



Design and Implementation of New Future Television Cloud Computing

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ABSTRACT

A design and implementation of new future TV Cloud Computing (ClComp) for international systems integration and bridging the gap between linear broadcast, information technology and Internet Protocol of television and mobile television is presented to help Authorized Groups (AuthGs) reach and engage audiences on any television screen. The cloud design is applied to the Egyptian Radio and Television Union (ERTU). The applications, security, efficiency, flexibility, greater agility, less expenditure and to overcome geographic limitations which are the solution of the cloud are introduced to compete in a global market. The design and evaluation steps are addressed to insure the reliability and compatibility of cloud to the desired targets. A software package for audio watermarking has been presented as an example for its application to ensure protection, in case of saving, and security, in case of transmission of the media through the proposed cloud. The package contains many visual tests such as probability, spectrum, power and scatter diagrams to enable user to quickly investigate the content. All this application was done to suit the web-based where many departments can get benefit from anywhere and anytime according to department request and cloud polices.

Indexing terms/Keywords:

AuthGs; Cloud Computing; ERTU; V-Model.



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INTRODUCTION

CiComp is a model for enabling convenient and on-demand network access to a shared pool of configurable computing resources (i.e., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. The CiComp of the television has been used to broadcast live TV to cell phones via satellite, terrestrial towers or Wi-Fi networks. Land-based broadcasting techniques send out analog or digital TV signals over the air from terrestrial base stations. The mobile telephone with a TV antenna and an analog or digital TV tuner can pick up the signals [1-5]. Some standards rely on satellite broadcasting to deliver live TV to cell phones. They can broadcast from satellite to mobile telephone, from satellite to base station to phone or use both techniques simultaneously [6]. This broadcast method streams live TV signals via the Internet. A Web-enabled smartphone with data capabilities can pick up the stream from any Wi-Fi hotspot or Wi MAX coverage area [7]. This paper contains a variety of materials which together provide a comprehensive the preparation programs of CiComp. Section II, gives an investigated design and implementation CiComp of ERTU development guideline (CiComp of ERTU). Section III describes ERTU hybrid cloud services. Cloud Deployment Models of ERTU are presented in section III. In section IV the V-Model adopted in software testing is described. The software package proposed for media protection and the experimental results are provided in section V. Finally section VI concludes the paper.

I. Design and implementation of CiComp for ERTU

Intended of this part is primary design and implementation of CiComp for AuthGs in their efforts to carry out, control and follow up ERTU development project in a systematic manner. It is also intended to be as a reference or standard for international cooperation in CiComp development. The approach used in CiComp of ERTU is based on a CiComp approach model considering the organization as a CiComp. The basic model shown in Fig. 1 is different to earlier models proposed and applied with some success by AuthGs. In this particular and evaluation, have been further broken down in order to show the various activities involved and how they are interrelated.

It is necessary to know the organizational structure of ERTU before constructing the CiComp a way that maximizes efficiency and profitability. All of the duties and responsibilities of those in the organizational structure of ERTU must be identified. Lines of authority must be carefully delineated so that all members of the organization will understand what their job responsibilities are. The study has been made for every function, no matter how large or small the operation, whether it is a major department or single-minor unit. Therefore, must know the role and the work and function of both Department of Public Relations and International, Department of Information Technology, Department of Legal Affairs, Technical Audit Unit, policies and institutional, Financial Management, News Center, Budget Management and Administrative Services, Television management, Radio Management, Engineering Management, Transmitter Service, so that CiComp do its part effectively and efficiently. Each CiComp of ERTU must be organized in such a way that best serves its needs and makes the business success. The process of CiComp of ERTU development is as the following:

- **Preliminary Study:** The purpose of this step is to analyze the reported problems and provide sufficient information to allow management to make sound decisions about the solutions.
- **Job Analysis:** The principle purpose of job analysis of ERTU is to gather information regarding how, where and with what the job is done. This information will be used to determine the CiComp objectives and content of the CiComp programme (taken into account the characteristics of CiComp of ERTU). Another purpose of this step is to determine job performance objectives. Those will enable AuthGs to evaluate the CiComp on the job performance.
- **Organization of ERTU Analysis:** The purpose of step 3 is to find out what the individuals to be AuthGs (called the "target AuthGs" already "Know" and to analyze and describe the constraints imposed by the socio-cultural environment and determine AuthGs predominant CiComp modes.
- **CiCompNeed and Job Aids:** The purpose of this step is to define CiComp of ERTU needs and the job aids design requirements.
- **Determination of Objectives:** The purpose of step 5 is to write CiComp objectives and to sequence AuthGs objectives and group them into AuthGs modules. The output of this step can be considered the "blue print" or curriculum of the planned AuthGs.
- **Design of Tests:** The purpose of step 6 is to design valid and reliable mastery test of CiComp for each terminal and other end-of-module objective defined in step 5. It is important to design (and validate) the mastery tests of CiComp before the corresponding "content" has been finalized. These tests are used to assess the effectiveness of CiComp and to identify possible programme failures.
- **Validation of Tests and Objectives:** The purpose of this step is to ensure that the pre-and post CiComp - test are valid and reliable.
- **Determination of Entry Requirements:** The purpose of this step is to summarize and up-date the information collected in previous steps which will influence the choice of CiComp methods and media, prescribe the entry capabilities (Skill/Knowledge/Attitudes: which must have been acquired before entering the CiComp developed) for each target group, design the pre-requisite tests for CiComp and define reaction objectives.

- **Design:** The purpose of this step is to provide a detailed plan for CiComp activities of each CiComp module, produce a draft of "content" defined in step 4 (job-aid) and in step 5 (manuscripts for CiComp manuals and job aids, script for programmers, produce detailed description on who this "content" shall be coded (write text, sound, image.) and reproduced (prescribe media).
- **Production and developmental:** The purpose of this step is to produce the CiComp materials design in step 9 and job aid specified in step 4. Each piece of CiComp material should therefore be tried out (developmentally tested) before it is reproduced for validation with the first group of regular AuthGs in realistic conditions.
- **Validation and Remedial Action:** The purposes of these steps are to assess the effectiveness of the CiComp at the AuthGs level, diagnose possible failures, and revise the CiComp material as required.
- **Implementation:** The purpose of step 13 is to implement the CiComp of ERTU must be as the following. Plan for adequate the CiComp required for CiComp of ERTU, Ensure that adequate AuthGs, Ensure that AuthGs are aware of the CiComp of ERTU offered and select CiComp and determine their CiComp need.
- **Post- CiComp of ERTU Evaluation:** The purpose of this step is to gather information which can be used to make necessary improvements in CiComp of ERTU and their systems affecting the performance of organization. In particular, ERTU must, in this step, determine to what extent the CiComp development has achieved its objectives in terms of effects on the job performance level, effects of the organization level and efficient use of available resources in the process of CiComp development. (The cycle of evaluation can be seen in Fig. 2).



Fig. 1: The Process of CiComp of ERTU Development.

CiComp of ERTU is environment which exposes services, platforms or resources in a manner that multiple authorized groups can use them from different locations and with different devices at the same time without affecting the quality aspects of the offered capabilities service, platform and resource. This means in particular availability, reliability and cost-effectiveness [8-10]. The aim of this work is designing and implantation CiComp of ERTU which is the institution Responsible for radio and broadcast media and audio-visual, includes information on the sectors of the Union, and its subsidiaries. Fig. 3 shows the CiComp of ERTU, (yellow line) mobile TV terrestrial, (green line) mobile TV web-based and mobile TV and (violet line) mobile TV satellite.

The concept behind CiComp of ERTU is virtualization. With virtualization, deployment of software becomes independent of the physical server. It provides the pool of resources need to run the application like computing, storage and provides the flexibility to change the capacity in order to meet the work load and demand. A virtual machine is designed to run applications on a platform like web or database server and bear the required changes without the need of hardware alteration.

Fig. 4 provides non-exhaustive view on the main aspects forming the CiComp of ERTU. This definition is considered too comprehensive and accurate to actually be of value for the intention of specifying and steering the development of CiComp of ERTU.

a) **The Developer Perspective:** It is of particular interest, what the CiComp of ERTU environment can offer technically, respectively what the developer needs to respect in his code in order to address CiComp of ERTU capabilities. CiComp of ERTU, due to their nature, do not prescribe a specific technical approach to solving these issues, but many technical issues arise implicitly from trying to address them, such as adaptability from the fact that AuthGs sand devices differ strongly, elasticity from the expected degree of availability, means for failure compensation due to the large scale and heterogeneous usage.

