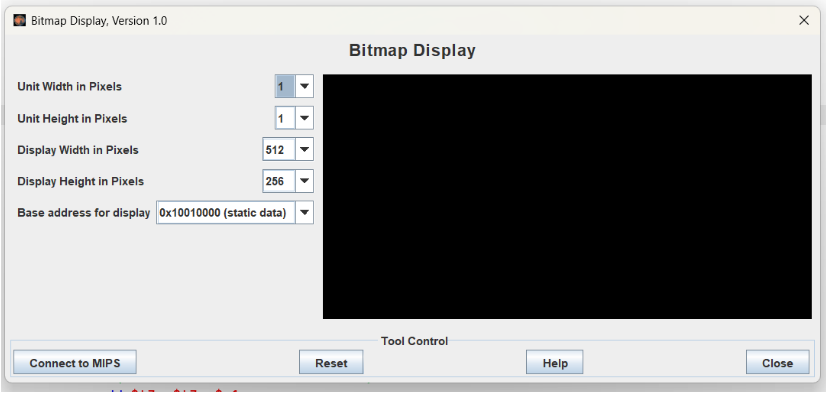
1 The Bitmap Display

This is the picture of the bitmap display in MIPS.



Unit Width in Pixels: 1
Unit Height in Pixels: 1
Display Width in Pixels: 512
Display Height in Pixels: 256
Base address for display: 0x10010000 (static data)

Figure 1: The MIPS bitmap display

There are various options in this display as seen from the image. All these options can be adjusted to the desired values.

There is a button called **Connect to MIPS** in the bitmap display, before we run/assemble our MIPS code, we need to connect our bitmap display to our MIPS IDE. Then when we run our program, we will be able to see the output of our program on this display(if the code was written to work with the bitmap display).

Code

View the code here.

```
.data
    row: .word 256
    col: .word 512
    frame: .word 0x20000
    .eqv DATA_SIZE 4
```

0x20000 represents the decimal number $1,31,072$ which is a product of 256 and 512.

```
li $t0, 100
li $t1, 200
```

Here we are basically taking the X and the Y coordinates for the pixel.

```
li $t2, 0x0040F7BC
```

Loading a bluish-green color onto the register **$t2**

Calculating the memory address to store the pixel into the frame

For this purpose, we have gone for the row-major approach and used this formula:

$$addr = baseAddr + (rowIndex * colSize + colIndex) * dataSize$$

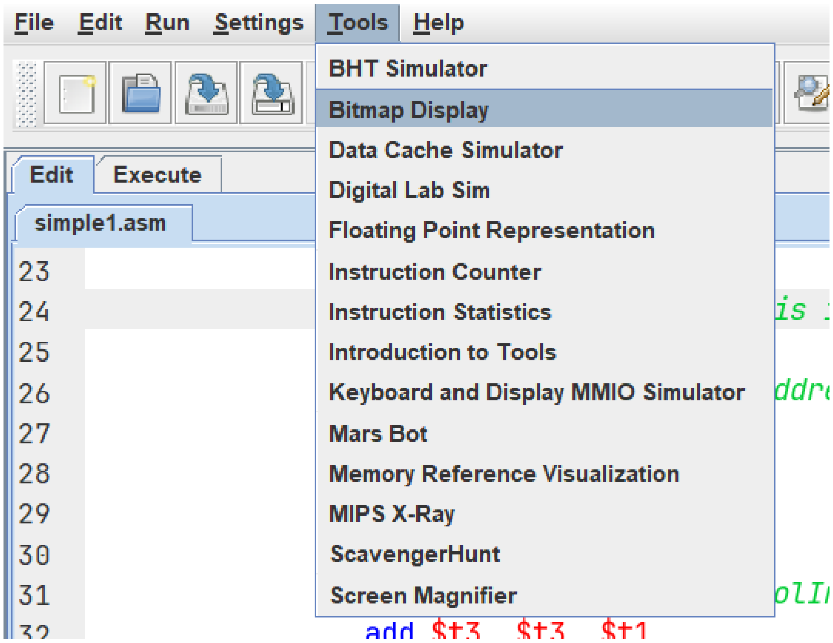
```
mul $t3, $t0, $t7
add $t3, $t3, $t1
mul $t3, $t3, DATA_SIZE
add $t3, $t3, $v1
```

These instructions are basically implementing the above formula.

```
sw $t2, ($t3)
```

Here, we are storing the pixel into the calculated memory address for the pixel.

Execution



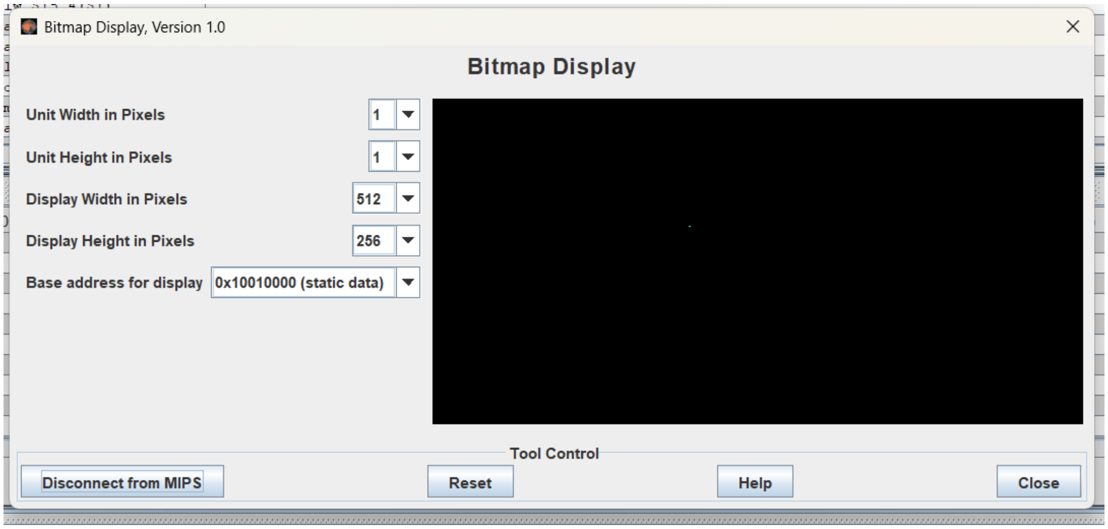
```
add $t3  $t3  $t1
```

Figure 2: Bitmap display option on MIPS tools menu

Click on **Bitmap Display** option. After that a bitmap window will be shown.

First, assemble the MIPS code using **F3**. After that press **F5** to run the code.

After that, a small white dot will be visible on the bitmap display(see image below).



Unit Width in Pixels 1

Unit Height in Pixels 1

Display Width in Pixels 512

Display Height in Pixels 256

Base address for display 0x10010000 (static data)

Figure 3: A tiny dot on the bitmap display