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

B RISHITHA (214G1A3286)

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 virtual internship" is the bonafide work carried out by **B RISHITHA** Roll Number 214G1A3286 in partial fulfilment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering (Data Science)**from May 2023 to July 2023.

Internship Coordinator

Mr. P. Veera Prakash, M. Tech., (Ph.D.),
Assistant Professor & HOD of CSE

Head of the Department

Dr. P. Chitralingappa, M. Tech., Ph.D.,
Associate Professor

Date:

Place: Ananthapuramu

EXTERNAL EXAMINER

PREFACE

In today's fast-paced and technology-driven world, businesses are constantly seeking ways to optimize their operations and enhance their efficiency. **Process mining** has emerged as a powerful tool that allows organizations to gain unprecedented insights into their processes, identify bottlenecks, streamline workflows, and make data-driven decisions. With the increasing demand for process optimization, understanding how to leverage process mining tools effectively has become a valuable skill for professionals across various industries.

The primary objective of this report is to document the key insights, experiences, and outcomes of the **Process Mining virtual internship**. It chronicles the journey from the initial exploration of process mining concepts to the final application of process analysis within a virtual business environment. The report delves into the various stages of the internship, highlighting the theoretical foundations, hands-on exercises, challenges faced, and the strategies employed to overcome them.

It is important to note that the content of this report is based on the knowledge and experiences gained up from **May 2023** to **July 2023**. As the field of process mining is constantly evolving, new developments and advancements may have occurred since that time. Nonetheless, the report encapsulates the core principles and methodologies that are fundamental to understanding and engaging with process mining concepts.

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.

It is with immense pleasure that I would like to express my indebted gratitude to my internship coordinator **Mr. P. Veera Prakash, Assistant Professor & HOD, Department of Computer Science and Engineering**, who has supported me a lot and encouraged me in every step of the internship work. I thank him for the stimulating support, constant encouragement and constructive criticism which have made possible to bring out this internship work.

I am very much thankful to **Dr. P. Chitralingappa, Associate Professor & HOD, Computer Science and Engineering (Data Science),** for his kind support and for providing necessary facilities to carry out the work.

I wish to convey my special thanks to **Dr. G. Balakrishna, Principal** of **Srinivasa Ramanujan Institute of Technology** for giving the required information in doing my internship. Not to forget, I thank all other faculty and non-teaching staff, and my friends who had directly or indirectly helped and supported me in completing my internship in time.

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.

B RISHITHA

(214G1A3286)

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LIST OF ABBREVIATIONS

PQL	Process Query Language
EMS	Event Management System
ERP	Enterprise Resource Planning
SCM	Supply Chain Management
CRM	Customer Relation Management
BPMN	Business Process Model and Notation
RPA	Robotic process automation

CHAPTER -1

Introduction To Process Mining

What is a Process?

● A process is very simply a series of linked or steps taken in order to resolve a ticket.

● For sales, it could be the steps to progress an opportunity from a lead to closure.

● Take order management, for example. This could be the steps from a customer ordering goods, to you shipping, and then ultimately getting paid for them.

