

Cloud application design for financial reporting in Indonesia's small and medium enterprises

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ABSTRACT

Small and medium enterprises (SMEs) in Indonesia are increasingly developing, but the application of information technology (IT) in small medium businesses is still lacking because for small medium business owners, doing their own bookkeeping without a system will maximize profits. However, this makes bookkeeping ineffective and inefficient because it requires manual data input and reconciliation. Utilizing a cloud-based accounting information system (CAIS) can integrate data, increase productivity, and minimize infrastructure costs because there is no need to provide costs for physical infrastructure. In this research, CAIS was designed to produce financial reports that focus on small medium businesses in Indonesia. The method used is a qualitative method by conducting observations through literature study for data collection and the rational unified process (RUP) which is limited to the elaboration stage to produce a prototype design. So, the result of this paper is a system design that can be used as a guide to continue with system development. This system aims to simplify transaction records so that they can be more efficient and effective in producing financial reports. The use of CAIS is also expected to increase profits and maximize the use of internet and technology in small medium businesses.

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1. INTRODUCTION

Technology is currently in Industry 4.0 which can support flexibility, efficiency, productivity, one of which is cloud computing [1]. Cloud computing has the goal of optimizing on-demand technology, hardware, and providing information as a service, achieving economies of scale in the distribution and operation of information technology (IT) strategies [2]. Cloud computing can be used in various fields, one of which is for business. Cloud computing is needed by businesses to increase competitive advantage, increase efficiency, and improve the global economy [3].

Nowadays, many businesses use systems to increase efficiency, productivity and increase profits [4]. Not only business in large companies but also in small medium enterprise (SMEs). Based on the latest data from the ministry of cooperatives and small and medium enterprises (Kemenkopukm) in 2021, the total micro small medium enterprise (MSME) in Indonesia is 64.2 million with 99.62% controlled by micro enterprises, namely around 63.9 million and the remaining 0.38% or around 300 thousand is controlled by SMEs. An accounting information system (AIS) is very necessary for medium enterprise (ME) because according to a survey, 57% of ME owner respondents do their own bookkeeping because they think they can provide maximum profit. They do not have basic knowledge about accounting records with a proper system

[5]. In fact, AIS can help in making decisions related to financial matters [6]. What's more, if it is combined with cloud computing to become a cloud-based accounting information system (CAIS) which can be called a CAIS, it can provide even more benefits. According to research conducted by Marsintauli *et al.* [7], the use of cloud accounting makes it easier for preparers of financial reports because it can be accessed anytime and anywhere with a complete and easy-to-use design, thereby reducing company expenses. Companies do not need to provide expensive storage such as servers and software applications that must be purchased and installed on each computer, companies can use cloud services so that companies can work flexibly, and can integrate systems [7].

Many previous studies were carried out to create systems for SMEs which focused on creating an AIS for financial reports. However, the creation of a CAIS that focuses on SMEs in Indonesia has not been explained clearly. In this research paper provided a solution by designing the architecture and application of a financial report with a CAIS where the system is created by utilizing a cloud-based web server and database so that it can be accessed anytime and anywhere as long as you have internet and do not need to spend money. Initial capital to prepare a physical server. This system is designed with an integrated data concept, so that processing financial reporting at SMEs can increase efficiency, effectiveness and productivity and this system is designed with an easy flow of use so that it can be easily understood by SMEs.

2. LITERATURE REVIEW

2.1. Cloud computing

Cloud computing is the next stage of evolution on the internet. Cloud in cloud computing can be interpreted as a provider of facilities ranging from computing-to-computing infrastructure, applications, business processes to personal collaboration that can be provided to users as a service wherever and whenever the user needs it [8]. With cloud computing, users can access files and applications from devices used by users that can be accessed using the internet. Examples include Google and Gmail [9]. Cloud computing has different types of services which are divided into 3 categories, namely applications (SaaS), platforms (PaaS), and infrastructure (IaaS). The definitions of these three categories are as follows [10]:

- i) SaaS is a service category where users use a web browser to access software applications. One example is Google Docs.
- ii) PaaS is a service category where users can use facilities for application design, development, testing, implementation and hosting. Examples of PaaS are Google and Microsoft Azure.
- iii) IaaS is a service category where users can access infrastructure via virtual machines. Examples are Amazon Web Services EC2 and S3.

