Department of Digital Business
Journal of Artificial Intelligence and Digital Business (RIGGS)
Homepage: https://journal.ilmudata.co.id/index.php/RIGGS
Vol. 4 No. 4 (2026) pp: 8716-8723
P-ISSN: 2963-9298, e-ISSN: 2963-914X

Design of a Rule-Based CIS to Determine the Customer Status of Bank Sumut Binjai

Anisa Sri Rahma, Najahaura Rahma, Raissa Amanda Putri
Program Studi Sistem Informasi, Fakultas Sains dan Teknologi, Universitas Islam Negeri Sumatera Utara
anisa0702231013@uinsu.ac.id, najahaura0702231012@uinsu.ac.id, raissa.ap@uinsu.ac.id

Abstract

The development of information technology is driving the banking sector to shift from manual systems to digital systems to improve efficiency, accuracy, and consistency in credit management. This digital transformation has become a crucial need due to the increasing number of customers and the complexity of the credit assessment process that must be carried out by banking institutions. PT. Bank Sumut Binjai Branch still applies manual determination of customer credit status, which has the potential to cause process delays, assessment errors, and inconsistencies in decision-making. This condition can impact the quality of service and credit risk faced by the bank. This study aims to design a Rule-Based Credit Information System that is able to determine customer credit status automatically based on predetermined rules. This system is designed to be able to process customer data systematically according to applicable criteria. The method used is a Rule-Based System which includes the stages of knowledge acquisition, knowledge representation, application of inference engines, and system evaluation. Data collection was carried out through interviews with credit officers and relevant literature studies as a basis for compiling system rules. The system design is modeled using Unified Modeling Language (UML) which is represented through Use Case Diagrams to illustrate the interaction between users and the system. The designed system is expected to assist credit officers in determining customer status quickly, accurately, objectively, and consistently, as well as increase the effectiveness of the credit decision-making process at PT. Bank Sumut Binjai Branch.

Keywords: System Information Credit Rule-Based System, UML, Customer Status

1. Introduction

The rapid development of information technology has brought about significant changes in the banking world. Previously manual business processes are now shifting to digital systems to improve efficiency, speed, and accuracy of service. One area most impacted by this development is credit management. Credit is a core banking service, widely used by the public for both consumer and productive purposes. Therefore, accurately determining credit status, such as current, under special attention, or non-performing, is crucial for maintaining the quality of a bank's portfolio and minimizing the risk of loss [1].

Studies conducted by several researchers indicate that many financial institutions still face challenges in managing credit data due to unintegrated manual systems. Research by Annisa (2020) confirms that manual credit assessment processes often result in analysis delays, human error , and low credit decision accuracy. Meanwhile, research by Putri (2021) highlights the importance of implementing web- based information systems to facilitate data verification and credit monitoring, enabling automated, real-time processing.

Furthermore, other research by Libres et al. (2022) and Rahmadani (2023) shows that the development of rule-based systems can be used to support the decision-making process, as these systems are able to assess customer status based on predetermined rules or criteria. With these systems, banks can detect non-performing loans early, improve data accuracy, and reduce reliance on manual analysis. Meanwhile, Nasution (2024) emphasizes that the integration of information technology and bank internal controls is a strategic step in maintaining asset quality and increasing transparency and accountability in credit management [2].

PT. Bank Sumut Binjai Branch as a regional financial institution has a strategic role in supporting the economic development of the community, particularly through the distribution of credit such as People's Business Credit (KUR) and Multi-Purpose Credit (KMG). Based on the results of observations, the process of assessing credit

smoothness at Bank Sumut is still carried out manually, so it takes a long time and risks causing inaccuracy in determining customer status. This condition can be overcome by the development of a Rule-Based Credit Information System that can assist officers in determining credit smoothness status automatically based on certain parameters, for example, late payments within a certain number of days [3].

With this rule-based information system, it is hoped that the credit analysis process at PT. Bank Sumut Binjai Branch will be faster, more accurate, and more consistent. Furthermore, this system can also assist management in *monitoring*, decision-making, and early prevention of potential bad debts.

