

Computer science

A guide to selected resources on the Internet

by Michael Knee

There's little doubt that computers have had a major effect on nearly every aspect of our lives—at work, at home, and in between. Computers have transformed society worldwide and changed the way people work, communicate, and play. The PC on your desk, lap, or palm represents centuries of progress in computing devices from counting pebbles and knotted strings to the abacus and adding machines.

Computer scientists and engineers design and build computers and associated technologies, including the hardware, software, and operating systems. Computer science also encompasses theoretical and mathematical aspects, such as the design and analysis of algorithms, performance studies of systems and components, and reliability studies. Computer scientists seek to answer the fundamental question, What can be automated?

Computer scientists were early users of the Internet, and there are numerous Web sites related to computer science and computing. This is a selected guide to some of the more useful resources.

Metasites/starting points

- **The Ada Project (TAP).** Named in honor of Ada Lovelace, TAP is a clearinghouse for information and resources related to women in computing. It includes publica-



tions, conferences, employment resources, fellowships and grants, news, organizations, plus projects and programs. Access: <http://tap.mills.edu/>.

- **Artificial Intelligence.** A WWW Virtual Library site containing links to research sites and projects, newsgroups, programming languages, journals, bibliographies, interactive demonstrations, and commercial sites and products. Access: <http://www.cs.reading.ac.uk/people/dwc/ai.html>.

- **Artificial Intelligence Resources.** An Artificial Intelligence Internet resources listing containing links to bibliographies, books, companies, conferences, employment opportunities, journals, newsgroups, publishers, repositories and resources lists, research groups, societies and organizations, and software repositories and directories. Access: http://ai.iit.nrc.ca/ai_point.html.

- **Complexity On-line.** An information service about complex systems providing access to books, journals, bibliographies, tutorials, software, and newsgroups. Access: <http://complex.csu.edu.au/complex/>.

- **Computational Geometry Pages.** A metasite providing access to Web-based and

About the author

Michael Knee is physical, mathematical, and computer sciences bibliographer at the University at Albany, SUNY, Science Library, e-mail: knee@albany.edu

print resources dealing with computational geometry, including links to research groups, forums, bibliographies, job announcements, books, journals, and software resources. *Access:* <http://compgeom.cs.uiuc.edu/~jeffe/compgeom/>.

- **Concurrent Systems.** A WWW Virtual Library site containing pointers to information on concurrent (parallel) systems, including electronic repositories, research groups and centers, research projects, tools, meetings, and journals. *Access:* <http://www.afm.sbu.ac.uk/concurrent/>.

- **Formal Methods.** A WWW Virtual Library site containing links to information on formal methods, including announcements, introductory articles, publications (bibliographies, books, journals, and collections of technical reports), individual notations, methods, and tools, meetings, projects, companies, organizations, newsgroups and mailing lists, plus a "who's who." *Access:* <http://www.afm.sbu.ac.uk/>.

- **The Genetic Programming Notebook.** An extensive collection of links to information on genetic programming, genetic algorithms, artificial intelligence, evolutionary computation, and robotics. It includes access to bibliographies, books, software, people, groups, journals, conferences, courses, tutorials, and news. *Access:* <http://www.geneticprogramming.com/>.

- **Logic Programming.** As part of the WWW Virtual Library, Logic Programming contains links to general repositories, Prolog, window system interfaces, other logic programming systems, meetings, and books. *Access:* <http://www.afm.sbu.ac.uk/logic-prog/>.

- **Resources for Programming Language Research.** A collection of links to resources for research in programming language theory, design, implementation, and related areas. This site also includes language overviews with access to language-specific sites, bibliographies, publications, and conferences. *Access:* <http://www.cs.cmu.edu/afs/cs.cmu.edu/user/mleone/web/language-research.html>.

- **Scientific Computing FAQ: S.C., Numerical Analysis, and Associated Fields Resource Guide.** This metasite lists and links to resources, such as electronic resources and software catalogs for numerical analysis and

related fields in scientific computing. *Access:* <http://www.math.com.com/corpdir/techinfo.mdir/scifaq/>.

