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(54) SYSTEM AND METHOD FOR DETERMINING UTTERANCE CONTEXT IN A MULTI-CONTEXT SPEECH APPLICATION

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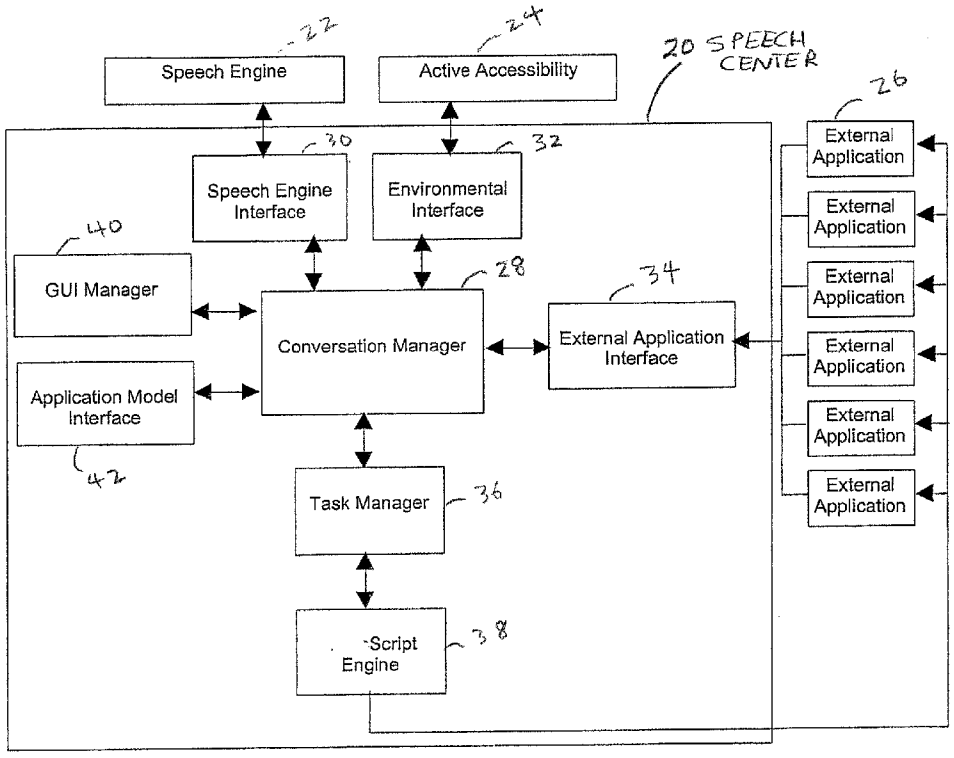
(57) **ABSTRACT**

A speech center coordinates speech services for a number of speech-enabled applications performing on a computer system. The speech center includes a conversation manager that manages conversations between a user and the speech-enabled applications. The conversation manager includes a context manager that maintains a context list of speech-enabled applications that the user has accessed. If the user speaks an utterance, the context manager determines which speech-enabled application should receive a translation of the utterance from the context list, such as by determining the most recently accessed application.



