KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
DIREKTORAT JENDERAL PENGUATAN RISET DAN PENGEMBANGAN
Direktorat Riset dan Pengabdian Masyarakat
Lt.4 Gedung D Jalan Jenderal Sudirman, Senayan, Jakarta 10270
Telepon: (021) 57946042 Fax: (021) 57946085

ADDENDUM KONTRAK PENELITIAN
TAHUN ANGGARAN 2017

ANTARA
PEJABAT PEMBUAT KOMITMEN DIREKTORAT RISET DAN PENGABDIAN

MASYARAKAT

DENGAN

Politeknik Negeri Ujung Pandang

Nomor: 052/ADD/SP2H/LT/DRPM/VIII/2017

Pada hari ini **Senin** tanggal **Dua puluh satu** bulan **Agustus** tahun dua ribu tujuh belas, kami yang bertandatangan dibawah ini :

1. **Ocky Karna Radjasa** : Direktur Riset dan Pengabdian Masyarakat, Direktorat Jenderal Penguatan Riset dan Pengembangan, Kementerian Riset, Teknologi dan Pendidikan Tinggi yang berkedudukan di Lt. 4 Gedung D Jalan Jenderal Sudirman, Senayan, Jakarta, dalam hal ini bertindak untuk dan atas nama Pejabat Pembuat Komitmen pada Direktorat Riset dan Pengabdian Masyarakat berdasarkan Keputusan Kuasa Pengguna Anggaran Direktorat Jenderal Penguatan Riset dan Pengembangan Kementerian Riset, Teknologi, dan Pendidikan Tinggi Nomor 02/E.1/KPT/2017 tanggal 14 Januari 2017, untuk selanjutnya disebut **PIHAK PERTAMA**;

2. **DR. IR. Hamzah Yusuf, MS** : Sebagai Direktur yang berkedudukan di Makassar, dalam hal ini bertindak untuk dan atas nama para Dosen di perguruan tinggi tersebut dengan nama dan judul proposal penelitian sebagaimana tersebut dalam Lampiran, untuk selanjutnya disebut **PIHAK KEDUA**.

Berdasarkan Instruksi Presiden Nomor 4 tahun 2017 tentang Efisiensi Belanja Barang Kementerian/Lembaga dalam Pelaksanaan Anggaran dan Pendapatan Belanja Negara Tahun 2017, maka dibuatlah ***Addendum*** sebagai berikut :

PASAL 1

1. Dalam kontrak penelitian pasal 3 yang semula berbunyi:

   (1) **PIHAK PERTAMA** memberikan pendanaan penelitian sebagaimana dimaksud dalam Pasal 2 sebesar **Rp 3.113.750.000,- (Tiga milyar seratus tiga belas juta tujuh ratus lima puluh ribu rupiah)** yang dibebankan kepada DIPA Direktorat Jenderal Penguatan Riset dan Pengembangan Kementerian Riset, Teknologi dan Pendidikan Tinggi Nomor SP DIPA-042.06.1.401516/2017 tanggal 7 Desember 2016.

   (2) Pendanaan Pelaksanaan Penelitian sebagaimana dimaksud pada ayat (1) dibayarkan oleh **PIHAK PERTAMA** kepada **PIHAK KEDUA** secara bertahap dari Kantor Pelayanan Perbendaharaan Negara (KPPN) III Jakarta kepada rekening Institusi melalui mekanisme Pembayaran Langsung (LS), dengan ketentuan sebagai berikut:

      a) Pembayaran Tahap Pertama sebesar 70% dari total bantuan dana kegiatan yaitu 70%X ***Rp 3.014.750.000,- = Rp. 2.110.325.000,- (Dua milyar seratus sepuluh juta tiga ratus dua puluh lima ribu rupiah),***

      b) Pembayaran Tahap Kedua/Terakhir sebesar 30% dari total bantuan dana kegiatan yaitu 30% X ***Rp 3.014.750.000,- = Rp. 904.425.000,- (Sembilan ratus empat juta empat ratus dua puluh lima ribu rupiah),***

      c) Pembayaran biaya tambahan sebesar ***Rp. 99.000.000,- (Sembilan puluh sembilan juta rupiah)***

      d) **PIHAK KEDUA** bertanggungjawab mutlak dalam penggunaan dana tersebut pada ayat (1) sesuai dengan proposal kegiatan yang telah disetujui.

   (3) Pembayaran Tahap Pertama sebesar 70% sebagai mana pada ayat (2) diberikan apabila **PIHAK KEDUA** telah melengkapi rancangan pelaksanaan penelitian yang memuat judul penelitian, pendekatan dan metode penelitian yang digunakan, data yang akan diperoleh, anggaran yang akan digunakan, dan tujuan penelitian berupa luaran yang akan dicapai.

   (4) Pembayaran Tahap Kedua sebesar 30% sebagaimana dimaksud pada ayat (3) diberikan apabila **PIHAK KEDUA** telah melakukan verifikasi selambat-lambatnya tanggal 15 September 2017 atas kewajiban peneliti mengunggah ke laman **SIMLITABMAS** dokumen sebagai berikut:
      a) Catatan harian pelaksanaan penelitian
      b) Laporan kemajuan pelaksanaan penelitian

   (5) Biaya tambahan dibayarkan kepada **PIHAK KEDUA** bersamaan dengan pembayaran Tahap Kedua dengan melampirkan Daftar luaran penelitian yang sudah di validasi oleh **PIHAK PERTAMA**.