- **A Software Engineering Resource List.** A listing of pointers to software engineering archives, research sites, conferences, and other related metasites. *Access:* <http://wwwsel.itt.nrc.ca/favs/>.

- **Theoretical Computer Science on the Web.** This site contains links to papers and sites of interest to the theory community; it includes organizations, journals, conferences, bibliographies, lecture notes, software, repositories, newsgroups, and mailing lists. *Access:* <http://robotics.stanford.edu/~suresh/theory/theory-home.html>.

- **The Virtual Museum of Computing.** This WWW Virtual Library site is a collection of Web sites connected to the history of computing. It also lists online computer-based exhibits. *Access:* <http://palimpsest.stanford.edu/icom/vlmp/computing.html>.

- **WWW Computer Architecture Home Page.** A Web site that provides access to computer architecture research groups, researchers, conferences, tools, simulators, benchmarks, books, online publications, organizations, and newsgroups. *Access:* <http://www.cs.wisc.edu/~arch/www/>.

Academic departments and institutes

- **Computer Science Departments Across the Web.** A listing with links to Web and gopher servers of academic computer science departments around the world. *Access:* <http://triluminary.cs.haverford.edu/CS-Departments.html>.

- **Graduate Assistantship Directory (GAD).** "GAD" is a publication of the Association for Computing Machinery; it provides information on graduate programs in computing, including degrees offered and specialties, numbers of faculty and students, faculty interest areas, computer equipment available, types and amounts of financial aid available to qualified students, and admissions requirements and application deadlines. *Access:* <http://www.acm.org/gad/>.

- **Institutes, Centers, and Laboratories.** A worldwide list of computer science institutes, centers, and laboratories. *Access:* <http://src.doc.ic.ac.uk/bySubject/Computing/Overview.html#inst>.

- **Supercomputing Centers and Parallel Computing.** A list of institutions from IEEE's ParaScope site involved in high-performance computing and parallel computing. *Access:* <http://computer.org/parascope/#parallel>.

Algorithm collections

- **Collected Algorithms (CALGO) of the Association for Computing Machinery (ACM).** CALGO contains software associated with papers published in the *ACM Transactions on Mathematical Software* and other ACM journals. The software is refereed for originality, accuracy, robustness, completeness, portability, and lasting value. The site begins with algorithm number 49 (issued in 1975), however, there are several earlier algorithms. *Access:* <http://www.acm.org/calgo/>.

- **The Stony Brook Algorithm Repository.** Based on his book *The Algorithm Design Manual*, Steven S. Skiena has mounted this site containing a collection of algorithm implementations for more than 70 of the most fundamental problems in combinatorial algorithms. *Access:* <http://www.cs.sunysb.edu/~algorith/>.

Associations, organizations, and societies

- **American Association for Artificial Intelligence (AAAI).** The AAAI, founded in 1979, is a scientific society devoted to advancing the scientific understanding of the mechanisms underlying thought and intelligent behavior and their embodiment in machines. The site contains information on artificial intelligence, AAAI publications (books, journals, conference proceedings, and technical papers), conference, workshop, and symposia information, and membership benefits. *Access:* <http://www.aaai.org/>.

- **Association for Computing Machinery (ACM).** Billing itself as "the first society in computing," the ACM is the world's first educational and scientific computing society.

Founded in 1947, its membership currently totals more than 80,000 computing professionals and students worldwide. The site includes information about ACM activities, services, conferences, publications, and policies.



The subscription-based ACM Digital Library contains full text of articles and papers from all of its journals, magazines, and proceedings; nonsubscribers can view tables of contents and abstracts. *Access:* <http://info.acm.org/>.

- **IEEE Computer Society.** Founded in 1947, the IEEE Computer Society is the world's oldest and largest (98,000 members) professional association of people in computing. The site contains a full range of information about conferences, standards, publications, activities, education, certification, and employment. The subscription-based Digital Library includes full text of articles from its transactions and magazines, and papers from selected proceedings; nonsubscribers can view tables of contents and abstracts. *Access:* <http://www.computer.org/>.

