into consideration only techniques that utilize service dependency information, graph models, and semantics. The plain concept beyond dependency is that whenever a web service receives several inputs and returns several outputs, the outputs is somehow correlating or dependent on the specified inputs. By utilizing a graph model, the attitude of obtainable web services is appeared in terms of their input-

output information, as well as semantic information about the web data. A graph is represented by a set of vertices or 'nodes' and a set of edges that link pairs of vertices. A graph might be undirected, significance that there is no variance between the two vertices connected with every edge, or its edges might be directed from one vertex to another. A weighted graph is a graph where every edge has a weight (some real number) connected with it. The dependency graph is utilized in finding a combined service to fulfill a specific request. The majority of composition graph-based styles or methods construct web services dependency graphs during runtime. They utilize a seeking algorithm for navigating dependency graphs for composing services. The major distinctions between these styles are Attributable to how they seek the dependency graph. A*, Dijkstra, Floyd, the mostly popular search techniques used were backward chaining , Forward chaining, and bidirectional search algorithms .

Hashemian et al. [20] save output and input dependencies among obtainable Web services in their dependency graph, and then construct composite services by using a graph seeking algorithm. In their graph, every service and Output and Input parameter is demonstrated by a vertex, service's Output and Input are demonstrated by outgoing and incoming edges, respectively. The authors take into account only the matching and dependencies among Output and Input parameters with the lack of focus on functional semantics, thus they can't warranty that the created composite services Responds to the requested functionality well.

Gekas et al. [23] developed a service composition registry as a hyperlinked graph network, dynamically analyzed its structure and with no size restrictions to conclude helpful heuristics to guide the composition process. Services are performed in a graph network and this graph was produced and explored during the composition process to find a potential path from the initial state to a final state. In order to minimize the time of searching, a group of heuristics were used. But according to the authors, creating the graph at the time of composition costs a lot from where of computation and limits the applicability of graph-based approaches to the problem of web service composition.

In [24], the authors utilize the backward chaining method in combined to depth initial search to obtain the needed services for a composite task. the author presented a summarized solution and they did not discuss a fulfillment plan generation algorithm obviously. Arpinar et al[25]the authors used an approach which utilized semantic similarity and graphs for web service composition as we planned to do in this work. They took into consideration edges with weights and deploy a shortest-path dynamic programming algorithm according to Bellman- Ford's algorithm for computing the shortest path. concerning cost, the authors considered the output and Input and fulfillment time of each service likeness but they did not consider the services' nonfunctional attributes.

Talantikite et al. [26] they proposed an algorithm to pre-compute and store a network of services that are connected by their output and input parameters. The link was built by utilizing semantic likeness functions based on ontology. They represented the service network utilizing a graph structure. Their approach utilized depth-first search algorithms and backward chaining to find sub-graphs that include services to accomplish the requested task. They proposed a way to choose an optimum plan in case of discovering more than one plan. However, they also created the graph at the same time of composition which incurs substantial overhead.

On the investigation for the e-Government data integration, the authors in [26] propose a conceptual SOA-based framework for the Palestinian e- Government Central Database. In this paper we present the realization of that framework.

A SOA-based approach to data integration achieves interoperability. The research work such as presented [27, 28] have stressed the importance of interoperability for the data integration process where database accessibility should be according to neutral mechanisms and will be freelance of the underlying implementation.

A technical construct that employs SOA as AN IT platform to handle totally different modalities, information streams, and devices within the operation space is conferred in [29]. They propose SOA for integration inheritance medical devices on networked medical devices. It is a model for a service-oriented e-

Government support platform for the mixing of both information and application referred to as (SoGoSP) is projected in [20]. It integrates information and applications from varied business systems deployed in both e-Government external and internal networks. The model consists of 4 item layers that embrace application layer, common service layer, service support layer and service integration layer.

A solution to information integration downside between heterogeneous databases is conferred in [24]. The answer is predicated on constructing information center with XML schema and internet Service technique which might gives a sensible solution to issues with business logic technique invocation and obvious information exchange in low layer. The wants of abstracting, sharing and integration multiple heterogeneous info management systems in e-Government square measure self-addressed in [29]. They introduce design of e-Government info management platform supported SOA framework.