Process Mining from Scientific Perspective

- 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

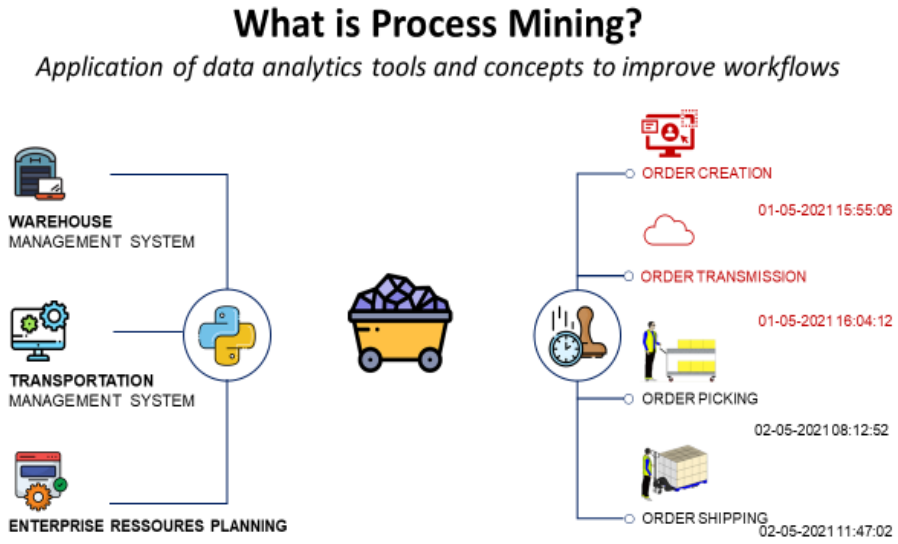


Fig 1.1: Example of Process Mining

CHAPTER-2

Celonis Academy and Process Mining

➢ 2.1 Overview of Celonis & it's expertise

Celonis expertise in process mining, coupled with its commitment to education and skill development through the Celonis Academy, makes the Process Mining Virtual Internship a transformative learning experience. By leveraging cutting-edge technology, real-world case studies, and a collaborative learning environment, participants are poised to emerge with a profound understanding of process optimization and the tools to drive operational excellence in their respective domains.

➢ 2.2 Why is process mining important?

Process mining leverages advanced algorithms to create transparency into current business processes, helping organizations to streamline and improve on them. It quickly uncovers valuable insights that can improve productivity, and ultimately illuminates the opportunities in your core business processes that will have the biggest impact on your customers and your bottom line.

For the opportunities impacting your business, process mining can be used to examine three major types of key performance indicators (KPIs):

- **Time KPIs**: How long does it take to complete a particular process?
- **Cost KPIs**: How much does it cost to complete a particular process?
- **Quality KPIs**: Does the outcome of this process meet established criteria?

Process mining has a significant advantage over more traditional "as-is" analysis — and that's its ability to access real-time event data. What's more, process mining also looks at historical data, with an ability to closely examine a series of event logs to achieve an in-depth understanding of what's going on — a stark contrast to the slow and manual heavy duty data infrastructure previously used to conduct the same calculations. Rather than relying on traditional data infrastructure to analyze transactions,since process mining can surface what is currently happening.

NOTE: Process Mining, now recognized by analysts as one of the most exciting new software categories. This report gives you a comprehensional introduction to theoretical and applied foundations of Process mining

Fig 2.1: Importance of Process Mining

Chapter 3

Internship Program overview

➢ 3.1 Learning objectives of Process Mining

The main objective of process mining techniques is to extract an unambiguous process model from event logs and then bridge the gap between traditional simulated model-based process analysis and data-oriented analysis techniques, such as machine learning and data mining.

➢ 3.2 Benefits of participating in the internship

Participating in a Celonis process mining virtual internship can offer several significant benefits that can enhance your knowledge, skills, and professional prospects.

- **Hands-On Experience with Industry-leading software:** By participating in the internship, you gain hands-on experience with this powerful tool, which is widely used by organizations to analyse, optimize, and automate their business processes. This experience can be a valuable addition to your skill set and make you more competitive in the job market.

- **Practical Process Mining Skills:** Through the internship, you'll learn how to apply process mining techniques to real-world business datasets. You'll gain insights into how processes operate, identify inefficiencies, and compliance issues, and propose data-driven solutions for process improvement.

- **Networking Opportunities:** Internships often provide opportunities to interact with professionals, mentors, and fellow interns within the organization or industry. Engaging with individuals who have experience in process mining and related fields can expand your professional network, open doors to potential job opportunities, and expose you to different perspectives on process optimization.

- **Resume Enhancement:** Having a Celonis process mining internship on your resume demonstrates your commitment to learning and your practical exposure to cutting-edge technology. This experience can capture the attention of potential employers, showcasing your ability to apply process mining concepts to real-world scenarios and adding credibility to your profile.

- **Industry Relevant Insights:** Working with Celonis can give you insights into how process mining is applied across various industries, such as manufacturing, healthcare, finance, and more. This exposure can help you understand the diverse challenges and opportunities that different sectors face, making you a well-rounded professional capable of adapting your skills to different contexts.

NOTE: Additionally, participating in the Celonis process mining virtual internship can provide a platform for learning about data-driven decision-making, process optimization, and digital transformation strategies that are increasingly crucial in today's business landscape.

Chapter 4

Foundations of Process Mining

➢ 4.1 Understanding Process Mining Concepts

For businesses now-a-days, it's quite hard to keep up with all the challenges. They've to deal with high cost expectations with lots of demands such as same day delivery, high transparency and highest product value etc. At the same time, they are confronted by the regular demands on the market. These challenges both on the customer and market side make it really difficult for businesses to survive in the long run.

