

Welcome to MIPS Ops!

The *MIPS Ops* web module (www.mipsops.com) is meant to assist MIPS newcomers in conceptualizing the algorithms that MIPS uses to accomplish certain functions. At the time of this writing, the module includes a simulation of how MIPS handles *integer multiplication*. An additional simulation for *integer division* is currently in the works and is scheduled to roll out in Summer 2015. Other simulations may be incorporated in the future.

The *MIPS Ops* web module consists of a two-part user interface (**Figure 1**). The first part, SIM SETTINGS, allows the user to select which simulation to run, as well as to set various parameters. The second part, SIM VIEWER, allows the user to view the simulation, as well as to control various aspects of the display via a navigation menu.

While care was taken to include help tips and mouse-over captions in the MIPS Ops interface, some users may still feel the need for more explanation in different areas of the tool. Hopefully, this brief guide will fill that need.

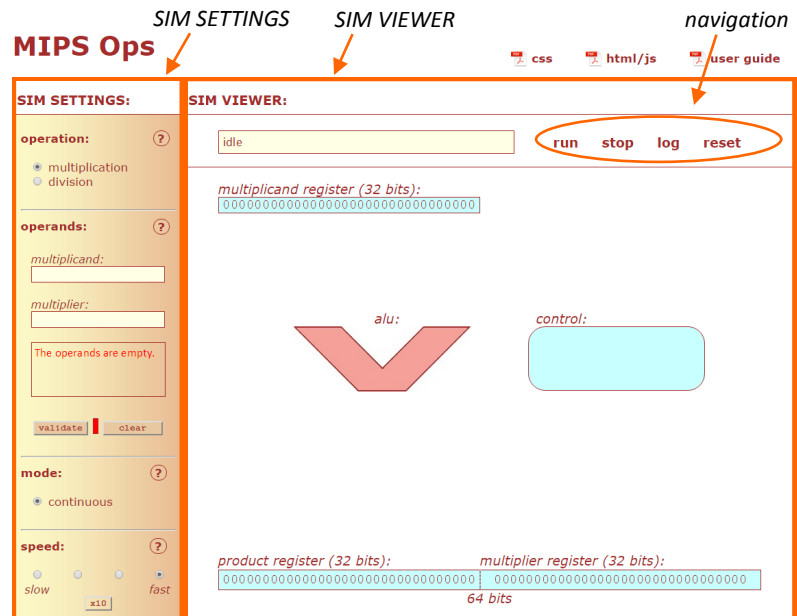


Figure 1: The MIPS Ops Interface

SIM SETTINGS

The SIM SETTINGS section of the interface has four selection areas: *operation*, *operands*, *mode*, and *speed*. These selection areas are detailed below.

- **OPERATION:**

This section allows the user to set the SIM VIEWER to run one of two MIPS operations: *multiplication* or *division*. The setting is selected via radio buttons. Both settings are *non-negative integer* operations (i.e., no floating point values or negative numbers are allowed in this version of *MIPS Ops*).

A pop-up help tip is provided for this area. The *multiplication* operation is checked by default.

As mentioned in the *Welcome* section, the *division* operation is still under construction and is not attached to the interface at this time. For now, if the *division* radio button is clicked, an alert is triggered to inform the user that the *division* operation is currently disconnected and that the operation will be set to multiplication.

- **OPERANDS:**

This section allows the user to enter the operands that will be used in the simulation. The operands are

entered via text boxes. If the *multiplication* operation is selected in the *operation* area, then the operands that may be entered are the *multiplicand* and the *multiplier*. If the *division* operation is selected, then the operands are the *dividend* and the *divisor*.

Because the simulation will not run unless the operands are valid, the *operand* area includes a validation feature (**Figure 2**). To validate the selected operands, you must click the *validate* button. In response, the *validation LED* lights to indicate the validation result— green for valid, red for invalid— and a message is displayed in the *message area* to confirm the validation results.

Because the simulation only works with integer inputs, any floating point values entered by the user will return invalid. Negative values and text characters are also rejected.

A pop-up help tip is provided for this area. A *clear* button is also provided to allow the user to reset the contents of the operand fields.

The operand fields and the validation LED are set to “clear” by default.

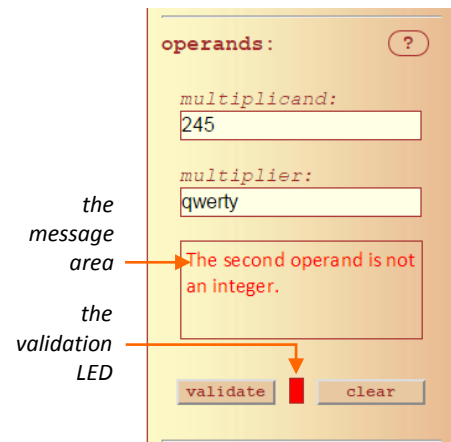


Figure 2: The validation feature

- **MODE:**

This section allows the user to select the *mode* that will be used to run the simulation. For the current version of *MIPS Ops*, the only mode available to the user is *continuous* mode, so a lone radio button is present in this selection area, and it is checked by default (**Figure 3**). As a result, the simulation is set to run continuously from beginning to end once started, but the user may click the *run* and *stop* links in the navigation menu (under the SIM VIEWER area) for more control.

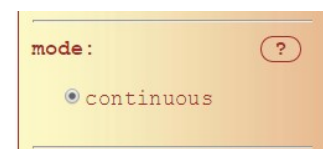


Figure 3: The mode section

A pop-up help tip is also provided for this area.