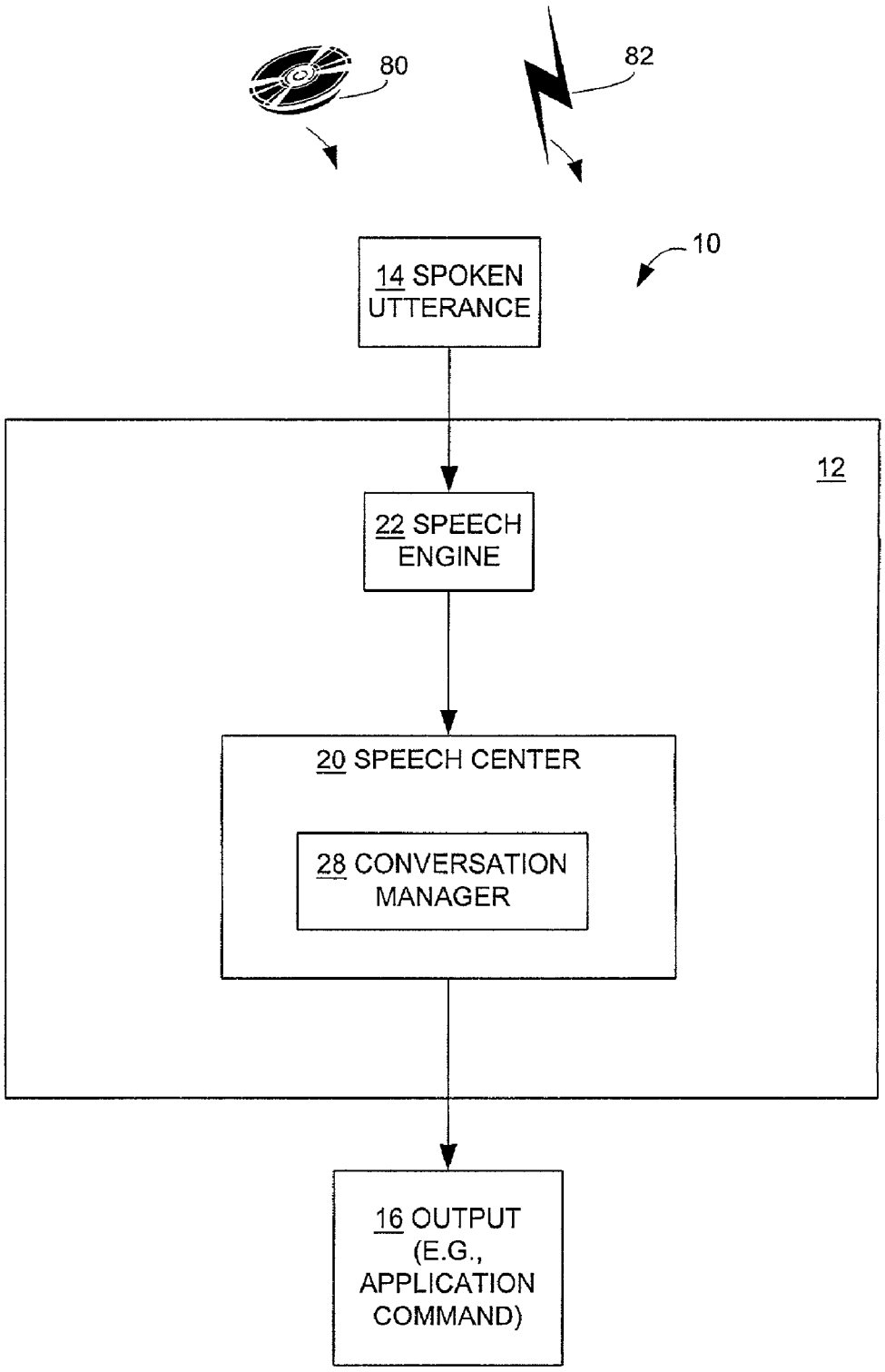

80
82
10
14 SPOKEN UTTERANCE
12
22 SPEECH ENGINE
20 SPEECH CENTER
28 CONVERSATION MANAGER
16 OUTPUT (E.G., APPLICATION COMMAND)

FIG. 1

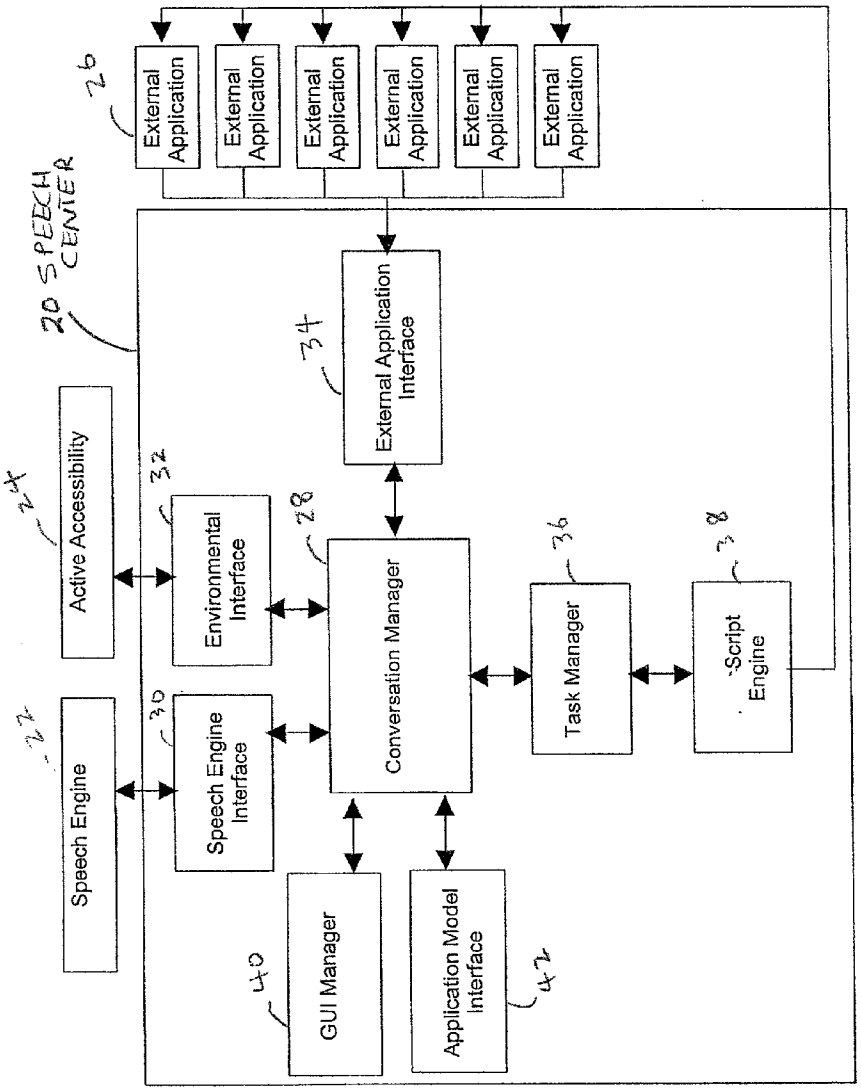

External Application
External Application
External Application
External Application
External Application
External Application
26
20 SPEECH CENTER
External Application Interface
34
Active Accessibility
24
Environmental Interface
32
Conversation Manager
28
Task Manager
36
Script Engine
38
Speech Engine
22
Speech Engine Interface
30
GUI Manager
40
Application Model Interface
42

