

Flash Animations for Improving the Effectiveness of C Programming

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Abstract: - In this paper, we propose an implementation method using C functions, quizzes for checking comprehension of statements, and developed a scenario that helps students to understand the concepts and algorithm. It is realized with visual representation. The web-based contents are implemented as FLASH animations.

Key-Words: - Web-based Education , FLASH, ANIMATION, overflow, underflow

1 Introduction

The universality of the Internet makes it a practical and suitable platform for delivering educational courses. Web-based education offers remote access from everywhere and at any time. Since lecturers can place educational materials on the Web, students are able to gain access to that information through the Web. Merely providing students with information is not sufficient for learning. A good learning material considers, for example, problem solving, intuition, imagination, and creativity as important components of learning. Interactivity is another key issue in making Web-based good materials. Students' interest in learning is drastically reduced when the level of interactivity is low. Therefore many lecturers seek to improve the effectiveness of their instruction by providing interactive and innovative Web-based course materials to their students. Motivated by this goal, we developed animation contents for C programming language.

Body

In this paper, we implemented various animations using Flash in order to help learners at C programming class understand concepts. We

embodied all function formats used in C language and how to use them in flash animations. If learners search for a function's name using the search function, they can find it a Flash animation function

2.1 FLASH animation of C Language standard function

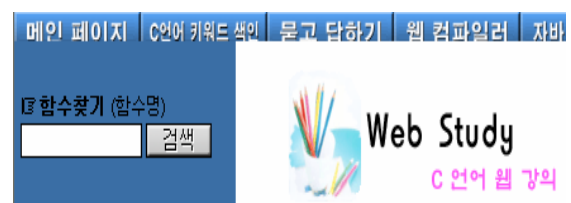


Fig. 1 Function search window

When including a subsection, you must use, for its heading, small letters, 12pt, left justified, bold and Times New Roman as here. In computer programming, the argument and result of the $\log(x)$ function are usually of floating point data type. C language uses $\log(x)$ for the $\log_e(x)$ function while $\log_{10}(x)$ typically denotes $\log_{10}(x)$. The \log_{10} function computes base-ten logarithm. As the first illustration, if a learner inputs \log_{10} function to be given making an calculation to some real number value of common logarithms and presses the search

button in Figure 1. The results will be shown on a window implemented in Flash as in Figure 2. If the learner presses the play button, the learner can see that input value X is turned into $\log_{10}(x)$ and assigned to output value Y. The process can be stopped by pressing the stop button, and if the speaker button is pressed, the learner can hear explanations about functions from the computer. If the example button is pressed, the learner can see results of this example.

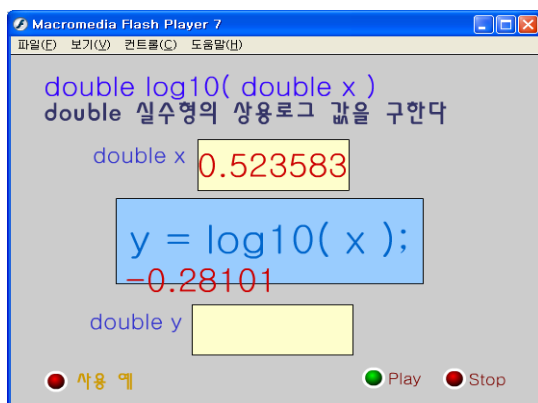


Fig. 2 \log_{10} function implemented by flash

As the second example, `fseek` is a C function belonging to the ANSI C standard library, and is included in file `stdio.h`. Its purpose is to change a file pointer for a specified stream. The prototype of the function is `int fseek(FILE *stream_pointer, long offset, int origin)`. The `fseek` animation for the process that stream pointer `fp` moves to a position is shown in Figure 9, at the position indicated by the associated file-position indicator for the stream (if defined), and advances the indicator appropriately.

