UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

MOBILE DATA TECHNOLOGIES LLC,
Patent Owner.

IPR2024-00246 (Patent 8,793,336 B2)
IPR2024-00247 (Patent 8,825,801 B2)
IPR2024-00248 (Patent 9,032,039 B2)
IPR2024-00249 (Patent 9,619,578 B2)
IPR2024-00250 (Patent 9,922,348 B2)

DECLARATION OF INGRID HSIEH-YEE, PH.D.

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I, Ingrid Hsieh-Yee, declare as follows:

I. INTRODUCTION AND QUALIFICATIONS

1. I am over the age of eighteen and otherwise competent to make this declaration.

2. I have been retained by counsel for Petitioner to provide my expert opinion in connection with the above-captioned proceedings ("IPR") regarding the public availability of a certain prior art references in relation to the above-captioned patents—i.e., U.S. Patent No. 8,793,336 B2, U.S. Patent No. 8,825,801 B2, U.S. Patent No. 9,032,039 B2, U.S. Patent No. 9,619,578 B2, and U.S. Patent No. 9,922,348 B2 ("Challenged Patents").

3. I am being compensated for my time in connection with this IPR at my current consulting rate. I am also being reimbursed for any reasonable expenses associated with my work and testimony in this investigation. My compensation is not contingent on the results of my study, the substance of my opinions, or the outcome of this matter.

A. Qualifications and Professional Experience

4. My complete qualifications and professional experience are described in my academic curriculum vitae (**Appendix A**). The following is a brief summary of my relevant qualifications and professional experience.

5. I was a professor in the Department of Library and Information Science

at the Catholic University of America for 32 years and was conferred the title of Professor Emerita in December 2022. I have experience working in an academic library, a medical library, and a legislative library. I hold a Ph.D. and a Masters in Library and Information Studies from the University of Wisconsin-Madison.

6. I am an expert on library cataloging and classification and have published two editions on this subject, *Organizing Audiovisual and Electronic Resources for Access: A Cataloging Guide* (2000 and 2006). I taught a variety of courses, including Cataloging and Classification, Advanced Cataloging and Classification, Organization of Internet Resources, Organization of Information, Metadata, Digital Content Creation and Management, Internet Searches and Web Design, Information Literacy Instruction, Advanced Information Retrieval and Analysis Strategies, and The Information Professions in Society. I am familiar with metadata schema design and implementation. In my teaching, I covered the design and implementation of metadata in databases, search engines, digital repositories, digital libraries, and digital archives. I also covered how information organization affects the discovery and access to digital resources on the Internet. My research interests cover cataloging and classification, information organization, metadata, information retrieval, information architecture, digital collections, scholarly communication, social media, user interaction with information systems, and others

II. BACKGROUND OF LIBRARY CATALOGING

A. Machine-Readable Cataloging ("MARC")

7. I am very familiar with a library cataloging encoding standard known as the "Machine-Readable Cataloging" standard, also known as "MARC," which became the national standard for sharing bibliographic data in the United States by 1971 and the international standard by 1973. MARC is the primary communications protocol for the transfer and storage of bibliographic metadata in libraries. Experts in my field reasonably rely upon MARC records when forming their opinions.

8. A MARC record consists of several fields, each of which contains specific data about the work. Each field is identified by a standardized, unique, three-digit code corresponding to the type of data that follows. **Appendix B** is a true and correct copy of Parts VII to X of "Understanding MARC Bibliographic: Machine-Readable Cataloging" (https://www.loc.gov/marc/umb/um07to10.html), a brief description and tutorial published by the Library of Congress in 2009 that explains commonly used MARC fields. For example, the personal author of a work is recorded in Field 100, the title is recorded in Field 245, publisher information is recorded in Field 260, the physical volume and characteristics of a publication are recorded in Field 300, and topical subjects are recorded in Fields 650. More details of MARC21 format for Bibliographic Data are available on the Library of Congress website at https://www.loc.gov/marc/bibliographic/.

9. I am very familiar with library cataloging and processing practices and the relationships between OCLC (Online Computer Library Center) and library catalogs, and how libraries create and share their records to help the public discover and access information.

10. OCLC is the largest bibliographic network of the world, and its WorldCat database contains more than 559 million records from thousands of member institutions (many of which are libraries of some type) in more than 100 countries. OCLC was founded in 1967 to promote and support library cooperation. According to the third article of the "Amended Articles of Incorporation of OCLC [Online Computer Library Center], Inc.," OCLC was created "to establish, maintain, and operate a computerized library network and to promote the evolution of library use, of libraries themselves, and of librarianship, and to provide processes and products for the benefit of library users and libraries, including such objectives as increasing availability of library resources to individual library patrons and reducing the rate of rise of library per-unit costs, all for the fundamental public purpose of furthering ease of access to and use of the ever-expanding body of worldwide scientific, literary, and educational knowledge and information" (source: https://www.oclc.org/content/dam/oclc/membership/articles-of-incorporation.pdf).

11. OCLC members can contribute original cataloging records in MARC to the system or derive cataloging records from existing records, an activity referred

to as "copy cataloging." When an OCLC participating institution acquires a work, it can create an original MARC record for the work in OCLC's Connexion system (a system for catalogers to create and share MARC records), and the system will automatically generate a code for the date of record creation in the yymmdd format, and the creating library's OCLC symbol is recorded in subfield "a" of the 040 field. Once the MARC record is in Connexion, it becomes available to other OCLC members for adoption to their local online catalogs (*i.e.*, copy cataloging).

12. After a MARC record is created in Connexion, it also becomes searchable and viewable on WorldCat.org, which is a free web portal for users to explore more than 10,000 libraries worldwide. Records in WorldCat.org, however, are not presented in MARC fields. Instead, the data elements are labeled to help users interpret the records. Thus, the information stored in MARC records in Connexion is available to the interested public through the user-friendly WorldCat web portal. WorldCat records can also be searched on OCLC FirstSearch, a subscription-based search system that provides access to many proprietary databases, including the WorldCat database.

B. Library Online Catalogs

13. Library online catalogs gained acceptance in the early 1980s and many libraries migrated their systems to the World Wide Web in the mid-1990s. Library online catalogs are based on MARC records that represent their collections in order

to help the public understand what materials are publicly accessible in those libraries. Most libraries with online catalogs have made their catalogs freely available on the Web. These online catalogs offer user-friendly search interfaces. Strong user interest in keyword searches and the popularity of Google have led to the "googlization" of library search systems. As a result, many library catalogs nowadays provide a single search box for users to conduct keyword searches, with additional support for searches by author, title, subject terms, and other data elements such as ISBN (International Standard Book Number). Library catalogs these days also offer features for users to narrow their search results by language, year, format, and other elements. Many libraries display MARC records on their online catalogs with labels for the data elements to help the public interpret MARC records. Many libraries also offer the option to display MARC records in MARC fields.

14. Libraries create MARC records for works they acquire, including books, serials, motion pictures, and publications in other formats. Monograph cataloging is fairly common in libraries, and most libraries make a newly cataloged monograph available to the public soon after the cataloging work is completed, usually within a week. Libraries can create original cataloging records or use an existing record in the OCLC WorldCat database to create a copy cataloging record. As soon as the cataloging record is completed, it is added to the library's online catalog for users. If the record is an original record, it is also entered into the OCLC

system. If it is a copy cataloging record, the library's holding symbol is attached to the existing original record in the OCLC system to facilitate searching and interlibrary loan.

15. I am personally familiar with many online catalogs, databases, and search engines. In preparing for this declaration, I used the following authoritative information systems to search for records:

- Google Scholar (https://scholar.google.com/)
- Internet Archive (https://archive.org/)
- Libraries.org, a directory of libraries throughout the world (https://librarytechnology.org/libraries/)
- Online catalog of the Cincinnati and Hamilton County Public Library (http://classic.cincinnatilibrary.org/search)
- Online catalog of the Library of Congress (https://catalog.loc.gov/)
- Online catalog of the Texas A&M University Libraries (https://catalog.library.tamu.edu/)
- Online catalog of the University of Northern Colorado Libraries (https://www.unco.edu/library/)
- WorldCat.org (https://search.worldcat.org/)

C. Scope of this Declaration

16. I have been asked to offer an opinion on the public availability dateS of

the following documents:

- Hansmann, U., Merk, L., Nicklous, M. S., & Stober, T. (2001). *Pervasive Computing Handbook*. Springer. **EX1035** ("*Hansmann*"); and
- Lemay, L., & Tyler, D. (2000).SAMS Teach Yourself Web Publishing with HTML 4 in 21 Days, 2nd edition. Indianapolis, IN: Sams. **EX1038** ("*Lemay*").

17. I am informed by counsel and. Understand that a given reference is "published" upon a satisfactory showing that such a document has been disseminated or otherwise made publicly available to the extent that persons interested and ordinarily skilled in the subject matter or art could locate it exercising reasonable diligence and obtain the document. I have also been informed by counsel and understand that materials available in a library constitute "printed publications" if they are catalogued and indexed according to general library practices and protocols that make the references available and accessible to members of the interested public.

18. I have been informed by counsel that each of the Challenged Patents claims June 18, 2002 as its earliest priority date. I have assessed public accessibility of the documents referenced below as of this claimed priority date.

19. I have been informed by counsel that the subject matter of this proceeding generally relates to network-based communications systems.

20. I have been informed by counsel that a "person of ordinary skill in the art at the time of the invention" (POSA) is a hypothetical person who is presumed to be familiar with the relevant field and its literature at the time of the inventions. I have been informed by counsel that this hypothetical person is also a person of ordinary creativity, capable of understanding the scientific principles and literature applicable to the pertinent field.

21. I have been informed by counsel that a person of ordinary skill in the art as of June 18, 2002, would have knowledge of the scientific literature and have skills relating to network-based communications systems. A person of ordinary skill in this subject matter or art would have possessed a bachelor's degree in electrical engineering, computer science, or similar field, with two years of experience in developing and implementing network-based computer systems that interact with mobile devices, such as systems for storing and retrieving information over the Internet or communicating using the Web using wireless mobile devices. A person could also have qualified as a person of ordinary skill in the art with some combination of (1) more formal education (such as a master's of science degree) and less technical experience, or (2) less formal education and more technical or professional experience.

22. It is my opinion that such a person would have been actively engaged in learning about the field, possibly through formal instruction and through

bibliographic resources. By at least June 18, 2002, such a person would have had access to a vast array of print and electronic resources, including at least the documents referenced below.

D. Evidence Considered in Forming My Opinion

23. In the preparation of this declaration, I have reviewed **EX1035** and **EX1038** referenced in paragraph 16 above, and any other documents I reference herein. Each of these is a type of material that experts in my field would reasonably rely upon when forming their opinions. I provided a further description of materials I considered in **Appendix C**.

III. Authenticity and Public Availability of *Hansmann* (EX1035)

A. Authentication

24. **EX1035** is a true and correct copy of excerpts of *Pervasive Computing Handbook*, ("*Hansmann*"), by Hansmann et al., published by Springer in 2001, that I received from counsel. This copy is presented as **EX1035** in this declaration.

25. Page 1 is the cover that shows the title, authors, authors of the forewords, and the publisher. Page 2 is the title page that shows the same information as the cover and indicates *Hansmann* has 183 figures. Page 3 is the copyright page that shows a copyright date of 2001 and Springer-Verlag Berlin Heidelberg holds the copyright. It also shows "3-540-67122-6" as the book's ISBN (International Standard Book Number). Pages 4 to 8 are the Forewords, pages 9 to 17 (internal pages xi to

xix) are the table of contents that shows this book has 21 chapters divided into five parts, and a Part VI that includes appendices, a bibliography, a glossary, and an index. Pages 18 to 39 (internal pages 31 to 52) are Chapter 2 "Information Access Devices" and pages 40 to 51 (internal pages 315 to 326) are Chapter 14 "Gateways". Page 52 is the back cover that shows the book's ISBN, a book description, and the publisher website (http://www.springer.de). The excerpts show *Hansmann* includes figures and tables.

26. To authenticate **EX1035**, I searched WorldCat.org (a free web portal) for records, and a record at https://search.worldcat.org/title/45102991 shows that Library of Congress (LC) is one of the holding libraries. After verifying the holdings information in the online catalog of LC, I requested a copy of excerpts of this book through a document vendor. This copy from LC is presented as **EX1035A** in this declaration.

27. **EX1035A** is a true and correct copy of excerpts of *Hansmann* obtained from the Library of Congress. Page 1 is the front cover that shows the title, authors, authors of the forewords, and the publisher. It carries a call number label of "QA 76.5 .P3946 2000" for copy 1, and a label of "T Meade GenColl" that indicates this book is in the general collection of the Fort Meade storage facility of the Library of Congress. Page 5 is the title page that shows the same information as the cover and indicates *Hansmann* has 183 figures. Page 6 is the copyright page that shows a

copyright date of 2001 and Springer-Verlag Berlin Heidelberg holds the copyright. It also shows "3-540-67122-6" as the book's ISBN (International Standard Book Number). Page 7 is another copy of the copyright page with a different contrast setting to make the date stamp of "Library of Congress DEC 14 2000 CIP" more legible. Pages 8 to 12 are the Forewords, pages 13 to 21 (internal pages xi to xix) are the table of contents that shows this book has 21 chapters that are divided into five parts, and a Part VI that includes appendices, a bibliography, a glossary, and an index. Pages 31 to 52 (internal pages 31 to 52) are Chapter 2 "Information Access Devices" and pages 53 to 64 (internal pages 315 to 326) are Chapter 14 "Gateways". Page 65 is the back cover that shows a Library of Congress barcode, the book's ISBN, a book description, and the publisher website (http://www.springer.de). The excerpts show *Hansmann* includes figures and tables.

28. I have closely compared **EX1035** with the excerpts from the Library of Congress (**EX1035A**), and found **EX1035** and its corresponding pages in **EX1035A** have the same content.

29. **EX1035** is in a condition that creates no suspicion about its authenticity. Specifically, this copy is not missing any intermediate pages, and there are no visible alterations to the document. Furthermore, **EX1035** has the same content as **EX1035A**, which is from a copy held by the Library of Congress. Based on my review and analysis, it is my opinion that **EX1035** is authentic.

B. Records of Library of Congress

30. To determine the public availability date of *Hansmann*, I obtained records for this book from the online catalog of the Library of Congress. **EX1035B** is a true and correct copy of the bibliographic and MARC records for *Hansmann*. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinion.

31. Pages 1 and 2 of **EX1035B** are the bibliographic record that shows the title, first author, publisher, physical description, ISBN, LCCN (Library of Congress control number) and subjects of *Hansmann*. The title, first author, publisher, and ISBN match the information presented in **EX1035** and **EX1035A**, confirming this record represents *Hansmann*. The Item Availability area shows the Library of Congress copy has a call number of "QA76.5 .P3946 2000 LANDOVR" and is stored offsite, but users can request access at the Jefferson or Adams Building Reading Rooms, and the status of the copies is "Not Charged" (meaning available for user request).

32. Pages 3 and 4 are the MARC record for *Hansmann*. The first six digits of Field 008 show the MARC record was created on "000921" (*i.e.*, September 21, 2000). Field 955 is a field for local cataloging activities, and it shows the initial record was created on "09-21-00" (*i.e.*, September 21, 2000), the record was "CIP ver." (meaning verified by the Cataloging in Publication Program) on "01-30-01" (*i.e.*,

January 30, 2001), and sent to BCCD (Binding and Collection Care Division) on "02-08-01" (*i.e.*, February 8, 2001). Subfields "a" and "c" of Field 040 show "DLC" created the original record and entered it into OCLC's WorldCat database. According to the *Directory of OCLC Members* (https://www.oclc.org/en/contacts/libraries.html), "DLC" is the OCLC library symbol for the Library of Congress. Fields 008, 955 and 040 inform my opinion that Library of Congress created a pre-publication record for *Hansmann* on September 21, 2000, verified the record on January 30, 2001, after it was published, and sent the physical copy to their processing unit on February 8, 2001. A common academic and research library practice is to process newly cataloged books promptly for public access, usually within a week after cataloging work is completed. My personal experience with the collections at the Library of Congress is that it can take one to three months for a newly cataloged book to be ready for public access. It is therefore my opinion that *Hansmann* became discoverable in the online catalog of the Library of Congress on September 21, 2000, when the library created the initial cataloging, and the physical copy, after processing, would become publicly accessible no later than May 8, 2001.

33. Field 010 shows the Library of Congress control number, Field 020 shows the ISBN, Field 245 shows the title, first author, and authors of the forewords, and Field 260 shows the publisher and publication date. Field 300 shows the front

matter ends on page xix, the last numbered page is page 409, and the book includes illustrations. Field 504 shows the book includes a bibliography and an index. Field 700 shows the first author is included in the record to help users discover this work.

34. The subjects of this book are represented in Field 050 by a Library of Congress Classification (LCC) number of "QA76.5" that represents "General works" on "Digital computers" (source: Library of Congress Classification, Schedule Q, at https://www.loc.gov/aba/publications/FreeLCC/LCC_Q2020TEXT.pdf), and in Field 082 by a Dewey Decimal Classification (DDC) number of "004" that represents "Computer science." Subjects are also represented in Fields 650 by two Library of Congress subject headings, "Portable computers" and "Embedded computer systems." These subject representations enable users to conduct subject searches to discover *Hansmann*.

35. This MARC record (**EX1035B**) shows that Library of Congress created a pre-publication record for *Hansmann* on September 21, 2000, making this book discoverable in their online catalog from that date on. The date stamp in **EX1035A** shows the Library of Congress Cataloging-in-Publication Program (CIP) received this book on December 14, 2000, after it was published, and the MARC record shows that CIP verified the pre-publication record on January 30, 2001. Interested users would be able to search for this book by the LCCN, ISBN, author, and title. They would also be able to conduct subject searches by the LCC number, DDC number,

and the Library of Congress subject headings in the MARC record to discover this book. The MARC record shows the book was sent to the processing unit on February 8, 2001, so it is my opinion that the physical copy would become publicly accessible no later than May 8, 2001, at the Library of Congress.

36. As evidence that the Library of Congress had an online catalog in operation in 2000 when the pre-publication record for *Hansmann* was created, I obtained a profile of the library at https://librarytechnology.org/library/2263 from libraries.org, a directory of libraries throughout the world. I personally located, identified, and obtained this profile. This is the type of record experts in my field would reasonably rely upon when forming their opinions. This profile is presented as **EX1035C** in this declaration.

37. The Technology Profile on page 2 of **EX1035C** shows the Library of Congress began using Voyager as their online catalog in 1998, and changed to Folio – EBSCO Information in 2023. These dates mean that in 2000 interested users were able to use the Voyager system to search for and access *Hansmann* at the Library of Congress.

C. Records of Texas A&M University Libraries

38. **EX1035D** is a true and correct copy of the bibliographic and MARC records for *Hansmann*. I personally located, identified, and obtained these records from the online catalog of the Texas A&M University Libraries. They are the type of

records experts in my field would reasonably rely upon when forming their opinions.

39. Page 1 includes the bibliographic record that shows the title, author, format, language, publisher, and subjects of *Hansmann*. Pages 1 to 3 are the MARC record. The first six digits of Field 008 show the record was created on "000921" (*i.e.*, September 21, 2000), and the code of "s2001" after the record creation date indicates this book has a single publication date of 2001. Subfields "a" and "c" of Field 040 show "DLC" (*i.e.*, Library of Congress) created an original record and entered it into the OCLC WorldCat database. Field 948 records local cataloging activities, and it shows *Hansmann* was "cataloged … 2001/2/9" (*i.e.*, cataloged on February 9, 2001) at this library system. Fields 008, 040, and 948 inform my opinion that the Texas A&M University Libraries used the Library of Congress record for copy cataloging and completed their record on February 9, 2001. A common academic and research library practice is to process newly cataloged monographs promptly for public access, usually within a week after the cataloging work is completed. It is therefore my opinion that *Hansmann* became discoverable in the online catalog of the Texas A&M University Libraries on February 9, 2001, when their copy cataloging record was completed. After processing, the physical copy of *Hansmann* would have become publicly accessible at this library system by February 16, 2001.

40. Since **EX1035D** is based on the Library of Congress MARC record

(**EX1035B**), it is understandable that these two records have many data elements in common, including the LCCN in Field 010, ISBN in Field 020, original cataloging agency in Field 040, title in Field 245, publisher in Field 260, physical description in Field 300, bibliography and index note in Field 504, and the first author in Field 700. These two records also use the same LCC number, DDC number, and Library of Congress subject headings to represent the subjects of *Hansmann*. A difference is that the Library of Congress MARC record (**EX1035B**) uses "2000" in Field 260 as the publication date, while the record of the Texas A&M University Libraries (**EX1035D**) shows in Field 264 that *Hansmann* has a "2001" copyright date. Since the copyright page on **EX1035** and **EX1035A** shows a "2001" publication date and the publisher's webpage for this book at https://link.springer.com/book/10.1007/978-3-662-04318-9 also shows a 2001 copyright date, it is my opinion that *Hansmann* was published in 2001, and the copy cataloging record of the A&M University Libraries reflects the publication date of *Hansmann* accurately. **EX1035D** also reflects more recent cataloging and encoding practices, such as including Fields 336, 337, and 338, and using no abbreviations in the record.

41. The MARC record of the Texas A&M University Libraries (**EX1035D**) shows that *Hansmann* became discoverable in the online catalog of this library system on February 9, 2001, when the library system completed their copy cataloging record. As of February 2001, interested users would be able to search for *Hansmann*

by LCCN, ISBN, title, and the first author. They would also be able to conduct subject searches to discover this book. After processing, the physical copy of this book would become publicly accessible at this library system by February 16, 2001.

42. As evidence that the Texas A&M University Libraries had an online catalog in operation in 2001 when the *Hansmann* record was added to the library system, I obtained a profile of this library system at https://librarytechnology.org/library/2088 from libraries.org, a directory of libraries throughout the world. This record is presented as **EX1035E** in this declaration.

43. The Technology Profile on page 2 of **EX1035E** shows this library system began using Voyager as their online catalog in 2000, and changed to FOLIO – Independent system in 2022. Symphony in 2003. These dates mean that in 2001 interested users were able to use Voyager at this library system to discover and access *Hansmann*.

D. Internet Archive Record

44. My research on Internet Archive found that the publisher of Hansmann made this book publicly available in late 2000. **EX1035G** is a true and correct copy of two records from Springer. I personally located, identified, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

45. Page 1 is a screen capture of a Wayback Machine calendar that shows

the publisher website at http://www.springer.de/ was captured 14,747 times from "18 Feb 1997" and "5 Jan 2025" and this particular copy was archived on "DEC 15 2000" and available at https://web.archive.org/web/20001215075500/http://www.springer.de/. Page 2 is the PDF of this archived website and the "Information Technology" features Hansmann, showing " 'The Pervasive Computing Handbook' introduces you to a new class of computing devices."

46. Page 3 is a screen capture of a Wayback Machine calendar that shows the publisher's What's New webpage at http://www.springer.de/press/whatsnew.html was captured 16 times between "18 Oct 2000" and "6 May 2021" and this particular copy was archived on "DEC 17 2000" and available at https://web.archive.org/web/20001217183700/http://www.springer.de/press/whatsnew.html#pervasive. Page 4 is the PDF of this archived copy, and the "Information Technology" area shows a heading of "A Guide to New Computing Devices" and a description that begins with "The Pervasive Computing Handbook describes a new class of computing devices which are becoming omnipresent in everyday life." The description on this webpage is a shorter version of the description on the back cover included in **EX1035** and **EX1035A**. A "Click and order" link and a "Table of Contents" accompany the book description. Internet Archive has not archived these

two links, but it is clear that by December 17, 2000, the publisher had used these two links to provide visitors with more information about *Hansmann* and an easy way to order the book online.

E. Usage Records

47. Actual usage of a publication is reflected by reviews that make reference to it. I have reviewed citations on Google Scholar and the publisher's webpage for this book at https://link.springer.com/book/10.1007/978-3-662-04318-9 to compile a list of early citations. **EX1035F** presents eight citations to *Hansmann* published in 2001 and shows the earliest citation appeared in February 2001, supporting my opinion that *Hansmann* was publicly accessible by February 16, 2001, at the Texas A&M University Libraries.

F. Summary of My Opinion on *Hansmann*

48. The copy of *Hansmann* from counsel (**EX1035**) is authentic because it contains no signs to raise suspicion about its authenticity. In addition, this copy has the same content as the copy held by the Library of Congress copy (**EX1035A**).

49. The MARC record of the Library of Congress (**EX1035B**) shows the library created a pre-publication record for *Hansmann* on September 21, 2000, making this book discoverable in their online catalog from that date on. After the book was published and received by the Library of Congress, catalogers of the library verified the cataloging record on February 7, 2001, and sent the copy to the

processing unit on February 8, 2001. After processing, the physical copy would become publicly accessible by May 8, 2001, at the Library of Congress. The Texas A&M University Libraries used the Library of Congress record (**EX1035B**) for copy cataloging and completed their copy cataloging record on February 9, 2001 (**EX1035D**), making this book discoverable in their online catalog from that date on. After processing, the physical copy would become publicly accessible no later than February 16, 2001, at this library system. Citations from 2001 show many researchers were able to access and use *Hansmann* in their research, and the earliest citation was published in February 2001 (**EX1035F**), supporting my opinion that this book became publicly accessible at the Texas A&M University Libraries by February 16, 2001.

50. Archived copies of the publisher website and webpage (**EX1035G**) show that by December 15, 2000, the publisher had listed *Hansmann* on their website, and by December 17, 2000, the publisher had promoted this book as "A Guide to New Computing Devices" and included a link for users to purchase the book online.

51. Based on the documents and records that I have analyzed, it is my opinion that *Hansmann* became publicly accessible no later than February 16, 2001, at the Texas A&M University Libraries, and the copy at the Library of Congress became publicly accessible no later than May 8, 2001. Citation history shows several citations were published in 2001. This book was in fact publicly discoverable by

December 15, 2000, from the publisher's website, and by December 17, 2000, interested users were able to discover the publisher webpage featuring *Hansmann* and use it to order their copy online.

IV. Authenticity and Public Availability of *Lemay* (EX1038)

A. Authentication

52. **EX1038** is a true and correct copy of excerpts of *SAMS Teach Yourself Web Publishing with HTML 4 in 21 Days*, ("*Lemay*"), by Laura Lemay with revisions by Denise Tyler, published by SAMS in 2000, that I obtained from the Library of Congress. When I began researching this book, I searched WorldCat.org (a free web portal) for records, and a record at https://search.worldcat.org/title/42621655 showed that Library of Congress (LC) was one of the holding libraries. After verifying the holdings information in the online catalog of LC, I requested a copy of excerpts of this book through a document vendor. This copy from LC is presented as **EX1038** in this declaration.

53. **EX1038** is a true and correct copy of excerpts of *Lemay* obtained from the Library of Congress. Page 1 is the spine of a bound volume that shows the author, title, call number ("QA 76.76.H94 L44 2000") and a label of "FT MEADE GenColl" that indicates this book is in the general collection at the Fort Meade storage facility of the Library of Congress.

54. Page 2 is the cover that shows the title, author ("Laura Lemay"),

publisher ("SAMS"), and a note indicating this book is the "SECOND EDITION. Includes coverage of XHTML." Page 8 is the title page that shows the book is by "Laura Lemay with revisions by Denise Tyler." It also shows the title, the edition statement, the publisher and its location. Page 9 is the copyright page that shows *Lemay* has a "2000" copyright date and Sams Publishing holds the copyright. This page shows "0-672-31725-7" as the ISBN, "99-63541" as the LCCN, a date of "First Printing: December 1999," and a hand-written call number of "QA76.76.H94 L44 2000" for copy 1. Pages 10 and 11 are copies of the copyright page with different contrast settings to make the date stamp more legible ("Library of Congress FEB 25 2000"). Pages 12 and 13 are the "Overview" that shows *Lemay* has seven parts and five appendixes. Pages 14 to 32 (internal pages [vii] to xxv) are the table of contents that shows this book provides 21 days of learning divided into seven parts, a Part 8 that has five appendixes, and an index. Pages 36 to 77 (internal pages [429] to 470) are pages from Part 5 "Day 14 Designing Forms."

55. To authenticate **EX1038**, I located a digitized copy of *Lemay* at https://archive.org/details/samsteachyoursel0002lema/page/n9/mode/1up?view=theater on Internet Archive. I have closely compared **EX1038** with this digitized copy and concluded that the pages in **EX1038** are the same as their corresponding pages in the digitized copy. As evidence of my analysis, I have asked counsel to produce sample pages from the digitized copy. A total of 34 pages from the digitized copy of

Lemay on Internet Archive are presented as **EX1038A** in this declaration. This exhibit includes the cover, title page, copyright page, and internal pages [429] to 453 of Part 5 "Day 14 Designing Forms" to show they and their corresponding pages in **EX1038** are the same.

56. **EX1038** is in a condition that creates no suspicion about its authenticity. Specifically, this copy is not missing any intermediate pages, and there are no visible alterations to the document. Furthermore, **EX1038** has the same content as the digitized copy on Internet Archive (as illustrated by **EX1038A)**. In addition, **EX1038** is from a copy of *Lemay* that is in the custody of a national Library. Based on my review and analysis, it is my opinion that **EX1038** is authentic.

57. The date stamp on **EX1038** shows the Library of Congress received *Lemay* on February 25, 2000. However, the MARC record of the library at https://lccn.loc.gov/99063541 shows the record was not completed until May 2003, so I searched for records from libraries that completed their records before the priority date of June 18, 2002. I have located records from a public library and an academic library to show that *Lemay* was publicly accessible at a public library by December 2000, and at an academic library by July 2001.

B. Records of Cincinnati & Hamilton County Public Library

58. To determine the public availability date of *Lemay*, I obtained records for this book from the online catalog of the Cincinnati and Hamilton County Public

Library. **EX1038B** is a true and correct copy of the bibliographic and MARC records for this book. I personally identified, located, and obtained these records. They are the type of records experts in my field would reasonably rely upon when forming their opinion.

59. Page 1 is the bibliographic record that shows the title, authors, publisher, copyright date, edition number, physical description, note on the cover, index note, subjects, ISBN, and the second author of this book. The title, first author, publisher, copyright date, and ISBN match the information presented in **EX1038**, confirming this record represents *Lemay*. The record also shows "005.72 L549s" as the call number of this book.

60. Page 2 is the MARC record for *Lemay*. The first six digits of Field 008 show the MARC record was created on "000119" (*i.e.*, January 19, 2000), and the "s2000" code following the record creation date indicates this book has a single publication date of 2000. Subfields "a" and "c" of Field 040 show "CPA" created the original record and entered it into the OCLC WorldCat database, and subfield "d" shows "OCL" modified the record later. According to the *MARC Code List for Organizations* (https://www.loc.gov/marc/organizations/), "CPA" is the code for the Palo Alto City Library, and "OCL" is the code for the Cleveland Public Library. The first three characters in Field 049 shows the holding library of this book is "OCP," which is the OCLC library symbol for the Cincinnati and Hamilton County Public

Library (https://www.oclc.org/en/contacts/libraries.html). Field 005 is a machine generated field that automatically records the last time this library modified this MARC record, and it shows "20001204121559" (*i.e.*, December 4, 2000, at 12 p.m., 15 minutes, and 59 seconds) as the last record modification date at this library. It is useful to keep in mind that record modification can take place for many reasons, such as correcting typos or updating the record to reflect the latest cataloging practice. The key point is a record must exist first, before it can be modified, meaning the date in Field 005 is usually later than the copy cataloging date. If a library completes a copy cataloging record, modifies it on the same day and makes no further changes to the record from then on, then the copy cataloging date and the date in Field 005 will be the same. Based on the data in Fields 008, 040, and 005, it is my opinion that the Cincinnati and Hamilton County Public Library used the original record created by the Palo Alto City Library in January 2000 for copy cataloging and made no changes to the original record, so its library code is not included in subfield "d" in Field 040. After the copy cataloging record was completed, the library last modified their copy cataloging record on December 4, 2000, meaning *Lemay* was discoverable at the online catalog of this library by that date, and the physical copy, after processing, would be publicly accessible no later than January 4, 2001, which would be a month after the record was last modified, because material processing at public libraries tend to take more than one week after the cataloging work is completed.