Fig. 2

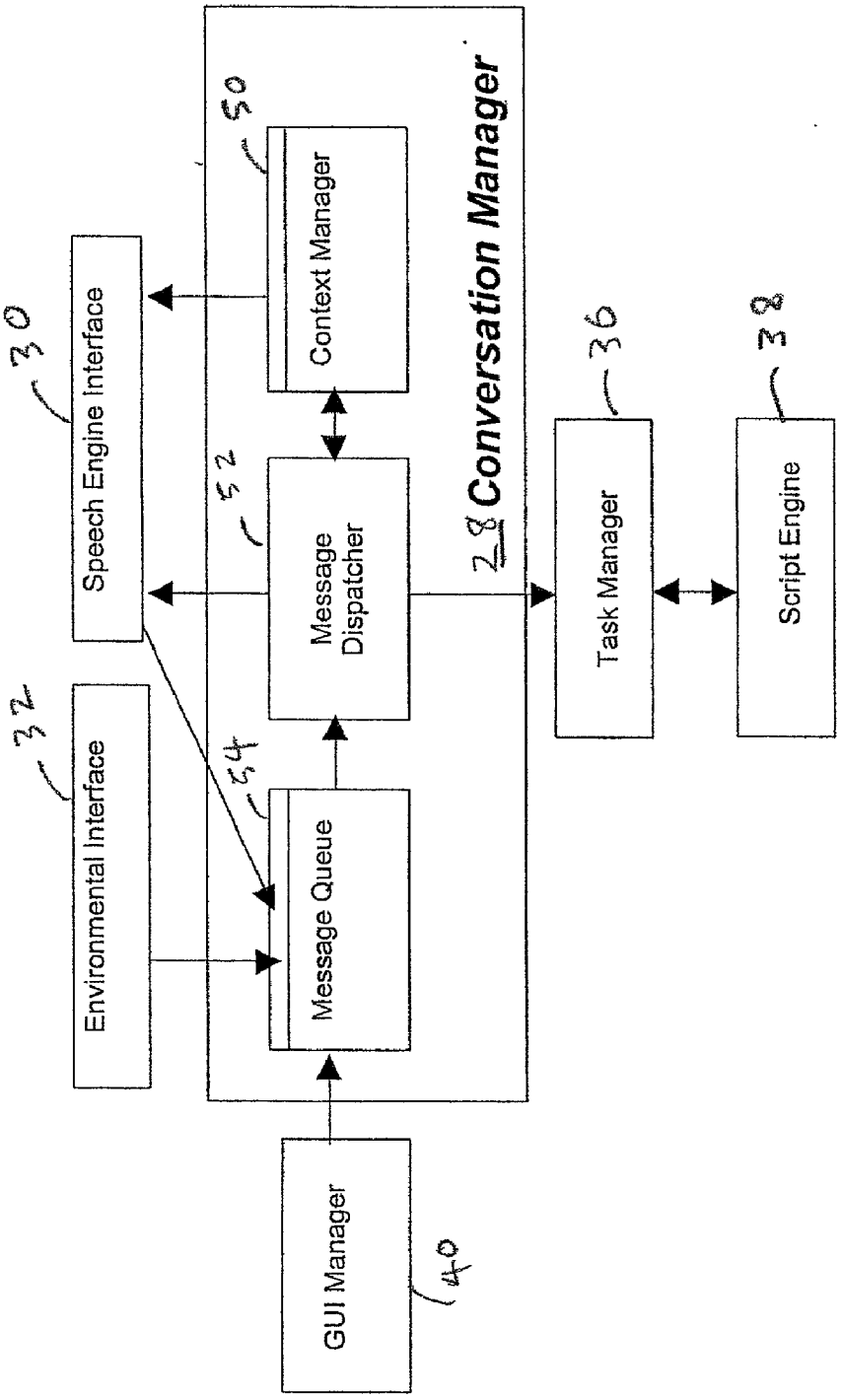

Speech Engine Interface
30
Environmental Interface
32
Context Manager
50
Message Dispatcher
52
Message Queue
54
28 Conversation Manager
Task Manager
36
Script Engine
38
GUI Manager
40

Fig. 3

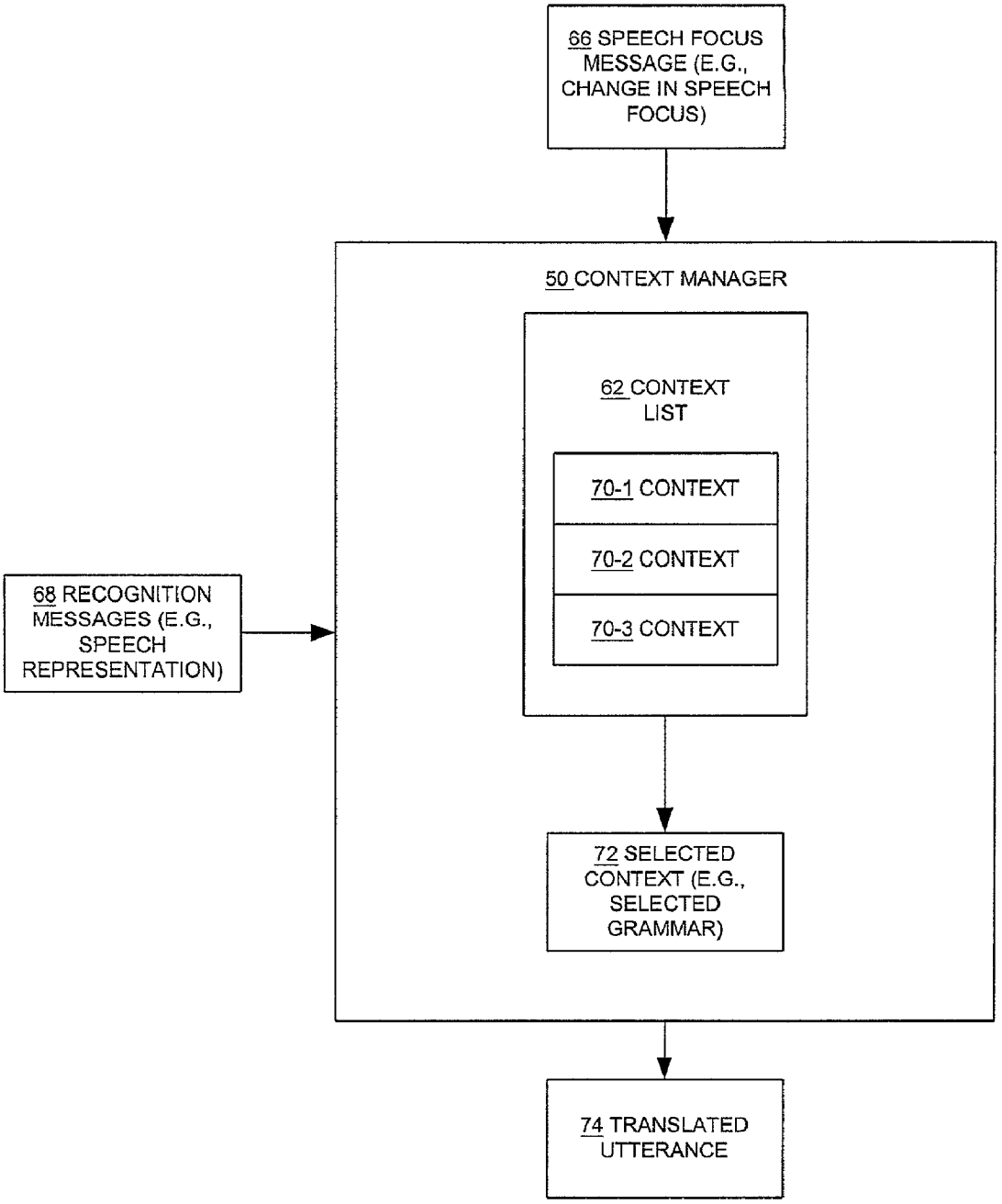

66 SPEECH FOCUS MESSAGE (E.G., CHANGE IN SPEECH FOCUS)
50 CONTEXT MANAGER
62 CONTEXT LIST
70-1 CONTEXT
70-2 CONTEXT
70-3 CONTEXT
68 RECOGNITION MESSAGES (E.G., SPEECH REPRESENTATION)
72 SELECTED CONTEXT (E.G., SELECTED GRAMMAR)
74 TRANSLATED UTTERANCE

