

CHAPTER I

INTRODUCTION

1.1 Background

Based on the Minister of Communications and Information Technology Law No.5 of 2020 the definition of cloud computing is an equitable, easy, and on-demand network access model for to a set of configurable computing resources including networks, servers, storages, applications, and services that can be provided and released quickly with minimal management power or service provider interaction power. *Komputasi awan adalah model penyediaan akses jaringan yang merata, mudah, berdasarkan permintaan untuk sekumpulan sumber daya komputasi yang dapat dikonfigurasi bersama antara lain jaringan, server, penyimpanan, aplikasi, dan layanan yang dapat disediakan dan dirilis dengan cepat dan dengan daya manajemen atau interaksi penyediaan layanan minimal* [1]. Availability is a challenge in cloud computing technology. Cloud environment conditions with high availability can use the fault tolerance method, which is the ability of the system to provide the desired service even when failures and errors occur in the system[2].

Cloud computing must be balanced with good and appropriate regulations because there are no regulation that arrange cloud computing in detail. The government is considered necessary to review the differences in existing regulations and contemplate their implementation in order to prepare themselves to welcome the cloud computing players. This attracted more global players in early 2020 because of Google, Amazon previously announced plans to open a datacenter in Indonesia in 2022 so that local players can compete with global cloud computing players in Indonesia [3].

Indonesia applies the technical regulatory standards that refer to the ANSI-TIA 942B:2017, which were basically adopted from the Uptime Institute regarding the classification of challenges for each tier and are still in the form of Ministerial Regulation Draft (RPM). Uptime Institute standardization of data centers and ANSI-TIA 942B:2017 defines the standard tier classification where tier-4 is taken as a fault tolerance challenges. In Singapore, regulatory standards are adopted from

ISO/IEC 19086-3. Standardization of ISO/IEC 19086-3 defines how a cloud computing component maintains a Service Level Agreement (SLA) and data center parameters that need to be monitored in order to support cloud services for cloud service providers, as well as a plan for fault tolerance maintenance schemes [4][5][6][7].

The results of the research were recommendations to the government as the regulator to apply regulatory standards for adding technical parameters to the Draft Ministerial Regulation of Communications and Information Technology Law regarding data centers standardization. The addition of technical parameter in availability aspect, technical schemes, and QoS network parameters based on international standards, which is ANSI-TIA 942B:2017, Uptime Institute, ISO/IEC 19086-3, ITU-T G.1010, IETF RFC 6349, and national standards in SNI 8799 section 2 of 2019 on data center management guidelines [8] by utilizing the high availability of fault tolerance schemes. The recommendations in this research were also addressed to cloud providers that focus on data centers based on the following:

1. Law No.11 of 2008 jo Law No.19 of 2016 on electronic information and transactions in articles 15 and 16, the cloud provider is required to maintain reliable and secure system, and take responsibility for their operation of the Electronic Systems [9][10].
2. Indonesia Government Regulation No.71 of 2019 which is concerning the Electronic System and Transaction Operation in Article 20 paragraph 2. The Cloud providers is required to manage, process, and/or store electronic systems and data electroni in the territory of Indonesia [11].
3. Presiden Decree of the Republic of Indonesia No.95 of 2018 on Electronic Based Government System, is a plan to build a data center using cloud computing technology with a fault tolerance scheme. The data center is expected to be built in more than one zone (the same zone, the multi zone, or the multi cloud) to maintan SLA, minimize the threat of downtime or damage that is prone to occur in a system and maintain the trust of cloud players in Indonesia [12].

1.2 Problem identification

The problem focused on this research is that there is no regulation governing the technical parameters of cloud computing that focuses on data centers. The identification of the problem in this research were:

- a. How to design and implement fault tolerance regulations on cloud computing in Indonesia's data center?
- b. How to design and implement a cloud computing availability scheme and good quality of service in data centers in Indonesia to avoid downtime?
- c. How to see whether the adopted regulations are still insufficient so that additional standardization proposals are needed?

1.3 Objectives

The main objectives of this research are:

1. Provide recommendations or suggestion for adding rules to complement the regulation of cloud computing standardization on data centers in Indonesia.
2. Provide recommendations for the regulation of cloud computing data centers standardization in Indonesia regarding system failures.
3. Providing availability recommendations that are acceptable to regulators, and providers involved in following aspect:
 - a. Recommendations for unavailable availability parameters from existing recommendations.
 - b. Recommendation of technical schemes to minimize downtime.
 - c. The network QoS parameters are delay and throughput.

1.4 Scope of the Research

The assumptions and limitations of the problem to support business modeling research on fault tolerance in the cloud application services are as follows:

- a. The research aspect was only focused on the technical field of fault tolerance to avoid failures in cloud computing systems.
- b. This research used leases on two different cloud providers, namely local cloud providers (Bit Super Cloud) and global cloud providers (Google Cloud Platform).

- c. Testing the QoS parameters testing, namely delay and throughput. Testing for uptime availability, MTTR, MTBF, and downtime.
- d. Elements used in cloud computing, server/instance, network, virtual router, firewall, Domain Name System (DNS), and monitoring management.
- e. Research did not involve electrical systems and hardware.
- f. Service applications can be accessed publicly with devices such as smartphones or laptops that are stably connected to the internet.

