An Internship Report

on

Process Mining Virtual Internship

Submitted in partial fulfilment of the requirements

for the award of the degree of

BACHELOR OF TECHNOLOGY

in

Computer Science and Engineering (Data Science)

by

V. Neeraja **214G1A3267**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

(DATA SCIENCE)

SRINIVASA RAMANUJAN INSTITUTE OF TECHNOLOGY

(AUTONOMOUS)

(Affiliated to JNTUA, accredited by NAAC with 'A' Grade, Approved by AICTE, New Delhi & Accredited by NBA (EEE, ECE & CSE))

Rotarypuram village, B K Samudram Mandal, Ananthapuramu-515701.

2023 – 2024

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Certificate

This is to certify that the internship report entitled "Process Mining" is the bonafide work carried out by **V.NEERAJA** bearing Roll Number 214G1A3267 in partial fulfilment of the requirements for the award of the degree of **Bachelor of Technology in Computer Science and Engineering (Data Science)** for three months from May 2023 to July 2023.

Internship Coordinator

Mr. P. Veera Prakash, M. Tech., (Ph.D.),
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Head of the Department

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Associate Professor

Date:

EXTERNAL EXAMINER

Place: Ananthapuramu

PREFACE

Brief overview of the company's history:

Celonis was founded in 2011 by Alex Rinke, Bastian Nominacher, and Martin Klenk as a spin-off from the Technical University of Munich (TUM). In 2012, Celonis joined the SAP Startup Focus program, an accelerator for analytics startups building new applications on the SAP HANA platform.

In July 2015, Celonis signed a reseller agreement with SAP. Celonis has since been offered by SAP as Celonis Process Mining by SAP.Celonis was the first company from the SAP Startup Focus program to sign a reseller agreement with SAP.[11

Company's Mission Statement:

Celonis helps companies reveal and fix inefficiencies they can't see, enabling them to perform at levels they never thought possible. Celonis is on a timeless mission to help companies improve efficiency (and reduce waste) by providing a modern way to run business processes entirely on data and intelligence.

Business Activities: Common business processes include **Purchase-to-Pay (P2P), Order-to-Cash (O2C)** or **Customer Service processes,** for instance.

- Accounts Payable processes
- Accounts Receivable processes
- Procurement Processes
- Order Management processes
- Inventory Management processes

ACKNOWLEDGEMENT

The satisfaction and euphoria that accompany the successful completion of any task would be incomplete without the mention of people who made it possible, whose constant guidance and encouragement crowned our efforts with success. It is a pleasant aspect that I have now the opportunity to express my gratitude for all of them.

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I also express our sincere thanks to the Management for providing excellent facilities and support**.**

Finally, I wish to convey my gratitude to my family who fostered all the requirements and facilities that I need.

V. Neeraja
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INDEX

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AI	Artificial Intelligence
BPM	Business Process Management
CRM	Customer Relationship Management
EMS	Execution Management System
ERP	Enterprise Resources Planning
ID	Identity Document
IT	Information Technology
KPI	Key Performance Indicator
ML	Machine Language
OLAP	Online Analytical Processing
PQL	Process Query Language
ROI	Return On Investment
SCM	Supply Chain Management
SQL	Structure Query Language
SaaS	Software as a Service
XES	Extensible Event Stream
XML	Extensible Mark-up Language

CHAPTER – 1
INTRODUCTION

Process mining is a family of techniques relating the fields of data science and process management to support the analysis of operational processes based on event logs. The goal of process mining is to turn event data into insights and actions. Process mining is an integral part of data science, fields by the availability of event data and the desire to improve processes. Process mining techniques use event data to show what people, machines, and organizations are really doing. Process mining provides novel insights that can be used to identify the execution paths taken by operational processes and address their performance and compliance problems.

Process mining is a technique designed to discover, monitor and improve real processes (i.e., not assumed processes) by extracting readily available knowledge from the event logs of information systems. Process Mining offers a data-driven and therefore more objective and holistic approach to understanding business processes.

As a result, Process Mining has come to dominate a large majority of operational excellence, automation and digitalization ambitions within industry. Process Mining is the leading new technology when it comes to talking about algorithmic businesses - in other words, businesses that use algorithms and large amounts of real-time data to create business value. This has only become possible through the advent of information systems and administrative tools (e.g. Enterprise Resource Planning or Customer Relationship Management systems) which provide a good data source for process analytics.

Process Mining is a solution to costly and time-intense efforts to get data-driven insights into a business, as acknowledged by the industry research firm Gartner.

Process mining focuses on different perspectives, such as control-flow, organizational, case, and time. While much of the work around process mining focuses on the sequence of activities i.e. control-flow the other perspectives also provide valuable information for management teams. Organizational perspectives can surface the various resources within a process, such as individual job roles or departments, and the time perspective can demonstrate bottlenecks by measuring the processing time of different events within a process.

