

Process Mining Virtual Internship

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Course Objective

- **Skill Development:** Process mining virtual internships focus on enhancing participants' process mining skills, including data analysis, process discovery, and improvement techniques.
- **Real-World Application:** These internships provide opportunities to apply process mining skills to real or simulated datasets, enabling interns to gain practical insights into optimizing business processes.

Introduction

➤ Process mining is a data-driven approach that involves extracting insights and knowledge from event logs to understand and improve business processes. Here's an introduction to process mining in four key points:

❖ **1. Definition and Purpose:** Process mining is a set of techniques that use event logs from information systems to analyze, visualize, and improve business processes. It aims to uncover the actual flow of activities, decisions, and interactions within a process, helping organizations identify inefficiencies, bottlenecks, and opportunities for optimization.

2. Event Logs: Event logs are digital records that capture the sequence of activities, timestamps, and attributes associated with each event in a process. These logs are typically generated by information systems, such as ERP or CRM software, and contain valuable data about how processes are executed in practice.

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❖ **3. Key Techniques:** Process mining encompasses several techniques, including:

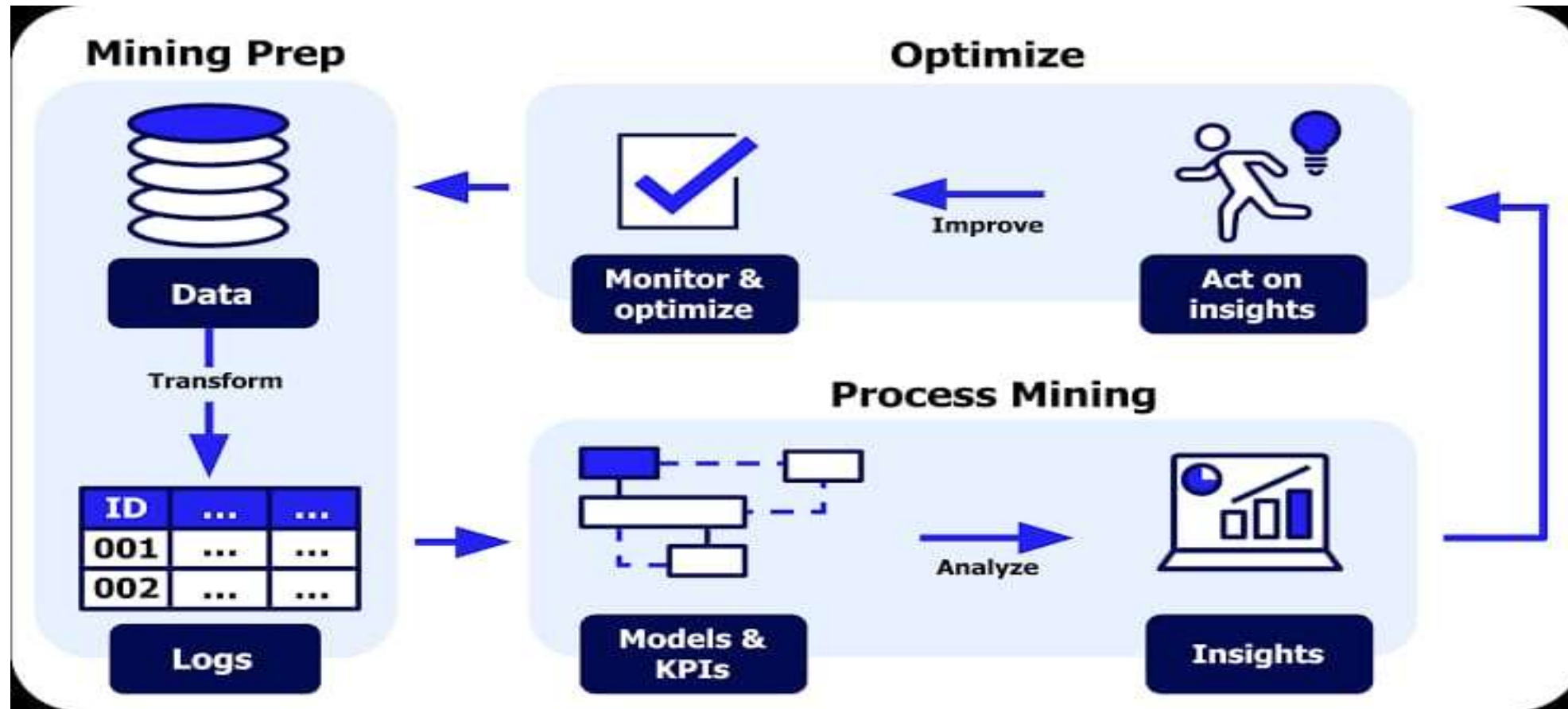
- **Discovery:** Creating visual representations (process maps) of the actual process flow based on event logs.
- **Conformance Checking:** Comparing the observed process with the intended process model to identify deviations and discrepancies.
- **Enhancement:** Suggesting process improvements by analyzing variations and inefficiencies in the process.
- **Prediction:** Forecasting future process behavior based on historical event data.
- **Automated Process Discovery:** Using algorithms to generate process models directly from event logs.

