

ORACLE

Understanding intelligent digital assistant routing

Program agenda

- 1 **Digital assistant routing overview**
- 2 The digital assistant routing model
- 3 Routing configurations & parameters
- 4 How to debug the routing

Digital assistant routing overview

Human conversation seldom follows a single story-line

- Our brains manage context switches

Routing in digital assistant "traffic controls" user messages

- Allows users to switch topics
- Routes messages to the most appropriate skill or intent
 - A new flow in a current skill
 - A different skill while suspending a current skill
 - A system intent

Decision making is based on confidence scores calculated by an NLP model

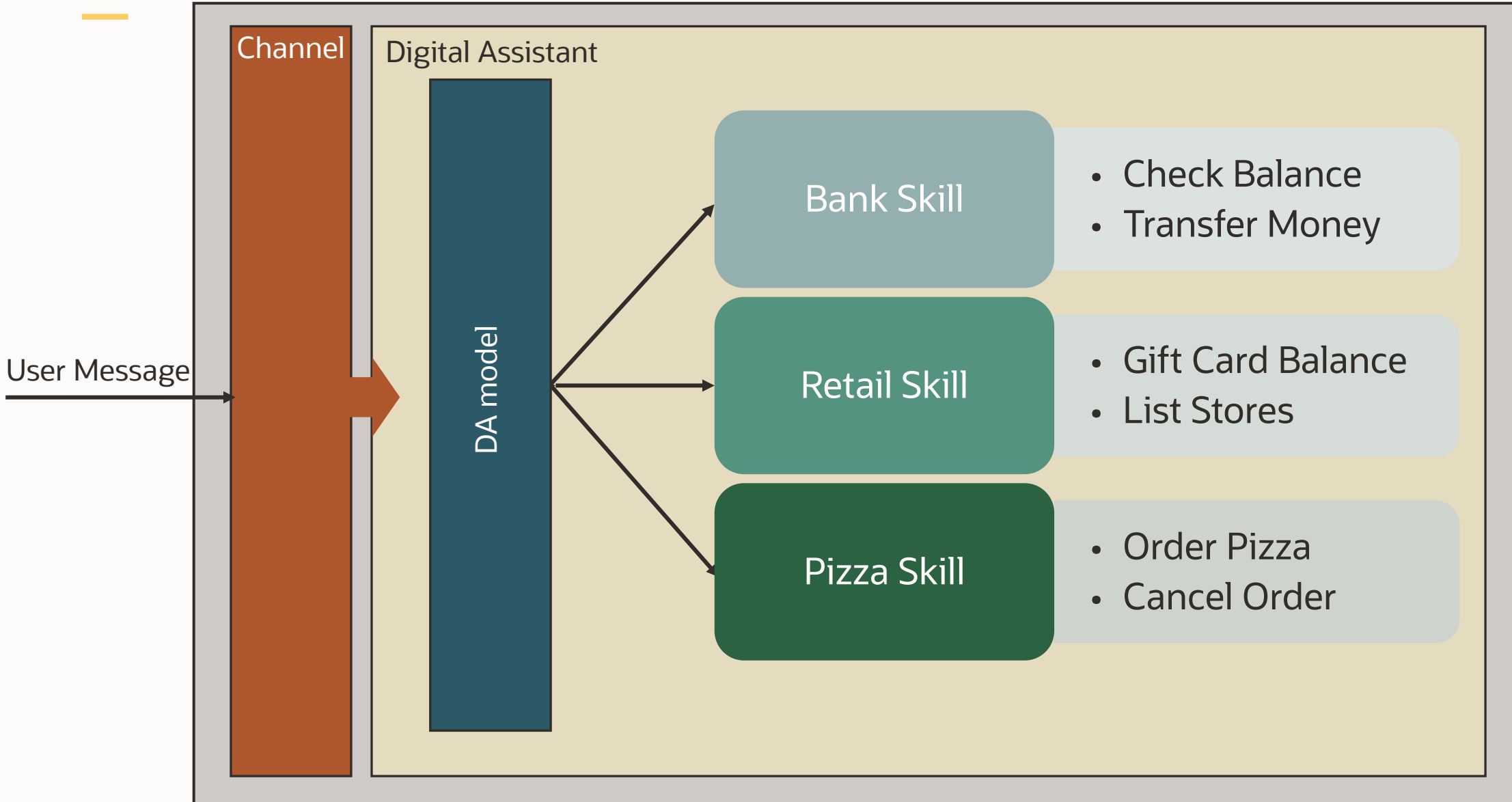


”

A digital assistant is an intelligent routing container of one or many skills

Digital assistant routing overview

ODA Instance



A digital assistant must be core to your development mindset

” It is not a case of if you use a digital assistant... you **SHOULD** always use one*

Digital assistant give you OOTB, with no code

- A “container” for modularized skill development
 - The world is moving to “single point of contact” digital assistants
 - More productive development
 - Better quality NLP
- Handles non-sequitur automatically (no code)
- Allows “contextually aware” conversations
- Promotes consistent behavior across skills and single point of development
 - Common handlers for exit and help
 - Primary mechanism for preventing “trapped” users
 - Common help processing
 - Common handler for unresolved

*the exceptions to this rule are truly exceptional



Routing terminology

Implicit routing

- Routing is determined based on the user message and the current context
- If a message matches two or more configured skills, then routing helps users to disambiguate the request

Explicit routing

- Occurs when the invocation name of a skill is part of the user message
 - *“Ask Spotify to play the Rolling Stones”*

Candidate skill

- Skills that candidates to handle a user message
- Confidence score defines threshold