Process mining should be viewed as a bridge between data science and process science. Process mining focuses on transforming event log into a meaningful representation of the process which can lead to the formation of several data science and machine learning related problems.

Types of process mining

Discovery: Process discovery uses event log data to create a process model without outside influence. Under this classification, no previous process models would exist to inform the development of a new process model. This type of process mining is the most widely adopted.

Conformance: Conformance checking confirms if the intended process model is reflected in practice. This type of process mining compares a process description to an existing process model based on its event log data, identifying any deviations from the intended model.

Enhancement: This type of process mining has also been referred to as extension, organizational mining, or performance mining. In this class of process mining, additional information is used to improve an existing process model. For example, the output of conformance checking can assist in identifying bottlenecks within a process model, allowing managers to optimize an existing process.

Process mining includes:

- Automated process discovery (extracting process models from an event log)
- Conformance checking (monitoring deviations by comparing model and log)
- Social network/organizational mining
- Automated construction of simulation models
- Model extension
- Model repair
- Case prediction
- History-based recommendations

Process Mining Software: Process mining software helps organizations analyze and visualize their business processes based on data extracted from various sources, such as transaction logs or event data. This software can identify patterns, bottlenecks, and inefficiencies within a process, enabling organizations to improve their operational efficiency, reduce costs, and enhance their customer experience.

In March 2023 The Analytics Insight Magazine identified top 5 process mining software companies for 2023:

1. Celonis
2. UiPath Process Mining
3. SAP Signavio Process Intelligence
4. Software AG ARIS Process Mining
5. ABBYY Timeline

Process Mining Enters the Business World

Since then, these ideas and the academic concepts behind Process Mining have bridged the gap to enter the business world. A variety of software vendors have ventured into the market and even expanded its capability from analytics to business execution**.** They achieve this through stronger operational links to automation frameworks and IT source systems which allow daily users to receive prompts and take direct action to improve processes.

One very recent example of this is the creation of the new Execution Management Software category by software vendor Celonis.

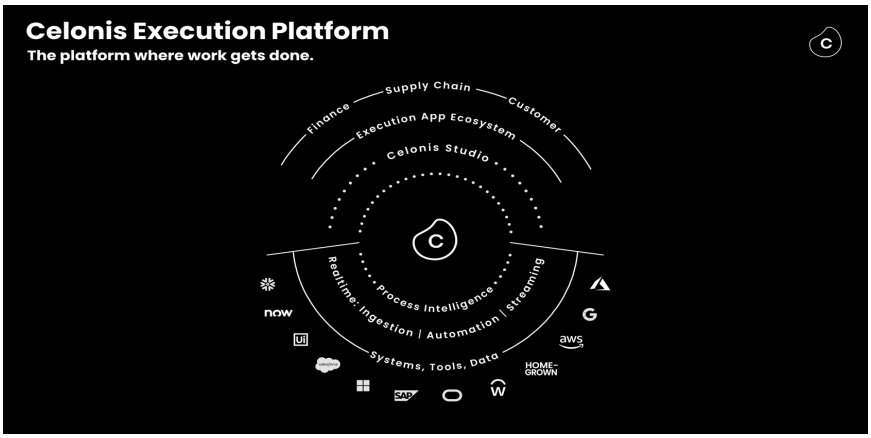

Fig. No. 1.1: Celonis Execution Platform

Theoretical Foundations: Process Mining is the combination of two disciplines: Data Science and Business Process Management. Process Mining essentially uses Data Science techniques, such as Big Data and AI, to address Process Science problems such as process improvement and automation (cf. van der Aalst 2016).

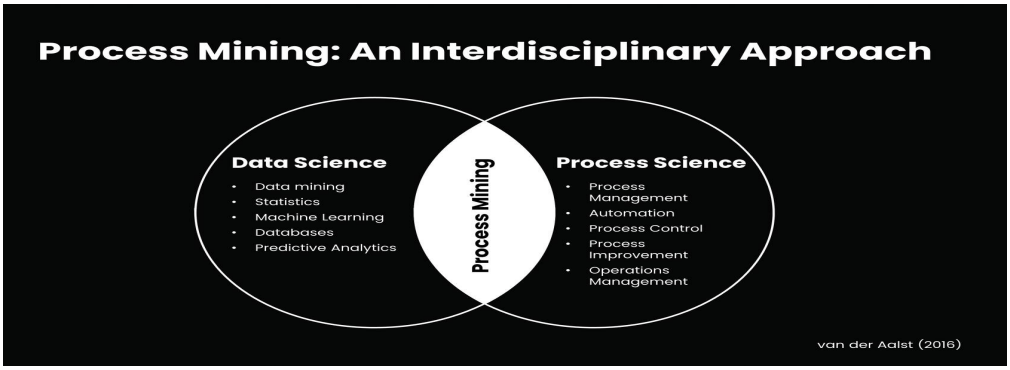

Fig.No.1.2: Process Mining –An interdisciplinary Approach

Why is process mining important?

