Chapter 2 User Interface

The BSVC graphical user interface provides friendly access to the otherwise character-based simulators developed using the BSVC simulation framework. This chapter discusses the different features of the user interface.

Invoking BSVC

The BSVC user interface is invoked by typing the following command:

bsvc[1]

Once invoked, the BSVC user interface should appear as shown in Figure 1. At this point the only options available are the "Simulator" and "Help" menus. These menus and other features of the user interface are discussed in the following sections of this chapter.

[1] Under the **Eos** and **Unity** environments at NCSU you should execute "**`add bsvc`**" before trying to invoke BSVC.

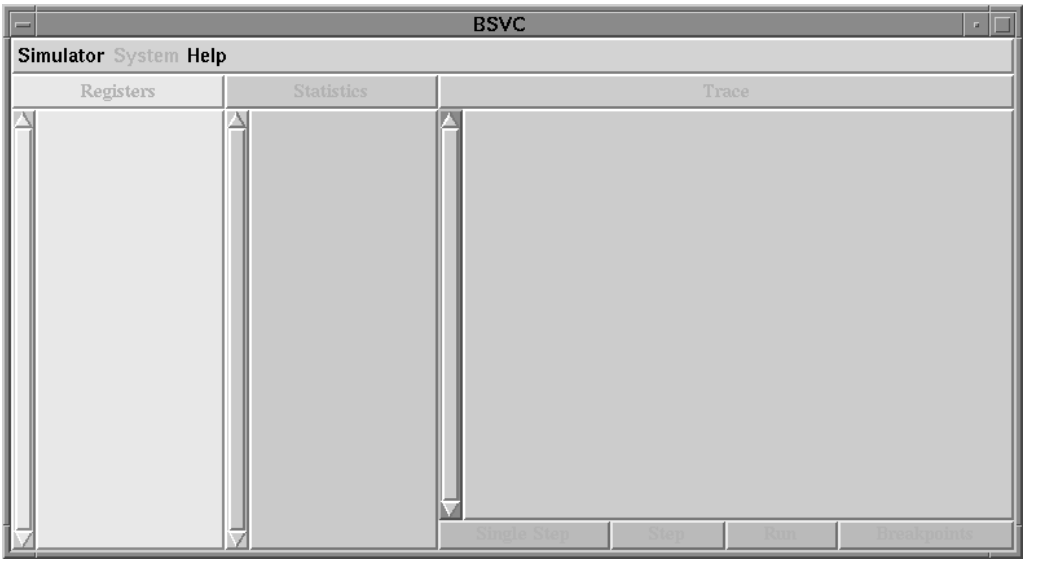

FIGURE 1 BSVC User Interface at Start-Up

Simulator Menu

This menu allows you to manage a simulator setup. A simulator setup consists of a simulator program and a list of devices attached to the simulator. The first step is to start-up a simulator by either loading an existing setup or creating a new setup.

Creating a New Setup

- Select the "New Setup..." option
- Enter the name of the simulator program to execute (e.g., Sim68000, SimHector, etc.)
- Use the Edit Simulator Setup dialog that appears to attach devices to the simulator (See "Device Management")

Loading a Setup[2]

- Select the "Load Setup..." option
- Select the setup file to load using the file selector

Editing a Setup

- Select the "Edit Setup..." option
- The Edit Simulator Setup dialog will appear (See "Device Management")

[2] A setup file to load when BSVC is executed can be specified as a command line argument (i.e. `bsvc /ncsu/bwmott/M68kTutor.setup`).

Saving a Setup

- Select the "Save Setup..." option
- Select or enter a file name using the file selector

Quitting BSVC

- Select the "Quit" option

Device Management

Whenever a setup is created or edited the dialog in Figure 2 will be displayed. Using this dialog a device can be attached or detached from the simulator.

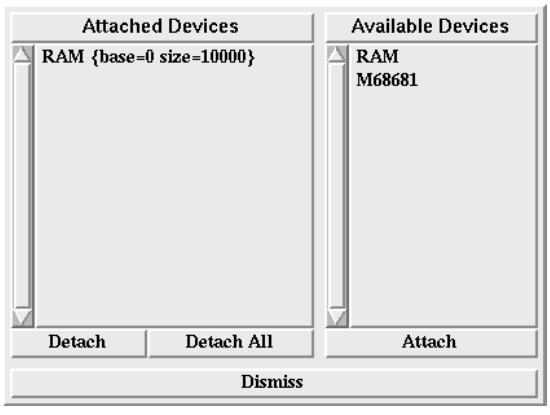

FIGURE 2 Edit Simulator Setup Dialog

Attaching a Device

- Select the device to attach from the available device list and press the "Attach" button
- Setup the new device using the device's setup dialog. An example of a device setup dialog is shown in Figure 3.

Detaching a Device

- Select the device to remove from the attached device list
- Press the "Detach" button

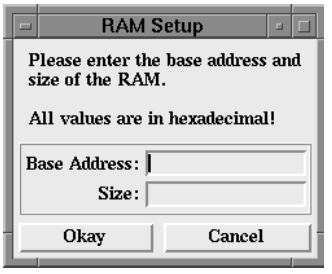

FIGURE 3 Ram Setup Dialog

Detaching all Devices

- Press the "Detach All" button to detach all of the devices from the simulator

System Menu

This menu is used to manage programs with the simulator. The menu has facilities to load programs, view the simulator's memory, load an assembler program listing, and perform a system reset.