1.1 Theoretical Basis

Contains a literature review used as a basis for developing a *rule-based credit information system* . These theories provide a conceptual understanding of information systems, credit processes, *rule-based methods* , system modeling using UML, and the application of databases and the PHP programming language, which are the main components in system design.

1) Information Systems

An information system is a combination of technology, data, procedures, and people that functions to manage and present information in an integrated manner. The implementation of information systems helps improve work efficiency and decision-making accuracy [4]. In this study, an information system was used to automate the customer credit status assessment process to make it faster, more accurate, and more consistent at PT. Bank Sumut, Binjai Branch.

2) Customer Credit and Credit Status

Credit is a financing facility provided by banks to customers based on a specific agreement and must be repaid within the agreed timeframe. According to Law Number 10 of 1998 concerning Banking, credit is a bank's primary activity in supporting the community's economy. Proper credit management helps banks mitigate risk and maintain financing quality. Customer credit status is classified as current, under special mention, and non-performing based on the level of payment fluency [5].

3) Rule - Based System

A rule-based system is an artificial intelligence method that uses "IF-THEN" logic to generate decisions automatically based on predetermined rules [6]. According to previous research, this system is able to mimic human thinking in solving problems quickly and consistently. The advantage of a rule-based system lies in its ability to explain the basis of decisions taken and minimize human error [7]. In this study, the Rule-Based method was used to determine customer credit status based on late payment parameters at Bank Sumut, Binjai Branch.

4) Unified Modeling Language (UML)

The Unified Modeling Language (UML) is a modeling language used to visualize and design the structure and behavior of software systems. UML helps developers describe the relationships between processes and interactions between users and the system through various types of diagrams, such as Use Case Diagrams, Activity Diagrams, Class Diagrams , and Sequence Diagrams [8]. In this study, UML was used to model the customer credit status assessment process to make the system design more structured and easier to understand.

5) Database and MySQL

A database is a collection of interrelated data that is structured and managed for easy access and updating. According to previous research, a database management system functions to efficiently organize and maintain data. Structured Query Language (SQL) is used as the standard language for creating, displaying, and modifying data [9].

DOI: https://doi.org/10.31004/riggs.v4i4.4953

One implementation is MySQL, a relational database management system developed by MySQL AB and now managed by Oracle Corporation . In this study, MySQL was used to store customer data, loans, and credit assessment rules [10].

6) PHP Programming Language

PHP (Hypertext Preprocessor) is a web-based programming language used to build dynamic and interactive applications. PHP is a server-side programming language combined with HTML to create dynamic web displays and can connect to databases such as MySQL. PHP processes data, displays information according to user requests, and facilitates the development of web-based systems. In this study, PHP was used to implement rule-based logic to automatically determine customer credit status [11].

Based on the theoretical description above, it can be concluded that the implementation of a *rule-based information system* supported by UML, MySQL, and PHP can improve the speed, accuracy, and consistency of customer credit assessment processes. All of the theories used serve as the conceptual foundation for designing and implementing a credit information system at PT. Bank Sumut, Binjai Branch.

2. Research Method

Study This use method Rule-Based System in design System Information Credit Web -based at PT. Bank Sumut Binjai Branch. This method implemented for designing capable system determine credit status and conditions payment customers in a way automatic based on rules that have been established. Rules the used by all actor system, namely customers, officers credit (admin), and supervisor, according to with right respective access. Approach Rule-Based System is selected Because capable imitate the process of taking decision officer credit in a way logical , consistent , and objective in monitor credit and payment status installments customers [12].

2.1. Data Collection Technique

Data used in study This obtained from two sources, namely:

1) Primary data, in the form of results interviews and observations direct with officer part credit of PT. Bank Sumut Binjai Branch related to the management process credit, payment installments, as well as credit status determination customers.
2) Secondary data, in the form of books, journals scientific, documents supporters and references from the internet related with system information credit and methods Rule-Based System.

2.2. Approach Study

Approach study focused on design system with apply method Rule-Based System for support the process of determining credit status and information payment customers. Rules arranged use IF–THEN logic and implemented in the system web -based that can accessed by customers, officers credit (admin), and supervisor. Stages method Rule -Based System used in study This is as following:

1) Knowledge Acquisition

Stage This aim for gather related knowledge and rules with management credit and payments installments customer. Knowledge obtained through interview with officer credit and observation running system. Information collected includes credit status customers (active, pending, and paid), payment data installments, as well as progress payments displayed on the system [13].

