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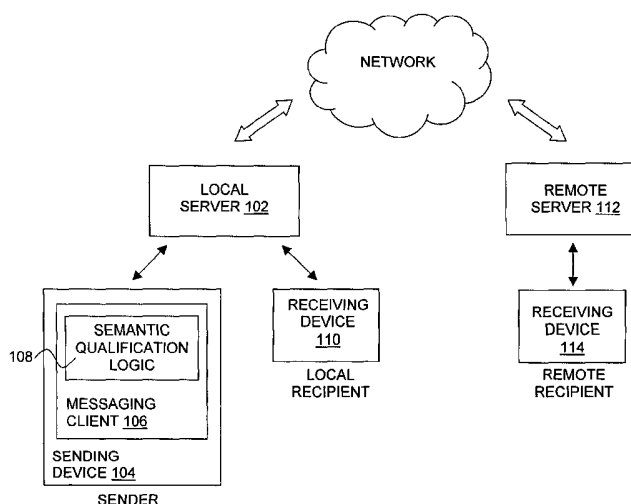
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(54) Title: SEMANTIC QUALIFICATION AND CONTEXTUALIZATION OF ELECTRONIC MESSAGES



(57) Abstract: A network environment including a messaging client endowed with semantic qualification logic in accordance with one embodiment of the invention. A sending device (104) is equipped with messaging client (106) to send and receive electronic messages to/from local and remote recipients. In one embodiment, local server (102) and remote server (112) may each represent a mail server. Accordingly, messaging client (106) may send an email message to local recipient via local server (102) and receiving device (110), and messaging client (106) may send an email message to a remote recipient via local server (102), remote server (112) and receiving device (114). In one embodiment, local server (102) may temporarily store email messages and forward the messages to designated recipients on behalf of sending device (104). In other embodiments, local server (102) may represent an HTTP server to route incoming and outgoing communication requests to and from sending device (104).

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SEMANTIC QUALIFICATION AND CONTEXTUALIZATION OF ELECTRONIC MESSAGES

RELATED APPLICATIONS

5 This non-provisional patent application claims priority to U.S. provisional patent application no. 60/401,942, entitled "Decision Support Tool For Reconciling Domain Specific Complex Data And Summary Delivery", filed on August 7, 2002 and having common inventorship with the present application, which is hereby fully incorporated by reference.

BACKGROUND OF THE INVENTION

10 With advances in integrated circuit, microprocessor, networking and communication technologies, an increasing number of devices, in particular, digital computing devices, are being interconnected. This increased interconnectivity of computing devices has laid the groundwork for a communication infrastructure particularly well suited for electronic
15 communications between such computing devices. More specifically, the increased interconnectivity of computing devices coupled with the ease of use and immediacy afforded by electronic messaging has led to the widespread adoption of electronic messaging applications such as email.

In the past, electronic messaging was limited to the exchange of text-
20 based email messages between a relatively small populace. Over time, however, electronic messaging applications and associated communications protocols have grown increasingly sophisticated enabling complex message formatting as well as the ability to distribute binary data with the messages to large numbers of recipients. Despite such advancements, however, email
25 continues to be used merely as a means of communication between two or more end users.

BRIEF DESCRIPTION OF DRAWINGS

The present invention will be described by way of exemplary
embodiments, but not limitations, illustrated in the accompanying drawings in
30 which like references denote similar elements, and in which:

Figure 1 illustrates an example network environment including an email client endowed with semantic qualification logic in accordance with one embodiment of the invention;

Figure 2 is an operational flow diagram illustrating a process flow for manual generation of semantic qualifiers, in accordance with one embodiment of the invention;

Figure 3 is a graphical representation of an email message composition interface suitable for use in practicing the present invention;

Figures 4a-4c depict various embodiments in which portions of an electronic mail message may be identified for semantic association and contextualization based upon an episode of care;

Figure 5 illustrates further facilities for identifying one or more semantic qualifiers to be associated with an identified portion of an electronic mail message, in accordance with one embodiment of the invention;

Figures 6a-6b illustrate sample code generated by semantic qualification logic 108 in accordance with various embodiments of the invention, to represent various semantic associations involved with the episode of care described in Figures 4a-4c and 5;

Figure 7 is an operational flow diagram illustrating context-based contextualization of an email message, in accordance with one embodiment of the invention;

Figure 8 is an operational flow diagram illustrating an automatic semantic association and contextualization process, in accordance with one embodiment of the present invention;

Figure 9 illustrates an example network environment including local mail server 902 endowed with semantic qualification logic 908 to automatically contextualize email messages, in accordance with one embodiment of the invention;

Figure 10 illustrates one embodiment of a hardware system intended to represent a broad category of devices suitable for practicing the present invention; and

Figure 11 illustrates one embodiment of a machine-readable medium.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

In the following detailed description, numerous specific details are set forth in order to provide a thorough understanding of the embodiments of the present invention. However, those skilled in the art will understand that the present
5 invention may be practiced without these specific details, that the present invention is not limited to the depicted embodiments, and that the present invention may be practiced in a variety of alternative embodiments. In other instances, well known methods, procedures, components, and circuits have not been described in detail.

10 Parts of the description will be presented using terminology commonly employed by those skilled in the art to convey the substance of their work to others skilled in the art. Also, parts of the description will be presented in terms of operations performed through the execution of programming instructions. As well understood by those skilled in the art, these operations often take the form of
15 electrical, magnetic, or optical signals capable of being stored, transferred, combined, and otherwise manipulated through, for instance, electrical components.

Various operations will be described as multiple discrete steps performed in turn in a manner that is helpful for understanding the embodiments of the present
20 invention. However, the order of description should not be construed as to imply that these operations are necessarily performed in the order they are presented, nor even order dependent. Lastly, repeated usage of the phrase "in one embodiment" does not necessarily refer to the same embodiment, although it may.

25 The description repeatedly uses the phrase "in one embodiment", which ordinarily does not refer to the same embodiment, although it may. Furthermore, the terms "comprising", "including", "having", and the like, as used in the present application, are synonymous.

In various embodiments of the invention, a method and apparatus for
30 contextualizing electronic messages is provided. The terms "contextualizing" and "contextualization" as used herein are intended to broadly refer to the act of conveying meaning, whether the meaning be literal, figurative, arbitrary or

connotative. Furthermore, in the following description including the claims, unless further particularized or otherwise noted, the terms "message" and "electronic message" are each intended to refer to a broad class of electronic message types including but not limited to electronic mail messages, instant messages, attachments and/or data files (in whole or in part), whether or not they comprise a text, binary, or otherwise encoded form, and whether or not they are transmitted via the Simple Mail Transport Protocol (SMTP), Instant Messaging and Presence Protocol (IMPP), HTTP, file transfer protocol (FTP), trivial file transfer protocol (TFTP), or otherwise.

10 In one embodiment, electronic messages are enriched with semantic qualifiers to provide contextualization of the messages as well as to facilitate semantic based searching, and post-processing of the electronic messages. In one embodiment of the invention, a given electronic message and/or its constituent content elements may be contextualized through the provision of one or more semantic qualifiers to convey a single meaning or compound meanings. Similarly, a given semantic qualifier may be repeated within a single message or repeated throughout multiple messages to facilitate grouping or categorization of content elements. The semantic qualifiers may be automatically associated (i.e. without further user input) with one or more content elements based upon e.g. one or more identified contexts, or the semantic qualifiers may be manually associated with one or more content elements through e.g. user input. A content element may represent one or more text elements such as characters, words, phrases, paragraphs, or other portions of the electronic message, and may correspond to one or more languages and/or character sets.

25 Figure 1 illustrates an example network environment including a messaging client endowed with semantic qualification logic in accordance with one embodiment of the invention. In the illustrated embodiment, sending device 104 is equipped with messaging client 106 to send and receive electronic messages to/from local and remote recipients. In one embodiment, local server 102 and remote server 112 may each represent a mail server. Accordingly, messaging client 106 may send an email message to a local recipient via local server 102 and receiving device 110, and messaging client 106 may send an email message to a

remote recipient via local server 102, remote server 112 and receiving device 114. In one embodiment, local server 102 may temporarily store email messages and forward the messages to designated recipients on behalf of sending device 104. In other embodiments, local server 102 may represent an HTTP server to route
5 incoming and outgoing communication requests to and from sending device 104.

In one embodiment, messaging client 106 is equipped with semantic qualification logic 108 to facilitate contextualization of electronic messages in accordance with teachings of the present invention. In one embodiment, contextualization is achieved through the addition of one or more semantic
10 qualifiers, where a qualifier may take a variety of forms such as, but not limited to one or more characters, symbols, words or tags. The semantic qualifiers may be associated with the elements they qualify in a number of manners. For example the semantic qualifiers may be included within any part of an electronic message, such as in the header or body sections of an email message, or the semantic
15 qualifiers may be external to the electronic message they act to contextualize. In one embodiment, a subset of content elements from the electronic message may be stored within a secondary message in association with one or more semantic qualifiers. The associations between the content element(s) and semantic qualifier(s) may be stored in the form of a lookup table, an indexed list, as well as
20 other formalized or ad hoc data relationships.