Loading a Program

- Select the "Load Program..." option
- Select the object file[3] to load using the file selector

Viewing the Simulator's Memory

- Select the "View Memory..." option
- Use the memory viewer dialog to view the desired memory locations (See "Memory Viewer")

Source Level Debugging

- Select the "Program Listing..." option
- Use the program listing dialog to load an assembler listing file (See "Program Listing")

System Reset

- Select the "Reset" option to perform a system reset on the simulator

[3] The object file has to be in a format that the simulator understands (e.g. Sim68000 loads Motorola S-Record files).

Memory Viewer

After you select the "View Memory..." option from the "System" menu the memory viewer dialog should appear as shown in Figure 4. This dialog allows the simulator's memory to be dumped to a file, altered, and viewed.

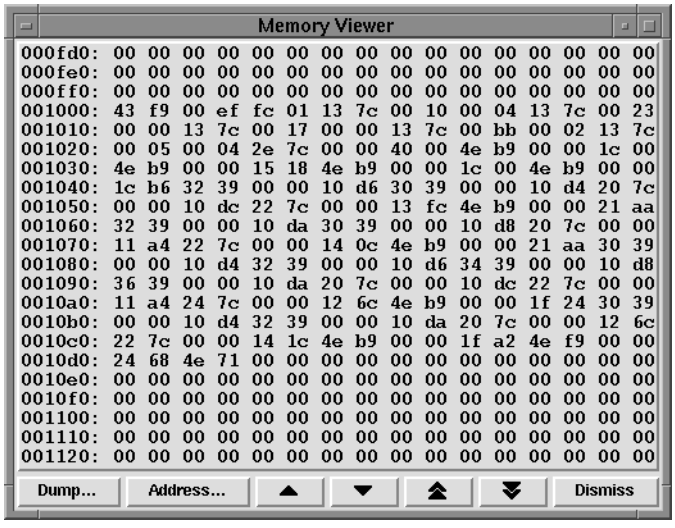

FIGURE 4 Memory Viewer Dialog

Dumping Memory to a File

- Select the "Dump..." button
- Enter the starting and ending address of the dump in the dialog that appears
- Select or enter a file name using the file selector
- The dump will be appended to the specified file

Altering Memory Locations

- Use the left mouse button to select a memory location to change
- Enter the new value for the selected memory location

Viewing Different Memory Locations

- Select the "Address..." button
- Enter the new address to view

Scrolling through Memory

- Select the "Up Arrow" button to scroll up one line
- Select the "Down Arrow" button to scroll down one line

- Select the "Double-Up Arrow" button to scroll up one screen
- Select the "Double-Down Arrow" button to scroll down one screen

Notes

1. In general it's a bad idea to view memory mapped I/O devices because some devices do things depending on how many times a register has been read or written. If the Memory Viewer is used to view one of these registers it could interfere with the simulation.
2. Addresses that do not map to a device will appear as "xx".
3. Having the memory viewer open while stepping through a program will cause the simulation to run slower.

Program Listing

After you select the "Program Listing..." option from the "System" menu the dialog in Figure 5 will be displayed. This dialog allows assembly listing files generated by an assembler to be loaded and viewed. While you step through a program the Program Listing dialog will automatically reposition the program listing according to the current value of the program counter. This can be really useful when debugging a program.

Notes

1. Having the Program Listing dialog open while stepping through a program will slow down the simulation.
2. Sometimes an incorrect line will be highlighted.

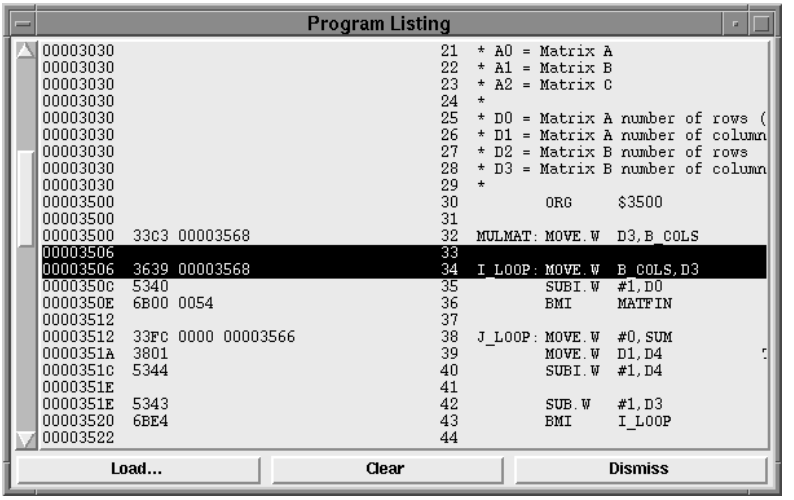

FIGURE 5 Program Listing Dialog

Help Menu

The current implementation of the help menu only has one option, "About BSVC...", to get information about the program. A hypertext help facility has been designed, but has not been integrated into the user interface yet.

