A Guide to Exploring the Internet

For

Computer Science Majors

Provided by:
Name

English 202C
Date

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Preface to Using this Guide

This section contains information for you to decide whether or not this guide will be helpful for the type of work or studying that you wish to accomplish. This preface will tell you what is in this guide, how the guide is organized, and what you should know before trying to understand the guide and its resources.

Content and Material

This guide includes links to documents, such as web sites and a journal, which vary between topics that a computer science student or professional will find appealing. Subjects range between networking, data encryption, robotics, load sharing, algorithm analysis, coding applications, internationalization, compression, and more. You can find simple examples as well as real-world practical examples. In either case, you will certainly find many formulas and theories. You can even find cutting-edge problems that have yet to be solved!

Intended Audience

This guide is appropriate for computer science or computer engineering majors. In general, junior and senior undergraduates in the field of computer science will find the guide more useful than any other group of people. On the other hand, this guide may also help students who are simply taking a computer science class and need extra reference materials. The information that you will find varies in skill level so that both an undergraduate and a professional will find the data useful.

Assumptions about the Reader

You should be moderately familiar with the theoretical field of computer science. You do not need to be an expert to understand many of the resources provided by this guide, but you will benefit more from the resources after taking a few college courses on the subject. While different colleges label their courses with different names, the topics that they cover are nearly identical; courses at the Pennsylvania State University that will help you the most are “Data Structures and Algorithms,” “Software Design Methods,” and “Discrete Mathematics.” However, if you are a novice, there are at least a few sites with basic tutorials to get you started. Such tutorials are written by experts and are considered top-notch. For example, the Java Sun website has a tutorial page where you will easily spot a “Getting Started” link that even tells you how to install your first compiler.

Since you have a heavy interest in computer science, this guide also assumes that you have a working knowledge of the internet. The guide will not teach you how to access websites or download and view PDF or XLS files.

Organization and Navigation

I organized this guide logically so that you can easily find the sections in which you are interested. The resources which follow this preface include both daily-updated websites as well as publications from professional journals. In the "Published Works" resource section you will find links to government sources such as census statistics. Within both resource sections you will notice that each resource becomes more complex and specific as you continue reading. Each section is organized in a gradient from basic enough for beginners to advanced enough for professionals. Each page has a heading in the upper right-hand corner that indicates the section that you are currently browsing. The page number is displayed in the top-center portion of each page.

Hints and Tips

- Depending on your skill level, you may find different sections useful. If you are new to computer science, start with the first resources in the "Internet Sites" section. Read as much basic information as you can so that you can understand as much as possible from the other resources that this guide includes. If you are a graduate, you may find it more helpful to work with the last websites and possibly some publications. Finally, if you are in the industry, you may find all of the resources listed under "Published Works" more helpful than any of the internet sites.
- Look for this symbol for sites that have discussion boards: The internet is a great place to network with others interested in the same topics as you.

- When you are done accessing all of the resources linked from this document, do not settle for the information that you have accumulated. Many of the online documents that I have provided are full of links to other accredited websites. Feel free to take advantage of the vast networking that the internet has to offer.

Resources within this Guide

This section contains the bulk of the information that this guide presents. There are two main categories of abstracts: internet websites and published works. Within each category, the resources are ordered from a basic level to an expert level. Every resource is actively accessible as of June 2nd, 2008.

Internet Sites

The Sun Developer Network

http://www.java.sun.com

Abstract: This website consists of many java resources, including technical documents that lay out the procedures for creating internet protocols, security systems, abstract data types, and other java technologies. Code samples are provided for complex subjects such as internationalization, performance optimization, openGL graphics, compression algorithms, and remote method invocation (RMI). In addition, one can find discussion boards that include in-depth dialogue between computer science professionals. Podcasts and video tutorials accompany the text-based documents for those who are audible learners.

Tips for using this site:

- Access the "Bug Database" from the menu in the lower right column. You can find bugs that other developers have discovered, and you can even post solutions to fix those problems.
- If you are a student, you may find the "Student Developers" link above the "Bug Database" link. On this page, you can find more information about applying to Sun Microsystems as an intern. You will find dates of when Sun Microsystems is recruiting at each college.
- Use the discussion boards on this website for product development. Roll your mouse over the "Support" button at the top. When the submenu appears, click on "Forums" to find the discussion boards. You will find over 1,000,000 threads. Before you post your own question, be sure to find the appropriate discussion board. The website splits the forum into logical categories, such as "Serialization" and "Accessibility," so that users can find what they need quickly. You will notice that the menu of links is now on the left. There you will see a search bar that says "Search Forums." You can search throughout the forums for keywords in your question in case someone else has asked it in the past.

The Yahoo Computer Science Directory

http://d3.dir.ac2.yahoo.com/Science/Computer_Science

Abstract: This website is a simple yet indispensable resource for acquiring online information in the computer science field. Like other directories, expect to visit this site and see lists of hyperlinks. The advantage to using a directory search is that you can find multiple sites that exist in the Yahoo directory but may not be displayed by a normal search because advertising sites tend to take the top ranks in normal searches. Topics from this directory include logic programming, databases, operating systems, human-computer interaction, and more. Overall, the sites that you can access through this directory are simple, concise, and contain both basic and challenging material.