   Diubah sehingga berbunyi:

   (1) **PIHAK PERTAMA** memberikan pendanaan penelitian sebagaimana dimaksud dalam Pasal 2 sebesar **Rp 3.014.750.000,- (Tiga milyar empat belas juta tujuh ratus lima puluh ribu rupiah** yang dibebankan kepada DIPA Direktorat Jenderal Penguatan Riset dan Pengembangan Kementerian Riset, Teknologi dan Pendidikan Tinggi Nomor SP DIPA-042.06.1.401516/2017 revisi ke 3 tanggal 31 Agustus 2017.

(2) Pendanaan Pelaksanaan Penelitian sebagaimana dimaksud pada ayat (1) dibayarkan oleh **PIHAK PERTAMA** kepada **PIHAK KEDUA** secara bertahapdari Kantor Pelayanan Perbendaharaan Negara(KPPN) III Jakarta kepada rekening Institusimelalui mekanisme Pembayaran Langsung (LS), dengan ketentuan sebagai berikut:

a) Pembayaran Tahap Pertama sebesar ***Rp. 2.110.325.000,- (Dua milyar seratus sepuluh juta tiga ratus dua puluh lima ribu rupiah),***

b) Pembayaran Tahap Kedua/Terakhir sebesar ***Rp. 904.425.000,- (Sembilan ratus empat juta empat ratus dua puluh lima ribu rupiah),***

c) **PIHAK KEDUA** bertanggungjawab mutlak dalam penggunaan dana tersebut pada ayat (1) sesuai dengan proposal kegiatan yang telah disetujui.

(3) Pembayaran Tahap Pertama sebagaiamana pada ayat (2) diberikan apabila **PIHAK KEDUA** telah melengkapi rancangan pelaksanaan penelitian yang memuat judul penelitian, pendekatan dan metode penelitian yang digunakan, data yang akan diperoleh, anggaran yang akan digunakan, dan tujuan penelitian berupa luaran yang akan dicapai.

(4) Pembayaran Tahap Kedua sebagaimana dimaksud pada ayat (3) diberikan apabila **PIHAK KEDUA** telah melakukan verifikasi selambat-lambatnya tanggal 15 September 2017 atas kewajiban peneliti mengunggah ke laman **SIMLITABMAS** dokumen sebagai berikut**:**

a) Catatan harian pelaksanaan penelitian
b) Laporan kemajuan pelaksanaan penelitian

(5) Biaya tambahan tidak dibayarkan kepada **PIHAK KEDUA**.

2. Pasal 7 yang semula berbunyi :

(1) **PIHAK KEDUA** harus menyampaikan Surat Pernyataan telah menyelesaikan seluruh pekerjaan yang dibuktikan dengan pengunggahan padalaman (*website*) SIMLITABMAS.

a. Catatan hariandan laporan komprehensif pelaksanaan Penelitian, pada tanggal **15 November 2017**
b. Laporan akhir, capaian hasil, Poster, artikel ilmiah dan profile, pada **1 November 2017** (bagi penelitian tahun terakhir).

(2) Apabila sampai dengan batas waktu yang telah ditetapkan untuk melaksanakan Kontrak Penelitian Penelitiantelah berakhir, **PIHAK KEDUA** belum menyelesaikan tugasnya dan atau terlambat mengirim laporan Kemajuan dan atau terlambat mengirim laporan akhir, maka **PIHAK KEDUA** dikenakan sanksi administratif berupa penghentian pembayaran dan tidak dapat mengajukan proposal penelitian dalam kurun waktu dua tahun berturut-turut.

(3) Peneliti/Pelaksana Penelitian yang tidak hadir dalam kegiatan Pemonitoran dan Evaluasi tanpa pemberitahuan sebelumnya kepada Direktur Riset dan Pengabdian Masyarakat, maka Pelaksanan Penelitian tidak berhak menerima sisa dana tahap kedua sebesar 30%.

(4) Apabila dalam penilaian luaran terdapat luaran tambahan yang tidak tercapai maka dana tambahan yang sudah diterima harus disetorkan kembali ke kas negara

diubah menjadi :

(1) **PIHAK KEDUA** harus menyampaikan Surat Pernyataan telah menyelesaikan seluruh pekerjaan yang dibuktikan dengan pengunggahan padalaman (*website*) SIMLITABMAS.

a. Catatan harian dan laporan komprehensif pelaksanaan Penelitian, pada tanggal **15 November 2017**
b. Laporan akhir, capaian hasil, Poster, artikel ilmiah dan profile, pada **15 November 2017** (bagi penelitian tahun terakhir).

(2) Apabila sampai dengan batas waktu yang telah ditetapkan untuk melaksanakan Kontrak Penelitian Penelitiantelah berakhir, **PIHAK KEDUA** belum menyelesaikan tugasnya dan atau terlambat mengirim laporan Kemajuan dan atau terlambat mengirim laporan akhir, maka **PIHAK KEDUA** dikenakan sanksi administratif berupa penghentian pembayaran dan tidak dapat mengajukan proposal penelitian dalam kurun waktu dua tahun berturut-turut.

