

Homework 5

Problem 1

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.

- a) You defined `int a[5]` but access `a[6]`
- b) The memory of your PC corrupted
- c) You run a command “kill -9 <pid>” in your shell
- d) You click your mouse

Problem 2

```
1.  char *ch;
2.
3.  int main() {
4.      ch = (char *) malloc(1);
5.      *ch = 'A';
6.
7.      if (Fork() == 0) {
8.          *ch = 'B'; printf("%c\n", *ch);
9.
10.         if (Fork() == 0) {
11.             printf("C\n");
12.         } else
13.             exit(0);
14.     } else {
15.         while (waitpid(-1, NULL, 0) > 0);
16.         char *argv[] = {"/bin/echo", ch, 0};
17.         Execve(argv[0], &argv[0], 0);
18.     }
19.
20.     free(ch);
21.     return 0;
22. }
```

Note: `/bin/echo` is an executable file that will print its arguments on the screen. No error occurs in the execution.

1. Please write down the output of the **child** and **parent** processes of the **fork** in line 7.
2. Write down all the possible outputs of the program. Is the output of the program **deterministic**? Please explain why.
3. Please point out whether there is a memory leakage or double free problem about variable **ch** in **each process**? Why?

Problem 3

How many lines will the following program output? Please give some explanation or give the process of computation.

```
1.int main() {  
2.  int i;  
3.  for (i = 0; i < 3; i++) {  
4.      if (fork() == 0) {  
5.          printf("Parent\n");  
6.      } else {  
7.          printf("Child\n");  
8.      }  
9.  }  
10. return 0;  
11.}
```