In one embodiment the semantic qualifiers represent metadata tag pairs that are embedded within electronic messages. In another embodiment the semantic qualifiers represent obfuscated tokens embedded within electronic messages. The semantic qualifiers may be associated with the messages and/or
25 elements they qualify based upon their positions relative to the messages/elements that they qualify. For example, semantic qualifiers may precede the element(s) that they are intended to qualify (e.g. in the form of a prefix), may follow the element(s) that they are intended to qualify (e.g. in the form of a suffix), or may both precede and follow the element(s) they are intended to
30 qualify in the event more than one qualifier is utilized.

Manual Qualifier Generation

In accordance with one embodiment of the invention, semantic qualification logic 108 includes facilities for a user to perform manual semantic highlighting on electronic messages such as, but not limited to email messages. In one
5 embodiment, a user manually identifies at least a portion of an electronic message to be semantically highlighted. The user may do so by manually marking portions of the electronic message (or the electronic message in its entirety) via a graphical user input device such as a mouse, trackball, stylus, pen or equivalent, or through text or macro-based input via one or more keystrokes of a keyboard. Furthermore,
10 the user may perform such marking on a pre-existing electronic message or during the composition of a new electronic message.

In addition to a user identifying at least a portion of an electronic message to be semantically highlighted, the user may also identify one or more semantic qualifiers to be associated with the identified portion(s) of the electronic message.
15 In one embodiment, the user may identify one or more semantic qualifiers from a selection of semantic qualifiers presented to the user. In another embodiment, the user may directly specify the semantic qualifiers to be used. For example, the user may be presented with facilities such as a graphical dialog box through which the user may provide a text-based token to be utilized as the semantic qualifier.

20 In one embodiment, once semantic qualifier(s) have been identified, they are associated with the appropriate identified portion(s) of the electronic message. In one embodiment of the invention, the semantic qualifiers are represented as metadata tag pairs that are embedded within the body of the email message and positioned so as to surround the associated portion of the email message. In one
25 embodiment, an extensible markup language (XML) based data structure representing the contextualized email message including semantic qualification associations is generated.

Figure 2 is an operational flow diagram illustrating a process flow for manual generation of semantic qualifiers, in accordance with one embodiment of
30 the invention. In the illustrated embodiment, the process begins at block 202 with semantic qualification logic 108 receiving a first indication from a user identifying a portion or portions of an electronic message to be qualified. At block 204, a

second indication is received from the user identifying one or more semantic qualifiers to be associated with the identified portion(s) of the electronic message. Lastly, at block 206, semantic qualification logic 108 associates the one or more semantic qualifiers identified by the user with the identified portion(s) of the electronic message to facilitate the contextualization of either the identified portion(s) of the electronic message or the electronic message in its entirety.

Figure 3 is a graphical representation of an electronic message composition interface suitable for practicing the present invention in accordance with one embodiment. More specifically, Figure 3 illustrates an email message composition interface (email interface 300) for generating electronic mail messages in accordance with one embodiment of the invention. In one embodiment, email interface 300 may be generated by messaging client 106 in response to a user electing to send an email message to one or more recipients. As shown, email interface 300 includes a displayed email message containing a message body section 304 and a message header section 302. Message body section 304 contains email message content elements to be contextualized, while message header section 302 is used to provide message transport information for routing the message. Although message header section 302 may contain a subject field for a user to provide information about the message, the subject information is used to describe to other users what the message relates to as a whole. In contrast, the semantic qualifiers of the present invention may facilitate the generation of one or more semantic associations with arbitrarily identifiable portions of the message content.

In one embodiment of the invention, portions of messages containing semantic associations may be aggregated based upon one or more rules or aggregation policies. In one embodiment, portions of messages containing semantic associations are identified and aggregated as the messages are transmitted by the sender via e.g. selection of the send button 310. Moreover, in one embodiment, the aggregated content can be searched to identify one or more previously generated semantic associations. In one embodiment, the search results may be aggregated to form one or more secondary electronic messages whether it is an email message, a text document, and so forth.

Figures 4a-4c illustrate a semantic association and contextualization process as it may apply to an electronic mail message related to an episode of care, in accordance with various embodiments of the invention. Figure 4a illustrates one method by which a portion of the electronic mail message of Figure 3 may be identified for semantic highlighting, in accordance with one embodiment. As shown, a user may utilize an input device such as a mouse to graphically select one or more portions of message body section 304 of an electronic mail message. For example, a user may position a mouse pointer on a display screen at location 408, click a mouse button, drag the mouse pointer to position 410, and release the mouse button to effectively identify the text element(s) "Bob Jones". In other embodiments, the user may utilize other indication techniques such as using one or more keystrokes or keystroke combinations, voice-based input techniques, and so forth. In response to the user identifying the one or more text elements, semantic qualification logic 108 may display one or more graphical input facilities for the user to manually provide/indicate one or more semantic qualifiers to be associated with the identified portion of the electronic mail message as shown in Figure 4b.

Figure 4b illustrates one embodiment of an interface for identifying one or more semantic qualifiers to be associated with an identified portion of an electronic mail message. In the illustrated example, the semantic qualifier "Patient" may be submitted to semantic qualification logic 108 through e.g. a hypertext transmission protocol (HTTP) POST operation, where it is then associated with the text element "Bob Jones" identified in Figure 4a.

Figure 4c illustrates an alternative embodiment of an interface for identifying one or more semantic qualifiers to be associated with an identified portion of an electronic mail message. As shown in Figure 4c, a user can use an alternative input mechanism such as a 'right click' of a mouse button to cause a context-sensitive list of options to be displayed to the user. For example, semantic qualification logic 108 may cause the display of context menu 411 in response to a user selecting the text element "Bob Jones" and then 'right clicking' on the highlighted selection (e.g. at position 412). In one embodiment, menu 411 includes a menu option (e.g. "Qualify") that when selected, indicates to semantic

qualification logic 108 that the user wishes to generate a semantic association between the highlighted text element and one or more semantic qualifiers. In response, semantic qualification logic 108 may display a list of semantic qualifiers (e.g. such as qualifier list 415) to facilitate user identification of the semantic
5 qualifiers to be associated with the highlighted text element. In the illustrated example, the semantic qualifier "Patient Name" is associated with the name "Bob Jones" based upon received user input. In one embodiment, the "Patient Name" qualifier is generated in the form of a metadata tag that is embedded within body section 304 in association with the content element "Bob Jones".

10 Figure 5 illustrates further facilities for identifying one or more semantic qualifiers to be associated with an identified portion of an electronic mail message, in accordance with one embodiment of the invention. In Figure 5, for example a user is in the process of choosing to contextualize the text element "nausea" as being a first symptom identified during the episode of care, and to contextualize
15 the text element "vomiting" as being a second symptom identified during the same episode of care.

Figures 6a-6b illustrate example code that may be generated by semantic qualification logic 108, in accordance with various embodiments of the invention, to represent various semantic associations corresponding to the episode of care described in Figures 4 and 5. In the illustrated example of Figure 6a, an email
20 message representation 600a includes header section 602, containing various demographic information corresponding to the email message, and body section 604 containing the message content. The illustrated email message further contains semantic qualifiers in the form of name/value pairs that are associated with one or more text elements. For example, in Figure 6a, the term "nausea" is
25 surrounded by a pair of tags named "symptom1" (610a,610b) and the term "vomiting" is surrounded by a pair of tags named "symptom2" (612a,612b). This is intended to indicate that "Bob Jones" has experienced symptoms of nausea and vomiting. Figure 6b illustrates an alternative method for generating semantic
30 association with email message content. In particular, in the email representation 600b of Figure 6b the symptoms are associated with the text through the use of attributes. For example, in Figure 6b, "nausea" 615 is identified as being a first

attribute associated with the patient's chief complaint of "fever" 616, and "vomiting" 618 is identified as being a second attribute associated with the patient's chief complaint of fever 616.

Although in the above-described examples, the semantic qualifiers were formed using text elements that also tended to appear within the document, this need not be the case. For example, assume a user was in the process of generating a very important grant proposal for submission via email. The user may wish to indicate via one or more semantic associations that that the grant proposal was in fact a proposal, and that the grant proposal was very important as a potential revenue source. In such a case, the user may indicate (e.g. via name/value pairs) that the email message was an important proposal, notwithstanding that the terms "important" or "proposal" may not appear anywhere in the electronic message. The "importance" of the proposal is a meaning that is attached to the document (or portions of the document) by the user.

