Contents

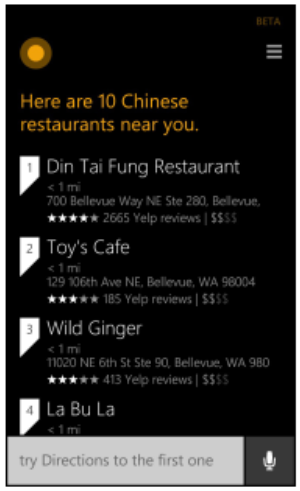
Cortana 1
Copilot 36
Azure Services 68

Cortana

Element	Analysis for Cortana
[11.0] A method for processing multi-modal natural language inputs, comprising:	Cortana implements a method for processing multi-modal natural language inputs, including voice input, text input, and/or mouse selection input.  https://www.youtube.com/watch?app=desktop&v=xuiKfUgEvfo

MICROSOFT CORP.
EXHIBIT 1018

Element	Analysis for Cortana
	What is the Cortana search box in Windows? The Cortana search box in Windows is a central place to enter queries and access information quickly. You can use it to search for files, apps, settings, and perform web searches without opening a browser. Just type or speak your query in the search box, and Cortana will provide relevant results. https://www.lenovo.com/us/en/glossary/cortana/ Cortana typically serves as a dictionary, thesaurus, or encyclopedia to its users. It comes in handy when you intend to save time on redundant tasks that machines can accomplish on their own. You can just type-in or ask your questions and get immediate responses without the need for any intervention. What's the synonym of analyze?, What is the length of the Great Wall of China?, What's the latitude and longitude of San Francisco?, and so on, are examples of questions that can be asked. https://www.spiceworks.com/tech/artificial-intelligence/articles/what-is-cortana/ **Cortana in Windows 10** The Cortana application in the Windows 10 version 2004 and later is a chat application with your personal productivity assistant. This application helps users to quickly get information across the Microsoft 365 platform by just using simply typed or spoken Keywords in queries. https://www.infiflex.com/making-microsoft-365-smarter-with-cortana **5.2. Flexible Item Selection** Unlike traditional over-the-phone spoken dialog systems, PDAs run on different device and form factors (*e.g.* smartphones, PCs and browsers). They have the visual element as an additional modality to communicate the system's response to the user. Visual display of the system's response changes human behavior when interacting with PDAs. In Fig. 2, we show the PDA response to the query "*show me chinese restaurants nearby*". The user can either select one (or more) of the items or choose none and instead reformulate their query. Thus immediately following a PDA's attempt to elicit a selection from a user, the system has two decisions to make; whether

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	 **Fig. 2.** Flexible on-screen item selection https://www.microsoft.com/en-us/research/wp-content/uploads/2016/12/CortanaLUDialog-FromSLTproceedings.pdf

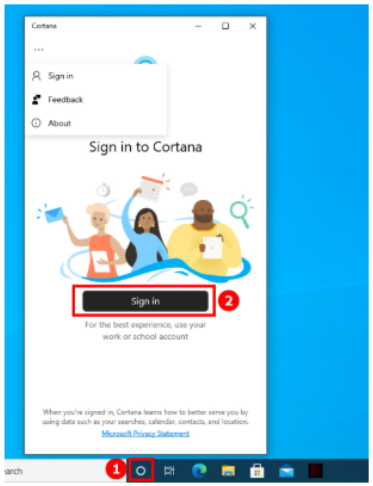
Element	Analysis for Cortana
	Stay on track with Cortana in Windows 10—To help you save time finding what you need and stay focused, we're releasing a new chat-based Cortana experience in Windows 10 focused on enhancing your productivity. With this, you can ask Cortana using natural language to quickly check your schedule, connect with people, set reminders, or add tasks in Microsoft To Do. You can also find local information, get definitions, and keep track of the latest news, weather, and finance updates with Bing as a Cortana optional connected service. Simply type or click on the microphone button and speak commands such as "Am I free at 9?", "Find time with Nestor to talk about the budget," "Join my meeting," "Remind me to review expenses every Friday at 3 PM," and more. This productivity focused experience is now generally available in English for customers in the United States with the Windows 10 May 2020 update. In the coming months, with regular app updates through the Microsoft Store, we'll enhance this experience to support wake word invocation and enable listening when you say "Cortana," offer more productivity capabilities such as surfacing relevant emails and documents to help you prepare for meetings, and expand supported capabilities for international users. https://www.microsoft.com/en-us/microsoft-365/blog/2020/05/27/making-easier-stay-caught-cortana-microsoft-365/ (emphasis added)
[11.1] registering a plurality of mobile devices with a context manager in response to a registration module associated with the context manager receiving a communication from the plurality of mobile devices;	Cortana meets this element. Cortana uses natural language processing (NLP) and natural language understanding (NLU) technology to determine contexts. On information and belief, Cortana uses a context manager to manage contexts for a user dialog; Cortana stores and maintains dialog history, which includes information relating to context for each turn of the dialog.

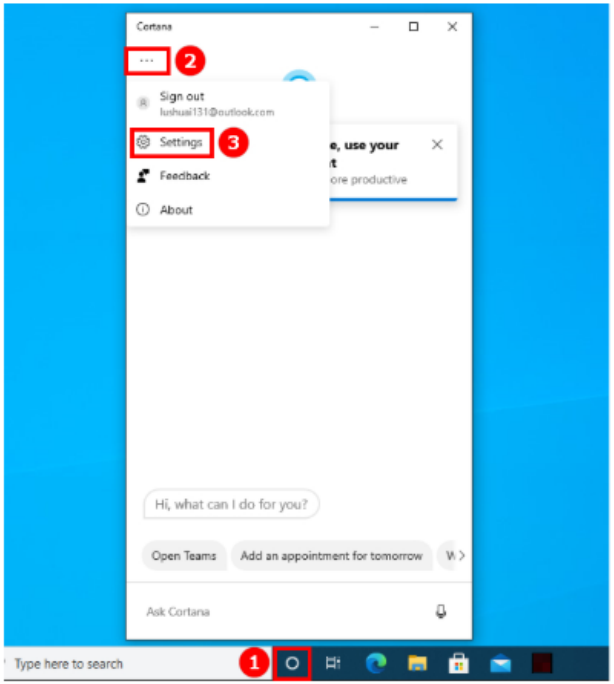
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	4. LANGUAGE UNDERSTANDING The language understanding (LU) component uses as input either typed text or speech transcription from an open vocabulary speech recognition service and performs semantic analysis on the query to determine the underlying user's intent [8, 9, 4, 15]. Our PDA LU is built to handle multi-domain, multi-turn, contextual query understanding [14, 9, 15, 16], subject to the constraints of the back-end data sources and experiences. The LU module semantically parses and analyses the queries according to a domain-specific semantic schema. Given a requirement to minimize latency and computational costs (dimensions 7,8) deep semantic analysis is not performed. Instead, LU delivers a flat analysis matching the experience requirements while allowing for free form natural language expressions that represent different user intents and slots. Follow-up queries in isolation are ambiguous, *e.g.*, • Turn 1: " how is the weather in New York" (weather) • Turn 2: "what about the weekend" (weather) or • Turn 1: "how is my schedule" (calendar) • Turn 2: "what about the weekend" (calendar) LU modeling thus must be performed in a contextual manner. Here, conversational session information from the history greatly reduces the ambiguity of the current turn. We built a set of models addressing contextual domain, intent and slot modeling [14, 15, 16]. Our current approach involves modeling contextual intent prediction as a sequential tagging problem with previous utterances as features that condition this turn's prediction. Contextual information from beyond LU, such as dialog state (where this is tracked by an experience), and PDA responses are also exploited as effective external features. Contextual modeling of queries reduces the likelihood of abrupt intent or domains switching leading to more coherent interaction during a multi-turn session.

Element	Analysis for Cortana
	5.4. Hypothesis Ranking and Selection HRS is the mechanism by which the platform ranks and selects the final response shown to the user. The processing is done in two stages, with an initial ranking of the hypotheses (HR) followed by selection of the best hypothesis according to rank score and other features (HS). One of the key decisions in dealing with open domain requests is the recognition of requests that are not handled by any specialized experience provider and letting such requests fall through to web search. AN OVERVIEW OF END–TO–END LANGUAGE UNDERSTANDING AND DIALOG MANAGEMENT FOR PERSONAL DIGITAL ASSISTANTS, Microsoft Corporation, 2016, available at https://www.microsoft.com/en-us/research/wp-content/uploads/2016/12/CortanaLUDialog-FromSLTproceedings.pdf (emphasis added) **Microsoft's Cortana Intelligence Institute cofounder on building better AI** News By Jason Ward last updated August 12, 2020 **Why is understanding context is so important?** A lot of the help that we require from digital assistants like Cortana depends strongly on the current context. Even location and time of day are important signals about the types of assistance that people are likely to require. For example, we see that users are more likely to request sleep sounds at home in the evening and productivity support, such as calendaring or email, at work during the day. Richer information about the current situation enables better support from Cortana. https://www.windowscentral.com/cortana-intelligence-institute-co-founder-ryen-white-talks-cortana For example, Cortana determines that the context for the second turn relates to restaurant.

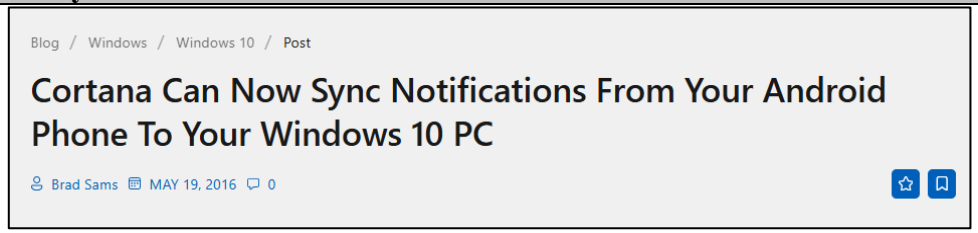
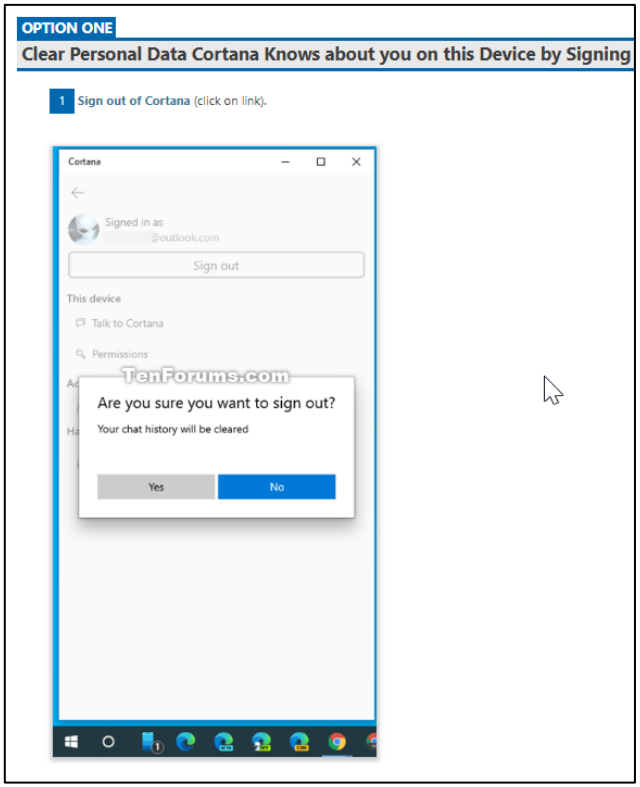
Element	Analysis for Cortana
	5.1. Slot/Entity Carry Over (SCO) and Co-reference Tracking keywords contained in slots and associated entities enables a certain set of user initiative experiences, *e.g.* • Turn 1: "find french restaurants in seattle" • State 1: cuisine="french", place_type="restaurants", absolute_location="seattle" • Turn 2: "how about chinese" • State 2: cuisine=**"chinese"**, place_type="restaurants", absolute_location="seattle" AN OVERVIEW OF END–TO–END LANGUAGE UNDERSTANDING AND DIALOG MANAGEMENT FOR PERSONAL DIGITAL ASSISTANTS, Microsoft Corporation, 2016, available at https://www.microsoft.com/en-us/research/wp-content/uploads/2016/12/CortanaLUDialog-FromSLTproceedings.pdf For example, Cortana determines the context for the second turn to be related to weather or schedule, depending on prior context.

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	Follow-up queries in isolation are ambiguous, *e.g.*, • Turn 1: " how is the weather in New York" (weather) • Turn 2: "what about the weekend" (weather) or • Turn 1: "how is my schedule" (calendar) • Turn 2: "what about the weekend" (calendar) LU modeling thus must be performed in a contextual manner. Here, conversational session information from the history greatly reduces the ambiguity of the current turn. We built a set of models addressing contextual domain, intent and slot modeling [14, 15, 16]. Our current approach involves modeling contextual intent prediction as a sequential tagging problem with previous utterances as features that condition this turn's prediction. Contextual information from beyond LU, such as dialog state (where this is tracked by an experience), and PDA responses are also exploited as effective external features. Contextual modeling of queries reduces the likelihood of abrupt intent or domains switching leading to more coherent interaction during a multi-turn session. AN OVERVIEW OF END–TO–END LANGUAGE UNDERSTANDING AND DIALOG MANAGEMENT FOR PERSONAL DIGITAL ASSISTANTS, Microsoft Corporation, 2016, available at https://www.microsoft.com/en-us/research/wp-content/uploads/2016/12/CortanaLUDialog-FromSLTproceedings.pdf For example, Cortana can register a plurality of mobile devices with a context manager by associating the mobile devices with the user account.

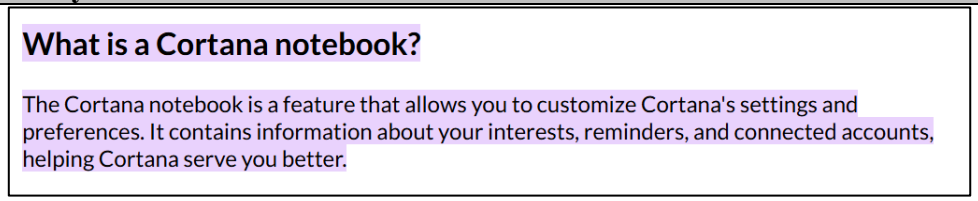
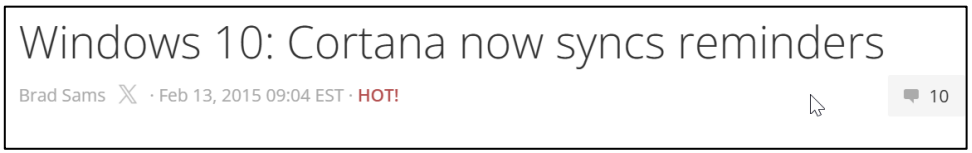
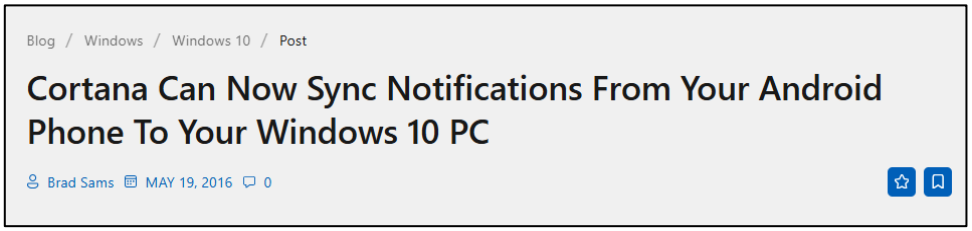
Element	Analysis for Cortana
	Windows 10 - Sign in and activate Cortana Last Update : 2024/07/17 09:36 SEND TO EMAIL Windows 10 - Sign in and activate Cortana **Sign in Cortana** **Sign in with your MSA** Add your Microsoft Account (MSA) and Cortana will help manage your services all in one place. Click icon and Click **[Sign in]**  Then input your account to login and continue.

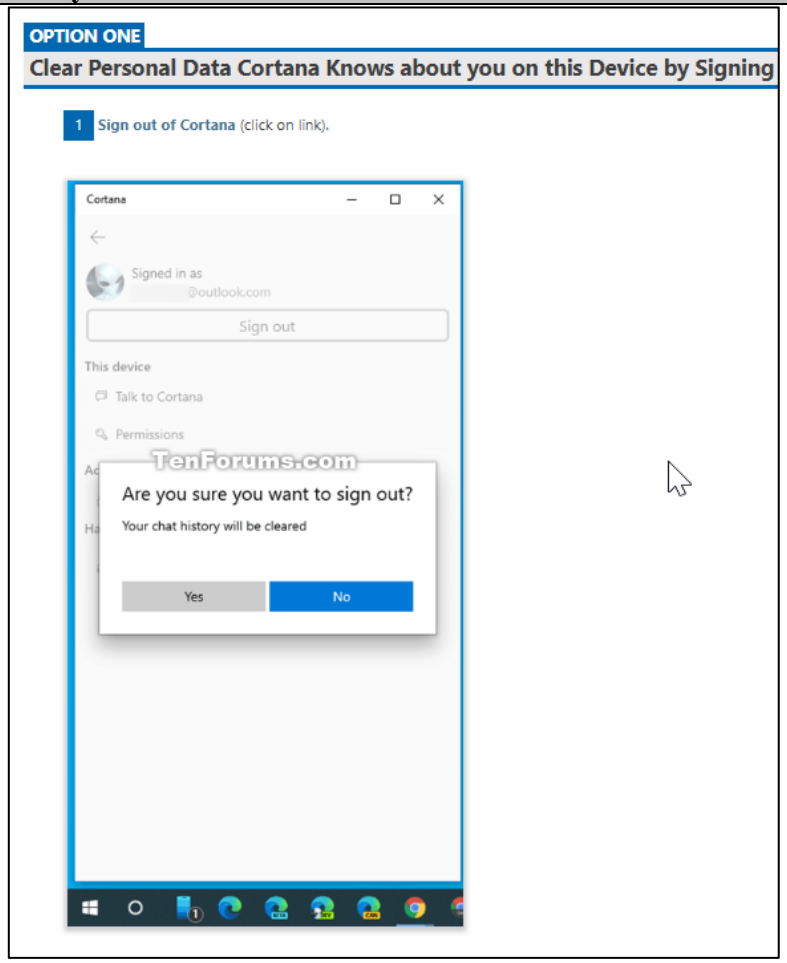
Element	Analysis for Cortana
	Activate Cortana Open Cortana, select **Settings**. ① Click icon and ② Click icon ···, and then ③ Select **[Settings]**  https://www.asus.com/us/support/faq/1014617/#:~:text=Last%20Update%20:%202024/07/,refer%20to%20below%20Microsoft%20link.
[11.2] subscribing the plurality of mobile devices registered with the context manager to one or more context events;	Cortana meets this element. For example, on information and belief, laptops and Android and other phones can access Cortana and sync notifications and other context events.

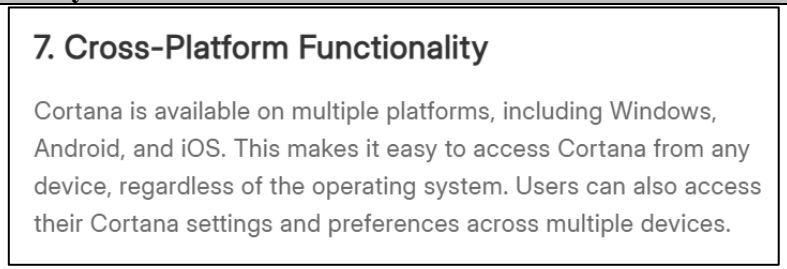
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	What is Cortana? Cortana is a virtual assistant developed by Microsoft, designed to provide voice-controlled assistance on various devices, including Windows computers, smartphones, and smart speakers. It utilizes natural language processing and machine learning to understand and respond to user commands and queries, making it an essential tool for technology, computing, programming, and communications tasks. **Does Cortana work on smartphones?** Yes, Cortana is available on smartphones running on Windows, Android™, and operating systems. On these devices, Cortana can perform various tasks, such as sending text messages, making calls, setting alarms, and providing directions. **Can Cortana control smart home devices?** Cortana supports a range of smart home devices and services, allowing you to control lights, thermostats, locks, and more using voice commands. It can also integrate with popular smart home platforms, enabling seamless automation and control. **What is a Cortana notebook?** The Cortana notebook is a feature that allows you to customize Cortana's settings and preferences. It contains information about your interests, reminders, and connected accounts, helping Cortana serve you better. https://www.lenovo.com/us/en/glossary/cortana/?orgRef=https%253A%252F%252Fwww.google.com%252F (emphasis added) Windows 10: Cortana now syncs reminders Brad Sams · Feb 13, 2015 09:04 EST · HOT! 10 https://www.neowin.net/news/windows-10-cortana-now-syncs-reminders/

Element	Analysis for Cortana
	 https://www.thurrott.com/windows/windows-10/67251/cortana-can-now-sync-notifications-android-phone-windows-10-pc  https://www.tenforums.com/tutorials/24514-clear-personal-data-information-cortana.html

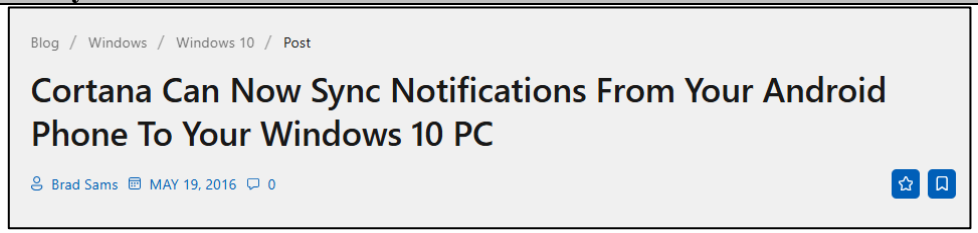
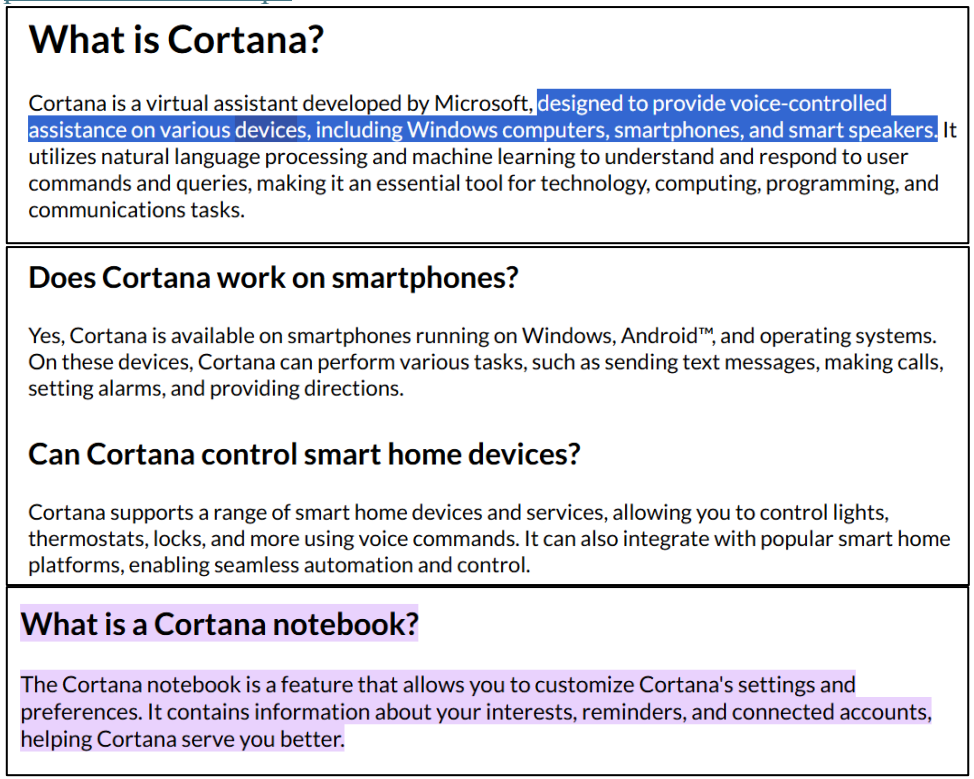
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	7. Cross-Platform Functionality Cortana is available on multiple platforms, including Windows, Android, and iOS. This makes it easy to access Cortana from any device, regardless of the operating system. Users can also access their Cortana settings and preferences across multiple devices. https://botpenguin.com/glossary/cortana-virtual-assistant
[11.3] receiving, at the context manager, a context input from one or more of the plurality of mobile devices registered with the context manager, wherein the context input includes a context change event; and	Cortana meets this element. For example, Cortana can receive context input such as user input from one or more mobile devices registered with the context manager. **What is Cortana?** Cortana is a virtual assistant developed by Microsoft, designed to provide voice-controlled assistance on various devices, including Windows computers, smartphones, and smart speakers. It utilizes natural language processing and machine learning to understand and respond to user commands and queries, making it an essential tool for technology, computing, programming, and communications tasks. **Does Cortana work on smartphones?** Yes, Cortana is available on smartphones running on Windows, Android™, and operating systems. On these devices, Cortana can perform various tasks, such as sending text messages, making calls, setting alarms, and providing directions. **Can Cortana control smart home devices?** Cortana supports a range of smart home devices and services, allowing you to control lights, thermostats, locks, and more using voice commands. It can also integrate with popular smart home platforms, enabling seamless automation and control.