To understand how Process Mining helps in overcoming these difficulties you have to

know what processes actually are.

Mathias Weske, professor of business process technology defines business process as a collection of related, structured activities or tasks that in a specific sequence produce a service or product.

- **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

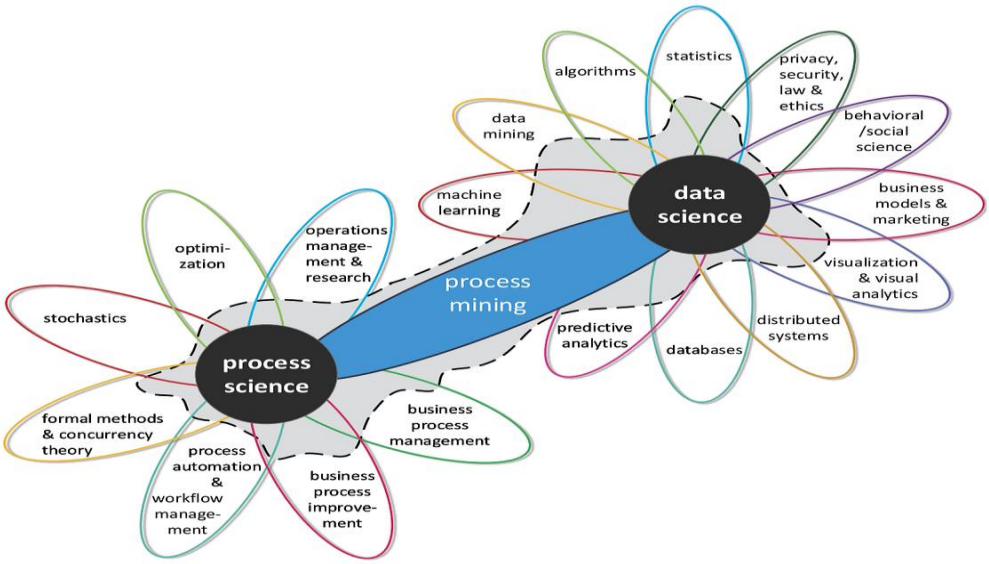


Fig 4.1: Process Mining

➢ 4.2 Importance of Digital Footprints & Event logs

The starting point of process mining is IT-based work regardless of which process or work flow you are dealing with. Any process interaction produces data that is stored to transactional systems like Oracle etc.

Independent of the system, the data always contains Three important pieces of information:

- **1. Activity:** Information about the process steps or activities that have been conducted.
- **2. Time:** Information about the points in time at which the activities were carried out.
- **3. ID:** Information about the object or id.

The combination of these three pieces is called a **Digital footprint**.