4. The Proposed Algorithm

Today, different governments are going to provide services that are suitable for citizen's capacity rather than stability. E-government application suites become principle concept to conduct wide range of clients/citizens. These applications suites suffer from many different challenges that were addressed in many researches before. Challenges include different information management systems, central database, robust infrastructure, interoperability, integrity and much more. In case, services are not satisfied perfectly the citizens of government, the country will have extreme challenge with cover the flow of work requests at their sites. Quality of service will be decreased rapidly to be insufficient. Delay of delivery, work overhead, inconsistent, and structure and semantics conflicts rather much more are subject of side effect to work performance rates. The problem of the proposed is focused on handling quality of service, integrity, delivery status, workflow notification, cost, security and interoperability between different organizations under approved unified government umbrella. The proposed system based on solving the key problem of e-government service architecture based on web service architecture, see figure 1 using cloud based service architecture. These shorts are listed as technical issues and functional challenges. In technical issues, the web service based model have single user profiling strategy, weak synchronization mechanism and have restricted user interface panel comparing to available hardware possible screen in current days. In single user profiling, e-government application has single entry point for every user which is represented by client web browser. These constraints restrict the user to be stand at his laptop if not his workstation computer. Single point of user profiling makes the user disable to consume his service on the go that limits his satisfaction and usages about service available by government. Synchronization is ancient challenges that forces applications to be solid against possible ways of system dynamicity. Synchronization works on consisting data, actions and flows of client's requests. Although, clients have verities of their terminal such as tablets, smart phones and on go transformable laptops as MS surface to access internet, but still web based e-government designs have only basis on computer, laptops stations. Always, user interface plays an important roles that increase human interactivity with the applications and system, in turn user interface represent shorten of web based service solutions. Whereas, functional shorts includes missing features as well detailed and descriptive workflow, status notification and sharing work packages.

The functional features are subject for being solved using work around strategies which may act as fit solution and may not rather than cost challenges. The functional requirements are elementary points in the proposed cloud based e-government framework. In the cloud based e-government architecture, there exists three basic blocks including user interface, data storage and back end block, see figure 2. The user interface block containing different items related to user interaction ranging from humanity interaction to verities of computing terminals. In the user interface, there is ability to provide native interface for mobile handheld devices, tablets, transformable laptops also have ability to provide basic entry point as web page. On

other hand, within block, cross platform development todays are fully supported depending on different technologies. All of these types of user interface support share global resources, preference, setting etc. In turn, user have many entry points to interact with applications services. Based on verities of interactions types, synchronization and central data storage becomes spot points of interest. In order to handle central data storage, data storage block contains ability to insatiate one or more instance of database. These instances are transparent from user via transparency management layer. Transparency features include modules for data integrity checks, consistency and consolidation. This management operation is performed through handling transactions. Transactions can be online, offline or batch package. Synchronization layer is responsible for making data up to date between online and offline and visa verse. Such features are enabled through supporting specialized framework per development technology such as dot net framework have it's own compatible software development kit, android platform have mainly android sdk, also iOS …etc. These frameworks support high precision of application development, integrity and compatibility. The back end have scope covering verity of services as workflow and document management, user management, notification service and business logic of government system. In user management is a service based module focus on enabling user authentication and data storage for user accounts. The module provides a set of APIs facilitating user registration process, authentication, password management and user profile editing. The proposed module provides a choice between internal authentication or integration with social networks like Face book, Twitter or Google+ accounts. The module allows developers to manage all aspects of users' accounts, change user properties, reset password, enable or disable users.

The proposed user management service is designed to be orthogonal design. another services can be used independently , they are not dependent or connected. The proposed user management module should also be able to integrate with existing LDAP, Active Directory ,CRM etc. also This module can work in conjunction with engine which provides comprehensive actionable analytics on user's behavior and the ability to take action e.g. lead generation, survey, coupon , email, push notification, coupon, social post etc. workflow management service provides an infrastructure to setup, execute, and monitor scientific workflows and works on coordination of operation of individual components that constitute the workflow ,i.e. orchestration. As research becomes more data-intensive and more reliant on the use of computers, larger volumes of experimentation data are recorded quicker and with greater precision. This trend has encouraged significant increase in complexity of scientific simulation software. Additional difficulties arise from the need to deal with the mismatched data formats that various services produce or consume. Workflow management service has emerged to solve this problem and provide an easy-to-use way of specifying the tasks that have to be performed during a specific cycle. Whereas document management module focus on handling files creation, access, audit, share etc. The module have different capabilities including find files and documents in seconds instead of hours, share files in order to allow more than one worker to access the same file at the same time, version control where consumers are able to manage document changes and revisions including going back to a past version of a document, configure document security for who could see and make changes on files and enable auditing to emphasize who saw and made updates to documents and archiving documents via retention periods for documents. Today, every application should have notification facility to announce about details, services, policies, laws or any new flyer for his wide range consumers. The proposed allows e-government suite to reach their consumers from notification service module to keep them touch for supervision, their service status report, feedback about their consumers and monitor and control quality of service regards service consumer perspectives. In turn, notification service enforce consumer to be informed with details and status about his enquiry. Under, business logic service nodes, e-government applications are going to provide wide unlimited range of services for the public. Based on service node, there are many constrains of support are satisfied including

