UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
ADVANCED MICRO DEVICES, INC.
Petitioners,

v.

ADVANCED CLUSTER SYSTEMS, INC.,
Patent Owner.

IPR2025-00913
IPR2025-00914
IPR2025-00915
IPR2025-00916

U.S. Patent Nos.
11,570,034
12,021,679
11,563,621
11,811,582

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 regarding the public availability of certain prior art references in relation to U.S. Patent Nos. 11,570,034; 12,021,679; 11,563,621; and 11,811,582 (the "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 (**Ex. 1087**). 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 worked as a part-time

consultant since late 2015, and completed more than 90 declarations directed at determining whether references were publicly accessible by a certain date. In the last four years I completed five depositions.

6. 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.

7. 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")

8. 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.

9. 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 A** 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/.

10. 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.

11. 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).

12. 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 WorldShare 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 WorldShare, it becomes available to other OCLC members for adoption to their local online catalogs (*i.e.*, copy cataloging).

13. After a MARC record (see ¶¶ 8-9 above) is created in WorldShare, 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 WorldShare is available to the interested public through the user-friendly WorldCat.org web portal. In addition, records in the WorldShare are also searchable in the OCLC FirstSearch system, which is a subscription-based search system for users to explore proprietary databases. Records in OCLC FirstSearch present more details than records in the free web portal, such as the Date of entry field that shows the time when a record is entered into the WorldCat database on OCLC.

B. Library Online Catalogs

14. 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.

15. 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.

16. Conference proceedings can be cataloged as monographs or serials. If conferences have unique themes and are not held on a regular basis, libraries often choose to catalog the proceedings of this type of conference as monographs to make it easier for interested users to discover and access the conference proceedings. Like regular monographs, the physical copies of these proceedings are promptly processed for user access, usually within a week after the cataloging work is completed.

17. **Ex. 1088** is a paper authored by Chip Nilges titled "The Online Computer Library Center's Open WorldCat Program" and published in *Library Trends*, Vol. 54, No. 3, pp. 430-447 (Winter 2006) ("*Nilges*") that provides a

thorough overview of the OCLC WorldCat Program.[1] It explains that, as of early 2006, "WorldCat is a worldwide union catalog created and maintained collectively by more than 9,000 member institutions. With more than 60 million online records representing almost 1 billion items held by member institutions, it is the largest and most comprehensive database of its kind. Open WorldCat seeks to make library collections and services visible and available through popular search engines such as Yahoo! and Google and other heavily used sites on the open Web. In this capacity, Open WorldCat provides an important central connection between the shared information of the library network and the Web. Through Open WorldCat, OCLC partners with search engines and other Web sites to link from search results to a 'find in a library' service managed by OCLC and powered by the WorldCat database." *Id*. at 430-31.

18. Users interested in learning about a particular subject matter have many tools to discover resources of interest. Google and similar search engines

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[1] **Ex. 1088** was publicly accessible in early 2006. As shown on the cover page of **Ex. 1088**, this volume of *Library Trends* was held by the library of the School of Library & Information Studies in Madison, Wisconsin, and the date stamp shows the library received this issue on March 21, 2006, making it publicly accessible at this library in March 2006.

enable users to locate materials of interest in various formats on the Internet. The success of the OCLC Open WorldCat program led to OCLC's decision to make WorldCat.org a free web portal to help users search across libraries around the world to locate what they need. Online catalogs at individual libraries help users identify publications in library collections that are relevant to their areas of interest. In addition, digital libraries, such as the IEEE Xplore Digital Library and the ACM Digital Library, support users to locate publications in the science and technology fields. Subject databases such as MEDLINE and PubMed support users to discover publication in biomedical and life sciences. There are also multi-disciplinary databases, such as ProQuest Complete and Academic Search Complete, that support users to search across subject fields. For digitized books, documents, videos, and other materials, users can consult the Internet Archive. To learn about archived web resources, users can search the Wayback Machine of the Internet Archive. Users can search search engines, library catalogs and databases by keywords, phrases, author, title, and other elements. Users with a bachelor's degree usually develop basic search skills at school to use these tools and the Internet Archive. Librarians are also readily available to assist users with their use of various search tools. Most of these search tools have been available since the early 1990s, and many of them became available in the 1970s. The WorldCat database of OCLC, for example, was launched in 1971; the WorldCat.org website became available to the public in 1988;

and WorldCat.org became a free web portal for the general public in 2006. OCLC's FirstSearch system enables users to search proprietary databases, and it was launched in 1991. It is therefore my opinion that people ordinarily skilled in the art of a subject area, today and since the early 1990s, would have basic skills to use search engines, library catalogs, databases, digital libraries, and digital archives.

19. 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:

- ACM Digital Library (https://dl.acm.org/)
- Google Patents (https://patents.google.com/)
- IEEE Xplore Digital Library (https://ieeexplore.ieee.org/Xplore/home.jsp)
- Internet Archive (https://archive.org/)
- OCLC FirstSearch (https://firstsearch.oclc.org/)
- Online catalog of the Academia Sinica (https://las.sinica.edu.tw/)
- Online catalog of the Federal Science Libraries Network of Canada (https://science-libraries.canada.ca/eng/home/)
- Online catalog of the Library of Congress (https://search.catalog.loc.gov/search)
- Online catalog of the library of the University of Edinburgh

(https://discovered.ed.ac.uk/discovery/search?vid=44UOE_INST:44UOE_VU2&lang=en)

- Online catalog of the Linda Hall Library (https://catalog.lindahall.org/discovery/search?vid=01LINDAHALL_INST:LHL)
- Online catalog of the Michigan Technological University Library (https://www.mtu.edu/library/)
- Online catalog of the University of California, Berkeley Library (https://www.lib.berkeley.edu/)
- Online catalog of the Washington State University Library (https://libraries.wsu.edu/)
- Online catalog of the Yale University Library (https://search.library.yale.edu/catalog/)
- Online catalog of TIB (German National Library of Science and Technology) (https://opac.tib.eu/DB=1/LNG=DU/)
- WorldCat.org, the free web portal (https://search.worldcat.org/)

C. Scope of this Declaration

20. I have been asked to offer my opinions on the public availability dates of the following documents:

(1) Menon, V., & Trefethen, A. E. (1997, November).

MultiMATLAB: Integrating MATLAB with high-performance parallel computing. In *SC '97: Proceedings of the 1997 ACM/IEEE Conference on Supercomputing* (pp. 1-18), **Ex. 1005** ("*Menon*");

(2) Trefethen, A. E., Menon, V. S., Chang, C. C., Czajkowski, G. J., Myers, C., & Trefethen, L. N. (1996, May). *MultiMATLAB: MATLAB on multiple processors,* **Ex. 1006** ("*Trefethen*");

(3) *RS/6000 SP: Planning. Vol. 1, Hardware and Physical Environment*, "Introducing the RS/6000 SP" and "375 MHz Power3 SMP High Node (F/C 2058), **Ex. 1007** ("*RS6000*");

(4) IBM "Operation and Use, Volume 1. Using the Parallel Operating Environment," Publication Number SA22-7425-01, Version 3 Release 2, Second Edition (December 2001), **Ex. 1008** ("*POE-2001*"); and

(5) MPI Forum. (1994, May). MPI: A Message-Passing Interface Standard, **Ex. 1017** ("*MPI-1994*").

21. 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.

22. I have been informed by counsel to assume that the Challenged Patents have a June 13, 2006 priority date. I have assessed public accessibility of the documents referenced below as of this priority date.

23. I have been informed by counsel that the subject matter of the Challenged Patents generally relates to high-performance parallel or cluster computing.

D. Person of Ordinary Skill in the Art

24. I have been informed by counsel that a "person of ordinary skill in the art at the time of the invention" (POSITA) 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.

25. I have been informed by counsel that a person of ordinary skill in the art as of June 2006, would have knowledge of the scientific literature and have

skills relating to high-performance parallel computing. A person of ordinary skill would have possessed a bachelor's degree in electrical engineering, computer science, computer engineering, or similar field, with two years of experience in the field of cluster or distributed computing or parallel processing and would be knowledgeable of high-level scientific computing languages.

26. 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 2006, such a person would have had access to a vast array of print and electronic resources, including at least the documents referenced below.

E. Evidence Considered in Forming My Opinion

27. In the preparation of this declaration, I have reviewed **Exs. 1005**, **1006**, **1007**, **1008**, and **1017** referenced in paragraph 20 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 B**.

III. Authentication and Public Availability of *Menon* (Ex. 1005)

A. Authentication

28. **Exhibit 1005** is a true and correct copy "MultiMATLAB: Integrating MATLAB with high-performance parallel computing," ("*Menon*"), by V. Menon

and A. E. Trefethen, in *SC '97: Proceedings of the 1997 ACM/IEEE Conference on Supercomputing* (pp. 1-18), that I received from counsel. This copy is presented as **Ex. 1005** in this declaration.

29. Page 1 of **Ex. 1005** shows the title, authors, and abstract, and the bottom of the page shows this article appears in "Proceedings of the ACM/IEEE SC97 Conference (SC'97) whose ISBN (International Standard Book Number) is "0-89791-985-8" and this article has a "1997" copyright date and IEEE (the Institute of Electrical and Electronics Engineers) holds the copyright. The stamp at the lower right corner identifies this article as "Ex. 1005 Intel Corporation."[2] **Ex. 1005** shows *Menon* has a total of 18 pages, including eight figures, one table, and 24 references.

30. To authenticate *Menon*, I searched Google Scholar for information on this article, and found an metadata record for this article in the ACM Digital Library at https://dl.acm.org/doi/abs/10.1145/509593.509623 that shows this article was published on "15 November 1997" and is a "Free Access" article, meaning users can access it free of charge. I then downloaded a copy of *Menon* at

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[2] I understand from counsel that **Ex. 1005** and the other exhibits I consider herein have previously been presented to the Patent Trial and Appeal Board as part of *Inter Partes* Review Proceedings filed by Intel Corporation.

https://dl.acm.org/doi/pdf/10.1145/509593.509623 from the ACM Digital Library. This ACM record includes a link to the conference proceedings containing *Menon*, and the ACM record for the conference proceedings at https://dl.acm.org/doi/proceedings/10.1145/509593 shows that *SC '97: Proceedings of the 1997 ACM/IEEE conference on Supercomputing* was published by the Association for Computing Machinery on "15 November 1997" and its ISBN is "978-0-89791-985-2." This ACM copy of *Menon* is presented as **Ex. 1089** in this declaration.

31. I have closely compared **Ex. 1005** and **Ex. 1089** and found them to contain the same content for *Menon*. The only difference is that some figures in the ACM copy are in color, while all the figures in **Ex. 1005** are black and white.

32. **Ex. 1005** is in a condition that raises no suspicion about its authenticity. Specifically, this copy of *Menon* is not missing any intermediate pages, and there are no visible alterations to the document. Furthermore, this copy has the same content as the publisher copy (**Ex. 1089**). Based on my review and analysis, it is my opinion that **Ex. 1005** is authentic.

B. Records of TIB

33. To determine the public availability date of *Proceedings of the 1997 ACM/IEEE conference on Supercomputing* ("SC'97") that contains *Menon*, I searched for library records in WorldCat.org, the free web portal, and a record at

https://search.worldcat.org/title/245635379 shows TIB (Technische Informationsbibliothek), the German National Library of Science and Technology, as one of the libraries that created an original record for SC'97. I then searched the online catalog of TIB to obtain the library record. Since the TIB does not display records in MARC, I searched the WorldCat database on the OCLC FirstSearch system to locate the TIB record. These three records are presented in **Ex. 1090**. 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.

34. Pages 1 and 2 of **Ex. 1090** are the true and correct copy of the WorldCat.org record for SC'97 that shows the title of the conference proceedings, and indicates this work is a Konferenzschrift (Conference proceedings) published on a CD-ROM in 1997 and its ISBNs are 9780897919852 and 0897919858. The record also shows TIB is the holding library. Page 3 of **Ex. 1090** is the TIB library record that shows the title, contributing bodies, language, publisher, format. Genre, ISBNs, a link to the IEEE record for SC'97I at https://ieeexplore.ieee.org/xpl/conhome/10614/proceeding, and a note that SC'97 is included in the IEEE Conference Package, and access to it on campus is free of charge.

35. Since TIB does not display records in MARC, I searched the

WorldCat database on OCLC FirstSearch to determine when the TIB record was created. OCLC FirstSearch is a subscription-based search system that supports users to explore proprietary databases, including the WorldCat database. As indicated above, catalogers share MARC records in the OCLC WorldShare system for copy cataloging, interlibrary loan, and collection management purposes. WorldShare records are also available to the general public on WorldCat.org, the free web portal, and to subscribers of the OCLC FirstSearch system. WorldCat.org presents records with label and data that help users identify holding libraries, while OCLC FirstSearch records contain more details such as the date when records were added to the WorldCat database on OCLC. Pages 4 and 5 of **Ex. 1090** are the TIB record on OCLC FirstSearch that shows the title, holding library, authors, publisher, year of publication, format, language, ISBNs. The "Entry" field shows this TIB record was entered into the OCLC WorldCat database on "19980219" (*i.e.*, February 19, 1998), making SC'97 that contains *Menon* discoverable from that date on by subscribers to OCLC FirstSearch and by the general public on WorldCat.org.

36. The records in **Ex. 1090** inform my opinion that TIB created an original record for SC'97 that contains *Menon* and entered their record into the OCLC WorldCat database on February 19, 1998. From that date on, the general public and subscribers to OCLC FirstSearch have been able to discover this record and use it to access the conference proceedings containing *Menon*.

C. Records of the Academia Sinica Library

37. To further demonstrate the public availability of SC'97, I searched OCLC FirstSearch for records and found the Academia Sinica library also created original records for this conference proceedings, so I searched for the Academia Sinica record as well. I personally located, identified, and obtained the records from OCLC FirstSearch and the online catalog of the Academia Sinica. Academia Sinica is the national academy of the Republic of China in Taiwan, and the highest institution for research in Taiwan. The academy supports research activities in mathematics, physical sciences, life sciences, humanities and social sciences. These records are presented as **Ex. 1091**. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

38. Page 1 of **Ex. 1091** is the bibliographic record that shows the conference name, title of the conference proceedings, publisher and publication date, and ISBN ("0897919858"), and other details. The title, ISBN, format, contributing bodies, and publication date match the information presented in **Ex. 1005,** confirming this record represents the conference proceedings containing *Menon*.

39. Page 2 is the MARC record, and the first six digits of Field 008 show the record was created on "981214" (*i.e.*, December 14, 1998), and the code of "s1997" following the record creation date indicates this work has a single

publication date of 1997. Subfields "a" and "c" of Field 040 show "AS" (*i.e.*, the Academia Sinica library) created the record and entered it into the WorldCat database on OCLC. Fields 008 and 040 inform my opinion that the Academia Sinica Library cataloged SC'97 on December 14, 1998, and entered it into the OCLC WorldCat database on that date, making this work discoverable from that date on in the library's online catalog. In addition, as of that date, this work also became discoverable by the general public on WorldCat.org, the free web portal, and by subscribers to OCLC FirstSearch.

