

The slide features a purple-toned background with a digital circuit board pattern. At the top right is the Visual Studio LIVE! AUSTIN logo. Below it, the title 'Create Intelligent Bots with Azure Bot Service and Cognitive Services' is displayed in large white font. Two speakers are introduced: Eric D. Boyd (Founder & CEO of responsiveX) and Derek Wade (Senior Consultant at responsiveX). The level is listed as 'Intro-Intermediate'. A '#VSLIVE' hashtag is at the bottom left, and a 'NO CODE LIMITS' logo with a star symbol is at the bottom right.

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## Create Intelligent Bots with Azure Bot Service and Cognitive Services

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Founder & CEO  
responsiveX

**Derek Wade**  
Senior Consultant  
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Level: Intro-Intermediate

#VSLIVE

NO CODE LIMITS



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Infrastructure // App Dev // Data and AI // DevSecOps



## Agenda

- What are Conversational Bots?
- How you can create Conversational Bots
- Enhancing your Conversational Bots with AI & Data
- Q&A



## What are Conversational Bots aka Chatbots?

- Perform simple and repetitive tasks
- Provide answers to questions quickly
- Make complex tasks simpler, with a guide
- And do it with a human touch



Bots should be where your audience is



# Hipmunk travel bot

The screenshot shows a conversational interface with a travel bot. The bot asks if the user is ready to get started, mentioning it lives for travel and can dig up anything needed. It suggests searching for flights or hotels. The user requests a hotel in Miami from 9/1 to 9/3. The bot responds by digging up hotels for Miami, FL for September 01-September 03, expressing ecstacy about the prices, reviews, and star rating. It then displays three hotel options:

- \$233: Royal Palm South Beach Miami, a Tribute Portfolio Resort**  
7.5/10 - Good Reviews.  
See Hotel Details  
See All Hotels  
Search Flights
- \$99: Hilton Miami Airport**  
8.0/10 - Good Reviews.  
See Hotel Details  
See All Hotels  
Search Flights
- \$167: Hotel Croydon by Beach Group Hotel**  
8.4/10 - Excellent Reviews.  
See Hotel Details  
See All Hotels  
Search Flights

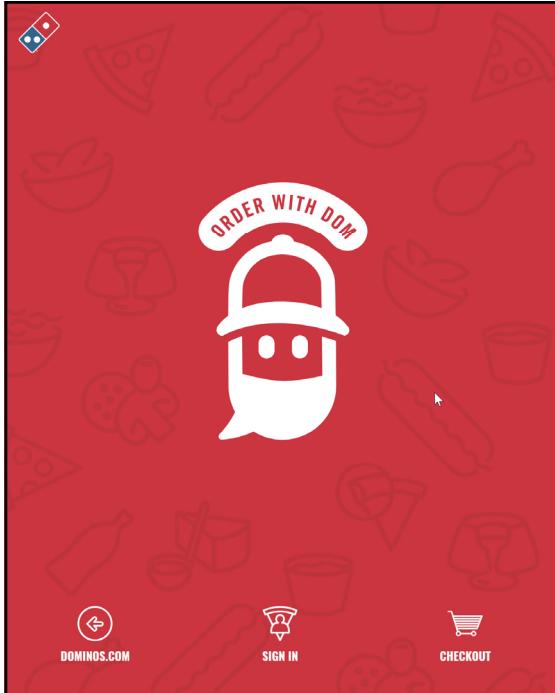
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# Bank of America - Erica

The screenshot shows two screens of the Bank of America mobile app. The left screen shows a message from Erica asking about the checking balance. The right screen shows Erica's suggestion to put more toward a Cash Rewards Visa, which could save up to \$300 per year. It includes a graph of spending trends and payment details.

Integrated into the BOA mobile app  
Interacts with messaging and voice  
Provides suggestions to customers  
19.5 million users  
Over 100 million interactions  
90% efficacy for useful answers

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## Domino's Pizza Bot

<https://www.dominos.com/chat-pizza-order/>

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Demo

## LET'S BUILD A BOT

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## Bot Framework SDK



Modular and extensible SDK for bot building for professional (pro-code) developers

SDKs for C#, Java, JavaScript, Typescript, and Python

<https://github.com/microsoft/botframework-sdk>

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## Developing with Visual Studio

.NET Core SDK 3.1 or later

<https://dotnet.microsoft.com/en-us/download>

Bot Framework v4 SDK Templates for VS

<https://marketplace.visualstudio.com/items?itemName=BotBuilder.botbuilderv4>

VS Code/CLI

dotnet new -i Microsoft.Bot.Framework.CSharp.EchoBot

dotnet new -i Microsoft.Bot.Framework.CSharp.CoreBot

dotnet new -i Microsoft.Bot.Framework.CSharp.EmptyBot

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# Bot lifecycle



Build

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# Activity

## Interactions between the bot and the user or channel

<https://github.com/Microsoft/botframework-sdk/blob/main/specs/botframework-activity/botframework-activity.md>

Activity Type	Interface	Description
<a href="#">message</a>	IMessageActivity	Represents a communication between bot and user that is intended to be shown within a conversational interface.
<a href="#">conversationUpdate</a>	IConversationUpdateActivity	Indicates that the bot was added to a conversation, other members were added to or removed from the conversation, or conversation metadata has changed.
<a href="#">contactRelationUpdate</a>	IContactRelationUpdateActivity	Indicates that the bot was added or removed from a user's contact list.
<a href="#">typing</a>	ITypingActivity	Indicates that the user or bot on the other end of the conversation is compiling a response.
<a href="#">endOfConversation</a>	IEndOfConversationActivity	Indicates the end of a conversation.
<a href="#">event</a>	IEventActivity	Represents a communication sent to a bot that is not visible to the user.
<a href="#">invoke</a>	IInvokeActivity	Represents a communication sent to a bot to request that it perform a specific operation. This activity type is reserved for internal use by the Microsoft Bot Framework.
<a href="#">messageReaction</a>	IMessageReactionActivity	Indicates that a user has reacted to an existing activity. For example, a user clicks the "Like" button on a message.

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# Entity

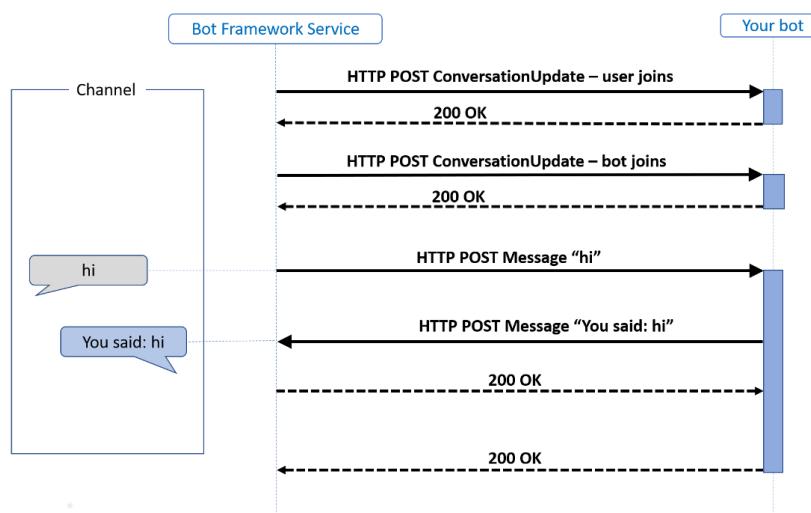
Metadata about an activity or conversation

<https://github.com/Microsoft/botframework-sdk/blob/main/specs/botframework-activity/botframework-activity.md>