61. Field 010 shows the Library of Congress control number, Field 020 shows the ISBN, Field 100 shows the first author, Field 245 shows the title and statement of responsibility, and three 246 fields show three variant titles are included to help users discover this book. Field 250 shows the edition statement, Field 260 shows the publisher and copyright date, Field 300 shows the physical description, and two 500 fields provide general notes. The reviser of this edition is included in Field 700 to help users discover this book.

62. The subjects of *Lemay* are represented in Field 092 by a Dewey Decimal Classification (DDC) number of "005.72" that represents "Data in computer systems" (https://www.oclc.org/content/dam/oclc/webdewey/help/000.pdf) and in Fields 650 by three Library of Congress subject headings: World Wide Web, HTML (Document markup language), and Internet. These subject representations enable users to conduct subject searches to discover *Lemay*.

63. This MARC record (**EX1038B**) shows that the Cincinnati and Hamilton County Public Library last modified their copy cataloging record on December 4, 2000. Since the date in Field 005 is either the same or later than the copy cataloging date, it is my opinion that *Lemay* became discoverable at this library by December 4, 2000, and the physical copy, after processing, would become publicly available no later than January 4, 2001.

64. As evidence that the Cincinnati and Hamilton County Public Library

had an online catalog in operation in December 2000 when the copy cataloging record for *Lemay* was last modified, I obtained a profile of the library at https://librarytechnology.org/library/641 from libraries.org, a directory of libraries throughout the world. I personally located, identified, and obtained this profile. This is the type of record experts in my field would reasonably rely upon when forming their opinions. This profile is presented as **EX1038C** in this declaration.

65. The Technology Profile on page 2 of **EX1038C** shows this library system began using a locally developed online catalog in 1996 and changed to Symphony in 2003. These dates mean that in 2000 interested users were able to use the locally developed online catalog to search for and access *Lemay* at this library system.

C. Records of University of Northern Colorado Libraries

66. **EX1038D** is a true and correct copy of the bibliographic and MARC records for *Lemay*. I personally located, identified, and obtained these records from the online catalog of the University of Northern Colorado Libraries. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

67. Pages 1 and 2 are the bibliographic record that shows the title, author, format, publisher, publication date, edition number, and call number of this book ("QA76.76.H94 L454 2000") at this library system. Record details include a "2000"

copyright date, edition statement, physical description, two notes, reviser of the second edition, three variant titles, and ISBN. The title, first author, publisher, copyright date, and ISBN match the information presented in **EX1038**, confirming this record represents *Lemay*.

68. Page 3 is the MARC record. The first six digits of Field 008 show the record was created on "000119" (*i.e.*, January 19, 2000), and the code of "s2000" after the record creation date indicates this book has a single publication date of 2000. Subfields "a" and "c" of Field 040 show "CPA" (*i.e.*, Palo Alto City Library) created an original record and entered it into the OCLC WorldCat database in January 2000, and subfield "d" shows "OCL" (*i.e.*, Cleveland Public Library) modified the record later. Since the University of Northern Colorado Libraries did not modify the original MARC record when they created their copy cataloging record, their library code is not included in Field 040. The first three characters of Field 049 show "COV" is the holding library. According to the *Directory of OCLC Members* (https://www.oclc.org/en/contacts/libraries.html), "COV" is the OCLC library symbol for the University of Northern Colorado. Field 005 shows this library last modified their MARC record on "20010727084842" (*i.e.*, July 27, 2001, at 8 a.m., 48 minutes and 42 seconds). As discussed above, the date recorded in Field 005 is usually later than or the same as the copy cataloging date, meaning *Lemay* would be discoverable at this library by July 27, 2001. Based on the data in Fields 008, 040,

and 005, it is my opinion that the University of Northern Colorado Libraries used a record originally created by the Palo Alto City Library in January 2000 to create their copy cataloging record, and last modified their record on July 27, 2001, meaning *Lemay* would become discoverable at this library system by that date. A common academic and research library practice is to process newly cataloged monographs promptly for public access, usually within a week after the cataloging work is completed. It is therefore my opinion that, after processing, *Lemay* became publicly accessible at this library system no later than August 3, 2001.

69. Since **EX1038D** and **EX1038B** are based on the same original record created by the Palo Alto City Library in January 2000, these two records contain the same data elements, including the LCCN in Field 010, ISBN in Field 020, creator and modifier of record in Field 040, author in Field 100, title and statement of responsibility in Field 245, three variant titles in Field 246, edition number in Field 250, physical description in Field 300, cover note and index note in two Field 500, three Library of Congress subject headings in Fields 650, and the reviser in Field 700. One difference is that the public library uses a Dewey Decimal Classification number (**EX1038B**), while the academic library uses a Library of Congress Classification number (**EX1038D**). Another difference is the University of Northern Colorado Libraries has updated their record to conform to the latest cataloging practice. As a result, **EX1038D** uses two 264 fields to show this work has a possible publication

date of 2000 and a copyright date of 2000, includes fields 336, 337, and 338, and shows authority control numbers in subfield "0" of Fields 100, 700, and 650.

70. The MARC record of the University of Northern Colorado Libraries (**EX1038D**) shows that *Lemay* would be discoverable in the online catalog of this library system by July 27, 2001, when the library system last modified their copy cataloging record. By at least that date, interested users would be able to search for *Lemay* by LCCN, ISBN, title, and authors. They would also be able to conduct subject searches to discover this book. After processing, the physical copy of this book would become publicly accessible at this library system no later than August 3, 2001.

71. As evidence that the University of Northern Colorado Libraries had an online catalog in operation in 2001 when the *Lemay* record was in the library system, I obtained a profile of this library system at https://librarytechnology.org/library/2244 from libraries.org, a directory of libraries throughout the world. This record is presented as **EX1038E** in this declaration.

72. The Technology Profile on page 2 of **EX1038E** shows this library system began using Innopac as their online catalog in 1997 and changed to Millennium in 2001. These dates mean that in 2001 interested users were able to use Millennium at this library system to discover and access *Lemay*.

D. Internet Archive Records

73. In addition to finding library records on the public availability dates of

Lemay, I also searched Internet Archive to determine when this book became publicly accessible on the Internet. **EX1038F** is a true and correct copy of the publisher's webpages for *Lemay*. I personally located, identified, and obtained them from Internet Archive. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

74. Page 1 is a screen capture of a Wayback Machine calendar that shows the webpage of the INFORMIT Store (http://www.informit.com/store/category_15_topic_84.shtml) was archived one time on August 15, 2000, and available at https://web.archive.org/web/20000815073128/http://www.informit.com/store/category_15_topic_84.shtml. Page 2 is the PDF of this archived copy that shows Laura Lemay is the featured author, and "Sams Teach Yourself Web Publishing with HTML 4 in 21 Day, Second Edition" by Laura Lemay and Denise Tyler were published on "12/20/99" and available for user purchase at $29.99.

75. Page 4 shows a screen capture of a Wayback Machine calendar that shows the webpage for *Lemay* (http://www.informit.com/product/0672317257/) was archived three times from "19 Jan 2000" to "16 Aug 2000" and this particular copy was archived on "AUG 16 2000" and available at https://web.archive.org/web/20000816035119/http://www.informit.com/product/0672317257/. Page 5 is the PDF of this archived copy that shows the title, author, web

price publisher, ISBN, publication date, and pages of *Lemay*, and includes a link for interested users to "Buy This Product." The end of the page shows this archived copy had a "2000" copyright date, and InformIT holds the copyright.

76. **EX1038F** informs my opinion that the publisher made the webpage for their online store and the webpage for *Lemay* discoverable no later than August 15, and August 16, 2000, respectively. After discovering one or both webpages by August 16, 2000, interested users would have been able to follow the link to purchase this book online.

E. Usage Records

77. Actual usage of a publication is reflected by reviews that make reference to it. I have reviewed citation records on Google Scholar and identified a 2001 publication that cited *Lemay*:

> Hill, J. R., & Hannafin, M. J. (2001). Teaching and learning in digital environments: The resurgence of resource-based learning. *Educational technology research and development*, 49(3), 37-52. Available at https://link.springer.com/article/10.1007/bf02504914.

This citation supports my opinion that *Lemay* was discoverable by December 4, 2000, at the Cincinnati and Hamilton County Public Library, and discoverable by July 27, 2001, at the University of Northern Colorado Libraries.

F. Summary of My Opinion on *Lemay*

78. The excerpts of *Lemay* obtained from the Library of Congress copy (**EX1038**) is authentic because it contains no signs to raise suspicion about its authenticity. In addition, my analysis has found that this copy of excerpts has the same content as the parts contained in the digitized copy at https://archive.org/details/samsteachyoursel0002lema/mode/1up on Internet Archive, as illustrated by **EX1038A**. Furthermore, **EX1038** is in the custody of a national library.

79. The MARC record of the Cincinnati and Hamilton County Public Library (**EX1038B**) shows the library used a record created by the Palo Alto City Library in January 2000 to create their copy cataloging record and last modified their record on December 4, 2000. The record modification date means that *Lemay* was discoverable in the online catalog of this library system by that date, and the physical copy, after processing, would have been publicly accessible no later than January 4, 2001. The MARC record of the University of Northern Colorado Libraries (**EX1038D**) shows the library used a record created by the Palo Alto City Library in January 2000 to create their copy cataloging record and last modified their record on July 27, 2001. The record modification date means that *Lemay* was discoverable in the online catalog of this library system by that date, and the physical copy, after processing, would have been publicly accessible no later than August 3, 2001.

Citation history shows a citation to *Lemay* was published in 2001.

80. The publisher of *Lemay* actually made this book publicly discoverable and accessible in 2000. The publisher's online store archived on August 15, 2000, shows *Lemay* was listed as available for purchase by that date, and the publisher's webpage for *Lemay* archived on August 16, 2000, shows interested users could follow the link to purchase this book online (**EX1038F**).

81. Based on the documents and records that I have analyzed, it is my opinion that *Lemay* became publicly discoverable and accessible on the Internet no later than August 15, 2000. This book became discoverable at the Cincinnati and Hamilton County Public Library by December 4, 2000, and the physical copy of this book, after processing, would have become publicly accessible by January 4, 2001. *Lemay* also became discoverable at the University of Northern Colorado Libraries by July 27, 2001, and the physical copy, after processing, would become publicly accessible by August 3, 2001. Citation history shows a citation to *Lemay* was published in 2001.

V. Conclusion

82. In signing this Declaration, I recognize that the Declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in this proceeding. If required, I will appear for cross-examination at

the appropriate time.

83. I hereby declare that all statements made herein of my own knowledge are true and that all statements are 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 18 U.S.C. §1035.

Dated: 1-10-2025

Respectfully submitted,

Ingrid Hsieh-Yee

Ingrid Hsieh-Yee, Ph.D.
Annapolis, Maryland

APPENDIX A

Ingrid Hsieh-Yee

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Education

Ph.D. 1990. Library and Information Studies, University of Wisconsin-Madison
Minors: Sociology and Psychology

M.A. 1984. Library and Information Studies, University of Wisconsin-Madison.

M.A. 1983. Comparative Literature, University of Wisconsin-Madison.

B.A. 1980. Foreign Languages and Literature, National Taiwan University.

Work Experience

Professor, School/Dept. of Library and Information Science, Catholic University of America, 1990-2022 (Assistant Professor, 1990-1996; Associate Professor, 1997-2004; Professor 2004-2022; Professor Emerita 2022)

Co-Chair, Dept. of Library and Information Science, Catholic University of America, June 2015-August 2016.

Acting Dean, School of Library and Information Science, Catholic University of America, January 2010-June 2012.

Cataloger, Dept. of Legislative Reference Library, Annapolis, Maryland, 1989-1990.

Lecturer, School of Library and Information Studies, University of Wisconsin-Madison, 1988.

Teaching Assistant, School of Library and Information Studies, University of Wisconsin-Madison, 1986-1988.

Cataloger, Health Sciences Library, University of Wisconsin-Madison, 1984-1986.

Areas of Teaching and Research Interests

Information Organization and Access; Metadata; Cataloging & Classification; Information Architecture; Information Retrieval; Digital Collections; Social Media; Scholarly

Communication; Information Behavior; Health Informatics; Human Computer Interaction; Usability Studies

Grants & Honors

Cultural Heritage Information Management Project. IMLS grant. Amount: $498,741. Period: Aug. 2012 to July 2015. Co-PI with Dr. Youngok Choi.

D.C. Health Information Technology (HIT4): Building Capacity & Providing Access in Our Nation's Capital. Dept. of Labor H2B Training Grant. Grant amount: $4,175,500. Grant period: Nov. 2011 to Dec. 2015. Partner with the Metropolitan School of Professional Studies of the Catholic University of America, Children's National Medical Center, D.C. Department of Employment Services, Holy Cross Hospital, Howard University, Center for Urban Progress, Providence Hospital, and Sibley Memorial Hospital.

Capital Health Careers Project. Department of Labor Healthcare Sector and Other High Growth and Emerging Industries Grant. Grant amount: $4,953,999. Grant period: March 2010 – February 2013. Awarded to a group of healthcare organizations and educational institutions in Washington, D.C. Providence Health Foundation of Providence Hospital (Lead institution). Part of the grant supported the development of a Master's degree program in Information Technology with a concentration in Health Information Technology offered by the School of Library and Information Science.

The Washington D.C. School Librarians Project. IMLS grant. Grant amount: $412,660. Grant period: Aug. 2007 – June 2011. The School partnered with the District of Columbia Public Schools (DCPS) and the District of Columbia Library Association to educate and mentor school media specialists for the DCPS system. PI, Jan. 2010 to June 2011.

SIG Member of the Year, American Society for Information Science and Technology (2009).

Most Outstanding Paper of *OCLC Systems & Services* (2001).

ALISE Research Grant (2001).

Most Outstanding Paper of *OCLC Systems & Services* (2000).

Research Grant from ERIC (1999-2000).

Best Research Paper Award; Association for Library and Information Science Education (1998).

Research Grants, Catholic University of America. 1991, 1992, 1993, 1996, 1998, 1999, 2004, 2005, 2006, 2007, 2013-14.

Cooperative Faculty Research Grant, Consortium of Universities in the Washington Metropolitan Area (1993-1994).

Cooperative Research Grant, Council on Library Resources (1993-1994).

Journal of the American Society for Information Science Best Paper Award (1993).

ASIS/ISI Information Science Doctoral Dissertation Scholarship (1989).

HEA Title IIB Fellowship (Dept. of Education) (1989)

Chinese-American Librarians Association Scholarship (1987).

Beta Phi Mu (1985).

Vilas Fellowship, University of Wisconsin-Madison. 1984

Publications

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Choi, Y., Hsieh-Yee, I., and Kules, B. (2007). Retrieval Effectiveness of TOC and LCSH. *Proceedings of the Joint Conference on Digital Libraries*, pp. 233-234.

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a Digital Teaching Commons to Enhance Metadata Teaching, Learning and Research. *Proceedings of the National Conference of the Association of College and Research Libraries, Baltimore, MD*, pp. 26-31.

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NISO A Framework of Guidance for Building Good Digital Collections. 2nd ed. Bethesda, MD: National Information Standards Organization, 2004. Framework Advisory Group: Grace Agnew, Liz Bishoff, Priscilla Caplan (Chair), Rebecca Gunther and Ingrid Hsieh-Yee.

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Works in Progress

Hsieh-Yee, I. Actionable lessons for debunking false information: A comparative analysis of literacy lessons in communication and library and information science

Hsieh-Yee, I. Representing diverse voices and communities in cataloging and indexing: The evolution of controlled vocabularies

Hsieh-Yee, I. Information Organization and Retrieval in Practice (a monograph scheduled for completion and publication in 2023)

Presentations

Bailey, T. & Hsieh-Yee, I. (February 2020). The Phenomena of Sharing Misinformation and the Need for Information Literacy. Presented at the 2020 Bridging the Spectrum Symposium, Washington, D.C., February 14, 2020.

Hsieh-Yee, I. and Fragan-Fly, J. (May 2018) Trends, Design & Strategies for Digital Scholarship Services. Presented at the 2018 Maryland/Delaware Library Association Conference, Cambridge, MD.

Hsieh-Yee, I. (February, 2018) Research Data Management: What It Takes to Succeed. Presented at the 10th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. (February, 2017) *Research Data Management: New Competencies and Opportunities for Information Professionals*. Presented at the 9th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. and Lawton, P. (February, 2017) *Enhancing Catholic Portal Searches with User Terms and LCSH*. Presented at the 9th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. (2016, October) *Visualizing Data for Information*. Presented at the 2016 Virginia Library Association Conference, Hot Springs, VA.

Hsieh-Yee, I. (2016, August) *Religious Materials Toolbox for Archivists: Solutions to Problems Facing the Profession*. Presented at Archives * Records 2016, Atlanta, GA.

Hsieh-Yee, I. and Lawton, P. (2016, March) *Enhancing Retrieval of Catholic Materials with LCSH Knowledge Structure*. Presented at the 2016 Catholic Library Association Conference, San Diego, CA.

Fagan-Fry, J. and Hsieh-Yee, I. (2016, February) *Approaches to Digital Scholarship at Top Universities around the World: Scholarly Publishing in the Digital Age.* Presented at the 8th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee and Fagan-Fry, J. (2016, January) *Innovative Services for Digital Scholarship at Top 100 Research Libraries of the World*. Poster presented at the 2016 Annual Conference of the Association for Library and Information Science Education, Boston, Mass.

Hsieh-Yee, I. and Lawton, P. (2015, June). *Crowdsourcing terms for CRRA portal themes.* Poster presented at the third CRRA symposium and annual meeting, Bringing the created toward the Creator: Liturgical art and design since Vatican II. Catholic Theological Union, Chicago, Illinois.

Hsieh-Yee, I. and Lawton, P. (2015, February). *Crowdsourcing terms for thematic exploration in the Catholic Portal.* Poster presented at the 7th Annual Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I., James, R., and Fagan-Fry, J. (2015, February). *Support for digital scholarship at top university libraries of the world*. Poster presented at the 7th Annual Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I., Zhang, S., Lin, K., and Cherry, S. (2015, February). *Thus said the end users: Summon experience and support for research workflows*. Poster presented at the 7th Annual Bridging the Spectrum Symposium, Washington, D.C.

Yontz, E., Hsieh-Yee, I., & Houston, S. (2015, February). *Healthy Heroes Summer Reading Club: Developing healthy youth at public libraries.* 11th Annual Jean Mills Health Symposium, Greenville, North Carolina.

Yontz, E., Hsieh-Yee, I., and Houston, S. (2015, January). *Healthy youth and libraries: A pilot study.* Association for Library & Information Science Education (ALISE) Annual Conference, Chicago, Illinois.

Hsieh-Yee, I. (2014, May). *Linking CRRA resources to portal themes via authority files*. Presented at the Catholic Research Resources Alliance 2014 Membership Meeting, Marquette, WI.

Hsieh-Yee, I. (2014, April). *Enhancing subject access to CRRA resources*. Presented at the 2014 Catholic Library Association Conference, Pittsburgh, PA.

Hsieh-Yee, I. (2014, January). *Health Information Technology Program: Educational entrepreneurship in action*. Presented at the 2014 annual Conference of the Association for Library and Information Science Education, Philadelphia, PA

Hsieh-Yee, I., Zhang, S., Lin, K., and Cherry, S. (2014, January). *Discovering information through Summon: An analysis of user search strategies and search success*. Paper presented at the 6th Bridging the Spectrum Symposium, Washington, D.C.

Hsieh-Yee, I. (2012, December). *National Digital Stewardship Alliance and SLIS at CUA: An Educational Partnership*. Paper presented at Best Practices Exchange: Acquiring, Preserving, and Providing Access to Government Information in the Digital Era, Annapolis, MD

Choi, Y. and Hsieh-Yee, I. (2010, January). *Finding Images in an OPAC: Analysis of User Queries, Subject Headings, and Description Notes*. Paper presented at 2nd Annual Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. and Coogan, J. (2010, January). *Google Scholar vs. Academic Search Premier: What Libraries and Searchers Need to Know*. Paper presented at 2nd Annual Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (2009, November). *Information Science Education: An LIS School's Perspective*. Paper presented at Annual Meeting of the American Society for Information Science and Technology, Vancouver, British Columbia, Canada.

Hsieh-Yee, I., Menard, E., Ya-Ning Chen, A., Shu-Jiun Chen, S., Kalfatovic, M. R., Wisser. K. M. (2009, November). *Information Organization in Libraries, Archives and Museums: Converging Practices and Collaboration Opportunities*. Presented at Annual Meeting of the American Society for Information Science and Technology, Vancouver, British Columbia, Canada. (Organizer and moderator of this panel.)

Hsieh-Yee, I. and Coogan, J. (2009, July). *Catching up to Google Scholar: The Retrieval Power of Academic Search Premier and Google Scholar*. Poster presented at American Library Association Conference, Chicago, Illinois.

Hsieh-Yee, I., with the CUA Scholarly Communications Project Team. (2009, January). *Digital Scholarship@CUA: Developing an Institutional Repository for CUA*. Poster presented at 1st Annual Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Wise, M., Cylke, K., and Hsieh-Yee, I. **(**2009, January). *Digital Talking Books: Meeting the Needs of the Blind and the Handicapped*. Paper presented at the Bridging the Spectrum Symposium, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (2009, January). *User Expectations of MERIC*. Presented at the Information Organization Competencies for the 21st Century Discussion Session of the 2009 Conference of the Association for Library and Information Science Education, Denver, Colorado.

Choi, Y., and Hsieh-Yee, I. (2008,November). *Subject Access for Images in an OPAC.* Annual Meeting of the American Society for Information Science and Technology, Columbus, Ohio. (Also co-organized a panel on Retrieving and Using Visual Resources: Challenges and Opportunities for Research and Education.)

Hsieh-Yee, I. (2008, June). *Educating Cataloging Professionals in a Changing Information Environment*. National Taiwan University, Taipei, Taiwan.

Vellucci, S. L., Moen, W.E., Hsieh-Yee, I., Marson, B., and Wisser, K. (2008, January) *Building a Metadata Education and Research Community through MERIC (Metadata Education and Research Information Commons): Demo and Stakeholder Input*. A panel presented at the 2008 Conference of the Association for Library and Information Science Education, Philadelphia, Pennsylvania.

Hsieh-Yee, I., Choi,Y. and Kules, B. (2007, October). *Searching for Books and Images in OPAC: Effects of LCSH, TOC and Subject Domains.* A poster presented at the American Society for Information Science and Technology Annual Meeting, Milwaukee, Wisconsin.

Hsieh-Yee, I. and Coogan, J. (2007, August) *Google Scholar vs. Academic Search Premier: A Comparative Analysis.* Presented to the Faculty and Staff of the University of the District

of Columbia.

Hsieh-Yee, I. and Coogan, J. (2007, June). *Google Scholar vs. Academic Search Premier: A Comparative Analysis*. Presented to the Washington Research Library Consortium Community, Catholic University of America, Washington, D.C.

Hsieh-Yee, I., Choi, Y., and Kules, B.. (2007, June). *What Users Need for Subject Access: Table of Contents or Subject Headings?* A poster presented at the 2007 American Library Association Annual Conference, Washington, D.C., June 2007.

Choi, Y., Hsieh-Yee, I., and Kules, B. (2007, June). *Retrieval Effectiveness of TOC and LCSH.* A paper presented at the Joint Conference on Digital Libraries 2007, Vancouver, Canada.

Vellucci, S. L., Hsieh-Yee, I., and Moen, W.E. (2007, May). *If We Build It, Will They Come? Building a Community of Practice for Metadata Stakeholders.* A poster presented at the Rutgers University Research Day, Bridgeton, New Jersey.

Hsieh-Yee, I. (2007, May). *Federated Searching: User Experience & Perceptions.* International Conference on Information Organization & Retrieval, National Taiwan University, Taipei, Taiwan.

Hsieh-Yee, I. (2007, May). *Search Performance of Google Scholar and Academic Search Premier.* International Conference on Information Organization & Retrieval, National Taiwan University, Taipei, Taiwan.

Hsieh-Yee, I. (2007, May) *MERIC: Building a Digital Commons for Metadata Education & Research.* International Conference on Information Organization & Retrieval, National Taiwan University, Taipei, Taiwan.

Hsieh-Yee, I., and Coogan, J. (2007, March/April). *A Comparative Analysis of Google Scholar and Academic Search Premier.* Poster presented at the Association of College & Research Libraries 13th National Conference, Baltimore, Maryland.

Vellucci, S. L. and Hsieh-Yee, I. (2007, March/April) *They Didn't Teach Me That in Library School! Building a Digital Teaching Commons to Enhance Metadata Teaching, Learning and Research*. On-site presentation and Webcast by Elluminate. A contributed paper presented at the Association of College & Research Libraries 13th National Conference, Baltimore, Maryland. The acceptance rate for contributed paper was 20%. This paper was one of 10 conference papers chosen for live webcast during the conference.

Moen, W., Hsieh-Yee, I. and Vellucci, S.L. (2007, January) *A DSpace Foundation for a Teaching & Research Commons: The Metadata Education and Research Information Commons.* A poster session presented at the Open Repositories Conference 2007, San Antonio, Texas.

Tang, R., Hsieh-Yee, I., and Zhang, S. (2006, November) *User Perception of MetaLib Combined Search*. Paper presented at the Annual Meeting of the American Society for Information Science and Technology, Austin, Texas, Nov. 2006.

Hsieh-Yee, I. (2006, November). *Federated Searching: User Perceptions, System Design, and Library Instructions.* Paper presented at the Annual Meeting of the American Society for Information Science and Technology, Austin, Texas. (Panel organizer, moderator, presenter).

Hsieh-Yee, I. (2006, November). *Building a Digital Teaching Commons to Enhance Teaching and Learning: The MERIC Experience and Challenges.* Paper presented at the Annual Meeting of the American Society for Information Science and Technology, Austin, Texas. (Panel organizer, moderator, presenter)

Hsieh-Yee, I. (2006, September). *Search Performance of Google Scholar and Academic Search Premier.* Paper presented at the ERIC Publishers Meeting, Washington, D.C.

Hsieh-Yee, I., Zhang, S., and Rong Tang, R. (2006, June). *User Perceptions of a Federated Search System*. Poster presented at Joint Conference on Digital Libraries, Chapel Hill, North Carolina.

Hsieh-Yee, I. and Zhang, S. (2006, June). *Preparing Users for Federated Search: Implications of a MetaLib User Perceptions Study.* Paper presented at the 2006 Ex Libris User Groups of North America Conference, Knoxville, Tennessee.

Hsieh-Yee, I. (2006, January). *MERIC Organizations and Navigation*. Paper presented at the 2006 ALISE Annual Conference, San Antonio, Texas.

Hsieh-Yee, I. (2006, January). *Metadata and Cataloging Education: Recommended Competencies.* Paper presented at the 2006 ALISE Annual Conference, San Antonio, Texas.

Hsieh-Yee, I. (2005, November). *Digital Library Evaluation: Progress & Next Steps.* Presentation at the Annual Meeting of the American Society for Information Science & Technology, Charlotte, North Carolina.

Hsieh-Yee, I. (2005, August). *Providing Access to Digital Content: Issues for DL Managers.* Presentation at MDK12 Digital Library Steering Committee Meeting, Columbia, Maryland.

Hsieh-Yee, I. (2005, April). *Enhancing Teaching and Learning: The Role of School Library Media Specialists.* Presentation at Meeting of the Baltimore County Public School System School Media Specialists, Baltimore, Maryland.

Hsieh-Yee, I. (2005, January). *Subject Access and Users: Insights & Inspirations from Marcia J. Bates.* Paper presented at the Historical Perspectives SIG, 2005 Conference of the Association for Library and Information Science Education, Boston, Massachusetts.

Hsieh-Yee, I. (2005, January). *Electronic Resource Management: Practice, Employer Expectations, & CE Interests.* Paper presented at Technical Services Education SIG, 2005 Conference of the Association for Library and Information Science Education, Boston, Massachusetts.

Hsieh-Yee, I. (2004, October). *Library Professionals for the Digital Age: Competencies & Preparation.* Paper presented at Bibliographic Access Management Team meeting, Library of Congress, Washington, D.C.

Hsieh-Yee, I. (2004, January). *Cataloging and metadata expertise for the digital era.* Presented at Preparing 21st Century Cataloging and Metadata Professionals: A Workshop for Educators and Trainers, San Diego and sponsored by ALCTS, ALISE, LC, and OCLC.

Hsieh-Yee, I. (2004, January). *Educating catalogers for the digital era.* Paper presented at the Technical Services SIG, 2004 Conference of the Association for Library and Information Science Education, San Diego.

Hsieh-Yee, I. (2003, July). *Cataloging Education for the 21st Century.* A presentation at the Library of Congress, Washington, D.C.

Hsieh-Yee, I. (2002, January) *Metadata Education and Research Priorities: A Delphi Study of Metadata Experts.* Presentation at the 2002 Conference of the Association for Library and Information Science Education, New Orleans.

Hsieh-Yee, I. (2001, November). *A Delphi Study of Metadata: Preliminary Findings.* Poster session at the 2001 Annual Meeting of the American Society for Information Science & Technology, Washington, D.C.

Hsieh-Yee, I. (2001, June). *Resources on Asian American Children: Analysis of Retrieval by Search Engines and WorldCat.* Presentation at the National Conference on Asian Pacific American Librarians, San Francisco.

Hsieh-Yee, I. (2001, January). *Delphi Study on Metadata: Project Design.* Presentation at Research Awards Session, Association for Library & Information Science Education, Washington, D.C.

Hsieh-Yee, I. (2000, May). *Web Search Behavior Research: Progress and Implications.* Presentation at the Symposium on Evaluating Library and Information Science Research, University of Wisconsin-Madison, Madison, Wisconsin.

Hsieh-Yee, I. (2000, March). *ERIC User Services: Evaluation in a Decentralized Environment.* Presentation at the National ERIC Joint Directors/Technical Meeting, Arlington, Virginia.

Hsieh-Yee, I. (2000, January). *Enhancing Learning with Web Technology.* Presentation at Faculty Conversations, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (2000, January). *From Surrogates to Objects: CUA's Approaches to Organizing Electronic Resources.* Paper presentation at the Annual Conference of the Association for Library and Information Science Education, San Antonio, Texas.

Yee, P., and Hsieh-Yee, I. (1997, November). *Individual Differences in Search Behavior on the WWW.* A poster session presented at the 38th Annual Meeting of the Psychonomic Society, Philadelphia, Pennsylvania.

Hsieh-Yee, I. (1997, April). *Research + Marketing + Preparation = Job!* Presented at the "Workshop on Resume and Interview Techniques," Special Libraries Association, Student Chapter, Catholic University of America, Washington, D.C.

Hsieh-Yee, I. (1997, February). *Creating CyberCatalogers: Education and Training.* Presentation at ALA's Midwinter Meeting, Washington, D.C.

Hsieh-Yee, I. (1997, February). *Search Tactics of Web Users in Searching for Texts, Graphics, Known Items and Subjects: A Search Simulation Study.* Presented at the Conference of the Association for Library and Information Science Education, Washington, D.C.

Hsieh-Yee, Ingrid. "Beginning Your Special Library/Information Center Career." Presented at SLA's "Career Day," Jan. 11, 1997, Catholic University of America.

Hsieh-Yee, I. (1996, September). *The Roles of Library and Information Scientists in Managing Electronic Information.* Presentation at Hamilton College, Clinton, New York.

Hsieh-Yee, I. (1996, May). *The Future of Cataloging as a Profession.* Presented at "The Cataloging Forum, Library of Congress, Washington, D.C.

Hsieh-Yee, I. (1994, October). *The Impact of the Internet on OPACs.* Presented at the Third Workshop on User Interfaces for OPACs, Library of Congress, Washington, D.C.

Reports

Hsieh-Yee, I., with Knowledge Management Competencies and Performance Action Group of the Federal Knowledge Management Initiative. "From Knowledge Management Competencies to Improved Organizational Performance." April 9, 2009.

Hsieh-Yee, I., with Knowledge Practices Action Group of the Federal Knowledge Management Initiative. "KM Practice in Government Agencies: Findings and Recommendations." April 9, 2009.

Hsieh-Yee, I. "Delphi Study on Metadata." 2001. Three quarterly reports submitted to the Association for Library and Information Science Education.

Hsieh-Yee, I. "College Students' Information Channels: Patterns of Use and Possible Factors in Channel Selection." 1995. Submitted to the Catholic University of America.

Hsieh-Yee, I. "The Information-Seeking Patterns of Scholars and Their Use of an Online Information System." 1994. Submitted to the Council on Library Resources.