cloud quality of service (QoS), service level agreement (SLA), pay as you use and use on the go principles.QoS includes two sides of service quality, side for the service quality during consuming e-government service from the citizen and other side from the government investor to achieve level of service demanding during provide the e-government service for the public. Same as QoS, SLA have two sides of participators, end user, citizen and investor, government. During satisfying, QoS and SLA, the citizen can consume different services from various terminals on the go of his way. Also, investor pays only per use of his covered range of citizens not based on resources allocated as SOA and WS. The proposed framework offers facility to be central and dynamic center satisfying interoperability, integrity and transparency. The proposed framework should have minimum total cost of maintenance, configurations and other regular operations which are successive operations of installation and setup. These operations are subject to be role for the government private cloud provider. Generally, the proposed system have covered different key points of e-government service suites including *interoperability*, i*ntegration*, *integrated central database* with replication and accessibility, *flexibility* and *manageability* which keep investment safe over different perspectives; *financial and organizational investment*.

5. Conclusion

A professional e-government framework that saves financial and organizational investment has been proposed. Such framework has been designed based on cloud benefits. Furthermore, it has kept away the limitations and cloud constrains via implementing government private cloud. In addition, it has the ability to migrate, imitate, develop and maintain e-government services. Moreover, it has awareness about interoperability, integration features, replication, manageability, flexibility and accessibility of integrated database centers.

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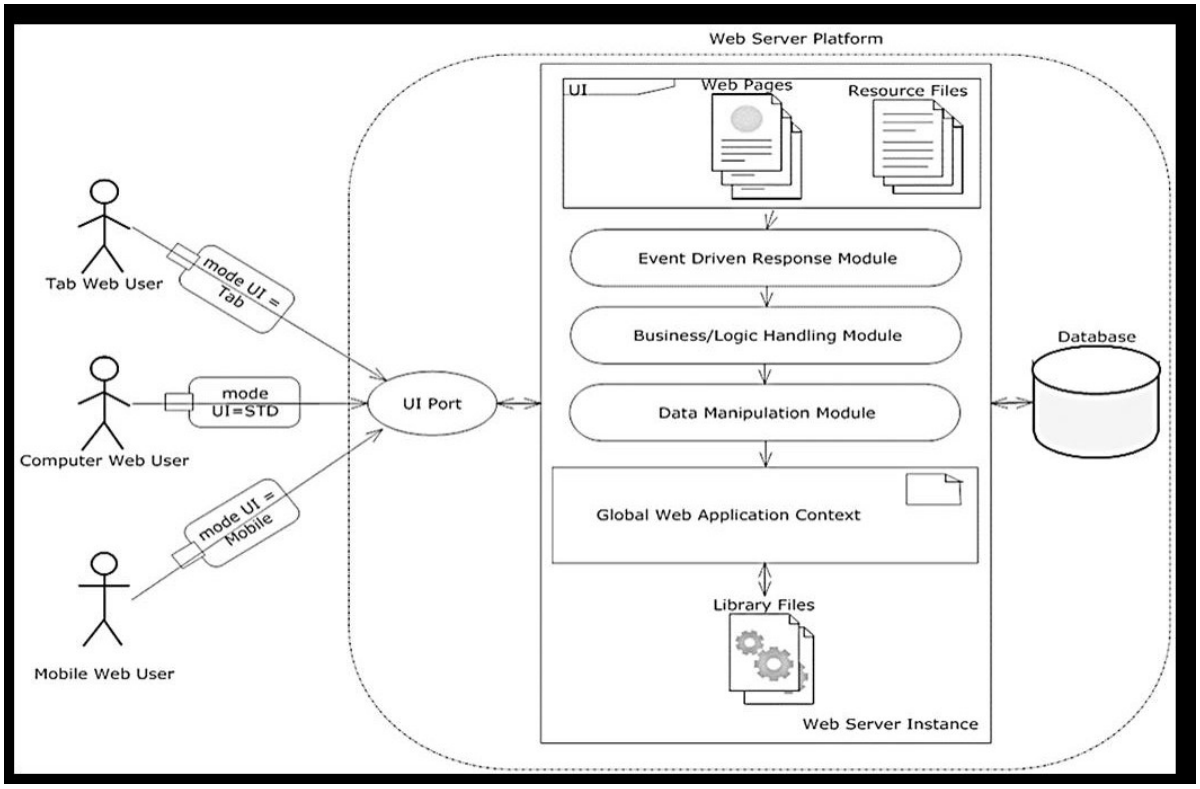

