مجلة التربوي
Journal of Educational
ISSN: 2011- 421X
Arcif Q3

معامل التأثير العربي 1.5
العدد 20

مجلة التربوي
مجلة علمية محكمة تصدر عن كلية التربية
جامعة المرقب

العدد العشرون
يناير 2022م

- **المجلة ترحب بما يرد عليها من أبحاث وعلى استعداد لنشرها بعد التحكيم .**
- **المجلة تحترم كل الاحترام آراء المحكمين وتعمل بمقتضاها .**
- **كافة الآراء والأفكار المنشورة تعبر عن آراء أصحابها ولا تتحمل المجلة تبعاتها .**
- **يتحمل الباحث مسؤولية الأمانة العلمية وهو المسؤول عما ينشر له .**
- **البحوث المقدمة للنشر لا ترد لأصحابها نشرت أو لم تنشر .**

مجـلة الـتربـوي
Journal of Educational
ISSN: 2011- 421X
Arcif Q3

معامل التأثير العربي 1.5
العدد 20

ضوابط النشر:

يشترط في البحوث العلمية المقدمة للنشر أن يراعى فيها ما يأتي :

- أصول البحث العلمي وقواعده .
- ألا تكون المادة العلمية قد سبق نشرها أو كانت جزءا من رسالة علمية .
- يرفق بالبحث تزكية لغوية وفق أنموذج معد .
- تعدل البحوث المقبولة وتصحح وفق ما يراه المحكمون .
- التزام الباحث بالضوابط التي وضعتها المجلة من عدد الصفحات ، ونوع الخط ورقمه ، والفترات الزمنية الممنوحة للتعديل ، وما يستجد من ضوابط تضعها المجلة مستقبلا .

تنبيهات :

- للمجلة الحق في تعديل البحث أو طلب تعديله أو رفضه .
- يخضع البحث في النشر لأولويات المجلة وسياستها .
- البحوث المنشورة تعبر عن وجهة نظر أصحابها ، ولا تعبر عن وجهة نظر المجلة .

Information for authors

1- Authors of the articles being accepted are required to respect the regulations and the rules of the scientific research.
2- The research articles or manuscripts should be original and have not been published previously. Materials that are currently being considered by another journal or is a part of scientific dissertation are requested not to be submitted.
3- The research articles should be approved by a linguistic reviewer.
4- All research articles in the journal undergo rigorous peer review based on initial editor screening.
5- All authors are requested to follow the regulations of publication in the template paper prepared by the editorial board of the journal.

Attention

1- The editor reserves the right to make any necessary changes in the papers, or request the author to do so, or reject the paper submitted.
2- The research articles undergo to the policy of the editorial board regarding the priority of publication.
3- The published articles represent only the authors' viewpoints.

مجـلة الـتربـوي
Journal of Educational
ISSN: 2011- 421X
Arcif Q3

معامل التأثير العربي 1.5
العدد 20

Cloud Computing Prototype for Libya Higher Education Institutions: Concept, Benefits and Challenges

Ali ahmed baraka[1], Abobaker m albaboh[2] , Abdussalam a alashhab[3]
Department of Internet Technology \ Faculty of Information Technology – Al-Asmarya University,
a.baraka@asmarya.edu.ly[1] , a.albaboh@asmarya.edu.ly[2] , ab.alashhab@asmarya.edu.ly[3]

Abstract

Cloud computing (CC) is a promising technology used to provide highly scalable services and secure computing environments. The concept and architecture of cloud computing are the focus of this paper. The challenges and benefits of adapting cloud computing technology in the Libyan education sector are also addressed. It highlights the state of the art in Libya regarding the use of learning technologies, and the enhancement of Higher Education (HE) at Libyan universities by cloud model is recommended. A prototype of hybrid cloud model is provided for the Libyan HE in this research with consideration of benefits and challenges. The paper encourage to do more future research with regard the implementation phase of the proposed prototype.

