HyperionDev

Tech Talks Session Housekeeping

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly.
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** midway and at the end of the session, should you wish to ask any follow-up questions.
- If you have any questions outside of this session, or that are not answered during this session, please do submit these for upcoming Tech Talks Sessions. You can submit these questions here: **https://forms.gle/MomSYvUWiSfKgMaZ9**

Tech Talks Session Housekeeping cont.

- For all **non-academic questions**, please submit a query:

  www.hyperiondev.com/support

- You can find all Tech Talks resources in our GitHub repository:

  https://github.com/HyperionDevBootcamps/Tech-Talks

- We would love your **feedback** on lectures: **Feedback on Lectures**

- If you are hearing impaired, please kindly use your computer's function through Google chrome to enable captions.

Safeguarding & Welfare

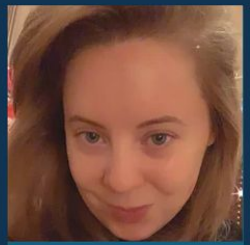
We are committed to all our students and staff feeling safe and happy; we want to make sure there is always someone you can turn to if you are worried about anything.

If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:

Ian Wyles
Designated Safeguarding Lead

Simone Botes

Rafiq Manan



Charlotte Witcher

Nurhaan Snyman

Ronald Munodawafa

Tevin Pitts

Scan to report a safeguarding concern

or email the Designated Safeguarding Lead:
Ian Wyles
safeguarding@hyperiondev.com

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End-to-End Application Design: Merging Software Engineering, Data Science, and the Web

Part 2

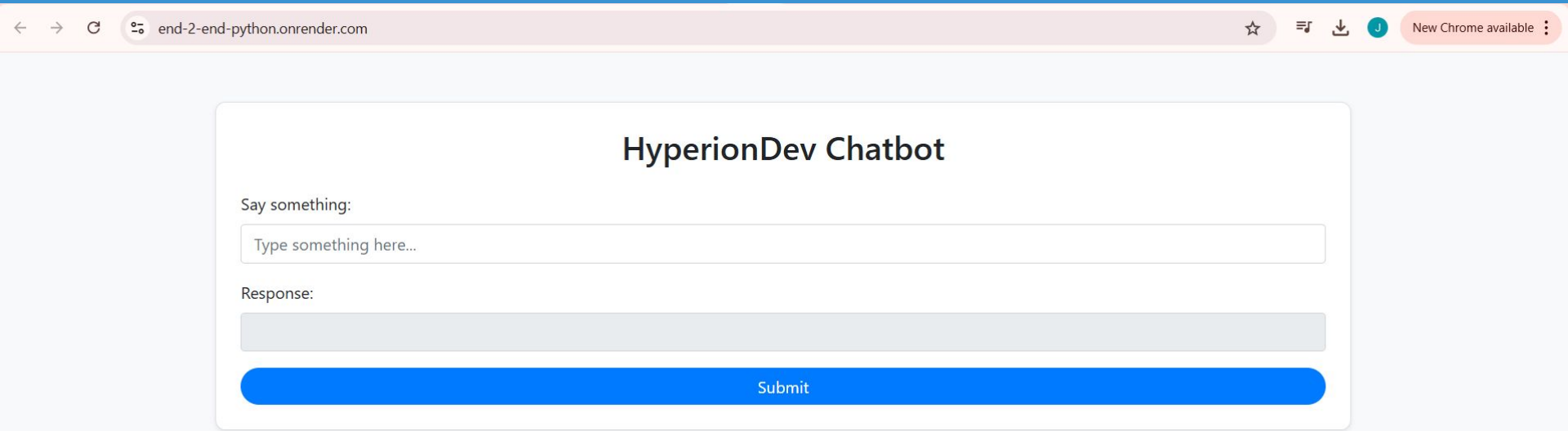
07 January 2025

Agenda

End-to-End Application Design: Part 2 - Interplay of Disciplines in End-to-End Application Design

