

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROSOFT CORPORATION,
Petitioner,

v.

X1 Discovery, Inc.,
Patent Owner.

U.S. Patent No. 7,370,035
Issued: May 6, 2008
Application No. 10/654,588
Filed: September 3, 2003

Title: METHODS AND SYSTEMS FOR SEARCH INDEXING

DECLARATION OF LOREN G. TERVEEN, PH.D.

MICROSOFT
EXHIBIT 1003

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I, Loren G. Terveen, Ph.D., do hereby declare as follows:

I. INTRODUCTION AND ENGAGEMENT

1. I have been retained as an independent expert on behalf of Microsoft Corporation in connection with the above-captioned Petition for *Inter Partes* Review (“IPR”) to provide my analyses and opinions on certain issues related to U.S. Patent No. 7,370,035 (hereinafter “the ’035 patent”).

2. I am being compensated at my usual and customary rate for the time I spent in connection with this IPR. My compensation is not affected by the outcome of this IPR.

3. Specifically, I have been asked to provide my opinions regarding whether claims 1-10 (each a “Challenged Claim” and collectively the “Challenged Claims”) of the ’035 patent would have been obvious to a person having ordinary skill in the art (“POSITA”) as of September 3, 2002. It is my opinion that each Challenged Claim would have been obvious to a POSITA after reviewing the prior art discussed herein.

II. BACKGROUND AND QUALIFICATIONS

4. I am a Professor of Computer Science & Engineering at the University of Minnesota.

5. I received a B.A. in Computer Science, Mathematics, and History from the University of South Dakota in 1984, a M.S. in Computer Science from the

University of Texas in 1988, and a Ph.D. from the University of Texas in Computer Science in 1991.

6. I am a member of the Association for Computing Machinery (ACM), the oldest, largest, and most prestigious computing society in the world. From 2015-2018 I served as President of ACM's Special Interest Group on Computer-Human Interaction, one of its largest and most active special interest groups. I also am a member of the ACM Council, the highest governing body of the ACM. I received the ACM Distinguished Scientist Award in 2009.

7. My research and teaching focus on human-computer interaction, user interface design, and social computing. I have several decades of experience in these specialties of computer science in both industry and academia. I worked for AT&T Laboratories from 1991 through 2002, during which time I conducted research and developed systems that solved problems in software engineering, web information seeking and organization, and recommender systems. As part of this research, I developed a number of systems on the World Wide Web, which involved, among other things, storing information in databases, generating HTML pages in response to user requests, and providing interactive search and browsing interfaces to users through the Common Gateway Interface (CGI) and other technologies. In all my research, I designed, implemented, and tested graphical user interfaces. I have been employed full-time as a professor at the University of Minnesota since 2002, during

which time I have taught classes in computer science, human-computer interaction and social computing, and have conducted, supervised, and published research in the field, much of which has involved information organization and seeking systems. My research has been published in numerous journal and conference papers, as well as in a book I co-authored entitled “Foundational Issues in Artificial Intelligence and Cognitive Science: Impasse and Solution.” I have served on the editorial board of ACM’s Transactions on Human-Computer Interaction and the Communications of the ACM, and have served as a reviewer for numerous journals, including ACM Computing Surveys, IEEE Transactions on Data and Knowledge Engineering, the International Journal of Human-Computer Studies, and the Journal of Computer-Supported Cooperative Work.

8. I am a listed inventor on ten patents, including several related to graphical interfaces, web-based systems, and information organization and search.

9. I have consulted on over 15 intellectual property cases that have dealt with topics in user interface design, recommender systems, web information systems, and information seeking systems. During these cases, I have testified before judges, been deposed, and written multiple expert reports.

10. I have attached a more detailed list of my qualifications as Appendix A. Based on my academic and professional experiences, I believe that I am

qualified in the technology fields pertaining to this proceeding (and described below), at least as a person of ordinary skill in the art.

11. I have no financial interest in the outcome of this proceeding, and will be paid for my time regardless of whether I testify at the proceedings or whether the outcome is in accordance with my conclusions.

III. MATERIALS CONSIDERED AND INFORMATION RELIED UPON REGARDING '035 PATENT

12. In preparing this declaration, I have reviewed the following materials bearing Exhibit Nos. that I understand are being referenced in the IPR to which my declaration accompanies:

LIST OF EXHIBITS

No.	Description
1001	U.S. Patent No. 7,370,035 (“’035 patent”)
1002	File History of U.S. Patent No. 7,370,035
1004	Steve Schwartz, <i>Visual QuickStart Guide Entourage 2001 for Macintosh</i> , Peachpit Press (2001) (“ Entourage-1 ”)
1005	Bonita Sebastian et al., <i>Microsoft Office 2001 A Hands-On Guide for Macintosh</i> , Computer Literacy Press (excerpts) (2000) (“ Entourage-2 ”)
1006	Nan Barber & David Reynolds, <i>Office 2001 for Macintosh: The Missing Manual</i> , Pogue Press/O’Reilly (1 st ed.) (Apr. 2001) (“ Entourage-3 ”)
1007	<i>Eudora Email User Manual for Windows Version 5.0</i> , QUALCOMM (Aug. 2000) (“ Eudora ”)
1008	Alan R. Neibauer, <i>Running Microsoft Outlook 2000</i> , Microsoft Press (excerpts) (1999) (“ Outlook ”)

No.	Description
1009	U.S. Patent No. 6,112,172 to True et al. (“ True ”)
1010	U.S. Patent No. 5,444,823 to Trung D. Nguyen (“ Nguyen ”)
1011	U.S. Patent No. 7,039,635 to Morgan et al. (“ Morgan ”)
1012	U.S. Patent Application Publication No. 2002/0055981 to Spaey et al. (“ Spaey ”)
1013	U.S. Patent No. 5,845,278 to Kirsch et al. (“ Kirsch ”)
1014	U.S. Patent No. 4,255,796 to Gabbe et al. (“ Gabbe ”)
1015	U.S. Patent No. 5,692,173 to Chee Heng Chew (“ Chew ”)
1016	U.S. Patent No. 6,049,796 to Siitonen et al. (“ Siitonen ”)
1017	U.S. Patent No. 5,303,361 to Colwell et al. (“ Colwell ”)
1018	U.S. Patent No. 6,741,985 to Robin A. R. Green (“ Green ”)
1019	U.S. Patent No. 5,991,756 to Jiong Wu (“ Wu ”)
1020	International Patent Application Publication No. WO 00/26762 to Mark Richanbach (“ Richanbach ”)
1021	Jef Raskin, <i>The Humane Interface: New Directions for Designing Interactive Systems</i> , ACM Press (2000) (“ Raskin ”)
1022	Richard M. Stallman, <i>GNU Emacs Manual</i> (1 st ed.) (Jun. 1985) (“ GNU Emacs ”)
1023	Ricardo Baeza-Yates & Berthier Ribeiro-Neto, <i>Modern Information Retrieval</i> , ACM Press (1999) (“ Baeza-Yates ”)
1024	Sunny Lam, <i>The Overview of Web Search Engines</i> (Feb. 9, 2001) (“ Lam ”)
1025	Oscar Vallarino, <i>On The Use Of Bit Maps For Multiple Key Retrieval</i> , Proceedings of the 1976 Conference on Data: Abstraction, Definition And Structure, 108-114 (Mar. 1976) (“ Vallarino ”)

No.	Description
1026	Steve Lawrence & C. Lee Giles, <i>Context And Page Analysis For Improved Web Search</i> , IEEE Internet Computing, 38-46 (Jul.-Aug. 1998) (“ Lawrence ”)
1027	Rawley D. Johnson et al., <i>Technical Reference Document Database System (TDOCS) Requirements Definition</i> (Aug. 1993) (“ Johnson ”)
1028	Lev Finkelstein et al., <i>Placing Search in Context: The Concept Revisited</i> , ACM Transactions on Info. Sys., Vol. 20, No. 1, 116-131 (Jan. 2002) (“ Finkelstein ”)
1029	U.S. Patent No. 6,952,805 to Tafoya et al. (“ Tafoya ”)
1030	U.S. Patent No. 6,009,459 to Belfiore et al. (“ Belfiore ”)
1031	U.S. Patent No. 5,220,625 to Hatakeyama et al. (“ Hatakeyama ”)
1032	U.S. Patent No. 6,185,551 to Birrell et al. (“ Birrell ”)
1033	U.S. Patent No. 6,839,702 to Patel et al. (“ Patel ”)
1034	U.S. Patent No. 6,973,450 to Silverbrook et al. (“ Silverbrook ”)
1035	U.S. Patent No. 6,834,276 to Jensen et al. (“ Jensen ”)
1036	U.S. Patent No. 5,946,678 to Ijsbrand Jan Aalbersberg (“ Aalbersberg ”)
1037	European Patent Application Publication No. EP 1 209 866 to Baldonado et al. (“ Baldonado ”)
1038	Declaration of Delainey Tanner, dated November 18, 2024
1039	Kaitlin Duck Sherwood, <i>Overcome Email Overload With Eudora 5</i> , World Wide Webfoot Press (excerpts) (1 st ed.) (2001)
1040	Claims Listing
1041	Donald E. Knuth, <i>The Art Of Computer Programming Vol. 3 Sorting And Searching</i> , Addison Wesley Longman (excerpts) (2 nd ed.) (May 1998)

No.	Description
1042	N/A
1043	Steven Schwartz & Robert Correll, <i>Running Microsoft Office 2001 for Mac</i> , Microsoft Press (excerpts) (2001)
1044	Ben Shneiderman et al., <i>Clarifying Search: A User-Interface Framework For Text Searches</i> , D-Lib Mag. (Jan. 1997)
1045	N/A
1046	N/A
1047	N/A
1048	N/A
1049	N/A
1050	N/A
1051	N/A
1052	Ben Shneiderman, <i>Designing The User Interface: Strategies For Effective Human-Computer Interaction</i> , Addison Wesley Longman (excerpts) (3 rd ed.) (1998)
1053	Claudine Badue et al., <i>Distributed Query Processing Using Partitioned Inverted Files</i> , Proc. Eighth Symp. on String Processing and Info. Retrieval, IEEE, 10-20 (2001)
1054	U.S. Patent No. 5,685,003 to Peltonen et al. (“ Peltonen ”)
1055	Dick Pountain, <i>The New Penguin Dictionary of Computing</i> , Penguin Group (excerpts) (1 st ed.) (2001)
1056	N/A
1057	Alfred and Emily Glossbrenner, <i>Search Engines For The World Wide Web</i> , PeachPit Press (3 rd ed.) (2001)
1058	N/A
1059	Adam A. Wilcox, <i>PC Learning Labs Teaches Lotus Notes 3.0</i> , Ziff-Davis Press (1993)

No.	Description
1060	N/A
1061	Stephen Londergan & Pat Freeland, <i>Lotus Notes R5 For Dummies Quick Reference</i> , IDG Books Worldwide, Inc. (1999)
1062	N/A
1063	Exhibit CX-0196 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1064	Exhibit CX-0198 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1065	Exhibit CX-0199 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1066	Exhibit CX-0203 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1067	Exhibit CX-0204 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1068	Exhibit CX-0206 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1069	Exhibit CX-0208 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1070	Exhibit CX-0209 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1071	Exhibit CX-0211 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)

No.	Description
1072	Exhibit CX-0213 to Complainant's Pre-Trial Brief in the Matter of Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof, ITC-337-TA-1389 (August 29, 2024)
1073	Exhibit CX-0214 to Complainant's Pre-Trial Brief in the Matter of Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof, ITC-337-TA-1389 (August 29, 2024)
1074	Exhibit CX-0215 to Complainant's Pre-Trial Brief in the Matter of <i>Certain Computing Devices Utilizing Indexed Search Systems and Components Thereof</i> , ITC-337-TA-1389 (August 29, 2024)
1075	U.S. Patent No. 9,663,139 to Gross et al. (" 139 patent ")
1076	File History of U.S. Patent No. 9,663,139
1077	U.S. Patent No. 10,552,490 to Gross et al. (" 490 patent ")
1078	File History of U.S. Patent No. 10,552,490

IV. UNDERSTANDING OF PATENT LAW

13. I am not an attorney. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to my opinions. My understanding of the law was provided to me by the Petitioner's attorneys.

14. I understand that when considering the scope of the claims of a patent that the patent claim terms should generally be given the ordinary meaning that the terms would have to a person of ordinary skill in the art in question after reading the patent as of the earliest claimed priority date.

15. I understand that the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the term

appears, but in the context of the entire patent, including the specification. I further understand that the principal considerations regarding the scope and meaning of the claims are the plain language of the claim (including the surrounding claim language and context), the patent specification, and the prosecution history. I understand that while a claim is to be read in light of the specification, one must generally avoid importing limitations into the claim from the specification. I am also informed that the prosecution history can often inform the meaning of the claim by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be. I applied these understandings when considering the scope and meaning of the claims of the '035 patent.

16. I understand that a prior art reference anticipates an asserted claim, and thus renders the claim unpatentable, if all elements of the claim are disclosed in that prior art reference, either explicitly or inherently (i.e., necessarily present or implied).

17. I further understand that a claim is unpatentable if it would have been obvious. Obviousness of a claim requires that the claim would have been obvious from the perspective of a POSITA at the time the alleged invention was made. I understand that a claim could have been obvious from a single prior art reference or from a combination of two or more prior art references.

18. I understand that an obviousness analysis requires an understanding of the scope and content of the prior art, any differences between the alleged invention and the prior art, and the level of ordinary skill in evaluating the pertinent art.

19. I further understand that a claim would have been obvious if it unites old elements with no change to their respective functions, or merely substitutes one element for another known in the field, and that combination yields predictable results. While it may be helpful to identify a reason for this combination, I understand that there is no strict requirement of finding an express teaching, suggestion, or motivation to combine within the references. When a product is available, design incentives and other market forces can prompt variations of it, either in the same field or different one. If a POSITA can implement a predictable variation, obviousness likely bars its patentability. For the same reason, if a technique has been used to improve one device and a POSITA would recognize that it would improve similar devices in the same way, using the technique would have been obvious. I understand that a claim would have been obvious if common sense directs one to combine multiple prior art references or add missing features to reproduce the alleged invention recited in the claims.

20. I further understand that certain factors may support or rebut the obviousness of a claim. I understand that such secondary considerations include,

among other things, commercial success of the patented invention, skepticism of those having ordinary skill in the art at the time of invention, unexpected results of the invention, any long-felt but unsolved need in the art that was satisfied by the alleged invention, the failure of others to make the alleged invention, praise of the alleged invention by those having ordinary skill in the art, and copying of the alleged invention by others in the field. I understand that there must be a nexus—a connection—between any such secondary considerations and the alleged invention. I also understand that contemporaneous and independent invention by others is a secondary consideration tending to show obviousness.

21. I understand that in considering obviousness, it is important not to determine obviousness using the benefit of hindsight derived from the descriptions found in the patent being considered.

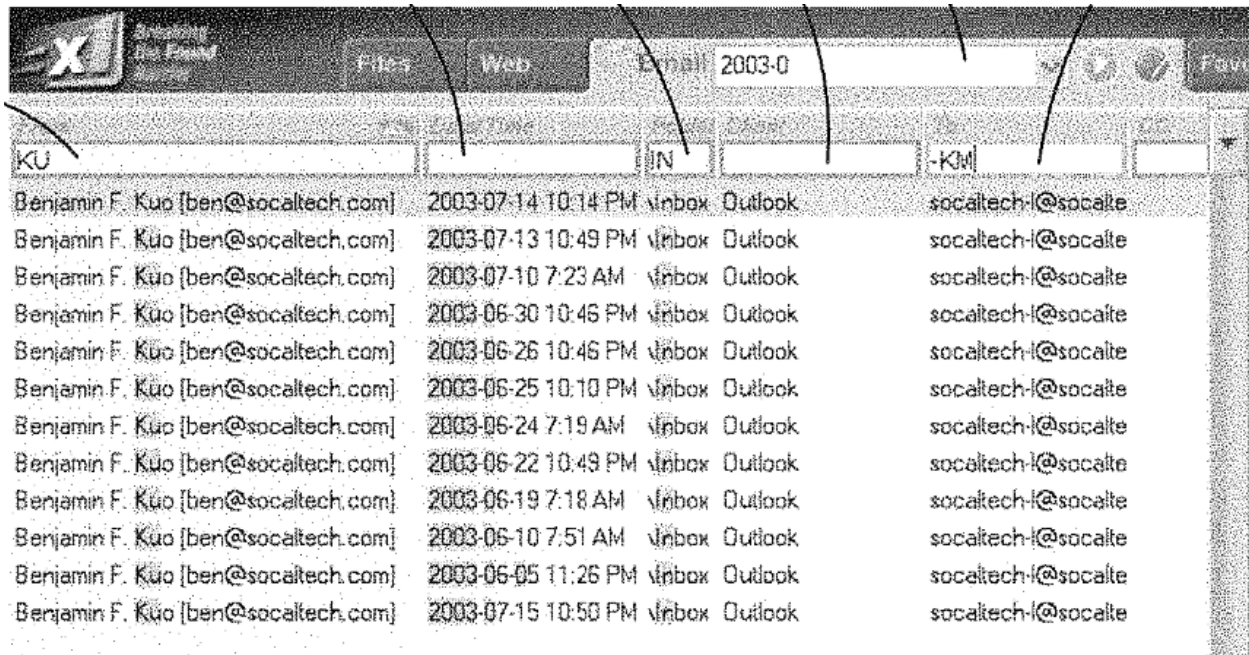
22. I understand that other challenges to the patentability of a patent, including patent ineligibility, enablement, written description, and definiteness or clarity of claim language, cannot be raised in IPR proceedings before the Board.

23. I understand that Petitioner has the burden of proving unpatentability by a preponderance of evidence, which means that the claims are more likely than not unpatentable.

24. The analysis in this declaration is in accordance with the above-stated legal principles.

V. THE '035 PATENT

25. The '035 patent generally relates to incremental (i.e., character-by-character) searching where search results are displayed as the user types their search query, rather than waiting for the user to complete their query and press the “Enter” key or click a search button, as in a delimited search. Specifically, the '035 patent alleges that its improvement over then-existing delimited searches is the ability to provide incremental search results. EX1001, 1:32-42 (disparaging delimited searches for requiring a user to click a search button before being able to view search results), 2:9-21 (touting the benefits of the application’s incremental searching). As an example of this incremental searching, FIG. 3G of the '035 patent shows how when searching through emails, emails received from a user containing the entered search string are displayed as the user types their query, such that a query of “KU” returns emails from a contact with the last name of “Kuo.”



EX1001, FIG. 3G (excerpted).

26. The claims specifically recite incrementally searching two strings entered into the same search field. Independent claims 1 and 10 recite in part:

receiving a first string in a first search field;
 in response to receiving the first string,
 incrementally locating a first group of documents that has
 at least a first word that begins with the first string;
 receiving a second string in the first search field,
 wherein the first and second strings are separated by a
 string separator character in the first search field;
 in response to receiving the second string,
 incrementally locating a second group of documents that
 has at least a second word that begins with the second
 string and identifying one or more documents that are

included in each of the first and second groups of documents; and

displaying an indication of one or more of the identified one or more documents that are included in each of the first and second groups of documents.

EX1001, 29:41-54, 30:37-52.

27. The '035 patent's specification provides an illustrative example of this claim-recited functionality at 22:61-23:2:

[I]f the user enter [sic] "Jo D" documents with the strings ("Jon" and "David"), ("Joe" and "Daniel"), ("John" and "Doe") will be located. If user then adds an "h" to "Jo" so that the search strings are now "Joh D" then the list of search results will be substantially immediately narrowed to present only documents having at least one string beginning with "Joh" and one string beginning with "D", such as a document containing ("John" and "Doe").

28. Thus, the strings are partial in that they are prefixes ("Jo" for "John" and "D" for "Doe"). And the search is incremental in that the search results are updated dynamically as the user adds additional letters to their search query.

29. The '035 patent's dependent claims relate to two concepts: (1) email-specific search functionality, such as searching the cc, bcc, subject, and/or body fields of an email (EX1001, 30:13-24, 30:29-32 (claims 5-7 and 9)), and (2) displaying the portion of the document containing the searched terms and

highlighting the occurrences of the searched term(s) (EX1001, 30:1-12 (claims 2-4)). In sum, the '035 patent describes and claims locating documents, including emails, that contain words beginning with two searched prefixes entered into the same search field, and updating the search results as the user types additional letters in the search field.

VI. LEVEL OF SKILL IN THE ART, AND STATE OF THE ART

A. Person Of Ordinary Skill In The Art

30. A person of ordinary skill in the art for purposes of the '035 patent in September 2002 ("POSITA") would have had a bachelor's degree in computer science, or equivalent, with two or more years of experience developing and implementing search engines and/or search interfaces. More education, e.g., a Master's or Ph.D., would compensate for less work experience and vice versa.

31. As demonstrated by the background references in Section VI.B (State Of The Art), a POSITA would have been familiar with common, then-existing search tool functionality, including:

- Incremental (i.e., character-by-character) searching in which search results are displayed as a user types their query (*infra* Section VI.B.1);
- locating documents containing two or more search strings, such as in response to a user including a Boolean AND operator in their search query (*infra* Section VI.B.2);

- highlighting a searched string in the search results so that a user can easily and quickly see where the searched string appears in the located document(s) (*infra* Section VI.B.3); and
- email-specific search functionality, such as the ability to search within email-specific headers (e.g., To, From, Subject, etc.) (*infra* Section VI.B.4).

B. State Of The Art

32. The knowledge and skill of a POSITA encompassed the following claim-recited features, as reflected in both background references and the references that form the ground of unpatentability presented in Sections VIII-IX. These features were all well-known, widely deployed (including in commercial systems), discussed in numerous patents, and often combined with one another.

1. Incrementally (i.e., Character-By-Character) Locating Documents Containing Partial Strings (e.g., Prefixes)

33. Although the '035 patent touts that its alleged improvement over then-existing delimited searches is the ability to provide incremental search results (*e.g.*, EX1001, 1:32-42, 2:9-21), such incremental searching was well known long before the patent's alleged 2002 priority date. For example, such incremental searching (*i.e.*, incrementally locating and displaying search results to a user as they type their query) was commonly used in, for example, text editors, search engines, digital encyclopedias, help centers, and email clients (EX1004, 8-9, 161; EX1009,

2:26-31, 2:39-48, 4:65-5:6; EX1010, 7:14-8:66; EX1011, Abstract, 2:49-3:58, 9:45-10:11; EX1012, [0026], [0051-53], [0167], [0247] (claim 1), FIGS. 8A-8C; EX1013, 10:14-28; EX1014, Abstract, 7:10-8:50; EX1015, Abstract, 1:16-21; EX1016, 2:51-67; EX1017, 9:50-10:10, FIGS. 8-11; EX1018, 5:16-6:40, 7:35-8:18, FIGS. 4-5, 8; EX1021, 125-127; EX1022, 55-57; EX1029, 12:66-15:60, FIG. 6; EX1039, 102-103; EX1043, 83-84, 337-338, 343-344, 355, 385-386, 404; EX1044, 3) at least because such incremental searching was known to provide several advantages over the other type of search, a delimited search (in which a user must type their query in full before initiating a search and receiving results), including: improved responsiveness, efficiency, and usability (EX1021, 124-127; EX1009, 2:25-48; EX1014, Abstract; EX1052, 518, 541).

34. As a first example, in 1978 Gabbe described using incremental searching to provide feedback on the volume of search results as the user typed their query. EX1014, Abstract, 7:10-8:50.

35. By 1985, at least one text editor (EMACS) employed incremental searching to locate search terms within a file. EX1021, 125-127; EX1022, (b).

36. And in 1994, the background section of at least one patent described “the incremental search method” as being known. EX1015, 1:16-21.

37. Other prior art references, including Schwartz, Sherwood, True, Nguyen, Spaey, Morgan, Kirsch, Siitonen, Shneiderman, and Colwell described

using incremental searching in a variety of contexts, including to search emails (EX1004, 8-9, 161; EX1039, 102-103; EX1043, 385-389), search digitized audio files / transcripts (EX1009, 2:26-31, 2:39-48, 4:65-5:6), locate help articles (EX1010, 7:14-8:66), search digital encyclopedias (EX1011, Abstract, 2:49-3:58, 9:45-10:11), locate PDA contacts (EX1016, 2:51-67), locate locally-saved files on a hard drive (EX1017, 9:50-10:10, FIGS. 8-11), and locate Internet-based documents saved on one or more remote servers (EX1012, [0026], [0051-53], [0167], [0247] (claim 1), FIGS. 8A-8C; EX1013, 10:14-28). EX1044, 3.

38. As mentioned above, incremental searching's popularity was due at least in part to its known advantages over delimited searches, including responsiveness, effectiveness, and usability. By their very nature, incremental search tools are more responsive than delimited searches because they return results as the user types (i.e., results are updated every time the user types a new character). A POSITA knew that this immediate feedback makes incremental searches not only faster than delimited searches (thus "wast[ing] less of a user's time") (EX1021, 126), but also more effective and easier to use because users can immediately tell whether their search query is working (i.e., returning relevant results) and can more quickly modify their search query to return more relevant results if necessary. EX1021, 126-127 ("Another advantage of incremental search is that, as the user enters the pattern, it provides constant feedback as to the results

of the search. With a delimited search, [the user] does not find out whether [their] pattern is suitable or even if it was typed correctly until it is fully entered and a search attempt has been made. ... Building a pattern incrementally allows the user to adjust the pattern interactively during the search, which leads the user to improve [their] search strategies through the feedback received.”); EX1009, 2:39-48 (“The immediate visual feedback provided to the user can increase the speed with which the user achieves satisfactory search results. Because query results are displayed as the query is being input, the user need not wait until the full query is entered before viewing the results. This allows the user to modify a partially-entered query in response to unsatisfactory or unexpected results. Immediate display of segments of interest in response to modification of the interest level threshold increases the speed with which the user can identify segments of interest.”); EX1044, 3 (“[A] very appealing alternative is that of ‘dynamic queries’: there is no Search button but the result set is continuously displayed and updated as phases of the search are changed. ... [T]he advantages [of dynamic queries] are great: users can broaden, narrow, or refocus their search several times in as many seconds.”); EX1052, 518 (“*Dynamic queries*—in which users adjust query widgets to produce continuous updates—have proved effective and satisfying.”), 541 (Dynamic queries employ “the use of rapid, incremental, and reversible actions” and provide “immediate display of feedback (less than 100 milliseconds).

Additional benefits are the prevention of syntax errors and an encouragement of exploration.”). Users also do not have to worry about “losing the search already accomplished” when modifying their search query (e.g., deleting characters).

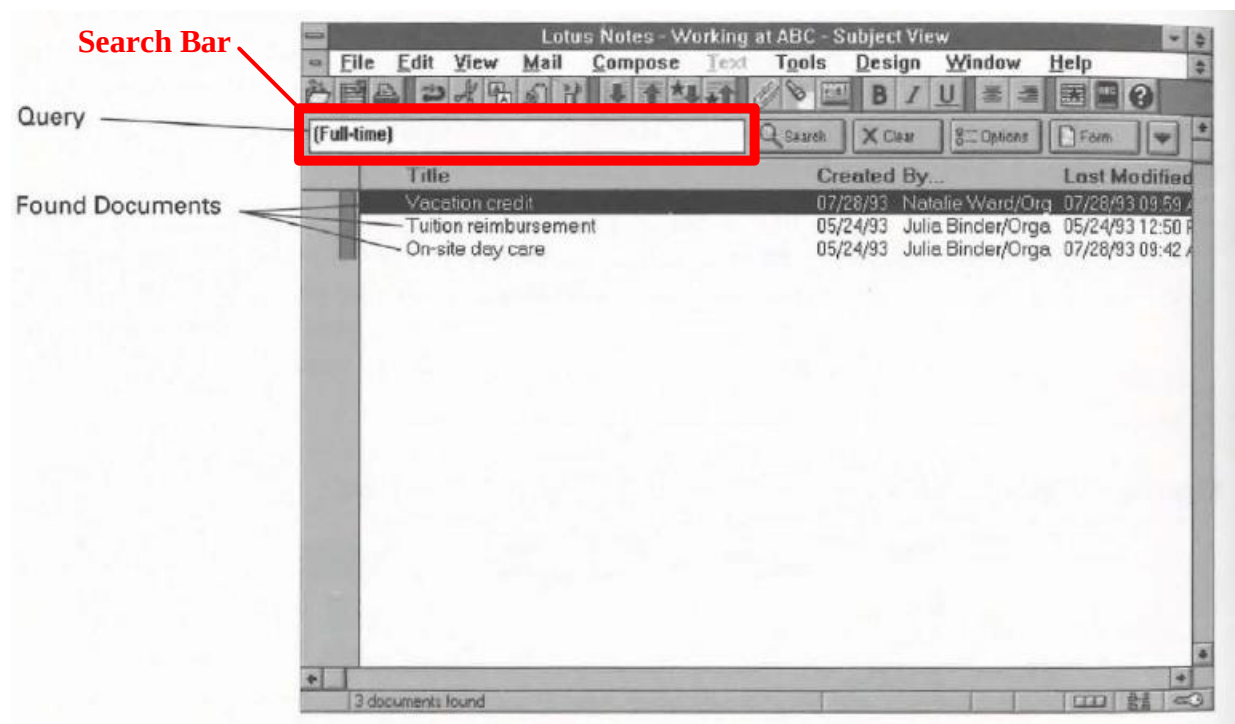
EX1021, 125-126.

39. It also was known that the aforementioned benefits of performing an incremental search apply to multi-string Boolean searches, which I discuss in more detail below in Section VI.B.2. EX1021, 127 (“Even building a Boolean search pattern is made more effective when the early results of the pattern appear as the user adds to the pattern’s specificity”).

**2. Locating Documents Containing Two
Non-Adjacent Search Strings Entered
In The Same Search Field (e.g., Boolean AND Searching)**

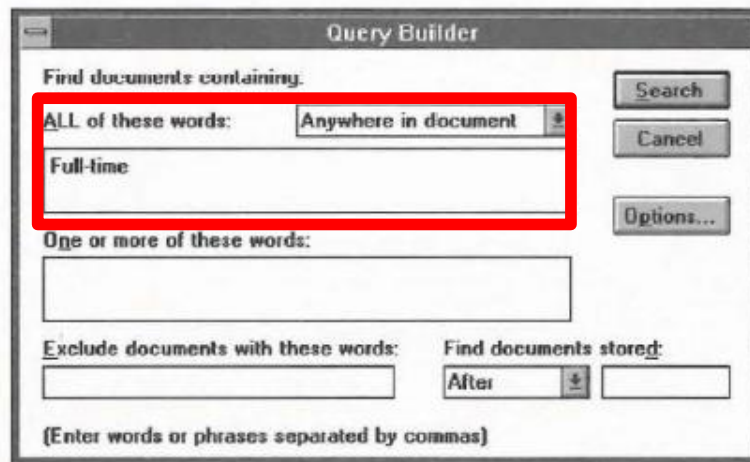
40. Locating documents containing multiple search strings/terms entered in a single search field (e.g., in response to the user including a space or Boolean AND operator between the search strings in a search query) was well known in the art before 2002 and most, if not all, major search engines included such functionality. *E.g.*, EX1009, 2:26-31, 2:39-48, 4:38-43, 4:66-5:6, 5:41-50, FIG. 2; EX1019, 6:52-62, FIG. 5; EX1020, 2:22-3:16, FIG. 1; EX1057, 19-27, 58-62, 70-73, 82, 85, 89, 100, 105, 109, 121, 125, 129-130, 143, 146, 151, 166, 187, 196, 198, 215, 227; EX1059, 160-165, EX1061, 140-142.

41. For example, by at least 1993, Lotus Notes allowed users to search for mail containing multiple search strings by entering multiple search strings in a single search field, either by separating the strings with a Boolean AND operator in a simple Search bar, or by separating the strings with a comma in a Query Builder dialog box. EX1059, 160-161 (“Notes provides two tools for performing these searches, the Search bar and the Query Builder dialog box.”), 162-164.



EX1059, 164 (red annotations added). “In the text box on the Search bar, enter the text for which you wish to search.” EX1059, 161. “You can use *logical operators* AND ... to find documents that contain various combinations of words and text strings.” EX1059, 162.

Using the Query Builder dialog box



EX1059, 163 (red annotations added). “To find documents containing all of several words, enter these words in the All Of These Words box. You should separate individual words by commas.” EX1059, 162.

42. It also was well known to locate documents containing multiple search strings by independently searching each string/term and then identifying the documents that appear in both sets of search results; this was a commonly used, classical approach that dates back to at least the 1970s. EX1024, 17 (“If the user types multiple keywords in the query, the search engine searches each of the keywords independently and combine [sic] all the results to generate the final answer.”); EX1023, 25-26, 101-105, 195, 196 (describing how when using inverted indexes to search for documents containing multiple keywords, “[e]ach element must be searched separately and a list ... generated for each one. Then, the lists of all elements are traversed in synchronization to find places where all the

words appear in sequence (for a phrase) or appear close enough (for proximity). ...

[T]he most time-demanding operation on inverted indices is the merging or intersection of the lists of occurrences.”), 207-208; EX1025, 109 (“In order to retrieve the data records that satisfy the conjunction, the resulting lists must then be intersected to determine the pointers to the data records desired.”), 110 (“For each condition of a conjunction, we OR together the columns involved; then we AND the obtained result columns which yields the result corresponding to the conjunctions.”); EX1019, 6:52-62 (“In this example, a user is searching for documents and presents a search request with a query string ‘The game of Go’. Search engine [] looks up each of the terms in word index []. ... Search engine [] then reads the document lists for ‘game’ and ‘go’, generates a match list for each term and applies an ‘AND’ operator to the match lists as described below in connection with FIG. 6.”), 9:11-12 (“FIG. 6 is a flow chart of a process of ‘AND’ing two or more match lists to generate a new match list.”), 9:24-32 (“The need for ‘AND’ing two or more match lists might come about where a search string contains an expression of the form ‘expression__A AND expression__B AND . . . ’. One match list is obtained for ‘expression__A’ indicating the documents that contain that subterm, another for ‘expression__B’, and so on. The resulting match list is a list of all the documents which contain all of the ‘AND’ed expressions.”); EX1026, 40; EX1033, 5:54-56; EX1041, 562; EX1044, 1-2;

EX1052, 515; EX1053, 11; EX1057, 19-26, 27 (“AND Searches [] for two or more keywords—both of which *must* appear in the results—is an excellent strategy for doing precise searches and greatly reducing the number of search results you have to consider.”), 58-62, 70-73, 82, 85, 89, 100, 105, 109, 121, 125, 129-130, 143, 146, 151, 166, 187, 196, 198, 215, 227; *see also* EX1007, 195.