Type	IRI equivalent	Description
GeoCoordinates	<a href="http://schema.org/GeoCoordinates/">http://schema.org/GeoCoordinates/</a>	Schema.org GeoCoordinates
Mention	<a href="https://botframework.com/schema/mention">https://botframework.com/schema/mention</a>	@-mention
Place	<a href="http://schema.org/Place">http://schema.org/Place</a>	Schema.org Place
Thing	<a href="http://schema.org/Thing">http://schema.org/Thing</a>	Schema.org Thing
string	N/A	String
number	N/A	Number
clientInfo	N/A	Skype client info

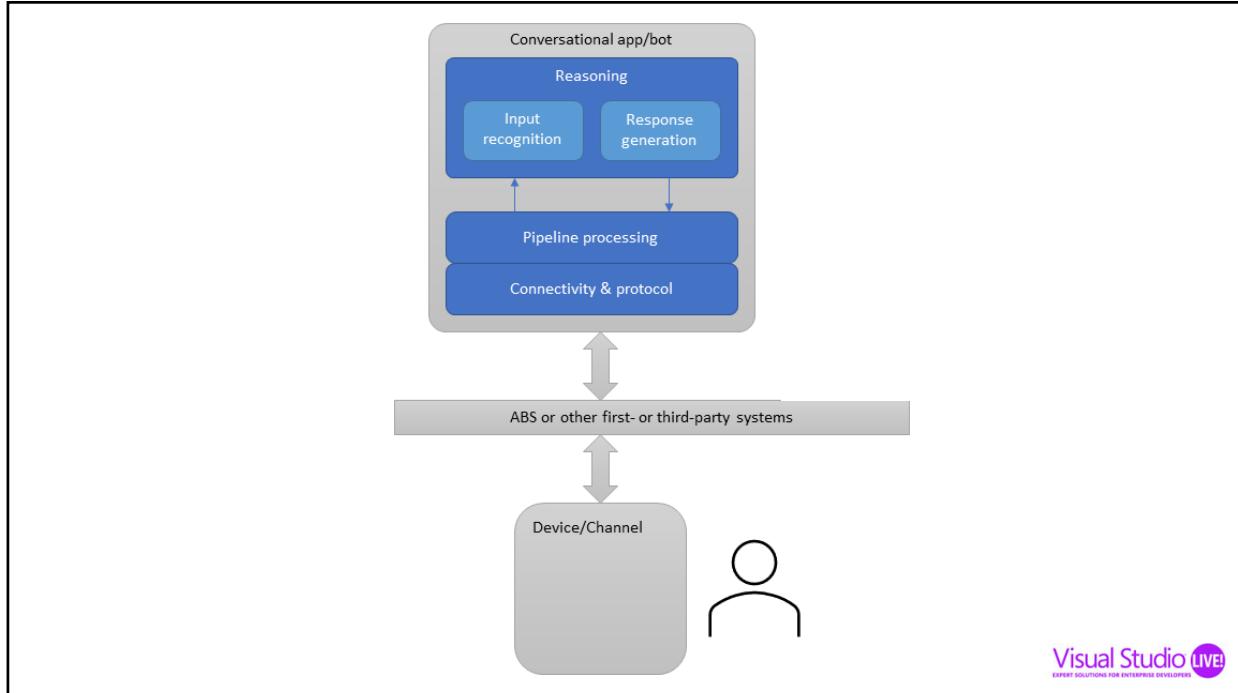


# Turns



Incoming activity to the bot from the user, and the immediate response to the user from the bot





## Bot app structure

**bot** class – handles conversational reasoning

- Recognizes and interprets user input
- Reasons about the input and performs relevant tasks
- Generates responses about what the bot is doing or has done

**adapter** class – handles connectivity with channels

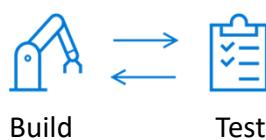
- Provides a method for handling requests from and methods for generating requests to the user's channel
- Provides a middleware pipeline which includes turn processing outside of the bot's turn handler
- Calls the bot's turn handler and catches errors not handled in the turn handler

# Bot logic

- Activity handlers
  - Event-driven model
  - Good for bots that have limited, short interactions
- Dialogs library
  - State-based model
  - Good for bots that have a long-running conversation with the user
- Custom bot class with your own logic for handling turns



# Bot lifecycle



Demo

## LET'S TEST THE BOT



## Bot Framework Emulator

Desktop app to test and debug bots

Support for Windows, macOS, Linux

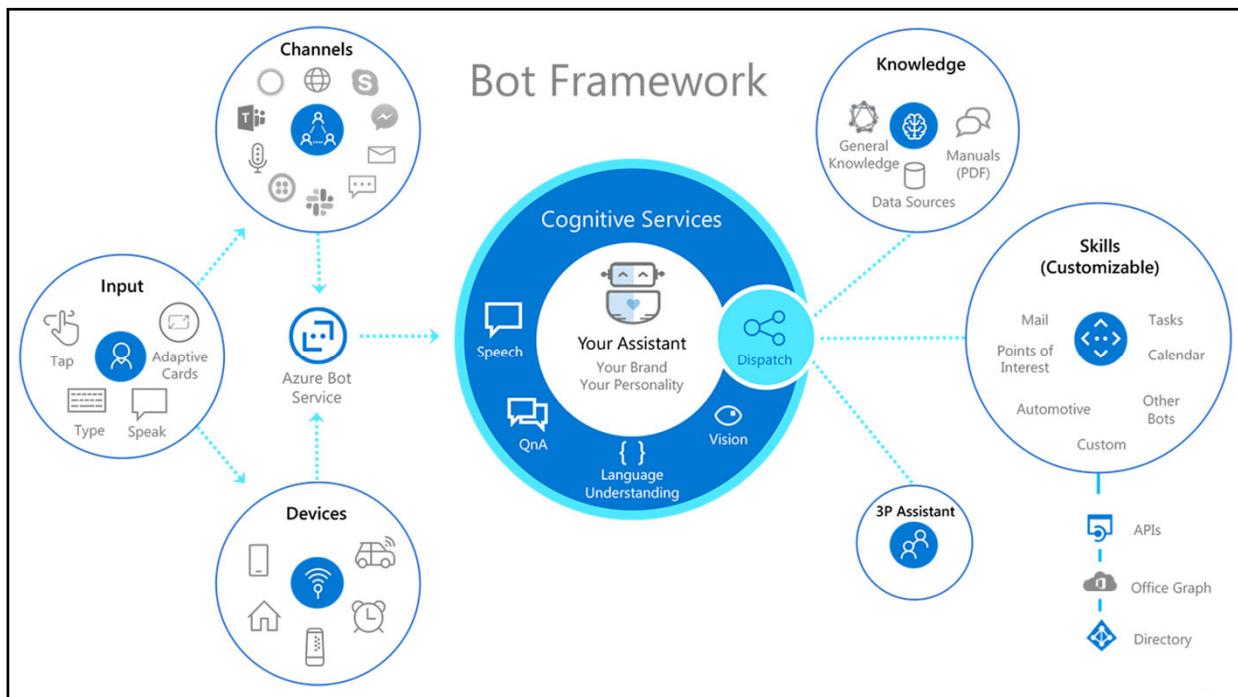
<https://github.com/Microsoft/BotFramework-Emulator>