Tips for using this site:

- Refine the subject you are searching for by clicking on the categorized links.
- Use the search box to find content as if you were searching normally on Yahoo or Google. By clicking on the radio buttons adjacent to the search box, you have the option to refine your search by exclusively searching the directory or even the category that you are browsing at the time in which you perform the search.
- You don't have to keep clicking on a category until you are as specific as possible. At any point in time, the directory displays a list of websites beneath its list of categorized links. Those websites stay current with whichever category you are currently browsing.
- If you find a website outside of the directory that you believe should be included, scroll to the upper right corner of the page and click "Suggest a Site." You have the option of paying $299 (as of June 2008) to include a commercial website in the directory, or you can include any other type of website free of charge. You don't need to own the website that you are recommending. Simply submit the URL, and a Yahoo manager will approve or decline the website after about a week.

Dr. Dobb's Portal

http://www.ddj.com

Abstract: This website consists of practical applications of computer science in the form of articles, discussion boards, blogs, and podcasts. The authors of the website intend their target audience to be developers within the field of computer science because the website includes less theory— which the audience should know already— but more examples. You will want to use this site when you are creating a piece of software and need help synthesizing the code. Whether your problem centers on artificial intelligence, DirectX, 3DStudio Max model loading, or neural networks, Dr. Dobb's Portal has an article with code samples to help you. Content includes architecture design, object-oriented programming tutorials from java and C++, software and freeware design tools, Windows/.NET code, and more specific topics from within those listed categories.

Tips for using this site:

- Use the bar at the top to navigate through the different pages on the site.
- Go to the "Blogs" page from the main page to get up-to-date information on what each of the developers from Dr. Dobb's Portal are working on. This is also where you will find the online forums and discussion boards where you can ask experts for solutions or appropriate steps to solving your problems. Feel free to post small chunks of code that have syntax or run-time errors if you have trouble solving those errors. Other developers are more than happy to exercise their knowledge and problem solving skills on your code.
- Take a few minutes to browse the videos provided on the main page. The website staff interview developers who have been in the field for years, and you don't want to miss what the industry professionals have to say!

The Cryptography World

http://www.cryptographyworld.com

Abstract: This website examines how different cryptographic schemes function. In general, the subject is very advanced and studied by the leading corporations in the computer science industry, but the website presents the subject in a logical fashion that helps its visitors who are new to cryptography— but not new to general computer science— understand the different encodings. The algorithms that you will find on this website include DES, MD5, HASH, RSA, AES, SHA-1, and HMAC. Each encoding has its own guide associate with it, which can be accessed through the "Cryptographic Algorithms" link on the home page. The website walks you through how to use each one of these encryptions as well as how to break them using a private key that can be solved for. This website is very handy for theorists who are looking to discover new cryptographic formulae or searching for more efficient algorithms.

Tips for using this site:

- Use the "Suppliers Directory" link to find other websites related to specific types of cryptographic algorithms. The suppliers are categorized by type of industry such as hardware, software, disaster recovery, products, portals, and training.
- Navigate to the "More Information" page where another menu shows up on the right-hand side. These extra links provide further insight to the actual code behind these encryptions. One of the links is called "Cryptography FAQ." This site includes an extensive FAQ for how encryptions work, why use encryptions, and who has the greatest use for encryptions. While "The Cryptography World" is very useful for advance students and professionals, it hasn't been updated since 2003, therefore the links may provide as much insight as the actual web page.

Published Works

The Public Standards for Government Cryptography

http://purl.access.gpo.gov/GPO/LPS72065

Title: Cryptographic algorithms and key sizes for Personal Identity Verification
Author: Polk, Timothy W.
Publisher: Gaithersburg, MD: U.S. Dept. of Commerce, National Institute of Standards and Technology, 2006

This report is from the *Catalogue of U.S. Government Publications.* Similar articles exist in the field of computer science that examine marketing standards and cryptography. You can easily find other topics such as "pathing" algorithims found in nature, such as bird migration.

This document indicates at the beginning that it assumes a working knowledge of data encryption and Public Key Infrastructure (PKI) technology.

Abstract: This publication is a government document created by the computer security division of the National Institute of Standards and Technology for the purpose of standardizing algorithms in the area of public data transfer security. As worded within the document, NIST is responsible for developing standards and guidelines, including minimum requirements, for providing adequate information security for all agency operations and assets. It analyzes and rigorously tests every algorithm from the U.S. Department of Commerce's Information Technology Laboratory research. This publication is helpful for professionals in the computer science industry who are looking for standards of encryption for private data like a social security number on an employee's id card.

Tips for using this document:

- If you are unfamiliar with certain government organizations' abbreviations, there is an appendix on page 14 that has a list of all acronyms used within the guide.
- If you are unsure which type of algorithm you are looking at, you can go to page 12 to find algorithm identifiers.

