

Service Landscape Online Ordering System Based on Cloud Technology

Faiza Renaldi, Christine Chlyw Nova, Agya Java Maulidin
Department of Informatics, Universitas Jenderal Achmad Yani, Indonesia
faiza.renaldi@unjani.ac.id, christine.chlywnova@student.unjani.ac.id,
java.maulidin@student.unjani.ac.id

Abdul Talib Bon
Department of Production and Operations, University Tun Hussein Onn Malaysia, Malaysia
talibon@gmail.com

Abstract

One of the things that can support the quality of service in a restaurant is the ordering process. The process of ordering places and food that is done manually is undoubtedly vulnerable to instability in a restaurant's quality of service. Unfortunately, this is still widely used in restaurants, especially local restaurants, due to the minimal technology investment they can afford. Cloud technology is the answer to this problem. Technology Cloud has been widely used, such as in financial systems, marketing systems, and clinical reservation systems, all of which target small companies so that they can implement the technology at a minimal cost. This study developed a service landscape architecture for an online ordering system based on cloud technology that allows small restaurants to implement an online order system for their respective businesses. After the analysis process, we get one business process, four business domains, 12 business functions, and 40 business service functions. Researchers are very confident that this service will become a reference in creating a cloud-based platform for food ordering systems at many local restaurants.

Keywords

Service Landscape, Cloud-based systems, Service Oriented Architecture, Online Restaurant Ordering Systems

1. Introduction

One of the things that can support the quality of service in a restaurant is the ordering process. However, the leading cause of the progress of an industry/organization/restaurant is customer loyalty. People's desire to get food and beverage variants (Abdullah 2017) is a motivating factor for purchasing food. Also, there are factors of price and taste (Rahman 2018) (Tjandra et al. 2014). The cuisine is also the reason why people buy food. Because of these factors, the culinary business is growing. However, there are many operational problems in the culinary world, one of which is redundant data, which results in queues during ordering (Inayati, Hidayatulloh, and Kamisutara 2015) (Muhamad Firdaus 2011). Therefore, a system that is capable of handling uncontrolled lines is needed. However, using the system will increase the investment cost of software maintenance, which is relatively high.

Service-Oriented Architecture (SOA) technology is a software system structure that allows different applications to interact with each other, providing the benefits of increasing integration and flexibility, eliminating data redundancy, and developing (Asmara, Nur Hasim, and Utama 2020). And the cloud technology that enables this system to be used by many restaurants with scalability, performance, security, availability, system monitoring requirements reduces software maintenance costs.

The implementation of this technology is called software as a service (SaaS). SaaS is a cloud computing service provider that provides applications in the cloud infrastructure and is ready for consumers' use. Users can access the system with an internet connection (Rahardian, Linawati, and Sudarma 2018) (Tongkaw 2013).

Software as a service has been; used in various areas such as health (Jatmika, Afwani, and Agitha 2019), (Jamil, Khairan, and Fuad 2015) (Bakri 2020), education (Saputra et al. 2018) (Aryotejo et al. 2018), services (Sulaiman and Widarma 2017) (Suryawan and Andika 2018) (Subagyo et al. 2013), and provide comprehensive benefits (Rahardian et al. 2018). This study implements the existing technology in software as a service, especially in the ordering system. This implementation will provide the benefit of minimizing existing queues by using IT technology but without a large investment.

2. Research Method

In designing a restaurant online order platform, This research uses the Design Science Research Methodology or DSRM method. This research begins with identifying problems and motivation, identifying goals and solutions, then design and development. The stages of the research process started from the data collection stage carried out by observation and interviews. Our respondents came from 22 restaurants in Bandung who were willing to be interviewed. The interview process took place at each restaurant from January 2, 2020, to February 26, 2020. Each interview takes 100 to 150 minutes; at each meeting, we ask various topics such as ongoing business processes, vision, mission, problems, or needs to address and analyze the actors' roles.

2.1 Identifying Problems and Motivation

When a restaurant wants to use technology to support its ordering process, It must be well integrative from the ordering stage to the payment stage. Since most restaurants operate on modest budgets, cost-effective technology is required. SOA-based solutions are needed to solve integration problems, while for maintenance costs, software and hardware are used cloud technology. The data collection process summarizes the issues into four priority issues, as seen in Table 1 below.

