

# Smart Tools for Cloud E-learning System

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**Abstract**—In this paper we propose an intelligent cloud-based teaching system for E-learning content services to the provision and sharing of various forms educational content, including text, images, videos, 3 dimensions objects and scenes of virtual reality and augmented reality. The proposed system provides a new and innovative solution for media services that can be accessed from smart devices cloud-based intelligent service environment with a fully integrated system.

**Keywords**—E-learning; Cloud computing; Indexation; learning in Arabic language; Smart Tools; Internet of Thing.

## I. INTRODUCTION

Thanks to the advances in information technologies and high-speed networking, the e-learning environment can offer a new paradigm of learning to learners. In traditional web-based e-learning mode, system construction and maintenance are located in interior of educational institutions or enterprises, which results in a lot of problems existed, such as a lot of investment needed, but without capital gains to return, without development potential and staying power. Yolaine Bourda remark in 2002 that “in education and training, the value is less in the content itself, but increasingly in the ability to search this content, find and to assemble fragments to provide relevant information and effective assistance to users, teachers, students.” [21-26].

These new requirements have given rise to problems of research and collection of teaching resources. But the existing Cloud E-Learning Systems to teach Arabic language and some Latin languages and research information are rare, rigid and they use search mechanisms that give irrelevant results as the keyword search. Also, they are based on indexing terms without considering the semantics of the educational content.

The Cloud E-Learning Systems for the Arabic language are relevant environments in many areas of training (teaching Arabic language) but also pose problems related to their creation tedious, costly in resources and time, and problems related to the search for information because of the increasing amount of information available and because of the methods of indexing, which is based on static methods such as keyword search that makes irrelevant the research process. For this, a new method of indexation is required [1]. Cloud computing is becoming an attractive

technology due to its dynamic scalability and effective usage of the resources; it can be utilized under circumstances where the availability of resources is limited.

As cloud computing has become a research hotspot among modern technologies, researchers pay more attentions to its applications. As concerned as cloud computing applied in the field of education, a lot of problems had been studied, such as the technology for future distance education cloud [2], teaching information system [3] [4] [5], the integration of teaching resources[6], teaching systems development[7].

In this paper, we propose an intelligent cloud-based teaching system for e-learning content services to the provision and sharing of various forms educational content, including text, images, videos, 3 dimensions objects and scenes of virtual reality and augmented reality.

## II. PEDAGOGICAL INDEXING

According to Loiseau, pedagogical indexing [8] is an "indexing performed according to a documentary language that allows the user to search for objects to use in education"[9]. Our thesis aims to propose a model for what we called the indexation of pedagogical texts for teaching the Arabic language [10] and demonstrate its feasibility by implementing a prototype. This leads us to insist that such a database must allow the following use cases:

- Adding text to the base.
- Text searching based on the problematic issues and specificity of the Arabic language.
- Support for selecting text.

The indexing operation which consists of analyzing the object to be indexed by extracting concepts of this analysis, and finally express it in a documentary language. The agent of these operations is not specified. So we can imagine several configurations: the analysis can be performed by a human operator or a machine, and the expression of concepts extracted in documentary language can be performed either by a human or a machine. [9] In our case, the indexing operation will involve the user and the system. The user is not a documentalst and as a teacher, it is primarily the use case "text's search" which interests him. Both sides of the indexing process will therefore be as simple and not boring as possible and to do that, they must be automated as possible. The analysis of some concepts of the document cannot be automated, such as the author or title (if these criteria are relevant to their operation in

language teaching). But any automated analysis must be supported by the system. The analysis part of the indexing will be hybrid in the sense that some concepts cannot be managed by the system, but the most fastidious will be automated where possible. In what follows, we will explain the influence of pedagogical context on the choice of the text, before exploring the existing standard description of educational resources so that we may adapted to the specificity of the Arabic language and needs users, and then introduce the notion of facet of a text and present a model in which it occurs.

### III. CLOUD COMPUTING

Cloud Computing is a technology that uses the internet and central remote servers to maintain data and applications. Cloud computing allows consumers and businesses to use applications without installation and access their personal files at any computer with internet access. This technology allows for much more efficient computing by centralizing data storage, processing and bandwidth. Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts remote services with a user's data, software and computation [11].

#### A. Infrastructure as a service (IaaS)

Hardware resources (such as storage) and computing power (CPU and memory) are offered as services to customers. This enables businesses to rent these resources rather than spending money to buy dedicated servers and networking equipment.. As examples in this category, Amazon1 offers S3 for storage, EC2 for computing power, and SQS for network communication for small businesses and individual consumers.

#### B. Software as a service (SaaS)

In this model, software applications are offered as services on the Internet rather than as software packages to be purchased by individual customers. One of the pioneering providers in this category is Salesforce.com offering its CRM application as a service. Other examples include Google web-based office applications (word processors, spreadsheets, etc.),

#### C. Platform as a service (PaaS)

This refers to providing facilities to support the entire application development lifecycle including design, implementation, debugging, testing, deployment, operation and support of rich Web applications and services on the

Internet. Most often Internet browsers are used as the development environment. Examples of platforms in this category are Microsoft Azure Services platform6, Google App Engine7, Salesforce.com Internet Application Development platform8 and Bungee Connect platform9. PaaS enables SaaS users to develop add-ons, and also develop standalone Web based applications, reuse other services and develop collaboratively in a team [12].

