

POST GRADUATE
PROGRAM IN
**GENERATIVE AI
AND ML**

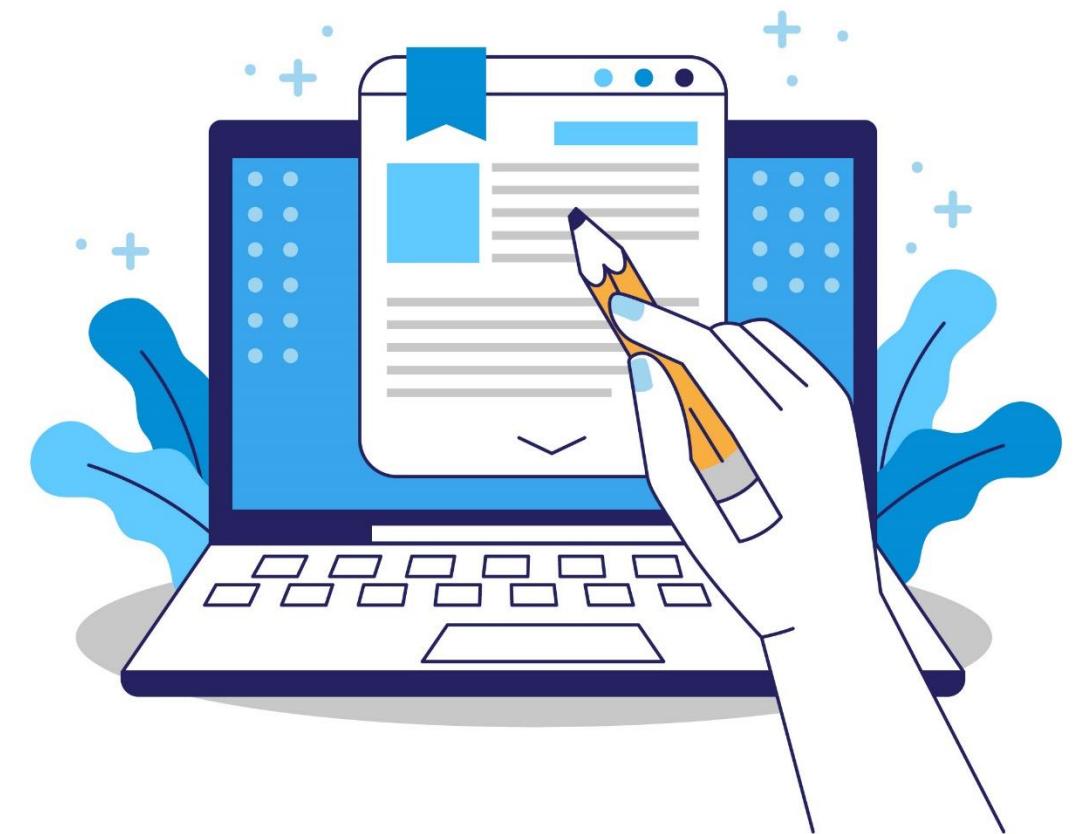
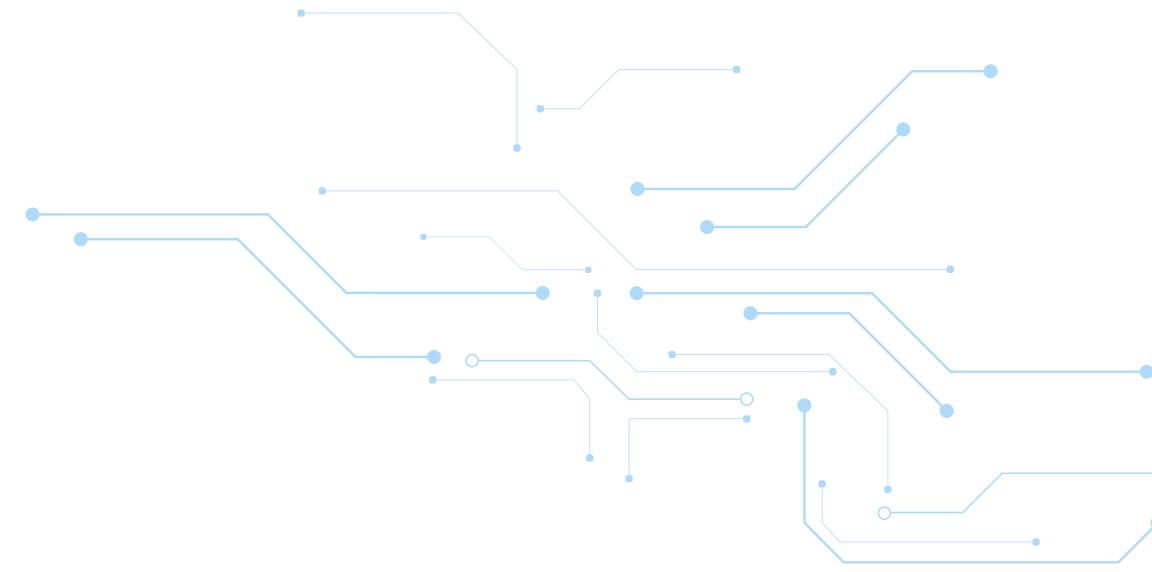
**Natural Language
Processing**



Building Chatbots

Topics

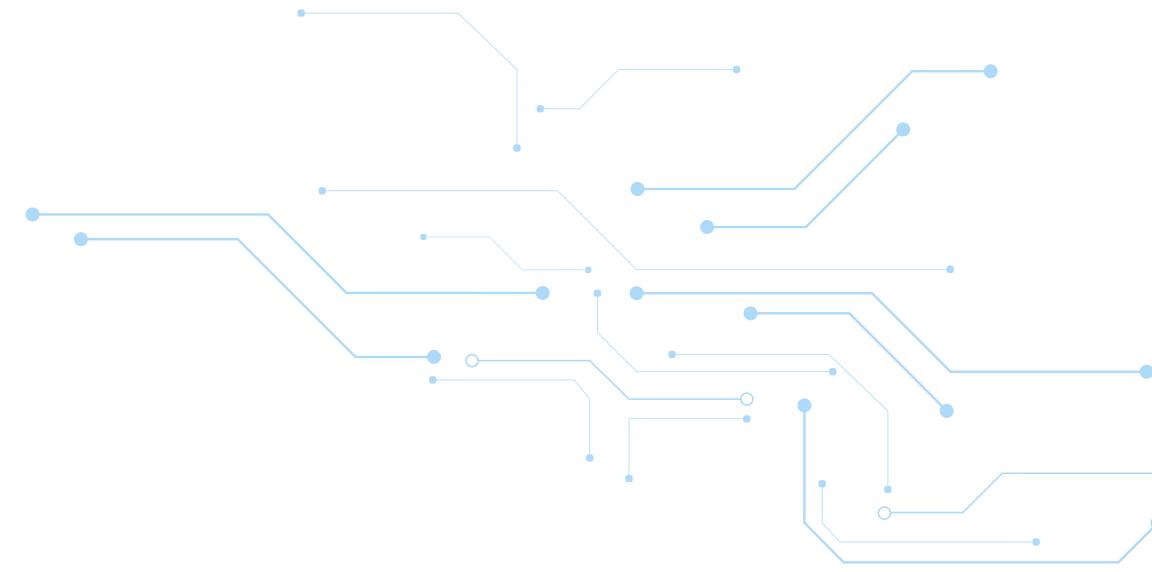
- e! NLP for Chatbot Frameworks
- e! Understanding Intents and Entities in Chatbots
- e! Chatbot Integration with Business Workflows
- e! Fine-Tuning Models for Contextual Chatbots
- e! Evaluating Chatbot Performance (Accuracy, Coherence, User Feedback)



Learning Objectives

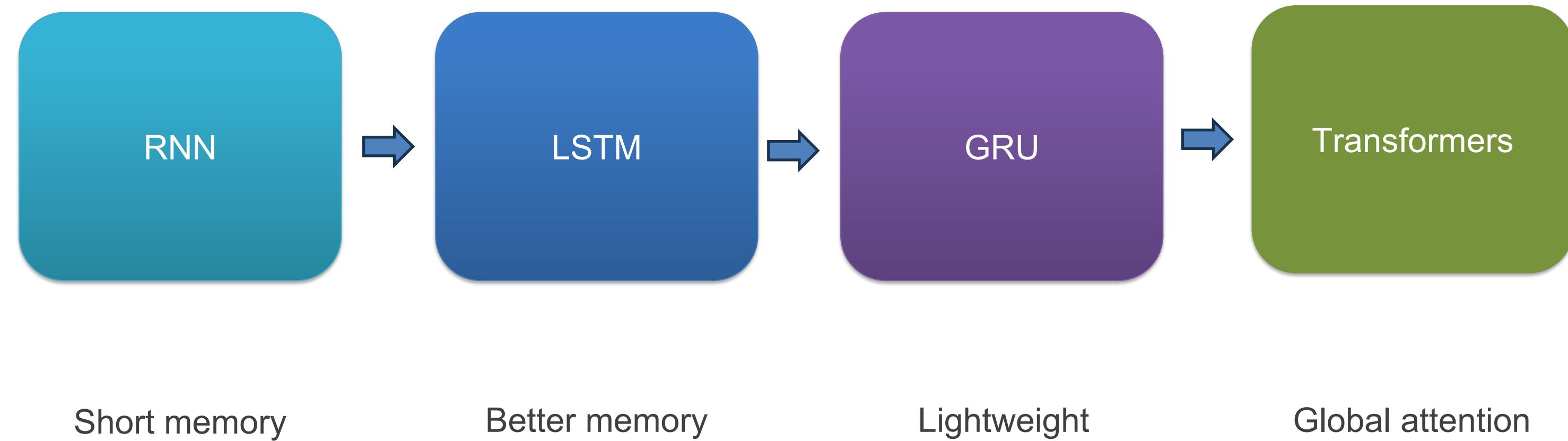
By the end of this lesson, you will be able to:

- e! Understand the role of neural models in powering NLP-based chatbots.
- e! Identify key components like intent detection, entity recognition, and context modelling.
- e! Explain how reinforcement learning from human feedback improves chatbot responses.
- e! Apply chatbot architectures to automate workflows across business systems.



NLP for Chatbot Frameworks

Evolution of Neural Architectures for Chatbots



What is NLP in Chatbots?

