CS 2340 Computer Architecture

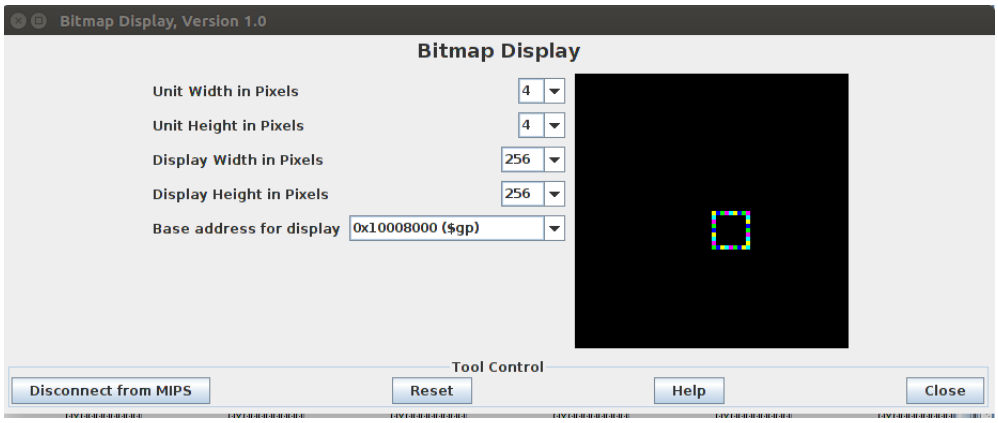
Homework 4: MMIO with MARS
This homework is worth 100 points

Objective: To gain experience working with memory-mapped I/O.

- Read the Bitmap tutorial and see code samples in the GitHub
- Watch the Homework 4 Bitmap video

Instructions

1. Write and test a function to draw a box on the bitmap display. The box should be roughly in the center of the screen. Draw the box one pixel at a time. Use 4 loops, one for the top, one for the right side, one for the bottom, one for the left side. Each loop writes 7 pixels per side. To make debugging easier, make the box a solid color first, then go on to step 2. Make sure that your code uses these settings:



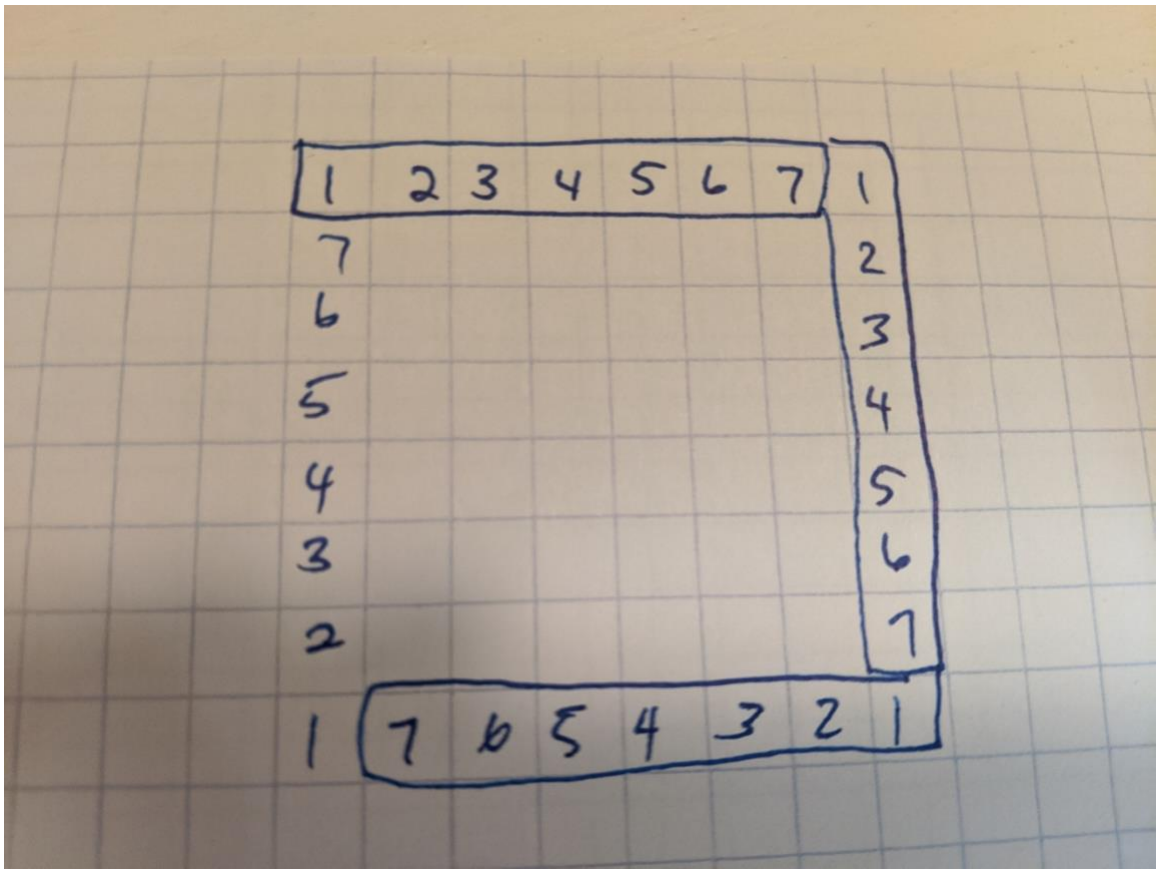
2. Modify the draw box function to have the marquee effect by drawing each pixel in a color from an array of colors. You can use colors similar to the following:

```
# colors
.eqv    RED     0x00FF0000
.eqv    GREEN   0x0000FF00
.eqv    BLUE    0x000000FF
.eqv    WHITE   0x00FFFFFF
.eqv    YELLOW  0x00FFFF00
.eqv    CYAN    0x0000FFFF
.eqv    MAGENTA 0x00FF00FF

.data
colors: .word   MAGENTA, CYAN, YELLOW, BLUE, GREEN, RED
```

3. Slow the marqee appearance down by adding a pause function between pixel writes, using syscall 32. Make the delay 5 ms.
4. Add keyboard functionality. You can see similar code in the bitmap sample program 2 in the GitHub. The w, a, s, and d keys should move the box up, left, right, or down one pixel. The space key should terminate the program.

Upload your .asm file to eLearning



Make sure you understand BitMap and keyboard programming in MARS because we will have another assignment using it.