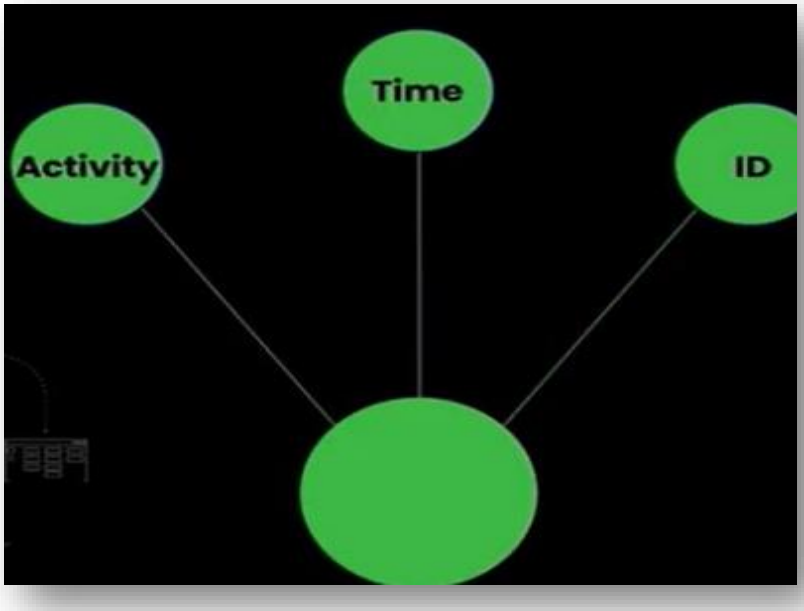
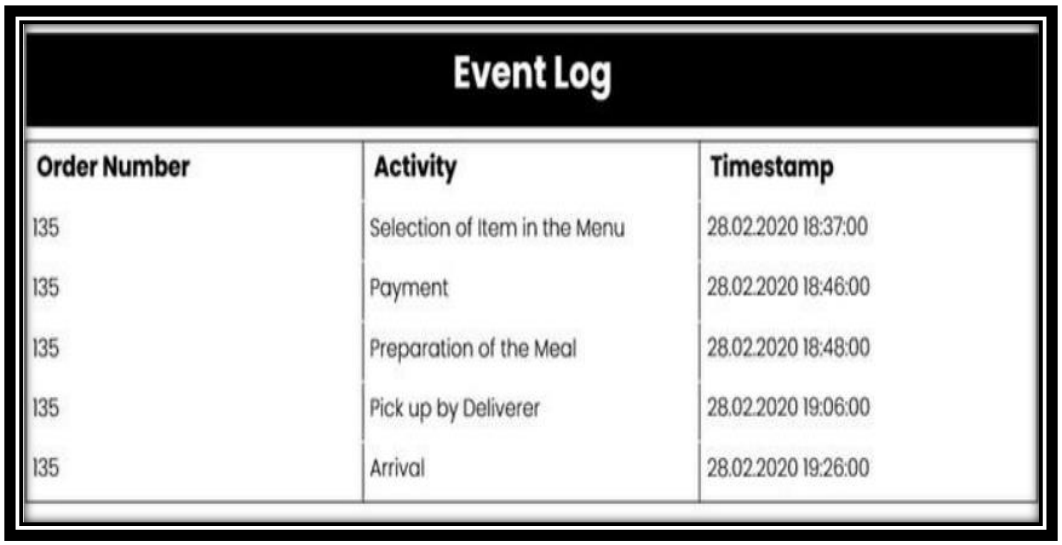


Fig 4.2: Digital Footprint

Once gathered, the process Mining technology uses these digital footprints to automatically visualize and reconstruct the process flow to get 100% transparent and object view on how process actually run.

The Event Log: Tracking the Digital Footprint

The event log is a table with three columns containing all the information from our example.



Event Log

Order Number	Activity	Timestamp
135	Selection of Item in the Menu	28.02.2020 18:37:00
135	Payment	28.02.2020 18:46:00
135	Preparation of the Meal	28.02.2020 18:48:00
135	Pick up by Deliverer	28.02.2020 19:06:00
135	Arrival	28.02.2020 19:26:00

Fig No 4.3 Event Log

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. Event Log information might also be retrieved in various situations and contexts from automated payment to customer journeys.

An Event Log contains each of the three key pieces of information that our digital footprints have:

- **A Case ID:** A unique identifier such as a purchase order item, invoice number or order number.
- **An 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.

Chapter 5

Review and Interpret Analysis

➢ 5.1 Navigate to an Analysis

- ♦ Once you want to navigate into analysis, you will find a vertical bar.
- ♦ To get familiarized with navigating to analysis you have to know space, package and asset relationship.
- ♦ It is a hierarchal relationship.
- ♦ Space contains packages and packages contains assets. In assets you will be able to find two analyses as shown in the fig.

