

Sample Assignments

Each department course used in one of the majors is listed here along with a set of sample assignments for that course. Courses are identified by title and include an indication of which major (CS, IS or IT) uses the course and whether the course is required (R) or elective (E). A full listing of the curriculum for each major is available at <http://cs.sru.edu>.

CpSc 130: Introduction to Programming and Information Systems (IT-R, IS-R)

Project 1: Cash Register

Create a point and click web page that allows the user to select some quantity of each product for purchase. The user may continue to add (or change) items until he or she indicates the order is complete. The program will present the total as each item is changed. The items to be sold should be selected from traditional Mexican cuisine, for example “taco” and “burrito” are OK, but not “Nachos BellGrande®”. Use images to identify the items on the web page.

Project 2: Best Movie Page

Create a web page that lists various categories of films, including at least action, foreign, romance, comedy, and gay/lesbian. Using the images provided as icons (select others as needed), allow the user to choose a category. The link takes the user to a separate category page for each genre you have chosen. In each category, add at least two well-known films. If you don't personally know of a film that should be listed (your opinion), do a key word search at imdb.com. Each Movie listing must include a title and a short description on a well-formatted page.

CpSc 140: Introduction to Programming Principles (IT-R, IS-R, CS-R)

Project 1: Flash-Card Learning Game

Write a program that maintains pairs of words (or phrases) in an array or pair or arrays, one in English, the other in Spanish. The program allows the user to select which language is presented. During play, the program randomly selects a term from the appropriate array, displays it, and reads the user's response. The response is compared to the expected result, scored, and, if not correct, the correct answer is displayed. The user must be able to indicate when game play ends, at which time a final score is presented.

Project 2: Cash Register

Create a text menu based system that allows the user to select some quantity of each product for purchase. The user may continue to add (unique) items until he or she indicates the order is complete. The program will then total the sale and present the amount to the user. The user enters the amount tendered and the program indicates the correct change. Include error checking. The items to be sold should be selected from traditional Mexican cuisine, for example “taco” and “burrito” are OK, but not “Nachos BellGrande®”.

CpSc 150: Advanced Programming Principles (IT-E, IS-R, CS-R)

Project 1: Object Oriented Design

Create a program that simulates the operation of a vending machine. The user interacts with an interface that offers choices of food, accepts coins, and responds appropriately.

The program could offer a choice of language for the interface such as English or Spanish. Another option would be to offer a choice of ethnic foods such as Mexican or Italian or Classic American Fast Food.

Project 2: Using arrays, loops, strings

Create a word substitution program. The user types in a sentence and the output is another sentence with some words replaced. The replaced words come from a data file of words and their substitutions.

The dictionary could include diversity by making such substitutions as black for white and white for black, female for male and male for female, lesbian for woman and woman for lesbian.

Project 3: Search and sort algorithms

Create a program that searches or sorts data files.

The data files could consist of a data base of people with traits to demonstrate diversity as a gender and ethnicity as well as other data. The requested sorts and searches could reflect combinations of the diversity factors and the other data.

CpSc 207: System Software and Architecture for End Users (IT-R)

Project 1: working with Basic UNIX commands

Create a file containing 10 English words each followed by a space character and then a one-word translation (using Alta Vista's Babel fish, Google's translation tools, or an actual bilingual dictionary) of that word into some other human language (extra credit for using non-Indo European languages). Write a shell script which accepts, as input, a word from either language and outputs its translation.

Discuss why this technique might not work for the general problem of translating text in one language to text in another language.

Project2: executable shell scripts

Take any of these six files (taken from the Internet Dictionary Project at <http://www.june29.com/IDP/>):

```
[dict]$ ls -ltr
-rw-r--r-- 1 ddailey ddailey 87371 Mar 28 2000 French.txt
-rw-r--r-- 1 ddailey ddailey 211010 Mar 28 2000 German.txt
-rw-r--r-- 1 ddailey ddailey 128738 Mar 28 2000 Italian.txt
-rw-r--r-- 1 ddailey ddailey 297443 Mar 28 2000 Latin.txt
-rw-r--r-- 1 ddailey ddailey 37078 Mar 28 2000 Portuguese.txt
-rw-r--r-- 1 ddailey ddailey 171565 Mar 28 2000 Spanish.txt
```

And write a shell script that accepts as input one English word and outputs the translation (and part of speech) into the language of your choice. Pay special attention to the irregularities of the ways in which these files are formatted. You may choose to download word lists for alternative languages, if you can verify that these resources are in the public domain or otherwise properly licensed.