40. Field 020 of the MARC record shows the ISBN, Field 111 shows the conference name is recorded as the author of the proceedings, Field 245 shows the title, subtitle and conference sponsors, and Field 246 shows a variant title is included to help users discover this work. Field 260 shows publisher information, Field 300 shows this work is on an optical disc, and Field 710s show the two conference sponsors are included to help users discover this work. The subject of the conference proceedings is represented in Field 650 by a Library of Congress subject heading, with "Supercomputers" as the main topic, followed by "Congresses" as a form subheading encoded in subfield "x". A second Field 650 shows a locally assigned subject term "Supercomputing" is included to represent the subject of SC'97.

41. This MARC record of the Academia Sinica Library shows that the

library created an original record for SC'97 on December 14, 1998. As of that date, users of this library could discover this work by ISBN, conference name, title, variant title, conference sponsors, a Library of Congress subject heading, and a locally assigned subject term.

42. Pages 3 and 4 of **Ex. 1091** are the Academia Sinica Library record for SC'97 that I located from OCLC FirstSearch. The top of this record shows the title and indicates the Academia Sinica Library is the holding library of this work. The "Date of Entry" field shows the record was entered into the WorldCat database on OCLC on "19981214" (*i.e.*, December 14, 1998).

43. The records in **Ex. 1091** inform my opinion that SC'97 that contains *Menon* became discoverable on December 14, 1998 at the online catalog of the Academica Sinica Library. In addition, on that date SC'97 also became discoverable by the general public on WorldCat.org, the free web portal, and by subscribers of OCLC FirstSearch.

D. Internet Archive Records

44. **Ex. 1091** shows users can access the conference proceedings of SC'97 at http://www.supercomp.org/sc97/proceedings/, so I searched Internet Archive for *Menon* and located an archived copy. **Ex. 1092** is a true and correct copy of *Menon* that I personally located, identified, and obtained from Internet Archive.

45. Page 1 of **Ex. 1092** is a screen capture of a Wayback Machine

calendar that shows this article was archived eight times between July 7, 1998 and April 26, 2005, and this particular copy was archived on "JUL 07 1998" and available at https://web.archive.org/web/19980707033046/http://www.supercomp.org/sc97/program/TECH/MENON/INDEX.HTM. Pages 2 to 14 are the full text of *Menon* that includes eight figures, one table, and 24 references.

46. I have closely compared this archived copy (**Ex. 1092**) with **Ex. 1005** and found them to have the same content. The differences between these two copies are that 1) **Ex. 1092** does not display the figures and table, but **Ex. 1005** and **Ex. 1092** use the same captions for the figures and table; 2) **Ex. 1092** includes keywords; and 3) pages of **Ex. 1005** shows the article appears in "Proceedings of the ACM/IEEE SC97 Conference (SC'97)," while **Ex. 1092** does not have this note, but both **Ex. 1005** ad **Ex. 1092** show *Menon* appears in a work whose ISBN is "0-89791-985-8." Based on my review and analysis, it is my opinion that *Menon* became publicly discoverable on the Internet no later than July 7, 1998. By that date Menon was already available on the Internet, so a person interested in supercomputing or high performance parallel computing would have been able to

use search engines such as Yahoo! or Google[3] to enter these terms or similar terms to discover the SC'97 conference proceedings and locate *Menon*. In addition, researchers interested in supercomputing would likely be aware of major events such as the ACM/IEEE Conferences on Supercomputing, and would have been able to use the conference URL (http://www.supercomp.org/) to explore the Wayback Machine to locate *Menon*. For example, an interested person would enter www.supercomp.org on the Wayback Machine to learn that the Internet Archive began archiving this website on January 1, 1997, and they would select archive dates of interest to look into resources related to the Conferences on Supercomputing. I have located archived webpages related to SC'97 and presented them as **Ex. 1093** below to show that interested users had several ways to discover *Menon* in late 1997 and early 1998.

47. Several archived web resources related to the SC'97 Conference show that the SC'97 conference proceedings on CD-ROM became accessible at the conference in November 1997. **Ex. 1093** contains true and correct copies of the

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[3] Both Yahoo! and Google search engines were available well before July 1998. *See* https://en.wikipedia.org/wiki/Yahoo_Search and https://en.wikipedia.org/wiki/Google_Search.

SC'97 Conference General Information, Conference main page, Proceedings Table of Contents, Technical Papers Sessions, Technical Papers Abstracts, and Technical Papers Author Index. I personally located, identified, and obtained these archived copies from Internet Archive. They are the type of material experts in my field would reasonably rely upon when forming their opinions.

48. Page 1 of **Ex. 1093** is a screen capture of a Wayback Machine calendar that shows this particular copy of the SC'97 Conference General Information webpage was archived on February 16, 1998. Pages 2 to 8 are the PDF of the archived webpage that shows on page 3 that the conference store will sell the CD-ROM Proceedings for $50 at the conference site. The "Proceedings/CD-ROM" on page 4 informs conference attendees that "SC97 proceedings are available on CD-ROM and on the Web at http://www.supercomp.org/sc97/proceedings. Additional copies of the Proceedings will be on sale at the conference store. To facilitate access to the Proceedings during the conference, the following special services are offered," including workstations for viewing the proceedings at the conference site. This archived webpage informs my opinion that the conference proceedings was available online at www.supercomp.org/sc97/proceedings, that the proceedings on CD-ROM was available for sale at the conference store, and that users could access the CD-ROM during the conference, meaning *Menon* was publicly accessible during the conference in November 1997, and definitely no later

than February 16, 1998.

49. Pages 9 and 10 are the archived copies of the SC'97 conference Proceedings, and the Wayback Machine calendar on page 9 shows this particular copy was archived on April 25, 1998, meaning this webpage was publicly discoverable and accessible on the Internet no later than April 25, 1998.

50. Pages 11 and 12 are the archived copies of the SC Conference Proceedings Table of Contents, and the Wayback Machine calendar on page 11 shows this particular copy was archived on April 25, 1998, meaning this Table of Contents webpage was publicly discoverable and accessible on the Internet no later than April 25, 1998.

51. Pages 13 to 20 are the copies of the SC'97 Technical Papers, and the Wayback Machine calendar on page 13 shows this particular copy was archived on April 26, 1998, and page 17 shows *Menon* is included in the Numerics Session.

52. Pages 21 to 32 show a copy of SC'97 Technical Papers Abstracts, and the Wayback Machine calendar on page 21 shows this particular copy was archived on April 26, 1998. Page 30 shows the abstract of *Menon*.

53. Taken together, archived webpages in **Ex. 1093** inform my opinion that interested users could access the SC'97 Conference Proceedings online at http://www.supercomp.org/sc97/proceedings. In addition, they could purchase the Proceedings on CD-ROM at the conference store, and during the November 1997

conference they could access the CD-ROM on workstations at the conference site. Archived pages of the conference main page, table of contents, technical papers sessions, and technical papers abstracts show *Menon* was included in the November 1997 conference and links were available for users to access this article during the conference. After the conference, interested users could access *Menon* no later than April 26, 1998.

E. Usage Records

54. Actual usage of a publication is reflected by other publications that make reference to it. I have identified four early citations to *Menon* from Google Scholar. They are briefly discussed below to show *Menon* was used by other researchers in 1998, 1999, and 2000.

55. Citation 1. Harrop, C. W., Hackstadt, S. T., Cuny, J. E., Malony, A. D., & Magde, L. S. (1998, November). Supporting runtime tool interaction for parallel simulations. In *SC'98: Proceedings of the 1998 ACM/IEEE Conference on Supercomputing* (pp. 37-37) ("Harrop"). I obtained the full text of this conference paper from IEEE. This publisher copy of Harrop is presented as **Ex. 1094** in this declaration. Page 1 shows the title, authors, and abstract, and the bottom of the page shows Harrop was included in the "Proceedings of the 1998 ACM/IEEE SC98 Conference" that has an ISBN of "0-8186-8707-X" and this conference paper has a 1998 copyright date.

56. As evidence that Harrop was published in November 1998, I located, identified, and obtained an IEEE metadata record for this article. This record is available at https://ieeexplore.ieee.org/abstract/document/1437324 from IEEE Xplore. The metadata record is attached to **Ex. 1094** as pages 15 to 17. Page 15 shows Harrop was published in "SC '98: Proceedings of the 1998 ACM/IEEE Conference on Supercomputing" and the conference took place from November 7 to 13 of 1998. The metadata record also shows this record was added to IEEE Xplore on "06 June 2005," making the record discoverable on IEEE Xplore from that date on. Page 16 shows *Menon* was cited in Reference 14 as: V. Menon and A. Trefethen. MultiMATLAB: Integrating MATLAB with High-Performance Parallel Computing, Proceedings of Supercomputing 97 (SC97).

57. Citation 2. Rana, O. F., Li, M., Walker, D. W., & Shields, M. (1999, September). An XML based component model for generating scientific applications and performing large scale simulations in a meta-computing environment. In *International Symposium on Generative and Component-Based Software Engineering* (pp. 210-224), ("Rana"). Berlin, Heidelberg: Springer Berlin Heidelberg. I obtained this copy of Rana from the Library of Congress. This library copy of Rana is presented as **Ex. 1095** in this declaration. Pages 1 to 5 are the front matter of *Generative and Component-Based Software Engineering: First International Symposium, GCSE'99, Erfurt, Germany, September 1999, Revised*

Papers that shows this publication is 1799 of the *Lecture Notes in Computer Science* series, its ISBN is 3-540-41172-0, Springer-Verlag Berlin Heidelberg published this work with a 2000 copyright date, and the Library of Congress received the physical copy on "DEC 10 2001." The table of contents shows on page 5 that Rana is grouped under the theme of "Domain Analysis and Component-Based Development" and begins on page 210. Pages 6 to 20 are the full text of Rana, and Reference 2 shows *Menon* is cited as "Vijay Menon and Anne E. Trefethen, 'MultiMATLAB: Integrating MATLAB with High-Performance Parallel Computing", SuperComputing97. 1997."

58. As evidence that the conference proceedings containing Rana became publicly accessible at libraries, I obtained the bibliographic and MARC records for the conference proceedings at https://lccn.loc.gov/00049680 from the online catalog of the Library of Congress. These records are attached to **Ex. 1095** as pages 23 to 30.

59. Field 008 of the MARC record on page 28 shows the record was created on "000928" (*i.e.*, September 28, 2000). Subfields "a" and "c" of Field 040 show "DLC (*i.e.*, the Library of Congress) created the original record and entered it into the WorldCat database on OCLC. Field 955 is a field for recording local cataloging activities, and it shows "2001-12-17 bk rec'd, to CIP ver." and "2001-12-20 to bccd." These notes in Field 955 indicate that the Library of Congress

created a pre-publication record (known as the CIP record, meaning "Cataloging-In-Publication record") for the conference proceedings containing Rana on September 28, 2000. The Library received the physical copy on December 17, 2001 for verification of the CIP record, and the book was sent to bccd (Binding and Collection Care Division) on December 20, 2001. A customary library practice is to process a newly cataloged publication promptly for public access, usually within a week after the cataloging work is completed. My personal experience with the Library of Congress collections is that it can take one to three months for a newly cataloged work to become publicly accessible. Based on Fields 008, 040, and 955 of the MARC record, it is my opinion that the Library of Congress created a CIP record for the conference proceedings containing Rana on September 28, 2000, received the published book for CIP record verification on December 17, 2001, and sent the book to the processing unit on December 20, 2001, meaning the physical copy, after processing, became publicly accessible at the Library of Congress no later than March 20, 2002.

60. Citation 3. Almasi, G., & Padua, D. A. (2000, August). MaJIC: A MATLAB just-in-time compiler. In *International Workshop on Languages and Compilers for Parallel Computing* (pp. 68-81), ("Almasi"). Berlin, Heidelberg: Springer Berlin Heidelberg. I obtained a copy of Almasi from https://link.springer.com/chapter/10.1007/3-540-45574-4_5, and the publisher's

webpage for the conference proceedings shows it was published first online on "01 January 2001." This publisher copy of Almasi is presented as **Ex. 1096** in this declaration. Page 1 shows the title, authors and abstract, and the bottom of the page shows *Almasi* was published in "LCPC 2000, LNCS 2017," which was edited by S. P. Midkiff et al., as pp. 68-81 in 2001 and has a 2001 copyright date. Reference 17 on page 13 shows *Menon* is cited as "V. Menon and A. E. Trefethen. MultiMATLAB: Integrating MATLAB with high-performance parallel computing. In *Proceedings of Supercomputing '97*, 1997."

61. As evidence that the conference proceedings containing Almasi was publicly accessible at libraries, I located, identified, and obtained the bibliographic record for this conference proceedings at https://search.library.yale.edu/catalog/9948726913408651 from the online catalog of the Yale University Library. The record is attached to **Ex. 1096** as page 15. The record shows the conference proceedings containing Almasi was added to the library catalog on "June 01, 2002," making this work discoverable at the library's online catalog from that date on. The physical copy, after processing, would become publicly accessible at the Yale University Library no later than June 2002.

62. Citation 4. Houstis, E. N., & Rice, J. R. (2000, March). On the Future of Problem Solving Environments, Department of Computer Science Technical Reports, Report number 00-009, Paper 1487, ("Houstis"), that I obtained from

Purdue e-Pubs, an institutional repository of Purdue University, available at https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=2486&context=cstech. This technical report by Houstis et al. is presented as **Ex. 1097** in this declaration. Page 1 is the cover sheet that shows the title, authors, report number, publication date ("2000"), and the citation to this report. It also identifies this work as a technical report of the Department of Computer Science of Purdue University. Page 2 is the title page that shows the report has a "March 2000" date. Page 3 is the abstract page that shows a "March 30, 2000" date. *Menon* is cited on page 72 as "[Menon and Trefethen, 1997] Menon, V. and Trefethen, A. (1997). MultiMATLAB: Integrating MATLAB with high-performance parallel computing. In *Proc. Supercomputing '97*."

63. As evidence that Houstis was published in 2000, I located, identified, and obtained Purdue's institutional repository metadata record for this technical report at https://docs.lib.purdue.edu/cstech/1487, and the webpage of John Rice, archived by Internet Archive on April 11, 2001, available at https://web.archive.org/web/20000411144916/https://www.cs.purdue.edu/people/jrr , and attached these files to the end of Houstis in **Ex. 1097** as pages 82 to 85. The metadata record on page 82 shows this report has a version date of "2000" and the webpage of John Rice shows on page 84 that "On the Future of Problem Solving Environments" has a "2000" date.

F. Summary of My Opinion on *Menon*

64. **Ex. 1005** is authentic because it is in a condition that raises no suspicion about its authenticity. Specifically, this copy of *Menon* is not missing any intermediate pages, and there are no visible alterations to the document. Furthermore, this copy has the same content as the ACM copy (**Ex. 1089**).

65. The ACM metadata record shows *Menon* was published on November 15, 1997. The records of TIB (the German National Library of Science and Technology) (**Ex. 1090**) show the library created an original record for the conference proceedings containing *Menon* on February 19, 1998. In addition, the records of the Academia Sinica Library (**Ex. 1091**) show the library created their original record for the same publication on December 14, 1998. These library records inform my opinion that the conference proceedings containing *Menon* became publicly discoverable and accessible in libraries no later than December 1998.