43. Indeed, this was a commonly used, classical approach that dates back to at least the 1970s. By 2002, this classical approach was so well known, others did not even bother describing it in great detail. EX1020, 3:3-10 (“In the example of FIG. 1, the phrase ‘merced microprocessor’ in block 102 may be parsed such that the word ‘merced’ creates a first set of hits while the word ‘microprocessor’ creates a second set of hits. In the absence of any Boolean operator, as is in the case of FIG. 1, it may be assumed, for example, that the user wishes to find all web pages or web sites that contain both the term ‘merced’ and the term ‘microprocessor.’ Using Boolean operators in search queries is conventional and will not be discussed in great detail here for brevity’s sake.”); EX1023, 102-103 (“The oldest (and still heavily used) form of combining keyword queries is to use Boolean operators ... The operators most commonly used, given two basic queries or Boolean subexpressions e_1 and e_2 are: ... **AND** The query (e_1 AND e_2) selects all documents which satisfy both e_1 and e_2 .”).

44. Moreover, it was well known that the search terms did not have to appear next to each other in the search results (i.e., the search terms could be non-adjacent). Indeed, it was common to determine not only where the search terms are located in a given document, but also their proximity to one another, and many search tools allowed users to specify an allowable distance between search terms (a so-called “proximity search”). EX1023, 101-103, 195-196; EX1017, 1:66-2:2, 7:59-66; EX1024, 12; EX1026, 40, 42, 46; EX1044, 2-6; EX1052, 515-518; EX1059, 160.

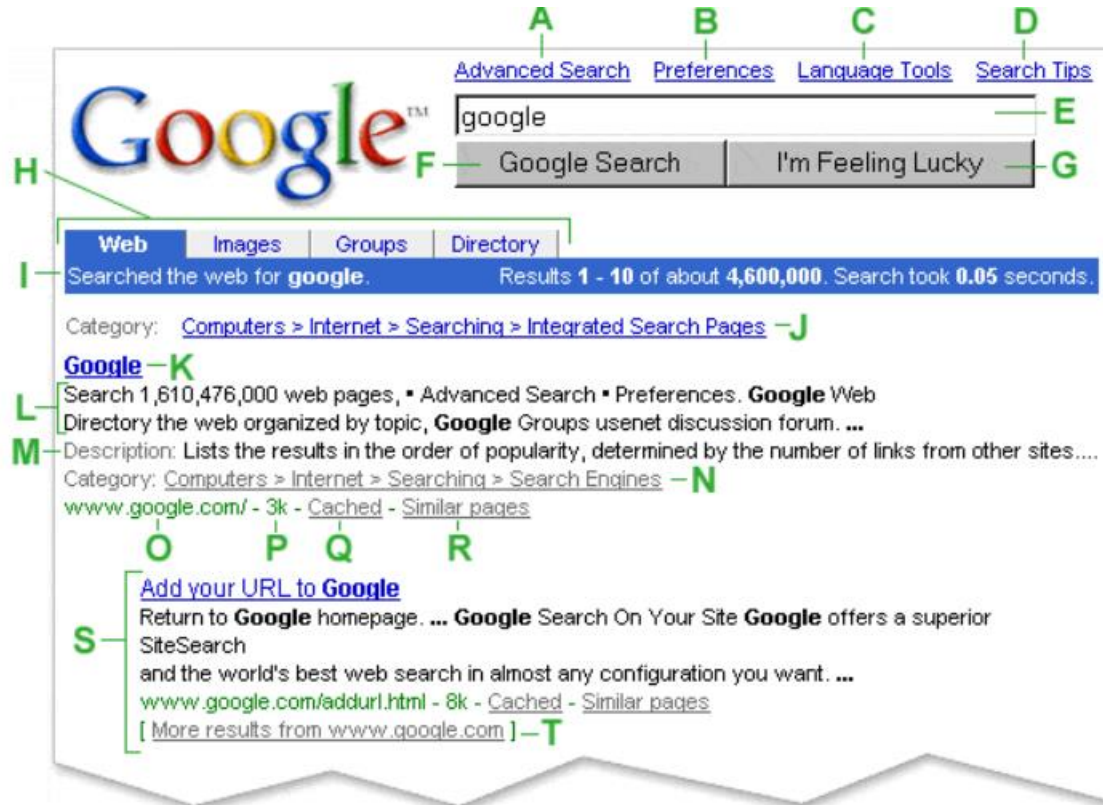
3. Displaying Portion(s) Of A Document Containing The Search Term(s) And Highlighting The Search Terms

45. It was well known before 2002 to display the portion(s) of a located document containing the search term(s) and highlight the search term(s) to give the user confidence in, and context for, the search results. EX1023, 101, 103 (“Besides selecting the appropriate documents, the [information retrieval] system may also ... highlight the occurrences within the documents of the words mentioned in the query.”), 207 (“[T]he final phase [of the search] retrieves the exact positions of the matches to highlight them in those documents that the user actually wants to see.”), 289 (“[I]t is often useful to *highlight* the occurrences of the terms or descriptors that match those of the user’s query. It can also be useful for the system to scroll the view of the document to the first passage that contains one or more of the query terms, and highlight the matched terms in a contrasting color or reverse video. This

display is thought to help draw the user's attention to the parts of the document most likely to be relevant to the query. Highlighting of query terms has been found time and again to be a useful feature for information access interfaces."); EX1027, 3-10 ("In-document match highlighting and search capabilities can also support user confidence. When a document is selected for viewing from a search results list, the search terms matched in the document text should be highlighted. Facilities should also be provided to permit the user to move rapidly, forward or backward, between successive highlighted search terms. This would permit staff to quickly find the portion of the displayed text that pertains to the query, and then to move through the document identifying any successive matches."); EX1017, 4:53-64, FIG. 2; EX1020, FIG. 1; EX1036, 6:8-20, FIG. 5; EX1030, Abstract, 2:29-34, 4:8-11, 7:15-28, 7:41-50, FIG. 9; EX1031, 17:28-33, FIG. 23; EX1033, 1:39-2:48, 5:41-7:43, FIG. 7; EX1034, FIGS. 55-59; EX1035, 16:57-17:5, 27:41-50, 28:7-10, 28:50-56, FIGS. 8-10; EX1038, 71-72 (APPX R); EX1057, 63, 67, 86-88, 163.

46. As just one example, Google's pre-2002 search results would display the portions of located documents containing the searched term(s) and would bold the searched term in the search results to highlight the search terms to the user in the displayed portions of text. EX1028, 119 ("A typical Google summary contains an excerpt from the Web page where the search terms are shown highlighted *in the context of this page.*"); EX1038, 56 (APPX L); EX1033, Title, Abstract, 6:49-59,

FIG. 7; *see also* EX1033, 6:52-56 (“In this example, the user has searched for the term ‘google’ and has selected a link on the Google web site for a document relating to ‘How to Google.’ As shown, the browser assistant [] highlights each occurrence of the word ‘google’ in the document.”); EX1057, 86-88.



EX1038, 56 (APPX L). *See also id.* (describing that the green “L” in the above figure corresponds to “an excerpt from the returned result page with your query terms bolded. These excerpts let you see the context in which your search terms appear on the page, before you click on the result.”).

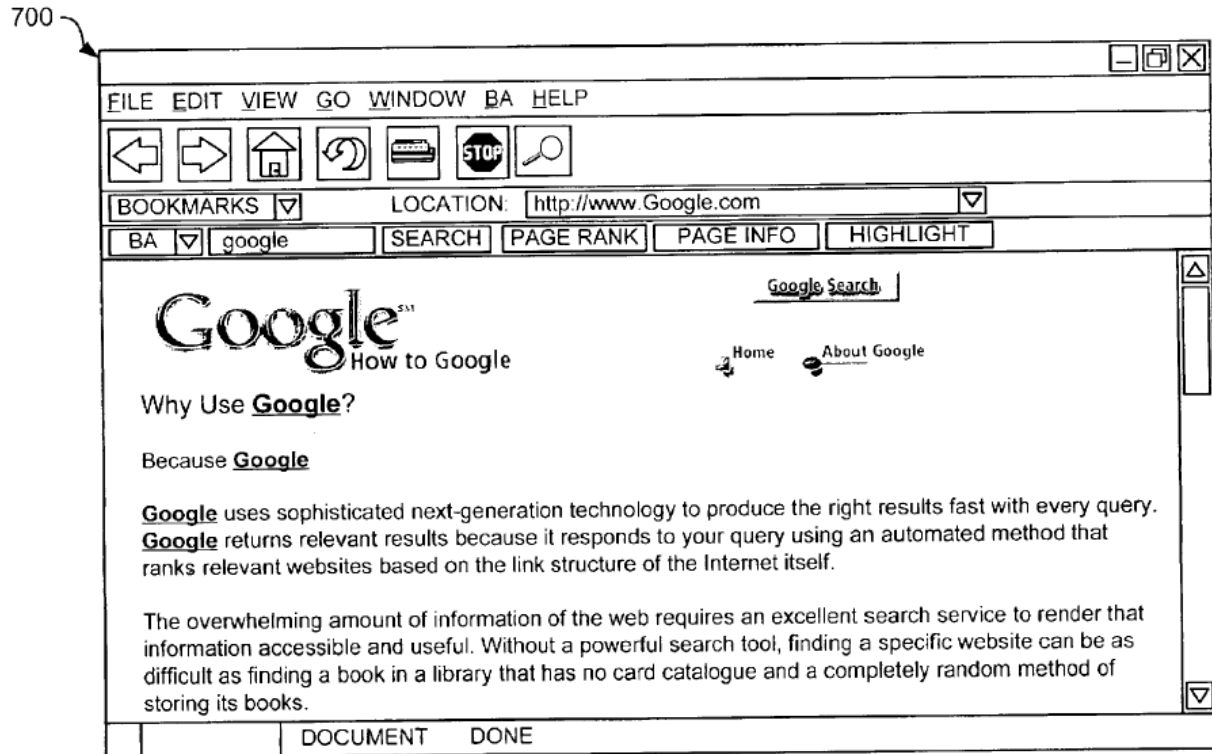


FIG. 7

EX1033, FIG. 7.

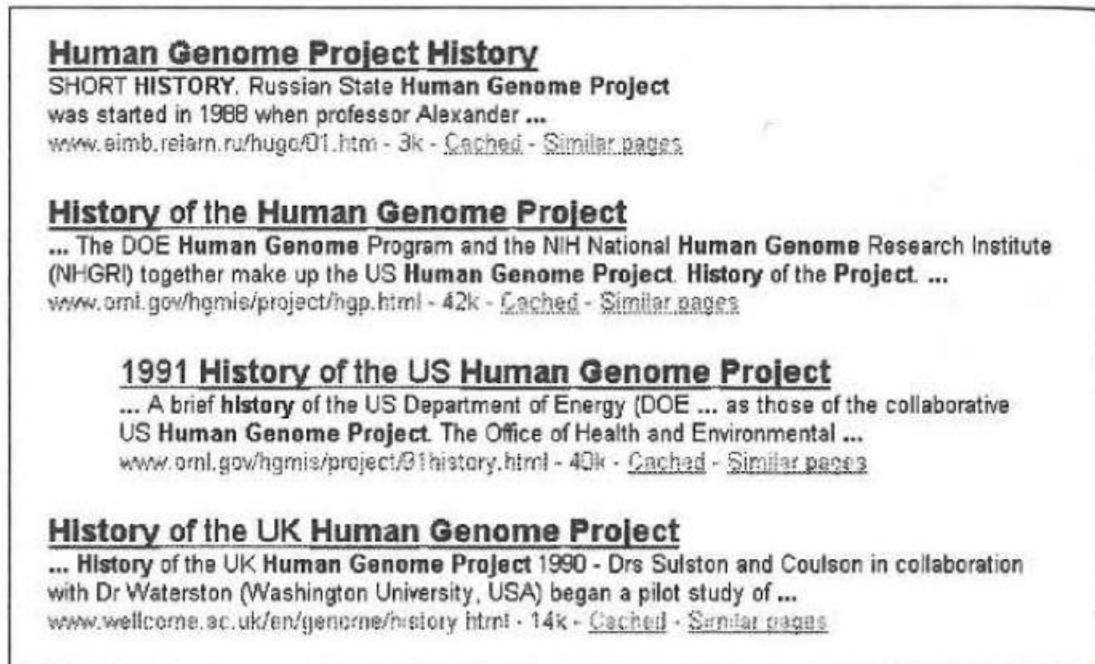


Figure 6.24 To produce these results, we searched for `allintitle:human genome project history`. Note that all of our search terms appear in bold in the Web page titles.

EX1057, 88.

47. As another example, Shneiderman discloses that the Xinquery search engine similarly highlighted every occurrence of search strings in the located documents. EX1044, 5-6.

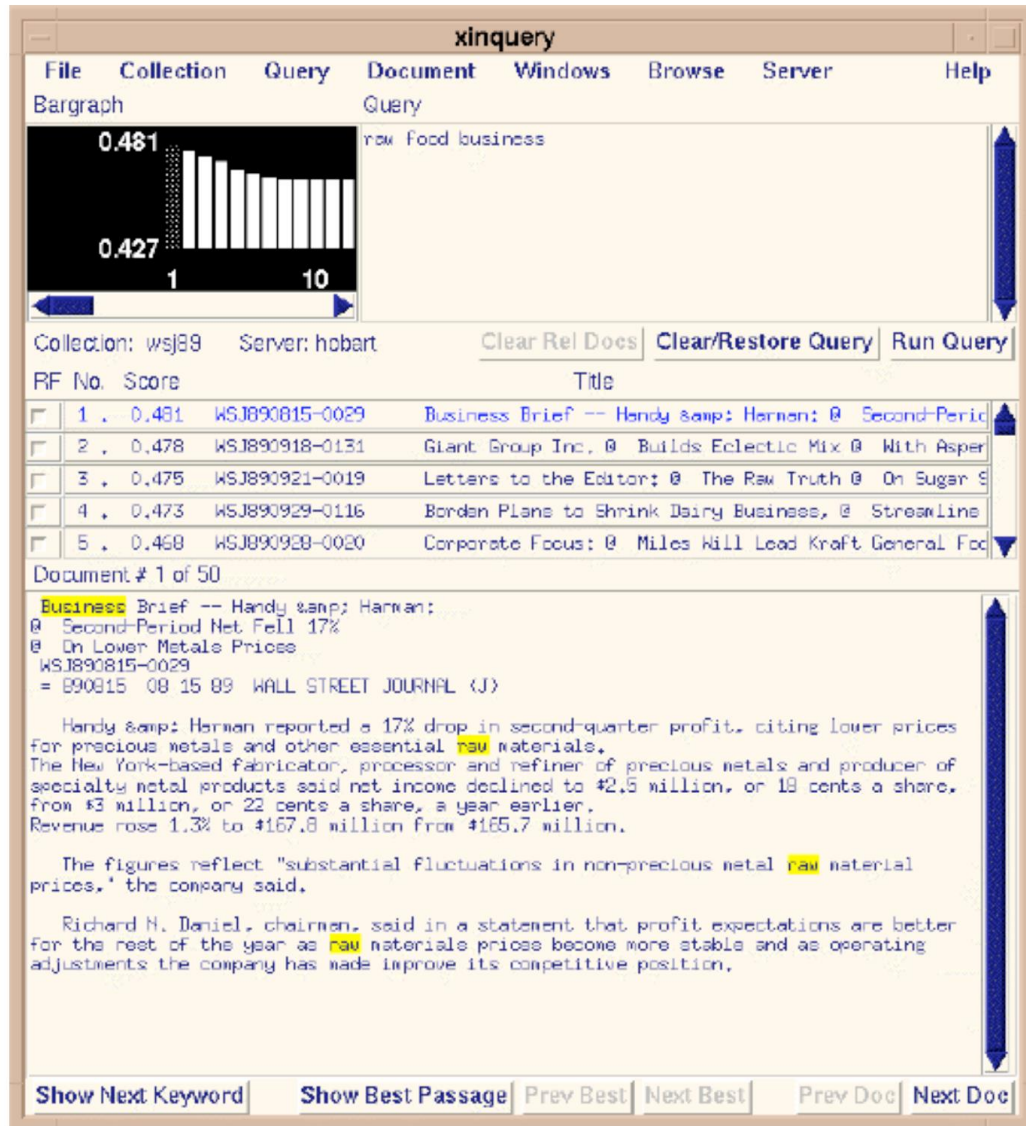


Figure 1. XINQUERY

EX1044, 5.

48. Two other search engines, Yahoo and AltaVista, also highlighted the search terms (by bolding the search terms) in the search results regardless of whether they appeared adjacent or non-adjacent to one another. EX1057, 63, 65, 74-75, 163.

1. [The Mozart Project](#)
The life, times and music of Wolfgang Amadeus **Mozart**. Includes a complete Köchel listing, bibliography, **biography**, links to related sites and...
URL: www.frontiernet.net/~sboerner/mozart/
Directory Match: [Wolfgang A Mozart Bios & Works](#)
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2. [Mozart Discussion](#)
Discussion of Wolfgang Amadeus **Mozart** on the web....
URL: mozart.composers.net/wwwboard/index.html
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URL: tpe.reflektor.cz/mozart/books/index.html
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4. [Mozart, Wolfgang Amadeu: Biography](#)
Site ©1996 Timothy A. Smith. Wolfgang Amadeus **Mozart** 1756-1791.
Child prodigy **Mozart** made his first public appearance, at six years of age, in a...
URL: jan.ucc.nau.edu/~tas3/awamozart.html
[Translate](#) [Related pages](#) [Facts about: Northern Arizona...](#)

Figure 5.23 Here's an example of how AltaVista presents search results for a query that includes the terms *Mozart* and *biography*.

EX1057, 63.



Figure 10.8 Here's an example of how Yahoo presents search results. Category Matches come first, followed by Site Matches.

EX1057, 163 (showing results for a search of “music boxes” AND “collectible”);
see also id., (“Your search terms will be displayed in bold to make them easier to spot.”).

49. It also was known to highlight search terms in emails specifically.

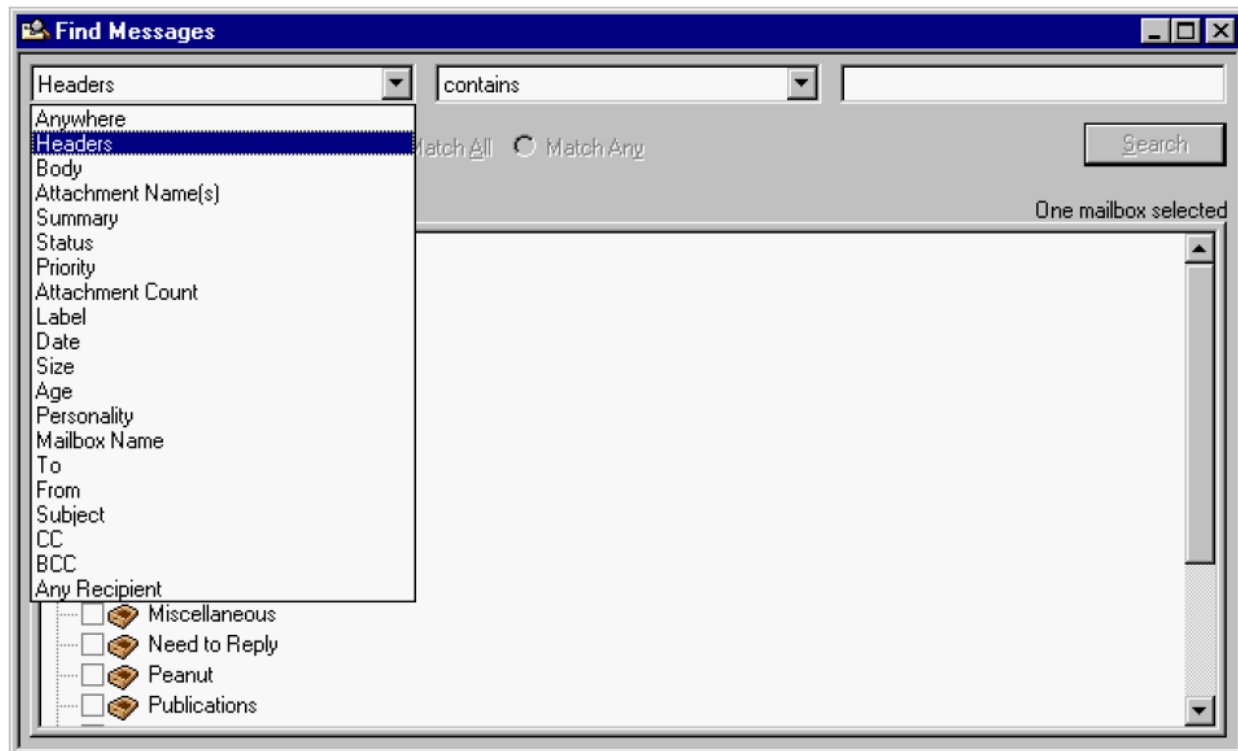
EX1004, 11, 163.

4. Email-Specific Searching

50. Before 2002, it also was well known to search emails specifically.

Indeed, most, if not all, then-existing email systems, such as Entourage, Eudora, and Outlook, had search functionality allowing users to search for terms appearing in various fields of an email, including the To, Cc, From, and Subject fields, as well as the body of the email. EX1004, 161-164; EX1006, 384-387; EX1007, 129-130; EX1008, 268-269, 471-478; EX1023, 108; EX1032, 5:51-56, 11:35-41, 11:64-12:11; EX1037, [0088]; EX1039, 100-105.

Find Messages drop-down and conjunction options lists



EX1007, 129.

VII. CLAIM CONSTRUCTION

51. I understand that, in IPR, claim terms should be given the ordinary meaning that the terms would have to a person of ordinary skill in the art on the earliest effective filing date, in view of the specification and file history.

52. For this declaration, I apply the plain and ordinary meaning of all claim terms. That said, I reserve the right to offer my opinions on any constructions or construction issues presented by Patent Owner.

VIII. GROUND 1: CLAIMS 1-10 ARE OBVIOUS OVER LOTUS NOTES (EX1059, EX1061), RASKIN (EX1021), AND WU (EX1019)

53. As explained below, claims 1-10 are obvious over the Lotus Notes references (EX1059, EX1061), Raskin (EX1021), and Wu (EX1019).

54. The Lotus Notes references teach every element of the challenged claims, including locating documents containing two search strings entered in a single search field, but do not expressly disclose two of the independent claims' features: (1) locating the documents incrementally (i.e., character-by-character) and (2) doing so using an intersection approach (i.e., searching each string separately and then identifying the documents that appear in both sets of search results). Both features were well known in the art (*supra* Sections VI.B.1, VI.B.2), however, Raskin expressly discloses (1) and Wu expressly discloses (2). Thus, claims 1-10 are obvious over Lotus Notes in view of Raskin and Wu.

A. Overview Of The Lotus Notes References (EX1059, EX1061)

55. The Lotus Notes references (EX1059, EX1061) are books describing IBM's Lotus Notes software. EX1059, (a), xvi-xviii; EX1061, (i), 2.

56. The Lotus Notes references are analogous art to the '035 patent because they are from the same field of endeavor: systems and methods for providing a user interface through which a user can enter search strings, and locating documents (e.g., emails) containing the search strings. *E.g.*, EX1001, 1:29-30, 2:9-21, 3:34-62, 4:28-54, FIGS. 3A, 3G-3I; EX1059, 83-85, 159-171; EX1061, 40-41, 133-148.

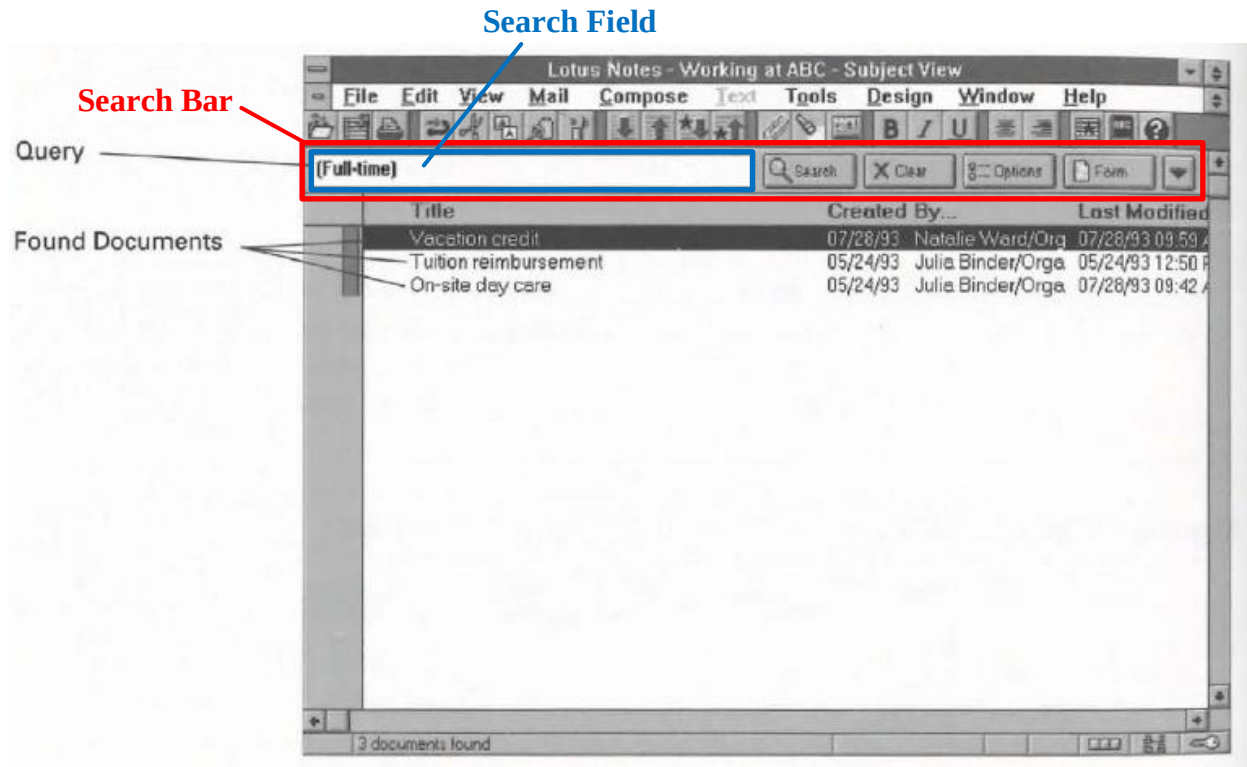
57. The Lotus Notes references explain how Lotus Notes works and how to use it. EX1059, *passim*. Londergan (EX1061) is directed to Lotus Notes R5 and Wilcox is directed to Lotus Notes 3.0 (an earlier version of Lotus Notes). EX1059 (a); EX1061, (i). Though Londergan explains some of the new features of Lotus Notes 5, including its calendaring and auto-complete features (EX1061, 45-74, 146-147), Wilcox provides additional details on the user interface and search functionality (EX1059, 84-85, 159-168) that a POSITA would have understood to also be present, or at least obvious to include, in Lotus Notes 5.

58. As these reference explain, Lotus Notes is a groupware product (EX1059, 1; EX1061, 5-8) that, *inter alia*, indexes documents (EX1059, 168-173; EX1061, 41, 135-139), including email messages (EX1059, 94-134; EX1061, 41,

135-139), and allows users to search for documents containing multiple search strings by entering the search strings in a single search field (EX1059, 160-165; EX1061, 139-142).

59. For example, Lotus Notes discloses two search tools—a simple Search bar and a more advanced Query Builder / Search Builder. EX1059, 160-161 (“Notes provides two tools for performing these searches, the Search bar and the Query Builder dialog box.”), 162-168; EX1061, 133-148.

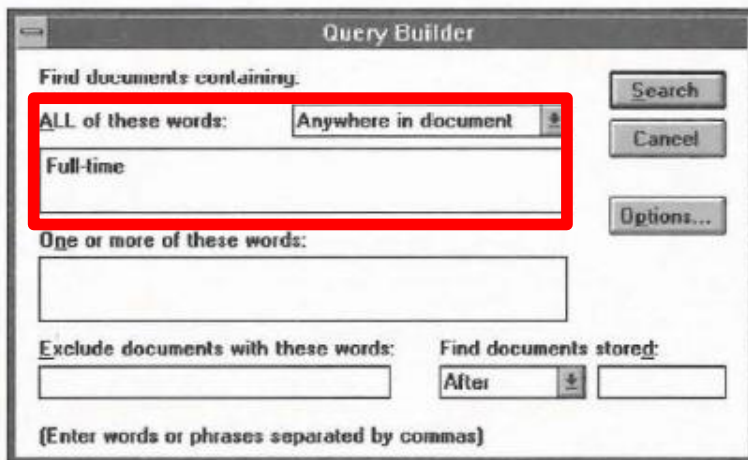
60. For the simple Search bar, the user enters multiple search strings in the search field of the Search bar and separates the search strings with a Boolean AND operator. EX1059, 161 (“In the text box on the Search bar, enter the text for which you wish to search.”), 162 (“You can use *logical operators* AND ... to find documents that contain various combinations of words and text strings.”); EX1061, 140 (“The Search bar contains several important parts. On the left, the blank box is where you type the text that you want to search for. ... **Words connected by *and*** ... [f]or example, [] **gold and silver** [] find[s] documents that contain both the word *gold* and the word *silver*.”).



EX1059, 164 (blue and red annotations added).

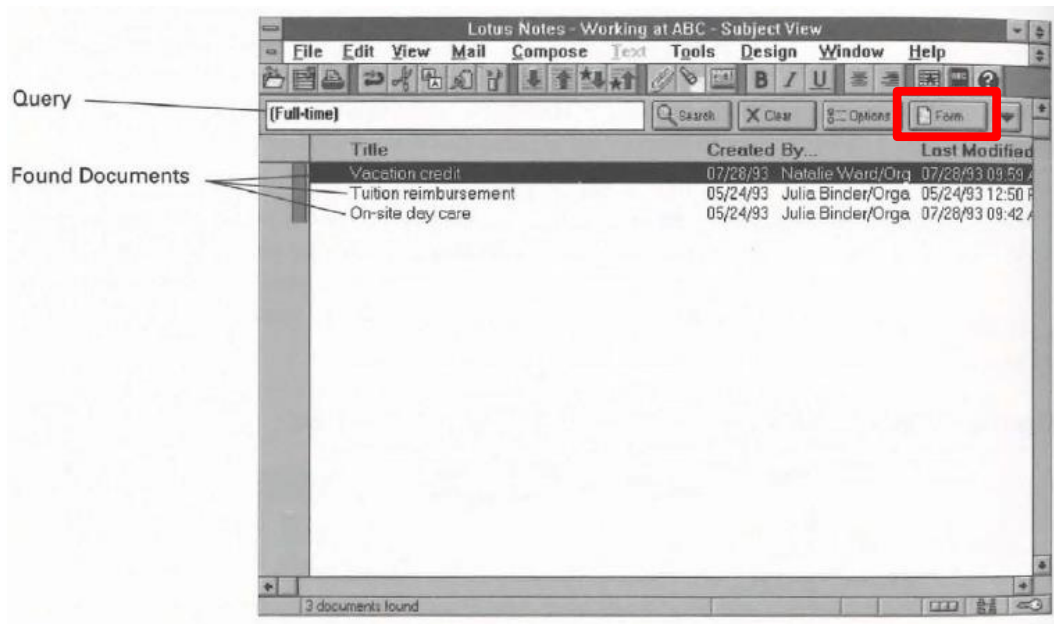
61. For the Query Builder / Search Builder, the user similarly enters the multiple strings in a single search field but separates the search strings with a comma instead of a Boolean AND operator. EX1059, 162 (“To find documents containing all of several words, enter these words in the All Of These Words box. You should separate individual words by commas.”); EX1061, 141-142.

Using the Query Builder dialog box



EX1059, 163 (red annotations added).

62. Lotus Notes also discloses searching within specific fields, including within the title, category, and/or body fields of the documents, by selecting the “Form” button. EX1059, 166-168; EX1061, 143-144.



EX1059, 164 (red annotations added).

Figure 5.20 Searching using a form

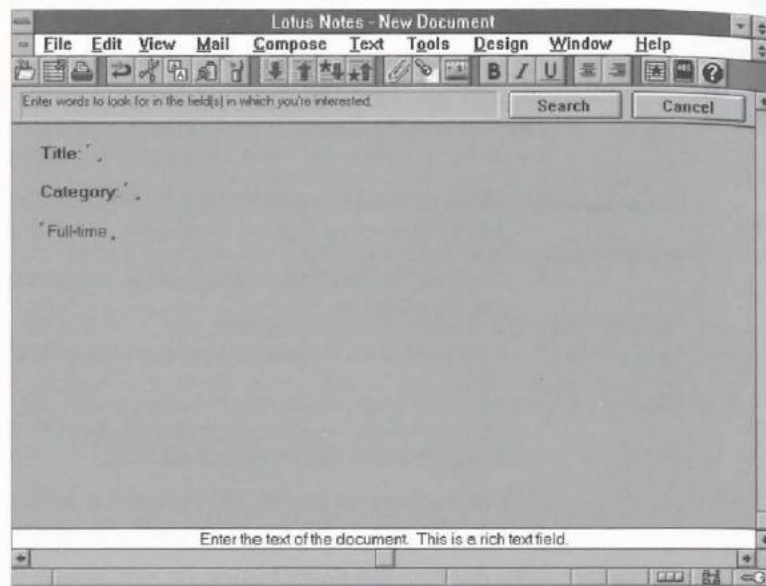


Figure 5.21 A query created using a form



EX1059, 168.

63. Although the Lotus Notes references do not expressly disclose performing an incremental search, Raskin does, and Raskin explains the well-known benefits of doing so, including better responsiveness, effectiveness, and usability. EX1021, 125-127.