Book Reviews

Review of *The Measurement and Evaluation of Library Services*, by Sharon L. Baker and F. Wilfrid Lancaster. *Information Processing and Management* 30 (1994): 450-52.

Review of *Subject Access to Films and Videos, by Sheila S. Intner and William E. Studwell; and Cataloging Unpublished Nonprint Materials*, by Verna Urbanski with Bao Chu Chang and Bernard L. Karon. *Information Processing and Management* 30 (1994): 449-50.

Review of *Automated Information Retrieval in Libraries: A Management Handbook*, by Vicki Anders. *Journal of Library and Information Science* 19 (1993): 98-100.

Review of *Full Text Databases*, by Carol Tenopir and Jung Soon Ro. *Information Processing and Management* 28 (1992): 667-68.

Review of *Descriptive Cataloging for the AACR2R And USMARC: A How-to-Do It Workbook*, by Larry Millsap and Terry Ellen Ferl. *Information Processing and Management* 28 (1992): 809-11.

Review of *MARC Manual: Understanding and Using MARC Records*, by Deborah J. Byrne. *Information Processing and Management* 28 (1992): 537-38.

Service

Professional Associations and Societies

- Library of Congress. RDA Training Program for the Profession. Co-authored with Tim Carlton. 2013-2014.
- 2014 Digital Preservation Outreach & Education Survey. Contributed to the design of the survey, 2014.
- National Digital Stewardship Alliance. Outreach Committee. 2011-2014.
- National Digital Stewardship Residency Program. Advisory Group, 2012-2013.
- FEDLINK Health Information Technology Advisory Council, 2011-2015.

- 2012 Joint Conference on Digital Libraries. Program Planning Committee, Pre-Conference Proposals Review Committee, 2012
- Catholic Research Resources Alliance. Five-Year Strategic Plan Task Force, 2011-2012
- Institute of Museum and Library Services. Grant reviewer. 2004, 2005, 2010.

- Association for Library and Information Science Education.
  * ALISE Bodan Wynar Research Paper Award Committee, 2015, 2016, 2017
  * ALISE Eugene Garfield Dissertation Award Competition, Jury, 2013, 2014
  * ALISE Research Grant Competition Committee. Chair, 2012
  * Pratt-Severn Faculty Innovation Award. Chair, 2009, 2010
  * ALISE Doctoral Poster Jury, 2012
  * "Information Organization Competencies for the 21st Century" Discussion session leader. 2009 Conference of the Association for Library and Information Science Education.
  * Assisted Technical Services SIG Convener in organizing a program, ""Building a Metadata Education and Research Community through MERIC (Metadata Education and Research Information Commons): Demo and Stakeholder Input" for the 2008 ALISE conference.
  * Association for Library Collections and Technical Services/Association for Library and Information Science Education (ALCTS/ALISE) Metadata Education and Research Information Center (MERIC) Advisory Board, Co-Chair (with Sherry Vellucci), 2005-2007. Chair, 2008-2009 (leading the effort to build MERIC, a repository and collaborative space for metadata educators, practitioners, and researchers)
  * Technical Services SIG, Convener, 2004-2005. Organized a program on "Electronic Resources Management: Current Practices, Employer Expectations, and Teaching Strategies" for the 2005 conference in Boston, Massachusetts.
  * Technical Services SIG, Convener, 2003-2004. Organized a program on "Organizing Information with Metadata: Desired Competencies and Teaching Innovations" for the 2004 conference.
  * Technical Services SIG, Convener, 1999-2000. Organized a program on "Teaching the Organization of Electronic Resources" for the 2000 conference.
  * Curriculum SIG, Co-convener (with Sibyl Moses), 1996-97. Organized a program on "Government Information Policy" for the 1997 conference.

- American Society for Information Science & Technology.
  * Reviewer, Conference program panel submissions and poster submissions, 2005, 2006, 2007, 2009, 2011, 2012, 2013, 2014, 2015, 2016, 2017
  * Nomination Committee, 2009-2011
  * Information Science Education Special Interest Group. American Society for Information Science and Technology. Chair-Elect, 2007-2008. Chair 2008-2009.
  * Committee on Information Science Education. 1999-2006.
  * Committee on Information Science Education. Organizing Committee for an orientation program for students at ASIS annual meetings, 1999-2001
  * Committee on Information Science Education. Sub-committee on Student Welfare (focusing on issues related to master's education), 1998-2001

* SIG ED. Organizing Committee for the "Seminar on Research and Career Development" for junior researchers. 1995-96 (chair), 1997-2001
* ISI Doctoral Dissertation Proposal Scholarship Jury, 1997; 2001, 2002
* Pratt-Severn Best Student Research Paper Award Jury. Chair. 1997
* 1998 Midyear Meeting (referee of contributed papers), 1997
* Organizer and moderator of the ASIS Doctoral Forum and the Doctoral Research Seminar 1994-1995
* SIG Human Computer Interaction. Chair-Elect, Chair, 1993-1995
* Doctoral Forum Award Jury, 1995
* Best Student Paper Award Jury, 1995

- American Library Association.
  * Committee on Accreditation, External Review Panelist, 2009- (site visiting team 2013-2014; site visiting team 2016-2017)
  * Association for Library Collections and Technical Services Task Force on Competencies and Education for a Career in Cataloging, member, 2008-2009
  * Facilitator for "What They Don't Teach in Library School: Competencies, Education and Employer Expectations for a Career in Cataloging," an Association for Library Collections and Technical Services Preconference, June 22, 2007 in Washington, D.C. Also a local liaison for bringing this program to the Catholic University of America.
  * Facilitator for a discussion on "Effect of Electronic Resources on Technical Services" at ALA's Midwinter Meeting held in Feb. 1997 in Washington, D.C.
  * International Relations Committee, Subcommittee Task Force for IFLA and China, 1994-1997

- Virginia Association of School Librarians. Scholarships and Awards Committee. 2010-2012

- Federal Knowledge Management Initiative, Knowledge Management Practices Action Group. Member. 2009 (leading the effort to build a knowledge management repository)
- Federal Knowledge Management Initiative, Knowledge Management Competencies & Learning Action Group. Member. 2009 (developing an action plan for helping government knowledge workers and government agencies to develop knowledge management competencies)
- National Center for Education Statistics. Technical Review Panel. 2008.
- External evaluator for a case of promotion to full professorship. University of Tennessee. 2008.
- National Information Standards Organization (NISO). Advisory Board, Revision of "IMLS Framework of Guidance for Building Good Digital Collections," 2004, 2007.
- Library of Congress, Bibliographic Control of Web Resources: A Library of Congress Action Plan. Principal Investigator of Action Item 5.1, focusing on cataloging and metadata education for students and new librarians, 2002-2003. (worked with the Association for Library Collections and Technical Services, Education Task Force)

- Chinese American Librarians Association
  * Chinese American Librarians Association Outstanding Library Leadership Award in Memory of Dr. Margaret Chang Fung, Award Committee, 2016-2017
  * Achievement Award Jury, 2000-2001
  * CALA Goal 2000 Task Force, 1997
  * Scholarship Committee, 1995, 1996-1997 (chair)
  * Board of Directors, 1994-1997
  * Publication Committee, 1993-1995
  * International Relations Committee, 1993-1996

- Sailor[SM] Assessment Advisory Group (An impact study of Sailor, Maryland's Public Information Network), 1995

- Editorial boards
  Journal of Library & Information Science. Editorial Board, 2012-
  Chinese American Librarians Association, *Occasional Papers Series*. Editorial Board, 2009-2016.
  Library Quarterly. Editorial Board, 2003-2008
  Bulletin of the Medical Library Association, 1994-97
  Newsletter editor for the Chinese American Librarians Association, 1989-92

- Referee for the following journals
  Information Processing and Management
  Journal of Digital Information
  Journal of Education for Library and Information Science
  Journal of Information Science
  Journal of Library & Information Science
  Journal of Library Metadata
  Journal of the American Society for Information Science & Technology
  Library and Information Science Research
  Library Quarterly

- Expert reviewer, "Digital Library" course, Evaluation module, University of North Carolina, Chapel Hill, 2007-2008.
- Expert reviewer, "Information Organization" course, University of Michigan, Ann Arbor. 2007.

Catholic University of America

- Academic Senate Committee on Appointments and Promotions, 2005-2008
- Academic Senate Committee on Committees and Rules, 2009-2012, 2019-2022
- Academic Senate representative (for School of Arts & Sciences), 2017-2020

- Academic Senate representative (for School of Library & Information Science) 2003-2012
- Academic Senate Library Committee, Interim Chair (2007), Member, 2008-2012
- Academic Senate Committee on Computing, 1995-2003

- President's Administrative Council, 2010-2012
- Deans' Council, 2010-2012
- Academic Leadership Group, 2010-2012
- Graduate Board, 2010-2012

- School of Arts & Sciences, Committee on Appointments and Promotions, 2015-2019
- School of Arts & Sciences, Academic Council, 2015-2016.
- School of Arts & Sciences, Ordinary Professor Group, 2013-
- Doctoral Dissertation Defense Committee, Chair, Dept. of Psychology, 2016, 2017, 2018, 2019, 2020, 2021, 2022
- Doctoral Dissertation Defense Committee, Chair, Dept. of Education, 2014, 2015, 2017, 2018, 2019
- Doctoral Dissertation Defense Committee, Chair, National Catholic School of Social Services, 2019, 2020, 2021
- Doctoral Dissertation Defense Committee, Chair, School of Nursing, 2006, 2008
- CUA Scholarly Communication Project Team, Member (2007), Chair, 2008-2009
- Dean Search Committee, 1992-1994, 1998-1999, 2002-2003, 2006-2007
- Fulbright Review Panel, 2006
- CUA Service Learning Advisory Board, 2001-2002
- CUA Faculty Conversations on Enhancing Teaching and Learning through Technology, Planning Group, 1999-2001
- CUA Initiative on Technology and Teaching, 1998-2001

Dept. of Library and Information Science

- Admissions Committee, 2007-2009, Chair 2010-2012, Member 2013-2015, Member 2018-2022
- Appointments and Promotions Committee, 1991-2022
- Student advisement, 1990-2022
- 4+1 Bachelor to Master program, Program Advisor, 2014-2022
- LIS Minor, Advisor, 2017-2022
- Curriculum Committee, 2020-21 (Member), 2021-2022 (Chair)
- Scholarship & Awards Committee, 2016-2018, 2020-21
- Comprehensive examination editor, 2020-21
- Symposium, Colloquium, Lecture Series Committee, May 2018-May 2020 (Chair)
- Symposium and Colloquium Committee, fall 2016-May 2018
- Bridging the Spectrum Symposium session moderator, 2018, 2019, 2020, 2021

- Organization of Information Core Course Outcomes Assessment, 2019, 2020
- The Information Professions in Society Core Course Outcomes Assessment, 2019, 2020
- Community Services Librarianship, Course of Study Review and Revision, 2020
- Organization of Information, Course of Study Review and Revision, 2019
- Organization of Information, Competency and Course Offerings Review, 2018-2019
- Accreditation presentation, Chair, June 2015-August 2016
- Interim Co-Chair, June 2015-August 2016.
- Blended/OWL Learning Committee, spring 2016-2018
- Technology Committee, fall 2016-2017
- Comprehensive examination editor, 2016-2017, reader (every year since 1990)
- LIS Advisory Board, 2015-2016 (chair); fall 2016- May 2018 (member)
- Committee on Planning and Assessment, 2015-2016 (chair)
- Senior Faculty Committee, 2014-2016.
- Accreditation Steering Committee, 2014-2016 (Chair, 2015-2016)
- Accreditation Students Standard Committee, co-chair, 2014-2016
- Accreditation Mission, Goals, and Objectives Standard Committee, co-chair, 2014-2016
- Accreditation Curriculum Standard, member 2014-2-16
- Accreditation Administration and Finance Standard, member 2014-2016
- Cultural Heritage Information Management Project (IMLS-funded), Co-PI, 2012-2015
- Cultural Heritage Information Management Forum (scheduled for June 2015), Co-Organizer, 2013-2015
- Health Information Technology Interim Review Committee, 2015 (chair)
- Health Sciences Librarianship Advisory Group, 2015- (chair)
- Comprehensive examination editors, 2013-2014, 2016-2017
- National Digital Stewardship Alliance liaison, 2011-2014
- Advisory Board, Chair 2010-2012
- Academic Honesty Committee, Chair, 2008-2012
- Blended Learning Committee, 2010-2012
- Colloquium Committee, 2010-2012
- Comprehensive Examination Administration, 2010-2012
- Cultural Heritage Information Management Advisory Committee, 2010-2012 (chair), 2013-
- Curriculum Committee, 1991-2003, 2007-2009, Chair 2010-2012, member 2013-
- Curriculum Subcommittee on Comprehensive Examination, Chair 2009-2012
- Health Information Technology Advisory Board, Chair 2010-2012. Member 2013-
- Health Sciences Advisory Committee, 2009, Chair 2010-2012. Member 2013-
- HIT Expert Forum, Chair 2012. Member 2013-2015
- Health Information Technology Student Group Advisor, 2011-2012
- State Council for Higher Education of Virginia, SLIS Representative, 2010-2012
- Symposium Planning Committee, 2010-2012
- Website Management Team, Chair, 2010-2012
- Urban School Librarianship Project (IMLS-Funded), PI, 2007-2011 (chair, 2010-11)

- Failing Grades Committee, 1995-1997 (chair), 2000-2001 (chair), 2004-2005 (chair), 2007 (chair)-2011
- Faculty Search Committee, 1994-1998, 2002-2004, 2006 (chair), Fall 2007-2009, Chair fall 2009-2012
- Recruitment Committee, Chair 2010-2012
- Strategic Planning Committee, Chair 2010-2012
- Technology Committee, 2010-2012
- Accreditation Advisory Committee, 2007-2009
- Accreditation Coordinating Committee, 2007-2009
- Accreditation Steering Committee, 2007-2009
- SLIS Advisory Group, 2007-2009
- Accreditation Curriculum Standard Committee, Co-chair, 2007-2009
- Accreditation Faculty Standard Committee, Co-chair, 2007-2009
- LSC 551 Information Organization Review Team, Co-chair, 2008-2009, 2015-2016.
- Curriculum Subcommittee on Portfolios, 2009
- LSC 555 Information Systems in Libraries and Information Centers Review Team, contributor, 2008-2009
- Redesign of LSC 730 Use and Users of Libraries and Information. 2009-
- Development of a metadata institute that was taught as LSC 715 Organization of Internet Resources in 2008. The institute is being revised and will be offered in 2010 under a new course title.
- Development of lesson plans, assignments, and evaluation rubrics for LSC 606, Cataloging and Classification, for the School's NCATE accreditation. 2008
- Howard and Mathilde Rovelstad Scholarship Committee, Chair, 2004-2007
- Assistant Dean Search Committee, Chair, Fall 2007
- Liaison to the Association for Library Collections and Technical Services to bring its preconference program, Cataloging Education and Employer Expectations, to CUA during the 2007 American Library Association Annual Meeting in Washington, D.C.
- Organizer of the colloquium presentation and reception for Tamar Sadeh of Ex Libris on PRIMO June 2007
- Practicum review and design (work with potential supervisors, such as the American Indian Museum internship description revision) 2006-
- Comprehensive examinations (edits, proctoring, and grading), 1990-
- SLIS Web site redesign: Comments and suggestions. Fall 2007
- Conducted surveys of current students and alumni in preparation for the 2005 re-accreditation, 2004-2005
- Technology Committee, 1992-1999 (chair, 1996-1998), 2002-2003 (member)
- Colloquia Committee 1997-1999, 2002-2003.
- Advisor of the CUA Student Chapter of the American Society for Information Science and Technology, 2002-2003
- Visiting Professor Search Committee, 1999, 2000, 2001
- Leader, Participation in the CORC experiment, 1999-2000
- Advisor of the Special Libraries Association Student Chapter, 1993-1999; the group was recognized for outstanding leadership by SLA in 1999.

- COA planning Committee, Task Force on Electronic Presentation of SLIS Reports (team leader) 1997-1998
- COA Planning Committee, Subcommittee on Technology 1996-1998
- NLM practicum coordinator, 1997-1998
- Computer Literacy Workshops: Assisted with the development and evaluation of the workshops, 1996-1998
- Leader, Participation in the InterCat project, 1995-1997

APPENDIX B

MARC 21 Reference Materials

Part VII: A Summary of Commonly Used MARC 21 Fields
Part VIII: A List of Other Fields Often Seen in MARC Records
Part IX: The Leader
Part X: Field 008 for Books

Part VII:

A Summary of Commonly Used MARC 21 Fields

This is a summary of the MARC 21 tags used most frequently by libraries in entering their own bibliographic records. For full listings of all MARC 21 tags, indicators, and subfield codes, see *MARC 21 Format for Bibliographic Data*.

In the explanations on these pages:

Tags -- The tags (3-digit numbers) are followed by the names of the fields they represent. In this summary, and in the *MARC 21 Format for Bibliographic Data*, if a tag can appear more than once in one bibliographic record, it is labeled repeatable (R). If it can only be used once, it is labeled non-repeatable (NR). For example, a catalog record can have several subjects, so the tags for subject added entries (6XX) are labeled repeatable (R).

Indicators -- The use of indicators is explained in fields where they are used. Indicators are one-digit numbers. Beginning with the 010 field, in every field -- following the tag -- are two character positions, one for Indicator 1 and one for Indicator 2. The indicators are not actually defined in all fields, however. And it is possible that a 2nd indicator will be used, while the 1st indicator remains undefined (or vice versa). When an indicator is undefined, the character position will be represented by the character # (for blank space).

Subfield codes -- All the data in each field (beginning with the 010 field) is divided into subfields, each of which is preceded by a delimiter-subfield code combination. The most common subfield codes used with each tag are shown. Each subfield code is preceded by the character $, signifying a delimiter. The name of the subfield follows the code.

In general, every field MUST have a subfield 'a' (**$a**). One exception that is often seen is in Field 020 (ISBN), when the ISBN information (subfield **$a**) is unavailable but the price (subfield **$c**) is known. Some subfields are repeatable. In this summary, repeatability is noted for only the more common repeatable subfields.

Examples: Examples follow the explanation for each field. For clarity, one space has been placed between the tag and the first indicator, one space has been placed between the second indicator and the first delimiter- subfield code, and one space has been inserted between the delimiter-subfield code and the subfield data.

010 Library of Congress Control Number -- (LCCN)
(NR, or Not Repeatable

Indicators undefined.
Subfield used most often:
$a -- Library of Congress control number

```
Example:    010 ##  $a ###86000988#
```

020 International Standard Book Number -- (ISBN)
(R, or Repeatable)

Indicators undefined.
Subfields used most often:
$a -- International Standard Book Number
$c -- Terms of availability (often a price)
$z -- Cancelled/invalid ISBN (R)

```
Example:    020 ##  $a 0877547637
```

040 Cataloging source -- (NR)

Indicators undefined.
Subfields used most often:
$a -- Original cataloging agency
$c -- Transcribing agency
$d -- Modifying agency (R)

```
Example:    040 ## $a DLC
                   $c DLC
                   $d gwhs
```

100 Main entry -- Personal name -- (primary author)
(NR; there can be only one main entry)

Indicator 1: Type of personal name entry element
0 -- Forename
1 -- Surname (this is the most common form)
3 -- Family name
Indicator 2 undefined.
Indicator 2 became obsolete in 1990. Older records may display 0 or 1
Subfields used most often:
$a -- Personal name
$b -- Numeration

$c -- Titles and other words associated with a name (R)
$q -- Fuller form of name
$d -- Dates associated with a name (generally, year of birth)

```
Example:    100 1# $a Gregory, Ruth W.
                   $q (Ruth Wilhelme),
                   $d 1910–
```

130 Main entry -- Uniform title -- (NR)

Indicator 1: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Indicator 2 undefined.

Indicator 2 became obsolete in 1990. (See 100 above.)

Subfields used most often:

$a -- Uniform title
$p -- Name of part/section of a work (R)
$l -- Language of a work
$s -- Version
$f -- Date of a work

```
Example:    130 0# $a Bible.
                   $p O.T.
                   $p Psalms.
```

240 Uniform title (NR)

Indicator 1: Uniform title printed or displayed

0 -- Not printed or displayed
1 -- Printed or displayed (most common)

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Subfields used most often:

$a -- Uniform title
$l -- Language of a work
$f -- Date of a work

```
Example:    240 10 $a Ile mystérieuse.
                   $l English.
                   $f 1978
```

245 Title Statement (NR)

Indicator 1: Title added entry

(Should the title be indexed as a title added entry?)

0 -- No title added entry

(indicates a title main entry; i.e. no author is given)

1 -- Title added entry

(the proper indicator when an author given in 1XX; the most common situation)

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present, including spaces; usually set at zero, except when the title begins with an article; e.g., for *The robe*, the second indicator would be set to 4. The letters *T*, *h*, *e*, and the space following them are then ignored in alphabetizing titles. The record will be automatically filed under "*r*" -- for *Robe*.

Subfields used most often:

$a -- Title proper

$h -- Medium (often used for non-book media)

$p -- Name of part/section of a work (R)

$b -- Reminder of title (subtitles, etc.)

$c -- Remainder of title page transcription/Statement of responsibility

```
Example:    245 14 $a The DNA story :
                   $b a documentary history of gene
                      cloning /
                   $c James D. Watson, John Tooze.
```

246 Varying form of title (R)

Indicator 1: Note/title added entry controller

1 -- Note, title added entry

3 -- No note, title added entry

Indicator 2: Type of title

-- No information provided

0 -- Portion of title

1 -- Parallel title

4 -- Cover title

8 -- Spine title

Subfield used most often:

$a -- Title proper

```
Example:    246 3# $a Four corners power review
```

250 Edition statement (NR)

Indicators undefined.
Subfield used most often:
$a -- Edition statement

```
Example:    250 ## $a 6th ed.
```

260 Publication, distribution, etc. (Imprint) (R)
Indicator 1: Sequence of publishing statements
-- No information provided
Indicator 2: Undefined
Subfields used most often:
$a -- Place of publication, distribution, etc. (R)
$b -- Name of publisher, distributor, etc. (R)
$c -- Date of publication, distribution, etc. (R)

```
Example:    260 ## $a New York :
                   $b Chelsea House,
                   $c 1986.
```

300 Physical description (R)
Indicators undefined.
Subfields used most often:
$a -- Extent (number of pages) (R)
$b -- Other physical details (usually illustration information)
$c -- Dimensions (cm.) (R)
$e -- Accompanying material (for example, "teacher's guide" or "manual")

```
Example:    300 ## $a 139 p. :
                   $b ill. ;
                   $c 24 cm.
```

440 Series statement / Added entry--Title
This field was made obsolete in 2008 to simplify the series statement. See 490 and 830.

490 Series statement (No added entry is traced from field) (R)
Indicator 1: Specifies whether series is traced (whether an 8XX tag is also present)
0 -- Series not traced
1 -- Series traced (8XX is in record)
Indicator 2 undefined.
Subfield used most often:

$a -- Series statement (R)
$v -- Volume number (R)

```
Example:    490 1# $a Colonial American craftsmen
```

500 General note (R)

Indicators undefined.
Subfield used most often:

$a -- General note (Used when no specialized note field has been defined for the information. Examples: Notes regarding the index; the source of the title; variations in title; descriptions of the nature, form, or scope of the item.)

```
Example:    500 ##  $a Includes index.
```

504 Bibliography, etc. note (R)

Indicators undefined.
Subfield used most often:

$a -- Bibliography, etc. note

```
Example:    504 ## $a Includes bibliographical
                      references.
```

505 Formatted contents note (R)

Indicator 1: Type of contents note
0 -- Complete contents
1 -- Incomplete contents (used with multivolume set when some volumes are not yet published)
2 -- Partial contents
Indicator 2: Level of content designation
-- Basic
Subfield used most often:

$a -- Formatted contents note

```
Example:    505 0# $a Pride and prejudice -- Emma
                      -- Northanger Abbey.
```

520 Summary, etc. note (R)

Indicator 1: Display constant controller
-- Summary

1 -- Review
2 -- Scope and content
3 -- Abstract

Indicator 2 undefined

Subfields used most often

$a -- Summary, abstract, or annotation
$b -- Expansion of summary note

```
Example:    520 ## $a This basic guide to parliamentary
                     procedure tells how to conduct
                     and participate in a meeting
                     properly.
```

600 Subject added entry -- Personal name (R)

Indicator 1: Type of personal name entry element

0 -- Forename
1 -- Surname (this is the most common form)
3 -- Family name

Indicator 2: Subject heading system/thesaurus (identifies the specific list or file which was used)

0 -- Library of Congress Subject Headings
1 -- LC subject headings for children's literature
2 -- Medical Subject Headings
3 -- National Agricultural Library subject authority file
4 -- Source not specified
5 -- Canadian Subject Headings
6 -- Répertoire de vedettes-matière
7 -- Source specified in subfield $2

(Note regarding Sears subject headings: The MARC 21 format does not provide an assigned indicator for Sears subject headings. Therefore, an indicator of 7 is used, and the MARC defined code "sears" is placed in subfield $2.)

Subfields used most often:

$a -- Personal name (surname and forename)
$b -- Numeration
$c -- Titles and other words associated with a name (R)
$q -- Fuller form of name
$d -- Dates associated with a name (generally, year of birth)
$t -- Title of a work
$v -- Form subdivision (R)
$x -- General subdivision (R)
$y -- Chronological subdivision (R)
$z -- Geographic subdivision (R)
$2 -- Source of heading or term (used with 2nd indicator of 7)

```
Example:    600 10 $a Shakespeare, William,
                   $d 1564-1616
                   $x Comedies
                   $x Stage history.
```

```
Example:    600 10 $a Shakespeare, William,
                   $d 1564-1616
                   $x Knowledge
                   $z Rome
                   $v Congresses.
```

Notice that subfields $v, $x, and $z in the 600 field are repeatable. Subfields $v, $x, $y, and $z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

610 Subject added entry -- Corporate name (R)

*Indicator 1:*Type of corporate name entry element

0 -- Inverted name (not used with AACR2)

1 -- Jurisdiction name

2 -- Name in direct order

Indicator 2: Subject heading system/thesaurus.

See indicator 2 under 600

Subfields used most often:

$a -- Corporate name or jurisdiction name as entry element

$b -- Subordinate unit (R)

$v -- Form subdivision (R)

$x -- General subdivision (R)

$y -- Chronological subdivision (R)

$z -- Geographic subdivision (R)

$2 -- Source of heading or term (used with 2nd indicator of 7)

```
Example:    610 10 $a United States.
                   $b Army Air Forces
                   $v Biography.
```

650 Subject added entry -- Topical term (Most subject headings fit here.) (R)

Indicator 1: Level of subject

-- No information provided

Indicator 2: Subject heading system/thesaurus

(identifies the specific list or file which was used)

0 -- Library of Congress Subject Headings

1 -- LC subject headings for children's literature

2 -- Medical Subject Headings
3 -- National Agricultural Library subject authority file
4 -- Source not specified
5 -- Canadian Subject Headings
6 -- Répertoire de vedettes-matière
7 -- Source specified in subfield $2

Note regarding Sears subject headings: The MARC 21 format does not provide an assigned indicator for Sears subject headings. Therefore, an indicator of 7 is used, and the MARC defined code "sears" is placed in subfield $2.)

Subfields used most often:
$a -- Topical term
$v -- Form subdivision (R)
$x -- General subdivision (R)
$y -- Chronological subdivision (R)
$z -- Geographic subdivision (R)
$2 -- Source of heading or term used with 2nd indicator of 7)

```
Example:    650 #0 $a Theater
                   $z United States
                   $v Biography
                   $v Dictionaries.
```

Notice that subfields $v, $x, and $z in the 650 field are repeatable. Subfields $v, $x, $y, and $z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

651 Subject added entry -- Geographic name (R)
Indicator 1: undefined.
Indicator 2: Subject heading system/thesaurus.
See indicator 2 under 600
Subfields used most often:
$a -- Geographic name
$v -- Form subdivision (R)
$x -- General subdivision (R)
$y -- Chronological subdivision (R)
$z -- Geographic subdivision (R)
$2 -- Source of heading or term (used with 2nd indicator of 7)

```
Example:    651 #0 $a United States
                   $x History
                   $v Chronology.
```

Notice that subfields $v, $x, and $z in the 651 field are repeatable. Subfields $v, $x, $y, and $z do not have to be in alphabetical order. They will be in the order prescribed by the instructions given by the subject heading system.

700 Added entry -- Personal name (R)

Indicator 1: Type of personal name entry element

0 -- Forename

1 -- Surname (this is the most common form)

3 -- Family name

Indicator 2: Type of added entry

-- No information provided (most common; co-authors, editors, etc.)

2 -- Analytical entry (The values for Indicator 2 changed in 1994 with Format Integration, and older records may display additional values. An analytical entry involves an author/title of an item contained in a work.)

Subfields used most often:

$a -- Personal name

$b -- Numeration

$c -- Titles and other words associated with a name (R)

$q -- Fuller form of name

$d -- Dates associated with a name (generally, year of birth)

$e -- Relator term (such as ill.) (R)

$4 -- Relator code (R)

```
Example:    700 1# $a Baldridge, Letitia.
```

710 Added entry -- Corporate name (R)

Indicator 1: Type of corporate name entry element

0 -- Inverted name (not used with AACR2)

1 -- Jurisdiction name

2 -- Name in direct order

Indicator 2: Type of added entry.

See Indicator 2 under 700

-- No information provided

2 -- Analytical entry

Subfields used most often:

$a -- Corporate name or jurisdiction name as entry element

$b -- Subordinate unit (R)

```
Example:    710 2# $a Sunburst Communications (Firm)
```

740 Added entry -- Uncontrolled related/analytical title (R)

Indicator 1: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including

spaces)

*Indicator 2:*Type of added entry. See Indicator 2 under 700

-- No information provided

2 -- Analytical entry

(This field was redefined in 1994 with Format Integration. Prior to 1994, the field was also used for variant titles, such as a different wording on a spine title. In records created since Format Integration, those variant tiles appear in a 246 field.)

Subfield used most often:

$a -- Title

```
Example:    740 02 $a Uncle Vanya.
```

800 Series added entry -- Personal name (R)

Indicator 1: Type of personal name entry element

0 -- Forename

1 -- Surname

3 -- Family name

Indicator 2 undefined.

Subfields used most often:

$a -- Personal name

$b -- Numeration

$c -- Titles and other words associated with a name (R)

$q -- Fuller form of name

$d -- Dates associated with a name (generally, year of birth)

$t -- Title of a work (the series)

$v -- Volume number

```
Example:    800 1# $a Fisher, Leonard Everett.
                   $t Colonial American craftsmen.
```

830 Series added entry -- Uniform title (R)

Indicator 1 undefined.

Indicator 2: Nonfiling characters

0-9 -- Number of nonfiling characters present (for initial articles, including spaces)

Subfield used most often:

$a -- Uniform title

$v -- Volume number

```
Example:    830 #0 $a Railroads of America (Macmillan)
```

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Part VIII:

A List of Other Fields Often Seen in MARC Records

001	Control number
003	Control number identifier
005	Date and time of latest transaction
006	Fixed-length data elements -- additional material characteristics
007	Physical description fixed field
008	Fixed length data elements (See Part X)
022	International Standard Serial Number (ISSN)
037	Source of acquisition
041	Language code
043	Geographic area code
050	Library of Congress call number
060	National Library of Medicine call number
082	Dewey Decimal classification number (the one recommended by the Library of Congress; locally-assigned call numbers may appear elsewhere)
110	Main entry -- Corporate name (less frequent under AACR2 rules)
256	Computer file characteristics
263	Projected publication date (indicates a CIP -- Cataloging in Publication -- record)
306	Playing time
508	Creation/production credits note
510	Citation/references note (review sources)
511	Participant or performer note
521	Target audience note (first indicator: 0 = reading grade level, 1 = interest age level, 2 = interest grade level, 3 = special audience characteristics, 4 = motivation interest level)
530	Additional physical form available note
538	System details note
586	Awards note
656	Index term -- Occupation
730	Added entry -- Uniform title
852	Location
856	Electronic location and access
9XX	Reserved for local use. (They are used by vendors, systems, or individual libraries to exchange additional data)

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Part IX:

The Leader

There are 24 positions in the Leader, numbered from 00 to 23. For fuller explanation, see the *MARC 21 Format for Bibliographic Data*.