Note: A step mode is in the works that will allow the user to run the simulation in steps, with each step executing only after the user clicks a step button. Once included, the step mode should make it simpler to control the simulation for users who are running it for the first time. The step mode will override the speed feature. This enhancement is scheduled to roll out with the division operation in Summer 2015.

- **SPEED:**

This section allows the user to select the *speed* at which the simulation executes. The speed setting is selected via radio buttons. Four speeds are available, ranging from *slow* to *fast*, with each incre-

ment providing a speed increase of approximately 25%. The user may hover over each radio button to see its speed (**Figure 4**).

Once familiar with *MIPS Ops*, users may begin to feel that the speed settings are too slow, so a *x10* option has been included to boost the selected *speed* setting by a factor of 10. To select the *x10* option, a user may click on the *x10* button at the bottom of the *speed* area. The status of the *x10* option is indicated by the color of the button itself—green for active, and amber for idle.

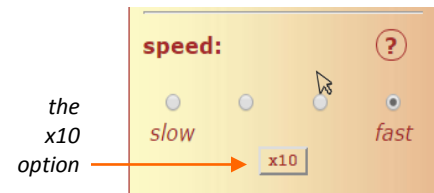


Figure 4: The speed section

The current version of *MIPS Ops* does not allow for adjusting the speed of the simulation while it is running. The simulation must be reset and then a new speed must be selected in order for the new speed setting to take effect.

As with the other areas of the SIM SETTINGS section, the *speed* area provides a pop-up help tip.

SIM VIEWER

The SIM VIEWER section of the interface has three activity areas: the *message box*, the *navigation menu*, and the *viewing pane* (**Figure 5**).

The *message box* provides a description of the simulation step that is being run at any point in time.

The *navigation menu* has four options to help users control the execution of the simulation: *run*, *stop*, *log*, and *reset*. These control options are detailed below.

- **RUN:**

This option allows the user to start the simulation. If the simulation has been stopped, then this option allows the user to resume it. When being resumed, the simulation will always pick up exactly where it left off.

the
viewing
pane

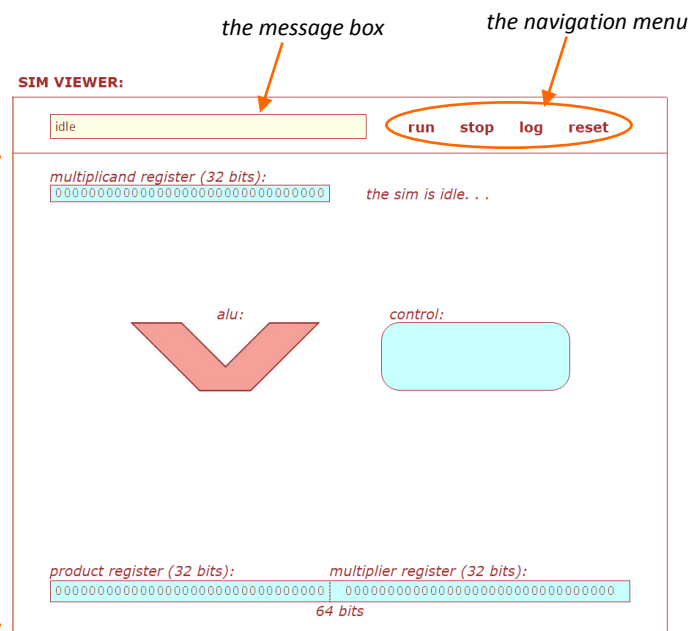


Figure 5: The SIM VIEWER

- **STOP:**

This option allows the user to stop the simulation. For users who are running a simulation for the first time, the *stop* feature provides a means to pause the animation for as long as needed to con-

sider the information that is being displayed in the *viewing pane* or the *log*. When ready, the user may click *run* to resume the simulation, which will pick up exactly where it left off.

- LOG:

This option allows the user to open and close a *log* of the current simulation. The *log* records each step of the current simulation as it is completed (**Figure 6**). For each step, the *log* entry records the name of the step, along with the contents of the registers that are being used in the simulation.

Ops Log				X
step	multiplicand	product	multiplier	
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For the *multiplication* operation, the registers that are displayed in the log include: *multipl-*
cand, *product*, and *mul-*
tiplier. For the *division*
operation (currently
unavailable), the regis-
ters will include: *divisor*,
remainder, and *quotient*.

[illegible]

Figure 6: The log

Because the registers that are displayed in the *log* render all 32-bits, the *log* has a large on-screen footprint. As a result, it has been implemented as a floating layer so that users may move it around on the screen in a way that optimizes their particular viewing experience. Depending on the viewer's monitor size, it is possible to position the *log* in such a way that both the simulation *viewing pane* and the *log* may be viewed simultaneously.

The *log* may be opened and closed as needed during the simulation execution without interrupting the runtime flow. When opened, the *log* updates in step with the simulation. When closed, the *log* continues to update in the background while the simulation is running.

The *log* and the *viewing pane* are synchronized such that the *log* responds appropriately whenever the user clicks on one of the *run*, *stop*, or *reset* control options.

Because the log feature is designed to display in a floating layer, it may not render optimally on mobile devices.

- **RESET:**

This option allows the user to reset the simulation. Resetting the simulation will restore the module to the same default settings that prevail upon the original page load. The *reset* option may be invoked at any time, regardless of whether the simulation is running.