❖ **4. Benefits:** Process mining offers numerous benefits, including:

- **Transparency:** Providing a clear view of how processes are executed in reality.
- **Efficiency:** Identifying bottlenecks, redundant steps, and inefficiencies for process optimization.
- **Compliance:** Detecting deviations from prescribed processes and ensuring adherence to regulations.
- **Data-Driven Insights:** Making informed decisions based on evidence from actual process execution.
- **Continuous Improvement:** Enabling organizations to iteratively enhance their processes over time.

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How process mining works :



Technology

- **Process mining relies on a combination of technologies to extract insights from event logs and analyze business processes effectively. Here are some key technologies used in process mining:**
- **1. Event Data Handling:**
 - ❑ **Enterprise & IoT:** Collecting data from systems and IoT devices.
 - ❑ **Storage:** Efficiently managing data with databases and big data tools.
- **2. Automated Process Understanding:**
 - ❑ **Mining Algorithms:** Deriving process models from event data.
 - ❑ **Model Notations:** Using standardized notations for representation.
- **3. Visual Insights:**
 - ❑ **Mining Software:** Tools for process visualization and analysis.
 - ❑ **Custom Dashboards:** Creating tailored visuals for specific insights.

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➤ 4. Data-Driven Intelligence:

- ❑ **Predictive Models:** Forecasting future behavior using historical data.
- ❑ **AI Anomaly Detection:** Identifying anomalies through machine learning.

➤ 5. Optimization and Automation:

- ❑ **Simulation:** Testing changes and optimizations via simulations.
- ❑ **BPM Integration:** Applying insights to enhance and automate processes.

These succinct technologies drive the heart of process mining, enabling businesses to uncover valuable insights and enhance their operations.

Applications

- Process mining finds applications across various industries and domains:
 - ❑ **Supply Chain Management:** Analyzing the end-to-end supply chain process for better resource allocation and inventory management.
 - ❑ **Healthcare:** Improving patient care pathways and hospital operations.
 - ❑ **Finance:** Enhancing loan approval processes, fraud detection, and compliance monitoring.
 - ❑ **Manufacturing:** Optimizing production workflows and identifying quality control issues.
 - ❑ **Customer Service:** Streamlining customer support processes and enhancing customer experiences.

Modules

✓ **Process Mining Fundamentals**

✓ **Write PQL Queries**

✓ **Get data into the EMS**

Process Mining Fundamentals

- **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**

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➤ **Get to Know Celonis Analysis:**

- ❑ Celonis Analysis is a cutting-edge process mining platform that transforms event logs into actionable insights. It visually maps out processes, uncovers inefficiencies, and suggests optimization opportunities. By combining real-time analytics and AI-driven tools, Celonis Analysis empowers businesses to make informed decisions for process enhancement and operational excellence.