Keywords: Cloud Architecture, CC Adoption, Libyan Higher Education, CC benefits, CC Challenges, Hybrid Cloud Prototype

1. INTRODUCTION

Cloud computing is the emerging paradigm of distributed computing, which allows for a complete transformation of computing power on the Internet. Cloud computing will allow computing resources including hardware, software, development platform and other services accessible to consumers over the internet as services. If these services are accessed, customers can only be charged for the services accessed in terms of the resources used and the length of usage.

The importance to use modern techniques of data warehouse in educational fields like institutes becomes great. This paper explores the academic institutions' adaption of cloud computing technologies. A CC research is required to understand the architecture of cloud computing; concept of cloud computing, cloud models, CC

benefits, and challenges. This paper looks at the experience of cloud computing at Libyan universities.

The HE landscape around the world is at a constant state of flux and evolution, mainly as a result of significant challenges arising from efforts in adopting new and emerging technologies. Such emerging technologies have chance to play a robust role to improve the education system. But traditional methods are unable to address the needs of HE where emphasis is on higher order learning experiences [1].

IT researchers, community agencies and education institutions help in offering CC services as a realistic and valuable method for capturing CC service cognitive determinants among students, and teachers at universities. These investigations can provide the best available information to decision-makers and stakeholders in the contexts of Libyan HE before the design of adoption programs takes place [2].

2. Related work

Considerable research put in place about the issue of IT cost as one of the issues that arise in the implementation of educational activities that are linked to the use of information technology for each service in higher education for stakeholders. Cloud computing technology is supposed to exist as a solution for higher education with a reliability and efficiency. For example, in order to save on software licensing costs and minimize technological capital, many universities around the US have adopted CC technologies [3]. On the other hand, Cloud computing has endured tremendous opposition to adoption because of complexity coupled with uncertainty. Security and loss of control are the most serious barrier facing organization to adopt CC services [4].

There are few studies which specifically focus on the benefits and challenges of CC adoption and use in the educational context, especially in higher education (HEIs), such as the universities, and which focus on CC use in education only as CC frameworks and implementation [5].

The literature has also provided different CC strategies and architectures to help in CC adaption in higher education [6-8]. Though, there is a gap between linking CC strategies and models with the possible benefits and challenges. This gab has put forward fidgety in the adaption process of CC in the educational domain, especially in the socio-technical issues associated with HEIs [9].

This research aims to provide insight on CC benefits and challenges and purpose a hybrid CC prototype to be adapted at the Libyan Higher Education system.

2. Cloud computing definition

The concept of cloud computing has evolved as a successful facility computing standard for the delivery of ICT (Information Communication Technology) assets as a service over the Internet. NIST: The cloud is a group of interconnected, virtual computers that are dynamically provisioned and presented as one or more unified computing assets. Cloud computing implementation spans across the needs of industry, academia, and government. Cloud computing is starting to play a major role in transforming education through the use of technology [10].

3.0 Cloud computing architectures

There are two branches of the cloud computing system: the front and the back ends. Both of them are linked through a network, typically the internet. The client (user) sees the front, while the back is the device cloud. The front end has the customer's device and cloud access program and the cloud computing services are offered back and forth such as various devices, servers and data storage [11]. A cloud client comprises computer hardware or computer software based on cloud computing or configured for the provision of cloud services [11]. The server contains the standard hardware and/or software necessary to provide the services depending on the users' needs [11].

As can be seen in Figure 1, among the front and back ends the architecture contains another three components namely Application, Platform and Infrastructure which will be discussed in the following section.

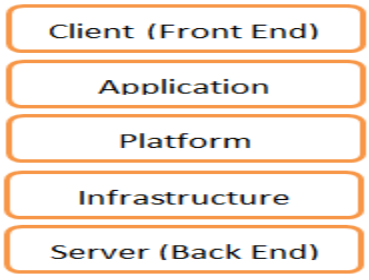

Figure 1 Cloud Computing fundamental Architecture

3.1 Cloud computing services models

Cloud computing service models can be categorized to Application as a Service (AaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) see Figure 2.

