



Development of Collaborative Business Intelligence Framework for Tourism Domain Analysis



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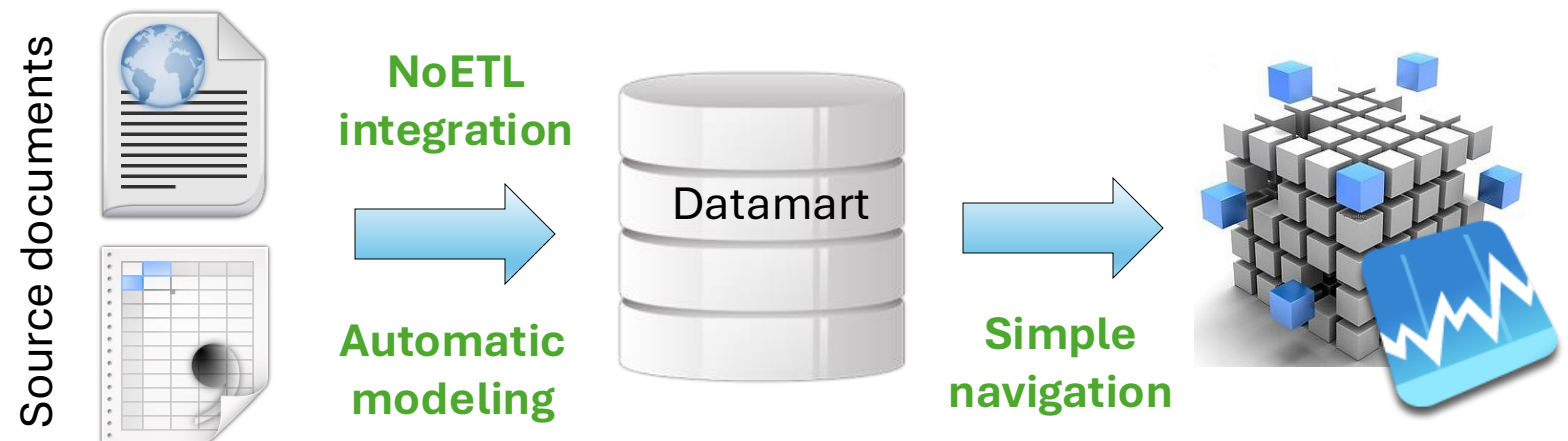
Bl4People

project ANR-19-CE23-0005 Bl4people



Business Intelligence for People (BI4People)

- The cloud BI trend crosses with the growing demand for collaborative tools that enable users to mashup private, self and open data, perform joint analytics, annotate figures or reports and communicate through social networks.
- **The aim of BI4people is to bring the power of OLAP interactive analysis to the largest possible audience**, by implementing the data warehousing process in software-as-a-service mode, from multisource, heterogeneous data integration to very simple OLAP-like analysis and data visualization. To achieve this goal, the BI service must implement privacy by design, be autonomous, extremely simple, user-friendly and intelligible, and **allow collaborative analyses**.



BI₄People

project ANR-19-CE23-0005 BI4people

Introduction



- **Collaborative Business Analysis (CBA)** is a methodology that encourages knowledge sharing and collaboration between the different groups involved in business analysis. Collaborative Business Analysis (CBA) is a process of analyzing data and making business decisions collaboratively.
- **Collective Intelligence (CI)** is a concept that refers to the ability of a group or network to collectively solve problems, make decisions and generate insights that are often beyond the abilities of individuals working alone
- **Collaborative Business Intelligence (CBI)** involves using social networks, quizzes, brainstorming sessions, and even simple chats between two or three coworkers on Teams to collectively solve problems. CBI involves enabling users to share data, insights, and perspectives with one another in order to improve decision-making and drive better business outcomes

Challenges



- standard reporting and predefined analytical content



- lack of business context information, such as best practices



- collaborative decision-making is done outside of the system using other tools



- deep insight in both the data to be analyzed and the intended analytical tasks



- strong focus on structured, internal data but lack the capability of integrating external information in an easy way

Collaborative Business Intelligence

- The main idea is to **collect people in one** virtual or real **space** and **encourage them leave their** comment or **opinions** for general purpose. Moreover, **reusing another collaborators' results** or comments makes general BI - CBI.
- ***Collaborative space & reusing experience:***
 - *how to help users analyze data, annotate and share analysis results, and to construct knowledge?*
 - *what are the most important ways of achieving CBI?*
- ***The main research question: What is the basic scenario for a collaborative BI ?***

Collaborative Business Intelligence

- **CBI** refers to **the integration** of **BI tools** and technologies **with collaborative** platforms and processes. It enables teams and individuals within an organization to work together more effectively when analyzing data, sharing insights, and making data-driven decisions. CBI leverages the strengths of both BI and collaborative features to enhance decision-making processes and organizational performance.

