UNITED

RAG-gedy Anns presents:

Agentic Complimentary Disruption Concierge (ACDC)

United Airlines & University of Chicago Hackathon

Our Team

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Agenda

1. Problem Statement
2. Our Solution
3. Data
4. Architecture
5. Risk
6. Future Vision

UNITED

In November 2024, United Airlines customers waited up to 4 hours on hold.

The industry average was 21 minutes.

Source: Mighty Travels

Rapid access to customer service would improve the experience for travelers and United agents

When Paul's flight was delayed:

- He waited at the gate with no updates for the first 90 minutes
- Missed his connecting flight to Boston, forcing him to rebook through a different city
- Arrived 6 hours late, missing his daughter's graduation ceremony

When Susana's flight was cancelled:

- She stood in a 2-hour line at customer service with 200+ other passengers
- Had to find her own hotel room and transportation, with no guidance from United
- Lost a full day of her vacation and paid out-of-pocket expenses

Customer service agents often **struggle** to resolve flight disruptions **efficiently** and **effectively**, costing airlines between **$25B and $35B** annually.

Source: Digital Travel Summit APAC 2025

Our Solution: An AI-Powered Flight Disruption Assistant

When a flight is cancelled or delayed, a dedicated **chatbot** appears in the **United Airlines app**, that:

1) Instantly analyzes:

Flight details	Passenger details
Current flight	Destination
Alternative flights	Passenger status
	Lounge Access

2) Provides personalized responses:

1. Optimal rebooking options for individuals and families
2. Recommendations for hotels
3. Airport lounge access
4. Compensation eligibility and next steps

Customer Service:

Customer Effort Score (CES) ↑
Customers get immediate access with minimal effort vs. putting effort into solving problems themselves

First Response Time ↓
24/7 immediate access vs. waiting for human agents

Customer Retention Rate ↑
Better experience reduces churn

Operations:

Utilization Rate ↑
Agents can perform complex rebooking tasks, improving aircrew utilization efficiency

Employee Performance KPIs

Service Quality ↑
Human attendants are less overwhelmed and pressured during disruptions, leading to better service delivery

Data is synthesized or collected from several sources

Flight Data

- Flight data from Aviation Stack API
- Synthetic customer data
- Random assignments of customers to flights

Hotel and Lounge Data

- Synthetic hotels data based on United's Hotel Partners
- Scraped United lounge data
- Scraped Priority Pass lounge data

United Airlines Unstructured Data

- Contract of Carriage
- Mileage Plus Rules
- Lounge Terms and Conditions

Architecture: 2 Agents, 9 Tools

2 agents: MCP Agent & Options Builder agent

MCP Agent:

- Runs all 9 tools in sequence from event capture to the result
- Analyzes customer sentiment after showing options
- Loops back to reprocess with better alternatives if customer appears upset

Options Builder Agent:

- Receives customer and flight context from MCP Agent
- Decides which specific tools to call (flights, hotels, lounges)
- Returns curated list of alternatives back to MCP Agent

Architecture: 2 Agents, 9 Tools

The MCP agent can loop back to reprocess with better alternatives, hoping that the customer prefers the new response

Escalation based on the sentiment of the passenger's response

Architecture: 2 Agents, 9 Tools

The *Options Builder Agent* conducts its own agentic workflow to find available hotels, lounges and flights for each individual passenger

Risk

Process Risk

Risks:
- Give wrong recommendations (suggesting full flights, unavailable hotels, excessive compensation)
- AI suggests impossible connections or unrealistic options

Mitigation:
- Add r**eal-time availability checks**
- **Require human approval** for high-value recommendations

Data Risk

Risks:
- Mishandling customer data: attaching wrong passenger info to the wrong customer
- Showing incorrect flight details or loyalty status

Mitigation:
- Use **unique customer IDs and flight IDs** for all database lookups
- Add **validation checks** to confirm customer matches flight booking

Legal & Compliance Risk

Risks:
- App doesn't work for visually impaired customers (ADA violation)
- No disclosure that customers are interacting with AI

Mitigation:
- **Add screen reader compatibility**; display "AI-generated recommendations" **disclaimers**

Use Risk

Risks:
- Customers fake angry messages to manipulate premium support treatment

Mitigation:
- Monitor escalation patterns; **weight loyalty tier** more heavily than sentiment

Third-Party Risk

Risks:
- Customer data sent to external AI companies
- System fails if AI services go down

Mitigation:
- Sign **data processing agreements** with AI vendors
- Build backup systems for AI outages

*American with Disabilities Act

Future Vision and Improvements

Customer Data Integration

Credit Card Detection: Identify card type from number to unlock lounge access and benefits

Visa Restrictions: Passport/nationality checking for international hotel options

Employee Priority: Operational importance weighting for United staff

External API Integration

Weather API: Predictive forecasting to identify at-risk flights 6+ hours ahead

News API: Real-time correlation between weather events and operational impacts

Live Transportation: Ground transport options and pricing for multi-city solutions