2) Knowledge Representation

Knowledge that has been obtained represented in form rule IF–THEN logic so that it can processed by the system. Rules This become base system in displays credit status and information payment to all over actor system. One of the example rules applied is as following:

DOI: https://doi.org/10.31004/riggs.v4i4.4953

IF credit status = Active AND total payment < total credit

THEN credit status = Active and progress payment displayed

IF credit status = Active AND payment done in accordance timetable

THEN description payment = Normal Payment

IF credit status = Pending

THEN credit waiting for further process

IF total payment = total credit

THEN credit status = Paid off

Rule the used by the system For display credit status information to customers, as well as for credit monitoring by officers credit (admin) and supervisor.

3) Inference Engine

Machine inference match credit and payment data customers with IF–THEN rules stored in the knowledge base. If the condition rule fulfilled, system produce decision in the form of credit status, information payments and progress installments in a way automatic.

4) Knowledge Based

Knowledge base keep all over IF–THEN rules and supporting data used by the system. Knowledge base This saved in a MySQL database containing customer data, credit data, payment data installments, and credit status [14].

5) Working Memory

Working memory temporarily store data in the form of credit status, total loan, total payment, and progress installments used system during the matching process rule ongoing.

6) Rule Execution and Implementation System

Based on rules are met, the system execute decisions and display them on the interface system. Customer can view credit status and information payment, officer credit (admin) can view and monitor credit status active customers, while supervisors can carry out overall monitoring credit through status and progress display payment [15].

With Thus, the stages Rule- Based *System* applied to research This expected capable produce system credit status assessment accurate, consistent and appropriate customer service with policy of PT. Bank Sumut Binjai Branch.

3. Results and Discussions

The results of the research are based on a logical sequence to form a story. The contents show facts/data. Can use Tables and Numbers but do not repeat the same data in pictures, tables, and text. To further clarify the description, can use subtitles.

Discussion is the basic explanation, relationship, and generalization shown by the results. The description answers a research question. If there are any dubious results then show them objectively.

DOI: https://doi.org/10.31004/riggs.v4i4.4953

3.1. System Design

The design of the Rule-Based Credit Information System at PT. Bank Sumut Binjai Branch is represented using a Use Case Diagram. The Use Case Diagram is utilized to illustrate the main functions of the system and to describe the interactions between users and the system in performing credit-related processes. Through this diagram, the overall functional flow of the system can be clearly understood, including the roles of each user and the services provided by the system. Although other UML diagrams are commonly used in system design, this research focuses only on the Use Case Diagram in order to emphasize the functional workflow and simplify the discussion of the proposed system.

Based on the Use Case Diagram, the system involves three main actors: Credit Officers, Supervisors, and Customers. Credit Officers manage customer, credit, and installment data, monitor credit status, and generate reports. Supervisors monitor credit activities and review reports, while customers access information related to installment status and payment history. This diagram illustrates role-based system interactions that support effective credit management at PT. Bank Sumut Binjai Branch.

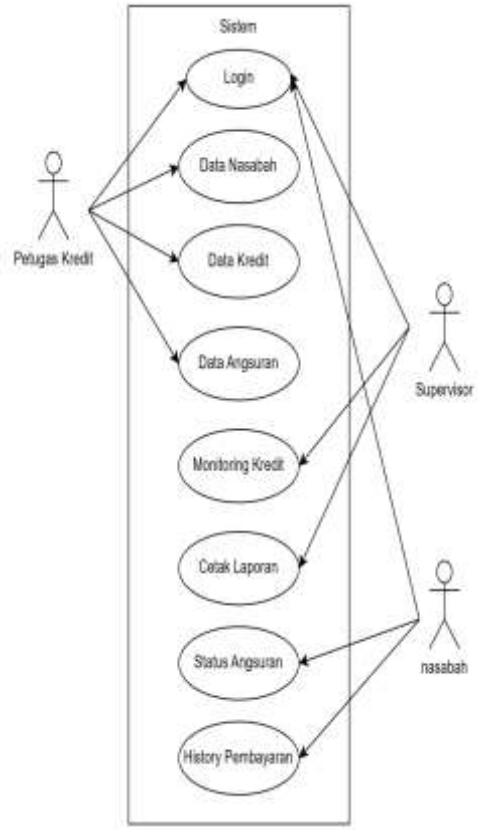

Figure 1 Use Case Diagram describes interaction between Officer Credit, Supervisor, and Customer with System Information Credit.