There are 5 important characteristics of cloud computing, namely i) cloud computing has extensive network access regardless of time and location. Cloud services can be accessed using any device using the internet. ii) Cloud computing has a multi-tenancy infrastructure that can accommodate many users and applications. iii) Elasticity allows users to add or reduce resources according to demand. iv) Self-services where computing capabilities will be provided automatically to users. v) Pay-as-you-go, which means users only pay for the cloud services used [11].

The advantages of using cloud computing for small businesses, namely i) it is cheaper and easier to start developing a business; ii) reduces costs, variable costs are not fixed costs; iii) increases flexibility; iv) increases collaboration; v) increases data security; vi) providing measurable resources; vii) improving service and customer acquisition support; viii) allowing resources to be purchased with operational funds rather than as capital expenditure; ix) allowing small businesses to shorten delivery times and start operations earlier; x) providing resources that were previously limited to large companies which is accessible and affordable; and xi) allows companies to shift their business to other companies that offer better cloud services or lower prices [12]. Another benefit of the cloud computing application in the small business case study from the results of research conducted by Chikkala and Syed [13] concluded that by using cloud computing services, small businesses can increase the scale of their operations quickly and can integrate existing small business operations in several regions, thereby helping real-time and effective data accessibility in making decisions.

Cloud computing is widely used by businesses, there have been several studies that have been conducted previously regarding the use of cloud computing in business, such as research conducted by Hasanah *et al.* [14] examining the implementation of cloud computing in restaurant's expenses monitoring systems to determine the level of efficiency with collect expenditure data from each branch by comparing their income. Research conducted by Modisane and Jokonya [15] evaluated the benefits of cloud computing in small, medium, micro-sized enterprises using the conceptual research model. Research conducted by Albelaihi and Khan [16] evaluated the benefits and barriers of using cloud computing in SMEs in Saudi Arabia using a qualitative method, namely interviewing the management section of active SMEs.

2.2. Accounting information system

AIS is a computer system that can track and report business activities, money movements within a company, and produce financial reports [17]. AIS are an absolute tool in the hands of managers who strive to remain at a competitive advantage in the midst of very rapid technological advances, increasing awareness and challenging demands from customers and business owners [18]. AIS can make the financial reporting process in an agency easier and faster because the processing of data into accounting information can be done through the system so that it can reduce the risk of recording errors which in the end can produce higher quality financial reports and can help reduce errors caused by someone's negligence and inability to prepare financial reports so that they can present more accurate and valid financial reports [19]. Based on research conducted by Latifah and Arisyahidin [20] regarding AIS analysis in a company, the results showed that the use of an AIS has a positive impact which directly improves company performance.

AIS has been widely applied in various fields, several studies such as those conducted by Wibowo *et al.* [21] analyzed and designed inventory AIS applications to improve internal control in micro, small, and medium enterprise filio CR. Research from Asy'ari *et al.* [22] created a Financial Information System for Micro Enterprise which aims to process financial data using the SDLC method for system design and running the application using localhost XAMPP. Research conducted by Muhammad *et al.* [23] examined the use of AIS in agricultural companies to increase the efficiency of information dissemination. Research conducted by Wafiyudin *et al.* [24] identified and examined the effectiveness of information using AIS for tuition fees during the COVID-19 pandemic using qualitative methods [24].