66. A copy of *Menon* archived by Internet Archive on July 7, 1998 (**Ex. 1092**), shows this article was publicly discoverable and accessible on the internet by that date. Although the archived copy does not include the figures and table as **Ex. 1005**, **Ex. 1092** and **Ex. 1005** use the same captions for the figures and table in *Menon*.

67. Public access to the conference proceedings containing *Menon* was

actually earlier than July 1998. The General Information webpage of the SC'97 conference website, archived on February 26, 1998 (**Ex. 1093**), informed users that the conference proceedings was available online, and interested users could use workstations at the conference to view the conference proceedings during the November 1997 conference. These dates inform my opinion that the SC'97 conference proceedings containing *Menon* was publicly accessible as early as November 1997, and no later than February 1998 when the webpage was archived by Internet Archive. Copies of the conference main page, table of contents, technical papers, and abstracts of technical papers archived in April 1998 (included in **Ex. 1093**), confirm that *Menon* was included in the SC'97 conference, and the conference proceedings was publicly discoverable on the Internet no later than April 1998.

68. Four citations to *Menon* published in 1998, 1999, and 2000 show other researchers were able to access this article and use it for their research as early as 1998. I have included metadata records and library records to show these four citing articles were publicly accessible before the June 2006 priority date.

69. Based on the records and documents that I have reviewed and analyzed, it is my opinion that *Menon* was published in November of 1997, and became publicly accessible at libraries no later than December 1998.

70. Copies and records from Internet Archive inform my opinion that the

conference proceedings containing *Menon* was accessible on the Internet at the time of the conference (*i.e.*, November 1997), conference attendees could view the proceedings at the conference site, and they could also purchase the SC'97 conference proceedings at the conference store. Archived webpages of the SC'97 conference show *Menon* was accessible on the Internet no later than April 1998, and an archived copy of *Menon* shows this article was publicly accessible no later than July 1998. The earliest citation to *Menon* was published in November of 1998.

IV. Authenticity and Public Availability of *Trefethen* (Ex. 1006)

A. Authentication

71. **Exhibit 1006** is a true and correct copy of "MultiMATLAB: MATLAB on multiple processors," ("*Trefethen*"), by Trefethen et al. that I received from counsel. This copy is presented as **Ex. 1006** in this declaration.

72. Page 1 of **Ex. 1006** shows the title, authors, abstract, and keywords ("MATLAB, MultiMATLAB, SP2, message passing, MPI, MPICH." The bottom of this page shows the copy is available at https://web.archive.org/web/19960510224514/http://www.cs.cornell.edu/Info/People/lnt/multimatlab.html. **Ex. 1006** has a total of 14 pages, including five figures (some in color) and 17 references.

73. To authenticate **Ex. 1006**, I checked the URL of this file and found a copy of *Trefethen* on Internet Archive. This archived copy is saved through Firefox

and presented as **Ex. 1098** in this declaration. Page 1 is a screen capture of a Wayback Machine calendar that shows *Trefethen* was archived 122 times from "10 May 1996" to "11 Jan 2025" and this particular copy was archived on May 10, 1996, and available at https://web.archive.org/web/19960510224514/http://www.cs.cornell.edu/Info/People/lnt/multimatlab.html. Pages 2 to 17 of **Ex. 1098** are the full text of *Trefethen*. I have closely compared **Ex. 1006** with **Ex. 1098** and found them to have the same content. Web browsers can save HTML files differently, particularly with the formatting of the saved content. *Trefethen* was archived by Internet Archive as an HTML file, and Firefox, Chrome, and Safari save the same file with different page numbers. Nevertheless, the content that I saved with Firefox (**Ex. 1098**) is the same as the content of **Ex. 1006**.

74. To further authenticate **Ex. 1006**, I searched Google for copies of *Trefethen*, and obtained a copy of *Trefethen* at https://ecommons.cornell.edu/server/api/core/bitstreams/79478a13-e65a-4526-8926-ca72d3fa3940/content from eCommons of the Cornell University Library. "eCommons" is the digital repository of Cornell University that "provides long-term access to a broad range of Cornell-related digital content of enduring value" (source: eCommons: Cornell's Digital Repository, at https://guides.library.cornell.edu/ecommons). This digital copy from Cornell is

presented as **Ex. 1099** in this declaration. I have closely compared **Ex. 1006** with **Ex. 1099** and found them to be identical.

75. **Ex. 1006** is in a condition that creates no suspicion about its authenticity. Specifically, the text flows smoothly in **Ex. 1006** and there are no visible alterations to the document. Furthermore, **Ex. 1006** has the same content as an archived copy that I obtained from the Internet (**Ex. 1098**), and is identical to a copy of *Trefethen* on the digital repository of Cornell University (**Ex. 1099**). Based on my review and analysis of these files, it is my opinion that **Ex. 1006** is authentic.

B. Discovery of *Trefethen* on Internet Archive

76. To determine the earliest public availability date of *Trefethen*, I searched Internet Archive for records. **Ex. 1100** contains archived records that I collected to show how I discovered the earliest copy of *Trefethen*. Interested users should be able to experience the same or similar paths to discover *Trefethen*. I personally located, identified, and obtained the records in **Ex. 1100**. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

77. Since **Ex. 1006** shows the personal webpage of the authors, I searched the lead author's webpage (http://www.tc.cornell.edu/~anne/) on Internet Archive, and found archived copies of Anne Trefethen's webpage. Page 1 of **Ex. 1100** is a screen capture of a Wayback Machine calendar that shows this file was archived 60

times between June 1997 and January 2009, and this particular copy was archived on June 14, 1997, and available at https://web.archive.org/web/19970614015204/http://www.tc.cornell.edu/~anne/. Pages 2 and 3 are the PDF of this archived copy that shows a link to "MultiMATLAB" under "Scientific Software and Parallel Linear Algebra" and the link led me to a copy of *Trefethen* archived on June 7, 1997 (available at https://web.archive.org/web/19970607233910/http://www.cs.cornell.edu/Info/People/lnt/multimatlab.html). The full text of this June 1997 copy is included in **Ex. 1100** as pages 5 to 20. The screen capture of a Wayback Machine calendar on page 4 shows this file was captured 122 times from "10 May 1996" to "11 Jan 2025." I looked up the May 10, 1996 file to learn that it is the earliest archived copy of *Trefethen*.

C. Records of the Washington State University Library

78. To determine the public availability of *Trefethen* at libraries, I searched WorldCat.org, the free web portal, by the title of this article and a WorldCat record at https://search.worldcat.org/title/37884365 shows three holding libraries. After reviewing records of these libraries, I learned that the Washington State University Library created the original record for *Trefethen*. I personally located, identified, and obtained the bibliographic and MARC records for *Trefethen* from the online catalog of the Washington State University Library. They are the

type of records experts in my field would reasonably rely upon when forming their opinions. These records are presented as **Ex. 1101** in this declaration.

79. Pages 1 to 3 of **Ex. 1101** are the bibliographic record that shows the title, lead author, and publication date of *Trefethen*. It also shows this work is available at the Owen Science and Engineering Library and its call number is "QA75.5.T43x no. 239." The title, lead author, and the lead author's research affiliation match the information presented in **Ex. 1006**, confirming this record represents *Trefethen*.

80. Page 4 is the MARC record that I copied from the online catalog of the Washington State University Library. The first six digits of Field 008 show the record was created on
"971103" (*i.e.*, November 3, 1997). Subfields "a" and "c" of Field 040 show "NTE" created the original record and entered it into the WorldCat database on OCLC. According to the Directory of OCLC Members
(https://www.oclc.org/en/contacts/libraries.html), "NTE" is the OCLC library symbol for Washington State University. Field 008 and 040 inform my opinion that the Washington State University Library cataloged *Trefethen* on November 3, 1997, making it discoverable in the library's online catalog from that date on.

81. Field 035 of the MARC record shows this record's OCLC number is "37884365," so I searched OCLC FirstSearch to locate this record. The FirstSearch

record is included in **Ex. 1101** as pages 5 and 6. The top of page 5 shows Cornell University and Washington State University are the holding libraries of *Trefethen*. As the MARC record on page 4 shows, the Washington State University Library created the original record, and that means the Cornell University Library used the original record to create their copy cataloging record later.

82. The "Entry" field and the database field on page 6 show the record was entered into the WorldCat database on "19971103" (*i.e.*, November 3, 1997), making *Trefethen* discoverable to subscribers of OCLC FirstSearch from that date on. In addition, this record made *Trefethen* discoverable by the general public on WorldCat.org, the free web portal.

83. The MARC record of the Washington State University Libraries shows how users could discover *Trefethen*. Field 245 shows the title and the lead author, Field 260 shows Cornell Theory Center published *Trefethen* in 1996, and Field 300 shows the physical characteristics of this work. Fields 490 and 830 show this work is no. 239 of a series. Field 710 shows Cornell Theory Center is included to help user discover this work.

84. The subjects of *Trefethen* are represented in Field 090 by a Library of Congress Classification Number of QA75.5 that represents periodicals on "Electronic computers. Computer science" (source: Library of Congress Classification, Schedule Q at

https://www.loc.gov/aba/publications/FreeLCC/LCC_Q2020TEXT.pdf), and in Fields 650 by two Library of Congress subject headings: "Science $x Mathematics $x Computer programs" ("$x" indicates a topical subheading) and "Multiprocessors." These subject representations enable interested users to conduct subject searches to discover *Trefethen*.

85. The MARC record (**Ex. 1101**) shows that the Washington State University Library cataloged *Trefethen* on November 3, 1997, making this work discoverable in their online catalog. As of that date, interested users could discover this work by the title, series, and Cornell Theory Center. They could also conduct subject searches in the library catalog to discover this work. Furthermore, on November 3, 1997, the Washington State University Library entered their record into the WorldCat database on OCLC, making *Trefethen* discoverable from that date on by OCLC FirstSearch subscribers and the general public who have free access to WorldCat.org, the free web portal. OCLC FirstSearch was launched in 1991 to support users to explore proprietary databases. WorldCat.org was launched in 1998 to enable the public to explore the OCLC WorldCat database, and it became a free web portal in 2006. As of late 1997 and 1998, interested users would have been able to use these two systems to discover *Trefethen*, and contact their librarians to access this document. If interested users needed assistance in using these two systems, librarians around the world would have been able to assist them

with their searches.

D. Usage Records

86. Actual usage of a publication is reflected by other publications that make reference to it. I have identified three early citations to *Trefethen* from Google Scholar. They are briefly discussed below to show *Trefethen* was used by other researchers in 1997 and 1998.

87. Citation 1. Temple Lang, D. W. (1997). A multi-threaded extension to a high level interactive statistical computing environment. Doctoral Dissertation, University of California, Berkeley. UMI Order No. 9827118. Index record available at https://www.proquest.com/dissertations-theses/multi-threaded-extension-high-level-interactive/docview/304343859/se-2 from ProQuest Dissertations & Theses Global. I obtained the full text of this dissertation from ProQuest. It is presented as **Ex. 1102** in this declaration. Page 3 is the title page that shows the dissertation was completed in "Fall 1997," page 5 shows the dissertation has a 1997 copyright date and the author holds the copyright, page 6 shows the dissertation committee approved the dissertation in September 1997. Page 137 shows *Trefethen* was cited in Reference 40 as: "Anne E. Trefethen, Vijay S. Menon, Chi-Chao Chang, Grzegorz J. Czajkowski, and Chris Myers. Multimatlab: Matlab on multiple processors. URL http://www.cs.cornell.edu/Info/People/Lnt?multimatlab.html, May 1996." The URL and "May 1996" date are the same as the URL and date on the

earliest archived copy of *Trefethen* that I obtained (**Ex. 1098**).

88. As evidence that **Ex. 1102** was publicly accessible at libraries, I personally located, identified, and obtained the bibliographic and MARC record for this dissertation at https://search.library.berkeley.edu/permalink/01UCS_BER/1thfj9n/alma9910059943597065 32 from the online catalog of the University of California, Berkeley Library. These records are presented as **Ex. 1103** in this declaration. The bibliographic details on page 1 show the title, author, creation date ("1997"), physical details ("vii, 161 leaves : illustrations"), and the pages of bibliographical references ("leaves 124-127") that match the information presented in **Ex. 1102**, confirming this record represents **Ex. 1102**.

89. The MARC record on page 3 was copied from the online catalog of the University of California, Berkeley Library. The first six digits of Field 008 show the record was created on "980727" (*i.e.*, July 27, 1998) and the code of "s1997" following the record creation date indicates this work has a single publication date of 1997. Subfields "a" and "c" of Field 040 show "CUY" created the original record and entered it into the WorldCat database on OCLC. According to the Directory of OCLC Members (https://www.oclc.org/en/contacts/libraries.html), "CUY" is the OCLC Library symbol for the University of California, Berkeley Library. Field 968 field is a local note field that shows this dissertation has an "Addate" of "980727"

meaning it was added to the library collection on July 27, 1998. Field 996 is also a local note field that shows "07-27-98" as the "CatDate" meaning the cataloging date of this record was July 27, 1998. Records in **Ex. 1103** inform my opinion that the University of California, Berkeley Library created an original record for **Ex. 1102** on July 27, 1998 and added it to the library collection on that date.

90. Citation 2. Quinn, M. J., Malishevsky, A., Seelam, N., & Zhao, Y. (1998, March). Preliminary results from a parallel MATLAB compiler. In Proceedings of the First Merged International Parallel Processing Symposium and Symposium on Parallel and Distributed Processing (pp. 81-87). I obtained a copy of this citing article from the Linda Hall Library. This library copy is presented as **Ex. 1104** in this declaration. Pages 1 to 7 (internal pages 81 to 87) are the full text of **Ex. 1104**, and page 1 shows the title, authors, and abstract. The bottom of page 1 shows this article has a 1998 copyright date with IEEE holding the copyright. Page 7 shows *Trefethen* was cited as Reference 11: Trefethen, A. E., Menon, V. S., Chang, C.-C., Czajkowski, G. J., Myers, C., and Trefethen, L. N., "MultiMATLAB: MATLAB on Multiple Processors," Technical Report 96-239, Cornell Theory Center, Ithaca, NY (1996). Page 8 is the cover of the conference proceedings containing Quinn, page 9 is the title page, and page 10 is the copyright page that shows "0-8186-8403-8" as the ISBN of this conference proceedings. Pages 11 to 20 (internal pages v to xiv) are the table of contents, and page 11 shows a date notation

of "6-26-98" that indicates this work was added to the library collections on June 26, 1998. The knowledge of this date annotation practice is based on my personal experience with the Linda Hall Library collections and catalogs. Page 12 shows Quinn is included in "Session 3: Mathematical Applications" and begins on page 81.