00-04 Record length (calculated by the computer for each record)

05 Record status
- a = increase in encoding level
- c = corrected or revised
- d = deleted
- n = new
- p = increase in encoding from prepublication (previous CIP)

06 Type of record
- a = language material
- c = printed music
- d = manuscript music
- e = cartographic material
- f = manuscript cartographic material
- g = projected medium
- i = nonmusical sound recording
- j = musical sound recording
- k = 2-dimensional nonprojectable graphic
- m = computer file
- o = kit
- p = mixed materials
- r = 3-dimensional artifact or naturally occurring object
- t = manuscript language material

07 Bibliographic level
- a = monographic component part
- b = serial component part
- c = collection
- d = subunit
- i = integrating resource
- m = monograph/item
- s = serial

08 Type of control
- # = no specified type
- a = archival

09 Character coding scheme
- # = MARC-8
- a = UCS/Unicode

10 Indicator count (always "2")

11 Subfield code count (always "2")

12-16 Base address of data (calculated by the computer for each record)

17 Encoding level
- # = full level

1 = full level, material not examined
2 = less-than-full level, material not examined
3 = abbreviated level
4 = core level
5 = partial (preliminary) level
7 = minimal level
8 = prepublication level (CIP)
u = unknown
z = not applicable

18 Descriptive cataloging form
= non-ISBD
a = AACR2
i = ISBD
u = unknown

19 Multipart resource record level
= Not specified or not applicable
a = Set
b = Part with independent title
c = Part with dependent title

20 Length of the length-of-field portion (always "4")
21 Length of the starting-character-position portion (always "5")
22 Length of the implementation-defined portion (always "0")
23 Undefined (always "0")

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Part X:

Field 008 for Books

Field 008 is used for Fixed Length Data Elements ("Fixed Field Codes"). There are 40 character positions in field 008, numbered from 00-39. Undefined positions must contain either a blank (#) or a fill character (|). Positions 00-17 and 35-39 are defined the same way for all media.

The information shown here for positions 18-34 applies only to books. For explanation of all the positions below and for positions 18-34 for other media, see the *MARC 21 Format for Bibliographic Data*.

Note that field 008 has no indicators or subfield codes.

00-05 Date entered on file (YYMMDD),
where Y=year, M=month, and D=day

06 Type of date/publication status:
b = no dates given; B.C. date involved
e = detailed date
s = single known date/probable date
m = multiple dates
r = reprint/reissue date (Date 1) and original date (Date 2)

n = dates unknown
q = questionable date
t = publication date and copyright date
| = no attempt to code

07-10 Date 1/beginning date of publication

11-14 Date 2/ending date of publication

Date fields contain the year(s) of publication. The type of date(s) in these elements are specified in fixed field element 06: Type of date/publication status. (For further details, see the field 008 description in the *MARC 21 Format for Bibliographic Data*.)

15-17 Place of publication, production, or execution

For example:
pk# = Pakistan
cau = California (US)

(For a full list of codes used in these positions, see the *MARC Code List for Countries*.)

18-21 Illustrations (up to 4 codes):

= no illustrations
a = illustrations
b = maps
c = portraits
d = charts
e = plans
f = plates
g = music
h = facsimiles
i = coats of arms
j = genealogical tables
k = forms
l = samples
m = phonodisc, phonowire, etc.
o = photographs
p = illuminations
| = no attempt to code

22 Target audience:

= unknown or not specified
a = preschool
b = primary
c = pre-adolescent
d = adolescent
e = adult
f = specialized
g = general
j = juvenile
| = no attempt to code

23 Form of item:

= none of the following
a = microfilm

b = microfiche
c = microopaque
d = large print
f = braille
r = regular print reproduction
s = electronic
| = no attempt to code

24-27 Nature of contents (up to 4):

= no specified nature of contents
a = abstracts/summaries
b = bibliographies (is one or contains one)
c = catalogs
d = dictionaries
e = encyclopedias
f = handbooks
g = legal articles
i = indexes
j = patent document
k = discographies
l = legislation
m = theses
n = surveys of literature
o = reviews
p = programmed texts
q = filmographies
r = directories
s = statistics
t = technical reports
u = standards/specifications
v = legal cases and notes
w = law reports and digests
z = treaties
| = no attempt to code

28 Government publication:

= not a government publication
i = international intergovernmental
f = federal/national
a = autonomous or semi-autonomous component
s = state, provincial, territorial, dependent, etc.
m = multistate
c = multilocal
l = local
z = other type of government publication
o = government publication -- level undetermined
u = unknown if item is government publication
| = no attempt to code

29 Conference publication:

0 = not a conference publication
1 = conference publication

| = no attempt to code

30 Festschrift:
0 = not a festschrift
1 = festschrift
| = no attempt to code

31 Index:
0 = no index
1 = index present
| = no attempt to code

32 Undefined (since 1990) (Earlier records may contain the values 0 or 1)
= Undefined
| = no attempt to code

33 Literary form:
0 = not fiction (not further specified)
1 = fiction (not further specified)
c = comic strips
d = dramas
e = essays
f = novels
h = humor, satires, etc.
i = letters
j = short stories
m = mixed forms
p = poetry
s = speeches
u = unknown
| = no attempt to code

34 Biography:
= no biographical material
a = autobiography
b = individual biography
c = collective biography
d = contains biographical information
| = no attempt to code

35-37 Language:
A three-letter code. For example: eng fre ger spa rus ita

(For a full list of codes used in these positions, see the *MARC Code List for Languages*.)

38 Modified record:
= not modified
x = missing characters (because of characters unavailable in MARC character set)
s = shortened
d = "dashed-on" information omitted
r = completely romanized/printed cards in script
o = completely romanized/printed cards romanized
| = no attempt to code

39 Cataloging source:

= national bibliographic agency
c = cooperative cataloging program
d = other sources
u = unknown
| = no attempt to code

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Library of Congress
Library of Congress Help Desk (10/27/2009)

APPENDIX C

Appendix C. Materials Considered

Ex	Description
1035	Excerpts of *Pervasive Computing Handbook* by U. Hansmann, L. Merk, M. S. Nicklous, and T. Stober. Berlin ; New York : Springer, 2000 ("*Hansmann*").
1035A	*Hansmann* obtained from the Library of Congress.
1035B	Bibliographic and MARC records for *Hansmann*, available at https://lccn.loc.gov/00049218 from the online catalog of the Library of Congress.
1035C	Profile of the Library of Congress, available at https://librarytechnology.org/library/2263.
1035D	Bibliographic and MARC records for *Hansmann*, available at https://catalog.library.tamu.edu/Record/in00001590462 from the online catalog of the Texas A&M University Libraries.
1035E	Profile of the Texas A&M University Libraries, available at https://librarytechnology.org/library/2088 from libraries.org, the directory of libraries throughout the world.
1035F	Citations to *Hansmann,* obtained from Google Scholar and Springer webpage for *Hansmann* at https://link.springer.com/book/10.1007/978-3-662-04318-9.
1035G	Springer website archived by Internet Archive on December 15, 2000, available at https://web.archive.org/web/20001215075500/http://www.springer.de/ and Springer What's New webpage archived by Internet Archive on December 17, 2000, and available at https://web.archive.org/web/20001217183700/http://www.springer.de/press/whatsnew.html#pervasive.
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Pervasive Computing Handbook

Forewords by Philippe Kahn and Nick Shelness

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Pervasive Computing Handbook

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Forewords by Philippe Kahn
and Nick Shelness

With 183 Figures



Springer

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Foreword 1

Our future is pervasive.

We were not meant to be chained to our computers in our Dilbert cubicles. Having millions of white-collar workers commute to work every day to sit for eight hours chained to their computer is something right out of a Kafka novel.

Before the cell phone, I can remember sitting at my desk waiting for calls to be returned. If I was traveling I made sure that I was all setup to place calls from public phone booths.

Today, I can't imagine having to look for a telephone booth! I can be reached on my tri-band digital cell phone anywhere in the world instantly. I also have a PDA that I carry everywhere. My PDA instantly synchronizes with my desktop computer, which in turn connects to a larger network of computers and web portals. The world is my neighborhood.

Soon digital devices will be working together hand in hand thanks to technologies such as Bluetooth. This includes devices such as Cell phones, Digital Cameras, PDAs, and desktop computers. The Wireless Internet is the catalyst for the convergence of digital communications, computing, and rich media. This is a mega trend that we call "Pervasive Computing".

What "Pervasive Computing" means to each and every one of us is the ability to take our own worlds of personal and business information with us wherever we go. Now we can always be in touch with our families, affinity groups, and co-workers.

The vision for "Pervasive Computing" encompasses universal and integrated instant person to person or person to business visual communications. This is a complete new media that will revolutionize the way we communicate. One good example is an instant wireless digital camera that can share photographs instantly with the rest of the world through the wireless Internet: point, shoot, and share... instantly. A picture is worth a 1,000 words!

As technologists we are delivering this vision through careful adherence to open industry standards such as JPEG 2000 and

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SyncML. Together with the worldwide build-up of a global infrastructure for the Wireless Internet these are the key ingredients to make our vision a reality.

The technology components necessary to deliver on this global vision are advanced and complex. However, they deliver an elegant and functional end-to-end solution. And as we know well, a world connected and synchronized is a world perfected.

Because of its universal appeal, the industry growth that will be generated by Pervasive Computing will be astounding.

"Pervasive Computing" is global and universal and focused on simplifying our daily lives. A very good thing!

Philippe Kahn
Chairman of the Board, LightSurf Technologies, Inc.
August 2000

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Foreword 2

Those of us old enough to have grey or missing hairs have lived through the aftermath of a number of major technological developments. These developments have resulted in the widespread deployment of, for example, black and white televisions, color televisions, VCRs, camcorders, quartz watches, mobile telephones, personal computers, and the Internet. In some of these cases (black and white television, VCRs, mobile telephones, personal computers, and the Internet), these technological developments have had a profound sociological impact. They have changed the way that people live their lives. In other cases (color television, camcorders, and quartz watches) they have been replacement technologies that have significantly improved the quality of an experience, but have had little or a less profound sociological impact.

We now stand on the verge of yet another major technological development – the embedding of inexpensive digital processing, storage, and communication capabilities into a vast range of devices both existing and new. These devices will span the gamut from home appliances (refrigerators, washing machines, stoves, etc.) to buildings (windows, doors, heating and air conditioning, etc.), vehicles (cars, busses, trucks, trains, airplanes, etc.), and new forms of personal electronic accessory (electronic organizers, electronic shopping lists, electronic books, web capable cell phones, etc.). What is not yet clear is how these capabilities will be exploited, if and how these devices will communicate with each other in practice, and what, if any, sociological impact their availability will have.

There are a number of preconditions that are necessary for the widespread deployment of devices that exploit new technological capabilities.

1. They have to deliver an easily perceived value, at a low enough price, to convince a significant number of individuals to part with their hard-earned cash.
2. They have to fit seamlessly into a widely deployed infrastructure.
3. They have to be sufficiently easy to use.

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Without an easily perceived value, nothing will happen, but price is also a key element of any deployment equation. From the moment of their introduction, a huge number of people could see the value of owning, carrying, and using a cell phone. They didn't rush out and buy one because the initial prices of purchase and use were high, and could only be justified for high value calls. If one views cell phone deployment rates, especially in Europe, then there have been three pricing developments that have had a huge impact on deployment levels. a) The real cost of handsets came down, but perhaps even more important, most of the real cost of a handset was amortized by service providers over future subscription and call charges. This allowed handsets to be sold for an artificially low price, and often be given away for free. b) During evenings and on weekends, cellular call tariffs were priced significantly below residential wireline telephone tariffs. This made a cell phone a significantly cheaper alternative to a residential wireline telephone, especially for households which were away during the day. c) Handsets that employ prepaid smart cards (SIMs) were introduced. These allowed cellular users to both budget and cap their call charges on a call by call basis, and for parents to totally eliminate bill shock when providing their children with cell phones. Each of these pricing developments has had a profound effect on the willingness of very large populations to own, carry, and use cellular telephones. In the UK alone, the introduction of prepaid smart card cell phones turned an additional 1/4 of the entire population into cell phone users in little more than a year.

Once purchased, devices must have widespread access to a widely deployed infrastructure. This in practice requires at least national, if not the universal, adoption and deployment of de-jure or de-facto standards. If different television sets had been required to view different broadcast channels, deployment would almost certainly have been stalled. Attempts to employ a different parallel infrastructure, even if better, are also usually doomed to failure. Sony's Betamax VCR format is a well known example of this. Without near total coverage in the areas a user wishes to traverse, a cellular telephone becomes largely useless. It is just such a widely deployed infrastructure that has given GSM cellular telephones their extremely wide appeal. I personally carry a tri-band GSM2 cell phone that has worked in every continent I have traversed in the last year including large parts of the North America, Europe, Australia, and Asia. Perhaps the greatest testimony to the importance of a widely deployed and common infrastructure is the World Wide Web. Hypertext linking and packet switching are both thirty year old technologies. What gave the Web its growth power was the ability to use almost

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any browser on almost any computer to access an entire and mushrooming world of content and services.

Finally, devices based on new technologies have to be sufficiently easy to use. Note, I didn't say easy to use. The number of deployed VCRs that display a flashing time of 00:00 are testimony to this, but if the main things that a user wishes to do are too difficult they will just give up, and tell their friends and neighbors not to waste their money trying.

So where do devices that embed digital processing, storage, and communication capabilities stand with respect to these three criteria? The simple answer is that it is too soon to know. There have been some extremely successful pilots and even full scale deployments in relatively narrow spaces such as electronic shopping assistants and web capable cell phones, but these are hard to project from.

We know that in Japan, NTT DoCoMo are deploying more than one million new I-mode (web capable) cell phones a month, but projecting from Japan, a country in which there are only 3 million PC-based web users, almost all of them office based, to other geographies that already have large numbers of home-based PC web users, is extremely dangerous. Similarly, projecting from Japan's success in employing a pure Web (HTML 3.2 and HTTP 1.1 over a cellular bearer rather than TCP/IP) infrastructure to future European success in deploying an alternative WAP (non-HTML and non-HTTP) infrastructure is, I think, premature.

So what is the role of this book? It is twofold. It is to peer into the future by presenting a number of potential road maps, and it is to describe the technologies and infrastructures that will be required to pave the way. Some of these technologies and infrastructures are available at a suitable price now, some will be available at a suitable price soon, while others are still missing in action.

Like the early days of automatic teller machines (ATMs), early pervasive computing pilots and deployments are already having a significant bottom line impact for early adopters (see NTT DoCoMo above). With the passage of time the deployment of pervasive computing devices and infrastructures, as with ATMs, may well simply become a cost of doing business that delivers minimal bottom line advantage. For this reason, the time is now right for businesses to determine whether they wish to take the risks and garner the potential rewards of being early adopters. This book is a useful tool in coming to an informed decision.

Nick Shelness
Chief Technical Officer, Lotus Development Corporation
August 2000

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Preface

"...a billion people interacting with a million e-businesses with a trillion intelligent devices interconnected ..."
(Lou Gerstner, IBM Chairman and CEO)

Information everywhere

Information is the nucleus of today's interconnected economy. We need to be able to exchange and retrieve our personal information quickly, efficiently, and securely, at any time and regardless of our current physical location. Electronic storage, transmission, and access of information are common tasks we rely and trust on.

Convenient applications for helping users manage information in daily life and business environments will be an essential growth factor in tomorrow's IT industry. Such applications will integrate software, hardware, infrastructure, and especially services and will focus on the needs and convenience of their potential users. Those who provide these applications will be able to offer added value, allowing them to differentiate themselves from their competitors. Traditional off-the-shelf software and even hardware will serve only as enabling components for these integrated solutions. These components will be standardized and exchangeable.

Pervasive Computing

"Everywhere at anytime" ...

This common slogan expresses in a nutshell the goal of *Pervasive* or *Ubiquitous Computing*. Both terms describe the visible and mobile front-end for the next generation of integrated IT applications. Pervasive Computing includes flexible and mobile devices like personal digital assistants, mobile phones, pagers, hand-held organizers, and home entertainment systems, which will access or provide a rich diversity of applications. As part of our daily life, these intelligent devices will offer an emerging number of private and professional transactions. They connect to worldwide networks without boundaries and provide quick and secure access to a wealth of information and services.

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A new era of applications

The early pilot applications of Pervasive Computing seem to originate from the pages of a science-fiction novel:

A supermarket chain equips its customers with free mobile devices accompanied by an application for placing online orders. A salesman for agriculture seeds accesses, from a remote farm, his company's order systems via a wireless network. Theatergoers pay for their ticket using a mobile WAP phone. In a networked home equipped with intelligent appliances, the microwave and the air-condition are controlled through the Internet using a common browser.

Integration behind the scenes

Nevertheless, Pervasive Computing is far more than just plugging in new incredible devices for multiple purposes. Behind the scenes, an increasing number of these new devices must be integrated into the IT organization. Device management as well as application management are two issues back-end systems have to deal with. Gateways, application servers, and communication networks are just some of the components used for building Pervasive Computing solutions. Small footprint clients for common systems, like databases or web servers, have to be supplied for numerous platforms.

Services

Besides making the systems ready for Pervasive Computing, the service infrastructure has to be extended. Internet Service Providers must be prepared to react to a rapidly growing demand for network access by everyone. GSM has turned out to be the dominant wireless network for communicating anywhere, making it the first choice for accessing Pervasive Computing applications from any point. Upcoming Internet portals will act as an "anytime available" intermediator between users and providers offering payment facilities, shopping opportunities, or information access. Nevertheless, even more complex services, like a public key infrastructure adding enhanced security and privacy to transactions, are beginning to be established.

Common standards

To make all these things work together seamlessly, the industry is currently agreeing upon the required standards. SyncML is one promising approach for ensuring the possibility to synchronize all kind of data on different devices. XML is definitely the basis for standardized data exchange.

About This Book

Technology

This book explains the fascinating variety of front-end devices for ubiquitous information access and their operating systems. It also covers the powerful back-end systems, which integrate the Pervasive Computing components into a seamless IT world. Fundamental topics include such commonly used terms as XML, WAP,

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transcoding, cryptography, and Java, just to mention a few. Another focus is set on the evolving industry standards, like SyncML, WAP, on which these new technologies are based.

Development

The book presents an overview of the different development strategies and tools for different Pervasive Computing platforms. In order to ease the planning and development of new solutions, concepts and considerations are explained specific to a variety of different target environments, such as handheld computers, home networks, smart phones, and others.

Business

Finally, this book has a strong emphasis on the business aspects, such as the new generation of services, delivering added value to a growing number of customers. E-Business, private home, finance, or travel will not be the only industries which will change their face entirely due to a new class of mobile computing devices, making the customer omnipresent.

A red line through the jungle

We try to give an impression of what Pervasive Computing is about and how it differs from conventional computing. We avoid losing ourselves in details, but provide a way through the jungle of terms, concepts, standards, and solutions instead. The major goal of this book is to put the various facets of Pervasive Computing together to a consistent and comprehensive view.

The Audience of This Book

Giving a comprehensive and profound overview of Pervasive Computing makes this book very valuable for a wide audience of readers. Following the main thread of this book, they will find an easy and quick entry to the related topics.

Business Managers

Business managers will learn what impact Pervasive Computing has on economy and society. The knowledge about Pervasive Computing paradigms, new business models, and a new generation of applications will affect their work as well as their decisions. They will see where Pervasive Computing can help businesses to offer new services and new products or how to improve existing businesses to reach a new range of customers. This book gives an overview about the broad range of possible as well as already existing solutions in the field of Pervasive Computing.

Software Architects and Project Managers

Those software architects and project managers who extend their e-business activities to a new front-end will read about which components pervasive solutions are made of and how these building blocks are related with each other. This book gives an overview of state-of-the-art pervasive technology and shows which components are available as well as how they fit together to build a complete solution.

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Application developers

Application developers getting involved with a particular segment of Pervasive Computing will find a high-level but profound introduction leveraging the start before digging into mazes of programmer guides. They will learn how to rapidly enable applications for the use of pervasive devices. They will also learn some typical patterns of Pervasive Computing and how to trade off various desirable properties in making design decisions. Typical development processes and tools are described.

No Need to Read the Whole Book

Most of us no longer have the time to read a book cover to cover. Therefore, we have broken this book into chunks that may be read in almost any sequence:

- "Introduction",
- "Part I, Devices",
- "Part II, Software",
- "Part III, Connecting the World",
- "Part IV, Back-end Server Infrastructure",
- "Part V, New Services", and
- "Part VI, Appendices"

At the end of each chapter, you will find a list of interesting links and suggestions for further reading.

Introduction

We set the stage by providing an overview of Pervasive Computing in general.

Chapter 1 **What Pervasive Computing is all about**

We describe the evolution from conventional computing via e-business to Pervasive Computing. We explain the paradigms and principles of Pervasive Computing, like decentralization, diversification, connectivity, and simplicity.

Part I *Devices*

In this part, we cover the most commonly used pervasive devices, like handheld computers, smart phones, telematics, smart cards, and many more. We describe their characteristics from a user's perspective, explain the areas of usage, their basic applications, their look-and-feel and everything else you need to know to get a good under-

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standing of these devices. This part groups the vast mass of devices into four categories, which are described in more detail within the different chapters.

Information Access Devices — Chapter 2

The first category covers handheld computers and smart phones, which are primarily used to access and communicate information. They are currently the most important group of Internet connected devices beside the traditional PC.

Smart Identification — Chapter 3

The second category comprises tiny labels and smart cards, which offer a huge possibility for identifying objects electronically in pervasive applications.

Embedded Controls — Chapter 4

This category shows how everyday devices, such as controls, refrigerators, or vending machines can provide additional services and applications while connected to a network. Another section describes the automobile as a versatile pervasive device.

Entertainment Systems — Chapter 5

Finally, the fourth category covers devices, which provide manifold sort of entertainment, such as game consoles and interactive television. For these devices analysts predict a promising future.

Software — Part II

In this part, we cover the most commonly used software components needed to build pervasive applications, like, Java, operating systems, middleware, and security building blocks. We also show which components are necessary to develop applications for these operating systems and how to start doing this.

Java — Chapter 6

Java is used in almost every area of Pervasive Computing, in some of the devices as well as in the server back-end infrastructure. The different flavors of Java, especially the ones for Pervasive Computing, are covered and explained here.

Operating Systems — Chapter 7

There is a wide variety of different operating systems used in the field of Pervasive Computing. In this chapter, we cover the most-widely used ones in handheld devices: Palm OS and Windows CE.

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as well as EPOC, which is used within phones and smart card operating systems like Java Card and Windows for Smart Cards. We describe the architecture and list the necessary tools to start developing for the respective platforms. This chapter also contains small sample programs for most of these operating systems.

Chapter 8 **Middleware Components**
Basic plumbing or middleware is necessary to leverage application programming for the devices themselves. Developing on top of common components helps to achieve independence from a particular Pervasive Computing device used by the customer. Middleware components are used to integrate the clients to their backend servers. We describe an exemplary selection of widely used components, like DB2 Everywhere, MQ Everywhere, the JavaTV and JavaPhone APIs, as well as OpenCard Framework and PC/SC.

Chapter 9 **Security**
Security is an extremely important part of every mobile e-commerce solution. We explain the background of security and the cryptographic techniques used to secure Pervasive Computing and give an overview of the different standards, algorithms, and protocols used.

Part III *Connecting the World*

Pervasive Computing and the different devices get really powerful if they are integrated with each other and the back-end infrastructure to form powerful solutions. This Part covers the important industry standards and technologies that provide connectivity and enable communication.

Chapter 10 **Internet Protocols and Formats**
As Pervasive Computing is somehow an extension of the Internet, most of the protocols and formats you might already know from the Internet are also used here. This chapter introduces HTTP, HTML, XML, and XSL for those of you who are not yet familiar with these standards.

Chapter 11 **WAP**
The Wireless Application Protocol (WAP) is today's standard for enabling wireless information devices and especially mobile phones to send and receive information and HTML-like pages in an efficient and performant way. We introduce you to the secrets of WAP and describe to you the most important facts that you need to know.

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Connectivity — Chapter 12

We cover the different protocols used to connect traditional and Pervasive Computing devices. We explain the background of wired networks, infrared communications, Bluetooth, as well as cellular and short-range radio wireless connections.

Service Discovery — Chapter 13

With a set of distributed Pervasive Computing devices offering different services to each other, a mechanism for service lookup and discovery is needed for an easy and automatic configuration of this complex environment. We explain the three mechanisms Jini, uPnP, and Salutation.

Back-end Server Infrastructure — Part IV

Behind the scenes, the server systems need to be prepared for Pervasive Computing and its requirements, which differ significantly from the needs of today's PC-focussed networks. We discuss the applied technologies and concepts.

Gateways — Chapter 14

Gateways are intelligent interceptors between servers and specific classes of devices. We show how they can be used to prepare data and to establish own subnets, for example the wireless network of a particular service provider.

Application Servers — Chapter 15

In most cases, Pervasive Computing devices are used to interact with data residing on back-end servers. This chapter describes the different additional jobs a back-end server has to do for Pervasive Computing front-ends. Load balancing, servlets, and Enterprise Java Beans are among the captions of this chapter.

Device Management — Chapter 16

This chapter deals with managing the incredible amount of devices and applications that are deployed in the field. Examined aspects include customer profiles, accounting, and billing. Another topic is the management of device capabilities and life cycles. And of course, the distribution and maintenance of applications are an important issue covered within this chapter.

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Chapter 17 **Synchronization**
Keeping data consistent on the server and on various mobile devices requires intelligent synchronization mechanisms. Aspects of synchronization are detailed within this chapter.

Part V *New Services*

Pervasive Computing offers a vast amount of new possibilities to create services, streamline processes and to start new businesses. The following chapters provide an overview on these areas, which are the most likely ones to boom first. They describe some of the most known Pervasive Computing solutions, which are in use by the customers today already.

Chapter 18 **Portals**
Portals are the central points of access to services in a connected world. A portal must be very attractive, interactive, complete, and easy to use to make the customer come back. In this chapter we describe functionality that is common to most portals and explain some exciting examples.

Chapter 19 **Home Services**
Today a Personal Computer is the only computer that a user directly interacts with at home. We explain how Pervasive Computing offers a huge potential for new and additional services at home, like intelligent appliances, home automation, remote home health care, energy services, new communication services, and many more.

Chapter 20 **Travel & Business Services**
A person who is traveling is mobile per se. Offering to a traveler the services he normally uses from his office and additional ones that ease his travel, like checking-in from a mobile phone at an airport, are some examples. Pervasive Computing can also make the daily life in the office easier. This chapter describes the new service opportunities that service provides in these areas face.

Chapter 21 **Consumer Services**
This chapter describes the new services that businesses will offer to consumers, like offering the possibility to shop using mobile devices, or ordering stocks and checking the balance of a checking account from the road. In this chapter, we will explain what is available today and what will come in the near future.

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2 Information Access Devices

2.1 Handheld Computers

Handheld computers comprise the largest group of Internet connectable pervasive devices. They are small, lightweight, and fit into pockets. A stylus is used to tap on a touch screen to activate applications or enter data. Currently two major operating systems are applied on handheld devices: Palm OS and Windows CE.

2.1.1 Palm OS-Based Devices

Palm OS was developed by Palm Computing, a subsidiary of 3COM. It is the best-known and most popular operating system for handheld devices, having a market share of about 70 percent. Palm OS based devices are manufactured by Palm or other companies, like Symbol, IBM, and Handspring, which licensed the operating system and sell devices on their own.

Some Palm OS devices

The renown Palm III models were launched in 1998. They included infrared communication, version 3.0 of Palm OS and 2 MB of memory. The newer Palm IIIx has 4 MB of memory and an improved display. The heart of the Palm IIIx is a Motorola Dragonball EZ processor, which is more power efficient and opens the way for the use of less expensive memory upgrades. The Palm IIIc is the first Palm OS based device with a color display. It was released in 2000. Besides having generous 8 MB of memory, the Palm IIIc runs Palm OS version 3.5, which is the latest update of the operating system.

The high-end Palm device for professional users is the Palm V. It is a very thin device in a brushed aluminum housing and features 8 MB of memory and a rechargeable lithium-ion battery (Figure 2.1).

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These Palm devices can be plugged into a cradle, which connects them to the serial port of a PC. An external modem is also available, allowing them to access a network directly through a phone line.

Figure 2.1: Visor and Palm V



Photos courtesy of Handspring Inc. and Palm Computing, Inc.

The Palm VII device has been designed to have Internet access without any additional hardware and software. The device is turned on whenever the user flips up the antenna. Currently, the Palm VII is only available in the US where users can send and receive wireless emails and lookup special web pages with this Palm device.

A cellular phone and a Palm within one device – that is the concept of Qualcomm's pdQ Smart Phone. It is a full-functional Palm with additional mailing and Internet access capabilities. Symbol's SPT 1500 and 1700 devices are specialized versions of the Palm III. The SPT 1500 has a built in laser-beam reader, and the SPT 1700 can transmit the scanned data using a wireless transmission module.

The last Palm OS device we want to mention here is Handspring's Visor which was developed by the team around Jeff Hawkins, who left 3COM in 1998 to found his own company. The Visor is based on Palm OS 3.0 (Figure 2.1). The advantages of the Visor concept are the very good performance, the improved date and address book applications, the USB interface and – maybe most important – the possibility to plug additional peripherals into a hardware interface called *Springboard*. Some of the planned add-ons are a wireless modem, a Bluetooth module, a MP3 player, and a GPS device.

Palm applications

The most important native applications of Palm OS based devices are the Address Book, the Date Book, the To Do List, the Memo Pad, and the Mail application (Figures 2.2 and 2.3).

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- The Address Book displays a master list of addresses sorted by last name and displaying the principal phone numbers.
- The Date Book is used to display and edit appointments in a daily, weekly or monthly view.
- At the time the Memo Pad application is started, it first shows an index consisting of the first lines of the memos. If you tap on a list element, the complete memo is displayed.
- With the Mail application users can read downloaded emails or generate new emails offline.

Many other applications are available as freeware, shareware or commercial products from various third-party providers. Among them are fax software, calculators, alarm clocks, drawing applications, games, travel guides, and many, many more.



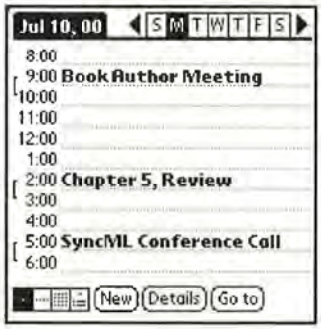


Figure 2.2: Address and Date Book





Figure 2.3: Mail and Memo Application

Text entry

Text can be entered with taps on a small keyboard and displayed on the screen. Alternatively, glyphs can be drawn in a dedicated area below the screen. Glyphs are simplified characters, which can easily be interpreted by a simple handwriting recognition software called Graffiti (Figure 2.4). Graffiti input eliminates the complexity of

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different writing styles. Almost every letter can be formed by a single stroke.

HotSync

The synchronization mechanism between a Palm OS based device and a desktop PC is HotSync. The changes made since the last HotSync are automatically updated on the Palm device and the desktop PC. If corresponding records are changed on the PC and the Palm OS device, HotSync will detect a version conflict.

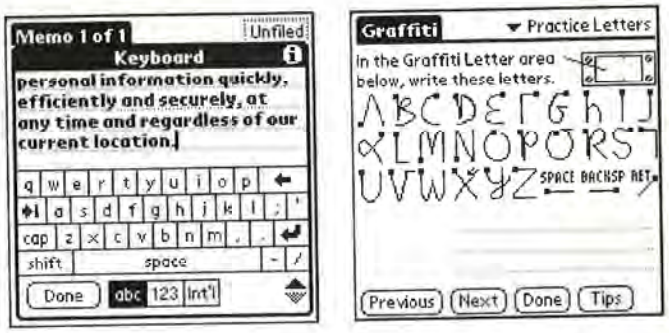


Figure 2.4: Graffiti and Keyboard

Infrared port

The infrared port offers a convenient possibility to exchange data between different devices. Business cards, calendar entries, and entire applications can be "beamed" from one Palm to another without the detour over HotSync and a PC. The infrared port can also be used to communicate with a cellular phone instead of an attached modem to connect wirelessly to a network.

