AIRLINE CUSTOMER SUPPORT CHATBOT

Problem Statement 2

Team Name : Confusion Matrix

Team Members:

Leela G M

Prathibha M

Sreya G

Preethi K

INTRODUCTION

Airline customers need support for multiple types of requests:

- Booking flights
- Cancelling flights
- Checking flight status
- Seat availability
- Airline policies (baggage, refunds, pets, etc.)

Each request involves multiple steps:

collect information → verify booking → fetch data → respond.

Manual handling is slow, error-prone, and repetitive, leading to customer dissatisfaction.

Existing systems lack automation, multi-turn conversation handling, and AI-based understanding of customer queries.

APPROACH

- **Conversational Chatbot built on Flask: Handles incoming customer messages and manages multi-turn conversations.**
- **Session-based flow: Tracks customer interactions step-by-step to ensure accurate data collection.**
- **In-memory datastore: Stores flight and booking information for quick access (mocked APIs).**
- **Policy Knowledge Base: Answers common airline policy queries (baggage, refunds, cancellation, meals, pets).**
- **Trained BERT NLU model: Detects user intent and extracts relevant slots (flight number, date, source, destination). Model is fully trained and ready for integration.**

Modular & Extensible Architecture: Easily add new request types, integrate APIs, and scale for multiple mers/industries.