Partnership Data Sources

Star Alliance Integration: Rebooking options across partner airlines

Hotel/Rental Partners: Direct booking capabilities with preferred rates

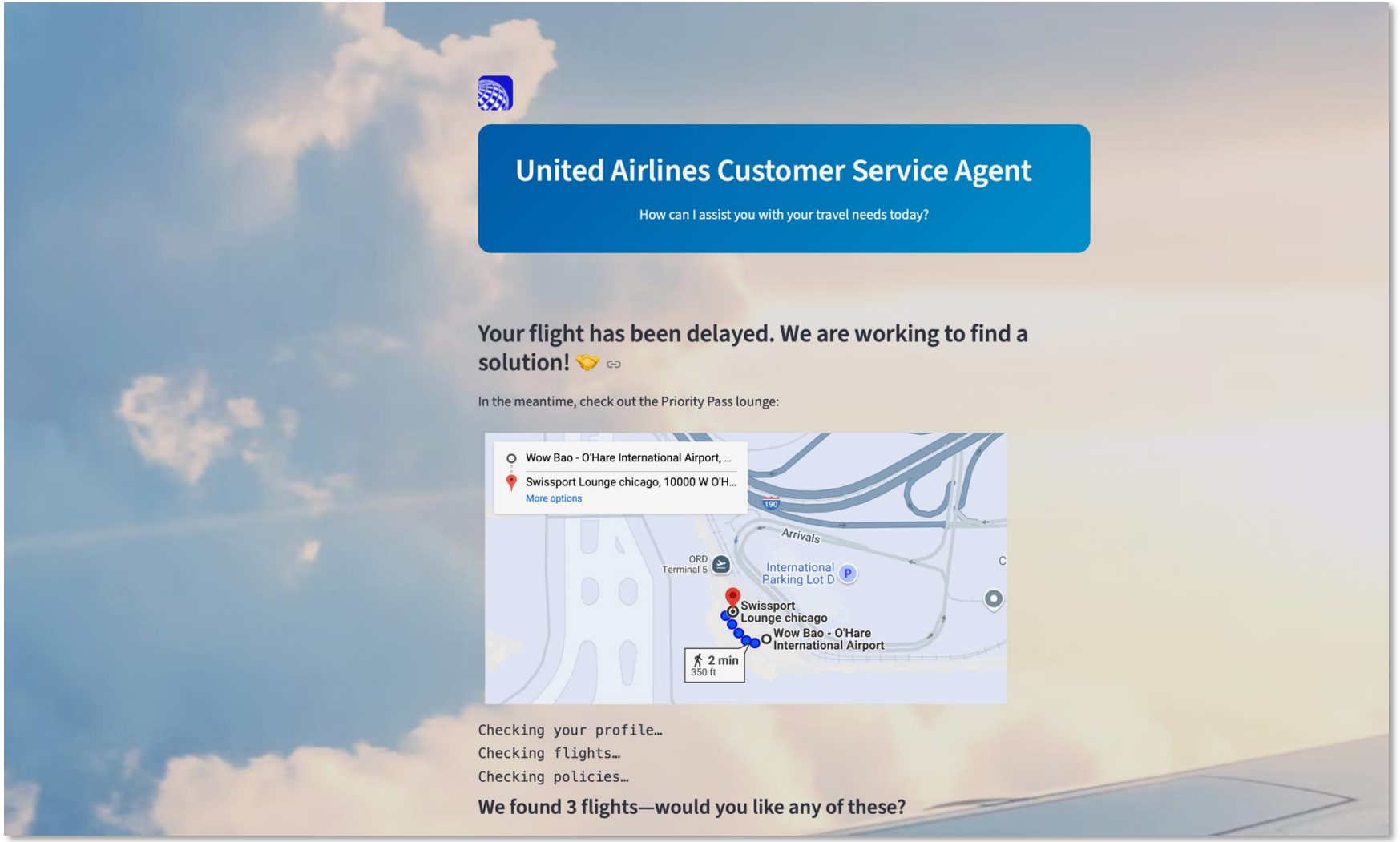
Nearby Airports: Alternative routing through secondary cities with ground transport