Internet access

The Palm allows to access Internet sites either through an Internet connected PC or directly by going online via modem. There are several Web browsers available. Similar to the capabilities of a PC based Web browser, the Palm Web browsers are able to cache Web sides. This feature is extremely important, since a Palm device usually doesn't have a permanent Internet connection. There are several providers for delivering Internet content, especially for handheld devices. One access point for synchronizing content is AvantGo:

- Internet content can be downloaded by the AvantGo software installed on a PC. AvantGo offers selected Web sites related to manifold topics, which are referred to as *channels*. Users can subscribe individually to particular channels of interest and receive updated content with every HotSync. The information is stored in HTML, thus also graphics, tables, and different fonts can be displayed. The Web pages are compressed before they are transmitted to the Palm OS device.

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- Since version 2.0 of AvantGo was introduced, it is also possible to use AvantGo as an online Web browser. A proxy server at AvantGo.com modifies the Web pages in a way that they can be displayed on Palm devices.

Similar to the Web access, there are two ways of working with emails – via a desktop PIM application or directly via mail server.

- Choosing the PC way means that sending and receiving emails takes places on the PC. The email is synchronized between the Palm device and the PC whenever a HotSync with the email program takes place. An email written on a Palm has to be delivered to the PC mail application before it is sent to the mail server in a second step.
- For direct Internet access the Palm uses a modem connection and an email server running the standard POP3/SMTP protocols.

2.1.2 Windows CE-Based Handheld Computers

Windows CE is the second major operating system for handheld computers, taking almost the remaining rest of the market share. Windows CE has been developed by Microsoft and is applied by manufacturers like Casio, HP, and Compaq.

Windows CE versus Palm OS

Comparing Palm OS and Windows CE devices is somehow pretty philosophic: Microsoft wants to extend today's Personal Computer platform to mobile computers. Users should be able to do the same things in the same way on any computer alike device – as far as such is possible under the given constraints of form factors and reduced processing power. Windows CE provides the same consistent look and feel, both on the common PC and on the smaller handheld. For instance Word and Excel will welcome you on Windows CE and the mailing tool is an Outlook derivative, of course. From the Microsoft perspective, a handheld is nothing else than a miniaturized PC! This philosophy is reflected by terms as PocketPC, Palmheld PC, and Handheld PC.

Palm propagates PC companions instead. They are different and complementary to PCs. Since the usage scenarios are different, the applications and their usage must be different too. Palm OS user interfaces are pretty straight-forward to use and are optimized for quick mobile information access – even in a crowded subway.

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In fact, the opinions about these different approaches are split: Some get started more easily with Windows CE because of the familiar user interface and because they have similar applications on their handheld, as they have on their PC. Others dislike the more circumstantial usage of Windows CE. There are more windows, more controls, and more taps required than a Palm III needs for the same operation.

High-end Windows CE hardware

Compared to the competing Palm OS, Windows CE requires plenty of memory and processing power making devices much more expensive. The Casio E-115 (Figure 2.5) for example takes a minimum of 16 MB of RAM and has a 133 MHz processor embedded. Palm devices instead are shipped with up to 8 MB RAM and include a cheap 20 MHz processor, which keeps them easily affordable for a broad audience.

Figure 2.5: E-115 PocketPC from Casio



Photo courtesy of Casio

Personal Information Management

While Palm concentrates on state-of-the-art mobile information management, Windows CE devices are technological wonderboxes, generously equipped with fancy hardware features: They usually have a color display with a good resolution, enabling multimedia applications such as computer games. There is a built-in microphone for a voice recording facility and a MP3 player. A stereo output is pro-

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vided to plug in a headset. USB and infrared support ensure connectivity with peripherals and other devices. A CompactFlash card slot can be used to attach memory cards for additional storage capacity or one of a wide variety of the other special-purpose cards such as a digital camera card, or a modem card. All these add-ons make Windows CE devices extremely versatile and justify the high price for those, who can take advantage out of them.

Delivered with Windows CE are the typical Personal Information Management (PIM) applications (Figure 2.6). Data can be entered with a displayed keyboard, which is operated with the stylus. Handwritten notes can be drawn on the touch screen and stored within graphic files or interpreted by a recognition software. Memos can also be recorded using the built-in microphone.

Active Sync

ActiveSync is the synchronization software, which Windows CE applications use for keeping the mobile data consistent and up-to-date with databases on the user's corresponding PC. This way, information like address book or calendar entries can be maintained both on the mobile device and on the workplace PC. ActiveSync supports communication through USB, infrared, and serial port, as well as via Ethernet LAN. ActiveSync cannot synchronize between two devices or between client and server directly.

ActiveSync comprises a Service Manager and multiple Service Providers. The Service Provider is the synchronization engine, establishing the connection, tracking changes, and resolving data conflicts. Service Providers are plug-ins contributed by application providers. They implement all application specific tasks, such as user interfaces or retrieving and storing changed data.

PocketPC

Most of today's Windows CE devices in the field run a customized version of Windows CE 2.11, which is tailored for handheld computers. That version is referred to as "Palmheld PC". Products are the Casio Cassiopeia E10x, Compaq Aero 1500, and HP Jornada 420. With the new Windows CE 3.0, the "Palmheld PC" was renamed to "PocketPC". This version is used for the HP Jornada 540, the Compaq iPaq H3630, and the Cassiopeia E-115. For version 3.0 Microsoft's developers have redesigned the user interface entirely, improving especially the clarity of the application layouts. Fancy stuff, like 3D look of buttons has been removed. The icons and windows remind a bit of the good old Windows 3.1.

The performance of version 3.0 has been doubled, and the operating system itself is much more stable than in recent versions. Among the features of 3.0 is a new handwriting recognition. Glyphs, script or print characters, written on the touch screen can be interpreted by that new software.

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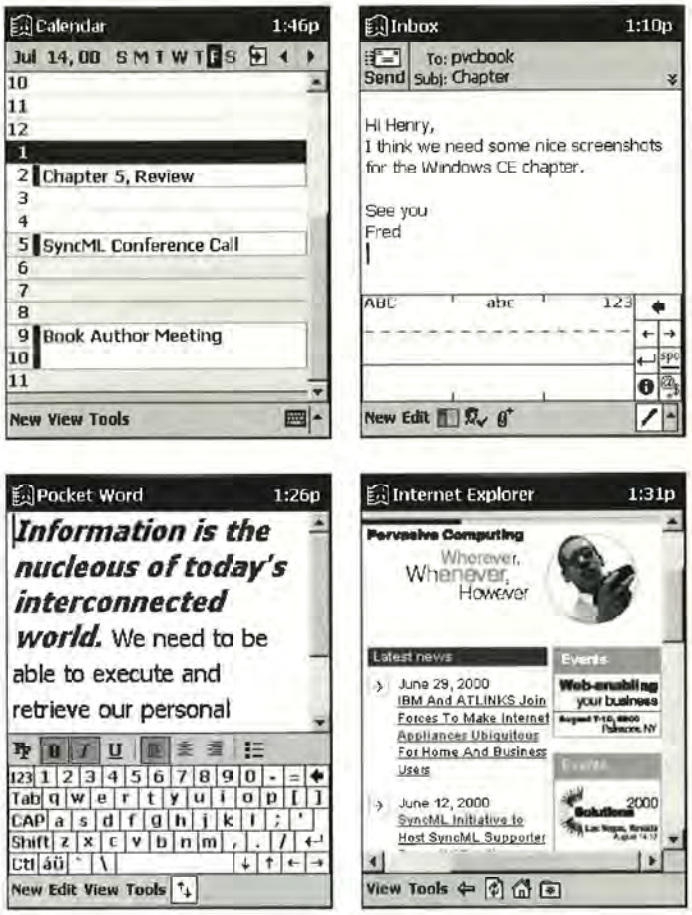


Figure 2.6: PocketPC Version of Calendar, Mail, Word, and Internet Explorer

PocketPC Office suite

The PIM applications of 2.11 have been updated and renamed to Pocket Outlook. Part of Windows CE are pocket versions of Microsoft Word and Excel. Up to now, these tools had only been shipped with larger sub-notebooks versions of CE. Word and Excel will help viewing attachments (if there is any chance to download them onto the device). MS Money and a street mapping program are nice complimentary utilities.

Internet Explorer

The Pocket Internet Explorer is definitely one of the highlights of version 3.0. It supports online and offline browsing, ActiveX and JavaScript. While the predecessor Mobile Channel Viewer could only browse dedicated web sites, the Pocket Internet Explorer is free to surf anywhere in the net. A "shrink to fit" mechanism is an ap-

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proach to deal with the smaller screen size: Web content is zoomed down, until it fits into the window.

Multimedia access

A electronic book application and a media player reflect the aim of Microsoft to emphasize on content delivery complementary to providing just base technology like operating systems.

The Microsoft Media Player can download an individual music library from major record companies onto a handheld device. The Windows Media format compresses two hours of music into 64 MB. That is about half as much as MP3 needs. Access management prevents copyright violations using cryptographic mechanisms.

Microsoft Reader is an electronic book software delivering books to Windows CE based devices. Well readable fonts, a built-in dictionary, and a large collection of book titles are the benefits for the user. The goody for the publisher is a corresponding copy-protection system preventing illegal reproduction.

While handheld computers are today mostly used by business people keeping track of their appointments, there will soon be a significant shift towards private and entertainment usage. Especially new multimedia computer games will target the PocketPC platform in close future.

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Table 2.1: Comparing Handheld Computers and Sub-Notebooks

Device Class	Palm	Pocket PC	Handheld PC	EPOC PDA
Products	Palm IIIx/ IIIc/V/VII (Palm), Visor (Hand-spring), Workpad (IBM)	Jornada 540 (HP), E-115 (Casio), iPaq H3630 (Compaq)	Aero 8000 (Compaq), Jornada 820 (HP), MobilePro 880 (NEC)	Serie 5mx pro/ Revo (Psion), MC218 (Ericsson)
Operating System	Palm OS	Windows CE 3.0	Windows CE 2.11	EPOC
Size	8 x 12 x 2 cm	13 x 7.8 x 1.6 cm	25 x 20 x 3 cm	17 x 9 x 2 cm
Weight	140 – 160 g	255 g	1 – 1.3 kg	200 – 350 g
Data Entry	Stylus	Stylus	Keyboard	Keyboard
Display Type	monochrome or 256 colors touch screen	65000 colors touch screen	65000 colors touch screen	monochrome touch screen
Display Size	7.8 cm	21 – 25 cm	21 – 25 cm	12 – 14 cm
Display Resolution	160 x 160 pixels	320 x 240 pixels	800 x 600 pixels	480 x 160 pixels
RAM	2 – 8 MB	16 MB	16 MB	8 – 32 MB
Battery charge	> 10 hours	8 hours	4 – 10 hours	> 10 hours
Peripherals	Serial, Infrared, Springboard (Visor only)	Serial, USB, Infrared, Compact Fl., Voice rec., Audio speaker,	Serial, USB, Infrared, PC Card, Compact Fl., ext. display	Serial Port, Infrared, Compact-Flash
Applications	PIM, HotSync, Graffiti	PIM, ActiveSync, Handwriting recognition, Internet Explorer, Office Suite, Media player	PIM, ActiveSync, Handwriting recognition, Internet Explorer, Office Suite	PIM, Internet Browser, Database, Spreadsheet, WAP (MC218 only)

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2.2 Sub-Notebooks

Something between handheld and laptop

In terms of size, weight, processing power, and functionality, sub-notebooks or clamshells are somewhere in between a handheld device and a regular notebook. Most of a handheld computer's characteristics are valid for sub-notebooks too. But they have more memory, more CPU power and they provide a reasonable screen as well. Additionally, they have a small keyboard, making data entry much easier – a significant advantage, in case a lot of text has to be typed in. Although sub-notebooks won't fit into pockets anymore, they are still highly portable and a bit lighter than full-sized notebooks. The main differences to regular notebooks are that the sub-notebooks have much less computing power, cost less and that they are intended for mobile usage. Like handhelds, they have instant-power on, avoiding to boot an operating system first before usage. Their battery capacity exceeds the usage time of notebooks. Nevertheless, floppy and CD ROM drives are uncommon for sub-notebooks. And hard disks are rare.

But being less convenient to carry around than a handheld and having less functionality than notebooks, makes the sub-notebook class not very popular for a broad audience.

Targeting mobile sales forces

Probably the largest group of users are mobile sales forces. Sales representatives need to fill out contracts, orders, or lead sheets directly at the point of sale. They must have immediate access to all relevant data, such as customer profiles, order status or product catalogues. Sub-notebooks are very well suited for these kind of tasks: The keyboard allows quick data entry and the display is large enough for product presentations. There is enough storage for local data repositories allowing to work offline while on travel and to synchronize only periodically with the company's back-end systems.

Most sub-notebooks run either the EPOC 32 operating system or Windows CE. Table 2.1 compares devices of the sub-notebook class with handheld computers described in the previous section of this chapter.

2.2.1 Windows CE-Based Sub-Notebooks

Major device manufacturers for Windows CE sub-notebooks are HP (Jornada 820) and Compaq (Aero 8000) – both are using version 2.11 of that operating system. Version 3.0 is not yet available for that class of devices. In Microsoft terminology, the Windows CE

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version 2.11 configuration for sub-notebooks is called "Handheld PC (H/PC)" or "Handheld PC Professional (H/PC Pro)". This might be a bit confusing with the terms "PocketPC" or "Palmheld PC" applied for handheld computers.

Along with handheld PC devices comes a complete set of miniaturized Microsoft office tools and the Internet Explorer. Windows CE handhelds feature a PC Card slot for various peripherals like wireless communication adapter, modems, and many more.

2.2.2 EPOC-Based Sub-Notebooks

EPOC is a versatile operating system designed for usage in various mobile devices. Beside sub-notebooks, it is also applied for phones. EPOC has been developed by the Symbian consortium, founded by Ericsson, Motorola, Nokia, and Psion. EPOC based sub-notebooks are available as MC218 from Ericsson, Oregon Scientific's OsariS, and Psion's 5mx Pro (Figure 2.7), Series 7, and revo. All of them are based on the current version of EPOC, EPOC Release 5, except for the OsariS, which still uses EPOC Release 4.

Figure 2.7: Psion 5mx Sub-Notebook Device



Photo courtesy of Psion

Remarkable is, that the EPOC operating system is very stable and users only experience crashes every few years. These devices contain a rich set of applications for mobile workers. Besides the PIM applications, they feature a word processor, a spreadsheet application, a web browser which supports Java applets, a communication suite with email, fax and SMS, as well as an application to backup and synchronize the device with a PC.

Data entered on an EPOC device can be exported to PC documents and imported in applications like Lotus SmartSuite, Word-

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Perfect or Microsoft Word. There is plenty of additional third-party software available for EPOC devices. Maps, databases, dictionaries, tools for internet, email, fax and SMS, financial calculators, and accounting applications, just to name a few of them.

2.3 Phones

Modern phones create a high demand for new pervasive technologies. They have evolved from a simple person-to-person voice interface to powerful network clients. Fancy computing features like tiny hard disks and voice recognition are condensed into a tiny shell dissolving the demarcation to handheld organizers. Today, address books, calendar, memos, and games are state of the art applications, which are no longer restricted to high-end phones.

But it is more than just surfing the net with a screenphone or playing Tetris on a cellular phone, while waiting for a train: address books and calendar entries on the device are synchronized with a Personal Computer. On the other side, data from server databases, like Enterprise Resource Planning (ERP) systems can be accessed, making phones valuable e-Business components.

2.3.1 Cellular Phones

An incredible diversity

The diversity of cellular phones is incredible; their functionality too: the endless list of features gets longer every day. There are manifold games, fancy form factors, built-in FM radio, and even PIM functionality. The operating systems used in cellular phones are quite manifold too. Mostly proprietary systems like RTOS from Siemens or GEOS from Geoworks are used. Others like EPOC are applied by several companies.

Entering text

One issue, cellular phones without a reasonable keyboard have to cope with, is how to enter text easily: Voice recognition is one sumptuous way. Instead of picking one of the miniaturized keys, commands and data can be spoken to the device. Stored phone numbers are dialed with one shout.

Predictive text input is another way to leverage data entry. T9, which stands for "Text on 9 keys", has been adopted by numerous phone manufacturers. The user types in arbitrary texts with the 9 keys of the numeric keypad of a phone. Only one keystroke per character is needed instead of the annoying multi-tap text entry. Since each numeric key stands for three or four letters, a software decodes

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the sequence of pressed keys. Within a linguistic database possible word variations are checked until the text is no longer ambiguous. There are databases in more than a dozen languages available.

The communication bearer between a mobile phone and the telecommunication network differs strongly from country to country:

GSM

Global System for Mobile Communication (GSM) is the accepted de facto standard for mobile wireless communication. A dense net of GSM base stations has been established by numerous telecommunication providers throughout more than 100 countries. Each station feeds the digital signals from cellular phones within its reach into the worldwide telephone network. The standard ensures interoperability from a technical point of view. Roaming agreements allow to use the phone in networks operated by other providers. This approach is strongly decentralized: all information required for user identification and authentication as well encryption of the communication is stored on a smart card, which is plugged into every phone. The so called Subscriber Identity Module (SIM) functions as a secure token.

There are several frequencies used for GSM: 900, 1800, and 1900 MHz. Triple Band phones support all frequencies, giving travelling users more flexibility.

CDMA and TDMA

In North America and parts of Asia wireless communication providers operate networks based on several other digital standards. Among these, Code Division Multiple Access (CDMA) is today's most common one. It also allows a secure communication using an encoding key, which is sent along with the voice data. Time Division Multiple Access (TDMA) is a competing standard, which works similar to CDMA, but has an improved bandwidth.

2.3.2 Data Transmission Capabilities

Accessing the Internet

Besides the pure voice communication, there are several ways for transmitting and accessing data through a wireless network. Data communication is used to transfer information between devices or between a device and an IT network, like the Internet. Especially the connection to the Internet gives mobile users access to a standard resource for information.

- Paging is one way of sending data to a recipient. Only a notification and a callback number is delivered.
- GSM data is a part of the GSM communication, which can be used for data or fax transmission.

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- Short Message Service (SMS) allows up to 160 characters to be transmitted within one message from and to a GSM phone.
- Wireless Application Protocol (WAP) is a cross-industry standard used to deliver specially formatted content from a web server to phones and other wireless devices with a limited screen. A WAP browser within a device enables Internet interaction for retrieving flight schedules, weather forecasts, driving directions, brokerage services, or making hotel reservations (Figure 2.8). All these applications are definitely a promising opportunity especially for mobile users.



Figure 2.8 : Some WAP Applications

Multimedia messaging

Data transmission using a mobile phone is becoming more and more important – the emerging WAP applications make this evident. But WAP is only the very beginning of new data based communication technologies. Beyond SMS, Picture Messaging allows to send text and graphics. Multimedia Message Service adds digital imaging capabilities. Mobile Multimedia supports entire new content types, such as animations or video clips.

GPRS and UTMS

The most important obstacle for this evolution is the speed of the data transmission itself; GSM Data currently allows only 9,6 kilobits per second, which is the bottleneck for wireless information retrieval. From the year 2000 on, a new enhancement to GSM, called General Packet Radio Service (GPRS) is available. This packet-oriented standard will increase the bandwidth of mobile data communication up to 115 kbps. That will already be more than the speed of today's ISDN wired telecommunication nets. But GPRS will only be an intermediate solution. In 2003 the Universal Mobile Telecommunications System (UMTS) will be introduced as a worldwide common

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standard for wireless communication. UMTS will allow 100 kbps to 2 Mbps for data transmission! Phones based on these enhanced communication standards are often referred as third generation phones (3G).

But communication aspects of phones are not limited to the pure telecommunication:

Infrared

Mobile phones usually have an infrared port to exchange data locally with another device. For example in order to "beam" an address book entry to someone else's phone or to interface with a calendar on a PC. Or a simple handheld computer could use an infrared connection to a mobile phone to establish a wireless connection for accessing some server.

Bluetooth

Bluetooth is a convenient approach to let multiple devices collaborate wireless with each other within a short distance of a few meters. While infrared is a one-to-one communication, Bluetooth establishes a local wireless radio frequency network. Phones, handhelds, and personal computer can communicate with peripherals, like headsets or hard disks. A typical scenario could be a handheld, connecting via Bluetooth to a phone, which dials up to a network. Using a Bluetooth connection, the downloaded data can be sent to a standalone memory card.

2.3.3 Smart Phones

Smart phones combine a mobile phone with a handheld organizer into an all-in one communication system.

Nokia Communicator

One example is the Nokia Communicator 9110. The device can be unfolded to access a small keyboard inside. The Communicator is based on the GEOS operating system and features an Intel embedded 386 class processor with 24 MHz. 4 MB of RAM are occupied by the operating system and the included applications. 2 MB is free for user data and another 2 MB is used for program execution. The monochrome display has a good resolution of 640 x 200 pixels. The communicator is based on dual band GSM wireless communication and provides fax, email, short messaging, Internet access, and Personal Information Management (PIM) applications. While PC connectivity via Infrared and serial port is a common feature, telnet and a VT100 emulation are an additional way of accessing data on servers of interest.

Ericsson R380

Another smart phone is the Ericsson R380 (Figure 2.9). The PDA functionality is similar to the Nokia. The key pad can be unfolded to access the touch screen hidden behind. With 360 x 120

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pixels that screen has a reasonable resolution. Dual band GSM, modem, and infrared port ensure connectivity, for example to synchronize with a PC. The R380 is WAP enabled and based on the versatile EPOC operating system.



Figure 2.9: Ericsson Phone R380

Photo courtesy of Ericsson

The near future smart phones of all manufacturers will take advantage of high-speed wireless communication networks like GPRS and UMTS. Besides the phone and organizer functionality, these devices will be able to exchange video and audio streams as self-evident as today's SMS (Figure 2.10).



Figure 2.10: Nokia Design Study of a Multimedia Smart Phone

Photo courtesy of Nokia

For instance Ericsson's future Communicator platform is a high-end device with a handheld computer look-and-feel (Figure 2.11). This EPOC device will support the three GSM frequencies 900, 1800, and 1900 as well as the new GPRS communication for high speed data transmission and Bluetooth. GPS is another feature Ericsson plans to include to their Communicator.

The MultiMobile is a smart phone prototype, developed by Siemens and Casio. It is based on a Cassiopeia PDA and runs the PocketPC version of Windows CE. Besides WAP and SMS, the MultiMobile can play MPEG-4 video files as well as MP3 audio files. This device can even be used for mobile video conferencing.

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Figure 2.11: Ericsson Communicator platform



Photo courtesy of Ericsson

2.3.4 Screenphones

Screenphones are the convergence of a phone and an Internet terminal. They have a reasonable screen, an optional keyboard and are dedicated to two single tasks: phoning and accessing Internet content and applications.

Figure 2.12: A Screenphone by Ericsson



Photo courtesy of Ericsson

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The main goal of screenphones is to offer simple and convenient usage. They provide a one-click connection to the net targeting especially non-technical users who would hesitate to install a PC on their own. The integrated browsers are capable of displaying multimedia web sites and usually can execute Java applications. Screenphones can be used for simple information retrieval, for executing e-commerce web applications, emailing, etc.

The device is delivered pre-installed and ready to be plugged into the telephone line. The connection to the Internet is established through an dial-up access provider. Mostly screenphones require an ISDN high-bandwidth connection, some use cable modems or even wireless connections. Usually a smart card reader is built-in, allowing secure financial transactions like home banking or e-commerce payments. Figure 2.12 shows a screenphone from Ericsson.

2.4 Further Readings

AvantGo

http://www.avantgo.com/frontdoor/index.html

Information about the AvantGo portfolio on different operating systems.

Ericsson

http://mobile.ericsson.com

The homepage of Ericsson's mobile phone activities.

Ericsson Mobile Phone R320

This white paper [ERI00] describes the features and functionality of the R320 smart phone from Ericsson. It includes the WAP configuration and a detailed glossary with mobile telephony related terms.

Handspring

http://www.handspring.com

Handspring shows the Visor Palm OS devices and some interesting add-on hard- and software.

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Motorola

http://commerce.motorola.com/consumer

Motorola's consumer products.

Multimedia Messaging

http://www.nokia.com/press/background/index.html

A white paper from Nokia [NOK00] describing how SMS evolves to mobile multimedia.

Nokia

http://www.nokia.com

The homepage of Nokia.

Palm Central

http://www.palmcentral.com

Plenty of software to download for Palm OS devices.

Palm Computing

http://www.palm.com

Information and downloads for Palm OS computing devices.

PalmZone

http://www.palmzone.com

Online Magazine covering Palm OS related topics.

ProxiNet

http://www.proxinet.com

The place where users can subscribe to the ProxiNet transcoding services for Palm.

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Psion

http://www.psion.com

Psion provides the largest variety of EPOC powered devices. Their web site provides information about Psion devices, support, and free downloads of various utilities.

Review and Forecast of the Worldwide Information Appliance Market

http://www.idc.com

An IDC [IDC00] market analysis and forecast about the usage of Internet connected devices, such as PDAs, games, TV, and screenphones.

Symbol

http://www.symbol.com/products/mobile_computers/mobile_computers.html

Symbol's mobile devices with laser beam scanning capabilities.

WAP Development

http://www.forum.nokia.com/wap_developer

Information about WAP development based on Nokia WAP phones.

Windows CE PocketPC

http://www.microsoft.com/pocketpc

The starting point when searching for Pocket PC information.

Windows CE Mobile Devices

http://www.microsoft.com/mobile

An overview of Windows CE devices. This site includes reviews, features, and comparisons of handheld and PocketPC devices. There are also developer and enterprise resources.

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Qualcomm

http://www.qualcomm.com

The homepage of Qualcomm includes technology and products for wireless communications.

ZDNet

http://hotfiles.zdnet.com

Shareware and freeware for Palm OS and Windows CE.

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14 Gateways

Pervasive Computing is dominated by a variety of non-IP network protocols, which are either proprietary or specific to a particular industry. As soon as devices want to access the Internet or other computer networks a protocol conversion is required. This task is done by a *connectivity gateway*. Gateways are the point of entry into a server network. They isolate the individual communication channels and their specific requirements from the rest of the back-end systems. Gateways, like a WAP Gateway or a Palm Webclipping Proxy Server convert TCP/IP to protocols optimized for wireless data transmission.

Besides protocol conversion, content can also be adjusted for specific classes of devices. Using appropriate *transcoding gateways*, a web application server can deliver content in various formats to different types of clients. The ProxiWare Server is one example for this type of gateway, which will be covered later in this chapter.

Gateways can either be part of the back-end system or they can belong to an user's personal setup. The first possibility could be a gateway which is installed by a service provider offering wireless access to his customers.

The second possibility covers workstations or other systems taking the role of a gateway between devices and the Internet. Local gateways can act as a focal point for personal application management and integration of manifold subordinated devices. One example is the classical PC to which a handheld companion connects. Another example is a *residential gateway* acting as a local interface between appliances connected to an in-home network and the external network, like the Internet. The residential gateway can dispatch external services entering a home network to the connected devices. Or it can route wireless appliances within an office to a high bandwidth Internet line.

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14.1 Connectivity Gateway

This section covers three examples of connectivity gateways: the Palm Webclipping Proxy Server, a WAP gateway, and the SecureWay Wireless Gateway.

14.1.1 Palm Webclipping Proxy Server

The developers of the Palm VII handheld computer decided not to use regular web browsing for wireless Internet access: Initially the Internet was not designed for small devices. To achieve a better performance they introduced web clipping. Instead of using a generic Internet browser, web clipping needs a corresponding standalone client application for *each* particular web site. This application implements the required browsing capability and has to be downloaded and stored locally on the device first. It holds the hard coded request forms for each query to the corresponding web page. Web site developers need to develop and deploy such a query component complementary to the regular HTML files. Web clipping uses HTML version 3.2 with some extensions and limitations. For example, there are special tags to identify a device. Applets, Java Script, frames, and cookies are not supported. Only simple queries and no complex hyperlinks to other web clipping sites are possible. The HTML files are converted into a binary format, which can be rendered on the Palm VII device. That technology minimizes storage requirements and the amount of data transferred. The benefits are lower transaction costs and longer battery life.

Palm.Net Data Center

All Palm VII communication goes through a proprietary connectivity gateway, the Palm Webclipping Proxy Server. That proxy server is part of the Palm.Net data center, which provides wireless Internet access to Palm VII users (Figure 14.1).

The communication between a Palm device and the gateway is based on the UDP protocol, which allows one packet to be sent as a request to the server and multiple packets to be replied. The data is compressed and encrypted to be optimized for wireless transmission with low bandwidth and latency. When a Palm VII sends an UDP query to Palm.Net, the gateway translates that query to a standard Internet request and forwards it to the corresponding web server. The server returns a response, which can be displayed on the Palm VII browser.

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Frequency agility, network authentication, and the Certicom elliptic curve cryptographic algorithm are used to establish a secure connection between the Palm VII and the Palm.Net Data Center. The connection from the Palm.Net data center to an Internet server can be protected with SSL using a 40 or 128 bit key. The Palm.Net Data Center itself is protected by firewalls.

Mobitex Wireless Network

Bearer for the Palm VII wireless communication is Bell South's Mobitex Network. It only operates within the US and uses the 900 MHz frequency. Every Palm VII device has a built-in radio frequency transceiver with an unique Mobitex access number. A direct line to Palm.Net Data center is configured.

One obstacle of the applied communication technology is that the radio frequency bearer allows only about 8 kilobytes per second for data transmission. This limits the amount of information, which can be exchanged in a reasonable response time. About 50 bytes for the query and 500 bytes for the response are the recommended sizing.

Although the Palm VII device only accesses the Mobitex network from Bell South, the architecture is basically open for devices based on other network technologies and providers.

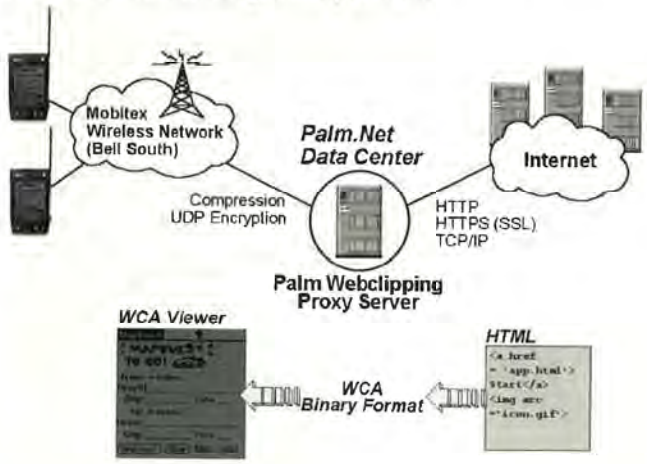


Figure 14.1: The Palm.Net Data Center

14.1.2 WAP Gateway

In order to connect WAP phones to the Internet the standard HTTP Internet protocol used by web servers must be converted into WAP's Wireless Session Protocol (WSP). As described in Chapter

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11, this task is done by a WAP gateway. Additionally the content, which must be provide in the Wireless Markup Language (WML) format is translated into a binary content representation (WBXML) to optimize transmission.

Besides content and protocol transformation, the server initiated client notification needs to be supported, which was introduced with WAP 1.2. This "push"-mechanism is a bit circumstantial, since normal HTTP servers can only respond to requests received from clients. The initiator of a push acts as a HTTP client of the WAP Gateway, which takes the role of a Web server, referred to as Push Proxy Gateway (PPG). The PPG forwards the push notification to the WAP client over WSP. Each push message consists of two components: the content to be pushed to the WAP client and a control entity, which holds information, like the message expiration date.

Since WAP is an open standard and independent from a specific telecommunication network any gateway should work with any WAP compliant phone.

Nokia WAP Server

Among the available commercial gateway products is *Nokia's WAP Server*. Connections from WAP clients to the gateway can base on the bearers Short Message Text (SMS) and Circuit Switched Data (CSD). It is possible to implement other protocols than HTTP on the server side, for instance, when legacy systems need to be supported. An application programming interface (API) enables a service provider to develop particular stand-alone applications, like servlets, directly on top of the gateway. Additional back-end server systems can be omitted this way.