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	 https://www.lenovo.com/us/en/glossary/cortana/?orgRef=https%253A%252F%252Fwww.google.com%252F (emphasis added)  https://www.neowin.net/news/windows-10-cortana-now-syncs-reminders/  https://www.thurrott.com/windows/windows-10/67251/cortana-can-now-sync-notifications-android-phone-windows-10-pc

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	 https://www.tenforums.com/tutorials/24514-clear-personal-data-information-cortana.html

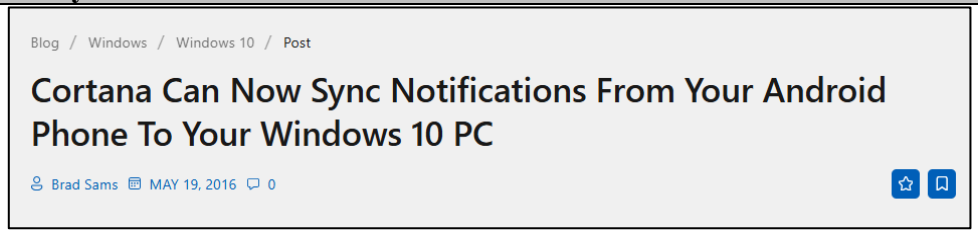
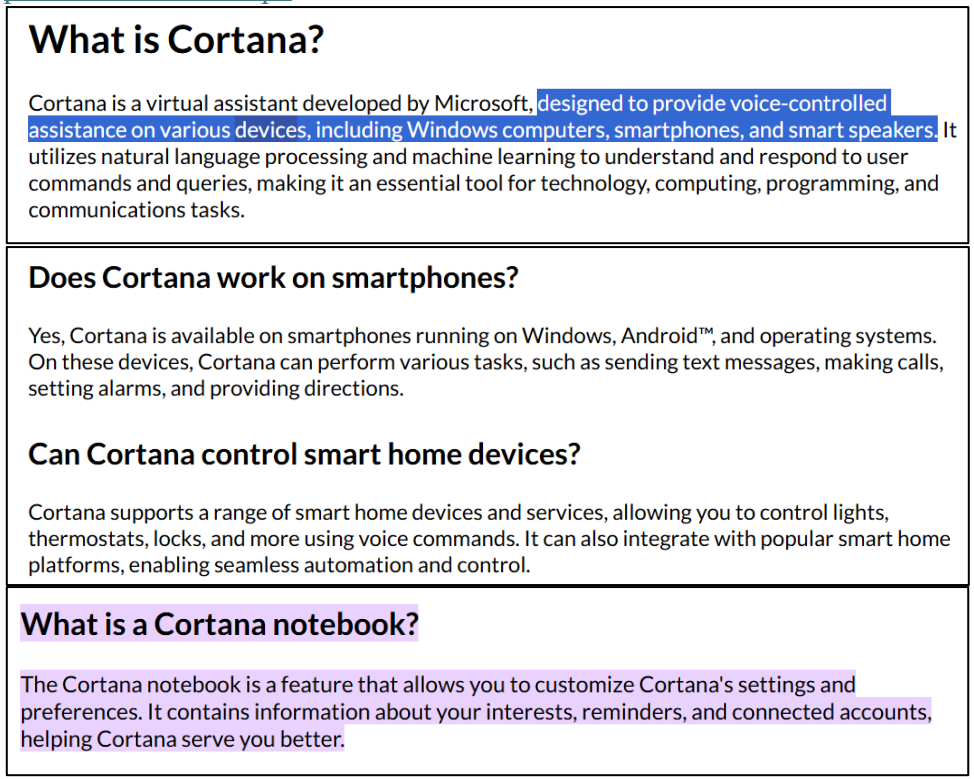
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	 https://botpenguin.com/glossary/cortana-virtual-assistant
[11.4] informing the plurality of mobile devices registered with the context manager of the context change event, wherein informing the plurality of mobile devices registered with the context manager of the context change event synchronizes a context across the plurality of mobile devices.	Cortana meets this element. For example, on information and belief, mobile devices such as laptops and phones that are synced with Cortana receives reminders, notifications, and other context events across these devices.  https://www.neowin.net/news/windows-10-cortana-now-syncs-reminders/

Element	Analysis for Cortana
	Tip 3: Integrate Cortana Across All Your Devices One of Cortana's most powerful features is her ability to seamlessly sync across all your Windows 10 devices, from your desktop PC to your smartphone. This means you can start a task on one device and pick it up on another, with Cortana facilitating a smooth transition. For example, let's say you're browsing the web on your laptop and come across an interesting article you want to read later. You can simply tell Cortana "Remind me to read this article tonight" and the reminder will instantly appear on your phone or tablet. Or if you're out and about and remember an important task you need to do, you can bark out a quick "Cortana, add milk to my shopping list" and it'll be waiting for you when you get home. Microsoft's support forums have plenty of tips on how to optimize Cortana's cross-device capabilities, from syncing your to-do lists to sharing web pages between devices. It's a game-changer for productivity and keeping your life organized. **Tip 4: Leverage Cortana's Contextual Awareness** One of Cortana's most impressive capabilities is her ability to understand context and tailor her responses accordingly. This means she can pick up on subtle cues in your queries and provide hyper-relevant information or take appropriate actions. For instance, let's say you're working on a project and need to look up some quick facts. You can simply say "Cortana, when was the Declaration of Independence signed?" and she'll recite the relevant information. But if you then follow up with "Who wrote it?", Cortana will automatically infer that you're still talking about the Declaration of Independence and provide the name of the author, Thomas Jefferson. Cortana's contextual awareness also extends to your location, calendar, and other personal data. So if you say "Cortana, what's the weather like today?", she'll know to give you the forecast for your current location. Or if you ask "When is my next meeting?", she'll consult your calendar and give you the details. The Ten Forums have a great discussion on how Cortana's contextual abilities can be leveraged to streamline all sorts of daily tasks. It's a capability that truly sets her apart from more rigid virtual assistants. https://itfix.org.uk/get-the-most-from-cortana-tips-for-windows-10/

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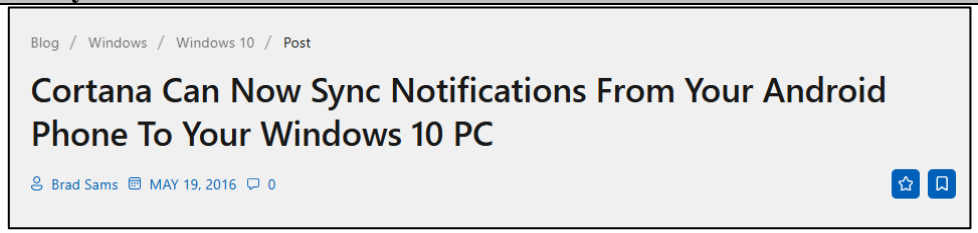
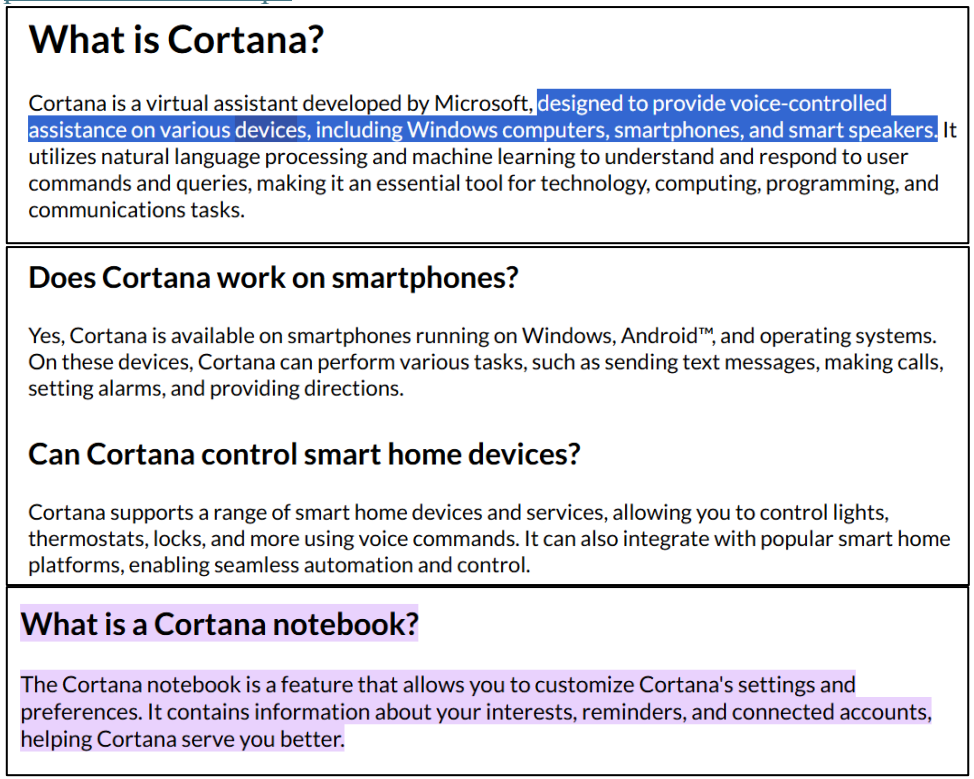
Element	Analysis for Cortana
[12.0] 12. The method of claim 11, wherein	See claim 11.
[12.1] a context tracking module associated with the context manager informs the plurality of mobile devices registered with the context manager of the context change event.	Cortana meets this element. For example, on information and belief, a module associated with Cortana provides the reminders, notifications, and other context events to the devices that are synced with Cortana.  https://www.neowin.net/news/windows-10-cortana-now-syncs-reminders/

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	Tip 3: Integrate Cortana Across All Your Devices One of Cortana's most powerful features is her ability to seamlessly sync across all your Windows 10 devices, from your desktop PC to your smartphone. This means you can start a task on one device and pick it up on another, with Cortana facilitating a smooth transition. For example, let's say you're browsing the web on your laptop and come across an interesting article you want to read later. You can simply tell Cortana "Remind me to read this article tonight" and the reminder will instantly appear on your phone or tablet. Or if you're out and about and remember an important task you need to do, you can bark out a quick "Cortana, add milk to my shopping list" and it'll be waiting for you when you get home. Microsoft's support forums have plenty of tips on how to optimize Cortana's cross-device capabilities, from syncing your to-do lists to sharing web pages between devices. It's a game-changer for productivity and keeping your life organized. **Tip 4: Leverage Cortana's Contextual Awareness** One of Cortana's most impressive capabilities is her ability to understand context and tailor her responses accordingly. This means she can pick up on subtle cues in your queries and provide hyper-relevant information or take appropriate actions. For instance, let's say you're working on a project and need to look up some quick facts. You can simply say "Cortana, when was the Declaration of Independence signed?" and she'll recite the relevant information. But if you then follow up with "Who wrote it?", Cortana will automatically infer that you're still talking about the Declaration of Independence and provide the name of the author, Thomas Jefferson. Cortana's contextual awareness also extends to your location, calendar, and other personal data. So if you say "Cortana, what's the weather like today?", she'll know to give you the forecast for your current location. Or if you ask "When is my next meeting?", she'll consult your calendar and give you the details. The Ten Forums have a great discussion on how Cortana's contextual abilities can be leveraged to streamline all sorts of daily tasks. It's a capability that truly sets her apart from more rigid virtual assistants. https://itfix.org.uk/get-the-most-from-cortana-tips-for-windows-10/

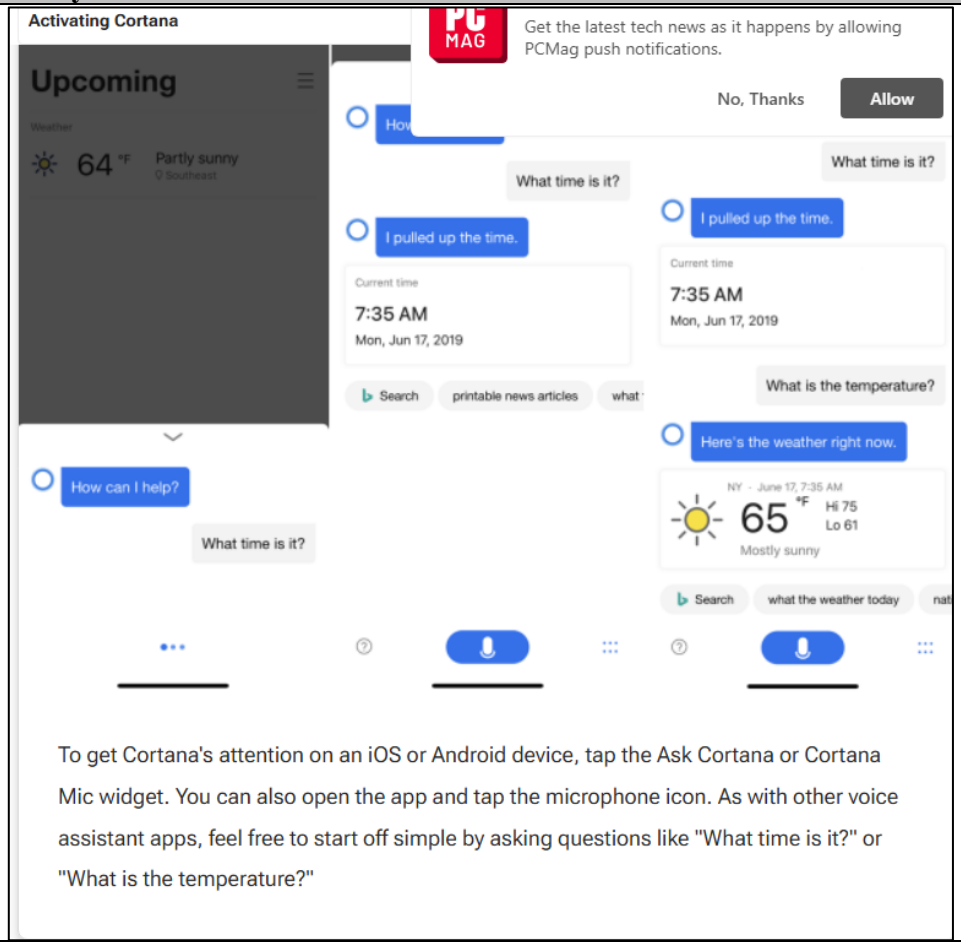
Element	Analysis for Cortana
	 https://www.thurrott.com/windows/windows-10/67251/cortana-can-now-sync-notifications-android-phone-windows-10-pc  https://www.lenovo.com/us/en/glossary/cortana/?orgRef=https%253A%252F%252Fwww.google.com%252F

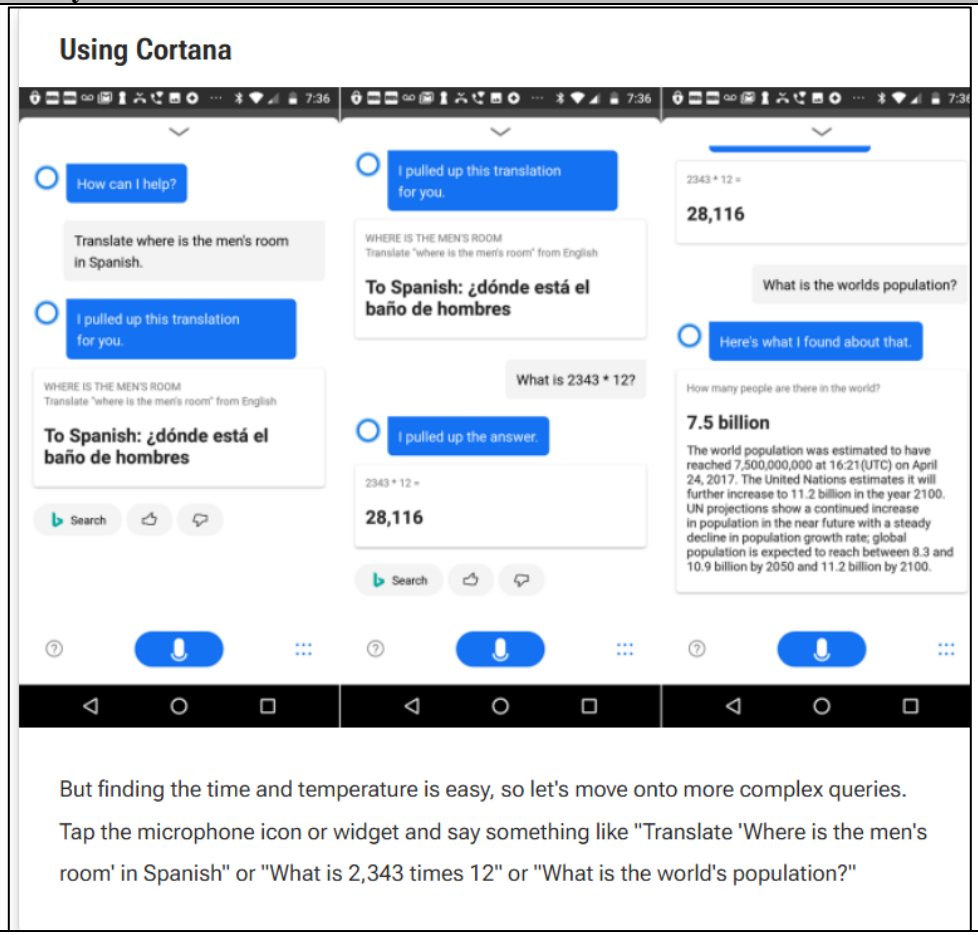
Element	Analysis for Cortana
[15.0] 15. The method of claim 11, further comprising	Cortana performs this method. See claim 11.
[15.1] removing, by the context manager, one or more of the plurality of mobile devices from the plurality of mobile devices registered with the context manager.	Cortana meets this element. For example, on information and belief, Cortana can stop syncing with one of more of the devices that receive the reminders, notifications, and other context events.  https://www.neowin.net/news/windows-10-cortana-now-syncs-reminders/

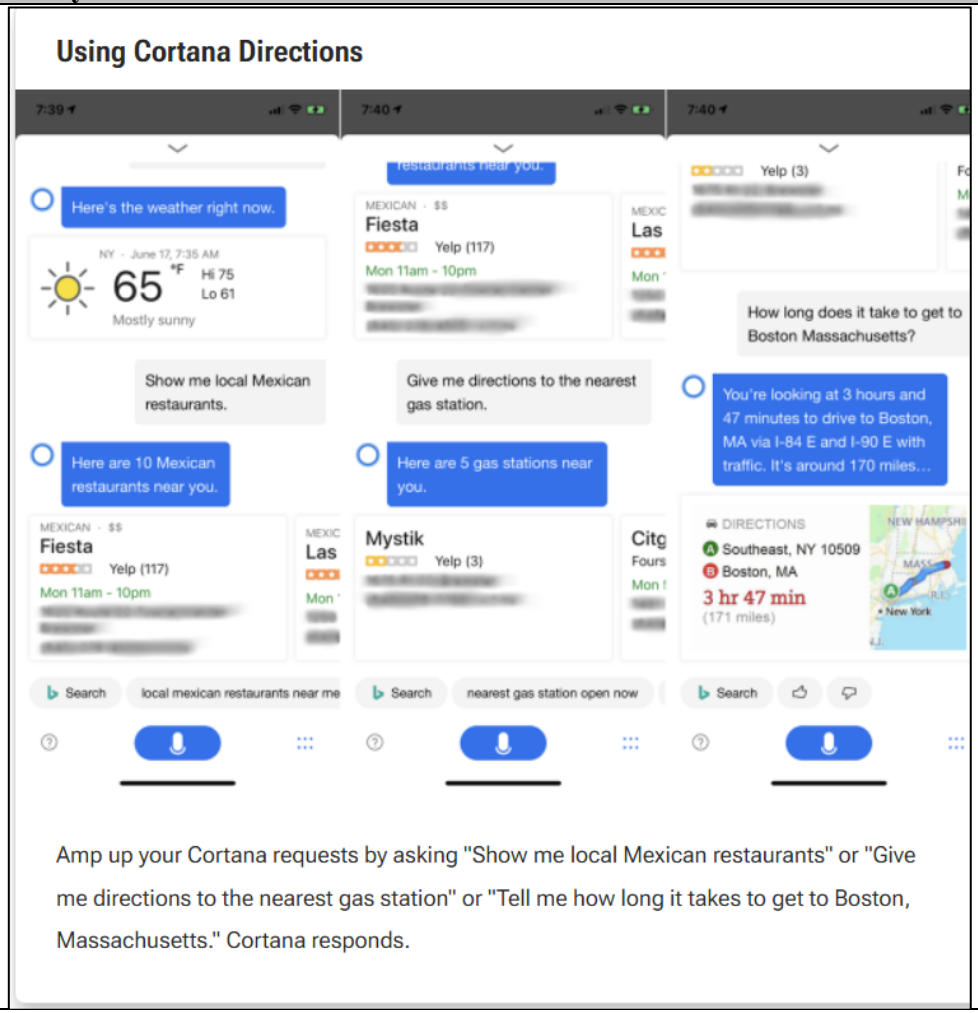
Element	Analysis for Cortana
	Tip 3: Integrate Cortana Across All Your Devices One of Cortana's most powerful features is her ability to seamlessly sync across all your Windows 10 devices, from your desktop PC to your smartphone. This means you can start a task on one device and pick it up on another, with Cortana facilitating a smooth transition. For example, let's say you're browsing the web on your laptop and come across an interesting article you want to read later. You can simply tell Cortana "Remind me to read this article tonight" and the reminder will instantly appear on your phone or tablet. Or if you're out and about and remember an important task you need to do, you can bark out a quick "Cortana, add milk to my shopping list" and it'll be waiting for you when you get home. Microsoft's support forums have plenty of tips on how to optimize Cortana's cross-device capabilities, from syncing your to-do lists to sharing web pages between devices. It's a game-changer for productivity and keeping your life organized. **Tip 4: Leverage Cortana's Contextual Awareness** One of Cortana's most impressive capabilities is her ability to understand context and tailor her responses accordingly. This means she can pick up on subtle cues in your queries and provide hyper-relevant information or take appropriate actions. For instance, let's say you're working on a project and need to look up some quick facts. You can simply say "Cortana, when was the Declaration of Independence signed?" and she'll recite the relevant information. But if you then follow up with "Who wrote it?", Cortana will automatically infer that you're still talking about the Declaration of Independence and provide the name of the author, Thomas Jefferson. Cortana's contextual awareness also extends to your location, calendar, and other personal data. So if you say "Cortana, what's the weather like today?", she'll know to give you the forecast for your current location. Or if you ask "When is my next meeting?", she'll consult your calendar and give you the details. The Ten Forums have a great discussion on how Cortana's contextual abilities can be leveraged to streamline all sorts of daily tasks. It's a capability that truly sets her apart from more rigid virtual assistants. https://itfix.org.uk/get-the-most-from-cortana-tips-for-windows-10/

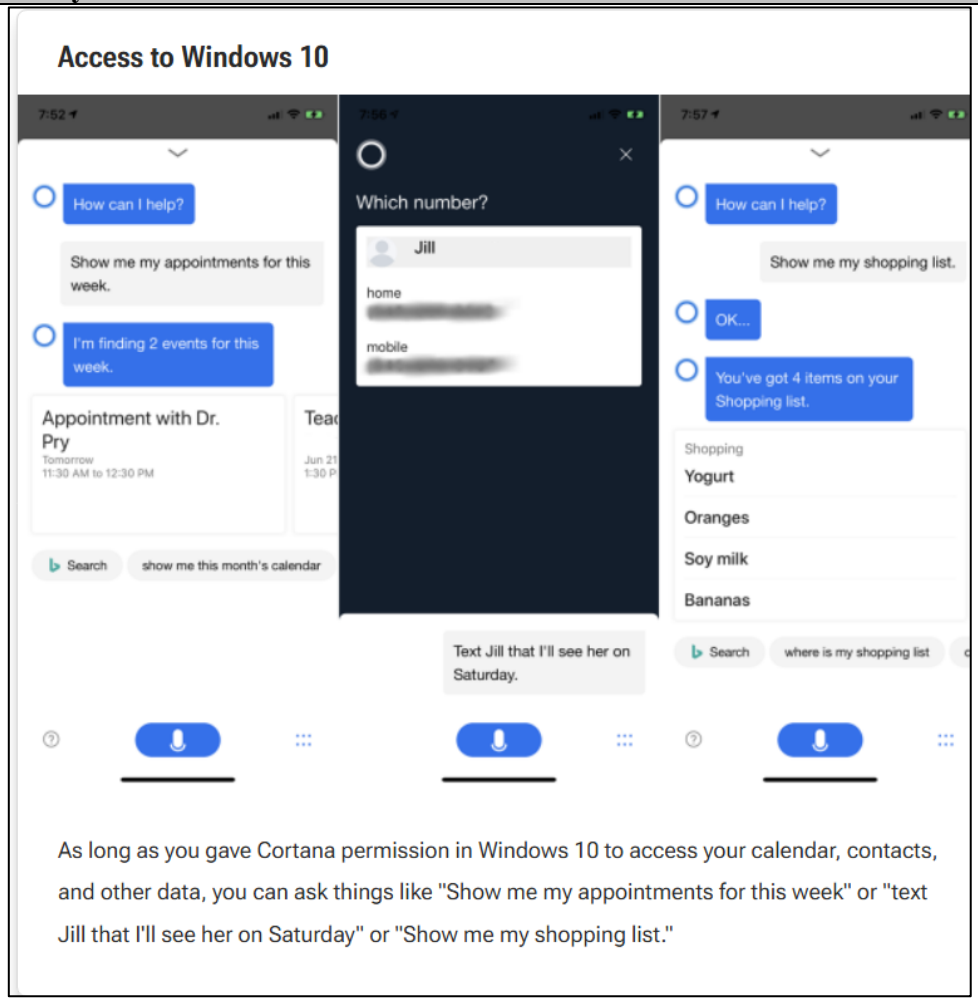
Element	Analysis for Cortana
	 https://www.thurrott.com/windows/windows-10/67251/cortana-can-now-sync-notifications-android-phone-windows-10-pc  https://www.lenovo.com/us/en/glossary/cortana/?orgRef=https%253A%252F%252Fwww.google.com%252F

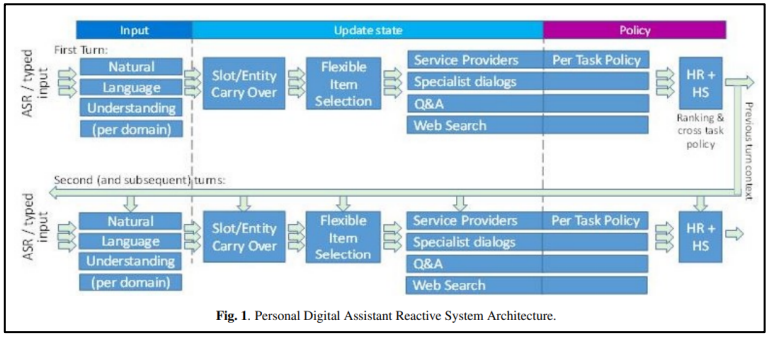
Element	Analysis for Cortana
[17.0] 17. The method of claim 11, further comprising:	Cortana performs this method. See claim 11.
[17.1] receiving a natural language utterance at a multi-modal voice user interface associated with at least one of the plurality of mobile devices registered with the context manager;	Cortana meets this element. For example, Cortana provided the ability to receive a spoken utterance at an interface running on an Android or iOS mobile device.  https://www.pcmag.com/how-to/how-to-use-microsoft-cortana-on-ios-and-android
[17.2] identifying, using a knowledge-enhanced speech recognition engine associated with the at least one mobile device, one or more contexts that completely or partially match one or more text combinations contained in	Cortana meets this element. For example, on information and belief, Cortana provides a knowledge-enhanced speech recognition engine associated with the Android or iOS device that identifies one or more contexts that are completely or partially matched by text combinations against the text transcribed from the utterance, including by comparing the text combinations against the grammar expression entries in a context description grammar and the contexts synchronized through the context manager.