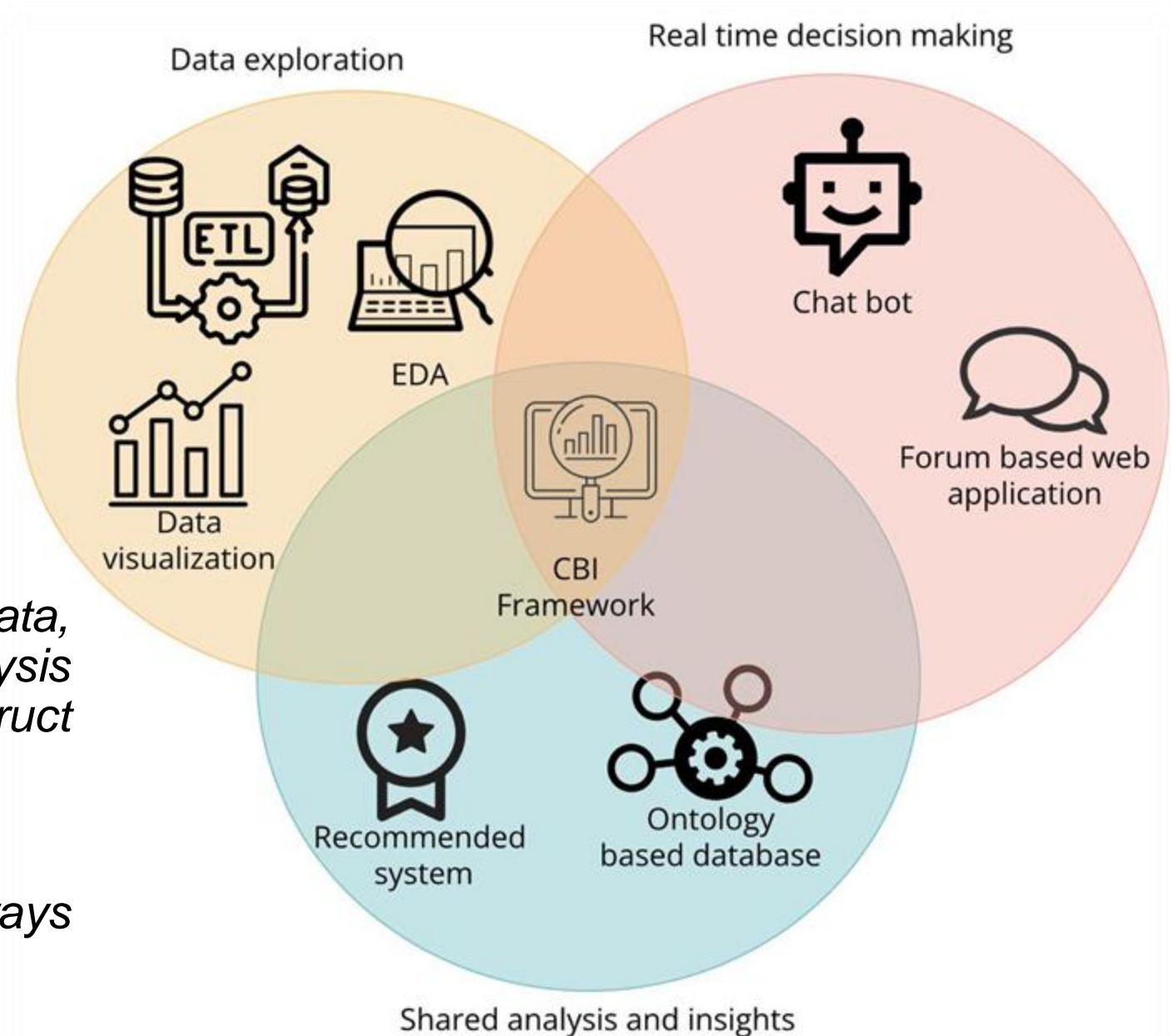
Key components:

- ***Data Sharing***: Allowing users to share data, reports, and dashboards easily within the organization. This fosters a culture of transparency and collective understanding.
- ***Real-Time Collaboration***: Enabling multiple users to work together on data analysis tasks in real-time, often through shared workspaces or collaborative platforms.
- ***Discussion and Annotation***: Providing tools for users to discuss, comment on, and annotate reports and data visualizations. This helps in capturing context and insights directly alongside the data.
- ***Social BI Features***: Incorporating social networking elements, such as activity feeds, notifications, and user profiles, to enhance communication and collaboration around data.

CBI Framework



- *How to help users analyze data, annotate and share analysis results, and to construct knowledge?*
- *What are the most important ways of achieving CBI?*



Towards Collaborative Business Intelligence Framework

- **Key Objectives**

- Organize Collaborative BI Processes: real-time collaboration; sharing of insights, reports, and dashboards; discussion and annotation tools
- Data Collection and Analysis: various sources; advanced analytics; social BI features
- Recommendation Creation Exploration: understand user preferences; recommendation algorithms

