Project Report:
Multi-media teaching aids for COMP102

by
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I Introduction

This is a report on my research assistant work at HKUST between Aug-95 and Jun-96 on the project "Multi-media Teaching Tools for COMP102". This project is supervised by Dr. T.C. Pong and there is also a undergraduate final year student, Mr. Kwan Hoi Ching, involved in the project during the period mentioned above.

In section II, I will briefly overview the accomplishment of this project so far. In section III, I will describe what has been done by me in detail. Finally in section IV, I will give some conclusion and future works directions.

II An Overview of the System

The teaching tools are currently built on the World Wide Web so that lecturers and students of the course can access the tools easily using a World Wide Web browser.

The system can now provides the following three functions:

1) Provide an easy way for the students to access the course related information. In the current implementation, this information includes lecture notes, examination questions & answers, homework assignments, lab. assignments, course outline and course news.

2) Provide some learning aids to illustrate some difficult concept taught in the class. At the current status, we have done some works on three sorting and one searching algorithms, control flow structure, parameter passing and array. All the learning aids are written in JAVA.

3) Provide some tools to the lecturers or the teaching assistants to modify or update the system easily.

If the server is up, you can access the system by pointing your WWW browser to http://csl3su2.cs.ust.hk:1333

III My Work Report

1) Setting up the World Wide Web Server

We are currently using the NCSA httpd as the WWW server on an UNIX machine. Currently, we don't have a permanent server machine. However, we have asked for permission to run the server on csl3su2.cs.ust.hk using the port 1333.

In order to run the server on HKUST CS domain, we must obey some regulations imposed by HKUST CS system. For more information about these regulations, please contact CS system by email: cssystem@cs.ust.hk.

The server software is installed at /project/mta_comp102/httpd/httpd_1.4.2/. You can run the server by simply change to the above directory and then run the shell script "run".

The documentation of the server is also available at /project/mta_comp102/httpd/httpd_1.3.docs in HTML format.

2) Learning Aids: Sorting and Searching Algorithms

I have implemented JAVA applets to illustrate the concept of three sorting (bubble sort, selection sort and insertion sort) and one searching (binary search) algorithms. All of them visualize the algorithms by examples using animation, textual and voice descriptions.

The voice descriptions are machine synthesized. They are generated by a program called TextAssist running on Windows 3.1.

The source code is located at:

    /project/mta_comp102/webpage/aids/Sort/Bubble
    /project/mta_comp102/webpage/aids/Sort/Selection
    /project/mta_comp102/webpage/aids/Sort/Insertion
    /project/mta_comp102/webpage/aids/Search/Binary

The voice description sound files (in .au format) are located at:

    /project/mta_comp102/webpage/aids/Sort/Bubble/sound
    /project/mta_comp102/webpage/aids/Sort/Selection/sound
    /project/mta_comp102/webpage/aids/Sort/Insertion/sound
    /project/mta_comp102/webpage/aids/Search/Binary/sound

3) Learning Aids: Control Flow

This JAVA applet can convert a C++ code segment to a flow diagram and let the user to run the program on the converted flow diagram. The purpose of this learning aids is visualizing different control flow statements in a general purpose programming language (in particular C++) by using flow diagram.

Since the purpose of this tool is not building and running real C++ program, the parser is very simple. It only concentrated on keywords related to those control flow statements, e.g., if, else, while, do... etc. In the current implementation, function, class definition are not supported.

The source code is located at:
    /project/mta_comp102/webpage/aids/Control

4) Learning Aids: Parameter Passing
Similar to the sorting and searching visualization applets, this JAVA applet illustrates different parameter passing concept by animation, textual and voice descriptions. The concept illustrated includes passing parameter by value, passing parameter by reference, passing array as parameter and the definition of formal and actual parameters.

The source code is located at:
    /project/mta_comp102/webpage/aids/Param

IV Conclusion and Future Works

We have built a integrated multi-media teaching tool for COMP102 to help the students access course information more easily. The tool also provides some learning aids to illustrate some difficult concept taught in the course to the students.

My main contribution on this project are setting up the WWW server and writing some teaching aids using JAVA. These teaching aids illustrates concept about control flow in programming, sorting and searching algorithms and parameter passing.

Although the current system is functional, much future works are still need to be done. To list a few:

1) Many people feel that the control flow applet is quite useful but they also want a better parser.

2) We can build teaching aids on more topics in the course. E.g., record/struct visualization.

3) We have found some incompatibility problems about JAVA in different platforms. Effort should be made to solve the problems or follow up the problems in the future version of JAVA/Netscape.

V References

1 Doug Cooper, *Oh! Pascal!*, W.W. Norton & Company, Inc., 1992.

2 David Flanagan, *Java in a Nutshell*, O'Reilly & Associates, Inc., 1996.

3 Tim Ritchey, *Java!*, New Riders Publishing, 1995.