- **Resources of Scholarly Societies: Computer Science.** This listing is part of the Scholarly Societies Project, sponsored by the University of Waterloo Library. It provides access to Web sites maintained by and for scholarly computer science societies around the world. *Access:* http://www.scholarly-societies.org/compsci_soc.html.

- **Society for Industrial and Applied Mathematics (SIAM).** A group of professionals formed SIAM in 1952 to advance the application of mathematics to science and industry. SIAM members are computer scientists, mathematicians, engineers, statisticians, and engineers. This site includes information about their publications, conferences, meetings, and subscription access to SIAM's online journals. *Access:* <http://www.siam.org/>.

Bibliographies/pre-prints/technical reports

- **The Collection of Computer Science Bibliographies.** This database is a collection of records from nearly 1,400 bibliographies, covering most areas of computer science. The records contain references to journal articles, conference papers, and technical reports. The collection, which is updated monthly, may be searched by author, title, journal, conference, or words anywhere in the record; it's also possible to limit the search by publication type and year. *Access:* <http://iinwww.ira.uka.de/bibliography/>.

- **CogPrints Electronic Archive: Computer Science.** An electronic archive containing pre-refereed preprints and published papers that are pertinent to the study of cogni-

tion. Access: <http://cogprints.soton.ac.uk/view-comp.html>.

• **Computer Science Technical Reports Archive Sites.** A listing of academic and research institutions around the world that distribute online computer science technical reports. Access: http://www.eccc.uni-trier.de/eccc/info/ftp_sites.html.

• **The Computing Research Repository (CoRR).** Sponsored through a partnership of the ACM, the Los Alamos e-Print archive, and Networked Computer Science Technical Reference Library (NCSTRL), CoRR seeks to be the single repository to which researchers from the whole field of computer science will submit reports as a means of rapid dissemination of research results. The database is searchable by a combination of author, title, keyword, journal, subject class, and report number; or it may be perused by subject class. Access: <http://xxx.lanl.gov/archive/cs/intro.html>.

• **Electronic Colloquium on Computational Complexity (ECCC).** ECCC provides links to research reports, monographs, lecture notes, survey reports, and theses dealing with computational complexity. Access: <http://www.eccc.uni-trier.de/eccc/>.

• **The Hypertext Bibliography Project.** This bibliography is comprised of bibliographies from key computer science journals, and IEEE, ACM, and SIAM symposia. The entire bibliography or individual journals may be searched by author, title, or abstract keywords. There is also an attempt being made to create a "citation index" similar to *Science Citation Index*. Access: <http://theory.lcs.mit.edu/~dmjones/hbp/>.

• **Networked Computer Science Technical Reports Library (NCSTRL).** NCSTRL is a collection of research reports and papers from institutions awarding doctoral degrees in computer science or engineering, and some industrial and government research laboratories. NCSTRL may be searched by author, title, or keyword in abstract; or browsed by year, author, or institution. Access: <http://cs-tr.cs.cornell.edu/>.

• **On-line CS Techreports.** A listing with links to sites around the world that have online computer science technical reports.

Access: <http://www.cs.cmu.edu/afs/cs.cmu.edu/user/jblythe/Mosaic/cs-reports.html>.

• **PrePRINT Network.** Developed by the U.S. Department of Energy, the PrePRINT Network furnishes access to electronic preprints available from academic institutions, research laboratories, and individual authors. The PrePRINT Alerts feature allows users to create personal profiles that will then notify the user as new information is added. Access: <http://www.osti.gov/preprints/computertech.html>.

• **ResearchIndex.** Produced at the NEC Research Institute, ResearchIndex is a database containing citations to journal articles, conference papers, and technical reports in computer and allied sciences. In addition to a list of documents, an author or subject search automatically generates the search context and a list of related documents. The autonomous citation indexing feature executes a citation search similar to *Science Citation Index*. Many of the citations are linked to the full text. Access: <http://citeseer.nj.nec.com/>.