15 Automatic and Semi-Automatic Qualifier Generation

In the example embodiments described above, portions of an electronic mail message to contain semantic associations, as well as the semantic qualifiers to be used were user-identified. In one embodiment of the invention, semantic qualifiers are automatically associated with portions of an electronic mail message based at least in part upon an identified context and without further user input.

A context is intended to define a scope or range from which one or more semantic qualifiers may be identified. A context can be indicated using one or more of a wide variety of data representation techniques including by way of a data dictionary, a schema, and so forth. In one embodiment, the context is manually identified by a user e.g. as part of the email message composition process. In an alternative embodiment, the context is automatically identified by e.g. semantic qualification logic 108 based upon one or more characteristics or traits of the electronic mail message, such as the content of the message body, the subject line of the message, the identity of the sender, the sender's domain, the identity of one or more of the designated recipients, the domain of one or more of the recipients, and so forth. In another embodiment of the invention, the context may be represented by one or more standardized data models such as

HL7, the clinical architecture standard (CDA) and so forth. For example, a context corresponding to a "claims processing" email module might provide a different selection of selectable or otherwise identifiable semantic qualifiers than would a context corresponding to a "lab processing" email module.

5 Figure 7 is an operational flow diagram illustrating a process flow for semi-automatic contextualization of an email message, in accordance with one embodiment of the invention. In the illustrated embodiment, the process begins with semantic qualifying logic 108 receiving an indication from a user identifying one or more text elements within an email message, block 702. The user may
10 make such an indication in a number of manners such as those described above. Next, the system makes a determination as to whether the identified element(s) corresponds to an identified context, block 704. In one embodiment, the system may employ one or more lookup or symbol tables to determine whether the identified element(s) are known to exist within the applicable context. If so,
15 semantic qualification logic 108 automatically associates the identified text element(s) with one or more semantic qualifiers defined by, or corresponding to the identified context, block 706. However, if a determination is made that the identified element(s) does not correspond to the identified context, then the system may prompt the user to identify one or more semantic qualifiers, block 708.
20 Thereafter, the one or more user-provided semantic qualifiers are associated with the one or more identified text elements to facilitate contextualization of the identified text elements or of the email message itself.

 In an alternative embodiment of the invention, upon determining that the identified element(s) corresponds to the identified context, semantic qualification
25 logic 108 may display one or more attributes associated with the one or more identified elements as determined e.g. by the context. For example, in an email message containing the text "chief complaint", semantic qualification logic 108 might automatically identify content element "chief complaint" based upon a medical-related context, and in response may display a list of possible symptoms
30 to the user for further classification/categorization. Thus, in accordance with one embodiment of the invention, semantic qualification logic 108 automatically identifies content elements based upon a given context, and in turn displays one

or more attributes associated with the identified content elements to the user. Thereafter, semantic qualification logic 108 can automatically generate/provide one or more semantic qualifiers to contextualize the identified content elements based upon user identification of one or more of the displayed attributes.

5 In yet another embodiment of the invention, semantic qualification logic 108 may operate to automatically identify content elements of a given email message and to automatically contextualize the message or portions of the message based upon semantic associations generated based upon the identified content elements. Figure 8 is an operational flow diagram illustrating an automatic
10 semantic association and contextualization process, in accordance with one embodiment of the present invention. In block 802, a context to be applied in contextualization of one or more email message is identified. As described above, the context may be manually identified by a user, or automatically identified by semantic qualification logic 108, for example. At block 804, semantic qualification
15 logic 108 proceeds to identify one or more elements contained within a given electronic mail message based at least in part upon the scope of the context. In one embodiment, semantic qualification logic 108 uses standard pattern matching techniques to identify whether the identified one or more elements correspond to one or more elements defined by the context. Thereafter, if the identified one or
20 more elements are determined to correspond to one or more elements defined by the context, the identified one or more elements are associated with one or more semantic qualifiers, block 806. In one embodiment, the semantic qualifiers to be associated with the identified one or more elements are defined by the context.

Figure 9 illustrates an example network environment including local mail
25 server 902 endowed with semantic qualification logic 908 to automatically contextualize email messages, in accordance with one embodiment of the invention. In one embodiment, semantic qualification logic 908 automatically identifies content elements contained within email messages processed by local mail server 902 (e.g. both incoming and outgoing) based upon an identified
30 context. Furthermore, semantic qualification logic 908 automatically associates one or more semantic qualifiers with the automatically identified content elements as determined by the identified context.

Example Client System

Figure 10 illustrates one embodiment of a hardware system intended to represent a broad category of devices (whether client or server based) such as personal computers, workstations, set-top boxes, wireless mobile phones, palm
5 sized personal digital assistants, embedded systems, as well as other general purpose or dedicated messaging devices. In the illustrated embodiment, the hardware system includes processor 1010 coupled to high speed bus 1005, which is coupled to input/output (I/O) bus 1015 through bus bridge 1030. Temporary memory 1020 is coupled to bus 1005, whereas permanent memory
10 1040 is coupled to bus 1015. I/O device(s) 1050 is also coupled to bus 1015 and may include a display device, one or more user input devices such as a keyboard and mouse, one or more external network interfaces, etc.

Certain embodiments may include additional components, may require less than all of the above components, or may combine one or more of the above
15 components together. For instance, temporary memory 1020 may be on-chip with processor 1010. Alternately, permanent memory 1040 may be eliminated and temporary memory 1020 may be replaced with an electrically erasable programmable read only memory (EEPROM), wherein software routines are executed in place from the EEPROM. Some implementations may employ a
20 single bus, to which all of the components are coupled, or one or more additional buses and bus bridges to which various additional components can be coupled. Those skilled in the art will be familiar with a variety of alternate internal networks including, for instance, an internal network based on a high speed system bus with a memory controller hub and an I/O controller hub. Additional components
25 may include additional processors, a CD ROM drive, additional memories, and other peripheral components known in the art.

In one embodiment, the present invention, as described above, is implemented using one or more hardware systems such as the hardware system of Figure 10. Where more than one computer is used, the systems can be
30 coupled to communicate over an external network, such as a local area network (LAN), an internet protocol (IP) network, etc. In one embodiment, the present invention is implemented as software routines executed by one or more

execution units within the computer(s). For a given computer, the software routines can be stored on a storage device, such as permanent memory 1040.

Alternately, as shown in Figure 11, the software routines can be machine executable instructions 1110 stored using any machine readable storage medium 1120, such as a diskette, CD-ROM, magnetic tape, digital video or versatile disk (DVD), laser disk, ROM, Flash memory, etc. The series of instructions need not be stored locally, and could be received from a remote storage device, such as a server on a network, a CD ROM device, a floppy disk, etc., through; for instance, I/O device(s) 1050 of Figure 10.

From whatever source, the instructions may be copied from the storage device into temporary memory 1020 and then accessed and executed by processor 1010. In one implementation, these software routines are written in the C programming language. It is to be appreciated, however, that these routines may be implemented in any of a wide variety of programming languages.

In alternate embodiments, the present invention is implemented in discrete hardware or firmware. For example, one or more application specific integrated circuits (ASICs) could be programmed with one or more of the above-described functions of the embodiments of the present invention. In another example, one or more functions of the embodiments of the present invention could be implemented in one or more ASICs on additional circuit boards and the circuit boards could be inserted into the computer(s) described above. In another example, programmable gate arrays could be used to implement one or more functions of embodiments of the present invention. In yet another example, a combination of hardware and software could be used to implement one or more functions of the embodiments of the present invention.

Epilog

While the present invention has been described in terms of the above-illustrated embodiments, those skilled in the art will recognize that the invention is not limited to the embodiments described. The present invention can be practiced with modification and alteration within the spirit and scope of the appended claims.

Thus, the description is to be regarded as illustrative instead of restrictive on the present invention.

CLAIMS

What is claimed is:

1. A computer implemented method comprising:
determining a context to be applied to an electronic mail message;
5 identifying one or more elements within the electronic mail message
based at least in part upon the context; and
associating one or more semantic qualifiers with the one or more elements
to provide contextualization of at least a portion of the electronic mail message.
- 10 2. The method of claim 1, wherein the semantic qualifiers comprise one or
more metadata tags.
3. The method of claim 1, wherein identifying one or more elements
comprises receiving an indication from a user identifying the one or more
15 elements.
4. The method of claim 1, wherein the one or more elements are
automatically identified based at least in part upon the context.
- 20 5. The method of claim 4, wherein the context is determined based upon one
or more standardized data models.
6. The method of claim 4, wherein the context is determined based upon an
XML Schema.
- 25 7. The method of claim 1, further comprising aggregating at least a subset of
the one or more elements based upon one or more semantic associations.
8. The method of claim 7, wherein the one or more elements are aggregated
30 to form one or more secondary electronic documents.