Candidate flow

- Intent in a candidate skill that could handle the user message

System intent

- Built-in intents
 - exit, help, unresolvedIntent

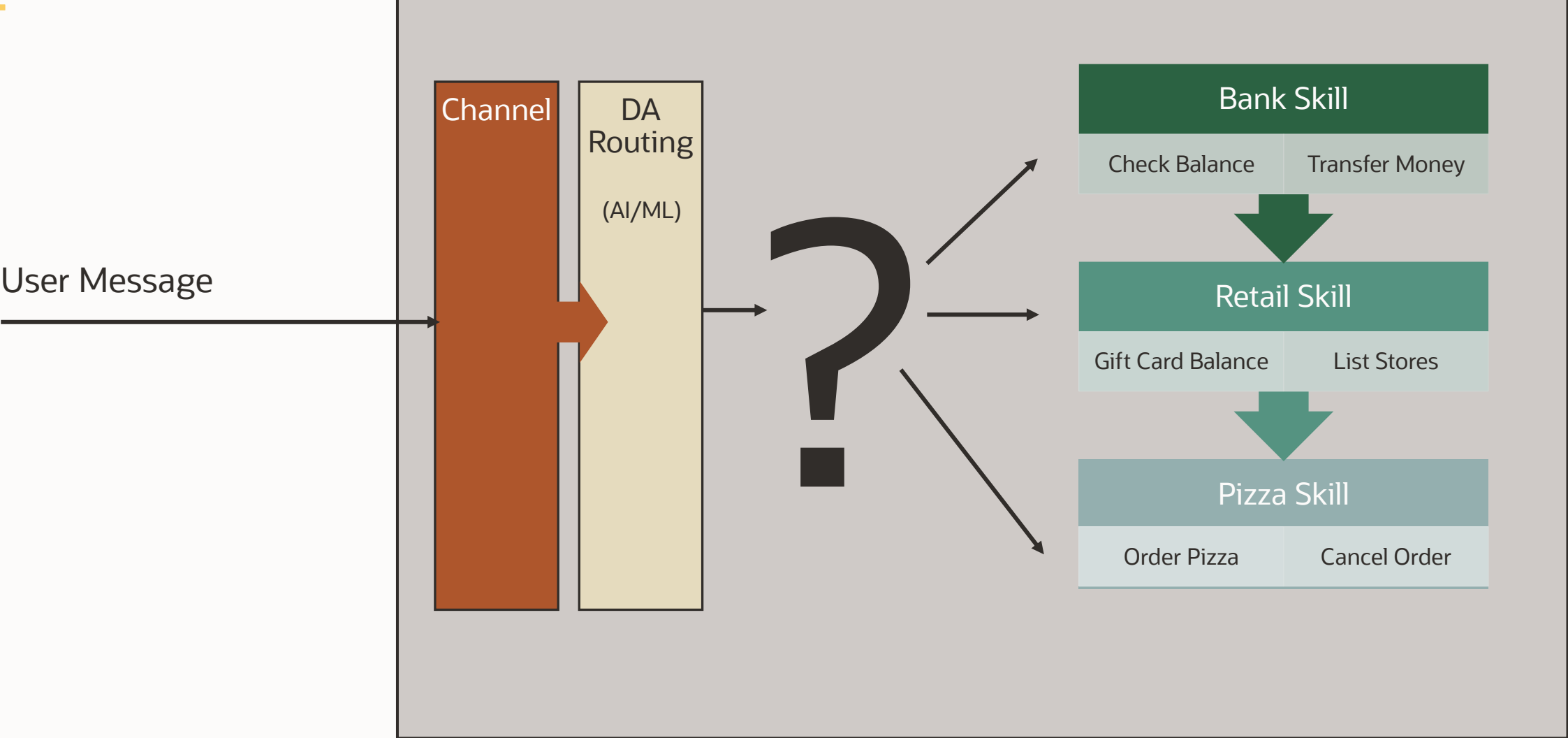
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The routing model



Implicit routing



Implicit routing

Example 1

One Match (above threshold)