➤ **Navigate to an Analysis:**

- ❑ In process mining, analysis involves examining event logs to uncover patterns, bottlenecks, and inefficiencies within business processes. By applying techniques like process discovery and conformance checking, organizations gain actionable insights to optimize processes and drive continuous improvement. This analysis helps streamline operations and enhance overall efficiency.

➤ **Use the Variant Explorer:**

- ❑ The Variant Explorer is a pivotal process mining tool enabling dynamic analysis of process variants. Through interactive visualization and filtering, it uncovers execution deviations, aiding in optimization and informed decision-making.

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➤ Use the Process Explorer:

- ❑ Vital in process mining, it visualizes complex processes, revealing insights on flows, bottlenecks, and variations. This user-friendly tool enables efficient navigation through event data, facilitating data-driven decisions for process optimization.

➤ Use Charts and Tables, Review KPIs:

- ❑ Process mining involves visualizing data through charts and tables to review key performance indicators (KPIs). These visualizations offer insights into process efficiency, bottlenecks, and compliance, aiding data-driven decision-making. By analyzing KPIs, organizations can optimize processes and enhance overall operational performance.

➤ Use Selection Views:

- ❑ Selection views in process mining offer a focused lens to analyze specific aspects of a process. These customized visualizations enable users to zoom in on critical details, like bottlenecks or compliance issues, enhancing decision-making by highlighting key insights without overwhelming complexity. By tailoring the data presentation, selection views facilitate efficient analysis and drive targeted process improvements.

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➤ Use the Case Explorer:

- ❑ The Case Explorer in process mining software offers a detailed view of individual process instances, showcasing activities, timestamps, and attributes. This feature assists in pinpointing patterns and bottlenecks, aiding process optimization by enabling focused analysis and informed decision-making.

➤ Use the Conformance Checker:

- ❑ The Conformance Checker is a crucial process mining component that contrasts actual process execution with predefined models, uncovering variations and inefficiencies. This tool identifies bottlenecks, compliance gaps, and optimization chances, supporting streamlined workflows and data-backed enhancements for continuous process improvement.

➤ Save and Share Analysis Selection, Export Data:

- ❑ In process mining, "Save and Share Analysis Selection" allows users to preserve specific visualizations, filters, and insights for future reference or collaboration. "Export Data" enables users to extract processed event data, models, or results in various formats, facilitating further analysis or integration with other tools or systems. These features enhance collaboration and extend the utility of process mining outcomes.

Write PQL Queries

- PQL, or Process Query Language, is a language used in the field of process mining to query and analyze event data captured from business processes. PQL allows you to extract valuable insights from event logs, discover patterns, and gain a better understanding of how processes are executed. Some of the PQL queries used in process mining are:
- **1. Selecting Events:** The most basic form of a PQL query involves selecting events from your event log. Events can be filtered based on various attributes such as timestamp, activity, resource, case ID, etc.
- **2. Filtering Cases:** You can focus on specific cases by filtering based on their unique case IDs.
- **3. Aggregations and Grouping:** You can aggregate data and group events by various attributes to analyze patterns.
- **4. Temporal Patterns:** Analyzing time-related patterns is essential in process mining.
- **5. Joining Events:** You can join events from multiple logs or based on different attributes.

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- **6.Filtering with Conditions:** You can add conditions to your queries for more specific analyses.
- **7.Discovering Paths:** PQL allows you to find common paths or sequences of activities.
- **8.Analyzing Resource Utilization:** You can analyze how resources are utilized in your processes.
- **9.Combining Conditions:** You can combine multiple conditions in your queries for more complex analyses.

These are just some examples of the types of queries you can write using PQL for process mining. The specific syntax and capabilities might vary depending on the process mining tool you're using, as different tools might implement their own versions of PQL.

Celonis PQL Engine

- One of the core components of the Celonis platform is the **Process Query Language (PQL) engine**. The Celonis Process Query Language (PQL) is a proprietary query language developed by Celonis specifically for querying and analyzing event data in the context of process mining. It's designed to enable users to interact with their process data in a powerful and flexible way, allowing them to uncover insights, identify bottlenecks, discover patterns, and optimize their processes.