CpSc 210: Productivity Software (IT-E, IS-R)

Project 1

Using U. S. Census data about the numbers of male vs. female workers in either the nursing field or the public teaching field in the last five decades generate a chart from an Excel spreadsheet that you create to display this data effectively.

Project 2

Prepare a PowerPoint presentation about a multinational software/hardware company based in Asia or Africa.

CpSc 217: Structured and Dynamic Web Programming (IT-R, CS-E)

Project 1

Develop a web page containing a 2 by 2 table with a graphic in each of the four cells. Each graphic should be 200 pixels high by 200 pixels wide. The graphics should be either drawn by you or verifiably legal (public domain or openly licensed) and should consist of

- A pagoda
- A yurt
- A Hogan
- An immeuble

There should appear no space, gaps nor lines between any of the pictures as the table is viewed in both IE and Firefox. (That is, the pictures should nestle seamlessly next to one another so that the viewer cannot see the edges between them.) When one clicks on any of the cells (from either browser), an alert message should display the filename of the picture that was chosen as well as a count of the number of times that picture has been clicked. Below the four pictures should be a button (centered under the pictures). When clicked, the button should make all four pictures change locations, moving to the table cell adjacent to it by clockwise rotation.

Project 2: String handling and probability

First choose two languages to work with. One should be Indo-European, the other should be non-Indo European. The orthography of at least one should not be the Roman alphabet. Build a web page in which the user can type or paste a paragraph or more of text from either language. When done, the user can press a button which "analyzes" the text. The analysis consists of two tabulations: the frequency of occurrence of every glyph (character) including punctuation marks (In alphabets that distinguish between lowercase and uppercase letters, the two variants of the same letter should be considered the same so that "a" and "A" are identified) and the frequency of occurrence of every character pair (or digraph -- in which "ab" is not the same as "ba") is tabulated and presented on the page.

Finally, when a second button is pressed, new random text is generated and placed somewhere else on the page. The newly generated text should be generated with the probabilities of characters' occurrences matching the frequency of occurrence within the user's text. That is, if the occurrence of "e" accounts for 12% of the characters used, then the probability of generating an "e" should be 0.12

CpSc 236: Selected Computer Languages (IT-E, IS-E, CS-E)

All of the suggestions from CpSc 150 are appropriate for courses in other languages

CpSc 300: Challenges of Computer Technology (IT-R, IS-R)

Project 1

Conduct research about software piracy, telecommunications legislation, or copyright/patent law in a country outside of North America. Word-process a documented, three to five-page report that you will present to your peers in class via PowerPoint slides.

Project 2

Examine New York Times articles about the digital divide in access to technology in North and South America. Present your findings to class in a 10-minute talk and discussion.

Project 3

Why are there so few women and minorities in information technology? Use current literature to answer this question in an essay exam.

CpSc 301: Practical Computer Security (IT-E)

Project 1: Why are there threats?

Frequently foreign interests (economic or governmental) have been blamed for various of the security threats to the electronic community. Imagine that you are a high ranking member of a foreign government that actually engages in cyberwarfare. How would you justify this activity? Write a one-page essay describing your government's reasons for engaging in such behavior.

Project 2: What is a threat?

Different nations have different laws about freedom of speech, decency and obscenity, and privacy. Suppose you were sent by your employer to administer computing and network systems in a foreign country. Give a case study of how the laws of one particular country might affect your job.

CpSc 305: Introduction to Expert Systems (IS-E)

Project 1

Assuming you add heterosexual, figure out from questions where someone is in the QLBGTI spectrum.

Project 2

Determine where someone lives based on information about population, size of country, percent female/male, and perhaps percent that in a particular religion or ethnic breakdown.

Project 3

Match up exchange students with host families based on cultural interests, language, ability/willingness to provide transportation, etc.

CpSc 311: Discrete Computational Structures (IT-R, IS-E, CS-E)

Project 1: History of Mathematics

List three major contributions to the history of mathematics that were contributed by persons neither from Europe nor the Americas.