Element	Analysis for Cortana
text transcribed from the natural language utterance, wherein identifying the matching contexts includes comparing the text combinations against one or more grammar expression entries in a context description grammar and one or more expected contexts stored in a context stack synchronized through the context manager;	

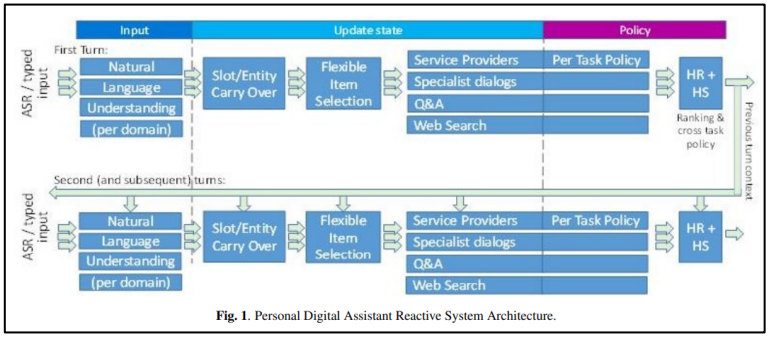
Element	Analysis for Cortana
	 But finding the time and temperature is easy, so let's move onto more complex queries. Tap the microphone icon or widget and say something like "Translate 'Where is the men's room' in Spanish" or "What is 2,343 times 12" or "What is the world's population?"

Element	Analysis for Cortana
	

Element	Analysis for Cortana
	 https://www.pcmag.com/how-to/how-to-use-microsoft-cortana-on-ios-and-android
[17.3] scoring each of the identified matching contexts; and	Cortana meets this element. For example, on information and belief, the contexts are scored and ranked to identify the most likely

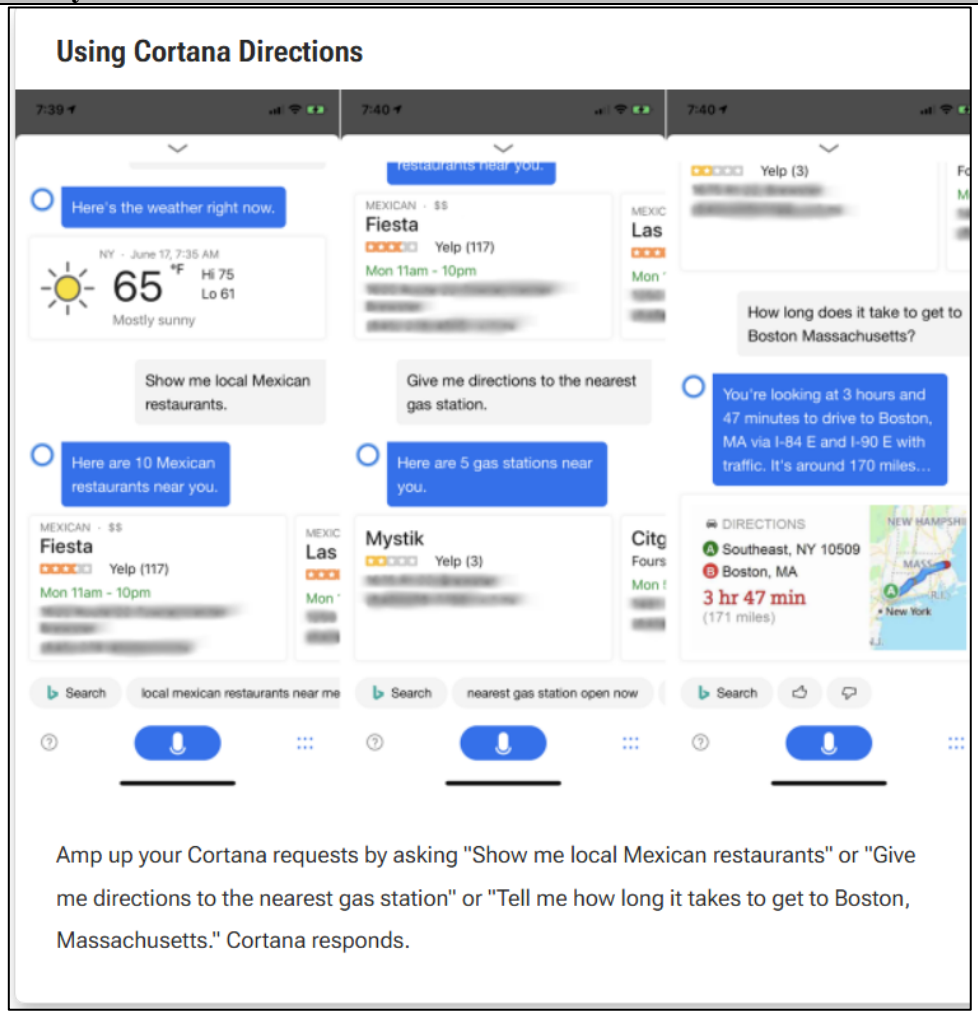
Element	Analysis for Cortana
	context.  **Fig. 1**. Personal Digital Assistant Reactive System Architecture. The output of the service providers are ranked [10, 11, 13], and a dialog policy component determines the final system response, which can include a visual card containing the content/entity information or an action. Typically, for voice input, the system also generates a natural language response, which can be synthesized into speech with a text–to–speech (TTS) synthesis engine. Key components of the system are described in detail in the next two sections.

Element	Analysis for Cortana
	5.3. Experience Providers Experience providers are a set of non-homogeneous services that share a common input and response API. Each can implement its own dialog policy under the hood and optionally use the platform provided SCO and FIS to power their scenarios. As described at the start of Section 3, the service providers are layered in such a way as to provide both deep interactive experiences and the necessary shallow but broad coverage to handle the open domain nature of first turn queries. The base layer with the broadest coverage is web search, followed by a multitude of question-answer services that respond with single turn and contextual responses (context from previous turns). More specialist providers will engage users with system initiative turns such as selection across multiple items (*e.g. system: "Here are 10 Chinese Restaurants near you, which one do you want?"*) making use of FIS; even more sophisticated scenarios, *e.g.* 20 question games, chit chat or task orientated dialogs will use complex, custom modes of interaction [12]. Interfacing to back-end data sources is also done through experience providers. This multitude of experience providers execute in parallel, taking advantage of the range of signals from the multiple upstream LU models, SCO and FIS. What is ultimately shown to the user depends on the ranking and selection component, HRS, discussed next. **5.4. Hypothesis Ranking and Selection** HRS is the mechanism by which the platform ranks and selects the final response shown to the user. The processing is done in two stages, with an initial ranking of the hypotheses (HR) followed by selection of the best hypothesis according to rank score and other features (HS). One of the key decisions in dealing with open domain requests is the recognition of requests that are not handled by any specialized experience provider and letting such requests fall through to web search. AN OVERVIEW OF END–TO–END LANGUAGE UNDERSTANDING AND DIALOG MANAGEMENT FOR PERSONAL DIGITAL ASSISTANTS, Microsoft Corporation, 2016, available at https://www.microsoft.com/en-us/research/wp-

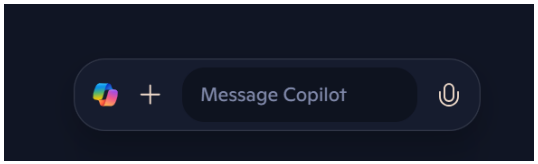
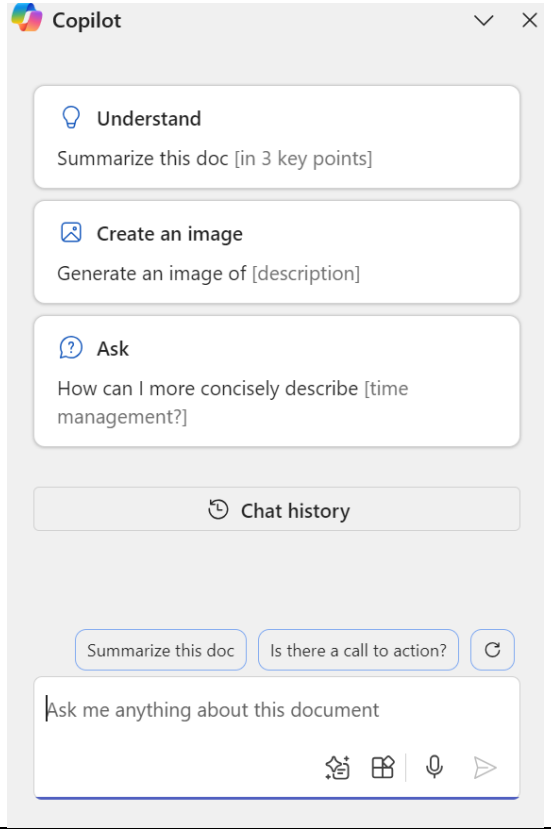
Element	Analysis for Cortana
	content/uploads/2016/12/CortanaLUDialog-FromSLTproceedings.pdf
[17.4] selecting the matching context having a highest score as a most likely context for the natural language utterance.	Cortana meets this element. For example, on information and belief, the contexts are scored and ranked to identify the most likely context.  **Fig. 1**. Personal Digital Assistant Reactive System Architecture. The output of the service providers are ranked [10, 11, 13], and a dialog policy component determines the final system response, which can include a visual card containing the content/entity information or an action. Typically, for voice input, the system also generates a natural language response, which can be synthesized into speech with a text–to–speech (TTS) synthesis engine. Key components of the system are described in detail in the next two sections.

Element	Analysis for Cortana
	5.3. Experience Providers Experience providers are a set of non-homogeneous services that share a common input and response API. Each can implement its own dialog policy under the hood and optionally use the platform provided SCO and FIS to power their scenarios. As described at the start of Section 3, the service providers are layered in such a way as to provide both deep interactive experiences and the necessary shallow but broad coverage to handle the open domain nature of first turn queries. The base layer with the broadest coverage is web search, followed by a multitude of question-answer services that respond with single turn and contextual responses (context from previous turns). More specialist providers will engage users with system initiative turns such as selection across multiple items (*e.g. system: "Here are 10 Chinese Restaurants near you, which one do you want?"*) making use of FIS; even more sophisticated scenarios, *e.g.* 20 question games, chit chat or task orientated dialogs will use complex, custom modes of interaction [12]. Interfacing to back-end data sources is also done through experience providers. This multitude of experience providers execute in parallel, taking advantage of the range of signals from the multiple upstream LU models, SCO and FIS. What is ultimately shown to the user depends on the ranking and selection component, HRS, discussed next. **5.4. Hypothesis Ranking and Selection** HRS is the mechanism by which the platform ranks and selects the final response shown to the user. The processing is done in two stages, with an initial ranking of the hypotheses (HR) followed by selection of the best hypothesis according to rank score and other features (HS). One of the key decisions in dealing with open domain requests is the recognition of requests that are not handled by any specialized experience provider and letting such requests fall through to web search. AN OVERVIEW OF END–TO–END LANGUAGE UNDERSTANDING AND DIALOG MANAGEMENT FOR PERSONAL DIGITAL ASSISTANTS, Microsoft Corporation, 2016, *available at* https://www.microsoft.com/en-us/research/wp-

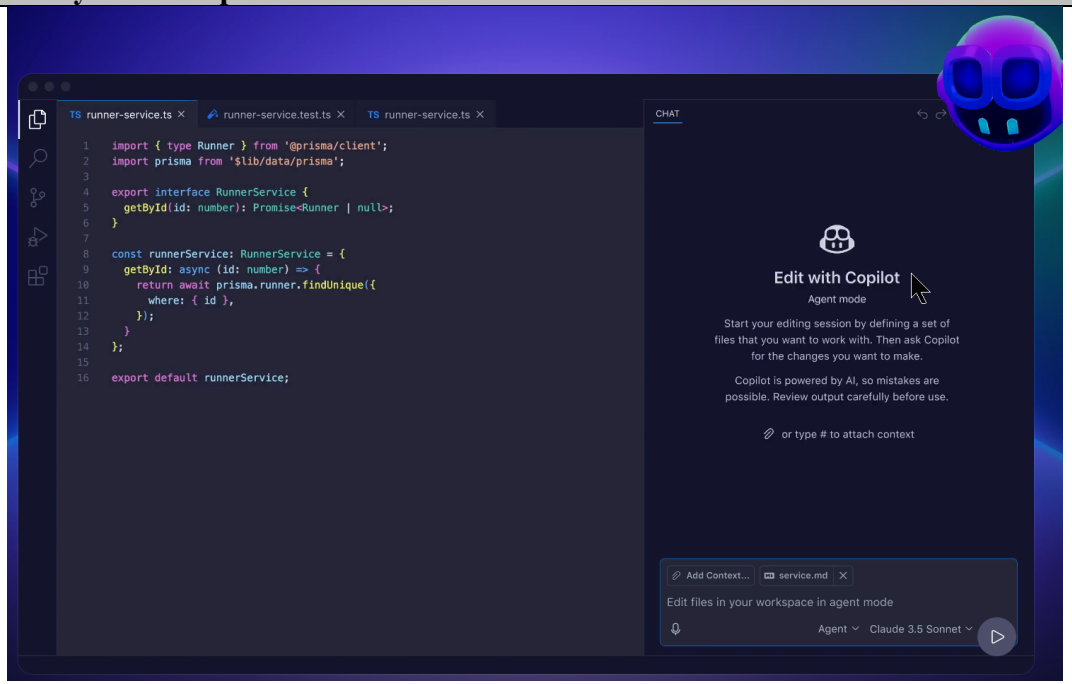
Element	Analysis for Cortana
	content/uploads/2016/12/CortanaLUDialog-FromSLTproceedings.pdf
[18.0] 18. The method of claim 17, wherein	See claim 17.
[18.1] the context change event received at the context manager includes a communication from the at least one mobile device that indicates a change in context to the most likely context.	Cortana meets this element. For example, on information and belief, the iOS or Android mobile device provides its location to the context manager, which indicates a change in context to the most likely context.

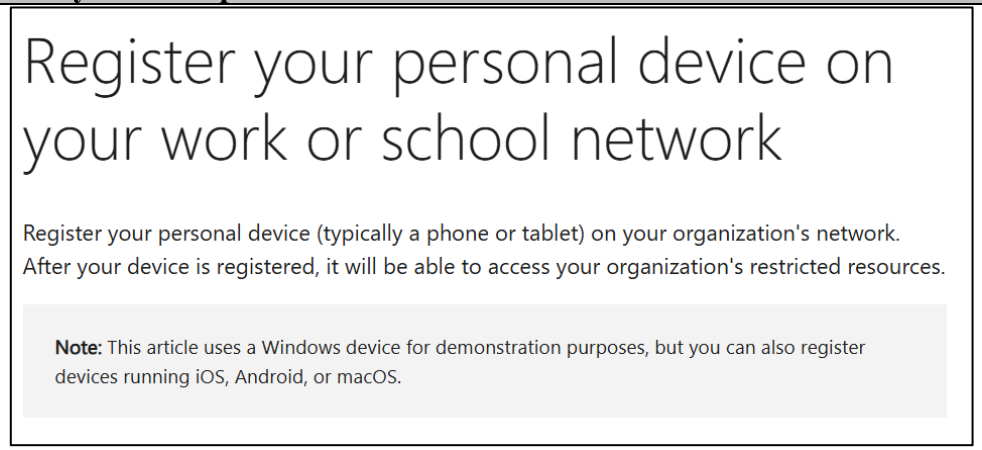
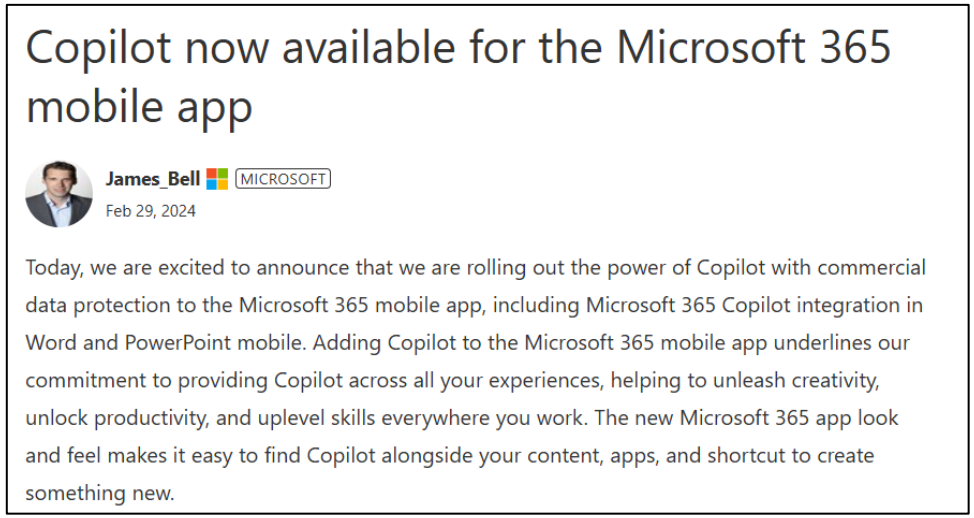
Element	Analysis for Cortana
	 https://www.pcmag.com/how-to/how-to-use-microsoft-cortana-on-ios-and-android

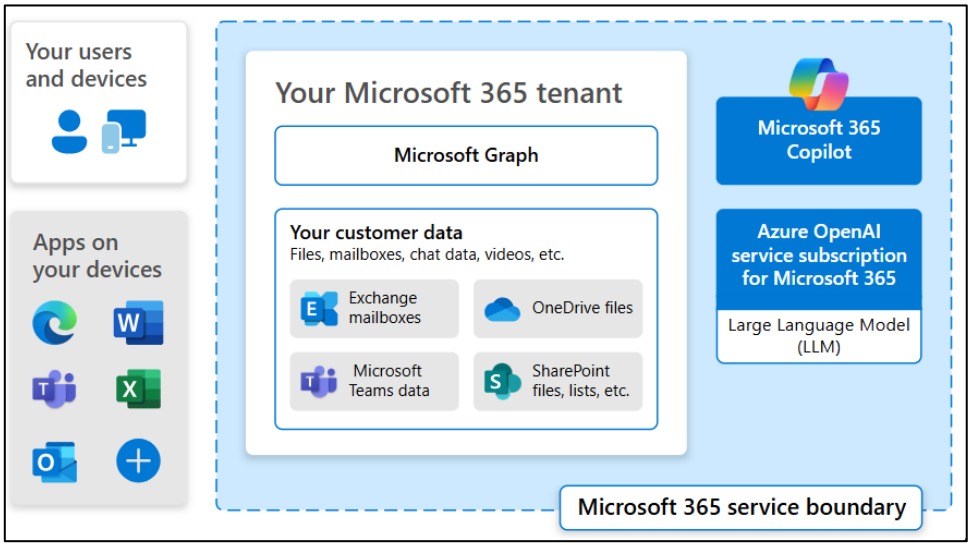
Copilot

Element	Analysis for Copilot
[11.0] A method for processing multi-modal natural language inputs, comprising:	Copilot implements a method for processing multi-modal natural language inputs, including voice input, text input, and/or mouse selection input, as can be seen at the user interface.  

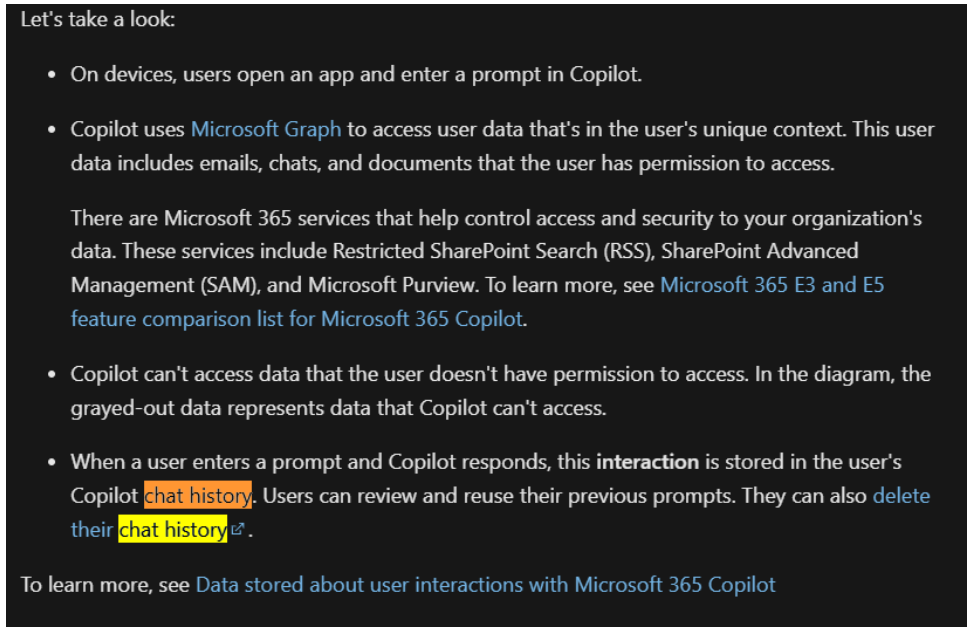
Element	Analysis for Copilot
	https://copilot.microsoft.com/chats  https://support.microsoft.com/en-us/topic/using-copilot-voice-with-microsoft-copilot-efad42fc-d593-49c6-98bf-5ed94c881c32

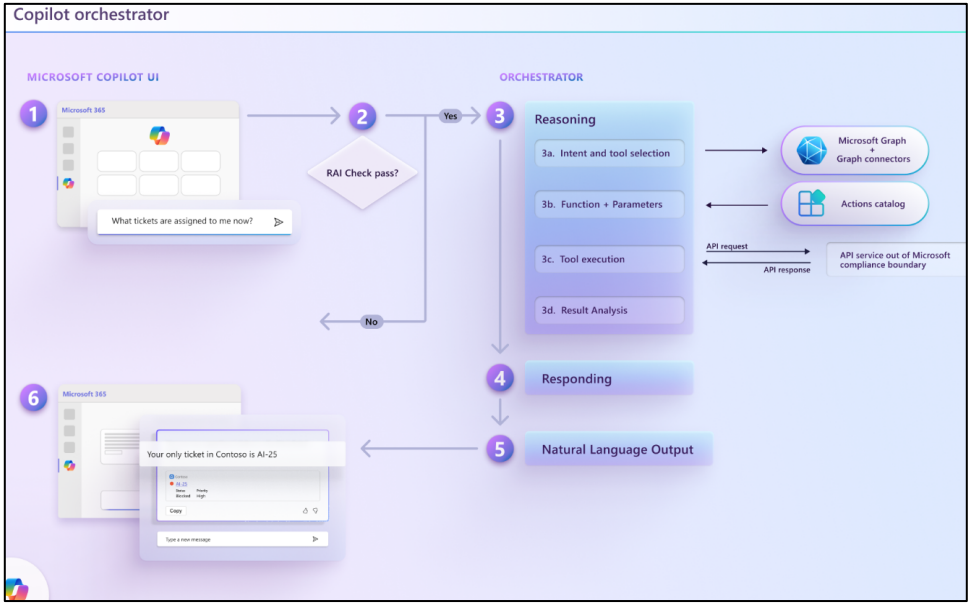
Element	Analysis for Copilot
	 https://github.com/features/copilot
[11.1] registering a plurality of mobile devices with a context manager in response to a registration module associated with the context manager receiving a communication from the plurality of mobile devices;	Copilot meets this element.

Element	Analysis for Copilot
	 https://support.microsoft.com/en-us/account-billing/register-your-personal-device-on-your-work-or-school-network-8803dd61-a613-45e3-ae6c-bd1ab25bf8a8  https://techcommunity.microsoft.com/blog/microsoft365copilotblog/copilot-now-available-for-the-microsoft-365-mobile-app/4071014

Element	Analysis for Copilot
	Copilot also integrates with Power BI -- Microsoft's data visualization tool -- which can pull together data from Microsoft 365 services, Windows and associated cloud services. This enables Copilot to understand the user's role, access permissions and organizational context for personalized responses. Organizations can use information based on Copilot's read of Microsoft Graph -- a means of aggregating multiple data sources from first-party or third-party apps and services -- to inform queries and visualize data with a Copilot prompt. https://www.techtarget.com/whatis/definition/Microsoft-Copilot (emphasis added)  https://learn.microsoft.com/en-us/copilot/microsoft-365/microsoft-365-copilot-architecture
[11.2] subscribing the plurality of mobile devices registered with the context manager to one or more context events;	Copilot meets this element. For example, a user of Copilot can access the user's preferences and dialog history through multiple devices used by the same user, including multiple mobile devices.