3. RESEARCH METHOD

3.1. Research procedure

Figure 1 is the research procedure in designing a cloud for SMEs. The research procedure was carried out in 4 stages, namely problem identification, where at this stage the gaps that occurred in the use of cloud in SMEs in Indonesia were identified. Identification of this problem is supported by data. So, the next stage is data collection. Data collection was carried out by observation through a literature review. Literature review related to cloud in SMEs collected from several literature studies, such as journals, conference papers and books over the last 5 years. After making observations from the literature study, then proceed to the next stage, namely the design stage. This design stage is divided into 2 stages, namely inception and elaboration. At the inception stage, system architecture design, activity diagram design, and use case design are carried out. Architectural design describes how the cloud is connected to applications in SMEs. The activity diagram design describes the flow of the system designed to suit the needs of SMEs. The usecase diagram design describes what functions are provided by the application or system to help carry out business processes in SMEs. After carrying out the inception design, we enter the final stage of design planning, namely making a prototype. Making this prototype is the final result of designing cloud applications for SMEs. The prototype created focused on creating financial reports for SMEs, so the prototype was created with a modern user interface (UI) and user experience (UX), so that it is easy to use. The design stops until the prototype is made, the testing and implementation stages can be developed in further research. This paper only focuses on design so that the final result is a prototype.

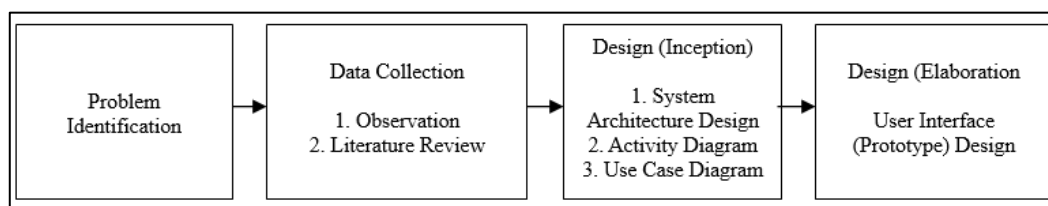


Figure 1. Research procedure

3.2. System architecture design

Figure 2 is the architectural design of a cloud application system built to solve problems for SMEs. The system architecture is created by utilizing the cloud to connect to a web server and database. Any financial data related to sales, purchases, payroll, and production is entered into the system and stored in a database that is accessed using the cloud. Then, the accounting department can retrieve data from the cloud database, generate financial reports, and can update the general ledger in the cloud database.

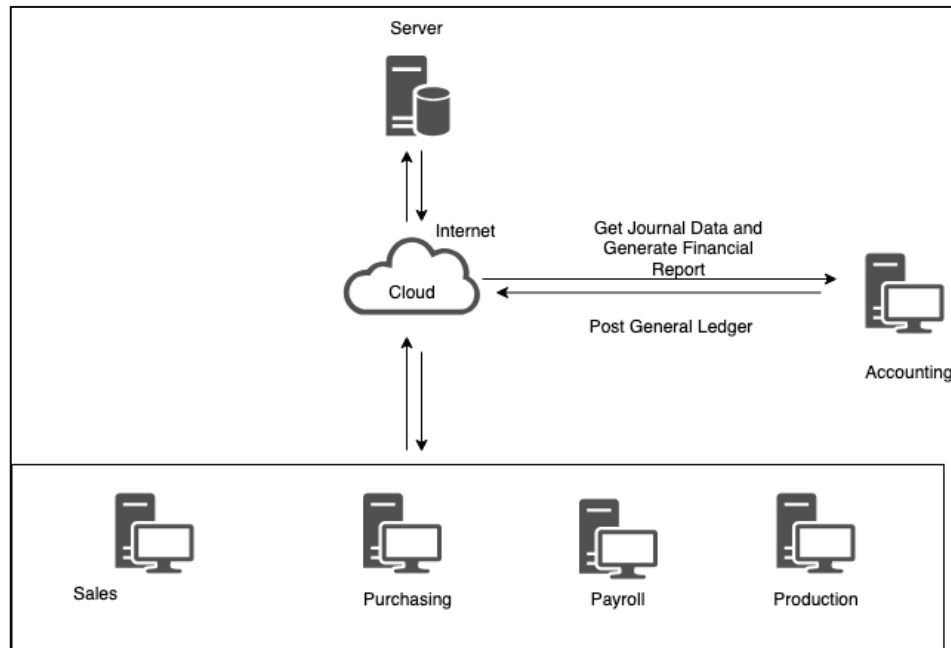


Figure 2. System architecture design

3.3. System design methodology

The methodology used to create an application prototype is to use the rational unified process (RUP) which consists of 4 stages, namely inception, elaboration, construction, and transition [25].

