Preface

IOP Conf. Series: Materials Science and Engineering **852** (2020) 011001 doi:10.1088/1757-899X/852/1/011001

2nd Tarumanagara International Conference on the Applications of Technology and Engineering 2019

Preface

On behalf of the organizing committee of 2nd Tarumanagara International Conference on the Applications of Technology and Engineering (TICATE) 2019, I would like to welcome all delegates to Jakarta, Indonesia with great pleasure. Being held from November 21 to 22, 2019 at Campus I- Jl. Letjen. S. Parman No. 1, Jakarta, the international conference is organized by Universitas Tarumanagara (UNTAR) and technically sponsored by IOP Publisher.

TICATE 2019 has attracted many academicians, scientists, engineers, postgraduates and other professionals from many countries. This conference accepted 215 papers from 7 different countries, those are Australia, Taiwan, India, Malaysia, Japan, Peru and Indonesia. The aim of the conference is to promote exchange of ideas among engineers, researchers, and scientists active in the related areas of technology and engineering.

Our special thank goes to our Rector, Prof. Dr. Agustinus Purna Irawan, who has initiate this international conference, to our Plenary Speakers, Dr.-Ing. Joewono Prasetijo from Universiti Tun Hussein Onn, Malaysia, Prof. Dr. Tjokorda Gde Tirta Nindhia from Udayana University, Indonesia, Prof. Dr. Srikantappa A.S. from Cauvery Institute of Technology, India, and Prof. Dr. Mohd. Zulkifli Abdullah from Universiti Sains Malaysia, Malaysia, and Prof. Yasuyuku Nemoto, Ph.D. from Ashikaga University, Japan.

Our special thank also goes to Tarzan Photo and PT. Astaguna Wisesa as our patrons. Also to all individuals and organizations such as the members of international editorial board, the conference organizers, the reviewers and the authors, for their contribution in making TICATE 2019 as a successful international conference and a memorable gathering event. I am also grateful for the support of publication service of IOP Publisher. We hope that the conference could present you wonderful memories to bring home in addition to new insights and friendship congregated during the event.

We truly value your participation and support for the conference. We hope that you will enjoy TICATE 2019 and culture and tradition in Jakarta.

Dr. Hugeng, S.T., M.T. (SMIEEE)

2nd TICATE 2019
Conference Organisation

INITIATIOR & ORGANIZING INSTITUION
Universitas Tarumanagara, Jakarta

Supporting Institution
IOP Publisher, Tarzan Photo, PT. Astaguna Wisesa

Honorary Chair
Prof. Dr. Agustinus Purna Irawan
R. M. Gatot Soemartono, Ph.D.
Chairman
Dr. Hugeng, S.T., M.T. (SMIEEE)
Co-chairperson
Dr. Fransisca Iriani Roesmala Dewi
Secretary
Bagus Mulyawan, M.M.

Program & Sponsorship
Mei Ie, M.M.
Herlina Budiono, M.M.
Parallel & Scientific Session
Dr. Hetty Karunia Tunjungsari
Sinta Paramita, M.A.
Treasurer
Wulan Purnama Sari, M.Si.

Keynote Speakers
Prof. Dr. Tjokorda Gde Tirta Nindhia, Universitas Udayana, Indonesia
Dr.-Ing. Joewono Prasetijo, Universiti Tun Hussein Onn, Malaysia
Prof. Dr. Srikantappa A.S., Cauvery Institute of Technology, India
Prof. Dr. Mohd. Zulkifli Abdullah, Universiti Sains Malaysia, Malaysia
Prof. Yasuyuku Nemoto, Ph.D., Ashikaga University, Japan

