

Moving Virtual University from Traditional Web to Cloud Computing

Case Study on Syrian Virtual University

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Abstract— E-learning takes many methods to makes learning concepts easier. With development of Web technologies and increased infrastructure resources (processing, storage) which allows developing techniques and methods of education especially in higher education, one of a web development under name cloud computing. Cloud computing not a new invention but it depends on used techniques (distributed computing and virtualization), cloud concept created new ways for virtual learning by providing a required resources for universities (traditional or virtual), cloud computing provide services to change virtual learning systems concepts to makes each step in virtual learning system easy. What we will see in this paper a cloud computing and traditional web concepts, and what a services provided by cloud to virtual universities by study (Syrian Virtual University) as example, and reviewing some of suggestions to develop (e-learning systems, security policy) of Syrian Virtual University.

Keywords- e-learning; cloud computing; Mobile web; SaaS; virtual laboratories.

I. INTRODUCTION

The concept of cloud computing is not a new technology but the development of the concepts of parallel computing, where “processing and storage” moved to the cloud platforms and provides everything as a service. This concept has enabled the development of activities from across the Web including virtual learning which also provided systematic economics of education has become one of the main point to cloud computing in the modern Web architecture to enable and create endless services (security, Applications, storage services). The difficulties and challenges facing virtual universities both in answer to infrastructure, security threats in the online environment has the largest share in the external threats that represent a risk in addition to internal risks to infrastructure. In other side of the constraints in the virtual learning is un-using virtual laboratory within educational systems, which allows increasing and building students skills. Not this point is a goal of virtual laboratory; just it’s designed and built is to expanding the knowledge and skills for learner.

New technique has been start working under label (Face Recognition System, FRS) this security technique used in laptops and pc’s but not in web application, one problem not allowed to implement this security policy in web applications and sites, is (the complexity of the face recognition algorithms). Servers resources faced some of fails with lowing resources especially with large users when login, cloud computing resolved this problem by providing large resources (processing, storage, Virtual machines), which

allowed for this security policy (FRS) to implement in web application and update login security system to organization, We will see in this paper what is a traditional web application and viewing its architecture. In next paragraph will explaining cloud application architecture. A last paragraphs explains virtual learning concept in short ideas, another one what is effects on virtual university by cloud services, and takes Syrian virtual university an example to detects its status in traditional web and what is a good benefits when it moving to cloud computing.

II. TRADITIONAL WEB

That expression indicates for a un-semantic web applications, some of expressions refers to (static web) which mean hasn’t dynamically in infrastructure (from low level – serves –, to up level –web applications–) applications model in traditional web engineering has rules design, most structural models for applications designed base called (Layers):

- Presentation layer.
- Business Application Layer.
- Storage layer (Data Access).

This applications divided to (N-Tier layers), where is all set layer specific powers.

A traditional web application consists only of a single layer (if the application form is not complicated and does not require a mechanism for accessing databases), the structure

of web applications are the most common applications that deal with three level, Figure 1.

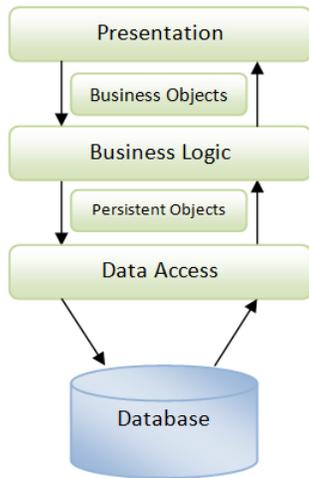


Figure 1. Web application, model (N-Tire)

III. CLOUD COMPUTING CONCEPT

Cloud computing define as a technology moved processing, application and storage concept from local devices to cloud computing, end user will not face problem with his application and his storage devices, because everything will be in cloud saved safety , and user will access to his data everywhere, any time and using cloud application which will replace local application. To simplify the computing concept we can says: a services provided to users, often for companies and institutions through the Internet, end user don't care how mad this service, just to use this service.

So cloud computing is a concept designed to provide all the requirements as a services (storage, applications, processing, virtual servers, virtual networks), so cloud computing is a new way to deliver services to users, and is not a technique [1], finally the goal is to provision of services and work on the equation of time to continuity in the implementation of work requirements.

Cloud computing creating new method to delivering applications as a services , end user does not need to install Office suites to manage his work, now user can use office directly, for example service documents from Google is reality idea to providing packages of Office Word, Excel etc.