1) Inception

Modeling the required business processes and defining business process requirements for the system to be created (business requirements). At this stage, activity diagrams and use case diagrams will be created.

2) Elaboration

This stage focuses on designing the system architecture. This stage focuses on analysis and system design as well as system implementation using a prototype. The prototype will be created with a web display using figma.

3) Construction

At this stage the focus is on creating components and system features. This stage focuses on system implementation and testing. In the early stages of construction, it is a good idea to re-examine the results of the analysis and design, especially the design of sequence diagrams, class diagrams, components and deployment. If the design created is in accordance with the system analysis, then implementation using a specific programming language can be carried out.

4) Transitions

At this stage the focus is on deployment or installation of the system so that it can be understood by users. This stage produces a software product which is a requirement for the initial operational capability milestone or initial operational capability limit or milestone. Activities at this stage include user training, maintenance and testing whether the system meets user expectations.

However, this paper will be limited to the inception and elaboration stages only, where the design is only made starting from analyzing system requirements and business processes to making prototype.

4. RESULTS AND DISCUSSION

4.1. Observation

From the results of observations made by collecting data from literature studies, the following results were obtained:

- 1) AIS for business helps in increasing efficiency, effectiveness and productivity. CAIS are also known to make financial recording easier and can be integrated in real time [26].
- 2) In research conducted by Pramuka and Pinasti [27], the results showed that small medium businesses expect a cloud that is useful and easy to use. In this research, it is also explained that small medium businesses also need strong infrastructure to support the small medium business accounting system. Many

small medium businesses lack the ability to prepare standard financial statements. Small medium businesses also need applications that are easy to use, efficient and reliable.

- 3) The use of IT is very important but its use is still limited to small medium business. Based on research conducted by Mukhtar *et al.* [28], it is stated that IT has a positive influence on economic development in small medium business. Research from Pohan and Iswadi [29] also states that IT in small medium business can increase small medium business profits.
- 4) Internet use in small medium businesses is still very low even though internet use in small medium businesses has a positive influence on income. The lack of use of this technology is caused by a lack of innovation and knowledge so that many small medium business owners choose to run their business in conventional ways [30].
- 5) In research conducted by Andriany *et al.* [31] it was stated that AIS was difficult to implement due to a lack of knowledge in using the application.

From the results of the observations made, it can be concluded that the creation of a CAIS is needed by small medium businesses in Indonesia so that they can maximize the use of the internet to access the cloud, increase small medium business profits, lower costs, increase efficiency, effectiveness and be easy to access. The design of the CAIS application must be easy for users in small medium business to use so that even though users in small medium business do not understand accounting, they can still use this application well to help run their business, especially in recording transactions and producing financial reports for small medium business.

4.2. Business process description

The process will start from the production side, the production department will produce their products for marketing. The production department will need raw materials to be processed, so the production department will make a request to the purchasing department to purchase raw materials from the vendor. The purchasing department will make purchase orders to vendors. After the goods are sent by the vendor and received by the company, the vendor will send an invoice to the purchasing department, then the purchasing department will input the invoice into the system so that the transaction is recorded. Once the raw materials are met, the production process will begin. When producing a product, labor will be needed to help with the production process and there will be other costs for production. So, the production department will input the costs required for production, the number of production workers, and the working time of production employees. After product production is complete, the product will be sent to the sales department to sell the product. The sales department will input sales orders to record the number of products sold and input sales invoices to record income from product sales. The payroll section will input the total number of employees at the SMEs and calculate the costs that must be incurred for all working employees. Payroll will input expenses for workers into the system. Finally, the finance department will start working to produce a financial report. The finance department will pull sales, purchasing, production, and payroll data from the database to input the journal and then post it to the general ledger which is stored in the database. After that, the finance department can carry out a trial balance to ensure the transaction is balanced and make adjustments. After that, the finance department can generate financial reporting through the system.