1. Identify Key Disciplines: Software Engineering, Data Science and Web Development,
2. Describe Interdisciplinary Interplay: How to the Key Disciplines interact with each other,
3. Explain Modern Web Application Basics

Target Application Demo



Interplay of Disciplines in End-to-End Application Design

Software Engineering

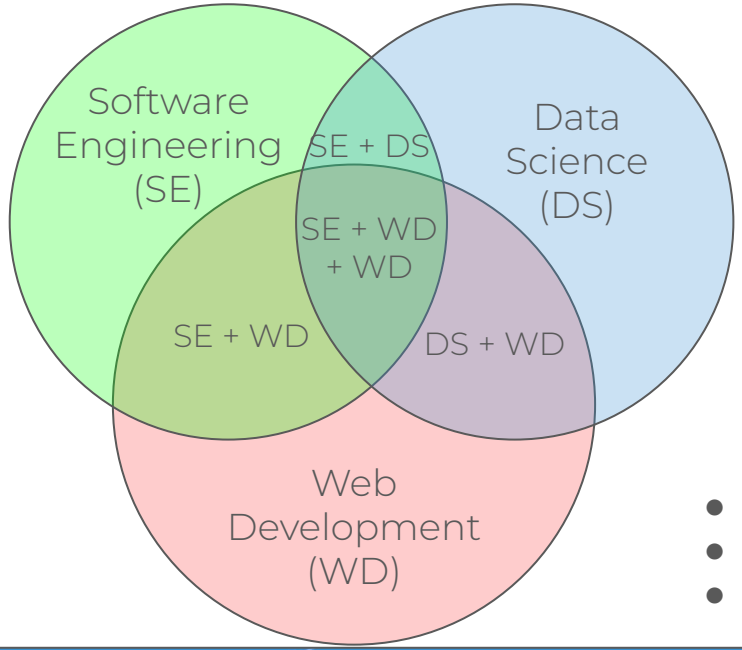
- System Architecture
- Backend Services
- Database Design
- Security