- **Benefits**

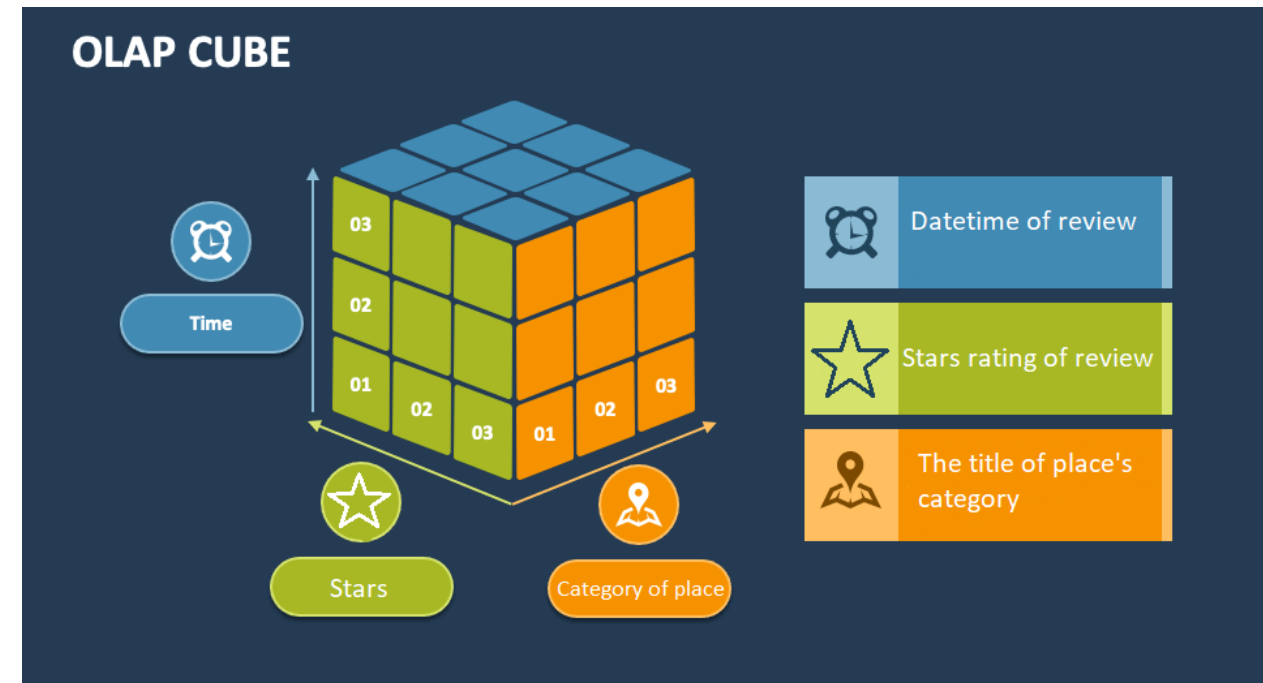
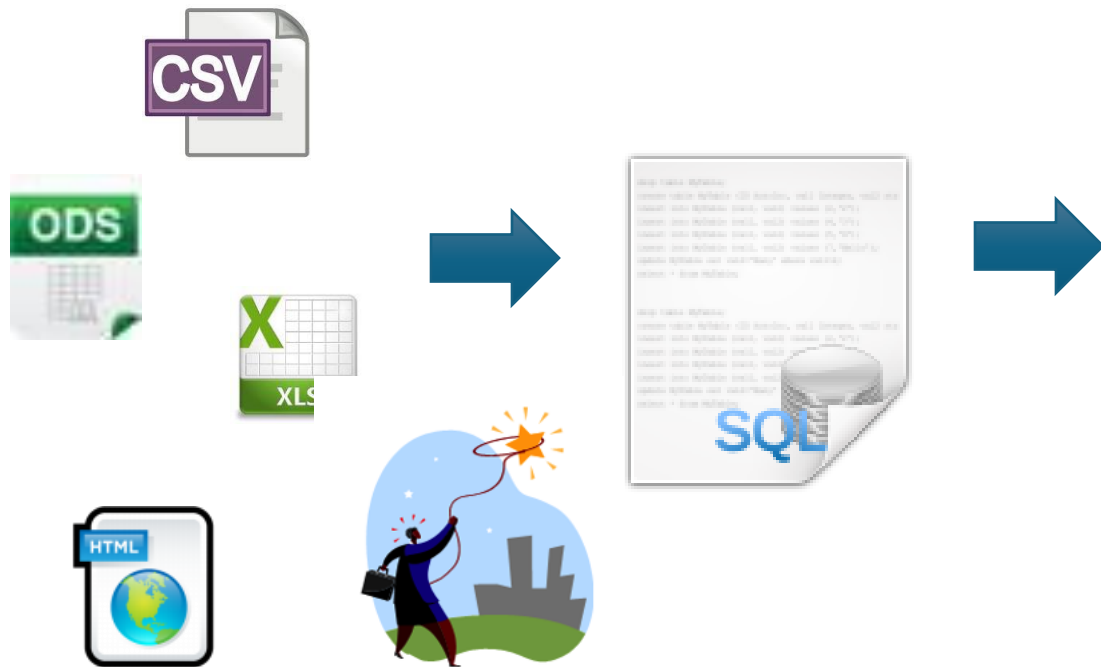
- Enhanced Decision-Making
 - Improved User Engagement
 - Personalized Experiences
- Our project aims to create a **playground for Collaborative Business Intelligence (CBI)** within the tourism domain. This playground will serve as a dynamic platform for organizing collaborative BI processes, collecting valuable data, and exploring the possibilities of providing personalized recommendations

Tourism BI systems

Name	Helps users to investigate tourism data	Sources of data	Collaborative BI is realized	Visualization of information
BITOUR	+	TripAdvisor, Twitter, OpenStreetmap	+/-	maps
DAF (Data Analytics Framework)	+	Public Administrations of Italy	-	Charts
Tourism Demand Forecast Based on Adaptive Neural Network Technology	+	China Weather Network, Beijing Tourism Network	-	tables, charts
BI4Tourism	+	Google Maps, OpenWeatherMap	+	Charts, maps, tables