FIG. 4

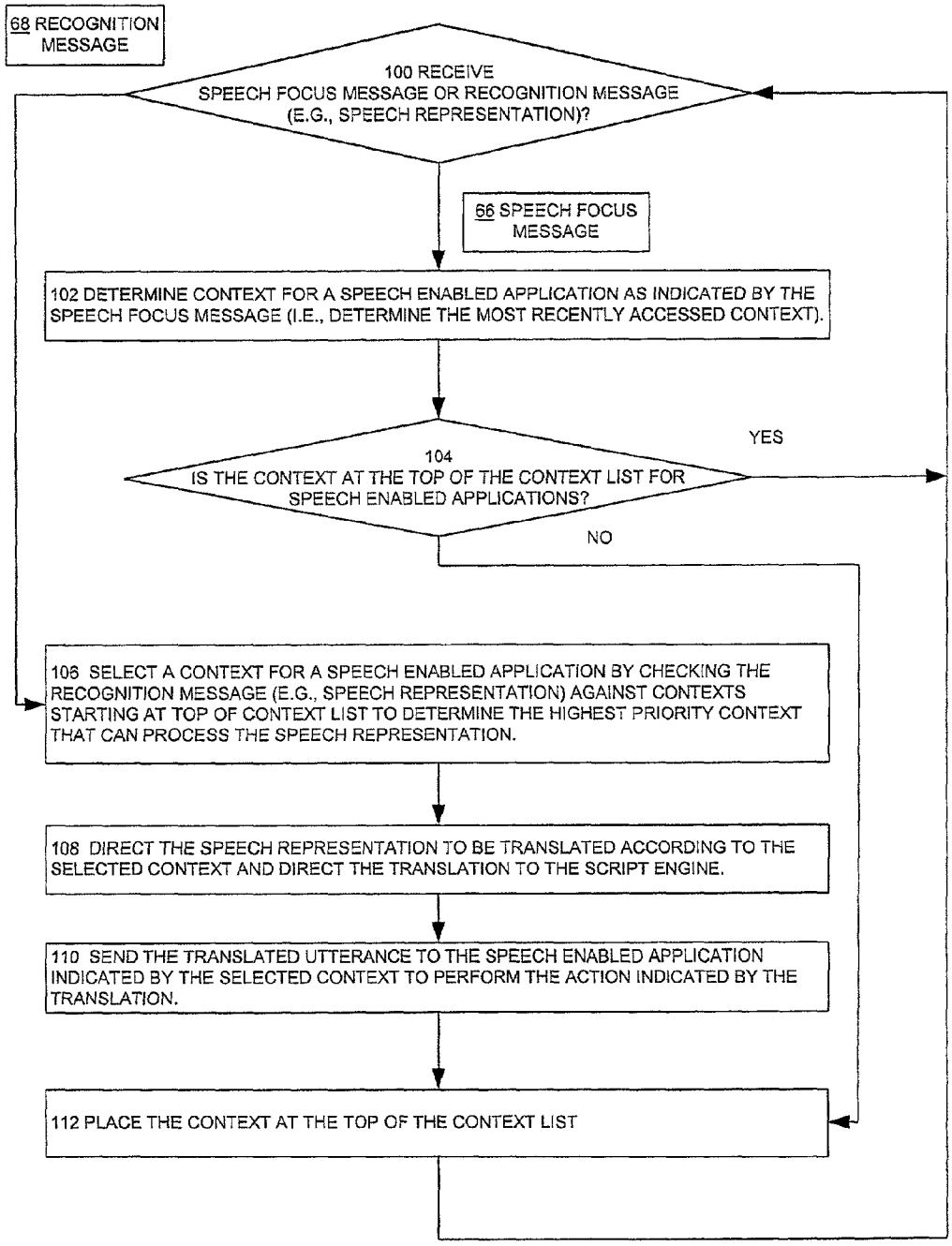

68 RECOGNITION MESSAGE
100 RECEIVE SPEECH FOCUS MESSAGE OR RECOGNITION MESSAGE (E.G., SPEECH REPRESENTATION)?
66 SPEECH FOCUS MESSAGE
102 DETERMINE CONTEXT FOR A SPEECH ENABLED APPLICATION AS INDICATED BY THE SPEECH FOCUS MESSAGE (I.E., DETERMINE THE MOST RECENTLY ACCESSED CONTEXT).
104 IS THE CONTEXT AT THE TOP OF THE CONTEXT LIST FOR SPEECH ENABLED APPLICATIONS?
YES
NO
106 SELECT A CONTEXT FOR A SPEECH ENABLED APPLICATION BY CHECKING THE RECOGNITION MESSAGE (E.G., SPEECH REPRESENTATION) AGAINST CONTEXTS STARTING AT TOP OF CONTEXT LIST TO DETERMINE THE HIGHEST PRIORITY CONTEXT THAT CAN PROCESS THE SPEECH REPRESENTATION.
108 DIRECT THE SPEECH REPRESENTATION TO BE TRANSLATED ACCORDING TO THE SELECTED CONTEXT AND DIRECT THE TRANSLATION TO THE SCRIPT ENGINE.
110 SEND THE TRANSLATED UTTERANCE TO THE SPEECH ENABLED APPLICATION INDICATED BY THE SELECTED CONTEXT TO PERFORM THE ACTION INDICATED BY THE TRANSLATION.
112 PLACE THE CONTEXT AT THE TOP OF THE CONTEXT LIST

FIG. 5

SYSTEM AND METHOD FOR DETERMINING UTTERANCE CONTEXT IN A MULTI-CONTEXT SPEECH APPLICATION

RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/261,372, filed Jan. 12, 2001. The entire teachings of the above application are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] Speech enabling mechanisms have been developed that allow a user of a computer system to verbally communicate with a computer system. Examples of speech recognition products that convert speech into text strings that can be utilized by software applications on a computer system include the ViaVoice™ product from IBM®, Armonk, N.Y., and NaturallySpeaking Professional from Dragon Systems, Newton, Mass.