Project 2: Mathematical notation

Write an essay about cross cultural issues in mathematical notation. Consider such topics as

- the number system itself and how different historical and contemporary cultures have written numbers
- linguistic differences in the oral representation of numbers (for example in French “ninety four” literally translated is “four-twenty fourteen”). Consider at least four languages in your analysis.
- Discuss how different national educational treatments of mathematics may influence its mastery by the citizenry.

CpSc 317: Scripting Languages (IT-R, IS-E)

Project 1: First and Last Names in the United State

From the US census bureau, we have three files consisting of last names, female first names and male first names of people in the most recent US census. For each letter of the alphabet, determine the probability that a name beginning in that letter is male or female and the probability that a name ending in that letter is male or female. Are there particular letters of the alphabet (either ending or beginning) that would tend to be affiliated more with certain ethnicities than with others. (Hint: first names ending in “ko” are almost always, in the United States, female.)

Project 2: Mapping with Geographic Data

The map at <http://granite.sru.edu/~ddailey/usmap.svg> takes public data from the US Census Bureau and shades the 50 states based on any of 82 variables chosen by the user. Do the same thing for the states, provinces, or counties of another country where English is not the official language. Be sure to discuss issues involved in finding the data, its original sources and its accuracy.

CpSc 323: Database Systems (IT-R, IS-R, CS-E)

Project 1

Design a database for maintaining data for genealogy researchers. A library wants to input the data so that researchers can locate the article on microfilm. Your job is to create a database that can hold information found in an obituary article.

The database:

- should have the ability to store all of the data given in the article into a set of well-defined tables that use BCNF as appropriate.
- data fields to be stored are: Last Name, First Name/ Initial, Middle Name / Initial, Maiden Name, Nickname, Title, Extension, Locality, Age, Gender, Race, Unit of Measure, DOB,

Appendix A: Sample Assignments

Newspaper, Publication Data, Pg, Article Type, Relative's Last Name, Relatives First Name/Initial, Relative's Middle Name/Initial, Relative's Maiden Name, Relative's Relationship, and Comments.

- Only null fields are Last Name, Date of Publication, Newspaper, Page, Article Type entries from list will be taken from a prescribed list
- Tables shall provide a logical grouping of data fields
- tables shall minimize the response time for queries of the MDB

The submitted design will include, a list of tables, entity diagram and data types for each attribute.

Project 2

A table of foods and their ethnic heritage has been created. It consists of the columns:

- FoodName
- NumIngredients
- Ethnicity
- PrepTime
- CookTime

Write the Queries to display the following:

1. FoodName and Ethnicity
2. CookTime
3. All columns using the *
4. All FoodNames where CookTime is 30
5. All FoodNames where PrepTime + CookTime is < 60
6. All columns Sorted by Ethnicity

CpSc 327: Systems Administration and Security (IT-R, IS-E)

Project 1: Systems administration in a foreign country

Suppose you were sent by your employer to administer computing and network systems in a foreign country. Of the tasks of managing networking, security, remote printing, storage allocation, account management, and backup, which would you imagine might be most affected by cross-cultural issues and why? What steps would you undertake to address those issues?

Project 2: Country of Origin

“The highest-piracy countries are Armenia, Bangladesh, Georgia, and Zimbabwe, all over 90 percent.” [\[http://www.telecentre.org/profiles/blogs/the-global-software-piracy\]](http://www.telecentre.org/profiles/blogs/the-global-software-piracy) Many attribute the relatively high rates of piracy to social conditions. When it comes to Internet attacks, the US often points the finger of blame at China or other global competitors. Research the issue of where Web-based attacks, phishing URL, and spam originate (or are hosted). Determine the top three countries for all malicious activity. Start with Symantec’s Internet Threat Security Reports, but back this up with additional resources.

CpSc 343: File Processing (IT-E, IS-R)

Project 1

Ask students to read a file from census data in a particular format and find certain information, for example: Using U. S. Census data about the numbers of male vs. female workers in either the nursing field or the public teaching field in the last five decades, generate a chart from an Excel spreadsheet that you create to display this data effectively.

Project 2

Design an HR database (set of files) that can be used by a company for employee management and healthcare management where the company allows domestic partners (and dependents). The system shouldn't "out" people just because they are using the benefits. Actually, this would be at least two "views" of the data.

CpSc 358: Simulation (CS-E)

Project 1: Queues.

Create a simulation of carhop service with servers that are identified with ethnic and gender traits. The simulation would use randomized data.