3.2. System Implementation

Based on design the system that has been explained through UML diagrams, then done stage implementation system. Implementation This realized in form System Information Credit web- based that integrates rule evaluation credits and features that have been designed, so that system can used in a way directly by the user in accordance with their respective functions.

1) Appearance *Login* Users

Appearance *login* users used For access system by three type user, namely Admin (Officer Credit), Supervisor, and Customer.

DOI: https://doi.org/10.31004/riggs.v4i4.4953

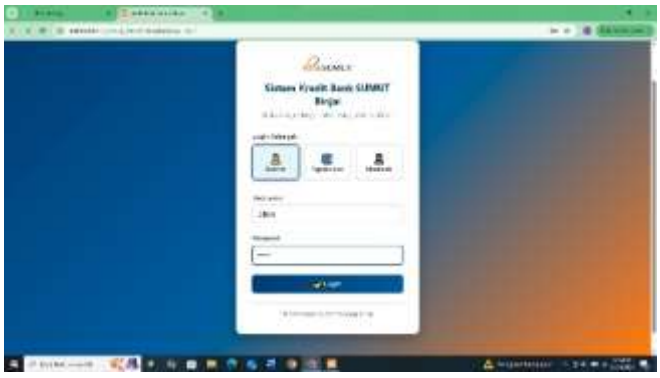

Figure 2 Login Page Users display interface login used for authentication process users before enter to the main menu in accordance right their respective access.

2) Admin Page View (Officer Credit)

Appearance admin page is used by officers credit as center data management, namely customer data, credit and payments which become base implementation Rule-Based System in credit status determination customers.

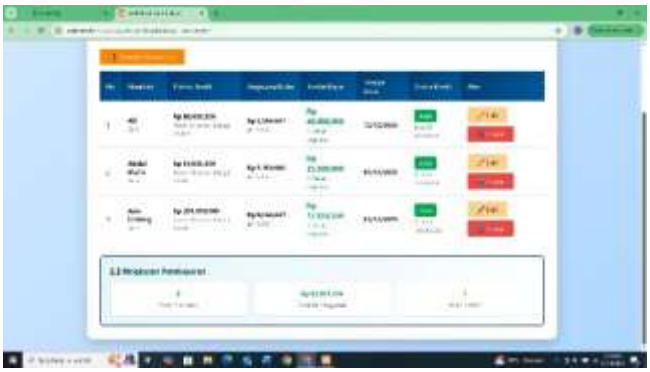

Figure 3 Payment Page Installments used as base implementation Rule-Based System. Payment data is entered on the page This processed by the system For determine credit status customers in a way automatic.

3) Supervisor Page View

Appearance supervisor page used For monitor and evaluate condition credit customers based on results processing system rule-based. Supervisor does not input data, but rather use page This as a control and retrieval medium decision managerial.

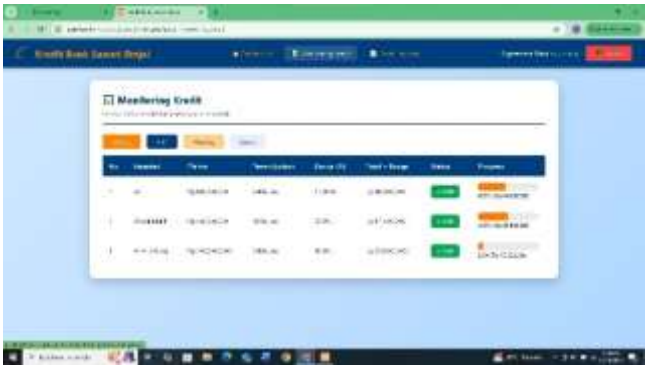

Figure 4 Monitoring Page Credits used by the Supervisor for see condition credit customers based on the status generated by the system rule-based that is active, pending, and paid.