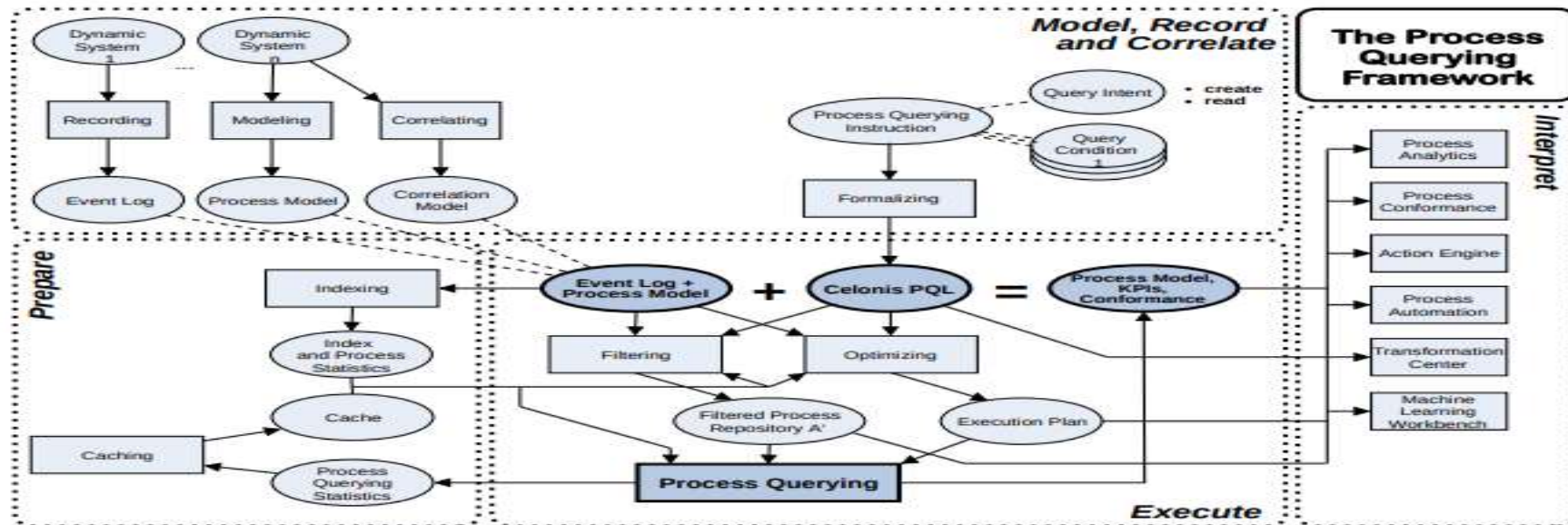


Fig: Celonis PQL in the context of the Process Querying Framework

Get Data into the EMS

- **EMS (Event Management System)** in the context of process mining usually refers to the system or software that collects, stores, and manages event data generated by various processes within an organization. This event data is then used for process analysis, optimization, and insights generation through process mining techniques.
- General process for getting data into the EMS for process mining:
- **1.Data Sources Identification:** Identify the sources from which you want to collect event data. These sources could include enterprise software systems (ERP, CRM, etc.), custom applications, sensor data, logs, and more.
- **2.Data Extraction:** Extract the relevant event data from the identified sources. This might involve querying databases, accessing APIs, or pulling data from logs.
- **3.Data Transformation:** Process the extracted data to ensure it is in a format that can be ingested by the EMS. This could involve cleaning, structuring, and enriching the data.
- **4.Data Ingestion:** Ingest the transformed data into the EMS. This might involve using APIs, batch processes, or real-time streaming depending on the capabilities of the EMS.
- **5.Data Storage:** The EMS will store the ingested data in a structured manner, usually in a database optimized for event storage.