Project 2: Best Fit and Bias.

Create best fit for data on table service for various ethnic and gender customers. The object would be to determine if service was fair among the various groups.

Project 3

Find and examine data for bias among various traits. Example rate of traffic tickets, prison terms, approval/denial rates for loans.

CpSc 365: Management Information Systems (IT-E, IS-R)

Project 1

As a team, look for articles in international newspapers about the impact that information systems have on countries outside of the United States, especially Asia and Africa. Bring the articles to class and discuss their implications.

Project 2

Determine a way to recycle equipment to "needy people". How are they identified? How is the program sustainable? How does it help the corporation?

CpSc 370: Computer Organization (IS-E, CS-R)

Project 1

Study character codes that are useful for Eastern languages, including why Unicode is two bytes.

Project 2

Write an assembly language with instructions appropriate for non-Western cultures.

CpSc 374: Algorithms and Data Structures (CS-R)

Project 1: Shortest-Path

For all of the major buildings on campus, develop a map (graph) that describes the path that wheelchair-bound person is able to take in traversing the campus. Weight each path segment based on a combination of difficulty of traversal and distance. Write a program that asks the user which building he or she is leaving and which he or she is traveling to. Determine the shortest path for the traversal.

Project 2: Flash-Card Learning Game

Write a program that maintains ordered pairs of words (or phrases) in a set, one part in English, the other in Spanish. The program allows the user to select which language is presented. During a drill, the program randomly selects a term from the set, displays it, and reads the user's response. The response is compared to the expected result, scored, and, if not correct, the correct answer is displayed. The item used is removed from the set before selecting another. The drill continues until the set is empty, at which time a final score is presented.

CpSc 376: Programming Languages (CS-R)

Project 1:

Some political scientists are interested in examining the gender, race, sexual orientation, nationality, and religion of people. The administrators have incomplete lists of each demographic that is being tracked. Thus, before analysis can begin, the administrators want the lists updated. You are to write a Lisp program that permits administrators to update demographic classifications and then creates a histogram of the demographics of a population. The political scientists want to examine:

- gender
- race
- sexual orientation
- nationality
- religion

When the program starts, it is to begin in administrator mode and permit additions to the above lists. After the administrator is complete the same program is to start normal input mode which permits different population groups to be analyzed.

Project 2:

Select a language from the list below and prepare a presentation for the class that discusses the salient design decisions.

Designer	Language
Alain Colmerauer	Prolog
Ralph Griswold	Icon
Guido van Rossum	Python
Ole-Johan Dahl, Kristen Nygaard	Simula-67
'83:Jean Ichbiah, '95: Tucker Taft	Ada
Yukihiro Matsumoto	Ruby

CpSc 378: Theory of Computation (CS-R)

Project 1: Computational Complexity

Use the biographical sketch of Richard A. Tapia as an introduction to a **computational complexity assignment**. Richard Tapia is North Harding Professor of Computational and Applied Mathematics at Rice University. The Richard Tapia Celebration of Diversity in Computing Conference honors the significant contributions of Dr. Richard A. Tapia, a mathematician and professor in the Department of Computational and Applied Mathematics at Rice University in Houston, Texas. He is internationally known for his research in computational and mathematical sciences and is a national leader in education and outreach programs. Dr. Tapia has authored or coauthored two books and more than 80 mathematical research papers. His current positions at Rice are Noah Harding Professor of Computational and Applied Mathematics; Associate Director of Graduate Studies, Office of Graduate Studies; and Director of the Center for Excellence and Equity in Education.

Richard Tapia was born in Los Angeles to parents who separately emigrated from Mexico as young teenagers in search of educational opportunities for themselves and for future generations. Richard was the first in his family to attend college, earning his B.A., M.A., and Ph.D. degrees in mathematics from the University of California, Los Angeles. Due to his efforts, Rice University has received national recognition for its educational outreach programs and the Rice Computational and Applied Mathematics Department has become a national leader in producing women and underrepresented minority Ph.D.'s in the mathematical sciences. Some of Dr. Tapia's honors include: election to the National Academy of Engineering (1992) for his seminal work in interior point methods; the first recipient of the A. Nico Habermann Award from the Computing Research Association (1994) for outstanding contribution to aiding members of underrepresented groups within the computing community; the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring from President Clinton (1996); appointment by President Clinton to the National Science Board (1996), the governing body of the National Science Foundation; and the establishment of a lecture series to honor Dr. Tapia and African American mathematician David Blackwell at Cornell University (2000). Dr. Tapia also received the Hispanic Engineer of the Year Award from Hispanic Engineer Magazine in 1996, and was inducted into the Hispanic Engineer National Achievement Awards Conference Hall of Fame in 1997. Dr. Tapia was inducted into the Texas Science Hall of Fame in 2004. Hispanic Engineer & Information Technology Magazine also selected him as one of the 50 Most Important Hispanics in Technology and Business for 2004.