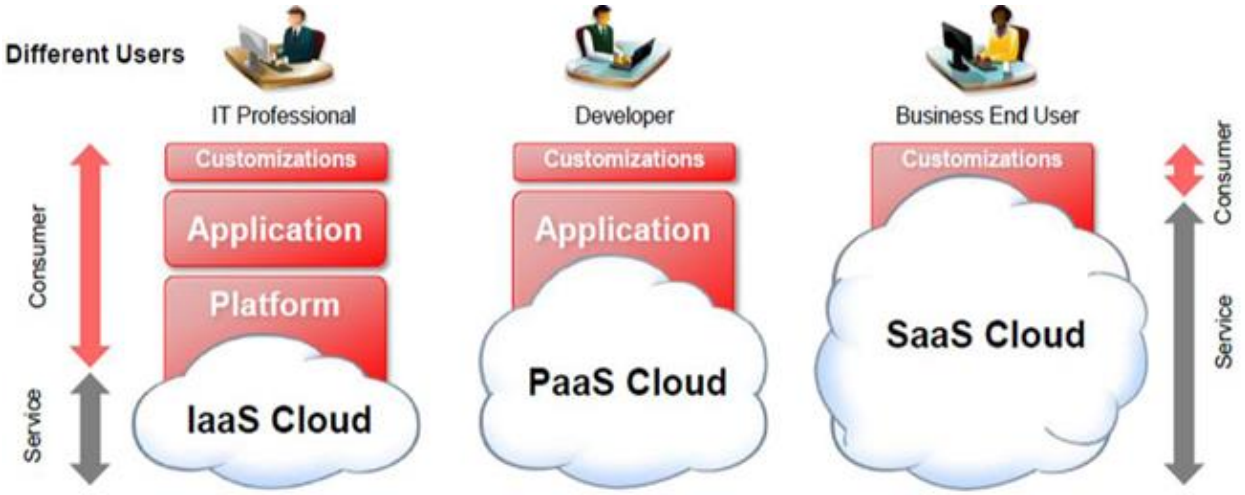

Figure 2, the three models of cloud computing services

The Application (Application as a Service AaaS) provides users with easy access to many of their normal business applications and services (includes e-mail and word processing packages, etc.) without forcing users to access these programs over the Internet, the special software on your computer needs to be installed and executed if you are using AaaS. You adopt just the pay-per-use pattern, which may minimize the overall price rather than purchasing the program at a comparatively higher price. This helps companies to save money by eliminating license fees and paying instead for what they use. Examples of AaaS are Google Gmail and Salesforce.com's online CRM system [12].

Platform as a Service (PaaS) is a collection of services offered by the cloud to build, deploy, manage and integrate applications in the cloud environment. This is a custom service where new software solutions to be built so that even the existing solutions can be expanded without having to bother the developer to provide the entire infrastructure and the software development kits SDK. Many cloud service provider's (CSPs) offering PaaS have various web-based tools to minimize

development time and cost to developers, such as versioning, agile and life cycle planning. Examples of PaaS are Google's Amazon's EC2, App Engine and Microsoft's Azure platform.

Infrastructure-as-a-Service IaaS is popular for offering a centralized, location-transparent service with a computing and storage infrastructure. CSP infrastructure requires storage, servers, bandwidth and network equipment, including software that tracks infrastructure use and only allows users to afford the use of the infrastructure. Some of IaaS's most common example are ServePath from Go Grid and Elastic Compute Cloud from Amazon (EC2) [12].

AaaS is widely used as a base for e-learning (e-learning) and mobile learning (mobile learning) which have proven successful in online education. PaaS hosts software development collaborations and programs for developers to share ideas. The popularity of IaaS expanded following advances in virtual computing technology and the concept of pay-per-use to reduce research costs and the use of high-end hardware needed in educational research institutions.

3.2 Cloud computing development model

Public cloud services are accessible to the public and maintained by an organization that provides cloud services, and the public cloud is one of the best forms of the current computing mode model. They are mainly used by the consumer of the public. Public cloud and the policy, cost and value are categorized by the service provider, such as, Google, Microsoft, and Amazon.