- b) **The Technical Perspective of AuthGs:** AuthGs are core stakeholder in CiComp of ERTU and the end-user who makes actual use of the resources over services offered. As CiComp of ERTU is economy through improved resource usage and ease-of-use for uptake the cost aspects which expressed through a wide range of factors, such as outsourcing of resources and management, higher availability and better service provisioning.
- c) **The Provider Perspective:** A provider hosts the resources that CiComp of ERTU offering such as infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Network as a Service (NaaS), Storage as a Service (StaaS), Security as a Service (SecaaS), Data as a Service (DaaS), Database as a Service (DBaaS), Test Environment as a Service (TEaaS), Desktop Virtualization, Application Programming Interface (API) as a Service (APIaaS), Backend as a Service (BaaS). CiComp of ERTU provider is responsible for managing and providing the resources in a way that economic incentives are met. From this perspective, the actual resources involved in provisioning become a major issue.

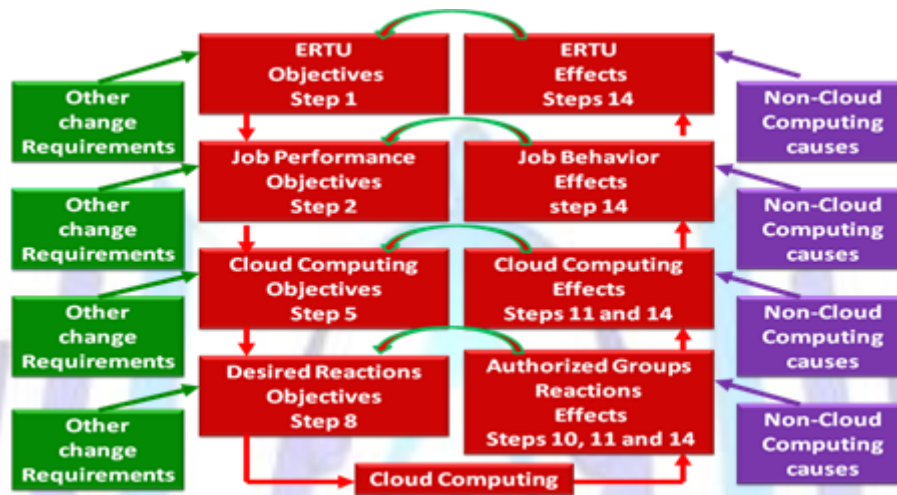


Fig. 2: Cycle of evaluation.

II. Cloud Deployment Models of ERTU

The four types of cloud deployment models of ERTU, identified by:

- a) **Public Cloud of ERTU:** The purpose of building public CiComp of ERTU is to achieve the vision and mission to improve the way of working.
- b) **Private Cloud of ERTU:** The cloud infrastructure is operated solely for Staff employed of ERTU.
- c) **Community Cloud of ERTU:** The goal of a community cloud is to have participating organizations realize the benefits of a public cloud such as multi-tenancy, security and policy compliance usually associated with a private cloud. The community cloud can be either on-premises or off-premises, and can be governed by the participating organizations or by a third-party managed service provider.
- d) **Hybrid Cloud of ERTU:** A hybrid cloud is a composition of at least one private cloud and at least one public cloud. A hybrid cloud is typically offered in one of two ways: a department has a private cloud and forms a partnership with a public cloud provider of ERTU, or a public cloud provider of ERTU forms a partnership with a department that provides private cloud platforms.

ERTU consist of many stations that used for broadcasting services and studios in different zones of countries. Fig. 5 shows the stations in country and the main building of ERTU where is called Masbiro.

ERTU can be represented as many private clouds and they are connected by many way to achieve its general purpose and the objective of ERTU. For any station, there is a connection to other networks like mobile and internet service. In this cloud, the encryption of broadcasting content deploys and applies the security. It is also used as gate for public cloud where ERTU has many sites spreads over the countries and presents a new and reliable connection for users of ERTU cloud. Archiving department is an example for private cloud where it used to save the program and creative works of ERTU's productions like films, program and any other multimedia that belongs to ERTU. The ERTU's cloud, content is saved in a way that cannot be violated.