Project 2: Turing Machine

Use the biographical sketch of Maria Klawe as an introduction.

Maria Klawe became President of the Harvey Mudd College on July 1, 2006. Previously she served as Dean of Engineering and a professor of Computer Science at Princeton University. She moved to Princeton in January 2003 from the University of British Columbia where she served as Dean of Science from 1998 to 2002, Vice-President of Student and Academic Services from 1995 to 1998, and Head of the Department of Computer Science from 1988 to 1995. Prior to UBC, Maria spent eight years with IBM Research in California, and two years at the University of Toronto. She received her PhD (1977) and BSc (1973) in Mathematics from the University of Alberta.



Maria has made significant research contributions in several areas of mathematics and computer science including functional analysis, discrete mathematics, theoretical computer science, interactive-multimedia for mathematics education, and assistive technology. Her current research interests include gender issues in technology, design and use of technology to assist individuals with cognitive and/or motor disorders, and discrete mathematics. Maria was the founder and director of the EGEMS project, a collaborative project on the design and use of computer games in enhancing mathematics education for grades 4 to 9. During the decade from 1993 to 2002 EGEMS developed several innovative and successful prototype games, and did seminal work in identifying important factors in the design of effective educational software. EGEMS research also studied the role of gender in technology-based learning environments and identified significant gender differences in how students interact with computers and software. This research was extended under the auspices of the NSERC-IBM Chair for Women in Science and Engineering that Maria held from 1997 to 2002, and the SWIFT (Supporting Women in Information Technology) project on how to attract and retain women in information technology careers. Maria is a Past President of the Association of Computing Machinery (ACM) in New York, Chair of the Board of Trustees of the Anita Borg Institute for Women and Technology in Palo Alto, a Trustee of the Mathematical Sciences Research Institute in Berkeley, and serves on the board of Math for America. In the past Maria has held leadership positions in the American Mathematical Society, the Computing Research Association, the Society for Industrial and Applied Mathematics, and the Canadian Mathematical Society. Maria was elected as a Fellow of the Association of Computing Machinery in 1995 and as a Founding Fellow of the Canadian Information Processing Society in 2006. Other awards include Vancouver YWCA Women of Distinction Award in Science and Technology (1997), Wired Woman Pioneer (2001), Canadian New Media Educator of the Year (2001), BC Science Council Champion of the Year (2001), University of Alberta Distinguished Alumna (2003), Nico Habermann Award (2004), and honorary doctorates from the University of Alberta (2007), Acadia University (2006), Dalhousie University (2005), Queen's University (2004), the University of Waterloo (2003), and Ryerson University (2001)

Design a Turing machine that will decide the language $\{w \in \{0, 1\}^* \mid w \text{ contains at least three } 1\text{'s}\}$. You need to define Q, Σ, Γ , the start, accept, and reject states and the transition function δ as a two dimensional table.

Design a Turing machine that will decide the language of pairs of matching left and right parentheses. Examples of strings belonging to the language: $\epsilon, (), (()), ()(), (((()()))$. You need to define Q, Σ, Γ , the start, accept, and reject states and the transition function δ as a two dimensional table.

Design a Turing machine that will decide the language $\{w \in \{a, b\}^* \mid \text{number of } a\text{'s in } w = \text{number of } b\text{'s in } w\}$. We did this as an example in the class. For this assignment, instead of crossing out the earliest a for a matching b , cross out the most recent uncrossed a on coming across a b . The same thing about b and a . You may have to worry about detecting the left end of the tape. You need to define Q, Σ, Γ , the start, accept, and reject states and the transition function δ as a two dimensional table.