# Bot lifecycle



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Demo

## LET'S PUBLISH A BOT

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## Bot lifecycle

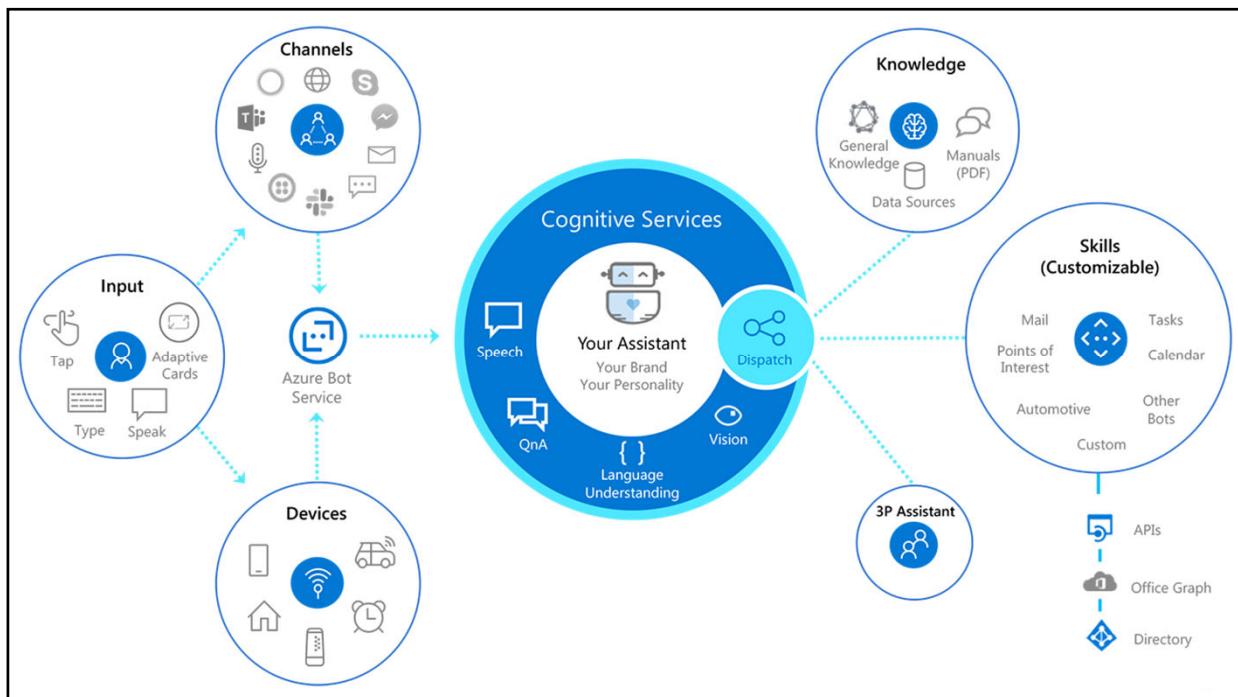


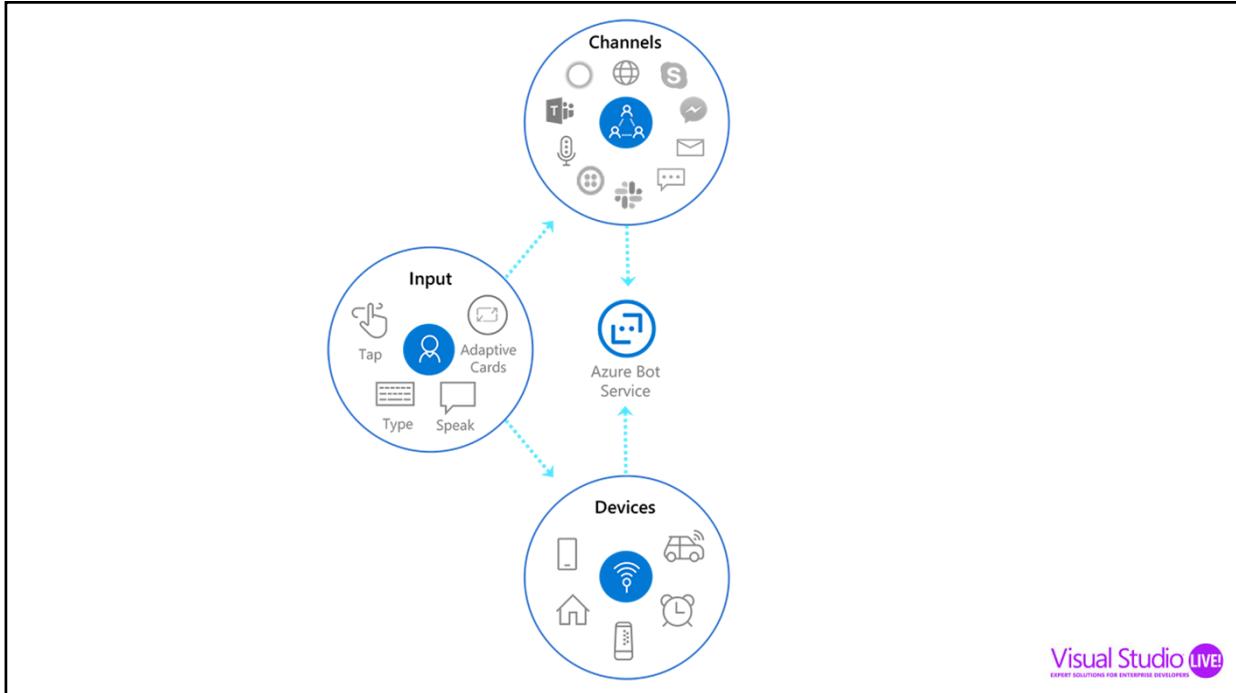
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# Channels