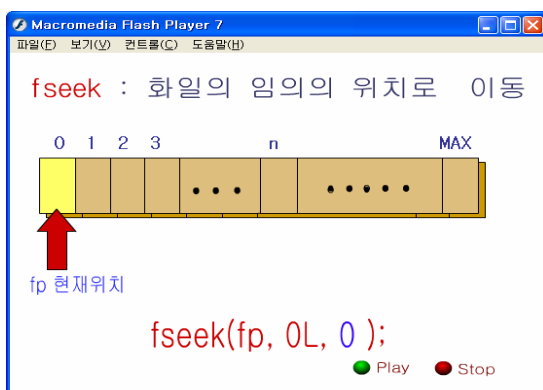


Fig. 3 `fseek` function animation

As the third example, the `fputc` function writes a character to a file. Its prototype is `int fputc(int c,`

`FILE *stream)`. The `fputc()` function writes a byte specified by `c` (converted to an unsigned char) to the output stream pointed to by `stream`, at the position indicated by the associated file position indicator for the stream (if defined), and advances the indicator appropriately. If the file cannot support positioning requests or if the stream was opened in the append mode, the byte is appended to the output stream. The `fputc` function animation shows the process that writes one character of a string "Hello" to a file named `aaa` in Figure 10.

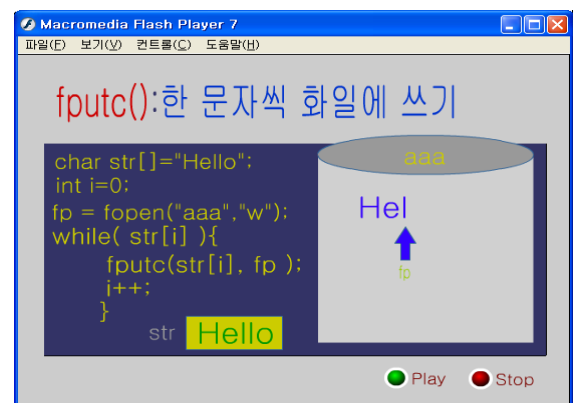


Fig. 4 `fputc` function animation

2.2 Quizzes implemented using FLASH

This section explains quizzes for measuring students' comprehension of C programming language. For example, the quiz of `if~else` statement embodied to measure users' comprehension is shown in Figure 5. The `if~else` statement is used to decide whether to do something at a specific point or to decide between two courses of action. In Figure 5, 'if' is generally followed by a condition in parentheses. The condition is evaluated. If the condition is true, the red box drawing statement is executed. If the condition is not true, the red box drawing statement is skipped. after 'else' the yellow box drawing statement is executed.

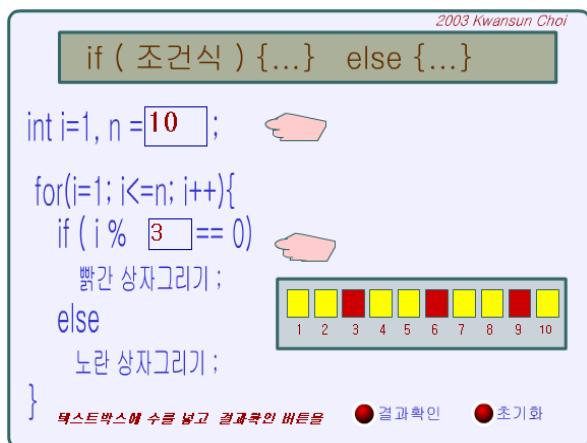


Fig. 5 If~else quiz

Figure 6 is a Flash quiz that the learner practices how to use a double-indexed array of strings. A string is an array of characters and that a double-indexed array is an array of arrays, so we can store an array of strings in a double-indexed char array. If the learner inputs free strings into the text-boxes that the finger indicates, the strings enter into a memory picture by the address values. The learner can understand the fact that the strings are put into a[0], a[1], a[2] and a[3], and in this case it is expressed with a pointer form, represented as *a, *(a+1), *(a+2) and *(a+3). For example, if a learner inputs string C++, JAVA, XML and FORTRAN in the text boxes and then presses the execution button, soon after the learner can confirm how to initialize arrays in Figure 6.