91. As evidence that Quinn was publicly accessible at libraries in 1998, I obtained the bibliographic and MARC records for the conference proceedings containing Quinn at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992954683405961 from the online catalog of the Linda Hall Library. These records are presented as **Ex. 1105**. Pages 1 to 3 are the bibliographic record. The title, 10-digit ISBN, and the copyright date match the information presented in **Ex. 1104**, confirming this record represents the conference proceedings containing Quinn. Page 4 is the MARC record that I copied from the online catalog of the Linda Hall Library. The first six digits of Field 008 show the record was created on "980611" (*i.e.*, June 11, 1998). Subfields "a" and "c" of Field 040 show EZT created the original record and entered it into the WorldCat database on OCLC, and subfield "d" shows LHL modified the original record later. According to the Directory of OCLC Members (https://www.oclc.org/en/contacts/libraries.html), EZT is the OCLC library symbol for the Michigan Technological University, and LHL is the

OCLC library symbol for the Linda Hall Library. Fields 008 and 040 inform my opinion that the Linda Hall Library MARC record is based on the original record created by the Michigan Technological University. The date annotation on the library's copy of Quinn shows the library added the conference proceedings to its collections on June 26, 1998. This date means that the copy cataloging work was completed by this date, making the conference proceedings containing Quinn discoverable at the online catalog of the Linda Hall Library from that date on. As of June 26, 1998, interested users could search for the conference proceedings by the ISBNs in Fields 020, conference name in Field 111, title in Field 245, variant titles in Fields 246, conference sponsors in Fields 710, and additional conference names in Fields 711. They could also conduct subject searches by the Library of Congress Classification Number in Field 090 and the Library of Congress subject headings in Fields 650.

92. To further demonstrate the public availability of the conference proceedings containing Quinn, I obtained the bibliographic and MARC records from the online catalog of the Michigan Technological University. These records are presented as **Ex. 1106** in this declaration. Pages 1 to 3 are the bibliographic record, and page 4 is the MARC record I copied from the library's online catalog. The first six digits of Field 008 show the record was created on "980611" (*i.e.*, June 11, 1998), and subfields "a" and "c" of Field 040 show EZT (*i.e.*, the Michigan

Technological University Library) created the record and entered it into the WorldCat database of OCLC. Fields 008 and 040 inform my opinion that this MARC record of the Michigan Technological University Library made the conference proceedings containing Quinn discoverable on June 11, 1998 at this library.

93. Since the Linda Hall Library record (**Ex. 1105**) is based on the original record (**Ex. 1106**), the two records have many data elements in common, including the ISBN in Field 020, title and conference sponsors in Field 245, publisher information and copyright date in Field 260, physical description in Field 30, bibliographical reference note in Field 504, conference sponsors in Fields 710, and two related conferences in Fields 711. In addition, the two records also use the same Library of Congress Classification Number in Field 090 and Library of Congress subject headings in Fields 650 to represent the subjects of this publication. There are small differences between these two records, including different forms for the main conference in Field 111, different variant titles in Fields 246, and the Linda Hall Library record includes two more related conferences than the original record.

94. **Ex. 1106** shows the original MARC record was completed on June 11, 1998. As of that date, interested users could search for the conference proceedings containing Quinn by ISBN, title, conference sponsors, variant titles,

related conferences, Library of Congress Classification number, and Library of Congress subject headings.

95. Citation 3. Chauveau, S., & Bodin, F. (1998, May). Menhir: An environment for high performance Matlab. In International Workshop on Languages, Compilers, and Run-Time Systems for Scalable Computers (pp. 27-40), ("Chauveau"). Berlin, Heidelberg: Springer Berlin Heidelberg. I obtained a copy of this article from the Library of Congress. This copy is presented as **Ex. 1107** in this declaration.

96. Pages 1 to 7 of **Ex. 1107** are the front matter of the book that contains Chauveau. Page 3 is the copyright page that shows "3-540-65172-1" as the book's ISBN, and "1998" as the book's copyright date, with Springer-Verlag Berlin Heidelberg as the copyright holder. Page 4 shows an enlarged scan of the copyright page to make the library date stamp more legible, and it shows a date stamp of "Library of Congress DEC – 2 1998 CIP." Pages 5 to 7 are the table of contents and page 5 shows Chauveau begins on page 27 of this book.

97. Pages 8 to 21 are the full text of Chauveau, and page 21 shows *Trefethen* is cited in Reference 12 as: Anne E. Trefethen, Vijay S. Menon, Chi-Chao Chang, Grzegorz J. Cazjkowski, Chirs Myers, and Lloyd N. Trefethen. MultiMATLAB: MATLAB on multiple processors. Technical Report 239, Cornell Theory Center, 1996.

98. As evidence that the book containing Chauveau became available at libraries, I obtained the bibliographic and MARC records for this book from the online catalog of the Library of Congress. These records are presented as **Ex. 1108** in this declaration. Pages 1 to 4 are the bibliographic record that shows the title, conference name, editor, publisher, copyright date, ISBNs, and other details, confirming this record represents the book that contains Chauveau. Pages 6 to 8 are the MARC record, and the first six digits of Field 008 show the record was first created on "980921" (*i.e.*, September 21, 1998). Subfields "a" and "c" of Field 040 show "DLC" (*i.e.*, Library of Congress) created the original record and entered it into the WorldCat database on OCLC. Field 955 is a note field for local cataloging activities and it shows a date of "01-08-99" (*i.e.*, January 8, 1999) for "CIP ver." (meaning verification of the Cataloging-In-Publication record). Fields 008, 040, and 955 inform my opinion that the Library of Congress created a pre-publication record for the book containing Chauveau on September 21, 1998, and received a physical copy on January 8, 1999, for the verification of the pre-publication record. After that step, the physical copy would be processed for public access. My personal experience with the collections at the Library of Congress is that it may take one to three months for a newly cataloged work to become publicly accessible. It is therefore my opinion that the book containing Chauveau would become publicly accessible at the Library of Congress no later than April 1999.

99. In short, the full text and supporting records for **Ex. 1102**, **Ex. 1104**, and **Ex. 1107** show that these citing documents to *Trefethen* were published in 1997 and 1998, and became publicly accessible at libraries in 1998 and early 1999.

E. Summary of My Opinion on *Trefethen*

100. It is my opinion that **Ex. 1006** is authentic because it contains no signs to raise suspicion about its authenticity. Specifically, the text flows logically from page to page, and there are no visible alterations to the document. Furthermore, **Ex. 1006** is identical to a copy obtained from the institutional repository of Cornell University (**Ex. 1099**), and has the same content as a copy archived by Internet Archive on May 10, 1996 (**Ex. 1098**).

101. Documents archived by Internet Archive (**Ex. 1100**) show interested users could discover *Trefethen* by visiting the lead author's webpage and following the link to *Trefethen*. The Wayback Machine calendar for *Trefethen* shows May 10, 1996 is the earliest time when *Trefethen* was archived. This date means that *Trefethen* was available on the Internet no later than May 10, 1996. From May 1996 to June 1997 and beyond, interested users could use search engines to search for MultiMATLAB or MATLAB to discover *Trefethen*. They could also use search engines to discover the author's webpage to find *Trefethen*.

102. The MARC record of the Washington State University Library (**Ex. 1101**) shows the library created an original record for *Trefethen* on November 3,

1997, making this work discoverable in their online catalog on that date.

103. Early citations to *Trefethen* were published in 1997 and 1998 and became publicly accessible at libraries in 1998 and early 1999 (**Exs. 1102**, **1103**, **1104**, **1105**, **1106**, **1107**, and **1108**).

104. Based on the records and documents I have reviewed, it is my opinion that *Trefethen* was published in May 1996, and was archived by Internet Archive on May 10, 1996, making this work discoverable on the Internet on that date. In 1996, 1997 and beyond, interested users could use search engines to search for MultiMATLAB or MATLAB to discover *Trefethen*. They could also use search engines to discover the lead author's webpage and follow the link for MultiMATLAB on that webpage to access *Trefethen*. The Washington State University Library cataloged *Trefethen* on November 3, 1997, making this work discoverable at this library on that date. Three early citations were published in 1997 and 1998, and became publicly accessible at libraries in 1998 and 1999. The earliest citation is a dissertation completed and approved in September 1997.

V. Authenticity and Public Availability of *RS6000* (Ex. 1007)

A. Authentication

105. **Ex. 1007** is a true and correct copy of "Introducing the RS/6000 SP" and "375 MHz Power3 SMP High Node (F/C 2058)" from RS/6000 SP: Planning. Vol. 1, Hardware and Physical Environment, ("*RS6000*"), that I received from

counsel. This copy is presented as **Ex. 1007** in this declaration.

106. Page 1 of **Ex. 1007** shows this document is entitled "RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment." Pages 1 to 8 are the full text of "Introduction the RS/6000 SP" (available at https://web.archive.org/web/20010726184202/http:/www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html; Figure 1 not displayed), and Pages 9 to 12 are the full text of "375 MHz POWER3 SMP High Note (F/C 2058)" (available at https://web.archive.org/web/20010726183314/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html).

107. To authenticate *RS6000*, I searched Internet Archive and located an archived copy of RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment, Ninth edition (April 2001), then used it to obtain "Introducing the RS/6000 SP" and "375 MHz Power3 SMP High Node (F/C 2058)." This archived copy of *RS6000* is presented as **Ex. 1109** in this declaration.

108. Page 1 of **Ex. 1109** is a screen capture of a Wayback Machine calendar that shows "RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment" was archived once on "JUN 17 2001" and available at https://web.archive.org/web/20010617011337/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst.html. Pages 2 and 3 are the

PDF version of the archived copy that shows this work is the "Ninth edition (April 2001)" and its document number is "GA22-7280-09." This document explains that this edition "applies to Version 3 Release 2 of IBM Parallel System Support Programs for AIX (PSSP), which runs on the IBM RS/6000 SP, and to all subsequent releases and modifications until otherwise indicated in new editions." The end of this home page shows this document has a 2001 copyright date and the International Business Machines Corporation holds the copyright date. Page 3 shows links to the contents of this document. I used the "Table of Contents" link on page 3 to obtain "Introducing the RS/6000 SP" section and the "375 MHz Power 3 SMP High Node (F/C 2058)" section.

109. Page 4 of **Ex. 1109** is a screen capture of a Wayback Machine calendar that shows "Introducing the RS/6000 SP" was archived twice and this particular copy was archived on "JUL 26 2001" and available at https://web.archive.org/web/20010726184202/http:/www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html (Figure 1 is not displayed because Internet Archive did not archive it). Pages 5 to 12 are the PDF of the archived copy that shows this section has eight pages.

110. Page 13 is a screen capture of a Wayback Machine calendar that shows "375 MHz POWER3 SMP High Node (F/C 2058)" was archived twice and this particular copy was archived on "JUL 26 2001" and available at

https://web.archive.org/web/20010726183314/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html. Pages 14 to 17 are the full text of this section.

111. I have closely compared **Ex. 1007** with the copy archived on July 26, 2001 (**Ex. 1109**), and found them to have the same content. It is my opinion that **Ex. 1007** is in a condition that creates no suspicion about its authenticity. Specifically, there are no visible alterations to the document. Furthermore, **Ex. 1007** has the same content as **Ex. 1109**. Based on my review, I have no reason to question the authenticity of **Ex. 1007**.

B. Internet Archive Records

112. **Ex. 1109** shows *RS6000* was publicly accessible on the Internet no later than July 26, 2001. To illustrate how interested users could discover this archived copy in 2001, I have obtained webpages archived by Internet Archive to show how I discovered **Ex. 1109**. These archived webpages are presented as **Ex. 1110** in this declaration.

113. My discovery of *RS6000* began with the "RS/6000 SP Product Documentation Library" on the IBM website. Page 1 of **Ex. 1110** is a Wayback Machine calendar that shows this webpage was archive 29 times and this particular copy was archived on "APR 10 2001" and available at https://web.archive.org/web/20010410025356/http://www.rs6000.ibm.com/resource

/aix_resource/sp_books/index.html). This page presents five groups of resources for users. I selected the link for "RS/6000 SP Planning" to reach the "RS/6000 SP Planning Library" archived on February 26, 2001 and available at https://web.archive.org/web/20010226130852/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/planning/index.html (see page 3 of **Ex. 1110**). The PDF of this archived webpage on page 4 of **Ex. 1110** shows links for RS/6000 SP Planning Volume 1, Hardware and Physical Environment (GA22-7280) (October, 2000) UPDATED[4] and RS/6000 SP: Planning Volume 2, Control Workstation and Software Environment (GA22-7281) (July, 2000). The "Browse HTML" link for volume 1 led me to RS/6000 SP: Planning. Vol. 1, Hardware and Physical Environment, archived on June 17, 2001, available at https://web.archive.org/web/20010617011337/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst.html (see page 5 of **Ex. 1110**). Pages 6 is the PDF of this archived copy that shows this copy is the "Ninth edition (April 2001)" version that has a document number of "GA22-7280-09." The "Table of Contents" link led me to the "Contents" webpage of RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment, archived on April 29, 2001, and available at

[4] As shown in **Ex. 1110**, the green highlighting is included on the webpage.

https://web.archive.org/web/20010429053331/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst02.html#ToC (see page 8 of **Ex. 1110**). Pages 9 to 19 are the PDF of this archived Contents page. I then used the links to obtain "Introducing the RS/6000 SP" and "375 MHz POWER3 SMP High Node (F/C 2058)."

114. Page 20 of **Ex. 1110** shows "Introducing the RS/6000 SP" was archived on "4 May 2001" and "26 Jul 2001," and this particular copy was archived on May 4, 2001, and available at https://web.archive.org/web/20010504220357/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html. Pages 21 to 28 are the PDF of this archived copy. The copy archived on July 26 2001 is the same as the copy archived on May 4, 2001, and included in **Ex. 1109**.

115. Page 29 of **Ex. 1110** shows "375 MHz POWER3 SMP High Node (F/C 2058)" was archived on "4 May 2001" and "26 Jul 2001," and this particular copy was archived on May 4, 2001, and available at https://web.archive.org/web/20010504220513/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html. Pages 30 to 33 are the PDF of this archived copy. The copy archived on July 26 2001 is the same as the copy archived on May 4, 2001, and included in **Ex. 1109**.

116. **Ex. 1110** shows the steps interested users could take to discover

RS/6000 SP: Planning, Vol. 1, Hardware and Physical Environment, Ninth edition (April 2001). The archived copies show the earliest archive date for Volume 1 is June 17, 2001, and the earliest archive date for "Introducing the RS/6000 SP" and "375 MHz POWER3 SMP High Node (F/C 2058)" was May 4, 2001, meaning these sections were publicly accessible on the Internet no later than May 4, 2001.

117. The bibliography of RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment indicates in the "Finding documentation on the world Wide Web" that "Most of the RS/6000 SP hardware and software books are available from the IBM RS/6000 Web site at: http://www.rs6000.ibm.com." I then used this URL to search Internet Archive for archived copies of *RS6000*. **Ex. 1111** contains archived webpages that illustrate another path to discover *RS6000*.

