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Bitmap Project: Drawing Canvas

Overview:

This bitmap project is a simulation of a drawing canvas app where the user can draw using pixels. The canvas space consists of a 64x60 bitmap space, with the bottom 4 rows reserved for the tool bar. Cursor position and commands are utilized with the keyboard (instructions below).

Instructions:

First start up the program and connect the keyboard and bitmap to mips. For the bitmap: set pixel size to 4x4, width and height to 256x256, and base address to $gp. When the program runs, press the OK button after seeing the intro message. The following commands can be used to draw on the canvas:

- W key to move up
- A key to move left
- S key to move down
- D key to move right
- 0 to choose red
- 1 to choose orange
- 2 to choose yellow
- 3 to choose green
- 4 to choose blue
- 5 to choose cyan
- 6 to choose purple
- 7 to choose white
- 8 to choose black
- 9 to choose brown
- P to fill canvas with current color
- L to clear canvas back to default color (black)
- V to draw pixel
- SPACE to exit the program

Pseudocode:

```
.data
        declare width and height
        declare colors and colors array
        declare intro message
main() {
        print intro message
        toolbar();
        draw_border();
        Set starting position at middle of bitmap
        while(not space) {
                if (w && not out of bounds) {-1 to y coord}
                if (a) {-1 to x coord}
                if (s && not out of bounds) {1 to y coord}
                if (d) {-1 to x coord}
                if (v) {draw_pixel();}
                if (0-9) {change to new imputed color. draw_current_color();}
                if (p) {fill_canvas();}
                if (l) {set color to black. fill_canvas();}
                if (SPACE) {exit;}
        }
        exit;
}

toolbar() {
        Load coordinates to bottom left of bitmap
        Loop through all colors and print 2x2 block using draw_pixel()
}

draw_border() {
        Set coordinates to bottom let of bitmap, above the tool bar
        Create loop to draw 1st, 2nd, 3rd, 4th row of border
                draw_pixel() for each pixel in the row
}

fill_canvas() {
        Save current location
        Set a0 and a1 to top left of bit map
        Loop through each pixel of canvas space
                draw_pixel()
        Set location back to original location
}
```

```
draw_current_color() {
        Save current location
        Set coordinate to bottom right of bitmap
        Draw_pixel to draw 2x2 block of selected color
        Set location back to original location
}

draw_pixel() {
        Calculate address of pixel
        Save word at address
}
```

Examples:

Warnings and Hints:

- Since you cannot see the cursor position, you can fill in a pixel with a different color from the background to see the current position.
- Do not input keys too quickly or the keyboard might crash.
- You can hold movement keys and draw pixel keys, but do not hold both at same time.
- After using the clear command, select a color before using the draw pixel or fill command.
- If you don't close out or reset the bitmap, you can stop and start the program again, and the bitmap will still be there.