1.5 Hypothesis

Cloud computing technology with the implementation of a fault tolerance scheme will produce availability values reaching 99.9% with the calculation of Mean Time Between Failure (MTBF) is the average uptime time and MTTR (Mean Time to Repair) is the average time needed to restore service. Server reboot time. E.g. 15 minutes, Bandwidth memory E.g. Mb/s, Gb/s [13]. Generate delay and throughput values in accordance with the ITU-T G.1010 standard, with these parameters are expected to be a reference to the draft regulation of data centers in Indonesia in technical terms. Where in terms of business for cloud providers can be seen about availability that meets the SLA so that business processes can run well without long downtime.

1.6 Research Methodology

The research methods used in this research are as follows:

- a. Study of literature

The literature study was carried out by collecting data in the form of conference papers, journals, textbooks, and various other studies that supported this research.

- b. Collecting data

Data collection includes data about infrastructure, market share, infrastructure power usage, and things owned by cloud providers.

- c. Data Calculation and Analysis Technique

Technical calculation and analysis of cloud computing referred to availability, throughput, and other matters related to cloud fault tolerance methods.

d. Conclusion

The analysis results can be concluded to answer the problem formulation so that it will provide recommendations or suggestions for regulators or cloud providers in the application of standardization of cloud computing data centers in Indonesia regarding system failures.

1.7 Methodology

The methodology used in this research was based on implementation to obtain the level of QoS and availability. The entire work of this research used schema shown in figure 1.1:

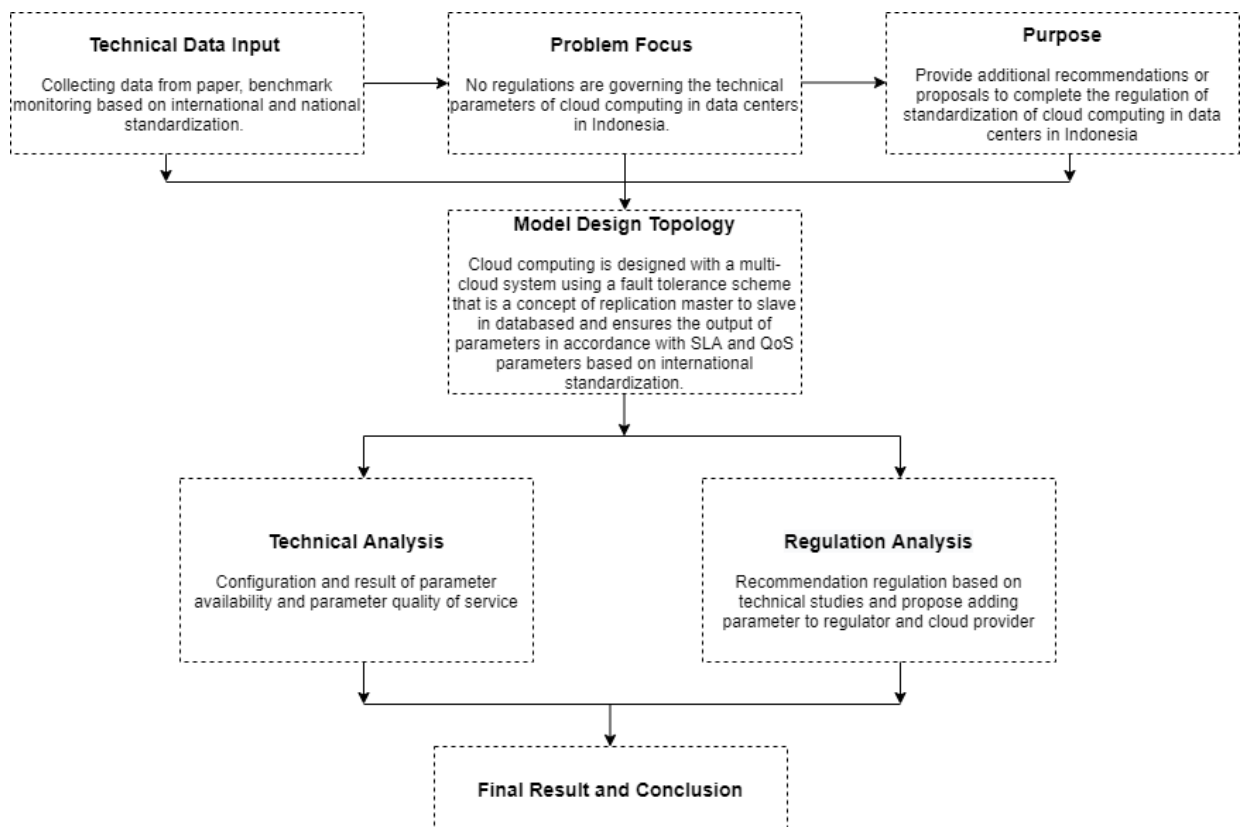


Figure 1.1 Methodology scheme.