The BI4Tourism

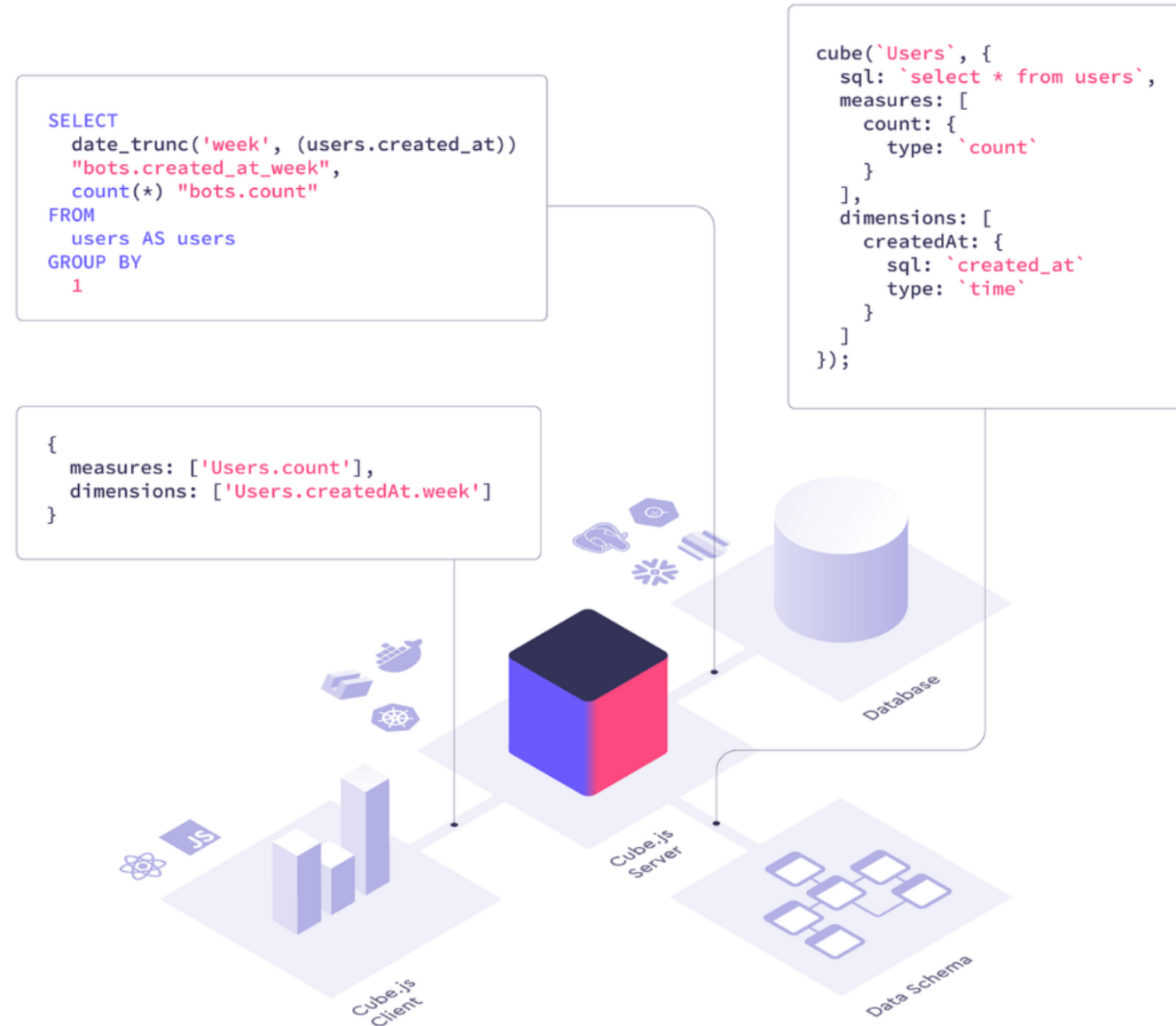
Our approach involves aggregating, cleansing, and structuring tourism data. This involves the gathering data from sources that usually have a disparate structure and need to be consolidated into a single