118. The Wayback Machine calendar of Internet Archive shows the URL for RS/6000 SP documentations (http://www.rs6000.ibm.com) was archived 421 times between "December 5, 1998 and August 19, 2025." I selected the link for the October 24, 2001 archived copy and was led to "IBM eserver pSeries" for UNIX and open systems, archived on Oct. 24, 2001, at https://web.archive.org/web/20011024235023/http://www-1.ibm.com/servers/eserver/pseries/ (see page 1 of **Ex. 1111** for the Wayback Machine calendar for this webpage, and pages 2 and 3 for the PDF of the archived copy). The Hardware section shows a link for Large scale servers "Featuring the

IBM RS/6000 SP," so I selected the "Learn more" link to find resources on RS/6000 SP. This link led to "UNIX Clusters," archived on November 17, 2001, and available at https://web.archive.org/web/20011117173836/http://www-1.ibm.com/servers/eserver/pseries/hardware/largescale/ (see page 4 for a Wayback Machine calendar and page 5 for the PDF of this archived copy). The RS/6000 SP section shows seven links for resources, so I selected "RS/6000 SP product documentation" to learn more. This link then led me to the RS/6000 SP Product Documentation Library, archived on April 10, 2001, and available at https://web.archive.org/web/20010410025356/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/index.html (see page 6 for a Wayback Machine calendar for this archived copy and page 7 for the PDF of this archived copy). The link for "RS/6000 SP Planning" led to the "RS/6000 SP Planning Library," archived on February 26, 2001, and available at https://web.archive.org/web/20010226130852/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/planning/index.html (see page 8 for a Wayback Machine calendar for this archived copy and page 9 for the PDF of this archived copy). Page 9 shows links for volume 1 (GA22-7280) and volume 2 (GA22-7281) of RS/6000 SP Planning. The link for "Browse HTML" for volume 1 led to the Ninth edition (April 2001) of RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment, archived on June 17, 2001, and available at https://web.archive.org/web/20010617011337/http://www.rs6000.ibm.com/resource/ai

x_resource/sp_books/hardware/planguide1/da709mst.html (see page 10 for a Wayback Machine calendar and Pages 11 and 12 for the PDF of this archived copy). The "Table of Contents" link led to the Contents page, archived on April 29, 2001, and available at https://web.archive.org/web/20010429053331/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst02.html#ToC (see page 13 for a Wayback Machine calendar for this archived copy, and pages 14 to 24 for the PDF of this archived copy). From this Contents page I selected "Introducing the RS/6000 SP," archived on May 4, 2001, and available at https://web.archive.org/web/20010504220357/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html (see pages 25 to 33); and "375 MHz POWER3 SMP High Node (F/C 2058)," archived on May 4, 2001, and available at https://web.archive.org/web/20010504220513/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html (see pages 34 to 38).

119. **Ex. 1111** shows the steps interested users could take to discover RS/6000 SP: Planning, Vol. 1, Hardware and Physical Environment, Ninth edition (April 2001). The archived copies in **Ex. 1111** show that interested users could begin with the URL for RS/6000 SP documentation (http://www.rs6000.ibm.com)

and follow relevant links to reach the Nineth edition of RS/6000 SP: Planning, Vol. 1, Hardware and Physical Environment. **Ex. 1111** shows the earliest archive date for Volume 1 was June 17, 2001, and the earliest archive date for "Introducing the RS/6000 SP" and "375 MHz POWER3 SMP High Node (F/C 2058)" was May 4, 2001, meaning these sections were publicly accessible on the Internet no later than May 4, 2001.

C. Usage Records

120. Actual usage of a publication is reflected by other publications that make reference to it. I have identified a 2002 citation by R. E. Moncrief to *RS/6000 SP* from Google Scholar. This article is briefly discussed below to show *RS6000* was known and used by other researchers in 2002.

121. Moncrief, II, R. E. (2002, July). *IBM RS/6000*. Available at https://users.cs.jmu.edu/abzugcx/Public/Student-Produced-Term-Projects/Computer-ARCHITECTURE-2002-SUMMER/IBM-RS-6000-by-Robert-Moncrief-2002-SUMMER-CS-585.doc. I have saved the Word document in PDF for this declaration. The PDF of Moncrief is presented as **Ex. 1112** in this declaration.

122. Page 1 of **Ex. 1112** shows "IBM RS/6000" as the title, Robert E Moncrief II as the author, and a text indicating this article is for "CS-585, Summer 2002." **Ex. 1112** has a total of seven pages, including figures (some color) and 11

references. Page 7 shows a reference for "IBM Corporation. "RS/6000 Planning Vol. 1, Hardware and Physical Environment" URL "http://publibfp.boulder.ibm.com/epubs/pdf/da70bmst.pdf."

D. Summary of My Opinion on *RS6000*

123. It is my opinion that **Ex. 1007** is authentic because it has the same content as a copy of this work archived by Internet Archive on May 4, 2001, and another copy archived by Internet Archive on July 26, 2001.

124. Webpages archived by Internet Archive (**Ex. 1110** and **1007C**) show two paths of discovery of *RS6000*, and the paths led to the same copy of RS/6000 SP: Planning, Vol. 1, Hardware and Physical Environment (Ninth edition, April 2001), archived on June 17, 2001, and available at https://web.archive.org/web/20010617011337/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst.html. Interested users could use the table of contents to select the sections of interest. Specifically, archived webpages show that "Introducing the RS/6000 SP" and "375 MHz POWER3 SMP High Node (F/C 2058)" were first archived on May 4, 2001, meaning these two sections were publicly accessible on the Internet no later than May 4, 2001. RS/6000 SP: Planning, Vol. 1, Hardware and Physical Environment was also cited by a researcher (Moncrief) in a paper completed in summer 2002.

125. Based on the records and documents I have reviewed, it is my opinion

that RS/6000 SP: Planning, Vol. 1, Hardware and Physical Environment (Ninth edition, April 2001) was publicly accessible on the Internet no later than June 17, 2001. In addition, "Introducing the RS/6000 SP" and "375 MHz POWER3 SMP High Node (F/C 2058)" were first archived on May 4, 2001, meaning these two sections were publicly accessible on the Internet no later than May 4, 2001. The earliest citation to RS/6000 SP: Planning, Vol. 1, Hardware and Physical Environment was completed in summer 2002.

VI. Authenticity and Public Availability of *POE-2001*(Ex. 1008)

A. Authentication

126. **Ex. 1008** is a true and correct copy of *IBM Parallel Environment for AIX, Operation and Use, Volume 1, Using the Parallel Operating Environment*, Version 3, Release 2, ("*POE-2001*"), that I received from counsel. Page 1 is the cover that shows the title and a document number of "SA22-7425-01." Page 4 is the copyright page that shows an edition statement of "Second Edition (December 2001)" and explains that "This edition applies to version 3, release 2 of IBM Parallel Environment for AIX (product number 5765-D93) and to all subsequent releases and modifications until otherwise indicated in new editions." This page shows **Ex. 1008** has a 2001 copyright date and the International Business Machines Corporation holds the copyright. The table of contents shows *POE-2001* includes four chapters, Appendix A, Appendix B, Glossary, Bibliography and an index.

127. **Ex. 1008** is in a condition that creates no suspicion about its authenticity. Specifically, there are no missing pages and no visible alterations to the document. In addition, the document includes notices on IBM products and services, copyright, licensing information, and trademarks (see internal pages 145 to 147). Based on my review, I have no reason to question the authenticity of **Ex. 1008**.

B. Internet Archive Records

128. My research found that archived webpages on the IBM website show *POE-2001* was available no later than February 2002 and continued to be available beyond early 2004. Internet Archive does not archive every web file or resource, and it has not archived*POE-2001*. Changes in IBM servers and system architecture may have contributed to this situation. I have obtained several archived webpages from the IBM website to show how interested users could discover *POE-2001* in 2002, 2003, and 2004, and how this document was presented as available for online browse or download on IBM webpages in those years. These webpages are presented in **Ex. 1113** in this declaration. In addition, two citing documents are included to show *POE-2001* was known and used by researchers in 2004 and 2005.

129. **Ex. 1113** contains archived webpages related to the discovery of *POE-2001*. I personally located, identified, and obtained these webpages from Internet Archive. These documents are the type of material experts in my field

would reasonably rely upon when forming their opinions.

130. **Ex. 1008** shows that documentation on most of the RS/6000 SP hardware and software books are available from the IBM web site at www.ibm.com/servers/eserver/pseries (see internal page 175), so I began with this link on the Wayback Machine of Internet Archive, and selected a link in December 2001. The system redirected me to https://web.archive.org/web/20011204190353/http://www-1.ibm.com/servers/eserver/pseries/. This URL indicates the URL of the original webpage was changed to http://www-1.ibm.com/servers/eserver/pseries/.

131. Page 1 of **Ex. 1113** shows a screen capture of a Wayback Machine calendar that shows the "IBM (e)server pSeries" webpage[5] was archived 337 times, and this particular copy was archived on "DEC 04 2001" and available at https://web.archive.org/web/20011204190353/http://www-1.ibm.com/servers/eserver/pseries/. Pages 2 and 3 are the PDF of this archived copy that shows various servers, and the navigation menu on the left side of the screen shows many options for exploring the IBM web site. I selected "Library" to find more resources, and was led to the "Library" webpage, archived on "FEB 01 2002" and available at https://web.archive.org/web/20020201231630/http://www-

[5] As shown on Ex. 1113, the "(e)" is printed in stylized red font.

1.ibm.com/servers/eserver/pseries/library/ (see pages 4 to 6).

132. From the "Library" webpage I selected "Scalable Parallel (SP) hardware and software documentation" that has a brief description of "SP multi-processor systems hardware and software manuals. Covers topics such as planning, service, system management, file systems, and diagnostics in parallel systems environments." This link led me to "RS/6000 SP (Scalable POWERparallel) hardware and software documentation." This webpage informs webpage visitors that they can browse "or download documentation for IBM (e)Server pSeries and IBM RS/6000 SP products. It's all here in this library." This webpage was archived on "JUN 09 2002" and available at https://web.archive.org/web/20020609145514/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/index.html (see pages 7 and 8).

133. Under "SP software" I selected the link for "Parallel Environment (PE)" and the link led to the webpage entitled "IBM Parallel Environment for AIX (PE)," which was archived on "JUN 06 2002" and available at https://web.archive.org/web/20020606195122/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html (see pages 9 to 11). This webpage presents documents in a three-column table. Page 10 shows the first table is for "PE for AIX 5L Version 3 Release 2 (December 2001)." Column 1 shows document titles, column 2 shows document numbers, and column 3 shows

PDF version for each document. This table shows "Operation and Use, Volume 1" has a document number of "SA22-7425-01" and the PDF version has "630MB." The document number and the PDF version are hyperlinks for users to access the files. However, Internet Archive has not archived these files.

134. Since the Wayback Machine calendar on page 9 shows this webpage was archived 29 times, I visited the links for February 2, 2002 to see if the files were archived earlier. Page 12 is a screen capture that shows the same information for "Operation and Use, Volume 1" was presented in the copy archived in February 2002 and available at https://web.archive.org/web/20020202032414/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html. While the table heading showed "Document number (Browse online)," the number of "SA22-7425-01" was not archived and could not be browsed online. I was not able to download the PDF version because Internet Archive has not archived it.

135. I tried the links for the copies archived on December 1, 2002, and June 8, 2003, and the system responded with the same display (see pages 13 and 14). These two archived copies are available at https://web.archive.org/web/20021201233611/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html and https://web.archive.org/web/20030608171628/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html. The document number

("SA22-7425-01") and the PDF links in these two archived pages were not archived by Internet Archive.

136. I also tried the link for the copy archived on February 3, 2004. This archived copy is available at https://web.archive.org/web/20040203114921/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html. By that time, Version 4.1 (October 2003) had become available (see page 15). Page 16 shows "PE for AIX 5L Version 3 Release 2 (December 2001) was still available for user access, and "Operation and Use, Volume 1" was listed with the same document number ("SA22-7425-01") and a link for the PDF version was included, but these two files were not archived by Internet Archive.

137. The archived webpages in **Ex. 1113** show that interested users could navigate the IBM web site to reach the webpage for "IBM Parallel Environment for AIX (PE)" but archives pages from February 2002 to February 2004 show Internet Archive did not archive *POE-2001*. Internet Archive is a valuable digital library of web resources, but it does not archive everything. In this case, while the archived webpages show Internet Archive did not capture the files on the webpage for "IBM Parallel Environment for AIX (PE)," that does not indicate that in the relevant time frame interested users could not download the file. As shown on page 9 of **Ex. 1113**, the PDF file was 630 MB, so it is likely the Internet Archive did not archive it

due to its size. But there is no reason to doubt that the file was not available in the relevant time frame.

C. Usage Records

138. Actual usage of a publication is reflected by other publications that make reference to it. I have searched Google Scholar and Google Patents to identify two citations that cited *POE-2001*. I have obtained these citing documents, and included supporting records to show the citing documents were publicly accessible before the June 2006 priority date.

139. Citation 1. Saif, T., & Parashar, M. (2004, August). Understanding the behavior and performance of non-blocking communications in MPI. In *European Conference on Parallel Processing* (pp. 173-182). Berlin, Heidelberg: Springer Berlin Heidelberg. I obtained the full text of Saif from https://www.cs.umd.edu/class/fall2019/cmsc714/readings/Saif-non-blocking.pdf. This copy is presented as **Ex. 1114**. Page 1 shows the title, authors, and abstract, and the bottom of the page shows Saif appears in "Euro-Par 2004, LNCS 3149, pp. 173-182, 2004" and has a "2004" copyright date with the publisher as the copyright holder. Reference #3 on page 10 shows *POE-2001* is cited as "Parallel Environment (PE) for AIX V3R2.0: Operation and Use, Vol. 1. December 2001."

140. As evidence that Saif was publicly accessible at libraries before the June 2006 priority date, I obtained bibliographic and MARC records for Euro-Par

2004, which is the conference proceedings that contains Saif, from the online catalog of the Library Congress at https://lccn.loc.gov/2004110451. These records are presented as **Ex. 1115** in this declaration.

141. Pages 1 to 4 of **Ex. 1115** are the bibliographic record that shows the title, conference name, editors, publisher, and date of publication ("2004"). These details match the information presented in **Ex. 1114**.

142. Pages 5 to 8 are the MARC record, and the first six digits of Field 008 show the record was created on "040719" (*i.e.*, July 19, 2004). Subfields "a" and "c" of Field 040 show DLC (*i.e.*, the Library of Congress) created the original record and entered it into the WorldCat database on OCLC. Field 955 is a field for local notes on cataloging activities, and it shows the record was completed on "2005-06-06" (*i.e.*, June 6, 2005). A customary library practice is to process a newly cataloged work promptly for public access, usually within a week after the cataloging work is completed. My personal experience with the Library of Congress collections is that it can take one to three months for a newly cataloged book to become publicly accessible. It is therefore my opinion that the conference proceedings containing Saif would become publicly accessible at the Library of Congress no later than September 6, 2005.

143. Citation 2. Huang, S. H, & Tuel, W. G. Managing message arrival to ensure proper matching of unordered messages. United States patent application US

10/685,144, publication date April 14, 2005, Publication No: US 2005/0078605A1; available at https://patentimages.storage.googleapis.com/7f/3a/be/d20cdc4465037a/US20050078605A1.pdf. I obtained the full text of this document from Google Patents. This copy is presented as **Ex. 1116** in this declaration. The document states on page 12 that "Details regarding a parallel operating environment for AIX are described in a publication entitled, "Operation and Use, Volume 1. Using the Parallel Operating Environment," Publication Number SA22-7425-01, Version 3 Release 2, Second Edition (December 2001), http://publib.boulder.ibm.com/doc link/en_US/a_doc_lib/sp34/pe/html/am102mst.html, which is hereby incorporated herein by reference in its entirety."

