Project Report: E-commerce Data Ingestion and Processing Pipeline

Introduction

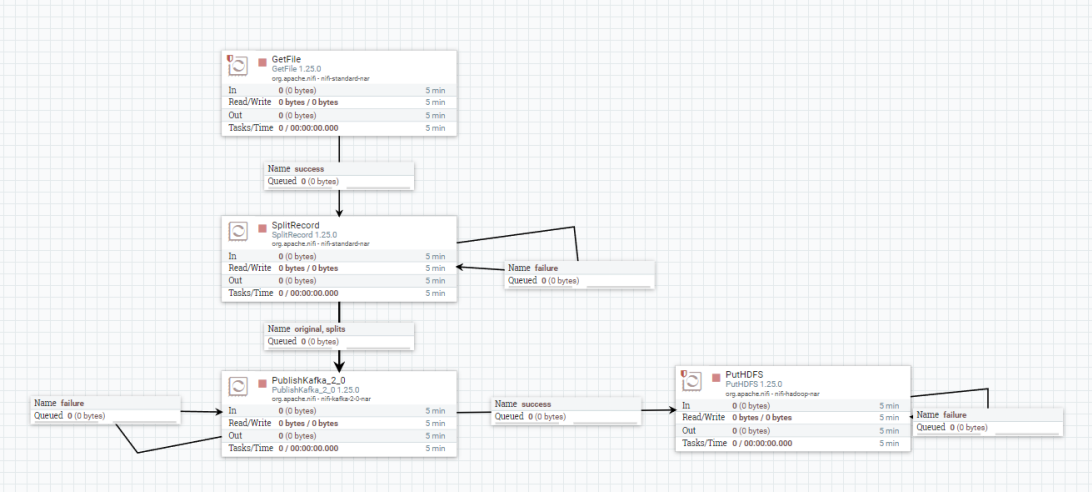
This project aims to build a comprehensive data ingestion and processing pipeline for e-commerce data obtained from Kaggle. The major goal is to illustrate the use of Apache NiFi for data flow automation, Apache Kafka for real-time data streaming, and Hadoop Distributed File System (HDFS) for scalable data storage.

Data Source

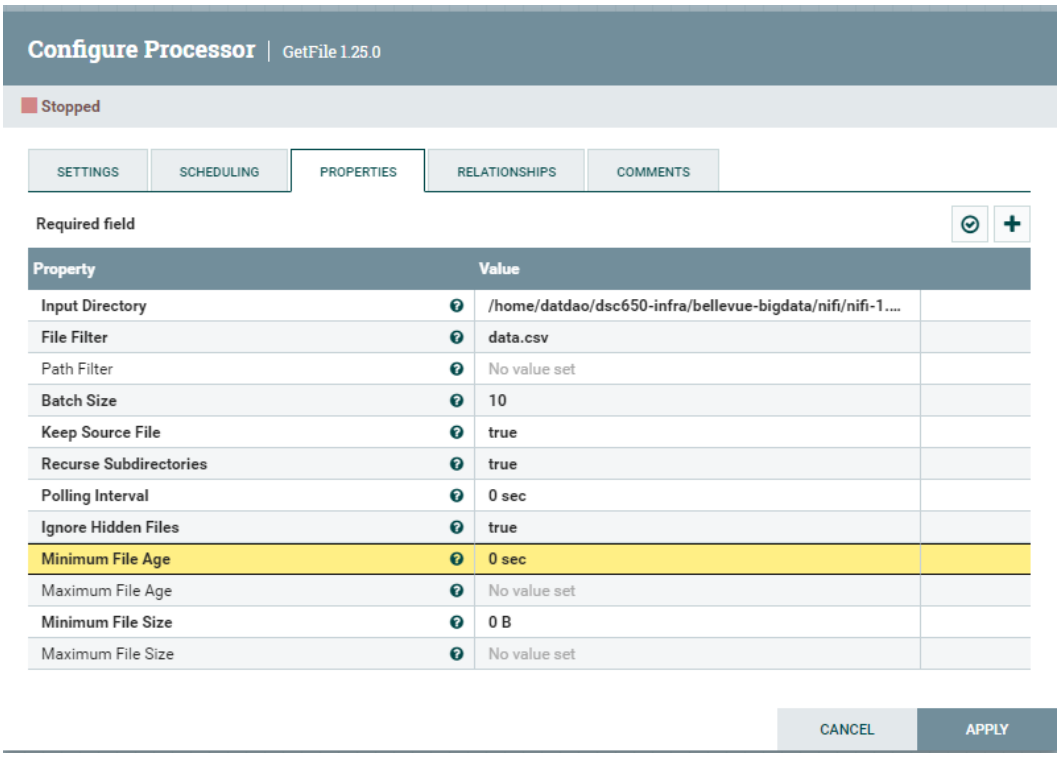
The dataset, sourced from Kaggle's E-commerce Data, is a comprehensive collection of transactions from an online retail platform. It contains many properties, including the invoice number, stock code, description, amount, invoice date, unit price, customer ID, and country. The collection comprises around 550,000 rows that represent each transaction.