(3) Peneliti/Pelaksana Penelitian yang tidak hadir dalam kegiatan Pemonitoran dan Evaluasi tanpa pemberitahuan sebelumnya kepada Direktur Riset dan Pengabdian Masyarakat, maka Pelaksanan Penelitian tidak berhak menerima sisa dana tahap kedua.

(4) Apabila dalam penilaian luaran terdapat luaran tambahan yang tidak tercapai maka dana tambahan yang sudah diterima harus disetorkan kembali ke kas negara

3. Mengubah lampiran kontrak penelitian menjadi sebagaimana dimaksud pada lampiran Addendum kontrak penelitian ini.

PASAL II

(1) ***Addendum*** ini merupakan bagian dari satu kesatuan yang tidak terpisahkan dengan Kontrak Penelitian.

(2) Ketentuan dan syarat yang telah diatur dalam Kontrak Penelitian sepanjang tidak diubah berdasarkan Addendum dinyatakan tetap berlaku dan mengikat.

Addendum Kontrak Penelitian Penelitian ini dibuat rangkap 3 (tiga) bermaterai cukup sesuai dengan ketentuan yang berlaku,Sehingga mempunyai kekuatan hokum yang sama dan merupakan bagian tidak terpisahkan dari Kontrak Penelitian dan biaya materai dibebankan kepada **PIHAK KEDUA**.

PIHAK PERTAMA	PIHAK KEDUA
Ocky Karna Radjasa	DR. IR. Hamzah Yusuf, MS
NIP. 19651029 199003 1 001	NIP 19581101 198803 1 001

LAMPIRAN KONTRAK PENELITIAN TAHUN 2017

005012

NOMOR SPPK	: 052 /SP2H/LT/DRPM/VIII/2017
PERGURUAN TINGGI/KOPERTIS	: Politeknik Negeri Ujung Pandang
TANGGAL DIPA	: Revisi 3 Tanggal 31 Agustus 2017
NOMOR DIPA	: SP DIPA-042.06-0/2017
UNIT ORGANISASI	: Direktorat Riset dan Pengabdian Masyarakat
KEMENTERIAN/LEMBAGA	: Kementerian Riset, Teknologi, dan Pendidikan Tinggi

RISET DASAR

1 Judul

Teknologi Informasi dan Komunikasi

NO	NAMA PENELITI	JUDUL PENELITIAN	DANA SEBELUM REVISI		DANA PENELITIAN SETELAH REVISI
			DANA PENELITIAN	DANA TAMBAHAN	
1	IRFAN SYAMSUDDIN 0020127305	IMPLEMENTATION OF LOW COST PRIVATE CLOUD DATA CENTER FOR GREEN E-GOVERNMENT BASED ON CLOUD COMPUTING PROTOTYPES	Rp. 170.000.000 Tahap I : Rp. 119.000.000 Tahap II : Rp. 51.000.000	Rp. 0	Rp. 170.000.000 Tahap I : Rp. 119.000.000 Tahap II : Rp. 51.000.000
SUBTOTAL DANA : **Teknologi Informasi dan Komunikasi**			Rp. **170.000.000** Tahap I : Rp. **119.000.000** Tahap II : Rp. **51.000.000**	Rp. **0**	Rp. **170.000.000** Tahap I : Rp. **119.000.000** Tahap II : Rp. **51.000.000**
SUBTOTAL DANA **RISET DASAR**			Rp. **170.000.000** Tahap I : Rp. **119.000.000** Tahap II : Rp. **51.000.000**	Rp. **0**	Rp. **170.000.000** Tahap I : Rp. **119.000.000** Tahap II : Rp. **51.000.000**

RISET TERAPAN

34 Judul

Energi dan Energi Terbarukan

NO	NAMA PENELITI	JUDUL PENELITIAN	DANA SEBELUM REVISI		DANA PENELITIAN SETELAH REVISI
			DANA PENELITIAN	DANA TAMBAHAN	
1	HATMA RUDITO 0020025602	SISTEM MONITORING DAN INFORMASI TEMPAT PEMBUANGAN SAMPAH BERBASIS WEB DAN SMS GATEWAY	Rp. 70.000.000 Tahap I : Rp. 49.000.000 Tahap II : Rp. 21.000.000	Rp. 15.000.000	Rp. 70.000.000 Tahap I : Rp. 49.000.000 Tahap II : Rp. 21.000.000