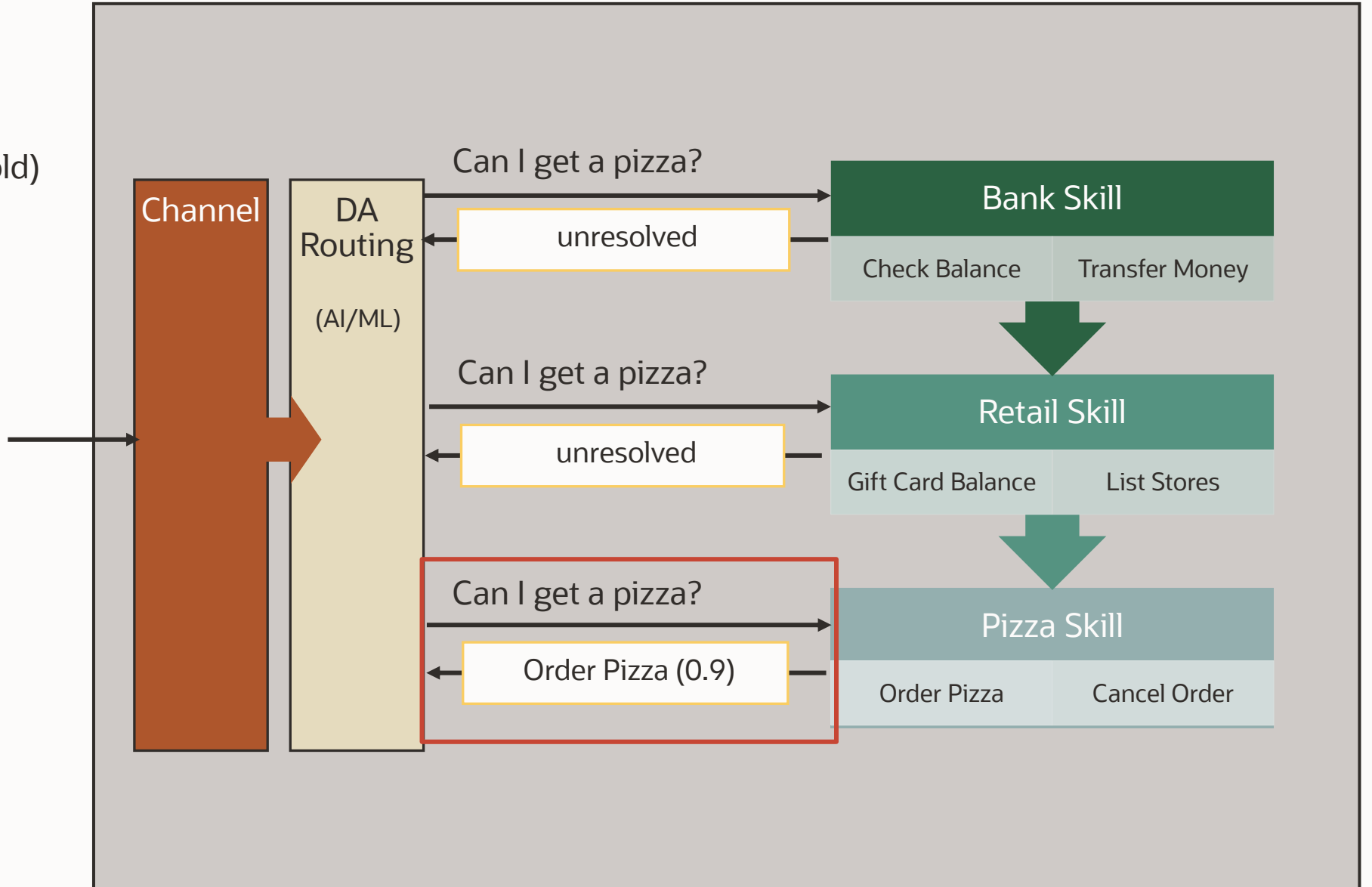
No active skill

Candidate Skills :

- Pizza

Candidate Flows :

- Order Pizza
- Cancel Order



Implicit routing

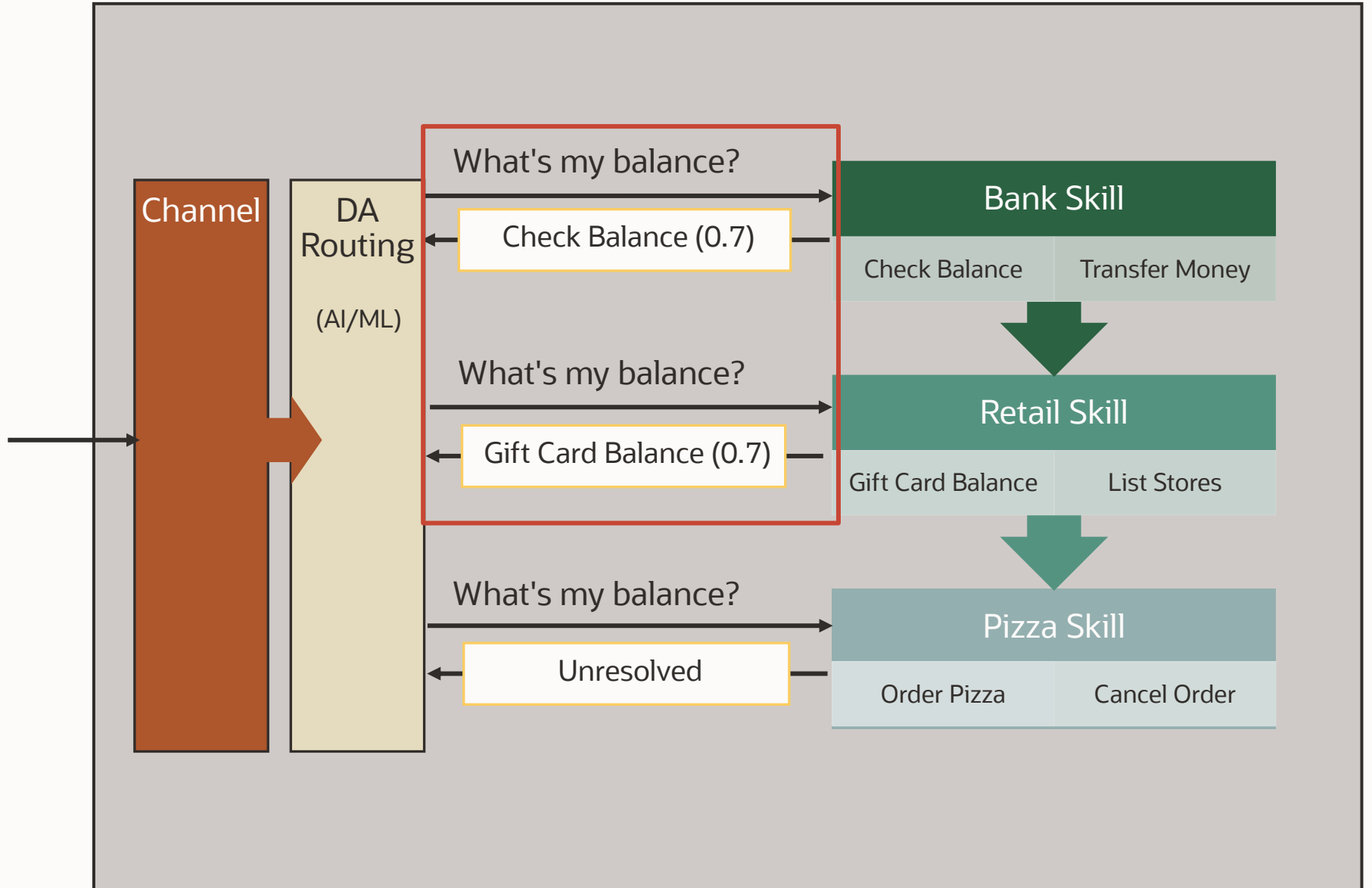
Example 2

Multiple Matches
(above threshold)

No active skill

Candidate Skills:

- Bank
- Retail



Implicit routing

Example 2

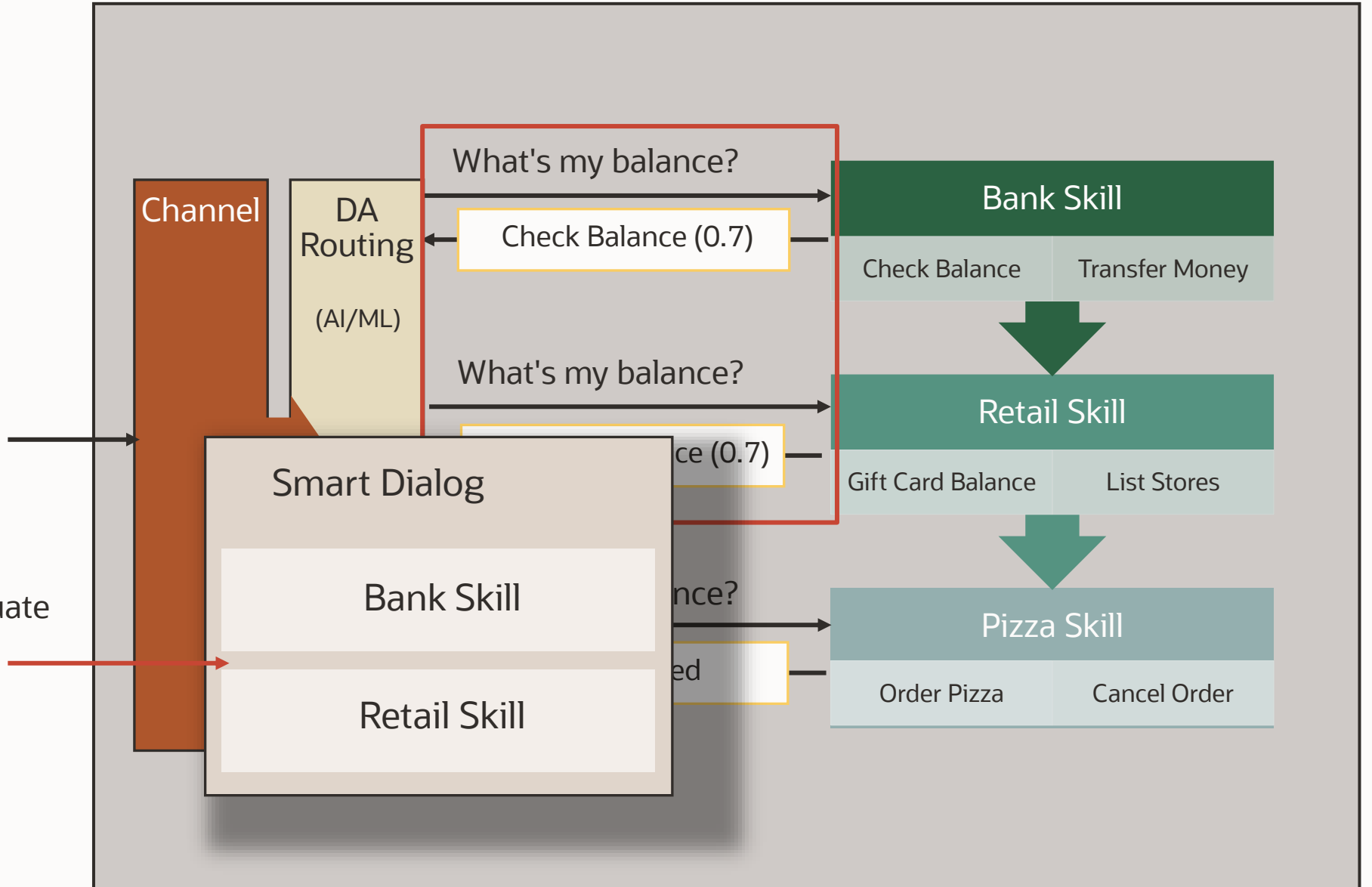
Multiple Matches
(above threshold)

No active skill

Candidate Skills:

- Bank
- Retail

Smart Dialog to disambiguate



Conversation context

Digital assistant is context aware

- Aware of the skill that currently handles the user conversation
- The skill is "the topic" of the user conversation

A current skill is given more weight during intent resolution than intents from other skills

- Context-aware routing

Explicit invocation of a skill with no further message "pins" the context

- Router treats referenced skill as current
- Awaits next message to route to pinned context