Element	Analysis for Copilot
	Accessing Microsoft Copilot Across Devices **Desktop** Before accessing Copilot on your desktop, you must ensure that Microsoft 365 is installed and updated on all relevant devices (Windows or macOS). If you don't already have Microsoft 365 apps (such as Word, Excel, PowerPoint, Outlook, or Teams), download them from the official Microsoft 365 website. The latest updates will include Copilot features, which you can enable once your license is active. Open any Microsoft 365 app (Word, Excel, PowerPoint, Outlook, or Teams) and locate the Copilot panel on the sidebar, which will appear after installation. At this point, you can use Copilot for document drafting, retrieving and analyzing data, inbox management, and preparing meeting summaries. **Mobile** Copilot is also available through Microsoft 365 mobile apps. Download the app from the App Store (iOS) or Google Play Store (Android) and log in with your organization's Microsoft 365 account. Then, Access Copilot through the mobile app interface for on-the-go productivity, email management, and document editing. **Web** If you're working remotely or across multiple locations, you can access Copilot via the web versions of Microsoft 365 applications. Just log in to your account at office.com and open any of the supported apps. https://www.newhorizons.com/resources/blog/how-to-get-microsoft-copilot Sync the enrolled device you're using for work to get the latest updates, requirements, and communications from your organization. Company Portal regularly syncs devices as long as you have a Wi-Fi connection. However, if you ever need to disconnect for an extended period of time, you can manually sync the device when you return to get any updates you missed. Syncing can also help resolve work-related downloads or other processes that are in progress or stalled. If you're experiencing slow or unusual behavior while installing or using a work app, try syncing your device to see if an update or requirement is missing. This article describes how to start a sync from the: • Company Portal app • Windows desktop taskbar or Start menu • System settings app https://learn.microsoft.com/en-us/mem/intune/user-help/sync-your-device-manually-windows

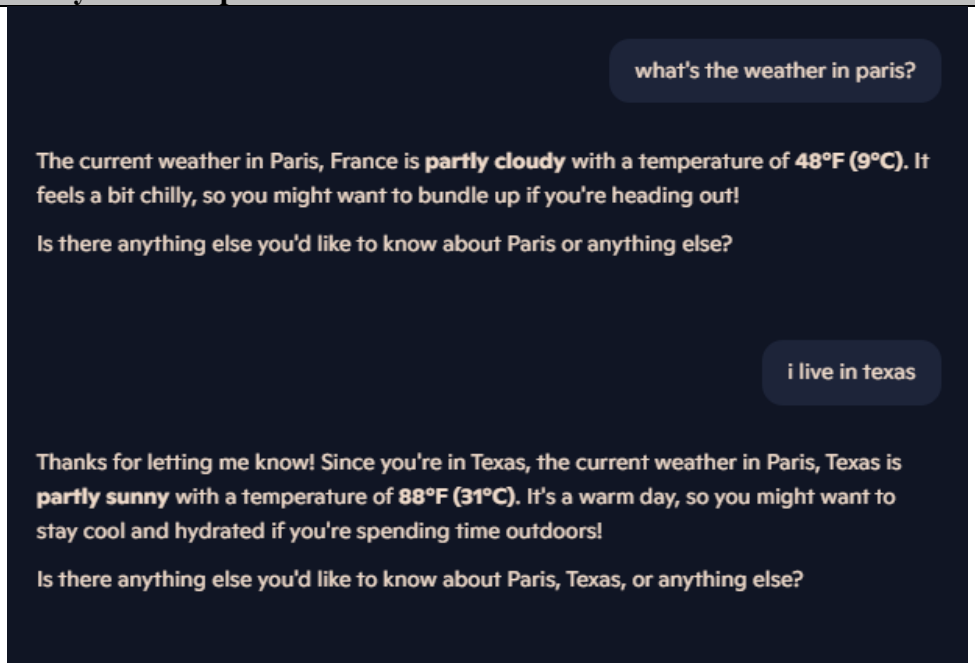
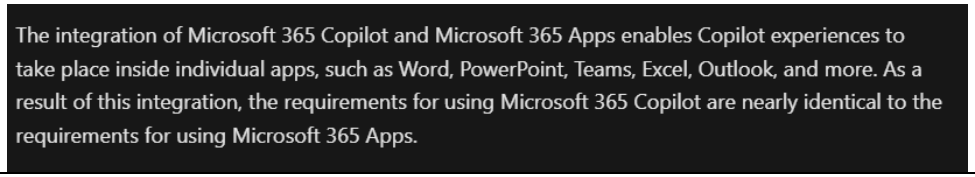
Element	Analysis for Copilot
	 https://learn.microsoft.com/en-us/copilot/microsoft-365/microsoft-365-copilot-architecture (emphasis added) Copilot also integrates with Power BI -- Microsoft's data visualization tool -- which can pull together data from Microsoft 365 services, Windows and associated cloud services. This enables Copilot to understand the user's role, access permissions and organizational context for personalized responses. Organizations can use information based on Copilot's read of Microsoft Graph -- a means of aggregating multiple data sources from first-party or third-party apps and services -- to inform queries and visualize data with a Copilot prompt. https://www.techtarget.com/whatis/definition/Microsoft-Copilot (emphasis added)
[11.3] receiving, at the context manager, a context input from one or more of the plurality of mobile	Copilot meets this element. For example, Copilot can receive a user input from multiple devices used by the user, and the user input can update the context for all the devices for the user. On information and belief, Copilot's

Element	Analysis for Copilot
devices registered with the context manager, wherein the context input includes a context change event; and	orchestrator provides functions relating to receiving context input from mobile devices registered with the context manager.  https://learn.microsoft.com/en-us/microsoft-365-copilot/extensibility/orchestrator
[11.4] informing the plurality of mobile devices registered with the context manager of the context change event, wherein informing the plurality of mobile devices registered with the context manager of the context change event synchronizes a context across the plurality of	Copilot meets this element. On information and belief, Copilot synchronizes context information across devices using Microsoft's cloud services (e.g., Microsoft 365 Apps, Azure AI) based on the user's Microsoft's account. The integration of Microsoft 365 Copilot and Microsoft 365 Apps enables Copilot experiences to take place inside individual apps, such as Word, PowerPoint, Teams, Excel, Outlook, and more. As a result of this integration, the requirements for using Microsoft 365 Copilot are nearly identical to the requirements for using Microsoft 365 Apps.

Element	Analysis for Copilot
mobile devices.	https://learn.microsoft.com/th-th/copilot/microsoft-365/microsoft-365-copilot-requirements  https://learn.microsoft.com/et-ee/copilot/manage

Element	Analysis for Copilot
	# Eligibility and Requirements Before using Microsoft Copilot's AI-powered capabilities, your organization must meet specific eligibility criteria and requirements. These prerequisites include: **Subscription Requirements** To access Copilot, your organization must have the proper subscription tier. Copilot is available across key Microsoft 365 applications like Word, Excel, PowerPoint, Outlook, and Teams, but only for users with the following subscription levels: ▪ **Microsoft 365 E3 or E5 for enterprises.** ▪ **Microsoft 365 A3 or A5 for educational institutions.** ▪ **Microsoft 365 Business Standard or Business Premium for smaller businesses.** **Authentication Prerequisites**: A Microsoft Entra ID-based account is necessary to authenticate and access files, emails, and other user data within your organization's Microsoft 365 environment, allowing Copilot to deliver personalized and secure assistance. **Cloud Integration**: To enable collaboration and real-time document sharing, you must integrate Copilot with cloud storage services like OneDrive or SharePoint. Once integrated, type a prompt in Copilot and it will retrieve the data you need from your documents, presentations, spreadsheets, and other files. **Supported Devices and Platforms**: Keep the latest versions of Microsoft 365 apps installed and up-to-date across your desktop, mobile, and web applications to access all the latest features and performance improvements.

Element	Analysis for Copilot
	Accessing Microsoft Copilot Across Devices **Desktop** Before accessing Copilot on your desktop, you must ensure that Microsoft 365 is installed and updated on all relevant devices (Windows or macOS). If you don't already have Microsoft 365 apps (such as Word, Excel, PowerPoint, Outlook, or Teams), download them from the official Microsoft 365 website. The latest updates will include Copilot features, which you can enable once your license is active. Open any Microsoft 365 app (Word, Excel, PowerPoint, Outlook, or Teams) and locate the Copilot panel on the sidebar, which will appear after installation. At this point, you can use Copilot for document drafting, retrieving and analyzing data, inbox management, and preparing meeting summaries. **Mobile** Copilot is also available through Microsoft 365 mobile apps. Download the app from the App Store (iOS) or Google Play Store (Android) and log in with your organization's Microsoft 365 account. Then, Access Copilot through the mobile app interface for on-the-go productivity, email management, and document editing. **Web** If you're working remotely or across multiple locations, you can access Copilot via the web versions of Microsoft 365 applications. Just log in to your account at office.com and open any of the supported apps. https://www.newhorizons.com/resources/blog/how-to-get-microsoft-copilot For example, after a user had the following dialog with Copilot on a laptop or other PC, the dialog history became available for the user's Copilot app on a smartphone.

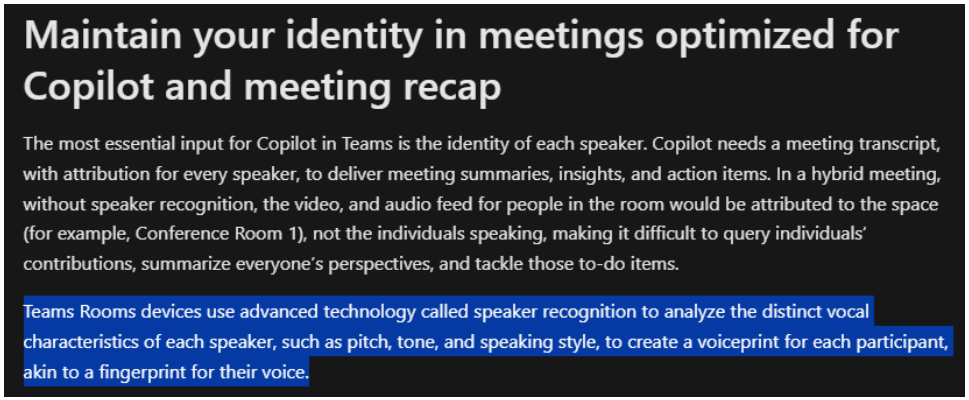
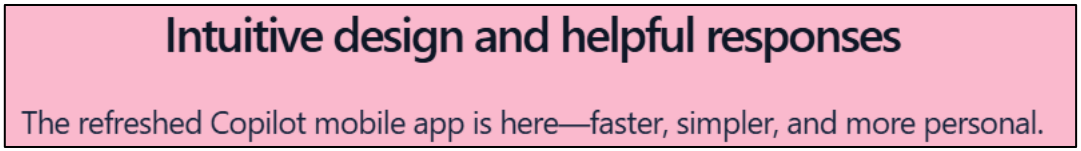
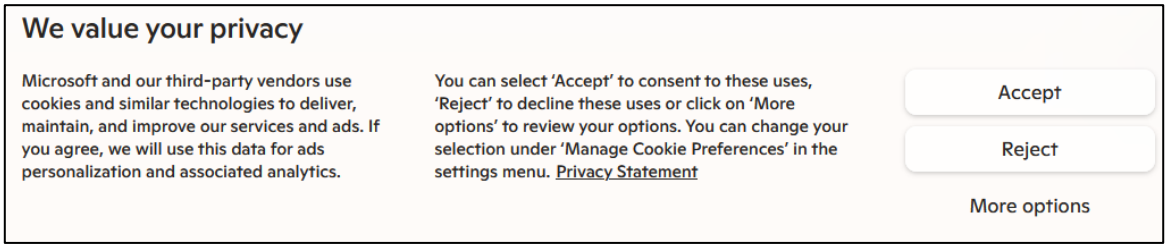
Element	Analysis for Copilot
	
[12.0] 12. The method of claim 11, wherein	Copilot performs this method. See claim 11.
[12.1] a context tracking module associated with the context manager informs the plurality of mobile devices registered with the context manager of the context change event.	Copilot meets this element. For example, on information and belief, a module associated with Copilot synchronizes context information across devices using Microsoft's cloud services (e.g., Microsoft 365 Apps, Azure AI) based on the user's Microsoft's account. 

Element	Analysis for Copilot
	https://learn.microsoft.com/th-th/copilot/microsoft-365/microsoft-365-copilot-requirements **How to pin Microsoft Copilot in the Microsoft 365 app, Microsoft Teams, and Outlook** To ensure people across your organization have easy access to Microsoft Copilot and can benefit from the security and experience updates to Copilot, we recommend you enable in-app access by pinning Microsoft Copilot. If you choose to pin Microsoft Copilot for your users, it appears in the Microsoft 365 app (web, Windows, and mobile). Copilot in other Microsoft 365 apps like Word, Excel, and PowerPoint requires a Microsoft 365 Copilot subscription. https://learn.microsoft.com/et-ee/copilot/manage **Accessing Microsoft Copilot Across Devices** **Desktop** Before accessing Copilot on your desktop, you must ensure that Microsoft 365 is installed and updated on all relevant devices (Windows or macOS). If you don't already have Microsoft 365 apps (such as Word, Excel, PowerPoint, Outlook, or Teams), download them from the official Microsoft 365 website. The latest updates will include Copilot features, which you can enable once your license is active. Open any Microsoft 365 app (Word, Excel, PowerPoint, Outlook, or Teams) and locate the Copilot panel on the sidebar, which will appear after installation. At this point, you can use Copilot for document drafting, retrieving and analyzing data, inbox management, and preparing meeting summaries. **Mobile** Copilot is also available through Microsoft 365 mobile apps. Download the app from the App Store (iOS) or Google Play Store (Android) and log in with your organization's Microsoft 365 account. Then, Access Copilot through the mobile app interface for on-the-go productivity, email management, and document editing. **Web** If you're working remotely or across multiple locations, you can access Copilot via the web versions of Microsoft 365 applications. Just log in to your account at office.com and open any of the supported apps.

Element	Analysis for Copilot
	https://www.newhorizons.com/resources/blog/how-to-get-microsoft-copilot
[15.0] 15. The method of claim 11, further comprising	Copilot performs this method. See claim 11.
[15.1] removing, by the context manager, one or more of the plurality of mobile devices from the plurality of mobile devices registered with the context manager.	Copilot meets this element. For example, on information and belief, Copilot can stop syncing context information across devices using Microsoft's cloud services (e.g., Microsoft 365 Apps, Azure AI) based on the user's Microsoft's account. The integration of Microsoft 365 Copilot and Microsoft 365 Apps enables Copilot experiences to take place inside individual apps, such as Word, PowerPoint, Teams, Excel, Outlook, and more. As a result of this integration, the requirements for using Microsoft 365 Copilot are nearly identical to the requirements for using Microsoft 365 Apps. https://learn.microsoft.com/th-th/copilot/microsoft-365/microsoft-365-copilot-requirements **How to pin Microsoft Copilot in the Microsoft 365 app, Microsoft Teams, and Outlook** To ensure people across your organization have easy access to Microsoft Copilot and can benefit from the security and experience updates to Copilot, we recommend you enable in-app access by pinning Microsoft Copilot. If you choose to pin Microsoft Copilot for your users, it appears in the Microsoft 365 app (web, Windows, and mobile). Copilot in other Microsoft 365 apps like Word, Excel, and PowerPoint requires a Microsoft 365 Copilot subscription. https://learn.microsoft.com/et-ee/copilot/manage

Element	Analysis for Copilot
	Accessing Microsoft Copilot Across Devices **Desktop** Before accessing Copilot on your desktop, you must ensure that Microsoft 365 is installed and updated on all relevant devices (Windows or macOS). If you don't already have Microsoft 365 apps (such as Word, Excel, PowerPoint, Outlook, or Teams), download them from the official Microsoft 365 website. The latest updates will include Copilot features, which you can enable once your license is active. Open any Microsoft 365 app (Word, Excel, PowerPoint, Outlook, or Teams) and locate the Copilot panel on the sidebar, which will appear after installation. At this point, you can use Copilot for document drafting, retrieving and analyzing data, inbox management, and preparing meeting summaries. **Mobile** Copilot is also available through Microsoft 365 mobile apps. Download the app from the App Store (iOS) or Google Play Store (Android) and log in with your organization's Microsoft 365 account. Then, Access Copilot through the mobile app interface for on-the-go productivity, email management, and document editing. **Web** If you're working remotely or across multiple locations, you can access Copilot via the web versions of Microsoft 365 applications. Just log in to your account at office.com and open any of the supported apps. https://www.newhorizons.com/resources/blog/how-to-get-microsoft-copilot
[17.0] 17. The method of claim 11, further comprising:	Copilot performs this method. See claim 11.
[17.1] receiving a natural language utterance at a multi-modal voice user interface associated with at least one of the plurality of mobile devices registered with the context manager;	Copilot meets this element. For example, the Copilot app receives a natural language utterance on a mobile device, such as a laptop or cellphone, that is registered to the user's account via Microsoft cloud services.

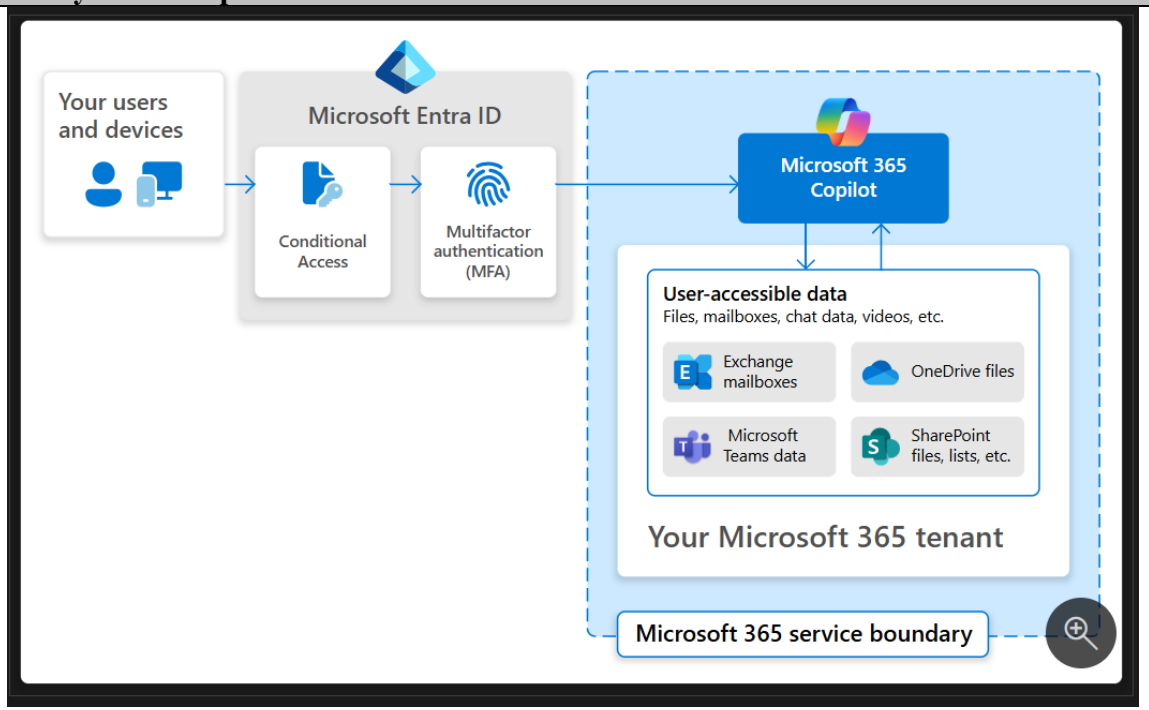
Element	Analysis for Copilot
	 https://www.microsoft.com/en-us/microsoft-copilot/for-individuals/do-more-with-ai/general-ai/what-is-copilot-voice
[17.2] identifying, using a knowledge-enhanced speech recognition engine associated with the at least	Copilot meets this element. For example, on information and belief, Copilot uses a knowledge-enhanced speech recognition engine based on prior interactions with a user.

Element	Analysis for Copilot
one mobile device, one or more contexts that completely or partially match one or more text combinations contained in text transcribed from the natural language utterance, wherein identifying the matching contexts includes comparing the text combinations against one or more grammar expression entries in a context description grammar and one or more expected contexts stored in a context stack synchronized through the context manager;	 https://learn.microsoft.com/en-us/microsoftteams/rooms/voice-recognition (emphasis added)  https://www.microsoft.com/en-us/microsoft-copilot/personal-ai-assistant  https://copilot.microsoft.com/onboarding

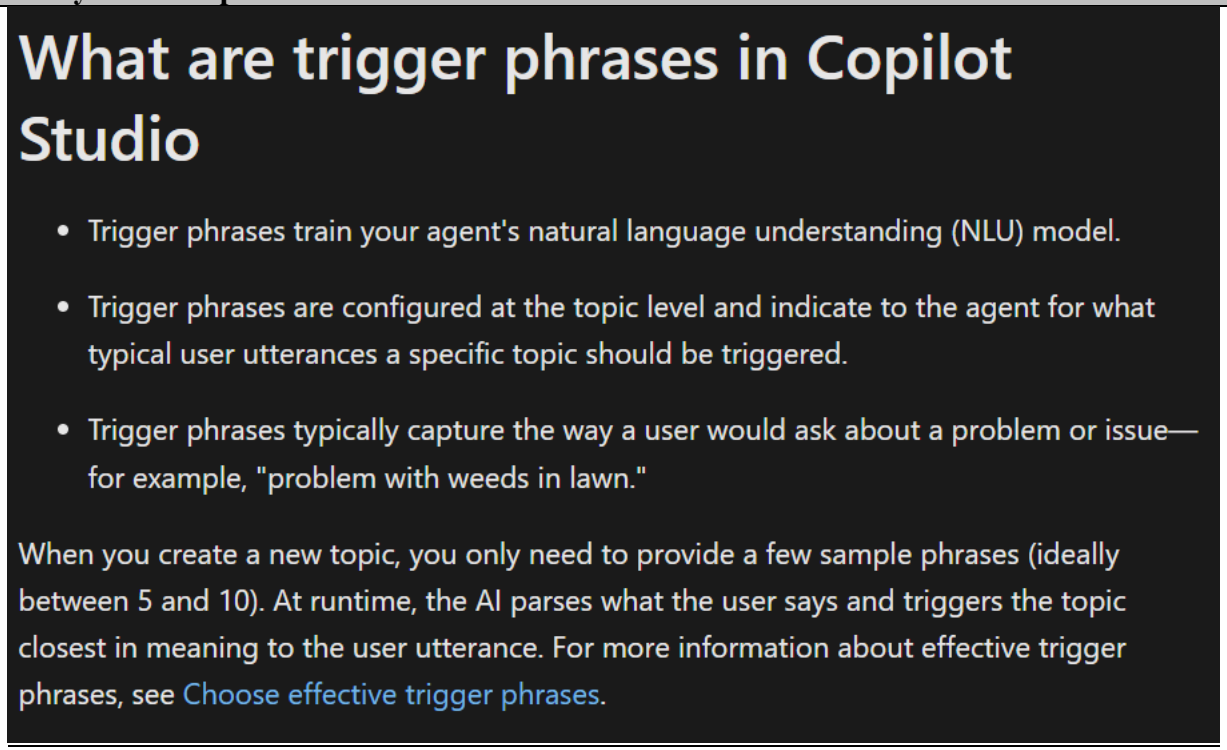
Element	Analysis for Copilot
	How to access and control your personal data You can also make choices about the collection and use of your data by Microsoft. You can control your personal data that Microsoft has obtained, and exercise your data protection rights, by contacting Microsoft or using various tools we provide. In some cases, your ability to access or control your personal data will be limited, as required or permitted by applicable law. How you can access or control your personal data will also depend on which products you use. For example, you can: • Control the use of your data for personalised advertising from Microsoft, including Xandr, by visiting our opt-out page. • Choose whether you wish to receive promotional emails, SMS messages, telephone calls and post from Microsoft. • Access and clear some of your data through the Microsoft privacy dashboard. Not all personal data processed by Microsoft can be accessed or controlled via the tools above. If you want to access or control personal data processed by Microsoft that is not available via the tools above or directly through the Microsoft products you use, you can always contact Microsoft at the address in the How to contact us section or by using our web form. We provide aggregate metrics about user requests to exercise their data protection rights via the Microsoft Privacy Report. **Microsoft Copilot capabilities.** Microsoft Copilot is Microsoft's everyday AI companion, and is designed to help you achieve more through a single experience that runs across devices, understanding relevant context on the web, on your PC and across apps to bring you the right skills at the right time. With the help of Copilot, users can start a draft of a new Word document, generate a PowerPoint presentation, quickly find the answers to complex search queries online, find relevant documents or other personal content, or be inspired to create new songs, stories, images or other content, among other tasks. Copilot is a family of services, and Microsoft's collection and use of data may differ depending on the service and the intended functionality in a given scenario.

Element	Analysis for Copilot
	The Copilot website and app (available on iOS and Android) is the core of the consumer Copilot experience. Within this core experience, users can search the web, create text, images, songs, or other outputs, or engage with other features, such as plugins. On the website and in the app, users enter "prompts" that provide instructions to Copilot (e.g. "Give me recommendations for a restaurant that accommodates parties of 10 near me"). In order to provide a relevant response, Copilot will use this prompt, along with the user's location, language and similar settings, to formulate a helpful response. In some markets, authenticated users can choose to allow Copilot to have access to prior prompt history to better personalise the product. The consumer Copilot product uses the data collected to provide and improve the Copilot services, including to provide relevant advertising. Users who are signed-in to their account can manage their prompt history in product and on the Microsoft Privacy Dashboard, and can adjust their location, language, and other settings in the product. https://www.microsoft.com/en-ca/privacy/privacystatement (emphasis added)

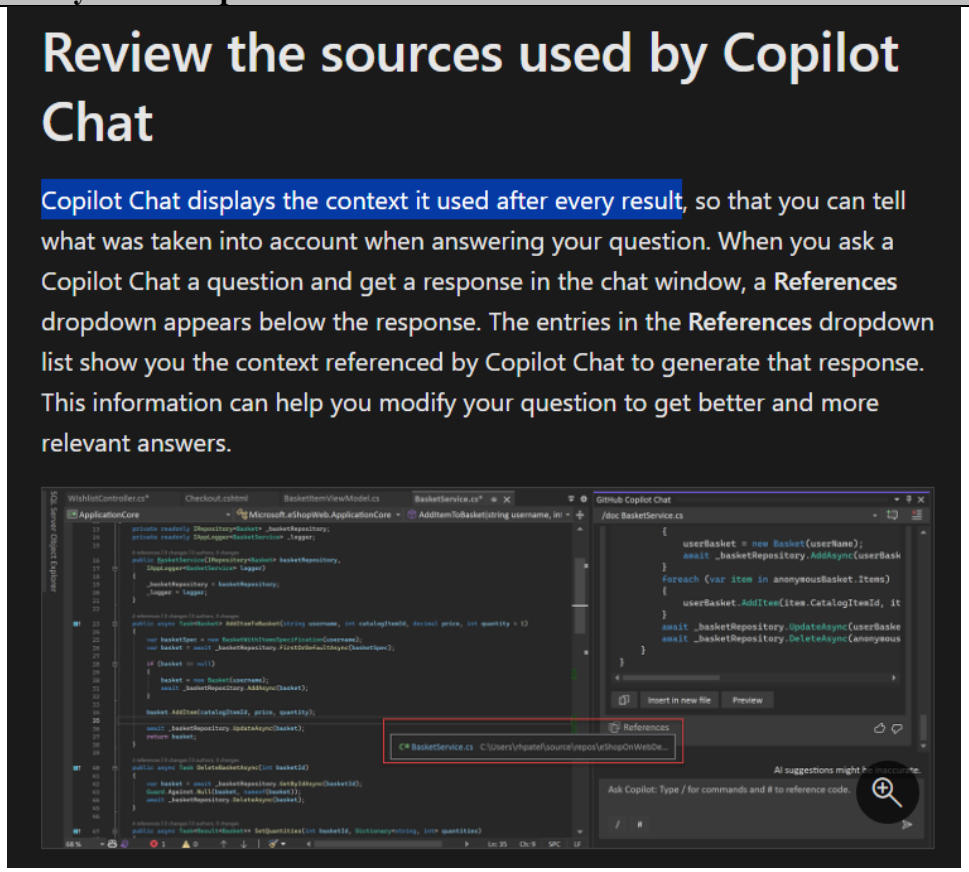
Element	Analysis for Copilot
	1. In a Microsoft 365 app, a user enters a prompt in Copilot. 2. Copilot preprocesses the input prompt using **grounding** and accesses Microsoft Graph in the user's tenant. • Grounding improves the specificity of your prompt, and helps you get answers that are relevant and actionable to your specific task. The prompt can include text from input files or other content Copilot discovers. • The data Copilot uses to generate responses is encrypted in transit. 3. Copilot sends the grounded prompt to the LLM. The LLM uses the prompt to generate a response that is contextually relevant to the user's task. 4. Copilot returns the response to the app and the user.

