

1 Project Description

1.1 Introduction

There is increasing pressure in education to provide high-quality instruction despite shrinking budgets. Most educators agree that one of the best ways to improve instruction is to increase student-instructor interaction. One of the most effective technologies for improving interaction between students and instructors is the electronic mailing list. This approach can improve instruction in standard courses and is particularly helpful for distance education where such lists play a crucial role. Generally the instructor will set up a mailing list for the course, and all the students subscribe to the list. Students find it easy to participate from home or from labs at school.

1.2 The Problem With Class Mailing Lists

The problem with class mailing lists is that at the end of a semester all the discussion (and therefore effort) by instructors and students is thrown away. Even when the messages from the list have been archived, the unorganized pile of messages is of limited utility to students or instructors for future semesters. What is needed is a way for this mass of unstructured information to be turned into an archive which the instructor and future students can learn from and build on.

1.3 Condensation & MCS as a Solution

I have developed a technique called *condensation* whereby a human editor uses an editing program to: choose which messages to archive, annotate the archived messages with additional information to make searching the archive easy, and possibly edit the messages themselves to remove any incorrect or irrelevant information. I call this complete system (editing tool and web-accessible archive) MCS: Mailinglist Condensation System. MCS is a part of my ongoing masters thesis in ICS, more information is available at <http://csdl.ics.hawaii.edu/Research/MCS/MCS.html>.

1.3.1 Example of MCS Use in a Classroom Setting

Kimo is taking ICS 111, and is stumped by an error message he received while trying to compile his homework assignment. It's 11:10 PM, the assignment is due at midnight, and he needs an answer fast! So he brings up his web browser and goes to the MCS archive for the class. The archive has been maintained by a series of instructors who have taught the course over the last 3 years. He types in the error message into the "Symptom" field of the web form, and clicks the "Search" button. The result is a table containing problems with symptoms similar to Kimo's, and also their solutions as accumulated over time (see figure 1). Kimo learns how to solve his problem and turn in the assignment just before the deadline.

This example illustrates just one possible data representation taken from one domain (problem-solution pairs in computer programming). MCS has a number of additional representations and can support a broad variety of domains. MCS can be equally useful in non-technical domains such as English composition where the archive would contain writing examples and common writing problems.

1.4 Business Plan

I intend to release MCS under an *Open Source* license. Making a product open source means that the program is freely redistributable, the source code is freely available, and other people are free to improve