SYSTEM ARCHITECTURE
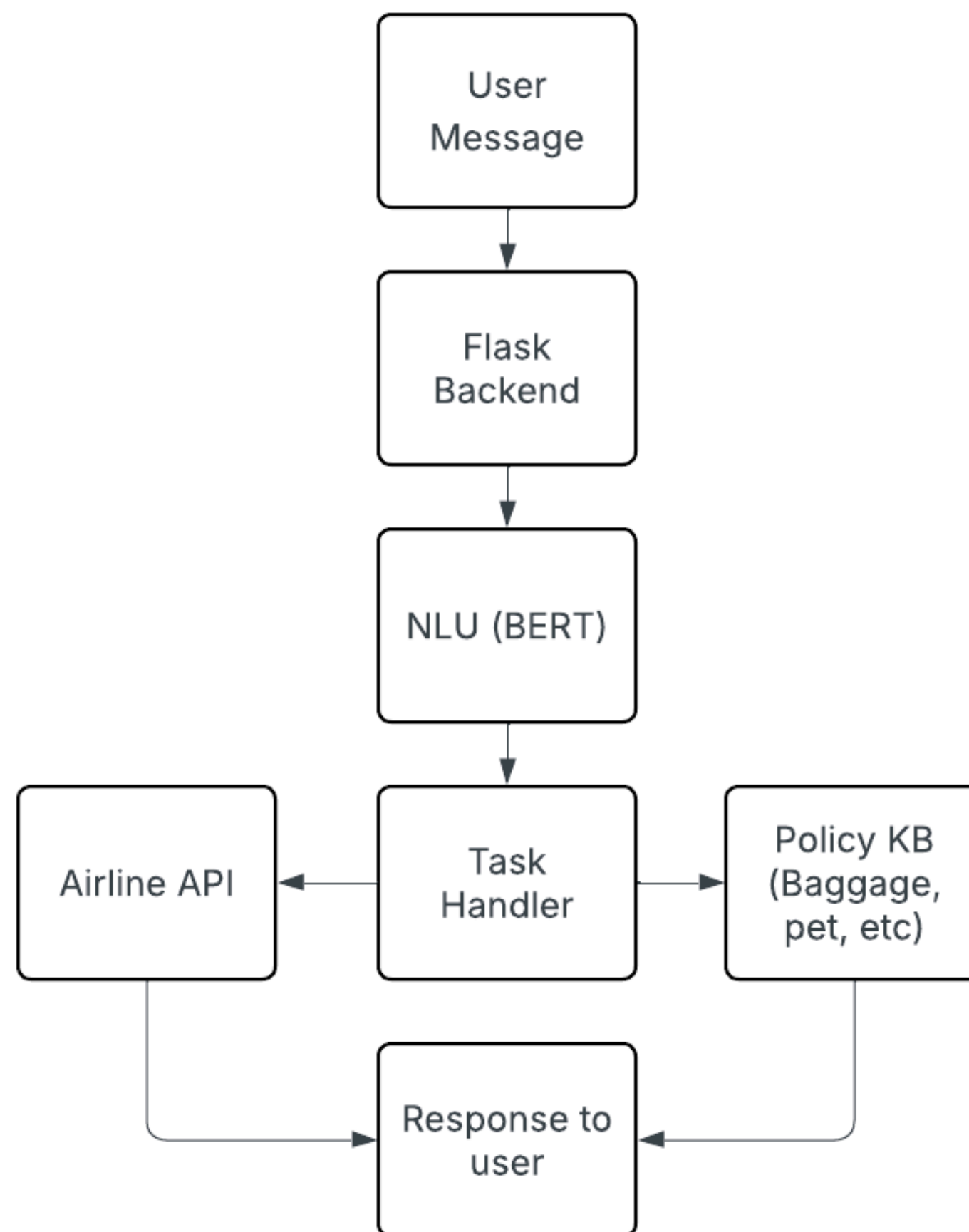
FEATURES / FUNCTIONALITIES

- Book flights: Collects departure, destination, flight number, and date – generates booking ID.
- Cancel flights: Cancel flight using booking ID and provide cancellation details.
- Check flight status: Provides up-to-date status for a booking ID.
- Policy lookup: Answers questions on baggage, refunds, check-in, meals, pets, etc.
- Seat availability: Returns available seats (currently mocked, ready for API integration).
- Intent & slot detection: BERT-based NLU predicts user intent and extracts relevant slots (flight number, date, source, destination).

OUTPUT

Booking conversation in chat UI

Airline Assistant

Chennai

Got it. Now tell me your destination city.

Mumbay

Did you mean 'Mumbai' as your destination city? (yes/no)

yes

Please provide your flight number.