Editorial Board / Reviewers:
Prof. Dr. rer. nat. Alexander Ferrein, University of Applied Sciences Aachen, Germany
Dr.-Ing. A. Ruggeri Toni Liang, Karlsruhe Institute of Technology, Germany
Dr. -Ing Stephan Herzog, TU Kaiserslautern, Germany
Dr. Thomas Marconi, Inside Secure, France
Prof. Yifan Chen, Ph.D., University of Waikato, New Zealand
Dr. Soh Sie Teng , Curtin University, Australia
Dr. Channing Chuang, Kun Shan Univeristy, Taiwan
Prof. Mohd Zulkifli bin Abdullah, Universiti Sains Malaysia, Malaysia
Prof. Zaidi Mohd. Ripin, Universiti Sains Malaysia, Malaysia
Dr. -Ing. Joewono Prasetijo, Universiti Tun Hussein Onn, Malaysia
Dr. Filbert H. Juwono, Curtin University, Sarawak Malaysia
Prof. Dr. Tresna P. Soemardi, Universitas Indonesia, Indonesia
Dr. -Ing. Eko Adhi Setiawan, Universitas Indonesia, Indonesia
Prof. Dr. Jamasri, Universitas Gadjah Mada, Indonesia
Dr. Bambang Kismono Hadi, Bandung Institute of Technology, Indonesia
Prof. Eko Sediyono, Universitas Kristen Satya Wacana, Indonesia
Prof. Tjokorda Gde Tirta Nindhia, Universitas Udayana, Indonesia
Dr. Rianti Ariobimo, Universitas Trisakti, Indonesia
Dr. Richard Napitupulu, Universitas HKBP Nommensen, Indonesia
Prof. Dr. Dyah Erny Herwindiati, Universitas Tarumanagara, Indonesia
Prof. Dr. Leksmono Suryo Putranto, Universitas Tarumanagara, Indonesia
Harto Tanujaya, Ph.D., Universitas Tarumanagara, Indonesia
Jap Tji Beng, Ph.D., Universitas Tarumanagara, Indonesia
Lina, Ph.D., Universitas Tarumanagara, Indonesia
Dr. Steven Darmawan, Universitas Tarumanagara, Indonesia


UNTAR


UNTAR


UNTAR


UNTAR


Tarumanagara International Conference
on the Applications
of Technology and Engineering


UNTAR
UNTAR
UNTAR
UNTAR

OPEN ACCESS 012023

Calibration and Validation Indonesian Highway Capacity Manual 1997 Model

Budi Yulianto, Setiono, Rizki Dewayani Putri, Stevani Tia Pratisca and Felix Fernando Hartono

+ Open abstract View article PDF

OPEN ACCESS 012024

Land mapping with least median of squares regression using landsat imagery: a case study Jakarta and sorrounding area

Bagus Mulyawan, Nicholas Jovianto, Janson Hendryli and Dyah Erny Herwindiati

+ Open abstract View article PDF

Implementation of incognito method and SHA-3 as an alternative to PIN selection in web login

Gesi Deta Hendika Wardani and Yogha Restu Pramadi

+ Open abstract View article PDF

OPEN ACCESS 012177

Aluminum Frame Product Development Using Quality Function Deployment and Value Engineering at PT KSN

Surya Perdana, Ridwan Usman and Zeny Fatimah Hunusalela

+ Open abstract View article PDF

OPEN ACCESS 012178

Cloud computing model in higher education

Bagus Mulyawan, Raymond Kosala, Benny Ranti and Suhono Harso Supangkat

+ Open abstract View article PDF

IOP Conf. Series: Materials Science and Engineering **852** (2020) 012178 doi:10.1088/1757-899X/852/1/012178

Cloud computing model in higher education

Bagus Mulyawan[1,4*], Raymond Kosala[1], Benny Ranti[2] Suhono Harso Supangkat[3]
[1]Binus Graduate Program, Doctor of Computer Science, Bina Nusantara University Jakarta, Indonesia
[2]Computer Science Department, Faculty of Computer Science, Universitas Indonesia, Indonesia 16424
[3]School of Electrical Engineering and Informatics, Bandung Institute of Technology, Bandung, Indonesia
[4]Faculty of Information Technology, Universitas Tarumanagara, Jakarta 11440
*corresponding author: *bagus.mulyawan@hotmail.com

Abstract— Currently, higher education is institutions that should be managed as a global business institution. Higher education should improve continually its business processes according to the demands of increasing its stakeholders. of the problems faced in the development of educational, activities if related to the use of information technology for each service in higher education for stakeholders is the issue of available funds. Cloud computing also has advantages related to infrastructure and maintenance and increases operating efficiency. Most institutions are currently moving towards cloud computing technology to reduce operational costs. For achieving these objectives, the institutions need to be supported by reliable technology. This study aim to propose cloud model for education and IT Governance conceptual framework for Cloud Computing model adoption, Tarumanagara University as a study case.
Keywords: cloud computing, higher education, IT Governance