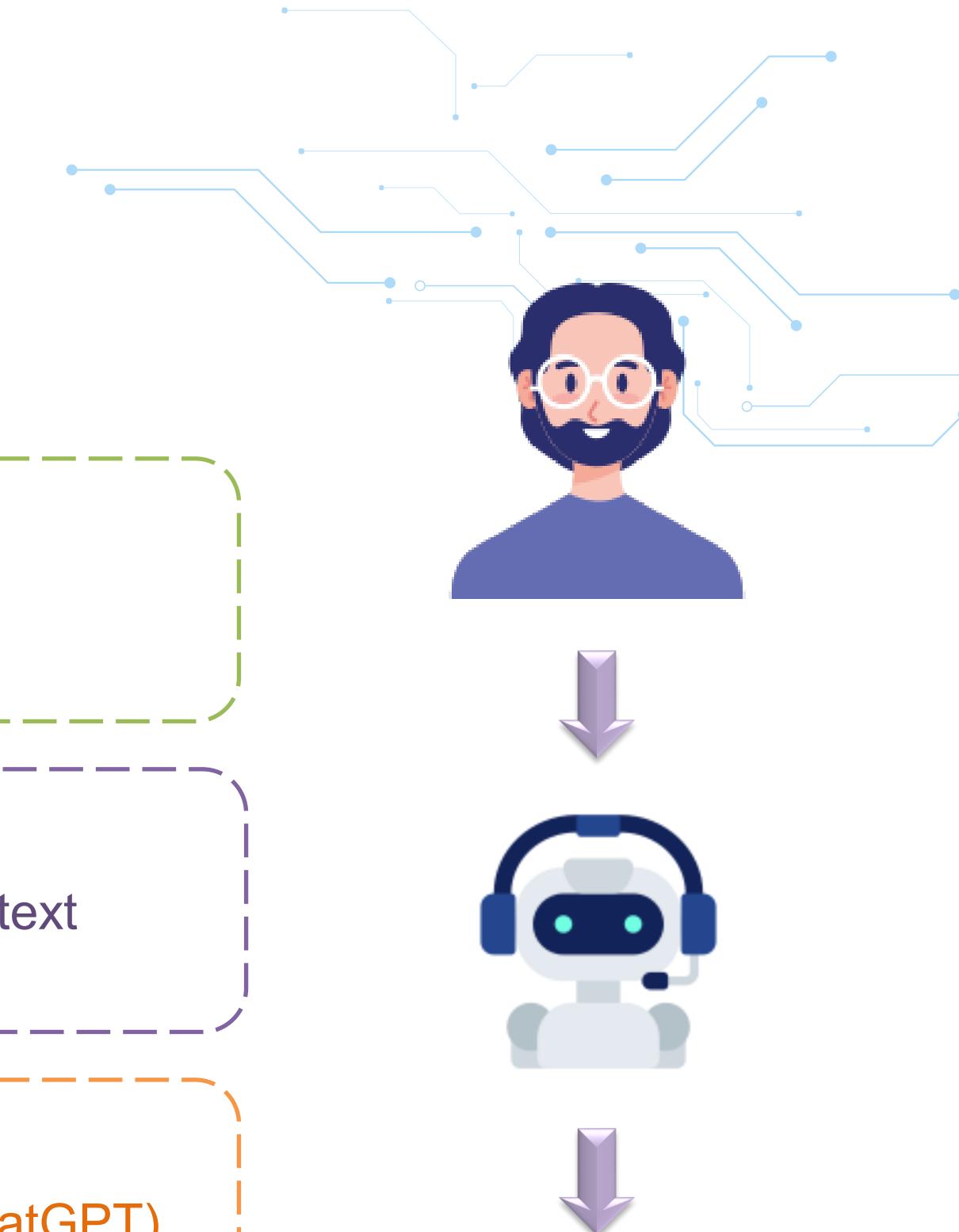


Enables bots to understand user intent

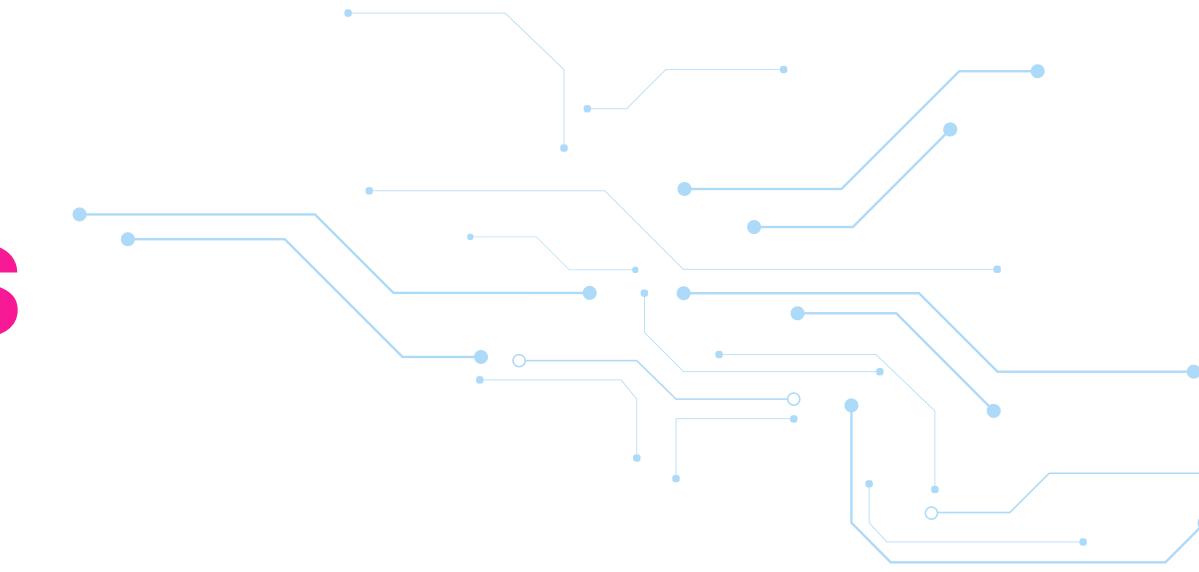
Processes natural language input & generates text

Core of voice/text-based assistants (e.g., Alexa, ChatGPT)

“What can I help you with?”



Comparison of NLP Frameworks



Framework	Language Support	Customization	Deployment Ease
Rasa	✓	High	Medium
Dialogflow	✓	Medium	Easy
Botpress	✗	High	Medium

Core NLP Tasks in Chatbots

01

Intent Detection – Understand what
the user wants

Entity Recognition – Extract keywords
like names, dates

02

Dialogue Management – Maintain
coherent multi-turn conversations

03

I need to book a flight

Intent Detection

Sure, where are
you traveling to?

New York

Entity Recognition

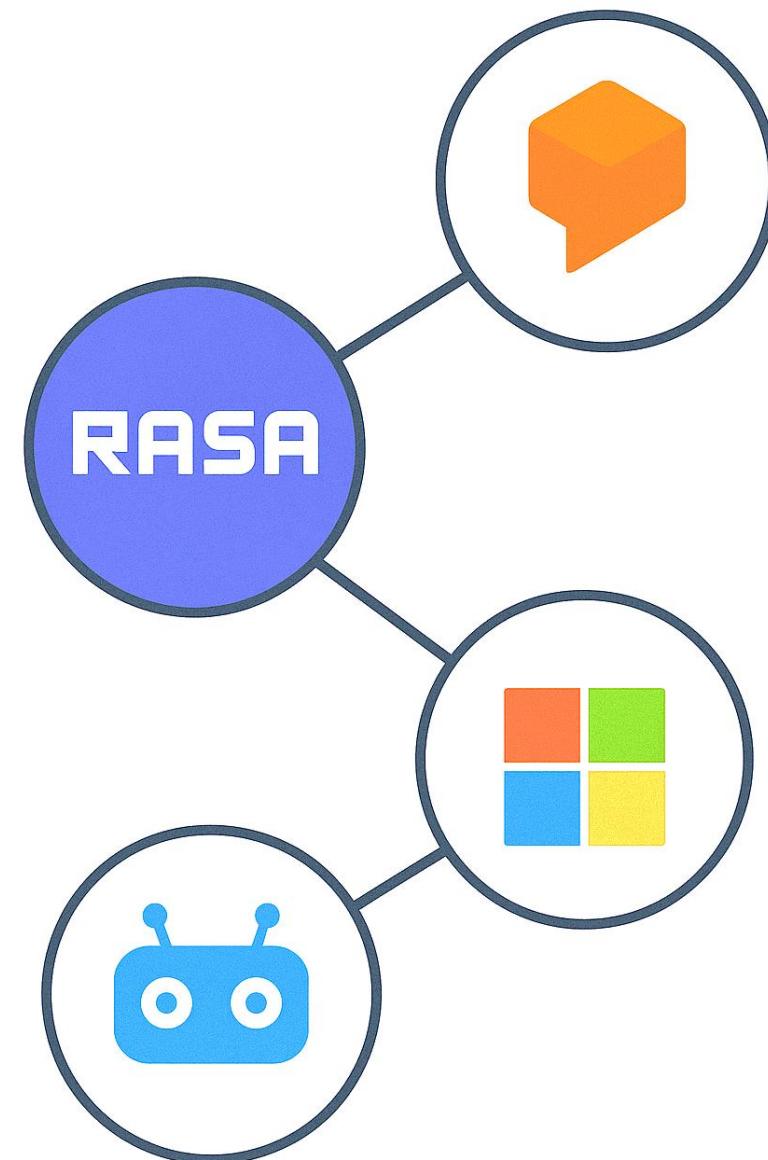
What date do you
want to travel?

Popular NLP Frameworks for Chatbots

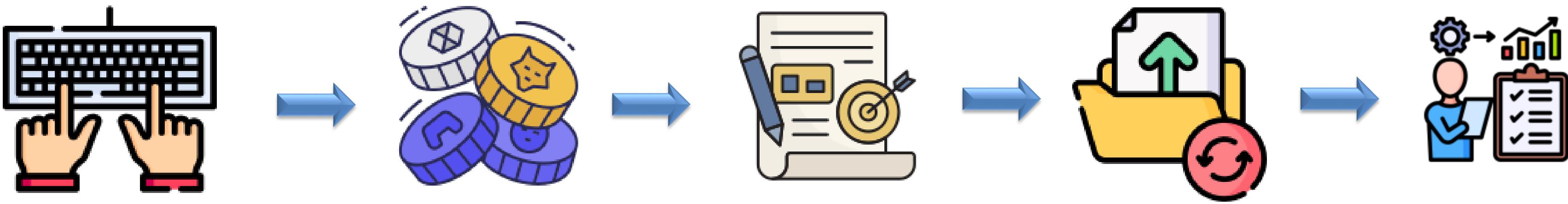
Rasa – Open-source NLP + dialogue manager

Dialogflow – Google's NLU with easy deployment

Botpress / Microsoft Bot Framework – Modular,
integratable tools

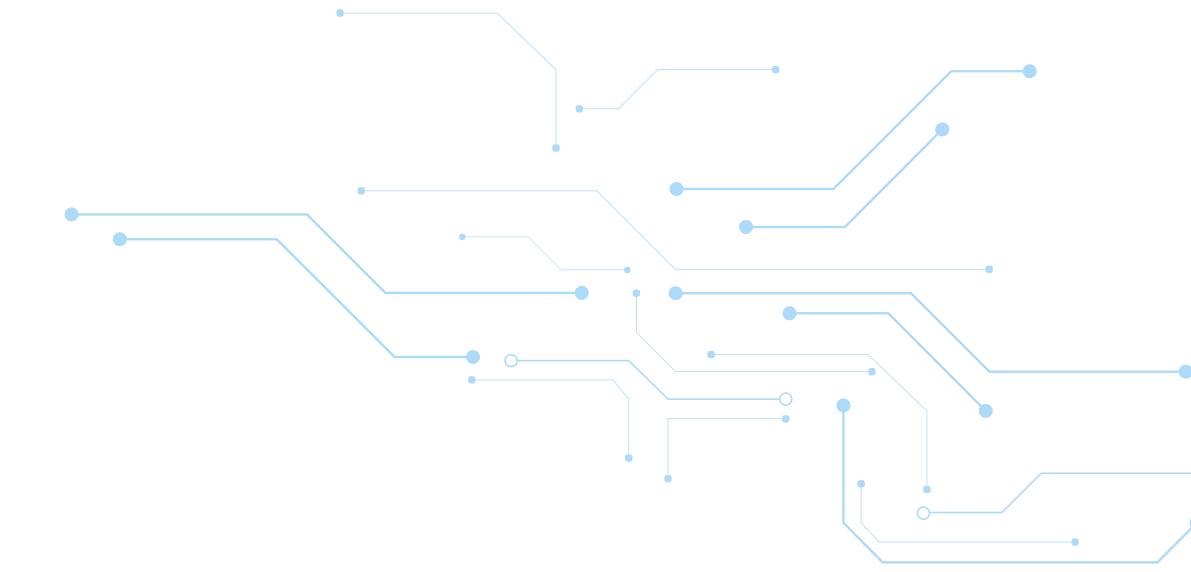


Example Pipeline



User input → Tokenization → Intent classification → Entity extraction → Response generation