2	**DANIEL KAMBUNO** **0026126002**	Pengembangan Soft Starting dengan Kontrol PID Pada Motor Induksi Menggunakan Mikrokontroller dan Mikrokomputer	Rp. 57.500.000 Tahap I : Rp. 40.250.000 Tahap II : Rp. 17.250.000	Rp. 0	Rp. 57.500.000 Tahap I : Rp. 40.250.000 Tahap II : Rp. 17.250.000
3	**LEWI** **0013096505**	Penerapan Turbin Crossflow Untuk Pembangunan PLTMH Di Desa Moncongloe Kabupaten Maros	Rp. 137.500.000 Tahap I : Rp. 96.250.000 Tahap II : Rp. 41.250.000	Rp. 0	Rp. 137.500.000 Tahap I : Rp. 96.250.000 Tahap II : Rp. 41.250.000
4	**MAKMUR SAINI** **0023066106**	Rancang Bangun Eliminasi Emisi gas buang terhadap Udara Atmosfer dengan Metode Mekanisme Ejektor	Rp. 83.500.000 Tahap I : Rp. 58.450.000 Tahap II : Rp. 25.050.000	Rp. 0	Rp. 83.500.000 Tahap I : Rp. 58.450.000 Tahap II : Rp. 25.050.000
5	**NIRWAN A NOOR** **0012126913**	RANCANG BANGUN ALAT UKUR PARAMETER PORTABLE DAN DATA LOGGER SOLAR PANEL	Rp. 50.000.000 Tahap I : Rp. 35.000.000 Tahap II : Rp. 15.000.000	Rp. 0	Rp. 50.000.000 Tahap I : Rp. 35.000.000 Tahap II : Rp. 15.000.000
6	**AKSAN** **0001066603**	Simulator Turbin Angin Untuk Modul Pembelajaran Di Laboratorium & Penerapan di masyarakat Pesisir Pantai	Rp. 50.000.000 Tahap I : Rp. 35.000.000 Tahap II : Rp. 15.000.000	Rp. 0	Rp. 50.000.000 Tahap I : Rp. 35.000.000 Tahap II : Rp. 15.000.000
7	**ABRAM TANGKEMANDA** **0017086512**	Peningkatan Kinerja Solar Water Heater Dengan Pengaruh Kemiringan Kolektor	Rp. 50.000.000 Tahap I : Rp. 35.000.000 Tahap II : Rp. 15.000.000	Rp. 0	Rp. 50.000.000 Tahap I : Rp. 35.000.000 Tahap II : Rp. 15.000.000

Code / Field of Science
Kode/ Nama Rumpun Ilmu :
462/ TEKNOLOGI INFORMASI

FINAL REPORT FIRST YEAR 2017

INTERNATIONAL RESEARCH COLLABORATION

AND SCIENTIFIC PUBLICATION

IMPLEMENTATION OF LOW COST PRIVATE CLOUD DATA CENTER FOR GREEN E-GOVERNMENT BASED ON CLOUD COMPUTING PROTOTYPES

IRFAN SYAMSUDDIN, ST, M.Com.ISM, PhD

NIDN : 0020127305

DR. ALIMIN, MPd

NIDN : 0012085911

PROFESSOR DAVID AL-DABASS, PhD

Dibiayai oleh :
Direktorat Riset dan Pengabdian
Direktorat Jendral Penguatan Riset dan Pengembangan
Kementrian Riset Teknologi dan Pendidikan Tinggi
Sesuai dengan kontrak penelitian tahun anggaran 2017
Nomor : 052/ SP2H/LT/DRPM/IV/2017/ tanggal 3 April 2017

POLITEKNIK NEGERI UJUNG PANDANG

NOTTINGHAM TRENT UNIVERSITY, UNITED KINGDOM

July , 2017

HALAMAN PENGESAHAN
PENELITIAN KERJASAMA LUAR NEGERI DAN PUBLIKASI INTERNASIONAL

Title of Research : IMPLEMENTATION OF LOW COST PRIVATE CLOUD DATA CENTER FOR GREEN E-GOVERNMENT BASED ON CLOUD COMPUTING PROTOTYPES

Code/Name of Field of Science: 462 / TEKNOLOGI INFORMASI

Chief researcher:

a. Full name	: IrfanSyamsuddin, ST, M.Com.ISM, PhD
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e. Mobile phone	: 0821 89 454 284
f. E-mail	: irfans@poliupg.ac.id irfansyam@yahoo.com

Member of researcher

a. Full name	: Dr. Alimin M.Pd
b. NIDN	: 0012085911
c. University	: Politeknik Negeri Ujung Pandang

International partner

a. Full name	: Professor David Al-Dabass, PhD
b. Name of institution	: Nottingham Trent University, United Kingdom
c. Address of institution	: Burton St. Nottingham NG1 4BU, United Kingdom

Length of research period : 3 years
Year of research : 2018-2019
Total research funds : Rp. 600.000.000,- (US $.4.300.00)
Research funds of current year: - proposed to DIKTI Rp. 200.000.000,- (US $ 14600.00)
- Inkind : *Support for Lab Facilities and Tutorial Registration and Materials equal to USD 2500*

Makassar, 25 October 2017.

Acknowledged
Director

Dr. Ir. Hamzah Yusuf, M.S
NIP. 19581104 198803 1 001

Chief Researcher

Irfan Syamsuddin, M.Com.ISM, PhD
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Approved,
Head of Research Institution

Ir. Suryanto, M.Sc, PhD
NIP 195908261988031002

DAFTAR ISI

SUMMARY

Long term objective of this collaborative research is to develop an integrated solution to streamline all e-government services in Indonesia considering low cost and security aspects of cloud computing technologies. For the short term period (2017-2019) we aim to extend our previous results by developing a private cloud data center which meet low cost requirement on one hand while on the other hand offers adequate quality of service as an innovative contribution for the next generation of e-government public services in Indonesia.

In terms of equality and mutual benefits of both parties, UK Simulation Society of Nottingham Trent University and Center for Applied ICT Research of PNUP have clearly stated equality in conducting this research and in case the results would be patented, the copyright will be entirely in the hands of Indonesia researchers.