Table 1. The priority of Problems in Restaurant Management System

Criteria	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Integration	1	1	2	1	4	4	3	1	2	1	3	4	3	3	4	1	4	1	1	4	2	4
Flexibility	3	2	3	2	1	2	2	4	3	3	1	1	2	4	3	4	2	4	3	2	1	2
Efficiency	2	3	1	3	2	3	4	3	4	3	2	2	1	2	2	3	3	3	2	1	3	1
Redundant	4	4	4	4	3	1	1	2	1	2	4	3	4	1	1	2	1	2	4	3	4	3

Numbers 1 to 4 determine the priority level, where the lower the value is given, the higher the priority. Integration gets a score of 51, flexible and gets a score of 55, efficiently receives a score of 56, and redundant receives a score of 57; this shows that these four problems are equally important to solve. SOA and cloud-based platforms can solve this problem.

2.2 Determining Goals and Solutions

Based on previous research, the purpose of this study is to build an order process architecture that has a high level of integration and data availability; using SOA and cloud techniques can produce systems that are guaranteed to have a group of integration(Namjoshi and Gupte 2011), (Abolfazli et al. 2012), (Tongkaw 2013). The proposed solution is to build a Cloud Technology Based Online Ordering System Service Landscape, covering all ordering processes based on problem identification.

2.3 Design and Development

The service landscape design was obtained from direct interviews with restaurant employees and owners and made observations about the integrated system in various restaurants. The service landscape is constructed by conducting a thorough analysis of restaurant processes and services. The Landscape which will be created consists of a business area, business domain, and business services. Business services will be made starting from the registration stage, ordering payment for customers, and managing orders to restaurant owners' prices.

2.3.1 Requirements

The requirements process is carried out to collect all the data needed in the online ordering process, which will be entered into the online ordering system's landscape service. From the interview results obtained with ten services that will be included in the service landscape. Below is described the system service to be built in Table 2.

Table 2. Order Process of 22 Restaurants

No	Restaurant System	Description
1.	Registration	Describe the Registration process
2.	Manage Menu	Describes the process of adding, changing, deleting menus
3.	Manage Place	Describes the process of adding, changing, deleting tables
4.	Manage Orders	Describe the process of adding, changing order data
5.	Manage Payments	Describe the add process, change payment data
6.	Manage user	Describes the process of adding, changing, deleting users
7.	Manage Employee	Describes the process of adding, changing, removing workers
8.	Manage Report	Describes the process of viewing, downloading, and finding reports
9.	Order Status	Describe the order status, change the order status
10.	Menu & Table Status	Describe the menu status, change the menu status

The following describes the order process stages built from registration, ordering, payment, and data management. In which there are ten processes explained in Figure 1.