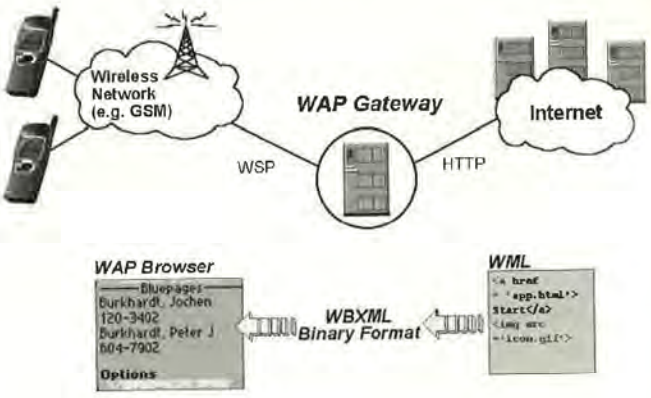


Figure 14.2: WAP Gateway

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14.2 Wireless Gateway

Gateway

The *IBM SecureWay Wireless Gateway* tunnels the IP protocol through a diverse set of wireless and wireline networks. Applications on client systems can communicate with enterprise networks based on TCP/IP, although this protocol is actually not supported by the communication bearer. Any application developed for the standard TCP/IP interface, will run on top of SecureWay Wireless without modifications.

Client

The *SecureWay Wireless Client* is the counterpart of the gateway and must be installed on the user's client system. A user interface allows to initiate the communication to the gateway. The mobile user can select the network type, which meets best his current needs, without making any changes to the installed applications.

In order to setup the network transparent to the application, different network characteristics are encapsulated by SecureWay Wireless. On the client side, all network specific details are hidden beneath the common TCP/IP interface layer. SecureWay Wireless works like an additional network device driver. It intercepts the TCP/IP communication and routes the data traffic over the chosen non-IP networks. Inside the gateway, Mobile Network Interfaces (MNI) expose the access to a particular network type.

The list of supported network protocols include:

- Public and private Packet networks (CDPD, DataTAC, GPRS, and Mobitex).
- Analog and digital cellular networks (GSM, CDMA, TDMA, and AMPS).
- Satellite networks (Norcom).
- Wireline (Cable modem, DSL, PSTN, ISDN, and Dial-up ISP).
- LAN connections (Ethernet, Token Ring, and wireless LAN).

Efficient

Besides the simple IP-based communication between client and gateway, SecureWay Wireless optimizes the network traffic using data compression mechanisms. Increasing efficiency is extremely important for low speed wireless networks. The benefits of less data traffic are better response times and often lower network fees. Additionally, an idle connection can be disconnected automatically and will resume as soon as communication continues. The user will not notice that interrupt (short-hold mode).

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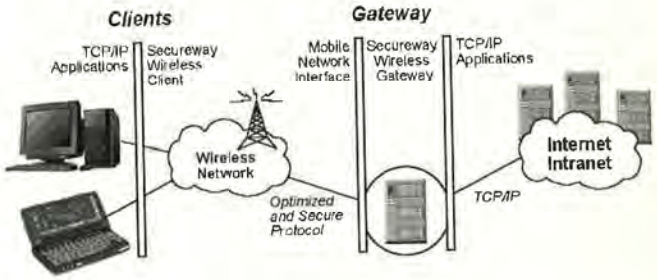
Secure

For reliable data privacy, all data transmitted through public networks from the client device to the gateway can be encrypted with RSA. Two way client/gateway authentication mechanisms prevent unwanted access.

Besides gateway and client, IBM provides *the SecureWay Wireless Gatekeeper*. This tool enables system administrators to configure multiple wireless and dial-up network, and define users, resources, and access rights. LDAP is used to store user profiles and network management data.

WebExpress is an enhancement for HTTP communication through SecureWay Wireless. WebExpress features HTTP header reduction, as well as HTML data stream compression and content caching.

Figure 14.3: SecureWay Wireless Gateway



14.3 Transcoding

Transcoding is a content adaptation technology, which tailors information for a specific device by transforming its format and representation. Multimedia data as it can be found on Web pages, is filtered, converted, and reformatted, until it matches the capabilities of the displaying device.

Why transcoding?

The purpose is obvious: When providers deliver content to various pervasive clients, they need to accommodate device specific constraints such as limited memory, slow data transmission, and small screens. Transcoding automatically translates content into different representations for each class of receiving client systems. This simplifies authoring, deployment, and maintenance dramatically! An arbitrary multimedia web page can be provided to Internet TVs, handhelds, and WAP phones without change. It is even possible to adapt content from legacy systems into a standardized Internet rep-

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resentation, or transcode Web pages to the proprietary format of a specific client device.

Besides adapting content according to particular device capabilities, another aspect of transcoding gains importance: information is personalized for a particular user, depending on his preferences and organizational policies. For instance, content of interest can be transcoded into individual user interface styles or a preferred language.

Transcoding Proxy

Transcoding is typically done by a gateway or proxy, which intercepts the data exchange between the content server providing multimedia data and the client rendering the received information (Figure 14.4). The transcoding proxy analyses the content and identifies the included media objects. In order to determine graphical navigation buttons, images, and related textual content, the semantics of each object is examined. According to defined preferences, appropriate methods for content manipulation are invoked. Preferences can be device capabilities, user profiles, communication bandwidth, and others. They indicate what kind of information has to be transcoded in which way.

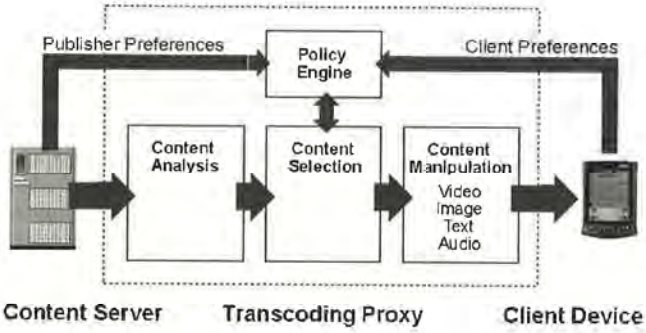


Figure 14.4: Internet Content Transcoder

Modality and fidelity

This content adaptation comprises two dimensions:

- *Modality.*
  Multimedia includes video clips, images, text and audio data in manifold formats. Since not all of these modalities are suitable for all devices, transcoding translates data according to the targeted devices needs.
- *Fidelity.*
  Reducing the fidelity of information is another approach to reach even small devices with multimedia information. Compressing and filtering are techniques applied in this context

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Content manipulation methods

The following list shows several common methods for content manipulation:

- Conversion of images to hyperlinks, allowing the user to retrieve them separately only when explicitly needed.
- Compression and reduction of scale and color level of images.
- Substitution and removal of images.
- Conversion from one image format to another.
- Translation of XML documents according to a given style sheet.
- Video skimming.
- Video-to-image conversion.
- Text-to-speech conversion and speech recognition.
- Text summarization from detailed text to headlines.
- Text reformatting from tables to simple lists.
- Language translation.

14.3.1 InfoPyramid Framework

An implementation of transcoding technology is the IBM InfoPyramid Framework. This framework allows to manage media objects with different modalities and fidelities. Media objects can be either stored in different representations or be created on-the-fly in order to meet the capabilities of a requesting device.

Media objects correspond to cells in an "*InfoPyramid*" (Figure 14.5). Within the pyramid, the fidelity of information representation decreases from bottom to top. The lower cells refer to detailed information, such as high-resolution images or comprehensive texts. The upper cells correspond to strongly compacted information, such as simplified images or summarized text. When moving horizontally within the pyramid, the modality changes. For instance text-to-speech conversion changes a text based representation to audio.

Transcoders

The framework includes methods to manipulate media objects. These are referred to as *transcoders* and are distinguished between *translators* and *summarizers*. Translators convert modality, while summarizers change fidelity. The framework is extensible and allows to add new transcoders using a provided developer toolkit. It is also possible to define additional modalities, such as different languages of text.

The framework has been implemented as a stand-alone proxy server as well as a servlet. The proxy server intercepts HTTP requests

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and responses between the user and any selected Web server. The servlet version runs directly on a particular Web application server.

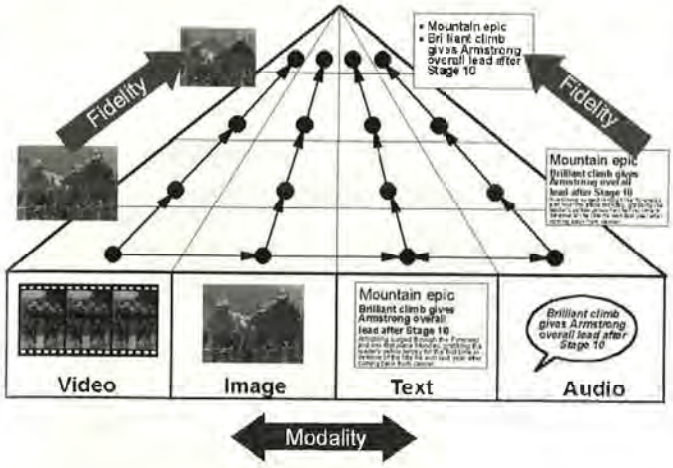


Figure 14.5: IBM's InfoPyramid

14.3.2 ProxiNet Transcoding Gateway

ProxiNet's transcoding technology is based on the *ProxiWeb* browser for client devices and the *ProxiWare* gateway. Any selected web site is retrieved, transformed, and delivered in a very compact representation to the client's ProxiWeb browser. ProxiWeb is an ultra-thin browser for Palm OS and comprises only about 120 kilobytes. When the device is connected to an Internet provider, the browser gives immediate Web access. Downloaded sites are kept within a cache and can be viewed offline at a later time again.

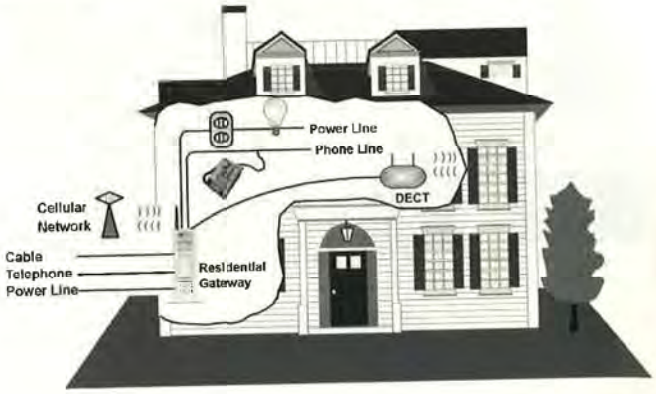
14.4 Residential Gateway

The residential gateway is a computer that acts as a central bridge between the outside world and the networked devices in the home. Figure 14.6 shows a residential gateway with several connectivity options in a home. There are two major aspects to the residential gateway.

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On one hand, the residential gateway integrates "traditional" communication media – telephone and cable TV – into the home audio-visual system. Through a caller ID function such a system could, for example, announce a caller's identity through the home audio system. The resident could then decide whether or not to get out of his Jacuzzi to pick up the phone.

Figure 14.6: Home Networks



On the other hand, work is carried out to define the gateway as a bridge between the home and the Internet. Valid services should be able to access the home systems. For example, the refrigerator repair center should be able to access the appliance in the home for diagnostic purposes. However, unauthorized access must be blocked – it must not be possible for unauthorized persons to determine information about the residents.

14.5 Further Readings

IBM Transcoding Solution

http://www.research.ibm.com/networked_data_systems/transcoding

This site includes documents and publications related to transcoding. An online demonstration transcodes arbitrary web pages, which can be selected by entering their URL.

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IBM Networked Home

http://www.ibm.com/pvc/nethome

This web page includes a scenario of a networked home environment.

Information Delivery Infrastructure in the Mobile, Wireless Age

http://www.proxinet.com/technology

This white paper covers the ProxiNet transcoding approach as well as a generic analysis of different technologies to deliver content to small devices [FOX99].

Nokia WAP Gateway

http://www.nokia.com/corporate/wap/wap_server1_1.html

The technical features of the Nokia WAP gateway can be accessed through this link.

Palm VII Wireless Internet Access

http://www.palm.com/pr/palmvii/7whitepaper.pdf

This white paper explains Palm's approach to provide wireless network access through the Palm.Net gateway [PALMVII].

Panja Home Systems

http://www.panja.com

This site features a photo tour through a networked home installation.

Point Clark

http://www.pointclark.net

A commercial provider for residential gateway software and services.

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ProxiNet

http://www.proxinet.com

The place where users can subscribe to the ProxiNet transcoding services for Palm devices.

Residential Area Highway Project

http://hoegaarden.ec.ele.tue.nl

This page includes interesting links to standardization activities, documents, and projects related to in-house networks and residential gateways.

SecureWay Wireless

http://www.ibm.com/software/network/mobile

Information about IBM's SecureWay Wireless product.

Meta Exhibit 1042 - Page 00148
IPR2024-00246, 00247, 00248, 00249, 00250

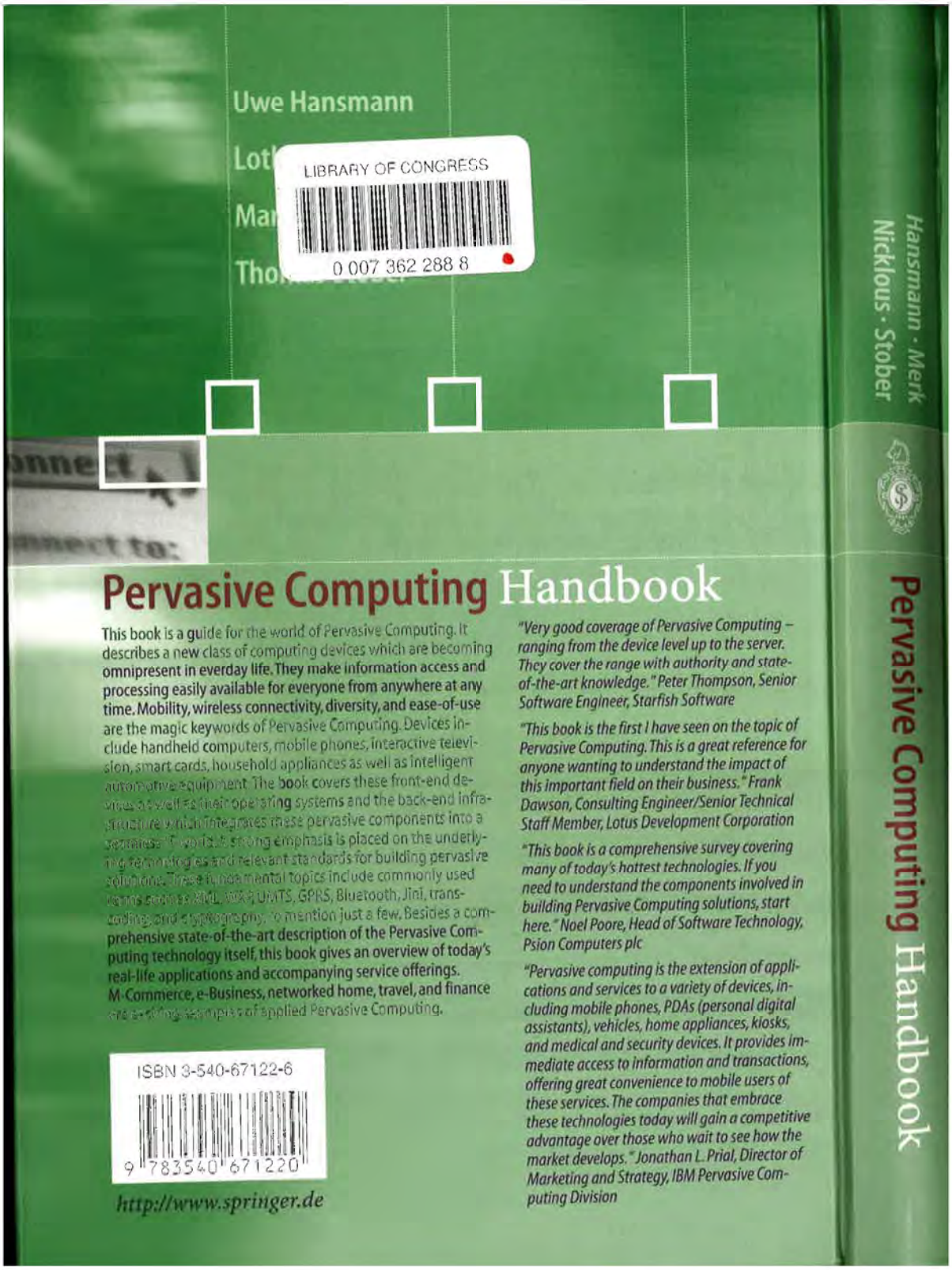

Uwe Hansmann
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Hansmann · Merk
Nicklous · Stober
Pervasive Computing Handbook
Pervasive Computing Handbook
This book is a guide for the world of Pervasive Computing. It describes a new class of computing devices which are becoming omnipresent in everday life. They make information access and processing easily available for everyone from anywhere at any time. Mobility, wireless connectivity, diversity, and ease-of-use are the magic keywords of Pervasive Computing. Devices include handheld computers, mobile phones, interactive television, smart cards, household appliances as well as intelligent automotive equipment. The book covers these front-end devices as well as their operating systems and the back-end infrastructure which integrates these pervasive components into a seamless IT world. A strong emphasis is placed on the underlying technologies and relevant standards for building pervasive solutions. These fundamental topics include commonly used terms such as XML, WAP, UMTS, GPRS, Bluetooth, Jini, transcoding, and cryptography, to mention just a few. Besides a comprehensive state-of-the-art description of the Pervasive Computing technology itself, this book gives an overview of today's real-life applications and accompanying service offerings. M-Commerce, e-Business, networked home, travel, and finance are exciting examples of applied Pervasive Computing.
"Very good coverage of Pervasive Computing – ranging from the device level up to the server. They cover the range with authority and state-of-the-art knowledge." Peter Thompson, Senior Software Engineer, Starfish Software
"This book is the first I have seen on the topic of Pervasive Computing. This is a great reference for anyone wanting to understand the impact of this important field on their business." Frank Dawson, Consulting Engineer/Senior Technical Staff Member, Lotus Development Corporation
"This book is a comprehensive survey covering many of today's hottest technologies. If you need to understand the components involved in building Pervasive Computing solutions, start here." Noel Poore, Head of Software Technology, Psion Computers plc
"Pervasive computing is the extension of applications and services to a variety of devices, including mobile phones, PDAs (personal digital assistants), vehicles, home appliances, kiosks, and medical and security devices. It provides immediate access to information and transactions, offering great convenience to mobile users of these services. The companies that embrace these technologies today will gain a competitive advantage over those who wait to see how the market develops." Jonathan L. Prial, Director of Marketing and Strategy, IBM Pervasive Computing Division
ISBN 3-540-67122-6
9 783540 671220
http://www.springer.de

EXHIBIT 1035B

LIBRARY | CATALOG

Search Navigation 1 of 7

BOOK

Pervasive computing handbook

Full Record MARC Tags

Main title

Pervasive computing handbook / Uwe Hansmann ... [et al.] ; forewords by Philippe Kahn and Nick Shelness.

Published/Created

Berlin ; New York : Springer, 2000.

Request this Item | LC Find It

More Information

LCCN Permalink	https://lccn.loc.gov/00049218
Description	xix, 409 p. : ill. ; 25 cm.
ISBN	3540671226 (alk. paper)
LC classification	QA76.5 .P3946 2000
Related names	Hansmann, Uwe, 1970-
LC Subjects	Portable computers. Embedded computer systems.
Browse by shelf order	QA76.5

Notes	Includes bibliographical references (p. 387-389) and index.
LCCN	00049218
Dewey class no.	004
Type of material	Book

Item Availability

CALL NUMBER	QA76.5 .P3946 2000 LANDOVR Copy 1
Request in	Jefferson or Adams Building Reading Rooms - STORED OFFSITE
Status	Not Charged

LIBRARY | CATALOG

Search Navigation 1 of 7

BOOK

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906	__	|**a** 7 |**b** cbc |**c** orignew |**d** 1 |**e** ocip |**f** 20 |**g** y-gencatlg
925	0_	|**a** acquire |**b** 2 shelf copies |**x** policy default
955	__	|**a** to ASCD pc17 09-21-00; jf03 09-25-00; jf11 to sl 9-26-00; jf12 to Dewey 09-26-00; aa11 09-27-00; CIP ver. jf07 to SL 01-30-01; jf12 to BCCD 02-08-01
010	__	|**a** 00049218
020	__	|**a** 3540671226 (alk. paper)
040	__	|**a** DLC |**c** DLC |**d** DLC
042	__	|**a** pcc
050	00	|**a** QA76.5 |**b** .P3946 2000
082	00	|**a** 004 |**2** 21
245	00	|**a** Pervasive computing handbook / |**c** Uwe Hansmann ... [et al.] ; forewords by Philippe Kahn and Nick Shelness.
260	__	|**a** Berlin ; |**a** New York : |**b** Springer, |**c** 2000.
300	__	|**a** xix, 409 p. : |**b** ill. ; |**c** 25 cm.
504	__	|**a** Includes bibliographical references (p. 387-389) and index.
650	_0	|**a** Portable computers.
650	_0	|**a** Embedded computer systems.
700	1_	|**a** Hansmann, Uwe, |**d** 1970-

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Status	Not Charged

EXHIBIT 1035C

libraries.org

A directory of libraries throughout the world

found **3** items where the item contains **Library of Congress**. Showing item **2** of **3**.

Library of Congress

United States -- Library of Congress

Address: 101 Independence Avenue SE
Washington, District of Columbia
20540
United States

Phone: 202-707-5000

Connect to: Library Web Site✔ Online Catalog

Library details: Library of Congress is a **National** library.
This library is affiliated with Library of Congress (view map) . The collection of the library contains **175,000,000** volumes. The library circulates **250,000** items per year.

Library Hours		
Day	**Open**	**Close**
Sunday	Closed	
Monday	8:30 am	8:30 pm
Tuesday	8:30 am	8:30 pm
Wednesday	8:30 am	8:30 pm
Thursday	8:30 am	8:30 pm
Friday	8:30 am	5:00 pm
Saturday	8:30 am	5:00 pm

Other Info: Went live with Voyager on August 15, 1999. Currently planning to implement the Library Collections Access Platform (LCAP) on FOLIO and EBSCO discovery services in FY25.

Permalink: https://librarytechnology.org/library/2263
(Use this link to refer back to this listing.)

Administration: The director of the library is **Dr. Carla Hayden** .

Organizational structure: The library is part of a **publicly-funded** organization. It operates on a **Non-profit** financial model.

Affiliations: The library is a member of the Association of Research Libraries

Collection size	175,000,000	**volumes**
Annual Circulation	250,000	**transactions**

Wireless: The library offers **wireless** access to the Internet. http://www.loc.gov/rr/wirelessaccess.html



Library of Congress



map location✔

Related Libraries

- All members of the Association of Research Libraries members
- Directory of ARL Member Libraries
- Libraries located in Washington (District of Columbia)
- all National libs in District of Columbia

About libraries.org

libraries.org is a free directory of libraries throughout the world.

This directory is a component of Library Technology Guides.

Technology Profile		
	Product Name	**Year Contracted**
Current Automation System	**FOLIO -- EBSCO Information Services**	**2023**
Previous Automation System	**Voyager**	1998
Discovery Service (w/index)	**Ex Libris CDI**	
Electronic Resource Management	**Electronic Resource Management**	
Item ID Type	Barcode	
This library is responsible for the procurement of the library automation system.		

View Privacy and Security Report

Automation Survey: We are conducting a study on the automation systems used in libraries. This survey should be completed by a person familiar with your libraries use of **FOLIO -- EBSCO Information Services**.

Respond to the 2024 Library Automation Perceptions Survey

Identifiers	
libraries.org ID	2263
OCLC Symbol	DLC
WorldCat Registry ID	**45266**

Record History: This listing was created on Aug 9, 1998 and was last modified on Nov 6, 2024.

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EXHIBIT 1035D



Pervasive computing handbook /

Show other versions (1)

Other Authors:	Hansmann, Uwe, 1970-
Format:	Book
Language:	English
Published:	Berlin ; New York : Springer, [2001]
Subjects:	Portable computers. Embedded computer systems.

Holdings | Description | Other Versions (1) | Similar Items | Staff View

MARC

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001	in00001590462	
005	20151022161646.0	
008	000921s2001 gw a b 001 0 eng	
010		**|a** 00049218
020		**|a** 3540671226 (alk. paper)
035		**| a** (OCoLC)ocm45102991
040		**|a** DLC **|c** DLC **| d** C#P **|d** UtOrBLW
042		**|a** pcc
049		**|a** TXAM

050	0	0	**|a** QA76.5 **|b** .P3946 2001
082	0	0	**|a** 004 **|2** 21
245	0	0	**|a** Pervasive computing handbook / **|c** Uwe Hansmann [and others] ; forewords by Philippe Kahn and Nick Shelness.
264		1	**|a** Berlin ; **|a** New York : **|b** Springer, **|c** [2001]
264		4	**|c** ©2001
300			**|a** xix, 409 pages : **|b** illustrations ; **|c** 24 cm.
336			**|a** text **|b** txt **|2** rdacontent
337			**|a** unmediated **|b** n **|2** rdamedia
338			**|a** volume **|b** nc **|2** rdacarrier
504			**|a** Includes bibliographical references (pages 387-389) and index.
650		0	**|a** Portable computers.
650		0	**|a** Embedded computer systems.
700	1		**|a** Hansmann, Uwe, **|d** 1970-
945			**|i** promptcat
949			**|l** A14826451242

994			**|a** 92 **|b** TXA
948			**|a** cataloged **|b** h **|c** 2001/2/9 **|d** c **|e** jlanham **|f** 1:35:13 pm
999			**|a** MARS
999	f	f	**|s** 4900ce4e-6889-33df-b7e5-512d79c0ee8b **|i** fb2632d2-eccb-3c43-a403-13e0d1d49ad7 **|t** 0
952	f	f	**|p** normal **|a** Texas A&M University **|b** College Station **|c** Sterling C. Evans Library **|d** Evans: Library Stacks **|t** 0 **|e** QA76.5 .P3946 2001 **|h** Library of Congress classification **|i** unmediated -- volume **|m** A14827005400
998	f	f	**|a** QA76.5 .P3946 2001 **|t** 0 **|l** Evans: Library Stacks

EXHIBIT 1035E

libraries.org

A directory of libraries throughout the world

found **21** items where the item contains **Texas A&M**. Showing item **6** of **21**.

Texas A&M University Libraries

Texas A&M University

Address: 5000 TAMU
College Station, Texas
77843-5000
United States

County: Brazos

Phone: 979-845-3731

Connect to: Library Web Site✔ Online Catalog

Library details: **Texas A&M University Libraries** is an **Academic** library. This library is affiliated with **Texas A&M University** (**view map**) . The collection of the library contains **5,618,101** volumes. The library circulates **224,573** items per year. The library serves a population of **69,962** FTE Enrollment.

Permalink: https://librarytechnology.org/library/2088
(Use this link to refer back to this listing.)

Administration: The director of the library is **Julie Mosbo Ballestro** .

Organizational structure: The library is part of a **publicly-funded** organization. It operates on a **Non-profit** financial model.

Academic Level: The library Serves an educational institution at the **University** level. The Carnegie Foundation designates this institution as: **Doctoral Universities: Very High Research Activity** (level 15).

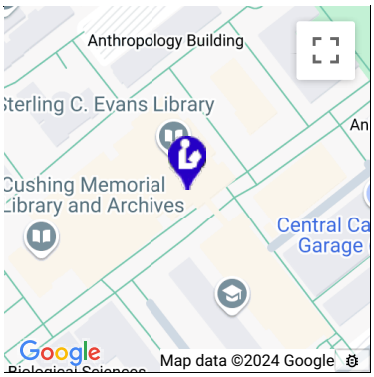
ARL

Affiliations: The library is a member of the **Association of Research Libraries**

Statistics Academic		
Enrollment	69,962	**FTE Students**
Collection size	5,618,101	**volumes**
Annual Circulation	224,573	**transactions**



Sterling C. Evans Library



map location✔

Related Libraries

- Other libraries with Carnegie class: **Doctoral Universities: Very High Research Activity**
- All members of the **Association of Research Libraries** members
- **Directory of ARL Member Libraries**
- Libraries located in **College Station** (Texas)
- Libraries located in **Brazos** county (Texas)
- **View map of libraries in Brazos County**
- **all Academic libs in Texas**



View Detailed Statistics

Wireless: The library offers **wireless** access to the Internet. authentication required

Technology Profile		
	Product Name	**Year Contracted**
Current Automation System	FOLIO -- Independent	2022
Previous Automation System	Voyager	2000
Previous Automation System	NOTIS	1987
Previous Automation System	DataPhase	1982
Discovery Service (w/index)	EBSCO Discovery Service	2015
Previous Discovery Index	Primo	2011
Authentication Service	EZproxy	
Digital Collection Management	amalgamation of different tools	
Institutional Repository	DSpace	
Electronic Resource Management	CORAL	
Archives Management	Archon	
Web Content Management	Cascade	
Item ID Type	Barcode	
Self-Check	3M SelfCheck	
This library is responsible for the procurement of the library automation system.		

View Privacy and Security Report

Automation Survey: We are conducting a study on the automation systems used in libraries. This survey should be completed by a person familiar with your libraries use of **FOLIO -- Independent**.

Respond to the 2024 Library Automation Perceptions Survey

Identifiers	
libraries.org ID	2088
OCLC Symbol	TXA
WorldCat Registry ID	2927
NCES LIBID	228723

Record History: This listing was created on Nov 30, 1997 and was last modified on Nov 8, 2024.

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EXHIBIT 1035F

Ex. 1035F
Citations to *Hansmann*

Source Document

Hansmann, U., et al. (2001). *Pervasive Computing Handbook*. Berlin ; New York : Springer.

Citations: 2001 (in chronological order)

Lehner, F., & Watson, R. (2001, February). From e-commerce to m-commerce: research directions. *University of Regensburg*, 1-13.

Blackwell, A. F., & Hague, R. (2001, September). AutoHAN: An architecture for programming the home. In *Proceedings IEEE Symposia on Human-Centric Computing Languages and Environments (Cat. No. 01TH8587)* (pp. 150-157). IEEE.

Safavi-Naini, R., Susilo, W., & Taban, G. (2001, October). Towards securing 3G mobile phones. In *Proceedings. Ninth IEEE International Conference on Networks, ICON 2001.* (pp. 222-227). IEEE.

Fleisch, E. (2001). Betriebswirtschaftliche Perspektiven des Ubiquitous Computing. In: Buhl, H.U., Huther, A., Reitwiesner, B. (eds) Information Age Economy. Physica, Heidelberg. https://doi.org/10.1007/978-3-642-57547-1_17.

Kautto, V. (2001). Middleware for Pervasive Computing. *HUT, Telecommunications Software and Multimedia Laboratory*.

Mattern, F. (2001). Ubiquitous Computing–Der Trend zur Informatisierung und Vernetzung aller Dinge. In *Der Weg in die mobile Informationsgesellschaft, Tagungsband 6. Deutscher Internet-Kongress*.

Mattern, F., Langheinrich, M. (2001). Allgegenwärtigkeit des Computers — Datenschutz in einer Welt intelligenter Alltagsdinge. In: Müller, G., Reichenbach, M. (eds) Sicherheitskonzepte für das Internet. Xpert.press. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-56684-4_2.

Mattern, F., & Sturm, P. (2001). From Distributed Systems to Ubiquitous Computing–. *The State of the Art Trends and Prospects of Future Networked Systems*, 3-25.

EXHIBIT 1035G

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BertelsmannSpringer Science+Business Media

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Information Technology

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The **Pervasive Computing Handbook** describes a new class of computing devices which are becoming omnipresent in everyday life. They make information access and processing easily available for everyone from anywhere at any time. Mobility, wireless connectivity, diversity, and ease of use are the magic keywords of pervasive computing. The book covers these front-end devices as well as their operating systems and the back-end infrastructure which integrate these pervasive components into a seamless IT world. These fundamental topics include commonly used terms such as XML, WAP, UMTS, GPRS, Bluetooth, Jini, transcoding, and cryptography. In addition, this book gives an overview of today's real-life applications and service offerings. M-Commerce, e-Business,

Awards

Geometry Software Cinderella receives the European Academic Software Award 2000

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The Springer CD-ROM Cinderella received the European Academic Software Award EASA 2000 in Rotterdam on November 28. The prize is awarded every two years to a maximum of ten products in the categories of innovative teachware, research software or Internet applications. The goal of the European competition, which has been held since 1994, is to stimulate the development and implementation of high quality software for education and research, as well as help software authors gain recognition for their efforts. The jury is made up of a panel of highly qualified European experts. The EASA is an initiative of the European Knowledge Media Association (EKMA). The CD-ROM Cinderella is a Java-based teachware for geometry. It was developed by Prof. Jürgen Richter-Gebert (ETH Zurich) and Dr.Ulrich Kortenkamp (FU Berlin). The program has already received the 1997 Multimedia Innovation Prize from the broadcasting station Südwestfunk in Baden-Baden.