Previously, we have investigated several cloud computing structures combined with a number of energy savings mechanisms and finally we obtained three low cost cloud computing prototypes with ability of reducing power consumption. The prototypes were developed and tested in laboratory environment supported by open source software.

Based on our long term research framework, the next three years research plan is proposed as follows.

The first year is targeted to determine the best candidate among three low cost cloud computing prototypes considering private cloud data center and e-government perspectives. It will be accomplished by applying two approaches, firstly by comparing energy consumption and performance of each prototype and secondly through the uses of multicriteria decision analysis approach such as Analytic Hierarchy Process. The part of applying multicriteria decision analysis will be conducted in UK by involving cloud computing experts from academia and professional.

In the second year, selected low cost prototype derived from previous year will be applied to establish Private Cloud Data Center that suitable for handling e-government data in heterogeneous environment (Wired and Wireless Mobile). Insights from UK cloud experts will be sought particularly having their experiences in establishing private data center for e-government use. Assessments will be done to find out its performance in dealing with a number of users with lots of data stored in the private cloud. The evaluation will be started from the interface (GUI) until data storage within the private cloud.

Finally, security and privacy issues will be the main concern in the last year. Since the low cost private cloud data center will serve both government and public data, audits on security and privacy should be a top priority before its implementation. This stage aims to ensure level of security and privacy by conducting a number of penetration testings. In terms of visualization and analysis of security and privacy weaknesses, advices from UK experts are required to assist us capturing the potential security holes. Therefore their excellent recommendations are of paramount importance.

I INTRODUCTION

1.1.Problem Statement and Potential Solution

Nowadays e-government tasks are becoming very complex along with the increasing needs of users in the format of G2G for inter government agencies, G2C for general public needs and G2B for business specific activities. Traditional ICT infrastructures would not be able to cope with these trends and therefore Cloud computing technologies are considered as suitable solutions in terms of its features of *Service on Demand, Ubiquitous Network Access, Location-independent Resource Pooling, Rapid Elasticity* and *Measured Service* (Syamsuddin and Al-Dabass, 2014).

In fact, cloud adoption plan has incorporated into the Indonesia national agenda of ICT infrastructure development particularly to extablish next generation e-government applications and infrastructures over cloud computing technologies. However, in comparison to other countries such as Malaysia, India and others, Indonesia is far left behind when the plan is turned into reality (Ghoshal, 2016).

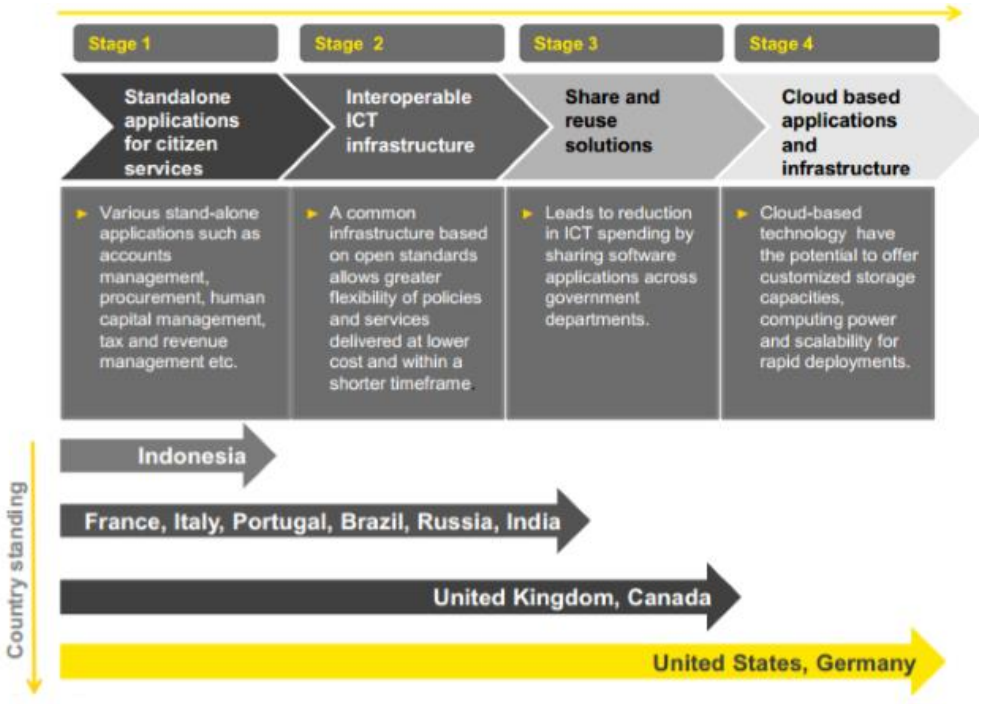


Figure 1. Cloud computing adoption stages for e-government (Goshal, 2016)

1.2. General Research Roadmap

The following graph describes our general researh roadmap in three period of time. First of all is PAST (2014-2016) regarding all research taks that we have completed and publication outcomes. Secondly, the next period called PROPOSED (2017-2019) that list main activities will be done during the next three years. Finally, last period of FUTURE (2020-2025) formulates our future aim to be accomplished in 2025.