9. The method of claim 7, wherein the one or more elements are aggregated upon transmission of the electronic mail message.
10. The method of claim 1, wherein the one or more elements comprise one
5 or more words.
11. The method of claim 1, wherein the semantic qualifiers comprise one or more metadata tags.
- 10 12. The method of claim 11, wherein the one or more metadata tags are formatted in accordance with one or more markup language syntaxes.
13. A method comprising:
receiving an indication from a user identifying one or more text elements
15 within an electronic mail message;
determining whether or not the identified one or more text elements corresponds to an identified context; and
automatically associating one or more semantic qualifiers with the one or more identified text elements to provide contextualization of at least one of the
20 electronic mail message and the one or more text elements upon determining that the identified one or more text elements correspond to the identified context.
14. The method of claim 13, wherein the one or more text elements comprise one or more words.
25
15. The method of claim 13, wherein the semantic qualifiers comprise one or more metadata tags.
16. The method of claim 15, wherein associating one or more semantic
30 qualifiers with the one or more identified text elements comprises embedding the one or more metadata tags within the electronic mail message.

17. The method of claim 13, wherein the context is determined based upon one or more standardized data models.
18. The method of claim 13, further comprising:
5 identifying a set of attributes associated with the identified one or more text elements; and
displaying the set of attributes to the user.
19. The method of claim 18, further comprising:
10 receiving a second indication from the user identifying an attribute from the set of attributes displayed to the user; and
automatically associating a second one or more semantic qualifiers with the identified one or more text elements to facilitate contextualizing of at least a subset of the one or more elements within the electronic mail message.
15
20. A method comprising:
receiving first user input identifying a portion of an electronic mail message;
receiving second user input assigning one or more semantic qualifiers to
20 the identified portion; and
automatically associating the one or more semantic qualifiers with the identified portion of the electronic mail message to facilitate contextualization of the identified portion.
21. The method of claim 20, further comprising:
25 determining whether or not the one or more semantic qualifiers are present within a context; and
displaying to the user, one or more selectable attributes corresponding to the one or more semantic qualifiers to facilitate further contextualization of the
30 identified portion, upon determining that the one or more semantic qualifiers are present within the context.

22. The method of claim 20, wherein the electronic mail message comprises a header section and a body section, and wherein the identified portion of the electronic mail message comprises a selected one or more words from the body section.

5

23. The method of claim 22, wherein the one or more semantic qualifiers are included within the body section of the electronic mail message.

24. The method of claim 22, wherein the one or more semantic qualifiers are included within the header section of the electronic mail message.

10

25. A computing device comprising:

a storage medium having stored therein a plurality of programming instructions designed to perform the method of

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determining a context to be applied to an electronic mail message,

identifying one or more elements within the electronic mail message

based at least in part upon the context,

associating one or more semantic qualifiers with the one or more

elements to provide contextualization of at least a portion of the electronic

20

mail message; and

at least one processor communicatively coupled to the storage medium to

execute the programming instructions.

26. The computing device of claim 25, wherein the semantic qualifiers comprise one or more metadata tags.

25

27. The computing device of claim 25, wherein identifying one or more elements comprises receiving an indication from a user identifying the one or more elements.

30

28. The computing device of claim 25, wherein the one or more elements are automatically identified based at least in part upon the context.

29. The computing device of claim 28, wherein the context is determined based upon one or more standardized data models.
- 5 30. The computing device of claim 28, wherein the context is determined based upon an XML Schema.
31. The computing device of claim 25, wherein the plurality of programming instructions are further designed to aggregate at least a subset of the one or
10 more elements based upon one or more semantic associations.
32. The computing device of claim 31, wherein the one or more elements are aggregated to form one or more secondary electronic documents.
- 15 33. The computing device of claim 31, wherein the one or more elements are aggregated upon transmission of the electronic mail message.
34. The computing device of claim 25, wherein the one or more elements comprise one or more words.
20
35. The computing device of claim 25, wherein the semantic qualifiers comprise one or more metadata tags.
36. The computing device of claim 35, wherein the one or more metadata tags
25 are formatted in accordance with one or more markup language syntaxes.
37. A computing device comprising:
a storage medium having stored therein a plurality of programming instructions designed to perform the method of
30 receiving an indication from a user identifying one or more text elements within an electronic mail message,

determining whether or not the identified one or more text elements corresponds to an identified context,

5 automatically associating one or more semantic qualifiers with the one or more identified text elements to provide contextualization of at least one of the electronic mail message and the one or more text elements upon determining that the identified one or more text elements correspond to the identified context; and

at least one processor communicatively coupled to the storage medium to execute the programming instructions.

10

38. The computing device of claim 37, wherein the one or more text elements comprise one or more words.

15 39. The computing device of claim 37, wherein the semantic qualifiers comprise one or more metadata tags.

40. The computing device of claim 39, wherein associating one or more semantic qualifiers with the one or more identified text elements comprises embedding the one or more metadata tags within the electronic mail message.

20

41. The computing device of claim 37, wherein the context is determined based upon one or more standardized data models.

25 42. The computing device of claim 37, wherein the plurality of programming instructions are further designed to

identify a set of attributes associated with the identified one or more text elements; and

display the set of attributes to the user.

30 43. The computing device of claim 42, wherein the plurality of programming instructions are further designed to

receive a second indication from the user identifying an attribute from the set of attributes displayed to the user; and

automatically associate a second one or more semantic qualifiers with the identified one or more text elements to facilitate contextualizing of at least a
5 subset of the one or more elements within the electronic mail message.

44. A computing device comprising:
a storage medium having stored therein a plurality of programming instructions designed to perform the method of
10 receiving first user input identifying a portion of an electronic mail message,
receiving second user input assigning one or more semantic qualifiers to the identified portion, and
automatically associating the one or more semantic qualifiers with
15 the identified portion of the electronic mail message to facilitate contextualization of the identified portion; and
at least one processor communicatively coupled to the storage medium to execute the programming instructions.

20 45. The computing device of claim 44, wherein the plurality of programming instructions are further designed to
determine whether or not the one or more semantic qualifiers are present within a context; and
display to the user, one or more selectable attributes corresponding to the
25 one or more semantic qualifiers to facilitate further contextualization of the identified portion, upon determining that the one or more semantic qualifiers are present within the context.

46. The computing device of claim 44, wherein the electronic mail message comprises a header section and a body section, and wherein the identified
30 portion of the electronic mail message comprises a selected one or more words from the body section.

47. The computing device of claim 46, wherein the one or more semantic qualifiers are included within the body section of the electronic mail message.
- 5 48. The computing device of claim 46, wherein the one or more semantic qualifiers are included within the header section of the electronic mail message.