Challenges in NLP for Chatbots



01

Handling ambiguous or noisy input



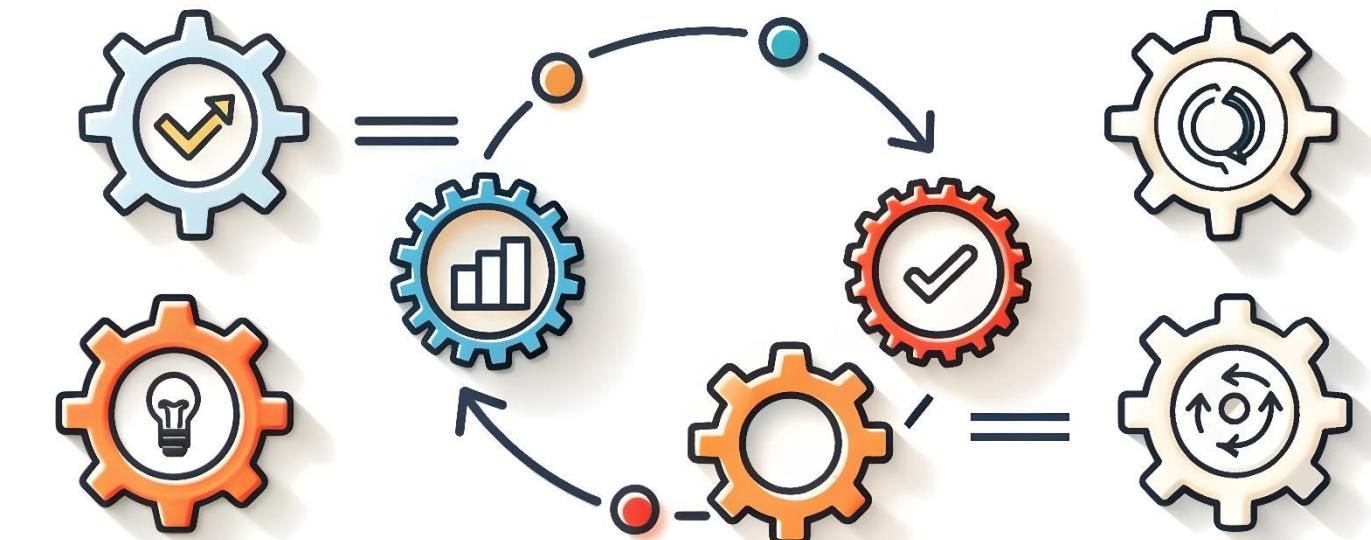
02

Multilingual understanding

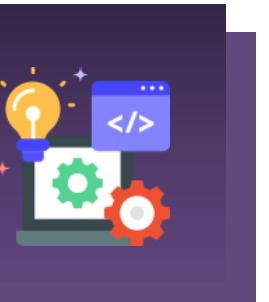


03

Maintaining context over turns



Limitations of Traditional Rule-Based Chatbots

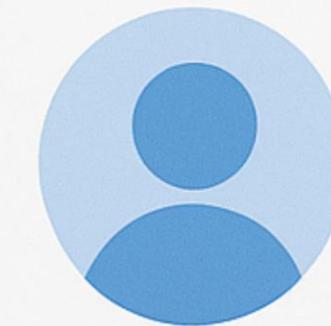
- 01 ► Hardcoded patterns**
- 02 ► Poor scalability**
- 03 ► No learning from feedback**



Understanding Intents and Entities in Chatbots

Understanding Intents and Entities in Chatbots

How chatbots understand what users want and extract useful information

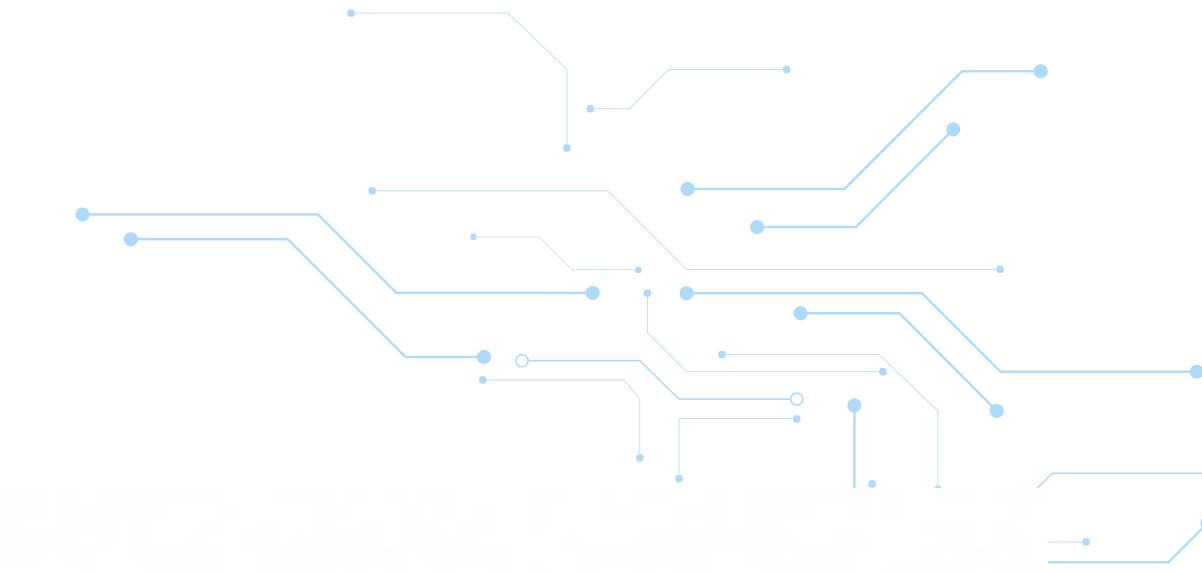


**Book a
flight to
Paris**

**intent:
book_flight**

**entity:
location = Paris**

What are Intents?

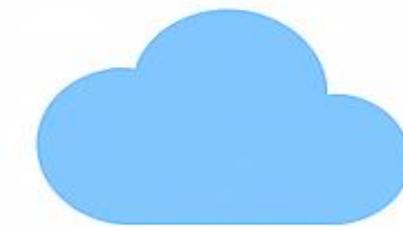


'Book a ticket' → **book_flight**

'What's the weather?' → **get_weather**



book_flight



get_weather



send_message

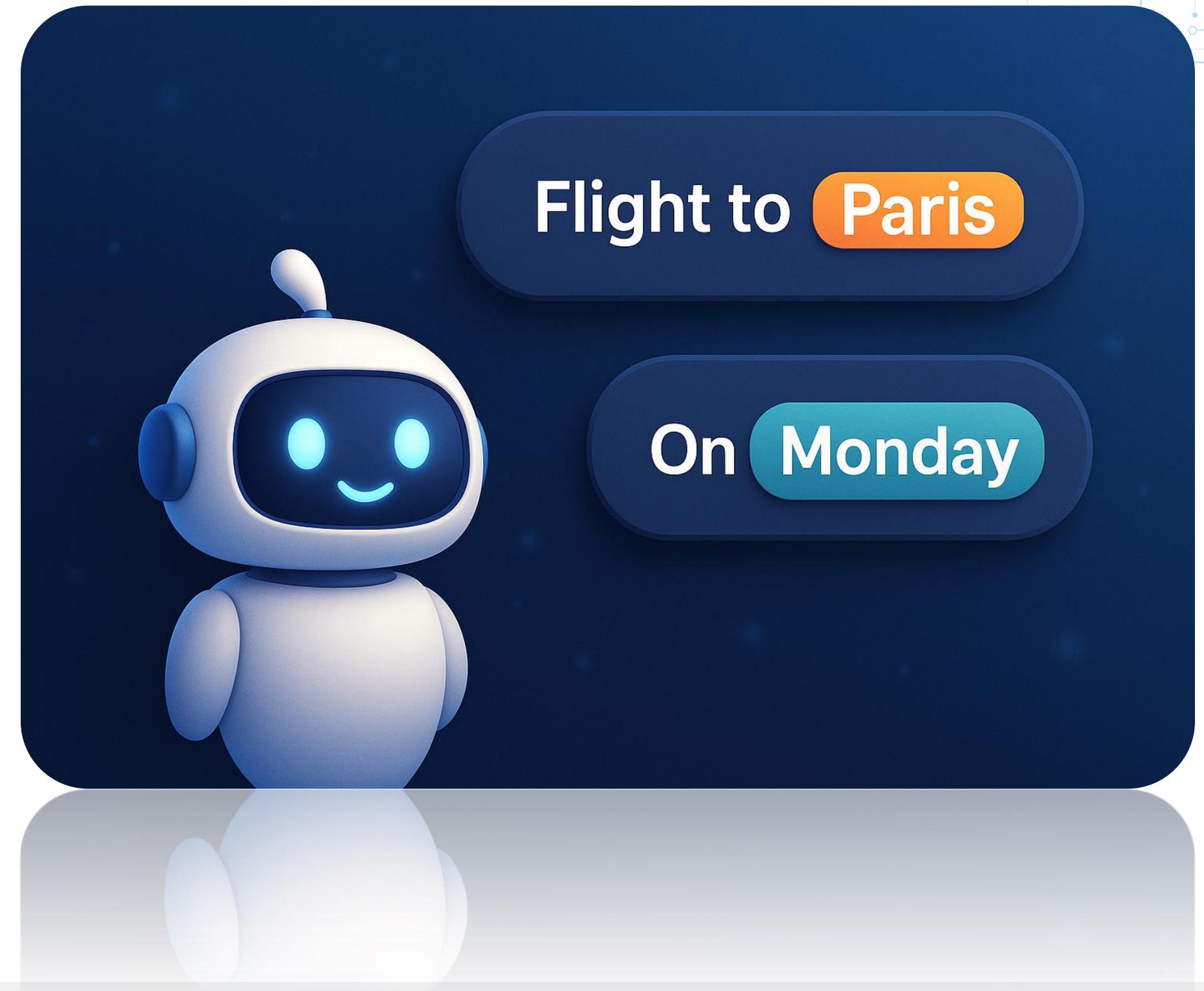
One message = one man intent

What are Entities?

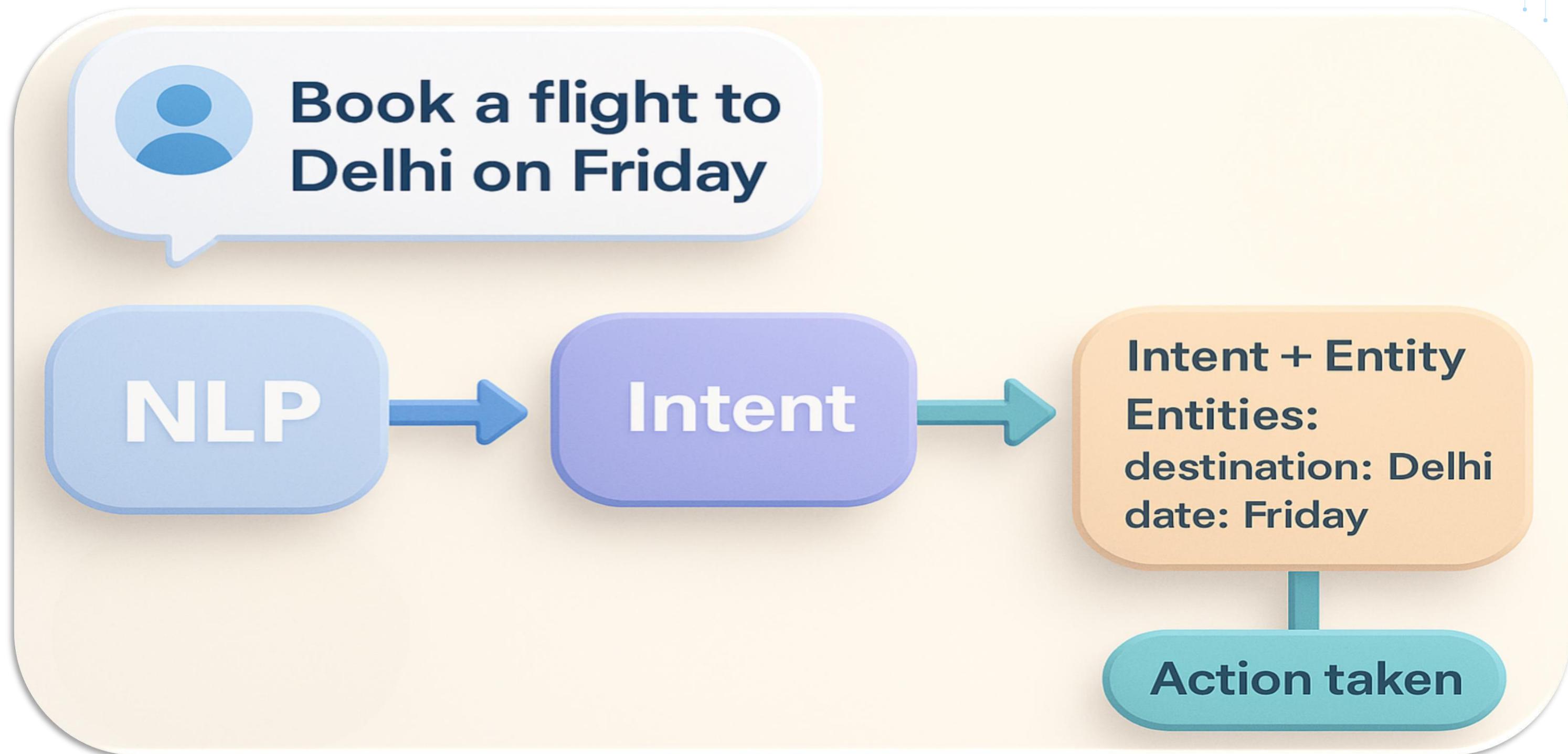
Entities = Key details in the user's input

Extract info to fulfill the intent:

- e! “Flight to Paris” → Entity: destination = Paris
- e! “On Monday” → Entity: date = Monday