144. **Ex. 1114** and **Ex. 1115** show this 2004 conference paper citing *POE-2001* became publicly accessible at the Library of Congress no later than September 6, 2005. **Ex. 1116** shows the patent application published in April 2005 cites *POE-2001*. These two citing documents show researchers were able to access *POE-2001* by April 2005 and no later than September 2005, which is several months before the June 2006 priority date.

D. Summary of My Opinion on *POE-2001*

145. It is my opinion that **Ex. 1008** is authentic because it contains no signs to raise suspicion about its authenticity. The pages flow sequentially, there are no

visible alterations to the pages, and notices on copyright, licensing and trademarks are clearly presented in the document. The document also includes sources for interested users to obtain documentation on the Internet.

146. The public availability of **Ex. 1008** is demonstrated by archived webpages on the IBM web site (**Ex. 1113**). These archived webpages show **Ex. 1008** was first presented on the IBM web site as available for public access in February 2002, but the file was not archived by Internet Archive. Archived webpages from February 2002 to February 2004 show **Ex. 1008** was presented on IBM webpages as available for user access. Internet Archive, however, did not archive the file. It is helpful to keep in mind that Internet Archive does not archive everything on the Internet. Although no archived copies of **Ex. 1008** can be located, five copies of the webpage for documentation for the IBM Parallel Environment for AIX (PE) show that **Ex. 1008** was presented as available for public access in February 2002. After a new version ("PE for AIX 5L V4.1") became available in October 2003, the webpage for documentation for the IBM Parallel Environment for AIX (PE) continued to present **Ex. 1008** as available for user access in February 2004.

147. **Ex. 1114**, **Ex. 1115**, and **Ex. 1116** show the 2004 and 2005 citations to **Ex. 1008** were publicly accessible by April 2005 and no later than September 2005, several months before the June 2006 priority date.

148. Based on the records and documents I have reviewed, it is my opinion that **Ex. 1008** was publicly accessible on the Internet in February 2002. The 2004 and 2005 citations show that **Ex. 1008** was definitely accessible to interested users before the priority date of June 2006.

VII. Authenticity and Public Availability of *MPI-1994* (Ex. 1017)

A. Authentication

149. **Ex. 1017** is a true and correct copy of "MPI: A message-passing interface standard," ("*MPI-1994*"), issued by the Message Passing Interface Forum in May 1994, that I received from counsel. This copy is presented as **Ex. 1017** in this declaration.

150. Page 1 of **Ex. 1017** is the title page that shows the title, issuing body, and a publication date of "May 5, 1994." A note shows this work "was supported in part by ARPA and NSF under grant ASC-9310330, the National Science Foundation Science and Technology Center Cooperative Agreement No. CCR-8809615, and by the Commission of the European Community through Esprit project P6643(PPPE)." Page 2 shows "The Message Passing Interface Forum (MPIF), with participation from over 40 organizations, has been meeting since November 1992 to discuss and define a set of library interface standards for message passing" and explains that this version "is the final report, Version 1.0, of the Message Passing Interface Forum. This document contains all the technical

features proposed for the interface. This copy of the draft was processed by LaTeX on May 5, 1994." This page shows this document has a "1994" copyright date and the University of Tennessee, Knoxville, Tennessee holds the copyright. Pages 3 to 6 are the table of contents that shows *MPI-1994* includes eight chapters, a bibliography, an Annex on Language Binding, and an MPI Function Index. The end of the Acknowledgement on page 7 states that "The University of Tennessee and Oak Ridge National Laboratory made the draft available by anonymous FTP mail servers and were instrumental in distributing the document." **Ex. 1017** shows the last numbered page of *MPI-1994* is 228.

151. To authenticate **Ex. 1017**, I searched Internet Archive for archived copies and found a copy at https://web.archive.org/web/19980703063729/http://www.mpi-forum.org/docs/mpi-10.ps that shows *MPI-1994* was archived on July 3, 1998 as a PostScript file. People share PostScript files ("ps") to ensure the final printed product is of high quality and matches the original file. I opened this archived PostScript file for *MPI-1994* with FreeFileConvert (https://www.freefileconvert.com/) and converted it into a PDF. This PDF is presented as **Ex. 1117** in this declaration. I have closely compared **Ex. 1017** with **Ex. 1117** and found them to be the same.

152. It is my opinion that **Ex. 1017** is authentic because there are no missing pages, the text flows logically from page to page, and there are no visible

alterations to the document. Furthermore, the content of **Ex. 1017** is the same as a copy posted in the PostScript file format and archived by Internet Archive (**Ex. 1117**). Based on my review and analysis, it is my opinion that **Ex. 1017** is authentic.

B. Internet Archive Records

153. Since **Ex. 1017** shows the file has been distributed via FTP mail servers and other channels, I searched Internet Archive for archived copies and found three archived webpages that showed a clear path to *MPI-1994*. These Internet Archive records are presented as **Ex. 1118** in this declaration.

154. Page 1 of **Ex. 1118** is a screen capture of a Wayback Machine calendar that shows the "Message Passing Interface Forum" (http://www.mpi-forum.org/) was archived 2,497 times between "25 Jan 1998" and "3 Oct 2025" and this particular copy was archived on January 25, 1998, available at https://web.archive.org/web/19980125230856/www.mpi-forum.org/. Page 2 is the PDF of this archived copy. I followed the link for "MPI documents (including standards)" to reach the "MPI Documents" webpage archived on January 25, 1998, available at https://web.archive.org/web/19980125230954/http://www.mpi-forum.org/docs/docs.html (see page 3 for the Wayback Machine calendar). Page 4 shows a description under the "MPI-1.0" heading that the "MPI-1.0 document is made available for archival purposes. It has been superseded by MP-1.1 (and later versions)." I then followed the "postscript" link for the MPI-1.0 document to reach

the postscript file archived on "JUL 03 1998" and available at https://web.archive.org/web/19980703063729/http://www.mpi-forum.org/docs/mpi-10.ps. I downloaded the postscript file, opened the file, and saved it as a PDF file for this declaration (presented as **Ex. 1117** above). **Ex. 1118** shows that interested users could follow this path to access *MPI-1994*, and that Version 1.0 was publicly accessible on the Internet no later than July 3, 1998.

C. Dissemination of *MPI-1994*

155. *MPI-1994* has been disseminated through several channels. "Implementing MPI: the 1994 MPI implementors' workshop," by W. Gropp and E. Lusk was published in October 1994 in the *Proceedings Scalable Parallel Libraries Conference* (pp. 55-59). This article describes a September 1994 workshop on implementation issues for MPI and presents a list of sharable MPI resources. I obtained a copy of this article at https://www.osti.gov/servlets/purl/519141 from the Department of Energy Office of Scientific and Technical Information. This article is presented as **Ex. 1119** in this declaration.

156. Page 6 of **Ex. 1119** (internal page 58) presents a partial list of "Sharable MPI Resources" that shows the Standard itself is available (1) "as a technical report: U. of T. report," (2) "as postscript for ftp: at info.mcs.anl.gov in pub/mpo/mpi-report.ps," (3) "as hypertext on the World Wide Web: http//www.mcs.anl.gov/mpi," and (4) "as a journal article: In the Fall issue of the

Journal of Supercomputing Applications," and the reference note shows the journal issue containing *MPI-1994* is v. 8, no. ¾, published in 1994. **Ex. 1119** was published in October 1994, meaning that by that time interested users would become aware of at least four sources to access *MPI-1994*.

D. Records of the National Science Library of Canada

157. To determine whether *MPI-1994* was publicly accessible at libraries, I searched for library records and found that the National Science Library of Canada cataloged this standard in 1994. **Ex. 1120** is a true and correct copy of the bibliographic and MARC records for *MPI-1994*. I personally located, identified, and obtained these records from the online catalog of the Federal Science Library Network of Canada. They are the type of records experts in my field would reasonably rely upon when forming their opinions.

158. Pages 1 and 2 of **Ex. 1120** are the bibliographic record. The Title field shows "MPI : a message-passing interface standard : special issue" to inform users that this record represents a special issue of a journal that contains *MPI-1994*. The Series field shows *MPI-1994* is available in "The International journal of supercomputer applications; v. 8, no. ¾." The Publisher field shows the MIT Press of Cambridge, MA published this special issue in 1994. The Description field shows this document runs from page 159 to page 419. The Added title field shows "Message-passing interface standard" to help users discover this publication. The

Location area shows this work is available at the National Science Library of Canada in Ottawa, its call number is "QA75.5 I62 v.8, no. ¾" and it is available for user access.

159. Page 3 is the MARC record, and the first six digits of Field 008 show this record was created on "941122" (*i.e.*, November 22, 1994). Subfields "a" and "c" of Field 040 show "CAOON" created the original record and entered it into the WorldCat database of OCLC. "OON" is the Canadian library symbol for the National Science Library of Canada, according to the record (https://sigles-symbols.bac-lac.gc.ca/eng/Search/Details?Id=1515) in the Canadian Library Directory. Field 005 is a machine-generated field that automatically records the last time this library modified this MARC record, and it shows the last record modification date was "19941122." Fields 008, 040, and 005 inform my opinion that the National Science Library of Canada created an original record for the journal issue containing *MPI-1994* on November 22, 1994, making *MPI-1994* discoverable in their online catalog on that date. As of that date, interested users could search for *MPI-1994* by title, added title, and journal title.

160. Subfield "c" of Field 040 shows the National Science Library of Canada entered their record into the WorldCat database on OCLC. Pages 4 and 5 of **Ex. 1120** are the record I obtained from OCLC FirstSearch. The top of the record shows the National Science Library of Canada as the holding library of the work

entitled "MPI : A message-passing interface standard : special issue." The FirstSearch record shows the same data elements as those in the library's records (see pages 1 and 2 of **Ex. 1120**). The Entry field and the Database field show this record was entered into the WorldCat database on "19941122," confirming the record was entered into the WorldCat database on OCLC on November 22, 1994.

161. **Ex. 1119** shows *MPI-1994* was disseminated through v. 8, no. ¾ of *The International Journal of Supercomputer Applications*, and **Ex. 1120** shows that the National Science Library of Canada created a record for this special issue on November 22, 1994, making *MPI-1994* discoverable in the library's online catalog on that date. The record was also entered into the WorldCat database, making *MPI-1994* discoverable from that date on by librarians who use the WorldCat database for copy cataloging and collection management purposes, by subscribers of OCLC FirstSearch, and by the general public who can freely access WorldCat.org, the free web portal.

E. Records of the Library of the University of Edinburgh

162. My research also identified the library of the University of Edinburgh as a holding library of *MPI-1994*. **Ex. 1121** is a true and correct copy of the bibliographic and MARC records for *MPI-1994* that I personally located, identified, and obtained from the library online catalog of the University of Edinburgh. They are the type of records experts in my field would reasonably rely upon when

forming their opinions.

163. Pages 1 and 2 of **Ex. 1121** are the bibliographic record that shows the title, creator ("Message Passing Interface Forum"), publisher, publication date ("1994"), language, and a note on the support for this work. These details match the information presented in **Ex. 1017** and **Ex. 1117**, confirming this record represents *MPI-1994* disseminated by the University of Tennessee.

164. Page 3 is the MARC record, and the first six digits of Field 008 show the record was created on "040330" (*i.e.*, March 30, 2004), and the code of "s1994" following the record creation date indicates the work has a single publication date of 1994. Subfields "a" and "c" of Field 040 show "StEdU" created the original record and entered it into the WorldCat database on OCLC. "StEdU" is the MARC code for the main library of the University of Edinburgh, according to the "MARC Codes for Organizations in The UK and Its Dependencies" (https://cdn.sanity.io/files/v5dwkion/production/117209c610914f5c919ab96ea4c995e44493bad5.pdf). Fields 008 and 040 inform my opinion that the library of the University of Edinburgh created an original record for *MPI-1994* on March 30, 2004, making this work discoverable in their online catalog on that date. As of that date, interested users could discover this work by title and creator.

165. Subfield "c" of Field 040 shows the library of the University of Edinburgh also entered their record into the WorldCat database on OCLC. Pages 4

and 5 of **Ex. 1121** are the record I obtained from OCLC FirstSearch. The top of the record shows the library of the University of Edinburgh as the holding library of the work entitled "MPI : A message-passing interface standard" authored by the Message Passing Interface Forum. The FirstSearch record shows the same data elements as those in the library's records (see pages 1 and 2 above). The Entry field and the Database field show this record was entered into the WorldCat database on "20040330," confirming the record became discoverable in the WorldCat database on OCLC on March 30, 2004.

166. **Ex. 1119** shows *MPI-1994* was disseminated as a report by the University of Tennessee, and **Ex. 1121** shows that the library of the University of Edinburgh created an original record for this report on March 30, 2004, making *MPI-1994* discoverable in the library's online catalog on that date. The record was also entered into the WorldCat database on March 30, 2004, making *MPI-1994* discoverable from that date on by librarians who use the WorldCat database for copy cataloging and collection management purposes, by subscribers of OCLC FirstSearch, and by the general public who can freely access WorldCat.org, the free web portal.

F. Usage Records

167. Actual usage of a publication is reflected by other publications that make reference to it. I have identified four citations to *MPI-1994* to show early

usage. These citations and supporting documents are discussed below to show these citing documents are authentic and were publicly accessible before the June 2006 priority date.

168. Citation 1. Majumdar, A. (1994, November). Fibers: A high-performance MPMD mechanism for integrated asynchronous data and control transfer. Doctoral Dissertation, Yale University. UMI Order No. 9523199. Available from ProQuest Dissertations & Theses Global. The ProQuest metadata record for this dissertation is available at https://www.proquest.com/dissertations-theses/fibers-high-performance-mpmd-mechanism-integrated/docview/304138939/se-2. I used it to obtain a copy of Majumdar. This copy is presented as **Ex. 1122** in this declaration. Page 3 of **Ex. 1122** is the title page that shows the author, title, and a publication date of "November 1994." Page 4 shows the UMI number is "9523199." Page 7 shows a "1994" copyright date with the author as the copyright holder. Page 116 shows *MPI-1994* was cited as "MPIF. MPI: A Message-Passing Interface Standard, May 1994."

169. As evidence that **Ex. 1122** was publicly accessible, I obtained the bibliographic and MARC records for this work from the Yale University Library at https://search.library.yale.edu/catalog/9937677313408651. These records are presented as **Ex. 1123** in this declaration. The bibliographic record on page 1 shows this record is for Majumdar's dissertation on microform. The author, title, UMI

number, and thesis note match the information presented in **Ex. 1122**. The "Added to Catalog" field shows the record was added to the online catalog on "June 01, 2002," meaning this record became discoverable in the library online catalog on June 1, 2002.