Private cloud services are provided to an organization only and are operated by that organization or a third party. Private clouds help institutions to host services needed in the cloud, while managing concerns about data monitoring and security, which is frequently not available in a public cloud. Private cloud is hardware/software cloud service provided to a particular institution.

Hybrid cloud services is a combined cloud services plan that includes a cloud model, data stored in the private cloud, and an agency database that is processed by software running in the public cloud. A combination of on-premises approach is implemented in a hybrid cloud computing environment using coordination between private cloud systems and public cloud services systems.

Community cloud services are delivered by different organizations and support a particular community with the same or similar issues. These core services may be managed by a third party company and may be located off-site such as government or cloud. Community cloud services in computing is a collaborative business in which the structure is distributed among several institutes of a given community with common interests (compliance, security, jurisdiction, etc.), and can be run internally or by a third party and hosted externally or internally [13, 14].

4.0 Cloud computing higher education

CC is now becoming the latest IT service model in higher education sector, including the leasing of new cloud-based computing services and the potential growth of IT. The use of cloud computing in high education (HE) is vast and well-known in many universities. According to some authors, the incorporation into HE of CC is primarily due to this technical innovation's cost-effective existence, although the CC's creative capacities are important to note, as it promotes and encourages the formation, use and distributing of ideas, information and thoughts. On the other hand, high education institutions HEIs and their stakeholders, for instance students and teachers, are nevertheless expected to implement and embrace CC and become aware of the technology's benefits and potential challenges [5].

Many studies showed that universities start to display a strong interest in using CC, while other institutions have already built particular systems or cloud deployment, for example, Indonesia's IOER. Empirical evidence concerning CC adoption in HE seemed to be limited and thus opened up possible future studies for researchers to explore the use of CCs in HE in the future and to find the current systems universities use before they introduce a cloud-driven educational system or establish a cloud framework. Thus, the following section will propose CC model for higher education system in Libya [5].

5.0 Cloud computing adoption by Libyan higher education

In Libya's education sector, the implementation and use of information and communications technology is still precocious, as access to IT services in many areas such as Government and Commercial Services is still behind the maturity level.

There are about 120 institutions of higher education in Libya, 12 public, 8 private universities and another 100 government-funded institutions that give education in the areas of management, technology, the creative art and the improvement of teachers' skills. Some Libya higher education institutions have a simple ICT infrastructure such as operating systems, internet access, and a local area network such as Benghazi University, Tripoli University, Asmarya University, Sebha University and the Academy of Postgraduate studies or Economics. The websites, research systems, and assessment systems and admission and registration systems of most higher education institutions in Libya are basically in process of growth [15, 16].

On several resource meetings of the institutions, continuous improvements in software and hardware have become critical things and will continue to press on institutions' budgets. However, many institutions could still benefit from the latest advances in IT technology at reasonable rates through cloud computing services. Cloud computing is likely to be an appealing proposal for entrepreneurs and educational companies. Cloud computing can also prove attractive to academic institutions.

College and university are always attracting students and keeping up with rapids in digital technology to upgrade their software and IT hardware. Adaption of cloud computing in Libyan universities could offer these institutions the means they can afford to achieve these ambitions. Moreover it could also lead to cost savings on labor costs by shifting responsibility to external providers to manage certain aspects of their software and hardware infrastructure as less IT services staff is needed than before [17].

Cloud computing provides educational opportunities for Libyan universities to provide e-learning services, especially in cases where these services are intensified by computer (virtual worlds, simulations, video streaming, etc.). The cloud offers students and teachers tools to deploy on-demand computer resources for lectures and jobs based on their learning needs. For example, teachers can use pre-installed software to quickly deploy computers (usually named Virtual Machines or VMs) when requested. The particular reasons for the adoption of cloud computing by several academic institutions include:

- Minimization of IT infrastructure costs.
- Maximizing educational quality.
- Increased suitability with features including pay-per-use.
- Improved consolidation of resources.
- Green achievement [18, 19].

