

Introduction to Conversational AI

1/15/2020

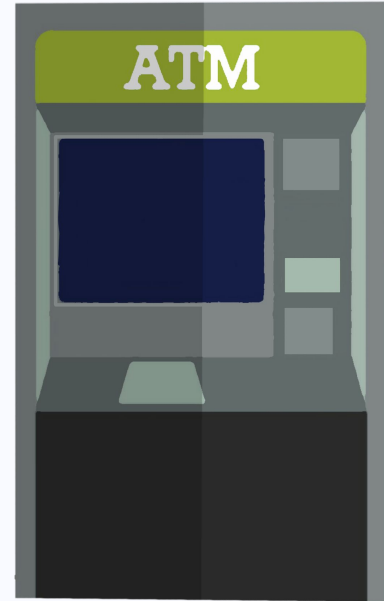
Objectives

- Explain the characteristics of a human in the room (HITR) conversational experience.
- Identify the major components of the State Graph.

Activity: Developing Conversations

Imagine that you are a bank teller. How would you interact with customers?

In a moment, we will examine two scenarios.



Activity: Developing Conversations

Scenario 1:

Customer checks savings account balance, and then decides to transfer \$1,000 to checking account.

Customer

Tell me the balance on my savings.

Transfer \$1,000 of that to my checking account.

~~Savings.~~

~~Checking.~~

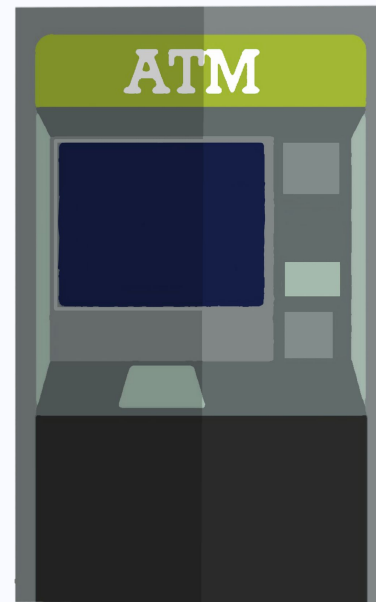
Bank Teller

Okay. The balance in your savings account is \$33,567.91.

~~Okay. Which account would you like to transfer from?~~

~~Okay. Which account would you like to transfer to?~~

Okay. I transferred \$1,000 from your savings to your checking account.



Activity: Developing Conversations

Scenario 2:

Customer tries to transfer \$10,000 from savings to checking account.

Customer

Transfer \$10,000 from my savings to my checking account.

Ok let's transfer the money out of my investment account instead.

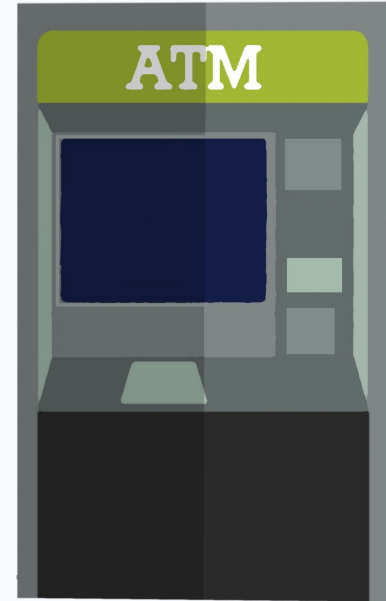
~~\$10,000 and my checkings account~~

Bank Teller

You have insufficient funds in your savings account to make this transfer

~~Ok, I'd be happy to help you with transferring money out of your investment account. What target account and dollar amount would you like ?~~

Ok I have your transfer to be \$10,000 from your investment account to your checkings account.



Requirements for a Good Solution

- No instructions needed
- Able to transition around context intuitively
- Best guess answers when there is ambiguity

Human in the Room - What is it?