Customer Data Integration

Advanced Sentiment: Priority-based escalation with cultural context

Real-time Inventory: Live seat availability across all options

Future Vision and Improvements

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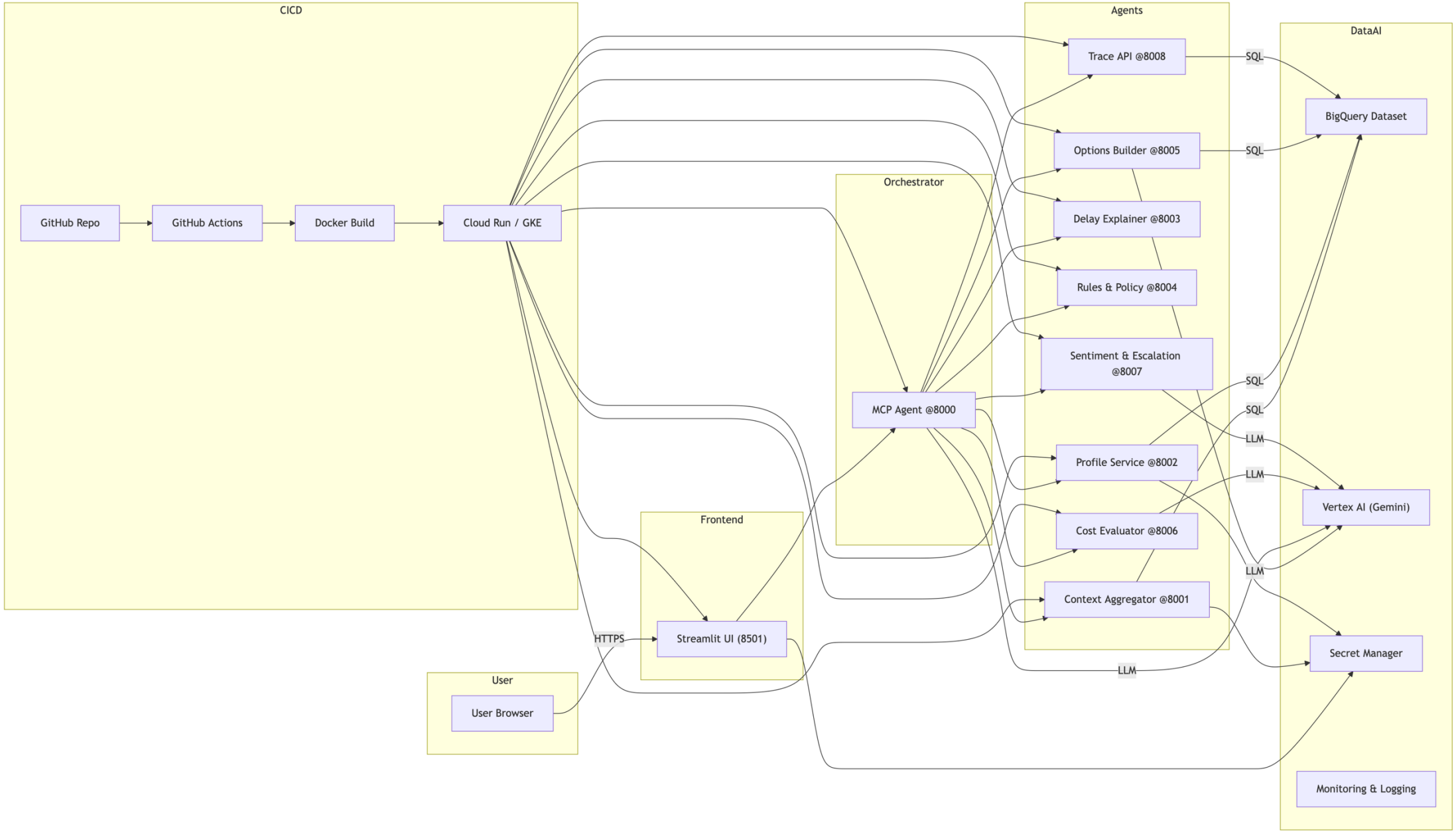
Thank You,
Questions?

Appendix


CICD
GitHub Repo
GitHub Actions
Docker Build
Cloud Run / GKE
Agents
Trace API @8008
Options Builder @8005
Delay Explainer @8003
Rules & Policy @8004
Sentiment & Escalation @8007
Profile Service @8002
Cost Evaluator @8006
Context Aggregator @8001
Orchestrator
MCP Agent @8000
DataAI
BigQuery Dataset
Vertex AI (Gemini)
Secret Manager
Monitoring & Logging
SQL
LLM
Frontend
Streamlit UI (8501)
HTTPS
User
User Browser

Architecture: Additional Information

Architecture Overview

- Built using LangChain and LangGraph workflow framework
- Google Cloud Platform (GCP) for infrastructure
- Integrated MCP (Model Context Protocol) servers within the LangGraph workflow

AI Framework & Tools

- **Primary Framework:** LangChain with LangGraph for workflow orchestration
- **LLM:** Gemini 2.5 Pro
- **Architecture Pattern:** Supervisor-based LangGraph architecture

Data & Retrieval

- **RAG Implementation:** Used in select microservices
- **Knowledge Sources:** BigQuery integration with structured tables & unstrcutured texts in tables

Server Integration

- **MCP Servers:** Integrates directly with the LangGraph workflow for seamless data access and processing

Roadmap to Production: Deployment & Maintenance Over Time

Data Synthesization Process

Customers

- Generated primarily by ChatGPT based on SQL table
- Priority Pass lounge access is randomly assigned to 40% of passengers

Hotels

- Randomly assigns 6 to 20 of United Airlines hotel partners to each airport
- Stars, distance from the airport and the number of open rooms are randomly determined

Flights and Booking

- Number of available seats and IATA delay codes are randomly assigned
- Customers are randomly assigned to flights
- Party size is assigned from 1 to 4