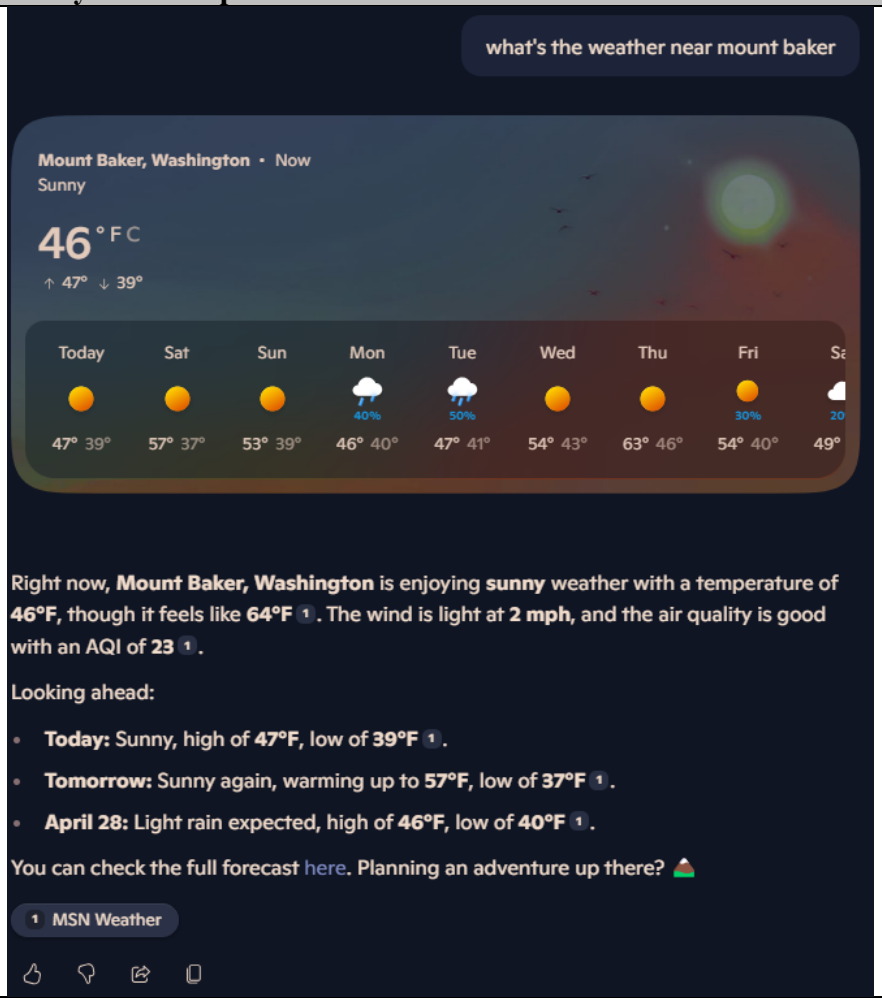
Element	Analysis for Copilot
	 https://learn.microsoft.com/en-us/copilot/microsoft-365/microsoft-365-copilot-architecture

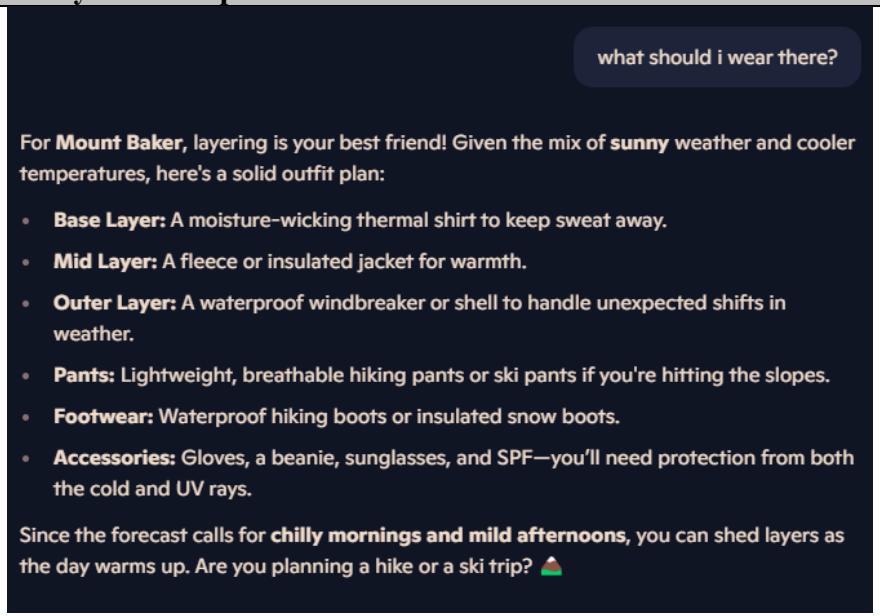
Element	Analysis for Copilot
	• **Excessive or inappropriate grounding data:** If you submit a prompt via the Copilot chat pane, then Copilot takes the chat history from that session as grounding data during preprocessing. Depending on what that chat history entails, you might get different or unexpected results. When writing prompts, you should take into consideration that any previous prompts and outputs will be used as grounding data. To avoid this, you can select the Copilot button to close and reopen the Copilot chat pane, clearing the chat history before you submit a new prompt. https://learn.microsoft.com/en-us/power-bi/create-reports/copilot-semantic-models For example, on information and belief, Copilot uses trigger phrases and NLU technology to compare the text combinations in the text transcribed from the natural language utterance against one or more grammar expression entries in a context description grammar.

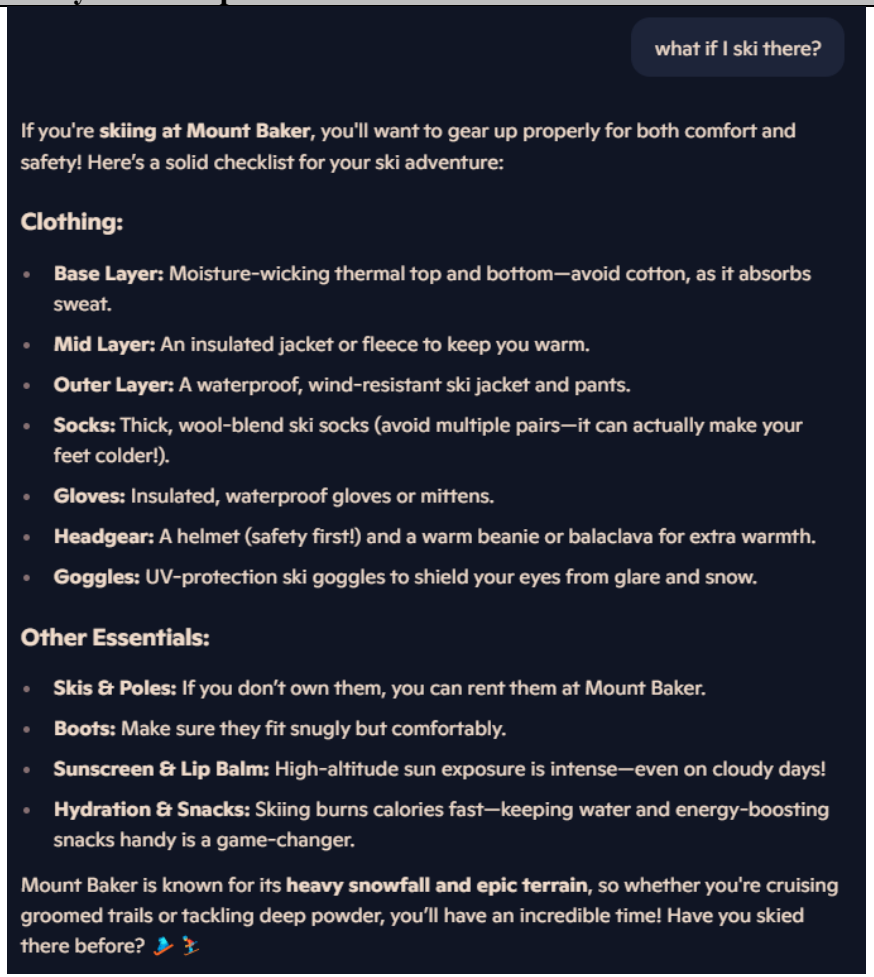
Element	Analysis for Copilot
	 https://learn.microsoft.com/en-us/microsoft-copilot-studio/guidance/trigger-phrases-best-practices For example, on information and belief, Copilot determines the context for the current input based on historical context information. For example, on information and belief, Copilot's orchestrator identifies one or more entries in a context stack matching information contained in the user input.

Element	Analysis for Copilot
	3. **Reasoning**: The Copilot orchestrator formulates a plan comprised of multiple actions that it performs in an attempt to respond to the user's prompt. a. **Context and tool selection**: The orchestrator retrieves the user's conversation context from the context store and integrates data from Microsoft Graph to refine the context. It then adjusts the initial query based on this updated context and forwards it to the LLM (large language model) to guide the next steps. The LLM might proceed to generating a response using Copilot's built-in capabilities, or it might determine that additional data is necessary. If more information is needed, the orchestrator does a search for the actions with the right skill for the task from the agent's enabled actions based on the descriptions of the actions and their functions. b. **Function matching and parameter determination**: The orchestrator formulates a new prompt that incorporates the user's initial query, the updated context, and the selected actions, and presents it to the LLM. The LLM evaluates the input and specifies the optimal action and function within that action to address the task. It then provides the orchestrator with the necessary function details and parameters required to gather the needed information. https://learn.microsoft.com/en-us/microsoft-365-copilot/extensibility/orchestrator For example, on information and belief, Copilot Chat identifies one or more entries in a context stack matching information contained in the user input.

Element	Analysis for Copilot
	 https://learn.microsoft.com/en-us/visualstudio/ide/copilot-chat-context?view=vs-2022 For example, on information and belief, in the interaction below, Copilot determines the most likely context for the follow-up multi-modal input "what if I ski there." On information and belief, the transcribed text is used to match contexts by applying the text combinations to the Copilot LLM and synchronized though Microsoft's cloud services.

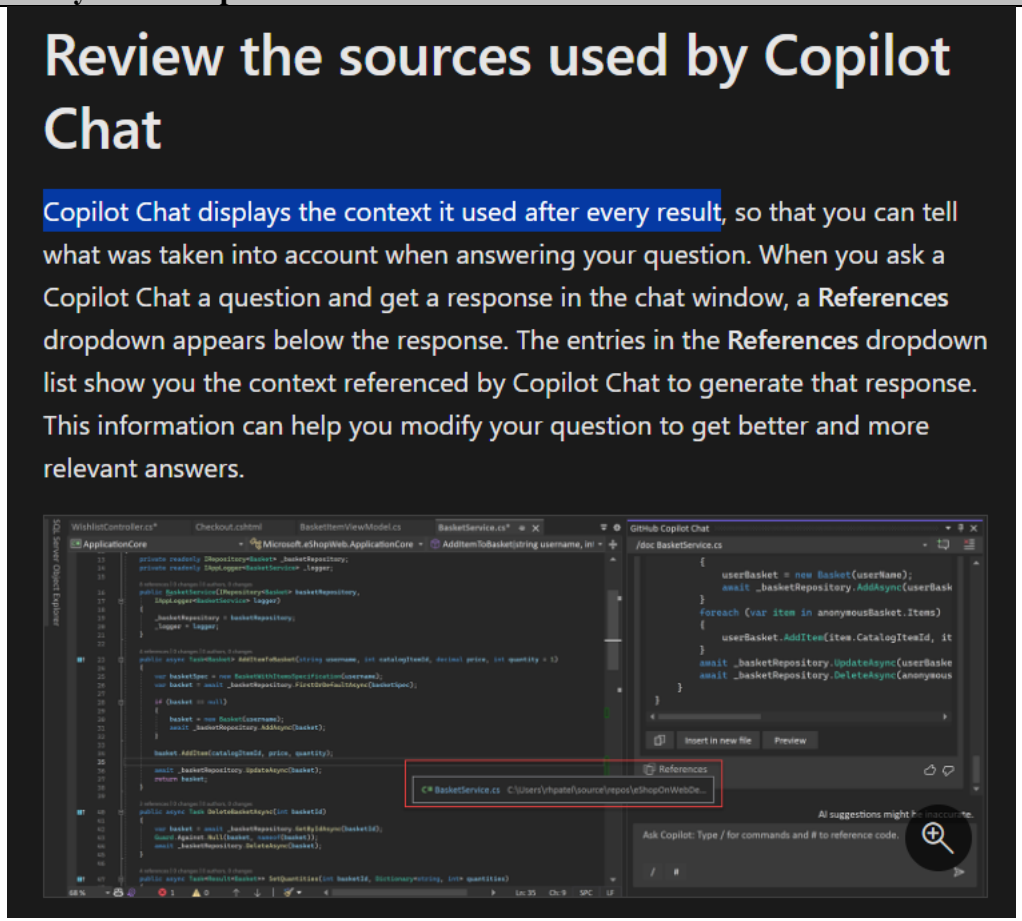
Element	Analysis for Copilot
	

Element	Analysis for Copilot
	

Element	Analysis for Copilot
	
[17.3] scoring each of the identified matching contexts; and	Copilot meets this element. On information and belief, Copilot uses natural language processing (NLP) and natural language understanding (NLU) technology to assign scores to potential contexts.

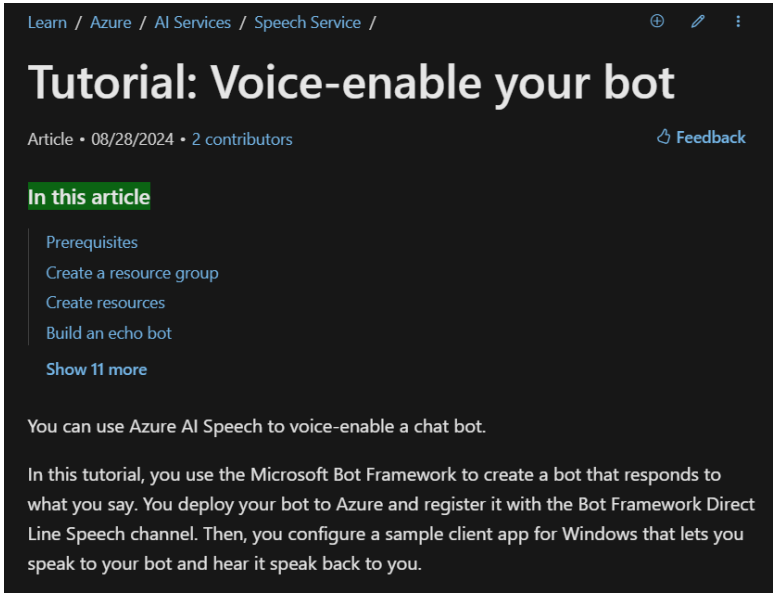
Element	Analysis for Copilot
	How does Copilot use NLU? Copilot leverages NLU to enhance user interactions by understanding the context and intent behind user inputs. When a user asks a question or makes a request, Copilot uses NLU to parse the text, identify key entities, and determine the user's intent. This allows Copilot to provide accurate and contextually relevant responses, as in the examples below: 1. Text prompts • Customer service assistant: When a user types, "I'm having trouble with my order," Copilot uses NLU to understand that the user is experiencing an issue and needs assistance, even though the word "help" is not explicitly mentioned. • Virtual assistant: If a user says, "Remind me to call mom tomorrow," Copilot interprets the intent to set a reminder for a specific task and time. • Sentiment analysis: When a user writes a review saying, "The product is amazing, but the delivery was slow," Copilot can identify the positive sentiment towards the product and the negative sentiment towards the delivery. 2. Image prompts • Image captioning: When provided with an image of a dog playing in the park, Copilot can generate a caption like, "A happy dog playing in the park," understanding the context and sentiment of the image. • Object recognition: Given an image of a cluttered desk, Copilot can identify and list objects such as a laptop, coffee mug, and notepad, understanding the context of a workspace. • Scene description: For an image of a beach at sunset, Copilot can describe the scene as, "A serene beach with the sun setting over the horizon," capturing the context and sentiment of the image. https://www.microsoft.com/en-us/bing/do-more-with-ai/what-is-natural-language-understanding?form=MA13KP

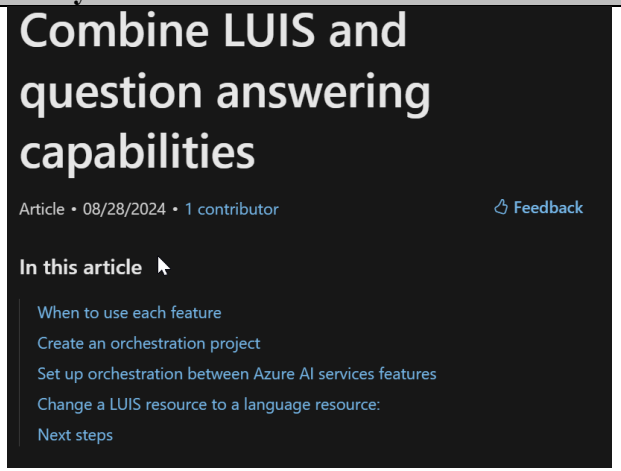
Element	Analysis for Copilot
	3. **Reasoning**: The Copilot orchestrator formulates a plan comprised of multiple actions that it performs in an attempt to respond to the user's prompt. a. **Context and tool selection**: The orchestrator retrieves the user's conversation context from the context store and integrates data from Microsoft Graph to refine the context. It then adjusts the initial query based on this updated context and forwards it to the LLM (large language model) to guide the next steps. The LLM might proceed to generating a response using Copilot's built-in capabilities, or it might determine that additional data is necessary. If more information is needed, the orchestrator does a search for the actions with the right skill for the task from the agent's enabled actions based on the descriptions of the actions and their functions. https://learn.microsoft.com/en-us/microsoft-365-copilot/extensibility/orchestrator

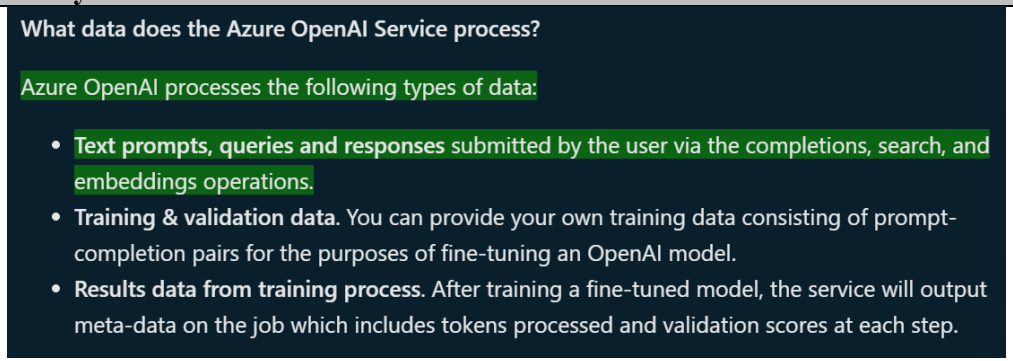
Element	Analysis for Copilot
	 https://learn.microsoft.com/en-us/visualstudio/ide/copilot-chat-context?view=vs-2022
[17.4] selecting the matching context having a highest score as a most likely context for the natural	Copilot meets this element. For example, on information and belief, Copilot uses natural language processing (NLP) and natural language understanding (NLU) technology to select the matching context having a highest score as a

Element	Analysis for Copilot
language utterance.	most likely context. See element [17.3].
[18.0] 18. The method of claim 17, wherein	Copilot performs this method. See claim 17.
[18.1] the context change event received at the context manager includes a communication from the at least one mobile device that indicates a change in context to the most likely context.	Copilot meets this element. For example, the Copilot app receives a communication on a mobile device, such as a laptop or cellphone, that is registered to the user's account via Microsoft cloud services. See element [17.1].

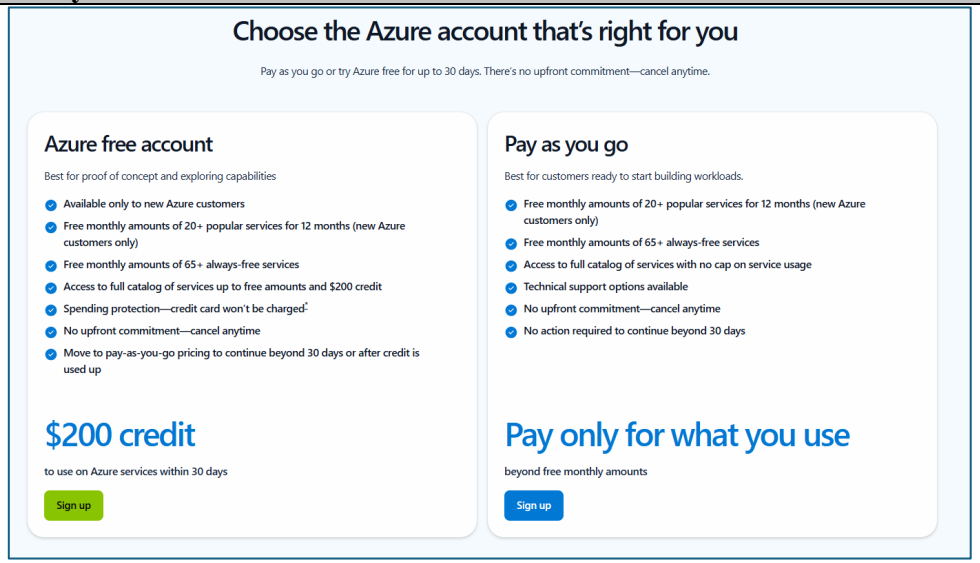
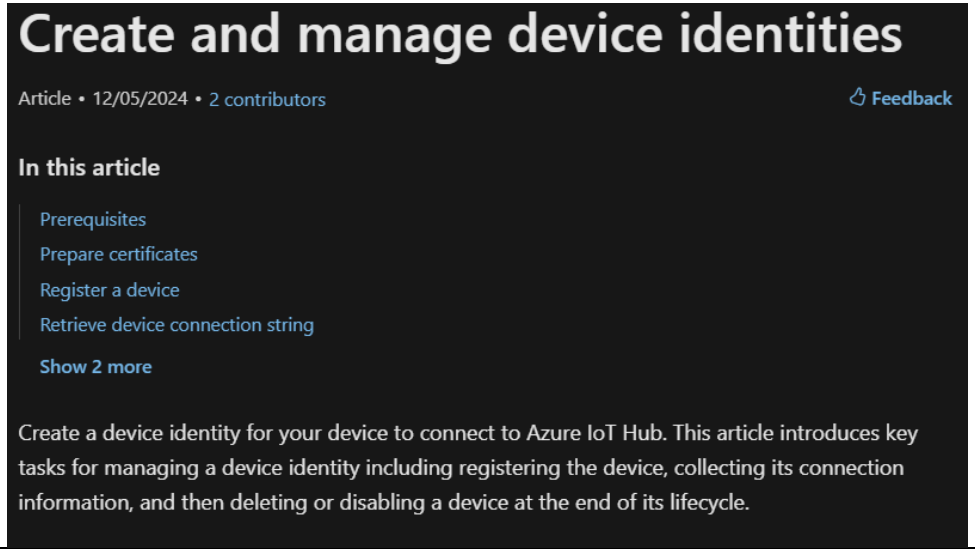
Azure Services

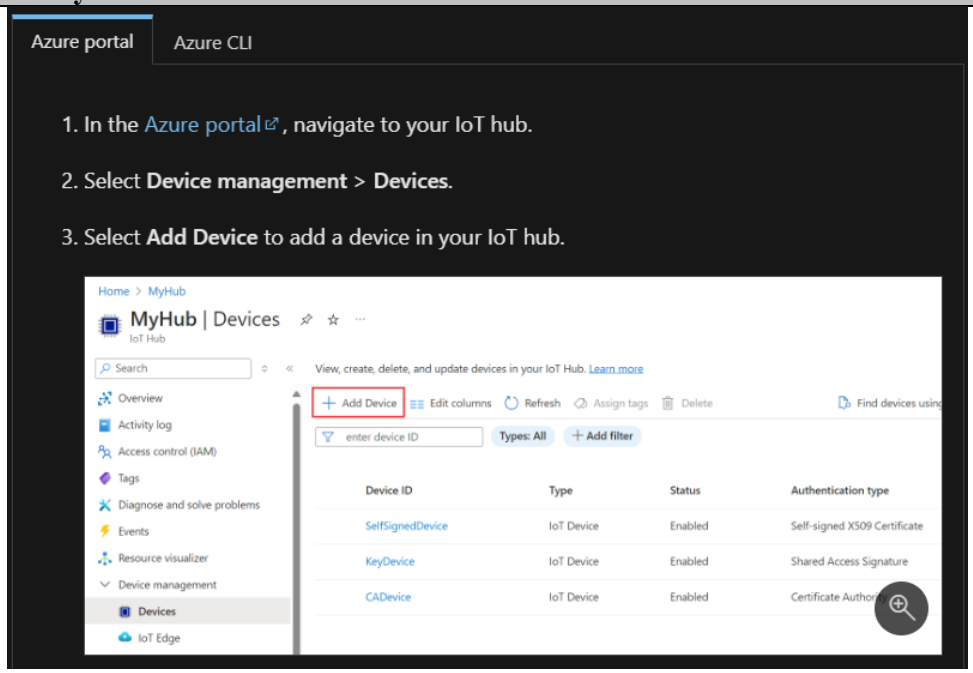
Element	Analysis for Azure Services
[11.0] A method for processing multi-modal natural language inputs, comprising:	Azure Services meet this element.  https://learn.microsoft.com/en-us/azure/ai-services/speech-service/tutorial-voice-enable-your-bot-speech-sdk On information and belief, Azure Services use Language Understanding (LUIS) and Conversational Language Understanding technology to understand and respond to user natural language inputs.

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/luis/how-to/orchestration-projects  https://learn.microsoft.com/en-us/azure/ai-services/language-service/conversational-language-understanding/overview

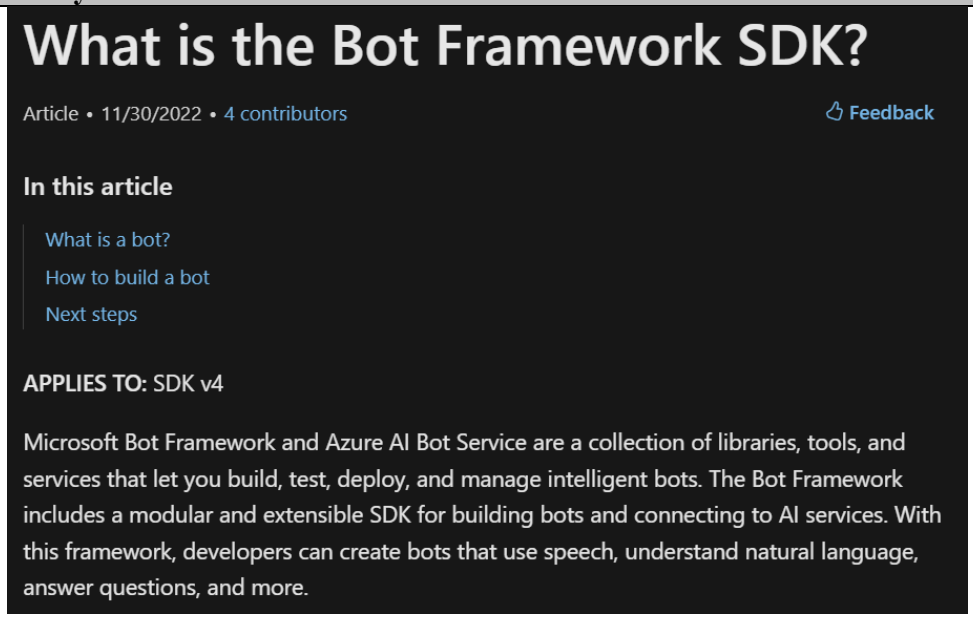
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/answers/questions/1183772/how-does-azure-open-ai-handles-user-input-data
[11.1] registering a plurality of mobile devices with a context manager in response to a registration module associated with the context manager receiving a communication from the plurality of mobile devices;	Azure services meet this element.