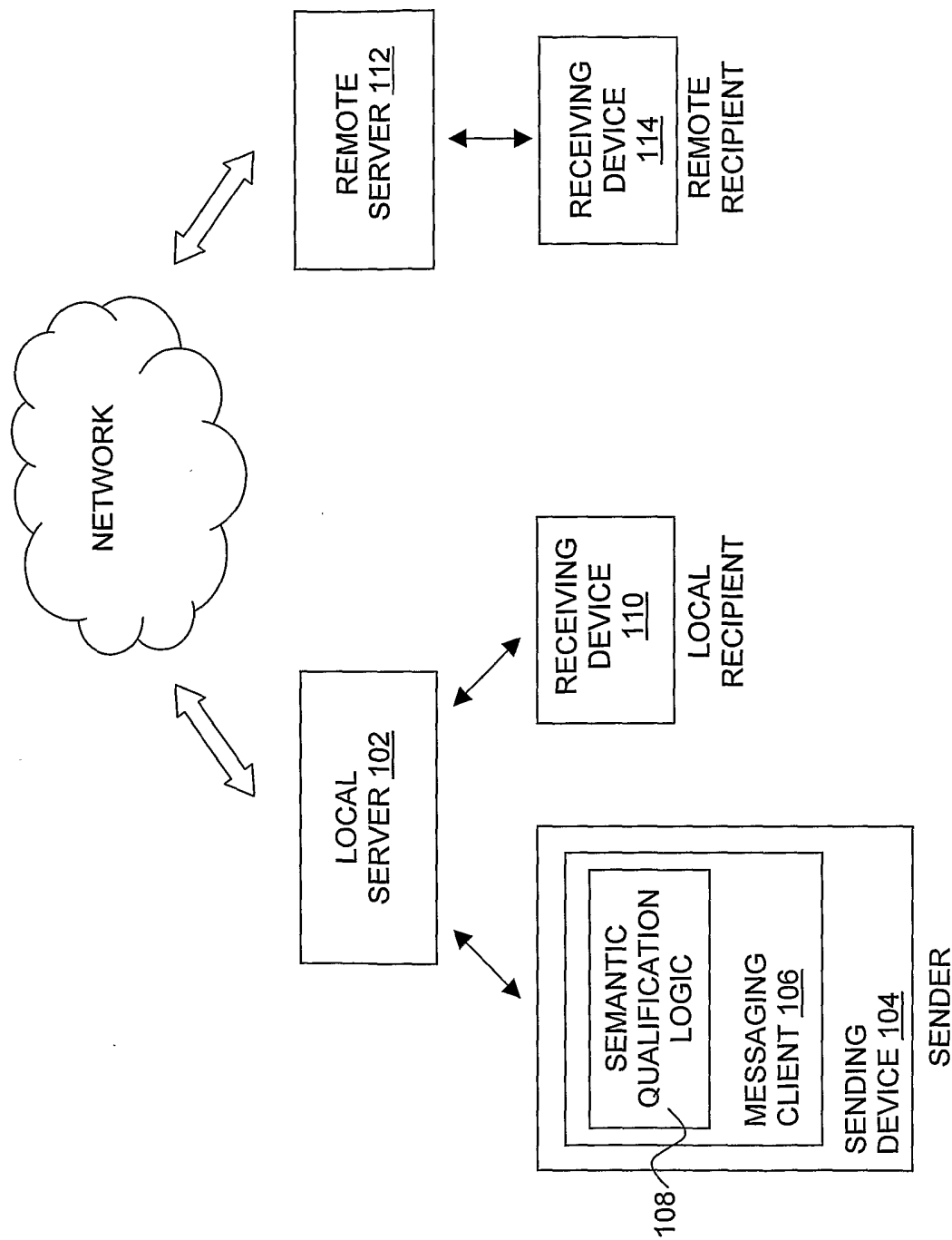


Figure 1

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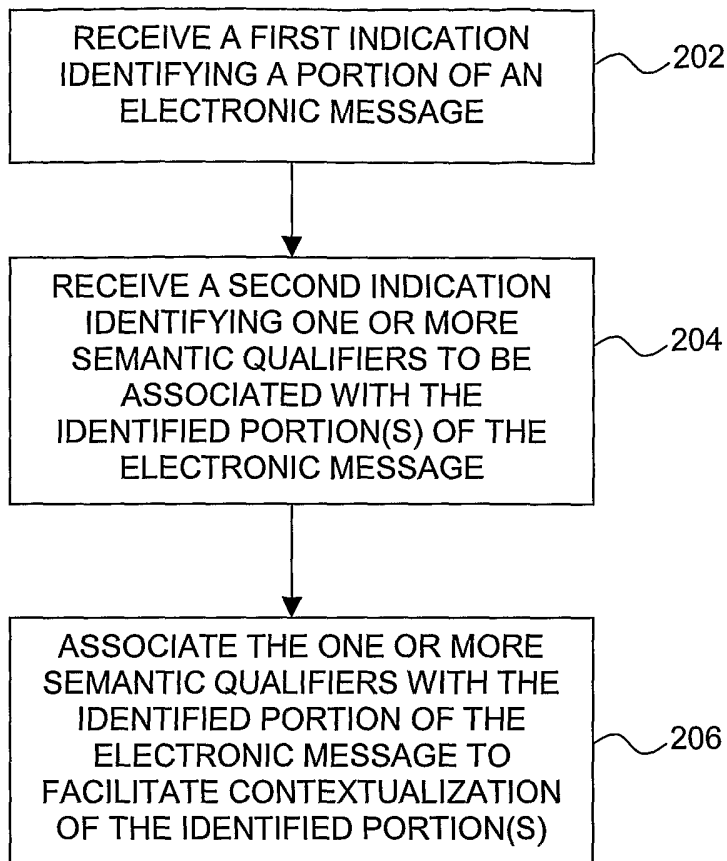