Cloud computing attributes can be visualized from the following comparison [12].

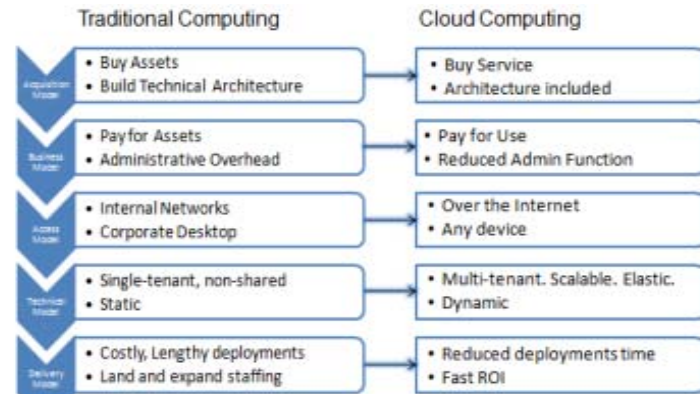


Fig.1 Comparison between traditional computing and Cloud computing

### IV. E-LEARNING BASED ON CLOUD COMPUTING

E-learning is an Internet-based learning process, using Internet technology to design, implement, select, manage, support and extend learning, which will not replace traditional education methods, but will greatly improve the efficiency of education. As e-learning has a lot of advantages like flexibility, diversity, measurement, opening and so on, it will become a primary way for learning in the new century as in Fig. 2.

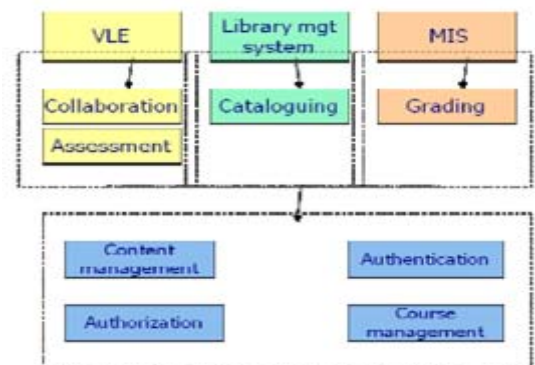


Fig.2 Architecture of simplified Learning System

## V. CLOUD-BASED APPLICATION IN S-LEARNING ENVIRONMENT

There are a number of cloud-based applications available in the e-learning sector as well.

-Mendez [13] illustrates that in traditional web-based learning mode, system construction and maintenance are located inside the educational institutions or enterprises, which led to a lot of problems, such as significant investment needed but without capital gains for them, which leads to a lack of development potential. In contrast, cloud-based e-learning model introduces scale efficiency mechanism, i.e. construction of e-learning system is entrusted to cloud computing suppliers, which can make providers and users to achieve a win-win situation. The cloud-based environment supports the creation of new generation of e-learning systems, able to run on a wide range of hardware devices, while storing data inside the cloud.

- Maraoui [1] presented a new Arabic text is proposed indexing approach using the creation of a new application profile of the LOM metadata schema (Learning Object Metadata) for the Arabic language. This profile includes the fields of LOM standard, and adds new fields for specific search information to Arabic language, and meets the needs of a teacher. Also, it's all using natural language processing tools like SAPA and AL-KHALIL.

-Asma[14] tried in their system outperform existing systems (static) and have a dynamic system that meets the needs of teachers and learners of Arabic. For a student, the system represents to him an exercise taken from the collection obtained after determination of CP, and if the student asks for more than an exercise in the same category, the system can provide to him and that by choosing each time a new text from collection obtained during the phase of the research. For teachers, the system represents to him a text's list respondents to their needs with a set of scripts, which he must choose one to apply to the selected text. So our system offers the possibility of varied types of exercises and texts applied in these exercises with taking into account the educational context and specificity of the Arabic language.

-Souheyl [15] presented a statistical approach to semantic indexing for multilingual text documents based on conceptual network formalism. They proposed to use this formalism as an indexing language to represent the descriptive concepts and their weighting. These concepts represent the content of the document. Their contribution is based on two steps; they proposed, in the first step, the extraction of index terms using the multilingual lexical resource EuroWordNet (EWN). In the second step, they passed from the representation of index terms to the representation of index concepts through conceptual network formalism. This latter is generated using the EWN resource and the association rules model (in attempt to discover the non taxonomic relations or contextual relations between the concepts of a document). These lasts are latent

relations, buried in the text, and carried by the semantic context of the co-occurrence of concepts in the document.

-Mounir [16] presented a video model integrating visual semantics, special and signal characterizations. It relies on an expensive representation formalism handling high-level video descriptions and a full-text query framework in an attempt to operate video indexing and retrieval beyond trivial low-level processes, semantic-based keyword annotation and retrieval frameworks.