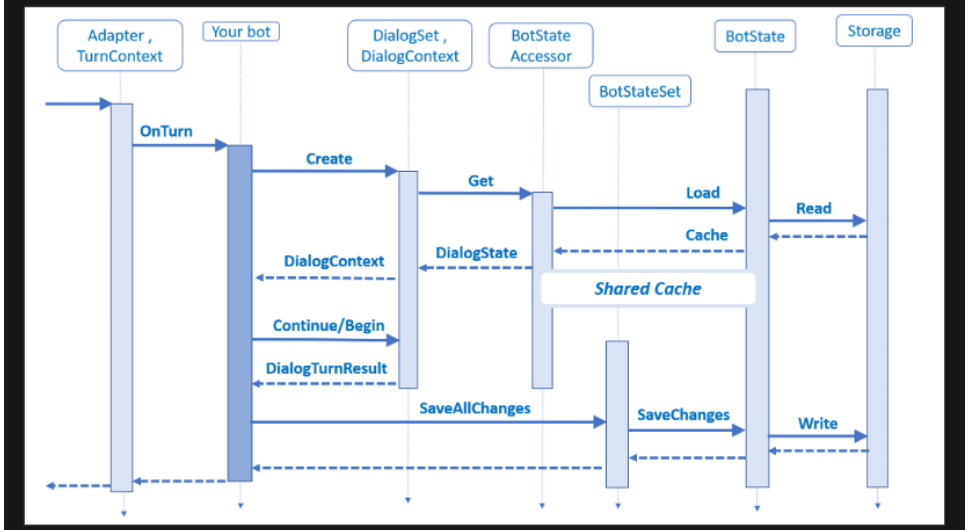
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/power-apps/developer/data-platform/walkthrough-register-app-azure-active-directory

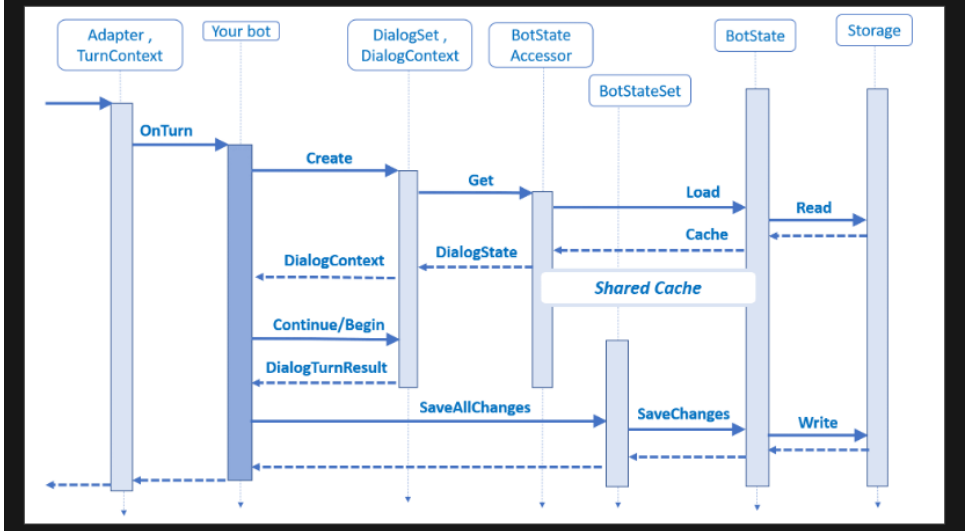
Element	Analysis for Azure Services
	 https://azure.microsoft.com/en-us/pricing/purchase-options/azure-account?icid=azurefreeaccount&WT.mc_id=javascript-00000-gllemos%2F 

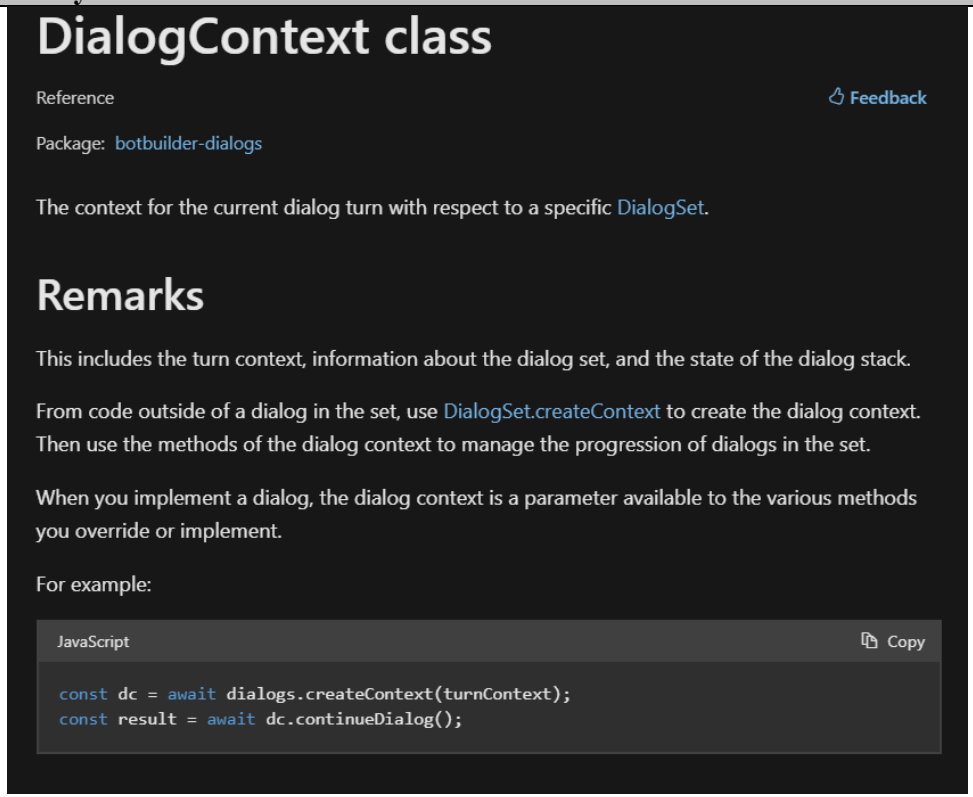
Element	Analysis for Azure Services
	

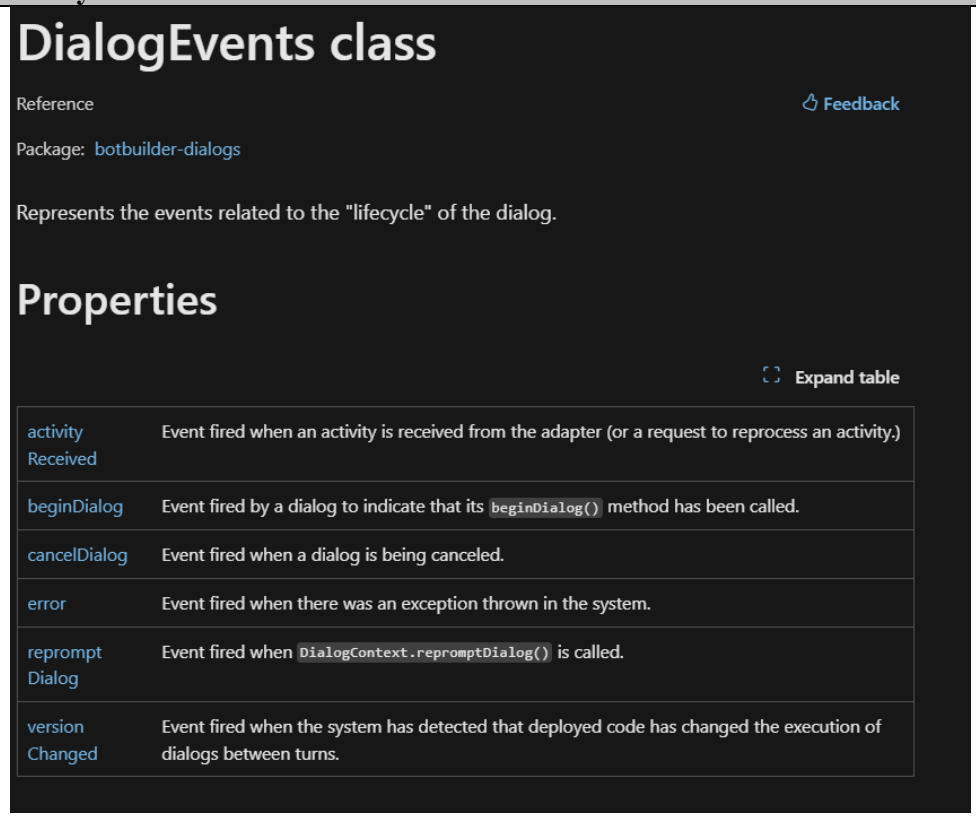
Element	Analysis for Azure Services
	4. In **Create a device**, provide the information for your new device identity: Expand table **Parameter** / **Dependent parameter** / **Value** **Device ID** — Provide a name for your new device. **Authentication type** — Select either **Symmetric key**, **X.509 self-signed**, or **X.509 CA signed**. **Auto-generate keys** — For **Symmetric key** authentication, check this box to have IoT Hub generate keys for your device. Or, uncheck this box and provide primary and secondary keys for your device. **Primary thumbprint** and **Secondary thumbprint** — For **X.509 self-signed** authentication, provide the thumbprint hash from the device's primary and secondary certificates. https://learn.microsoft.com/en-us/azure/iot-hub/create-connect-device?tabs=portal For example, on information and belief, Azure AI uses Microsoft Bot Framework SDK to maintain dialog context of a user across multiple devices.

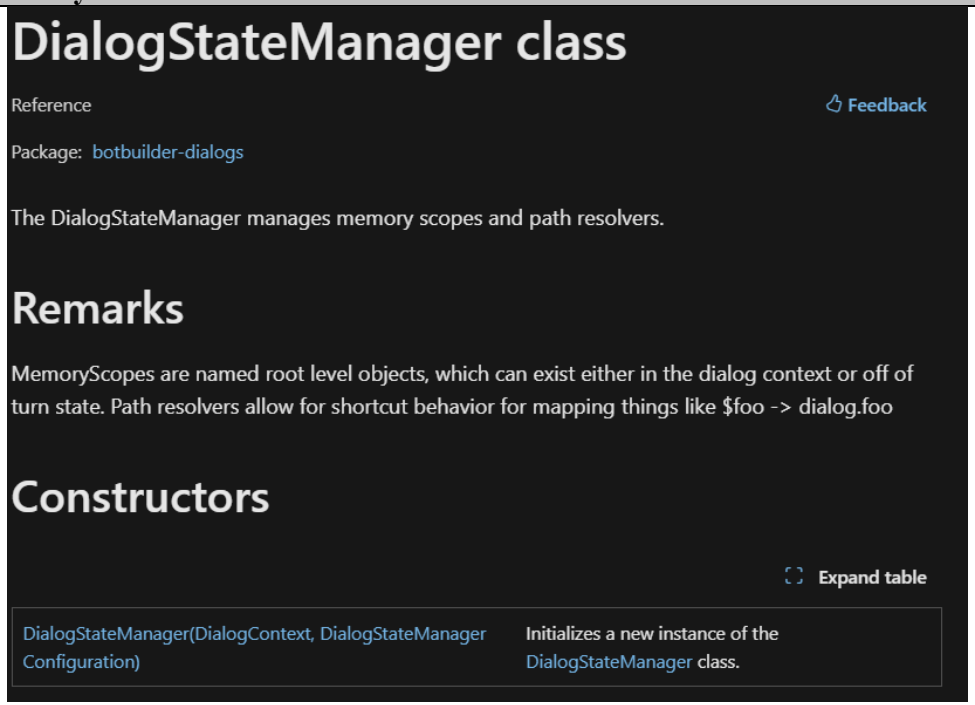
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/bot-service/bot-service-overview?view=azure-bot-service-4.0

Element	Analysis for Azure Services
	Why do I need state? Maintaining state allows your bot to have more meaningful conversations by remembering certain things about a user or conversation. For example, if you've talked to a user previously, you can save previous information about them, so that you don't have to ask for it again. State also keeps data for longer than the current turn, so that your bot keeps information over the course of a multi-turn conversation. As it pertains to bots, there are a few layers to using state: the storage layer, state management (contained in the bot state in the diagram below), and state property accessors. This diagram illustrates parts of the interaction sequence between these layers, with the solid arrows representing a method call, and the dashed arrows representing the response (with or without a return value).  https://learn.microsoft.com/en-us/azure/bot-service/bot-builder-concept-state?view=azure-bot-service-4.0
[11.2] subscribing the plurality of mobile devices registered with the context manager to one or more	Azure Services meet this element. For example, on information and belief, Azure Services synchronize contexts of dialog history across devices.

Element	Analysis for Azure Services
context events;	**Why do I need state?** Maintaining state allows your bot to have more meaningful conversations by remembering certain things about a user or conversation. For example, if you've talked to a user previously, you can save previous information about them, so that you don't have to ask for it again. State also keeps data for longer than the current turn, so that your bot keeps information over the course of a multi-turn conversation. As it pertains to bots, there are a few layers to using state: the storage layer, state management (contained in the bot state in the diagram below), and state property accessors. This diagram illustrates parts of the interaction sequence between these layers, with the solid arrows representing a method call, and the dashed arrows representing the response (with or without a return value).  https://learn.microsoft.com/en-us/azure/bot-service/bot-builder-concept-state?view=azure-bot-service-4.0

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/javascript/api/botbuilder-dialogs/dialogcontext?view=botbuilder-ts-latest

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/javascript/api/botbuilder-dialogs/dialogevents?view=botbuilder-ts-latest

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/javascript/api/botbuilder-dialogs/dialogstatemanager?view=botbuilder-ts-latest

Element	Analysis for Azure Services

How to enable chat history?

To enable chat history, deploy or redeploy your model as a web app using Azure OpenAI Studio. Once completed, activate chat history by clicking the dedicated enablement button within the Azure OpenAI Studio interface. With chat history enabled, users gain control over their interaction.

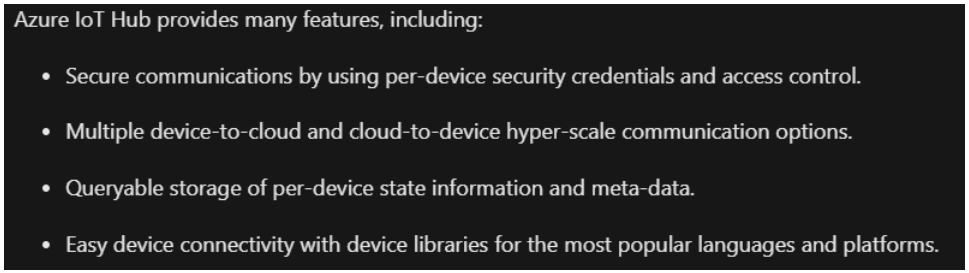
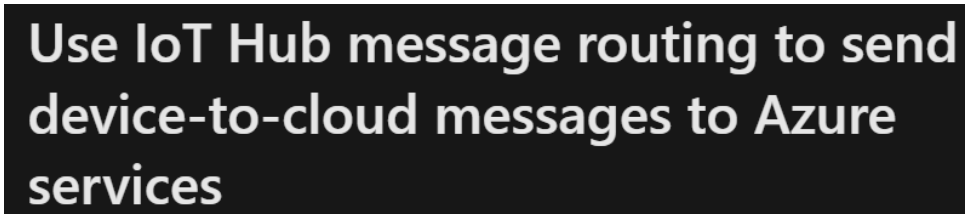
In the top right corner, they can show or hide their chat history. When displayed, users can rename or delete conversations, giving full control of the chat history experience to users. Conversations are automatically ordered from newest to oldest, simplifying navigation. Each conversation is named based on the initial query, making it easy for users to locate and reference past interactions.

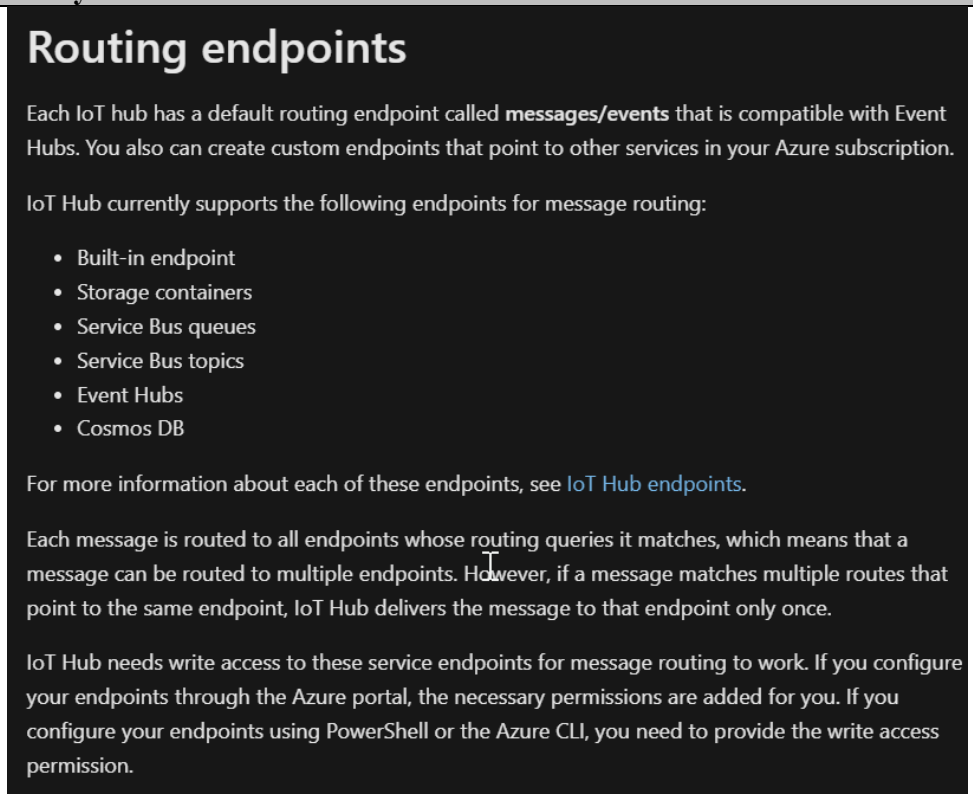
Enabling chat history in Azure OpenAI Studio can easily provide a valuable resource for your web app users, allowing them to easily reference past conversations and queries.

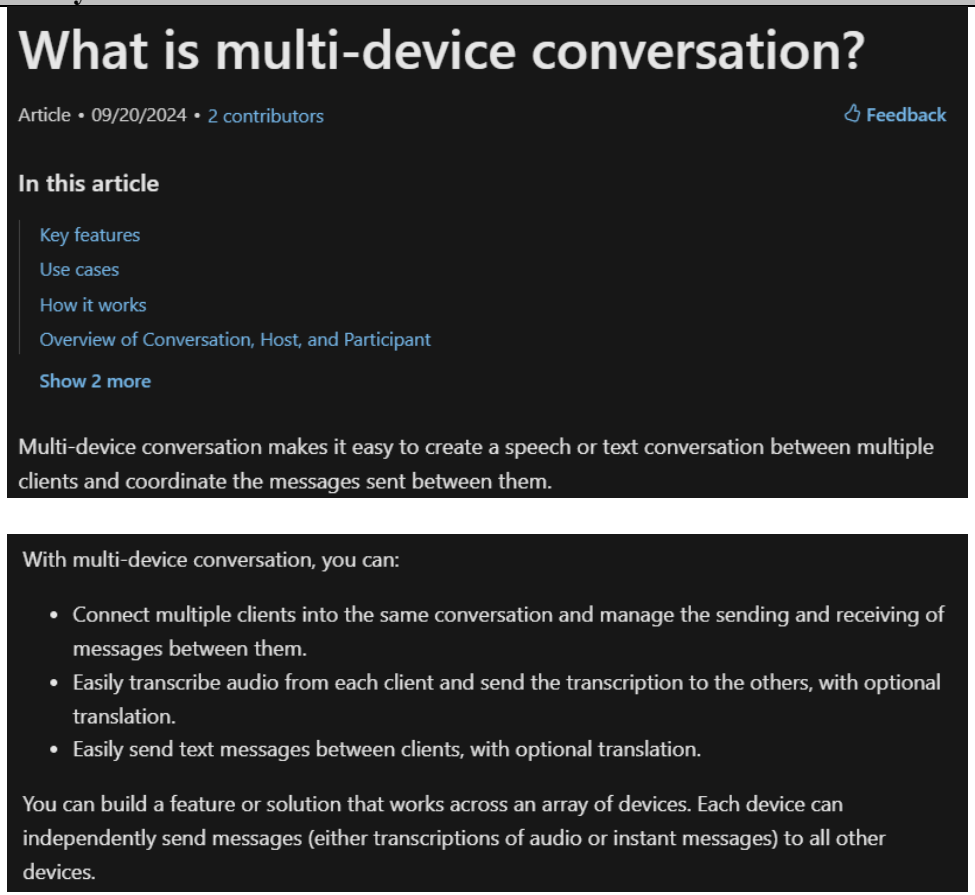
https://techcommunity.microsoft.com/blog/azure-ai-services-blog/enable-chat-history-on-azure-openai-studio-with-azure-cosmos-db/4051636

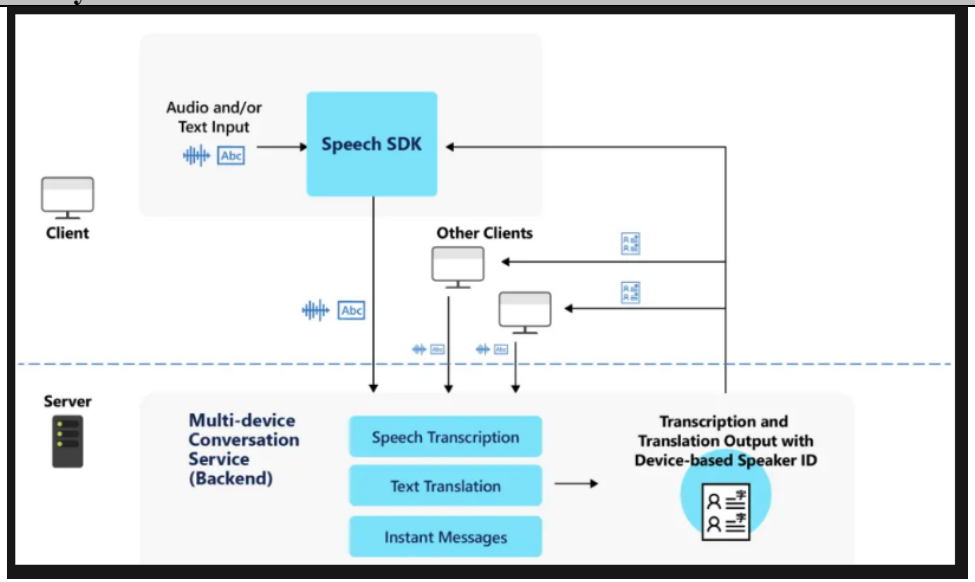
For example, on information and belief, Azure AI enables synchronization of contexts across devices using Azure IoT Hub.

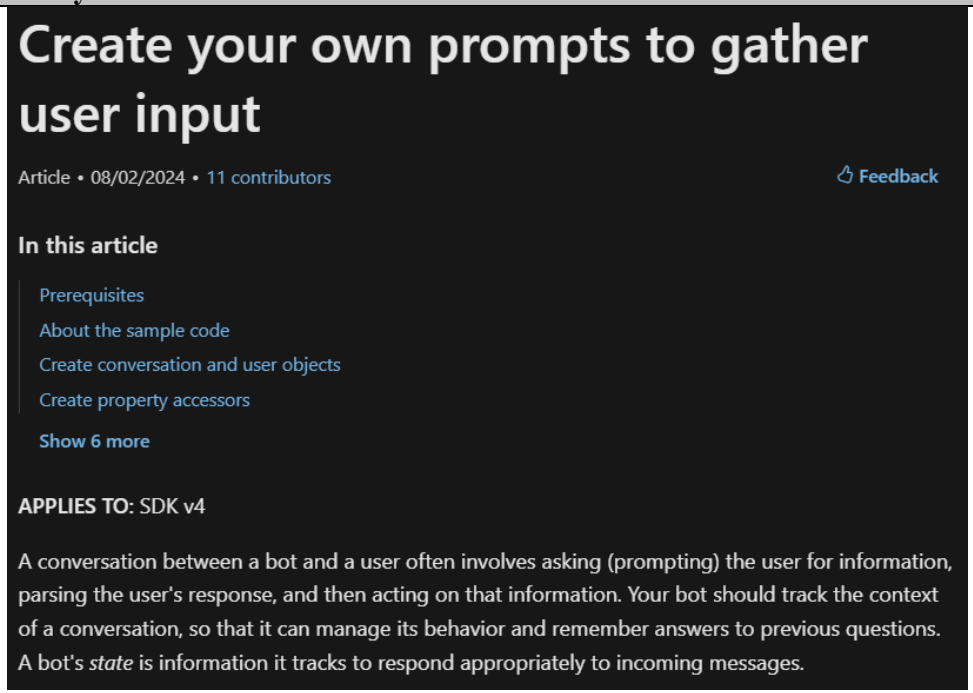


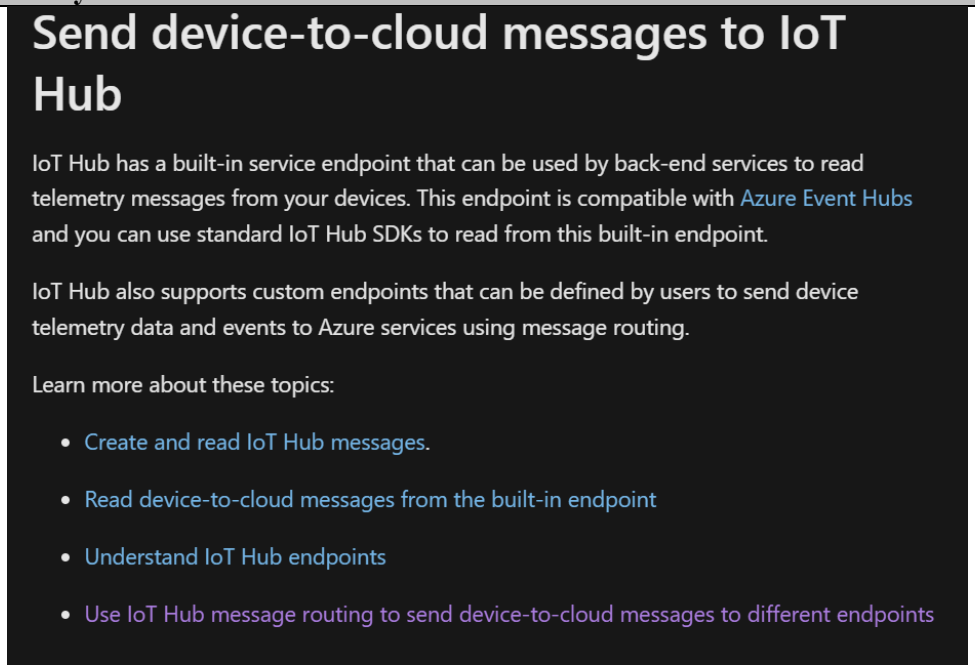
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide 

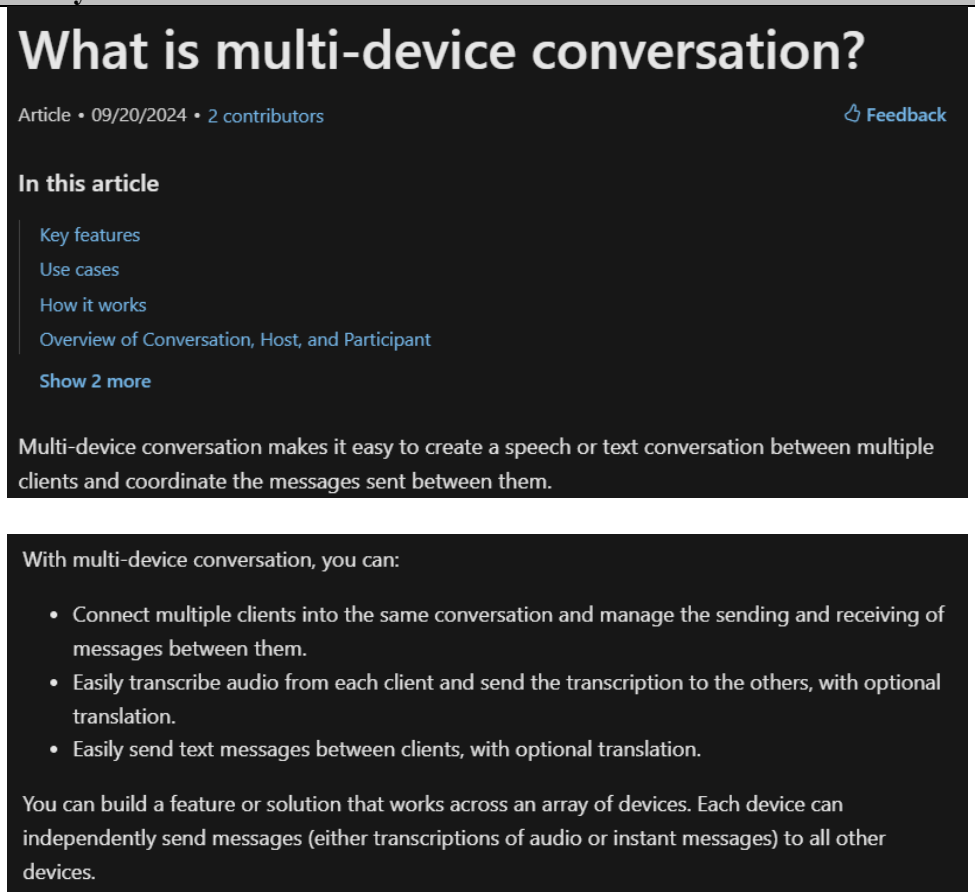
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-messages-d2c On information and belief, Azure Services enable synchronization of contexts across devices using multi-device conversation.