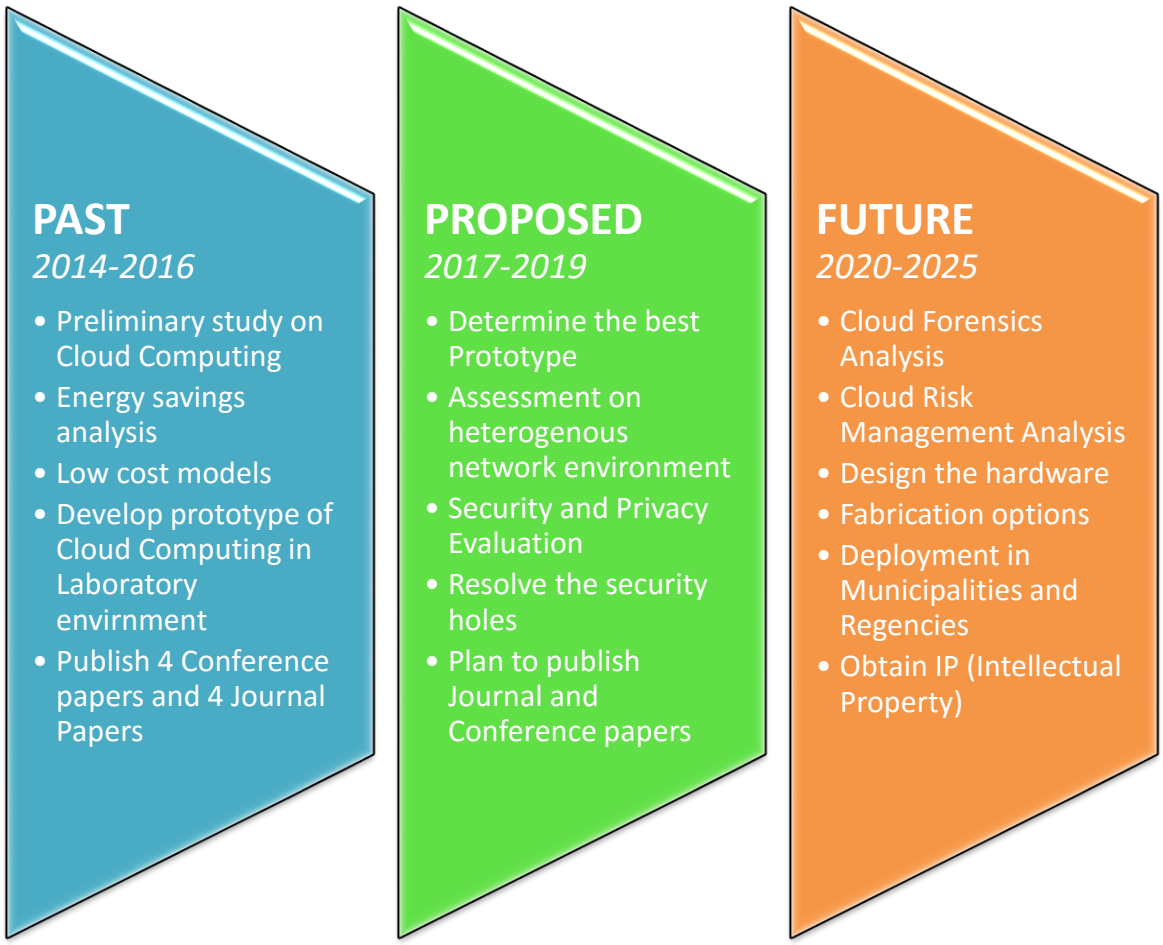


Figure 2. Overall research roadmap (2014-2025)

II. TARGET AND OUTPUT

2.1. Target

The research has determined several target to be achieved during the first year. The targets are as follows:

1. One (1) manuscript paper accepted in Scopus indexed journal.
2. One (1) manuscript paper accepted and presented in International Conference.
3. Become a presenter in an International Conference.

2.2. Output

Based on the stated target, we aims to have two outputs are follows :

1. Acceptance Letter from Journal Editor
2. Acceptance Letter from Conference Chair
3. Presenter in an International conference

III. RESEARCH METHOD

Cloud storage is a combination of IaaS and SaaS. It might be seen as IaaS since cloud storage provides a cloud based infrastructure to enable users storing their data on the cloud, while it also can serve as SaaS as it relies on specific software to enable data storing mechanisms on the cloud [6].

Cloud storage tries to replace common media storage such as local harddisk, CD/ DVD, flash drive and others by providing similar storage function away from users local system and across the span of dedicated servers which are meant for this. Cloud storage provide media for saving, editing, and managing data on the cloud scalably as needed by the users [7].

Curently, cloud storage is available both in open and closed source forms. In this study, only open sources one are discussed as this is the main topic to be described. Then, there are four candidates of open source cloud storage system OwnCloud, SeaFile, Cozy and Syncany.

The four open source cloud storage mentioned above are considered as candidate for cloud adoption in e-government data center creation.This study employs extended Analytic Hierarchy Process method by the use of Fuzzy Set Theory. The framework is basically structured according to the Analytic Hierarchy Process to form the evaluation hierarchy.

In order to make selection among four open source cloud storage, Fuzzy Analytic Hierarchy Process [12] is applied. Fuzzy set theory is oriented to the rationality of uncertainty due to imprecision or vagueness [12]. In the field of Multi Criteria Decision Making, fuzzy set theory has given a significant contribution by accepting uncertainty and inconsistent judgment as a nature of human decision making [12].