Project 3: The Game of "Choice"

Many still believe that sexual orientation is a matter of choice. It is well known among the ignorant, that proximity to those whose sexual preference varies from one's own may cause one to question one's sexuality or even to change. In Conway's game of life, each cell has one of two states (dead or alive). In ours, each cell will have one of three states: gay, straight or questioning.

Appendix A: Sample Assignments

The program will read the state (rectangular map) from a file or allow the user to select cells interactively and assign a state. Each generation, including the initial is displayed. The rules for determining the next generation are as follows:

If the cell is “straight” and 4 or more neighbors are straight, the cell stays the same.

If the cell is “straight” and 2 or 3 neighbors are straight, the cell becomes “questioning”.

If the cell is “straight” and 0 or 1 neighbors are straight, the cell becomes “gay”.

If the cell is “gay” and 4 or more neighbors are gay, the cell stays the same.

If the cell is “gay” and 2 or 3 neighbors are gay, the cell becomes “questioning”.

If the cell is “gay” and 0 or 1 neighbors are gay, the cell becomes “straight”.

If the cell is “questioning” and 4 or more neighbors are questioning or the number of neighboring gay cells equals the number of neighboring straight cells, the cell stays the same. Otherwise, the cell changes to the state of the maximum of gay and straight neighbors.

Submit with a DFA to show state changes.

Note: As implied above, this is not intended to model the real world. The “questioning” state is simply a contrivance for the program. We cannot replace “questioning” with bisexual, as we are not dealing with the gender of the neighbors. (And, a bisexual might well argue that he or she is not questioning his or her orientation.)

CpSc 413: Systems Analysis (IT-R, IS-R)

Project 1 (Related to the assignment in 365 (2))

A company is currently managing their donations of recycled equipment to *some_entity* in the US, using excel... design and analyze a system whereby the donations occur in another country, it is efficiently managed, there is sustainability (corporate support) and consideration is given to International law.

Project 2

Temp Office Personnel specializes in providing jobs for women with children. They match special skills to needs at a company and take into account the time needs of the mothers. A position is often filled by two, and potentially, more temps. All the skills have to match. Times need to correlate. And, they need a way to effectively transition work. Create a data model for such a system.

CpSc 423: Computer Networks (IT-R, IS-R, CS-R)

Project 1: Software Development Project

It is generally recognized that the free flow of information makes it more difficult to oppress people. In most countries, the Internet is *the* means of guaranteeing such a free flow, but in others the Internet is filtered, monitored, suppressed or otherwise controlled by an oppressive government.

Using current research methods - for example, Google and “trusted news sources” - identify a country and an ethnic or racial minority that is oppressed by the government of that country. Verify your findings with Amnesty International or another (Get it approved by the Instructor.) well-known human rights organization. Briefly describe the type of oppression, referencing the sources you used to substantiate the claim(s).

Describe how the government (can or might) controls access to the Internet and the free flow of information. If possible, substantiate this with references as well.

Project 2

Consider the development of an HTTP proxy service (available outside the country in question) that protects the identity of an individual within such a country from those outside and that hides the source of the information from those within the country. If possible, consider whether the contents of messages (in either direction) could be hidden, disguised or encrypted. Modify the proxy server we developed earlier to accomplish this.

Project 3: Digital Divide

For each of the populated continents (Asia, Africa, North America, South America, Europe and Australia), identify at least three servers that will respond to ping and tracert in three different countries (assume Australia includes Tasmania, New Guinea, the Aru Islands and Raja Ampat Islands). For each of your servers, run ping tests to determine the minimum, average and maximum response times. Show the results using a graph. Use tracert to determine paths taken to each destination. Identify shared links in the paths and significant bottlenecks. Draw a graph showing the results.

CpSc 427: Interface Design (IT-R)

Project 1: Accessibility

Consider several different ways of marking up the following diagram (available from the W3C at http://www.w3.org/html/logo/downloads/HTML5_Logo.svg) using SVG:



How would you write the SVG so that the picture would be maximally accessible to a blind person? Explain why you would make the changes you suggest.

Project 2: Color perception and color terms

Write a paper on the neurological, perceptual and cultural issues involved in the use of colors on a web site. Include such topics as why women have more terms for colors than men and cross cultural differences in the emotive connotations of various colors.

CpSc 443: Software Project Management (IT-E, IS-R)

This assignment should be the next *step* of either of the CpSc 413 projects. Presentation on projects described in some selected set of papers (that would describe projects in Asia, Africa, etc.)