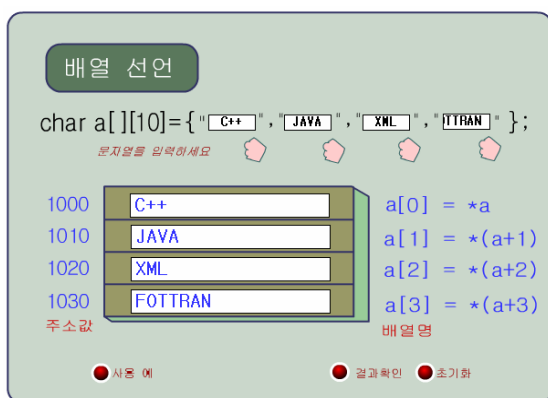


Fig. 6 Double-indexed character array quiz

The Overflow has the following meaning. In a digital computer, the amount resulting from calculation is greater than that a given register or storage location can store or represent. Underflow is a condition that can occur when the result of a floating point operation is smaller in magnitude than the smallest quantity representable. For example, an eight-bit 2's complement exponent can represent multipliers from 2^{-128} to 2^{127} . A result less than 2^{-128} can cause underflow. In order for students to understand the concept easily, we developed a scenario and embodied it in Flash animation. As a fish is compared to an integer number data and a fish tank is compared to the role of variables contained the data. Proper fishes only can live in the fish tank but smaller fishes will run away from the net as in Figure 7. This is underflow. Awfully large fishes will run away tearing the net as in Figure 8. Therefore Figure 9 shows that large fishes are not put in the fish tank.

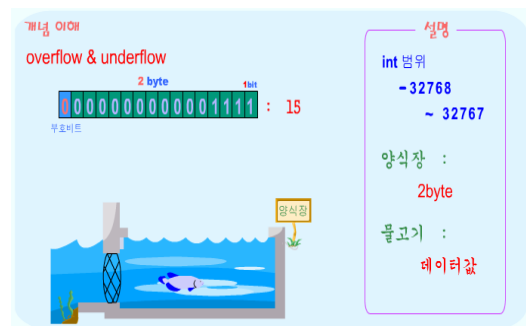


Fig. 7 Integer data representation

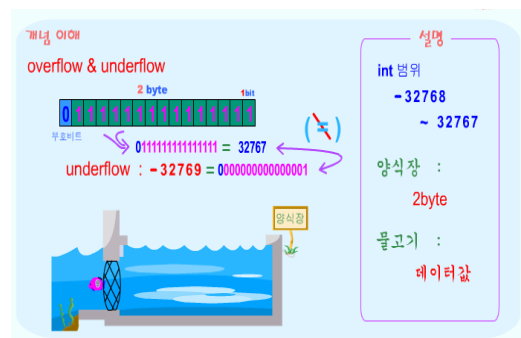


Fig. 8 An example of underflow

2.3 Flash animation to understand conception

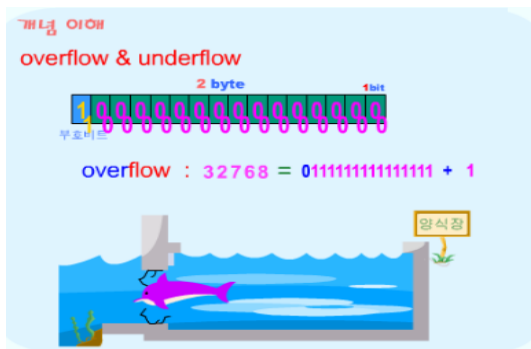


Fig. 9 An example of overflow

3 Conclusion

With the emergence of the Web, teachers and learners can study indirectly using various communicational methods between the teachers and the learners without the limitation of time and space. The rapid development of computer network is getting rid of traditional learning methods. Learners can learn through the convenient access to the Internet at any time and in any place. So many Web-based contents are being developed and applied as main teaching materials or secondary teaching materials. We developed a material to teach how to use C language programming functions, quiz problems to check concepts, and sentences and a scenario so as to understand problems deeply by the visual expression of algorithm processes. We made materials on how to use C language standard functions in text and how to use animations to add the phonetics of a language using Flash. We made a scenario to let learners understand concepts more easily and changed it into animations. We made quizzes to check the understanding level of C language sentences. We embodied the developed contents on the Web with Flash. More various scenario of algorithms will be created for further study, and embodied with applet and Flash animations in order to understand C language and algorithms as well.

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