format. For example, the collected data from Google Maps will be a JSON object with dozens of fields. We try to solve this problem by mapping data to an OLAP cube.



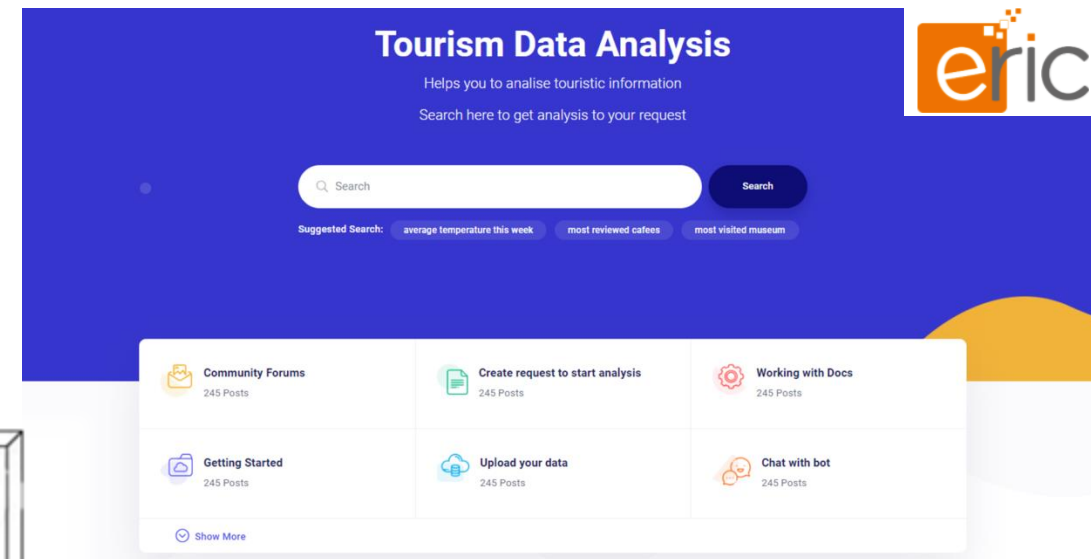
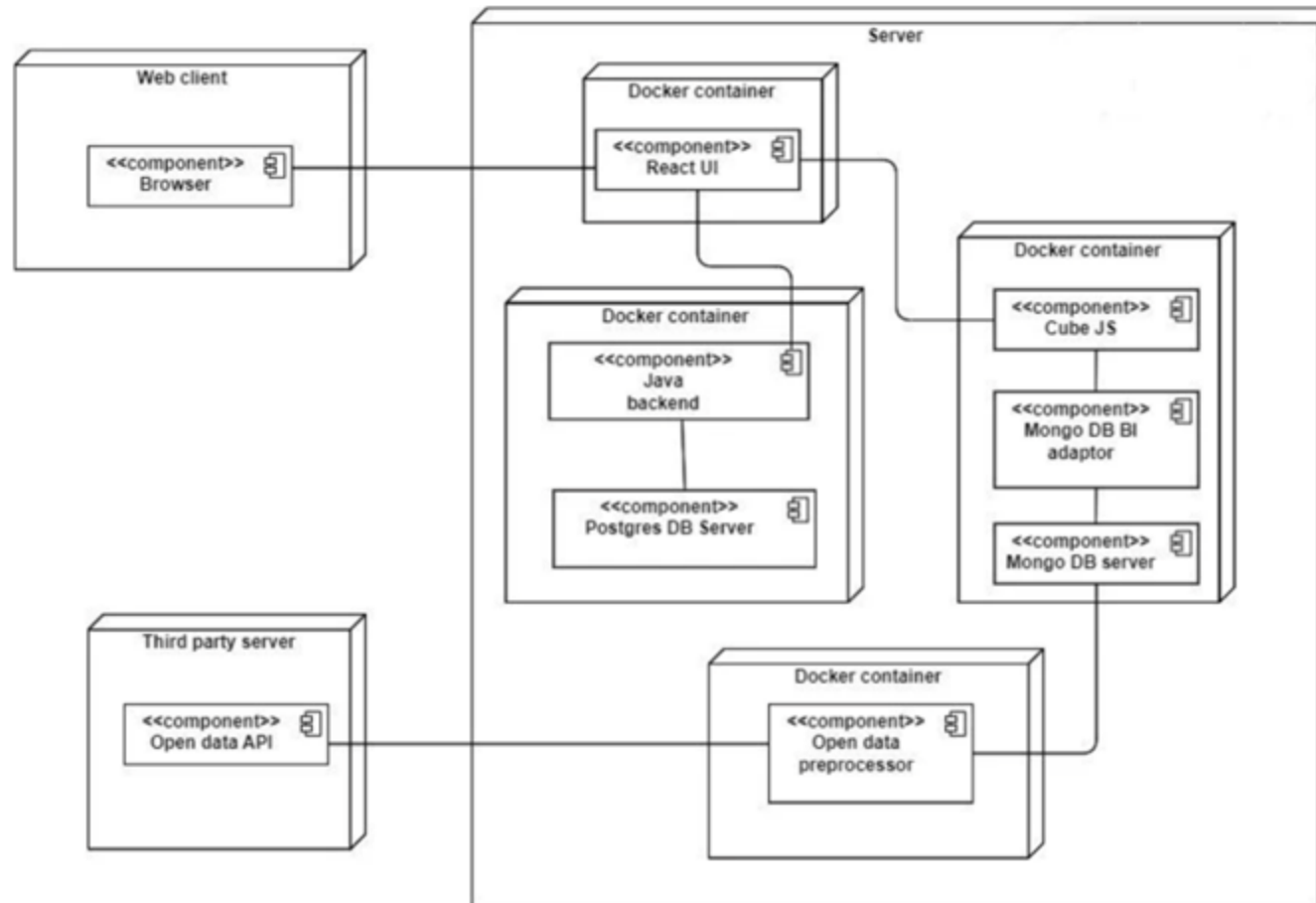
Cube JS