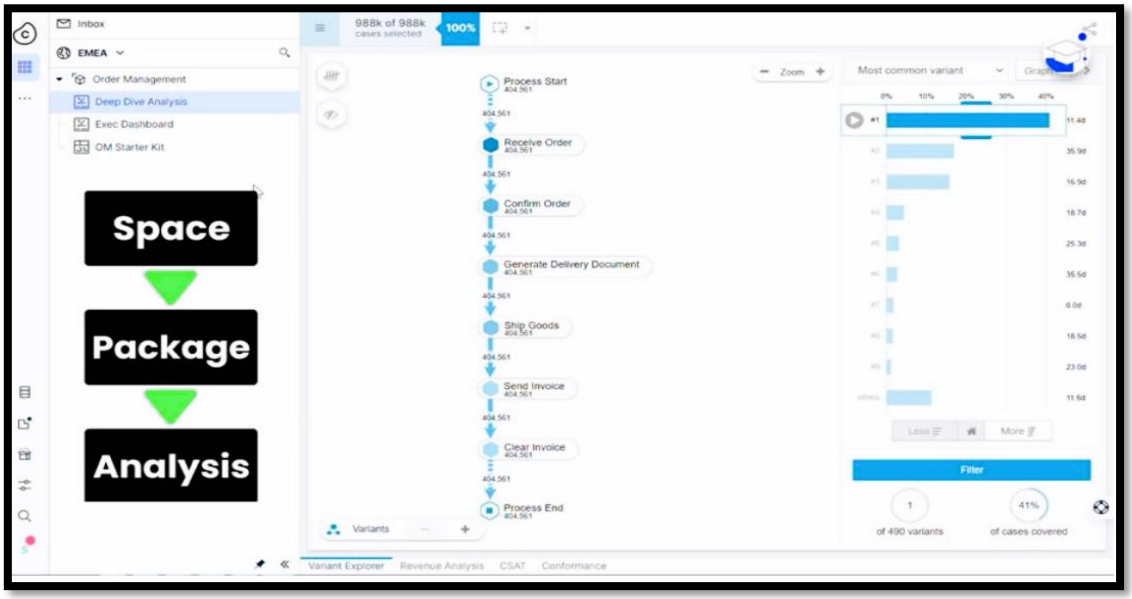


Fig 5.1: Navigate to Analysis

➢ 5.2 The Variant Explorer and The Process Explorer

In process mining, both Variant Explorer and Process Explorer are terms that refer to functionalities or tools used to analyse and visualize different aspects of process execution based on event log data.

The Variant Explorer focuses on identifying and visualizing the various process variants that exist within a dataset. A process variant represents a distinct path of activities and decisions that a process can take during execution.

The Process Explorer, on the other hand offers a more detailed view of the process's execution by focusing on individual process instances and their attributes. It helps you understand the specific details of each case as it moves through the process.

➢ 5.3 Charts and Tables

Charts and tables are powerful visual tools that can be utilized effectively in process mining to analyze and communicate insights derived from event logs. They help you present complex data in a clear and understandable manner.

When using charts and tables in process mining, it's important to choose the right type of visualization based on the specific insights you want to convey. Clear labelling, appropriate color coding, and effective data aggregation are key to ensuring that the visuals enhance the understanding of the process analysis results.

➢ 5.4 Selection views

Selection views allow you to zoom in on specific aspects of your process, which can lead to deeper insights and more targeted process improvements. Different process mining software tools offer various ways to create and manipulate these views, empowering you to tailor your analysis to the questions you need to answer or the issues you're aiming to address.

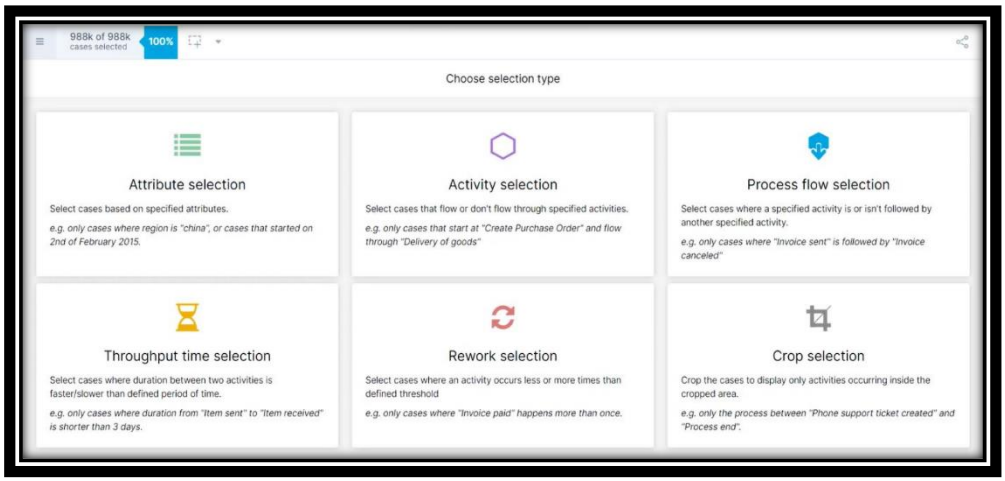


Fig 5.2: Selection views

➢ 5.5 The Case Explorer

The Case Explorer is a feature in process mining software tools that allows users to explore and analyse individual process instances or cases in detail. It provides a granular view of the activities, events, and attributes associated with a specific case, allowing for in-depth analysis and understanding of how that case traversed through the process.

Overall, the Case Explorer is a powerful tool that provides a detailed view of individual process instances, enabling you to analyse specific behaviours, identify patterns, and make informed decisions for process improvement.

