```
1 @ Ryan Bentz
2 @ Project 2 - Part 1
3 @ This program initializes the GPIO port and GPIO pins connected to the user
  LEDs
4 @ in order to control the LEDS
5 @ It cycles through each LED, turning them on one-by-one then turning them off
6 @ altogether.
7 @ 11/22/17
8
9 .data
10 STACK:      .rept 128
11            .byte 0x00
12            .endr
13
14 .text
15 .global _start
16 _start:
17
18 @ Define the Register Addressed, Offsets, and write values to control the LEDs
19 .equ    LED0, 0x00200000            @Create a constant for LED0
20 .equ    LED1, 0x00400000            @Create a constant for LED1
21 .equ    LED2, 0x00800000            @Create a constant for LED2
22 .equ    LED3, 0x01000000            @Create a constant for LED3
23 .equ    DELAY_VAL, 0x0022DCD5 @0x0032DCD5
24
25 @Initialize the clock to GPIO 1
26 LDR R0, =0x44E000AC
27 MOV R2, #0x00000002     @ value to turn on the GPIO module
28 LDR R1, [R0]            @ Read the register value
29 ORR R1, R1, R2          @ Combine new value and existing register value
30 STR R1, [R0]            @ Write the value to the register
31
32 @ Set the LED pin state as high
33 @ default values for GPIO pin states is OFF
34
35 @Configure the LED pins as output
36 LDR R0, =0x4804C134     @ GPIO_OE
37 @ Write zeroes to register bits to enable as output
38 MOV R2, #0xFE1FFFFF     @ Value to enable the pin
39 LDR R1, [R0]            @ Read the register value
40 AND R1, R1, R2          @ Combine value to write new to register
41 STR R1, [R0]            @ write new value to the register
42
43 LOOP:
44 @ Turn on the LEDs one by one
45     LDR R0, =0x4804C13C
46     MOV R1, #LED0       @ Turn on LED 0
47     STR R1, [R0]
48     BL DELAY            @ Wait 1 second
49     ORR R1, #LED1       @ Turn on LED 1
50     STR R1, [R0]
51     BL DELAY            @ Wait 1 second
52     ORR R1, #LED2       @ Turn on LED 2
53     STR R1, [R0]
54     BL DELAY            @ Wait 1 second
55     ORR R1, #LED3       @ Turn on LED 3
56     STR R1, [R0]
57     BL DELAY            @ Wait 1 second
58 @ Turn off the LEDs all at once
59     MOV R1, #0x00
```

```
60      STR R1, [R0]            @ Write the value to the register
61      BL DELAY                @ Wait 1 second
62      B LOOP          @ repeat if not equal
63
64 @ End of program
65      B END
66
67
68 @---------------------------------------------------------------------------
69 @ DELAY ROUTINE
70 @ Causes a 1 second delay
71 DELAY:
72 STMFD R13!, {R4, R14}   @ save the register states and link register location
73 LDR R4, =DELAY_VAL
74 D_LOOP:
75      NOP
76      SUBS R4, #1
77      BNE D_LOOP
78 LDMFD R13!, {R4, PC}
79
80 END:
81 .END
```