Cube.js is an open-source framework that helps developers build analytical web applications.

It integrates with databases to provide real-time querying and visualization capabilities through a flexible and efficient data modeling layer.



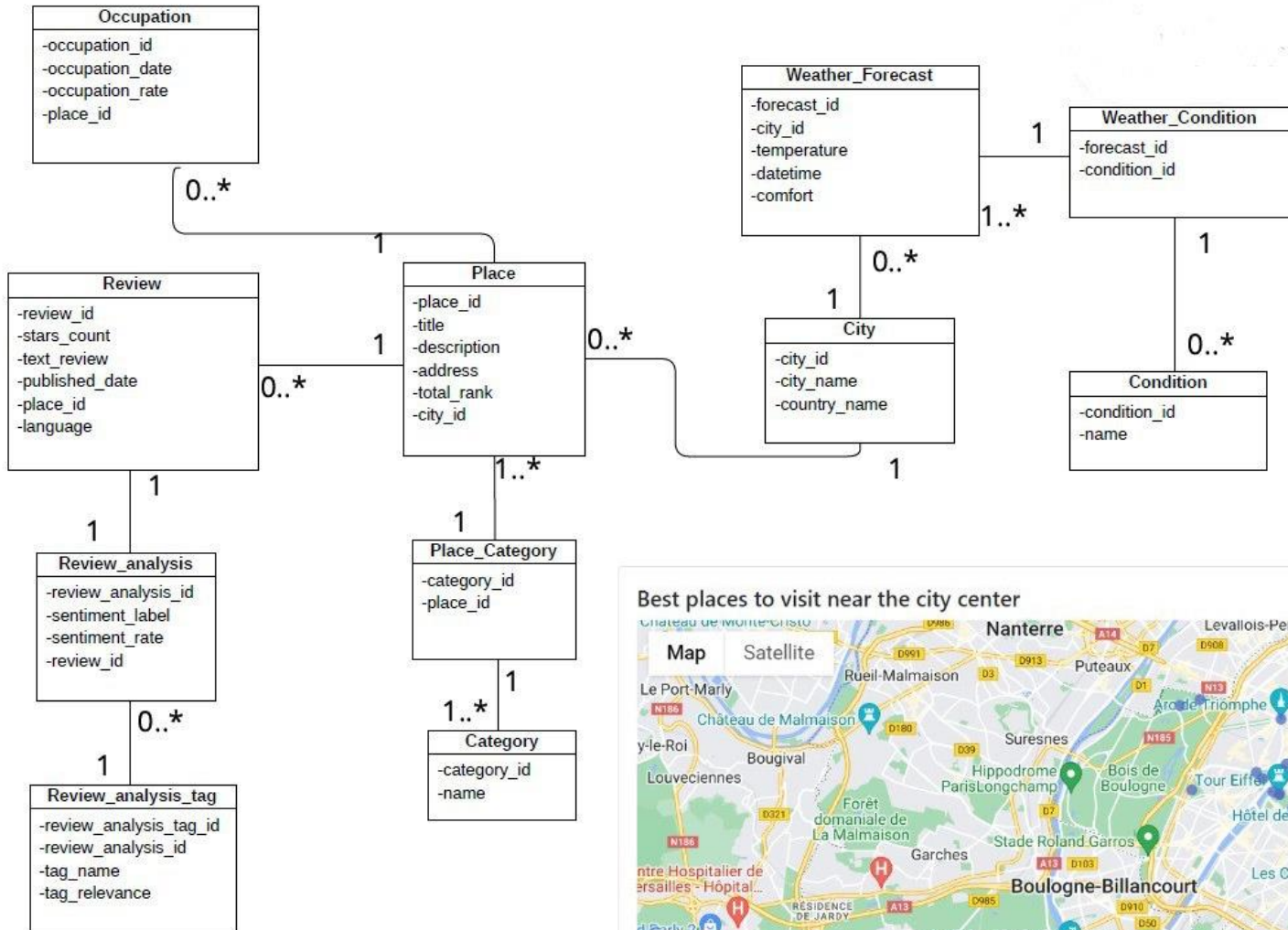
The BI4Tourism



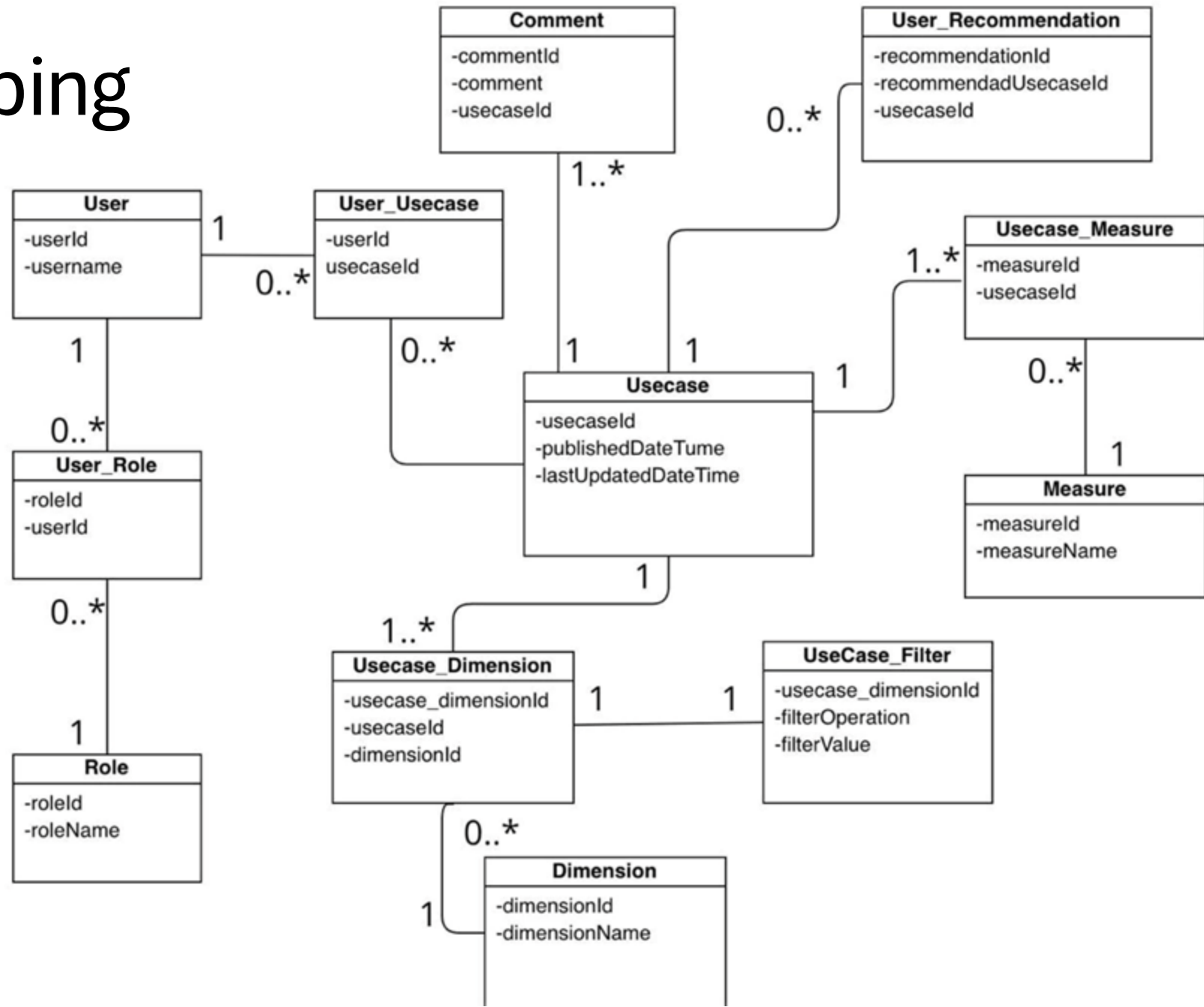
The system is web based application, similar to the forum, that helps users visualize and compare tourism data due to resolve specific users' tourism needs

The BI4Tourism should save answers and questions of the user during his session as well as ask the user to leave comment