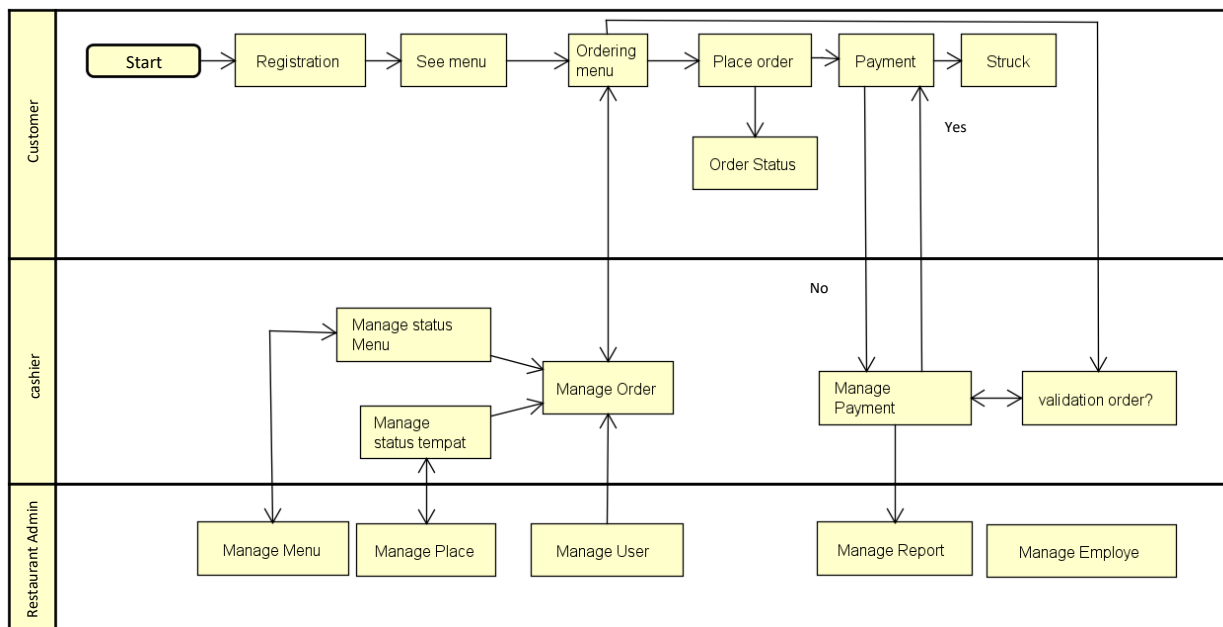


Figure 1. Ordering Process in a Restaurant

2.3.2 Business Capability Analysis

Based on the analysis of the 22 restaurants, The author obtained ten business processes that will produce service functions that describe system functions. The following is a list and the service functions for the SOA architecture described in Table 3.

Table 3. Service Function of the Restaurant Order Management Systems

No	Business Skills	Service Functions
1.	Registration	+insertDataRegistratio(), +setDataRegistration()
2.	Manage Menu	+createDataMenu(), +setDataMenu(), +deleteDataMenu(), +getDataMenu(), +editDataMenu(), +setStokmenu()
3.	Manage Place	+createDataMeja(), +setDataMeja (), +deleteDataMeja (), +getDataMeja (), +editDataMeja (), +setstokMeja()
4.	Manage Orders	+createData Pesanan (), +setData Pesanan (), +deleteDataPesanan (), +getData Pesanan (), +editData Pesananan()
5.	Manage Payments	+insertDataPendaftaran(), +setData Pesanan (), +getData Pesanan (), +getDataMeja(), +getDataMenu(), +editData Pesananan()
6.	Manage user	+getDataPengguna(), +setData Pengguna(), +deteleDataPengguna()
7.	Manage Employee	+getDataPekerja(), +setDataPekerja(), +setDataKehadiran()
8.	Manage Report	+getDataPembayaran(), +getDataPesanan()
9.	Order Status	+getDataPesanan()
10.	Menu & Table Status	+getStokMenu(), +getStokMeja()

2.3.3 Analysis of SOA and Cloud Technology

There is no application in the restaurant, so it is challenging to optimize service to customers and restaurant management. SOA can provide a layer of integration with a view spanning the entire order process through payment and user management. With the SOA system built easier to integrate, restaurants can provide the best service to customers. Because the information provided to customers is in real-time and system access can also be done in real-time. Utilizing SOA helps increase flexibility, reduce message waiting times, and eliminating redundant data (Appandairaj and Murugappan 2013). Cloud technology provides a solution in minimizing software creation and software maintenance costs such as scalability, performance, security, availability, and system monitoring requirements (Hameed et al. 2016)(Appandairaj and Murugappan 2013).

3. Results and analysis

Based on the results of the business process analysis of 22 restaurants in Bandung, it is obtained one business area described in Figure 2.