[0003] In particular a user may communicate through a microphone with a software application that displays output in a window on the display screen of the computer system. For example, a user can communicate with a word processing application to input text that is entered into a document file being presented in a window. Next, the user can select another speech-enabled application with an input device, such as a mouse or keyboard. The user can also select another speech-enabled application by explicitly giving a spoken command to select that application (e.g., "switch to calendar"). Then, the user can provide speech input through the microphone to that application. For example, a user can use the mouse to select the window for a calendar application (or provide an explicit selection command for that application), which then pops to the foreground, obscuring the previously displayed foreground application, such as a word processing application. Then, the user can provide a speech utterance, such as commands or sentence fragments, to be entered to the calendar application. After speaking to the calendar application, the user can use an input device to select the window for another application, such as the word processing application, bring the window forward for that application and then commence providing a speech utterance for that application, and so on.

SUMMARY OF THE INVENTION

[0004] The user must thus explicitly select the window for each speech enabled application to be spoken to, and complete the desired task such as entering an appointment into the calendar, before selecting and returning to the previous application to complete some ongoing task, such as a command to enter text into a document. Also, different conventional applications may be speech enabled, but they typically may not share the same speech enabling interfaces, are not aware of each other as speech enabled applications, and cannot make a determination which application should receive a particular speech utterance. If a user speaks out of context, that is, speaks a calendar command to set up an appointment that is received by a word processing application, then the user can experience an unexpected or undesirable result. For example, the word processing application rejects the command outright without any attempt at understanding or enters the literal text of the spoken utterance in the current open document. Meanwhile, the appointment was not entered in the user's calendar. This leads to wasted time and effort, as well as frustration on the user's part.

[0005] A speech center configured according to the invention is an independent application which serves as a focal point for all speech communication with the user. The speech center provides speech services for a number of desktop applications, including the task of deciding the target application for a particular utterance provided by the user. This is in contrast to the conventional practice of having individual, independent speech-enabled applications, which leaves the user with a stable of speech-enabled applications, each contending for control of the microphone, and each oblivious to the other.

[0006] Such a speech center avoids the time, expense, and footprint of duplicating speech services in multiple applications. The speech center achieves consistent functionality across speech-enabled applications. Dictation has the same capabilities in all applications that support it, for example. As technology improves, a new feature can be incorporated into the speech center once, instead of into each speech-enabled application individually.

[0007] The speech center can allow cross-application speech. In one example, a user is working with a spreadsheet application, but then asks about the user's next appointment and obtains the information from a calendar program. In another example, the user asks what is the current stock price for a particular company and obtains the stock price from a stock monitoring service. Furthermore, the user asks whether the user has any new messages and receives an answer supplied by a message or mail application.

[0008] Applications do not even have to be running (i.e., currently performing on a computer system). For example, the user makes a request to take a letter, and a word processing application starts up (i.e., is launched by the speech center) if it is not already running.

[0009] The speech center can use speech to create an overall environment which melds the capabilities of a number of speech-enabled applications on the user's desktop. These applications do not have to necessarily be applications from any one supplier or vendor. Any application that supports a robust automation user interface can participate.

[0010] In one aspect of the present invention, a method and apparatus is provided for determining a speech-enabled application to receive a spoken utterance in a multi-context speech enabled environment. The apparatus includes a context manager and a message handler. The context manager evaluates contexts for speech enabled applications based upon an access characteristic. The message handler receives a representation of a spoken utterance. The context manager receives the representations of the spoken utterance from the message handler and directs the representation of the spoken utterance to a selected speech enabled application based upon the evaluation of the contexts. The context manager, prior to evaluating the contexts, may create the contexts for the speech enabled applications in the speech enabled environment.

[0011] In another aspect of the invention, the context manager identifies each context based on a persistent grammar, a foreground grammar, or a background grammar for each speech enabled application. For example, an applica-

tion that has a window displayed in the foreground (overlapping other windows) is a foreground application, and the context is identified based on a foreground grammar (if one is identified for that application) or based on a persistent grammar (if the application has one persistent grammar that is used for both foreground and background modes).

[0012] The context manager may prioritize the contexts based on the access characteristic. The access characteristic may be based on recency of relevant access to the context.

[0013] In a further aspect, the context manager uses a grammar to identify which speech enabled application is to receive the representation of the spoken utterance. The grammar may be a Backus Naur Form (BNF). For example, the context manager uses the grammar to determine if a representation of a spoken utterance from a user is acceptable to (can be processed by) a particular speech-enabled application.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

[0015] **FIG. 1**, is an illustration of a preferred embodiment in a computer system.

[0016] **FIG. 2** is a block diagram showing the components of a speech center system configured according to the invention.

[0017] **FIG. 3** is a block diagram showing the components of a conversation manager employed in the speech center system of **FIG. 2**.

[0018] **FIG. 4** is a block diagram showing the components of a context manager according to the present invention employed in the conversation manager of **FIG. 3**.

[0019] **FIG. 5** is a flow chart of a procedure for determining a speech enabled application to receive a representation of a spoken utterance according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0020] A description of preferred embodiments of the invention follows.

[0021] **FIG. 1** is an illustration of a preferred embodiment in a computer system **10**. Generally, the computer system **10** includes a digital processor **12** which hosts and executes a speech center system **20** and speech engine **22** in working memory. The input spoken utterance **14** is a voice command or other speech input from a user of the computer system **10** (e.g., into a microphone connected to the computer system **10**). The speech center system **20** includes a conversation manager **28** which determines a context **70** (see **FIG. 4**) for the spoken utterance **14**. The output **16** is a command or other input based on the spoken utterance **14** directed to the speech enabled external application **26** (see. **FIG. 2**) selected by the conversation manager **28** based on the context **70**.

