Design of a Web-based Visual Simulator and its Evaluation based on Real Computer Education

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ABSTRACT
A visual computer simulator has been designed to help learners to understand computer architecture and organization efficiently. It is used in a real education, such as classroom lecture of computer architecture and exercise of assembly programming. Our simulator is written in a pure Java language and works not only as an applet but also as a stand-alone application. Its graphical user interface (GUI) provides visual simulating function in the register-transfer level and assists beginners of computer science to comprehend how a computer works. The simulator also equips built-in e-mail handlers to facilitate communicating function and supports asynchronous information sharing between learners and instructors. We have applied our simulator into a real education and evaluated its simulating and communicating capabilities. This paper reports statistic evaluation of visualization and communication. It is confirmed that capabilities of visualization and communication of our simulator are statistically significant.

Categories and Subject Descriptors
I.6 [**Simulation and Modeling**]: Simulation Support Systems

General Terms
Design Experimentation

Keywords
Computer simulator, Visualization, Built-in e-mail handler

1. INTRODUCTION
A visual computer simulator is called VisuSim and originally designed for an educational tool to demonstrate how a computer works graphically [1]. Figure1 shows an overview of VisuSim and its GUI as a Java applet downloaded from a dedicated web server. The server includes a Java-applet code for VisuSim, several kinds of sample programs for it and messages for its users. According to its user, the server transfers a code of VisuSim and files of sample program / message to user's browser. The GUI of VisuSim is organized with following parts and buttons. The GUI facilitates to illustrate how a computer works and gives users of VisuSim

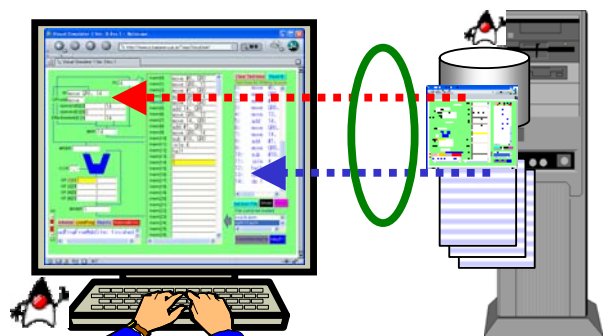graphical explanation of behavior and structure of computer.

Figure 1 Overview of Computer Simulator, VisuSim

2. Characteristics of our Visual Simulator
With VisuSim, a graphical demonstration is available in classroom lecture on Computer Architecture as well as Assembly Programming[2]. It is easy and transparent for even beginners to understand the internal behavior and structure of computer more precisely. Built-in e-mail handler can be provided for communication between the learners. It is useful for learners and instructors to share the status of their VisuSim and exchange question and suggestion between them. VisuSim can provide an effective GUI of simulation to learners. It is confirmed that an educational effect of its GUI is statistically significant.

Acknowledgement

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