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December 1, 2020

**Final Project Part 1 Team Alpha Report**

**Overview:**

Threads:

Consumer:

Draws cursor and display life / score

MoveCube (Threads 0 – 4):

Moves a cube a random direction that is not blocked

Draw Blocks:

Draws the cubes on the screen

Producer:

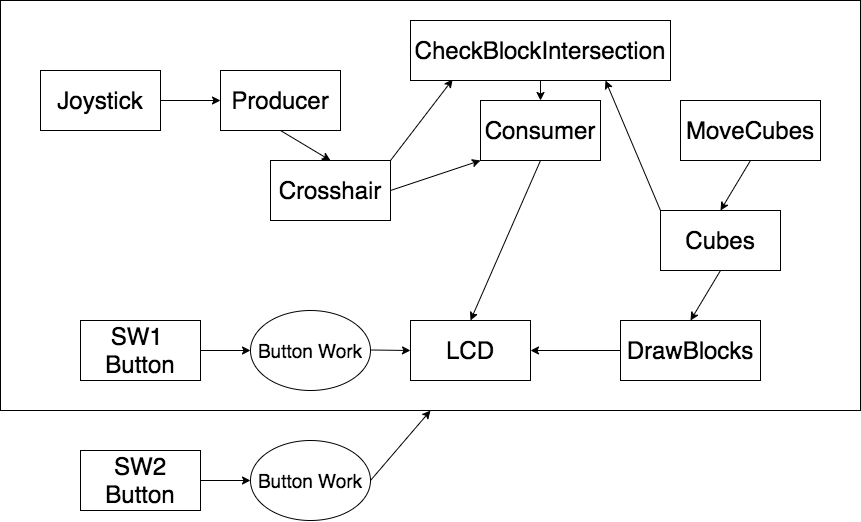
Updates the location of the crosshair based on the joystick input

SW1 Task:

Displays the life time, horizontal and vertical area, and elapsed times

SW2 Task:

Resets game by resetting semaphores and restarting threads



**Roles and Responsibilities:**

James: Parts 4 and 5, cube logic, deadlock prevention, reset functionality, debugging and finalizing the code

William: Crosshair cube detection, Cube logic

Jacob: Revised miniproject 4 to do tasks 1 and 2, wrote report

Jack: Part 3, random number generator

**Random Number Generator:**

**Deadlock Prevention:**

We prevent deadlock with an early detection mechanism that never allows a cube to wait for a semaphore (grid location) that is taken by another cube. In the method to move a cube, we disable interrupts.

status = StartCritical();

total\_valid\_dirs = get\_movable\_directions(cube, valid\_directions);

…

OS\_bWait(&blocks[new\_y][new\_x]); // this should never block

OS\_bSignal(&blocks[cube->y][cube->x]);

EndCritical(status);

After disabling interrupts, we check all the available directions this cube can move.

if (cube->x > 0 && blocks[cube->y][cube->x - 1].Value) {

…

}

if (cube->x < HORIZONAL\_NUM\_BLOCKS - 1 && blocks[cube->y][cube->x + 1].Value) {

…

}

To check a direction, we not only see if the new location in that direction would be off the screen but also if the new locations semaphore is not blocked. If it is, the direction is not valid and ignored. Therefore, any directions we pick, the semaphore will not be blocked and not deadlock can happen. It is important that this calculation is in a critical section because this prevents other cubes from holding onto semaphores for directions which were initially valid.