Figure 2

3 / 1 1

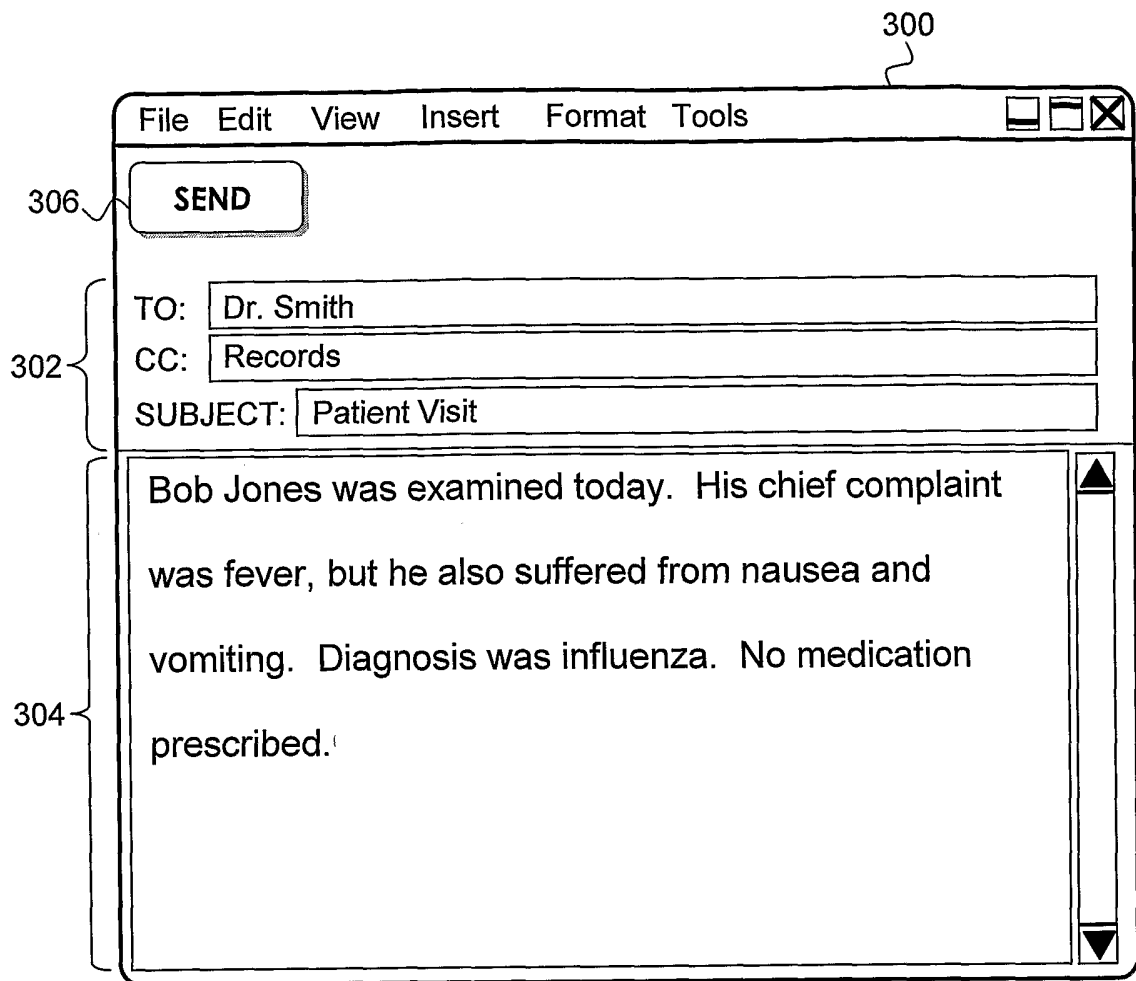


Figure 3

4 / 1 1

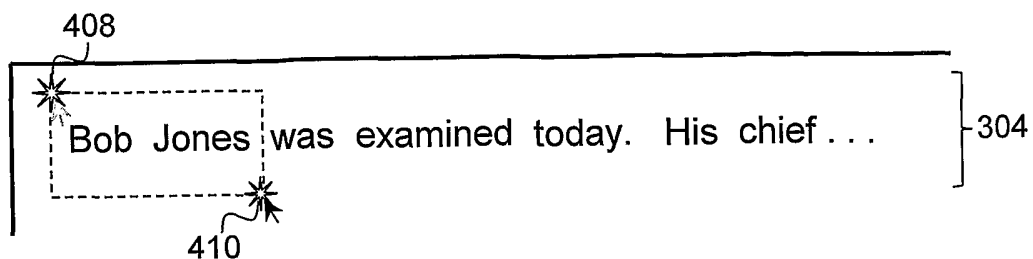


Figure 4a

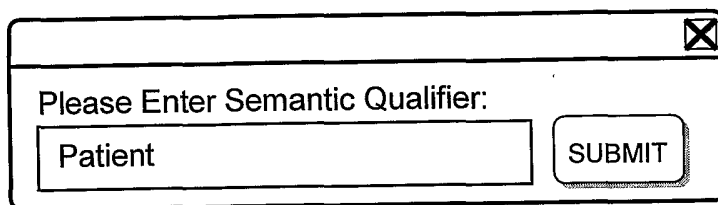


Figure 4b

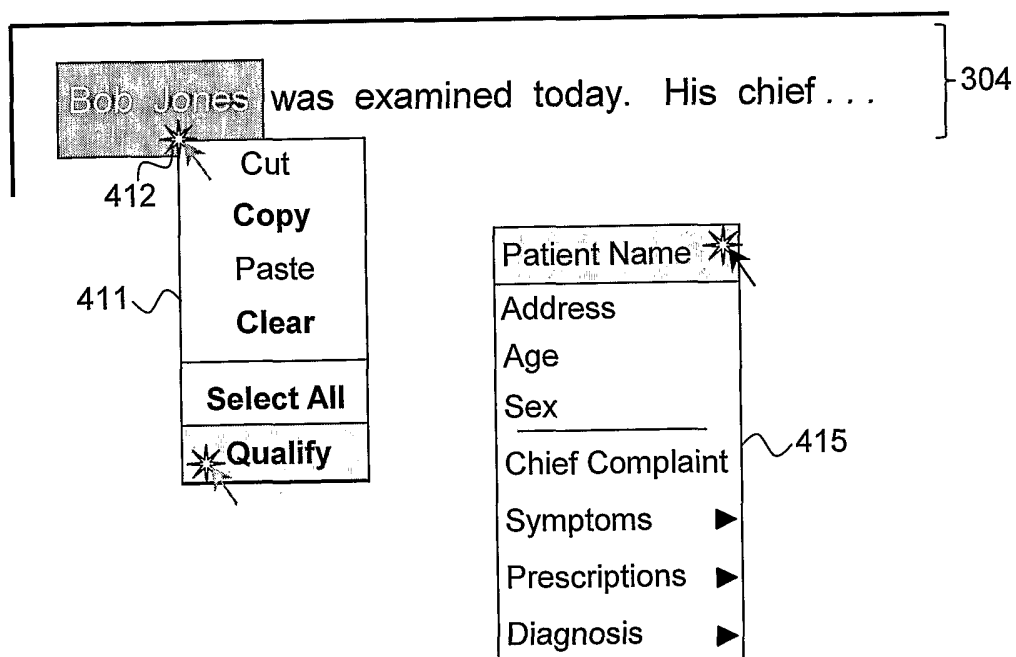
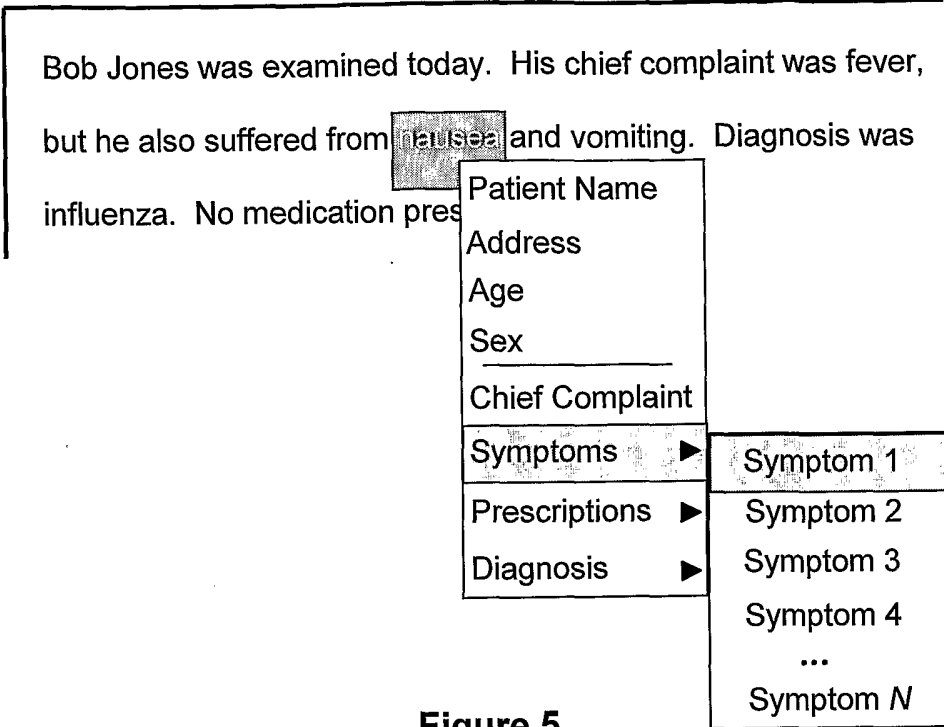


Figure 4c



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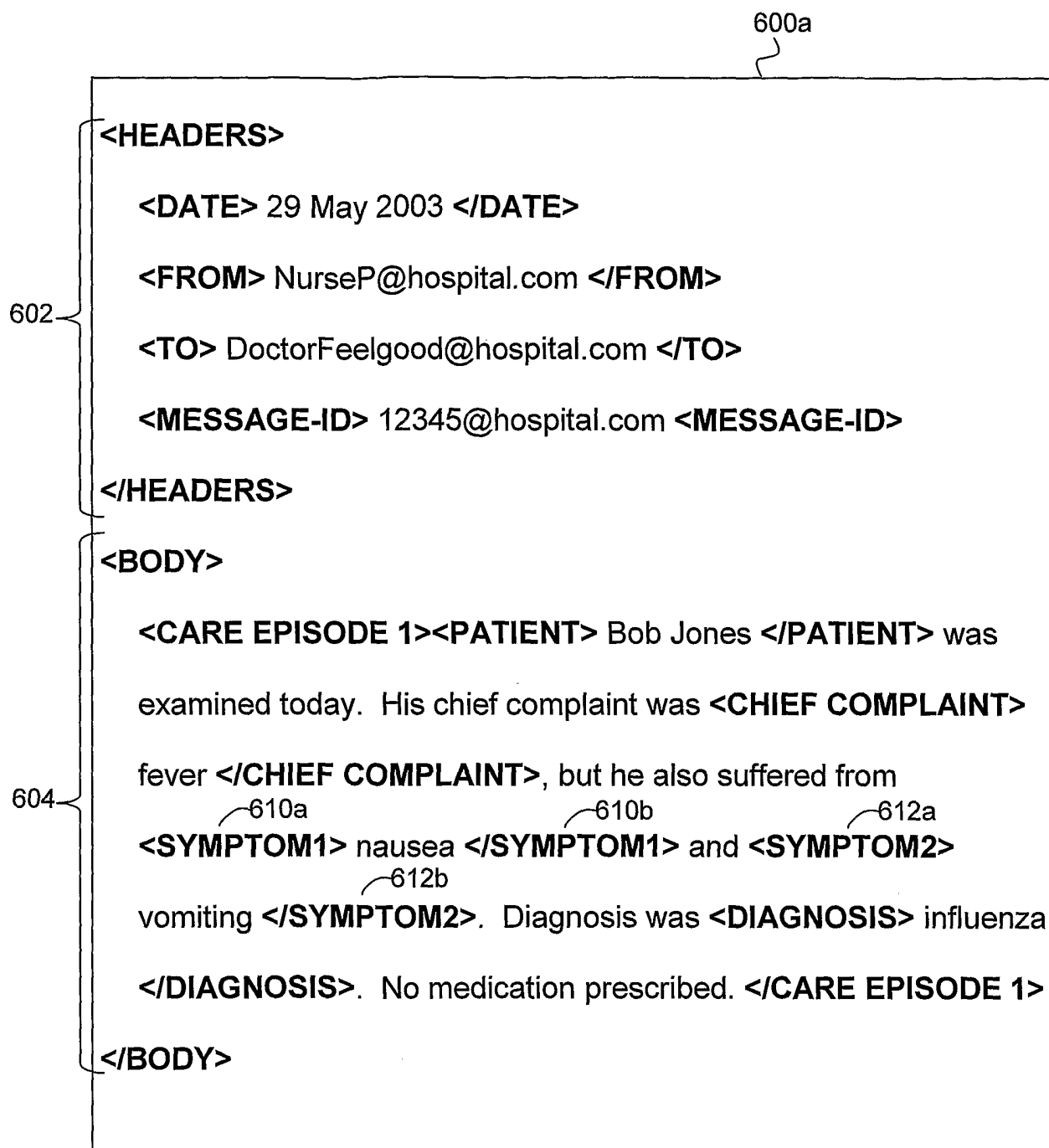