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Demo

## LET'S CONNECT A BOT TO CHANNELS

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# Channels

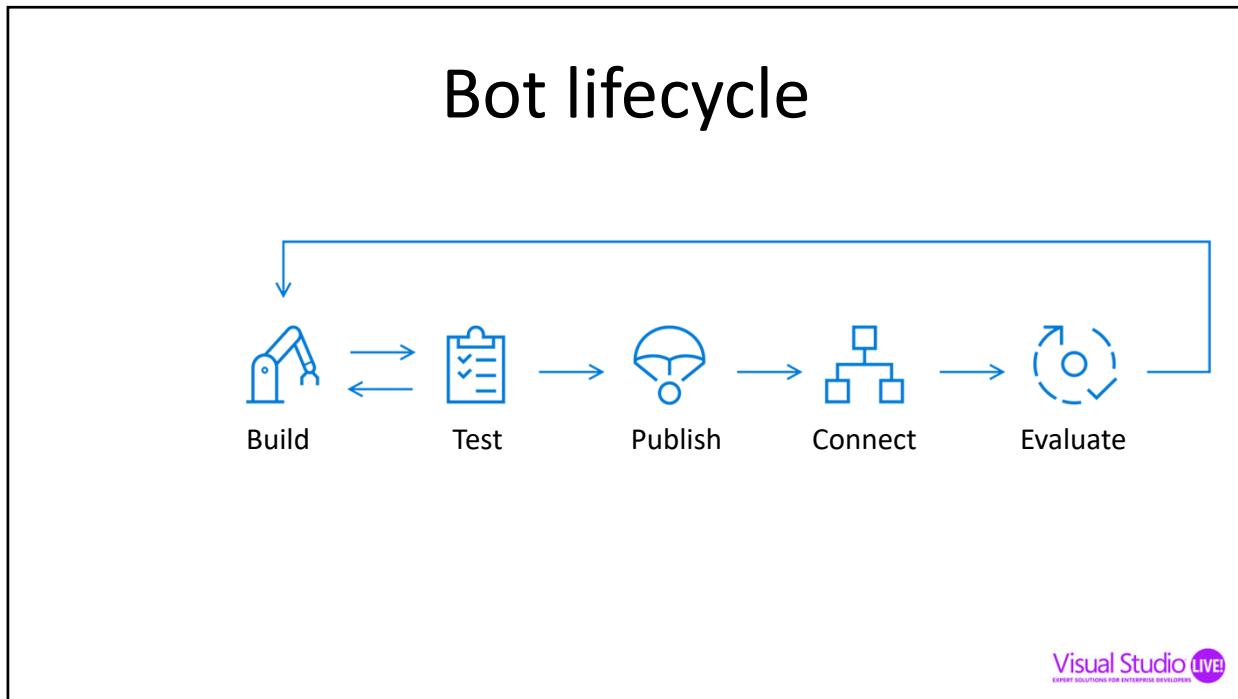
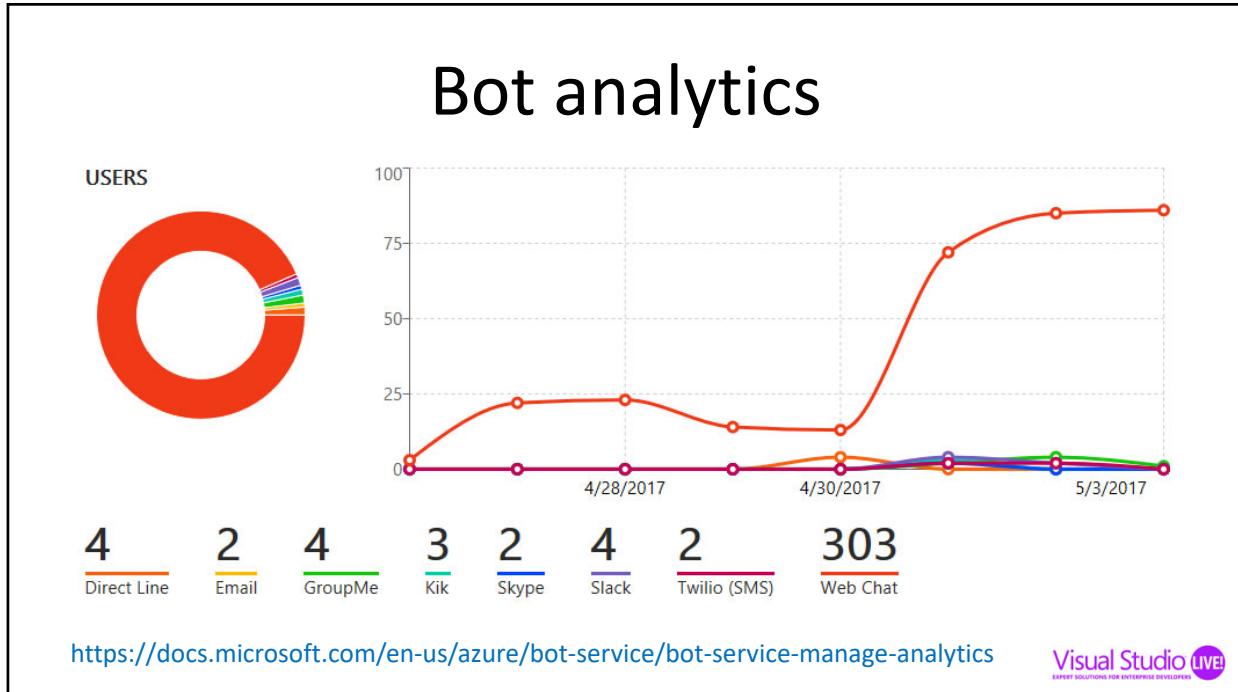
- The Bot Framework allows you to develop a bot in a channel-agnostic way by normalizing messages that the bot sends to a channel

<https://docs.microsoft.com/en-us/azure/bot-service/bot-service-manage-channels>



# Bot lifecycle





# Building Bots



Bot Framework  
SDK

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# Building Bots

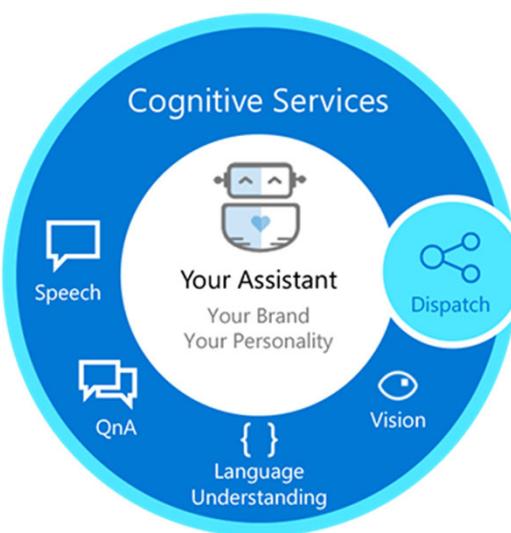


Bot Framework  
SDK



Bot Service

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## Language Understanding (LUIS)

AI service that applies custom machine-learning intelligence to a user's conversational, natural language text to predict overall meaning, and pull out relevant, detailed information

<https://docs.microsoft.com/en-us/azure/cognitive-services/luis>

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# Utterances

- Inputs from users that your app needs to interpret
- It's important to capture a variety of different example utterances for each intent
- Examples
  - "How do I get a computer?"
  - "Where do I get a laptop?"
  - "I want to get a desktop, how do I go about it?"
  - "When can I have a new machine?"

<https://docs.microsoft.com/en-us/azure/cognitive-services/luis/concepts/utterances>



# Intents

- A task or action the user wants to perform
- The purpose or goal expressed in a user's

Intents	Example utterances
<b>BookFlight</b>	"Book me a flight to Rio next week" "Fly me to Rio on the 24th" "I need a plane ticket next Sunday to Rio de Janeiro"
<b>CheckWeather</b>	"What's the weather like in Boston?" "Show me the forecast for this weekend"

<https://docs.microsoft.com/en-us/azure/cognitive-services/luis/concepts/intents>



# Entities

- An item or an element that is relevant to the user's intent
- Data that can be extracted from the utterance and is essential to complete a user's required action

<https://docs.microsoft.com/en-us/azure/cognitive-services/luis/concepts/entities>



# Entities

Utterance	Intent predicted	Entities extracted	Explanation
Hello, how are you?	Greeting	-	Nothing to extract.
I want to order a small pizza	orderPizza	'small'	'Size' entity is extracted as 'small'.
Turn off bedroom light	turnOff	'bedroom'	'Room' entity is extracted as 'bedroom'.
Check balance in my savings account ending in 4406	checkBalance	'savings', '4406'	'accountType' entity is extracted as 'savings' and 'accountNumber' entity is extracted as '4406'.
Buy 3 tickets to New York	buyTickets	'3', 'New York'	'ticketsCount' entity is extracted as '3' and 'Destination' entity is extracted as 'New York'.



# Building Bots



Bot Framework  
SDK



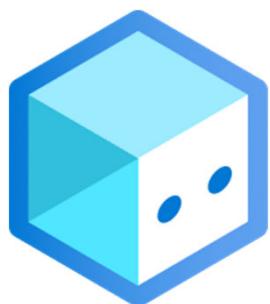
Bot Service



Bot Framework  
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## Bot Framework Composer



Open-source, bot building IDE

Built on Bot Framework SDK

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Demo

## LET'S CREATE A BOT WITH COMPOSER



Tunneling to your local machine

The ngrok logo, which consists of the word "ngrok" in a bold, lowercase, sans-serif font. The letter "n" is blue, while "grok" is a darker shade of blue.