- Human in the room refers to an AI's capability to have human level understanding.
- The ability for conversations to be understood from a natural perspective:
 - No forced keywords
 - Contextual memory
 - Ability to follow up and provide multiple conversational turns
 - Able to maneuver ambiguity

Understanding HitR: Building a Great Conversation

- Human in the Room Encompasses many aspects of a great conversation:
 - Best guess answers
 - Flexibility in conversational response
 - Ambiguity resolved through natural patterns
 - Natural corrections of conversational flow
- HitR can guide the scoping of the use case

Here are some examples of thing that HitR can accomplish:

Human in the Room - Context

You have built an AI to answer HR questions.

This is NOT an example of HitR because it assumes too much, would an actual interaction between an HR specialist and an employee play out in this fashion? How could the conversation be modified to look more like a human interaction?



You can find information on posting jobs and monitor jobs on our HR Resources website:
<https://www.mycompany.com/hr/hiring/index.html>.

Human in the Room - Best Guess

You have built an AI to answer IT service desk inquiries.

This is an example of a HitR conversation. It utilizes context and process understanding to make a best guess concerning which incident the user is requesting.

How much time is left on my ticket SLA?



Your most recent issue concerning your computer repair incident (incident number 12345) has 2 more days before it is considered delinquent.

Human in the Room - Resolving Ambiguity

You have built an AI to transfer money between people and their friends.

Some situations require that very narrow domain specific knowledge be applied to resolve the situation. In this case that is what accounts the user has to transfer money from. If the AI can present the user the specific information (typically procured in business logic) it is best able to guide the conversation.

Give Bob \$50



Sure, I can do that. Would you like to provide the funds from your checking or your savings account?



uhhh... checking works



Sending Bob \$50 from your checking account



Human in the Room - Misunderstood Intents

You have built an AI to answer HR questions.

This is and is not representative of a good HitR experience. The AI did misclassify the human's intent, but was able to correct and transition to the proper solution.

I need my last w2



For the definition of w2 please see <https://www.mycompany.com/hr/terms.html&term=w2>



No where do I get a copy?



You can download your last w2 from your tax and pay tab on the company intranet.

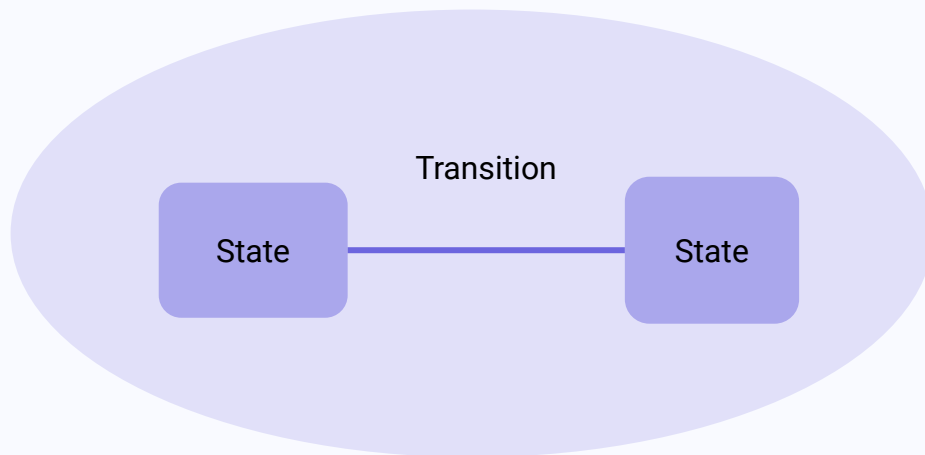


Conversation Architecture

- 2 Components
 - Conversation Management - Manages the conversation pathways and contextual awareness
 - Query Lifecycle - The breakdown of a single query into individual NLU components that can be processed in reference to conversation management
- These two components work together to generate a human-in-the-room level of understanding and experience

