

COS10004 – Computer System

Lab 07

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Question 16:

16.1 Establish the base address of the GPIO registers?

BASE = \$3F000000

GPIO_OFFSET = \$200000

mov r0,BASE

orr r0,GPIO_OFFSET

=> These commands will first declare two constant variables, which is BASE and GPIO_OFFSET, the mov command will put the value from BASE into register 0, and finally the orr command will perform a bitwise OR operation for the two operands.

16.2 Program GPIO18 for writing

mov r1, #1

lsl r1,#24

str r1,[r0,#4]

=> In order to program GPIO18 for writing, we must first set certain bits in the function register, which in this case is the bits from 24 – 26 in the second register. Hence the first and second command were written. Lastly, we need to move the value to the correct address, which is 0x3F200004, therefore, the third command was written.

16.3 SET GPIO to ON

mov r1,#1

```
lsl r1,#18  
str r1,[r0,#28]
```

=> After enabling the GPIO18 for writing, we need to set it on, that's the reason why we need to mov 1 to the register number 1. We then shift to registers to its appropriate offset, which will be 0x3F20001C – the register in charge of writing 1 to the GPIO pin and in that registers we need to select our GPIO, which is 18. Hence the second and third command were written.

16.4 Program GPIO18 for writing

```
loop$  
b loop$
```

Question 20

20.1 What number bit is set (within the associated 32 bit block) to enable GPIO23 for writing ?

Function registers number 3 will be in charge for GPIO20 to GPIO29, and in this register, bits 9-11 will be GPIO23. We will simply use #9.

20.2.What is the byte offset from GPIO_BASE that this 32 bit block must be written to in memory ?

The third function registers start at 8 so we will use #8.

20.3.What number bit is set to set GPIO23 to ON (again within the 32 bit block associated with that GPIO pin)?

The register that writes 1 to GPIO pin is #28

20.4. What is the byte offset from GPIO_BASE that this 32 bit block must be written to memory?

GPIO_BASE is 0x2000000

Question 22:

22.1. Which exact snippet of code will need to change compared to turning the LED on ?

```
;Setting it on
mov     r1,#1
lsl     r1,#23
str     r1,[r0,#28]
```

22.2. Provide the alternative code to turn the LED off (again you will need to refer to the GPIO register diagram). No need to demonstrate this working. We'll deal with flashing LEDs next week.

```
;Setting it off
;mov     r1,#1_
;lsl     r1,#23
;str     r1,[r0,#40]
```