Figure 1. Web Service based e-government framework.

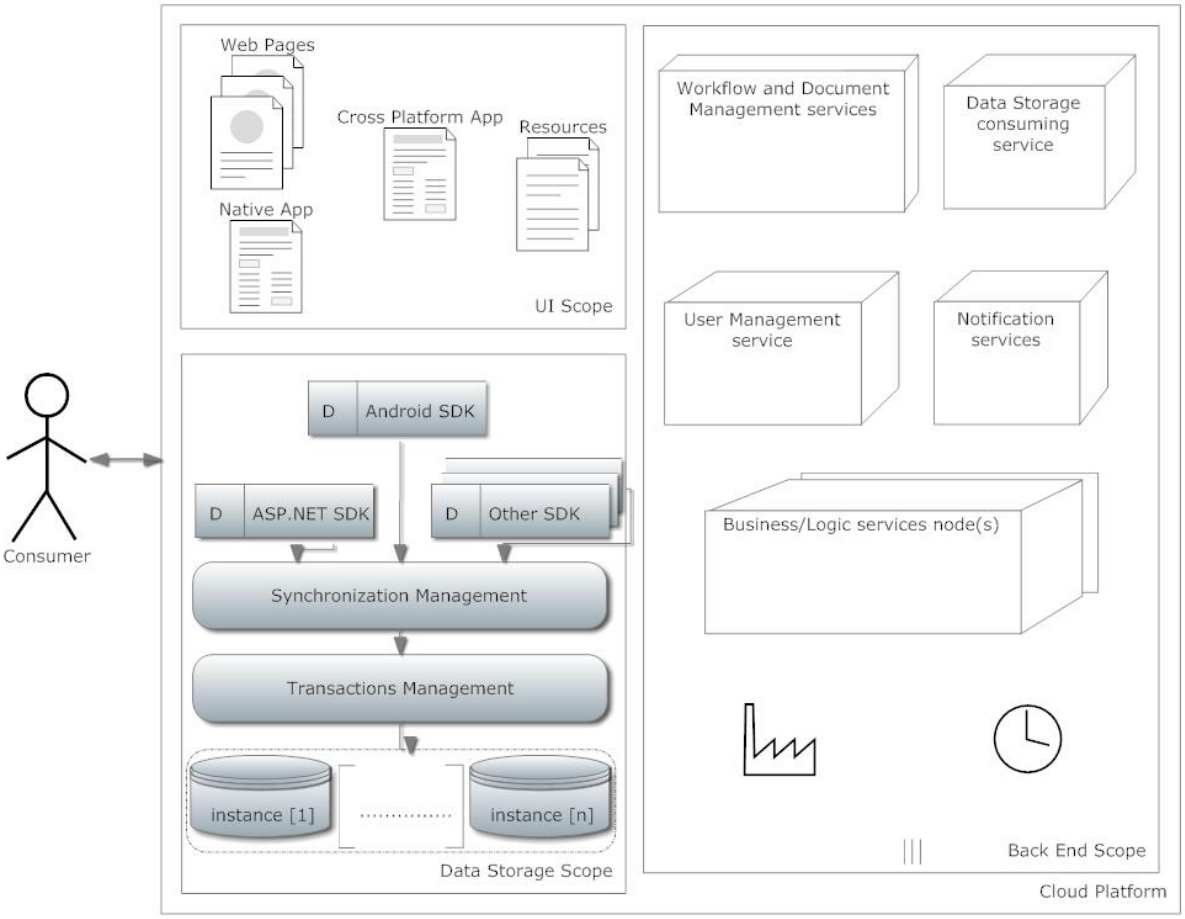

Figure 2. The proposed cloud based e-government framework.