Increasing sales isn't the only way to generate revenue. Six sigma and lean methodologies also demonstrate how the reduction of operational costs can also increase your return-on-investment (ROI). Process mining helps businesses reduce these costs by quantifying the inefficiencies in their operational models, allowing leaders to make objective decisions about resource allocation. The discovery of these bottlenecks can not only reduce costs and expedite process improvement, but it can also drive more innovation, quality, and better customer retention. However, since process mining is still a relatively new discipline, it still has some hurdles to overcome. Some of those challenges include:

- **Data Quality:** Finding, merging and cleaning data is usually required to enable process mining. Data might be distributed over various data sources. It can also be incomplete or contain different labels or levels of granularity. Accounting for these differences will be important to the information that a process model yields.
- **Concept drift:** Sometimes processes change as they are being analysed, resulting in concept drift.

Event log: Event Logs are the format in which we can retrieve our digital footprints from the underlying IT systems. They're essentially the log books that IT systems keep to record what events take place for each Case ID and at what time. The Event Log information can be retrieved from several types of IT systems such as Enterprise Resource Planning (ERP), Supply Chain Management (SCM) or Customer Relationship Management (CRM) systems. These systems typically generate and store Event Log information in real time.

- **Case ID**: a unique identifier such as a purchase order item, invoice number or order number
- **Activity**: the description of what has happened - for example, the creation of a purchase order or the receipt of goods
- **Timestamp**: the date and time that the activity took place

With these data points, you can reconstruct a process flow for a particular Case ID and aggregate the information across all Case IDs.

CHAPTER – 2

FOUNDATION OF PROCESS MINING

Process Mining Fundamentals

The Following are Modules included:

1. Review and Interpret Analyses:

- Get to Know Celonis Analysis
- Navigate to an Analysis
- Use the Variant Explorer
- Use the Process Explorer
- Use Charts and Tables, Review KPIs
- Use Selection Views
- Use the Case Explorer
- Use the Conformance Checker
- Save and Share Analysis Selection, Export Data
- Wrap-up: Review and Interpret Analyses

2. Build Analyses:

- Get Ready to Build Analysis
- Create the Analysis Asset
- Add the First Analysis Sheet and Publish
- Configure Tables and Charts in Analysis
- Configure Single KPI, Selection & Design Component
- Configure Standard Process KPIs in the Visual Editor
- Configure Custom KPIs in the Visual Editor
- Configure a Conformance Checker Sheet
- Create Background Filters in Analyses
- Create Dynamic Analyses Wrap-up: Build Analyses

Review and Interpret Analyses:

When interacting with the dynamic visual representation and drilldown tools such as tables and charts, one can take an exploratory approach or a confirmatory approach.

- **Exploratory approach:**

An exploratory approach is one where you simply explore the data and see what value opportunities jump out at you. You're diving into the data without specific expectations and with an open mind. Analysis tools such as the Process Explorer, the Variant Explorer, and the Conformance checker are ideal for this.

- **Confirmatory approach:**

With the confirmatory approach, you're examining the data to see if it confirms or denies a hypothesis. Using your Celonis Analysis, specifically by filtering on attributes and using drilldown tables, you can find out whether the data confirms or denies that these perceived pain points exist and have a significant impact.

Beyond uncovering inefficiencies and their root causes using Celonis Analysis, our customers choose to use Celonis tools such as Action Flows (process automation) and Celonis Apps to maximize their organization's performance capacity. In this sense, they don't stop at Process Mining and leverage all that the Celonis Execution Management System (EMS) has to offer.

Process, activity and case :

- **Activity:** Events that take place during a process
- **Case:** An item or object you follow through the process
- **Process:** A series of linked steps taken in order to achieve a particular goal

What Is Variant Explorer?

Variant Explorer allows the user to explore his process based on the end to end variants.Variant Explorer is a Celonis EMS Analysis tool that helps you explore how a specific process flows through your organization. Using Variant Explorer, you can see the individual activities within each process variant and the frequency of each variant (based on number of cases). You can also compare variants to each other and see metrics for individual variants, such as Activity Frequency and Throughput Time.

Switch between Case Frequency and Activity Frequency KPIs

The Case Frequency KPI reflects the number of unique cases associated with an activity or connection. In a single variant, naturally, the number is the same across the activities and connections.

When looking at a variant, sometimes you want to know if a case went through an activity two or more times in its process journey (also called “rework”). This usually reflects an undesired flow of the process. If you switch to the Activity Frequency KPI, you'll see if there's been rework.