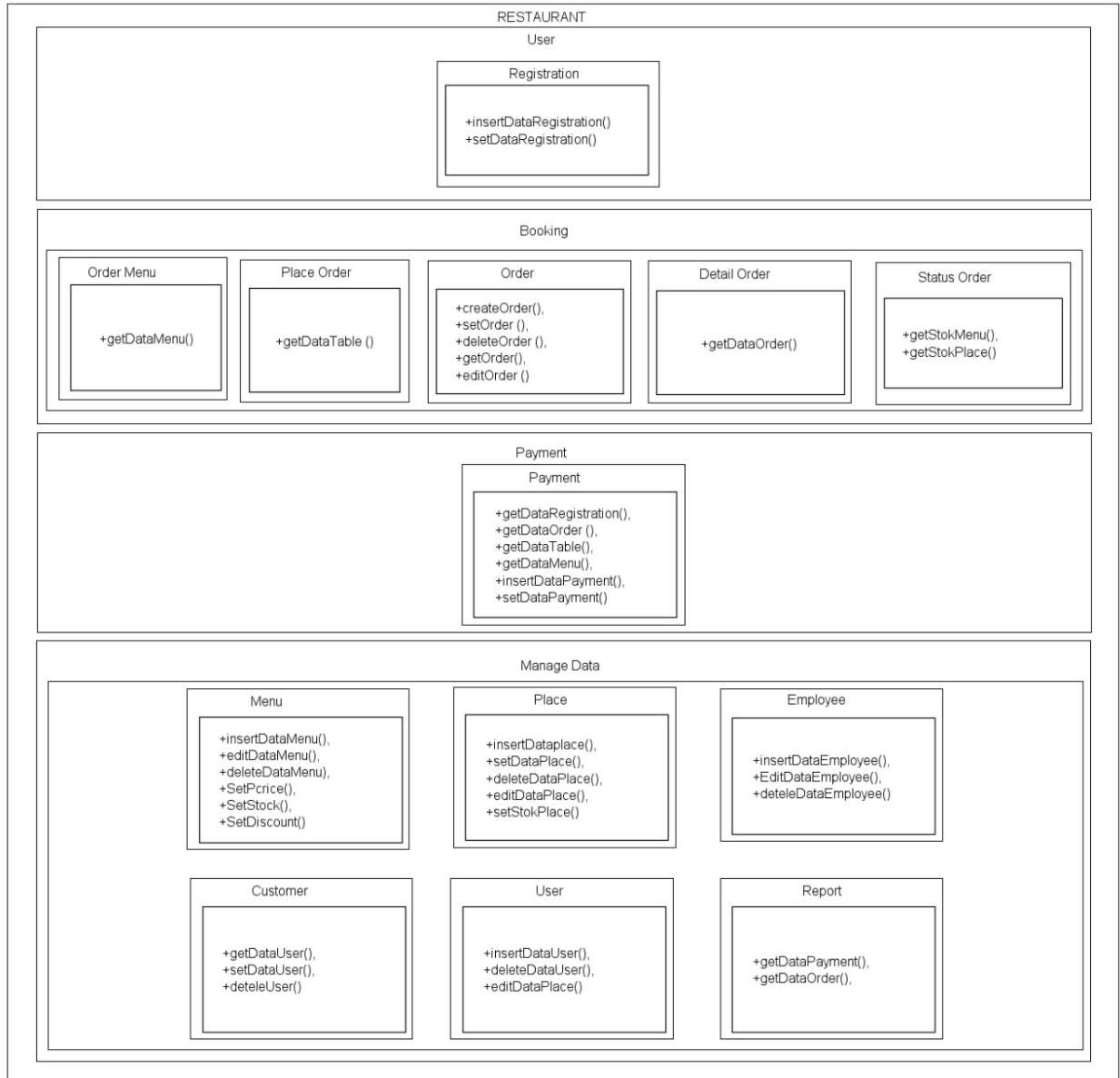


Figure 2 Service Landscape Restaurant

The framework generates one business area, four business domains, 12 business capabilities, 40 service functions. Each resulting business capability is independent but integrated. Starting from the registration stage, the menu order, place orders, then carrying out the order process, and finally the payment process. There is also a place management process, menus, customers, reports, and workers. Furthermore, we apply SOA and cloud architecture on top of this service landscape, as shown in figure 3.