Information on Cinderella

Cinderella Homepage / Demo Version

networked home, travel, and finance are some exciting examples of applied pervasive computing.

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Anthropology

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BertelsmannSpringer: Business Press Conference

Historian's Prize for Dr. William H. Brock

On November 24, 2000, Dr. William H. Brock was awarded the Historian's Prize by the Justus Liebig University in Giessen, Germany. Brock is the author of the Justus von Liebig biography, which originally appeared in English. With this prize, he is honored for his portrayal of this great chemist, statesman and reformer. Brock's fresh interpretation of the scientist's stormy career shows how Liebig demonstrated chemistry's significance for society. The German translation of the Liebig biography was published by Vieweg-Verlag, and is available from Springer.

Springer Books by William H. Brock

Company News

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Springer: Online and Print on the Road to Success

Springer-

Facts & Figures

- Total consolidated turnover in 1999/2000: DM 1.343 billion.
- Operating result: DM 144 million.
- Return on sales: 10.7 percent.
- Since July 1999 BertelsmannSpringer invested DM 120 million in the expansion of the publishing group.
- The profit of the whole Springer group, 18 months from the date of takeover, increased from practically zero to DM 60 million.
- Springer New York exceeded the turnover mark of US$ 100 million for the first time this year.
- BertelsmannSpringer employs 5,030 employees worldwide, 750 of them at Springer-Verlag..

Bertelsma

Press materials:

"Growth and Integration..." (download, doc format, 530 kB)

Presentation (Powerpoint, zipped, 600 kB)

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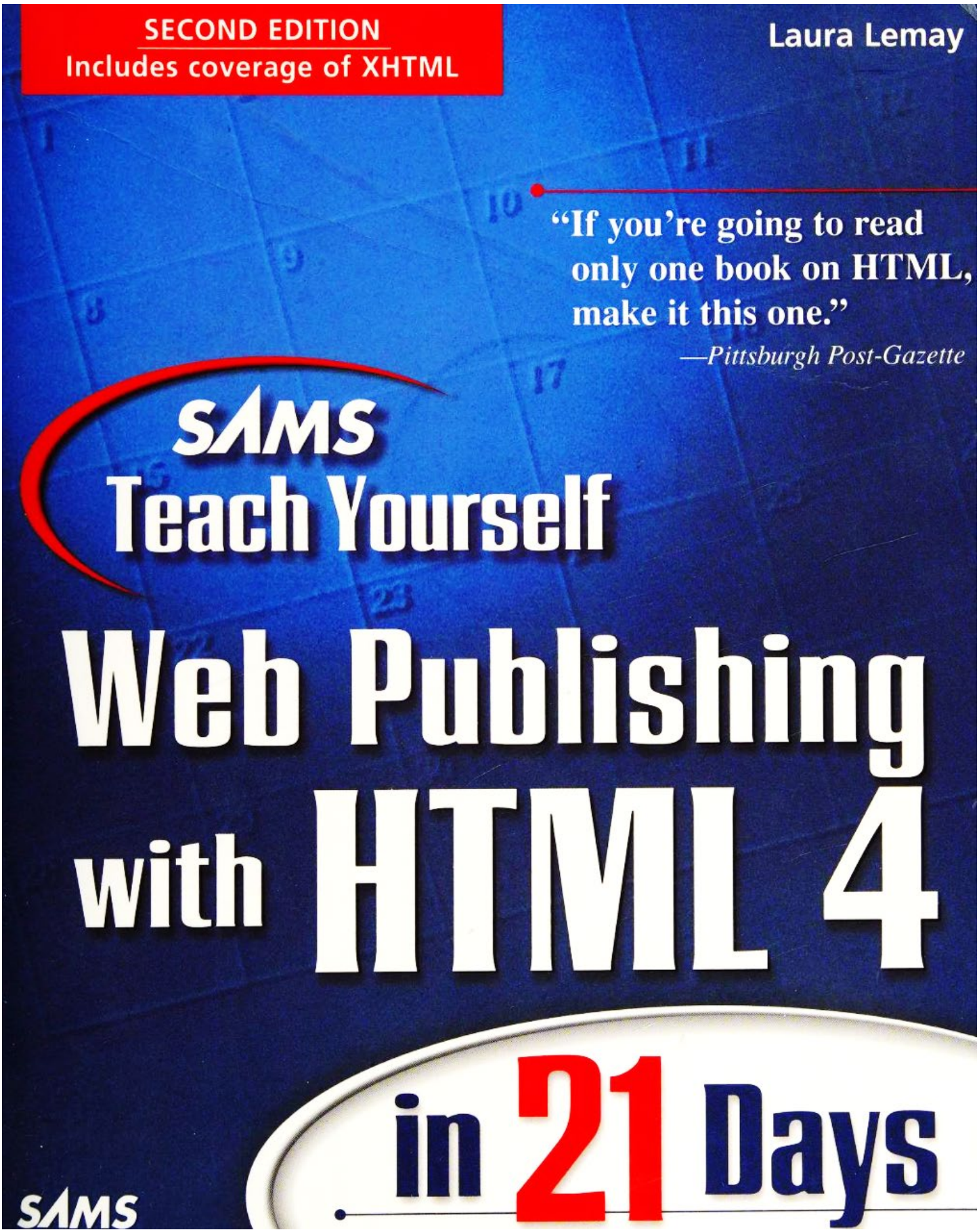
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BertelsmannSpringer Science+Business Media

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EXHIBIT 1038A



Meta Exhibit 1042 - Page 00177
IPR2024-00246, 00247, 00248, 00249, 00250

Laura Lemay
With revisions by Denise Tyler

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Sams Teach Yourself Web Publishing with HTML 4 in 21 Days, Second Edition

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Introduction

So you've browsed the Web for a while, and you've seen the sort of stuff that people are putting up on the Internet. And you're noticing that more and more stuff is going up all the time, and that more and more people are becoming interested in it. "I want to do that," you think. "How can I do that?" If you have the time and you know where to look, you could find out everything you need to know from the information out on the Web. It's all there, it's all available, and it's all free. Or, you could read this book instead. Here, in one volume that you can keep by your desk to read, reference, and squish spiders with, is a wealth of information that you'll need to create your own Web pages—everything from how to write them, to how to link them together, to how to present and publish them on the Internet.

But wait, there's more. This book goes beyond the scope of other books on how to create Web pages, which just teach you the basic technical details such as how to produce a boldface word. In this book, you'll learn why you should be producing a particular effect and when you should use it, as well as how. In addition, this book provides hints, suggestions, and examples of how to structure your overall Web site, not just the words within each page. This book won't just teach you how to create a Web site—it'll teach you how to create a good Web site.

Also, unlike many other books on this subject, this book doesn't focus on any one computer system. Regardless of whether you're using a PC running Windows, a Macintosh, or some dialect of UNIX (or any other computer system), many of the concepts in this book will be valuable to you. And you'll be able to apply them to your Web pages regardless of your platform of choice.

Sound good? Glad you think so. I thought it was a good idea when I wrote it, and I hope you get as much out of this book reading it as I did writing it.

Who Should Read This Book

Is this book for you? That depends:

- If you've seen what's out on the Web, and you want to contribute your own content, this book is for you.
- If you work for a company that wants to create a Web "presence" and you're not sure where to start, this book is for you.
- If you're an information developer, such as a technical writer, and you want to learn how the Web can help you present your information online, this book is for you.

- If you're just curious about how the Web works, some parts of this book are for you, although you might be able to find what you need on the Web itself.
- If you've never seen the Web before but you've heard that it's really nifty and want to get set up using it, this book isn't for you. You'll need a more general book about getting set up and browsing the Web before moving on to actually producing Web documents yourself.
- You've done Web presentations before with text, images, and links. Maybe you've played with a table or two and set up a few simple forms. In this case, you may be able to skim the first half of the book, but the second half should still offer you a lot of helpful information.

What This Book Contains

This book is intended to be read and absorbed over the course of 21 days (although it may take you more or less time depending on how much you can absorb in a day). On each day you'll read one chapter, each of which describes concepts in an area of Web site design. The chapters are arranged in a logical order, taking you from the simplest tasks toward more advanced techniques.

Part 1 Getting Started

In Part 1, you get a general overview of the World Wide Web and what you can do with it, and then come up with a plan for your Web presentation. You'll also write your first *very* basic Web page.

Part 2 Creating Simple Web Pages

In Part 2, you learn about the HTML language and how to write simple documents and link them together using hypertext links. You'll also learn how to format the paragraphs and characters on your Web pages.

Part 3 Web Graphics

In Part 3, you learn how to use images and color in your Web pages. You'll also learn how to compile and create animated graphics, and how to create and use clickable imagemaps to link to other pages in your Web site.

Part 4 Doing More with HTML

In Part 4, you learn how to format Web pages by using Cascading Style Sheets (CSS), and how HTML and CSS work together to enhance the appearance of your Web pages. You'll also learn how to create and format tables, and how to design Web sites that use frames to display multiple pages in a single browser window.

Part 5 Multimedia, Forms, and Dynamic HTML

In Part 5, you learn how to enhance your Web pages with multimedia, sound, video, and other advanced presentation methods. You'll learn how to add Java, JavaScript, and Dynamic HTML to take your Web pages to a higher level of interactivity and presentation.

Part 6 Designing Effective Web Pages

In Part 6, you get some hints for creating a well-constructed Web site, and you explore some examples of Web sites to get an idea of what sort of work you can do. You'll also learn about some things to consider when you want to design pages that will reach the types of "real world" users that you want to reach.

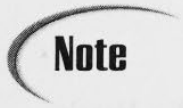
Part 7 Going Live on the Web

In Part 7, you learn how to put your presentation up on the Web, including how to advertise the work you've done. Finally, you'll learn how to test and maintain your Web site.

What You Need Before You Start

There are seemingly hundreds of books on the market about how to get connected to the Internet, and lots of books about how to use the World Wide Web. This book isn't one of them. I'm assuming that if you're reading this book, you already have a working connection to the Internet, that you have a Web browser such as Netscape Navigator or Microsoft Internet Explorer available to you, and that you've used it at least a couple of times. You should also have at least a passing acquaintance with some other portions of the Internet such as electronic mail and Usenet news, because I may refer to them in general terms in this book. Although you won't need to explicitly use them to work through the content in this book, some parts of the Web may refer to these other concepts.

In other words, you need to have used the Web in order to provide content for the Web. If you have this one simple qualification, then read on!



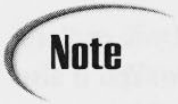
To really take advantage of all the concepts and examples in this book, you should seriously consider using a recent version of Netscape Navigator (version 4.0 or later) or Microsoft Internet Explorer (version 4.0 or later).

Conventions Used in This Book

This book uses special typefaces and other graphical elements to highlight different types of information.

Special Elements

Four types of "boxed" elements present pertinent information that relates to the topic being discussed: Note, Tip, Caution, and New Term. Each item has a special icon associated with it, as described here.



Notes highlight special details about the current topic.



It's a good idea to read the tips because they present shortcuts or trouble-saving ideas for performing specific tasks.



Don't skip the cautions. They supply you with information to help you avoid making decisions or performing actions that can cause you trouble.



Whenever I introduce a *new term*, I set it off with an icon like this one, and define it for you. I use italic for new terms.

HTML Input and Output Examples

Throughout the book, I present exercises and examples of HTML input and output. Here are the input and out icons.



An input icon identifies HTML code that you can type in yourself.



An output icon indicates what the HTML input produces in a Web browser such as Microsoft Internet Explorer.

Special Fonts

Several items are presented in a monospace font, which can be plain or italic. Here's what each one means:

`plain mono`	Applied to commands, filenames, file extensions, directory names, Internet addresses, URLs, and HTML input. For example, HTML tags such as `<TABLE>` and `<P>` appear in this font.

mono italic	Applied to placeholders, which are generic items for which something specific is substituted as part of a command or as part of computer output. For instance, the term represented by *filename* would be the real name of the file, such as `myfile.txt`.

Teach Yourself Web Publishing with HTML: The Web Site

To help you get the most out of this book, there is also a Web site. This site contains the source code and graphics for the examples used in this book plus updated information about where to find tools and hints to help you further develop and expand your Web presentations. The site is at `http://www.tywebpub.com/`. Check it out!

PART 5

DAY 14

Designing Forms

Up to this point, you have learned almost everything you need to know to create functional, attractive, and somewhat interactive Web pages. If you think about it, however, the pages you've created thus far have an information flow that is one-way. Your HTML documents, images, sounds, and video have been traveling, with no return ticket, to the people viewing them in their Web browsers.

Today's lesson is about creating HTML forms in order to collect information from people visiting your Web site. Forms enable you to gather just about any kind of information for immediate processing by a server-side script or for later analysis using other applications. If you've spent much time browsing the Web, you undoubtedly have run across forms of various flavors. Many forms exist: simple forms that perform searches, forms that log you in to Web sites, forms that enable you to order products online, and so on. They all share one thing in common: accepting input from a Web page visitor.

If you're one to worry about compatibility, you can set your mind at ease. HTML forms have been around virtually since the beginning of the HTML language, and are widely supported by all leading Web browsers. I'll make sure to point out any possible compatibility problems along the way.

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Don't be intimidated by forms! While they may look complex, they actually are very easy to code. The hardest part is formatting them. In today's lesson, the following topics are covered, which will enable you to create any type of form possible with HTML:

- How HTML forms interact with server-side scripts to provide interactivity
- Creating simple forms to get the hang of it.
- Learning all the types of form controls you can use to create radio buttons, check boxes, and more
- Using more advanced form controls to amaze your friends and coworkers
- Form planning so that your data matches any server-side scripts you use

Understanding Form and Function

Right off the bat, you need to understand a few things about forms. First, a form is part of a Web page that you create using HTML elements. Each form contains a `form` element that has special controls, such as buttons, text fields, check boxes, submit buttons, and menus. These controls make up the user interface for the form (that is, the pieces of the form users see on the Web page). When people fill out forms, they are interacting with the controls of the forms. In addition, you can use many other HTML elements within forms to create legends, provide additional information, add structure, and so on. These elements are not part of the form itself, but can enhance your form's look or improve its usability.

NEW TERM An *HTML form* allows you to gather information from a person visiting your Web page. You can take the information you collect and send it to a script residing on your Web server to manipulate or store it.

When a person fills out an HTML form, he or she enters information or makes choices using the form controls. The final step is submitting it, at which time several things happen. First, the form identifies the controls within the form that contain data and builds a form data set to contain it. Next, the data set is encoded and sent to the Web server to be processed.

It is very important that you understand the implications of this final step. The data, after all, is what you are after! This is the reason you've chosen to create a form in the first place. After a user clicks the Submit button, the process ceases to be one of pure HTML and becomes reliant upon scripts (called *Common Gateway Interface*, or *CGI* scripts, most often written in a scripting language called Perl) that are resident on the Web server. In other words, for your form to be successful, you must already have a script on the server that will take the data and store it or manipulate it in some manner.

There are a few important exceptions to this rule. First, a form may redirect a person to another Web page, based on his or her input, or the form sends an email containing the form data to an email address. The second exception is useful and is an easy way for you to test forms. Rather than using a script, you can simply instruct the form to email the contents to you. One final exception is that forms sometimes are used in Dynamic HTML because they trap user events, such as clicking the mouse. A form in a Dynamic Web page may not be used to collect data, but could be used to create buttons from which the user can choose to perform some action.

Exercise 14.1: Creating a Simple Form that Accepts a Name and Password

To Do

Okay, let's get right to it and create a simple form that illustrates the concepts just presented.

I've created a Web page that prompts the user to enter a name and a password to continue. Take a peek down at Figure 14.1 to see the Web page.

Start by opening up your favorite HTML editor (mine is Notepad) and creating a Web page template. Begin by entering the standard HTML header information, include the `body` element, and then close the `body` and `html` elements to form a template from which to work. If you already have a template similar to this, just load it into your HTML editor.

Note

I tend to use Transitional HTML and note that in the `<!doctype>` declaration. This gives me the flexibility of adding deprecated HTML elements if I choose, without having to worry about validation errors.

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/transitional.dtd">
<html>
<head>
<title>myTitle</title>
</head>
<body>


</body>
</html>
```

Next, add your `title` so that people will understand the purpose of the Web page.

```
<title>Enter the Wabbit Hole</title>
```

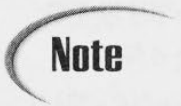

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- Within the `body` of the Web page, add a `form` element. I have added both the opening and closing tags, with an empty line in between so that I don't forget to close the `form` when I'm finished.

```
<form action="http://www.fakeurl.com/cgi-bin/entrance.cgi" method="post">

</form>
```

Before continuing, you need to know more about the `form` element and the attributes you see within the opening tag. Obviously, `<form` begins the element and indicates that you are creating an HTML form. The `action` attribute, which is required, specifies the URL to the server-side script (including the file name) that will process the form when it is submitted. It is very important that the script with the name you have entered is present on your Web server at the location the URL specifies.



> Prior to "going live" with forms, you should contact your ISP and ask them whether you can use the scripts they have or add your own. You also need to determine the URL that points to the directory in which the scripts reside on the server. Some ISPs rigidly control scripts for security purposes and will not allow you to create or add scripts to the server. If that is the case, and you really need to implement forms on your Web pages, you should consider searching for a new ISP.

The next attribute is `method`, which can accept one of two possible values: `post` or `get`. These values define how form data is submitted to your Web server. The `post` method includes the form data in the body of the form and sends it to the Web server. The `get` method appends the data to the URL specified in the `action` attribute and most often is used in searches.

Now add some form controls and information to make it easy for a visitor to understand how to fill out the form. Within the `form` element, begin by adding a helpful description of the data to be entered by the user, and then add a `text` form control. This prompts them to enter their name in a text-entry field. Don't worry about positioning just yet because later you will put all the form controls into a table.

```
<form action="http://www.fakeurl.com/cgi-bin/entrance.cgi" method="post">
Your wascawy name:<input type="text" name="username" />
</form>
```

Next, add another bit of helpful text and a password control.

```
<form action="http://www.fakeurl.com/cgi-bin/entrance.cgi" method="post">
Your wascawy name:<input type="text" name="username" />
Your just as wascawy password:<input type="password" name="userpassword" />
</form>
```

Notice that both of these form controls are part of the `input` element. The `type` attribute defines which type of control will be created. In this case, you have a text control and a password control. Each type of control looks differently when it appears in a Web browser (such as a text-entry field, button, or check box), accepts a different type of user input (such as entering text or the click of a button), and is suitable for different purposes. Each control also receives a name that distinguishes it and its data from the other form controls. You can use whatever `name` you like, as long as it is unique. (Normally control names must all be different; however, exceptions to this are explained later in this lesson).

Finally, add a `submit` button so that the user can send the information he or she entered into the form. Add a `reset` button that clears the form in case the user made a mistake or wants to start over.

```
<form action="http://www.fakeurl.com/cgi-bin/entrance.cgi" method="post">
Your wascawy name:<input type="text" name="username" />
Your just as wascawy password:<input type="password" name="userpassword" />
<input type="submit" value="Enter" />
<input type="reset" value="Oops!" />
</form>
```

The `submit` and `reset` buttons are another type of `input` element. Notice that I've included the `value` attribute with each. In this case, the `value` attribute modifies the text that is shown in the button and displayed in the Web browser. You can choose not to use the `value` attribute with these buttons. If so, the Web browser will display default text for these two types of buttons.

Note

When naming form controls and labeling buttons, you should strive for clarity and meaning. If a form is frustrating or hard to figure out, the person you want to provide the information most likely will leave your site for greener pastures!

At this point, you have created the form and it is ready to rumble; however, if you load it into your Web browser, you'll see that it doesn't look all that appealing. It's time to add a few graphical elements to make the page look better, and arrange the elements of the form into a nicely aligned table.

I've created three graphics to place at the top of the page and used a `table` to arrange them.

```
<table border="0">
    <tr>
        <td><img src="sign.gif" width="174" height="200" /></td>
```


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```
        <td align="center"><img src="arrow.gif" width="85" height="100" /><br>
        <img src="hole.gif" width="143" height="58" /></td>
    </tr>
</table>
```

Next, create another `table` and that contains four rows and two columns. You're going to put your `form` in the table to position all the elements.

```
<table border="0">
<tr>
    <td></td>
    <td></td>
</tr>
<tr>
    <td></td>
    <td></td>
</tr>
<tr>
    <td></td>
    <td></td>
<tr>
    <td></td>
    <td></td>
</tr>
</table>
```

Now, add the form elements by inserting the opening `form` tag after the opening `table` tag. Insert the form controls into the rows and columns of the table, as I have shown, making sure not to forget the closing `form` tag.

Notice that I've left the third row of the `table` blank—that's because I'm cheating! After I completed the source code for this example, I wanted a bit more space between the `password` field and the buttons. After a bit of experimentation, I also aligned the text prompts to the right, set each column to take up 50 percent of the total width of the table, and centered the buttons in their respective columns.

```
<table border="0">
    <form action="http://www.fakeurl.com/cgi-bin/entrance.cgi" method="post">
    <tr>
        <td align="right" width="50%">Your wascawy name:</td>
        <td width="50%"><input type="text" name="username" /></td>
    </tr>
    <tr>
        <td align="right">Your just as wascawy password:</td>
        <td><input type="password" name="userpassword" /></td>
    </tr>
    <tr>
        <td></td>
        <td></td>
    </tr>
```

```
    <tr>
        <td align="center"><input type="submit" value="Enter" /></td>
        <td align="center"><input type="reset" value="Oops!" /></td>
    </tr>
    </form>
</table>
```

This looks like it stands a chance of working, so now put all the source code together. A few final notes are warranted. First, I wrapped everything up in a `div` element, and set the `align` attribute to `center` in order to center everything on the page. Note on the page where the opening and closing `div` tags are located. To add some extra space between the graphics and the form, I also included a line break using the `br` element.

INPUT

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/transitional.dtd">
<html>
<head>
<title>Enter the Wabbit Hole</title>
</head>
<body>
<div align="center">
<table border="0">
    <tr>
        <td><img src="sign.gif" width="174" height="200" /></td>
        <td align="center"><img src="arrow.gif" width="85" height="100"
/><br>
        <img src="hole.gif" width="143" height="58" /></td>
    </tr>
</table>
<br>
<table border="0">
    <form action="http://www.fakeurl.com/cgi-bin/entrance.cgi"
method="post">
    <tr>
        <td align="right" width="50%">Your wascawy name:</td>
        <td width="50%"><input type="text" name="username" /></td>
    </tr>
    <tr>
        <td align="right">Your just as wascawy password:</td>
        <td><input type="password" name="userpassword" /></td>
    </tr>
    <tr>
        <td></td> <!-- Comment: left blank to add space -->
        <td></td> <!-- Comment: left blank to add space -->
    </tr>
    <tr>
        <td align="center"><input type="submit" value="Enter" /></td>
        <td align="center"><input type="reset" value="Oops!" /></td>
    </tr>
    </form>
```


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```
</table>
</div>
</body>
</html>
```

That took a little work, but I think the final product shown in Figure 14.1 looks good.

OUTPUT

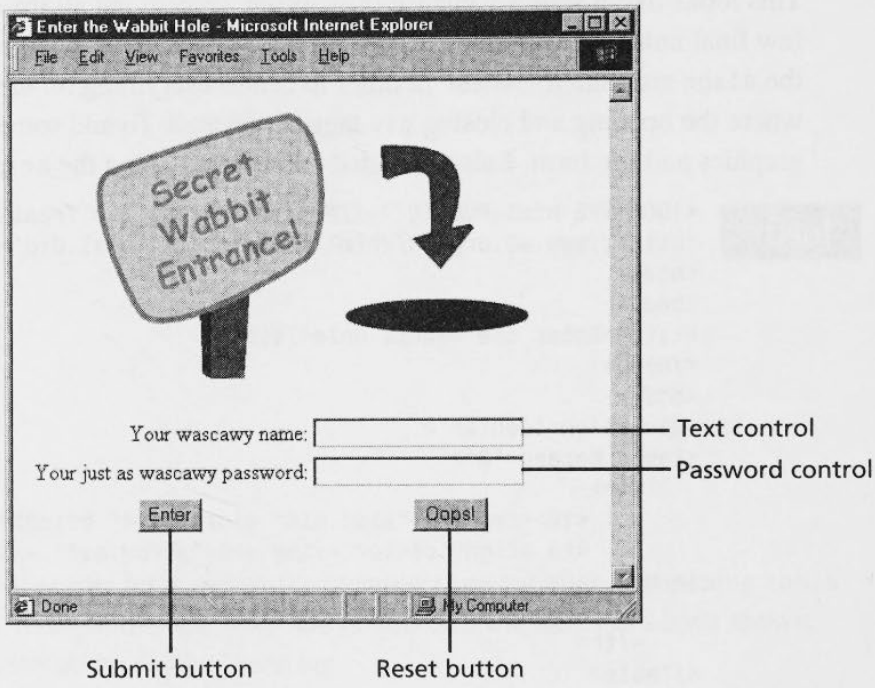


FIGURE 14.1

A simple HTML form with four form controls provides access to the Secret Wabbit Hole.

To complete the exercise, I tested the form to see whether it returned the data I wanted. Following is what the data set looks like:

```
username=Elmer&userpassword=hunter
```

It is pretty measly, but you can see that each form element `name` contains data that I entered into the form and is nicely tied to that data. Using a script, you will find it easy to parse this output, manipulate it, and achieve your overall purpose.

Essential Elements of a Form

After completing the first exercise, you should have picked up a few things: how to use the `form` element, including simple form controls, and using the `submit` and `reset` buttons. This section fully explains and expands upon them. The discussion is divided into two major areas: the `form` element and the controls created by the `input` element. After this discussion, you'll walk through a more complicated exercise.

Using the `form` Element to Create Forms

Because the `form` element is the basis for all forms created in Web pages, it is important that you understand how to use it.

First, `forms` are considered *block-level elements*. To understand this, you need to know about the other basic HTML content model: *inline elements*. You apply inline elements, such as `<b>` and `<u>`, to text or individual characters to modify their appearance. As such, they contain the text they modify, such as `<b>I Love this game!</b>`, and can contain other nested inline elements. `<b>I <i>Love</i> this game!</b>` is perfectly valid HTML.

Block-level elements are larger organizational structures (such as the `form` and `table` elements). They can include contain Web page content, inline, as well as other block-level HTML elements. If you display the following HTML in a Web browser, the existence of the nested inline element does not start a new line.

```
<b>Nesting <i>inline</i> elements does not cause a line-break.</b>
```

However, block-level elements such as `form` start a new line in the Web browser. The upshot of all of this is that if you are concerned about the layout of your page, the opening tag of the `form` element will cause a new line to be created. Consider the following code fragment:

NEW TERM *Inline elements* such as `<b>...</b>` can contain text and other inline elements. *Block-level elements* such as `<div>...</div>` can contain content, other block-level elements, and inline elements. Most block-level elements are displayed on a new line while inline elements do not start a new line.

```
<p>Oatmeal <form action="http://www.fakeurl.com/cgi-bin/register.cgi"
method="post">
lovers wishing to view our private stock of recipes need to enter your name
and password.</p>
```

Placing the `form` tag in its current location causes a new line to be created after `Oatmeal`, resulting in the inappropriate visual effect shown in Figure 14.2.

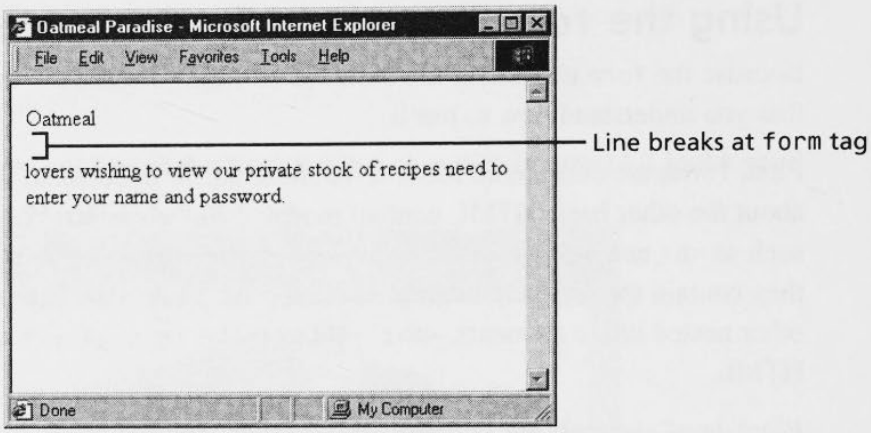
To sum up thus far, the `form` element causes a new line to be created and the `form` can contain content, inline, and other block-level elements. The one exception to this is that you cannot nest forms—only one form at a time, please!

The syntax for creating the `form` element is fairly straightforward. You most often will use only two attributes—`action` and *`method`*—of which `action` is mandatory, as in the following code snippet.

```
<form action="someaction" method="get or post">
content, form controls, and other HTML elements
</form>
```

FIGURE 14.2

Placing a `form` element within an inline element, such as the paragraph `<p>`, causes a line break.



`action` defines the action taken when the form is submitted, and generally contains a URL to a CGI script on the Web server. Here again, remember that the script must be in the exact location you specify and working properly for the form to successfully be submitted. Although most forms send their data to scripts, you also can make the action link to another Web page or a `mailto` link. The latter is formed as follows:

```
<form action="mailto:somebody@isp.com" method="post">
```

This attaches the form data set to an email, which then is sent to the email address listed in the `action` attribute.



To test your forms, I recommend using `mailto` to send yourself the results of your test form. Doing this enables you to debug your form and ensures that you are getting the correct data prior to linking up with a script.

The `method` attribute can be one of only two possible values: `get` or `post`. These values define how the form data provided by the `action` attribute will be sent to the script. Forms that use `get` append the form data to the `action` URL with a question mark, and then send the entire kit-and-caboodle to the modified URL. Sites with search engines normally use this method. If I had a text control named `searchstring` and had entered `Orangutans` in the field, the resulting URL might look the following:

```
http://www.fakeurl.com/cgi-bin/search?searchstring=Orangutans
```

Although the `method` attribute is not required, the default value of `get` will be used if you omit it.

The other possible value is `post`. Rather than appending the form data to a URL and sending the combined URL-data string to the server, `post` simply sends the form data to the location specified by the `action` attribute.

That about does it for the `form` element, but you've really only just begun. Did you notice that the `form` element, by itself, doesn't do much more than indicate which type of action to take when the form is submitted? To actually gather information, you're going to need items called form controls.

Creating Form Controls with the `input` Element

Now it's time to learn how to create the elements that gather information within a form. The `input` element enables you to create many different types of controls.

NEW TERM *Form controls* are special HTML elements used in a `form` that allow you to gather information from a person viewing your Web page. The information is collected into a data set that is sent to the location of the `action` attribute when the form is submitted.

The `input` element consists of an opening tag with attributes, no other content, and no closing tag.

```
<input attributes  />
```

The key point here is choosing the right attributes that will create the type of form control you need. The most important of these is `type`, which defines the control. For all controls, except submit and reset buttons, the `name` attribute is required. The `name` attribute names the control so that data can be assigned to the form control name when sent to the server. The rest of this section describes the different types of controls you can create using the `input` element.

Creating Text Controls

Text controls enable you to gather information from a user in small quantities. This creates a single-line text input field in which users can type information, such as their name or a search term. Unlike other controls, such as radio buttons (that have only two states—on and off) or menu items (that are predefined), text controls give visitors complete freedom to enter any text they desire.