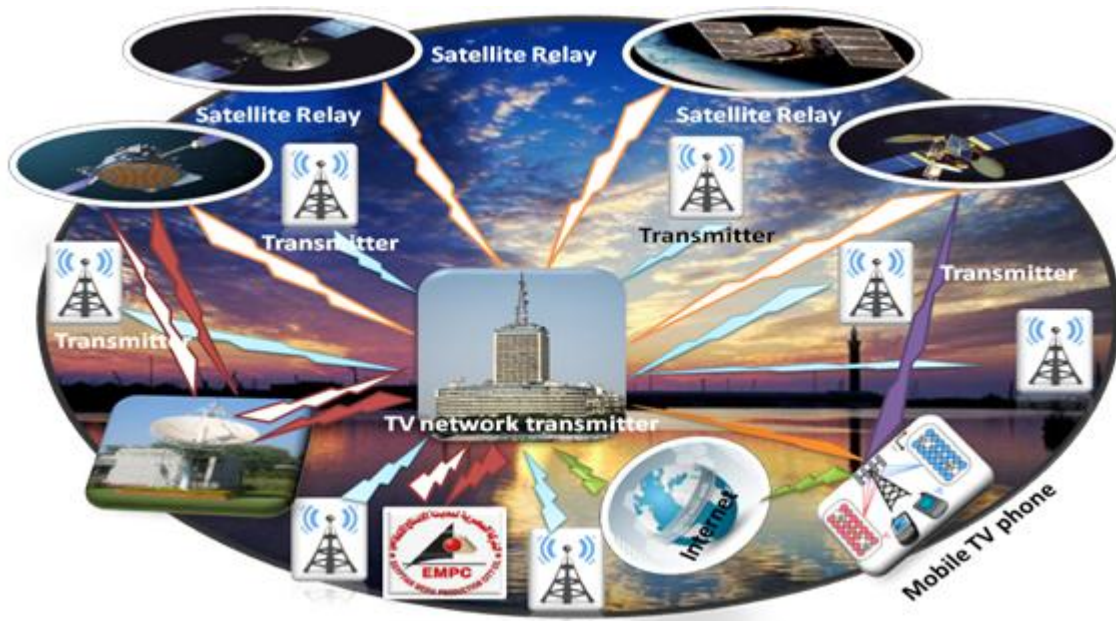


Fig. 3: CIComp of ERTU, (yellow line) mobile TV terrestrial, (green line) mobile TV web-based and mobile TV and (violet line) mobile TV satellite.

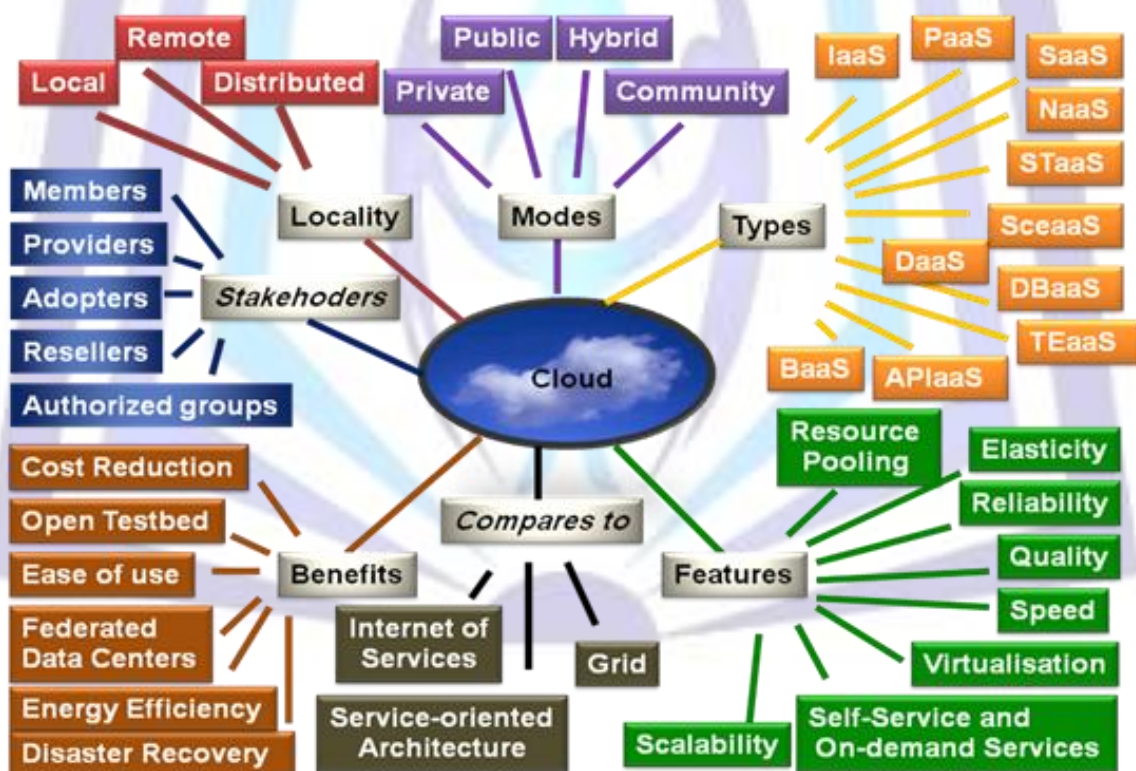


Fig. 4: Main aspects forming a CIComp of ERTU.