Web Development

- User interface
- API integration
- Accessible design

Data Science

- AI/ML Models
- Data Analytics
- Statistical Analysis
- Predictions



SE + DS

- Data Processing
- Algorithm Optimization

DS + WD

- Data Visualization
- Interactive Analytics

SE + WD

- API Integration
- Performance

SE + DS + WD

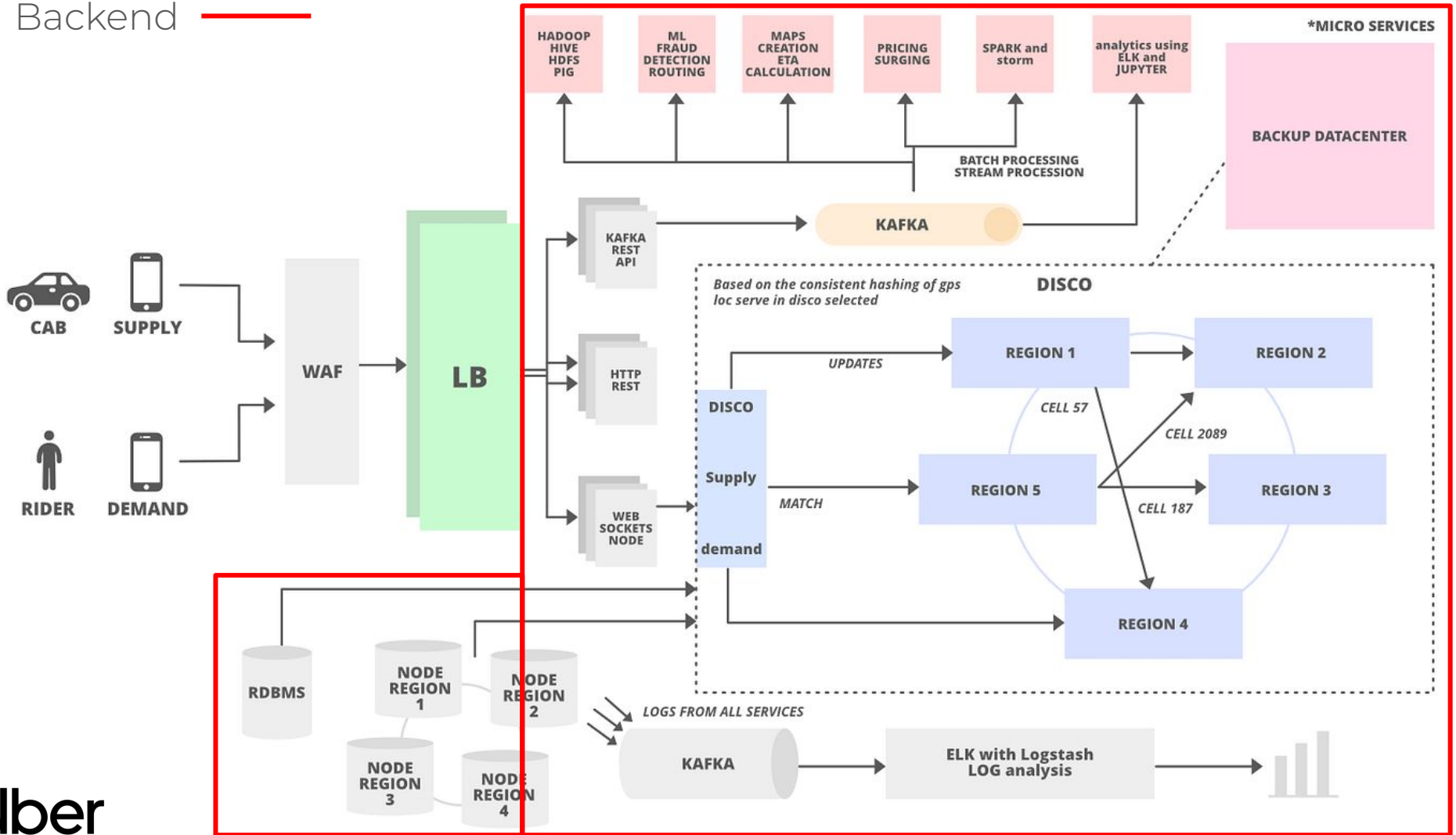
- Full-Stack Applications
- ChatGPT Integration
- Deployment Pipeline

Software Engineering: The Foundation

- **Backend Design**
  - Builds server-side logic and infrastructure.
  - Ensures efficiency, security, and scalability.
- **API Development**
  - Acts as the communication bridge between components and external services.
  - "The glue that holds everything together."
- **System Architecture**
  - Designs scalable, reliable structures for performance and maintainability.
- **External API Integration**
  - Connects to external services like ChatGPT for added functionality.
  - Example: Enabling conversational AI in a customer support app.

A robust backend ensures smooth, secure rides for users and drivers alike.

Backend



Uber

Data Science: Adding Intelligence

- **AI/ML Integration**: Enhances features like personalization, recommendations, and natural language processing.
- **Data Analysis & User Interaction**: Leverages user data to improve functionality and tailor experiences.
- **Ethical Considerations**: Prioritize data privacy, avoid bias in AI, and use AI responsibly.

AI/ML creates smarter, more personalized e-hailing experiences.