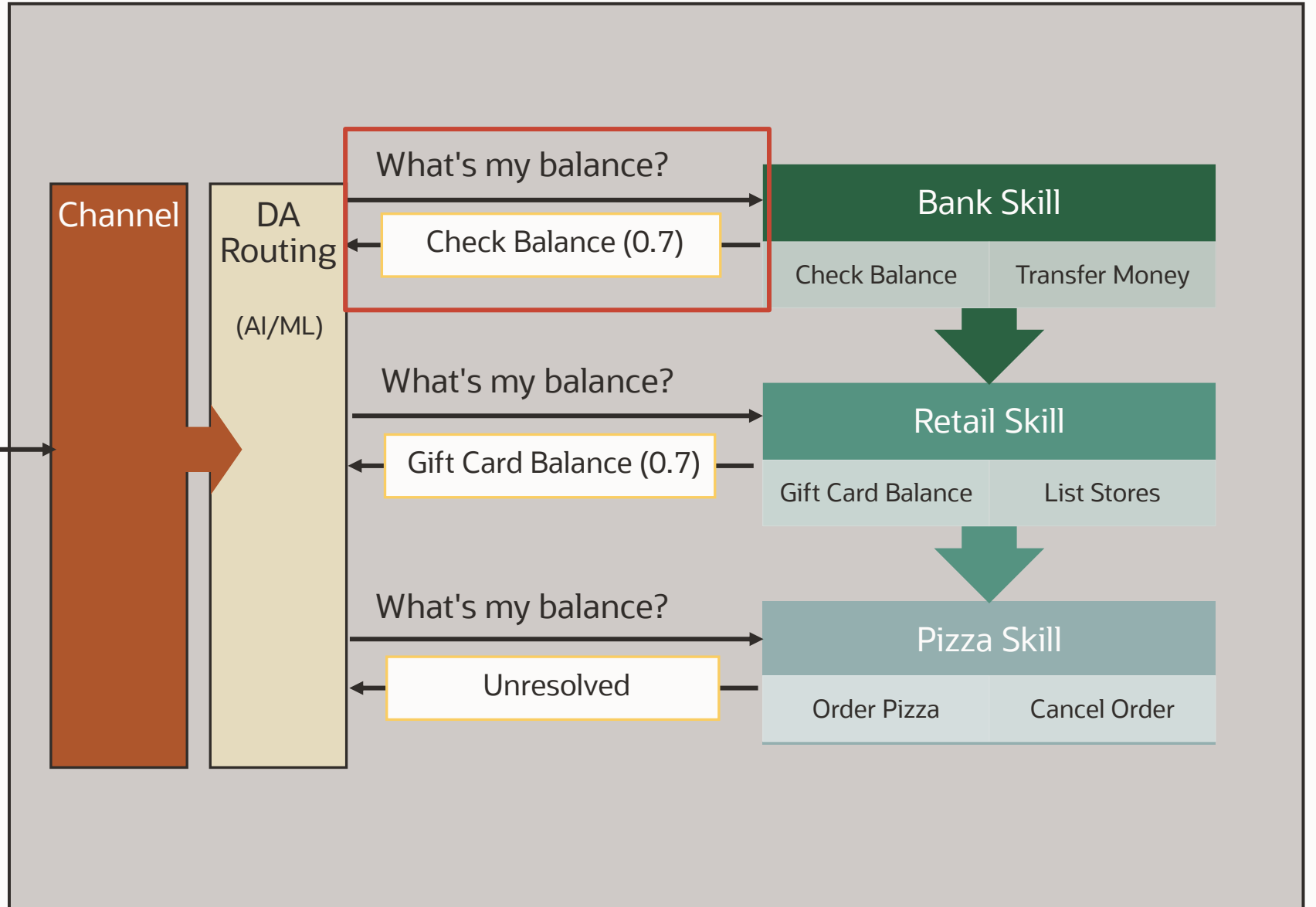
Implicit routing

Example 3

Multiple Matches
(above threshold)

