Enhancing E-government Services by Using Cloud Computing

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***Abstract*— In today's time, the developing of e-government services and keep up with new technology tools become to play an important role in facilitating the provision of e-services at the doorstep to beneficiaries. Providing online services of government and make it reachable from beneficiaries became the aim of many governments, therefore many governments aim to develop government services by including cloud computing as a platform to provide services. This paper gives an overview of e-government players and cloud computing, as well as discusses how to enhancing e-government services by cloud computing.**

Keywords*— *e-government, Cloud Computing, Process of Developing E-government system.

I. INTRODUCTION

Today's with the revolution of technology, the world is witnessing a major development in the provision of e-services by using cloud computing, perhaps one of the most prominent areas that have benefited from cloud computing services is e-commerce. The inclusion of cloud computing services in the development of e-government services has become play an important role to win beneficiaries' satisfaction. Cloud computing has many advantages such as performance, data recovery, cost saving, and reliability & availability. Enhancing e-government services by using cloud computing become very important to change the traditional system and provide all services of e-government overt world wide web, easily and effectively.

However, this paper aims to find out and discusses the main stages to develop e-government system, and clarifying the data flow process to select the right tools of applying cloud computing successfully in providing e-government services. It is divided into 3 sections which are:

- [1] E-government concept,
- [2] Cloud computing concept,
- [3] Enhancing e-government services using cloud computing.

II. E-GOVERNMENT CONCEPT

The main concept of e-government is providing e-services by depending on technology tools and building an integrated system to providing an easy way for the beneficiaries to complete their needs anywhere at any time . On the other hand, the e-government can be defined as the use of technology tools as a platform for providing e-government services and increased the productivity of services for beneficiaries easily and accurately and efficiently. E-government contains several activities and services to different citizens and organizations in a variety of government services [1]. E-government identified four, main elements for e-government interaction [2]:

- Government-to-Government (G2G)

G2G is referring to the communication and exchange of data between the government components, such as departments and agencies.

- Government-to- Employees (G2E)

G2E refer to the relationship between the government and employees,G2E can be described as providing e-services environment to the employees of government such as online training and paying utilities.

- Government-to-Citizen (G2C)

G2C can be described as accessibility online to government services to retrieve needed information anywhere at any time.

- Government-to-Business (G2B)

G2B can be described as the interaction between the government and business. also can be defined as the ability of the government in providing services to the business sector such as registering businesses, payment of taxes and obtaining permits.

III. CLOUD COMPUTING CONCEPT

There is no doubt under the revolution of technology tools and the internet, many governments and privet sectors

become aims to developing its e-services to be easy to reach and at any time. Cloud computing one of the technology tools that give the ability to deliver computing services such as storage, databases, servers and software, to provide the e-services with all efficiently and fastly at any given time and no matter where they are [3]. Iimplementing e-government without clouds is an old technique and is not too much efficient.

A. The Advantages of Cloud Computing

The use of cloud computing in e-government is a big shift to change the traditional way of e-government services, and providing government services in a flexible way and easily [4]. The advantages of cloud computing are [4][5] :

- Performance: traditional system (Local server) in terms of delivering better services. Cloud computing performance depends on the use of complete components of the latest generation of hardware and software, that contributes to providing e-services over the worldwide network easily, efficiently and securely.
- Cost: cloud computing is contributing to reducing the cost of providing e-services, by eliminates the expense of buying hardware and software and the care of running and pay for electricity and cooling system.
- Reliability and Availability: cloud computing gives users the ability to access and get needed information at any time (24/7) no matter where they are.
- Data Recovery: cloud computing provides all needed tools to save data as well as all backup plan. In cloud computing, the data never be lost, because of the ability of restoring the lost data.

IV. ENHANCING E-GOVERNMENT SERVICES USING CLOUD COMPUTING

The rapid development of IT technology (hardware and software) has a significant impact on how data is transferred, analyzed and processed. Therefore, many governments aim to benefit from the development of ICT to improve e-services in general and e-government services in particular. The emergence of cloud computing technologies has led to major developments in e-government services which has made the information that beneficiaries need become more accessible. Figure 1 illustrate enhancing e-government services using cloud computing.