<https://docs.microsoft.com/en-us/azure/bot-service/bot-service-debug-channel-ngrok>



# Building Bots



Bot Framework  
SDK



Bot Service



Bot Framework  
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# Building Bots



Bot Framework  
SDK



Bot Service



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Composer



Power Virtual Agents

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# Power Virtual Agents



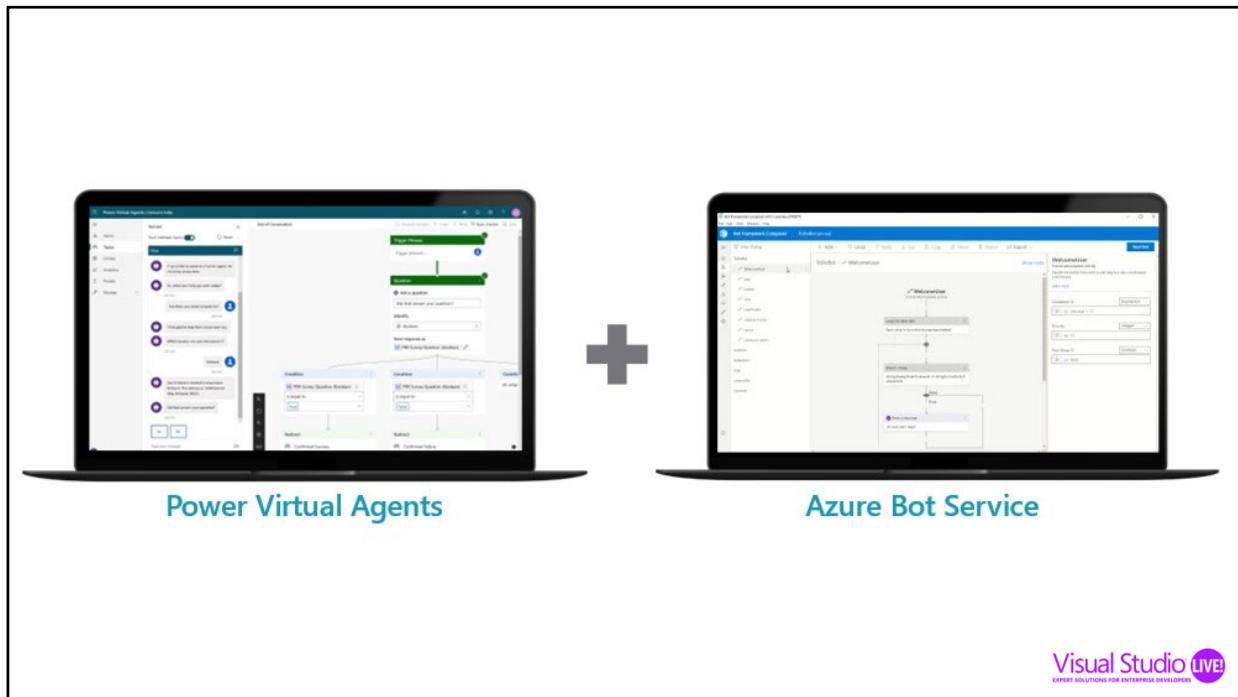
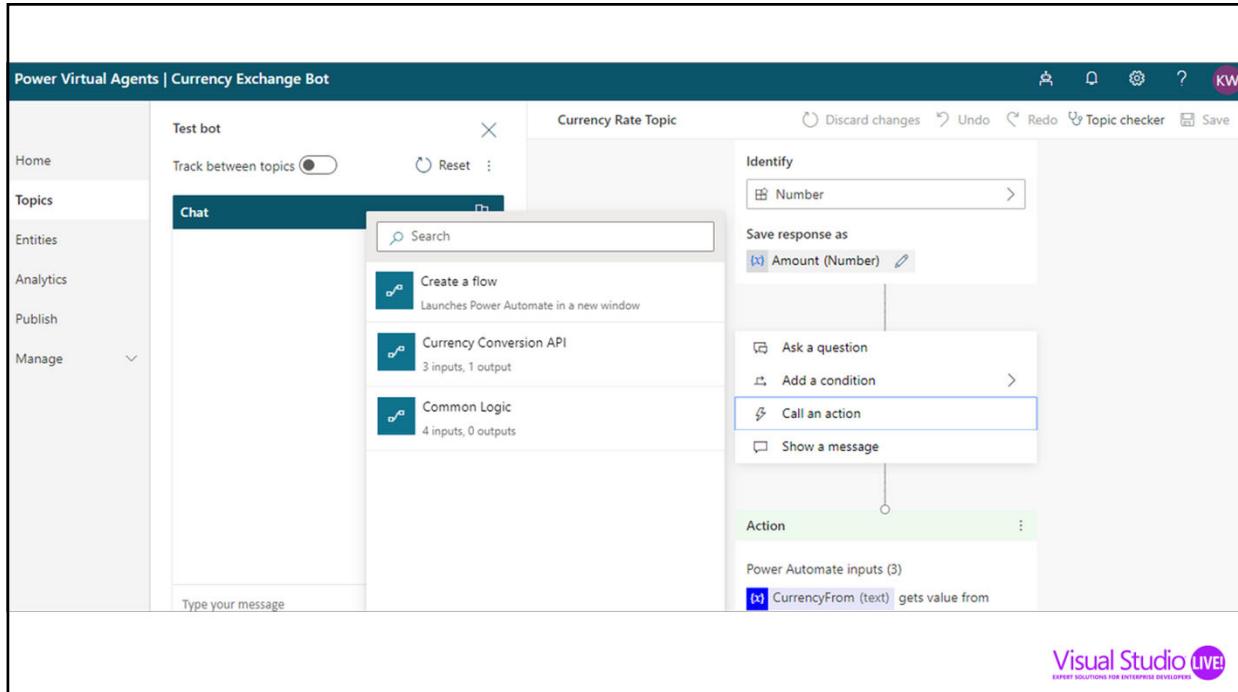
Empower *everyone*  
to easily create  
conversational bots