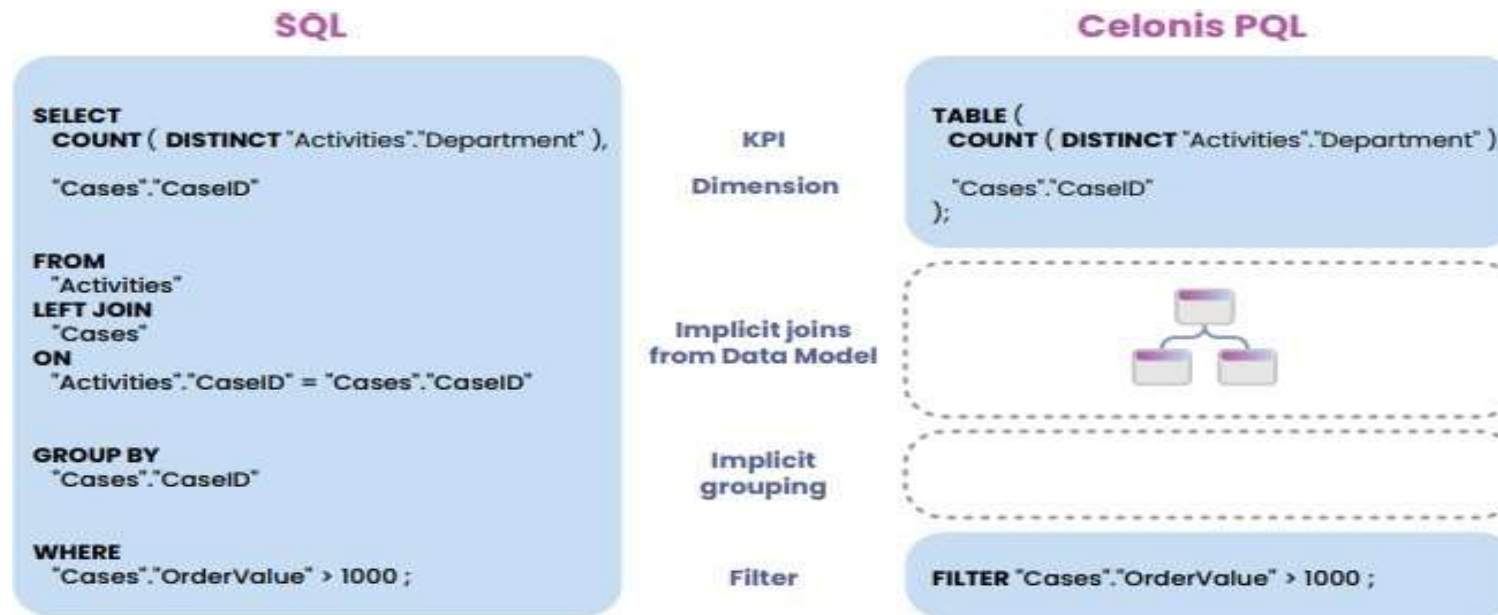
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- **6.Data Enrichment:** Sometimes, additional context needs to be added to the events to enhance their meaning. This could involve mapping codes to human-readable labels, associating resources with events, etc.
- **7.Data Indexing:** Index the data to make it searchable and accessible for querying.
- **8.Data Quality Checking:** Perform checks to ensure data integrity and accuracy.
- **9.Data Retention:** Determine how long the data will be stored in the EMS based on legal, compliance, and business requirements.
- **10.Access Control:** Implement access controls and permissions to ensure that only authorized personnel can access the event data.
- **11.Integration with Process Mining Tools:** These tools offer functionalities for analyzing and visualizing the event data to derive insights about process performance, bottlenecks, deviations, and more.
- **12.Analysis and Visualization:** Use process mining tools to create visualizations, conduct analyses, and generate insights from the event data stored in the EMS.



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- Celonis PQL provides a wide range of different operators which can be combined to answer complex business questions. The following list gives an overview of the most important classes of operators.