Data Science: Adding Intelligence

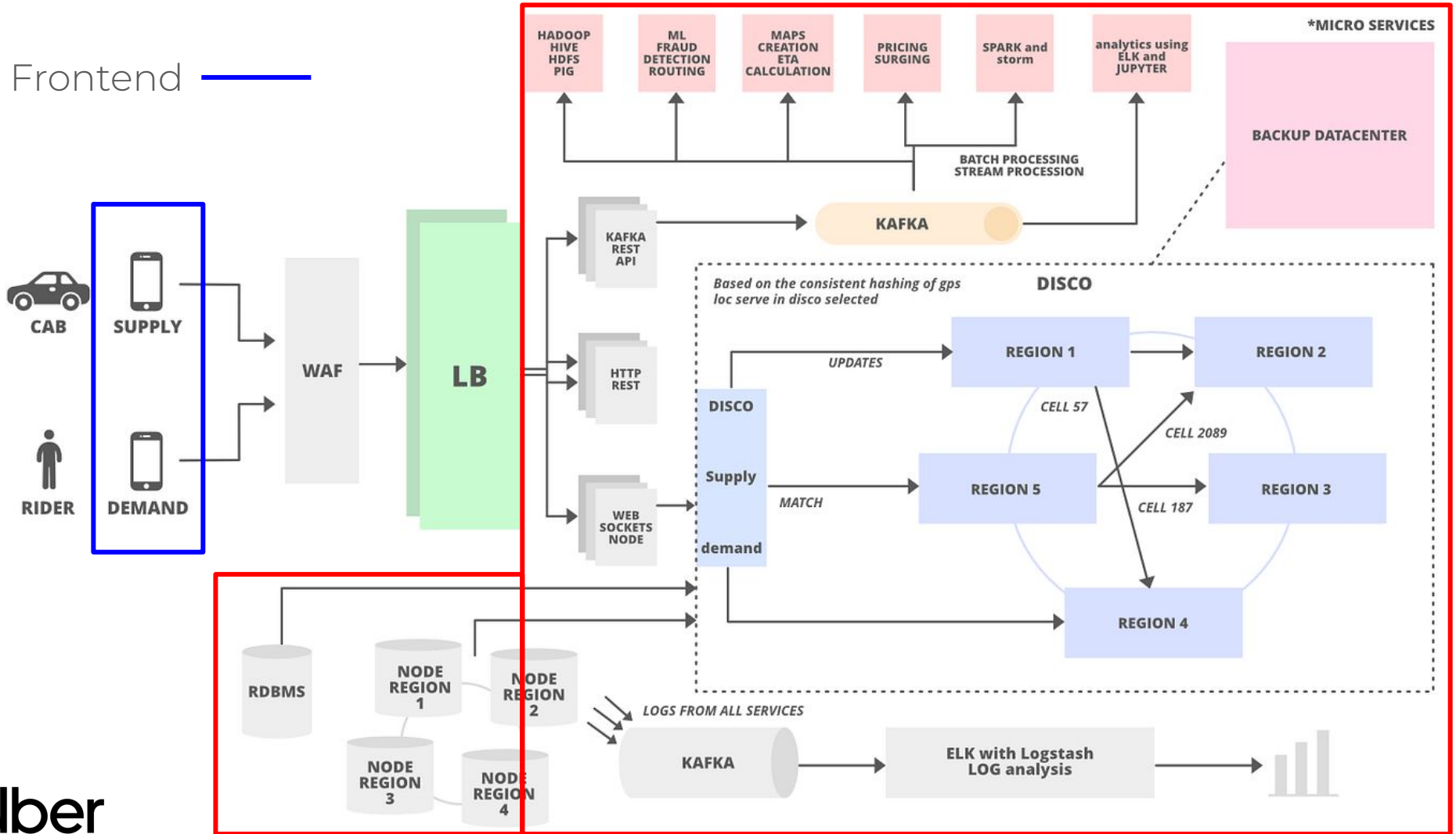
- **ChatGPT API**: ChatGPT API retrieves ride status through a simple user query.

```
import openai

response = openai.ChatCompletion.create(
    model="gpt-4",
    messages=[{"role": "user", "content": "What is the status of my ride?"}]
)

print(response['choices'][0]['message']['content'])
```