Text controls always are part of an `input` element, which is included in the `form` element. Begin by creating an `input` element and choose `text` as the value for the `type` attribute. Make sure to name your control so that the server script will be able to process the value. Figure 14.3 shows a text control that offers helpful text that describes what you want the user to enter in the control.

```
<p>Enter the name of your pet: <input type="text" name="petname" /></p>
```

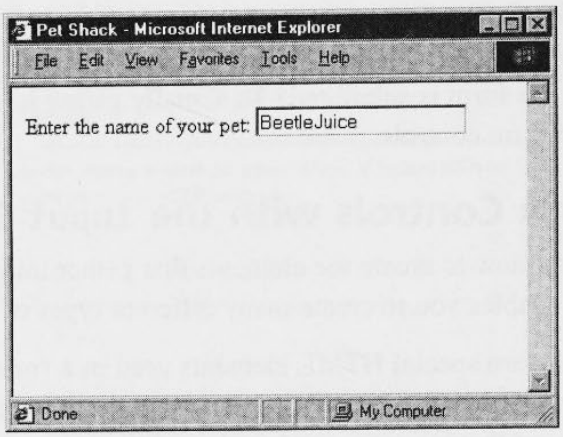
You can modify the appearance of text controls by using the `size` attribute. Entering a number sets the width of the text control in characters, as in the following:

```
<input type="text" name="petname" size="15" />
```


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FIGURE 14.3

Text controls create a single-line text entry field.



To limit the number of characters a user can enter, add the `maxlength` attribute to the text control. This sets the maximum number of characters the user can enter. If users attempt to enter more text, their Web browser will stop accepting input for that particular control.

```
<input type="text" name="petname" size="15" maxlength="15" />
```

To display text in the text control prior to the user entering information, use the `value` attribute. The `value` attribute can act as a prompt or reminder to the user to enter data, as in the following:

```
<input type="text" name="petname" size="15" maxlength="15" value="Enter Pet
Name" />
```

In this case, `Enter Pet Name` appears in the control when the form is drawn in the Web browser. It remains there until the user modifies it.



When using the `value` attribute, using a value that is larger than the size of the text control can confuse the user because the text will appear to be cut off. Try to use only enough information to make your point. Ensure that any `value` is less than or equal to the number of characters you specified in `maxlength`.

To make text controls read-only, include the `readonly` attribute, as in the following:

```
<input type="text" name="year" value="1999" readonly />
```

This prevents users from entering text in the text control. It also is useful to establish a constant default for a text control when the form is submitted.

Creating Password Controls

The password control is very similar to the text control in that users enter only a small amount of text in the form. This, however, is a special case because the password control uses asterisks to mask the user's input.



You don't have to limit your use of the `password` control to just passwords. You can use it for any sensitive material that you feel needs to be hidden when the user enters the information into the form.

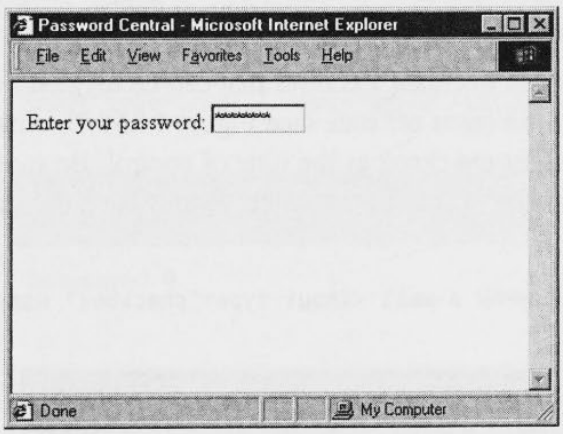
To create a `password` control, create an `input` element and assign `password` to the `type` attribute. To limit the size of the password control and the maximum number of characters a user can enter, you can use the `length` and `maxlength` attributes, as in the following code:

```
<p>Enter your password: <input type="password" name="userpassword"
➥size="8" maxlength="8" /></p>
```

Figure 14.4 shows a password control with some helpful text that describes to the user the purpose of the control.

FIGURE 14.4

Create masked text input fields with password controls.



Note that you do not need to include the `value` attribute because the value you enter is masked when drawn into the user's Web browser.



Any information sent by a `password` control is not masked or encrypted in any way; therefore, this is not a secure means of transmitting sensitive information. Although the users can't read what they are typing, the `password` control has no other inherent security measures.

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Creating Submit Buttons

You use the submit button to transmit form data for processing by a server-side script or other program. Entering `submit` as the `type` of control creates a submit button that contains the default caption of Submit Query. To change the text shown in the button, use the `value` attribute and enter your own description, as in the following.

```
<input type="submit" value="Send Form Data" />
```



You can have more than one submit button per form.

Creating Reset Buttons

You use reset buttons to clear the contents of the form and set all the form controls to their initial default values. In most cases, this is the value you specify using the `value` attribute when you create each control. As with the `submit` button, you can change the default caption of `reset` to one of your own choosing by using the `value` attribute, as in the following:

```
<input type="reset" value="Clear Form" />
```

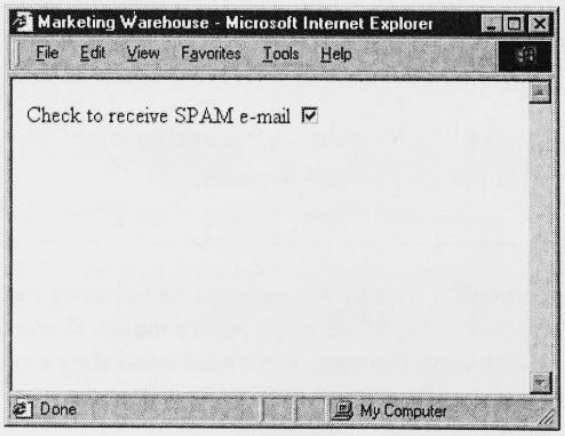
Creating Check Box Controls

Check boxes enable you to create a control that can be toggled between checked and unchecked, reflecting an on or off state (see Figure 14.5). To create a check box, use the `input` element and enter `checkbox` as the type of control. Be sure to include the `name` attribute so that the script will know to which control the data is assigned, as in the following:

```
<p>Check to receive SPAM e-mail <input type="checkbox" name="spam" /></p>
```

FIGURE 14.5

Check box controls create boxes users check.



To initially display the check box as checked, include the `checked` attribute, as in the following:

```
<input type="checkbox" name="year" checked />
```

You can group check boxes together and assign the same control name. This allows multiple values to be chosen and applied to one property.

```
<p>Check all symptoms that you are experiencing:<BR />
Nausea <input type="checkbox" name="symptoms" value="nausea" /><br />
Light-headedness <input type="checkbox" name="symptoms" value="lightheadedness"
/><br />
Fever <input type="checkbox" name="symptoms" value="fever" /><br />
Headache <input type="checkbox" name="symptoms" value="headache" /><br />
</p>
```

When this form is submitted to a script for processing, each check box that is checked returns a value associated with the name of the check box.

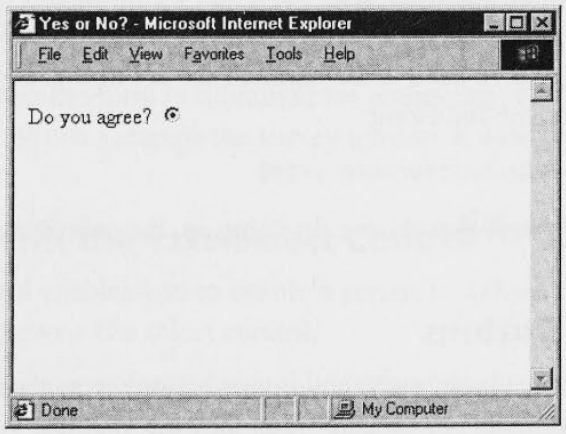
Creating Radio Buttons

Radio buttons are almost identical to check boxes, but appear differently in the Web browser. Rather than a box that can be checked or unchecked, a small circular (sometimes diamond shaped) button is drawn and filled when the user selects it (see Figure 14.6). You create radio buttons in an `input` element by entering `radio` as the type of control. The `value` attribute, which is mandatory, assigns data to the radio button. When the `form` is submitted, the `value` is sent to the server if the radio button is selected.

```
<p>Do you agree? <input type="radio" name="agree" value="Yes" /></p>
```

FIGURE 14.6

Radio buttons are useful for yes or no questions or choosing one item from a list.



When two or more radio buttons share the same control name, they form a mutually exclusive data set. In other words, only one radio button can be selected. In the following code snippet, both radio buttons have the `name` of `sex`, which means that the user can

select only one. If a user selected Male, realized it was a mistake, and then selected Female, the Male radio button automatically would then be unselected.

```
<input type="radio" name="sex" value="Male" />
<input type="radio" name="sex" value="Female" />
```

Creating Graphical Buttons

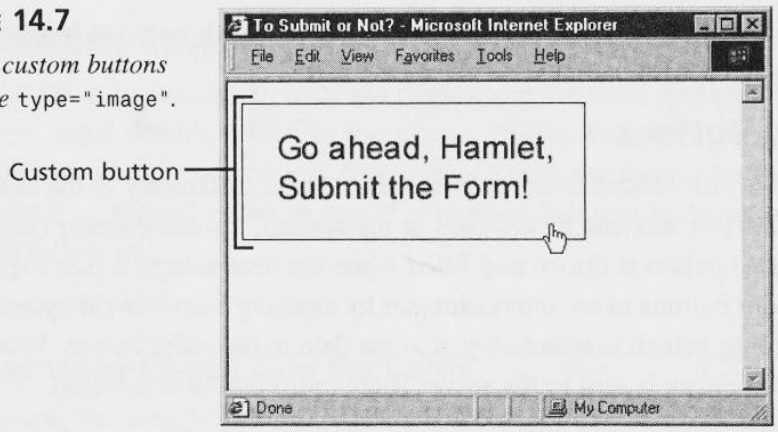
Using `image` as the `type` of `input` control creates a submit button decorated with the image you choose using the `src` attribute, as in the following:

```
<input type="image" src="submit.gif" name="submitformbtn" />
```

Figure 14.7 shows a custom button created with an image.

FIGURE 14.7

Create custom buttons with the `type="image"`.



In addition to submitting the form data, the x and y coordinates of the point the user clicked are transmitted to the server. The data is submitted as *`name.x = x coord`* and *`name.y = y coord`*, where *name* is the name of the control. Using the preceding code, a result might look like the following:

```
submitoformbtn.x=150&submitformbtn.y=200
```

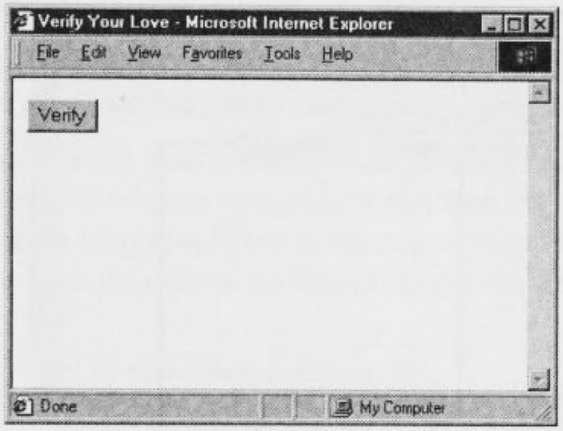
You can omit the name, if you choose. In doing so, the coordinates returned would just be `x =` and `y =`.

Creating Push Buttons

In addition to creating submit, reset, and image buttons, you also can create push buttons that cause client-side scripts to execute when they are enabled. Figure 14.8 shows a button that has a client-side script as the action to take when it is pressed. Use the following code to create a push button:

```
<input type="button" name="verify" value="verify" onclick="verifydata()" />
```

FIGURE 14.8
Push buttons can be tied to client-side scripts.



In this example, a button that runs a script function called `verifydata` when it is clicked is created. You indicate the name that appears in the button with the `value` attribute of `Verify Data`.

Buttons created using this method are more limited than those created by using the `button` element. Don't confuse the two!

Hiding Controls with `hidden`

Hidden controls are special controls that are hidden from and cannot be modified by the user. When the user submits the form, the value assigned to the hidden control is sent along with the other data.

```
<input type="hidden" name="surveynumber" value="1402" />
```

I have seen this technique used most often with surveys where a way to identify the data is required. In this case, I have created a hidden form control named `surveynumber` with a value of `1402`. When the form is submitted for processing, I can identify the form based on this information. When I change the survey tomorrow, I can change the `value` to a different number.

Upload Files with the `file` Select Control

The file select control enables you to enable a person to upload a file along with the form. Figure 14.9 shows a file select control.

```
<p>Please select a file for upload: <input type="file" name="fileupload" /></p>
```

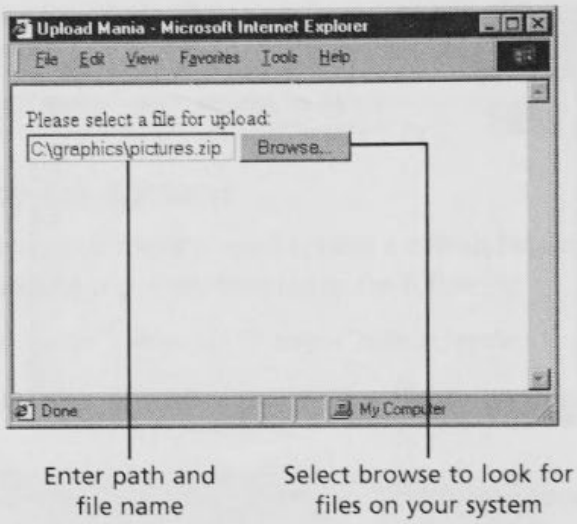
Users can enter a file name (with the path) or choose to browse the contents of their hard drive in order to identify a file to upload. If you use the `value` attribute, you theoretically can specify an initial file name to appear; however, this does not seem to be supported by Microsoft Internet Explorer 5 or Netscape Navigator 4.5.

```
<input type="file" name="fileupload" value="myresume.doc" />
```


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FIGURE 14.9

Uploading files is easy with the file select control.



Exercise 14.2: Creating a Form with Several Types of `input` Controls

▼ To Do

It's time for another exercise. For this exercise, you'll work with all the types of controls presented in this section.

To start, open the template you created in Exercise 14.1, and create three `form` templates. You will use the first form for a survey, the second to gain access to a member's area of a fictitious Mime Academy, and the third to search the site. Refer to the following code:

```
<form action="http://www.fakeurl.com/cgi-bin/survey.cgi method="post"
</form>
<form action="http://www.fakeurl.com/cgi-bin/members.cgi method="post"
</form>
<form action="http://www.fakeurl.com/cgi-bin/search.cgi method="get"
</form>
```

Notice that you will be using different scripts for each form, and that the third uses the `get` method.

Now it's time to add form controls to each form. For the survey, you will want to ask a few simple multiple-choice questions. For the first question, use check boxes and assign the same name to them all. Place the text prompt before the `input` element so that it shows up in the browser window to the left of the check box. The following code shows you how:

```
<form action="http://www.fakeurl.com/cgi-bin/survey.cgi method="post"
Take today's survey
I like miming because: (check all that apply)
It's fun<input type="checkbox" name="whyilikeit" value="fun" />
```

▼

```
I meet interesting people<input type="checkbox" name="whyilikeit" value="people"
/>
It's who I am<input type="checkbox" name="whyilikeit" value="personality" />
The money<input type="checkbox" name="whyilikeit" value="money" />
```

The second question for this form is another multiple-choice question, but you only want to accept one answer. For this, use radio buttons that have the same assigned name. Rather than placing the text prompts before the button, place the text prompts after so that they will show up to the right of the buttons. Doing this ensures that the buttons are lined up.

```
The most difficult thing about being a mime is:
<input type="radio" name="difficult" value="makeup" />Putting on the makeup
<input type="radio" name="difficult" value="unitard" />Wearing a spandex unitard
<input type="radio" name="difficult" value="nottalking" />Not talking
```

Next, enter a file select element that enables users to select and upload a file when they submit the survey. Add submit and reset buttons. Finally, in order to track the survey, add a hidden control that is hard-coded to return the value of `061300`. By using this hidden control, you can track all survey responses by date and change the control every day. After you add the hidden control, enter the closing `form` tag.

```
Upload a picture of yourself miming!
<input type="file" name="picture" />
<input type="submit" value="submit" />
<input type="reset" value="reset" />
<input type="hidden" name="surveynumber" value="091899" />
</form>
```

The second and third forms are much easier. The second form involves adding text and password controls for a person's user name and password, and finishes with a submit button. Limit the maximum number of characters that can be entered to `20` and `10` respectively, and then limit the password field `10` characters, as in the following:

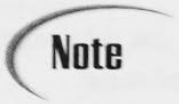
```
<form action="http://www.fakeurl.com/cgi-bin/members.cgi method="post">
Enter our Member's Only area!
Username:<input type="text" name="username" maxlength="20" />
Password:<input type="password" name="userpassword" size="10" maxlength="10" />
<input type="submit" value="Submit" />
</form>
```

The final form is simply a text control and an image button. The image button acts as a submit button. It contains a graphic that I've created in place of the normal button face.

```
<form action="http://www.fakeurl.com/cgi-bin/search.cgi method="get">
Search our database<input type="text" name="searchstring" />
<input type="image" src="searchbtn.gif" name="searchbtn" />
</form>
```


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- The forms, form controls, and other information are complete; however, in order for them to look good in an HTML document, you will need to format them.



I have found that formatting my forms after I create them enables me to concentrate on each aspect separately, which produces better results.

The visual appearance of the page divides nicely into five elements: three forms, a title graphic that will appear at the top of the Web page, and another graphic to add interest.

To organize your items on the page, first center the title graphic at the top of the page by using the following code:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/transitional.dtd">
<html>
<head>
<title>Anne's Mime Academy</title>
</head>
<body>
<div align="center">
    <img src="welcome.gif" height="35" width="300" />
</div>
```

Moving on to the graphic and forms, notice that two forms are rather short and one is long. Think of the remainder of the page as having two columns in which you can place the two smaller forms, including seating the "interest" graphic on one side and the longer form on the other. How are you going to do this? Tables!

Start by creating a master table that contains two columns and three rows. In the following code, I've commented the role that each row and column of the table will play:

```
<table border="0">
<tr>
    <td></td> <!-- Row 1, Column 1: for the interest graphic -->
    <td></td> <!-- Row 1, Column 2: use for nested table holding the first form
-->
</tr>
<tr>
    <td></td> <!-- Row 2, Column 1: for another nested table and the second form
-->
    <td></td> <!-- Row 2, Column 2: first form continues -->
</tr>
<tr>
    <td></td> <!-- Row 3, Column 1: for the third nested table and third form --
>
    <td></td> <!-- Row 3, Column 2: first form continues -->
</tr>
</table>
```

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▼ Now use the following code to add the nested tables:

```
<table border="0">
<tr>
    <td></td> <!-- Row 1, Column 1: for the interest graphic -->
    <td><!-- Row 1, Column 2: use for nested table holding the first form -->
    <table border="0">
        <tr>
            <td></td>
            <td></td>
        </tr>
        <!-- add 12 more table rows here like the previous one -->
    </table>
    </td>
</tr>
<tr>
    <td><!-- Row 2, Column 1: use for nested table holding the second form -->
    <table border="0">
        <tr>
            <td></td>
            <td></td>
        </tr>
        <tr>
            <td></td>
            <td></td>
        </tr>
        <tr>
            <td></td>
            <td></td>
        </tr>
        <tr>
            <td></td>
            <td></td>
        </tr>
    </table>
    </td>
    <td></td> <!-- Row 2, Column 2: first form continues -->
</tr>
<tr>
    <td><!-- Row 3, Column 1: for the third nested table and third form -->
    <table border="0">
        <tr>
            <td></td>
            <td></td>
        </tr>
        <tr>
            <td></td>
            <td></td>
        </tr>
        </form>
    </table>
</tr>
▼ </table>
```

▼ Now add all the graphic and form elements to their appropriate locations in the tables and put the entire thing together.

INPUT

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/transitional.dtd">
<html>
<head>
<title>Anne's Mime Academy</title>
</head>
<body>
<div align="center">
    <img src="welcome.gif" height="35" width="300" />
</div>
<table border="0">
<tr>
    <td align="center"><img src="anne.gif" height="146" width="200"
/></td>
    <td rowspan="3">
    <table border="0" bgcolor="#ffcc33">
        <form action="http://www.fakeurl.com/cgi-bin/survey.cgi"
method="post">
        <tr>
            <td align="center" colspan="2">Take today's survey</td>
            <td></td>
        </tr>
        <tr>
            <td colspan="2">I like miming because: (check all that
apply)</td>
            <td></td>
        </tr>
        <tr>
            <td> </td>
            <td>It's fun<input type="checkbox" name="whyilikeit"
value="fun" /></td>
        </tr>
        <tr>
            <td> </td>
            <td>I meet interesting people<input type="checkbox"
➥       name="whyilikeit" value="people" /></td>
        </tr>
        <tr>
            <td> </td>
            <td>It's who I am<input type="checkbox" name="whyilikeit"
➥       value="personality" /></td>
        </tr>
```

▼

```
        <tr>
            <td> </td>
            <td>The money<input type="checkbox" name="whyilikeit"
value="money" /></td>
        </tr>
        <tr>
            <td colspan="2">The most difficult thing about being a mime
is:</td>
            <td></td>
        </tr>
        <tr>
            <td> </td>
            <td><input type="radio" name="difficult" value="makeup" />
➥       Putting on the makeup</td>
        </tr>
        <tr>
            <td> </td>
            <td><input type="radio" name="difficult" value="unitard" />
➥        Wearing a spandex unitard</td>
</tr>
        <tr>
            <td> </td>
            <td><input type="radio" name="difficult" value="nottalking"
/>Not talking</td>
        </tr>
        <tr>
            <td colspan="2">Upload a picture of yourself miming!</td>
            <td></td>
        </tr>
        <tr>
            <td></td>
            <td><input type="file" name="picture" /></td>
        </tr>
        <tr>
            <td colspan="2" align="center"><input type="submit"
value="submit" />
➥       <input type="reset" value="reset" /></td>
            <td></td>
        </tr>
        <input type="hidden" name="surveynumber" value="091899" />
        </form>
    </table>
    </td>
</tr>
```

```
<tr>
    <td valign="top">
    <table border="0" bgcolor="#ffff99" width="100%">
        <form action="http://www.fakeurl.com/cgi-bin/members.cgi"
method="post">
        <tr>
            <td align="center" colspan="2">Enter our Member's Only
area!</td>
            <td></td>
        </tr>
        <tr>
            <td>Username:</td>
            <td><input type="text" name="username" maxlength="20" /></td>
        </tr>
        <tr>
            <td>Password:</td>
            <td><input type="password" name="userpassword" size="10"
maxlength="10" /></td>
        </tr>
        <tr>
            <td align="center" colspan="2"><input type="submit"
value="submit" /></td>
            <td></td>
        </tr>
        </form>
    </table>
    </td>
</tr>
<tr>
    <td>
    <table border="0" width="100%" bgcolor="#ffcccc">
        <form action="http://www.fakeurl.com/cgi-bin/search.cgi"
method="get">
        <tr>
            <td>Search our database</td>
            <td><input type="text" name="searchstring" /></td>
        </tr>
        <tr>
            <td align="center" colspan="2"><input type="image"
➥       src="searchbtn.gif" name="searchbtn" /></td>
            <td></td>
        </tr>
        </form>
    </table>
    </td>
</tr>
</table>
</body>
</html>
```

Figure 14.10 shows the completed Web page, complete with multiple forms and controls.

OUTPUT

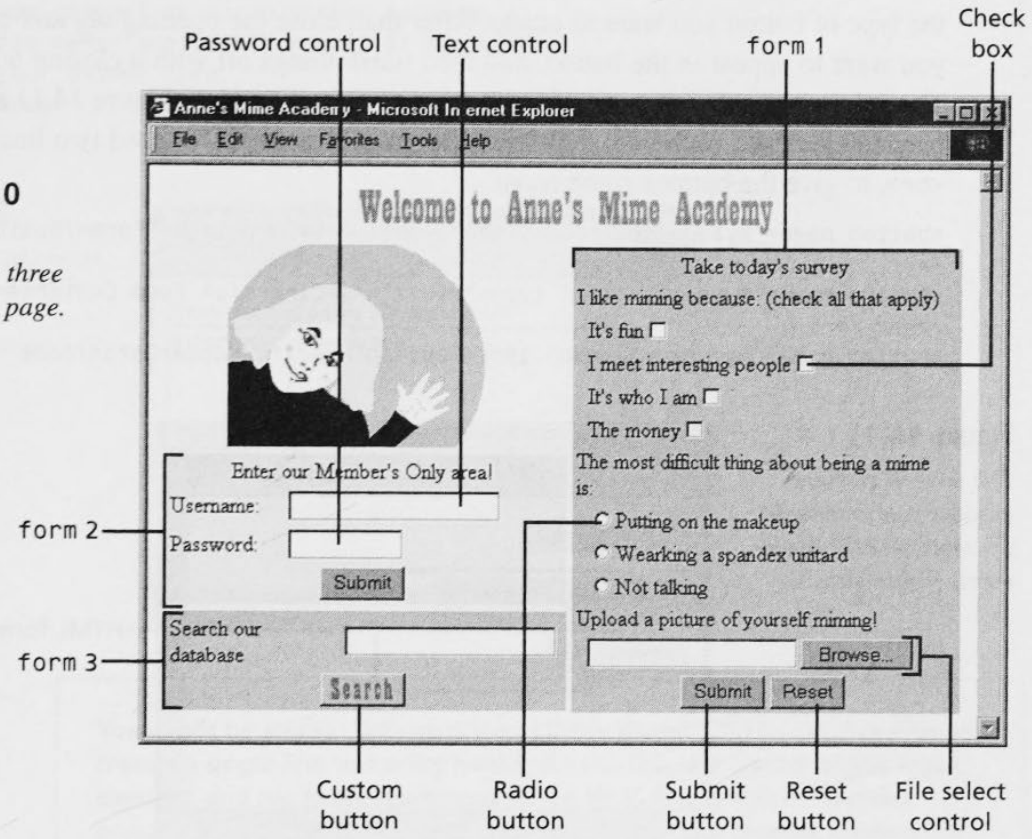


FIGURE 14.10

Anne's Mime Academy has three forms on one page.

Using Other Control Elements

In addition to form controls you can create using the `input` element, there are three that are elements in and of themselves.

Using the `button` Element

A button you create using the `button` element is similar to the buttons you create with the `input` element, except that these buttons can contain content within the opening and closing tags that actually appear on the buttons.

Note

The `button` element (as opposed to the `input` element of `type="button"`) is not supported by Netscape Navigator.

You can create three different types of buttons: submit, reset, and custom. To create them, start by entering the opening tag of the `button` element, followed by the `name` attribute. The `name` attribute names the control. Next, enter the `type` attribute and choose

Meta Exhibit 1042 - Page 00209
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Call No. 005.72 L549s, 2000
Rating

Copies	Location	Call No.	Note	Status
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Edition 2nd ed.
Description xxv, 831 p. : ill. ; 23 cm.
Note "Includes coverage of XHTML"--Cover.
Includes index.
Subject World Wide Web.
HTML (Document markup language)
Internet.
Added Author Tyler, Denise.
ISBN 0672317257 : $29.99

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libraries.org

A directory of libraries throughout the world

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Cincinnati and Hamilton County Public Library

Hamilton County, OH

Address: 800 Vine Street
Cincinnati, **Ohio**
45202-2009
United States

County: Hamilton

Phone: 513-369-6000

Connect to: Library Web Site✔ Online Catalog

Library details: **Cincinnati and Hamilton County Public Library** is a **Public** library. This library is affiliated with **Cincinnati and Hamilton County Public Library** (**view map**) . The collection of the library contains **4,772,281** volumes. The library circulates **21,200,000** items per year. The library serves a population of **802,374** residents .

Permalink: **https://librarytechnology.org/library/641**
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Administration: The director of the library is **Paula Brehm-Heeger** .

Organizational structure: This is a publicly funded and managed library.

Affiliations: The library is a member of the **Urban Libraries Council** .

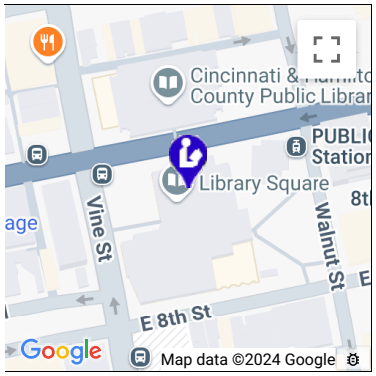
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Statistics Public		
Service Population	802,374	**Residents**
Collection size	4,772,281	**volumes**
Annual Circulation	21,200,000	**transactions**



Cincinnati and Hamilton County Public Library



map location✔

Related Libraries

- Libraries located in **Cincinnati** (Ohio)
- Libraries located in **Hamilton** county (Ohio)
- **View map of libraries in Hamilton County**
- **all Public libs in Ohio**
- **United States**
- **Automation systems in Ohio**

About libraries.org

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View Detailed Statistics

Technology Profile		
	Product Name	Year Contracted
Current Automation System	Sierra	2012
Previous Automation System	Symphony	2003
Previous Automation System	Locally developed	1996
Discovery Interface	BiblioCore	2020
Previous Discovery Interface	Encore	2012
Web Content Management	BiblioWeb	
Item ID Type	RFID	
RFID Tag Type	HF	
This library is responsible for the procurement of the library automation system.		

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Automation Survey: We are conducting a study on the automation systems used in libraries. This survey should be completed by a person familiar with your libraries use of **Sierra**.
The 2024 Automation Survey has been completed for this Library.

Identifiers	
libraries.org ID	641
NCES FSCSKEY	OH0049
NCES LIBID	OH0049-002

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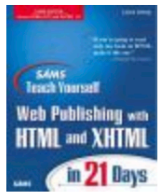
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Lemay, Laura.

Book | Sams | [2000] | 2nd ed.

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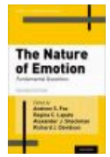
Location	Call No.	Status
Michnr Stacks	QA76.76.H94 L454 2000	AVAILABLE

Details

Imprint	Indianapolis, Ind. : Sams, [2000] ©2000
Edition	2nd ed.
Description	xxv, 831 pages : illustrations ; 23 cm
Note	"Includes coverage of XHTML"--Cover. Includes index.

Search Results

Next result:



The nature of emotion : fundamental questions / edited by ...

Other Sources

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Subject	World Wide Web. HTML (Document markup language) Internet.
Other Name	Tyler, Denise.
Alt Title	Teach yourself Web publishing with HTML 4 in 21 days. Web publishing with HTML 4 in 21 days. HTML 4 in 21 days.
ISBN #	0672317257
OCLC #	43310843

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list search:

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Greeley, Colorado
80639
United States

County: Weld

Phone: 970-351-2671

Connect to: Library Web Site✔ Online Catalog

Library details: **University of Northern Colorado Libraries** is an **Academic** library. This library is affiliated with **University of Northern Colorado** (**view map**) . The collection of the library contains **1,131,041** volumes. The library circulates **166,705** items per year. The library serves a population of **11,352** FTE Enrollment.

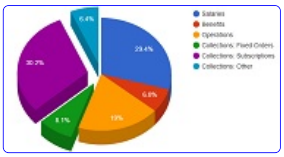
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Academic Level: The library Serves an educational institution at the **University** level. The Carnegie Foundation designates this institution as: **Doctoral/Professional Universities** (level 17).

Statistics Academic		
Enrollment	11,352	**FTE Students**
Collection size	1,131,041	**volumes**
Annual Circulation	166,705	**transactions**



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James A Michener Library



map location✔

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	Product Name	Year Contracted
Current Automation System	Sierra	2013
Previous Automation System	Millennium	2001
Previous Automation System	Innopac	1997
Previous Automation System	Carl	1982
Previous Automation System	None	
Discovery Service (w/index)	Ex Libris CDI	2011
Discovery Interface	Summon	2011
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This library is responsible for the procurement of the library automation system.		

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Respond to the 2024 Library Automation Perceptions Survey

Identifiers	
libraries.org ID	2244
OCLC Symbol	COV
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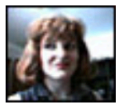
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Denise Tyler; Rafe Colburn Publish Date: 2/23/00 - Price: $49.99

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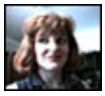
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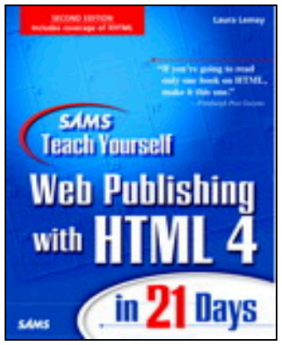
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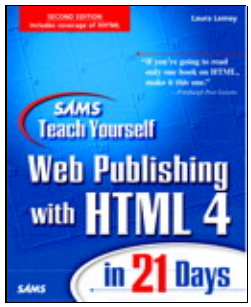


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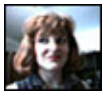
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