[0022] In one embodiment, a computer program product **80**, including a computer readable medium (e.g., one or more CDROM's, diskettes, tapes, etc.), provides software instructions for the conversation manager **28** or any of its components (see **FIG. 3**). The computer program product **80** may be installed by any suitable software installation procedure, as is well known in the art. In another embodiment, the software instructions may also be downloaded over a wireless connection. A computer program propagated signal product **82** embodied on a propagated signal on a propagation medium (e.g., a radio wave, an infrared wave, a laser wave, a sound wave, or an electrical wave propagated over the Internet or other network) provides software instructions for the conversation manager **28** or any of its components (see **FIG. 3**). In alternate embodiments, the propagated signal is an analog carrier wave or digital signal carried on the propagated medium. For example, the propagated signal may be a digitized signal propagated over the Internet or other network. In one embodiment, the propagated signal is a signal that is transmitted over the propagation medium over a period of time, such as the instructions for a software application sent in packets over a network over a period of milliseconds, seconds, minutes, or longer. In another embodiment, the computer readable medium of the computer program product **80** is a propagation medium that the computer may receive and read, such as by receiving the propagation medium and identifying a propagated signal embodied in the propagation medium, as described above for the computer program propagated signal product **82**.

[0023] **FIG. 2** shows the components of a speech center system **20** configured according to the present invention. **FIG. 2** also illustrates external applications **26** that communicate with the speech center **20**, a speech engine **22**, and active accessability module **24**. The speech center **20**, speech engine **22**, active accessability module **24**, and external applications **26**, in one aspect of the invention, may be hosted on one computer system **10**. In another embodiment, one or more of the external applications **26** may be hosted and executed by a different digital processor **12** than the digital processor **12** that hosts the speech center **20**. Generally, the speech center **20** (and its individual components) may be implemented as hardware or software. The speech center **20** includes a conversation manager **28**, speech engine interface **30**, environmental interface **32**, external application interface **34**, task manager **36**, script engine **38**, GUI manager **40**, and application module interface **42**.

[0024] The speech engine interface module **30** encapsulates the details of communicating with the speech engine **22**, isolating the speech center **20** from the speech engine **22** specifics. In a preferred embodiment, the speech engine **22** is ViaVoice™ from IBM®.

[0025] The environmental interface module **32** enables the speech center **20** to keep in touch with what is happening on the user's computer. Changes in window focus, such as dialogs popping up and being dismissed, and applications **26** launching and exiting, must all be monitored in order to interpret the meaning of voice commands. A preferred embodiment uses Microsoft® Active Accessibility® (MSAA) from Microsoft Corporation, Redmond, Wash., to provide this information, but again flexibility to change this or incorporate additional information sources is desirable.

[0026] The script engine **38** enables the speech center **20** to control applications **26** by executing script against them. The script engine **38** provides the following capabilities: The script engine **38** supports cross-application scripting via OLE automation or through imported DLL'S. It is capable of executing arbitrary strings representing well formed script engine **38** statements. This enables the speech center **20** to easily compose calls to respective application operations and invoke them. The script engine **38** environment also allows the definition of new subroutines and functions that combine the primitive functionality provided by applications **26** into actions that more closely correspond to those that a user might talk about. While the speech center **20** is a script-enabled application, this does not mean that the applications **26** that it controls needs to be script-enabled. In the preferred embodiment, the script engine **38** is a LotusScript engine from IBM, and so long as an application **26** provides an OLE automation or DLL interface, it will be controllable by the speech center **20**.

[0027] The task manager **36** controls script execution through the script engine **38**. The task manager **36** provides the capability to proceed with multiple execution requests simultaneously, to queue up additional script commands for busy applications **26**, and to track the progress of the execution, informing the clients when execution of a script is in progress or has completed.

[0028] The external application interface **34** enables communications from external applications **26** to the speech center **20**. For the most part, the speech center **20** can operate without any modifications to the applications **26** it controls, but in some circumstances, it may be desirable to allow the applications **26** to communicate information directly back to the speech center **20**. The external application interface **34** is provided to support this kind of push-back of information. This interface **34** allows applications **26** to load custom grammars, or define task specific vocabulary. The external application interface **34** also allows applications **26** to explicitly tap into the speech center **20** for speech recognition and synthesis services.

[0029] The application model interface **42** provides models for applications **26** communicating with the speech center **20**. The power of the speech center **20** derives from the fact that it has significant knowledge about the applications **26** it controls. Without this knowledge, it would be limited to providing little more than simplistic menu based command and control services. Instead, the speech center **20** has a detailed model of what a user might say to a particular application **26**, and how to respond. That knowledge is provided individually on an application **26** by application **26** basis, and is incorporated into the speech center through the application model interface **42**.

[0030] The GUI manager **40** provides an interface to the speech center **20**. Even though the speech center **20** operates primarily through a speech interface, there will still be some cases of graphical user interface interaction with the user. Recognition feedback, dictation correction, and preference setting are all cases where traditional GUI interface elements may be desirable. The GUI manager **40** abstracts the details of exactly how these services are implemented, and provides an abstract interface to the rest of the speech center **20**.

[0031] The conversation manager **28** is the central component of the speech center **20** that integrates the information from all the other modules **30, 32, 34, 36, 38, 40, 42**. In a preferred embodiment, the conversation manager **28** is not a separate component, but is the internals of the speech center **20**. Isolated by the outer modules from the speech engine **22** and operating system dependencies, it is abstract and portable. When an utterance is recognized, the conversation manager **28** combines an analysis of the utterance with information on the state of the desktop and remembered context from previous recognitions to determine the intended target of the utterance. The utterance is then translated into the appropriate script engine **38** calls and dispatched to the target application **26**. The conversation manager **28** is also responsible for controlling when dictation functionality is active, based on the context determined by the environmental interface **32**.

[0032] **FIG. 3** shows the components of the conversation manager **28** according to the present invention. The conversation manager **28** includes a context manager **50**, message dispatcher **52**, and message queue **54**.