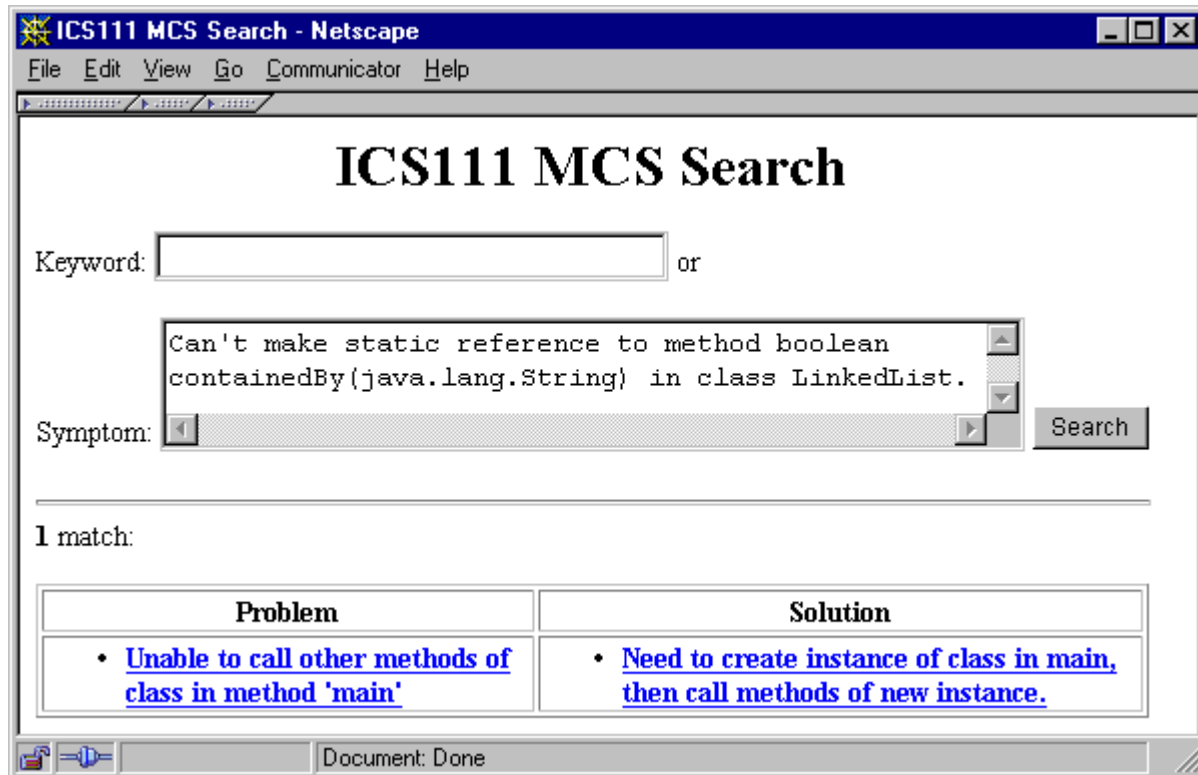


Figure 1: Mockup of MCS symptom-based problem lookup

the product. Popular examples of open source are the Linux operating system and the Apache web server.

It might seem strange that my business plan starts by giving away the software for free! However, the open source movement has demonstrated that it *is* a viable way to make money. The money is made by providing service and support to customers, not in the distribution of the actual software.

Distributing free software via the Internet has substantial marketing advantages since it allows users to download and evaluate the package without cost. However, many instructors will not have the time, expertise, or institutional support to set up and maintain the archive. One solution is a “service subscription”, whereby the institution contracts with my company to provide ongoing support and enhancements. Another potential profit center is the textbook industry. A special MCS database could be supplied on CD-ROM with the text (or made available online) as a ‘seed’ archive that would be ‘localized’ over time through additions by students and instructors. My company would contract with the textbook publisher to provide the initial database, with revenues generated from royalties on the text.

Given the number of educational institutions in the US and the growing emphasis on distance education, I feel there is an enormous market for these support and editing services. Since these services can be provided remotely via the Internet, the overhead of such the business would be very low.

1.5 Competing Technologies

There are effectively no competing systems in this area. Obviously an instructor could manually assemble a “Frequently-Asked Questions” document for a class, but this still doesn’t address the problems of continuous updating and efficient searching by students.

There are also web-based instructional support systems like MAILE (Manoa Advanced Interactive Learning Environment) here at UHM. These systems may provide improved accessibility to discussion, but they provide no tools for condensing information over multiple semesters.

1.6 Project Plan

I will be working on this project after the completion of my thesis in Summer 1999. After the completion of my thesis, I will “clean up” MCS so that it can be made available for open source distribution. Working with Professor Johnson (my advisor), I will set up MCS condensed web sites for class mailing lists that he has archived. I expect to have the archives ready by the early Fall 1999. He has agreed to pilot the MCS system in his two scheduled classes for Fall 1999.

1.6.1 Deliverables

By the end of the grant award period, I expect to have a version of MCS suitable for open source distribution, a working server which distributes MCS, one or more condensed class mailing list archives available on this server, and a technical report relating the lessons learned in the process.

2 Project Budget

The project budget is essentially one item: a server which will be used to distribute MCS and to store MCS-maintained mailing list archives. It will also be required as a workstation for myself when performing editing, system maintenance, project development tasks.

Most of the following pricing information was obtained from the Apple Store for Education <<http://store.apple.com/Catalog/US/Images/routingPage.html>>. The pricing for Mac OS X Server (the operating system for this server) is not yet finalized. It should be available in the month of February 1999, well in advance of the April 1 expected award date. There may be small variations in the price of the equipment when the order is actually placed due to bundling offers from Apple, etc. Microsoft Office 98 can be obtained from the UH Bookstore.