Frontend

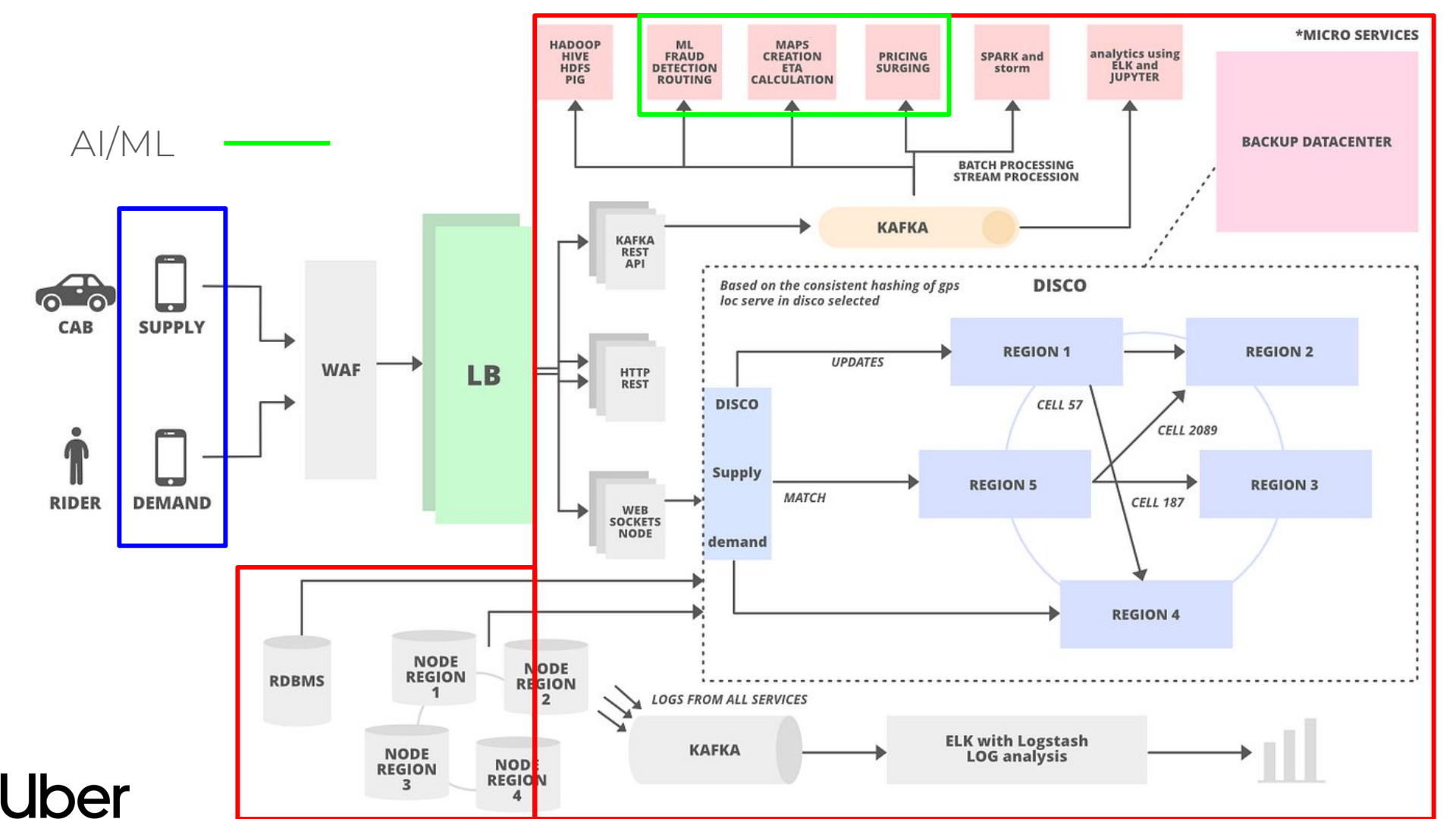


Uber

Web Development: The User's Window

- **Frontend Design & UI/UX**: Builds intuitive, engaging user interfaces for seamless interaction.
- **Connecting Frontend & Backend**: Frontend communicates with the backend using APIs.
- **Responsive Design**: Ensures the application works flawlessly across devices (desktop, tablet, mobile).
- **Accessibility**
  - Adheres to WCAG guidelines to design for users with disabilities.
  - Focuses on inclusivity through proper color contrast, keyboard navigation, and screen reader compatibility.