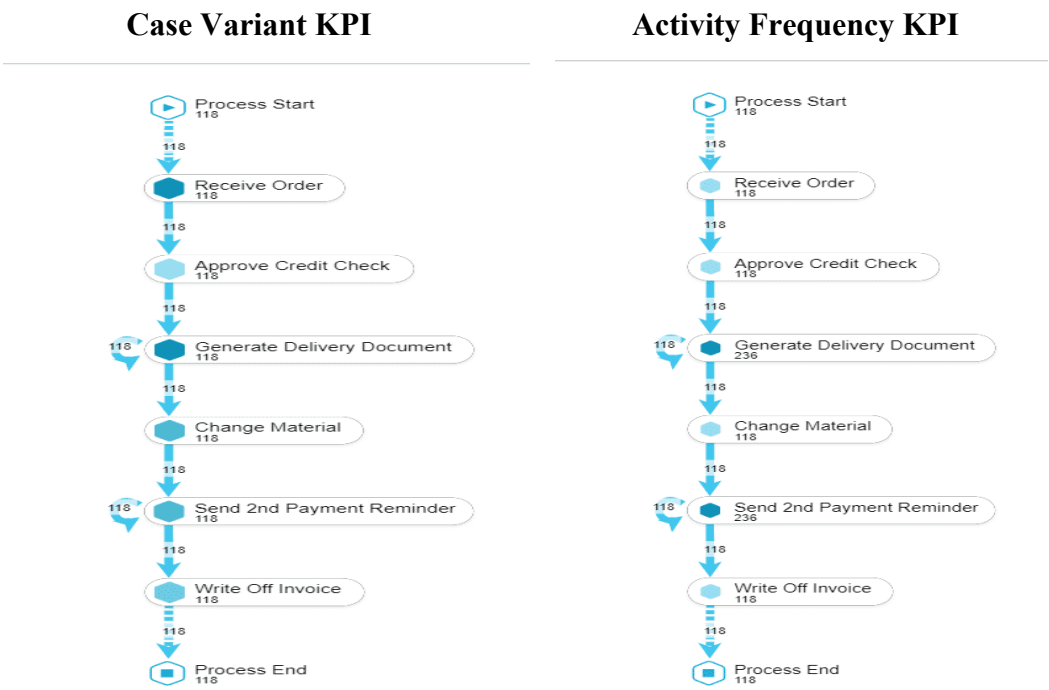

Fig. No. 2.1: Case Variant KPI and Activity Frequency KPI

Process Explorer:

The Process Explorer is another analysis tool to use when taking an exploratory approach. It's especially useful for quickly revealing activities beyond the most common ones. It also allows you to narrow your focus on a single activity.

Use Charts and Tables, Review KPIs :

- A dimension is a category of attributes; for example, the dimension "customer name" is a category for individual customer names. Other examples of dimensions, depending on the nature of the process, can include vendor name, sales organization, region, and material group.
- Key Performance Indicators (KPIs**)** are used to calculate and add aggregated values; for example, case count, order value, invoice value, throughput time, and automation rate.

- Charts and tables display a combination of dimensions and KPIs, providing us meaningful process details to help us understand how the process is performing. Additionally, in combination with the Variant and Process Explorers, charts and tables enable us to identify root causes of process inefficiencies.

1. Attribute selection allows you to select based on single values from the tables in your data model.
2. Activity selection allows you to select cases based on the activities they flow through, start, or end with.
3. The process flow selection allows you to select cases based on their process flow.

Case Explorer: The Case Explorer can also be used for single-case analysis once you have narrowed down your analysis to a few extreme cases. Additionally, if you're involved with process and data validation when a new process is brought on, you'll most likely end up using the Case Explorer.

The Case Explorer is useful once you've narrowed down the analysis to a few cases that you want to investigate further.

What is the Conformance checker?

Every organization has an optimal process in mind that they want to achieve. With the conformance checker, you can see how far away the organization is from reaching that goal and investigate common patterns for inefficiency. the Conformance checker **t**o complement your efforts in interacting with the analysis visualizations and charts and tables.

Analysis includes seven types of visual design components. With these components, you can enhance the user interface of the analysis, guide users' eyes in a certain direction, and enhance their experience interpreting the analysis.

Design Components:

- Variable input
- Button
- Button Dropdown
- Text Component
- Image

- Line
- Logo

In the Code Editor, you can write PQL syntax to build any kind of KPI you want. PQL, short for Process Query Language, is a Celonis proprietary language. The syntax of PQL is very close to the SQL standard. PQL is simpler and specialized for process-related queries.

Why Apply Background Filters

It's true that analysis users can apply filters when interacting with components and one of six Selection Views. But as the analysis builder, you might want to set background filters that are applied before the end user begins their analysis. For example, you might want to remove certain data from the Analysis due to privacy reasons. End users cannot remove these background filters.

