Assembly Project: Breakout

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1 Instruction and Summary

1. Which milestones were implemented?

   1-5:

   Easy features: - Multiple lives (3) - Pause (press p) - Launch ball (press spacebar) - Sound Effects (collisions, launching, and game over)

   Hard features: - Different angles from paddle collision

2. How to view the game:

   (a) Unit of 8 pixels for width and height.

   (b) Width of 256 pixels.

   (c) Height of 512 pixels.

3. Game Summary:

   - Use a and d to move the paddle
   - Press spacebar to launch the ball at the beginning of the game
   - You have three lives
   - When the ball hits directly in the middle of the paddle, it bounces straight up
   - When the ball hits the very edge of the paddle, it bounces at a harsh angle
   - Otherwise, it bounces at a 45 degree angle
   - Press p to pause and unpause the game
   - When you lose the entire game, a sad face will show
   - You can also press q or esc to quit the game
   - To restart on the sad face screen, press r
   - To fully exit the game, press q or esc on the sad face screen
   - Turn on the volume to enjoy the sounds of MIDI bytes

Doing the two arrays for the brick colours and positions were difficult, but I was able to do it so that I could properly paint on and off the pause screen! I also had to figure out how to use the sounds by looking at the MIPs site about syscalls.

DATA

Mutable:
  BALL_POS: ball's position
  PAD_POS: paddle's position
  BRICK-COLOURS: array for each brick's colour
  LIVES: 3 : 4 bytes
    ⇒ 4 bytes = integer, 3 → value

Immutable:
  ADDR_DSPL: address of bitmap display
  ADDR_KBRD: address of keyboard
  WHITE: colour white for ball
  GREY: colour grey for borders
  BLACK: colour black for erasing
  PINK: colour pink for beginning of bricks
  LIGHT_PURPLE: colour light purple for paddle
  TOP-LEFT-CORNER: address of top left corner of display
  TOP-RIGHT-CORNER:
  BOT-LEFT-CORNER:
  BOT-RIGHT-CORNER:
  INIT-BALL: initial position of ball
  INIT-PAD: initial position of paddle
  PAUSE-POS: initial position of pause symbol
  MID-C: middle C pitch
  E-4: E4 pitch
  GB-4: G♭ 4 pitch
  EB-4: E♭ 4 pitch
  LENGTH: length of MIDI note
  VOLUME: note volume
  VOICE-OOH: voice ooh midi instrument for ♩
  LAUNCH-HIT: instrument for launching ball
  SYNTH-HIT: instrument for collisions
  BRICK-BEGIN: address for initial brick position
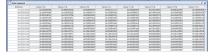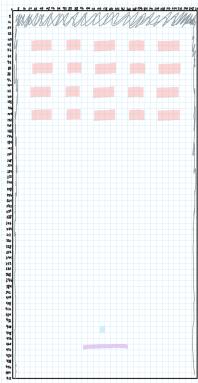 BRICK-POSITIONS: array of each brick's initial position

Figure 1: Memory Plan

Figure 2: Memory

Figure 3: Grid Diagram