• **Virtual Technical Reports Center.** Arranged alphabetically by institution, the Center lists sites around the world that provide access to the full text of their technical reports, preprints, reprints, dissertations, theses, or research reports. Access: <http://www.lib.umd.edu/UMCP/ENGIN/TechReports/Virtual-TechReports.html>.

Calculators

• **Calculators On-Line Center: Engineering: Electrical & Computer.** As a part Jim Martindale's "The Reference Desk," computer scientists and students will find links to calculators from the basic to the complex. Access: <http://www-sci.lib.uci.edu/HSG/RefCalculators4A.html>.

Compilers and interpreters

• **Catalog of Free Compilers and Interpreters.** This catalog lists links to freely available software for language tools, including compilers, compiler generators, interpreters, translators, important libraries, and assemblers. Access: <http://www.idiom.com/free-compilers/>.

Dictionaries and encyclopedias

• **BABEL.** A glossary of computer-oriented abbreviations and acronyms. Access: <http://www.cs.tut.fi/tl/stuff/misc/babel.html>.



• **Dictionary of PC Hardware and Data Communications Terms.** Written by Mitchell Shnier and published by O'Reilly & Associates, this comprehensive dictionary provides complete descriptions of complex terms. *Access:* <http://www.ora.com/reference/dictionary/>.

• **Online Dictionary of Computing.** A searchable dictionary of acronyms, programming languages, tools, architectures, operating systems, networking, theory, mathematics, telecoms, institutions, companies, projects, products, and history. *Access:* <http://www.instantweb.com/foldoc/>.

• **The Language List.** A list and description of all known computer programming languages. *Access:* <http://cui.unige.ch/cgi-bin/langlist/>.

• **Webopedia: Online Computer Dictionary for Internet Terms and Technical Support.** An online dictionary of computer- and Internet-related terms. *Access:* <http://www.pcwebopaedia.com/>.

(Webopedia)[™]

• **Whatis.** An encyclopedia of information technology; it includes a comprehensive listing of every file format in the world. *Access:* <http://whatis.techtarget.com/>.

Electronic journals

This section concentrates on electronic journals and magazines that are freely accessible on the Web and Web sites that list computing and computer science periodicals. As described above, access to the e-journals from professional associations like ACM and IEEE requires a subscription. Commercial publishers such as Elsevier, Springer, and Wiley also provide subscription-based access to the electronic versions of their journals. EBSCO Academic Search, Expanded Academic ASAP, and other fee-based, full-text journal aggregators provide access to numerous computing journals and magazines.

• **Computer Science Journals.** Arranged alphabetically by publisher and title, this is a no-nonsense guide to the tables of contents of selected computer science journals. *Access:* <http://www.informatik.uni-trier.de/~ley/db/journals/>.

• **Directory of Computing Science Journals.** A listing of more than 500 computer science journals arranged alphabetically by title with a title keyword index. Each journal listed contains links to its Web page, table of contents, abstracts, and full text (for subscribers). *Access:* <http://elib.cs.sfu.ca/Collections/CMPT/cs-journals/>.

• **The Electronic Journal of Combinatorics.** A fully refereed electronic journal that publishes papers in all branches of discrete mathematics, including combinatorics, graph theory, and discrete algorithms. *Access:* <http://www.combinatorics.org/>.

• **Electronic Transactions on Artificial Intelligence (ETAI).** ETAI is more than a conventional journal gone electronic. It is also a medium for scientific communication and a forum for exchange of scientific results, information about current events, and debate about recently published research results. *Access:* <http://www.ida.liu.se/ext/etai/>.

• **Free Scholarly Electronic Journals-Computers/IT.** An annotated webliography in *Issues in Science and Technology Librarianship*¹ covering free scholarly computing journals. *Access:* <http://www.library.ucsb.edu/istl/00-fall/internet-b.html#comp>.

• **Top 100 Computer Magazines.** This site provides a listing with links to the top 100 computer (software, network, and microprocessor) Web magazines. The magazines are ranked by "Web influence" and can be displayed alphabetically by title or by rank. *Access:* <http://www.internetvalley.com/top100mag.html>.

