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Class: Computer Systems (Thursday afternoon)

Title: Lab 7

16.1 – Code that establishes the base address of the GPIO registers:

```
BASE = $FE000000
GPIO_OFFSET = $200000
mov r0,BASE
orr r0,GPIO_OFFSET
```

16.2 – Code that sets up GPIO18 for writing:

```
mov r1,#1
lsl r1,#24
str r1,[r0,#4]
```

16.3 – Code that sets the GPIO18 to ON:

```
mov r1,#1
lsl r1,#18
str r1,[r0,#28]
```

16.4 – Code that stops the program counter from going beyond the executable code:

```
loop$:
b loop$
```

20.1, 20.2 – Bit number 9 must be set in the associated 32-bit block to enable writing to GPIO23. The byte offset from GPIO_BASE of the block to write to is 8.

20.3, 20.4 – Bit number 23 must be set in the associated 32-bit block in order to set GPIO23 to ON. The byte offset from GPIO_BASE of the 32-bit block to write to is 28.

21 – Source code to turn on 2 LEDS controlled by GPIO18 and GPIO23 respectively:

```
BASE = $FE000000
GPIO_OFFSET = $200000

mov r0,BASE
orr r0,GPIO_OFFSET

mov r1,#1
lsl r1,#24
str r1,[r0,#4]

mov r1,#1
```

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

```
mov r1,#1
lsl r1,#9
str r1,[r0,#8]
```

```
mov r1,#1
lsl r1,#23
str r1,[r0,#28]
```

```
loop$:
b loop$
```

22.1, 22.2 – Assuming that the LED controlled by GPIO18 is to be turned off, the code snippet which sets GPIO18 to ON needs to be changed. The alternative code will be:

```
mov r1,#1
lsl r1,#18
str r1,[r0,#40]
```