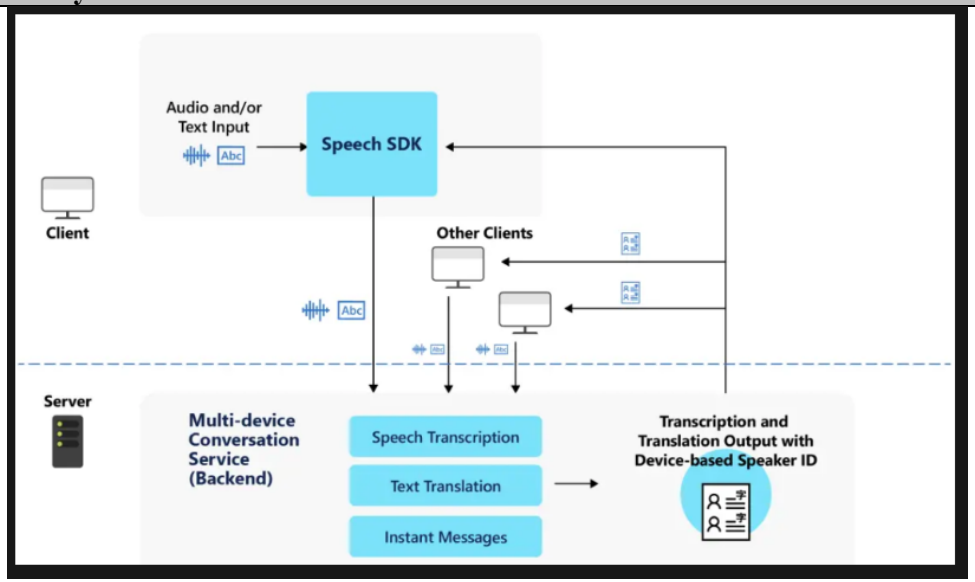
Element	Analysis for Azure Services
	

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/speech-service/multi-device-conversation
[11.3] receiving, at the context manager, a context input from one or more of the plurality of mobile devices registered with the context manager, wherein the context input includes a context change event; and	Azure Services meet this element. For example, Azure AI receives messages, including telemetry data, events, and state information, from devices, including mobile devices such as laptops and other mobile devices, at a hub.

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/bot-service/bot-builder-primitive-prompts?view=azure-bot-service-4.0&tabs=javascript

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-messaging

Element	Analysis for Azure Services
	

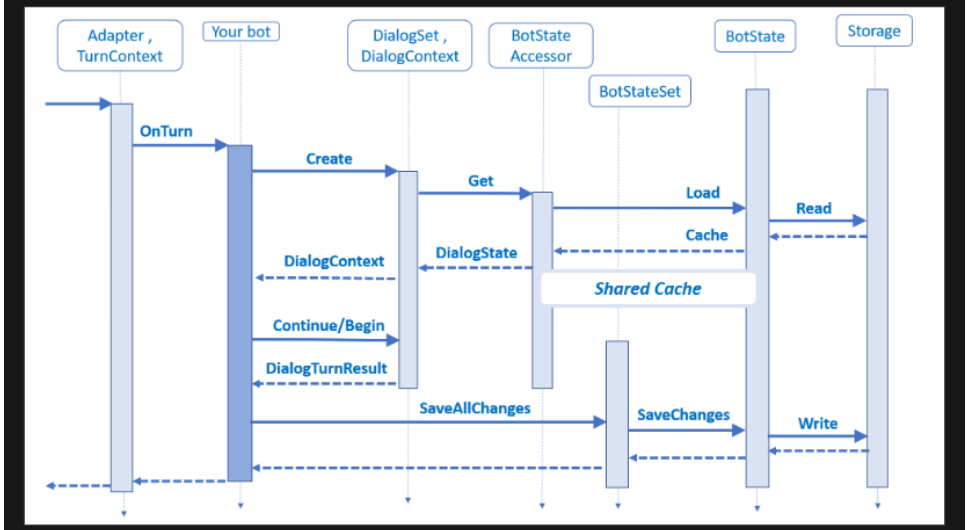
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/speech-service/multi-device-conversation
[11.4] informing the plurality of mobile devices registered with the context manager of the context change event, wherein informing the plurality of mobile devices registered with the context manager of the context change event synchronizes a context across the plurality of mobile devices.	Azure Services meet this element. For example, the Azure AI hub informs devices, including mobile devices such as laptops and other mobile devices, of messages from other devices, state changes, and other context change events.

Element	Analysis for Azure Services

Why do I need state?

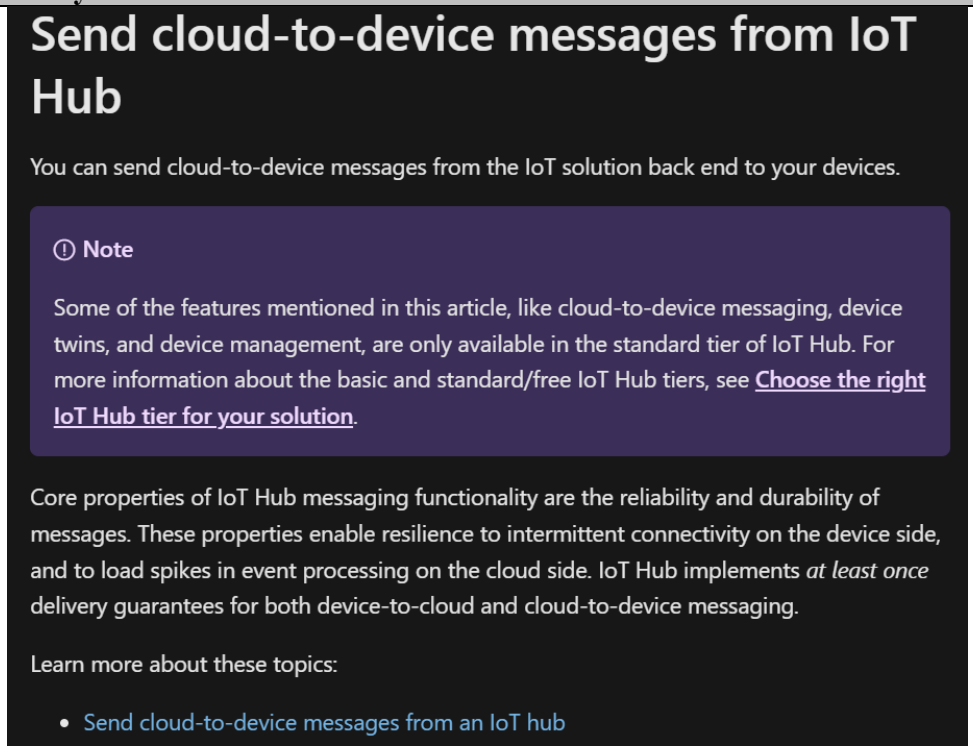
Maintaining state allows your bot to have more meaningful conversations by remembering certain things about a user or conversation. For example, if you've talked to a user previously, you can save previous information about them, so that you don't have to ask for it again. State also keeps data for longer than the current turn, so that your bot keeps information over the course of a multi-turn conversation.

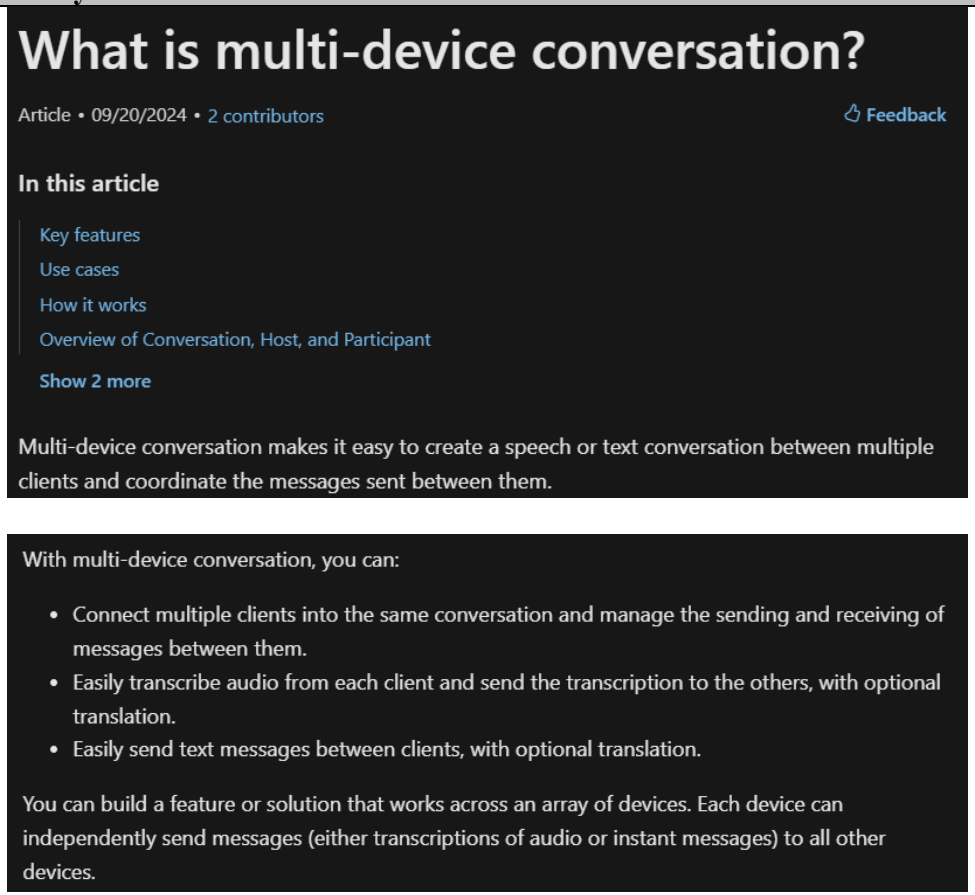
As it pertains to bots, there are a few layers to using state: the storage layer, state management (contained in the bot state in the diagram below), and state property accessors. This diagram illustrates parts of the interaction sequence between these layers, with the solid arrows representing a method call, and the dashed arrows representing the response (with or without a return value).

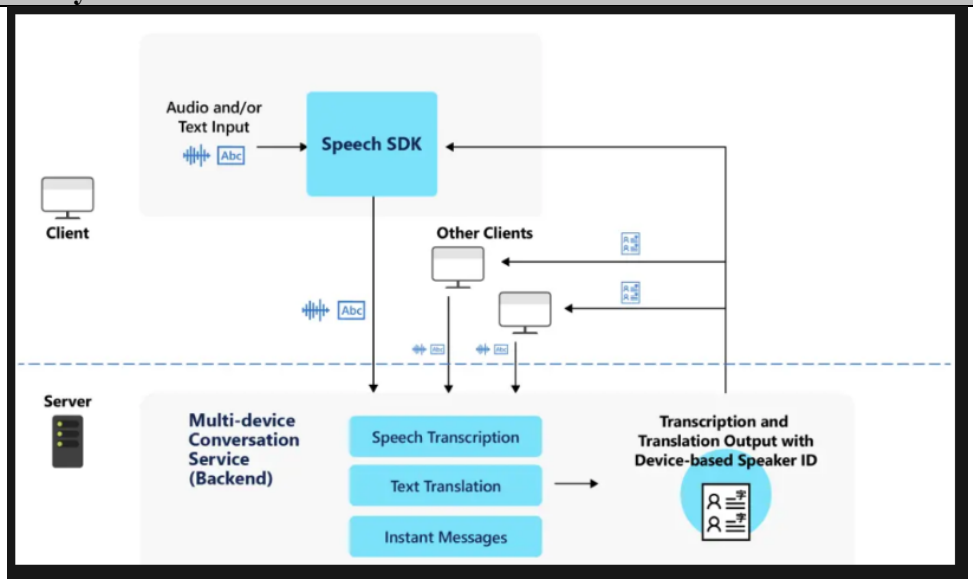


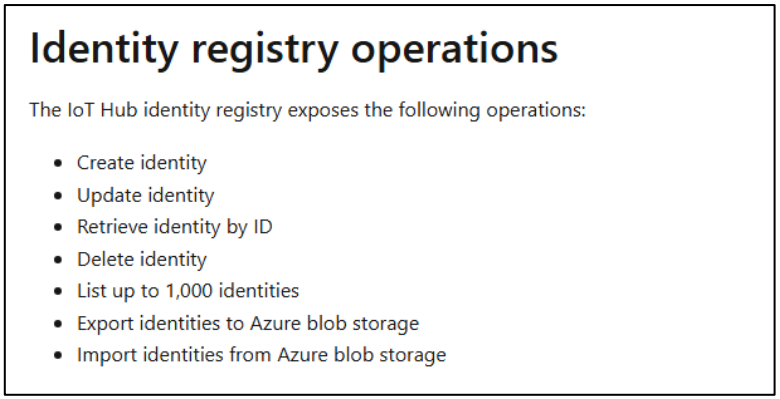
https://learn.microsoft.com/en-us/azure/bot-service/bot-builder-concept-state?view=azure-bot-service-4.0

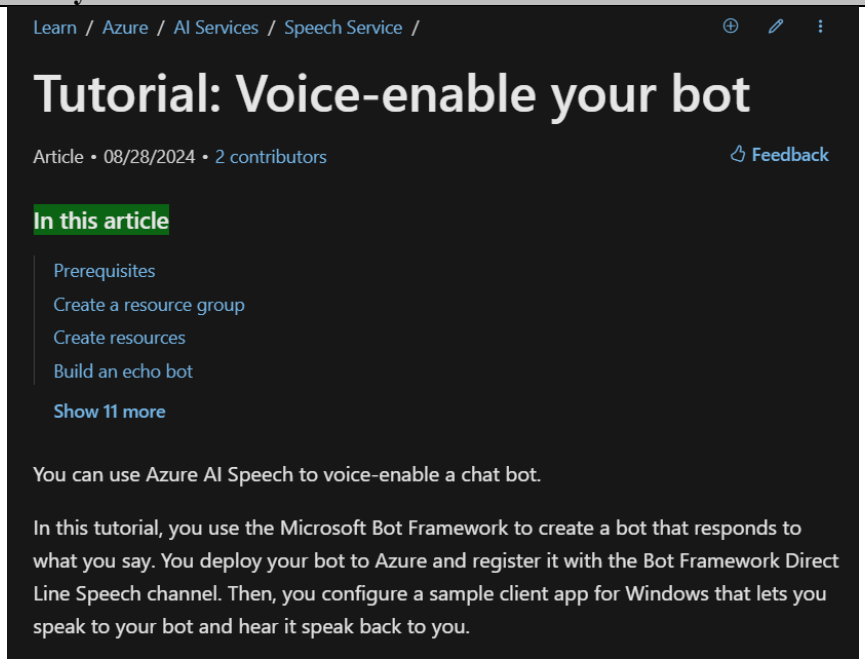
Element	Analysis for Azure Services
	Personalizer works by learning what your application should show to users in a given context. Context and actions are the two most important pieces of information that you pass into Personalizer. The **context** represents the information you have about the current user or the state of your system, and the **actions** are the options to be chosen from. **Context** Information for the *context* depends on each application and use case, but it typically may include information such as: • Demographic and profile information about your user. • Information extracted from HTTP headers such as user agent, or derived from HTTP information such as reverse geographic lookups based on IP addresses. • Information about the current time, such as day of the week, weekend or not, morning or afternoon, holiday season or not, etc. • Information extracted from mobile applications, such as location, movement, or battery level. • Historical aggregates of the behavior of users - such as what are the movie genres this user has viewed the most. • Information about the state of the system. Your application is responsible for loading the information about the context from the relevant databases, sensors, and systems you may have. If your context information doesn't change, you can add logic in your application to cache this information, before sending it to the Rank API. https://learn.microsoft.com/en-us/azure/ai-services/personalizer/concepts-features

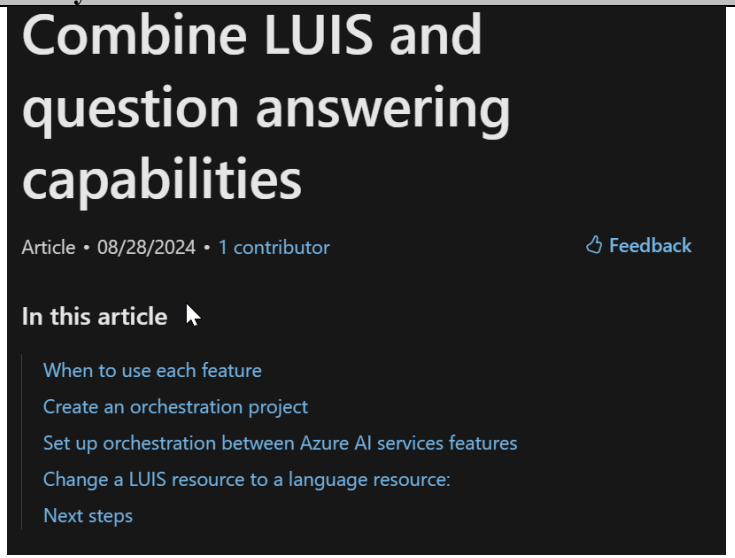
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-messaging

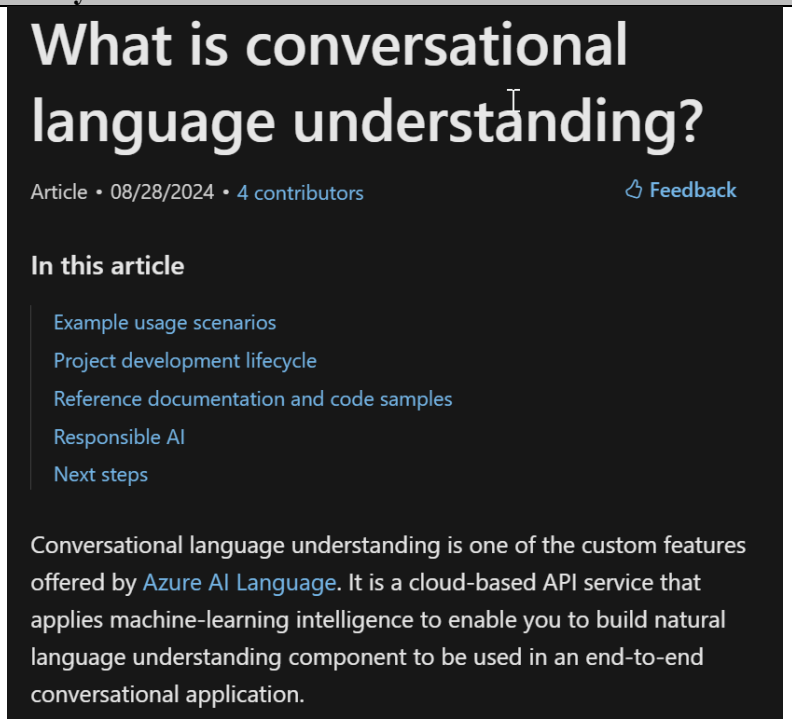
Element	Analysis for Azure Services
	

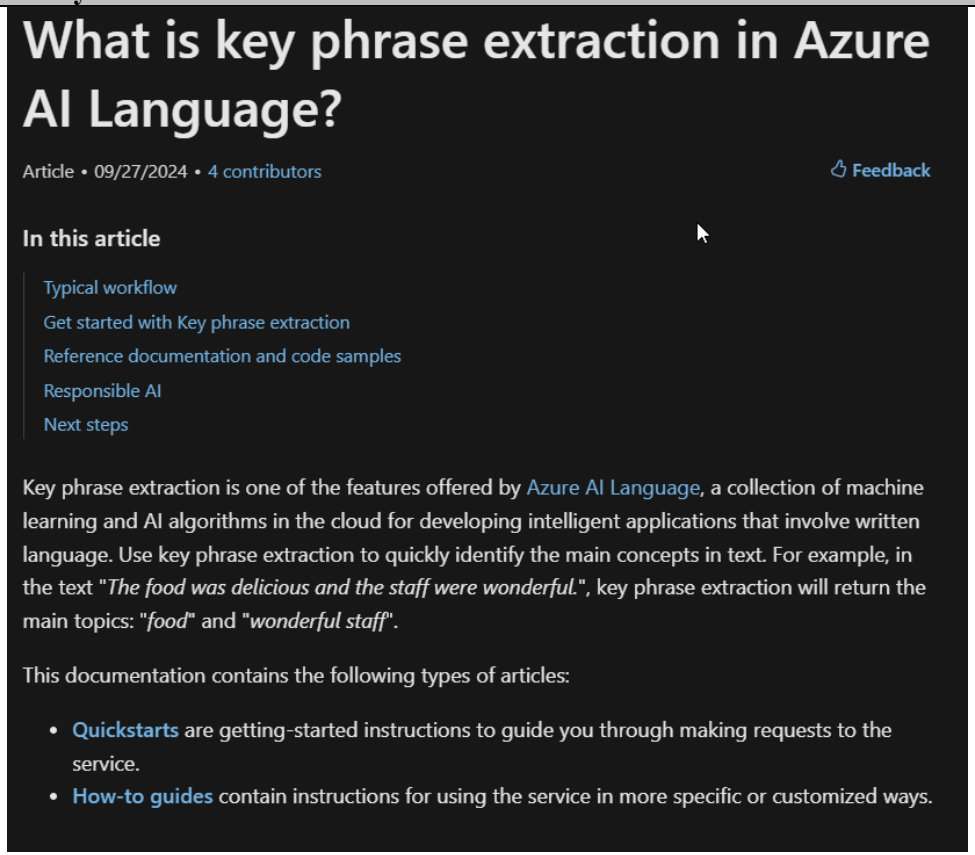
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/speech-service/multi-device-conversation
[12.0] 12. The method of claim 11, wherein	Azure Services perform this method. See claim 11.
[12.1] a context tracking module associated with the context manager informs the plurality of mobile devices registered with the context manager of the context change event.	Azure Services meet this element. See element [11.4].
[15.0] 15. The method of claim 11, further comprising	Azure Services perform this method. See claim 11.
[15.1] removing, by the context manager, one or	Azure Services meet this element.

Element	Analysis for Azure Services
more of the plurality of mobile devices from the plurality of mobile devices registered with the context manager.	For example, the hub can delete one or more of the devices registered with it.  https://learn.microsoft.com/en-us/azure/iot-hub/iot-hub-devguide-identity-registry
[17.0] 17. The method of claim 11, further comprising:	Azure Services perform this method. See claim 11.
[17.1] receiving a natural language utterance at a multi-modal voice user interface associated with at least one of the plurality of mobile devices registered with the context manager;	Azure Services meet this element. For example, Azure AI receives a user generated natural language speech utterance.

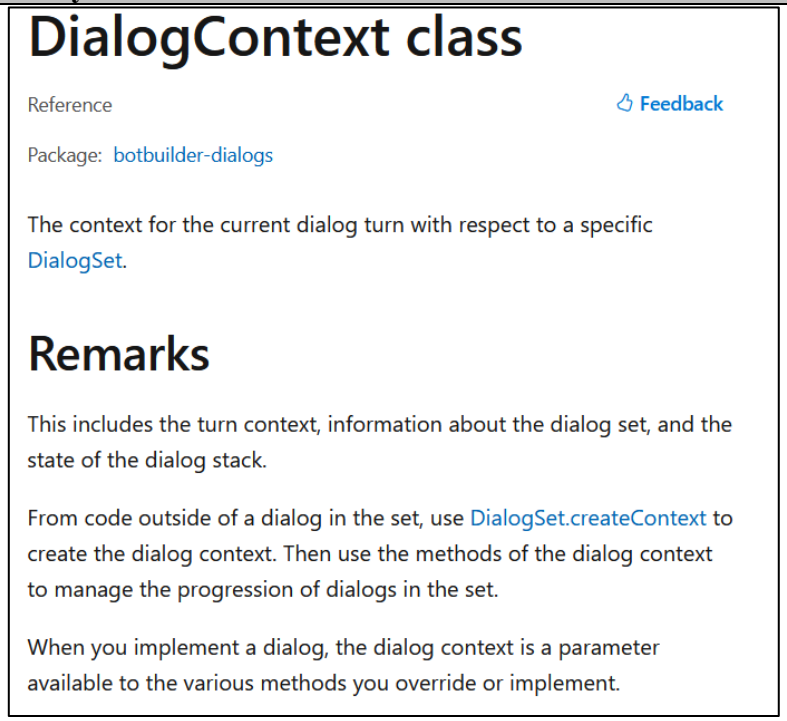
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/speech-service/tutorial-voice-enable-your-bot-speech-sdk On information and belief, Azure AI uses Language Understanding (LUIS) and Conversational Language Understanding technology to understand and respond to user speech utterances.