4.3. Activity diagram

Figure 3 in Appendix is an activity diagram that depicts the activities carried out by each department such as in Figure 3(a) to 3(e) in; sales, purchasing, production, and payroll to assist in producing financial reports generated by the system by assisting in inputting every transaction that occurs in each department, but it still needs to be several things are carried out by the finance department, such as adjustments and reconciliation of journals that have been input into the system with original data.

4.4. Usecase diagram

Figure 4 depicts the interaction of each function in the system with actors. Create sales order and create sales invoice can be done by sales. Create purchase order can be done by purchasing. Post general journal can be done by sales, purchasing, production, and payroll. The post general journal records every transaction carried out by each department. Get general journal data, update general ledger, and generate financial report carried out by finance.

4.5. User interface

Figure 5 shows several main features of the system for producing financial reports. Figure 5(a) is the display for inputting the general journal. This display can be accessed by sales, purchasing, production, and payroll staff to input transactions that occur. There is an "add transaction" button if you want to add a transaction to the journal. In the general journal there is also a "total balance", if the color is red, it means that the data entered is not balanced and cannot be submitted. The submit button can be pressed if the total

balance is green, which means the data entered is balanced. Figure 5(b) is a display for inputting the general ledger which can be accessed by finance staff and can be updated if there are errors. Figure 5(c) is a display for generating financial reports carried out by finance staff. Financial reports are generated from the general journal which is stored in a cloud database.

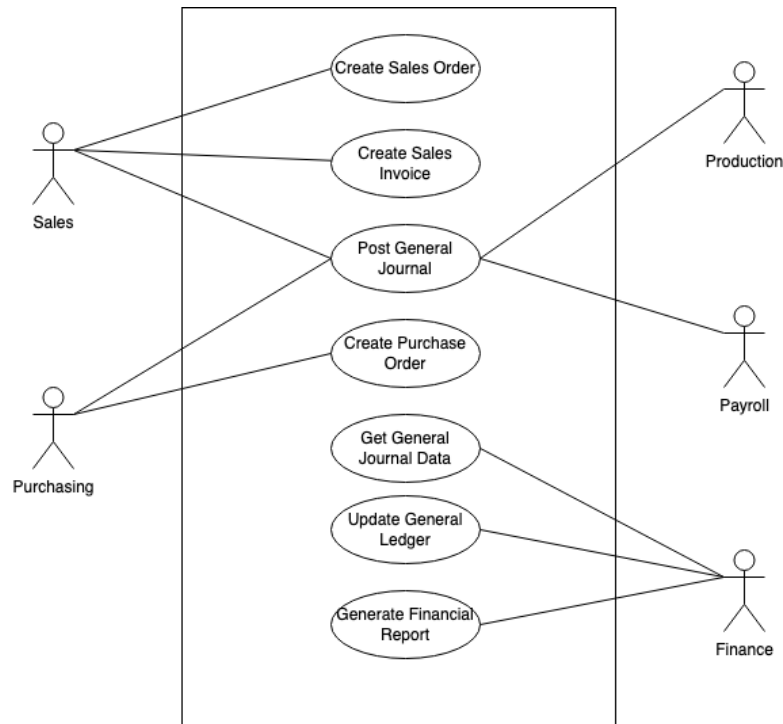


Figure 4. Usecase diagram

(a) Input General Journal

(b) General Ledger

(c) Financial Report

Figure 5. User interface: (a) general journal, (b) general ledger, and (c) financial report