B. Overview Of Raskin (EX1021)

64. Raskin is a textbook describing user interface design principles, including for search interfaces. EX1021, xi-xii, 124-132.

65. Raskin is analogous art to the '035 patent because it is from the same field of endeavor: systems and methods for providing a user interface through

which a user can enter search strings, and locating documents (e.g., emails) containing the search strings. *E.g.*, EX1001, 1:29-30, 2:9-21, 3:34-62, 4:28-54, FIGS. 3A, 3G-3I; EX1021, 118-132.

66. Specifically, Raskin describes that there are two main types of searches—delimited searches and incremental searches—and that incremental searches are almost always preferred because they are faster, more effective, and easier to use. EX1021, 125, 126 (“[T]he advantages of incremental searching are so numerous ... that I can see almost no occasions when a delimited search would be preferred.”), 127.

67. In a delimited search, a user “types the pattern, followed by [either] a delimiter ... such as Return” or “click[ing] a button with a label such as OK, Search, Find, or Find Next.” EX1021, 125. An incremental search, on the other hand, “immediately begins to search” as soon as the user “types the first character of the pattern” (EX1021, 126), and continues to update the search results as each character is added or deleted. EX1021, 125-126. Thus, incremental searches “provide[] constant feedback as to the results of the search,” thus “wast[ing] less of a user’s time” and allowing “the user to improve [their] search strategies through the feedback received.” EX1021, 126-127.

68. Although Lotus Notes and Raskin do not expressly disclose locating documents containing both user-entered search strings by searching each string

separately and then combining / intersecting the results, Wu does. EX1019, 6:51-66, 8:66-9:44.

C. Overview Of Wu (EX1019)

69. Wu is a U.S. patent assigned to Yahoo, Inc., that describes a process for searching for, locating, and retrieving indexed documents that contain user-entered search strings. EX1019, Abstract, 3:24-43, 6:51-9:33, FIGS. 3-6.

70. Wu is analogous art to the '035 patent because it is from the same field of endeavor: systems and methods for providing a user interface through which a user can enter search strings, and locating documents (e.g., emails) containing the search strings. *E.g.*, EX1001, 1:29-30, 2:9-21, 3:34-62, 4:28-54, FIGS. 3A, 3G-3I; EX1019, Abstract, 3:24-43, 6:51-9:33, FIGS. 3-6.

71. Specifically, Wu describes a process for locating documents containing at least two search strings by searching each string separately, generating match lists for each string, and then identifying the documents in both sets of match lists. EX1019, 6:51-66, 8:66-9:44. For example, Wu describes how the search tool locates documents containing the words “Game” and “Go” by searching each term separately, generates two match lists, one for documents that contain the word “Game” and another for documents that contain the word “Go,” and then identifies the documents present in both sets of match lists by performing an AND operation (i.e., an intersection of the two match lists). EX1019, 6:54-62

(“Search engine [] looks up each of the terms in the word index []. ... Search engine [] then reads the document lists for ‘game’ and ‘go’, generates a match list for each term and applies an ‘AND’ operator to the match lists as described below in connection with FIG. 6.”), 8:66-11:32, FIGS. 5-6.

D. Combining The Lotus Notes References, Raskin, And Wu

72. A POSITA would have been motivated with a reasonable expectation of success to combine the teachings from the Lotus Notes references on locating documents containing multiple strings entered in a single search field with Raskin’s teachings to provide search results incrementally (i.e., as the user types their query) and Wu’s teachings to locate the documents containing the multiple strings using an intersection approach (i.e., by searching each string independently and then identifying the documents that appear in both sets of search results).

73. A POSITA would have been motivated to combine the complementary teachings on Lotus Notes from Londergan (EX1061) and Wilcox (EX1059) to obtain a more complete and comprehensive understanding of the Lotus Notes system, its features, and its capabilities. For example, Wilcox provides additional details on the core functionality of Lotus Notes’ user interface and search functionality (EX1059, 84-85, 159-168) while Londergan provides details on new features of Lotus Notes R5, including its calendaring and auto-complete features (EX1061, 45-74, 146-147). A POSITA would have looked to Wilcox to

gain a solid understanding of Lotus Notes' core functionality, and would have looked to Londergan for details on the new features in Lotus Notes 5 that were added to this core functionality.

74. A POSITA would have reasonably expected success in combining the two references' complementary teachings on Lotus Notes' search functionality at least because the references describe using the same search tool (e.g., Lotus Notes' Search bar) for the same purpose: finding documents containing multiple strings entered in a single search field. Moreover, the core search functionality of Lotus Notes' search tool (e.g., the Search bar) is largely, if not completely, the same between the two versions, and a POSITA would have understood that any uniquely described functionality for one version would be compatible with the other version given how similar the search tool is in these two versions of the software.

75. A POSITA would have been motivated to perform Lotus Notes' multi-string search incrementally for the reasons stated by Raskin: speed, effectiveness, and ease of use. EX1021, 125-127. Indeed, Raskin specifically points to the type of search taught by Lotus Notes—a multi-string Boolean search—as a search that benefits from being performed incrementally. EX1021, 127 (“[B]uilding a Boolean search pattern is made more effective when the early results of the pattern appear as the user adds to the pattern’s specificity.”).

76. When implementing Lotus Notes' multi-string search, a POSITA would have been motivated to locate the documents containing the two search strings by searching each string separately (i.e., locating a first set of documents containing at least one word that begins with the first string and locating a second set of documents containing at least one word that begins with the second string) and then combining / intersecting the results (i.e., identifying the documents present in the first and second sets of documents), as taught by Wu, at least because it was one of a limited number of well-known, predictable approaches, was simple and easy to implement, and is especially well suited for incremental searches. EX1019, 6:52-62, 9:11-12; *see also supra* Section VI.B.2.

77. A POSITA would have reasonably expected to succeed in combining these teachings from Raskin and Wu with Lotus Notes' teachings because it would have required only simple and straightforward software modifications.

78. In sum, a POSITA would have been motivated with a reasonable expectation of success to modify Lotus Notes' multi-string, single-field search tool to locate documents incrementally, as taught by Raskin, and to locate the documents containing both search strings by searching each string separately and then intersecting the results, as taught by Wu.

**E. The Lotus Notes+Raskin+Wu
Combination Teaches Every Claim Element**

1. Claim 1

a) Element [1.1]

[1.1] A method of performing a search comprising:

79. The Lotus Notes references teach a method of performing a search, including locating documents containing multiple search strings entered in a single search field. EX1059, 84-85, 159-168; EX1061, 40-41, 133-147. For example, both references disclose using a simple “Search bar” or more advanced search tool (Query Builder / Search Builder) to search for documents (e.g., emails) containing multiple search strings (e.g., words) by typing those search strings in a single search field (blank box) and separating the search strings with a string separator character (e.g., a Boolean AND operator). EX1059, 84-85, 159-168; EX1061, 40-41, 133-147.

b) Elements [1.2], [1.4]

[1.2] receiving a first string in a first search field;

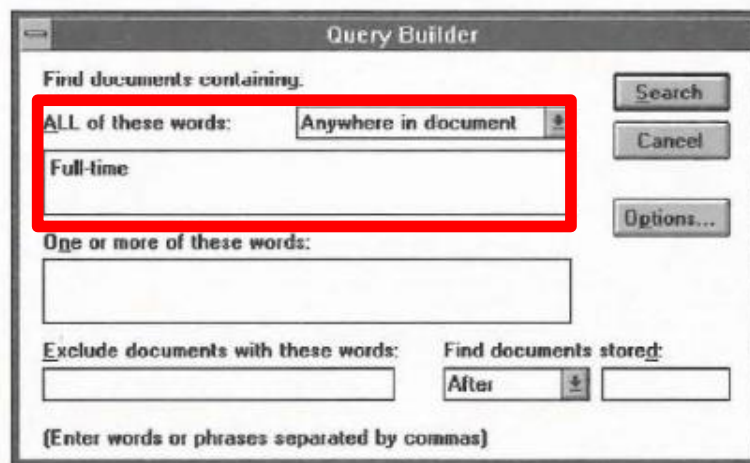
[1.4] receiving a second string in the first search field, wherein the first and second strings are separated by a string separator character in the first search field;

80. The Lotus Notes references teach receiving a first search string (a word such as “gold”) and a second search string (another word such as “silver”) in

a single search field (e.g., a blank box of a Search bar and/or a blank box of a Query Builder/Search Builder dialog box) separated by a string separator character (e.g., a Boolean AND operator and/or a comma). EX1059, 159-168; EX1061, 17, 133-148, 195.

81. For example, the Lotus Notes references describe receiving two search strings in the search field of the Query Builder / Search Builder dialog box separated by a comma. EX1059, 159-165; EX1061, 142-144.

Using the Query Builder dialog box



EX1059, 163 (red annotations added). *See also id.*, 162 (“To find documents containing all of several words, enter these words in the All Of These Words box. You should separate individual words by commas.”); EX1061, 141-142.

82. As another example, the Lotus notes references describe receiving two search strings such as “gold” and “silver” in the search field of the Search bar

separated by a Boolean AND operator. EX1061, 17, 140-141, 195; *see also* EX1059, 159-162.



EX1061, 140; *see also id.* (“[T]ype **gold and silver** to find documents that contain both the word *gold* and the word *silver*.”); EX1059, 162 (“You can use *logical operators* AND ... to find documents that contain various combinations of words and text strings.”). To the extent the Boolean AND operator is not considered a string separator character (which I do not agree with), it would have been obvious to a POSITA when implementing Raskin’s teachings to perform the search incrementally to use a single-character string separator character instead of the three-character Boolean AND operator, such as a plus sign, as was known in the art (*e.g.*, EX1057, 60, 109, 129, 151), or a comma, as described by the Lotus Notes references (EX1059, 159-165), at least because a POSITA knew that a goal of the incremental search is to minimize the number of characters the user has to enter before obtaining the desired search results. *E.g.*, EX1021, 125-127.

c) **Elements [1.3], [1.5]**

[1.3] in response to receiving the first string, incrementally locating a first group of documents that has at least a first word that begins with the first string;

[1.5] in response to receiving the second string, incrementally locating a second group of documents that has at least a second word that begins with the second string and identifying one or more documents that are included in each of the first and second groups of documents; and

83. The Lotus Notes+Raskin+Wu combination teaches these elements.

The Lotus Notes references disclose locating documents containing both search strings but do not expressly disclose doing so incrementally (i.e., locating documents that contain words that begin with the partial / incomplete search strings as the user types in their search query) and doing so using an intersection approach (i.e., locating a first group of documents that contain the first search string, locating a second group of documents that contain the second search string, and then identifying the document(s) included in both sets of documents). EX1059, 159-168; EX1061, 134-135, 139-146. As noted above, however, Raskin discloses incremental searches (which were well known, *see* Section VI.B.1) and explains their known benefits, and Wu discloses the well-known intersection approach for locating documents containing two search strings. EX1019, 6:51-53, 6:54-62 (“Search engine [] looks up each of the terms in the word index []. ... Search engine [] then reads the document lists for ‘game’ and ‘go’, generates a match list for each term and applies an ‘AND’ operator to the match lists as described below in connection with FIG. 6.”), 6:63-66, 8:66-9:10, 9:11-12 (“FIG. 6 is a flow chart of a process of ‘AND’ing two or more match lists to generate a new match list.”),

9:13-23, 9:24-32 (“The need for ‘AND’ing two or more match lists might come about where a search string contains an expression of the form ‘expression__A AND expression__B AND . . . ’. One match list is obtained for ‘expression__A’ indicating the documents that contain that subterm, another for ‘expression__B’, and so on. The resulting match list is a list of all the documents which contain all of the ‘AND’ed expressions”), 9:33-11:32, FIGS. 5-6; EX1021, 125-127.

84. As I explained above in Section VIII.D, a POSITA would have been motivated to combine the Lotus Notes references’ teachings on the Lotus Notes search tool with Raskin’s teachings to locate documents incrementally for the reasons stated by Raskin: speed, effectiveness, and ease of use. EX1021, 125-127. Unlike a delimited search in which a user has to wait until they have entered their full search query to view the search results, an incremental search, “immediately begins to search” as soon as the user “types the first character of the pattern” (EX1021, 125), and continues to update the search results as each character is added or deleted. EX1021, 125-126. Thus, incremental searches “provide[] constant feedback as to the results of the search,” thus “wast[ing] less of a user’s time” and allowing “the user to improve [their] search strategies through the feedback received.” EX1021, 126-127.

85. Specifically, the constant feedback allows the user to more quickly identify errors or problems with their search and to refine their query in real time to

obtain the desired results more quickly than they would have with a delimited search. EX1021, 126-127. Moreover, if the user's query is on point, the user does not have to type the full query before seeing the desired results. *Id.*, 126. Indeed, Raskin specifically points to the type of search taught by Lotus Notes—a multi-string Boolean search—as a search that benefits from being performed incrementally. EX1021, 127 (“[B]uilding a Boolean search pattern is made more effective when the early results of the pattern appears as the user adds to the pattern’s specificity.”).

86. A POSITA would have understood that implementing Raskin’s incremental search teachings involves treating the search strings as partial search strings / prefixes and locating documents that contain words the begin with the search strings at least because POSITA knew that this is fundamentally how incremental searching works. The user types a character and the incremental search tool locates all documents containing words that start with that character, and then as the user types additional characters, the search tool narrows the results to only documents that contain those additional characters. EX1021, 125-127.

87. As I also explained above in Section VIII.D, a POSITA would have been motivated to locate the documents containing the two search strings by searching each string separately and then combining / intersecting the results, as taught by Wu, at least because it was one of a limited number of well-known,

predictable approaches, and was simple and easy to implement. EX1019, 6:52-62, 9:11-12; *see also supra* Section VI.B.2. In particular, a POSITA would have recognized that there were a limited number of known ways (a few at most) to locate documents containing both search strings, including either the claimed intersection approach, which searches each string separately and then combines / intersects the results, a sequential approach, which sequentially checks each document for both search strings, or a sort of hybrid approach, which locates documents containing one of the search strings and then searches within that set of documents for documents also containing the other search string.

88. Moreover, this intersection approach would have been a commonsense approach for locating documents containing both search strings when performing an incremental search because a POSITA would have recognized that this approach's separate treatment of each string is well suited for an incremental search where a user can independently modify each string as they type in their query. That is, a POSITA would have understood that the intersection approach's separate treatment of the search strings would provide quick results for such an incremental search because it would be able to efficiently update search results in response to modifications to either search string. For example, if a user were to modify only one string, the sequential search approach would have to completely rerun the search because it searches for both strings simultaneously,

whereas the intersection approach could preserve previous results for the unmodified search string, and would only have to update results for the modified search string.

89. As I also explained above in Section VIII.D, a POSITA would have reasonably expected to succeed in combining these teachings from Raskin and Wu with Lotus Notes' teachings because it would have required only simple and straightforward software modifications.

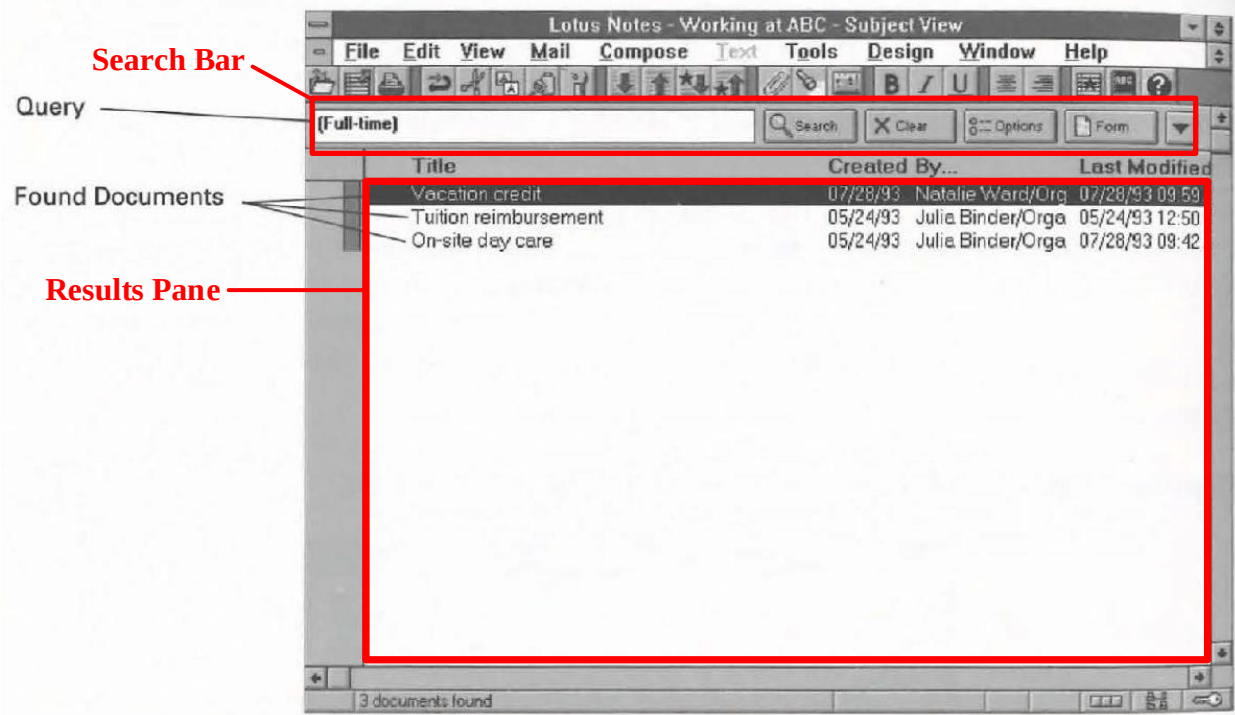
d) Element [1.6]

[1.6] displaying an indication of one or more of the identified one or more documents that are included in each of the first and second groups of documents.
--

90. The Lotus Notes references teach displaying an indication of the one or more documents that contain the two search strings (i.e., the identified one or more documents included in each of the first and second groups of documents). EX1059, 84-85, 160-165; EX1061, 133-135, 139-140, 141 (“[C]lick Search, and wait for the proper documents to appear.”), 142-144, 145-146 (“Notes lists the documents that match your criteria in order of their relevance”), 148.

91. For example, Lotus Notes displays the documents containing the search strings in a results pane below the Search bar.

Figure 5.17 **The results of a query**



EX1059, 164 (red annotations added).

2. Claim 2

2. The method of claim 1, further comprising displaying a portion of a selected document of the documents that are included in each of the first and second groups of documents.

92. The Lotus Notes+Raskin+Wu combination renders this claim obvious at least because the Lotus Notes references expressly disclose displaying a portion of a selected document of the documents containing the first and second search strings (i.e., the first and second groups of documents). EX1059, 164 (“Open the [] document The found text [] is indicated by a red box.”), 165; EX1061, 145,

146 (“[O]pen a document uncovered by a search Notes then shows you the document and highlights the text that you wanted to find.”).

93. Moreover, it would have been obvious to display a portion of a selected document because it was well known in the art to do so to provide the user with more information about each of the search results. *Supra* Section VI.B.3.

3. Claim 3

3. The method of claim 2, further comprising automatically highlighting a first occurrence of the first word in the selected document.

94. The Lotus Notes+Raskin+Wu combination renders this claim obvious at least because the Lotus Notes references expressly disclose automatically highlighting a first occurrence of the first word in the selected document. EX1059, 164 (“The found text [] is indicated by a red box.”), 165; EX1061, 145, 146 (“Notes [] shows you the document and highlights the text that you wanted to find.”).

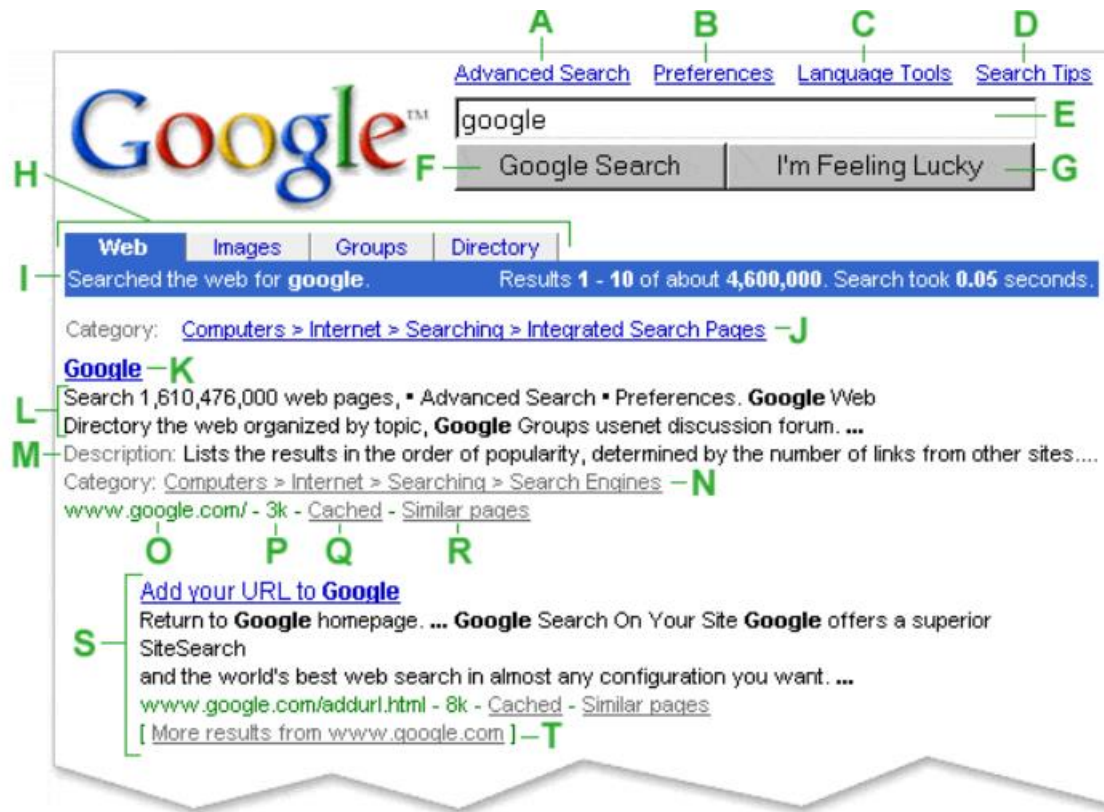
95. Moreover, it would have been obvious to highlight the first occurrence of the first word in the selected document at least because it was well known in the art to do so to draw the user’s attention to the most relevant portions of the document. *Supra* Section VI.B.3.

4. Claim 4

4. The method of claim 2, further comprising highlighting at the same time a plurality of occurrences of the first word in the selected document while not highlighting portions of text between occurrences of the first word.

96. The Lotus Notes+Raskin+Wu combination renders this claim obvious at least because the Lotus Notes references teach highlighting at the same time a plurality of occurrences of the first word in the selected document while not highlighting portions of text between occurrences of the first word at least because they disclose “highlight[ing] the text that you wanted to find” (not just the first instance) and disclose quickly jumping from occurrence to occurrence. EX1061, 146 (“[Y]ou can jump quickly to the next occurrence of the search text by pressing Ctrl++.”); *see also* EX1059, 164. Moreover, a POSITA would have found it obvious to highlight a plurality of occurrences of the first word in the selected document (e.g., every occurrence of the first word), rather than only the first occurrence, to point the user to more (e.g., all) of the relevant portions of the document, as was well known in the art. *See supra* Sections VI.B.3, VIII.E.3.

97. As just a few examples, Google (EX1038), Shneiderman (EX1044), Jensen (EX1035), and Glossbrenner (EX1057) each disclose highlighting every occurrence of the search string(s) in the search results.



EX1038, 56 (APPX L) (showing every occurrence of the searched word “google”).

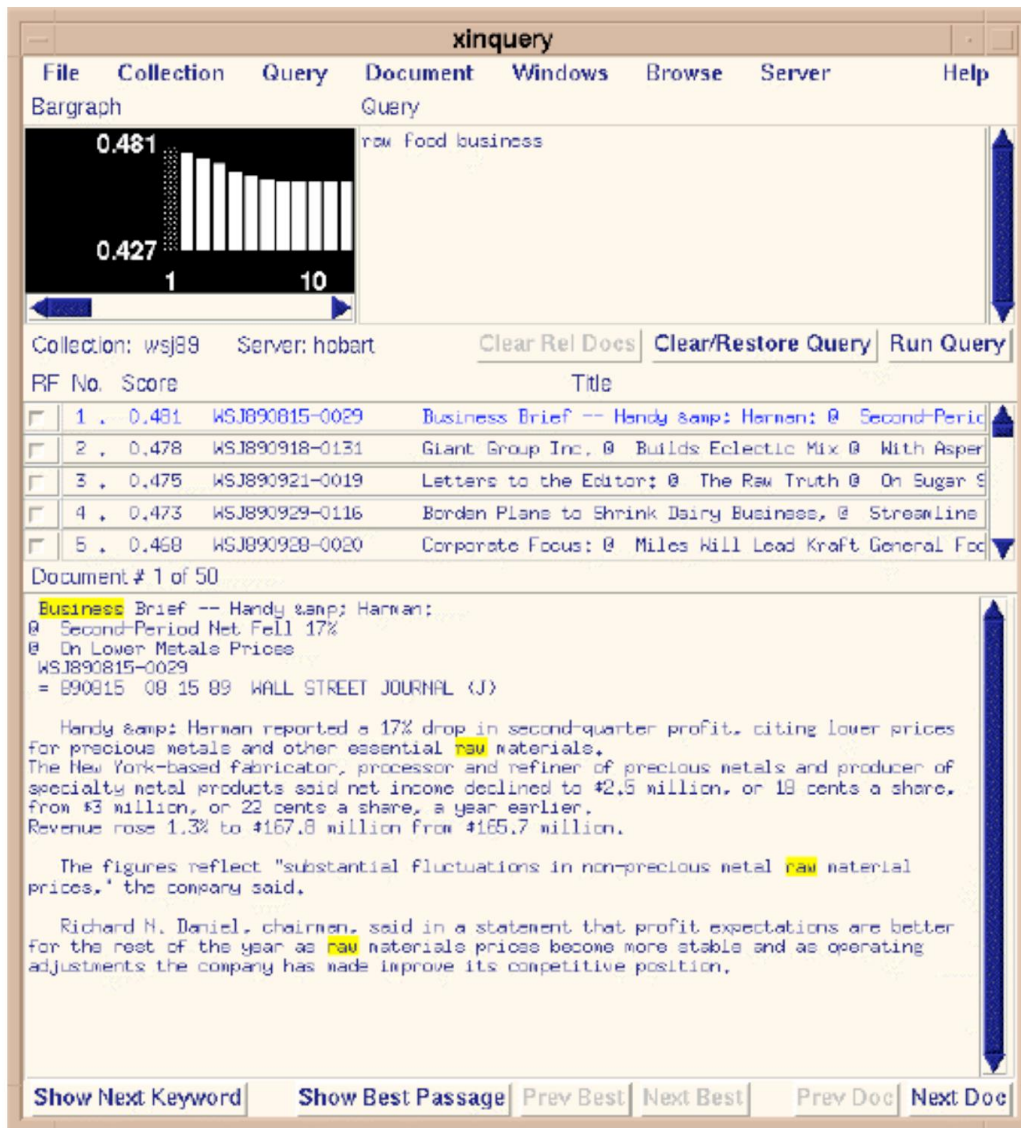


Figure 1. XINQUERY

EX1044, 5 (showing every occurrence of the searched strings “Business” and “raw”).

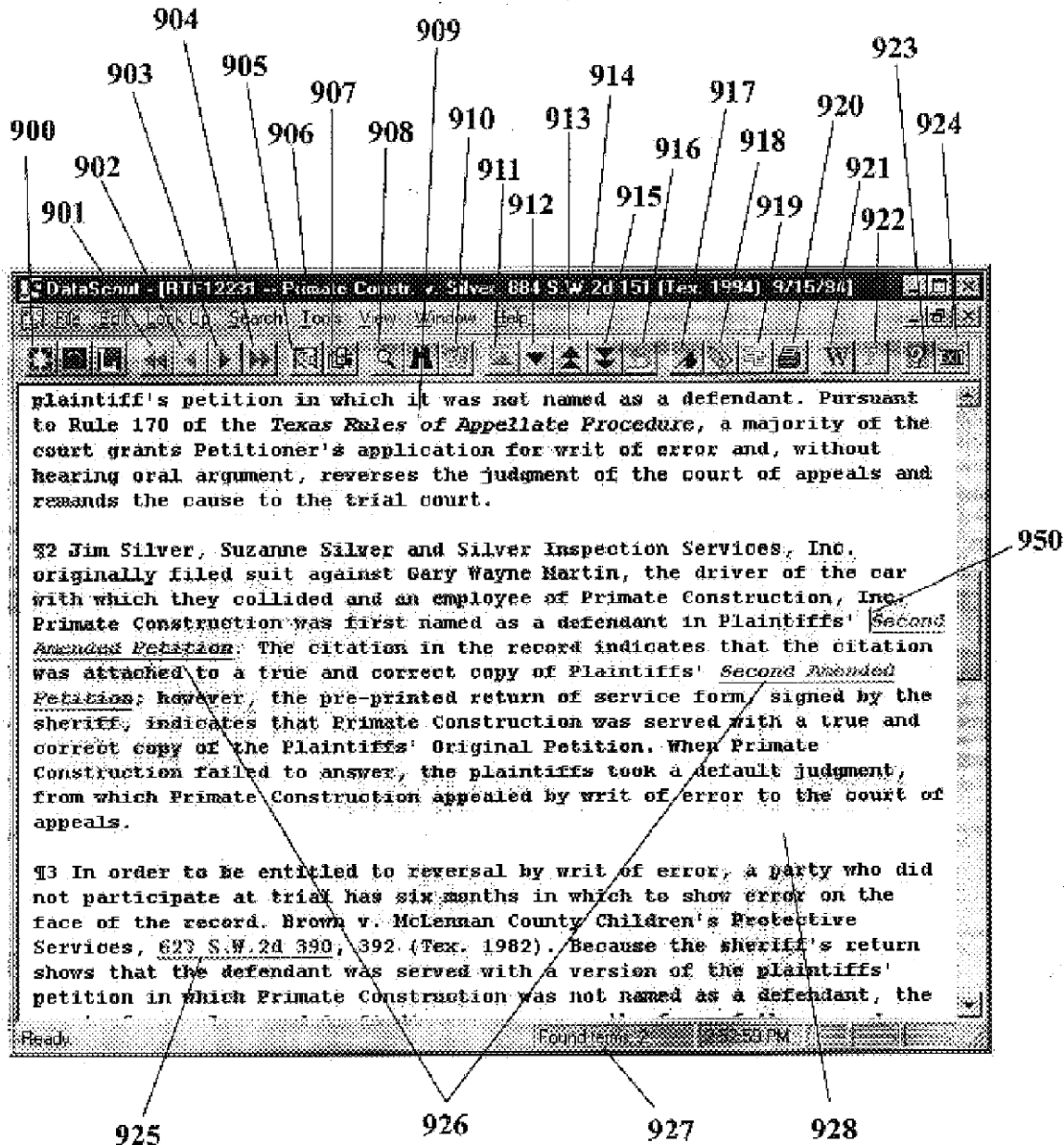


Fig. 9

EX1035, FIG. 9 (showing highlighting, via italicizing and underlining, every occurrence of the searched term “second amended petition”).

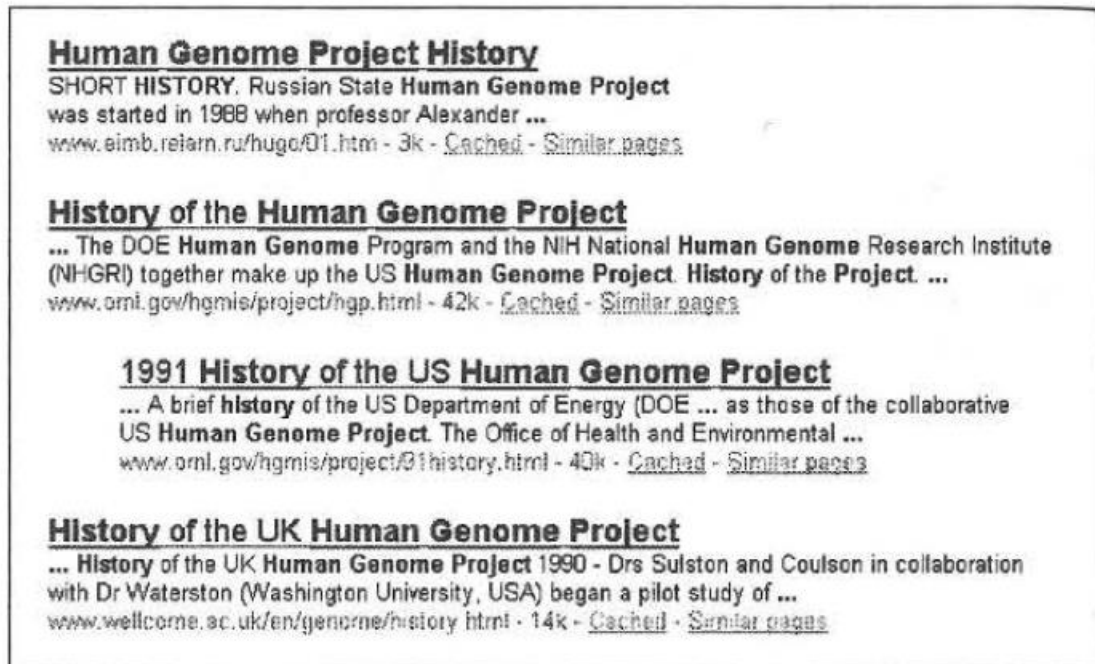


Figure 6.24 To produce these results, we searched for `allintitle:human genome project history`. Note that all of our search terms appear in bold in the Web page titles.

EX1057, 88.