Active skill: Bank

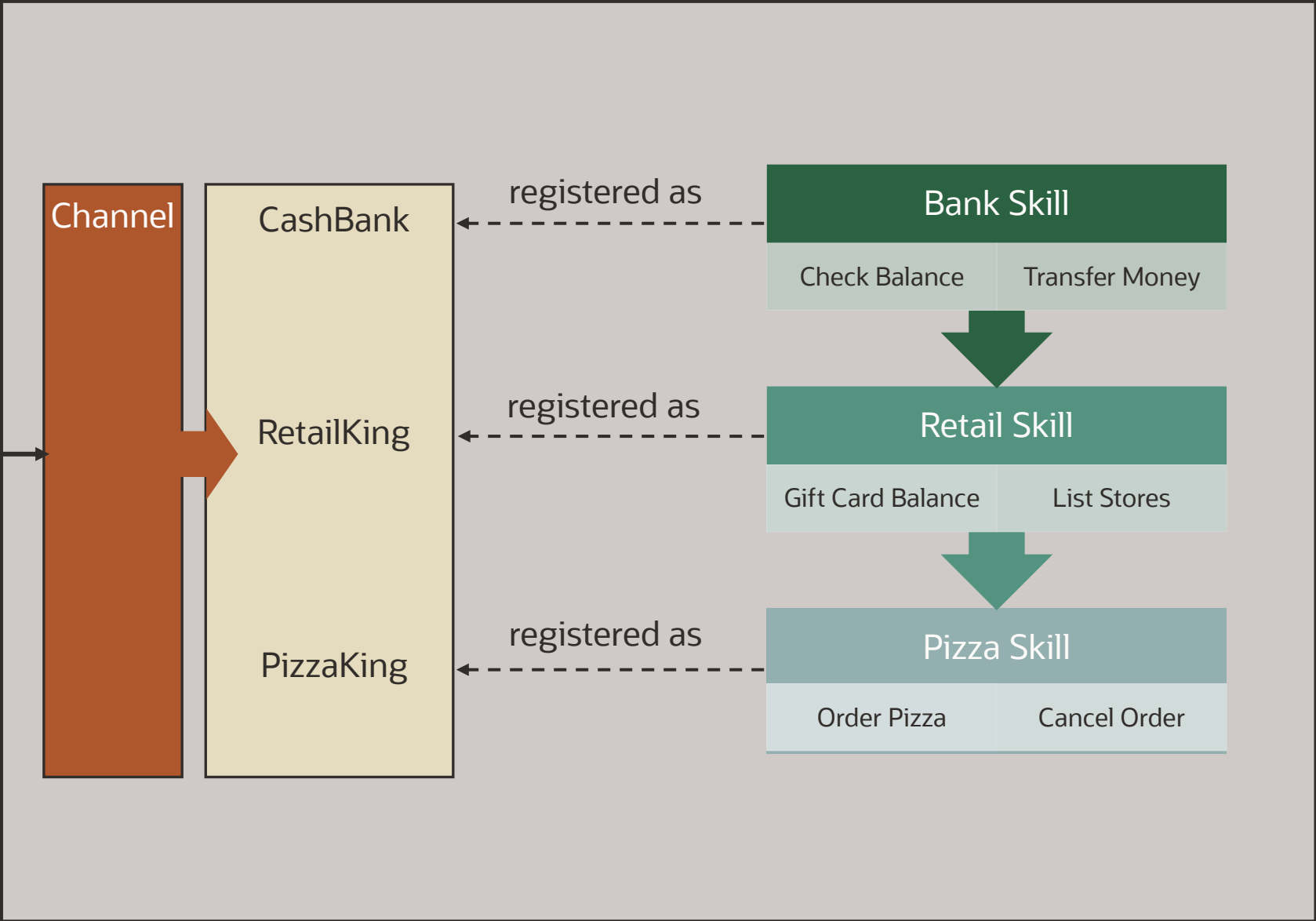
Context adds extra weight in routing



Explicit routing

Explicit routing uses registered Skill name

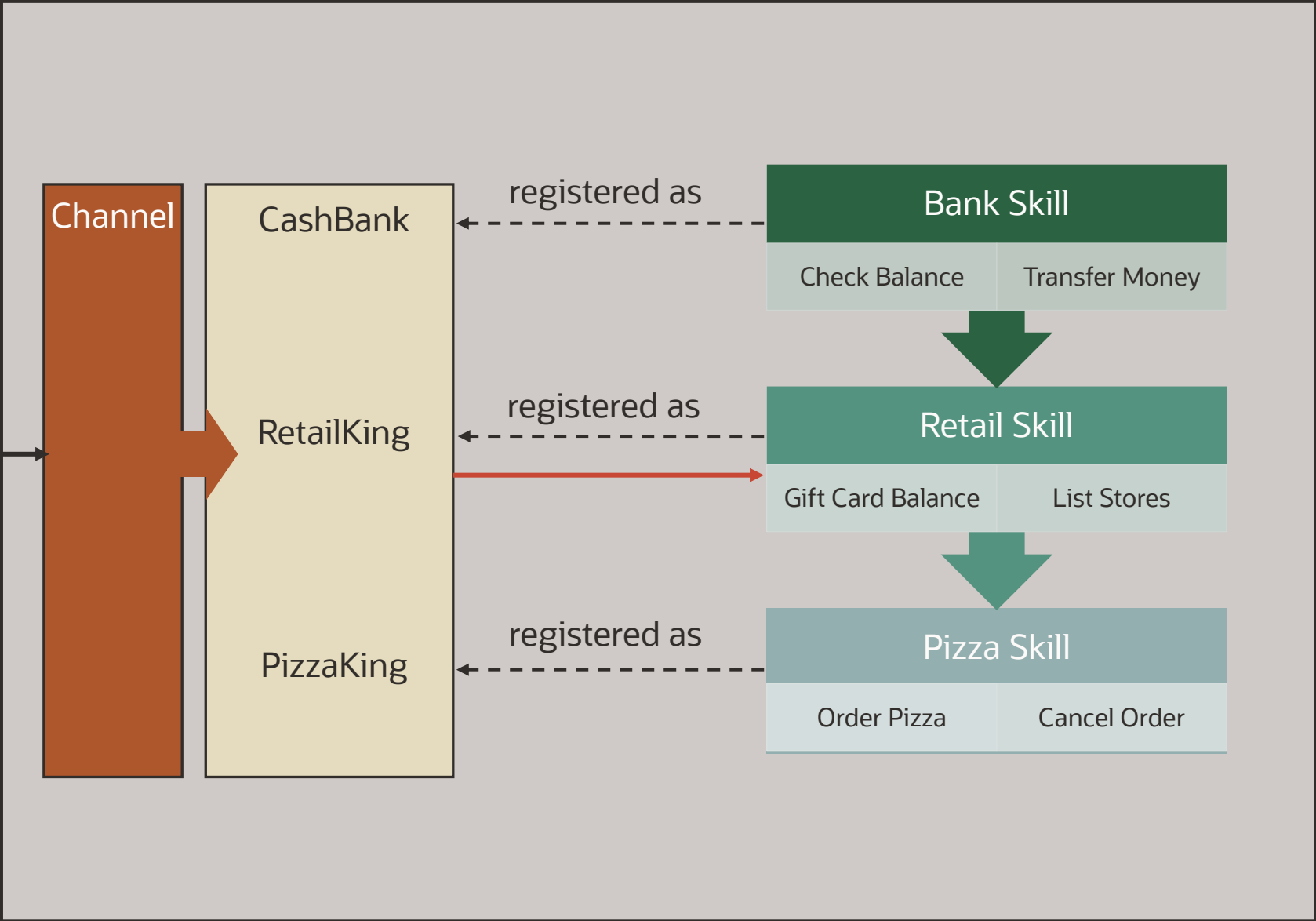
User Message
<addressing> <utterance>



Explicit routing

Explicit routing uses registered Skill name

Ask **RetailKing** to list all the stores



”

Even if you only have one skill, you still benefit from using a digital assistant, so use it

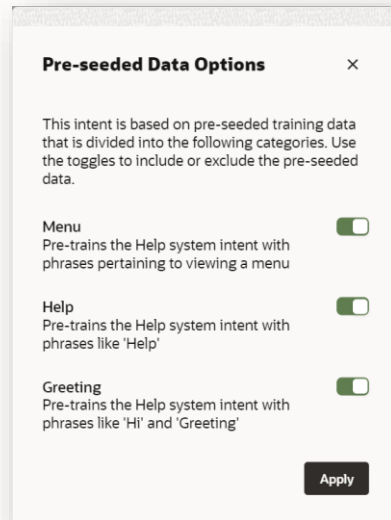
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System intents

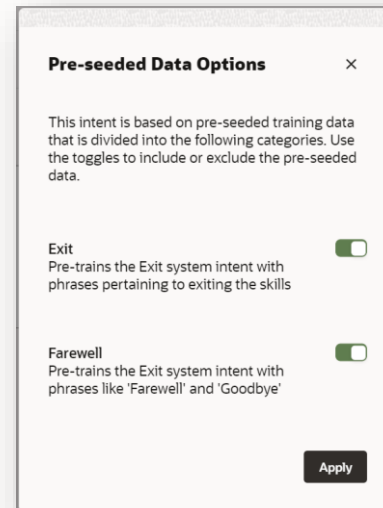
help

- Uses NLP to determine whether a user requests help, a menu or if provides a greeting
- If user is in a skill conversation, then help is displayed for the current skill



exit

- Users can exit from a current conversation, or from all conversations
- Trained with phrases users would use to end a conversation



unresolvedIntent

- Defines out of scope phrases the digital assistant is not designed to answer
- It has built-in utterances for all the natively-supported languages
- A help menu is displayed instead