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/luis/how-to/orchestration-projects

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/microsoft-copilot-studio/advanced-clu-integration
[17.2] identifying, using a knowledge-enhanced speech recognition engine associated with the at least one mobile device, one or more contexts that completely or partially match one or more text combinations contained in text transcribed from the	Azure services meet this element. For example, Azure AI uses key phrase extraction to parse user input.

Element	Analysis for Azure Services
natural language utterance, wherein identifying the matching contexts includes comparing the text combinations against one or more grammar expression entries in a context description grammar and one or more expected contexts stored in a context stack synchronized through the context manager;	 https://learn.microsoft.com/en-us/azure/ai-services/language-service/key-phrase-extraction/overview#reference-documentation-and-code-samples For example, Azure AI recognizes intents for user utterances.

Element	Analysis for Azure Services
	Conversational language understanding (CLU) is a cloud-based AI offering in Azure AI Language. It's the newest generation of Language Understanding (LUIS) and offers backwards compatibility with previously created LUIS applications. CLU employs state-of-the-art machine learning intelligence to allow users to build a custom natural language understanding model for predicting intents and entities in conversational utterances. CLU offers the following advantages over LUIS: • Improved accuracy with state-of-the-art machine learning models for better intent classification and entity extraction. LUIS required more examples to generalize certain concepts in intents and entities, while CLU's more advanced machine learning reduces the burden on customers by requiring significantly less data. https://learn.microsoft.com/en-us/azure/ai-services/language-service/conversational-language-understanding/how-to/migrate-from-luis?context=%2Fazure%2Fai-services%2FLUIS%2Fcontext%2Fcontext&tabs=luis-portal (emphasis added) For example, Azure AI also recognizes and tracks contexts for user utterances, including on a context stack.

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/javascript/api/botbuilder-dialogs/dialogcontext?view=botbuilder-ts-latest

Element	Analysis for Azure Services
	Dialog state Dialogs can implement a *multi-turn conversation*, and as such, they rely on *persisted state* across turns. Without state in dialogs, your bot wouldn't know where it was in the conversation or what information it had already gathered. To retain a dialog's place in the conversation, the dialog's state must be retrieved from and saved to memory each turn. This is handled via a dialog state property accessor defined on the bot's conversation state. This dialog state manages information for all active dialogs, and children of active dialogs. This allows the bot to pick up where it left off last and to handle various conversation models. At run time, the dialog state property includes information on where the dialog is in its logical process, including any internally collected information in the form of a *dialog instance* object. Again, this needs to be read into the bot and saved out to memory each turn.

Element	Analysis for Azure Services

Dialog infrastructure

Along with various types of dialogs, the following classes are involved in the design and control of conversations. While you don't usually need to interact with these classes directly, being aware of them and their purpose is useful when designing dialogs for a bot.

Expand table

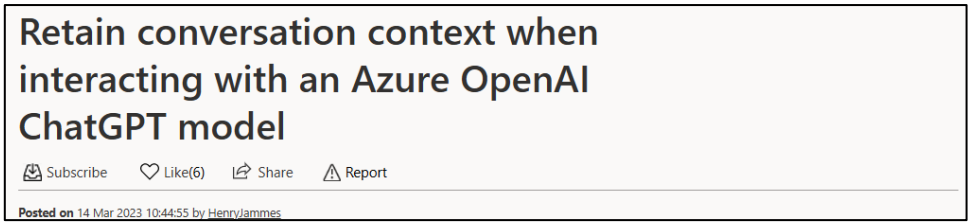
Class	Description
Dialog set	Defines a collection of dialogs that can reference each other and work in concert.
Dialog context	Contains information about all active dialogs.
Dialog instance	Contains information about one active dialog.
Dialog turn result	Contains status information from an active, or recently active, dialog. If the active dialog ended, this contains its return value.

The dialog stack

A dialog context contains information about all active dialogs and includes a *dialog stack*, which acts as a *call stack* for all the active dialogs. Each container dialog has an inner set of dialogs that it's controlling, and so each active container dialog introduces an inner dialog context and dialog stack as part of its state.

While you won't access the stack directly, understanding that it exists and its function will help you understand how various aspects of the dialogs library work.

https://learn.microsoft.com/en-us/azure/bot-service/bot-builder-concept-dialog?view=azure-bot-

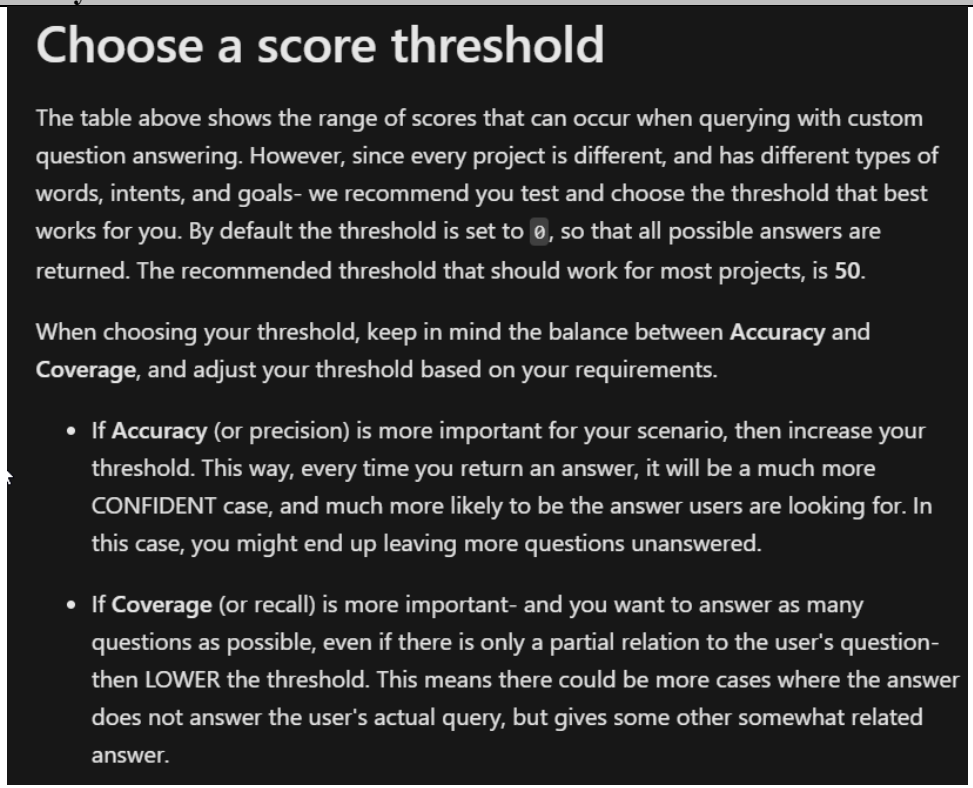
Element	Analysis for Azure Services
	service-4.0  https://community.powerplatform.com/forums/thread/details/?threadid=e4d204b9-32e1-4e72-9fbe-616e7741d1d5
[17.3] scoring each of the identified matching contexts; and	Azure Services meet this element. On information and belief, Azure Services score each of the possible contexts, including by providing a confidence associated with a given score.

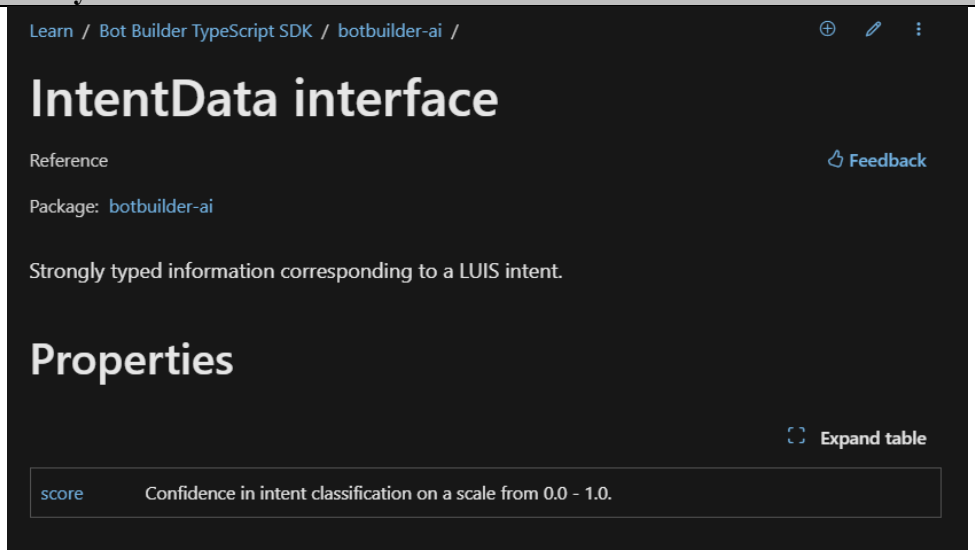
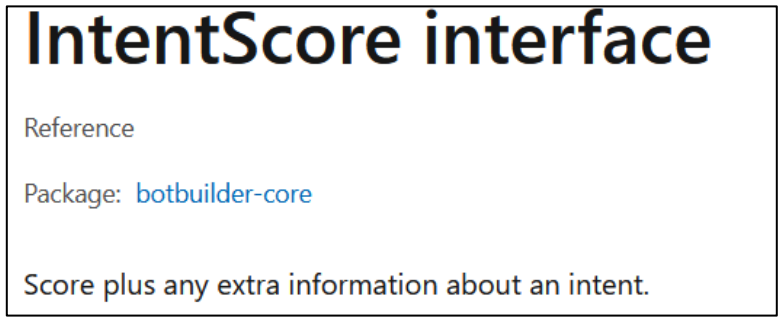
Element	Analysis for Azure Services

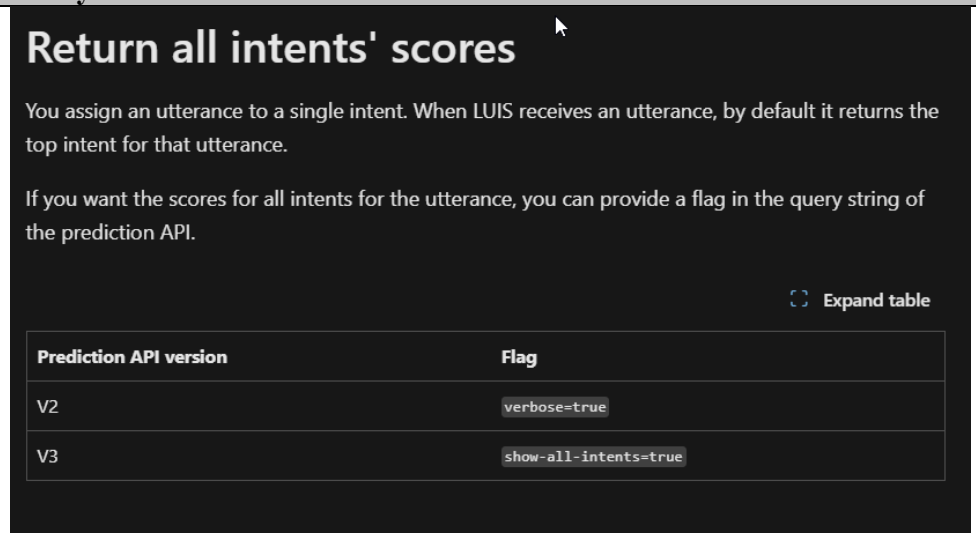
The following table indicates typical confidence associated for a given score.

Expand table

Score Value	Score Meaning	Example Query
0.90 - 1.00	A near exact match of user query and a KB question	
> 0.70	High confidence - typically a good answer that completely answers the user's query	
0.50 - 0.70	Medium confidence - typically a fairly good answer that should answer the main intent of the user query	
0.30 - 0.50	Low confidence - typically a related answer, that partially answers the user's intent	
< 0.30	Very low confidence - typically does not answer the user's query, but has some matching words or phrases	
0	No match, so the answer is not returned.	

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/language-service/question-answering/concepts/confidence-score Further, Azure AI assigns confidence scores to potential intents.

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/javascript/api/botbuilder-ai/intentdata?view=botbuilder-ts-latest  https://learn.microsoft.com/en-us/javascript/api/botbuilder-core/intentscore?view=botbuilder-ts-latest

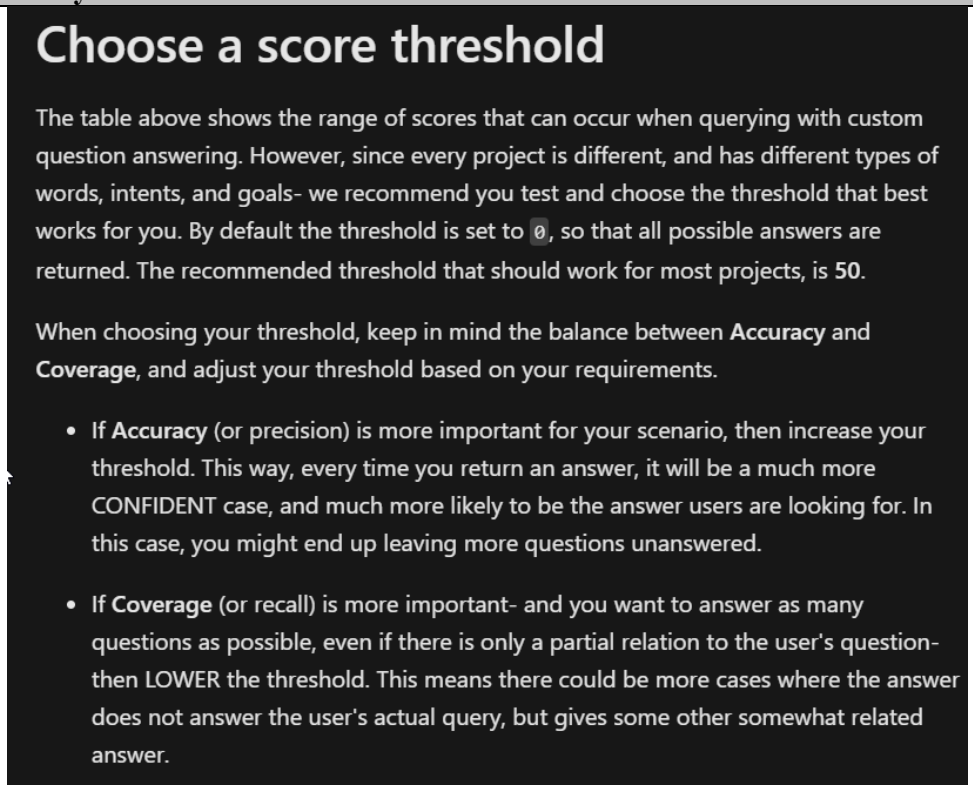
Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/LUIS/concepts/intents
[17.4] selecting the matching context having a highest score as a most likely context for the natural language utterance.	Azure Services meet this element. On information and belief, Azure Services select the context having the highest score and provide a response accordingly.

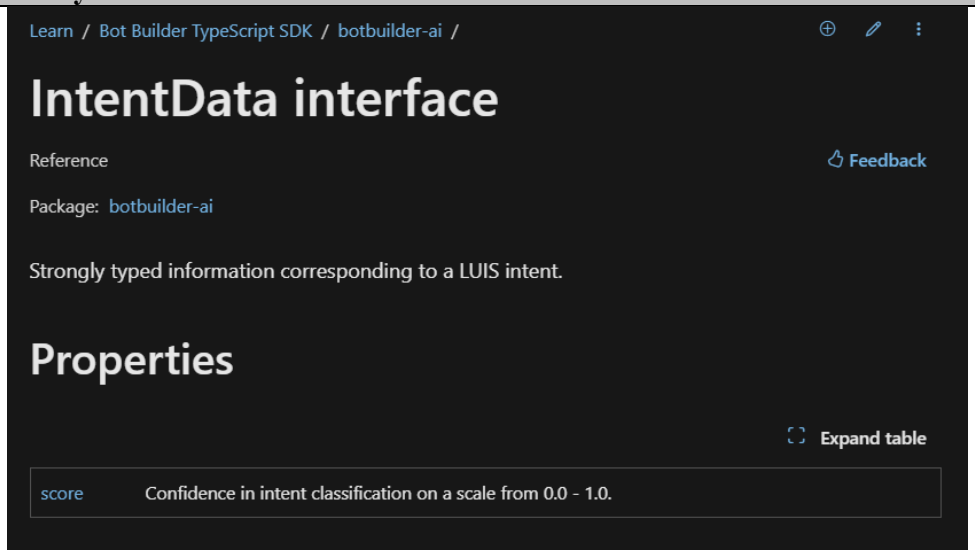
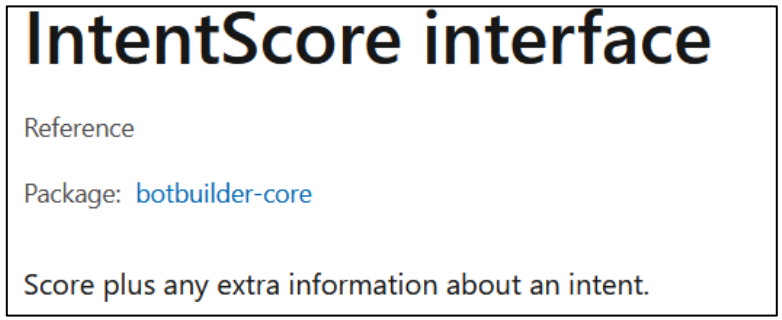
Element	Analysis for Azure Services

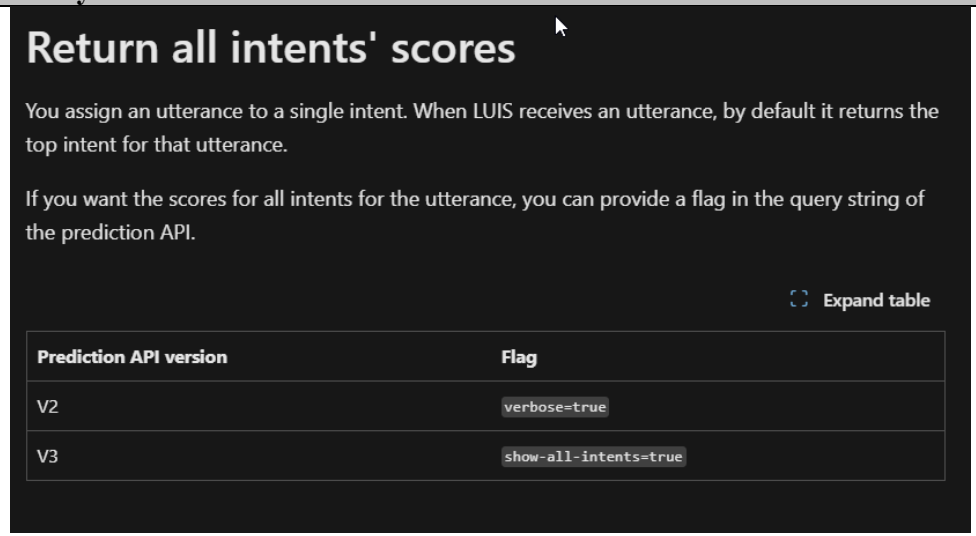
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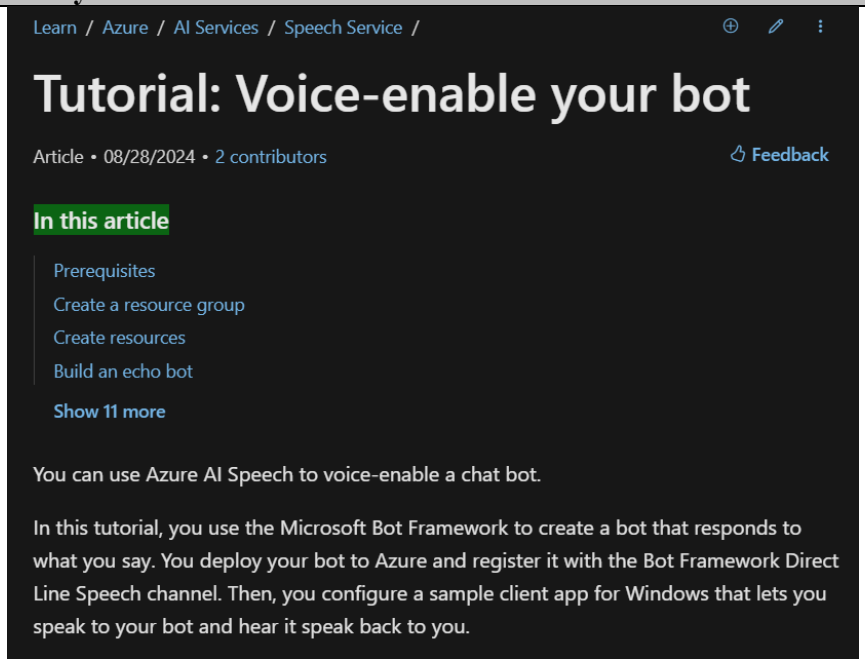
Expand table

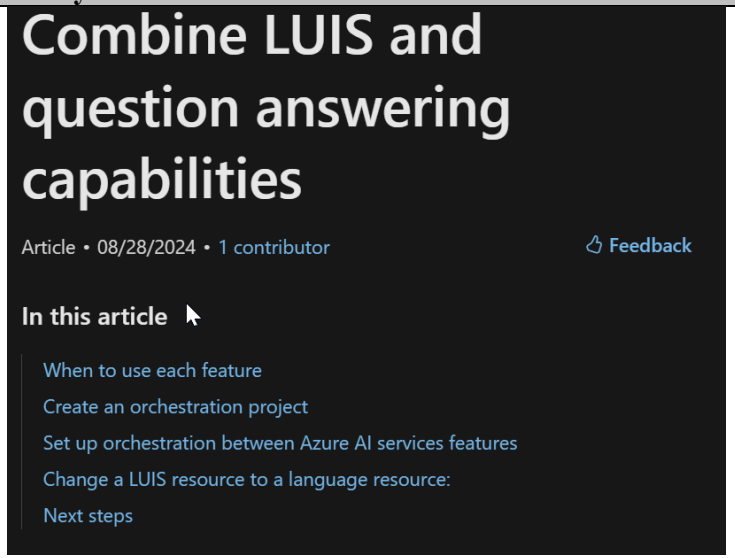
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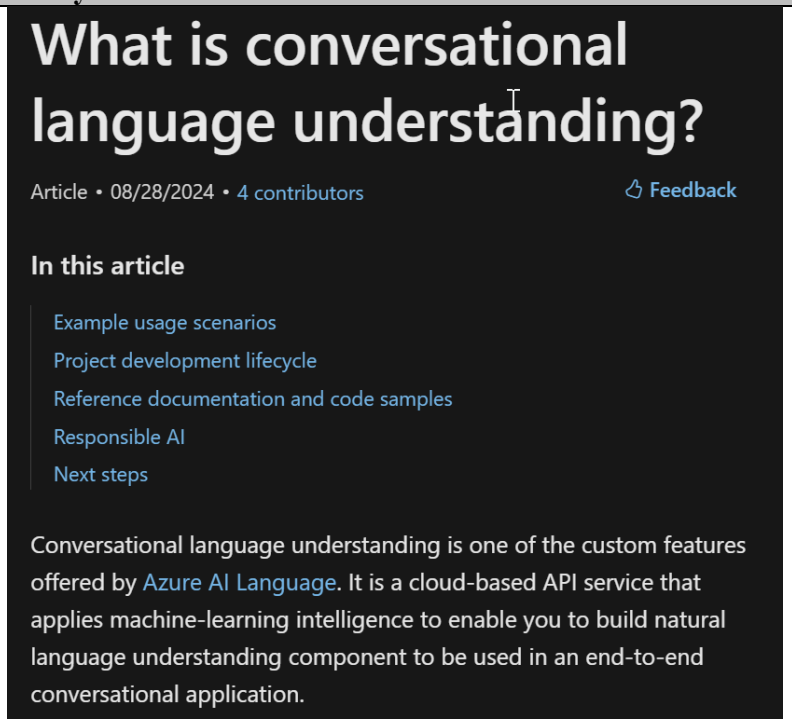
Element	Analysis for Azure Services
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	 https://learn.microsoft.com/en-us/javascript/api/botbuilder-ai/intentdata?view=botbuilder-ts-latest  https://learn.microsoft.com/en-us/javascript/api/botbuilder-core/intentscore?view=botbuilder-ts-latest

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/LUIS/concepts/intents
[18.0] 18. The method of claim 17, wherein	Azure Services perform this method. See claim 17.
[18.1] the context change event received at the context manager includes a communication from the at least one mobile device that indicates a change in context to the most likely context.	Azure Services meet this element. For example, on information and belief, the hub receives information about the most likely context and places it in the dialog stack.

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/speech-service/tutorial-voice-enable-your-bot-speech-sdk On information and belief, Azure AI uses Language Understanding (LUIS) and Conversational Language Understanding technology to understand and respond to user speech utterances.

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/azure/ai-services/luis/how-to/orchestration-projects

Element	Analysis for Azure Services
	 https://learn.microsoft.com/en-us/microsoft-copilot-studio/advanced-clu-integration

Element	Analysis for Azure Services
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Element	Analysis for Azure Services

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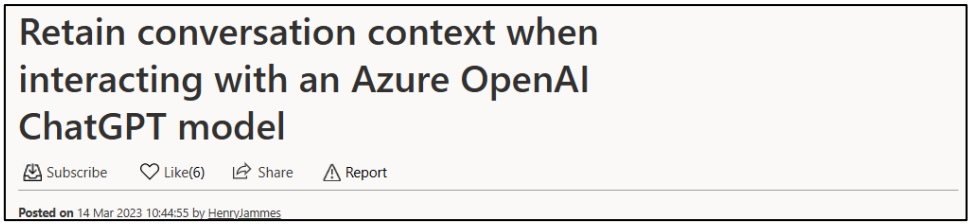
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https://learn.microsoft.com/en-us/azure/bot-service/bot-builder-concept-dialog?view=azure-bot-

Element	Analysis for Azure Services
	service-4.0  https://community.powerplatform.com/forums/thread/details/?threadid=e4d204b9-32e1-4e72-9fbe-616e7741d1d5