low-code/no-code

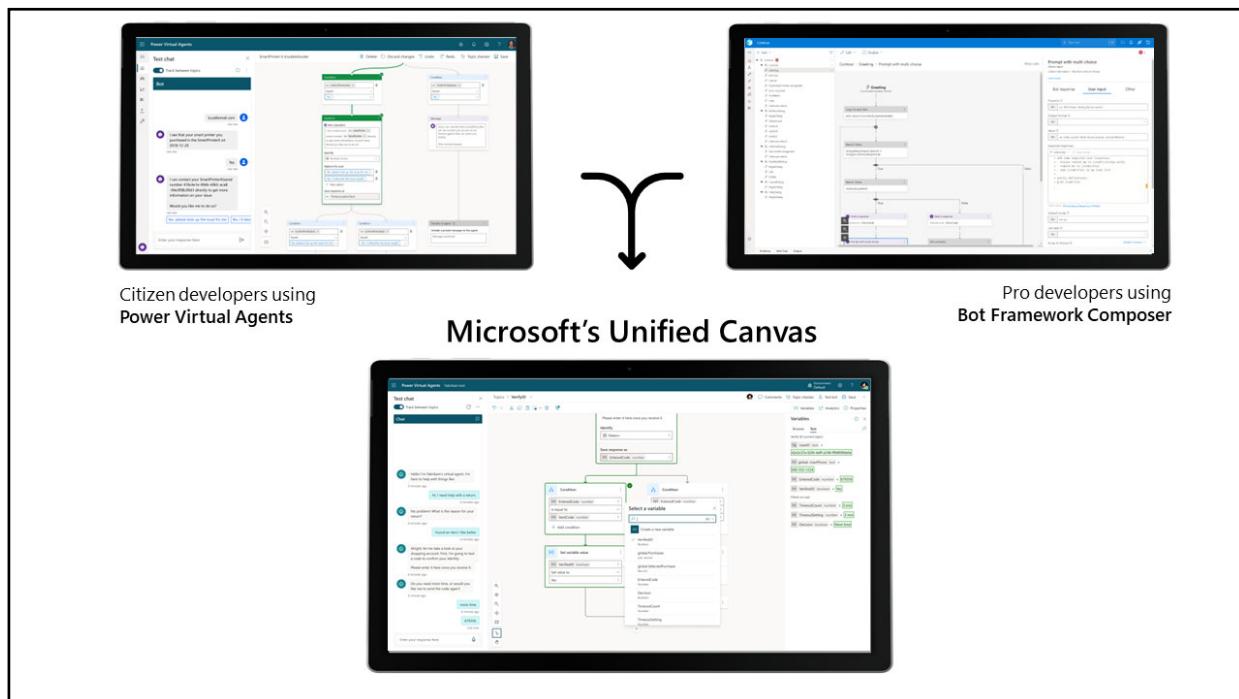
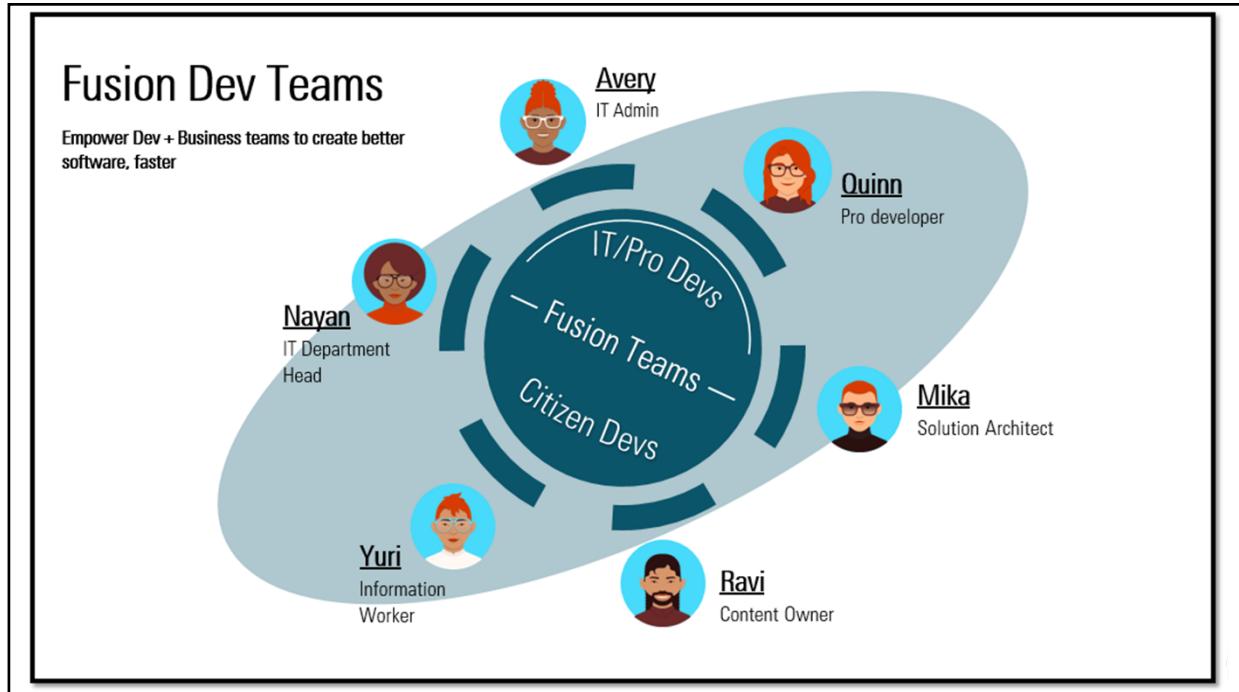
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The screenshot shows the Power Virtual Agents platform. On the left, a sidebar titled "Test chat" displays a conversation between a user ("luca@email.com") and a bot. The bot has responded with: "I see that your smart printer you purchased is the SmartPrinterX on 2018-12-20". The user has responded with "Yes". The bot then asks: "Would you like me to do so?" with options "Yes, please look up the issue for me" and "No, I'll describe the issue myself". The user has selected "Yes, please look up the issue for me". On the right, the main workspace shows the bot's logic flow. It starts with a "Condition" node comparing the user input "ConfirmPrinter(text)" to "Yes". If "Yes", it leads to a "Question" node: "I can contact your (x) LatestPrinter (serial number (x) SerialNumber directly to get more information on your issue. Would you like me to do so?". This node has two options: "Multiple choice" (selected) and "New option". The "Multiple choice" option contains "Yes, please look up the issue for me" and "No, I'll describe the issue myself". The "Ask a question" node also has a "Save response as" field set to "(x) PrinterLocation(Text)". If the user selects "No", the flow continues to a "Message" node: "Sorry, our records show something else. Let me connect you to one of our human agents that can assist you further. One moment please.". Finally, the flow ends with a "Transfer to agent" node.

# Visual Studio Live! Austin 2022

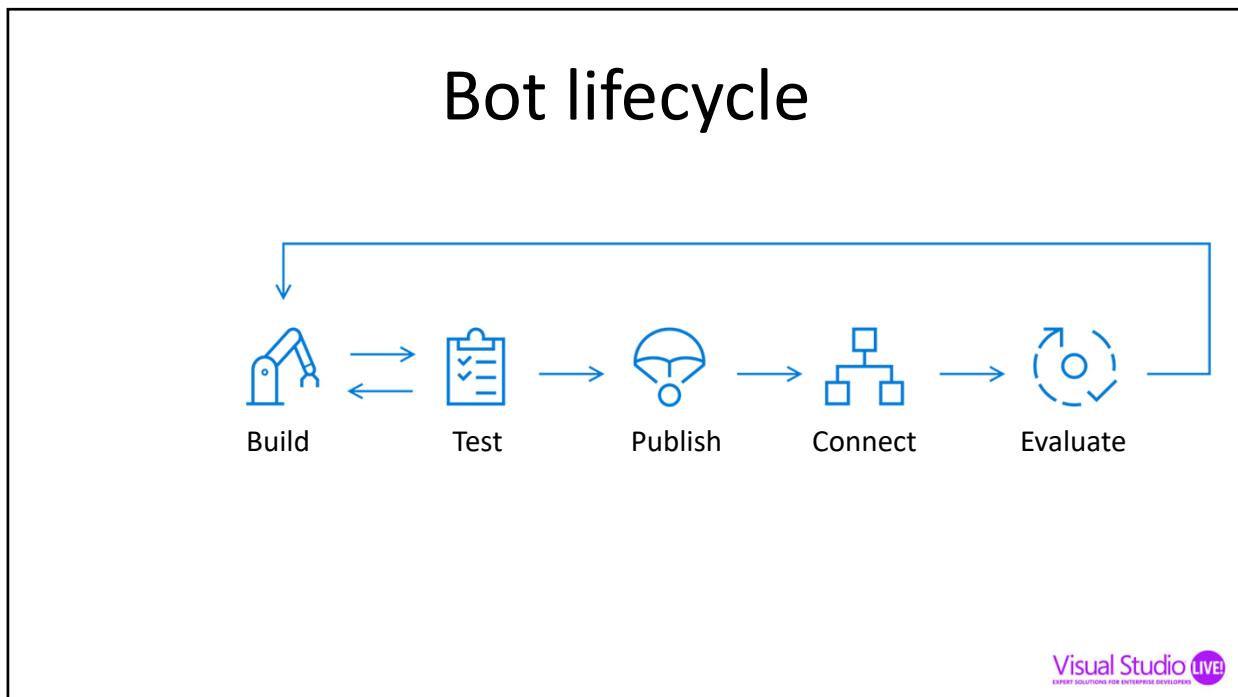


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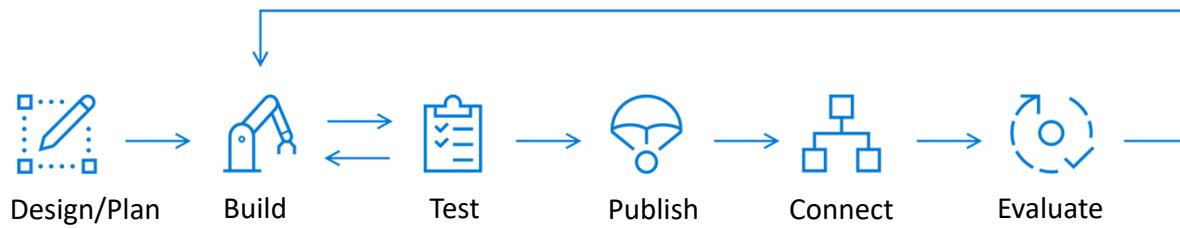