1. [The Mozart Project](#)
The life, times and music of Wolfgang Amadeus **Mozart**. Includes a complete Köchel listing, bibliography, **biography**, links to related sites and...
URL: www.frontiernet.net/~sboerner/mozart/
Directory Match: [Wolfgang A Mozart Bios & Works](#)
[Translate](#) [More pages from this site](#) [Related pages](#) [Facts about Frontier Corp](#)

2. [Mozart Discussion](#)
Discussion of Wolfgang Amadeus **Mozart** on the web....
URL: mozart.composers.net/wwwboard/index.html
[Translate](#) [More pages from this site](#) [Related pages](#)

3. [The Mozart Project: Bibliography](#)
HOME | **BIOGRAPHY** | COMPOSITIONS | SELECTED ESSAYS | BIBLIOGRAPHY
Mozart's Works and Writings. Anderson, Emily, ed. The...
URL: tpe.reflektor.cz/mozart/books/index.html
[Translate](#) [More pages from this site](#) [Related pages](#)

4. [Mozart, Wolfgang Amadeu: Biography](#)
Site ©1996 Timothy A. Smith. Wolfgang Amadeus **Mozart** 1756-1791.
Child prodigy **Mozart** made his first public appearance, at six years of age, in a...
URL: jan.ucc.nau.edu/~tas3/wamozart.html
[Translate](#) [Related pages](#) [Facts about: Northern Arizona...](#)

Figure 5.23 Here's an example of how AltaVista presents search results for a query that includes the terms *Mozart* and *biography*.

EX1057, 63.

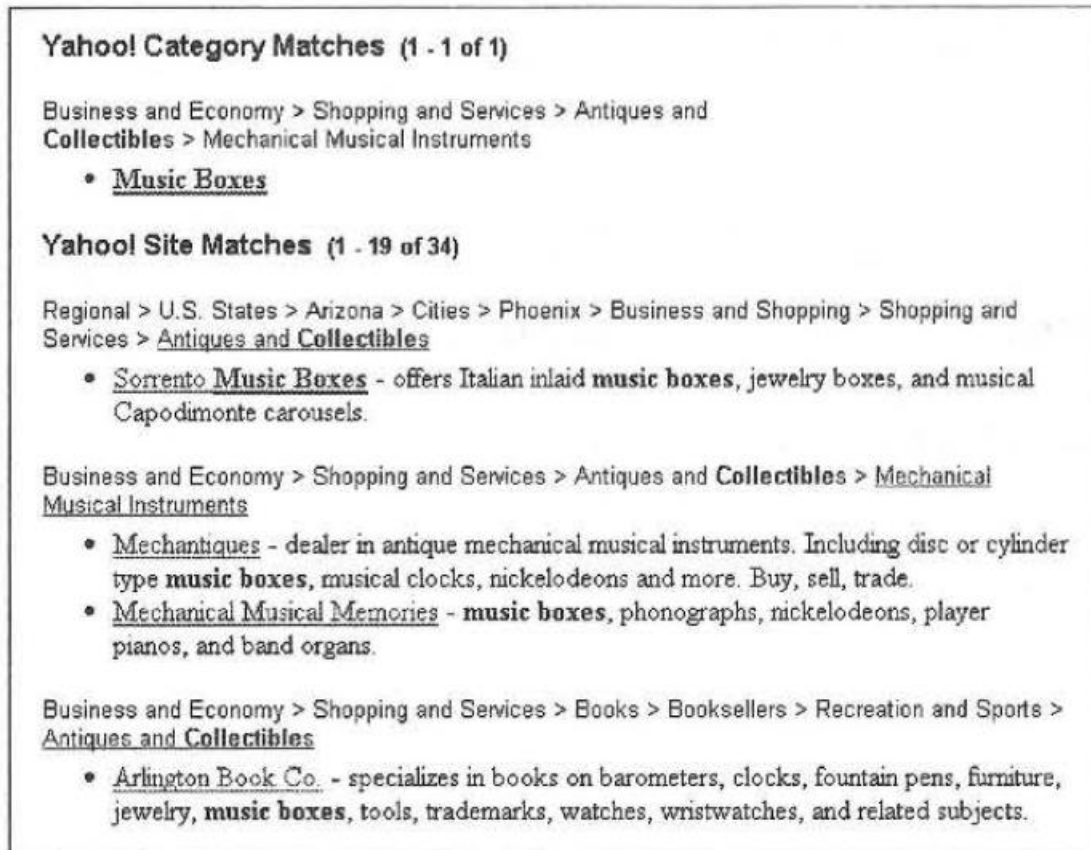


Figure 10.8 Here's an example of how Yahoo presents search results. Category Matches come first, followed by Site Matches.

EX1057, 163.

5. Claim 5

5. The method of claim 1, wherein the documents comprise one or more of emails, text documents, contact information, appointment information, task information, music files, system files, photographs, and images.

98. The Lotus Notes+Raskin+Wu combination renders this claim obvious at least because, as explained above for elements [1.3] and [1.5] (*supra* Section

VIII.E.1.c), the Lotus Notes references disclose that the documents comprise emails. EX1059, 94-134, 159-171; EX1061, 21-43, 133-148.

6. Claim 6

6. The method of claim 1, wherein the documents comprise emails and the method further comprises automatically displaying in a user interface a first occurrence of the first word in a first of the identified one or more emails.

99. This claim is obvious at least because for the same reasons provided above for claims 3 and 5. *Supra* Sections VIII.E.3, VIII.E.5.

7. Claims 7-9

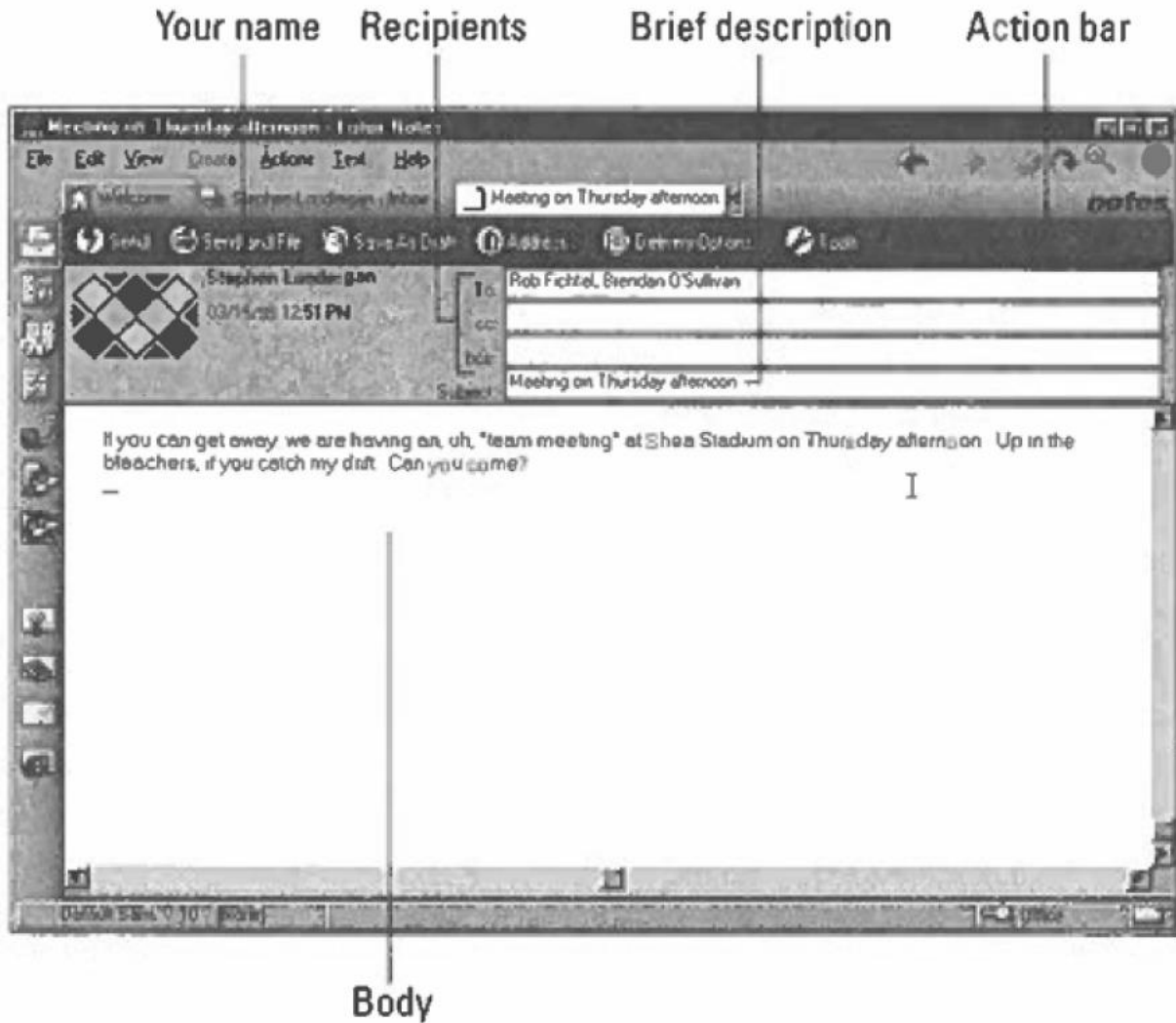
7. The method of claim 1, wherein at least some of the documents comprise at least the following email fields in which one or more of the first and second strings may be located: to, from, cc, bcc, subject, body.

8. The method of claim 1, wherein the single search field corresponds with a single field of the documents and the incrementally locating steps are performed only on content of the single field of the documents.

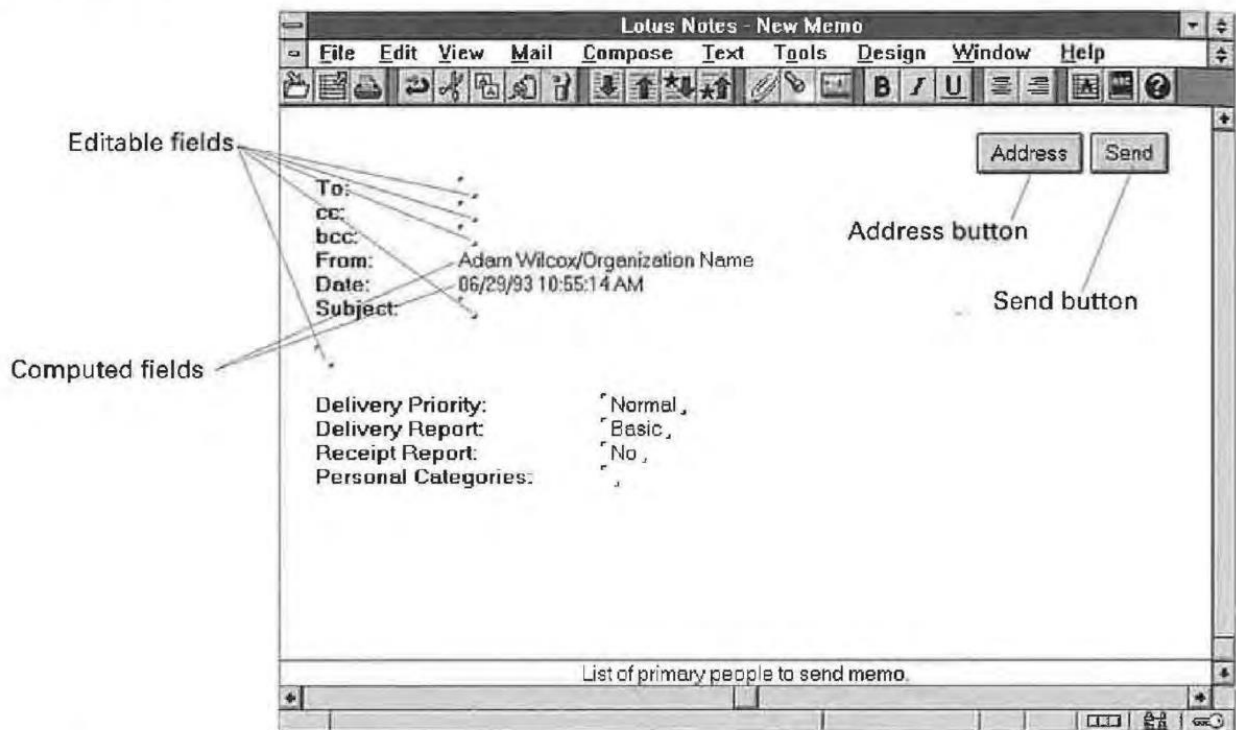
9. The method of claim 8, wherein the single field of the documents comprises one of: to, from, cc, bcc, subject, and body fields of email documents.

100. The Lotus Notes+Raskin+Wu combination renders this claim obvious at least because the Lotus Notes references disclose that the documents comprise emails comprising title, category, body, To, cc, and bcc fields (EX1059, 100-112; EX1061, 31-35), disclose the ability to search within specific fields of the documents, such as by using a form (EX1059, 167-168; EX1061, 142-144, 146-147), and disclose searching within the “name, To, cc, and bcc fields in the memos

in your email database ... ” (EX1061, 147). *See also* EX1059, 249-253 (allowing users to create their own custom fields).



EX1061, 32 (showing the fields of an email include the To, cc, bcc, subject, and body fields).



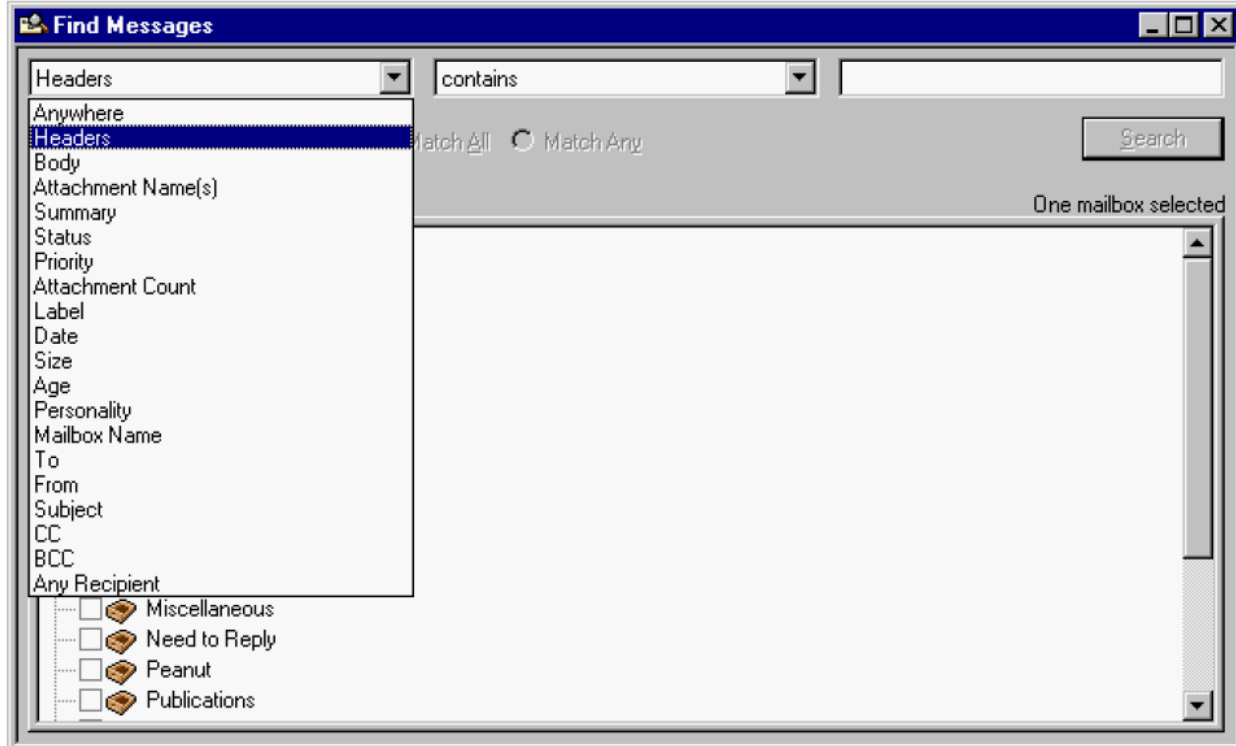
EX1059, 102 (showing the fields of an email include the To, cc, bcc, subject, and body fields).

Figure 5.21 A query created using a form



EX1059, 168 (showing use of a form to search within a specific field (in this example, the body) of a document).

101. Moreover, a POSITA would have found it obvious to provide this targeted search ability, given that it was well known in the art. *Supra* Section VI.B.4.

Find Messages drop-down and conjunction options lists

EX1007, 129.

8. Claim 10

a) Element [10.1]

[10.1] A search apparatus stored on a computer readable medium, the search apparatus comprising instructions configured to be executed by a computing device in order to perform the method of:

102. The Lotus Notes references teach that the search apparatus (the Lotus Notes software) is stored on a computer readable medium (a hard drive) and contains instructions configured to be executed by a computing device (e.g., the computing device on which the Lotus Notes software is downloaded) in order to perform the claimed method steps recited in elements [10.2]-[10.6]. EX1059, xx-

xxi, xxv-xxix, 3-5, 6 (“[T]he Notes workstation software must be installed on your computer’s hard drive.”); EX1061, 128-129, 136-137, 148, 187 (“Notes [is] installed on users’ computers.”), 190, 191.

b) Elements [10.2]-[10.6]

103. These elements are substantively identical to elements [1.2]-[1.6].

Thus, the Lotus Notes+Raskin+Wu combination teaches these elements for at least the same reasons provided above in Sections VIII.E.1.b-VIII.E.1.d.

IX. GROUND 2: CLAIMS 1-10 ARE OBVIOUS OVER THE ENTOURAGE REFERENCES (EX1004-EX1006), TRUE (EX1009), AND BAEZA-YATES (EX1023)

104. As explained below, claims 1-10 are obvious over the Entourage references (EX1004-EX1006) in view of True (EX1009) and Baeza-Yates (EX1023).

105. The Entourage references disclose every element of the challenged claims except two of the independent claims’ features: (1) receiving two partial search strings in a single search field; and (2) locating documents containing the two partial search strings by searching each string separately and then identifying the documents that appear in both sets of search results. Both features were well known in the art (*supra* Section VI.B.2), however, and True expressly discloses (1) and Baeza-Yates expressly discloses (2).

106. In sum, the patent's alleged improvement—incremental searching—was not an improvement, but rather a very well-known concept that dates back to at least the 1970s. *Supra* Section VI.B.1. The Entourage references expressly disclose this concept and disclose using it to specifically search emails, as recited in some of the dependent claims. The independent claims' recitation of the other well-known features disclosed by True and Baeza-Yates do not make these otherwise obvious claims nonobvious. Just the opposite, it confirms that these claims are nothing more than the obvious inclusion of well-known features in a then-existing incremental search tool.

107. Thus, claims 1-10 are obvious over the Entourage reference in view of True and Baeza-Yates.

A. Overview Of The Entourage References (EX1004-EX1006)

108. The Entourage references—Schwartz (EX1004), Sebastian (EX1005), and Barber (EX1006)—are books describing aspects of the same Microsoft email system: Entourage 2001 for Macintosh (“Entourage”). EX1004, (i); EX1005, (a)-(c), 171-188; EX1006, (i), 1-3, 5, 9, 283-392.

109. The Entourage references are analogous art to the '035 patent because they are from the same field of endeavor: systems and methods for providing a user interface through which a user can enter search strings, and locating documents (e.g., emails) containing the search strings. *E.g.*, EX1001, 1:29-30, 2:9-

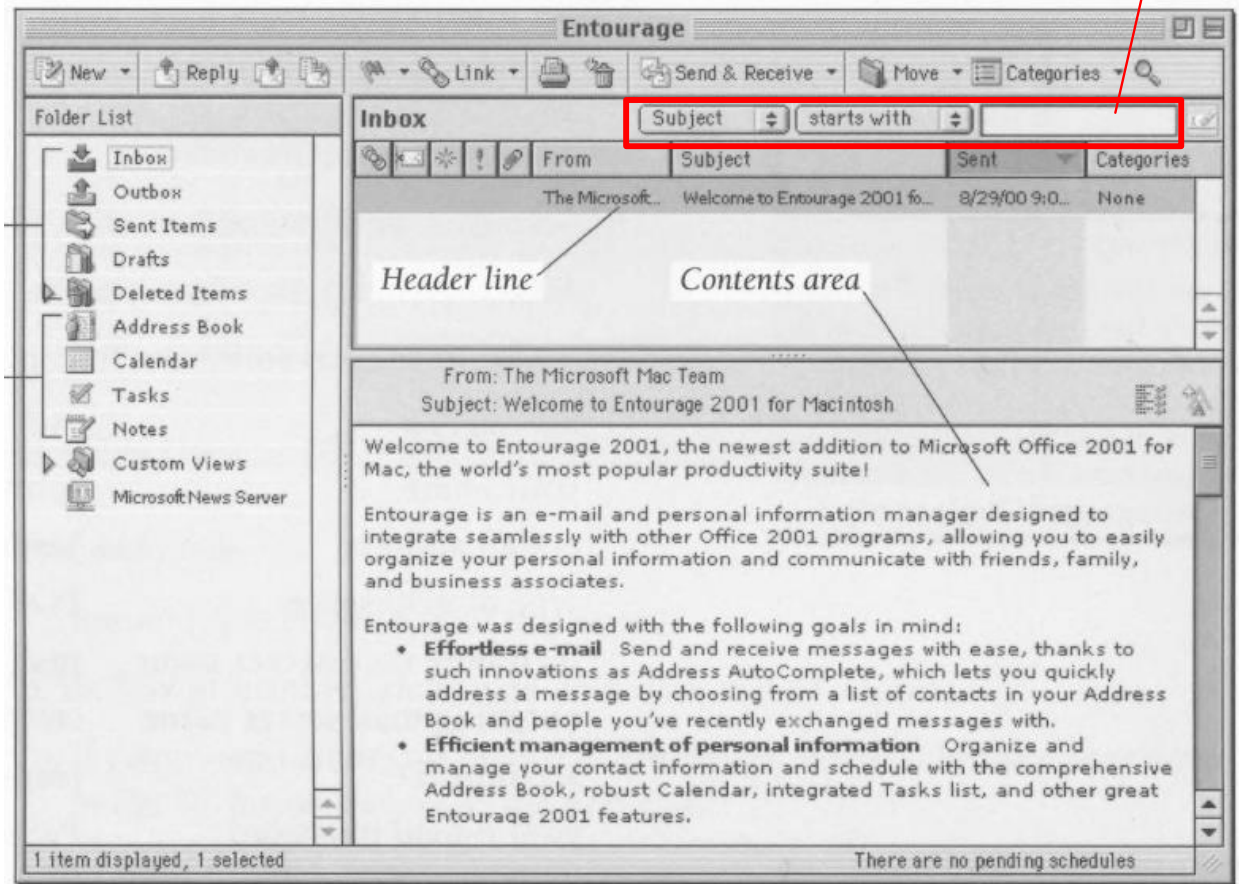
21, 3:34-62, 4:28-54, FIGS. 3A, 3G-3I; EX1004, 2-12, 161-164; EX1005, 173; EX1006, 283-285, 384-387.

110. The Entourage references explain how Entourage works and how to use it. EX1004, *passim*; EX1005, 171-188; EX1006, 283-392. As these references explain, Entourage comprises six main components: an email client, newsgroup reader, address book, calendar, tasks, and notes. *E.g.*, EX1004, 2; EX1006, 281. Entourage provides several ways for users to search for documents (e.g., emails, news articles, tasks, contacts) containing specific text: (1) an incremental, quick-find search; (2) a “Find” search; and (3) and an “Advanced Find” search. EX1004, 8-14, 38-39, 89-90, 136, 161-164, 204-205, 209; EX1005, 173; EX1006, 384-387. A user can access the incremental, quick-find search from the main window of a folder (e.g., the main window of an email Inbox folder). EX1004, 8-9, 39, 89, 161, 204-205, 209; EX1005, 173; EX1006, 358, 384.

111. The incremental, quick-find search allows a user to search within specific email headers (To, From, Subject, Category) and displays results incrementally, “[a]s you type the filter text.” EX1004, 9; *see also id.*, 8, 161; EX1005, 173; EX1006, 358, 384. Thus, the incremental search will display results for prefixes (words that “[s]tart[] [w]ith” the user-entered search string), such that the user does not have to type out the entire word. *E.g.*, EX1004, 161; EX1005, 173; EX1006, 384-386.

Entourage's Incremental, Quick-Find Search

Search Field



EX1005, 173 (red annotations added).

Entourage's Incremental, Quick-Find Search

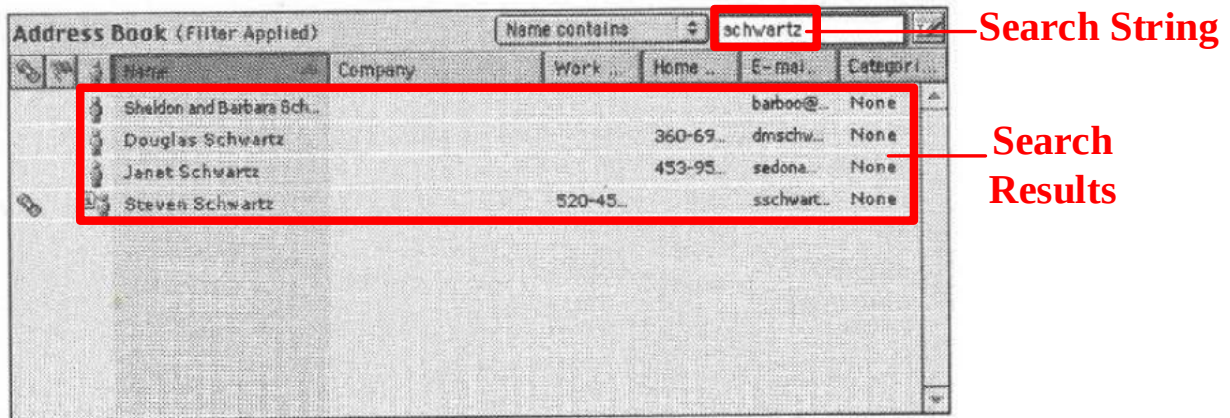


Figure 1.12 As you type the filter text, only matches are shown in the list.

EX1004, 9 (red annotations added); *see also id.*, 38.

112. The Find and Advanced Find searches, on the other hand, are delimited searches—they require the user to select a “Find” button before they begin displaying results. EX1004, 10-12, 162-163; EX1006, 384-387. The Find search can be initiated by, e.g., pressing command+F, which launches the search interface—a Find dialog box. EX1004, 161; EX1006, 384. The Advanced Find search can be initiated by, e.g., pressing the “More Options” button in the Find dialog box or pressing option+command+F. EX1004, 9, 11, 162; EX1006, 385.

Entourage's Find Search

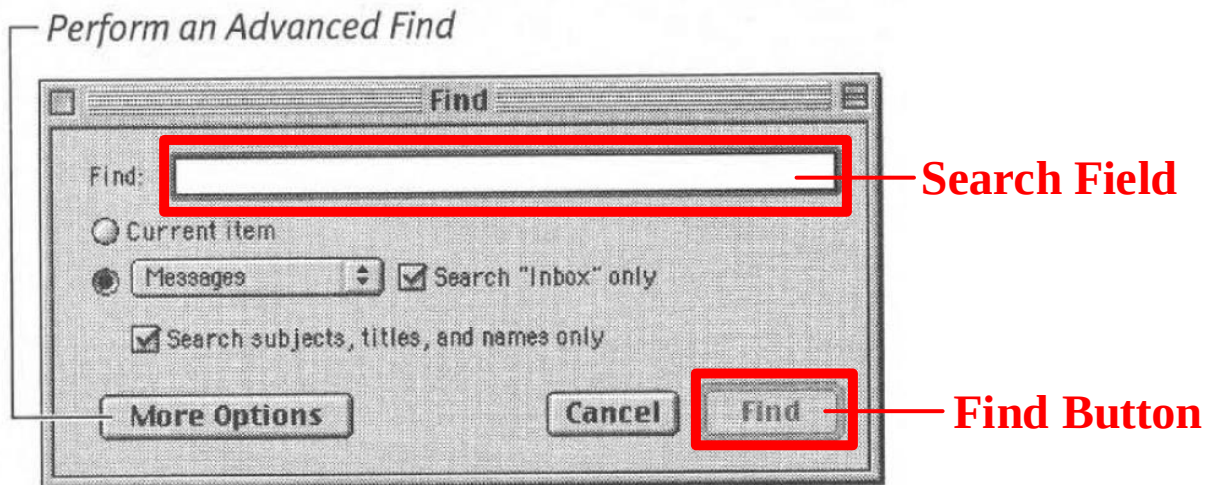


Figure 1.13 You can conduct simple searches by specifying criteria in the Find dialog box.

EX1004, 9 (red annotations added).

Entourage's Advanced Find Search

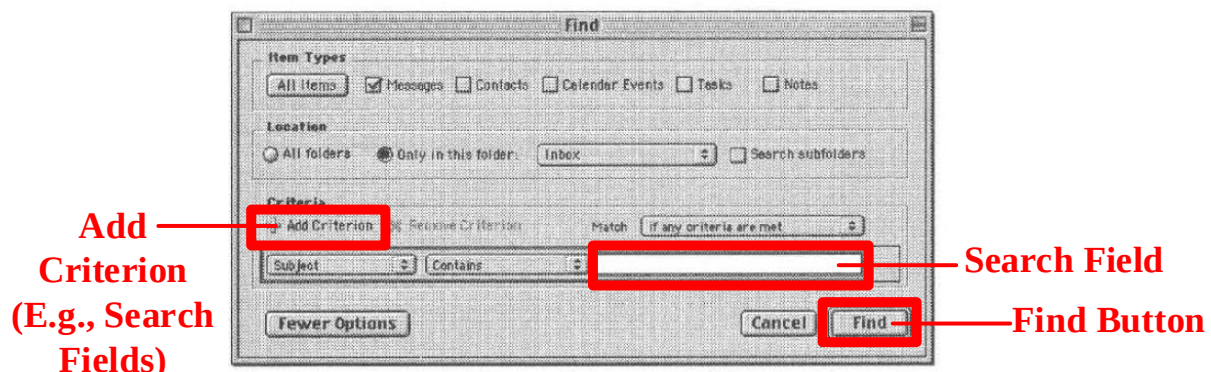


Figure 11.18 To perform a more complex search (such as one that uses multiple criteria), choose the Advanced Find command. You can find only unread messages, messages that contain attachments, or messages that have been identified as junk email, for example.

EX1004, 162 (red annotations added).

113. The Find search can search the body portion of emails (in addition to the headers as in the incremental, quick-find search) (EX1004, 9-10, 161-162; EX1006, 384-385) and the Advanced Find search can search across multiple headers, item types, and/or folders (EX1004, 11-12, 162-163; EX1006, 385-387) and allows a user to filter emails based on whether or not they have an attachment (EX1004, 162; EX1006, 386-387).

114. After Entourage finds a document (e.g., email) containing the search string(s), Entourage scrolls to the portion of the document that contains the search string(s) and highlights the search string(s). *E.g.*, EX1004, 11 (“Entourage highlights the first match, scrolling as necessary to display it”), 163.

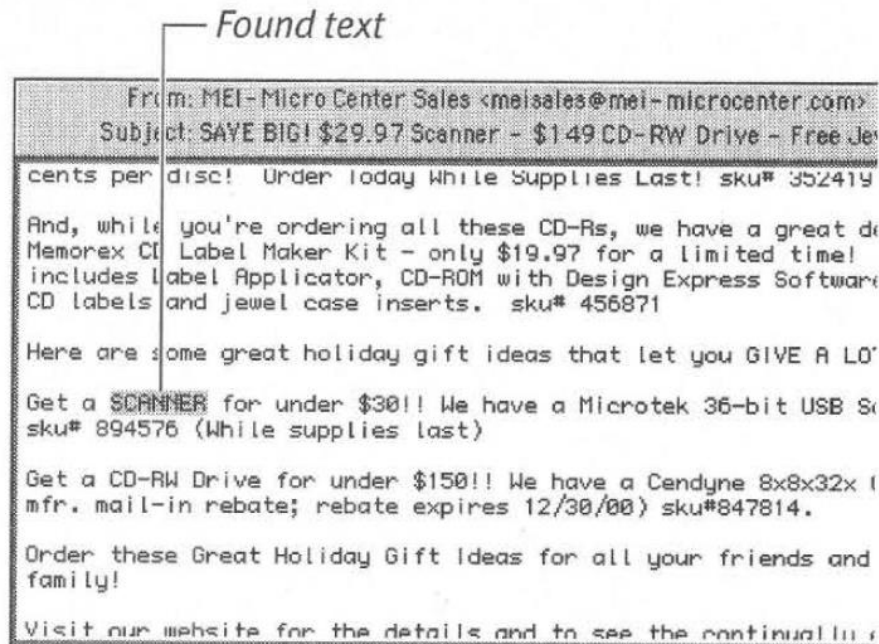


Figure 11.20 The first instance of the found text—if there is one—is highlighted for you.

EX1004, 163.

B. Combining The Entourage References

115. A POSITA would have been motivated to combine the teachings of the three Entourage references (Schwartz, Sebastian, and Barber) at least because they describe the same Microsoft email system—Entourage 2001 for Macintosh. *E.g.*, EX1004, (i); EX1005, (a)-(c), 171-188; EX1006, (i), 1-3, 5, 9, 283-392. Specifically, a POSITA would have been motivated to look to the teachings of all three references to obtain a more complete and comprehensive understanding of the Entourage system, its features, and its capabilities, especially since each reference provides additional teachings not found in the other references. For example, Schwartz provides extra details on text highlighting (*e.g.*, EX1004, 163), Barber provides extra details on the Advanced Find search (*e.g.*, EX1006, 387), and Sebastian provides extra details on the main email interface (*e.g.*, EX1005, 173). Thus, a POSITA would have been motivated to combine the teachings of the three Entourage references to gain a more complete understanding of how the Entourage system works.