Cloud computing architecture has three layers (Infrastructure as a service, platform as a service and software as a service) as schema, Figure 2 below from down to up:

1. Infrastructure as a service (IaaS).
2. Platform as a service (PaaS)
3. Software as a service (SaaS).

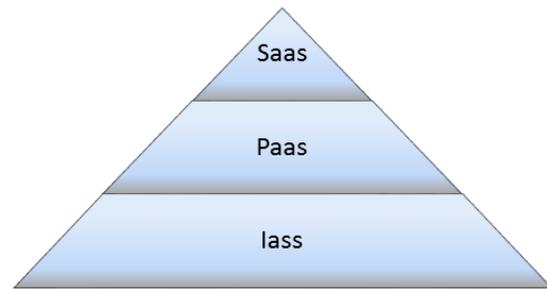


Figure 2. Cloud computing schema

IV. CLOUD APPLICATION STRUCTURE

What is cloud application? As we know a web application designed to move traditional applications (On-Demand) to play on web and its token name Software as a service (SaaS), That's concept be more than a web application (application play on server). That concept lets a web engineers to rethink in web architecture and application structure.

Cloud Applications is a new concept to provide the programs and applications in the form of services Software as a Service so that you are not obliged to purchase software licenses, but instead you pay a monthly subscription to receive the services required from the program without the need to purchase. It is sometimes also known as on-demand applications On-Demand applications. The program is hosted in a data center of confidence rather than hosted on special devices, which require the strength of computational processing power and memory capacity of large storage may not be able to provide.

Cloud applications based on the virtual environment, and this architecture deference on traditional web application, traditional side based on the concept of N- tire model (data access layer, business logic layer and presentation layer) in the design. A new generation of applications (Cloudy) depends on cloud infrastructure to delivering as a service, and designed to play under virtual environment not one but can able to run under exchange environments. Figure 3 [2] structure of cloud applications.

V. CLOUD STORAGE CONCEPT

Depends on Wikipedia definition [3] "*Cloud storage is a model of networked enterprise storage where data is stored in virtualized pools of storage which are generally hosted by third parties. Hosting companies operate large data centers, and people who require their data to be hosted buy or lease storage capacity from them. The data center operators, in the background, virtualize the resources according to the requirements of the customer and expose them as storage pools, which the customers can themselves use to store files or data objects. Physically, the resource may span across multiple servers and multiple locations. The safety of the files*

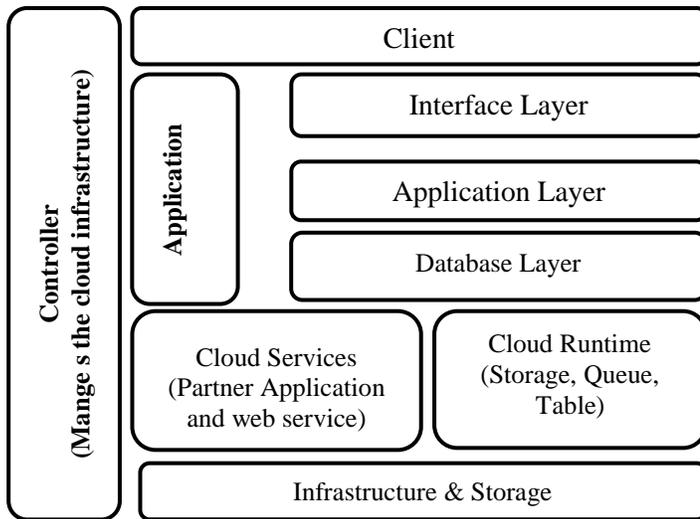


Figure 3. structure of cloud applications

depends upon the hosting companies and on the applications that leverage the cloud storage". Cloud aims to cancel the concept (traditional storage) on (Hard disks, memory flash, SSD), and storage to top-level status (user will saves his data on cloud storage systems)

Cloud storage benefits:

1. Reduce storage media costs.
2. Reducing backup cost.
3. Data availability: user able to access to his data any time.

Cloud computing has special mechanism to store files on cloud storage platforms, a mechanism worked on certain levels these levels called layers of data and divided for two layers, as below[4]:
 1) Active files: the files that have the high performance (more using), each file has more rank will moves to layer it called (top importance tier).

2) Inactive files: files which have (less rank) less used, it transported to the storage layer called (low importance tier).

VI. VIRTUAL LEARNING

We can define virtual learning is transportation and delivery of various types of knowledge and science to students around the world using Internet, the evolution of the Internet and its techniques especially in respect of direct communication and the possibility of creating interactive virtual conferencing, last points allows to appears modern style of education known as virtual learning, where the most universities in America and Europe, worked in virtual learning based traditional method in some cases, anyway virtual learning made it more professional, interactive, collaborate and giving credence to this kind of higher, we can see an increasing in virtual universities which counted more one hundred [5], depends on Unesco organization.