Basically, in fuzzy set theory, triangular fuzzy numbers are represented with a triplet (L, M, U) for Lower, Medium and Upper numbers. Figure 3 shows the membership triangular fuzzy numbers.

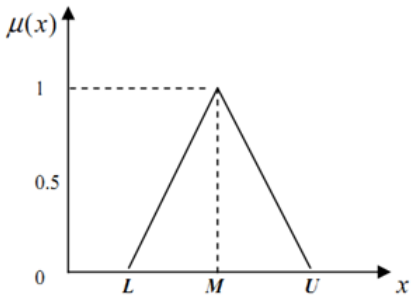


Figure 1. Triangular fuzzy numbers

Instead of using crisp numbers to represent preference used in classical Analytic Hierarchy Process[17], fuzzy numbers along with its linguistic variables are applied in this framework as shown in the following table.

Table 1. AHP Linguistic Variables and Fuzzy Numbers

Linguistic Variable	*Fuzzy Scale*	*Reciprocal Scale*
Equally Important	(0.5,0.5,0.55)	(0.45, 0.5, 0.5)
Slightly Important	(0.55, 0.6, 0.65)	(0.35, 0.4, 0.45)
Important	(0.65, 0.7, 0.75)	(0.25, 0.3, 0.35)
Very Important	(0.75, 0.8, 0.85)	(0.15, 0.2, 0.25)
Absolutely Important	(0.85, 0.9, 0.9)	(0.1, 0.1, 0.15)

Inspired by Wang's cloud adoption model [13], a novel cloud adoption framework for open source cloud storage decision making is proposed as depicted in figure 2. The framework is basically structured according to the Analytic Hierarchy Process to form the evaluation hierarchy. However, the decision analysis employs Fuzzy approach using fuzzy triangular numbers as means of linguistic variables. In other words, instead of using crips number of

clasical AHP this approach utilizes fuzzy numbers to deal with uncertainty and fagueness commonly found in technical decision making such as cloud computing.

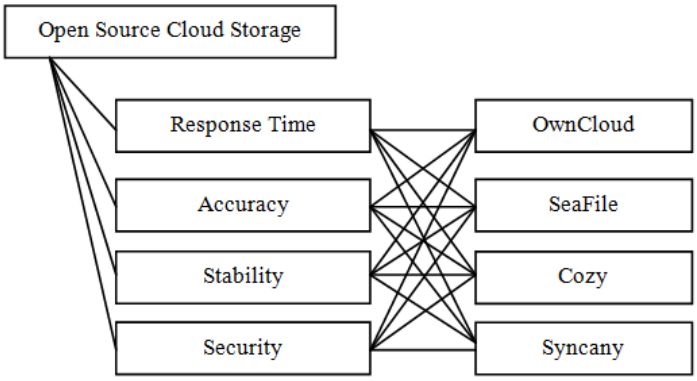
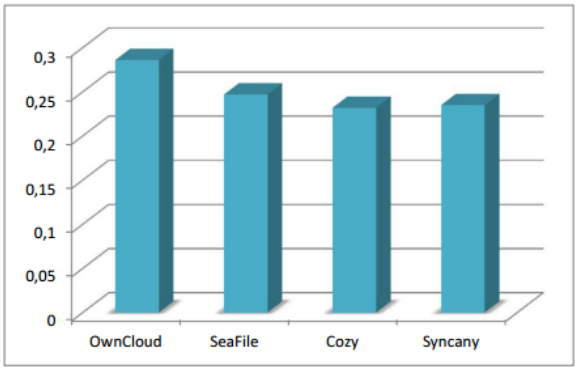


Figure 2. Open source Cloud storage decision framework

The framework consists of three levels of goal, criteria and alternatives. At the top level, the goal is defined as selecting the most appropriate open source cloud storage for being adopted in e-government data center project. Subsequently, four criteria are listed in the following level, namely Response Time, Accuracy, Stability and Security. Finally, the alternatives are the four candidates of open source cloud storage.

Experts who are responsible to make the decision in this case were involved to make judgement among four candidates. After all steps of pairwise comparisons have been completed and consistency ratio calculation was below 0.1 [12], the final results are obtained as follows.



Alternative	Weight
OwnCloud	0,286
SeaFile	0,247
Cozy	0,232
Syncany	0,235

Figure 3. Final result of open source selection

The finding clearly suggests that among all candidates, OwnCloud is the best open source cloud storage to be adopted by e-government considering four aspects of mentioned previously, response time, accuracy, stability, and security.

IV. PROPERNESS OF HIGHER INSTITUTION

In order to perform the research particularly in the first year (2017), researchers rely on laboratory facilities at the Center for Applied ICT Research, Department of Computer and Networking Engineering, School of Electrical Engineering, Politeknik Negeri Ujung Pandang.

Similar to previous KLN research project (2014-2015), we develop the simulator using open source technology. In particular, the software helps in developing the topology of cloud computing as well as performing simulation on various schemes and finally presenting the final results in proper way.

In addition, the availability of internet access permits us to use various internet resources such as public cloud applications which are very crucial in this research.