170. Page 2 is the MARC record and the first six digits of Field 008 show the record was created on "950126" (*i.e.*, January 26, 1995). The code of "s1994" following the record creation date shows the work has a single publication date of 1994. The rest of the record shows users can discover this dissertation by author and title.

171. **Ex. 1122** shows the dissertation was completed in November 1994, and the library records for the microform version of the dissertation (**Ex. 1123**) show the MARC record was created on January 26 1995, making this work discoverable in the library's online catalog at that time. The earliest record of the Yale University Library, archived on July 22, 1997, shows the library's online catalog at that time was "ORBIS" (see https://web.archive.org/web/19970722192701/http://www.library.yale.edu/). On June 1, 2002, this MARC record was added to Quicksearch, "a discovery tool that searches Orbis, as well as many other resources and collections not searchable through Orbis" (source: "Searching Orbis and QuickSearch: Home" at https://guides.library.yale.edu/orbis-quicksearch). **Ex. 1122** and **Ex. 1123** show this

citing document was publicly discoverable and accessible at the online catalog of the Yale University Library on January 26, 1995, and became discoverable on their QuickSearch system on June 1, 2002.

172. Citation 2. Huber Jr, J. V., Chien, A. A., Elford, C. L., Blumenthal, D. S., & Reed, D. A. (1995, July). PPFS: A high performance portable parallel file system. In *Proceedings of the 9th International Conference on Supercomputing* (pp. 385-394). This document was indexed by the ACM Digital Library and the metadata record is available at https://dl.acm.org/doi/10.1145/224538.224638. I used the PDF link to obtain the full text of this article. This ACM copy is presented as **Ex. 1124**. Page 1 shows the title, authors, and abstract, and indicates this article appears in a work whose International Standard Book Number is "0-89791-726-6" and it has a "1995" copyright date with ACM as the copyright holder. *MPI-1994* is cited in Reference 19 as "MPI. MPI: A Message Passing Interface Standard. Tech. rep., Message Passing Interface Forum, May 1994."

173. As evidence that Huber was publicly accessible, I obtained the ACM metadata record for this article (https://dl.acm.org/doi/10.1145/224538.224638) from the ACM Digital Library. This record is presented as **Ex. 1125** in this declaration. Page 1 of **Ex. 1125** is a screen capture of the top of the ACM record to show Huber is a "Free access" article, meaning users can access it free of charge. The "published" field shows this article was published on "03 July 1995." The rest

of the pages in **Ex. 1125** show the top portion of the Huber article, references, and other details.

174. **Ex. 1124** and **Ex. 1125** show that Huber that cites to *MPI-1994* was published on July 3, 1995, and freely available to interested users in the ACM Digital Library.

175. Citation 3. Bhat, P. B., Lim, Y. W., & Prasanna, V. K. (1995, October). Issues in using heterogeneous HPC systems for embedded real time signal processing applications. In Proceedings of the 2nd International Workshop on Real-Time Computing Systems and Applications (RTCSA '95). This article was indexed by IEEE Xplore, and the IEEE metadata record for Bhat is available at https://ieeexplore.ieee.org/document/528763. I used the PDF link for this article to obtain a copy. This IEEE copy is presented as **Ex. 1126** in this declaration. Page 1 of **Ex. 1126** shows the title, authors, and abstract, and indicates this article appears in a work whose International Standard Book Number is "0-8186-7106-8" and this article has a "1995" copyright date with IEEE as the copyright holder. *MPI-1994* is cited as Reference 11 on page 8: Message Passing Interface Forum. "MPI: A Message-Passing Interface Standard," Technical Report CS-94-230, University of Tennessee, Knoxville, TN, May 5 1994.

176. As evidence that Bhat was publicly accessible before the June 2006 priority date, I obtained the IEEE metadata record for Bhat from

https://ieeexplore.ieee.org/document/528763. This record is presented as **Ex. 1127** in this declaration. Page 1 of **Ex. 1127** shows the title, authors, and publisher. The "Date of Conference" field shows the conference at which Bhat was presented took place from October 25 to 27, 1995. The "Date Added to IEEE Xplore" is "06 August 2002," making this record discoverable on IEEE Xplore on August 6, 2002.

177. **Ex. 1126** and **Ex. 1127** show that Bhat, which cites to *MPI-1994*, was presented at an October 1995 conference, and the IEEE metadata record was added to IEEE Xplore on August 6, 2002. These two documents show that this citing article was publicly discoverable before the June 2006 priority date.

178. Citation 4. Worley, P. H. (1996, July). MPI performance evaluation and characterization using a compact application benchmark code. In *Proceedings. Second MPI Developer's Conference* (pp. 170-177). I obtained a copy of this article from the Linda Hall Library. The library copy is presented as **Ex. 1128** in this declaration. Pages 1 to 8 are the full text of Worley. Page 1 shows the title, author, and abstract, and indicates this article appears in a work whose International Standard Book Number is "0-8186-7533-0" and this article has a "1996" copyright date with IEEE as the copyright holder. *MPI-1994* is cited as Reference 7 on page 8: MPI Committee. MPIL a message-passing interface standard. Internat. J. Supercomputer Applications, 8(3/4): 165-416, Fall/Winter 1994. Page 9 is the cover of the conference proceedings containing Worley, page 10 is the title page, page 11

is the copyright page, and pages 12 to 14 are the table of contents that shows Worley begins on page 170 and is included in the "Performance" section. The left side of page 12 shows a date annotation of "1/20/98" (meaning this work was added to the collections of the Linda Hall Library on January 20, 1998). The knowledge of this date annotation practice is based on my personal experience with the Linda Hall Library collections and catalogs.

179. As evidence that Worley was publicly discoverable at libraries, I obtained the bibliographic and MARC records for the conference proceedings containing Worley from the online catalog of the Linda Hall Library. These records (available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992783863405961) are presented as **Ex. 1129** in this declaration. Pages 1 and 2 are the bibliographic record. The title, conference name, 10-digit ISBN for the paper version, publisher, and copyright date match the information presented in **Ex. 1128**. Page 3 is the MARC record, and the first six digits of Field 008 show this record was created on "961030" (*i.e.*, October 30, 1996). Subfields "a" and "c" show "CUZ" created the original record and entered it into the WorldCat database on OCLC, and subfield "d" shows "LHL" modified the original record later. According to the Directory of OCLC Members (https://www.oclc.org/en/contacts/libraries.html), "CUZ" is the OCLC library

symbol for the University of California, Santa Cruz, and "LHL" is the OCLC library symbol for the Linda Hall Library. Field 005 shows the last time the Linda Hall Library modified this record was "19980119162500" (meaning January 19, 1998, at 4 p.m., 25 minutes). Fields 008, 040, and 005 inform my opinion that the Linda Hall Library used a record created by the library of the University of California, Santa Cruz, for copy cataloging, and last modified their MARC record on January 19, 1998. This date is consistent with the date annotation in **Ex. 1128** that shows the conference proceedings containing Worley was added to the collections of the Linda Hall Library on January 20, 1998, after the copy cataloging work for this publication was completed on January 19, 1998.

180. **Ex. 1128** and **Ex. 1129** show that Worley was published in 1996, and became discoverable and accessible at the Linda Hall Library in January 1998.

G. Summary of My Opinion on *MPI-1994*

181. It is my opinion that *MPI-1994* is authentic because it is the same as the copy archived by Internet Archive on July 3, 1998 (**Ex. 1117**). **Ex. 1118** shows how I discovered this archived copy. **Ex. 1119** shows an article published in October 1994 presents four sources for interested users to access *MPI-1994*. **Ex. 1120** shows the National Science Library of Canada created, on November 22, 1994, a MARC record for the special journal issue that presents *MPI-1994*, making *MPI-1994* discoverable in the library's online catalog on that date. **Ex. 1121** shows

the library of the University of Edinburgh created an original record for *MPI-1994* on March 30, 2004, making *MPI-1994* discoverable at the library's online catalog on that date. Citation records (**Ex. 1122**, **1124**, **1126** and **1128**) and their supporting records show these citing documents were published in 1994, 1995, and 1996, and were publicly accessible before the June 2006 priority date.

182. Based on the documents and records I have reviewed, it is my opinion that *MPI-1994* became publicly accessible by November 1994 when a citing document was published, and when the National Science Library of Canada created their original MARC record for this standard. *MPI-1994* was definitely available no later than July 1998 when it was first archived by Internet Archive.

VIII. Internet Archive Affidavit by Ms. Mina Ching

183. **Ex. 1029** is a true and correct copy of an Internet Archive Affidavit prepared by Ms. Mina Ching that I received from counsel. Ms. Ching states in Paragraph 2 that the Internet Archive "is a website that provides access to a digital library of Internet sites and other cultural artifacts in digital form" and "researchers, historians, scholars, and the general public" have free access to this digital library. She further states in Paragraph 3 that the Wayback Machine is a service of the Internet Archive that enables users "to browse more than 450 billion pages stored in the Internet Archive's web archive." In Paragraph 4 she explains that archived data on Internet Archive "is obtained by use of web archiving software that

automatically stores copies of files available via the Internet, each file preserved as it existed at a particular point in time." In Paragraph 5 she explains the structure of the extended URL the Internet Archive assigns to an archived file, and indicates the date in an extended URL represents a preserved instance of a file for a given URL.

184. In Paragraph 6 Ms. Ching states that files in Exhibit A "are true and accurate copies of browser screenshots of the Internet Archive's records of the archived files for the URLs and the dates specified in the attached coversheet of each screen shot." In addition, she confirms in Paragraph 7 that the file with the extended URL of "https://web.archive.org/web/19980703063729/http://www.mpi-forum.org/docs/mpi-10.ps is a "true and accurate copy of the Internet Archive's records of the archived file." Fifteen archived web files presented as exhibits in this declaration are authenticated by Ms. Ching's affidavit. The table below presents the archived web files and the pages in Ms. Ching's affidavit that authenticate them.

Exhibits in this declaration	**Internet Archive Affidavit (Ex. 1029) pages**
1092. Menon, archived on July 7, 1998. https://web.archive.org/web/19980707033046/http://www.supercomp.org/sc97/program/TECH/MENON/INDEX.HTM	23 - 32
1098. Trefethen, archived on May 10, 1996. https://web.archive.org/web/19960510224514/http://www.cs.cornell.edu/Info/People/lnt/multimatlab.html.	36 - 44
1109. "Introducing RS/6000 SP," archived on July 26, 2001.	47 - 51

Exhibits in this declaration	Internet Archive Affidavit (Ex. 1029) pages
https://web.archive.org/web/20010726184202/http:/www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html 1110. "Introducing the RS/6000 SP", archived on May 4, 2001. This is the same as 1109, but archived on a different date. https://web.archive.org/web/20010504220357/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html	
1109. "375 MHz POWER3 SMP High Node (F/C 2058)," archived on July 26, 2001. https://web.archive.org/web/20010726183314/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html 1110. "375 MHz POWER3 SMP High Node (F/C 2058)," archived on May 4, 2001. This is the same as 1109, but archived on a different date. https://web.archive.org/web/20010504220513/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html	53 - 56
1117. *MPI: A Message-Passing Interface Standard*, archived on July 03, 1998. https://web.archive.org/web/19980703063729/http://www.mpi-forum.org/docs/mpi-10.ps	Paragraph 7 of Affidavit and Exhibit B
1118. "MPI Documents" archived on January 25, 1998. https://web.archive.org/web/19980125230954/http://www.mpi-forum.org/docs/docs.html	45 - 46

Exhibits in this declaration	Internet Archive Affidavit (Ex. 1029) pages
The following items show the same original files were archived, but copies presented in this declaration and the Internet Archive affidavit are of different archive dates.	
1113. "RS/6000 SP (Scalable POWERparallel) hardware and software documentation," archived on June 9, 2002. https://web.archive.org/web/20020609145514/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/index.html	72 - 73
1113. Library webpage, archived on February 1, 2002. https://web.archive.org/web/20020201231630/http://www-1.ibm.com/servers/eserver/pseries/library/	74 - 75
1113. IBM Parallel Environment for AIX (PE) webpage archived on June 6, 2002. https://web.archive.org/web/20020606195122/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html. The same webpage archived on February 2, 2002. https://web.archive.org/web/20020202032414/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html; archived on December 1, 2002. https://web.archive.org/web/20021201233611/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html;	76 - 77

Exhibits in this declaration	Internet Archive Affidavit (Ex. 1029) pages
archived on June 8, 2003. https://web.archive.org/web/20030608171628/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html archived on February 3, 2004. https://web.archive.org/web/20040203114921/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html	

185. The table above shows that these archived web files, presented as exhibits in this declaration, "are true and accurate copies of browser screenshots of the Internet Archive's records of the archived files for the URLs" (per Paragraph 6 of the affidavit).

IX. Conclusion

186. In signing this Declaration, I recognize that the Declaration will be filed as evidence in a matter before 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.

187. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

Dated: 12-8-2025

Respectfully submitted,

Ingrid Hsieh-Yee, Ph.D.

APPENDIX A

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.

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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

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$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
```


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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)

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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:

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$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

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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)

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```
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

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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.
```


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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

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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

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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)

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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

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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

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| = 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:

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#	=	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)

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Appendix B. Materials Considered

Exhibit	Description
1005	Menon, V., & Trefethen, A. E. (1997, November). MultiMATLAB: Integrating MATLAB with high-performance parallel computing. In SC '97: *Proceedings of the 1997 ACM/IEEE Conference on Supercomputing* (pp. 1-18). ("*Menon*"). Counsel copy.
1089	ACM metadata record and copy of *Menon*, available at https://dl.acm.org/doi/10.1145/509593.509623.
1090	WorldCat.org record for SC'97 that contains *Menon*, available at https://search.worldcat.org/title/245635379; Bibliographic record for SC'97, available from the online catalog of the TIB Library (the German National Library of Science and Technology) at https://opac.tib.eu/DB=1/SET=2/TTL=1/SHW?FRST=4; and the TIB record obtained from OCLC FirstSearch (subscription-based search system).
1091	Bibliographic and MARC records for SC '97 that contains *Menon*, available at https://las.sinica.edu.tw/search*eng/a?searchtype=t&searcharg=SC+%2797&SORT=D&submit.x=11&submit.y=13 from the online catalog of the Academia Sinica Library; and the record obtained from OCLC FirstSearch (subscription-based search system).
1092	Copy of *Menon*, archived by Internet Archive on July 7, 1998, available at https://web.archive.org/web/19980707033046/http://www.supercomp.org/sc97/program/TECH/MENON/INDEX.HTM

Exhibit	Description
1093	SC 97 Conference General Information, archived by Internet Archive on February 16, 1998, available at https://web.archive.org/web/19980216120239/http://www.supercomp.org/sc97/proceedings/GENERAL.HTM#PRO; SC 97 Conference Proceedings, archived by Internet Archive on April 25, 1998, available at https://web.archive.org/web/19980425214612/http://supercomp.org/sc97/program/; SC 97 Proceedings Table of Contents, archived by Internet Archive on April 25, 1998, available at https://web.archive.org/web/19980425085801/http://supercomp.org/sc97/program/TOC97.HTM; SC 97 Technical Papers Sessions, archived by Internet Archive on April 26, 1998, available at https://web.archive.org/web/19980426004057/http://supercomp.org/sc97/program/TECH/TSESS.HTM; and SC97 Technical Papers Abstracts, archived by Internet Archive on April 26, 1998, available at https://web.archive.org/web/19980426004212/http://supercomp.org/sc97/program/TECH/TABST.HTM.
1094	Harrop, C. W., Hackstadt, S. T., Cuny, J. E., Malony, A. D., & Magde, L. S. (1998, November). Supporting runtime tool interaction for parallel simulations. In *SC'98: Proceedings of the 1998 ACM/IEEE Conference on Supercomputing* (pp. 37-37), ("Harrop"); and the IEEE metadata record for Harrop, available at https://ieeexplore.ieee.org/abstract/document/1437324 from IEEE Xplore.
1095	Rana, O. F., Li, M., Walker, D. W., & Shields, M. (1999, September). An XML based component model for generating scientific applications and performing large scale simulations in a meta-computing environment. In *International Symposium on Generative and Component-Based Software Engineering* (pp. 210-224), ("Rana"). Berlin, Heidelberg: Springer Berlin Heidelberg. And bibliographic and MARC records for this conference proceedings at https://lccn.loc.gov/00049680 from the online catalog of the Library of Congress.