VII. SYRIAN VIRTUAL UNIVERSITY STRUCTURE

Syrian Virtual University (SVU) [6] is a government University created science 2002 to educate on-line over Internet; and arranged it in the assessment of July 2013 is 48, but on virtual universities listed at 35 depending on IIEP and Webmetrics [7].

SVU has fourteen professional academic programs as in below:

1. Bachelor in Information Technology.
2. Bachelor in Law Sciences.
3. Bachelor of Science in Economics.
4. Bachelor in Mass Communication.
5. Educational Habilitation Diploma.
6. English Program.
7. Higher National Diploma in Computing and Business Applications.
8. B. S. in Information Systems Engineering.
9. Master of Business Administration.
10. Master of Quality Management.
11. Master of Technology Management.
12. Master in Webology.
13. Master in Web Sciences.
14. Doctoral Program.

Talking about the structure of the Virtual University and what are systems and policies must on SVU to reach to high level of educational services; I will review SVU structure as below:

- First Level: Administrative structure internal of the University which managing administrative parts and educational status, that level specific what is a requirement for other parts.
- Second level: technical parts.
- Third level: services level, which includes these levels:

Administrative services: including (registration services, student affairs, exam part)

Academic services: including (online conferencing system, examination system, Moodle system, Request System, Mail System, virtual library).

I analyzed the structure of the Syrian Virtual University and detect what does not exist and what are systems needs to developing, as following table (1):

TABLE (1): SVU REQUIREMENTS

System	Status
Conferencing System	Need to replace
Login policy system	Need to develop
Virtual Laboratory	Not exist
Social media, and social network	Exist, at facebook and twitter but just to publishing news and decisions

Depending on table (1) I will review in the last section of this paper development suggestions for Syrian Virtual

University to update (e-learning and security policy) systems.

VIII. THE IMPACT OF CLOUD COMPUTING ON VIRTUAL UNIVERSITY

Academy service building to achieve the attributes of higher education and to achieve (skills and knowledge) to students by providing highly technical concepts to them. Developing the infrastructure of virtual university has many points as it:

- 1) Learning systems development cost
- 2) Infrastructure developing and maintenance cost.

Anyway all problems and challenges can be cancelled by cloud computing, and development e-learning systems and infrastructure of the University in low costs, where cloud computing able to provide these services below fast, easy ways:

- 1) Providing computer processing capabilities.
- 2) Provide storage space.
- 3) Provide software development platforms.
- 4) Providing virtual laboratories

Research on Cloud computing platform for virtual university providing e-learning by (Nisha Gautam and Dr. Manu Sood, October 2012) [8] a research provide guide to cloud computing services and what is benefits on e-learning providers (virtual universities) " We have concluded that, e-learning is an open source of learning. For the advancement of e-learning website, it is also important to have user friendly environment to the user. So, we can provide better environment to the user in which they can work efficiently without any barrier of the different environments. For that purpose the cloud computing platform is used. It is an open platform for any service and virtually available on the web", additionally there are a reason for virtual university to transport it's structural from traditional Web platforms to the cloud platforms, as these points:

1) Service cost: University services on cloud computing platforms are a low-cost, compared with the current web servers.

2) Scalability: increasing resources of the infrastructure requirements and cost cheap in cloud environment. So, moving to cloud computing is the best option for virtual universities.

IX. PROPOSALS TO DEVELOPMENT THE SVU STRUCTURE

In this section we will explain what a mechanisms for appropriate solutions to the Syrian Virtual University, and view a cloud services provided which allow updating SVU structure. I will start with these questions:

- What are the updates on educational systems based on cloud computing services?

- What is the verification policy entry to University Systems?
- Is a university using a social networks and social media based learning method?
- What are an enhancements should a Syrian Virtual University to do? Therefore these are proposals to developing SVU e-learning structure:

A. Conferencing system

Syrian virtual University using a Linktivity Collaboration player, it used that application when started, that Linktivity system was a good application lastly, and when a registered student was little (under 20 students in class). Linktivity player required additional programs to work (Java, flash, only Internet explorer, windows xp) for both sides (Tutor, student), last year appeared updates and an application able to work under windows 7 platform. If one side faced technical error in additional application (Linktivity will not work) and student will not able to entering an on-line session, (this problem became more separated). Anyway, in additional bad point in Linktivity player is a (echo sound) in some cases, which makes a session so bad.