In short, both laboratory facilities and internet access in Department of Computer and Networking Engineering, School of Electrical Engineering, Politeknik Negeri Ujung Pandang are useful in delivering the research successfully.

.V. RESULTS AND ACHIEVEMENTS

5.1. Results

Based on our proposal, we have already fulfilled the results of the first year (2017) as we promised in the proposal as follows :

- *ONE International Journal (Submitted)*
- *ONE International Conference (Presented) and*
- *Become a presenter at an International Conference*

5.2. Achievements

A. International Journal (Accepted)

1. Decision Analysis Model for Cloud Based Grass Surveillance Systems *Accepted in Journal of Engineering and Applied Sciences MEDWELL* (Scopus Q2) Title : (*Waiting for Publication*)
2. Low Cost E-Government Cloud Data Center: A Case Study on Adopting Open Source Technology *Accepted in Journal of Engineering and Applied Sciences MEDWELL* (Scopus Q2) (*Waiting for Publication)*

So, we have **exceed our target** by having **TWO Journal Papers <u>Accepted</u>** in Scopus indexed journal.

B. International Conference (Presented)

1. A Virtual Lab Model to Integrate Computer Networking Courses, Presented at The 2nd International Conference on Education, Science, and Technology (ICEST) Makassar , 11-12 March 2017

2. Review on Intelligent Video Streaming Schemes for Cloud Computing, 5th International Conference on Advances in Science, Engineering, Technology and Natural Resources (ICASETNR-17), Bangkok 4-5 August 2017

Similarly, **we have also exceed our target** by having **TWO Conference Papers <u>Presented</u>** and has also become **<u>Speaker</u>** at **TWO International Conferences**.

VI. FUTURE RESEARCH

Future research that are based on the first year achievements will be as follows :

1. To establish Private Cloud Data Center for e-government needs and assess its performace and energy consumption within heterogeneous networks environment. (SECOND YEAR)
2. To improve security and privacy mechanisms of the prototype of cloud data center. (THIRD YEAR)

Also, similarly in the first year, we also project that there will be at least one Scopus index journal and One international paper conference as expected outputs in the next year.

Table 1. Expected outcome every year

3.

No	Types of Outcome		Indicator		
			CY	CY+1	CY+2
1	Scientific Publication	International	Submitted	Published	Published
2	Speaker in Scientific Forum	International	Has been conducted	Has been conducted	Has been conducted
3	Keynote Speaker	International		Registered	Has been conducted
4	Technology Readiness Level		2	3	3

IV CONCLUSION AND RECOMMENDATIONS

Cloud storage is a combination of IaaS and SaaS. It might be seen as IaaS since cloud storage provides a cloud based infrastructure to enable users storing their data on the cloud, while it also can serve as SaaS as it relies on specific software to enable data storing mechanisms on the cloud.

In this study , we aim to assess which open source cloud storage best suited for our objective of low cost government data center. A case study of the adoption a cloud storage for e-government is presented. The study was carried out within two steps. Firstly, four open source cloud storages are chosen as candidate for the deployment. In this stage, fuzzy AHP is employed to verify the best among them in terms of response time, accuracy, stability, and security. OwnCloud is finally selected with the highest weight competing other cloud data storages. Secondly, based on OwnCloud, a new E-Government Cloud Data Center is deployed. Modifications of several features are exemplified in order to improve user registration, group creation and synchronization according to the case requirements.

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Financial Report (70% = Rp 119.000.000,-)

				Honor per tahun		
HONOR	Honor/ Jam	Waktu	Minggu	Tahun 1	Tahun 2	Tahun 3
Honor Peneliti	90000	15	4 minggu 10 bulan	50,000,000		
					-	-
					-	-
				50,000,000		

					Biaya Per Tahun	
Material	Justifikasi		Kuantitas	Harga Satuan	Tahun 1	Tahun 2
Setup Prototype Cloud 1,2,3,4			4	3,000,000	12,000,000	
Desain Decision Framework			1	4,000,000	4,000,000	
AHP Simulation Analysis			1	6,000,000	6,000,000	
Sensitivity Analysis			3	2,000,000	6,000,000	
Paper Scopus Journal Medwell 01			1	4,500,000	4,500,000	
Review English Journal 01			1	2,500,000	2,500,000	
Paper ICEST 2017			1	3,000,000	3,000,000	
Review ICEST			1	1,500,000	1,500,000	
Paper Scopus Journal Medwell 02			1	4,500,000	4,500,000	
Review English Journal 02			1	2,500,000	2,500,000	
Paper Scopus Journal FEComp 03			1	5,000,000	5,000,000	
Review English Journal 03			2	2,500,000	5,000,000	
Sub Total Materials					**56,500,000**	
PERJALANAN					-	
Registrasi Conf Bangkok			1	2,500,000	2,500,000	

Tiket JKt Bangkok PP			1	4,500,000	4,500,000	
Tiket Mks Jkt PP			1	2,500,000	2,500,000	
Akomodasi Konsumsi			1	2,000,000	2,000,000	
Sub Total Perjalanan					11,500,000	
					-	
LAPORAN					-	
Diseminasi			1	300,000	300,000	
Biaya Monev			1	400,000	400,000	
Laporan Akhir			1	300,000	300,000	
Sub Total Laporan					1,000,000	
					-	
TOTAL TAHUN 1			***119,000,000 (70%)***			