Data collection and exploration

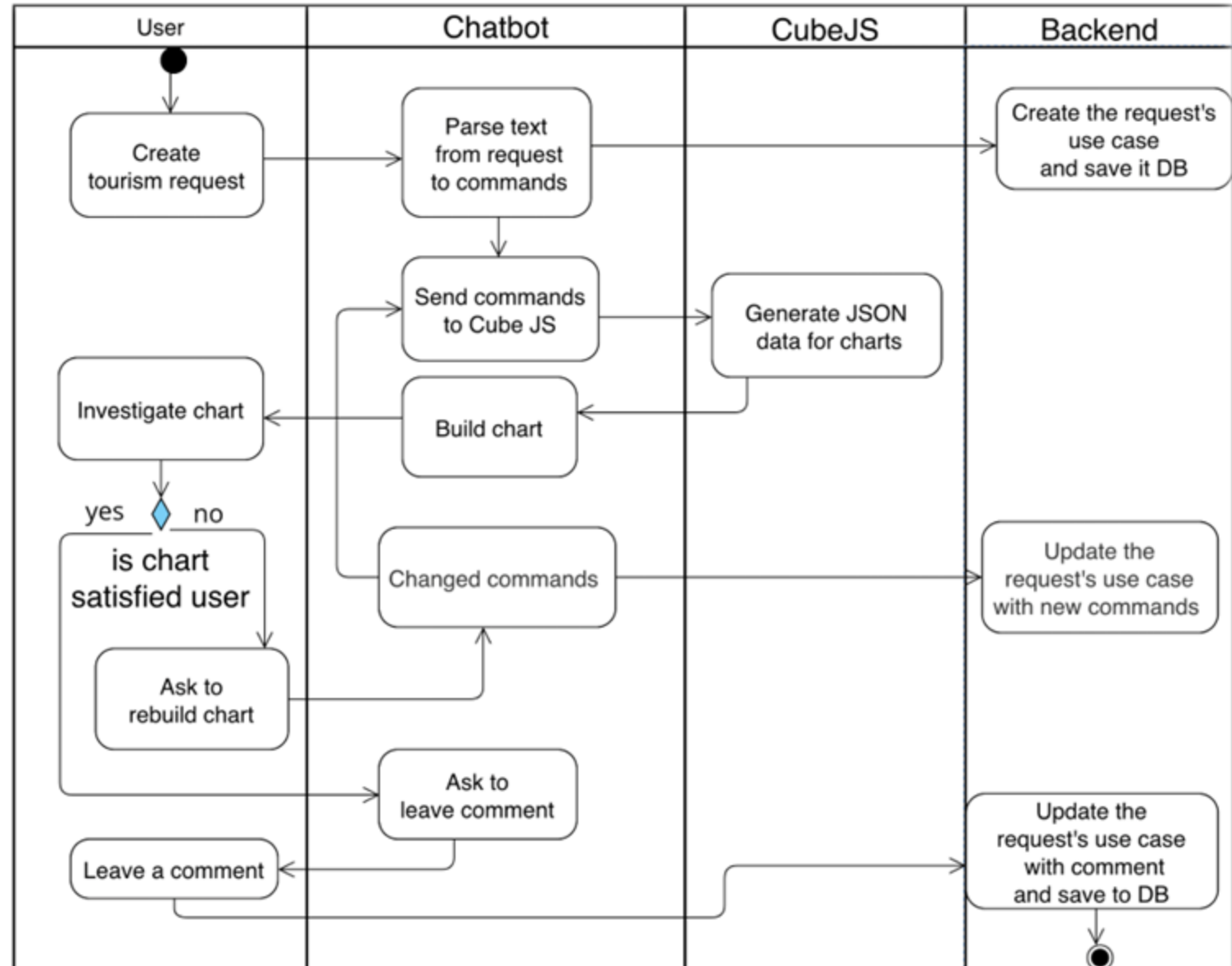


Case Keeping

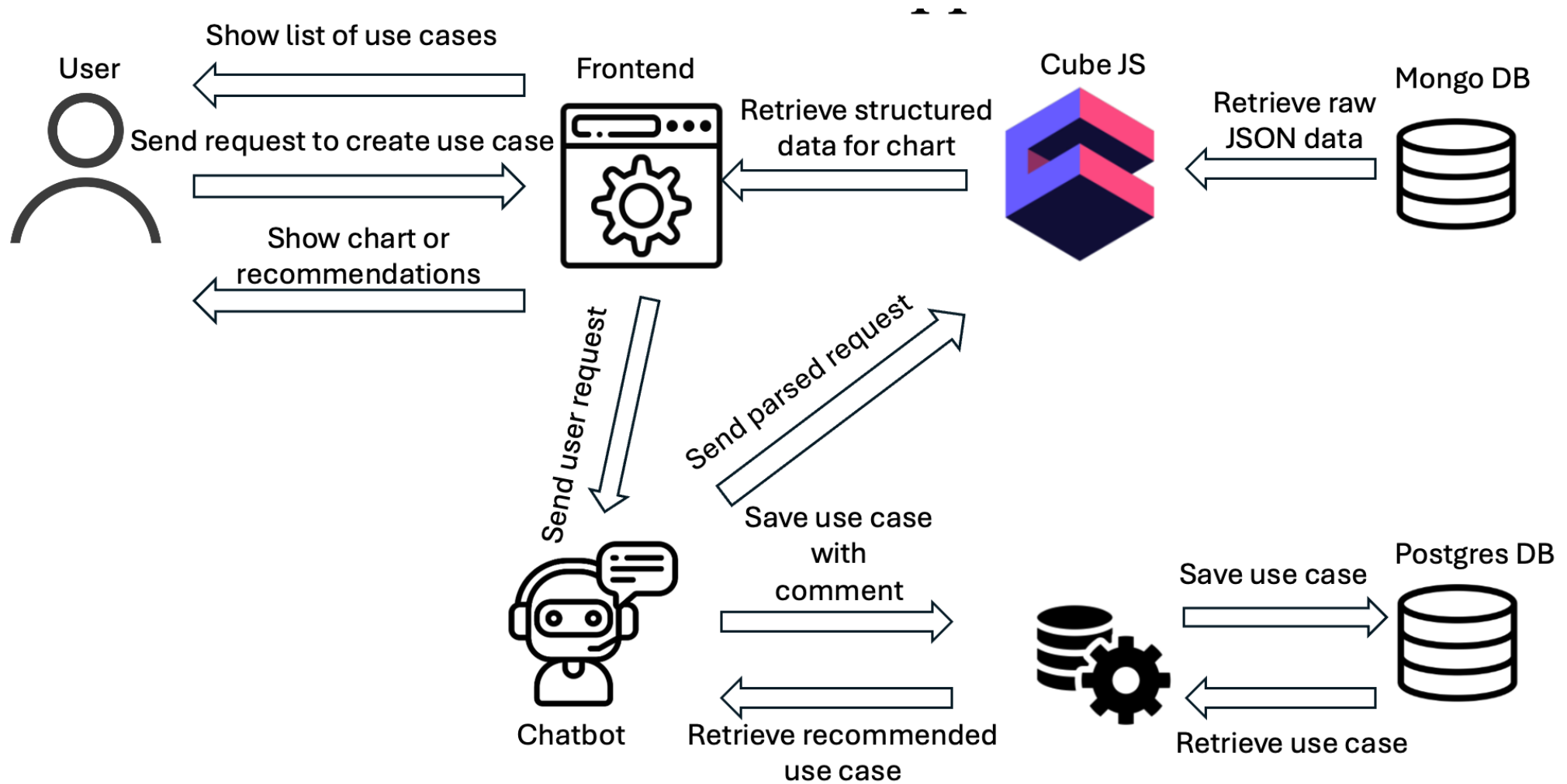


Virtual Assistant

The goal of a virtual assistant is to make data exploration more accessible to a wider range of users and to reduce the time and effort required for data analysis



BI4Tourism Software



Prototyping



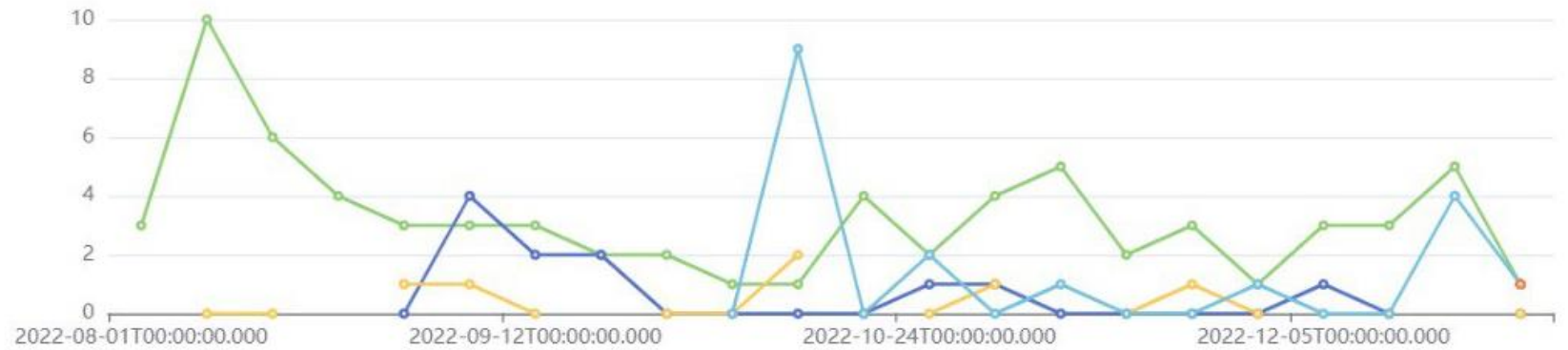
Likes count by category name

Likes count by category name

Chat gpt Query builder List items

Count of likes by category

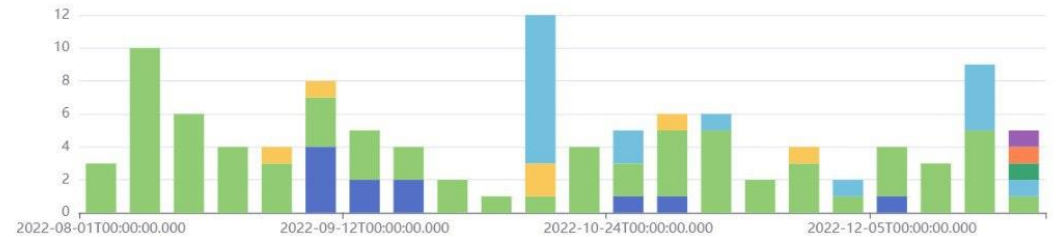
○ Historical place
○ Tourist attraction
○ Sculpture
○ Art museum
○ Amusement park ride
○ Amusement park
○ Art center
○ Park



Best places to visit near the city center



Count of likes by category



Discussion and Conclusion

- **Data Exploration:** This phase involves the comprehensive exploration of tourism data, encompassing various sources and datasets. It facilitates a deep understanding of the available data landscape, allowing stakeholders to identify trends, patterns, and potential insights.
- **Shared Analysis and Insights:** In this component, stakeholders engage in collaborative analysis and knowledge sharing. Through shared access to data and analytical tools, participants collaboratively explore, interpret, and derive insights from the tourism data. This collaborative environment fosters a synergistic approach to understanding and addressing challenges within the tourism domain.
- **Real-time Decision-making:** The final component emphasizes the integration of insights derived from collaborative analysis into real-time decision-making processes. By leveraging the CBI framework, stakeholders can make informed decisions promptly, responding swiftly to changing circumstances and optimizing tourism-related strategies and initiatives.

Discussion and Conclusion

- CBI represents a refinement of traditional BI, emphasizing the cooperative execution of BI tasks.
- The tourism industry is experiencing rapid growth, leading to heightened competition among businesses, our focus is on developing an application tailored for tourists, empowering them to make well-informed decisions about destinations and activities.
- Our approach involves aggregating, cleansing, and structuring tourism data to offer a user-friendly interface equipped with collaborative analysis tools.
- CubeJS serves as a tool in creating an additional layer between the database and the main application, MongoDB is chosen as the NOSQL database.
- We introduce the CBI framework tailored for the tourism domain, which comprises three primary components: 1) Data Exploration; 2) Shared Analysis and Insights; 3) Real-time Decision-making.

THANK YOU FOR YOUR ATTENTION!