Background filters can be applied at three levels:

- A component (such as a Process Explorer or an OLAP Table)
- A sheet
- The entire Analysis

PQL Syntax for Background Filters

To apply static background filters, we use PQL (Process Query Language). PQL is a Celonis proprietary language. The syntax of PQL is very close to the SQL standard. PQL is simpler and specialized for process-related queries.

CHAPTER – 3

THE RISING STAR PROGRAM

Select your pathway and continue your journey!

Fig. No. 3.1: Various Rising Star Pathways

What is the Celonis Rising Stars Program?

The Celonis Rising Stars Program is a unique learning experience designed for university and college students who are interested in learning the skills and knowledge necessary for a career in process mining and execution management.

A collaboration of Celonis Academy and the Celonis Academic Alliance, the Rising Stars Program is a new Academic Learning Journey consisting of individual courses and training tracks assembled into four paths.

Students begin their Rising Star journey by learning the basics of process mining with the Introduction to Process Mining course. Next, they will deepen their understanding of process mining and Celonis EMS with the Process Mining Fundamentals training track.

Pathway to Rising Business Star: This path contains the Deliver Business Value with Celonis and the Create and Deliver Demos training tracks. The two tracks are designed for people interested in roles such as Process Manager and Process Analyst. After completing the path, learners should be able to frame value by identifying improvement opportunities, develop an action plan to make process improvements, develop and deliver a business value oriented demo and use the various Demo creation tools available in Celonis.

Pathway to Rising Technical Star: This path includes the Write PQL Queries and Get Data into the EMS training tracks. These tracks are designed for roles such as

Process Mining Engineer and Process Mining Architect. After completing the material in this path, learners have a solid grasp of PQL (Process Query Language), be able to create static background filters, compare attributes with benchmarking analysis sheets, configure drill down tables and ingest data into Celonis EMS.

Pathway to Rising Automation Star: This path consists of the Automation Bootcamp course and Build Action Flows training track. The material in this path is designed for people interested in roles such as Process Improvement Manager and Process Automation Manager. After completing the material in this path, students should understand the basics of business process automation and its link to process mining, know how Celonis automation tools can be applied to real-world business scenarios and be able to create automation scenarios using Make or Celonis Action Flows.

Pathway to Rising Research Star: This path consists of the Process Mining: From There to Execution training track and is taught by Professor Wil van der Aalst, Chief Scientist of Celonis and a full professor at RWTH Aachen University. He is regarded by many as the godfather of process mining. After completing the material in this path, learners should have a solid theoretical and academic foundation in process mining, understand the practical application of process mining with real business cases, understand the key process discovery and conformance checking algorithms, and understand how comparative and predictive process mining techniques organizations use to perform root cause analysis of performance and compliances issues.

Rising Star Path Ways	Business	Technical	Automation	Research
Module 1	Deliver Business Value with Celonis	Write PQL Queries	Process Automation Basics	Process Mining: From Theory to Execution
Module 2	Create and Deliver Demos	Get Data into the EMS	Process Automation Concepts	
Module 3			Build Action Flows	

Table 3.1 : Different Modules in Different Rising Star Path Way

CHAPTER - 4

Process Mining Applications and Real Time Example

Applications of Process Mining:

Financial services, telecommunications, healthcare, and retail are just a few examples of industries where process mining can be used for business process management and process improvement. These sectors have a wealth of data that can be used as a starting point, and process deviations from their intended behaviour can have expensive repercussions.

1. **Financial Services:**

   Because of the rise in transaction volume and the digitization of more industries, aberrant activity is harder to detect using manual methods. Companies in the financial services sector have the chance to continually and thoroughly identify issues within high-volume processes thanks to process mining, which is a solution to the increased regulatory and audit requirements.

2. **Telecommunications:**

   As subscriber quantities increase and activations become more and more automated, there is a greater danger of unsuccessful activations. When telecom companies get more orders, process mining gives them the chance to identify pricey issues and client blowback in their Order-to-Activation processes.

3. **Healthcare:**

   The risks associated with preserving population health and achieving individual patient journey objectives rise as data about patient experiences and results keep growing. Process mining supports the delivery of effective and high-quality end-to-end patient journeys for healthcare organizations dealing with the exponential growth of data, from before a first doctor appointment through treatment regimens to closed treatment cases.

4. **Retail:**

   Due to technology or process problems, retail businesses have seen expensive consumer fallout from complicated e-commerce operations. Process mining assists

merchants in ensuring that consumers can complete transactions efficiently and without issues despite rising transaction volumes.