[0033] **FIG. 4** shows the components of the context manager **50** according to the present invention. The context manager **50** includes a context list **62**. The context list includes contexts **70** (e.g., **70-1, 70-1, 70-3**, etc.) for speech-enabled applications **26**, which represent the grammars for the applications **26**.

[0034] In the conversation manager **28** a central message queue **54** receives asynchronous messages from the external interfaces (**30** and **32**) as well as from internal modules. These messages are then processed and acted upon. The context manager **50** maintains the priority and state of the various grammars in the context list **62** in the system. Speech focus change messages **66** from the environmental interface **32** cause the context manager **50** to reshuffle module priorities and grammar states. Recognition messages **68** from the speech engine interface **30** are tested by the context manager **50** against the active grammars in the context list **62** in priority order. When a successful match is found, the corresponding translation **74** is dispatched to the script engine **38** for execution, and the priority of the matching grammar (i.e., selected context **72**) is raised.

[0035] The implementation of the speech center **20** makes use of tools, such as translation mechanisms, that have already been developed for dealing with voice. One example of such a voice translation mechanism is provided by copending, commonly assigned U.S. patent application Ser. No. 09/342,937 filed Jun. 29, 1999, entitled "Method and Apparatus for Translation of Common Language Utterance into Computer Application Program Commands," the entire teachings of which are incorporated herein by reference. The goal is to provide multiple-application support relatively quickly. Toward that end, a grammar is defined for each application **26**, along with the associated translations for a script engine **38**. The grammar is termed a "persistent grammar" for that application **26** if it is the same grammar for the application **26** regardless of whether the application **26** is in either the foreground or the background. An application may also have a "foreground grammar" for when the application **26** is in the foreground, and a different "background grammar" for when the application **26** is in the background. The speech center **20** tracks speech focus in the environmental interface **32** with the aid of MSAA support, mostly tracking window focus. One grammar from each

application **26** is active simultaneously, but since there will always be overlap between what the different application grammars will accept, the speech center **20** does not necessarily dispatch a command back to the application **26** whose grammar recognized it. Instead, when an utterance is recognized, it will be tested against each application's grammar to see if the grammar will accept it. The order of testing is based on a dynamic speech focus priority. The first application's grammar which will accept the utterance is then used for translation, and the command dispatched to the corresponding application **26**. The speech focus priority is established by maintaining an ordered list of applications (e.g., context list **62**). Whenever an application **26** gains window focus, it will move to the head of the list **62**. Likewise, whenever an application **26** which is not the top priority application **26** is chosen as the target for a speech command, the application **26** indicated by the selected context **72** will move to the head of the list **62**. In this way, the last application **26** that the user touched or talked to will get the first opportunity at interpreting the next user utterance, and the other applications **26** will be ordered in a most-recently-accessed way.

[**0036**] In particular, the flow chart in **FIG. 5** shows an example of a specific procedure for determining which speech enabled application receives a representation of a spoken utterance for a preferred embodiment of the invention. In step **100**, a message handler (e.g., message queue **54** and message dispatcher **52**) determines whether a message is a speech focus message **66** or recognition message (speech representation recognized by the speech engine **22**) **68**. In step **102**, if the message is a speech focus message **66**, the context manager **50** receives the speech focus message **66** and determines the context **70** for a speech enabled application **26** as indicated by the speech focus message **66**. For example, the context manager **50** determines that the speech focus message **66** indicates the most recently accessed speech-enabled application **26**. In step **104**, the context manager **50** determines whether the context **70** for that application **26** is at the top of the context list **62**. If the context **70** for the most recently accessed application **26** is not at the top of the context list **62**, then the context manager **50** proceeds to step **112** to place the context **70** at the top of the context list **62**.

[**0037**] In step **106**, if the message received in step **100** is determined to be a recognition message **68**, the context manager **50** receives the recognition message **68** and selects a context **70** for a speech enabled application **26** by checking the speech representation against contexts **70**, starting at top of context list **62** to determine the highest priority context **70** that can process the speech representation. For example, the context manager **50** uses the grammar associated with each context **70** to determine if the recognition message **68** is capable of being processed by that grammar In step **108**, the context manager **50** directs the speech representation to be translated according to the selected context **72** and directs the translation to the script engine **38**. In step **110**, the context manager **50** sends the translated utterance **74** to the speech enabled application **26** indicated by the selected context **72** to perform the action indicated by the translated utterance **74**. In step **112**, the context manager **50** places the selected context **72** at the top of the context list **62**.

[**0038**] In a preferred embodiment, each context **70** is implemented as a context object (in C++ or other object oriented programming language) for a specific speech-enabled application **26**. The context manager **50** maintains the context list **62** as a queue of context objects. Each context object stores a grammar for that speech-enabled application **26**. Furthermore, the context object may indicate one or more files that contain grammars for the same speech enabled application **26**. For example, the context object may indicate different files that each store a foreground grammar, a background grammar, and a dialog grammar.

[**0039**] The speech center **20** may also have a speech center context that stores native grammars that can be used in translating a recognition message **68**. After the context manager **50** determines the context **70** to which the utterance contained in the recognition message **68** should be directed, the translation of the utterance is first tried using the native grammars stored by the speech center **20**. Then a translation is tried using the one or more grammars indicated by the context **70** for that application **26**.

[**0040**] The following shows an example of selection between two grammars that serve as the contexts **70** for two applications **26**. The following is a sample grammar for an electronic mail application **26**:

```
<mail> = do I have any messages |
  open <message> |
  create a message |
  send <message>|
  print <message>.
<message> = the? <nth> message | it | this.
<nth> = first | second | third | fourth | fifth | . . .
```

[**0041**] This grammar allows phrases to be spoken by a user of the electronic mail application **26**, such as:

[**0042**] "Open the first message."

[**0043**] "Create a message."

[**0044**] "Send this."

[**0045**] "Print it."

[**0046**] The following is a sample grammar for a calendar application **26**:

```
<appointment> = do I have any appointments |
  open <appointment> |
  create an appointment |
  print <appointment>.
<appointment> = the? <nth> appointment | it | this.
```

[**0047**] This grammar allows phrases to be spoken by a user of the calendar application **26**, such as:

[**0048**] "Open the first appointment."