The Chicago Journal of Theoretical Computer Science

http://cjtcs.cs.uchicago.edu

Title: *Chicago Journal of Theoretical Computer Science*
Editor: Simon, Janos
Publisher: Department of Computer Science, The University of Chicago

The *Chicago Journal of Theoretical Computer Science* is a powerful resource for someone who is seeking professional application of complicated algorithms. Computer scientists can use the theories and lemma presented in this journal to maximize efficiency in any algorithm.

Abstract: This publication contains articles consisting of culminations of data about the math behind computer science that researchers have spent years studying. The document is set up as a list of articles that have been published in this specific journal. Every entry in the list is a link to the original print of the corresponding article. Generally in each article of this online journal, scientists prove theories about self-stabilizing trees, combinatorics, polynomial nondeterminism, and randomized reductions among other advanced topics. You need to know what you are looking for to find useful any of the information presented in this online journal because the information is specific and highly technical. A developer who specializes in self-stabilizing trees or some other specific abstract data type may find this publication advantageous. A graduate student who is trying to improve the efficiency of a specific algorithm could find this website helpful as well.

Tips for using this document:

- The online journal is not very user-friendly and lacks a style-sheet for formatting purposes. However, the organization can still help you out. You can find all recently published articles by the journal towards the top of the home page and all of the older articles towards the bottom. The specific dates of publication for each article trail the articles' titles.
- At the very bottom of the home page there is a link that says "Information about this Journal." If you click on the link, it will send you to a table of contents page that has more information than you would otherwise have found. This information includes instructions to submit your own professional article for the journal, as well as tips for formatting your article to look professional.

The Statistical Abstract of the United States

http://www.census.gov

The online version of the Statistical Abstract of the United States provides general statistics about the citizens and residents of the U.S. This resource is extensive and contains data relating to academics, professional careers, religious beliefs, composition of ethnic groups, and more. It contains information that dates back decades.

Abstract: The Statistical Abstract of the United States contains information about households, businesses, geography, world news, and special topics such as facts for students and teachers (e.g. college admissions information). The data is up-to-date and already contains statistics from 2008. To use this website, either use the "Search" box at the upper-right corner, or use the "Subjects A to Z" link that you can find next to the search box. Type into the search box key words that relate to the subject that you need data for.

For example, at http://www.census.gov/prod/2007pubs/08abstract/science.pdf, you will find statistics about the funding for information technology research. The document breaks down research funding based on the providers of the funds: the federal government, the nonfederal government, nonprofit organizations, universities and colleges, and the science and technology industry such as IT businesses. The document displays this data in tables and includes a description of each of the tables and how to read them. This data is helpful for someone looking for funding in the area of information technology or computer science. The document helps researchers find grants to support their work.

Tips for using this document:

- On the right side of the homepage, there is a "Population Finder" application. Simply type in your zip code or city and state, then click "Go." The most recent statistics for your town will be displayed on the next page.
- Below the "Population Finder" is an application called "Find An Area Profile." To use this application, find your state in the drop-down box. A page will display with facts about your state. You can narrow the search at the top by selecting your county or city. The data that displays is information about businesses and homeowners in your area, grouped by general ethnicity (such as "Asian" or "Hispanic"). You can see how many Hispanic home-owners there are in your county, or how many Caucasian business owners are in your city.

ISI Web of Knowledge

http://apps.isiknowledge.com

The ISI Web of Knowledge is an online database index that makes searching for databases simple by using a user-friendly search interface that you would not find in a physical database index.

Abstract: Like other online database indices, the ISI Web of Knowledge allows users to search for journals and databases based on different search criteria such as author and topic. Graduate students and other professional researches will find this useful if they need references to the most up-to-date information in their field of study. The database includes the names of the publications that have the articles that you may be looking for, so all you have to do is go to the library and find the journals or periodicals.

A computer scientist may find this site helpful for accessing reference material for any subject in computer science. I often use this site to read about what my professors have written since almost everything they have published can be found in this database. For instance, Professor Sean Hallgren of the Penn State Department of Computer Science and Engineering wrote an article titled “Polynomial-time quantum algorithms for Pell's equation and the principal ideal problem.” The construction of the online database website does not allow linking specific searches, so I cannot include a link to Professor Hallgren’s article. However, you can search for it to read about his solution to Pell’s equation if you are interested in quantum physics and computing.

Tips for using this document:

- When searching for data, you can refine your search by three qualifiers. Possible qualifiers include title, author, year published, topic, and publication name.
- Since you are probably searching for subjects related to computer science, you can further narrow your search by clicking on the “Web of Science” tab at the top, instead of “All Databases.” This will remove subjects such as international affairs and U.S. economy.
- You can save any search that you perform. When you perform the search, a button will appear in the upper-right corner that says “Save this Search.” Click it, and a cookie will be stored on your computer. Later when you access the site again, in the upper right corner of the home page there is a link that says “My Saved Searches.” If you click on this link, a list of all of your most recently saved searches will appear. This is extremely helpful for researchers who are performing multiple searches and need to save their sources.