Item	Part No.	Price
Custom Configured System		\$3,739.00
Power Macintosh G3	Z00W	
US English	065-1516	
DVD-ROM drive & DVD-Video card	065-1575	
10/100BASE-T Ethernet built-in	065-1623	
400MHz PowerPC G3 with 1MB L2 cache	065-1519	
256MB SDRAM - 2 DIMMs	065-1683	
Zip drive	065-1530	
USB Keyboard (iMac keyboard w/extension cable)	065-1613	
RAGE 128 graphics card with 16MB SDRAM	065-1522	
9GB Ultra2 SCSI & single-channel Ultra2 SCSI card	065-1528	
Apple Studio Display (16" viewable)	M6221LL/A	
Ultra SCSI PCI card (for external devices)		\$46.00
Mac OS X Server		\$995.00 [est.]
Microsoft Office 98		\$230.00
	Order Total	\$5,010.00

3 Essay Question

As an Aspect Technology Fund grant recipient, how would you contribute to the field of technology and promote the spirit of entrepreneurship?

As grant recipient, I will be extending a technology which I am developing in the realm of academia. I am hopeful that this kind of project can serve as a model for other students and faculty to commercialize their research projects. My project will also demonstrate that the open source approach is particularly appropriate for university software entrepreneurs due to factors like the reduced start up costs required.

Technology transfer from UH to industry is an important way to improve the economy here in Hawaii. I personally feel that the state's economic doldrums are in great part due to our excessive reliance on tourism. As the Asian economic crisis has shown, Hawaii cannot afford to rely so heavily on tourism. Furthermore, excessive tourism clearly damages Hawaii's fragile environment, which hurts all of us.

The information technology industry doesn't suffer from these problems. Customers don't really care where a program or web page was written. For information technology, Hawaii's geographical isolation is irrelevant. Information technology has virtually no environmental impact compared to other industries, which is another advantage.

One of the most common ways to make money in information technology is to develop software and sell it to customers (with support being an afterthought). While this can be a very successful model, it does have inherent risks. One of the biggest risks is the development of the software product. Many companies have gone bankrupt by underestimating the time and effort required to create a product at the level of quality that customers expect. After the product is complete, you have to expend large sums marketing it and distributing it to customers. Next, you hope that the customers like your product enough to pay for it. Finally, even if you are successful you cannot rest on your laurels: you must immediately start working on upgrades or new products to insure your revenue stream.

The open source licensing model for software (which I am using for MCS) sidesteps many of these problems. In many cases the initial version of the open source product isn't of "commercial quality". Developing this version requires less effort than its traditional counterpart as it may not do everything or be free of faults, yet it will still be usable. This is the moment of truth: is the product good enough that people will download it and use it? If so, we immediately start tapping into the benefits of open source. Since it is free, many people will be willing to try it out. Since the source code is available, some akamai users who find bugs will decide to fix them and contribute the fixes back to the project. Other users will want MCS to do things that it doesn't do yet; they may decide to go ahead and make the enhancements themselves instead of waiting for someone else. Since everything is shared freely, MCS taps into a vast resource of programming expertise at no cost!

While the open source model helps in the areas of development, marketing, and distribution, it does so at the expense of the traditional revenue stream: software sales. The solution is to generate revenue by selling service and support. The advantage here is that service and support provide a continuing revenue stream, unlike the traditional model. Because this revenue starts soon after the release of the product, the startup costs for such a company are lower than for a traditional company. The continuing revenues also allow an open source company to fund their next product internally instead of requiring additional capital infusions. More information about the open source movement and its success stories can be found at <http://www.opensource.org/>.

This grant will assist me in encouraging others to take advantage of this exciting business model and other entrepreneurial opportunities. Many academic projects fall by the wayside when the research is complete, yet companies like Netscape and Inktomi have shown that commercialization of research is possible.

I also want to show people both here in Hawaii and throughout the world that building a company on the open source model is feasible and a great way to give back to the global Internet community. As a successful researcher in the Collaborative Software Development Lab here at UHM and as one of the founders of the local Internet service provider LavaNet, I feel I have the ability to make all this happen.