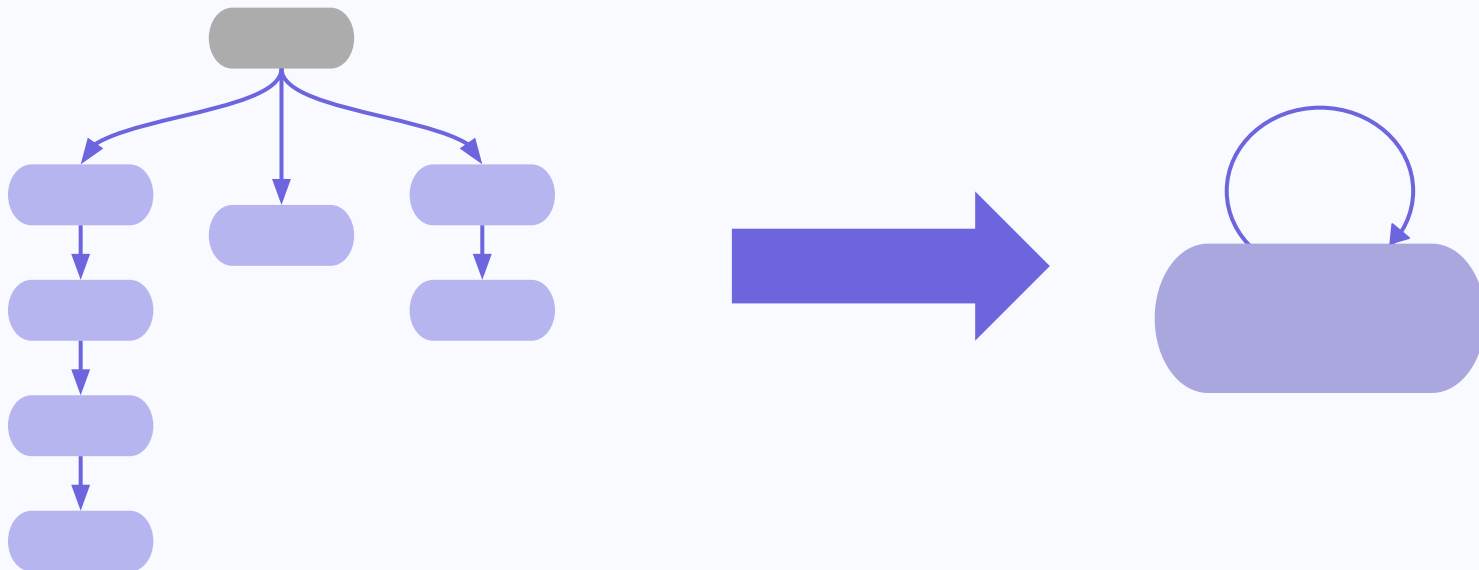
State Graph

ClinC uses the **State Graph** to manage the conversation architecture. The key components in a state graph are states and transitions.



Conversation Management

The state based approach allows for massive scaling of conversational capabilities.



Conversation Architecture: States

Single **states** can collapse multiple scenarios into manageable logical components.

Scenario

Response

The customer did not provide the source account.

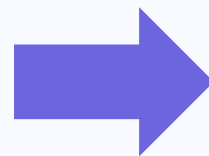
"What account would you like to know more about?"

The customer asked about an account that doesn't exist.

"You don't have that account. I do see that you have a checking and savings."

The customer asked about multiple accounts.

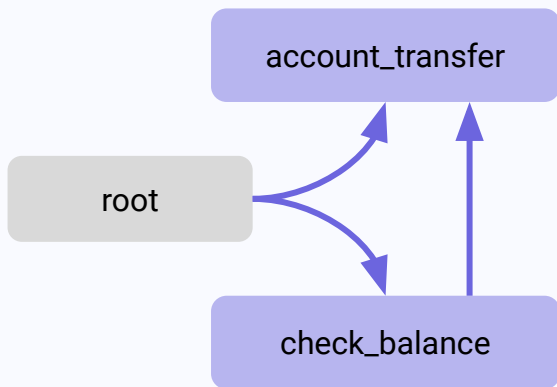
"The balance in your checking account is \$18,450, and the balance in your savings account is \$30,252."