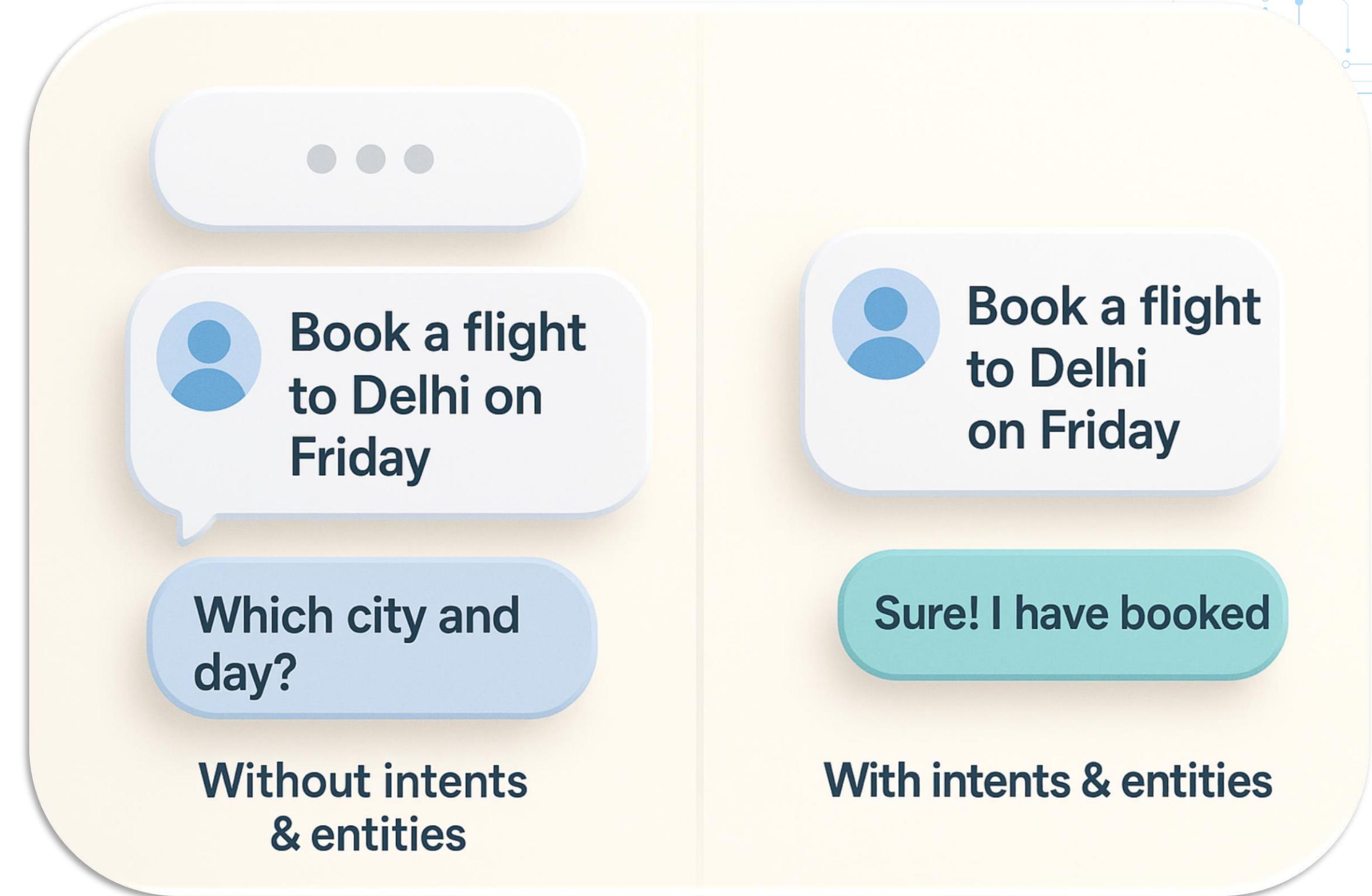
Intents + Entities in Action



Why They Matter for Chatbots

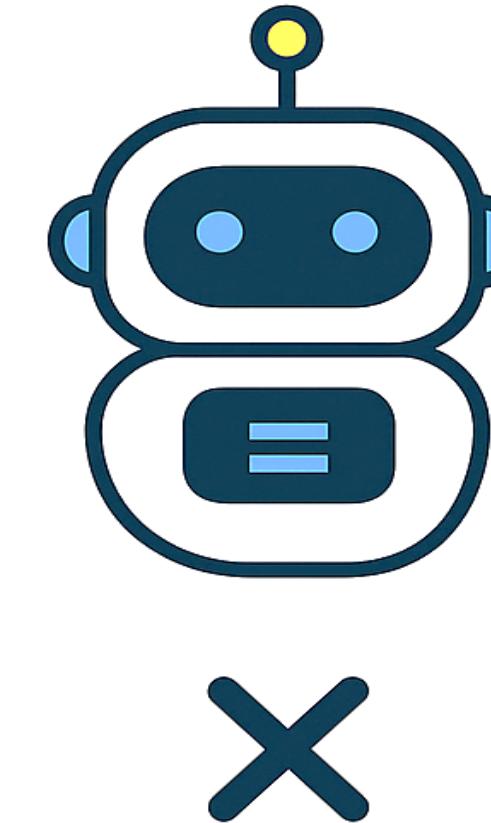
Enables:

- e! Better automation
- e! Context-aware responses
- e! Reduced ambiguity

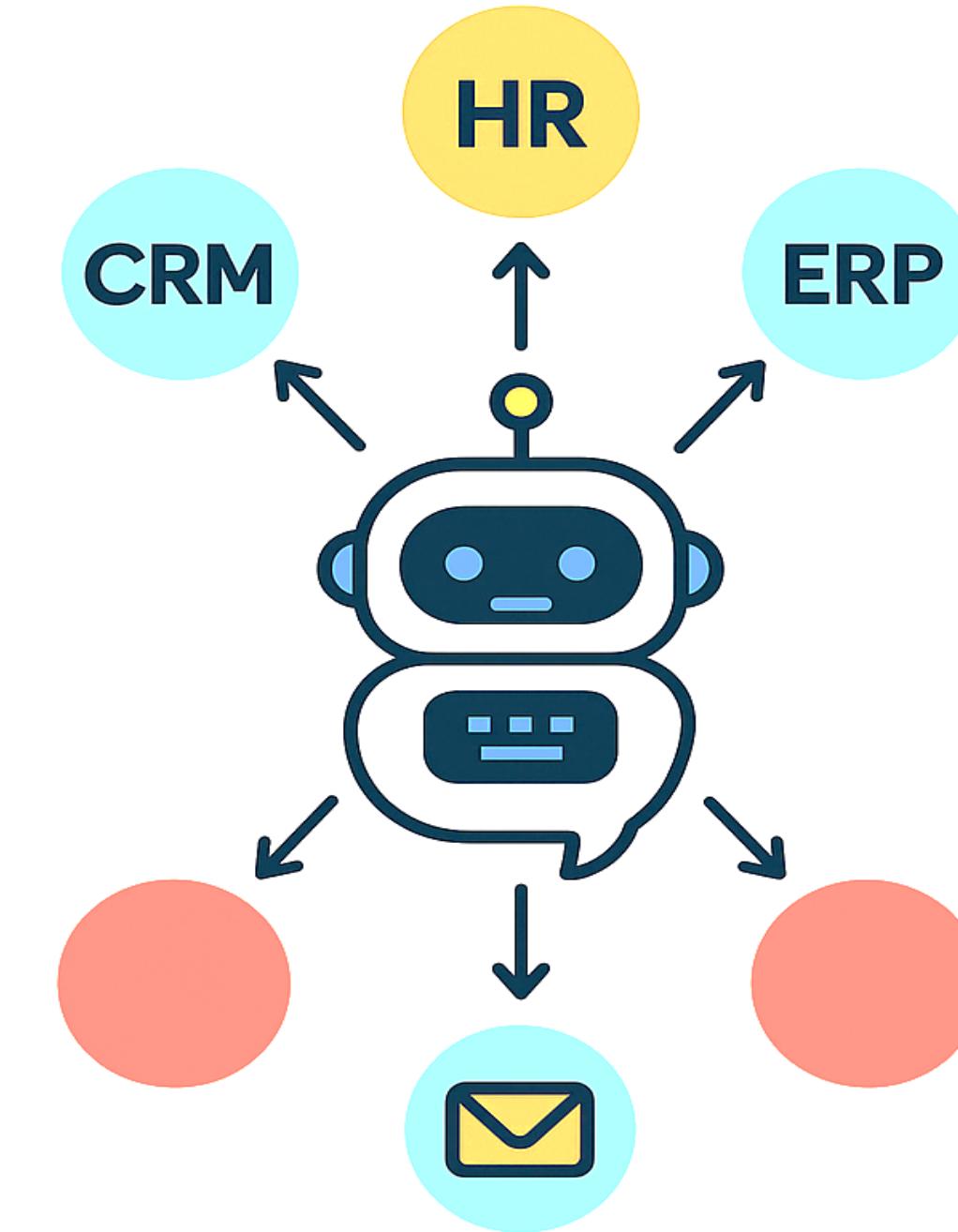


Chatbot Integration with Business Workflows

Integrate Chatbots with Business Workflows

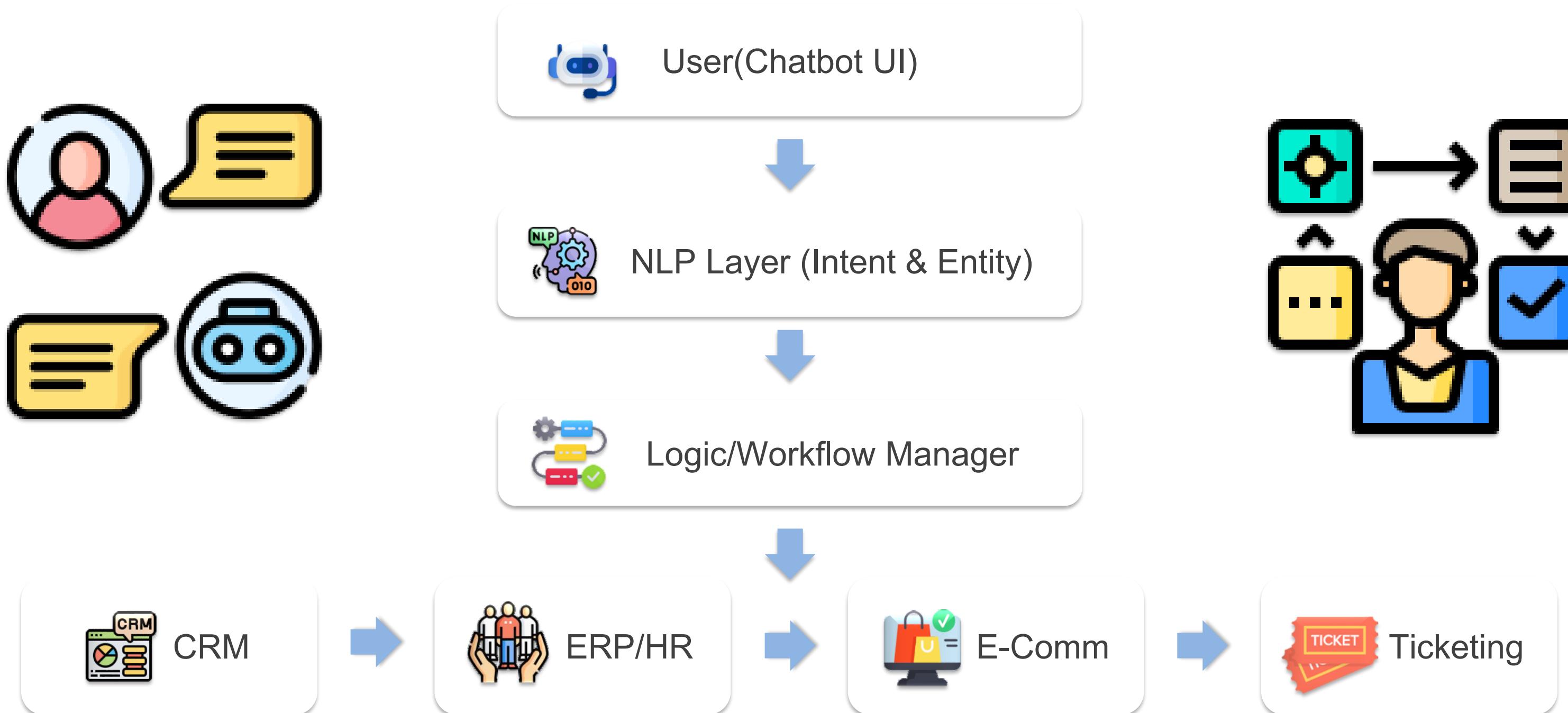


✖ Traditional bots are limited to FAQs

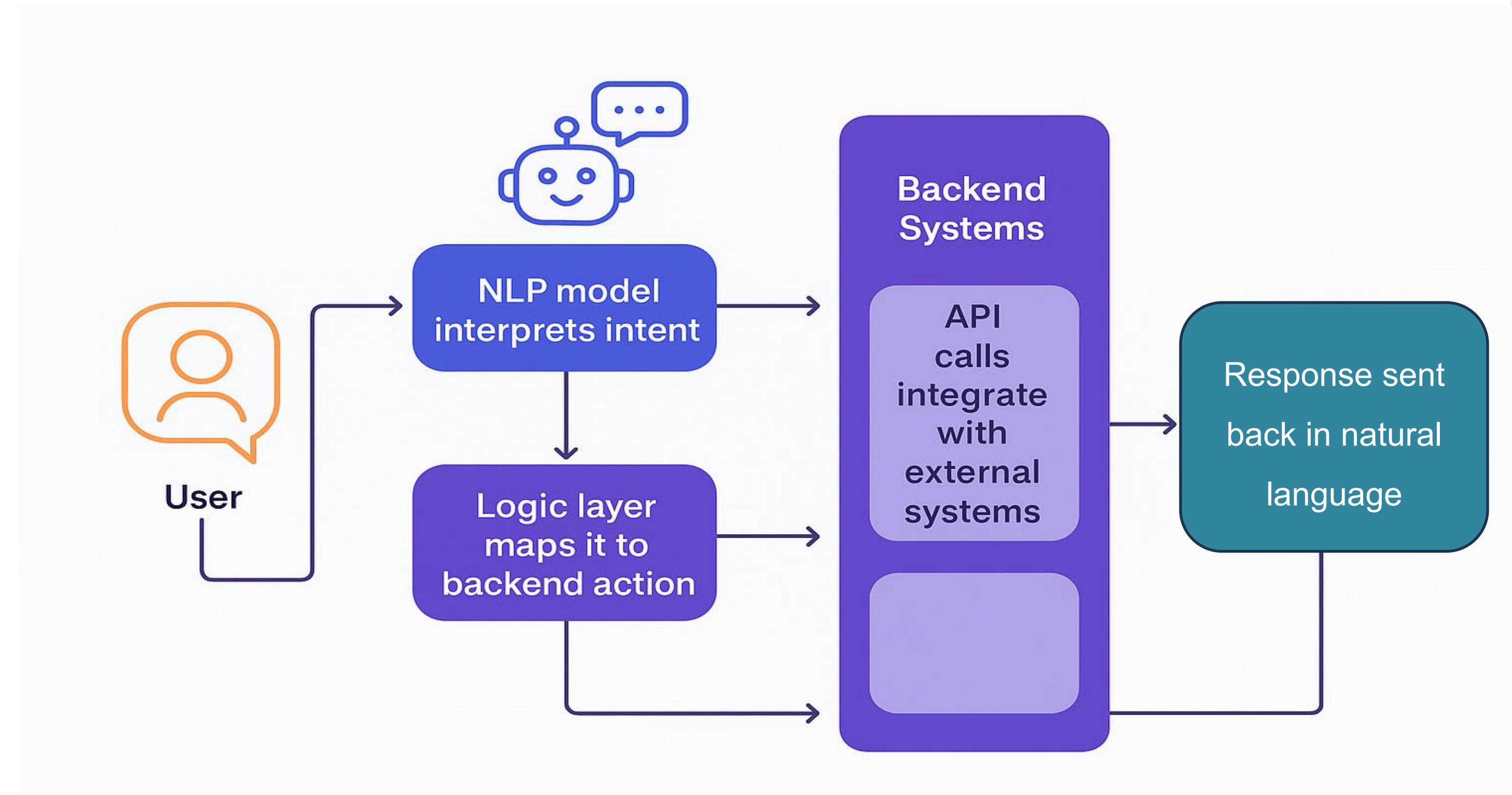


✓ Integrated bots automate entire business processes:

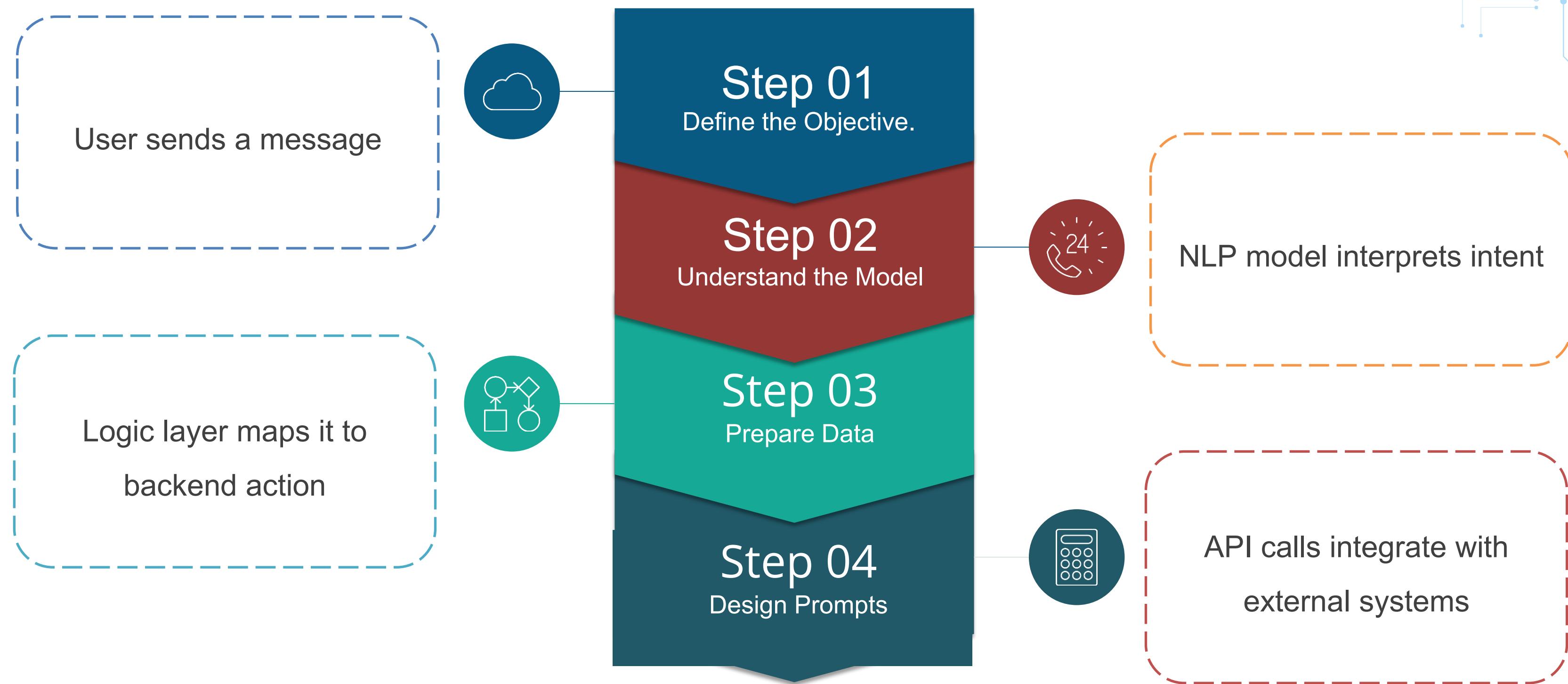
Chatbot Integration Architecture



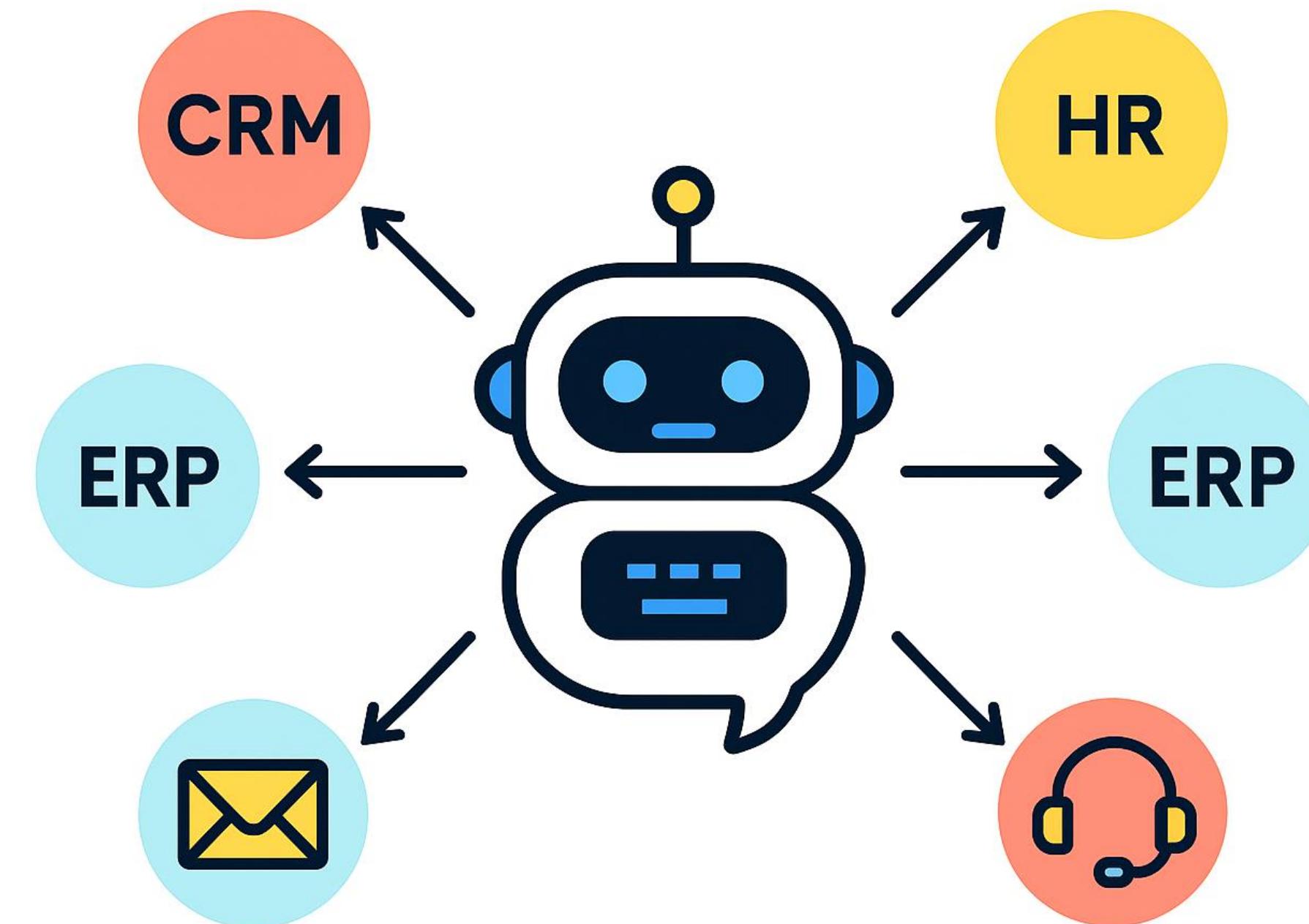
Key Integration Points



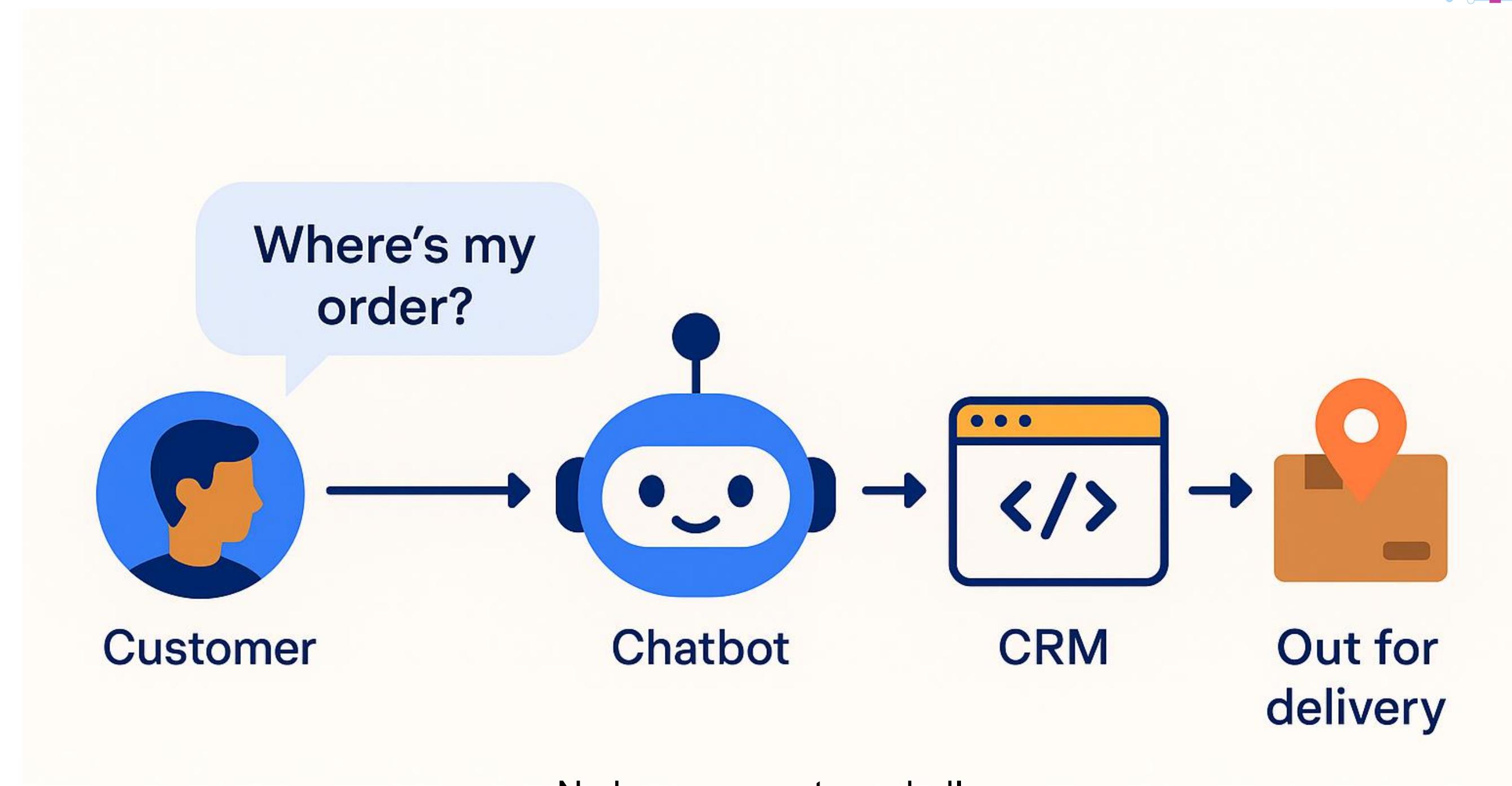
How It Works – Architecture Overview



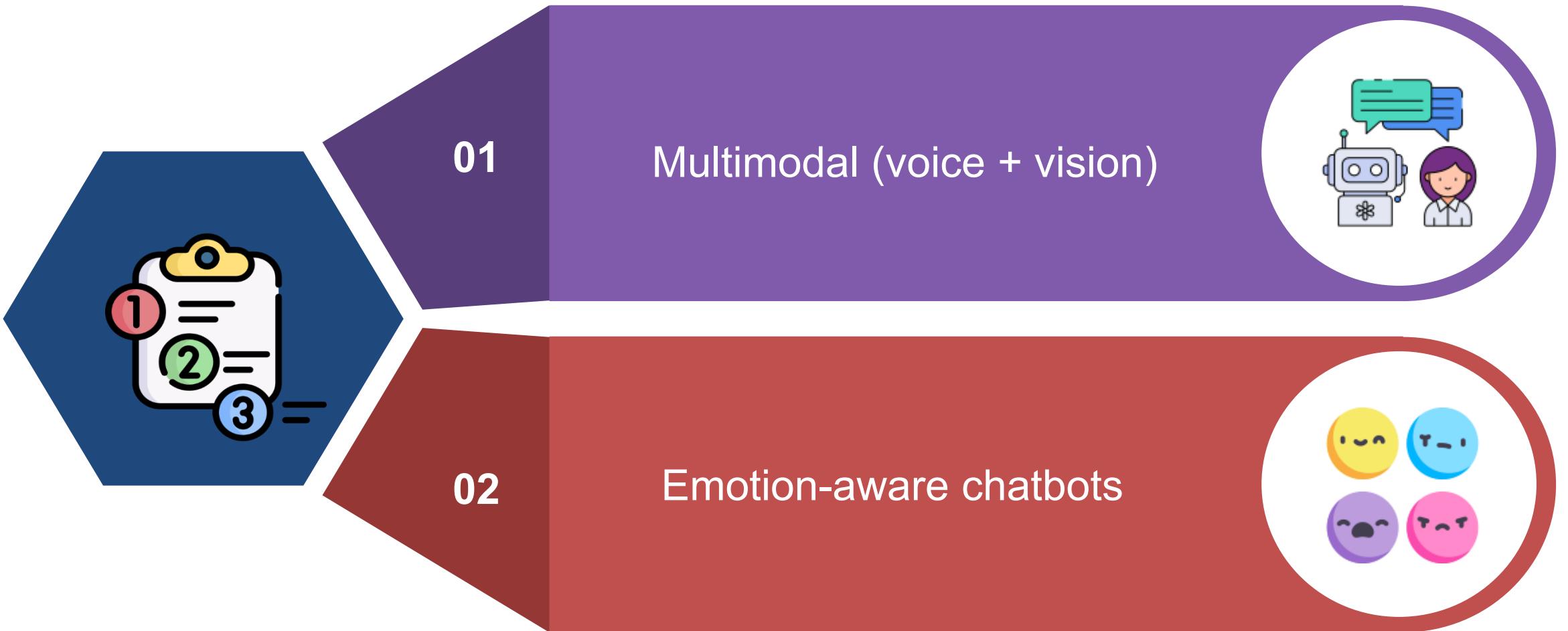
Applications of Chatbot



Real-World Use Case – E-commerce Support



Future of Chatbots with Neural Models



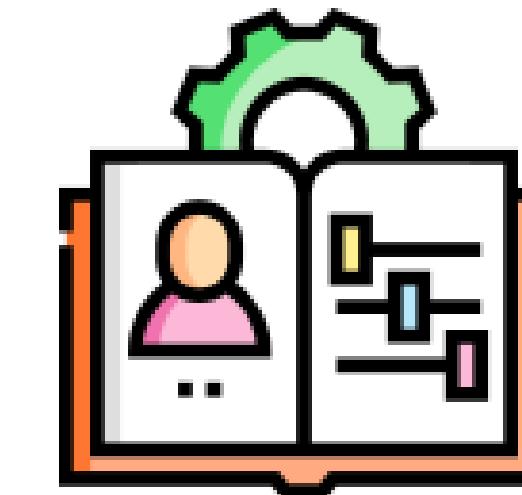
Benefits of Chatbot Integration



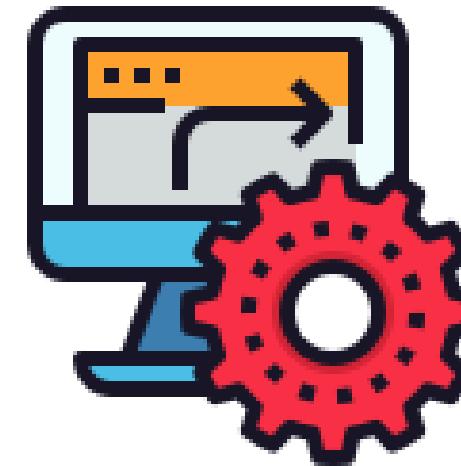
Faster resolution



Reduced support costs



Personalized responses

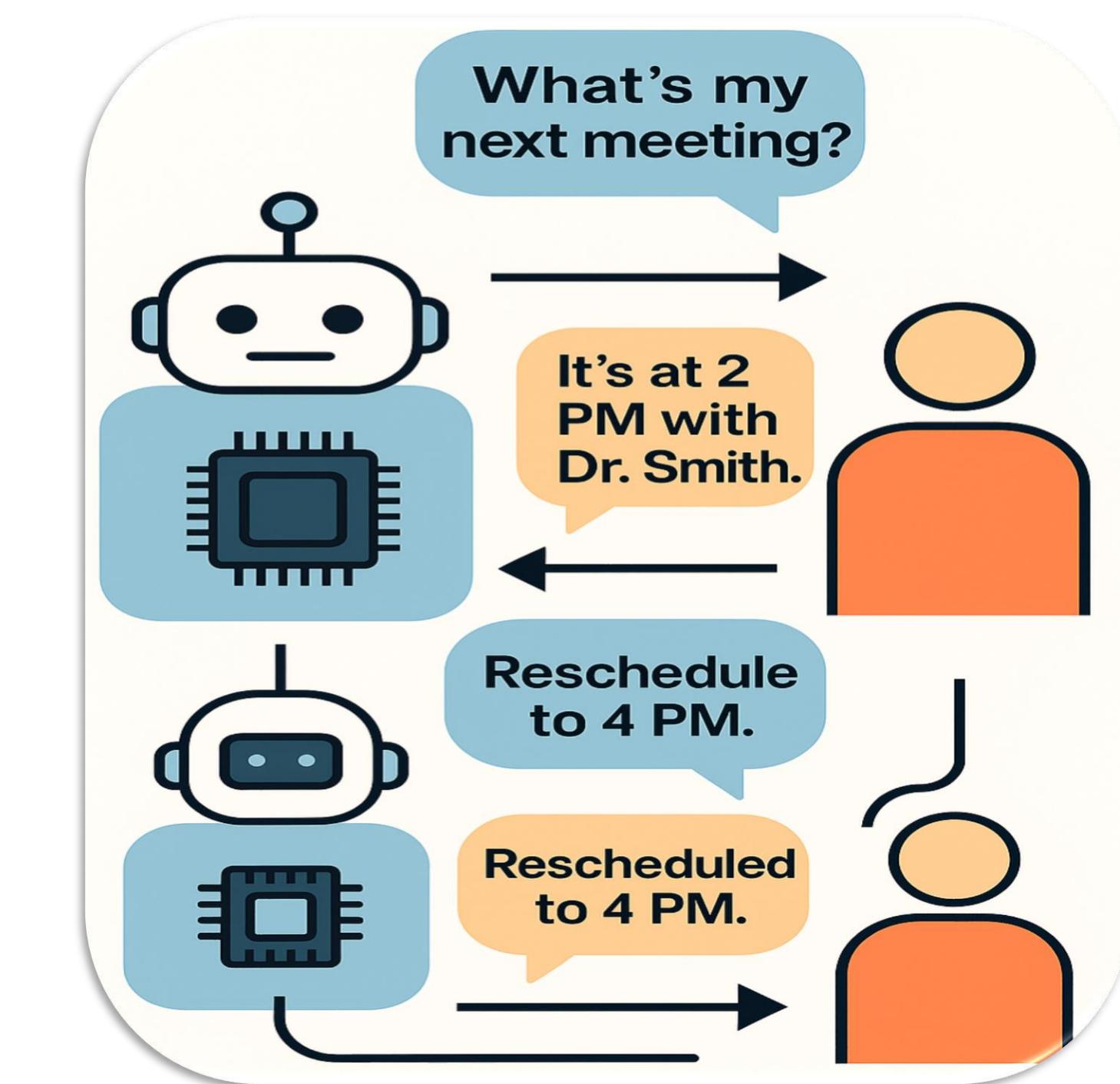


24/7 automation

Fine-Tuning Models for Contextual Chatbots

Fine-Tuning Models for Contextual Chatbots

Teaching chatbots to remember,
relate, and respond intelligently



What is Context in Chatbots?