## Visual Studio Live! Austin 2022

The screenshot shows the Power Virtual Agents builder interface. A conversation flow is being built under the topic 'Verify ID'. The flow starts with a 'Question' block asking for a code. It then branches into two 'Condition' blocks: one for 'EnteredCode' being equal to 'SentCode' (which triggers a 'Set variable value' block to set 'VerifiedID' to 'Yes'), and another for 'EnteredCode' not being equal to 'SentCode' (which triggers a 'Message' block with the response 'Hmm, your code doesn't match the we sent to your phone'). Both paths lead to an 'End conversation' block.



## Bot lifecycle



## Conversational User Experience (CUX)

- modality of interaction that's based on natural language

Natural  
Conversation      ↗  
Supportive  
System

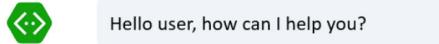
## Successful bots

- Easily solve a user's problem with minimal steps
- Solve a problem better/easier/faster than other approaches
- Runs in platforms users use
- Are discoverable and intuitive
- Guides the user when they are stuck
  - Handover to a live agent
  - Provide relevant help



## The design of the first interaction

Option #1



Option #2



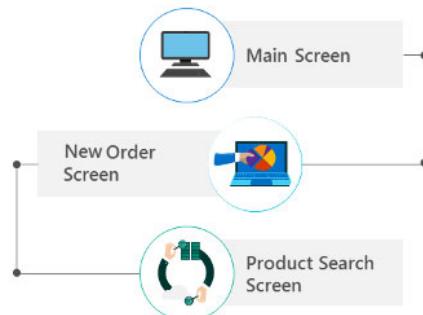
## Guide the user from the first interaction

Hi! I'm here to take your sandwich order.  
What kind of bread would you like?  
We have white, wheat, or rye.

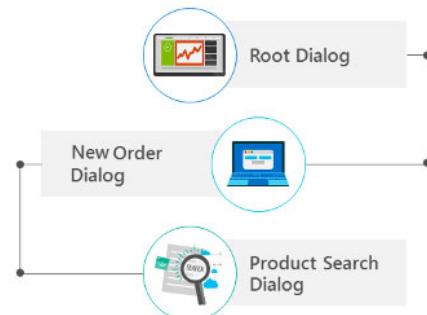


## Conversation flow

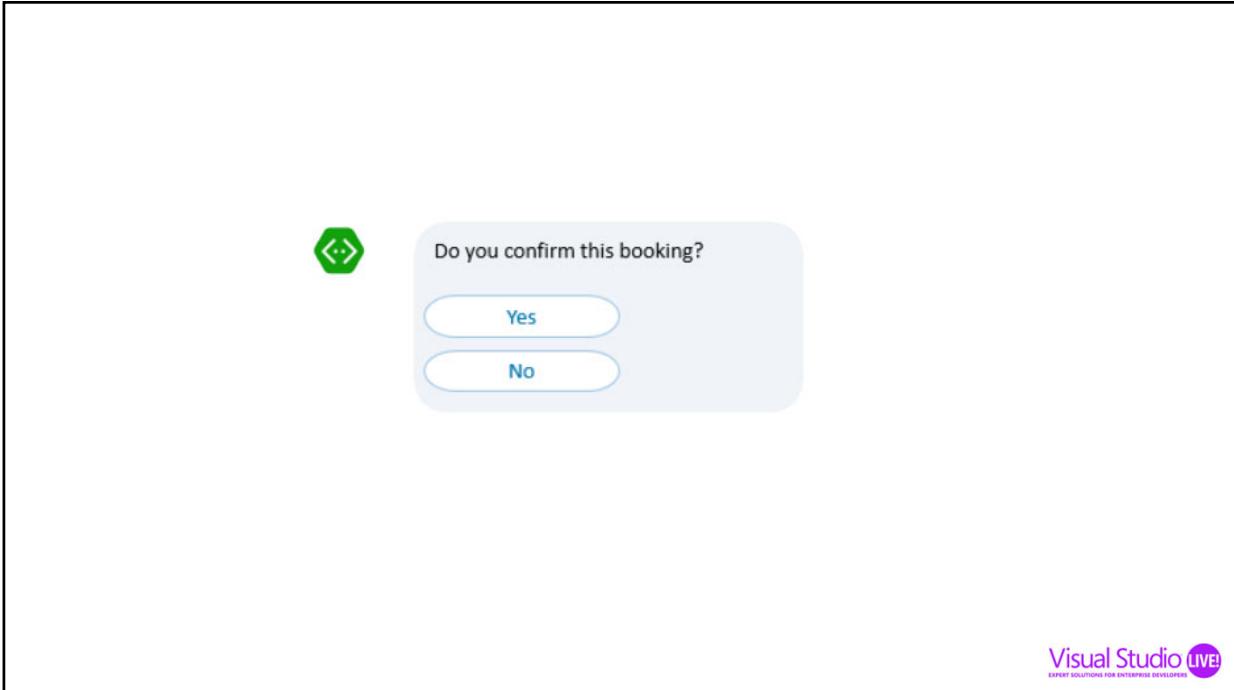
### TRADITIONAL APPLICATION



### BOT



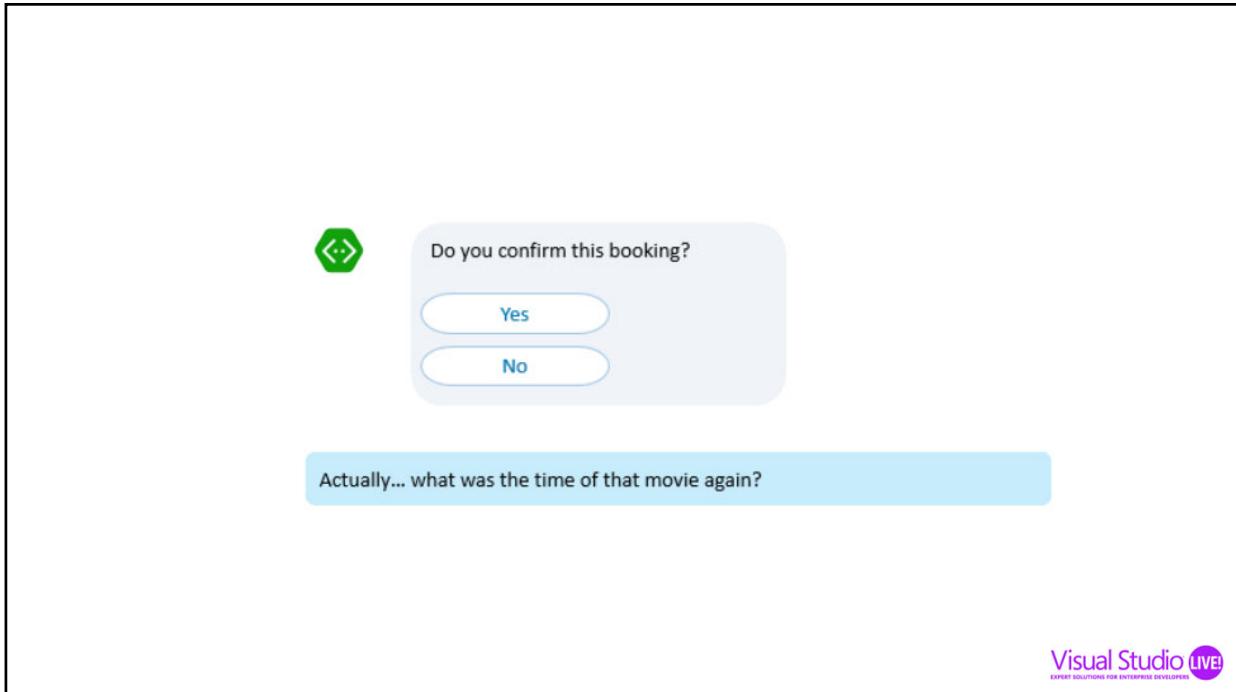
## Visual Studio Live! Austin 2022



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## How should your bot handle interruptions?