➢ 5.6 The Conformance checker

The Conformance Checker is a crucial component of process mining tools that help as recorded in event logs, and the expected or predefined process model. Its primary purpose is to identify discrepancies, deviations, and non-compliance issues between the observed process behaviour and the intended process design.

The conformance checker is a valuable tool in process mining as it bridges the gap between expected and actual process behaviour, providing insights into

discrepancies and enabling organizations to align their processes with the intended design, leading to better efficiency and compliance.

➢ 5.7 Save and Share Analysis Selection

Saving and sharing process mining analyses is essential for collaboration, documentation, and knowledge dissemination within your organization. Process mining tools often offer various ways to save and share your analysis results.

Chapter 6

Rising Technical Star

Rising Technical Star in process mining refers to an individual who is gaining recognition and acclaim for their exceptional technical skills and contributions in the field of process mining.

➢ 6.1 Write PQL Queries

Celonis PQL is an integral component of the Celonis Software Architecture. All Celonis applications use this language to query data from a data model.

PQL (Process Query Language) Queries are an essential component of process mining. They allow analysts to extract valuable insights from process data.

PQL Queries enable you to explore and analyse process behaviour, identify bottlenecks, measure performance, and discover patterns within the data.

By using PQL Queries, you can ask specific questions about your process and obtain meaningful answers.

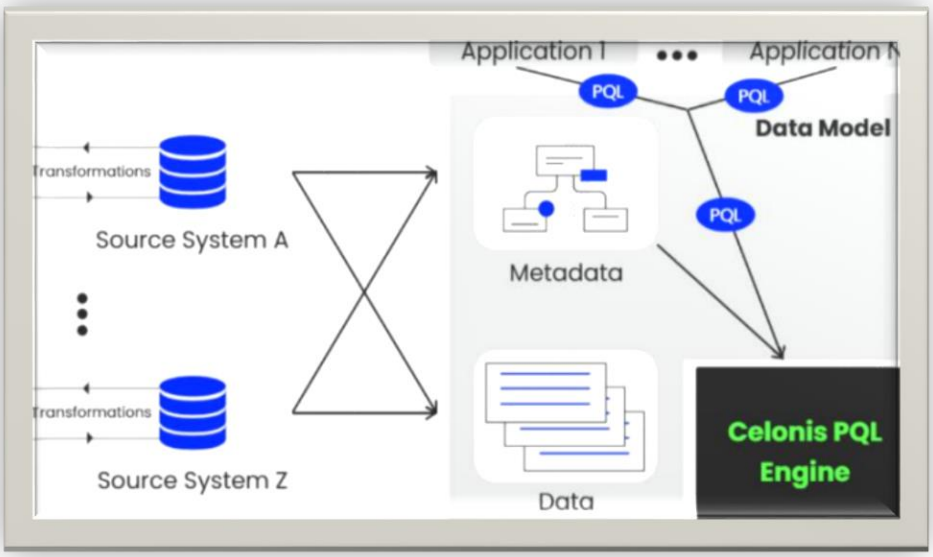


Fig 6.1: Components of Celonis Software Architecture

➢ 6.2 Get Data into the EMS

Get data into EMS involves integrating data from various sources such as ERP systems, databases, log files, and other data formats.

Process data is important because it serves as the very foundation for others to analyze and act on.

Without this data, no other activities can take place within the EMS and you won't be able to mine, improve, act on, or automate your processes.

Build and refine your data pipeline

Data Integration helps you connect to source systems, extract the relevant data, transform it to your needs, and load it into a polished Data Model.

Data Model is the fuel to all other work in your EMS.

When building the data model, you are also responsible for validation, scheduling, monitoring as well as optimizing performance.