CpSc 450: Internship (IT-E, IS-E, CS-E)

Project 1: SRU Proprietary Report

After completing the internship, write a report that describes the company environment or culture as it pertains to multiculturalism. Describe how the culture could be improved while maintaining effectiveness and profitability

CpSc 456: Introduction to Computer Graphics (CS-E)

Project 1: Avatar Creator

Many social networking sites allow the user to post an image which might be an avatar to represent them pictorially, some make more extensive use of avatars. For our purposes, we will assume a 2D, static avatar is the goal. Write a program that assists that user in creation of an avatar. Your program must take into account the preferred gender and race (skin tone) of the user. For extra credit, include height and weight preferences (for example, tall & slim).

Project 2: 3D Game

Create a game in which the protagonist-hero is a person of color.

CpSc 464: Principles of Concurrent Programming and Operating Systems (CS-R)

Project 1

You are to write a C program that uses POSIX semaphores and threads to implement a multiple producer, multiple consumer conveyor belt that produces both sopos and molletes. Use the following information to complete the assignment: Two employees, Carlos and Fernanda, consume the Mexican snacks by removing them from the conveyor belt in the order they are produced. The conveyor belt can only have 10 items on the belt at a time with a maximum of 3 sopos permitted on the belt at a time. Additional restrictions: the Mexican snacks are consumed in FIFO order, producers should exit when a total of 100 Mexican snacks are generated, do not use global variables, pass parameters. For proper simulation, you will need to implement parameters that control timing.

- t N the delay in milliseconds between the production of each sope.
- s N the delay in milliseconds between the production of each mollete.
- F N where N is the number of milliseconds that Fernanda needs to place an item in its wrapper
- C N where N is the number of milliseconds that Carlos needs to place an item in its wrapper

If an argument is not given for any one of the threads, that thread should incur no delay. You need not check for errors when sleeping. Output each time a Mexican snack is produced and each time a Mexican snack is consumed. At the end of the run, print a summary of how many sopos and molletes were produced and how many Mexican snacks Carlos and Fernanda consumed.

Project 2

Use the biography of Sandra Johnson as an introduction to an Operating Systems assignment.

Appendix A: Sample Assignments

Sandra K. Johnson is a Senior Technical Staff Member at IBM and is part of University Alliances with a focus on sub-Saharan Africa. Her previous assignments include working as the Chief Technology Officer, Global Small and Medium Business for IBM Systems and Technology Group, the Linux Performance Architect, and managing the Linux Performance, WebSphere Database Development, and Java Server Performance teams within IBM development and research organizations. She is an ACM Lecturer on the topic "Methodologies for Optimizing Linux Server Performance".

ABSTRACT:

The Linux operating system has gained significant popularity in the past several years as a platform for a diverse set of client and server computing machines. This talk describes the various methodologies used to improve the performance of the Linux kernel on high-end enterprise server machines. Described are methodologies for measuring, analyzing, and improving the performance and scalability of the Linux kernel, focusing on platform-independent issues. A diverse set of workloads are described, including web serving, database, and file serving. In addition, various components of the Linux kernel (e.g., the disk I/O subsystem) are examined. Several well-known benchmarks are used to quantify Linux performance for these workloads and system components. The results show significant improvements in the Linux kernel for enterprise servers.



CpSc 466: Compiler Design and Implementation (CS-E)

Project 1

Use the biography of Vugranam Sreedhar as an introduction to a Compiler Design assignment. in program analysis, compiler optimization, programming languages, security, business process, multicore Dr. Vugranam C. (VC) Sreedhar is currently a Research Scientist and a Project leader at IBM TJ Watson Research Center working in the area of Information Security. His Ph.D. thesis is in the area of program analysis and is entitled "Program Analysis Using DJ Graphs". Dr. Sreedhar has worked in several projects architecture, concurrency analysis, software quality, and embedded systems.

Jugranam C. (VC) Sreedhar is a lecturer with the ACM Distinguished Speaker Program on various topics including "Static Single Assignment Form and its Applications".

ABSTRACT:

Static Single Assignment (SSA) Form is now a well accepted intermediate representation for compiler optimization. In this talk I will discuss the core ideas behind SSA form, related representations, and how they is used in improving program analysis techniques and in improving compiler optimizations. I will also discuss some of the key algorithms for constructing SSA form. I will then discuss some new applications of SSA in the area of tpestate analysis and detecting security vulnerabilities.