In continue study sessions system (which works under traditional web method) System lectures of Syrian Virtual University requires to upload a recorded lecture to (SVU) servers, Figure 4 shows the synchronization session.

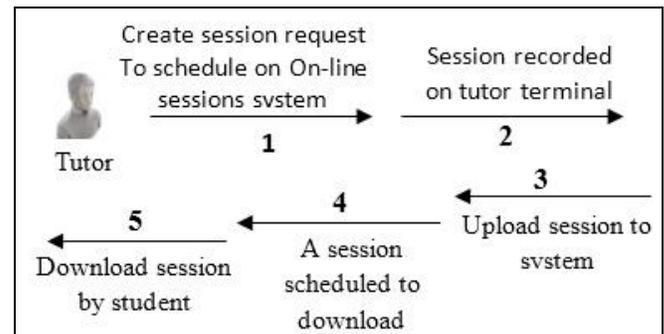


Figure 4 create\upload session using Linktivity.

Proposal development

Should using cloud application which recorded session directly to cloud storage servers, that's mean (record session and upload it) and student (download to watch) this stage will cancel in cloud applications. There are many of cloud application for conferencing and has special specification like (edit recorded session) and playback etc. one of it called (Mikogo) [9], that application not required additional applications (just browser) and is compatible with all browsers, Figure 5 below shows create online session by cloud application model.

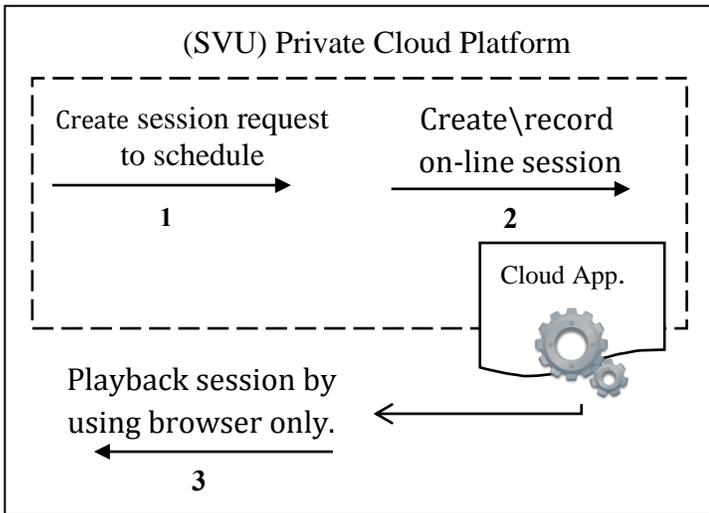


Figure 5 Create online session by cloud application model

B. Virtual laboratories (v-labs)

Virtual laboratories starts using based education and classified it as one of e-learning methods, v-labs is a new age of e-learning, v-labs not for one field, it takes many models:

- First model: virtual simulation laboratories (like fiscal and chemical labs).
- Second model: DistanceLab.(this labs depends on true devices in laboratory and you can watch lab by camera and controlling devices by robots)
- Third model: Laboratory of Linguistics (that kind of labs using to expanding knowledge's in language, because it using a web to feedback hug information to learning, like Microsoft lab [10]"This is a prototype Contextual Thesaurus developed by Microsoft Research. Actually, it's quite a bit more than that: it's an English-to-English machine translation system that employs the same architecture that the Microsoft Translator uses when translating different languages. To the best of our knowledge, this is the first large-scale paraphrasing system anywhere".
- Fourth model: programming development Labs, (the aim of these kinds of labs is to and testing codes without a development environment or a programming language Compilers installed on a student terminal, if you like (php) and there is no Apachi server installed on you device you can able to go programming lab and test you code. There are many of programming v-labs like (Codbad) [11], which offers many of compilers for (C, C + +, D, PHP, Python, Ruby .etc.).

So implementing v-labs based education system will improve education method and expanding learner skills.

C. Social network based e-learning

After checking Syrian Virtual University structure researcher did not find any reality to use social networks or

media networks in educational process, just SVU using social network Facebook for its' decisions and break news. So I think to Proposal development for educational process by using social networking and media networks in based e-learning method to increase interaction and communication between students and tutors through enhanced scientific debate outside the lecture times.

D. Development policy and identity verification.

A virtual higher education environment requires privacy policies in there systems, particularly to access (examination system, student profiles). Student access to his profile which allows to accessing to subsystems but not mean to use it directly. Student will be able to use subsystems (Moodle system, Request System) after re-enter his (user name and password).