Employment

• **ACM Career Opportunities.** A listing of job opportunities, mostly in academic institutions, which have appeared as advertisements in ACM publications. *Access:* <http://www.acm.org/cacm/careeropp/>.

• **Developers.Net.** A comprehensive employment site for software professionals that provides access to numerous developer's jobs across the United States. *Access:* <http://www.developers.net/>.



- **IEEE Careers for Electrical Engineers & Computer Scientists.** The IEEE student career Web site is an excellent career resource; it includes information on finding a job, career planning, salaries, and an employer database. *Access:* <http://www.ieee.org/organizations/eab/studentcareers.htm>.

Meetings and conferences

- **Meeting/Conference Announcement Lists: Computer Science.** Compiled by the University of Waterloo Scholarly Societies Project, this site links to information on upcoming meetings and conferences. *Access:* <http://www.scholarly-societies.org/meetings.html#COMPUTERSCI>.

Programming languages, courses, and tutorials

This section lists Web sites, courses, and tutorials dealing with programming languages and other computing topics, concepts, or technology. Programmers' Oasis is listed first because it provides access to numerous programming language Web sites, courses, and tutorials that are otherwise not listed here.

- **Programmer's Oasis.** This site contains links to programming language Web sites, courses, and tutorials with information on compilers and translators, newsgroups, organizations and standards, Windows family programming, algorithms and data structures, news, and other sites of interest to programmers. *Access:* <http://www.netti.fi/~simos/oasis/>.

- **All BASIC Code Archives.** The archives are a comprehensive collection of BASIC Code for the various BASIC languages, covering all operating systems, but focusing on DOS and Windows. There are source code packets available for QuickBasic, PowerBasic, VisualBasic, LibertyBasic, ASIC, Rapid-Q, and XBasic. *Access:* <http://www.basicguru.com/abc/>.

- **The Art of Assembly Language Programming.** This is an in-depth tutorial on assembly language programming in PDF format. Access to the 25 chapters and three appendices is provided by a thorough table of contents and index. *Access:* http://webster.cs.ucr.edu/Page_asm/ArtofAssembly/pdf/AoAPDF.html.

- **C Programming.** This site is an introductory C tutorial; it includes an online test and sample programming problems. *Access:* <http://math.nmu.edu/programming/c/start.htm>.

- **CODE Visual Parallel Programming System.** Computationally Oriented Display Environment (CODE) is a visual parallel program that allows users to change a sequential program into a parallel one. The software must be downloaded and installed on a UNIX system. *Access:* <http://www.cs.utexas.edu/users/code/>.

- **Computer Vision Handbook.** The purpose of this handbook is to outline important ideas and techniques used in computer vision and to furnish references to books, papers, and Web sites containing additional information. *Access:* <http://www.cs.hmc.edu/~fleck/computer-vision-handbook/>.

- **Designing and Building Parallel Programs.** This is the online version of the Addison-Wesley text *Designing and Building Parallel Programs* by Ian Foster. The site integrates the contents of the book with a collection of public domain parallel software tools and a set of links to other information on parallel and distributed computing. *Access:* <http://www-unix.mcs.anl.gov/dbpp/>.

- **The Fortran Library.** The Fortran Library contains a collection of general purpose Fortran 90 routines that can be used to simplify the development of programs with a batch-style input/output interface. Most of the routines can be used to perform standard non-numeric coding tasks. *Access:* <http://www.pnl.gov/berc/flib/>.

- **A Gentle Introduction to Haskell.** The goal of this tutorial is to provide an introduction to the Haskell programming language for a programmer who has experience with at least one other functional language. *Access:* <http://www.haskell.org/tutorial/>.

- **The GP Tutorial.** A basic tutorial on genetic programming. *Access:* <http://www.geneticprogramming.com/Tutorial>.

- **Help-Site Computer Manuals.** Help-Site contains links to computer-related support documents and sites, including FAQ lists, tutorials, manuals, and official or unofficial support sites. *Access:* <http://help-site.com/>.