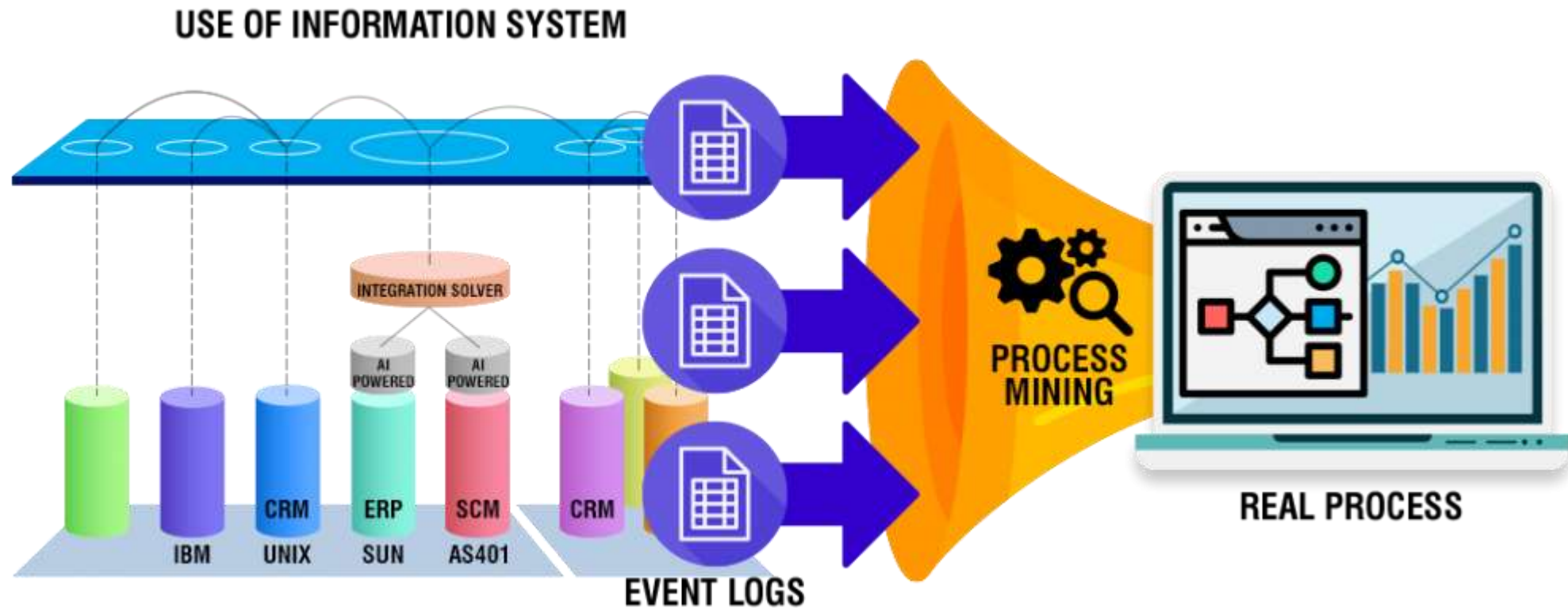


Comparison of SQL and PQL

Real Time Applications

- **Operational Process Monitoring:** Continuously analyze ongoing processes to detect anomalies in real time and trigger alerts for immediate action.
- **Dynamic Workflow Adjustment:** Modify workflows on-the-fly based on real-time insights to optimize resource allocation and task assignments.
- **Resource Allocation Optimization:** Utilize real-time data to balance resource workloads, prevent overloads, and ensure efficient resource utilization.
- **Fraud Detection and Prevention:** Detect and prevent fraudulent activities by identifying anomalies and suspicious patterns in real-time transaction data.