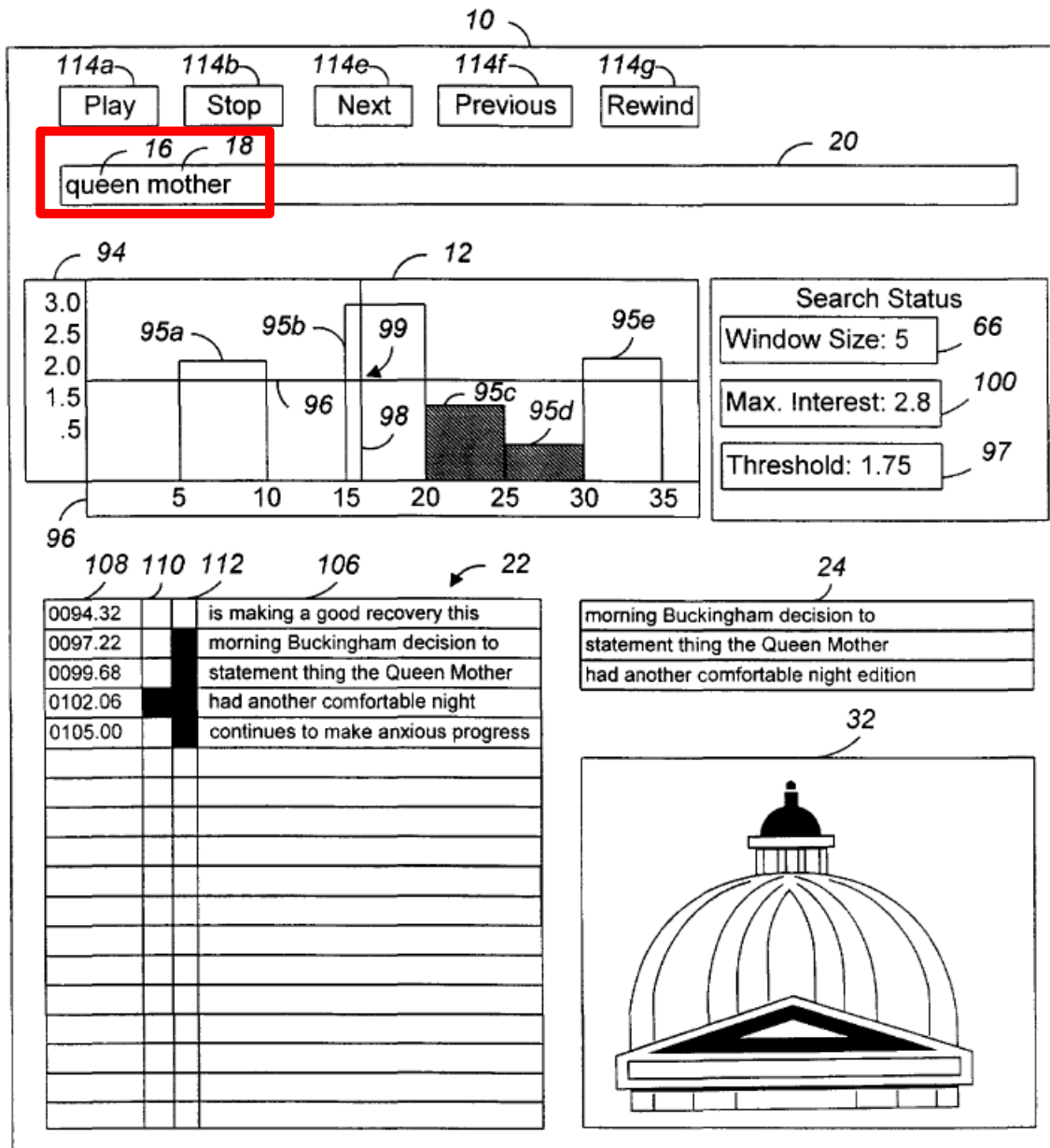
116. A POSITA also would have reasonably expected to succeed in combining the teachings of these three references at least because they describe the same version of Entourage (Entourage 2001) for the same computing system (Macintosh). *E.g.*, EX1004, (i); EX1005, (a)-(c), 171-188; EX1006, (i), 1-3, 5, 9, 283-392.

**C. Overview Of The True (EX1009)
And Baeza-Yates (EX1023) References**

117. True and Baeza-Yates are analogous art to the '035 patent because they are from the same field of endeavor: systems and methods for providing a user interface through which a user can enter search strings, and locating documents and/or portions of documents containing the search strings. *E.g.*, EX1001, 1:29-30, 2:9-21, 3:34-62, 4:28-54, FIGS. 3A, 3G-3I; EX1009, Abstract, 1:37-2:61, 3:19-5:51, FIGS. 1-2; EX1023, (i), (v), 11-14.

118. True is an issued U.S. patent that discloses incrementally searching for, and locating, portions of an audio transcript containing multiple search strings entered in a single search field. EX1009, 2:26-31, 2:39-48, 4:38-43, 4:65-5:6, 5:41-50, FIG. 2. For example, True discloses that as a user enters the strings “queen” and “mother” in a single search field, the search tool displays “query results ... as the query is being input.” EX1009, 2:41-42; *see also id.*, 2:26-48, 4:66-5:6. A POSITA would have understood that True’s search tool separately searches each search string at least because the search tool ranks the search results based on the number of occurrences of each search string in the audio transcript, regardless of their position in the audio transcript. EX1009, 5:41-50.

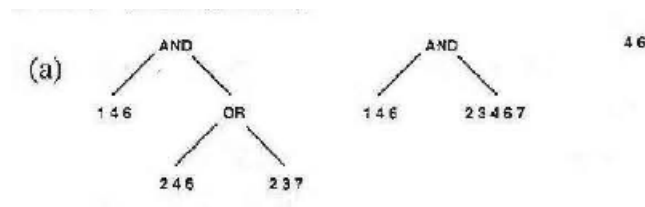
FIG. 2



EX1009, FIG. 2 (red annotation added).

119. Baeza-Yates is a textbook published in 1999, primarily intended for undergraduate information retrieval (IR) students (EX1023, (v)). Among many other IR topics, Baeza-Yates discloses locating documents containing two search

strings by locating a first set of documents containing at least one word that begins with the first string and locating a second set of documents containing at least one word that begins with the second string and then combining the results (i.e., identifying the documents present in the first and second sets of documents), as was well known in the art. EX1023, 101-103, 195, (“[P]hrases and proximity queries are split into single words. ... The lists of the occurrences of all the words found are retrieved. ... The occurrences are processed to solve ... Boolean operations.”), 196 (“Each element must be searched separately and a list ... generated for each one. Then, the lists of all elements are traversed in synchronization to find places where all the words ... appear close enough (for proximity).”), 207-208; *see also supra* Section VI.B.2 (citing, e.g., EX1019, 6:52-62, 9:11-12, 9:24-32; EX1024, 17; EX1025, 109-110).



EX1023, 208 (showing identifying a first set of documents (1, 4, and 6) containing a first search string and identifying a second set of documents (2, 3, 4, 6, and 7) containing a second search string and then identifying the documents (4 and 6) that appear in both sets of documents).

**D. Combining Entourage With
The True And Baeza-Yates References**

120. The Entourage+True+Baeza-Yates combination combines the Entourage references' teachings to incrementally locate documents, including emails, containing at least one search string entered in a search field with True's teachings to do so for multiple search strings entered in the search field, and Baeza-Yates teachings to do so by searching each string separately (i.e., searching for a first set of documents containing the first search string and searching for a second set of documents containing the second search string), and then intersecting the results (i.e., identifying the documents that appear in both sets of results).

121. A POSITA would have been motivated to combine the Entourage references' teachings to incrementally search at least one search string entered in a single search field (*e.g.*, EX1004, 8-10, 38-39, 89, 161, 204-205, 209, 267; EX1005, 173; EX1006, 358, 384, 387) with True's express teachings to do so for multiple search strings entered in the search field (EX1009, 2:26-31, 2:39-48, 4:38-43, 4:65-5:6, 5:41-50, FIG. 2; *infra* Sections IX.E.1.b-IX.E.1.c.) at least because a POSITA knew that such a multi-string search would return more relevant results than a single-string query. *Infra* Sections IX.E.1.b-IX.E.1.c; EX1023, 25-26, 61, 101-105; EX1057, 27 ("Searching for two or more keywords—both of which *must* appear in the results—is an excellent strategy for doing precise searches and greatly reducing the number of search results you have to consider.").

122. A POSITA would have reasonably expected to succeed in incorporating this functionality from True in Entourage's search tool at least because Entourage's search tool already includes the same or substantially similar functionality, and because it would have required only simple and straightforward software modifications.

123. Further, when incorporating True's teachings to search for multiple search strings, a POSITA would have been motivated to include Baeza-Yates teachings to locate the documents containing the two search strings by searching each string separately and then intersecting the results at least because this was one of only a limited number (a few at most) of known ways to locate documents containing multiple search strings, was simple and easy to implement, and was especially well suited for an incremental search. EX1023, 25-26, 101-105, 195-196, 207-208.

124. Indeed, a POSITA would have reasonably expected to succeed in implementing this functionality from Baeza-Yates in Entourage's search tool at least because it would have required only simple and straightforward software modifications.

**E. The Entourage+True+Baeza-Yates
Combination Teaches Every Claim Element**

1. Claim 1

a) Element [1.1]

[1.1] A method of performing a search comprising:

125. The Entourage references teach performing a search. EX1004, 2-3, 7-14, 38-39, 89-90, 136, 161-164, 204-205, 207, 209; EX1005, 173; EX1006, 358, 384-387. For example, the Entourage references teach searching various types of documents, including emails (EX1004, 8, 10-11, 13, 161-164; EX1005, 173; EX1006, 384-387), contacts (EX1004, 39-40), tasks (EX1004, 89-90), and news articles (EX1004, 204-205, 209). *See also* EX1043, 83-84, 337-338, 343-344, 355, 385-389, 404.

b) Elements [1.2], [1.4]

[1.2] receiving a first string in a first search field;

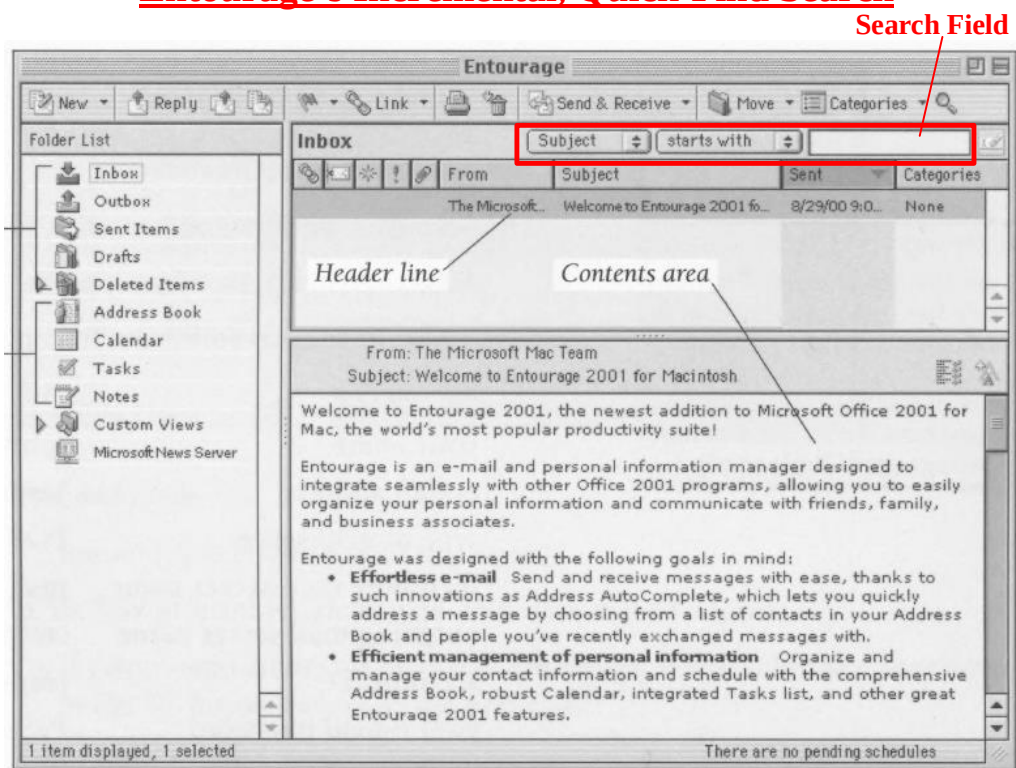
[1.4] receiving a second string in the first search field, wherein the first and second strings are separated by a string separator character in the first search field;

126. The Entourage references in combination with True teach these claim elements, especially in view of the knowledge of a POSITA reflected in the numerous background references described above in Section VI.B.2. EX1004, 2-3, 7-14, 38-39, 89-90, 136, 161-164, 204-205, 209; EX1005, 173; EX1006, 384-387; EX1009, 2:26-31, 2:39-48, 4:38-43, 4:65-5:6, 5:41-50, FIG. 2; *supra* Section VI.B.2.

127. For example, the Entourage references expressly disclose receiving at least one search string (e.g., the start or all of a person's last name, such as

“schwa” or “schwartz”) (EX1004, 9, 38) in a search field, and at least suggest receiving two search strings (e.g., a person’s first and last names, such as “Orson Welles,” etc.) (e.g., EX1006, 387) in the search field separated by a string separator character (e.g., a space) (EX1006, 387). *See also* EX1004, 267; EX1043, 327, 338, 343-344, 379-380, 385-389, 402-409. The Entourage references also expressly disclose “searching for text strings” (plural), at least suggesting to a POSITA to receive multiple search strings in the single search field of Entourage’s incremental Quick Find search. EX1004, 267, 269 (emphasis added).

Entourage’s Incremental, Quick-Find Search



EX1005, 173 (red annotations added).

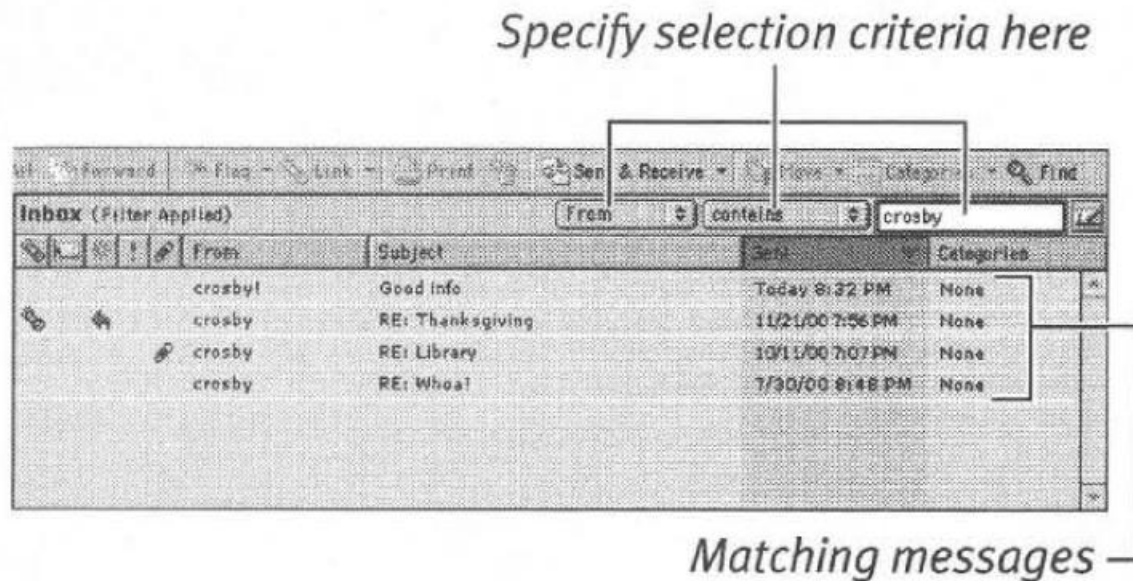


Figure 11.15 To locate messages quickly based on Subject, From, To, or Category information, you can enter selection criteria above the message list.

EX1004, 161.

128. Moreover, a POSITA would have been motivated to incorporate True's express teachings to receive two search strings in the search field (EX1009, 2:26-31, 2:39-48, 4:38-43, 4:65-5:6, 5:41-50, FIG. 2) to provide more targeted searching, as was common sense and well known in the art. *Supra* Section VI.B.2. For example, a POSITA knew, based on their own knowledge and common sense, that a multi-string search such as "Orson Welles" returns more specific and thus more relevant results than searching for just "Orson" or just "Welles" alone.

EX1057, 27 ("Searching for two or more keywords—both of which *must* appear in the results—is an excellent strategy for doing precise searches and greatly reducing

the number of search results you have to consider.”). A POSITA would have reasonably expected to succeed in incorporating this functionality from True in the Entourage search tool at least because the Entourage search tool already includes the same or substantially similar functionality and would have required only simple and straightforward software modifications.

129. A POSITA also would have found it obvious to treat Entourage’s space (e.g., the space between “Orson” and “Welles”) as a string separator character—and thus treat the two keywords separated by the space (e.g., “Orson” and “Welles”) as separate search strings and search them separately—at least because it was common to do so. *E.g.*, EX1007, 195; EX1019, 6:52-62, EX1020, 4:23-5:10 (“[T]he user may enter the phrase ‘merced microprocessor.’ ... [T]he phrase ... may be parsed such that the word ‘merced’ creates a first set of hits while the word ‘microprocessor’ creates a second set of hits. In the absence of any Boolean operator, as is in the case of FIG. 1, it may be assumed, for example, that the user wishes to find all web pages or web sites that contain both the term ‘merced’ and the term ‘microprocessor.’ Using Boolean operators in search queries is conventional and will not be discussed in great detail here for brevity’s sake.”); EX1024, 17 (“If the user types multiple keywords in the query, the search engine searches each of the keywords independently and combine [sic] all the results to generate the final answer.”); EX1057, 27 (“[S]ome search engines default to doing

an AND search... .”), 82 (“Google defaults to doing an AND search ... so plus signs (+) aren’t necessary.”), 89. A POSITA would have understood that a user can perform an exact search for a phrase (e.g., Orson Welles) by placing quotation marks around the phrase, as was well known in the art, to return only documents containing the exact phrase. EX1023, 287; EX1035, 26:64-27:13; EX1057, 19 (“[Y]ou[] need to enclose the words in quotation marks to let them know you’re doing a *phrase search*.”), 89, 109, 129, 151, 166; EX1059, 162 (“To search for multiple-word phrases, you should enclose them in quotation marks.”); EX1061, 140 (“[T]ype ‘**gold and silver**’ to find documents that contain the phrase *gold and silver*.”).

130. Moreover, it was well known to use various other types of string separator characters, including a Boolean AND operator, a comma, and a plus sign, to instruct the search tool to treat two words entered in a search field as separate search strings (and thus search them separately), and to only locate documents containing both words (whether they appear adjacent or non-adjacent in the documents). *E.g.*, EX1009, 1:6-10, 4:38-42, FIG. 2; EX1019, 6:51-66, 8:66-11:32, 13:26-30, FIG. 6; EX1023, 102-103 (“The oldest (and still heavily used) form of combining keyword queries is to use Boolean operators. ... The operators most commonly used, given two basic queries or Boolean subexpressions e_1 and e_2 are: ... **AND** The query (e_1 AND e_2) selects all documents which satisfy both e_1 and

e_2 .”); EX1057, 60 (“Use a plus sign (+) in front of each word or phrase that must appear in the results”), 129 (same), 109 (same), 151 (To search “multiple words and phrases, each of which must be present ... [y]ou can also use plus signs (+) or AND operator.”), 166; EX1059, 161 (“In the text box on the Search bar, enter the text for which you wish to search.”), 162 (“You can use *logical operators* AND ... to find documents that contain various combinations of words and text strings.”), 163 (“[T]o search for documents that contain all of several words, type them all in this box, separated by commas.”).

131. Thus, even if the Entourage references do not expressly disclose receiving two search strings in the same search field (which I do not acquiesce is appropriate), a POSITA still would have found it obvious to include this basic and well-known functionality—described, for example, by True—to allow a user to enter more targeted search queries and thereby receive more relevant search results.

c) Elements [1.3], [1.5]

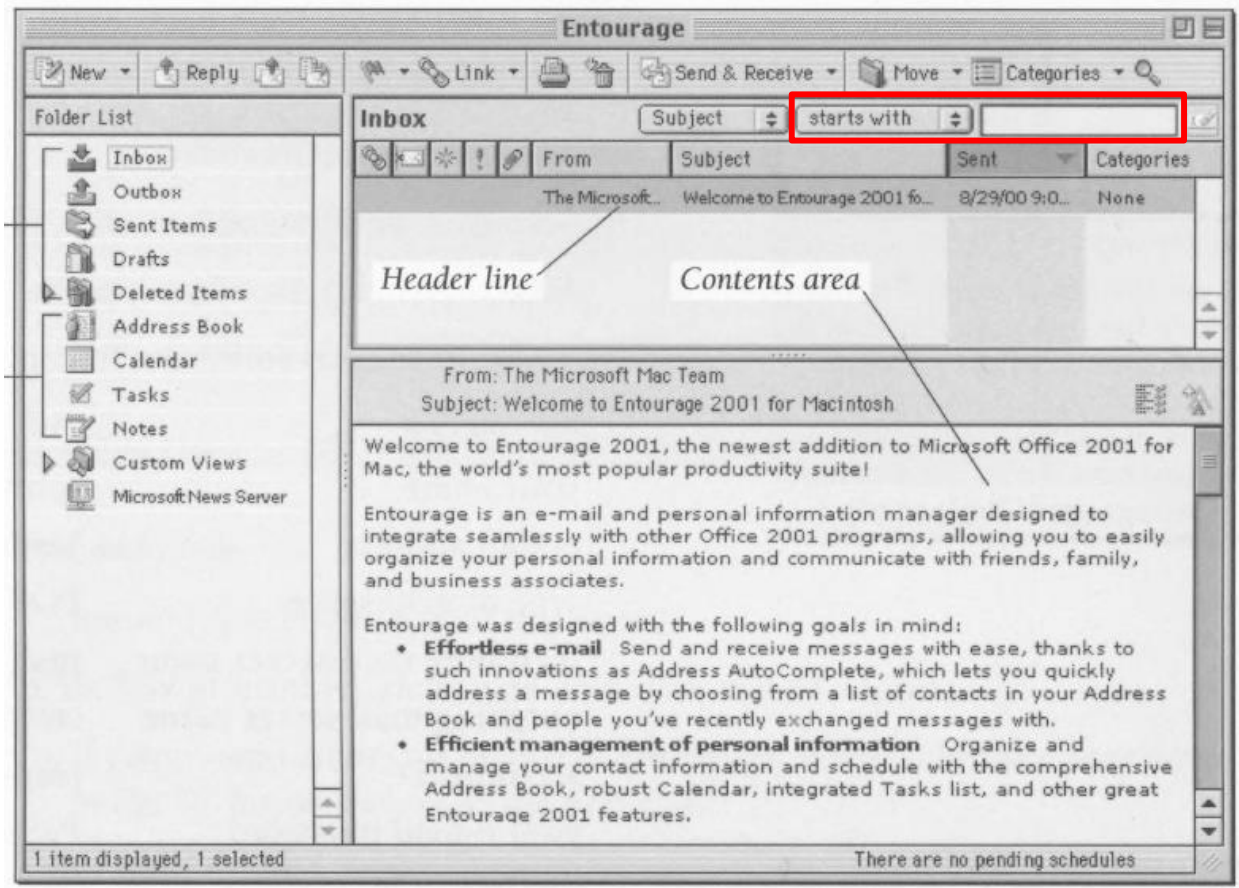
[1.3] in response to receiving the first string, incrementally locating a first group of documents that has at least a first word that begins with the first string;

[1.5] in response to receiving the second string, incrementally locating a second group of documents that has at least a second word that begins with the second string and identifying one or more documents that are included in each of the first and second groups of documents; and

132. The Entourage references in combination with True and Baeza-Yates teach these claim elements, especially in view of the knowledge of a POSITA reflected in the numerous background references described above in Sections VI.B.1-VI.B.2. EX1004, 2-3, 7-14, 38-39, 89-90, 161-164, 204-205, 209; EX1005, 173; EX1006, 358-384; EX1009, 2:26-31, 2:39-48, 4:38-43, 4:65-5:6, 5:41-50, FIG. 2; EX1023, 25-26, 101-105, 195-196, 207-208; *supra* Sections VI.B.1-VI.B.2; *see also* EX1043, 83-84, 337-338, 343-344, 355, 385-386, 404.

133. For example, the Entourage references teach what was generally well known in the art: incrementally locating (displaying search results as the user types their query) a group of documents (e.g., contacts, emails, news articles, tasks)¹ that has at least a first word that begins with (“starts with”) (EX1005, 173) the string (e.g., prefix/word). EX1004, 8, 9 (results are shown “[a]s you type the filter text”), 10, 38-39, 89, 161, 204-205, 209; EX1005, 173; EX1006, 358, 384; *supra* Section VI.B.1; *see also* EX1043, 83-84, 337-338, 343-344, 355, 385-386, 404.

¹ The '035 patent states that “documents comprise one or more of emails, text documents, contact information ... [and] task information.” EX1001, 30:13-16 (claim 5).



EX1005, 173 (red annotation added).

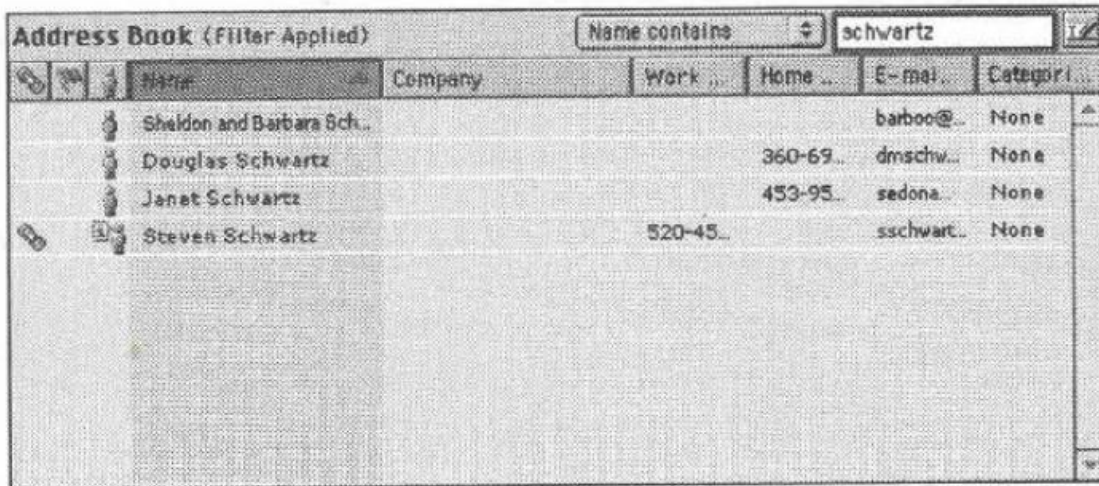


Figure 1.12 As you type the filter text, only matches are shown in the list.

EX1004, 9.

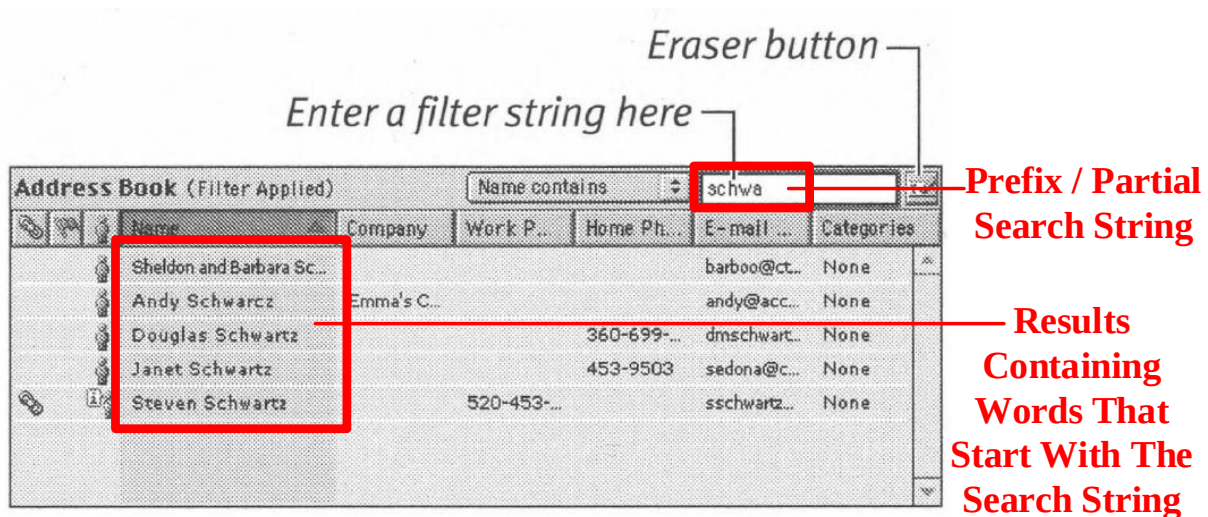


Figure 3.4 You can limit the display to records that contain a particular text string.

EX1004, 38 (red annotations added).

134. The Entourage references also disclose “searching for text strings,” (EX1004, 267, 269; *see also* EX1006, 384, 387) plural, which at least suggests

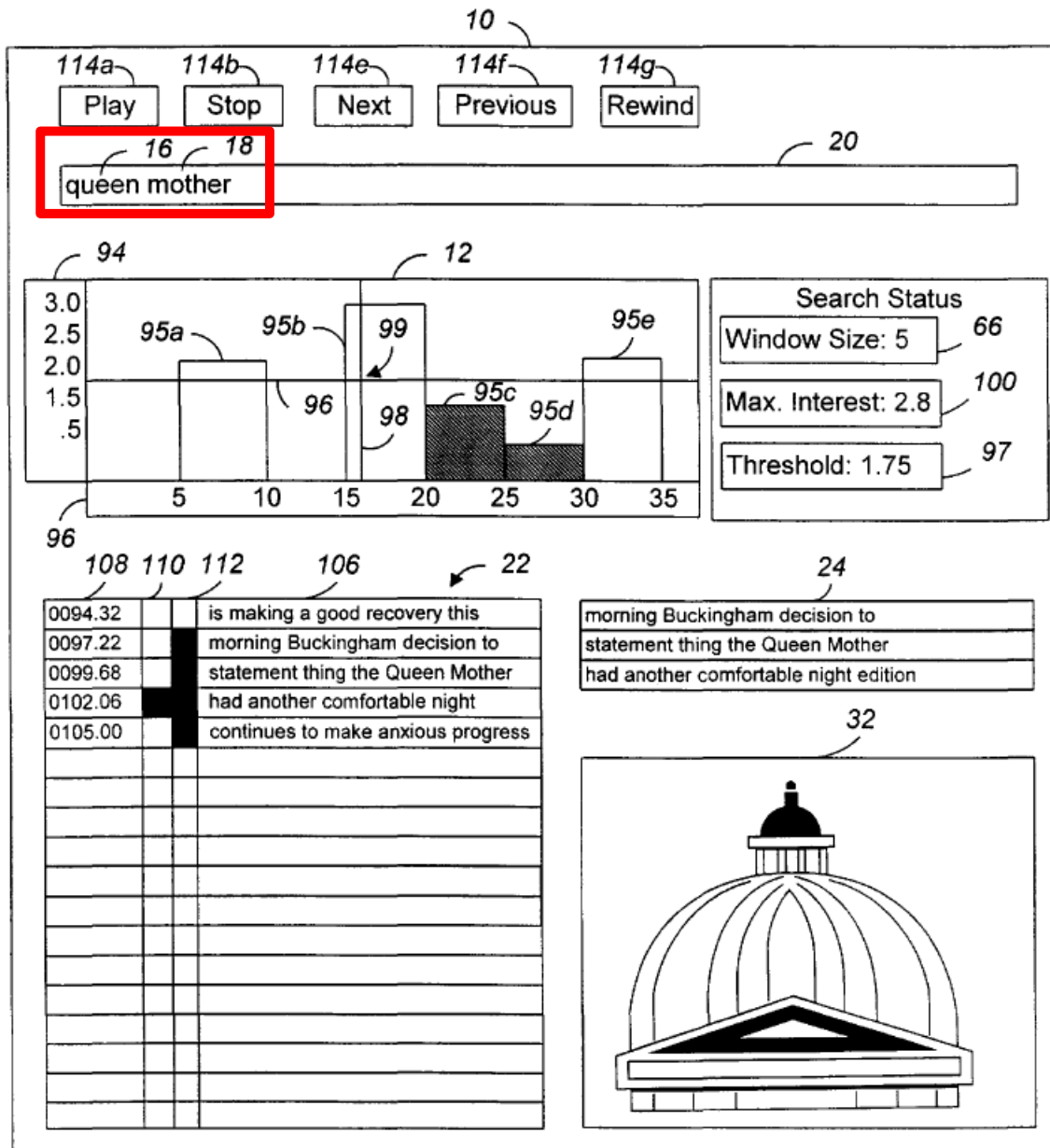
incrementally searching two search strings entered in a single search field in view of the Entourage references' express teachings to perform an incremental search. EX1004, 8-10, 38-39, 89, 161, 204-205, 209; EX1005, 173; EX1006, 358, 384; EX1043, 83-84, 337-338, 343-344, 355, 385-386, 404; *see also* EX1006, 384, 387 (disclosing performing a search on a query comprising multiple words entered in a single search field). Moreover, it would have been obvious to a POSITA to search for multiple search strings entered in a single search field at least because it was within a POSITA's knowledge to do so, as reflected in the numerous background references cited above in Sections VI.B.2 (state of the art) and IX.E.1.b (elements [1.2] and [1.4]). *Supra* Sections VI.B.2, IX.E.1.b.

135. Moreover a POSITA would have been motivated to incorporate True's teachings to incrementally locate (i.e., locate as the user types or modifies their search query) documents containing multiple search strings entered in the same search field (e.g., documents containing the strings "queen" and "mother") to provide more targeted searching, as was common sense and well known in the art. EX1009, 2:26-31, 2:39-48, 4:38-43, 4:65-5:6, 5:41-50, FIG. 2; EX1057, 27 ("AND Searches [] for two or more keywords—both of which *must* appear in the results—is an excellent strategy for doing precise searches and greatly reducing the number of search results you have to consider."); *supra* Sections VI.B.2, IX.E.1.b.

136. A POSITA would have reasonably expected to succeed in incorporating this functionality from True in Entourage's search tool at least because Entourage's search tool already includes the same or substantially similar functionality, and because it would have required only simple and straightforward software modifications.