Methodology

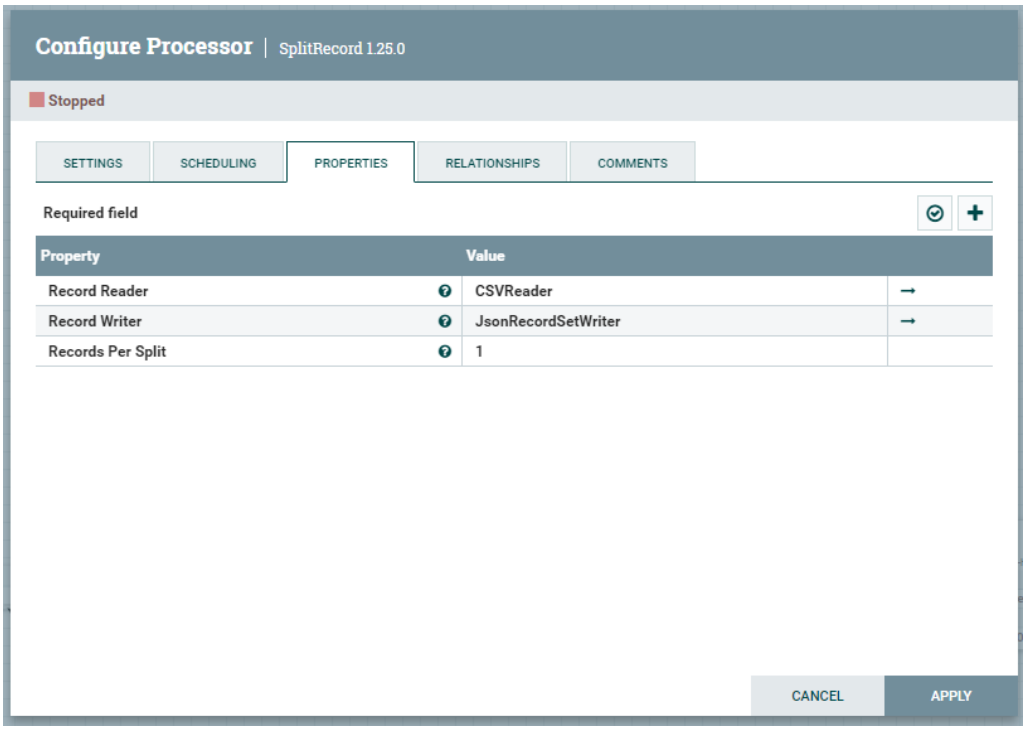
Data Ingestion with Apache NiFi



GetFile Processor: Initiates the data flow by fetching the CSV dataset from a predefined directory.