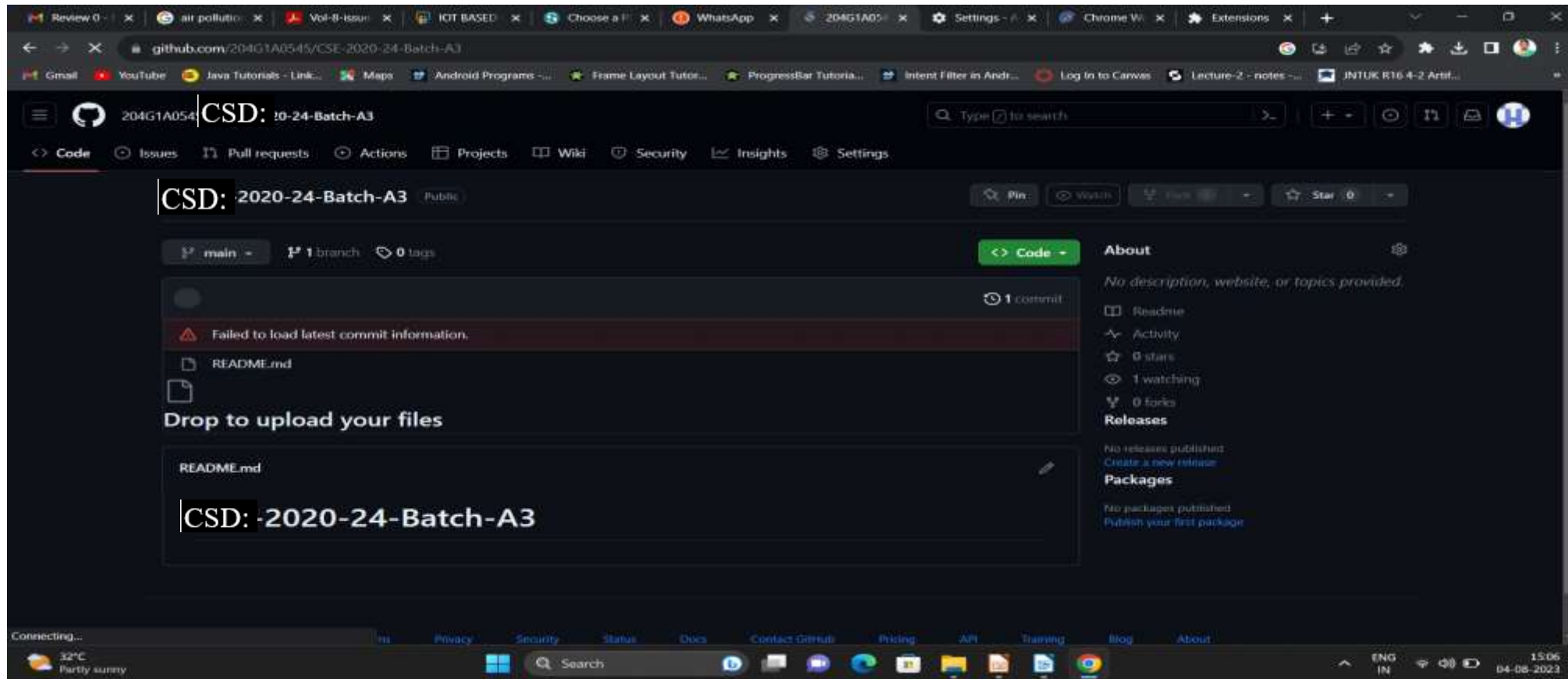
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Learning Outcomes

- ✓ **Understand Fundamentals:** Gain a solid foundation in process mining concepts, techniques, and methodologies.
- ✓ **Data Analysis Skills:** Learn to extract, preprocess, and analyze event data to derive insights about process performance and behavior.
- ✓ **Modeling Expertise:** Develop skills in creating process models, identifying bottlenecks, and optimizing workflows for improved efficiency.
- ✓ **Real-world Applications:** Apply process mining techniques to real-world scenarios, such as operational monitoring, compliance checking, and performance enhancement.
- ✓ **Tool Proficiency:** Acquire hands-on experience with leading process mining tools, enabling the practical application of concepts to actual data.

Git Hub Dashboard



- Repository Name Like: Summer Internship I
- Under that include document, presentation and Certificate(Pdf).

Any Queries?

Thank You!!!