5.1 Hybrid cloud computing architecture for higher education universities in Libya

The hybrid cloud model offers the best possible use of private and public models, integrating the features of public cloud in terms of economies and efficiencies with the privacy model's protection and control. However, it takes advanced thought and some handy technologies to use both public and private cloud services [20]. That is, firms with significant IT investments want to increase their existing IT services with selected cloud services to generate business value while maintaining their main data resources. The use of separate technologies to handle different integration styles must be managed in aspects like hardware/software development and the processes of integration must be updated [21].

In the Right Size study, 55% of businesses intend for hybrid clouds, 13% expect to use multiple public clouds and 14% for multiple private clouds. This shows the development and the interest of the market in hybrid cloud computing and demonstrates the increasing uptake in this architecture [20].

Hybrid clouds provide flexibility of IT services usage in companies. This flexibility leads to agility and agility allows organizations to adapt at the "speed of need". For businesses that working in competitive and rapidly changing market, this flexibility is critically necessary. Health care, finance and e-learning are some examples. Until recently, however, it was difficult to move workloads from private to public or vice versa [20]. Therefore, pairing public and private models is complex, and the integration process requires considering the following:

- Interoperability is required in both on-premise and public cloud model.
- Expansibility of the architecture that is easy to configure with existing tools, applications, and systems.

- Unified infrastructure is able to conceal heterogeneity and handle heterogeneous environments with a single dashboard.
- On-site management of resources sharing and composition, and services sharing.
- Ability to choose the cloud services of different providers and to construct save compositions and decide how and when IaaS or PaaS resources will be obtained and released; integrations need to be dynamically managed to meet business needs changes. Integrate existing on-site middleware and applications, and integrate cloud services with existing data sources.
- Data sharing and isolation in a multi-tenancy environment should be based on security and policy [21]

Figure 3 represents the proposed hybrid cloud computing development model for higher educational universities in Libya. Users from different universities such as students, lecturers, administrators, researchers and IT staff can make use of different services provided by the hybrid cloud. The users can access to some public cloud services such as e-mail services directly by requesting the service provider. Besides that, more specific services such as e-learning can be accessed through making a service request to the higher education hybrid cloud interface layer; the user can use the sources available in the cloud. The interface layer authentication server is used to store user information. The user interface layer also defines the user's access model with which students, teachers, researchers, IT practitioners or administrative staff can be identified [22].