Figure 6a

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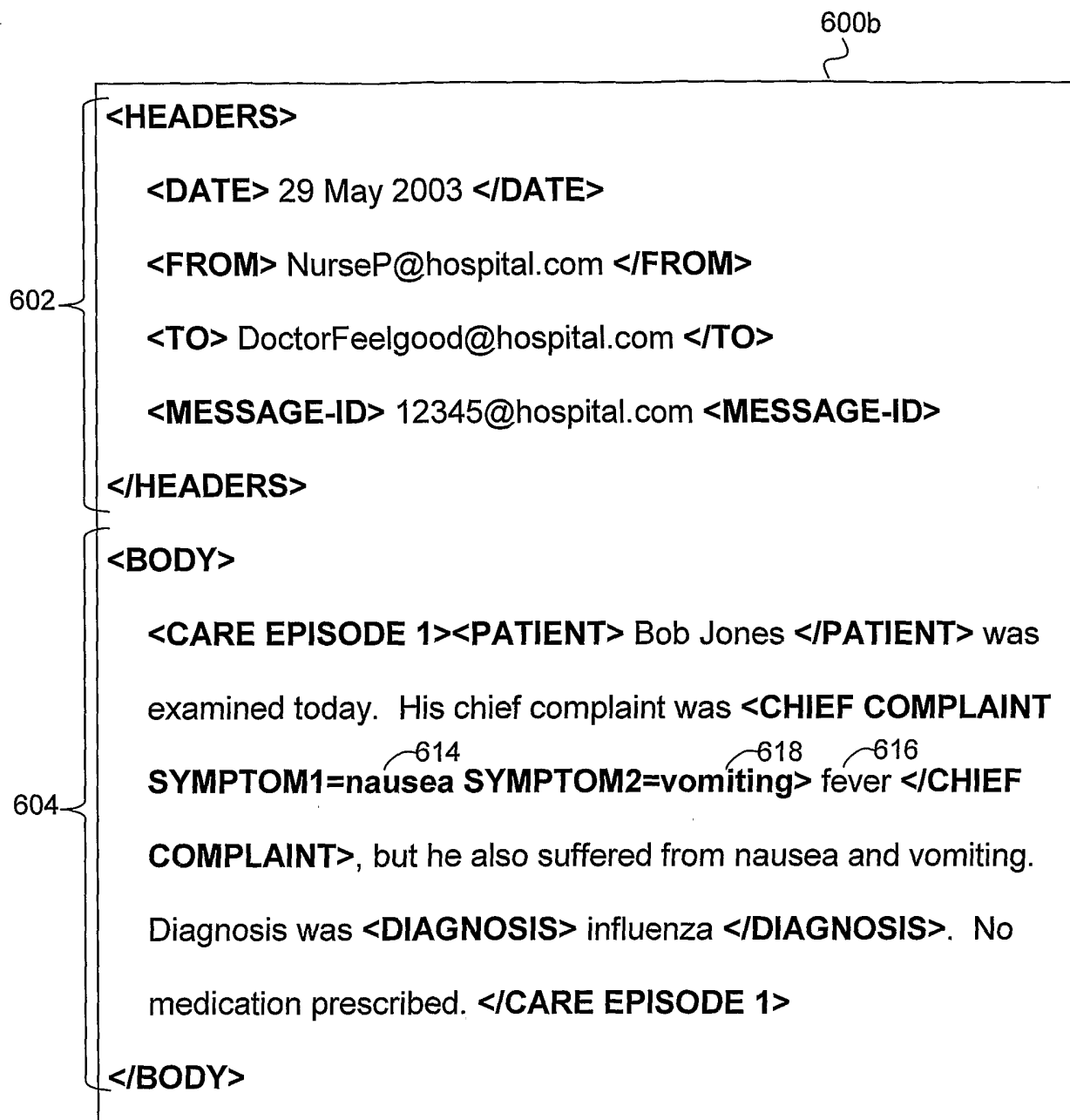


Figure 6b

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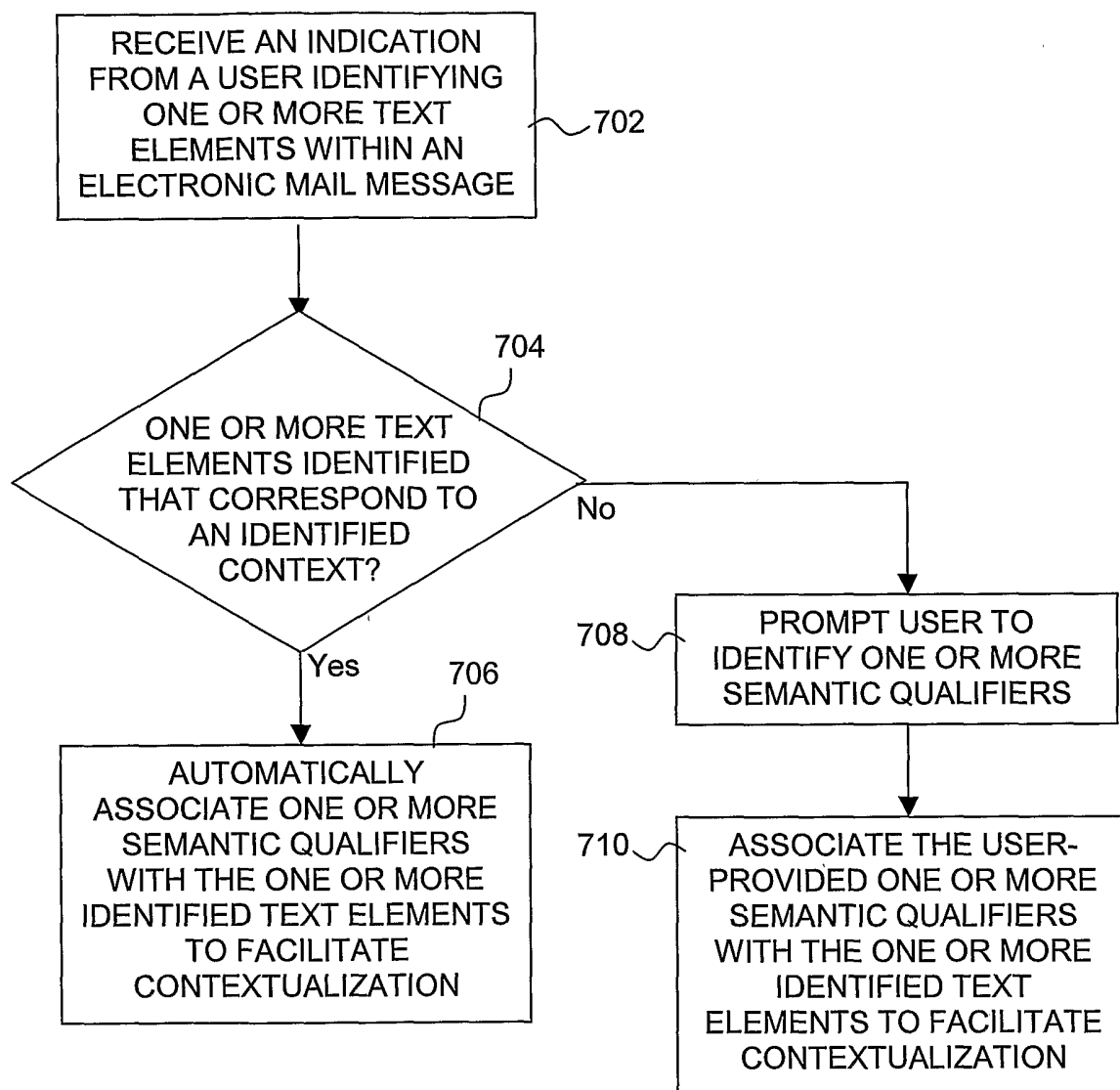
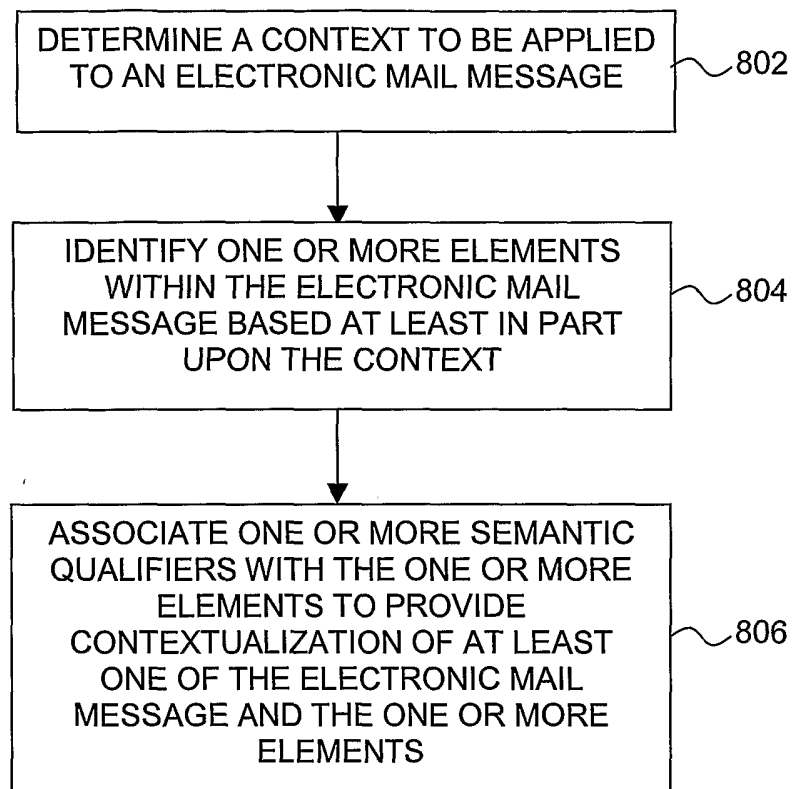