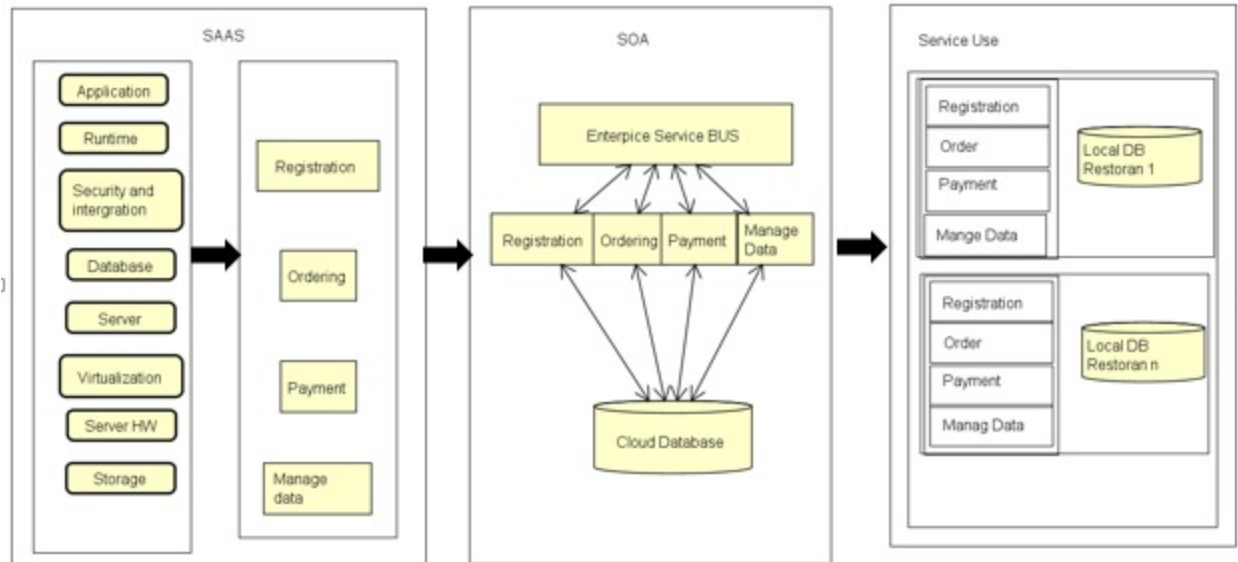


Figure 3 Service Landscape Service Online Ordering System Based on Cloud Technology

SOA implementation with Web services, which he can access via the internet. Components for building online ordering systems, software as SaaS services, SOA, and user services. SaaS technology provides benefits for application maintenance, runtime processing, security and consistency, databases, servers, virtualization, data storage, and business domains identified in the service landscape, comprising user registration, ordering, payment, and data management.

4. Conclusion

This study presents a service landscape of an online ordering system at a restaurant. The proposed service is based on Service Oriented Architecture (SOA) and cloud services. SOA provides the advantage of increasing integration and flexibility, reducing message waiting times, and eliminating redundant data Cloud with Software as a Service (SaaS) services takes care of scalability, performance, security, availability, system monitoring requirements and reduces software maintenance costs (Appandairaj and Murugappan 2013)

This research process was carried out for three months from January 2020 to March 2020, resulting in a service landscape consisting of one business area, four business domains, 12 business capabilities, 40 service functions. This condition will become the foundation for entrepreneurs in the culinary field to choose their services within an online ordering system with integration, equipped with a cloud-based platform architecture with software as a Service service. This landscape service can use in various restaurants through government or private initiatives. Some service area details still need to be provided, such as database schema and API management schema. Furthermore, researchers also expect a transformation that supports customer motivation to place orders online.

References

- Abdullah, T, "Customer Motivation Of Restaurant In Bandung When Eating Outside Of The Home." *Tourism Scientific Journal*, Vol. 2, pp.192–212, 2017.
- Abolfazli, S., Zohreh S., Muhammad, S., and Abdullah. G, "MOMCC: Market-Oriented Architecture for Mobile Cloud Computing Based on Service Oriented Architecture." *IEEE International Conference on Communications in China Workshops, Beijing, China*, pp. 8–13, 2012
- Appandairaj, A., and S. Murugappan, "Service Oriented Architecture Design for Web Based Home Banking Systems With Cloud Based Service." *International Journal of Emerging Technology and Advanced Engineering*, pp.138–43, 2013
- Aryotejo, G., Santi, W., , and Daniel, Y., "The Use of Cloud Computing as Software as a Service in an Effort to Improve the Competence of Teacher Information Technology and the Management System of PAUD Dabin V Semarang." *Prosiding Seminar Nasional Unimus* pp.633–40, 2018