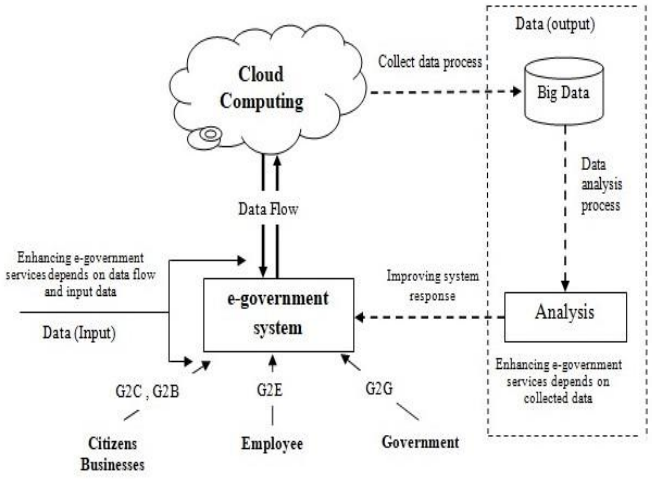

Fig 1. Enhancing e-government Services Using Cloud Computing

To ensure cloud computing is implemented in e-government services successfully, have to understand the stages of e-government developing system, and the process of data transfer and how. The understanding of these points helps decision-maker to enhance e-government services by providing needed tools such as (Hardware, Software) to providing e-government services successfully. However, using cloud computing to enhancing e-government services needs to clarify and understand the following points:

- Process of developing e-government system
- Data type
- Data flow process

A. Process of Developing E-government System

In e-government developing system process will be used IDEF0 to clarifying the main stages of the developing process, the following figure 2 illustrates the e-government developing system process

- Define the requirement of e-gov system: A System Requirement describes what is required to meet the users' requirement (Citizen, Admin). System requirements specify which actions the design must provide in order to benefit the system's users. The system requirements document (functional specification) should be precise. Should define exactly what is to be implemented. It also includes users of the system the system's services, constraints and goals. These requirements are described and defined in detail, serving as the system specification.

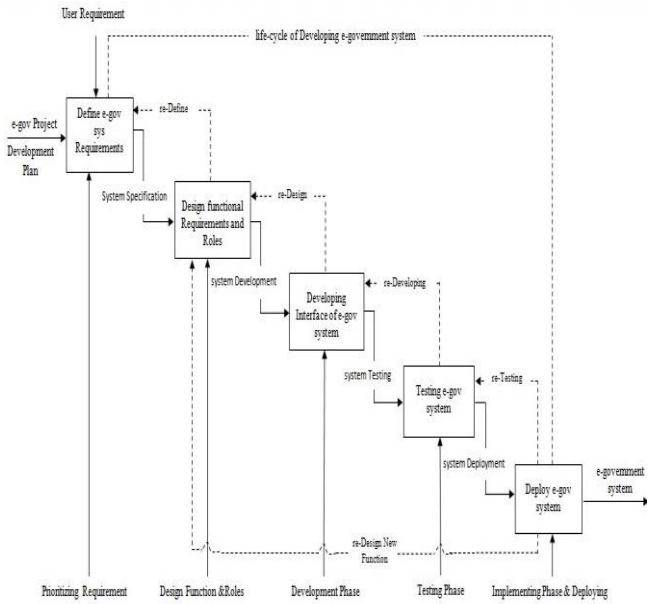

Fig 2. E-government Developing System

- Design functional requirements and roles: Designing the function of the system is a very important section to identify the permissions of each user on the system, designing the function of the system with its specific roles of each user contribute exchanging the data easily and fastly.
- Develop Interface of e-gov system: In the stage of developing the interface of the system, the design has to involve all the objects that a user sees and interacts with directly on their screen to complete a task or inquire. In the stage of designing interface, all the details must be taken into consideration such as colors, links, buttons and ... etc. The interface of the system is the channel between citizen and services providing (government).
- Testing e-gov system: This is the main focus of the life cycle of the system and is the longest stage of the system development life cycle, testing stage involves verifying that each unit meets its specification , and each function in the system meeting the requirement that designed for.
- Deploy e-gov system: This stage is the last stage in the developing system process and can be defined as the implementation stage. Deploy stage come after the stage of testing, and confirm that the system meets the needed requirement, and all the functions of the e-gov system work together probable.