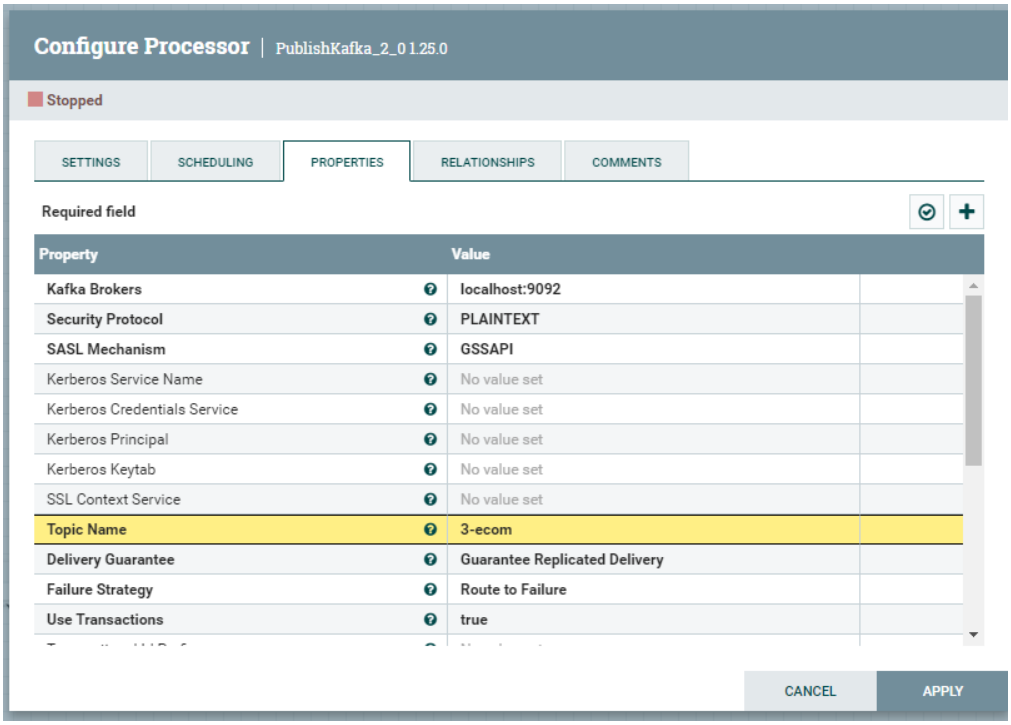


SplitRecords Processor: Parses the CSV file using CSVReader and JsonRecordSetWriter to divide it into individual JSON records, increasing the granularity and flexibility of data processing. This will assist utilize and demonstrate real-time data to the message streaming processing from Kafka.



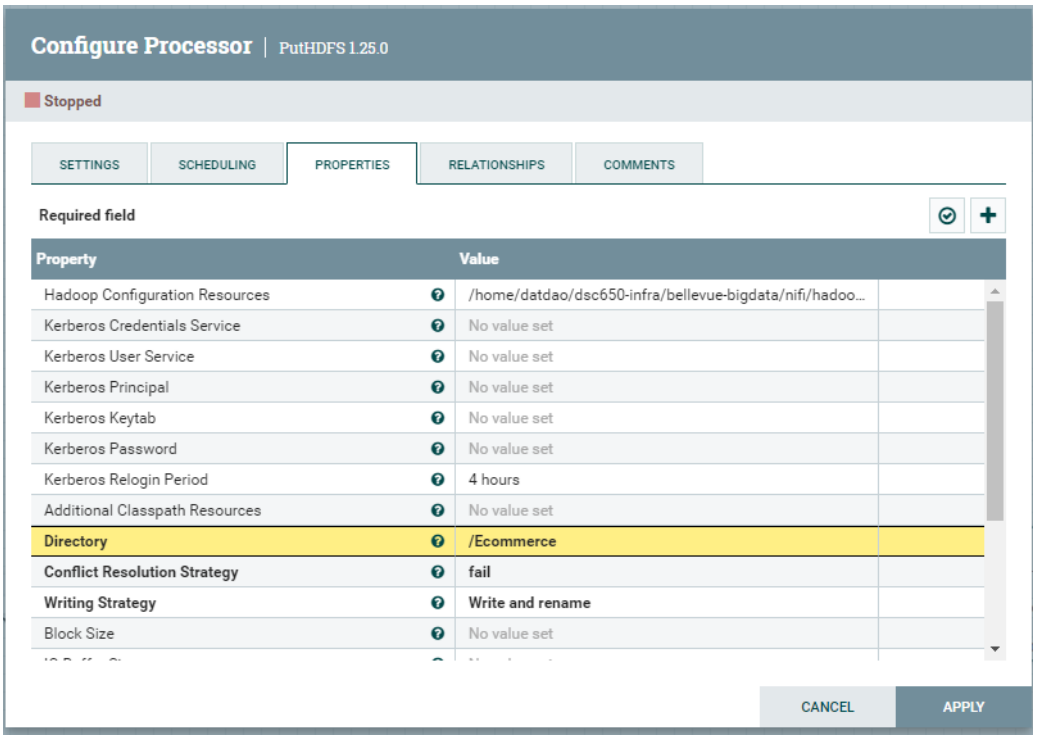
Data Streaming with Apache Kafka

PublishKafka 2.0 Processor: Set up to publish JSON data to the 3-ecom Kafka topic. This stage enables real-time data streaming and decoupled data processing downstream.



Data Storage with HDFS

PutHDFS Processor: Ensures that JSON records are persistently stored in the /Ecommerce directory on HDFS. This component is critical for data persistence and enables large-scale data analysis.



Challenges and Solutions

One key issue was to optimize the SplitRecords processor's speed to handle enormous amounts of data effectively. This was handled by fine-tuning processor settings like 'Record Reader' and 'Record Writer', as well as altering batch size to balance the load.

Conclusion

The project effectively integrates Apache NiFi, Kafka, and HDFS to provide a scalable and efficient data input and processing pipeline for e-commerce. The selected technologies performed well on real-world e-commerce datasets, demonstrating their promise for comparable data-driven applications.

References

Kaggle. (n.d.). E-commerce data set. Retrieved from: https://www.kaggle.com/carrie1/ecommerce-data