A polished frontend bridges users to the app's full potential.


AI/ML
*MICRO SERVICES
HADOOP HIVE HDFS PIG
ML FRAUD DETECTION ROUTING
MAPS CREATION ETA CALCULATION
PRICING SURGING
SPARK and storm
analytics using ELK and JUPYTER
BACKUP DATACENTER
BATCH PROCESSING STREAM PROCESSION
KAFKA
KAFKA REST API
HTTP REST
WEB SOCKETS NODE
CAB
RIDER
SUPPLY
DEMAND
WAF
LB
Based on the consistent hashing of gps loc serve in disco selected
DISCO
UPDATES
REGION 1
REGION 2
CELL 57
CELL 2089
DISCO
Supply
demand
MATCH
REGION 5
REGION 3
CELL 187
REGION 4
RDBMS
NODE REGION 1
NODE REGION 2
NODE REGION 3
NODE REGION 4
LOGS FROM ALL SERVICES
KAFKA
ELK with Logstash LOG analysis
Uber

The Interconnected Ecosystem: E-Hailing

- **Web Development**:
  - User enters pickup and drop-off locations in the app.
  - App displays available ride options dynamically (e.g., Economy, Premium).
- **Software Engineering**
  - Receives ride request details (pickup, destination, and ride type).
  - Matches the user with the nearest available driver.
- **Data Science**:
  - AI Optimization: Calculates dynamic pricing based on demand, distance, and traffic.
  - Route Optimization: Determines the fastest route for the trip, considering real-time traffic.

Real-World Examples

- **Netflix**:
  - Data Science: Personalized recommendations based on user watch history.
  - Software Engineering: Reliable streaming infrastructure for smooth playback.
  - Web Development: Intuitive user interface for browsing and watching content.
- **Spotify**:
  - Data Science: Curates music recommendations based on listening habits.
  - Software Engineering: Efficient storage and delivery of music tracks.
  - Web Development: Mobile and web apps for seamless user experience.
- **Barclays Bank**:
  - Data Science: Fraud detection and personalized financial insights for customers.
  - Software Engineering: Secure backend systems for transactions and account management.
  - Web Development: User-friendly online banking platforms and mobile apps.

Summary

- Modern applications require a collaborative approach, integrating expertise from various fields.
- **Software Engineering** provides the foundation (backend, APIs, architecture).
- **Data Science** adds intelligence and personalization through **AI/ML**.
- **Web Development** creates the user interface and ensures a seamless user experience.
- The interplay between these disciplines is crucial for creating successful, impactful applications

Poll

How did you find the topic?

- Very interesting
- Somewhat interesting
- Neutral
- Not very Interesting
- Mot interesting at all

Poll

Was the registration process easy enough? If you faced any difficulties, please let us know in the chat.

- Yes, it was very easy
- It was easy, but could be improved
- Neutral
- It was a bit difficult
- No, it was very difficult

Poll

Are you making use of Discourse?

- Yes, I use it regularly
- Yes, but only occasionally
- No, I’m not using it yet
- I don’t know what Discourse is

Poll

When you accessed your dashboard, did you see a banner telling you to register for Tech Talks?

Yes, I saw the banner but I had already registered for this session

Yes, I saw the banner and registered for this session

No, I didn't see the banner

I haven't accessed my dashboard yet

Questions & Wrap-Up

Resources

- The Architecture of Uber's API gateway | Uber Blog
- System Design of Uber App — Uber System Architecture | by Anu Upadhyay | Medium