- Asmara, R., Jauari, A., and Adi, P., "Integrasi E-Government Kabupaten Sidoarjo Dengan Service Oriented Architecture (SOA)." *JURNALINOVTEK POLBENG*, Vol 5, pp.16–30, 2020.
- Bakri, M., "Cloud Computation Technology Architecture For Regional Health Service Information Systems." *Jurnal Komputer Dan Informatika*, Vol.15, pp.201–8, 2020.
- Hameed, R., Omar, A., Mohamad, Omar T. Hamid, and Nicolae, T., "Design of E-Healthcare Management System Based on Cloud and Service Oriented Architecture." *E-Health and Bioengineering Conference*, pp.1–4, 2016.
- Inayati, I., M. Nur Hidayatulloh, and Made, K., "Web-Based Food Order Application (Case Study: RM Lesehan Berkah Ilaahi Gresik)." *E-Narodroid*, Vol.2, 2015.
- Jamil, M., Amal, K., and Achmad, F., "Social Network-Based Telemedicine Application Implementation Using Cloud Computing Technology." *Jurnal Edukasi Dan Penelitian Informatika (JEPIN)*, 2015.
- Jatmika, Andy, H., Royana, A., and Nadiyahari, A., "Design of Software As A Service (SAAS) for Maternal and Child Health Service Systems (PKIA) at Public Health Centers in Mataram City Based on Cloud Computing." *Jurnal Teknologi Informasi Dan Ilmu Komputer*, pp.485–90, 2019.
- Muhamad, F., Joko NK., "Designing Web-Based Hotel Reservation Information System." *Konvergensi* vol.5, pp.57–67, 2011.
- Namjoshi, J., and Archana, G., "Service Oriented Architecture for Cloud Based Travel Reservation Software as a Service." *International Conference on Cloud Computing*, pp.147–50, 2011.
- Rahardian, RL., Linawati, and Made, S., "Implementation of Cloud Computing Software As a Service at UMKM." *Majalah Ilmiah Teknologi Elektro* vol.15. pp.365-370, 2018.
- Rahman, A., "Factors Affecting Consumer Purchase Interest In Gunung Sari 2 Eating House In Sipaku Area Kec. Kec. Air Batu Asahan." Vol.2, pp.9–14, 2018.
- Saputra, YA., Faiza, R., and Santikarama, I., "Development Of Landscape Services At Lppm In Private College Using Orientation Architecture Software Approach." *Prosiding Snatif*, 2018
- Subagyo, A., Muhamad, Y., Sumianto, J., Noviar, A., Ani, M., Luthfirda, S., Yasman, and Sunarto, "Analysis and Design of Employee Recruitment Using the Ahp Method in Service-Oriented Systems Case Study of Vehicle Service Business." *Seminar Nasional Sains & Teknologi*, Vol.2, pp.84–95, 2013.
- Sulaiman, OK., and Adi, W., "Cloud Computing Based Internet of Things (IoT) System in Campus Area Network." *Computer and Systems Architecture*, September 2017
- Suryawan, L., and Ary A., "Implementation of Scrum Model Development on Rezvac Cloud Reservation and Payment System." *Siniesa*, pp.117–24, 2018.
- Tjandra, Y., Andrea, G., Monika, K., and Regina, J., "Analysis Of Factors That Shape Consumer Purchase Decision In D'cost Restaurant, Kayun, Surabaya." *Hospitality Dan Manajemen Jasa*, pp.277–91, 2014.
- Tongkaw, A., "Multi Perspective Integrations Information and Communication Technologies (ICTs) in Higher Education in Developing Countries: Case Study Thailand." *Procedia - Social and Behavioral Sciences*, pp.1467–72, 2013.

Biographies

Faiza Renaldi is a lecturer in the department of informatics, Faculty of Science and Informatics, Universitas Jenderal Achmad Yani Indonesia. He received his master of business informatics at Universiteit Utrecht, The Netherlands, in 2006. His research interests are health informatics, information systems/information technology management, e-government, agile project management, and IT entrepreneurship.

Christine Chlyw Nova is a research assistant in the informatics department, Universitas Jenderal Achmad Yani, Indonesia. Her main research interest is in cloud technology and customer relationship management.

Agya Java Maulidin is a research assistant at the department of informatics, Universitas Jenderal Achmad Yani, Indonesia. His primary research interests are web services technologies, NoSQL technology, and mobile-based application.

Abdul Talib Bon is a professor of Production and Operations Management in the Faculty of Technology Management and Business at the University Tun Hussein Onn Malaysia since 1999. He has a Ph.D. in Computer Science, which he obtained from the Universite de La Rochelle, France, in 2008. His doctoral thesis was on the topic of Process Quality Improvement on Beltline Moulding Manufacturing. He studied Business Administration at the University Kebangsaan Malaysia, for which he was awarded the MBA in the year 1998. He has a bachelor's degree and a diploma in Mechanical Engineering, which he obtained from the University Teknologi Malaysia. He received his postgraduate certificate in Mechatronics and Robotics from Carlisle, United Kingdom, in 1997. He had published more than 150 International Proceedings and International Journals, and eight books. He is a member of MSORSM, IIF, IEOM, IIE, INFORMS, TAM, and MIM.