5. **Digital Transformation:**

Process mining is frequently used in larger-scale digital transformation initiatives because it can give you the precise insights needed for process improvement, allowing systems to run more quickly, smoothly, and efficiently, as well as objective data-driven insights into the causes of delays and inefficiencies within business processes.

Real Time example of Process Mining

Process mining is a data-driven approach for discovering and analyzing business processes. It looks for event logs in IT systems and uses this data much like a digital fingerprint to create a visual representation of each process and workflow. This allows businesses to gain insight into their operations and identify areas where they can improve efficiency.

CaseID	Activity	Timestamp	
1	Loan Application Submitted	8:20 AM	1/1/20
1	Credit Report Requested	8:30 AM	1/1/20
1	Income Verification Requested	8:45 AM	1/1/20
1	Loan Approved	9:15 AM	1/1/20
1	Loan Disbursement	9:30 AM	1/1/20
2	Loan Application Submitted	9:15 AM	1/2/20
2	Credit Report Requested	9:30 AM	1/2/20
2	Income Verification Requested	9:45 AM	1/2/20
2	Loan Denied	10:15 AM	1/2/20
3	Loan Application Submitted	10:20 AM	1/3/20
3	Credit Report Requested	10:30 AM	1/3/20
3	Income Verification Requested	10:45 AM	1/3/20
3	Income Verification Requested	10:45 AM	1/3/20

Fig.No.4.1: Simplified example of event logs in a mortgage loan data set

Process mining is not a new technology. It originates in the field of data science and can be simply thought of as the application of data mining techniques to business process management. Thanks to significant investments and technological advancements such as artificial intelligence (AI) we have seen a rapid expansion of different kinds of processes mining software companies.

How can process mining help banks and financial services companies?

Banking, financial services and insurance (BFSI) are known for being highly complex business sectors where competitive advantage can come from achieving operational excellence in relatively repetitive but service-intensive processes. This makes them ideal candidates for process mining.

Process mining can be used to analyze any financial processes and identify areas for improvement and automation in a data-driven way. For example, an insurance firm can use process mining in improving the claims process, a mortgage lender can use process mining across the loan approvals process, or an institutional lender can use process mining to help with reporting and audit processes.

Key benefits of process mining in financial services

Process mining can help most financial services to improve efficiency and reduce costs to better serve the needs of their customers. Some key benefits for banks and financial institutions include:

- Discover and remove costly process bottlenecks.
- Automatically detect fraudulent transactions.
- Manage regulatory and compliance risk.
- Identify automation or standardization opportunities.
- Improve customer satisfaction and customer experience.

Case Study: improving mortgage loan approvals with process mining

Let's look at an example of how process mining can be used to improve home loan approvals in consumer banking. By analyzing data from existing loan applications, a financial institution can identify areas where the process is slow or inefficient and make changes to streamline it.

Examples of mortgage loan processes that can be mined

1. **Loan origination** - steps taken by a new borrower to apply for a loan and for processing the loan application.
2. **Loan processing** - tasks preparing the loan application for underwriting.

3. **Loan underwriting** - credit review, risk assessment and verification of eligibility for loan.
4. **Loan closing** - executing the mortgage loan application and contract.
5. **Loan servicing** - managing the scheduling, notifications and payments of loans.

For example, they may find that mortgage loan applications are taking too long to process, or that certain documents are being requested unnecessarily, leading to long average cycle times. For mortgage lenders, slowness in processing new loan applications can lead to higher fallout rates as customers may go for faster alternatives.