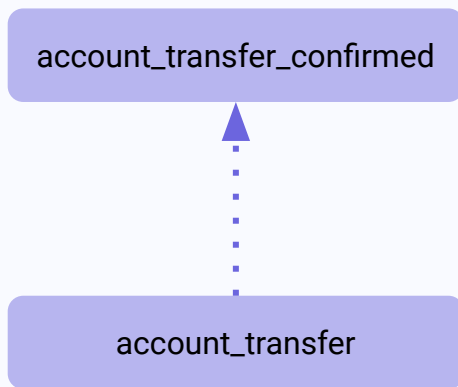
check_balance

Conversation Architecture: Transitions

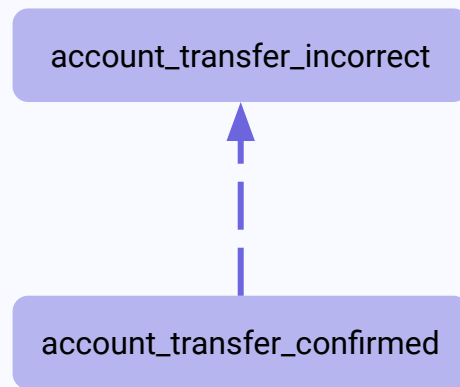
Transitions are connections between states. There are three types:



Classification



Variable

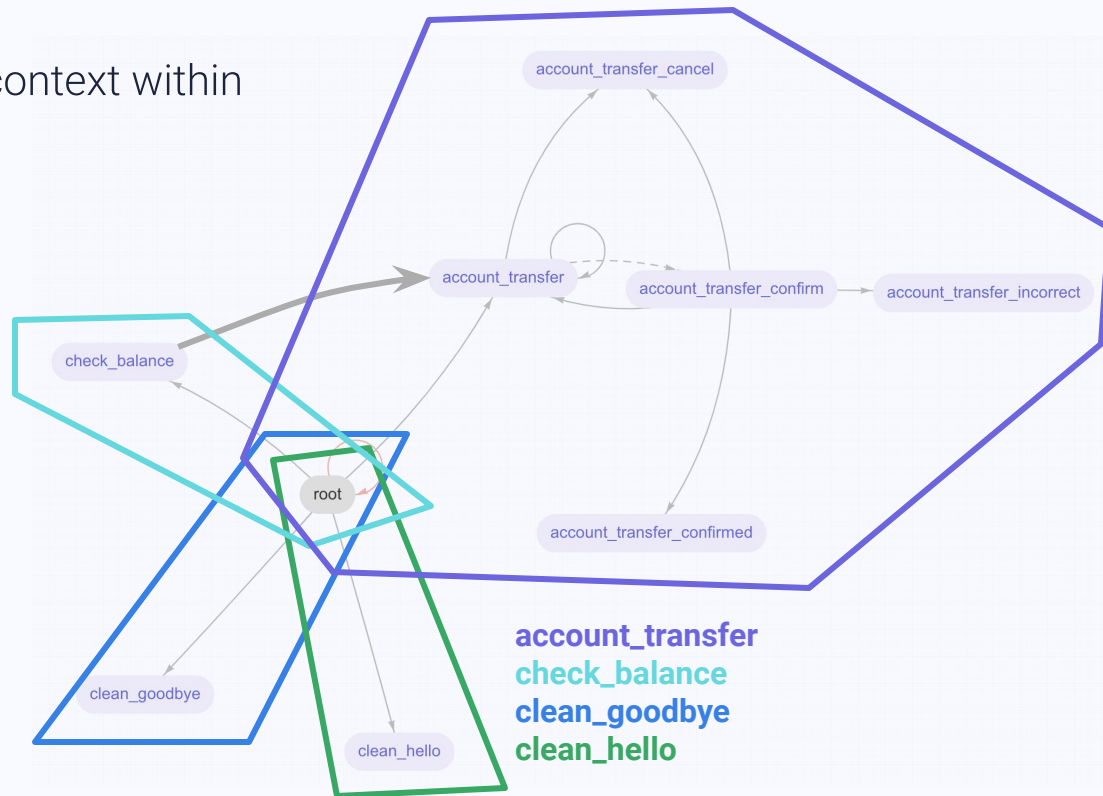


Business Logic

Competencies

Competencies are used to manage context within the state graph.

- Each competency consists of state(s).
- Slots are defined for each competency



The Query Lifecycle

The **Query Lifecycle** consists of: Classification, Slot Value Pairing, Slot Mapping, and Business Logic.