Context = chatbot's ability to understand:

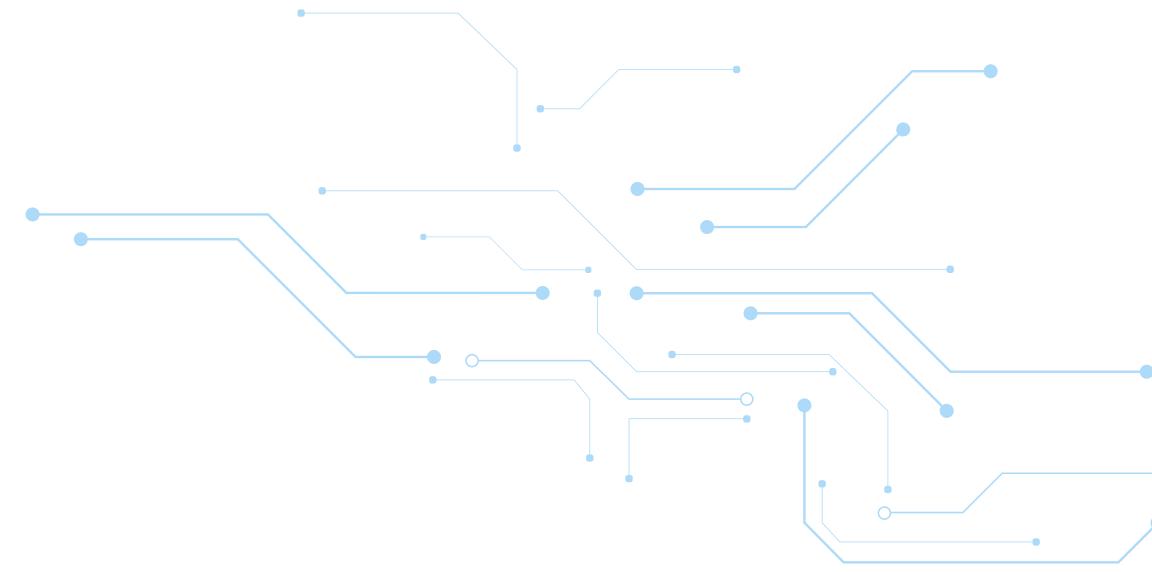
- e! Previous user messages
- e! User profile or preferences
- e! Ongoing topic

Without context → responses are disjointed

For example: User says “I bought my first car”



Why Fine-Tuning Helps



01

Maintain conversation flow

Handle pronouns, ellipsis ("that", "it")

02

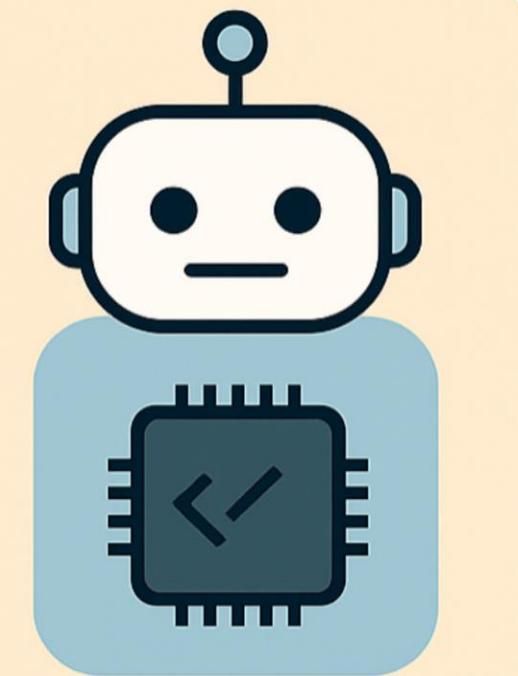
Adapt tone and behavior to audience

03

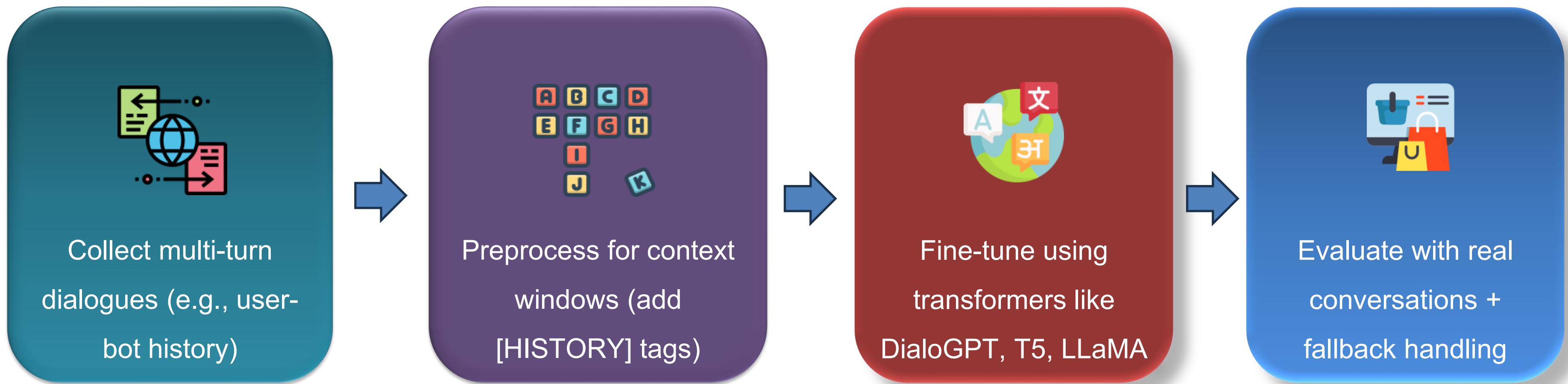
**BASE
MODEL**

**CUSTOM
DATA**

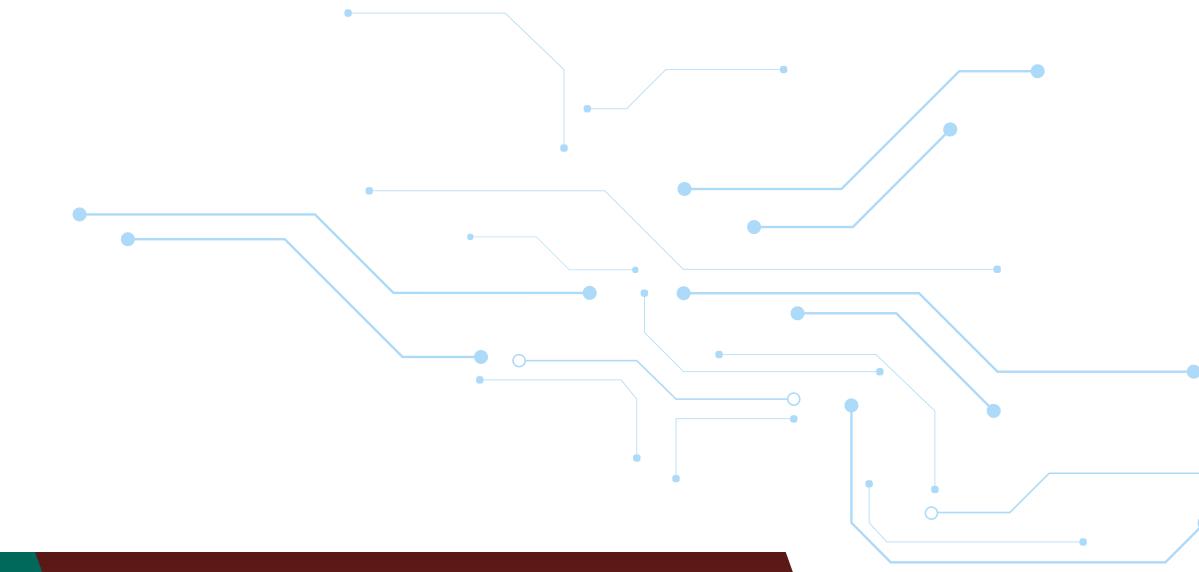
**CONTEXT-
AWARE**



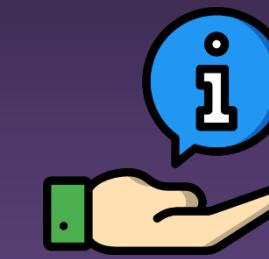
How to Fine-Tune for Context



Best Practices & Tools



Use intent/entity
pipelines with
memory modules



Use feedback loops:
update model with failed
responses



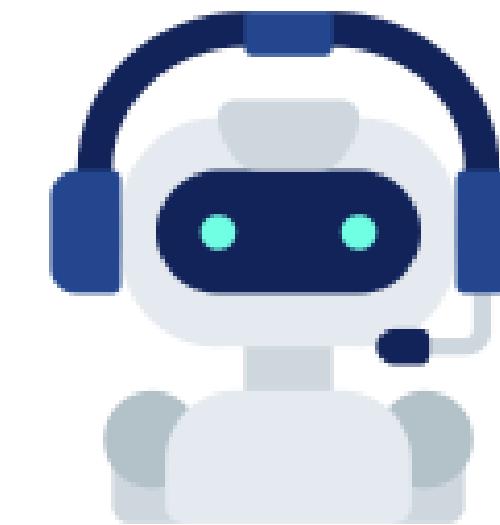
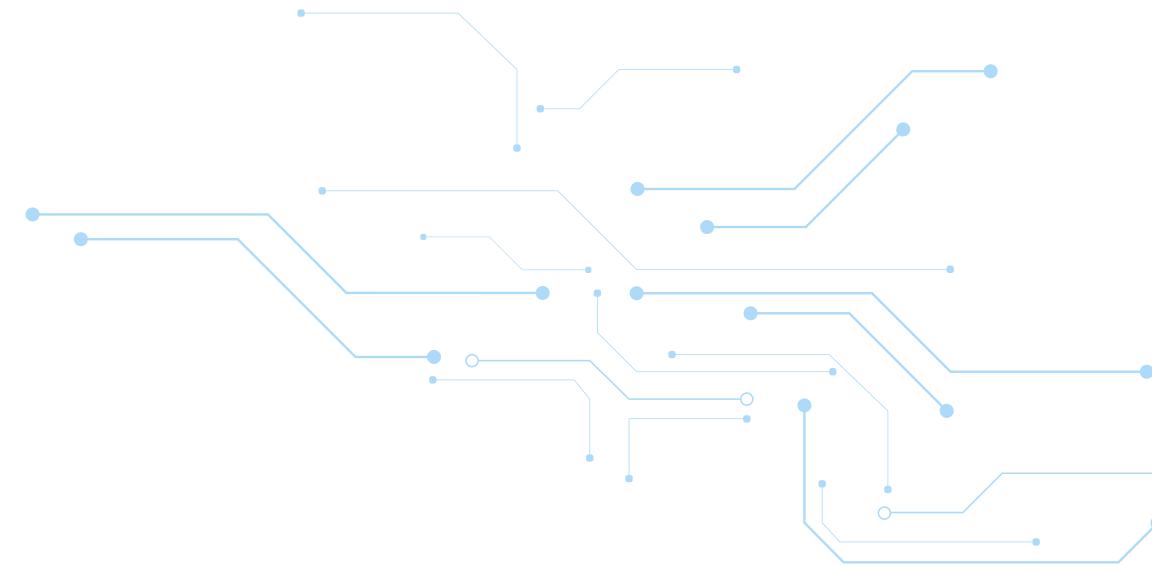
Tools: Hugging Face
Transformers, Rasa,
LangChain



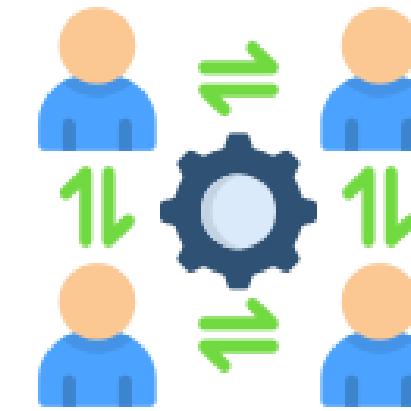
Keep sessions short but
meaningful (context
window size)

Evaluating Chatbot Performance (Accuracy, Coherence, User Feedback)

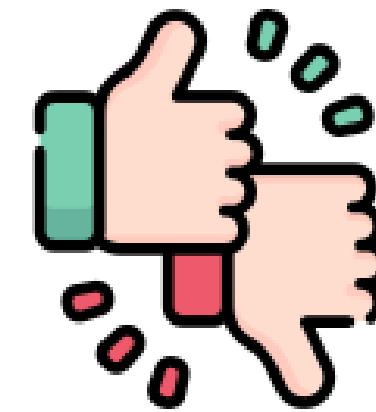
Evaluating Chatbot Performance



Accuracy

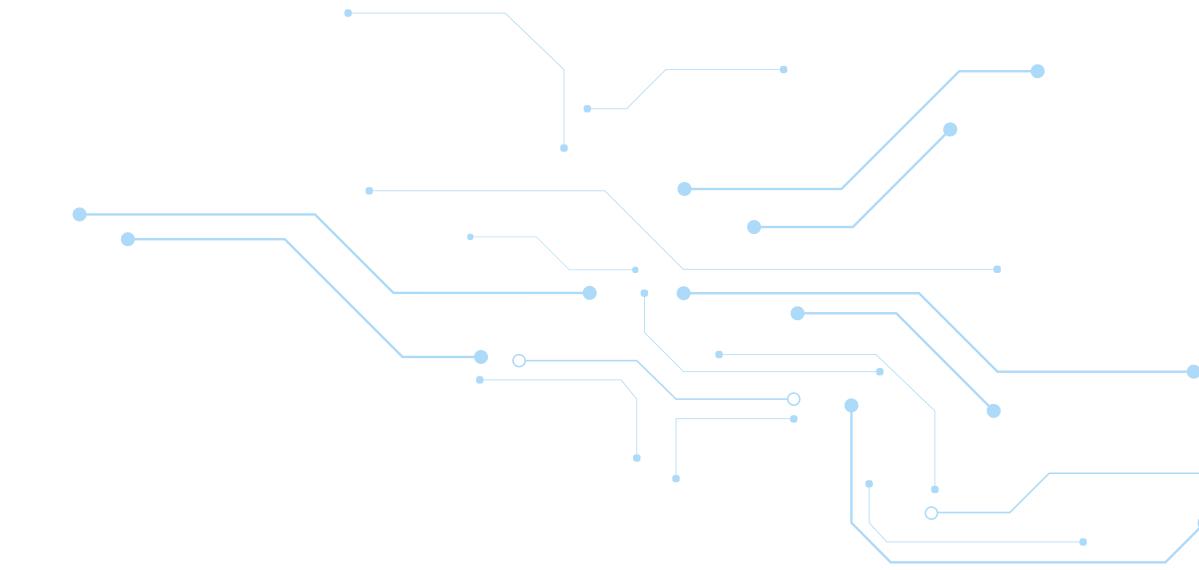


Coherence



Feedback

Metric 1 – Accuracy



Correctness of facts/information

Accurate intent classification

Correct entity extraction



Confusion Matrix



BLEU/ROUGE



F1-Score

Metric 2 – Coherence



Topic consistency

Pronoun reference clarity

Multi-turn understanding

Coherent conversation

Where's my order?