137. Specifically, True discloses that the "user types a query, consisting of a combination of words of interest" in a single search field (a "query window"), as shown in True's annotated FIG. 2 below. EX1009, 3:36-37.

FIG. 2



EX1009, FIG. 2 (red annotation added).

138. The search tool separately searches each search string (e.g., “queen” and “mother”) and displays “query results ... as the query is being input” (EX1009, 2:41-42) according to the number of occurrences of the search strings in

each document (transcript window) and the system's confidence that the strings were correctly transcribed by the speech recognizer. EX1009, 4:21-5:15. 5:41-50 (“A window's interest level may be calculated, for example, as the sum of the confidences of each word in the transcript window matching a word in the query. For example, if the query is ‘queen mother,’ and a transcript window contains an occurrence of the word ‘queen’ with a confidence level of 0.27, another occurrence of the word ‘queen’ with a confidence level of 0.75, and an occurrence of the word ‘mother’ with a confidence level of 0.82, then the window's interest level is 1.84 (0.27+0.75+0.82). Thus, multiple occurrences of a search word are all given weight in the interest level computation.”), FIG. 2. A POSITA would have understood that True's search tool separately searches each search string at least because the search tool ranks the search results based on the number of occurrences of each search string in the audio transcript, regardless of their position in the audio transcript. EX1009, 5:41-50.

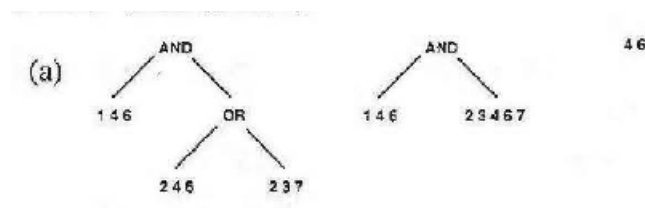
139. Thus, it would have been obvious to a POSITA to incrementally locate documents containing two strings (as opposed to just one string) to provide the user with more relevant results, as is suggested by the Entourage references and was known to a POSITA. *Supra* Section VI.B.2; EX1057, 27 (“AND Searches [] for two or more keywords—both of which *must* appear in the results—is an excellent strategy for doing precise searches and greatly reducing the number of

search results you have to consider.”); *see also* EX1021, 125-126, 127 (“Even building a Boolean search pattern is made more effective when the early results of the pattern appear as the user adds to the pattern’s specificity”).

140. Further, when implementing True’s teachings to search two search strings, a POSITA would have been motivated with a reasonable expectation of success to incorporate Baeza-Yates’ teachings to locate documents containing the two search strings by independently searching each string and then taking the intersection of those results (i.e., locating a first group of documents that has at least a first word that begins with the first string, locating a second group of documents that has at least a second word that begins with the second string, and identifying one or more documents that are included in each of the first and second groups of documents) at least because this was one of only a limited number (a few at most) of known ways to identify files containing more than one search string, was simple, predictable and easy to implement, and was especially well suited for Entourage’s incremental search. EX1023, 101-103, 195-196, 207-208; *supra* Section VI.B.2.

141. For example, Baeza-Yates describes how “phrases and proximity queries are split into single words. ... The lists of the occurrences of all the words found are retrieved. ... The occurrences are processed to solve ... Boolean operations.”). EX1023, 195; *see also id.*, 101-103, 196 (“Each element must be

searched separately and a list ... generated for each one. Then, the lists of all elements are traversed in synchronization to find places where all the words ... appear close enough (for proximity).”), 207-208. Figure 8.12 of Baeza-Yates, for example, shows how a simple Boolean search for “[string 1] AND [string 2] OR [string 3]” identifies a first set of documents (1, 4, and 6) containing the first search string, identifies a second set of documents (2, 3, 4, 6, and 7) containing either the second string or the third string, and then identifies the documents (4 and 6) that appear in both sets of documents.



EX1023, 208.

142. Many others also provided similar descriptions of this classical approach. EX1019, 6:52-62 (“In this example, a user is searching for documents and presents a search request with a query string ‘The game of Go’. Search engine [] looks up each of the terms in word index []. ... Search engine [] then reads the document lists for ‘game’ and ‘go’, generates a match list for each term and applies an ‘AND’ operator to the match lists as described below in connection with FIG. 6.”), 9:11-12, 9:24-32 (“The need for ‘AND’ing two or more match lists might come about where a search string contains an expression of the form

‘expression__A AND expression__B AND . . .’. One match list is obtained for ‘expression__A’ indicating the documents that contain that subterm, another for ‘expression__B’, and so on. The resulting match list is a list of all the documents which contain all of the ‘AND’ed expressions.”); EX1024, 17 (“If the user types multiple keywords in the query, the search engine searches each of the keywords independently and combine [sic] all the results to generate the final answer.”); EX1025, 109-110.

143. Thus, it would have been obvious to a POSITA to identify the documents containing both search strings by incrementally searching each search string separately and then identifying the documents that appear in both sets of search results at least because this was one of only a limited number (a few at most) of well-known techniques that a POSITA naturally would have utilized. In particular, a POSITA would have recognized that there were only a limited number of known ways (a few at most) to locate documents containing both search strings, including either the claimed intersection approach, which searches each string separately and then combines / intersects the results, a sequential approach, which sequentially checks each document for both search strings, or a sort of hybrid approach, which locates documents containing one of the search strings and then searches within that set of documents for documents also containing the other search string.

144. Moreover, this intersection approach would have been a commonsense approach for locating documents containing both search strings when performing an incremental search because a POSITA would have recognized that this approach's separate treatment of each string is well suited for an incremental search where a user can independently modify each string as they type in their query. That is, a POSITA would have understood that the intersection approach's separate treatment of the search strings would provide quick results for such an incremental search because it would be able to efficiently update search results in response to modifications to either search string. For example, if a user were to modify only one string, the sequential search approach would have to completely rerun the search because it searches for both strings simultaneously, whereas the intersection approach could preserve previous results for the unmodified search string, and would only have to update results for the modified search string.

d) Element [1.6]

[1.6] displaying an indication of one or more of the identified one or more documents that are included in each of the first and second groups of documents.

145. The Entourage references teach this claim element, especially in view of the knowledge of a POSITA reflected in the numerous background references described above in Sections VI.B.1-VI.B.3. EX1004, 2-3, 7-13, 38, 90, 161-163,

204; EX1006, 384-387; *supra* Sections VI.B.1-VI.B.3; *see also* EX1043, 83-84, 337-338, 343-344, 355, 385-386, 404.

146. For example, the Entourage references depict how search results are displayed as the user types their query. EX1004, 9, 38, 161-162, 204; *see also* EX1043, 83-84, 337-338, 343-344, 355, 385-386, 404.

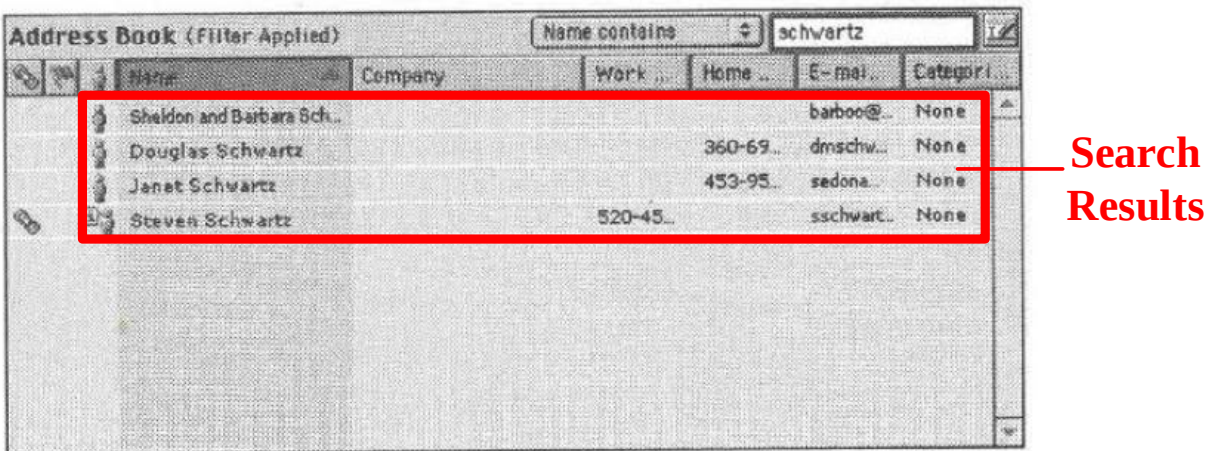


Figure 1.12 As you type the filter text, only matches are shown in the list.

EX1004, 9 (red annotations added).

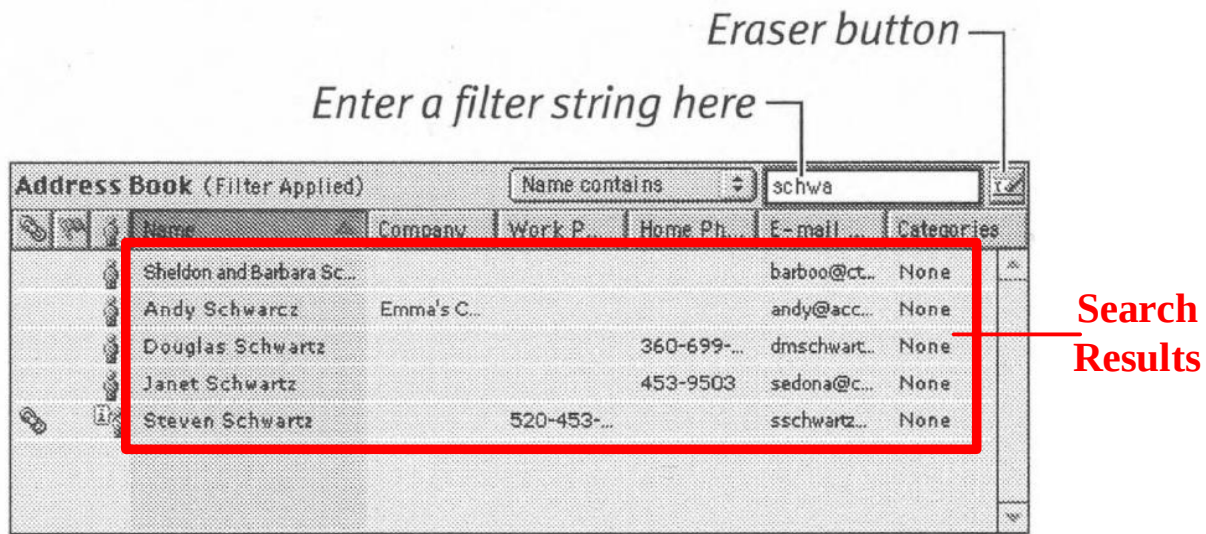


Figure 3.4 You can limit the display to records that contain a particular text string.

EX1004, 38 (red annotations added).

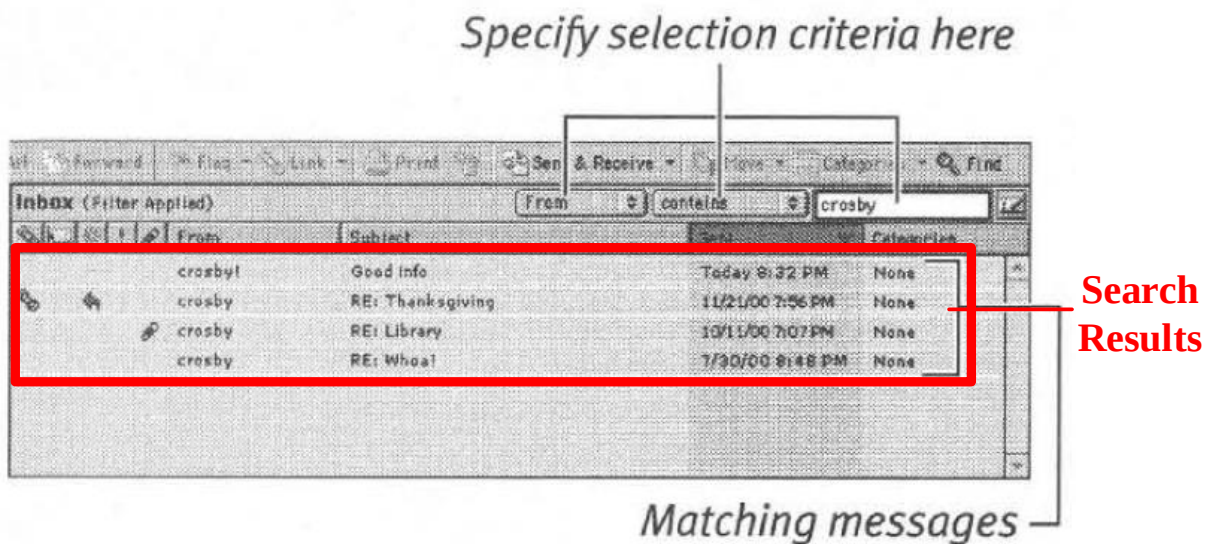


Figure 11.15 To locate messages quickly based on Subject, From, To, or Category information, you can enter selection criteria above the message list.

EX1004, 161 (red annotations added).

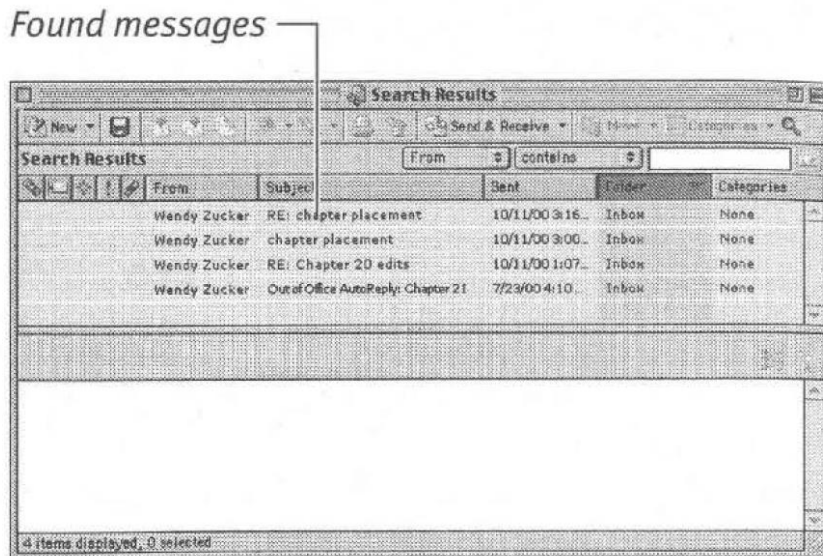


Figure 11.17 Search results are displayed in a new window. To examine any of the matches, click its header and read the message in the preview pane.

EX1004, 162.

147. Thus, when identifying documents that contain the two search strings, as explained above for elements [1.3] and [1.5] (*supra* Section IX.E.1.c), it would have been obvious to display these identified documents, as taught by the Entourage references and known to a POSITA. *Supra* Section VI.B.2.

148. For example, Richanbach and Scneiderman disclose the well-known concept of displaying documents containing multiple search strings. EX1020, FIG. 1; EX1044, 2-6.

Query With Two Search Strings

Result With
Both Search
Strings

Excite [Mideast Deal Saved](#) [Microsoft Attacks Netscape](#) | [More...](#)

Today on Excite
Friday, October 23, 14:48
[Research Your Family Tree](#)
[Poll: Nicotine Junkies?](#)
[Meet Your Match](#)
[New! Clubs with Photos](#)

[Search Tips](#) [Power Search](#)

[Autos](#) [Games](#) [News](#)
[Careers](#) [Health](#) [People/Chat](#)
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FIG. 1

EX1020, FIG. 1 (red annotations added).

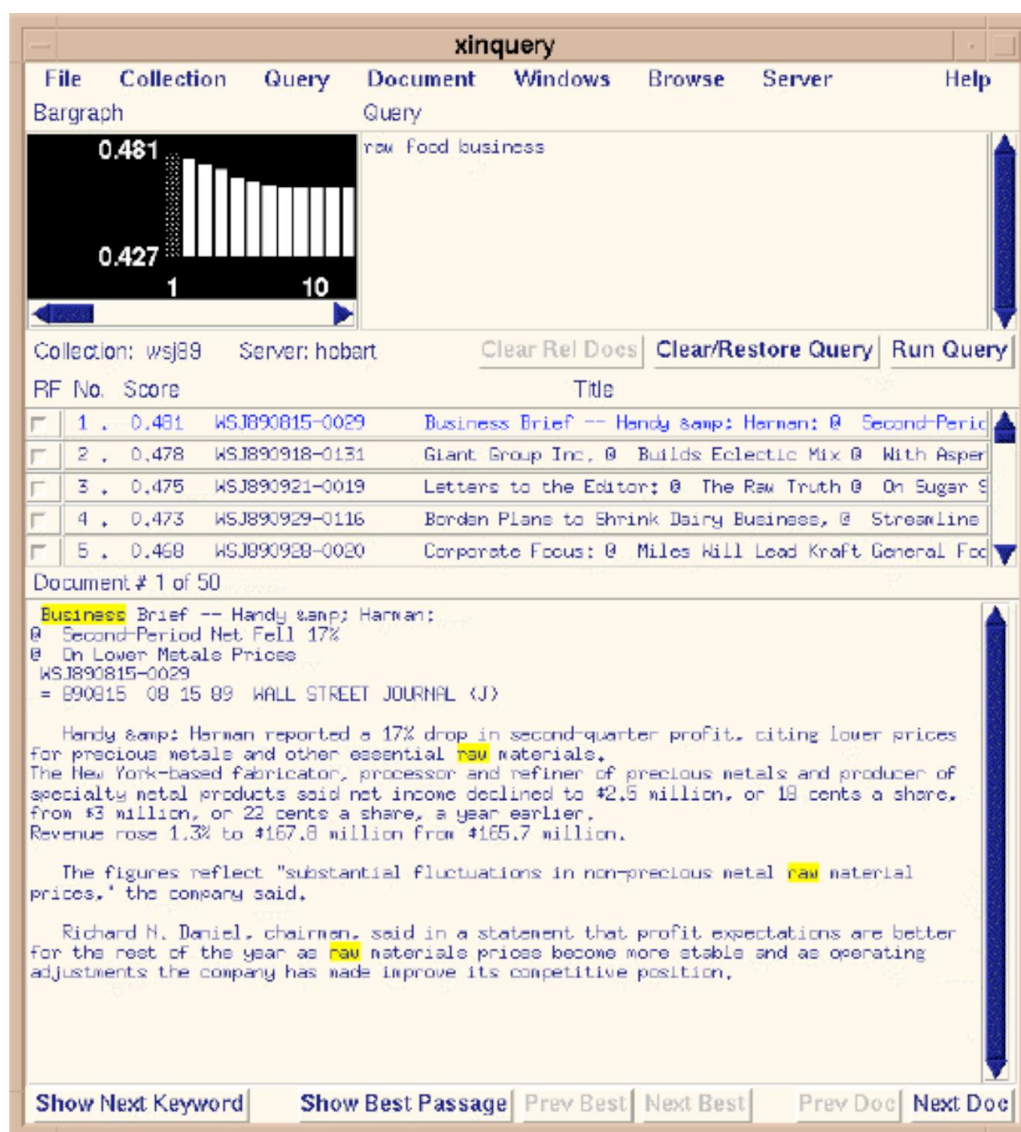


Figure 1. XINQUERY

EX1044, 5 (showing a located document containing two search strings (“Business” and “raw”), where each search string occurrence is highlighted).

2. Claim 2

2. The method of claim 1, further comprising displaying a portion of a selected document of the documents that are included in each of the first and second groups of documents.

149. The Entourage+True+Baeza-Yates combination renders this claim obvious at least because the Entourage references expressly disclose displaying a portion of a selected document of the set of documents in the search results, which, as explained above for element [1.3] and [1.5] (*supra* Section IX.E.1.c), would obviously have included the documents present in the each of the first and second groups of documents (i.e., the documents containing the first and second search strings). EX1004, 8-13, 38, 161-163, 204-205; EX1006, 384-387.

150. For example, for emails, Entourage discloses displaying a portion of the “From” header, the “Subject” header, and the “Sent” header for the returned search results. EX1004, 10, 161-162.

Found messages

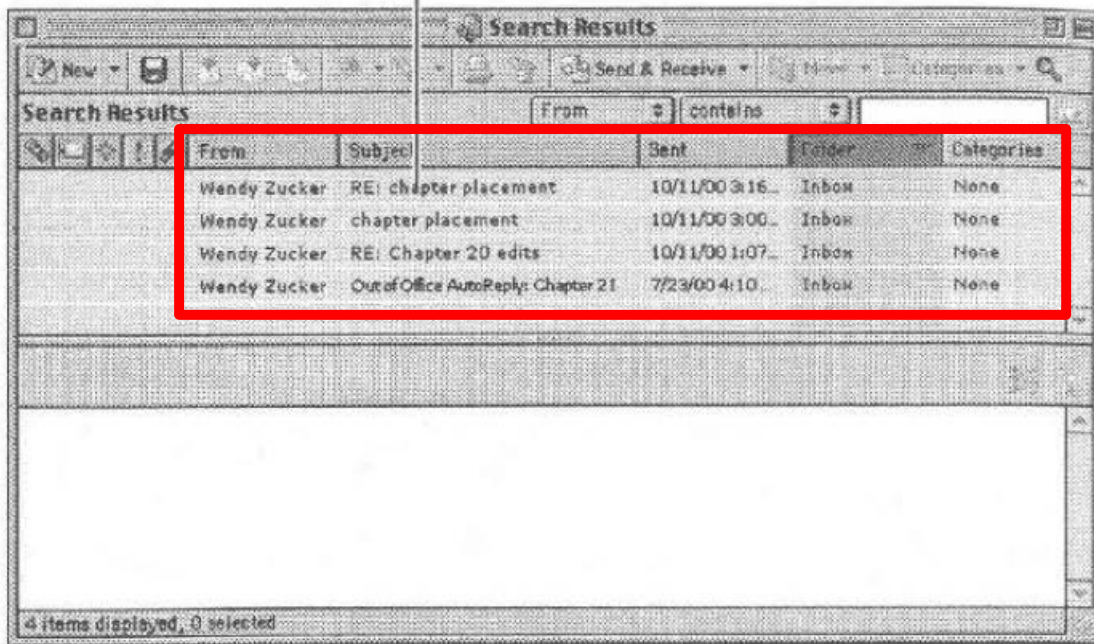


Figure 11.17 Search results are displayed in a new window. To examine any of the matches, click its header and read the message in the preview pane.

EX1004, 162 (red annotations added showing displayed portions of the returned search results). Similarly, Entourage discloses displaying: (1) a portion of a contact's name, company, work phone, home phone, and email address (EX1004, 9, 38-39); (2) a portion of a task's name, due date and category (EX1004, 89); and (3) a portion of a news article's name (EX1004, 204).

151. As another example, a user can select a particular document (e.g., email) and the body of the document is displayed in the preview pane. EX1004, 2-3, 6-7, 38, 162 ("To examine any of the matches, click its header and read the message in the preview pane."), 205.

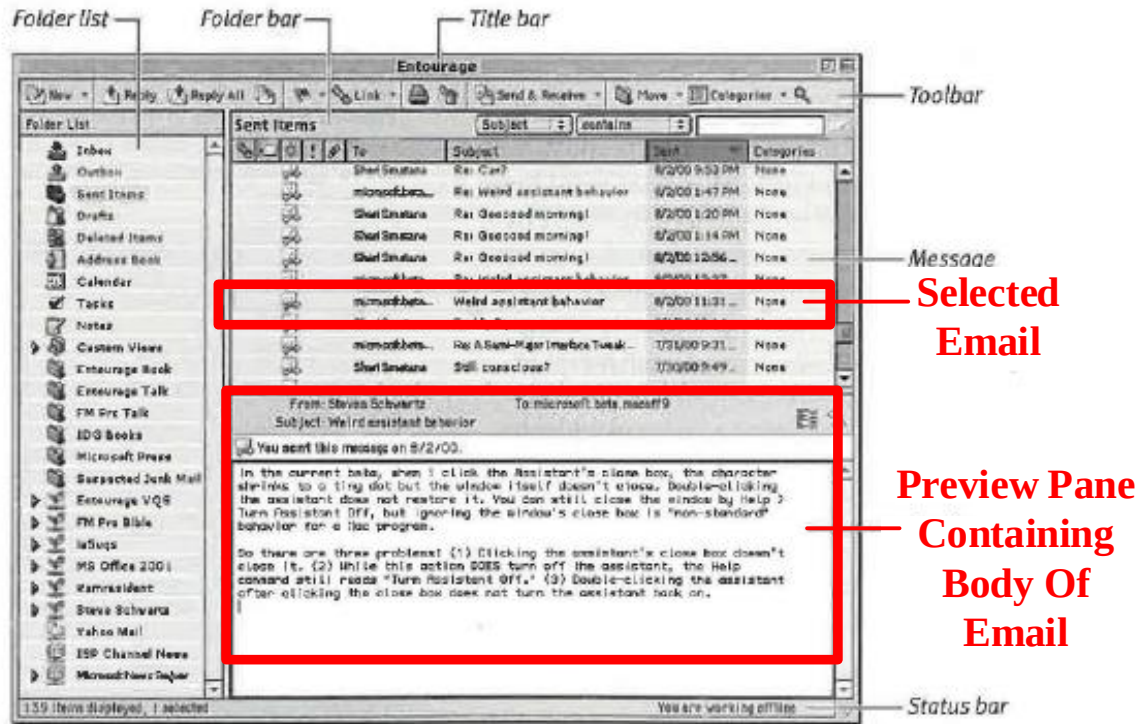
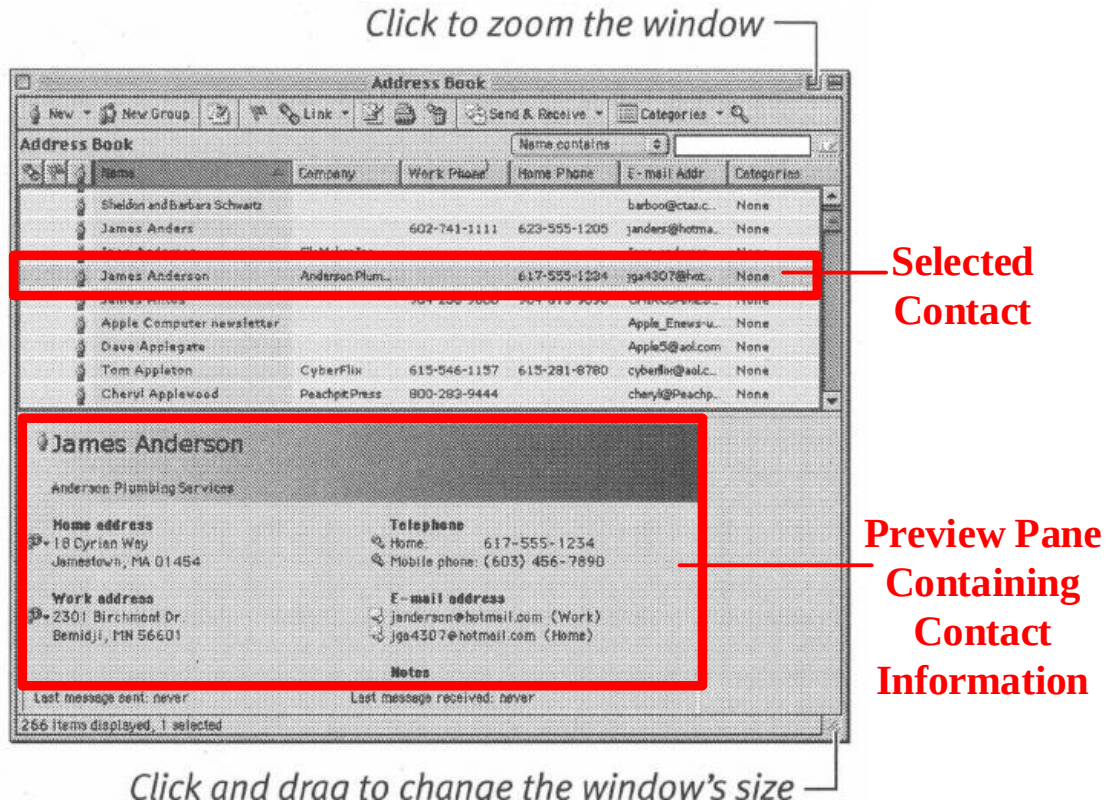


Figure 1.4 The main Entourage window.

EX1004, 3 (red annotations added).



EX1004, 38 (red annotations added).

152. Moreover, even assuming *arguendo* the Entourage references do not expressly disclose displaying a portion of a selected document that appears in a set of search results (which I do not agree with), it would have been obvious to a POSITA to do so to provide the user with more information about each of the search results and allow them to make a more informed decision about which document to open, as was well known in the art and within a POSITA's knowledge. *Supra* Section VI.B.3.

3. Claim 3

3. The method of claim 2, further comprising automatically highlighting a first occurrence of the first word in the selected document.

153. The Entourage+True+Baeza-Yates combination renders this claim obvious at least because the Entourage references expressly disclose automatically “highlight[ing] the first match.” EX1004, 11; *see also id.*, 163 (“The first instance of the found text ... is highlighted... .”); *see also* EX1043, 386.

154. For example, the Entourage references disclose highlighting the first occurrence of a searched word in an email. *E.g.*, EX1004, 11, 163.

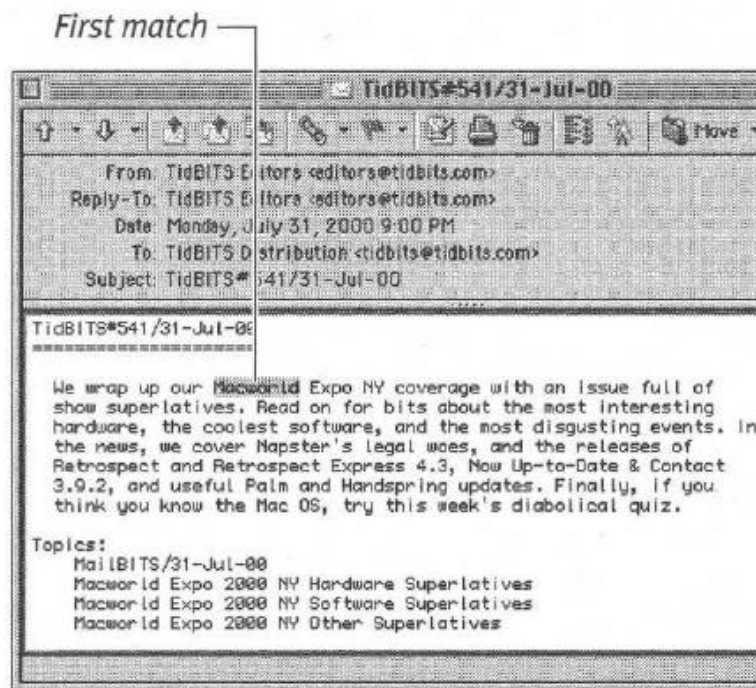


Figure 1.16 When you search for matching text within an item, Entourage highlights the first match, scrolling as necessary to display it.

EX1004, 11.

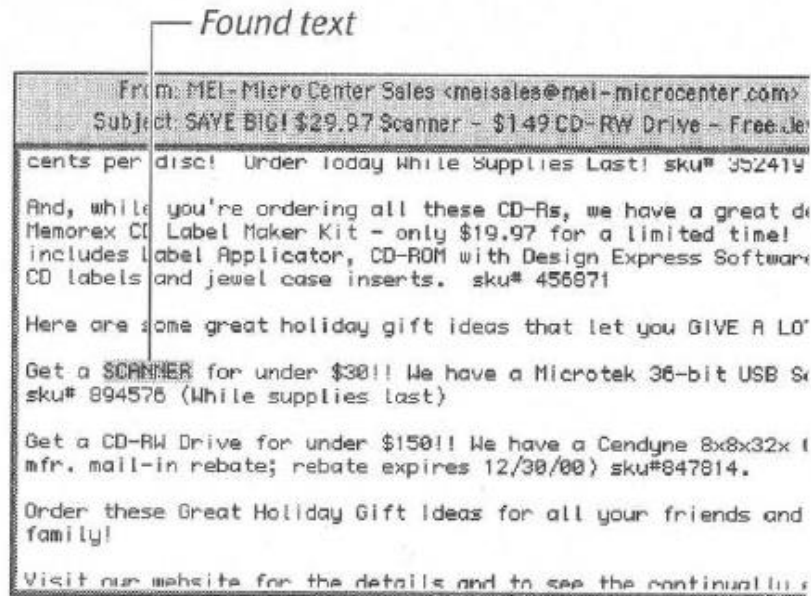


Figure 11.20 The first instance of the found text—if there is one—is highlighted for you.

EX1004, 163.