1. Introduction

One of the problems faced in the development of educational, activities, if related to the use of information technology for each service in higher education for stakeholders is the issue of available funds. The existence of cloud computing technology is expected as a technology that can be a solution with a significant level of efficiency and effectiveness for higher education..[1] Cloud computing technology increases user access to various resources in educational institutions without being limited by time and geographical location [2]. Cloud computing also has advantages related to infrastructure and maintenance and increases operating efficiency. Most institutions are currently moving towards cloud computing technology to reduce operational costs.[3]. Cloud computing is also a technology adopted by many organisations with more dynamic development capabilities and virtualisation technology. This has a significant impact on universities in the future. Cloud computing technology is also an option for universities that have limited budget.[4]. Some universities in the US have implemented Cloud Computing technology to use this to save on software licensing costs and reduce technical resources. By implementing North State State University cloup computing it can reduce the number of technical staff from 15 people to 3 people..[5]. This study explores the concept of Cloud Computing in the Higher Education, Tarumanagara University as a study case. The research contributions from this paper in the academic and practice world are as follows:

- Propose cloud model for higher education
- Propose IT Governance framework for Cloud Computing Model Adoption

2. Cloud Computing

2.1. Definition of Cloud Computing

According to NIST cloud computing is
"*a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction*" .
The International Organization for Standardization (ISO) defined cloud computing as
"*a paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand*" [6].

2.2. Characteristics of Cloud Computing

The five characteristics of cloud computing are self-service based on demand, wide network access, resource collection, fast elasticity, and measured services. Three service models are Cloud Software as a Service (SaaS), Cloud Platform as a Service (PaaS), and Cloud Infrastructure as a Service (IaaS). The four deployment models are Private Cloud, Public Cloud, Community Cloud and Hybrid Cloud. A cloud-based education system is needed to create knowledge and use it in higher education as a factor needed for cultural, social, economic and technological transformation that enables the transfer of knowledge and create new innovations for education, research and development.[7]

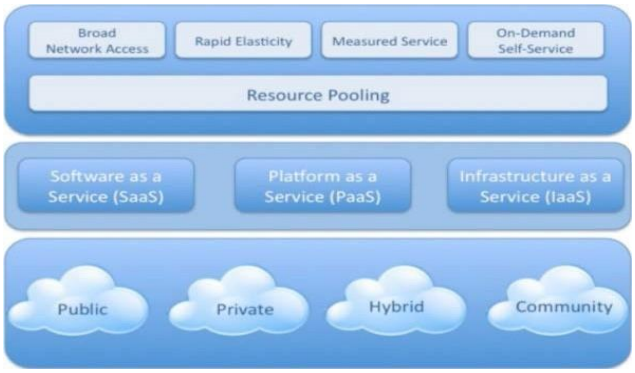

Figure 1. Cloud Computing Architecture [1]

2.3. The Benefit of Cloud Computing in Higher Education

According to [8] expressed that the following are significant benefits of cloud computing in educational institution and can be divided as follows:

Table 1. Benefit Cloud Computing in Higher Education

No.	Aspect	Benefit
1.	Technical	Easily access, Data management, Multi-tenancy, Student experience
2.	Economical	Cost Reducing, most of the software applications are free, available, ready-to-use or pay-per-use.
3.	Non-Functional	Flexibility, Reliability, Availability
4	Security	Improved incredibility, Centralized data storage, Virtualization

3. Methods

The method used in this research is the study of literature, surveys and interviews. Literature studies are conducted through various journals that discuss cloud computing in tertiary institutions, and surveys are conducted through printed and electronic documents at the Computer Center of Universitas Tarumanagara while the interview was conducted with the Head of the Universitas Tarumanagara Computer Center.

4. Results

Currently, Tarumanagara University Information System is managed by the Computer Center. The application system is built using multiplatform with Windows and Linux based operating systems. The application is developed based on web using the programming language. Net and PHP. Network infrastructure, servers are managed independently by the Computer Center. The types of applications developed at Tarumanagara University include e-learning applications, e-library applications, research and community service applications, academic applications and other supporting applications. All applications are developed by Computer Center. The information system infrastructure of Tarumanagara University can be seen in Figure 1. While the network infrastructure and server infrastructure. Some problems with the current conditions are obstacles in development due to budget constraints and inadequate staff numbers. aims, a cloud computing model for Tarumanagara University is proposed and an IT governance framework to help determine the adoption of cloud computing technology.