Figure 7

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**Figure 8**

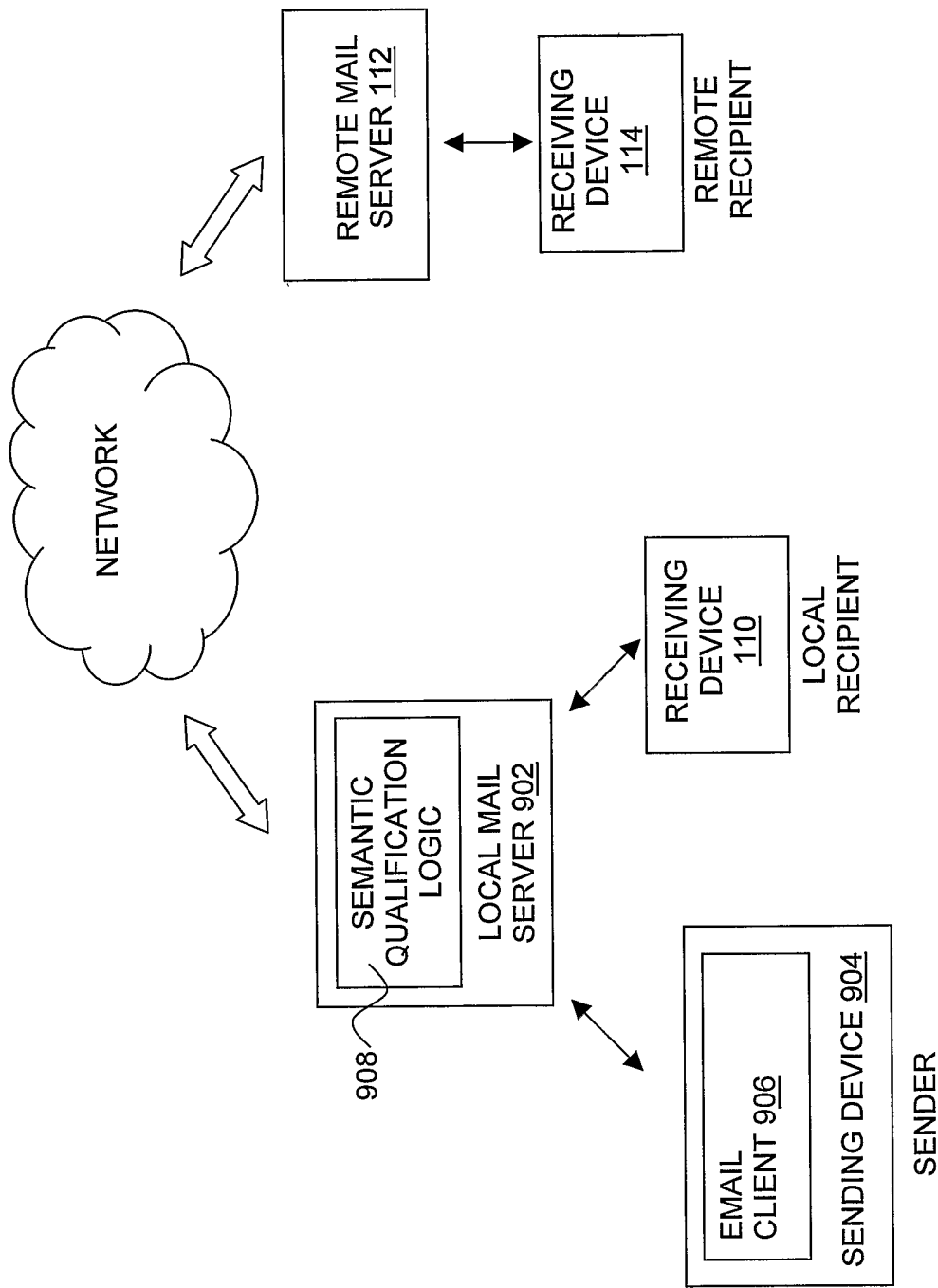
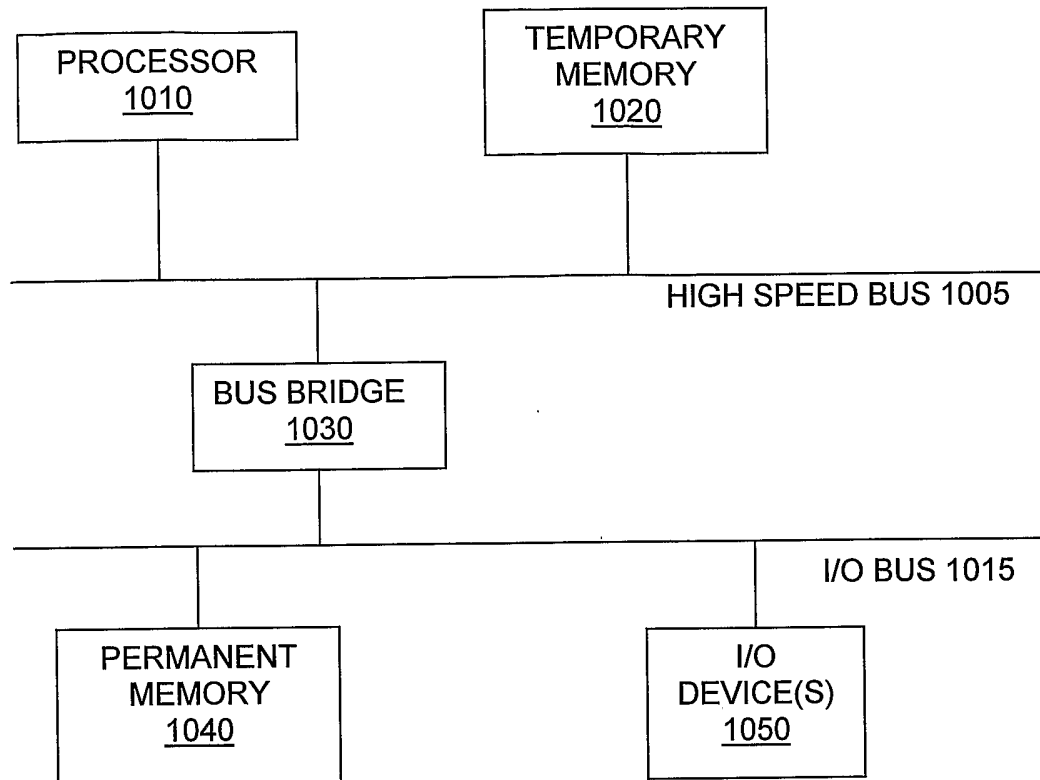
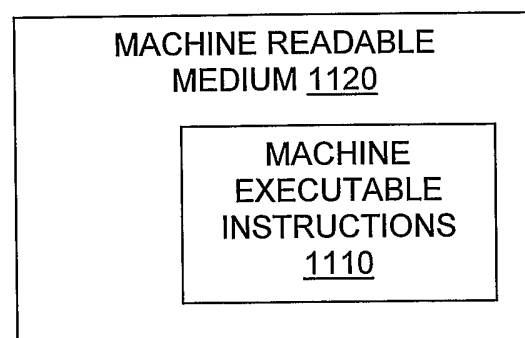


Figure 9

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**Figure 10****Figure 11**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/24424

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G05B 15/00

US CL : 700/2; 709/201, 203; 707/10; 713/156

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 700/2; 709/201, 203; 707/10; 713/156

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,862,325 A (REED et al.) 19 June 1999 (19.06.1999), Whole Document.	1-48
Y	US 5,832,496 A (ANAND et al.) 03 November 1998 (03.11.1998), Whole document.	1-48
A	US 6,151,624 A (TEARE et al.) 21 November 2000 (21.11.2000), Whole document.	1-48
A	US 6,389,403 B1 (DORAK, Jr.) 14 May 2002 (14.05.2002), Whole Document.	1-48

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

18 November 2003 (18.11.2003)

Date of mailing of the international search report

03 DEC 2003

Name and mailing address of the ISA/US

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