ICS EXE 1

February 22, 2022

1 HCL

We have introduced HCL in class to design combinatorial logic circuit. Try to write HCL code for the following circuits.

1.1 Max4

Take four word signal A, B, C and D as input, output the max value of them.

```
word max4 =
```

1.2 Median

Take three word signals A, B, and C as input, output the secondary biggest value of them.

```
word median =
```

2 Fork

2.1 Q1

Please show all possible outputs of the following program.

```c
int main()
{
    int x = 1;
    if (Fork() == 0)
        printf("p1: x=%d\n", ++x);
    printf("p2: x=%d\n", --x);
    exit(0);
}
```

2.2 Q2

How many lines will the following program output?

```
int main()
{
    for (int i = 0; i < 4; i++) {
        Fork();
    }
    printf("hello\n");
    exit(0);
}
```

3 OS

3.1 Virtual Memory

How do you understand virtual memory? What's the problem if processes access memory using physical address directly?

3.2 Process

On a single-core CPU, three processes, A, B and C are running. Process A is running a program with an infinite loop, as is shown below:

```
int main(void) {
    while (1) {
        /* waste CPU time */
    }
}
```

Would this process A block the execution of process B and C? Why?

4 Exception

Please specify which kind of exception(Faults, Aborts, Traps, Interrupts) will occur in the given scenario, point out whether it is asynchronous or synchronous, and specify where the exception handler will return to.

1. You dereference a NULL pointer.
2. The memory of your PC corrupted
3. You run a command "kill -9 pid " in your shell
4. You click your mouse