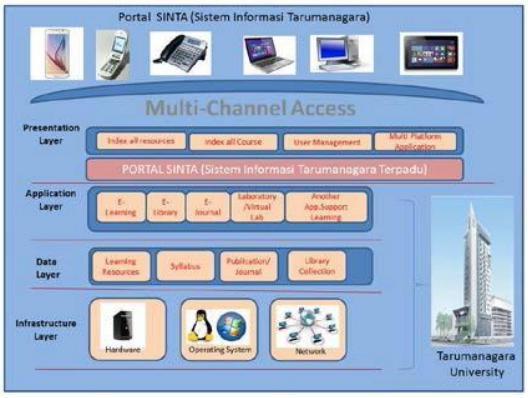

Figure 2. Information System Infrastructure of UNTAR

4.1. Proposed Cloud Computing Model

The proposed cloud computing model can be seen in Figure 3. The proposed cloud computing model uses a hybrid architecture, which aims to keep Tarumanagara University in control of data for internal and confidential purposes. While applications and data that are in the public interest can be migrated to locations in cloud computing to increase flexibility, efficiency and service effectiveness. The proposed architecture consists of:

1. Infrastructure layer.
   At the infrastructure layer which can be divided into two things, namely physical infrastructure and functional infrastructure.
2. Data Layer
   At this layer various types of data are available such as lecture materials, library collections, publication data.

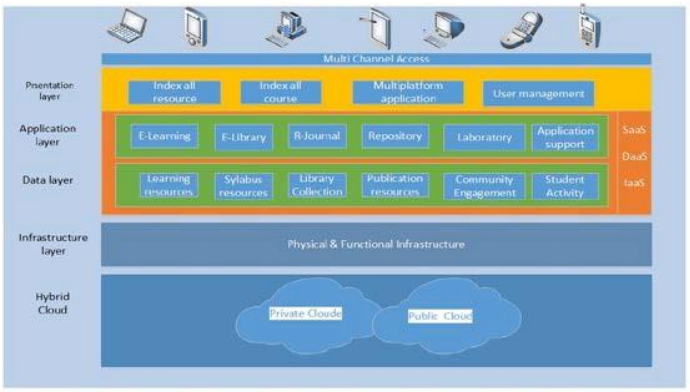

Figure 3. Propose Cloud Computing Model

3. Application Layer
   Its applications include e-learning applications, e-libraries, Human Resource Management, academic applications, and other supporting applications.
4. Presentation Layer
   This layer is for managing users both internal and external users to access various services and applications available in cloud computing.

4.2. Proposed IT Governance Conceptual Framework

Accord [9] decision the adoption of a technology influenced by factors:

1. Organisational Aspect

In governance from the aspect of the organization that includes organisational structure, communication models, company size that will influence the decision to adopt technology

2. Technological Aspect

Refers to internal and external technology that is appropriate for the company, strengths and weaknesses, complexity and compatibility

3. Environmental Aspect

Refers to type of business, type of industry, access to resources and relationship with the government

Figure 4 is the proposed IT governance of cloud computing technology adoption which is an adaptation of the TOE framework.[9]