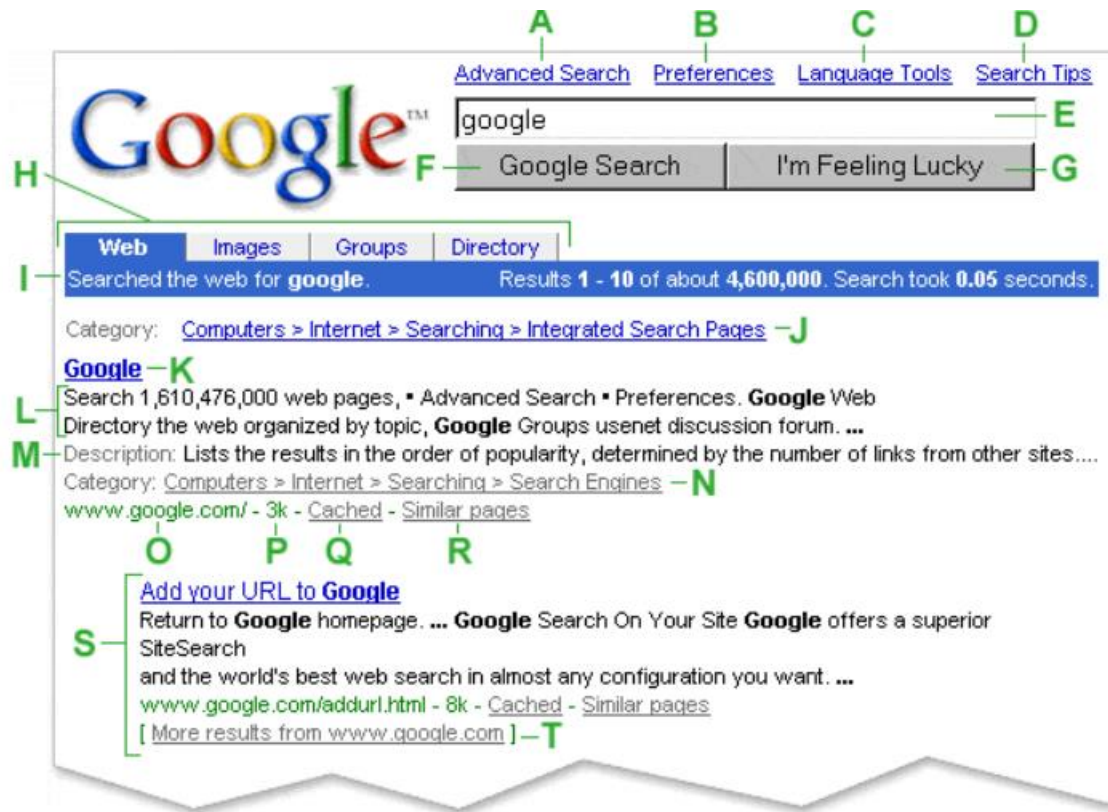
155. Moreover, it would have been obvious to highlight the first occurrence of the first word in the selected document at least because it was well known in the art to do so to draw the user's attention to the most relevant portions of the document. *Supra* Section VI.B.3. For example, as described by Baeza-Yates "it is often useful to highlight the occurrences of the terms or descriptors that match those of the user's query. ... This display is thought to help draw the user's attention to the parts of the document most likely to be relevant to the query. Highlighting of query terms has been found time and again to be a useful feature for information access interfaces." EX1023, 289.

4. Claim 4

4. The method of claim 2, further comprising highlighting at the same time a plurality of occurrences of the first word in the selected document while not highlighting portions of text between occurrences of the first word.

156. The Entourage+True+Baeza-Yates combination renders this claim obvious at least because a POSITA would have understood or at least found it obvious to highlight a plurality of occurrences of the first word in the selected document (e.g., every occurrence of the first word), rather than only the first occurrence, to provide the user with greater context about the relevant portions of the document, as was well known in the art. *See supra* Sections VI.B.3, IX.E.3.

157. For example, as explained by Baeza-Yates, Johnson, and others, highlighting a plurality of occurrences of the search string(s) provides several benefits, including greater context and greater user confidence in the search results. EX1023, 101, 103, 207, 289; EX1027, 3-10; *supra* Section VI.B.3. As just a few examples, Google (EX1038), Shneiderman (EX1044), Jensen (EX1035), and Glossbrenner (EX1057) each disclose highlighting every occurrence of the search string(s) in the search results.



EX1038, 56 (APPX L) (showing every occurrence of the searched word “google”).

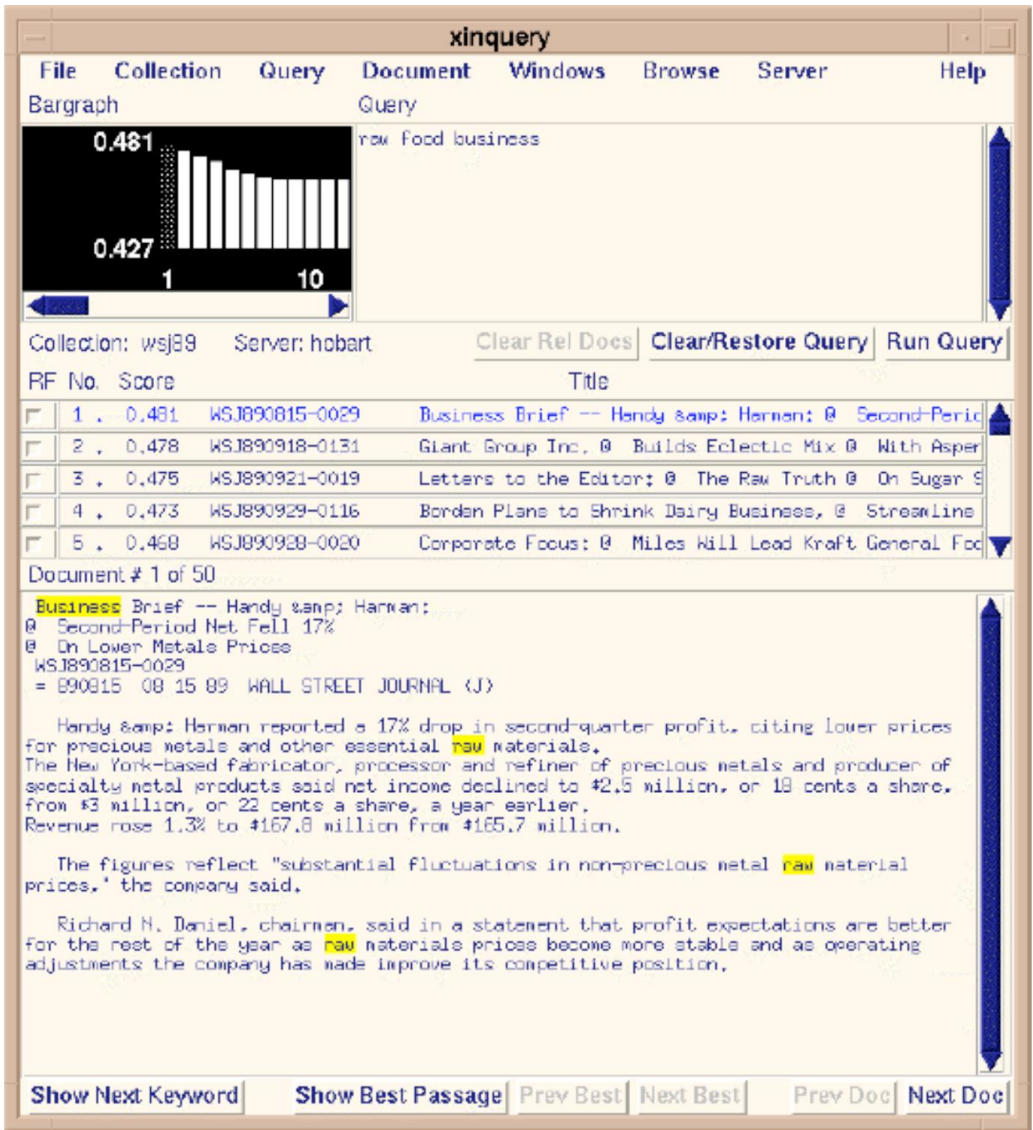


Figure 1. XINQUERY

EX1044, 5 (showing every occurrence of the searched strings “Business” and “raw”).

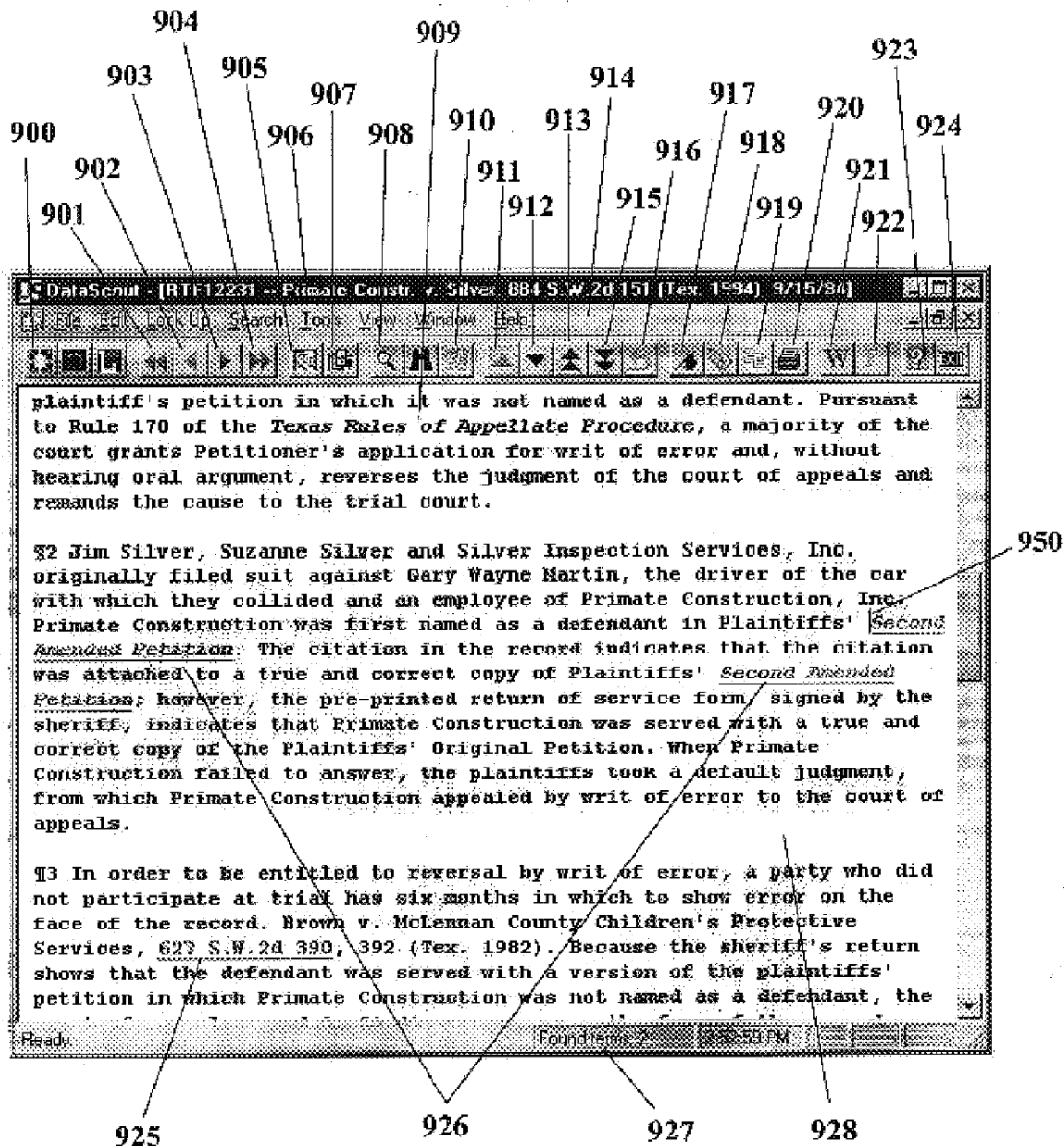


Fig. 9

EX1035, FIG. 9 (showing highlighting of every occurrence of the searched term “second amended petition”).

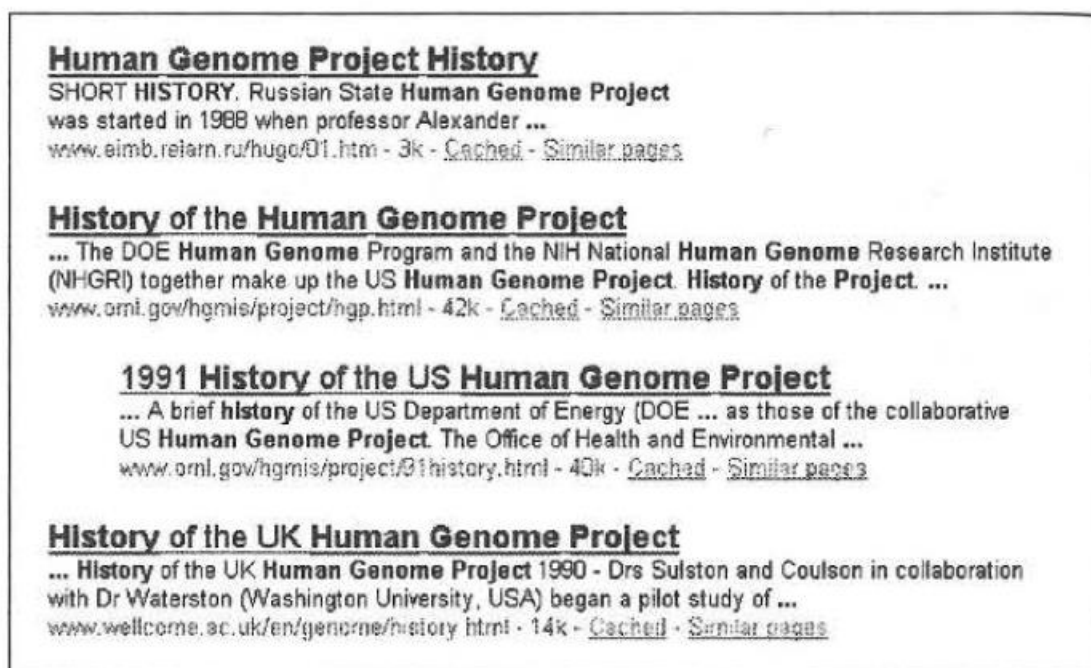


Figure 6.24 To produce these results, we searched for `allintitle:human genome project history`. Note that all of our search terms appear in bold in the Web page titles.

EX1057, 88.

1. **The Mozart Project**
 The life, times and music of Wolfgang Amadeus **Mozart**. Includes a complete Köchel listing, bibliography, **biography**, links to related sites and...
 URL: www.frontiernet.net/~sboerner/mozart/
 Directory Match: [Wolfgang A Mozart Bios & Works](#)
[Translate](#) [More pages from this site](#) [Related pages](#) [Facts about Frontier Corp](#)
2. **Mozart Discussion**
 Discussion of Wolfgang Amadeus **Mozart** on the web....
 URL: mozart.composers.net/wwwboard/index.html
[Translate](#) [More pages from this site](#) [Related pages](#)
3. **The Mozart Project: Bibliography**
 HOME | **BIOGRAPHY** | COMPOSITIONS | SELECTED ESSAYS | BIBLIOGRAPHY
Mozart's Works and Writings. Anderson, Emily, ed. The...
 URL: tpe.reflektor.cz/mozart/books/index.html
[Translate](#) [More pages from this site](#) [Related pages](#)
4. **Mozart, Wolfgang Amadeu: Biography**
 Site ©1996 Timothy A. Smith. Wolfgang Amadeus **Mozart** 1756-1791.
 Child prodigy **Mozart** made his first public appearance, at six years of age, in a...
 URL: jan.ucc.nau.edu/~tas3/wamozart.html
[Translate](#) [Related pages](#) [Facts about: Northern Arizona...](#)

Figure 5.23 Here's an example of how AltaVista presents search results for a query that includes the terms *Mozart* and *biography*.

EX1057, 63.



Figure 10.8 Here's an example of how Yahoo presents search results. Category Matches come first, followed by Site Matches.

EX1057, 163.

5. Claim 5

5. The method of claim 1, wherein the documents comprise one or more of emails, text documents, contact information, appointment information, task information, music files, system files, photographs, and images.

158. The Entourage+True+Baeza-Yates combination renders this claim obvious at least because, as explained above for elements [1.3] and [1.5], the Entourage references disclose that the documents comprise emails, contact

information, task information, and text documents (news articles). *Supra* Section IX.E.1.c; EX1004, 2-3, 8-14, 38-39, 89-90, 161-164, 204-205, 209; EX1005, 173; EX1006, 358-384.

6. Claim 6

6. The method of claim 1, wherein the documents comprise emails and the method further comprises automatically displaying in a user interface a first occurrence of the first word in a first of the identified one or more emails.

159. This claim is obvious for the same reasons provided above for claims 3 and 5. *Supra* Sections IX.E.3, IX.E.5. For example, the Entourage references expressly disclose that the documents comprise emails and further disclose automatically displaying a first occurrence of the first word in one of the identified emails. *E.g.*, EX1004, 11, 161-163. Moreover, it was well known in the art to do this to draw the user's attention to the relevant portion of the document. *Supra* Section VI.B.3.

7. Claims 7-9

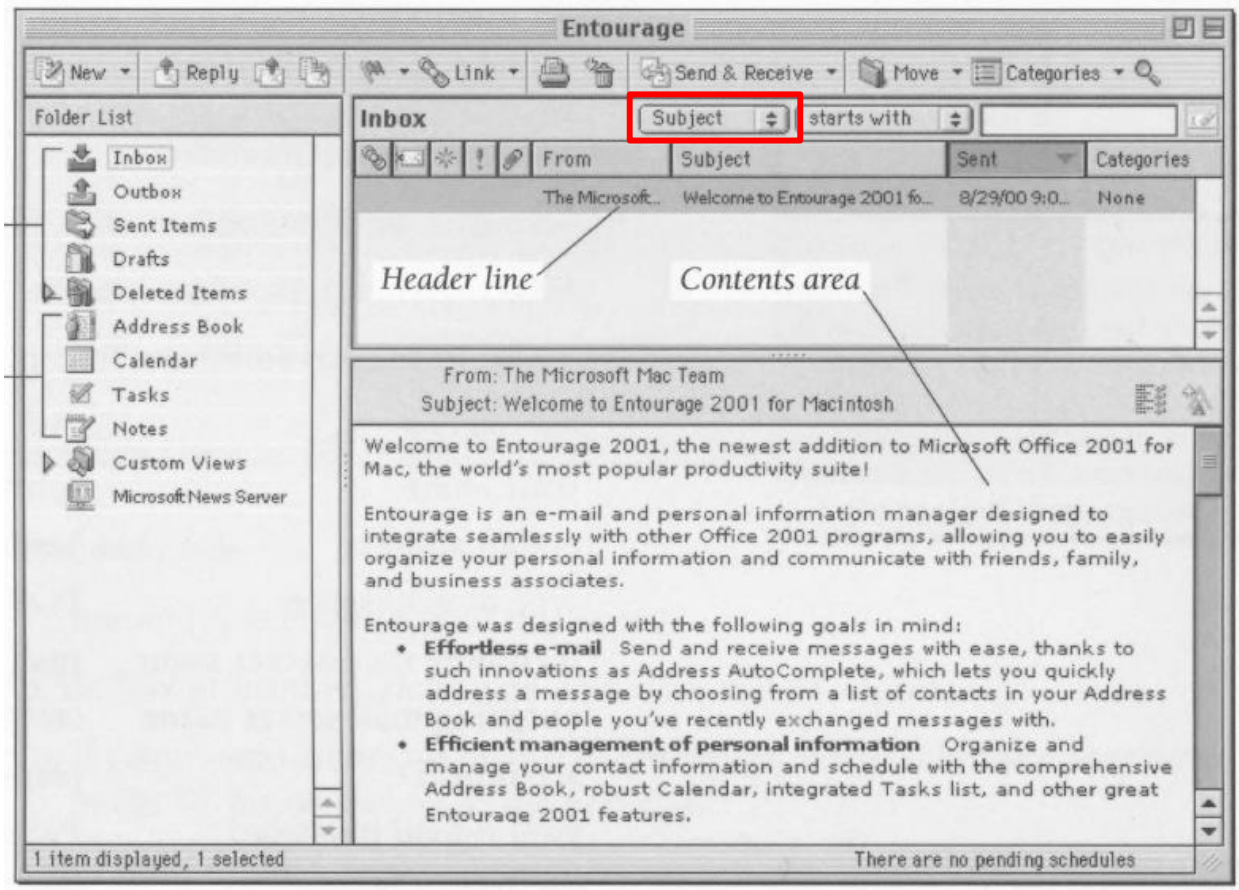
7. The method of claim 1, wherein at least some of the documents comprise at least the following email fields in which one or more of the first and second strings may be located: to, from, cc, bcc, subject, body.

8. The method of claim 1, wherein the single search field corresponds with a single field of the documents and the incrementally locating steps are performed only on content of the single field of the documents.

9. The method of claim 8, wherein the single field of the documents comprises one of: to, from, cc, bcc, subject, and body fields of email documents.

160. The Entourage+True+Baeza-Yates combination renders these claims obvious at least because the Entourage references disclose that the documents (e.g., emails) comprise at least the “To,” “From,” and “Subject” fields, and disclose the ability to search within only one specific field of the emails, as explained above in Sections VIII.A and VIII.C.1. EX1004, 2-3, 8-14, 38, 89, 161-162, 205, 207-209; EX1005, 173; EX1006, 358, 384, 387.

161. Specifically, Entourage includes a drop-down menu where a user can search within a specific field (e.g., “To,” “From,” “Subject,” etc.) and the incremental search is performed only within the specified field. *Supra* Section VIII.A; EX1004, 2-3, 8-14, 38, 89, 161 (“Click the leftmost pop-up menu above the message list, and choose Subject, From, To, or Category. ... The message list is filtered to show only the messages that have been assigned the chosen category. ... Type a search string in the text box. Matching headers are displayed in the message list.”), 162, 205, 207-209; EX1005, 173; EX1006, 384-387.



EX1005, 173 (red annotation added showing searching only within the “Subject” header).

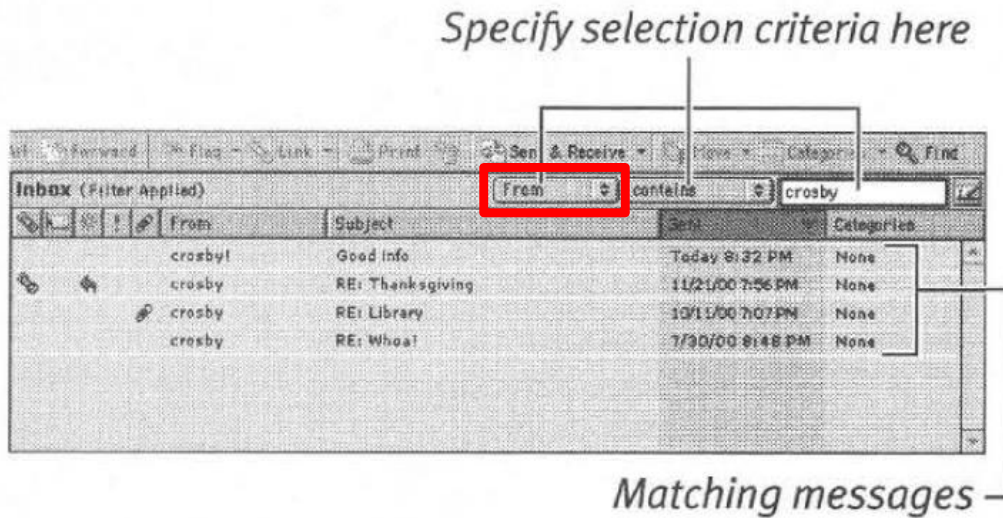
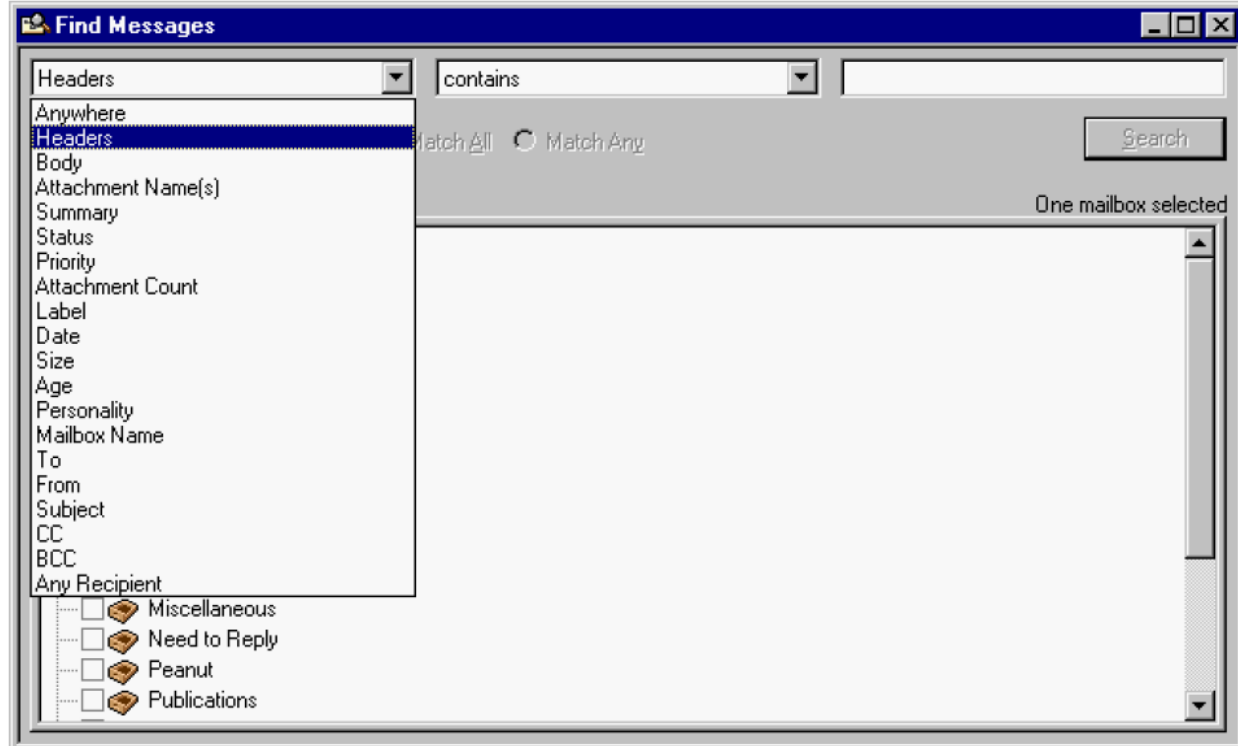


Figure 11.15 To locate messages quickly based on Subject, From, To, or Category information, you can enter selection criteria above the message list.

EX1004, 161 (red annotations added showing searching only within the “From” header). Moreover, it was well known in the art to search within these specific email headers, among others. *Supra* Section VI.B.4.

Find Messages drop-down and conjunction options lists

EX1007, 129.

8. Claim 10

a) Element [10.1]

[10.1] A search apparatus stored on a computer readable medium, the search apparatus comprising instructions configured to be executed by a computing device in order to perform the method of:

162. The Entourage references teach this claim element at least because they disclose a search apparatus (the software on the Microsoft Office 2001 CD-ROM that provides Entourage's search functionality) stored on a computer readable medium (hard drive). EX1004, 23, 30, 35-36, 54-55; EX1006, 1, 5, 9, 613-618; *see also* EX1043, 573-576. For example, the Entourage references

disclose “[i]nstalling the software from the Microsoft Office 2001 CD-ROM” to “[s]et[] up Entourage.” EX1004, 23; *see also id.*, 30, 54-55. This involves saving the software program (Microsoft Office 2001), which includes Entourage (EX1004, 23, 35-36; EX1006, 1, 5, 9), to the computer’s computer readable medium (“hard drive”). EX1006, 613 (“Drag the Office folder from the Office CD-ROM onto your hard drive.”), 614-618. A POSITA would have understood that the software comprises instructions (computer code and associated algorithms) to be executed by a computing device (e.g., a Macintosh computer) to perform the claimed method at least because the POSITA knew that this is how software and computing systems work.

a) Elements [10.2]-[10.6]

163. These elements are substantively identical to elements [1.2]-[1.6]. Thus, the Entourage+True+Baeza-Yates combination teaches these elements for at least the same reasons provided above in Sections IX.E.1.b-IX.E.1.d.

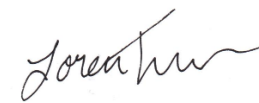
X. OBJECTIVE INDICIA OF NON-OBVIOUSNESS

164. I am aware that Patent Owner raised secondary considerations arguments in another proceeding (an ITC proceeding) and reviewed the exhibits that Patent Owner submitted in that proceeding to support its secondary considerations allegations (*see, e.g.*, EX1063-EX1074). Nothing in those exhibits, however, changes my opinion about the obviousness of the challenged claims or

suggests that the objective indication would overcome the strong showing of obviousness presented in Grounds 1-2. At best, the exhibits cited by Patent Owner in the ITC proceeding point to claim features that were well known in the art, such as incremental searching. For example, EX1067 confirms that Firefox had such incremental searching, stating that: “As you type [X1’s search tool] eliminates documents with no matches. Users of the search feature in Firefox are familiar with how this approach works.” EX1067, 1. EX1073 also confirms that Outlook and Lookeen had document previewing and term highlighting functionality, stating that “Much like Outlook—or Lookeen—for that matter, X1 Search shows the list of the items it finds along with a preview pane so you can browse through the list and see a preview of each item as you highlight it.” EX1073, 4.

I, Loren G. Terveen, do hereby declare and state, that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: December 19, 2024



Signature

APPENDIX A

Loren G. Terveen

terveen@umn.edu	University of Minnesota	(612) 624-8310
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Address	Department of Computer Science and Engineering University of Minnesota Minneapolis, MN 55455		
Education	Ph.D. in Computer Sciences	University of Texas	1991
	M.S. in Computer Sciences	University of Texas	1988
	B.A. in Computer Science, Mathematics, History	University of South Dakota	1984
Affiliations	Member of ACM, ACM/SIGCHI		
Research Interests	Human-Computer Interaction, Social Computing, Artificial Intelligence		
Professional Experience	Professor	University of Minnesota	2002 --
	Distinguished McKnight University Professor		2017 --
	Principal Member of Technical Staff	AT&T Labs - Research	1996-2002
	Member of Technical Staff	AT&T Bell Labs	1991-1996
	Graduate Research Intern	Microelectronics and Computer Corporation	1986-19991
	Teaching Assistant	University of Texas at Austin	1985

AWARDS AND MAJOR ROLES

ACM Distinguished Scientist (awarded 2009)

ACM SIGCHI Academy (2019)

ACM SIGCHI Lifetime Service Award (2023)

ACM SIGCHI President (2015-2018)

ACM Council, SIG Governing Board Representative (2016 – 2018)

RESEARCH

External Funding

NSF:CISE: Community-Engaged Design and Implementation of a Framework for Ethical Online Communities Research (**Co-PI**, with Svetlana Yarosh PI, Stevie Chancellor Co-PI, Joseph Konstan Co-PI, Kangjie Lu Co-PI), \$400,000 for 01/01/2023 to 12/31/2025.

Cisco: Detecting and Reducing Bias in Collaborative Virtual Meetings (**Co-PI**, with Stevie Chancellor PI). **\$177,915** for 9/1/2021 to 12/31/2022.

NSF:CHS:Small: Incorporating and Balancing Stakeholder Values in Algorithm Design (UMN **PI**), Award Total \$500,000, UMN Share \$243,941 for 8/1/2019 to 7/31/2022.

NSF: EAGER: AI-DCL: Capture, Explain and Negotiate the Inherent Trade-offs in Machine Learning Algorithms (UMN **co-PI**), Award Total \$295,713, UMN Share \$103,267 for 10/1/2019 to 9/30/2022.

NSF:CHS: Small: Collaborative Research: Structured Data Peer Production: Addressing Challenges and Leveraging Opportunities (**PI**), \$249,738 for 9/1/2018 - 8/31/2021.

National Cancer Institute (NCI): Restore: Improving sexual outcomes of gay and bisexual prostate cancer survivors (R. Simon Rosser **PI**; my role: **Co-PI**); \$2,039,220 (directs) \$3,039,541 (total), 2017-2022.

NSF: “PFI:BIC: Smart Human-Centered Collision Warning System: sensors, intelligent algorithms and human-computer interfaces for safe and minimally intrusive car-bicycle interactions” (Co-PI, with Rajesh Rajamani (PI), Max Donath, and Nichole Morris), \$999,773 for September 1, 2016 to August 31, 2019.

NSF: “Computer-Supported Cooperative Work Doctoral Colloquium” (**PI**), \$25,000 for 03/01/2016 to 02/28/2017.

National Institute on Drug Abuse: “A Technology-Delivered Peer-to-Peer Support ARB Adherence Intervention for HIV+ Adults”, (Co-PI, with Keith Horvath (PI) and Darin Erickson), \$3,302,62 for 07/01-2015 to 05/31/2020.

NSF: “HCC: Tools and Mechanisms to Support Social Participation Efforts”, (**PI**), \$499,399 for 10/01/2012 to 09/30/2015.

NSF: “SoCS: Collaborative Research: Novel Algorithms and Interaction Mechanisms to Enhance Social Production”, (**PI**), \$527,140, for 7/01/2012 to 06/30/2015.

NSF: “Collaborative Research: Supporting Newcomer Socialization in Online Production Communities”, (**PI**), \$301,135.00 for 08/2011 to 08/31/2015.

Minnesota Department of Transportation: “Statewide Cycloplan: A Bicycle Planning Tool with Participatory GIS”, **(PI)**, \$130,000, for 10/01/2011 to 06/30/2013.

Metropolitan Council: “Cycloplan II”, **(PI)**, \$71,350, for 08/15/2011 to 05/31/2012.

NSF: “Wikisym Doctoral Consortium”, **(PI)**, \$13,163, for 05/01/2011 to 04/30/2012.

IBM: “Mobile Crowdsensing”, **(PI)**, \$100,000 awarded 04/01/2011

NSF: “Social-Computational Systems (SoCS) Community Meeting” **(PI)**, \$48,801 for 09/01/2010 to 08/31/2011

NSF: “SoCS: Collaborative Research: Information Framing: Intelligent Interfaces for an Online Production Community”, **(PI)**, \$375,000 for 09/15/2010 to 08/31/2015.

NSF: “Collaborative Research: Guiding Folksonomy Development to Enable Novel Tagging Applications” **(PI)**, with J. Riedl and S. Sen (Macalester College)). \$949, 788 for 04/1/2010 to 03/31/2014 (UMN Share).

Minnesota Department of Transportation: Bike, Bus, and Beyond: Extending Cyclopath to Enable MultiModal Routing **(PI)**, \$60,627, for 07/08/2010 to 01/31/2012

NIH: An Interactive Website to Promote Communication about Sexual Health and Dating Relationships between Parents and Teens **(Co-PI)**, with Sonya Brady **(PI)**, Simon Rosser, and Renee Sieving), \$679,500 for 09/30/2009 to 08/31/2011.

Metropolitan Council: “Cycloplan” **(PI)**, \$185,000, October 2009 – March 2011.

NSF “Collaborative Research: Understanding Online Volunteer Communities: Toward Theory-Based Design” **(co-PI)**, with J. Riedl, J. Konstan, M. Snyder, & Y. Ren; R. Kraut (CMU) \$2,400,000 for 08/01/2008 to 07/31/2013.