4.6. Discussion

This research was conducted to design a cloud-based application for SMEs in Indonesia which aims to help SMEs in Indonesia in making financial reports. This research was conducted using a qualitative

approach. To carry out application design, the RUP life cycle method will be used which is limited to the elaboration stage, namely making a prototype design. From the results of observations made using a literature review, it was found that the use of information systems in business really helps increase business effectiveness and efficiency. Apart from that, from observations it is also known that using the CAIS has benefits, namely making financial transaction records easier and all transaction data can be integrated in real-time. However, it is also known from the results of observations that the use of AIS in SMEs is considered difficult and reduces the profits obtained. There are still SMEs that use manual methods to carry out financial transaction records, making it difficult to make financial reports. The lack of use of information systems is also caused by a lack of knowledge of technology in SMEs. Therefore, this research aims to provide a cloud solution for AIS for SMEs to make it easier to create financial reports for SMEs. Cloud can integrate all transactions from various parts, such as sales, purchasing, payroll and production and can update financial journals in real time. So, financial reports can be generated automatically easily. This research focuses on design that has a final result, namely in the form of prototyping. This prototype becomes the final design of this design stage. The prototype is designed with a more modern appearance to make it easier for users to use the application and as a solution to the problem of limited technological knowledge which causes difficulties in using the system. This prototype can be tested to find out whether the system designed is suitable and can be used easily by SMEs. At this design stage, it has also been explained how the system flow of the system being designed, the functions in the system, and what the architectural description of the system to be built is. However, the testing and implementation stages were not discussed in this research. This research is limited to the design stage, namely the elaboration stage to produce a prototype. This research can be continued for further research to carry out the testing and implementation stages so that it can be directly used and benefited by SMEs in Indonesia to make it easier to make financial reports.

5. CONCLUSION

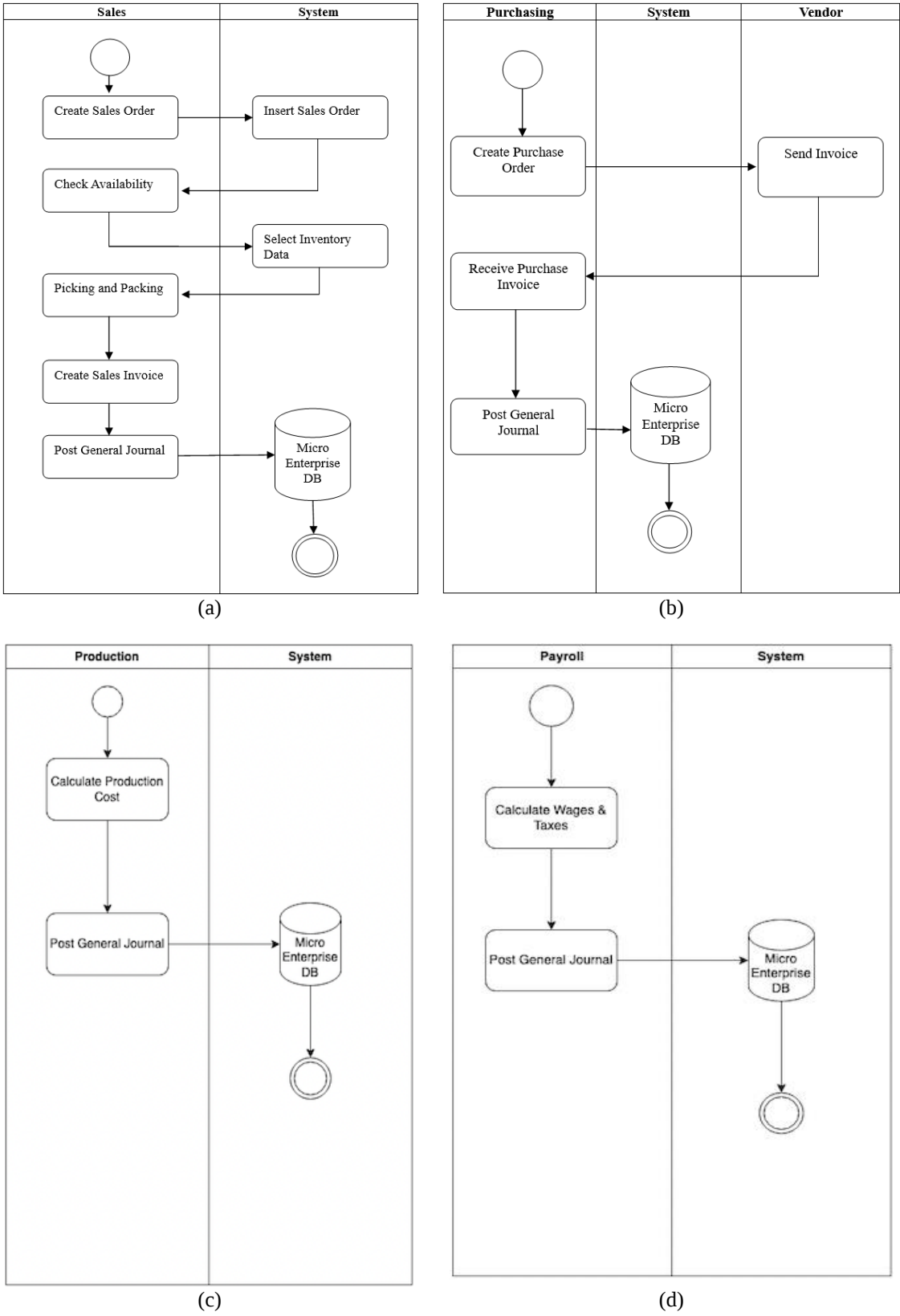
Technology has reached Industry 4.0 which can increase the efficiency and effectiveness of business activities. One of the technologies that can be utilized in Industry 4.0 is cloud computing. Cloud computing has been widely used in large companies, but cloud computing is still little used in small medium businesses. Cloud computing can increase efficiency and productivity in small medium businesses and reduce costs. In this research, we have discussed the development of small medium business in Indonesia. However, many small medium businesses still record their transactions manually. This makes it very difficult to create financial reports because you have to do it manually by opening all the files. From this research, a solution was produced to make financial reports more easily by utilizing cloud computing by integrating data. Utilizing cloud computing can also reduce infrastructure costs that must be incurred by small medium businesses and can also maximize internet use to increase small medium business profits. Each staff from different sections can input transactions that occur into a journal so that it can make it easier to generate financial reports. This paper is only limited to system design where the results of this paper only extend to architectural design, diagram design and user interface. The design of this system is also made to make it easier to use the application so that users in small medium businesses do not find it difficult to use the application, especially in recording transactions and preparing financial reports. Furthermore, this research can be developed with more in-depth analysis and used to develop and implement systems in small medium enterprises in Indonesia.