Proposal development

To access to subsystems in easy way and simple step, the proposal is by implementing OpenId Protocol with Auth protocol which detect student Identity for one time and allows his to using all subsystem by one click, like Google authentication to use subservices.

E. Using cloud resources to developing security policy

All websites depends on user name and password to detecting user identity this method is a traditional way to detecting identity and privileges. So to looking for more high technical way to checking user identity, we starts to the main reason to development the security policy of Syrian Virtual University by review this point:

- User name and password became not enough to establish student identity.

As we know a student uses his ID and password to login, web site policy system checking student entries and allowing to accessing subsystems if an entries is correct. This is a traditional way to detecting student identity in traditional web (user name and password), and this method be un-useful especially when student gives his (ID/Password) to someone to deliver project or to attend online session, and in additional point hacker stolen student login information, all this conditions happens, so what is proposals to improve login policy?. To improve security login that's required costs to increase servers' resources, why? Because a one solution available to use based username and password login is recognition detects, which has many methods (face, sound and footprint) all this methods used complex algorithms to analyzing all cases to detect user identity that's mean requires more of resources for server. This is a big problem faced this technique in traditional web, and resolved by using cloud computing resources.

Proposal development

Cloud computing provides super resources in processing, storage, etc. which allowed to use systems was unable to use it in traditional web, like face recognition system (FRS), now using advanced techniques to checking login by Face Recognition System (FRS) will improve verification of user identity, based the model (user name and

password), so the suggestion to improve SVU security policy by using facecrop open source product from Luxand company [12], facecrop product designed to run in any environments until cloud, I designed sample Figure for my suggestion of Syrian Virtual University to improve security policy by moving to cloud platform, as Figure 6 shows using (FRS) based on traditional method login under cloud environment, a client enter his (Id & password), in next step moving to (FRS), after detecting a client be able to access for all subsystems.

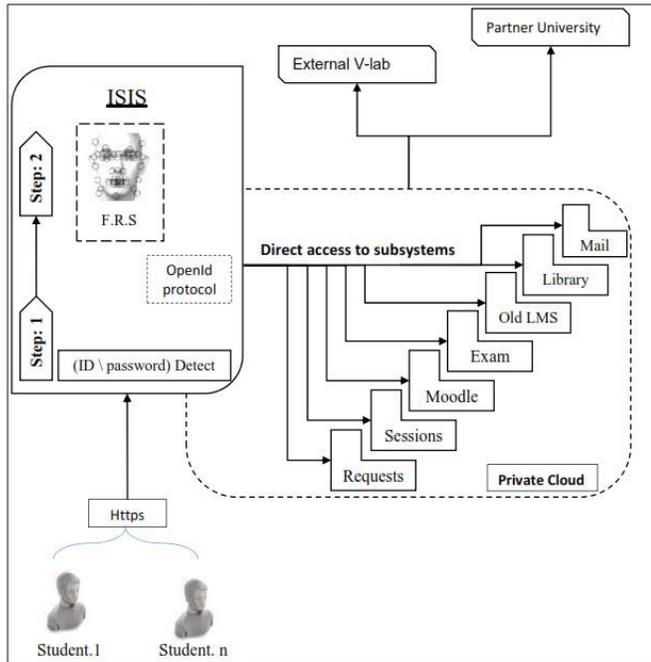


Figure 6 Using FRS under cloud environment

IT managers, University head office and supervisors will say: why to use two procedures in identity detecting? My answer will be: while we have cloud computing which has unlimited great resources, so we can able to using a complex algorithms in identity detecting process. Until if a hundreds of students' login to university, I think no problems will them faced it, and no servers will down, because a university platform works under cloud computing environment which will provides cheap resources for complex processing.

X. CONCLUSION

After reviewing all concepts about cloud computing based on traditional web, I would finishing my search in final conclusion and gives what is principle for Syrian Virtual University, by immigration from tradition web infrastructure to cloud computing and using cloud services to enhance university systems, which allow to applying and implementing services (v-lab and FRS) were unable to use it in traditional web because a low resources in traditional web infrastructure. So what we want to focus in our goal in update university systems by implement (FRS) Face Recognition System. Using FRS in virtual university will be able to detect students' identity otherwise (user name/password) login which known a traditional way in

detect user identity. Another point in enhancing learning system is replace Linktivity model for online sessions and use cloud application like (Mikogo), and using social networks and social video networks which will add positive values to Syrian Virtual University in e-learning method. Finally enhancing e-learning system / policy system is important but required expensive costs, and we can reduce these costs by moving to cloud computing environments.

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