The routing parameters

Fine-tuning of routing decisions

Key configuration parameters to focus on are

- Built-in system intent confidence threshold (consider 0.9)
- Candidate skill confidence threshold (consider 0.4)
- Confidence win margin (consider 0.4)
- Consider only current context threshold (consider 0.9)

Routing Parameters

Built-In System Intent Confidence Threshold

 ▼ ▲

Consider All Threshold

 ▼ ▲

Flow Name For Processing Message With Image Only

Candidate Skills Confidence Threshold

 ▼ ▲

Consider Only Current Context Threshold

 ▼ ▲

Skill Name For Processing Message With Image Only

 ▼

Confidence Win Margin

 ▼ ▲

Explicit Invocation Confidence Threshold

 ▼ ▲

Skill Start State For Processing Message With Image Only

 ▼

Examples for Candidate Skills

Confidence Threshold: 40%
Win Margin: 10%
Consider All Threshold: 80%

Skill A : 78%
Skill B : 69%
Skill C : 67 %
Skill D : 49%

Confidence Threshold: 40%
Win Margin: 20%
Consider All Threshold: 80%

Skill A : 78%
Skill B : 69%
Skill C : 67 %
Skill D : 39%

Confidence Threshold: 40%
Win Margin: 10%
Consider All Threshold: 70%

Skill A : 85%
Skill B : 81%
Skill C : 73 %
Skill D : 70%

Smart dialog configuration

Control the appearance of smart dialogs

- When the user exits, switches, interrupts or resumes a flow
- When set to > 1 will always show

Interrupt Message Switching to <code>#{system.routingToIntent}</code> in <code>#{system.r</code>	Interrupt Prompt Do you want to switch to <code>#{system.routingToIntent}</code> ir	Interrupt Prompt Confidence Threshold 1.1
Interrupt To Unmatch Flow Prompt No match found in <code>#{system.routingToSkill}</code> . Do you :	Invalid History Action Message Sorry, this choice is no longer available.	Label for Q & A Ask Question
Max Sample Utterance 5	Max Skill Bot to Display 5	No Matches Were Found Prompt No matches were found. Here are some things you ca
No Skill Bot Prompt You don't have skill bots have been registered yet. Re	None of the above None of the above	Nothing to Exit Prompt There's nothing to exit. You don't have any requests i
Notification Interrupt Prompt You have just received a notification from <code>#{system.r</code>	Resume Message Resuming <code>#{system.routingFromIntent}</code> in <code>#{system.r</code>	Resume Prompt Do you want to resume <code>#{system.routingFromIntent}</code>



Common functionality configuration

Control common functionality for the digital assistant

- Common handlers for
 - Help
 - Exit
 - Unresolved

Digital Assistant Custom Help Skill	Digital Assistant Custom Help State
<input type="text" value="No Selection"/>	<input type="text" value="No Selection"/>
Digital Assistant Custom UnresolvedIntent Skill	Digital Assistant Custom UnresolvedIntent State
<input type="text" value="GR_Pizza_For_DA_Starter"/>	<input type="text" value="unresolved"/>
Digital Assistant Custom Exit Skill	Digital Assistant Custom Exit State
<input type="text" value="No Selection"/>	<input type="text" value="No Selection"/>
Digital Assistant Custom NoneOfAbove Skill	Digital Assistant Custom NoneOfAbove Flow/State
<input type="text" value="No Selection"/>	<input type="text" value="No Selection"/>

”

The digital assistant's unresolvedIntent is only used to help discriminate the help and exit intents

Digital assistant other interesting features

Control how skills function in the digital assistant

- Enabled - whether the skill is turned on or not
- Exposed – whether the skill appears in any routing or help dialogs
- Group – grouped skills are all considered “in context” if one is
- Example utterances – the options that appear on the help cards

Enabled

Exposed ?

Interaction Model

Invocation ?

GR_UnresolvedHandler

Group ?

Optionally, enter the name of a group for closely related skills.

English ?

Example Utterances (2)

Enter your example utterances here.

An example utterance

This is used on the help card



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Conversation tester

Test digital assistant before deployment

Conversation shows

- dialog flow states
- variable and values

Routing shows

- conversation path
- resolved intents
- router decision making
 - Candidate skills and intents

The screenshot displays the Bot Tester interface, which is used for testing digital assistants. It is divided into two main sections: a conversation simulation on the left and routing details on the right.

Bot Tester Interface:

- Top Bar:** Includes tabs for "Bot Tester", "Test Cases", and "Test Run Results". It also features "Save as Test" and "Reset" buttons, and a "Channel" dropdown menu set to "Oracle Web".
- Conversation Simulation:** Shows a sequence of user actions and system responses:
 - User actions: "Order Pizza", "Cancel Pizza", "Order More", "Exit conversation and view assistant help", "exit", "help".
 - System responses: "Exited Order Pizza.", "Welcome! I can do following things for you:", "Digital Bank Financial Virtual Assistant" with options "go to digital bank", "ask digital bank to check my balance", and "send money using digital bank".

Routing Details:

- Routing:** Shows the router's response: "Digital Assistant response is generated by router".
- Utterance:** Shows the sentence "help" and its reformed version "help".
- Starting context-aware routing:** Shows the conversation state: "START_Nth_FLOW".
- Rules:** Shows the system help message: "System help, as we are in the digital assistant context and only the system's intent matches."
- Intent Calls for sentence 'help':** Shows the system intents and their scores:

Action	Details	Score
System Intents	Digital Assistant: ODA_HOL_DT	
	Skill: help	Score: 100%
	Skill: exit	Score: 0%
	Skill: unresolvedIntent	Score: 0%

Confidence Threshold: 90%



What routing looks like in the debugger

tell me my balance

For which account do you want your balance?