- **Learn C/C++ Today.** After furnishing some background and tools required for C and C++, this site lists several tutorials available on the Web. *Access:* <http://www.cyberdiem.com/vin/learn.html>.

- **Linux Documentation Project (LDP).** LDP provides access to Linux guides (book length), HOWTOs (documents on specific

subjects), FAQs (questions with answers), man pages (help with individual commands), and the "Linux Gazette" (a magazine with tips and tricks). *Access:* <http://www.linuxdoc.org/>.

- **MSDN Online.** Microsoft Developers Network provides a bounty of technical information, sample code, documentation, technical articles, and reference guides for developers using Microsoft tools, products, and technologies. It also contains standards and release information, as well as samples, downloads, and tutorials. *Access:* <http://msdn.microsoft.com/default.asp>.

- **Numerical Recipe Books On-Line.** The site provides access to the complete text of the following Numerical Recipes book from Cambridge University Press: *Numerical Recipes in C: The Art of Scientific Computing*, *Numerical Recipes in Fortran 77: The Art of Scientific Computing*, and *Numerical Recipes in Fortran 90: The Art of Parallel Scientific Computing*. *Access:* <http://lib-www.lanl.gov/numerical/>.

- **searchVB.com.** searchVB.com is a technology specific search engine for Visual Basic (VB). It provides access to VB Web sites, news, products, services, and

technical tips. *Access:* <http://searchvb.techtarget.com/>.

- **TTT System: Topic, Task, & Test.** The TTT System includes topics (background readings), tasks (activities for practice), and tests (multiple choice and interactively graded) for beginners who want to learn how to write programs in the C++ language. *Access:* <http://clio.mit.csu.edu.au/TTT/stdcpp/>.

- **UNIXhelp for Users.** This site contains helpful information for users of the UNIX operating system. It is organized by tasks, commands, concepts, and utilities, and includes a searchable glossary. *Access:* <http://cypress.mcsr.olemiss.edu/unixhelp/>.

- **World Lecture Hall—Computer Science.** The World Lecture Hall has an extensive listing of computing and computer science courses. *Access:* <http://www.utexas.edu/world/lecture/cs/>.

Note

1. Michael Fosmire and Elizabeth Young, "Free Scholarly Electronic Journals: An Annotated Webliography," *Issues in Science and Technology Librarianship* 28 (Fall 2000), <http://www.library.ucsb.edu/istl/00-fall/internet.html> (20 November 2000). ■

(*"Crossing the divide" cont. from page 594*)

"It takes a conscious effort to create partnerships," said participant John Forsythe of Bowling Green, Ohio. "The library is the ultimate facilitator."—*Naomi Sutherland, University of Tennessee at Chattanooga, Naomi-Sutherland@utc.edu*

Digital dominoes

This well-attended panel presentation, "Digital Dominoes: The Impact of Digital Reference on the Traditional Reference Model," described the MIT and Cornell University real-time digital reference projects. Pat Flanagan (MIT) gave an overview of their pilot project "Ask Us!—Live," which uses the chat and cobrowsing capabilities of LSSI software. Volunteer librarians from all MIT libraries staff the service. She reported that the user satisfaction rate has been high. Paul Constantine (Cornell University) discussed the development of their "LiveHelp" service, which has been operational since January 2000.

"LiveHelp" incorporates LivePerson chat software, which allows for canned responses and the pushing of Web pages. The vision for the service is to provide users with access to high-quality reference service digitally anytime from anywhere, for reference service to be a key component of the digital library, and for it to be "high tech and high touch."

LiveHelp is staffed by a combination of librarians and reference assistants. Constantine acknowledged that implementation of digital reference requires a shifting of resources. Deborah Helman, Lisa Horowitz, Sarah Wenzel (MIT), and Nancy Skipper (Cornell) spoke about software selection and other planning issues, policy issues, training, staffing, and marketing of their digital reference services. Possible developments may include collaboration with other libraries to provide extended hours of service, voiceover IP capability, and real-time technical, interlibrary loan, and technical assistance.—*Martha Tarlton, University of North Texas Libraries, tarlton@library.unt.edu* ■