Exhibit	Description
1096	Almasi, G., & Padua, D. A. (2000, August). MaJIC: A MATLAB just-in-time compiler. In *International Workshop on Languages and Compilers for Parallel Computing* (pp. 68-81). Berlin, Heidelberg: Springer Berlin Heidelberg. And the records from the Yale University Library at https://search.library.yale.edu/catalog/9948726913408651.
1097	Houstis, E. N., & Rice, J. R. (2000). On the Future of Problem Solving Environments, ("*Houstis*"), Department of Computer Science Technical Reports, Report number 00-009, Paper 1487, available at https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=2486&context=cstech from Purdue e-Pubs; metadata record for *Houstis* from Purdue e-Pubs at https://docs.lib.purdue.edu/cstech/1487; and the webpage of John Rice, archived on April 11, 2001, available at https://web.archive.org/web/20000411144916/https://www.cs.purdue.edu/people/jrr.
1006	Trefethen, A. E., Menon, V. S., Chang, C. C., Czajkowski, G. J., Myers, C., & Trefethen, L. N. (1996, May). *MultiMATLAB: MATLAB on multiple processors*. Cornell University. ("*Trefethen*") Counsel copy.
1098	Copy of *Trefethen*, archived by Internet Archive on May 10, 1996, available at https://web.archive.org/web/19960510224514/http://www.cs.cornell.edu/Info/People/lnt/multimatlab.html.
1099	Copy of *Trefethen*, available at https://ecommons.cornell.edu/server/api/core/bitstreams/79478a13-e65a-4526-8926-ca72d3fa3940/content from Cornell University.

Exhibit	Description
1100	Trefethen's webpage archived by Internet Archive on June 14, 1997, available at https://web.archive.org/web/19970614015204/http://www.tc.cornell.edu/~anne/ shows a link to *Trefethen*, archived on June 7 1997, available at https://web.archive.org/web/19970607233910/http://www.cs.cornell.edu/Info/People/lnt/multimatlab.html.
1101	Bibliographic and MARC records for *Trefethen*, available at https://searchit.libraries.wsu.edu/permalink/01ALLIANCE_WSU/1rq08rk/alma99243620130101842 from the online catalog of the Washington State University Libraries; and the library record on OCLC FirstSearch (subscription required for access).
1102	Temple Lang, D. W. (1997, September). A multi-threaded extension to a high level interactive statistical computing environment. Doctoral Dissertation, University of California, Berkeley. UMI Order No. 9827118. Index record available at https://www.proquest.com/dissertations-theses/multi-threaded-extension-high-level-interactive/docview/304343859/se-2 from ProQuest Dissertations & Theses Global.
1103	Bibliographic and MARC records for the dissertation of D. W. Temple Lang, available at https://search.library.berkeley.edu/permalink/01UCS_BER/1thfj9n/alma991005994359706532 from the online catalog of the University of California, Berkeley Library.
1104	Quinn, M. J., Malishevsky, A., Seelam, N., & Zhao, Y. (1998, March). Preliminary results from a parallel MATLAB compiler. In *Proceedings of the First Merged International Parallel Processing Symposium and Symposium on Parallel and Distributed Processing* (pp. 81-87). Copy obtained from the Linda Hall Library.

Exhibit	Description
1105	Bibliographic and MARC records for the *Proceedings of the First Merged International Parallel Processing Symposium & Symposium on Parallel and Distributed Processing, March 30-April 3, 1998, Orlando, Florida* that contains Quinn, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992954683405961 from the online catalog of the Linda Hall Library.
1106	Bibliographic and MARC records for the *Proceedings of the First Merged International Parallel Processing Symposium & Symposium on Parallel and Distributed Processing, March 30-April 3, 1998, Orlando, Florida* that contains Quinn, available at https://col-mtu.primo.exlibrisgroup.com/permalink/01COL_MTU/13nj5id/alma994543313404769 from the online catalog of the Michigan Technological University Library.
1107	Chauveau, S., & Bodin, F. (1998, May). Menhir: An environment for high performance Matlab. In *International Workshop on Languages, Compilers, and Run-Time Systems for Scalable Computers* (pp. 27-40). Berlin, Heidelberg: Springer Berlin Heidelberg. Copy obtained from the Library of Congress.
1108	Bibliographic and MARC records for *International Workshop on Languages, Compilers, and Run-Time Systems for Scalable Computers* that contains Chauveau, available at https://lccn.loc.gov/98045572 from the online catalog of the Library of Congress.
1007	RS/6000 SP: Planning. Vol. 1, Hardware and Physical Environment, "Introducing the RS/6000 SP" and "375 MHz Power3 SMP High Node (F/C 2058). ("*RS6000*"). Counsel copy.

Exhibit	Description
1109	RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment, Document Number GA22-7280-09, Ninth edition (April 2001). Archived on June 17, 2001, available at https://web.archive.org/web/20010617011337/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst.html; and a copy of "Introducing the RS/6000 SP," archived by Internet Archive on July 26, 2001, available at https://web.archive.org/web/20010726184202/http:/www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html; and a copy of "375 MHz POWER3 SMP High Node (F/C 2058)," archived on July 26, 2001, and available at https://web.archive.org/web/20010726183314/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html
1110	RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment, Document Number GA22-7280-09, Ninth edition (April 2001). Archived on June 17, 2001, available at https://web.archive.org/web/20010617011337/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst.html; "Introducing the RS/6000 SP", archived on May 4, 2001, available at https://web.archive.org/web/20010504220357/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html#HDRPITCH; and "375 MHz POWER3 SMP High Node (F/C 2058)," archived on May 4, 2001, https://web.archive.org/web/20010504220513/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html.

1111	Discovery path: 1) IA redirects to "IBM server sSeries" for UNIX and open systems, archived on Oct. 24, 2001, at https://web.archive.org/web/20011024235023/http://www-1.ibm.com/servers/eserver/pseries/ >> select RS/6000 learn more link 2) "UNIX Clusters" (archived Nov. 17, 2001, available at https://web.archive.org/web/20011117173836/http://www-1.ibm.com/servers/eserver/pseries/hardware/largescale/ .. "RS/6000 SP Product documentation" 3) RS/6000 SP Product Documentation Library, archived on April 10, 2001, available at https://web.archive.org/web/20010410025356/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/index.html >> RS/6000 SP Planning 4) PP4 webpage for RS/6000 SP Planning Library, archived on February 26, 2001, available at https://web.archive.org/web/20010226130852/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/planning/index.html >> "Browse HTML" 5) RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment, Document Number GA22-7280-09, Ninth edition (April 2001). Archived on June 17, 2001, available at https://web.archive.org/web/20010617011337/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst.html 6) Table of Contents of RS/6000 SP: Planning Vol. 1, Hardware and Physical Environment, Document Number GA22-7280-09, Ninth edition (April 2001). Archived on April 29, 2001, available https://web.archive.org/web/20010429053331/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst02.html#ToC, and "Introducing the RS/6000 SP,"

Exhibit	Description
	archived on May 4, 2001, available at https://web.archive.org/web/20010504220357/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst07.html#HDRPITCH 7) "375 MHz POWER3 SMP High Node (F/C 2058)," archived on May 4, 2001, https://web.archive.org/web/20010504220513/http://www.rs6000.ibm.com/resource/aix_resource/sp_books/hardware/planguide1/da709mst08.html
1112	PDF of Moncrief, II, R. E. (2002, July). *IBM RS/6000*. Available at https://users.cs.jmu.edu/abzugcx/Public/Student-Produced-Term-Projects/Computer-ARCHITECTURE-2002-SUMMER/IBM-RS-6000-by-Robert-Moncrief-2002-SUMMER-CS-585.doc
1008	IBM Parallel Environment for AIX, Operation and Use, Volume 1, Using the Parallel Operating Environment. Version 3, Release 2, Second Edition (December 2001), Document number: SA22-7425-01 ("*POE-2001*"). Counsel copy.

1113	Path of discovery: 1) UNIX and Oen Systems. IBM eserver sSeries. Original URL: http://www-1.ibm.com/servers/eserver/pseries/ (archived 337 times between "17 Oct 2000" and "21 Jul 2025"). Archived on December 4, 2001, available at https://web.archive.org/web/20011204190353/http://www-1.ibm.com/servers/eserver/pseries/ 2) Library, archived on February 1, 2002, available at https://web.archive.org/web/20020201231630/http://www-1.ibm.com/servers/eserver/pseries/library/ 3) RS/6000 SP (Scalable POWERparallel) hardware and software documentation, archived on June 9, 2002, available at https://web.archive.org/web/20020609145514/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/index.html 4) IBM Parallel Environment for AIX (PE) webpage archived on June 6, 2002, available at https://web.archive.org/web/20020606195122/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html 5) IBM Parallel Environment for AIX (PE). Archived on 2/2/2002, available at https://web.archive.org/web/20020202032414/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html 6) IBM Parallel Environment for AIX (PE). Archived on 12/01/2002, available at https://web.archive.org/web/20021201233611/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html

Exhibit	Description
	7) IBM Parallel Environment for AIX (PE). Archived on 6/8/2003, available at https://web.archive.org/web/20030608171628/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html 8) IBM Parallel Environment for AIX (PE). Archived on 2/3/2004, available https://web.archive.org/web/20040203114921/http://www-1.ibm.com/servers/eserver/pseries/library/sp_books/pe.html
1114	Saif, T., & Parashar, M. (2004, August). Understanding the behavior and performance of non-blocking communications in MPI. In *European Conference on Parallel Processing* (pp. 173-182). Berlin, Heidelberg: Springer Berlin Heidelberg.
1115	Bibliographic and MARC records for the European Conference on Parallel Processing that contains Saif, available at https://lccn.loc.gov/2004110451 from the online catalog of the Library of Congress.
1116	Huang, S. H, & Tuel, W. G. Managing message arrival to ensure proper matching of unordered messages. United States patent application US 10/685,144, publication date April 14, 2005, Publication No: US 2005/0078605A1. Available at https://patentimages.storage.googleapis.com/7f/3a/be/d20cdc4465037a/US20050078605A1.pdf
1017	Message Passing Interface Forum (1994). MPI: A Message-Passing Interface Standard. ("*MPI-1994*"). Counsel Copy.
1117	MPI: A Message-Passing Interface Standard, archived on July 03, 1998, and available at https://web.archive.org/web/19980703063729/http://www.mpi-forum.org/docs/mpi-10.ps. I have opened the ps file and saved it as a PDF for this exhibit.

Exhibit	Description
1118	Discovery path: Search Internet Archive for archived copies of the "Message Passing Interface Forum" (http://www.mpi-forum.org/) and found a copy of the Forum archived on January 25, 1998, available at https://web.archive.org/web/19980125230856/www.mpi-forum.org/. Follow the link for "MPI documents (including standards)" to reach "MPI Documents" archived on January 25, 1998, available at https://web.archive.org/web/19980125230954/http://www.mpi-forum.org/docs/docs.html Select the "postscript" link for the MPI-1.0 document to find *MPI-1994* archived on July 3, 1998, available at https://web.archive.org/web/19980703063729/http://www.mpi-forum.org/docs/mpi-10.ps
1119	Gropp, W., & Lusk, E. (1994, October). Implementing MPI: the 1994 MPI implementors' workshop. In *Proceedings Scalable Parallel Libraries Conference* (pp. 55-59). IEEE. Also available at https://www.osti.gov/servlets/purl/519141 from the Department of Energy Office of Scientific and Technical Information.
1120	Bibliographic and MARC record for *MPI-1994* in *The International journal of supercomputer applications*, v. 8, no. ¾, available at https://science-catalogue.canada.ca/record=1592348~S6 from the online catalog of the Federal Science Libraries Network of Canada.
1121	Bibliographic and MARC record for *MPI-1994*, available at https://discovered.ed.ac.uk/permalink/44UOE_INST/7g3mt6/alma9912021753502466 from the online catalog of the library of the University of Edinburgh.

Exhibit	Description
1122	Majumdar, A. (1994, November). Fibers: A high-performance MPMD mechanism for integrated asynchronous data and control transfer. Doctoral Dissertation, Yale University. UMI Order No. 9523199. Available from ProQuest Dissertations & Theses Global. (304138939). The metadata record is available at https://www.proquest.com/dissertations-theses/fibers-high-performance-mpmd-mechanism-integrated/docview/304138939/se-2
1123	Bibliographic record for Majumdar at https://search.library.yale.edu/catalog/9937677313408651from the online catalog of the Yale University Library.
1124	Huber Jr, J. V., Chien, A. A., Elford, C. L., Blumenthal, D. S., & Reed, D. A. (1995, July). PPFS: A high performance portable parallel file system. In *Proceedings of the 9th International Conference on Supercomputing* (pp. 385-394).
1125	ACM DL metadata record for Huber at https://dl.acm.org/doi/10.1145/224538.224638.
1126	Bhat, P. B., Lim, Y. W., & Prasanna, V. K. (1995, October). Issues in using heterogeneous HPC systems for embedded real time signal processing applications. In Proceedings of the 2nd International Workshop on Real-Time Computing Systems and Applications (RTCSA '95). IEEE Computer Society, USA, 134.
1127	IEEE metadata record for Bhat, available at https://ieeexplore.ieee.org/document/528763
1128	Worley, P. H. (1996, July). MPI performance evaluation and characterization using a compact application benchmark code. In *Proceedings. Second MPI Developer's Conference* (pp. 170-177). IEEE.

Exhibit	Description
1129	Bibliographic and MARC records for *Proceedings. Second MPI Developer's Conference* that contains Worley, available at https://catalog.lindahall.org/permalink/01LINDAHALL_INST/19lda7s/alma992783863405961 from the online catalog of the Linda Hall Library.
1088	Nilges, C. (2006). The online computer library center's open WorldCat program. *Library trends*, 54(3), 430-447, ("Nilges"), obtained from the library of the School of Library and Information Studies of the University of Wisconsin, Madison.
1029	Internet Archive Affidavit by Ms. Mina Ching.