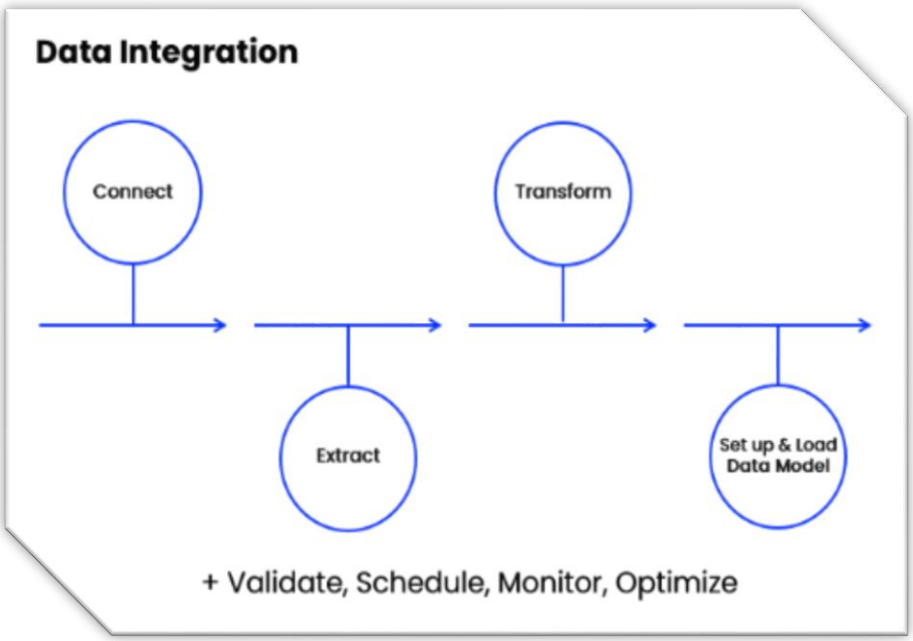


Fig 6.2: Data Integration

Chapter 7

LEARNING OUTCOMES

Upon completing this training program, you will acquire a comprehensive skill set that empowers you to excel in the realm of process mining. The program is designed to equip you with the following capabilities:

- **Understanding Process Mining:** You will gain a deep understanding of what process miningentails and the fundamental principles that underpin its functionality. By the end of the training, you will be well-versed in the mechanisms through which process mining extracts valuable insights from event logs to enhance business processes.
- **Event Log Insight:** You will grasp the significance of event logs as valuable repositories of data that encapsulate the chronology of activities within processes. You will also appreciate why these event logs are pivotal for effective process mining endeavors, providing a comprehensive understanding of process execution.
- **Business Use Case Identification:** You will learn to identify and articulate a myriad of real- world business scenarios where process mining is indispensable. From healthcare optimization to fraud detection in finance, you will be able to pinpoint opportunities where process mining can be leveraged for operational excellence.
- **Initiating Learning Pathways**: Acquiring the foundational knowledge in this training will also guide you in seeking out additional specialized courses. You will be equipped with the ability to identify appropriate training resources that facilitate your journey into process mining.
- **Discover, Analyze, and Improve Business Processes:** The training will furnish you with theskills to embark on a journey of process discovery, analysis, and improvement. You will delve into techniques that harness data-driven methodologies to extract insights from event logs, effectively identifying bottlenecks, inefficiencies, and optimization prospects.

- **Visual Representation and Decision Making:** You will develop proficiency in crafting visual representations of complex processes, a skill that significantly aids decision-making and process enhancement endeavors. These visual models serve as powerful tools in communicating insights and fostering data-driven decision making.
- **Process Mining Tool Proficiency:** By the end of the training, you will be adept in utilizing process mining tools to interpret results effectively. You will master the art of extracting actionable insights from intricate data sets, leading to heightened organizational efficiency and overall effectiveness.

In summary, this training program will empower you with a holistic understanding of process mining, ensuring your readiness to uncover hidden insights, optimize operations, and make informed decisions that steer organizations toward a future of streamlined processes and enhanced performance.

Conclusion

My internship experience with celonis has been a remarkable journey of growth, learning, and practical application of process mining concepts. Throughout this internship, I had the opportunity to immerse myself in the world of process mining, leveraging the power of celonis platform to analyze and optimize real-world business processes.

Throughout this comprehensive documentation on process mining, we've embarked on a journey through the intricacies and potential of this revolutionary approach. From understanding the foundational concepts to exploring its myriad applications, we've delved deep into the world of process mining and its profound impact on organizations across industries.

In closing, the Celonis process mining internship has been a pivotal chapter in my professional journey, equipping me with the tools and insights to thrive in the dynamic landscape of process optimization. With newfound confidence and a wealth of experiences, I eagerly anticipate applying these lessons as I embark on new challenges and contribute to the evolution of process excellence.

Certificate And Recognition

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Certificate of Virtual Internship

This is to certify that

Rishitha Bontha

Srinivasa Ramanujan Institute of Technology

has successfully completed 10 weeks

Process Mining Virtual Internship

during May - July 2023

Supported By celonis

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Student ID :STU623067db1c8f91647339483

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