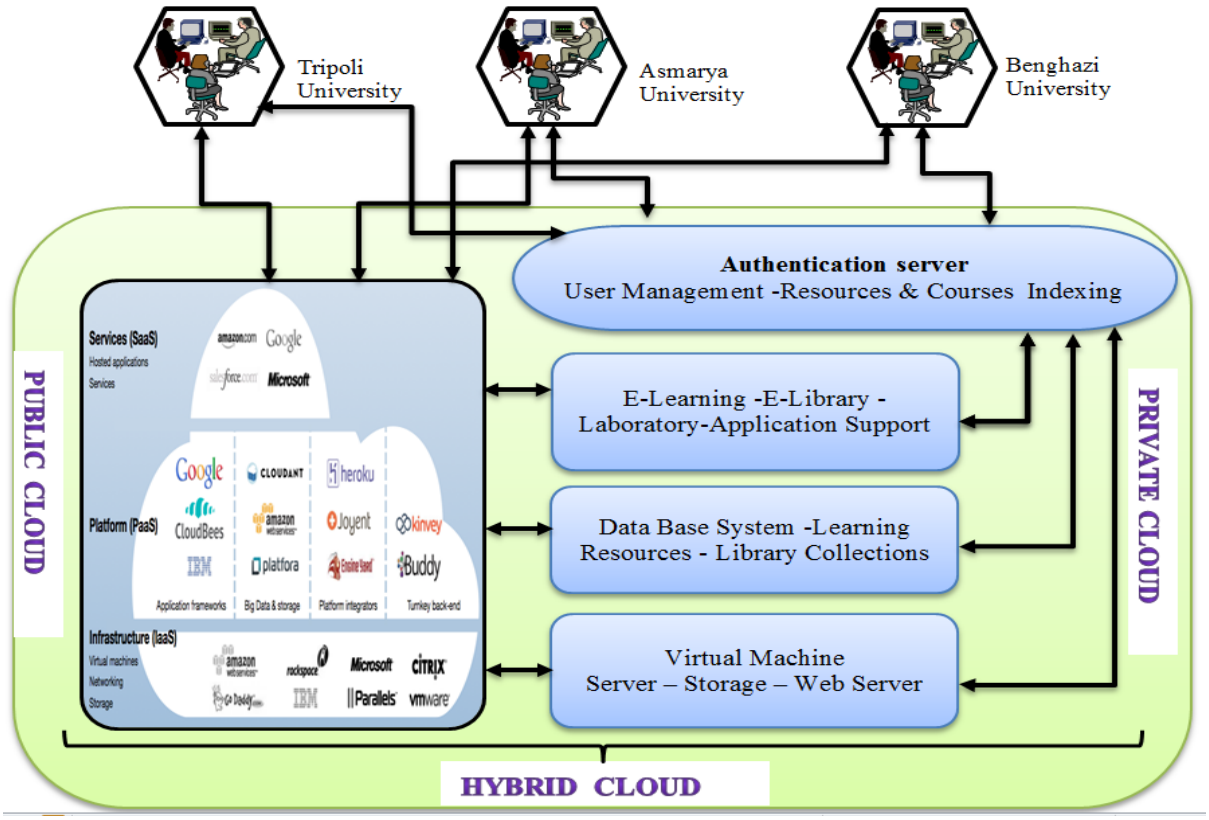

Figure 3 the proposed hybrid cloud computing development model for higher educational universities in Libya

The required service is processed in the appropriate layer once the user is authenticated as a valid user. The service is denied otherwise. The required service is guided in SaaS layer to the applications, for example, E-library and app support accommodated in this layer. IT practitioners are able to create and deploy applications such as database system and learning resources, and can access to public cloud resources and platforms in the PaaS layer. The physical infrastructure is virtualized in the IaaS layer including web server and storage, so the required service is forwarded to the right location for private or public clouds.

6.0 Cloud computing benefits

Cloud computing lowers institutional capital costs. Attributed that this is because educational institutions are able to provide a wide range of programs and only account for the real capability charged for them. It spares costs of installation and maintenance in academic institutions by more than 50 percent. It gives flexibility to

provide research and academic facilities, as users can reach it anywhere in the institution. It offers an integrated and customized information infrastructure that provides easy access in the educational institution to the desired computing services [19].

Institutions of higher education have tremendous knowledge to deal with, from research to teaching materials. These data could overpower conventional storage options on site. Also, universities may easily loosing data that can never be recovered again when a natural disaster occurs or a server fails. That is where cloud storage also provides continuation and data recovery if disasters occurred [7].

Specifically speaking with regard to the benefits of the hybrid cloud model, hybrid includes both private and public clouds. It is most flexible with educational institutions' needs. Since some structured processes work together to achieve sync and makes the perfect response for heavy load educational platforms between various cloud types that cannot be effectively controlled in-house by an organization. This helps universities to target organizations worldwide that need to expand their range beyond geographical limits, and it also provides both secure and multilateral public resource [23].

7.0 Cloud computing challenges

Security risks, such as security of the data storage facility; data transmission security and provider reliability, service track record and corporate relations are associated with cloud computing. Data integrity, privacy and confidentiality are top priorities as well. Issues concerning data ownership and access, identity management, accreditation, certification and verification, all contribute to wider issues concerning the accountability and role of cloud service providers in relation to cloud clients. Key challenges are described as risk and management issues for educational institutions [24].

The common risks include the threat to privacy and protection of data. The relationship between the cloud supplier and the institution poses a significant data security risk, particularly if the matter was not critically evaluated [19].

A training courses should be structured to educate students, faculty and administrators to make secure use of cloud computing. For example, students need to be trained to keep cloud services safe, restricting information provided and learning privacy best practices. Practitioners in universities should also be mindful

that many cloud apps were not initially developed for education and security concerns were not primary objectives in the design process [18].