Register Manipulation

After a simulator has been started by loading a setup or creating a new setup the register list will be filled in as shown in Figure 6. These registers can be modified during the simulation.

Modifying a Register's Value[4]

- Select a register to modify using the left mouse button
- Select the "Alter..." option from the "Registers" menu
- Enter the new hexadecimal value for the register

Clearing all the Registers

- Select the "Clear All" option from the "Registers" menu

Getting a Register Description

- Select a register using the left mouse button
- Select the "Description" option from the "Registers" menu

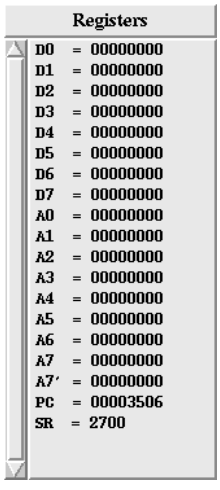

FIGURE 6 Register List

[4] A register can also be modified by double clicking the left mouse button on it.

Simulator Statistics

Some simulators keep simulation statistics. These statistics might include the number of instructions executed, the number of reads and writes to memory, and any other statistics the simulator designer wants. If a simulator keeps statistics they will be displayed in the statistics list as shown in Figure 7.

Clearing Statistics

- Select the "Clear All" option from the "Statistics" menu

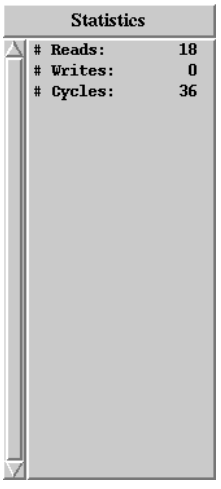

FIGURE 7 Hector 1600 Simulator Statistics

Program Execution and Control

The program execution and control area of the user interface is shown in Figure 8. These controls allow single stepping, running, and setting breakpoints.

Single Stepping

- Pressing the "Single Step" button will execute the next instruction and display a trace record in the trace window.

FIGURE 8 Execution Control Area

Running

- Pressing the "Run" button causes the simulator to execute instructions until a fatal error occurs, a breakpoint is reached, or execution is interrupted.

Breakpoints

Breakpoints can be set or cleared using the breakpoint dialog that is displayed when the "Breakpoints" button is pressed. The breakpoint dialog is shown in Figure 9.

Adding Breakpoints

- Select the "Add" entry field
- Enter the breakpoint's and press return

Removing Breakpoints

- Select the breakpoints to remove using the left mouse button
- Press the "Remove" button

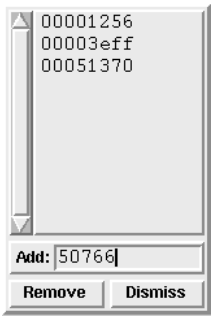

FIGURE 9 Breakpoint Dialog

Trace Window

Every time an instruction is executed using the single step button a trace record will be displayed in the trace window. The actual contents of a trace record are simulator specific. The trace window is shown in Figure 10.

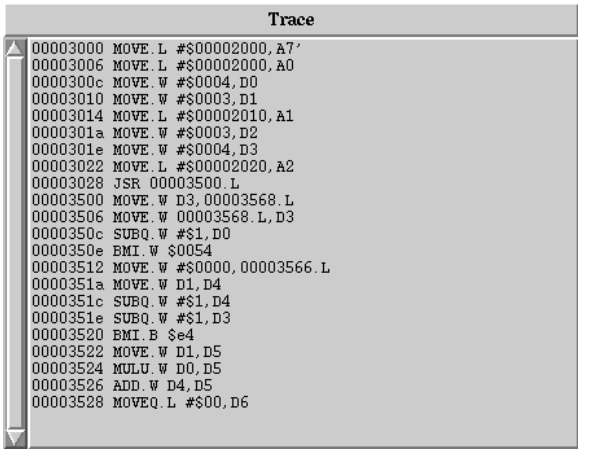

FIGURE 10 Trace Window

Saving Contents

- Select the "Save Contents..." option from the "Trace" menu
- Select or enter a file name using the file selector[5]

Clearing Contents

- Select the "Clear Contents" option from the "Trace" menu

Inserting Registers

- Select the "Insert Registers" option from the "Trace" menu to insert the register list into the trace window

Inserting Statistics

- Select the "Insert Statistics" option from the "Trace" menu to insert the statistics into the trace window

Setting Trace Preferences

- Select the "Trace Preferences..." option from the "Trace" menu
- Select the trace record entries to display using the dialog that appears

[5] The contents of the trace window will be appended to the selected file.

Bugs

Although the user interface has been designed to handle most errors it's not foolproof.

1. If the simulator process dies for some reason the user interface will freeze up. This will hopefully be fixed in a future release.
2. If a program that never does any output is run as a simulator the user interface will lockup (e.g., 'cat' instead of 'Sim68000').
3. Not all of the Tcl/Tk errors are trapped by the user interface in its current incarnation. Therefore the default Tcl/Tk error dialog will be displayed.