-Mohamed [17] presented a step towards a standard semantic indexing of continuous speech (indexing by the sense). The index is presented based on the meaning of the elements (Verbs, Names) of the sentences. Also, other information that we can extract from speech. The index will be simpler and more meaningful. They tried not to use any external source to represent the meaning, which makes it more difficult and need resources that not in mostly exist. Also it focuses only on the speech, making specific and effective index, and because the speech she is rich enough to have its own standard. This work presented a step towards our goal of a standard semantic indexing continuous speech.

-Casquero [18] presented a framework based on iGoogle and using the Google Apps infrastructure for the development of a network of cooperative personal learning environments. They discussed the integration of institutional and external services in order to provide customized support to faculty members in their daily activities. They also take advantage of the framework as a test-bed for the research, implementation and testing of their educational purpose services.

- Marenzi [19] investigated how educational software can be used in an academic or corporate learning environment. They integrated models and tools that they developed into an open source environment for the creation, storage and exchange of learning objects as well as learning experiences. They presented the "LearnWeb 2.0" infrastructure to support lifelong learning and to enhance the learning experience. This infrastructure brings together information stored on institutional servers, centralized repositories, learners' desktops, and online community sharing systems like Flickr and YouTube.

- Sedayao [20] proposed an online virtual computing lab that offers virtual computers equipped with numerous applications such as Matlab, Maple, SAS, and many others that can be remotely accessed from the Internet.

## VI. CLOUD E-LEARNING SYSTEM FOR ARABIC LANGUAGE BASED ON SMART TOOLS

The Cloud E-Learning Systems for the Arabic language are relevant environments in many areas of training (teaching Arabic language) but also pose problems related to their creation tedious, costly in resources and time, and problems related to the search for information because of the increasing amount of information available and because

of the methods of indexing, which is based on static methods such as keyword search that makes irrelevant the research process [1].

Our work will be for Tunisia and for teaching in Arabic language which we proposed an intelligent cloud-based teaching system for e-learning content services to the provision and sharing of various forms educational content, including text, images, videos, 3 dimensions objects and scenes of virtual reality and augmented reality. The proposed system provides a new and innovative solution for media services that can be accessed from smart devices cloud-based intelligent service environment with a fully integrated system. So, we should offer to teachers of the Arabic language the opportunity to choose the media of their activities against the criteria, which requires the integration of a pedagogically indexed database, so we use smart Tools to index thing. The content is managed in the cloud in a compatible common file format. The system supports various platforms, such as personal computers (PCs), notebooks, tablets, smart TVs. Besides, a security system is provided for controlling data access and encryption in the cloud.

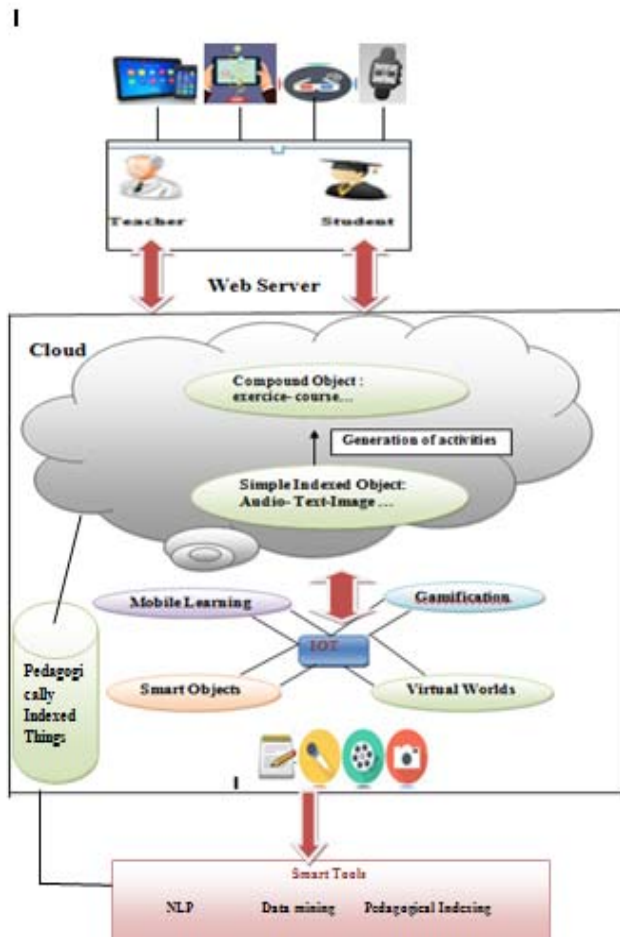


Fig.3 Proposed model

## VII. Conclusion

Modern learning services typically deal with multimedia resources such as graphics, video, images; text *etc.*, since such resources provide an efficient learning environment that helps learners understand the topic of interest better. As we mentioned at the beginning of our work, we have tried in our system to provide a new and innovative solution for media services for Tunisia and for teaching in Arabic language that can be accessed from smart devices cloud-based intelligent service environment with a fully integrated system.

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