- savings
- checking
- credit card

Type Here... Speak Attach

Details	Payload	
Consider flows from all models.	View JSON	
Intent Calls for sentence 'tell me my balance'		
Action	Details	Payload
System Intents	Digital Assistant: GR_Pizza_Finance_Retail Skill: unresolvedIntent Score: 49.45% Skill: help Score: 26.41% Skill: exit Score: 23.77% Confidence Threshold: 90% Confidence Win Margin: 10% Consider All Confidence Threshold: 80%	View JSON
Candidate Skills	Digital Assistant: GR_Pizza_Finance_Retail Skill: GR_Finance_For_DA_Starter-22 Score: 100% Skill: GR_Retail_For_DA_Starter-22 Score: 66.05% Skill: GR_Pizza_For_DA_Starter-22 Score: 6.1% Confidence Threshold: 40% Confidence Win Margin: 10% Consider All Confidence Threshold: 80%	View JSON
Candidate Flows	Skill: GR_Finance_For_DA_Starter Intent: Balances Score: 100% Confidence Threshold: 50% Confidence Win Margin: 10% Consider All Confidence Threshold: 80%	View JSON



What routing looks like in the debugger

Save as Test Reset Channel: Oracle Web

what is my balance

Do you want to go to:

- GiftCardBalance in RetailKing
- Balances in CashBank
- None of the above

Type Here... Speak Attach

Action	Details	Payload
System Intents	Digital Assistant: GR_Pizza_Finance_Retail Skill: unresolvedIntent Score: 46.02% Skill: help Score: 6.82% Skill: exit Score: 0.78% Confidence Threshold: 90% Confidence Win Margin: 10% Consider All Confidence Threshold: 80%	View JSON
Candidate Skills	Digital Assistant: GR_Pizza_Finance_Retail Skill: GR_Finance_For_DA_Starter-22 Score: 100% Skill: GR_Retail_For_DA_Starter-22 Score: 100% Skill: GR_Pizza_For_DA_Starter-22 Score: 5.27% Confidence Threshold: 40% Confidence Win Margin: 10% Consider All Confidence Threshold: 80%	View JSON
Candidate Flows	Skill: RetailKing Intent: GiftCardBalance Score: 100% Confidence Threshold: 40% Confidence Win Margin: 10% Consider All Confidence Threshold: 80%	View JSON
Candidate Flows	Skill: CashBank Intent: Balances Score: 100% Confidence Threshold: 50% Confidence Win Margin: 10% Consider All Confidence Threshold: 80%	View JSON



What routing looks like in the debugger

Save as Test Reset Channel: Oracle Web

\$2334.56

show what my balance is

For which account do you want your balance?

- savings
- checking
- credit card

savings

The balance in your savings account (258293-832) is \$2610.56

what is my balance

For which account do you want your balance?

- savings
- checking
- credit card

Type Here... Speak Attach

Conversation	Routing	JSON
	Skill: exit	Score: 0.78%
	Confidence Threshold: 90%	
	Confidence Win Margin: 10%	
	Consider All Confidence Threshold: 80%	
Candidate Skills	Digital Assistant: GR_Pizza_Finance_Retail	View JSON
	Skill: GR_Finance_For_DA_Starter-22	Score: 100%
	Skill: GR_Retail_For_DA_Starter-22	Score: 100%
	Skill: GR_Pizza_For_DA_Starter-22	Score: 5.27%
	Confidence Threshold: 40%	
	Confidence Win Margin: 10%	
	Consider All Confidence Threshold: 80%	
Candidate Flows	Skill: Retail skill	View JSON
	Intent: GiftCardBalance	Score: 100%
	Confidence Threshold: 40%	
	Confidence Win Margin: 10%	
	Consider All Confidence Threshold: 80%	
Candidate Flows	Skill: GR_Finance_For_DA_Starter	View JSON
	Intent: Balances	Score: 100%
	Confidence Threshold: 50%	
	Confidence Win Margin: 10%	
	Consider All Confidence Threshold: 80%	
Current context	Skill: GR_Finance_For_DA_Starter	View JSON
	Intent: Balances	Score: 100%
	Confidence Threshold: 50%	
	Confidence Win Margin: 10%	
	Consider All Confidence Threshold: 80%	



What routing looks like in the debugger

The chat interface shows the following sequence of events:

- User input: "sausage"
- System response: "I don't understand. What do you want to do?"
- User input: "sausage"
- System response: "I don't understand. What do you want to do?"
- User input: "what is my balance"
- System response: "For which account do you want your balance?" with a menu containing "savings", "checking", and "credit card".
- User input: "I want to order pizza"
- System response: "Do you want to switch to Dispute in CashBank now?" with a menu containing "Yes" and "No".

At the bottom, there is a text input field "Type Here...", a "Speak" button with a microphone icon, and an "Attach" button with a paperclip icon.

Confidence win margin: 10%
Consider All Confidence Threshold: 80%

System Intents	Digital Assistant: GR_Pizza_Finance_Retail		View JSON
	Skill: unresolvedIntent	Score: 44.73%	
	Skill: help	Score: 22.35%	
	Skill: exit	Score: 19.31%	
	Confidence Threshold: 90%		
	Confidence Win Margin: 10%		
	Consider All Confidence Threshold: 80%		
Candidate Skills	Digital Assistant: GR_Pizza_Finance_Retail		View JSON
	Skill: GR_Pizza_For_DA_Starter-22-10	Score: 89.27%	
	Skill: GR_Retail_For_DA_Starter-22-10	Score: 49.13%	
	Skill: unresolvedIntent	Score: 46.1%	
	Skill: GR_Finance_For_DA_Starter-22-10	Score: 44.96%	
	Confidence Threshold: 40%		
	Confidence Win Margin: 10%		
	Consider All Confidence Threshold: 80%		
Candidate Flows	Skill: Pizza Skill		View JSON
	Intent: OrderPizza	Score: 100%	
	Intent: CancelPizza	Score: 6.4%	
	Intent: unresolvedIntent	Score: 0%	
	Confidence Threshold: 40%		
	Confidence Win Margin: 10%		
	Consider All Confidence Threshold: 80%		
Current context	Skill: CashBank		View JSON
	Intent: Dispute	Score: 52.33%	
	Intent: unresolvedIntent	Score: 24.26%	



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