NSF: “Recommender Systems Doctoral Consortium” **(PI)** \$15,415, 2007-2008.

NSF: “Mining Spatiotemporal Data: From Personal Use to Community Knowledge” **(PI)** \$449,570 for 12/1/2005 to 11/30/2009.

NSF: “Collaborative Research: Mark This! - Operationalizing the notion of "place" for interactive community systems” **(PI)**, with Q. Jones (NJIT) and S. Whittaker (Univ. of Sheffield)). \$173,411 for 6/1/2003 to 5/31/2007 (UMN share).

NSF: “Being There: Mobile Devices for Community and Commerce” **(PI)**, with J. Konstan, J. Riedl, and S. Shekhar). \$120,000 for 9/1/2002 to 8/31/2005.

NSF: “ITR: Collaborative Research: Designing On-Line Communities to Enhance Participation” (co-PI, with J. Konstan & J. Riedl, R. Kraut & S. Kiesler (CMU), P. Resnick and Y. Chen (Univ. of Michigan)). \$1,246,017 for 9/1/2003 to 8/31/2009 (UMN share).

AT&T: “VURI: Collaborative Filtering and Intelligent Interface Design for Enhanced TV Applications” (PI). \$35,000 for November 1, 2008 to October 31, 2009.

AT&T: “VURI: Collaborative Filtering and Intelligent Interface Design for Enhanced TV Applications” (PI). \$35,000 for June 1, 2007 to May 31, 2008.

Internal Funding

Minnesota/China Collaborative Research Grant: "Expertise Oriented Mining for Web Community". \$10,000 for July 1, 2007 to June 30, 2008 (PI, with Jie Tang, Tsinghua University, Beijing China).

University of Minnesota TEL grant: “The Next Generation Online Learning Environment: Designing for Community and Collaboration”. \$10,000 for September 2006 to May 2007. (co-PI, with Joan Hughes, David Ernst, and Ann Ooms, College of Education and Human Development).

University of Minnesota Digital Technology Center: “Indoor Navigation Aids for Visually Impaired People”. \$25,670 for June 2005 to December 2006. (co-PI, with S. Shekhar and G. Legge).

University of Minnesota Digital Technology Center: “Eye-Tracking Research on Community Websites: Photo Directories and Building Social Networks”. \$19,300 for June 2004 to June 2005. (co-PI, with J. Konstan).

University of Minnesota Grant-In-Aid: “Facilitating Participation in Online Communities”. \$20,397 for 1/1/2003 to 6/30/2004.

Books

1. Bickhard, M.H. and Terveen, L.G. Foundational Issues in Artificial Intelligence and Cognitive Science: Impasse and Solution, (1995), Elsevier Science.

Refereed Journal Papers

2. Mo Houtti, Moyan Zhou, Loren Terveen, and Stevie Chancellor. “All of the White People Went First”: How Video Conferencing Consolidates Control and Exacerbates Workplace Bias. *PACM Human-Computer Interaction* (2023).
3. Mo Houtti, Isaac Johnson, Joel Cepeda, Soumya Khandelwal, Aviral Bhatnagar, and Loren Terveen. 2022. “We Need a Woman in Music”: Exploring Wikipedia’s Values on Article Priority. *PACM Human-Computer Interaction* 7, (2022).
4. Charles Chunkai Zhang*, Mo Houtti*, C, Estelle Smith, Ruoyan Kong, and Loren Terveen. Working for Invisible Machines or Pumping Information into an Empty Void? An Exploration of Wikidata Contributors’ Motivations. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 6 (2022). (* co-first authors)
5. C. Estelle Smith, William Lane, Hannah Miller Hillberg, Daniel Kluver, Loren Terveen, and Svetlana Yarosh. Effective Strategies for Crowd-Powered Cognitive Reappraisal Systems: A

- Field Deployment of the Flip*Doubt Web Application for Mental Health. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 5 (2021). **Best Paper Honorable Mention.**
6. C. Estelle Smith, Avleen Kaur, Katie Z. Gach, Loren Terveen, Mary Jo Kreitzer, and Susan O'Conner-Von. What is Spiritual Support and How Might It Impact the Design of Online Health Communities? In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 5 (2021).
 7. Levonian, Z., Dow, M., Erickson, D.R., Ghosh, S., Miller Hillberg, H., Narayanan, S., Terveen, L. and Yarosh, L. Patterns of Patient and Caregiver Mutual Support Connections in an Online Health Community. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 4 (2020).
 8. Zhu, H., Yu, B., Halfaker, A., and Terveen, L. Value-Sensitive Algorithm Design: Method, Case Study, and Lessons. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 2, No. 2 (2018).
 9. Miller Hillberg, H., Levonian, Z., Terveen, L., and Hecht, B. What I See is What You Don't Get: Effects of Seeing Emoji Rendering Differences Across Platforms. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 2, No. 2 (2018).
 10. Hall, A., Terveen, L., and Halfaker, A. Bot Detection in Wikidata Using Behavioral Cues. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 2, No. 2 (2018).
 11. Sheppard, S.A., Turner, J., Thebault-Spieker, J., Zhu, H., and Terveen, L. Never Too Old, Cold or Dry to Watch the Sky: A Survival Analysis of Citizen Science Volunteerism. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 1, No. 2 (2017).
 12. Thebault-Spieker, J., Kluver, D., Klein, M., Halfaker, A., Hecht, B., Terveen, L., and Konstan, J. Simulation Experiments On (The Absence of) Ratings Bias in Reputation Systems. In *Proceedings of the ACM on Human-Computer Interaction*, Vol. 1, No. 2 (2017).
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123. Terveen, L.G. Interface Support for Data Archaeology, *ISMM International Conference on Information and Knowledge Management (CIKM'93)*. (acceptance rate for 1992 unknown; average is 24%).
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Book Chapters

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Other Publications

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138. Kaur, H., Johnson, I., Miller, H., Terveen, L., Lampe, C., Hecht, b., and Lasecki, W. Oh The Places You'll Share: An Affordances-Based Model of Social Media Posting Behaviors. In *Extended Abstracts of CHI 2017* (ACM Conference on Human Factors in Computing Systems). 40% acceptance rate.
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142. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "The role of community orientation in promoting online participation" (with J. S. Kim, P. C. Dwyer, J. Filson Moses, P. T. Fuglestad, C. A. Mannino, R Davies, & M. Snyder)
143. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "Applying a functional approach to participation in online groups" (with P. T. Fuglestad, P. C. Dwyer, J. Filson Moses, J. S. Kim, C. A. Mannino, R Davies, & M. Snyder)
144. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "Past volunteerism predicts amount of content contributed in an online community" (with P. C. Dwyer, J. Filson Moses, P. T. Fuglestad, J. S. Kim, C. A. Mannino, R Davies, & M. Snyder)
145. Society for Personality and Social Psychology, San Antonio, TX. January, 2011. "Social motives and personality as predictors of online participation" (with J. Filson Moses, P. C. Dwyer, P. T. Fuglestad, J. S. Kim, C. A. Mannino, R Davies, & M. Snyder)
146. Kapoor, N., Frankowski, D., Konstan, J., and Terveen, L. Lessons Learned in Implementing the CHIplace Online Community, in *Proceedings of Human-Computer Interaction International 2005*.
147. Zhou, C., Ludford, P., Frankowski, D., and Terveen, L. An Experiment in Exploring How People Describe Places, Short Paper in *Proceedings of Pervasive 2005*.
148. Zhou, C., Ludford, P., Frankowski, D., and Terveen, L. An Experiment in Discovering Personally Meaningful Places from Location Data, Short Paper in *Proceedings of CHI 2005*.
149. Kapoor, N., Konstan, J., and Terveen, L. How Peer Photos Influence Member Participation in Online Communities, Short Paper in *Proceedings of CHI 2005*.
150. Amento, B., Hill, W., and Terveen, L. The Sound of One Hand: A Wrist-mounted Bio-acoustic Fingertip Gesture Interface, Short Paper in *Proceedings of CHI 2002*, 724-725. 33% acceptance rate.
151. Terveen, L., Hill, W., and Amento, B. Collaborative Filtering to Locate, Comprehend, and Organize Collections of Websites, in SIGART Bulletin, 9, 3&4 (1998), 10-17.
152. Terveen, L., Hill, W., Amento, B., McDonald, D., and Creter, J. 1997. PHOAKS: a system for sharing recommendations. *Commun. ACM* 40, 3 (Mar. 1997), 59-62.
153. Terveen, L.G., Stolze, M., and Hill, W. From 'Model World' to 'Magic World', in *SIGCHI Bulletin*, 27, 4 (1995), 31-34.
154. Terveen, L.G., Papavero, E., and Tuomenoksa, M. DynaDesigner: A Tool for Rapid Design and Deployment of Device-Independent Interactive Services, Refereed Formal Demonstration in *Adjunct Proceedings of CHI'95*, 29-30.

155. Terveen, L.G. Person-Computer Cooperation through Collaborative Manipulation. Ph.D. Thesis, University of Texas Department of Computer Sciences, 1991.

Invited Presentations

Carnegie Mellon University

Northwestern University

The University of California Irvine

Carleton College

Twin Cities MetroGIS Policy Board

Hennepin County Bicycle Advisory Committee

University of Minnesota Digital Humanities Collaborative

University of Minnesota Advanced Transportation Technologies Seminar Series

Georgia Tech

University of Minnesota Urban Ecosystems Symposium

University of Minnesota New Media

IBM T.J. Watson Research

University of Illinois

University of Maryland

University of Washington

Carnegie-Mellon University

Swedish Institute of Computer Science / Royal Institute of Technology

Uppsala University, Sweden

New Jersey Institute of Technology

Microsoft Research

Vassar University

Rensselaer Polytechnic Institute

University of Colorado

Virginia Tech

University of Nebraska

Conference Presentations

- ACM Conference on Computer-Supported Cooperative Work (CSCW), 2014.
- ACM Conference on Computer-Supported Cooperative Work (CSCW), 2012.
- ACM Conference on Computer-Supported Cooperative Work (CSCW), 2002.
- ACM Conference on Computer-Supported Cooperative Work (CSCW), 1998.
- ACM Conference on Human Factors in Computing Systems (CHI), 1998.
- ACM Conference on Design of Interactive Systems, 1997.

- ACM Conference on Human Factors in Computing Systems (CHI), 1997.
- ACM Conference on Human Factors in Computing Systems (CHI), 1996.
- IFIP TC13 International Conference on Human-Computer Interaction (INTERACT), 1995.
- IEEE Conference on Knowledge-Based Software Engineering, 1994.
- ACM Conference on Human Factors in Computing Systems (CHI), 1993.
- Conference on Information and Knowledge Management, 1993.
- Conference on Information and Knowledge Management, 1992.
- National Conference on Artificial Intelligence (AAAI), 1991.
- International Joint Conference on Artificial Intelligence (IJCAI), 1991.
- National Conference on Artificial Intelligence (AAAI), 1990.

Workshop Presentations

- CHI 2013 GeoHCI Workshop
 - “Geographical Social Production: Lessons from Cyclopath”
- CSCW 2002 Workshop on “The Role of Place in Shaping Virtual Communities”:
 - “Place-Based Community Information Systems”.
- CHI 99 Workshop on “Interacting with Recommender Systems”:
 - “Visualization Interfaces for Recommender Systems”.
- 1999 Human-Computer Interaction Consortium Workshop:
 - “A Reference Task Agenda for Human-Computer Interaction”.
- 1998 AAI Workshop on “Recommender Systems”:
 - “The PHOAKS Recommender System”.
- 1997 Human-Computer Interaction Consortium Workshop:
 - “The PHOAKS Recommender System”.
- 1995 Lifelike Computer Characters Workshop:
 - “Hidden Hands, not Talking Heads: The Magic World Interaction Paradigm”.
- 1995 Lifelike Computer Characters Workshop:
 - “Moving Agent-User Voice Dialogue towards Natural Conversation”.
- CHI 95 Workshop on “‘Model World’ to ‘Magic World’: Making Visual Objects the Medium for Intelligent Design Assistance”:
 - “The ‘Magic World’ Approach to Human-Computer Collaboration”.
- 1993 AAAI Fall Symposium: “Human-Computer Collaboration: Reconciling Theory, Synthesizing Practice”:
 - “A Framework for Human-Computer Collaboration”
- 1993 AI-ED Workshop on “Collaborative Problem Solving: Theoretical Frameworks and Innovative Systems”:

- “Collaborative Problem Solving in Interactive Systems”.
- 1992 CAIA Workshop on “Applying AI To Software Problems: Assessing Promises and Pitfalls”:
 - “Representing and Disseminating Software Design Knowledge”.
- 1992 AAAI Spring Symposium on “Cognitive Aspects of Knowledge Acquisition”:
 - “In The Footprints of The Masters: Embedding Knowledge Acquisition in Organizational Activity”.
- AAAI 90 Workshop on “Complex Systems, Ethnomethodology, and Interaction Analysis”:
 - “Resources for Person-Computer Collaboration”.
- 1990 AAAI Spring Symposium on “Knowledge-Based Human-Computer Communication”:
 - “Tools for Human-Computer Collaboration”.

Patents

U.S. Patent # 5,388,188. Apparatus and methods for providing design advice. (with P. Selfridge). Issued February 7, 1995.

U.S. Patent #5,659,724. Interactive data analysis apparatus employing a knowledge base. (with A. Borgida, R.J. Brachman, T. Kirk, and P. Selfridge). Issued August 19, 1997.

U.S. Patent #5,680,530. Graphical environment for interactively specifying a target system (with P. Selfridge). Issued October 21, 1997.

U.S. Patent #5,806,060. Interactive data analysis employing a knowledge base. (with A. Borgida, R.J. Brachman, T. Kirk, and P. Selfridge). Issued September 8, 1998.

U.S. Patent # 5,809,492. Apparatus and method for defining rules for personal agents. (with L. Murray). Issued September 15, 1998.

U.S. Patent # 5,953,393. Personal Telephone Agent. (With P. Culbreth, P. Danielsen, R.J. Hall, E. Papavero, and M. Tuomenoksa). Issued September 14, 1999.

U.S. Patent #6,029,192. System and method for locating resources on a network using resource evaluations derived from electronic messages. (with W.C. Hill). Issued February 22, 2000.

U.S. Patent #6,244,873. Wireless myoelectric control apparatus and methods. (with W.C. Hill, F.C. Pereira, and Y. Singer). Issued June 12, 2001.

U.S. Patent #6,256,648. System and method for selecting and displaying hyperlinked information resources. (with W.C. Hill). Issued July 3, 2001.

U.S. Patent #9,430,043. Bioacoustic Control System, Method, and Apparatus. (with B. Amento and W.C. Hill). Issued August 30, 2016.

CONSULTING

I provide details for matters that have become public. In other cases, I provide general descriptions.

- (2023) Retained by Unified Patents. General technology area: online advertising. Writing declaration in support of inter partes review petitions.

- (2023) Retained on behalf a consumer and information technology company. General technology area: graphical and touch-based user interfaces. Writing declaration in support of inter partes review petitions.
- (2023) Retained on behalf of a computer software, hardware, and consumer electronics company. General technology areas: graphical user interfaces for web information access. Writing declaration in support of inter partes review petitions.
- (2022) Retained on behalf of a computer software company. General technology areas: map-based user interfaces, mobile computing, messaging. Writing declarations in inter partes review proceedings involving patents owned by the company.
- (2022) Retained as expert witness on behalf of a computer software and hardware company. General technology area: group collaboration systems. Writing declaration in support of inter partes review petitions.
- (2022) Retained as expert witness on behalf of a consumer electronics company. General technology area: graphical user interfaces. Analyzed possible infringements of the company's patents.
- (2022) Retained as expert witness on behalf of a computer software company. General technology areas: Web-based and mobile user interfaces.
- (2022) Retained as expert witness on behalf of a computer software company. General technology areas: Web-based and mobile user interfaces.
- (2021) Retained to write declaration in support of inter partes review petitions. General technology area: information discovery.
- (2021) Retained on behalf of a computer software and hardware company. General technology area: graphical user interfaces. Writing declaration in support of inter partes review petitions.
 - **Deposed: September 2022**
- (2021) Retained on behalf of a computer software and hardware company. General technology areas: web information access, voice interaction, home automation. Writing declaration in support of inter partes review petitions.
- (2021) Retained on behalf of a computer software company. General technology area: multimedia messaging. Analyzing potential infringement of company's patents.
- (2021) Retained on behalf of a computer software company. General technology areas: map-based user interfaces, mobile computing, messaging. Writing declarations in support of patent holder's position in *ex parte* reexaminations.

- (2020) Retained on behalf of a computer software and hardware company. General technology area: information processing, hypertext, inference. Writing expert reports.
- (2020) Retained on behalf of a computer software and hardware company. General technology area: graphical user interfaces. Analyzed potential invalidity of patents.
- (2020) Retained by on behalf of a consumer electronics company. General technology area: graphical user interfaces. Analyzed possible infringements of the company's patents.
- (2020) Retained by Erise IP on behalf of Apple
 - Worked on *Inter Partes* review declaration
 - **Deposed: December 2020**
- (2019) Retained on behalf of Comcast. General technology area: interactive program guide systems. Writing expert reports.
 - **Deposed July 2021**
 - **Testified July 2022**
 - **Testified at jury trial April 2022:** Judge William Jung of the U.S. District Court for the Middle District of Florida granted judgment as a matter of law of no infringement for Comcast.
- (2019) Retained on behalf of a computer and internet software company. General technology area: information search. Did not write expert reports.
- Retained by O'Melveny & Myers on behalf of Google (2019)
- Retained by Erise IP on Behalf of Unified Patents, Inc. (2018)
 - Worked on *Inter Partes* review declaration
 - **Deposed: September 2019**
- Retained by Maynard, Cooper & Gale for an *Ex Parte* Reexamination (2018)
- Retained by Klarquist Sparkman on behalf of LinkedIn (2018)
 - Worked on an *Inter Partes* review declaration
- Retained by Klarquist Sparkman on behalf of Microsoft (2017-2018)
 - Worked on multiple *Inter Partes* review declarations and a Post Grant Review declaration
- Microsoft Corporation and Microsoft Mobile, Inc. vs. Koninklijke Philips N.V.
 - Retained as expert on behalf of Microsoft by Perkins Coie (2017-2019)
 - PTAB Case No. IPR2018-00023
 - Wrote an *Inter Partes* Review declaration
 - **Deposed: July 2018**
 - District Court Case

▪ **Deposed: July 2019**

- Retained by Perkins-Coie on behalf of Microsoft (vs. Cypress Lake Software)
 - Wrote a Post Grant Review declaration
- TiVo Inc. v. Samsung Electronics
 - Retained as expert on behalf of TiVo by Irell & Manella (2016)
 - Case No. 2:15-cv-1503 (E.D. Tex.)
- Netflix v. Rovi 4:11-cv-06591
 - Retained as expert on behalf of Netflix by Keker Van Nest (2014-2015)
 - **Presented technology tutorial to Judge, March 2015**
- Clear with Computers vs. Vermeer
 - Clear with Computers, LLC vs. Vermeer Corporation*
Civil Action No. 13-cv-00167 (E.D. Texas)
 - Retained by Faegre, Baker, and Daniels
- Clear with Computer vs. Manitowoc Cranes, LLC.
 - Clear with Computers, LLC vs. Vermeer Corporation*
Civil Action No. 13-cv-00167 and related cases (E.D. Texas)
 - Retained by Baker Botts
- Clear with Computers vs. Terex Corporation
 - Clear with Computers, LLC v. Terex Corporation*
Civil Action No. 6:12-cv-00634 (E.D. Texas)
 - Retained by Fish & Richardson
- Clear with Computers vs. Valmont Industries, Inc.
 - Clear with Computers, LLC v. Valmont Industries, Inc.*
Civil Action No. 6:13-cv-00166 (E.D. Texas)
 - Retained by Fish & Richardson
 - During the first half of 2014 I was retained by three different firms on behalf of four different clients to work on invalidity. I also worked on non-infringement on behalf of Vermeer.
- Intellectual Ventures vs. U.S. Bancorp and U.S. Bank
 - Intellectual Ventures II LLC v. U.S. Bancorp and U.S. Bank*
Civil Action No. 13-2071 (U.S. District of Minnesota, Fourth Division)
 - Retained by Winthrop & Weinstine on behalf of U.S. Bancorp and U.S. Bank
 - Consulted on non-infringement and invalidity from late 2013 through mid 2014
- “Products Containing Interactive Program Guide and Parental Control Technology”:
Rovi vs. LG Electronics, Mitsubishi, Netflix, Roku, and Vizio.
 - Case No. ITC 337-TA-845
 - International Trade Commission
 - Retained as expert on behalf of respondents Netflix and Roku by Keker Van Nest (2012-2013)

- **Deposed: 2013**
- **Testified in court: 2013**
- Motorola Mobility vs. Microsoft and Microsoft vs. Motorola Mobility (Counterclaim)
 - Case No. 1:10-CV-24063-MORENO
 - United States District Court Southern District of Florida
 - Retained as expert on behalf of Microsoft (2011-2012) by Sidley Austin
 - **Deposed: 2011**
- Interval Licensing LLC vs. Aol, Inc.; Apple, Inc., eBay, Inc.; Facebook, Inc.; Google, Inc.; Netflix, Inc.; Office Depot Inc.; OfficeMax Inc.; Staples, Inc.; Yahoo, Inc.; and YouTube, LLC.
 - Case No. 2:10-cv-01385-MJP
 - United States District Court Western District of Washington at Seattle
 - Retained as expert of behalf of four of the respondents – eBay Inc.; Netflix, Inc.; Office Depot, Inc.; and Staples, Inc. – by Klarquist Sparkman (2011)
- Microsoft vs. Tivo
 - Case No. 5:10-cv-00240-RS
 - United States District Court Northern District of California
 - Retained as expert on behalf of plaintiff by Perkins Coie (2010-2011)
- Elsevier B.V., Elsevier Inc., and Mosby, Inc. vs. UnitedHealth Group, Inc. etc.
 - 09 Civ. 2124
 - United States District Court Southern District of New York
 - Retained as expert on behalf of respondent by Dorsey & Whitney (2010)
- NORTHBROOK DIGITAL LLC vs. Vendio Services, Inc.
 - Civil File No. 07-CV-2250
 - United States District Court District of Minnesota
 - Retained as expert on behalf of plaintiff by Dorsey & Whitney (2009)

SERVICE

University of Minnesota Committees

- College of Science & Engineering Consultative Committee: 2015-2018
- College of Science & Engineering Honors & Awards Committee, 2017-2020

External Professional Activities

ACM Special Interest Group on Computer Human Interaction

- President: 2015-2018
- Executive Committee: Adjunct Chair for Awards, 2012 – 2015.

- Executive Committee: Vice President for Membership and Communication, 2009 – 2012.

Conference Chair

- CHI 2002: ACM Conference on Human Factors in Computing Systems
- IUI 1998: ACM Conference on Intelligent User Interfaces.

Program Committee Chair

- CSCW 2004: ACM Conference on Computer-Supported Cooperative Work.
- CSCW 2013: ACM Conference on Computer-Supported Cooperative Work.

Computer Supported Cooperative Work (CSCW) Steering Committee

- Chair, 2012-2014 (First elected Chair of the committee that oversees the CSCW Conference and the general CSCW and Social Computing research community.)

Awards Committee Chair

- CSCW 2008: ACM Conference on Computer-Supported Cooperative Work.

Journals Edited

- Special Issue of *Knowledge-Based Systems* on Human-Computer Collaboration, Vol. 8, No. 2-3, 1995.

Proceedings Edited

- Proceedings of the 2002 ACM Conference on Human Factors in Computing Systems (CHI 2002).
- Proceedings of the 1998 ACM Conference on Intelligent User Interfaces (IUI 1998).

Editorial Boards

- Communications of the ACM, 2009-present.
- ACM Transactions on CHI, 2000-2006.
- Knowledge-Based Systems, 1993-2009.
- ACM *intelligence*, 1998-2001.

Program Committees

- ACM Conference on Human Factors in Computing Systems (CHI): 1999-2004, 2006, 2016.
- ACM Conference on Computer-Supported Cooperative Work (CSCW): 2000, 2006, 2008, 2010, 2011, 2012, 2015.
- ACM Conference on Intelligent User Interfaces (IUI): 1997-2000, 2004.
- ACM Recommender Systems Conference: 2007, 2008, 2009, 2010, 2013.
- ACM GROUP Conference: 2007, 2009, 2010.

- ACM SIGIR Conference: 2008.
- AAAI Conference on the Web and Social Media: 2011, 2012, 2016.
- User Modeling, Adaptation, and Personalization: 2011, 2016.
- NordiCHI 2008, 2010.
- Communities and Technology: 2009.
- Computer-Supported Cooperative Learning 2002.
- User Modeling: 2001.
- International Conference on Knowledge Capture 2001.
- Knowledge-Based Software Engineering (KBSE): 1994-1999.
- Intelligent Data Analysis: 1997.
- National Conference on Artificial Intelligence (AAAI): 1996-1997.
- IEEE Conference on Artificial Intelligence for Applications (CAIA): 1994.
- International Workshop on Privacy-Aware Location-based Mobile Services: 2007.
- SIGIR Workshop on Future Challenges in Expertise Retrieval: 2008.

Other conference leadership positions

- ACM Conference on Computer-Supported Cooperative Work Doctoral Consortium Co-Chair, 2016 and 2011.
- The 2nd AAAI Conference on Human Computation and Crowdsourcing (HCOMP 2014) Doctoral Consortium Co-Chair.
- International Symposium on Wikis and Open Collaboration Doctoral Symposium Chair, 2011.
- ACM Conference on Recommender Systems Doctoral Consortium, Co-Chair, 2007.
- International Joint Conference for Artificial Intelligence Doctoral Consortium, Co-Chair, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, Co-Chair, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, Co-Chair, 1996.

Reviewer

Journals

- ACM Computing Surveys.
- IEEE Transactions on Data and Knowledge Engineering.
- IEEE Expert.
- Information Systems.
- International Journal of Human-Computer Studies.
- Journal of Computer-Supported Cooperative Work.

Conferences

- Ninth IFIP International Conference on Human-Computer Interaction (INTERACT): 2003.
- ACM Conference on Human Factors in Computing Systems (CHI): 1995-1998.
- ACM Conference on Computer-Supported Cooperative Work (CSCW): 1998.
- ACM Symposium on User Interface Software and Technology (UIST): 1996.
- ISSM Conference on Information and Knowledge Management: 1993.

National Science Foundations Panels

Served on panels in 1996, 1998, 2001, 2003, 2005, 2010, 2012, 2013.

Workshops Organized

- ACM Wikis and Open Collaboration Doctoral Symposium, 2011.
- Social Computational Systems Community Workshop, 2011.
- ACM Computer Supported Cooperative Work Doctoral Consortium, 2011.
- International Conference on Ubiquitous Computing (UbiComp): “Multi-device Interfaces for Ubiquitous Peripheral Interaction”, 2003.
- ACM Conference on Human Factors in Computer Systems (CHI): “Interacting with Recommender Systems”, 1999.
- International Joint Conference for Artificial Intelligence Doctoral Consortium, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, 1997.
- American Association for Artificial Intelligence Doctoral Consortium, 1996.
- ACM Conference on Human Factors in Computer Systems (CHI): “‘Model World’ to ‘Magic World’: Making Visual Objects the Medium for Intelligent Design Assistance”, 1995.
- ACM Conference on Human Factors in Computer Systems (CHI): “New Uses and Abuses of Interaction History”, 1994.
- AAAI Fall Symposium: “Human-Computer Collaboration: Reconciling Theory, Synthesizing Practice”, 1993.
- World Conference on Artificial Intelligence and Education: “Collaborative Problem Solving: Theoretical Frameworks and Innovative Systems”, 1993.
- Conference on AI for Applications: “Applying AI To Software Problems: Assessing Promises and Pitfalls”, 1992.

Other Professional Service

- Member of SIGCHI Publications Board and Conference Management Committee, 2002-2004.
- ACM Special Interest Group on Artificial Intelligence Conference Chair (1995-1999); originated and co-organized Doctoral Consortia held in conjunction with AAAI and IJCAI.

Internal Service

- Associate Department Head, 2019-
- Chair, Department Head Search Committee, 2015.
- Chair, Strategic Planning Committee, 2013-2014.
- Chair, Social Computing Faculty Search Committee, 2013-2014.
- Curriculum Committee, 2012-2013.
- Chair, Strategic Planning Committee / Faculty Recruiting Committee, 2011-2012.
- Director of Graduate Studies: 2007-2010.
- Communications Committee: 2007
- Newsletter/Brochure Committee (chair): 2006-2007
- Research Opportunities Committee: 2005-2007
- Curriculum Committee: 2003-2005.
- Hosted Robert Kraut, Cray Colloquium speaker: October 2003.
- Participated in recruiting and admission activities.
- Information, Technology, and Everyday Life Initiative: Committee Member.

TEACHING AND ADVISING

Ph.D. Students Advised

- Dan Cosley (co-advised with John Riedl): completed PhD July 2006, currently an Associate Professor at Cornell University; on leave as Program Director at NSF.
- Pamela Ludford: completed PhD September 2007, currently an independent consultant.
- Reid Priedhorksy: completed PhD August 2010, currently employed at Los Alamos National Laboratories.
- Colin Delong: completed PhD October 2013 (co-advised with Jaideep Srivastava)
- Mikhil Masli: completed PhD July 2013, currently employed at IBM.
- Aaron Halfaker (co-advised with John Riedl): completed PhD September 2013, currently employed at Microsoft.
- Katie Panciera: completed PhD August 2014; currently Assistant Professor at Milwaukee School of Engineering.
- Fernando Torre: completed PhD September 2014; founder of a startup.
- Shuo (Steven) Chang: completed PhD August 2016; currently employed at Facebook.
- Tien Nguyen (co-advised with Joe Konstan): completed PhD August 2016; currently employed at Facebook.
- Morten Warncke-Wang (co-advised with Brent Hecht): completed PhD December 2016, currently employed at the Wikimedia Foundation.
- Andrew Sheppard: completed PhD December 2017, currently employed at Houston

Engineering.

- Jacob Thebault-Spieker (co-advised with Brent Hecht): completed PhD December 2017; currently Assistant Professor at The University of Wisconsin.
- Hannah Miller (co-advised with Brent Hecht): completed PhD August 2018; currently Assistant Professor at University of Wisconsin Oshkosh.
- Vikas Kumar (co-advised with Joe Konstan), completed PhD August 2018, currently employed at KenSci.
- Andrew Hall: completed PhD August 2019; currently employed at 3M.
- Bowen Yu (co-advised with Haiyi Zhu), completed PhD December 2018, currently employed at Facebook.
- C. Estelle Smith: completed PhD December 2020; currently Assistant Professor at the Colorado School of Mines.
- Zach Levonian (co-advised with Lana Yarosh): completed PhD July 2022.
- Charles Chuankai Zhang (entered program Fall 2019).
- Mohammed (Mo) Houtti (entered program Fall 2019)
- Moyan Zhou (entered program Fall 2021)
- Ava Bartolome (entered program Fall 2022; co-advised with Stevie Chancellor)

M.S. Students Advised

- Tyler Danielsen – received degree in 2016
- Jie Kang – received degree in 2016
- Zahra Eslami – received degree in 2015
- Yanjie Liu – received degree in 2013
- Renji Yu – received degree in 2012
- Carol Drysdale – received degree in 2011
- Jingwen Zhang – received degree in 2011
- Jisu Oh – received degree in 2010
- Sara Drenner – received degree in 2008
- Anna Rouben – received degree in 2006
- Arjun Sundararajan – received degree in 2006
- Pamela Ludford – received degree in 2005
- Rahul Akolkar – graduated May 2004

Undergraduate Honors / Senior Thesis Students Advised

- Moyan Zhou 2021
- Avleen Kaur 2020

- Harmanpreet Kaur, 2016
- Arlo Siemsen, 2014
- Johnathan Frenz, 2013
- David Pitchford - 2012
- Michael Ludwig - 2010
- Jordan Focht – 2010
- Kurt Wilms - 2005
- John Murphy – 2004

Other Committees

- Hanlin Li, PhD: Member of final examination committee (Northwestern University).
- Matheus Araújo, PhD: Member of preliminary and final examination committees
- Hao-Fei Cheng, PhD: Member of preliminary and final examination committees
- Catherine Grevet, PhD: member of preliminary and final examination committees (Georgia Tech).
- Loxley Wang, PhD: member of preliminary and final examination committees.
- Abigail Bakke, PhD: member of preliminary and final examination committees
- Tahir Sousa, MS: member of final examination committee
- Tony Lam, PhD: member of preliminary examination committee.
- Michael Janseen, PhD: member of preliminary examination committee.
- Haleh Hagh Shenass, PhD: member of preliminary & final examination committees.
- Julie Beilfuss, MS: member of final examination committee.
- Liv Knatterud, MS: member of final examination committee.
- Sean McNee, MS: member of final examination committee.
- Shankar Subrahmanian, MS: member of final examination committee.
- Vamsee Venuturumilli, MS: member of final examination committee.
- Eric Gilbert, Ph.D. Preliminary and Final Examination Committees (UIUC, 2009/2010): member of thesis committee.
- Yi (Jenny) Zhang, Ph.D. (New Jersey Institute of Technology, 2004): member of thesis committee.
- Brian Amento, Ph.D. (Virginia Tech, 2001): member of thesis committee.
- David McDonald, Ph.D. (UC Irvine, 2000): member of thesis committee.

Courses taught

A list of all the classes I have taught, in most cases multiple times.

- CSCI 8115: Human-Computer Interaction and UI Technology

- CSCI 5125: Collaborative and Social Computing
- CSCI 5116: GUI Toolkits and Their Implementation
- CSCI 5115: User Interface Design, Implementation, and Evaluation
- HSEM 2519H: Honors Seminar on Crowdsourcing
- CSCI 1902: Structure of Computer Programming II
- CSCI 1901H: Introduction to Computer Science (Honors)

Tutorials

“Intelligent User Interfaces: Issues, Approaches, Evaluation”, offered at 1993 Conference on Artificial Intelligence for Applications.