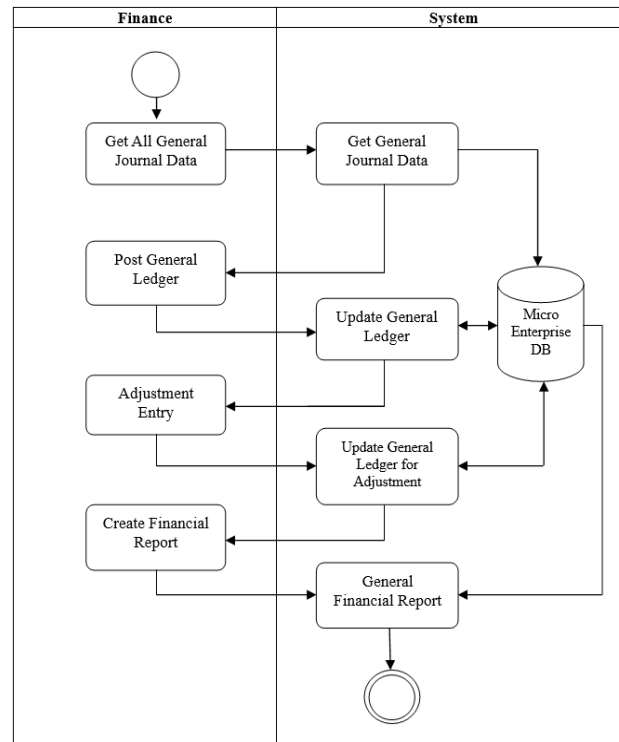
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APPENDIX





(e)

Figure 3. Activity diagram; (a) sales activity diagram, (b) purchase activity diagram, (c) production activity diagram, (d) payroll activity diagram, and (e) accounting activity diagram

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