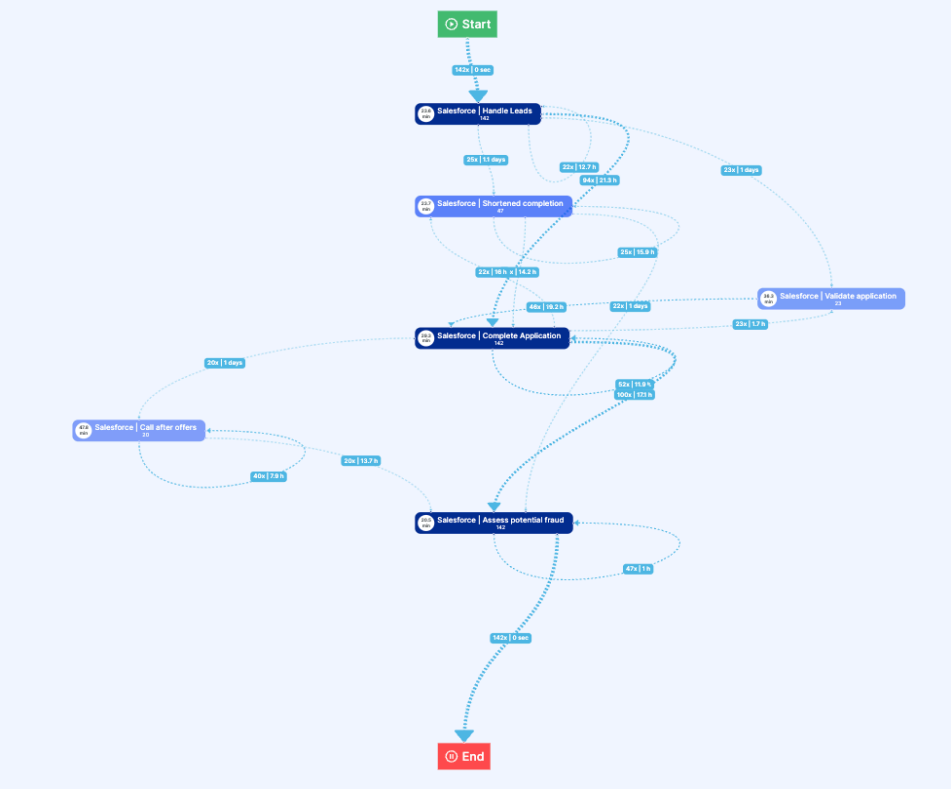

Fig.No.4.2: Mortgage application process variants within Salesforce CRM

By making changes such as automating certain parts of the workflow or removing unnecessary steps, the organization can speed up loan approvals, maximize pull-through rates and improve customer service.

Limitations of process mining in financial services

While conventional process mining has proven benefits to BFSI companies it has one major limitation. Many financial processes and workflows extend beyond the core

ERP or CRM solutions. Think, for example, of the various business applications that are used to support case handling, such as Microsoft Excel for reporting, Adobe PDF for contracts and various cloud-based credit risk databases. In most cases, process mining is limited to the availability of event logs and each business application needs to be integrated separately.

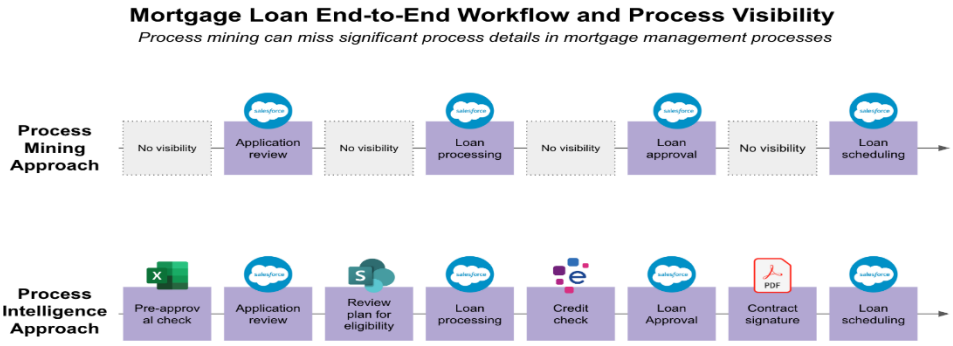

Fig. No. 4.3: Mortgage Loan End-to-End Workflow and process Visibility

The key alternative to process mining is hybrid process intelligence software such as Workfellow. Hybrid process intelligence utilizes artificial intelligence to create generative event logs for all of your tasks and processes - providing you a truly 360 degree view on financial processes. The key benefit of hybrid process intelligence is that you get to track all the tasks, workflows and activities across all your business applications, and not just your ERP or CRM system event logs.

Conclusion

Process mining is a powerful data science technique that can help organizations in the finance industry to gain insight into their processes and identify areas for improvement. It can be used to identify bottlenecks in processes such as loan approvals, uncover discrepancies between internal processes and external regulations, and detect fraudulent activities.

One alternative to process mining solutions is process intelligence software, which gives you a more detailed end-to-end view of your workflows and IT systems. By using process mining or process intelligence, organizations can streamline their processes and improve efficiency, ultimately leading to better customer service and higher profits.

CHAPTER - 5

Process Mining –Use cases And Its Stages

What makes good process mining software?

There are over 35 different process mining solutions available in the market catering to different types of organizations and clients. No matter what your specific needs, it's good to keep in mind some key areas to consider:

- **Ease of use** - process mining software doesn't need to be difficult to use. Seek screenshots or a product demonstration to see if it looks easy to use or navigate.
- **Configurability** - some process mining solutions only cater to specific use cases or require significant effort to configure or integrate with different source systems.
- **Analytics and reporting** - if you're looking for enterprise-grade process mining, you're likely to need advanced and trustworthy analytics and reporting capabilities.
- **End-to-end visibility (E2E)** - as more work is digitalized, you need full E2E visibility of the full process journey across different tools and systems.
- **Level of support** - whether you are a first-time process analyst or an experienced process architect you'll likely have different needs for support and onboarding.
- **Total cost of ownership** - process mining solutions come in a variety of costs and service levels. It's smart to consider the total cost of ownership including the implementation cost as well as the cost of running ongoing process analytics.