8.0. Discussion

Cloud computing is an developing concept of technology that promises a solution to the present financial crisis facing institutions of higher education. The shift from conventional systems to CC would make it possible for Libyan HE organizations to meet rapidly evolving hardware and software requirements at lower charge. It would help normalize and revise educational contents and improve cooperation among HE institutions. Libyan universities expect to reduce their IT budget by 50 percent by shifting more of their applications into the cloud. This reflects a dramatic change in strategy and a huge opportunity for improving operational performance, agility and creativity. However, in the first instance, HE organizations need to establish a systematic cloud computing strategy to meet each institution's specific needs to support a smooth transition and optimum performance. At the beginning of a time of transformation, HE institutes are faced with several cloud adoption challenges [7].

The integration of cloud computing presents many challenges and issues such as choosing an outsourcing agreement with a more conventional approach. Libyan academic institutions must evaluate costs and benefits, but their trust in both the cloud model in question and the vendor delivering the service will be a major factor in these decisions [22].

By integrating high-performance and mass storage computing resources, the model offers a better quality of service as are the anticipated benefits of the hybrid design being proposed. Hybrid CC will automatically detect and rule out node failure and do not affect the normal functioning of the current system. Data in the hybrid model is intensively processed and stored. For example, centralized data management, data resources distribution, data synchronization, program development, security control and effective real-time monitoring are the responsibility of CC hybrid model. The hybrid cloud-based for Libyan universities recovers computing and data to a wide variety of remote computers across the country, offers powerful processing power and a vast storage area in tens of thousands of cloud computers and allows the 'cloud' an Internet service for students lectures and other users. Universities do not need to implement physical platform; that is operated through a

costly virtualization platform. It can be set up as a shared on-demand distributed resource pool, including servers, storage equipment, network devices, and full virtualization [25].

9.0 Conclusion

Centered on the advantages of using cloud technology at the Libyan universities, CC can help students seeking quality facilities, more immersive teaching and e-learning methods and digital learning materials in the 21st century. The prototype of Hybrid Cloud Computing is the technology proposed solution in this paper for Libyan higher education. It allows access, management and use of third-party resources and incorporates them into the internal (private cloud) infrastructure of this system in order to avoid dependence on certain vendors. Application security checks and company data are also maintained in the internal system and cannot be accessed by third parties [3]. This research also explains how public and private clouds are integrated with hybrid cloud computing and considered the challenges expected in this model. Further research on the adoption of cloud computing should concentrate on the implementation of a cloud adoption system in developed countries' universities. Hybrid cloud computing in particular in developing countries is a modern technology, and will help Libyan universities recognize the advantages, disadvantages, and challenges of this technology.

References

[1] M. A. H. Masud, J. Yong, and X. Huang, "Cloud computing for higher education: a roadmap," in *Proceedings of the 2012 IEEE 16th International Conference on Computer Supported Cooperative Work in Design (CSCWD)*, 2012, pp. 552-557.

[2] Z. Asadi, M. Abdekhoda, and H. Nadrian, "Cloud computing services adoption among higher education faculties: development of a standardized questionnaire," *Education and Information Technologies*, vol. 25, pp. 175-191, 2020.

[3] B. Mulyawan, R. Kosala, B. Ranti, and S. H. Supangkat, "Cloud computing model in higher education," in *IOP Conference Series: Materials Science and Engineering*, 2020, p. 012178.

[4] E. Gorelik, "Cloud computing models, comparison of cloud computing service and deployment models," *Composite Information Systems Laboratory (CISL), Sloan School of Management*, 2013.

[5] M. B. Ali, T. Wood-Harper, and M. Mohamad, "Benefits and challenges of cloud computing adoption and usage in higher education: A systematic literature review," *International Journal of Enterprise Information Systems (IJEIS)*, vol. 14, pp. 64-77, 2018.