Project 2

Use the biography of Jose Amaral as an introduction to a Compiler Design assignment.

Jose Nelson Amaral is a professor in the Department of Computing Science. He is the head of the Compiler Design and Optimization Laboratory. His areas of expertise also include high-performance computing and computer architecture.

Jose Nelson is a lecturer with the ACM Distinguished Speaker Program on various topics including "Compilers That Adapt After Leaving the Compiler Shop".

ABSTRACT:



Optimizing compilers often need feedback from training runs of programs to determine the frequency of execution of different paths and the affinity between data elements. Currently static compilers rely on static feedback data, ie. data that is obtained from a few, sometimes a single, training runs. These training runs use a set of inputs that the software developer hopes to be representative of the actual behavior of the application throughout its lifetime. The information obtained from these training runs is then embedded into the optimizing decisions made by the code generator. This talk points some of the shortcomings in the current static compiler feedback-directed optimization techniques.

Dynamic adaptive compilers, or adaptive just-in-time compilers, monitor the current run of the program and make decisions to trigger re-compilation of modules to better optimize them. Some researchers have proposed a mechanism to embed summary information from previous runs into adaptive dynamic compilation systems.

However, no system has been proposed that enables the continuing monitoring of an application's run-time behavior throughout the lifetime of the application for compilation purposes. This vision talk explores the issues --- both sociological and technical --- involved in the creation of such a framework. Significant work in the combination of machine-learning techniques with optimizing compilers needs to be done for such a framework to be successful. The widespread acceptance of software that do self-upgrading and automatic installation of software patches indicates that such a compilation system could be well received by computer users that are concerned with performance.

CpSc 474: Computer Architecture (CS-R)

Project 1: Architecture History

Find and report on accomplishments of computer scientists of specific gender and races. One example of a woman is Admiral Grace Hopper, a woman who did research on early computers such as the Mark I and languages such as COBOL. Another example is an African, Philip Emeagwali, a Nigerian who made major contributions to the design of the Connection Machine. (www.math.buffalo.edu/mad/computer-science/emeagwali_philip.html)

Project 2: Architecture Limits

Find and report on environmental and cultural differences that influence how one builds a computer for use in the jungle, desert, high altitude, etc.

CpSc 476: Artificial Intelligence (CS-E)

Project 1

Create a program that poses questions to the user and then determines such diverse traits such as gender, sexual orientation, ethnicity based on their responses.

Project 2

Create a program that helps the visually impaired learn about a specific topic such as the importance of color in Monet's paintings.

CpSc 478: Analysis of Algorithms (CS-E)

Project 1:

Use Dijkstra's shortest path algorithm to perform a search of $G=(V, E)$ where the vertices in the graph are cities in Africa and the edges of the graph are distances between African cities.

Project 2:

Examine the performance of 5 $O(n \log n)$ sort algorithms using this list of Hispanic surnames as input:

GARCIA, GARZA, MARTINEZ, ALVAREZ, RODRIGUEZ, ROMERO, LOPEZ, FERNANDEZ, HERNANDEZ, MEDINA, GONZALES, MORENO, PEREZ, MENDOZA, SANCHEZ, HERRERA, RIVERA, SOTO, RAMIREZ, JIMENEZ, TORRES, VARGAS, GONZALES, CASTRO, FLORES, RODRIQUEZ, DIAZ, MENDEZ, GOMEZ, MUNOZ, ORTIZ, SANTIAGO, CRUZ, PENA, MORALES, GUZMAN, REYES, SALAZAR, RAMOS, AGUILAR, RUIZ, DELGADO, CHAVEZ, VALDEZ, VASQUEZ, RIOS, GUTIERREZ, VEGA, CASTILLO, ORTEGA

CpSc 488: Software Engineering (CS-R)

Project 1: Mobile-Education

Research the use of mobile education, especially as it is being used to address the digital divide. Design an educational game that can be used on current generation smart phones. We will assume wide spread adoption of smart phones in the near future.

Project 2: Project Design and Development

For the major course project, identify a female colleague or professional willing to act as customer-manager for each group. Students then develop the project iteratively with all “customer questions” directed to the customer-manager.