Process mining use cases

Process mining techniques have been used to improve process flows across a wide variety of industries. Since process maps highlight the key performance indicators (KPIs) which impact performance, they have spurred businesses to re-examine their operational inefficiencies. Some use cases include:

- **Education:** Process mining can help identify effective course curriculums by monitoring and evaluating student performance and behaviours, such as how much time a student spends viewing class materials.

- **Finance:** Financial institutions have used process mining software to improve inter-organizational processes, audit accounts, increase income, and broaden its customer base.

- **Public works:** Process mining has been used to streamline the invoice process for public works projects, which involve various stakeholders, such as construction companies, cleaning businesses, and environmental bureaus**.**

- **Software Development:** Since engineering processes are typically disorganized, process mining can help to identify a clearly documented process. It can also help IT administrators monitor the process, allowing them to verify that the system is running as expected.

- **Healthcare**: Process mining provides recommendations for reducing the treatment processing time of patients.

- **E-Commerce**: It can provide insight into buyer behaviours and provide accurate recommendations to increase sales.

- **Manufacturing**: Process mining can help to assign the appropriate resources depending on case—i.e. product—attributes, allowing managers to transform their business operations. They can gain insight into production times and reallocate resources, such as storage space, machines, or workers, accordingly.

What to consider when choosing process mining tools

When selecting process mining software, there are several key considerations that should be taken into account.

Scope of analysis: The software should be able to provide a comprehensive analysis of the process data, making use of both current and historical data.

Granularity of insights: The process mining tool should also be able to provide accurate insights into inefficiencies and bottlenecks, and provide an easy-to-use interface that makes it simple to identify and assess new and existing processes.
Integration needs: Many process mining solutions require access to event logs from

different source systems. If you have a fragmented enterprise software landscape you'll need to consider how much integration effort will be required to data mine key processes.

On-premise or cloud: While many process mining software solutions are today offered as software-as-a-service (SaaS) some organizations may require on-premise solutions.

Total cost of ownership: While every organization will have different resources to implement a process mining tool, you should consider the total cost of implementation including both the price and resources required to achieve results.

Main stages of process mining

As people (and software) interact with business IT systems, their actions are captured by these systems and can then be transformed into event logs and visualized with the help of process mining. That's how it happens.

1. The activity or interaction with the system takes place, creating a digital record. Some examples of such activities are receiving an order, submitting a piece of documentation, approving a loan, entering information into a health record, etc.
2. Process mining software transforms the digital records into event logs**.** The most common format for these event logs is an XML-based format XES (eXtensible Event Stream).
3. The visualization of a process is automatically created using event logs. It's important to understand that unlike traditional BPM techniques, process mining shows the real process as it's actually done, not the ideal model as it was meant to be.
4. Process analytics takes place. Here, KPIs can be created and monitored to uncover potential improvement areas; data mining and/or ML algorithms can be used to detect hidden patterns and dependencies; or conformance checking techniques can be applied to compare the process to a certain ideal mode.

CHAPTER -6

OUTCOMES

After you complete this training, you should be able to:

▪ Understand what process mining is and the basics of how it works.

▪ Summarize what an event log is and why we need it for processing.

▪ Identify business use cases for process mining.

▪ Learn how to find training courses to get started.

▪ Understand how to discover, analyses, and improve business process using data driven techniques.

▪ Will learn to extract insights from event logs, identify bottlenecks, inefficiencies, and opportunities for optimization.

▪ And also, you will learn to extract to create visual representations of processes to aid decision making and process improvement efforts.

▪ You will gain skills in using process mining tools and interpreting the results to enhance organizational efficiency and effectiveness.

Conclusion

Process mining is a powerful data science technique that can help organizations in the finance industry to gain insight into their processes and identify areas for improvement. It can be used to identify bottlenecks in processes such as loan approvals, uncover discrepancies between internal processes and external regulations, and detect fraudulent activities.

One alternative to process mining solutions is process intelligence software, which gives you a more detailed end-to-end view of your workflows and IT systems. By using process mining or process intelligence, organizations can streamline their processes and improve efficiency, ultimately leading to better customer service and higher profits.

Process Mining is a holistic, bottom-up approach to process excellence that builds on the principles of continuous improvement such as Six Sigma while advancing the technologies used to achieve it, such as AI, automation, and BI analytics. In process mining, event data in the company's IT systems (such as ERP, CRM, and BPM) is used to gain insights into the company's business processes. Insights are provided by automatically visualizing data with process flow diagrams and creating analytics that provide information on required improvements and deepen the understanding of what is happening in the business processes. That is why Process Mining is now an indispensable component of any Automation and Digitization Strategy.