 **Utterance**

I would like to check the balance in my checking account.

 **Response**

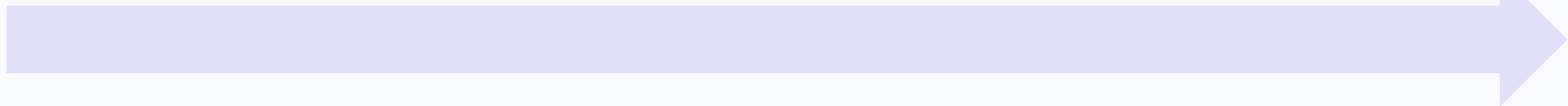
Sure. The balance in your checking account is \$18,879.78.

 **Classification**

 **Slot Value Pairing**

 **Slot Mapping**

 **Business Logic**



The Query Lifecycle: Classification

Classification identifies the intent of each utterance.

Utterance

I would like to check the balance in my checking account.

Intent

Check Balance

Transfer Money

 Classification



The Query Lifecycle: Slot Value Pairing

Slot Value Pairing extracts key information from the utterance.

Utterance

I would like to check the balance in my **checking** account.

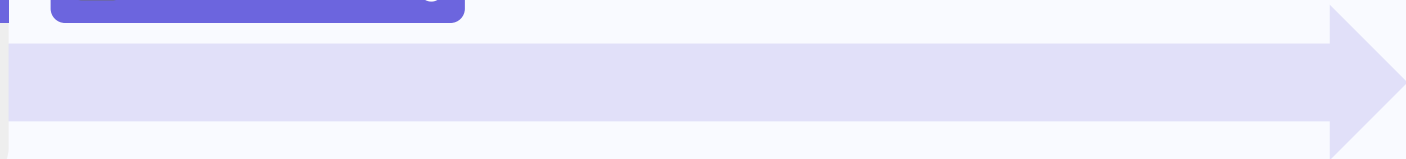
Slot

Account

 Classification

Intent:
Check Balance

 Slot Value Pairing



The Query Lifecycle: Business Logic

Slot Mapping maps extracted slot values to known actionable data.

Slot Values

Secondary Clusters

Mapped Values

“checking”

Checking, checking, checkings

checking



Classification

Intent:
Check Balance

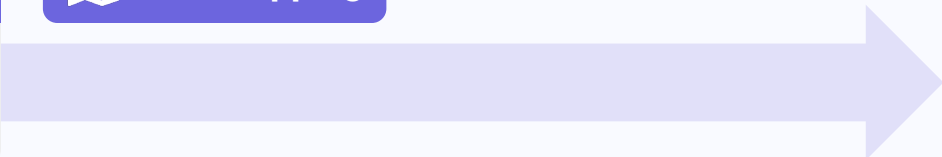


Slot Value Pairing

Account:
“checking”



Slot Mapping



The Query Lifecycle: Business Logic

Business Logic sends and receives external information.

NLP Engine



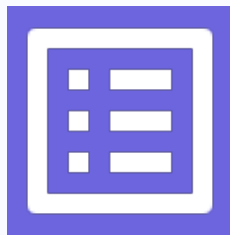
Request Payload

Intent: Check Balance
Account:"checking"
Account_Mapped: checking

Response Payload

Intent: Check Balance
Account:"checking"
Account_Mapped: checking
Balance: \$18,879.78

BL Server



Bank Database



Classification

Intent:
Check Balance

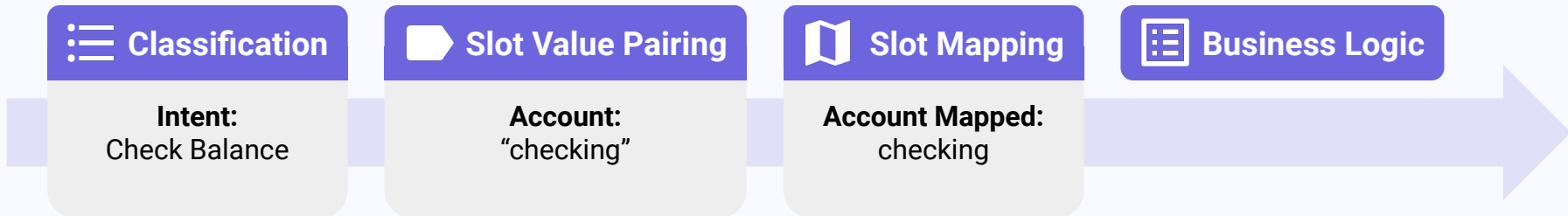
Slot Value Pairing

Account:
"checking"

Slot Mapping

Account Mapped:
checking

Business Logic



The Query Lifecycle: Response Logic

Response Logic generates a response.