- First, there is no *right* answer
- But you could
  - Insist that the user answer the question first
  - Disregard everything that the user had done previously, reset the whole dialog stack, and start from the beginning by attempting to answer the user's question
  - Attempt to answer the user's question and then return to that yes/no question and try to resume from there



## Bot navigation

- Users can navigate websites using
  - breadcrumbs
  - apps using menus
  - web browser **forward** and **back** buttons
- Bots are non-linear

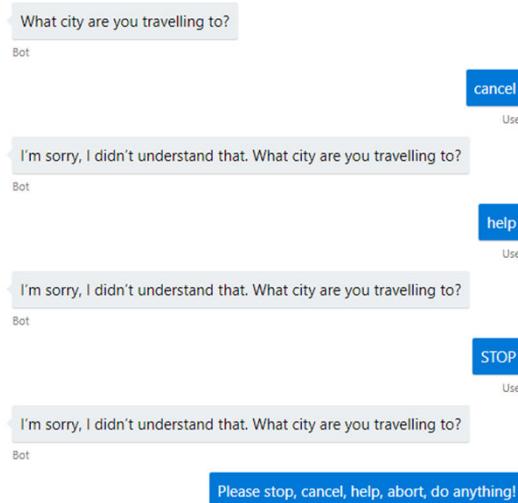


## Bot navigation dilemmas

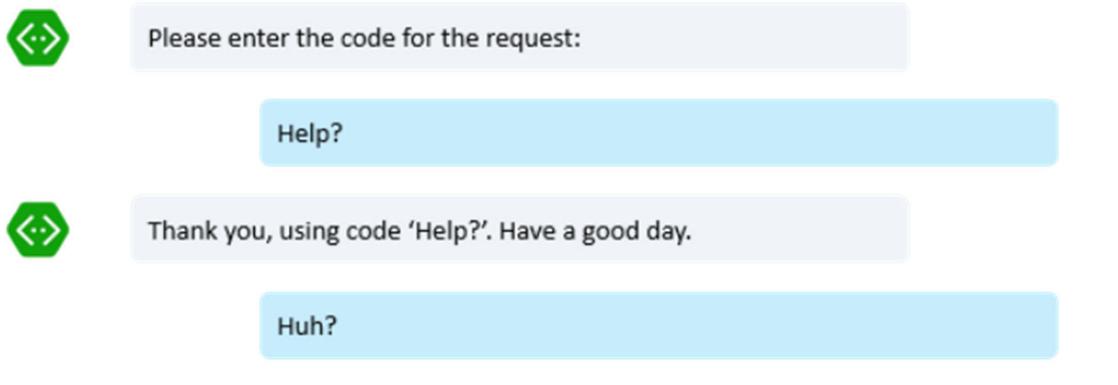
- How do you ensure that a user doesn't get lost in a conversation with a bot?
- Can a user navigate "back" in a conversation with a bot?
- How does a user navigate to the "main menu" during a conversation with a bot?
- How does a user "cancel" an operation during a conversation with a bot?



## “Stubborn” bot



## “Clueless” bot



## “Mysterious” bot



How can I help you today?

Which movies are showing this week?

Hello?

Which movies are showing this week?

Hey bot, are you there?



## “Captain obvious” bot



You just spent \$10 on your credit card!

Yup, I know...



It looks like you are driving to work!

Really...



It looks like you arrived at work! Have a nice day!

Jeez, get a life, bot...



## “Can’t forget” bot

I want to travel to Italy



Please confirm: Are you ok with me charging \$200 for your trip to Las Vegas?

Which Trip to Las Vegas???



Your trip to Las Vegas you wanted me to book for June the 5th

OMG that was 3 months ago, bot...

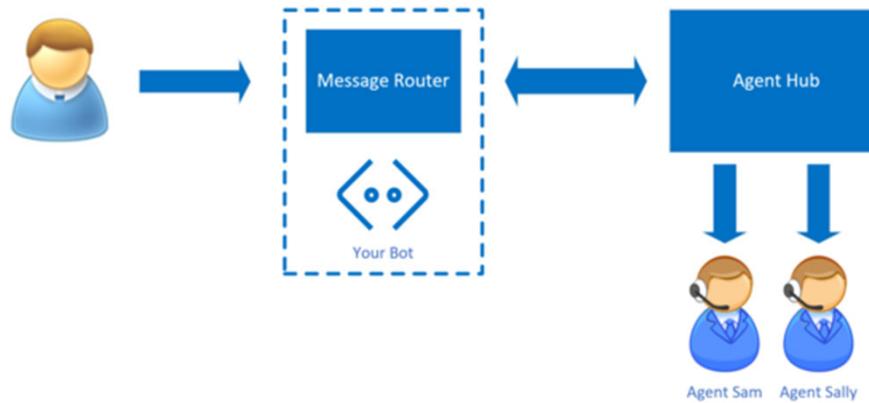
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## Don't put lipstick on a pig

Intelligence, natural language and voice might be sexy, but are not required, and may not even contribute to success.

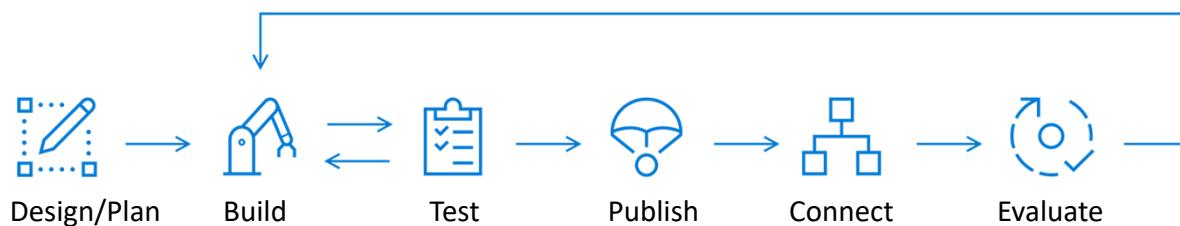
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## Bot as a proxy



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## Bot lifecycle



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# Building Bots



Bot Framework  
SDK



Bot Service



Bot Framework  
Composer



Power Virtual Agents

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# Resources

- Power Virtual Agents
  - <https://powervirtualagents.microsoft.com>
- Azure Bot Service Documentation
  - <https://docs.microsoft.com/en-us/azure/bot-service>
- Azure Bot Framework Emulator
  - <https://github.com/Microsoft/BotFramework-Emulator>
- Bot Samples
  - <https://github.com/microsoft/BotBuilder-Samples>

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# Questions

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## Questions?



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## Session Survey

- Your feedback is very important to us
- Please take a moment to complete the session survey found in the mobile app
- Use the QR code or search for “Converge360 Events” in your app store
- Find this session on the Agenda tab
- Click “Session Evaluation”
- Thank you!



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