Fig. 5: The public CIComp of ERTU over the country.

III. Software Testing

Software testing is a process of verifying and validating that a software application meets the business and technical requirements that guided its design and development, and works as expected. Software testing also identifies important defects, flaws, or errors in the application code that must be fixed. A comprehensive testing regime examines all components associated with the application. Even more, testing provides an opportunity to validate and verify things like the assumptions that went into the requirements, the appropriateness of the software that the application is to run on, and the manuals and documentation that accompany the application.

Testing can involve some or all of the following factors. The more, the better:

- Analysis Business requirements.
- Functional design requirements.
- Technical design requirements.
- Regulatory requirements.
- Programmer code.
- Systems administration standards and restrictions.
- Organization standards.
- Professional and best practices.
- Hardware configuration.
- Cultural issues and language differences.

Software testing is too important to leave to the end of the task. V-model was used as the CIComp testing model. The V-Model of testing incorporates testing into the entire software development life cycle. Fig. 6 provides the V-Model which proceeds down and then up, from left to right depicting the basic sequence of development and testing activities. The model highlights the existence of different levels of testing and depicts the way each relates to a different development phase. V-Model clearly illustrates that testing can and should start at the very beginning of the task. In the requirements gathering stage the Analyze Business Requirements can verify and validate the business case used to justify the task. The model illustrates how each subsequent phase should verify and validate work done in the previous phase, and how work done during development is used to guide the individual testing phases. This interconnectedness lets us identify important errors, omissions, and other problems before they can do serious harm.

IV. Conclusions

Design and implementation of ERTU CIComp was done through this paper. As watermarking is an active tool for protecting the ERTU's cloud contents, a software package for audio watermarking was presented here. The package contains many visual tests such as probability, spectrum, power and scatter diagrams to enable user to quickly investigate the content. As seen from the results, it has a good performance for embedding watermark image and a good reconstructed audio. Audio watermarking done gave an acceptable performance and the security is guaranteed. All this application is done to suit the web-based where many departments can get benefit from anywhere and anytime according to department request and cloud policies.

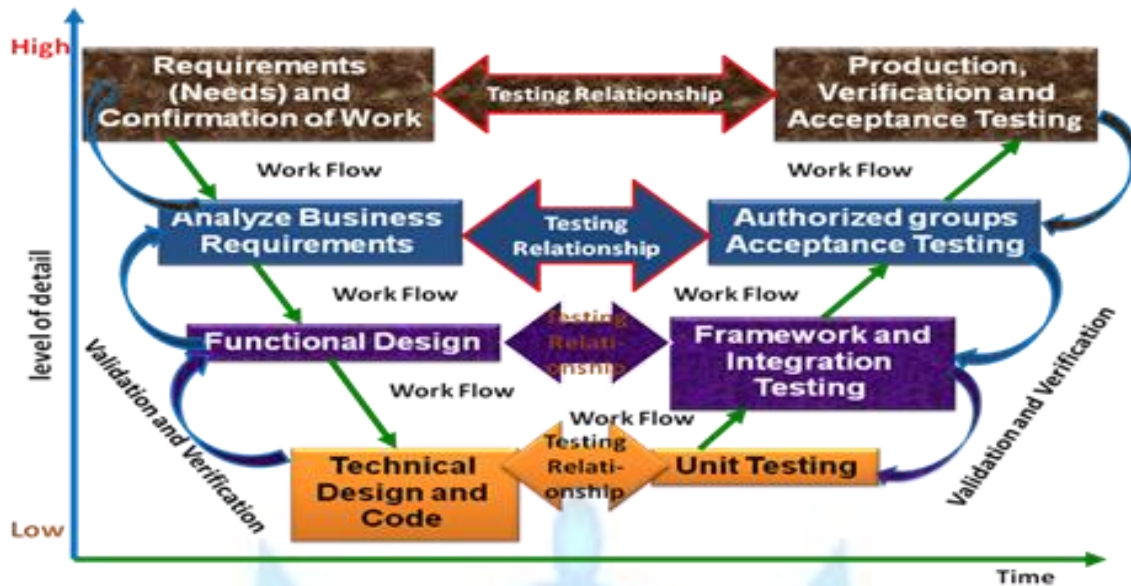


Fig. 6: V- Model of software testing.

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