 **Utterance**

I would like to check the balance in my checking account.

 **Response**

Sure. The balance in your checking account is \$18,879.78.

 **Classification**

Intent:
Check Balance

 **Slot Value Pairing**

Account:
"checking"

 **Slot Mapping**

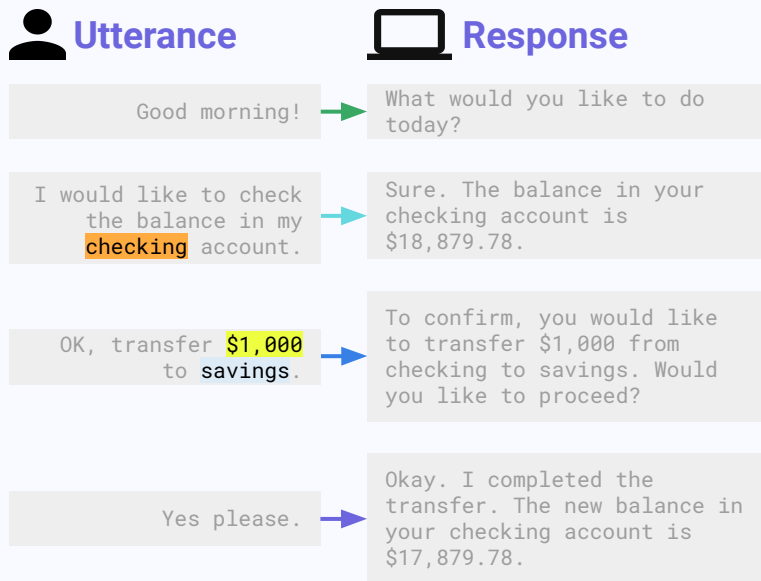
Account Mapped:
checking

 **Business Logic**

Balance:
\$18,879.78

Activity: State Graph

A state graph diagram displays the conversational structure.



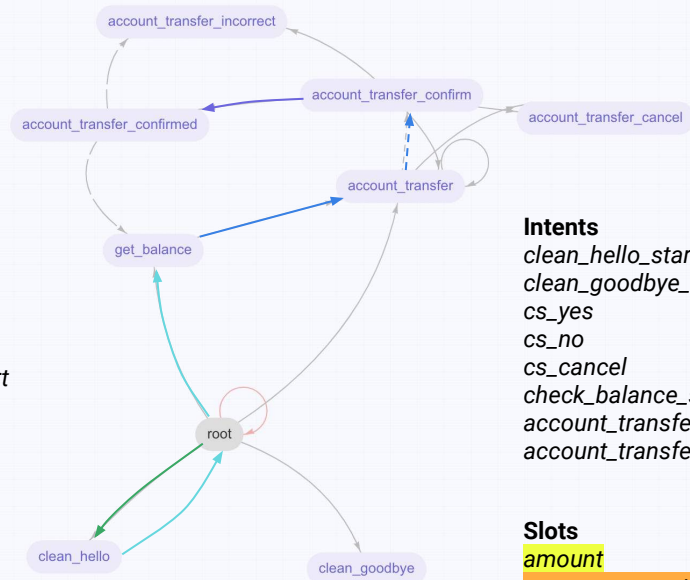
Intent

clean_hello_start

get_balance_start

account_transfer_start

cs_yes



Intents

clean_hello_start
clean_goodbye_start
cs_yes
cs_no
cs_cancel
check_balance_start
account_transfer_start
account_transfer_update

Slots

amount
source_account
destination_account