B. Data Type

The data type can be defined as a set of values, in the e-government system the data type values could be in different types, such as Numeric Types, Boolean Types, Character Types, also could be a photo. Understand the data type helps to enhance to system response, by identifying the right tools and needed software to process the data fastly.

C. Data flow process

The best method to understand the data flow process is using Data flow diagrams (DFD), can be described as the process of drawing data flow in the system, as well as a clarification the data transfer from the input to the end of a process [6]. Data flow diagrams give a clear action of the process of each function in the system. DFD has often been used due to the following reasons:

1) Understanding the process of the data flow of each function.
2) Determination of the logical data flow.

The following figure 3 illustrates an example of the data flow diagram for one of the main function in the system the Login function of an employee of the e-government system as an example to clarify the Data flow diagram process.

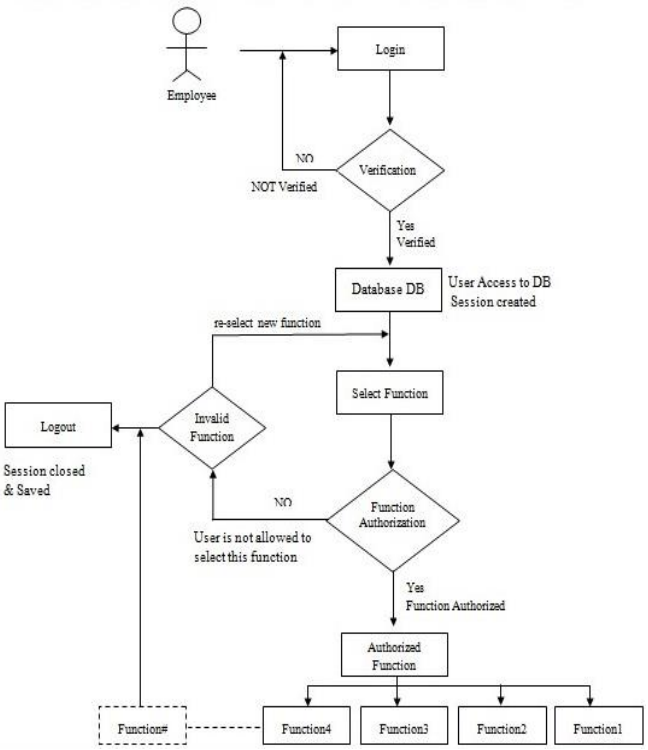

Fig 3. Data flow diagram process (Login Function)

However, the e-government system has many functions, each function has its own data flow process and data size. understanding the system functions and the size of data in the system helps to select the needed tools and software to use cloud computing to enhancing e-government services.

The e-government system processes a large amount of data. therefore, is very important to know the size of data to develop the e-government system in accordance with the size of these data, as well as require the right tools in cloud

computing to providing e-government services easily and process data fastly.

V. Conclusion

Developing e-government services comes with a number of challenges that need to be addressed before they are implemented. This includes the implementation of cloud computing since it provides beneficiaries access to information as and when needed, anywhere at any time.

To ensure cloud computing grants quick access to e-government services, there is a need for a deep understanding of all components of e-government in the development system process.

However, clarifying and understanding the process of developing e-government system, data type, and data flow process, have a direct impact on decision-maker to choose the appropriate tools that are consistent with the size of data, as well as the implementation of necessary ICT tools. These ensure quick, simultaneous, and secure transfer of data.

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