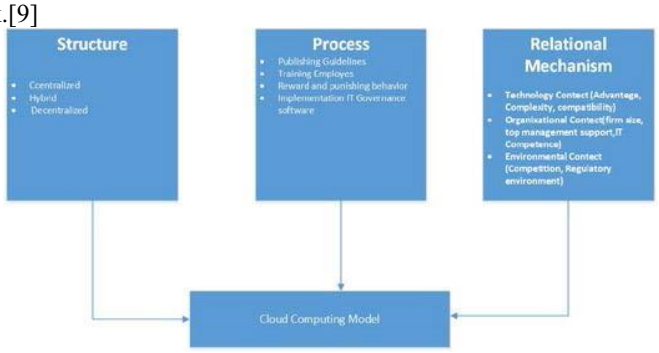

Figure 4. IT Governance Conceptual Framework

5. Conclusions

Based on consideration of these benefits to adopting cloud computing technology at Tarumanagara University. Given the demands of students in the 21st century to get better services, more interactive teaching and learning processes and multimedia-based teaching materials. Seen was utilizing cloud computing technology at Tarumanagara University as well as introducing cloud technology students so that it was also useful to prepare students for the world of work. The technology proposed as a solution for this is Hybrid Cloud Computing. Hybrid Cloud is a model of Cloud Computing deployment. It provides the ability to access, manage and use third party resources and incorporate them into internal infrastructure (private cloud) with this system to avoid dependence on particular vendors. Also, application security controls and essential company data remain in the internal system and cannot be accessed by third parties. However, for the implementation of cloud computing the model can be influenced by the factors of governance structure, technological context, organisational context, and environmental context.

6. Refrences

[1] G. Soni Fajar Surya and K. Surendra, "E-readiness framework for cloud computing adoption in higher education," *Proc. - 2014 Int. Conf. Adv. Informatics Concept, Theory Appl. ICAICTA 2014*, pp. 278–282, 2015.

[2] A. O. Akande and J. P. Van Belle, "Cloud computing in higher education: A snapshot of software as a service," *IEEE Int. Conf. Adapt. Sci. Technol. ICAST*, vol. 2015-Janua, 2015.

[3] N. S. Aldahwan and M. S. Saleh, "Developing a Framework for Cost-Benefit Analysis of Cloud Computing Adoption by Higher Education Institutions in Saudi Arabia," *2018 Int. Conf. Smart Comput. Electron. Enterp. ICSCEE 2018*, pp. 1–9, 2018.

[4] X. Liu, "A Study on Smart Campus Model in the Era of Big Data," vol. 87, no. Icemeet 2016, pp. 919–922, 2017.

[5] B. A. Nan Cenka and Z. A. Hasibuan, "Enhancing educational services using cloud technology," *2013 Int. Conf. Inf. Commun. Technol. ICoICT 2013*, pp. 155–160, 2013.

[6] N. I. Alsaeed and M. S. Saleh, "Towards Cloud Computing Services for Higher Educational Institutions: Concepts & Literature Review," *2015 Int. Conf. Cloud Comput. ICCC 2015*, 2015.

[7] A. H. Masud, J. Yong, and X. Huang, "Cloud Computing for Higher Education: A roadmap," *Proc. 2012 IEEE 16th Int. Conf. Comput. Support. Coop. Work Des. CSCWD 2012*, pp. 552–557, 2012.

[8] M. M. Mosbah, H. S. Alnashar, and M. A. El-Nasr, "Cloud computing framework for solving egyptian higher education," *Proc. - 2014 4th Int. Conf. Adv. Comput. Commun. ICACC 2014*, pp. 208–213, 2014.

[9] H. P. Borgman, B. Bahli, H. Heier, and F. Schewski, "Cloudrise: Exploring cloud computing adoption and governance with the TOE framework," *Proc. Annu. Hawaii Int. Conf. Syst. Sci.*, pp. 4425–4435, 2013.

Jakarta, 29 August 2019

No. : 119-TIM/6527/UNTAR/VIII/2019

FULL PAPER ACCEPTANCE NOTIFICATION
Reference Number : TICATE-0212
Title : CLOUD COMPUTING MODEL IN HIGHER EDUCATION

Dear Mr. Bagus Mulyawan
Thank you for your paper submission to the TICATE 2019. The reviewers have now finished reviewing your paper.

According to the results and recommendations from the reviewers, we would like to inform you since your paper has been accepted subject to **revision**. Hence, please improve your manuscript based on the reviewers' comments.

It will be appreciated if you put your Reference Number and your name as your paper revision file name (e.g. TICATE1-021 Bagus Mulyawan).

You need to send us your revised manuscript to the TICATE 2019 committee (ticate@untar.ac.id) by 30 September 2019 to avoid unnecessary delay.

Please complete your registration before 1 October 2019 for regular registration deadline. You are eligible to complete the payment before submitting the revision.

We invite you to present your paper at the conference. Further updated information will be published in our website (http://ticate.untar.ac.id)

If you have any questions, please do not hesitate to contact us.

Thank you very much for your cooperation.

Sincerely,

Dr. Hugeng, S.T.,M.T.(SMIEEE)