[**0049**] "Create an appointment."

[**0050**] "Print the fourth appointment."

[**0051**] "Print it."

[**0052**] If both of these grammars were loaded into the context manager **50**, (ignoring foreground/background issues in this example, assuming that the grammars are the

same for both foreground and background), the speech center system **20** is listening for any of the phrases accepted by either grammar. If the speech center **20** hears a phrase such as "print the first message" or "print the first appointment," the context manager **50** can readily figure out the intended target application **26** for the uttered sentence. Only one grammar will accept the phrase, which thus indicates the selected context **72** for that phrase and that associated application **26** is the one that should be targeted to receive the corresponding command.

[**0053**] If the sentence is "print it" however, both grammars are capable of accepting the utterance. The context manager **50** therefore has to make a choice by referring to the context list **62** of applications in order of recency of access. The context manager **50** tests the utterance against these grammars (indicated by the contexts **70** in the context list **62**) in priority order, and passes the commands on to the first application **26** that has a grammar that will accept the phrase.

[**0054**] The context list **62** of applications is reordered every time a recognition is directed to an application **26** other than the highest priority one, or whenever another application **26** gets windows focus (for example, because it was clicked on), as described above. The result is that the system **20** is biased to send the commands to the most recently accessed application **26**. For example:

[**0055**] 1. The user opens the first message in the electronic mail application **26**, which results in the context **70** for the electronic mail application **26** being placed first in the context list **62**. If the user says "print it," then the first message is printed.

[**0056**] 2. The user then opens the second appointment in the calendar application **26**, which results in the context **70** for the calendar application **26** being placed first in the context list **62**. If the user says "print this," then the second appointment is printed.

[**0057**] 3. The user next opens the third message in the electronic mail application **26**, which results in the context **70** for the electronic mail application **26** being placed first in the context list **62**.

[**0058**] 4. The user then uses the mouse to click on the fourth appointment displayed in a window for the calendar application **26**. As a result, the context **70** for the calendar application **26** supersedes the context **70** for the electronic mail application **26** in the context list **62**. If the user says "print it," then the fourth appointment is printed.

[**0059**] Thus, the context manager **50** resolves the ambiguous phrase (e.g., "print this" or "print it") by looking in the context list **62** to determine the top priority context **70**. Then, assuming that the grammar for the top priority context **70** can process (i.e., recognize) the phrase, the context manager **50** directs a translation of the phrase to the application **26** indicated by the top priority context **70**.

[**0060**] In a preferred embodiment, the grammar used for each speech-enabled application **26** may be a Backus Naur Form (BNF) grammar as shown above. In other embodiments, context **70** may include another type of grammar, lists of keywords or phrases, hashed lists of words, or other suitable approaches to allow identification of a phrase as acceptable to a speech-enabled application **26**.

[**0061**] While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the invention encompassed by the appended claims.

What is claimed is:

1. A method for determining a speech-enabled application to receive a spoken utterance in a multi-context speech enabled environment comprising the steps of:

evaluating a plurality of contexts for speech enabled applications based upon an access characteristic;

receiving a representation of a spoken utterance; and

directing the representation of the spoken utterance to a selected speech enabled application based upon the step of evaluating the contexts.

2. The method of claim 1, further comprising the step, prior to evaluating the contexts, of creating the contexts for the speech enabled applications in the speech enabled environment.

3. The method of claim 1 further comprising the step of identifying each context based on a persistent grammar, a foreground grammar, or a background grammar for each speech enabled application.

4. The method of claim 1 wherein the step of evaluating contexts comprises prioritizing the contexts based on the access characteristic.

5. The method of claim 1, wherein the access characteristic is based on recency of relevant access to the context.

6. The method of claim 1, wherein the step of directing the representation of the spoken utterance to the one of the contexts comprises using a grammar to identify the selected context.

7. The method of claim 6, wherein the grammar is a Backus Naur Form grammar.

8. An apparatus for determining a speech-enabled application to receive a spoken utterance in a multi-context speech enabled environment, comprising:

a context manager for evaluating a plurality of contexts for speech enabled applications based upon an access characteristic; and

a message handler for receiving a representation of a spoken utterance,

the context manager receiving the representations of the spoken utterance from the message handler and directing the representation of the spoken utterance to a selected speech enabled application based upon the evaluating of the contexts.

9. The apparatus of claim 8, wherein the context manager, prior to evaluating the contexts, creates the contexts for the speech enabled applications in the speech enabled environment.

10. The apparatus of claim 8, wherein the context manager identifies each context based on a persistent grammar, a foreground grammar, or a background grammar for each speech enabled application.

11. The apparatus of claim 8, wherein the context manager prioritizes the contexts based on the access characteristic.

12. The apparatus of claim 8, wherein the access characteristic is based on recency of relevant access to the context.

13. The apparatus of claim 8, wherein the context manager uses a grammar to identify the selected speech enabled application.

14. The apparatus of claim 13, wherein the grammar is a Backus Naur Form grammar.

15. A computer program product comprising:

a computer usable medium for determining a speech-enabled application to receive a spoken utterance in a multi-context speech enabled environment; and

a set of computer program instructions embodied on the computer useable medium, including instructions to:

evaluate contexts for speech enabled applications based upon an access characteristic;

receive a representation of a spoken utterance; and

direct the representation of the spoken utterance to a selected speech enabled application based upon evaluating the contexts.

16. The computer program product of claim 15, wherein the set of computer instructions comprises further instructions, prior to evaluating the contexts, to create the contexts for the speech enabled applications in the speech enabled environment.

17. The computer program product of claim 15, wherein the set of computer instructions comprises further instructions to identify each context based on a persistent grammar, a foreground grammar, or a background grammar for each speech enabled application.

18. The computer program product of claim 15, wherein the set of computer instructions comprises further instructions to prioritize the contexts based on the access characteristic.

19. The computer program product of claim 15, wherein the access characteristic is based on recency of relevant access to the context.

20. The computer program product of claim 15, wherein the set of computer instructions comprises further instructions to use a grammar to identify the selected context.

21. The computer program product of claim **20**, wherein the grammar is a Backus Naur Form grammar.

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