DOI: https://doi.org/10.31004/riggs.v4i4.4953

Figure 5 Pages Print Credit Report as output system rule-based that Supervisors use to needs evaluation and decision making decision.

4) Customer Page View

Appearance page customers used by customers For see information credit and installments based on results processing system. Customer No can change the data, but only see results decision defined system use approach Rule-Based System (results evaluation IF–THEN rule).

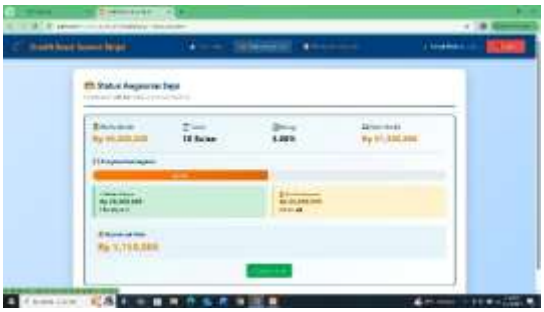

Figure 6 Information Page Credit and Installment Status which is obtained customers as results evaluation system rule-based on payment data.

Figure 7 Pages of Payment History Installments that works as supporting data in the process of determining credit status by the system rule-based.

Based on results design and implementation, System Information Credit Rule- Based capable determine credit status customers in a way automatic and consistent through implementation IF–THEN rule. System This support credit monitoring, transparency information, as well as assist the retrieval process decision at PT. Bank Sumut Binjai Branch.

4. Conclusion

System Information Credit Based Rule-Based designed at PT. Bank Sumut Binjai Branch capable determine credit status customers in a way automatic, fast, and accurate through implementation IF–THEN rule. System This reduce dependence on manual processes as well minimize error in determining credit status, with support UML design that makes flow and structure system more clear. In addition, the system This make it easier officer credit in data monitoring, assisting supervisors in monitoring and evaluation credit, as well as give transparency information to

DOI: https://doi.org/10.31004/riggs.v4i4.4953

customers. With Thus, the implementation system This can increase efficiency management credit and support taking more decisions consistent at PT. Bank Sumut Binjai Branch.

Reference

[1] Arafat, M., Trimarsiah, Y., & Hendy, S. (2022). Rancang Bangun Sistem Informasi Pemesanan Online Percetakan Sriwijaya Multi Grafika Berbasis Website. *JURNAL INTECH*, *3*(2), 6–11. https://doi.org/https://doi.org/10.54895/intech.v3i2.1691

[2] Arujisaputra, E. T. (2025). Penerapan Sistem Informasi untuk Meningkatkan Efisiensi Operasional dan Pengambilan Keputusan di Perusahaan. *Journal Scientific of Mandalika (Jsm)*, *6*(3), 700–709. https://doi.org/https://doi.org/10.36312/10.36312/vol6iss3pp700-709

[3] Bahri, S. (2020). RANCANG BANGUN SISTEM INFORMASI BERBASIS WEB PADA TEACHING FACTORY BAKERY SMK PUTRA ANDA BINJAI. *Jurnal Informatika : Fakultas Sains Dan Teknologi*, *8*(3), 95–100. https://doi.org/https://doi.org/10.36987/informatika.v8i3.1820

[4] Budiman, M., Usman, & Ilyas. (2020). SISTEM INFORMASI MANAJEMEN KREDIT BERBASIS WEB PADA BANK PERKREDITAN RAKYAT GEMILANG TEMBILAHAN. *Jurnal Perangkat Lunak*, *2*(3), 123–129. https://doi.org/https://doi.org/10.32520/jupel.v2i3.1154

[5] Firdaus, Saputra, A., & Putri, D. E. (2024). Pengembangan Sistem Informasi Pengajuan Kredit Berbasis Website. *INNOVATIVE: Journal Of Social Science Research Volume*, *4*(3), 18182–18192. https://doi.org/https://doi.org/10.31004/innovative.v4i3.12708