It's on the way.



Incoherent conversation

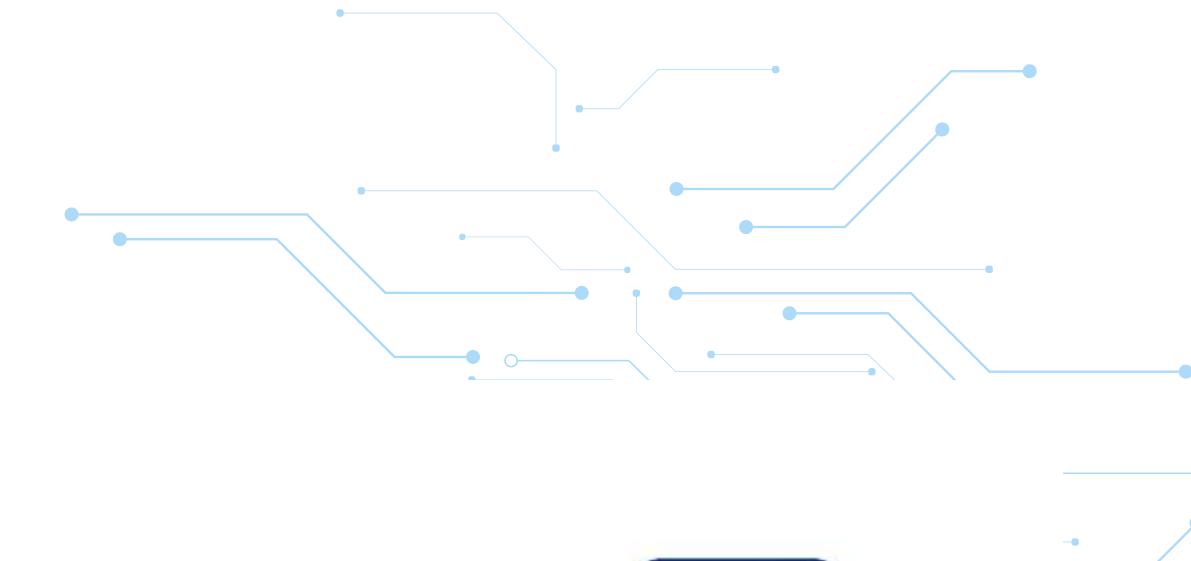
Where's
on way~?



Which order?



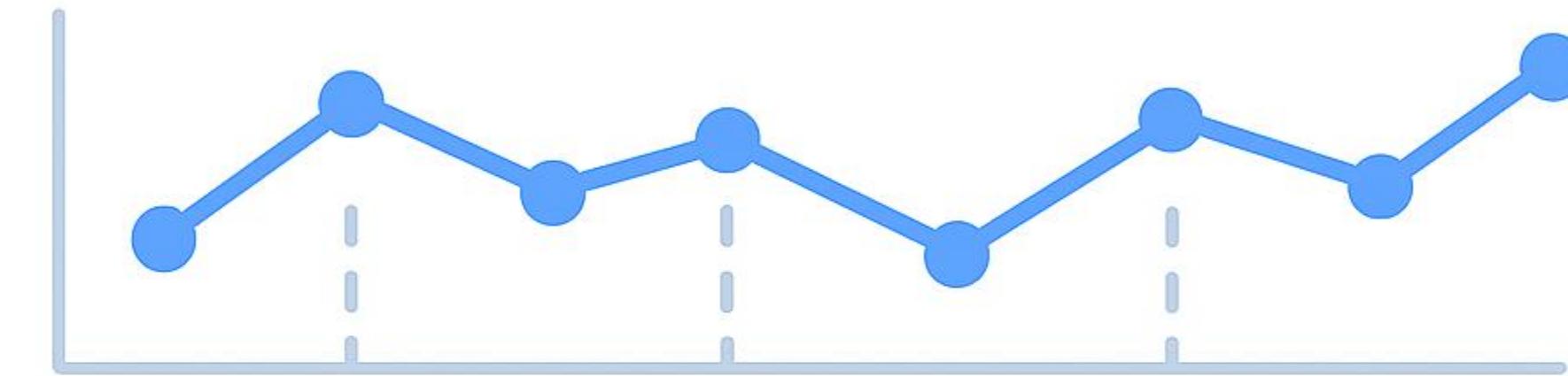
Metric 3 – User Feedback



Identify weak responses

Retrain model with preference data
(RLHF)

Feedback



Free-form comment

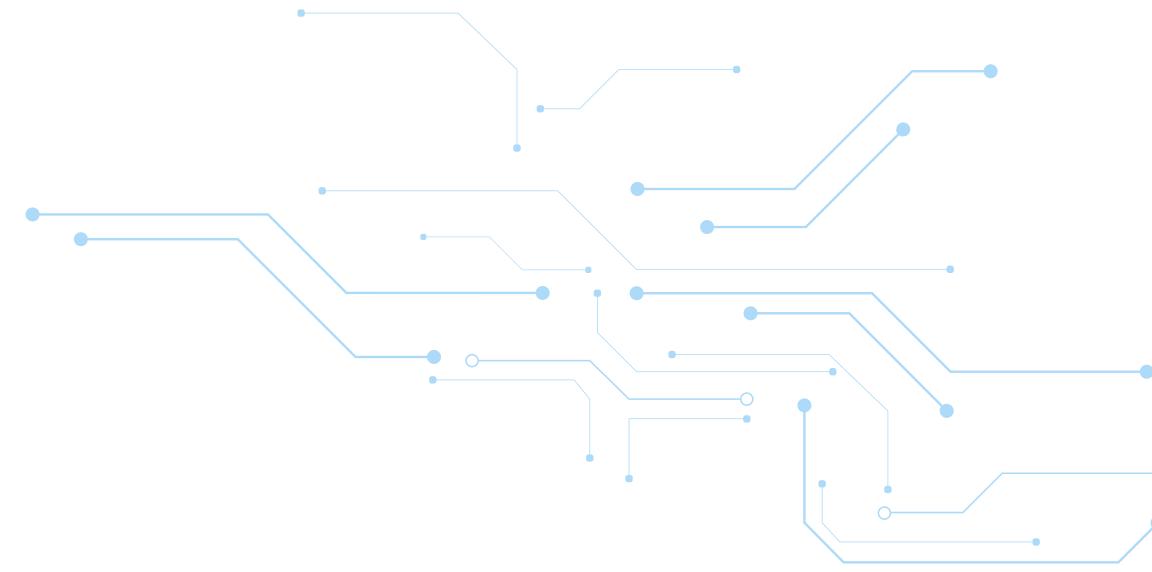
Building a Contextual Gemini Chatbot with Multi-Turn Memory (CLI-Based) (Demonstration)

Note: Refer to Module 10: Demo on LMS for detailed steps.

Summary

In this lesson, you have learned that:

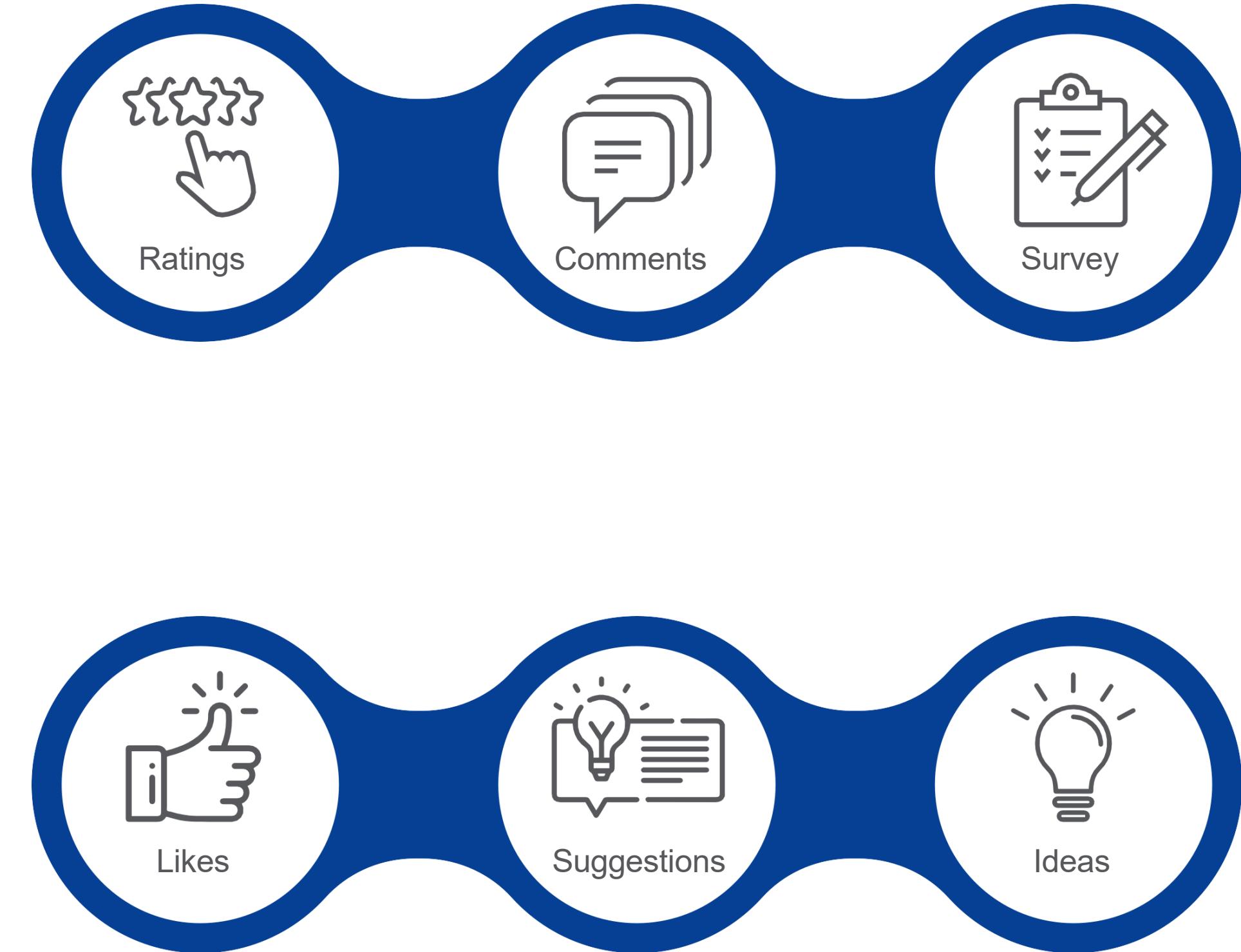
- e! Neural models such as LSTM and Transformers drive the intelligence behind modern chatbots.
- e! NLP tasks—like intent detection and entity extraction—enable chatbots to understand and respond meaningfully.
- e! Integration with business workflows allows chatbots to automate CRM, and e-commerce tasks.
- e! Fine-tuning and reinforcement learning ensure chatbots provide context-aware, accurate, and adaptive responses.



Questions



Feedback



Thank You

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www.edureka.co