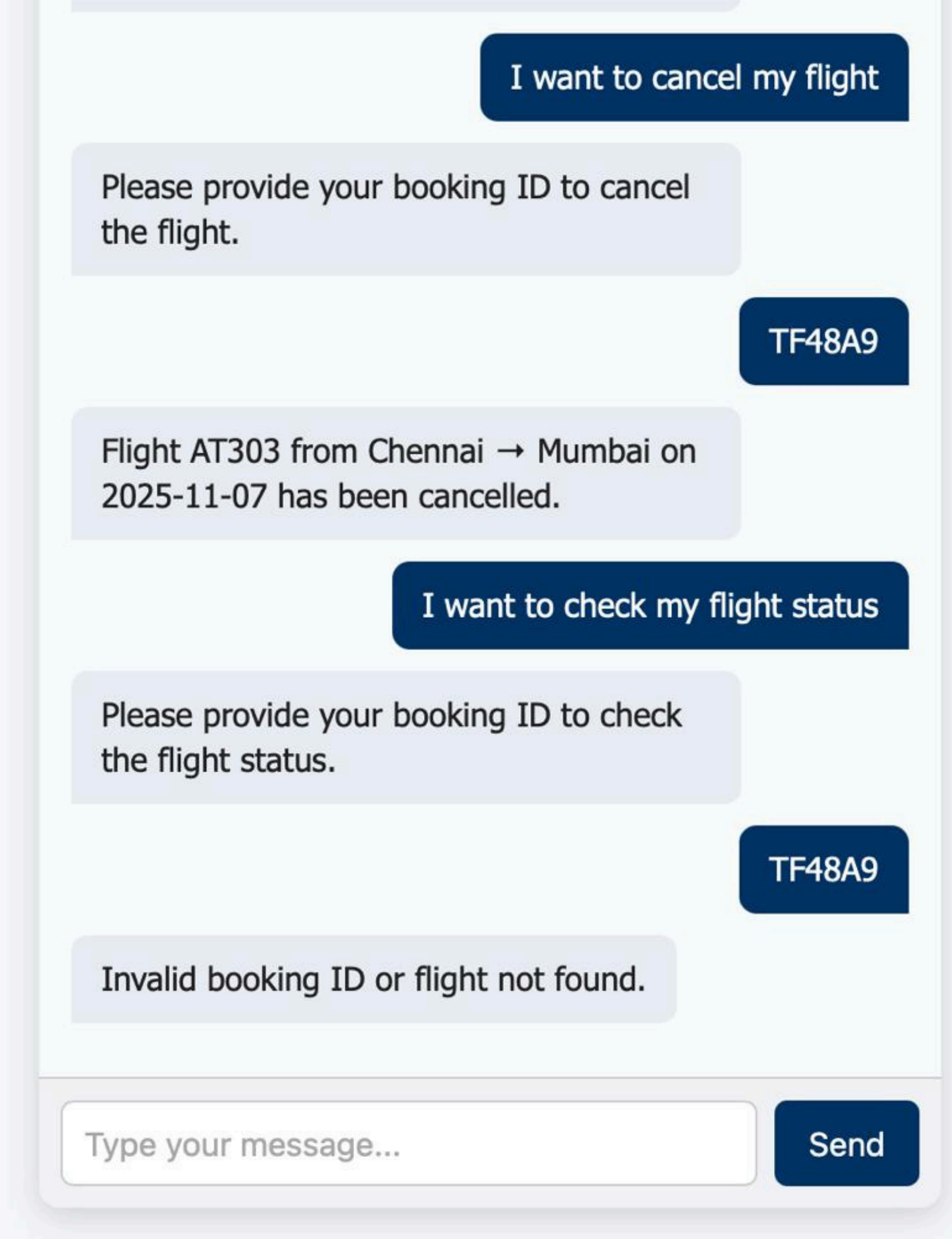AT303

Enter your flight date (YYYY-MM-DD).

2025-11-07

Flight booked successfully! Booking ID: TF48A9 From: Chennai → To: Mumbai Flight: AT303 Date: 2025-11-07

Type your message...

Send

Cancellation flow.

I want to cancel my flight

Please provide your booking ID to cancel the flight.

TF48A9

Flight AT303 from Chennai → Mumbai on 2025-11-07 has been cancelled.

I want to check my flight status

Please provide your booking ID to check the flight status.

TF48A9

Invalid booking ID or flight not found.

Type your message...   Send

Flight status check.

Enter your flight date (YYYY-MM-DD):

2025-11-07

Flight booked successfully! Booking ID: TF48A9 From: Chennai → To: Mumbai Flight: AT303 Date: 2025-11-07

I want to check my flight status

Please provide your booking ID to check the flight status.

TF48A9

Flight Status: Booking ID: TF48A9 From: Chennai → To: Mumbai Flight: AT303 Date: 2025-11-07 Status: On Time

Type your message...

Send

Policy query response

I want to cancel my flight

Please provide your booking ID to cancel the flight.

KIDPOG

Flight AT303 from Chennai → Mumbai on 2025-11-07 has been cancelled.

Will I get a refund?

Refunds are processed within 5–7 business days after cancellation.

What is the baggage limit?

Each passenger is allowed one carry-on bag up to 7 kg and one checked bag up to 15 kg.

Type your message... Send

AI POWERED INTENT AND SLOT DETECTION

- Trained BERT-based NLU to understand user intent and extract relevant slots.
- Intents covered: BookFlight, CancelFlight, FlightStatus, PolicyQuery.
- Slots extracted: flight number, date, source, destination, topic (for policy queries).
- Fully trained and ready to integrate into the chatbot.
- Demonstrates the system is AI-ready and capable of understanding natural language queries.

```
You: Are pets allowed
Intent: Pet_Travel
Slots: {'pet_topic': 'pets'}

You: Cancel Flight
Intent: Cancel_Trip
Slots: {'flight_action': 'Cancel'}
```

```python
# Intent model
intent_model = BertForSequenceClassification.from_pretrained("./intent_model"
intent_tokenizer = BertTokenizer.from_pretrained("./intent_model")
intent_model.eval()
intent_id2label = intent_model.config.id2label

# Slot model
slot_model = BertForTokenClassification.from_pretrained("./slot_model")
slot_tokenizer = BertTokenizerFast.from_pretrained("./slot_model")
slot_model.eval()
slot_id2label = slot_model.config.id2label
```

CHALLENGES & LIMITATIONS

- **Time constraints during hackathon → Some API calls (seat availability, cancellation) are mocked.**

- **Partial integration of BERT NLU into chatbot flow; currently using keyword-based responses.**

- **UI is basic (HTML/CSS proof-of-concept, not fully polished).**

- **Single industry demo (airline only).**

FUTURE IMPROVEMENTS

- Integrate real airline APIs for booking, cancellation, and seat availability.

- Fully integrate BERT NLU into the chatbot for AI-powered intent recognition and slot filling.

- Add visual tooling for admin to configure tasks, policies, and workflows easily.

- Extend to multiple industries and customers, making the platform more versatile.

- Deploy on cloud to ensure low-latency, production-ready performance.

THANK YOU