[6] Fordiana Ekawati. (2025). PERANCANGAN PROSES BISNIS UNTUK PERSETUJUAN KREDIT MENGGUNAKAN METODE DESIGN SCIENCE RESEARCH PROCESS (DSRP) BERBASIS MOBILE. *Jurnal Pajak Dan Bisnis*, *6*(1), 181–193. https://doi.org/https://doi.org/10.55336/jpb.v6i1.294

[7] Herman, Z. M., & Ma, H. (2025). Perancangan Aplikasi Pengelolaan Sistem Layanan Informasi Keuangan (SLIK) pada Bank BPR Nusamba Singaparna Berbasis Website. *Jurnal Penelitian Inovatif (JUPIN)*, *5*(2), 1773–1786. https://doi.org/https://doi.org/10.54082/jupin.1496

[8] Hidayat, M. K., Priyanti, E., Putri, D., & Ardianto, R. (2022). *Sistem Manajemen Basis Data*. ISBN 978-623-6433-75-1

[9] Juanda, R., & Yadi, I. Z. (2020). Penerapan Rule Based Dengan Algoritma Viterbi Untuk Deteksi Kesalahan Huruf Kapital Pada Karya Ilmiah. *Journal of Computer and Information Systems Ampera*, *1*(1), 53–62. https://doi.org/https://doi.org/10.51519/journalcisa.v1i1.5

[10] Manongga, J. (2025). Peranan sistem informasi akuntansi dalam menunjang efektivitas pengendalian internal pemberian kredit di PT. Bank Sulutgo Cabang Airmadidi. *Manajemen Bisnis Dan Keuangan Korporat*, *3*(1), 229–244. https://doi.org/https://doi.org/10.58784/mbkk.313

[11] Nistrina, K., & Sahidah, L. (2022). UNIFIED MODELLING LANGUAGE (UML) UNTUK PERANCANGAN SISTEM INFORMASI PENERIMAAN SISWA BARU DI SMK MARGA INSAN KAMIL. *Jurnal Sistem Informasi, J-SIKA*, *04*(01), 17–23. https://doi.org/https://ejournal.unibba.ac.id/index.php/j-sika/article/view/839

[12] Purba, I. G., & Sipahutar, A. (2022). Pengaturan pemberian kredit pada dunia perbankan di indonesia. *JURNAL NORMATIF FAKULTAS HUKUM UNIVERSITAS AL AZHAR*, *2*(2), 203–211. https://doi.org/https://doi.org/10.54123/jn.v2i2.230

[13] Saputra, F., Handoko, R. M., Putra, W., Priskila, R., Raya, U. P., & Informatika, T. (2024). Chatbot Berbasis Whatsapp Teknik Informatika Universitas Palangkaraya : Rules Based System. *Jurnal Teknlogi Informatika Dan Komputer MH. Thamrin*, *10*(1), 300–312. https://doi.org/https://doi.org/10.37012/jtik.v10i1.2111

[14] Sunarto, R. M., Crisvin, Sudiyono, Y., & Suwita, J. (2025). OPTIMALISASI PENENTUAN JURUSAN CALON MAHASISWA DENGAN SIREJU: SISTEM PENDUKUNG KEPUTUSAN RULE-BASED BERBASIS GOOGLE WORKSPACE DI UNIPI. *Jurnal IPSIKOM*, *13*(1), 76–86. https://doi.org/https://doi.org/10.58217/ipsikom.v13i1.54

[15] Wulandari, P., Suherman, A., Noor, I., Program, S., Accounting, O., Sukabumi, M., & Kredit, A. (2025). PENERAPAN SISTEM INFORMASI AKUNTANSI DALAM PROSES ANALISIS KREDIT SEBAGAI UPAYA MENCEGAH KREDIT MACET (Studi Kasus Bank bjb KCP Jampangkulon). *Jurnal Masharif Al-Syariah: Jurnal Ekonomi Dan Perbankan Syariah*, *10*(204), 1378–1399. https://doi.org/https://doi.org/10.30651/jms.v10i2.26348

DOI: https://doi.org/10.31004/riggs.v4i4.4953