[6] M. Mircea and A. I. Andreescu, "Using cloud computing in higher education: A strategy to improve agility in the current financial crisis," *Communications of the IBIMA*, 2011.
[7] V. H. Pardeshi, "Cloud computing for higher education institutes: architecture, strategy and recommendations for effective adaptation," *Procedia Economics and Finance*, vol. 11, pp. 589-599, 2014.
[8] G. S. S. David and R. Anbuselvi, "An architecture for Cloud computing in Higher Education," in *2015 International Conference on Soft-Computing and Networks Security (ICSNS)*, 2015, pp. 1-6.
[9] M. B. Ali, "Multiple Perspective of Cloud Computing Adoption Determinants in Higher Education a Systematic Review," *International Journal of Cloud Applications and Computing (IJCAC)*, vol. 9, pp. 89-109, 2019.
[10] M. Firdhous, O. Ghazali, and S. Hassan, "Cloud computing for rural ICT development: Opportunities and challenges," in *2013 International Conference on Computing, Electrical and Electronic Engineering (ICCEEE)*, 2013, pp. 680-685.
[11] Y. Jadeja and K. Modi, "Cloud computing-concepts, architecture and challenges," in *2012 International Conference on Computing, Electronics and Electrical Technologies (ICCEET)*, 2012, pp. 877-880.
[12] S. Carlin and K. Curran, "Cloud computing technologies," *International Journal of Cloud Computing and Services Science*, vol. 1, p. 59, 2012.
[13] N. Alsaeed and M. Saleh, "Towards cloud computing services for higher educational institutions: Concepts & literature review," in *2015 International Conference on Cloud Computing (ICCC)*, 2015, pp. 1-7.
[14] M. S. Adrees, M. K. A. Omer, and O. E. Sheta, "Cloud computing architecture for higher education in the third world countries (Republic of The Sudan as Model)," *International Journal of Database Management Systems*, vol. 7, pp. 13-24, 2015.
[15] T. N. C. f. Q. a. A. o. E. Institutions. (23/12/2020). Available: https://qaa.ly/#
[16] M. Alghali, H. Najwa, and I. Roesnita, "Challenges and benefits of implementing cloud based e-learning in developing countries," *Proceeding of the Social Sciences Research ICSSR*, pp. 9-10, 2014.
[17] N. Sultan, "Cloud computing for education: A new dawn?," *International Journal of Information Management*, vol. 30, pp. 109-116, 2010.
[18] J. A. González-Martínez, M. L. Bote-Lorenzo, E. Gómez-Sánchez, and R. Cano-Parra, "Cloud computing and education: A state-of-the-art survey," *Computers & Education*, vol. 80, pp. 132-151, 2015.
[19] R. Alsufyani, F. Safdari, and V. Chang, "Migration of cloud services and deliveries to higher education," in *Proceedings of ESaaSA 2015-2nd International Workshop on Emerging Software as a Service and Analytics, In conjuction with the 5th International Conference on Cloud Computing and Services Science-CLOSER 2015*, 2015, pp. 86-94.
[20] D. S. Linthicum, "Emerging hybrid cloud patterns," *IEEE Cloud Computing*, vol. 3, pp. 88-91, 2016.
[21] G. Breiter and V. K. Naik, "A framework for controlling and managing hybrid cloud service integration," in *2013 IEEE international conference on Cloud engineering (ic2e)*, 2013, pp. 217-224.

[22] Z. S. A. Al Kindia, "A conceptual architectural framework of cloud computing for higher educational institutions in the Sultanate of Oman," University of Nizwa, 2014.
[23] M. Vaishnnave, K. S. Devi, and P. Srinivasan, "A survey on cloud computing and hybrid cloud," *Int. J. Appl. Eng. Res*, vol. 14, pp. 429-434, 2019.
[24] K. Hignite, R. N. Katz, and R. Yanosky, "Shaping the higher education cloud," *EDUCAUSE White Paper, May*, vol. 21, 2010.
[25] H. H. Nasereddin, "Building of Private Cloud Computing Architecture to Support E-Learning," *High Technology Letter*, vol. 26, 2020.

مجلة التربوي
Journal of Educational
ISSN: 2011- 421X
Arcif Q3

معامل التأثير العربي 1.5
العدد 20

الفهـــــــــــرس