CS220 - Computer System II
Assignment 11 (100 points)

Due: 11/18/2016, 11:59pm

1 Question 1 (100 points)

You will implement exception handling feature capable of state restoration using setjmp and longjmp, and signals. You will create a directory Assn11 and implement your code in except.c. Specifically, you will implement the following:

- `struct var_state;`, a structure that will save the state of a variable. This structure will contain address, size and data along with a pointer to the next var_state structure. "address" corresponds to the address of the variable, "size" corresponds to the size of the variable, and "data" is the size bytes stored at address. Declare a global structure `var_state_head` that is the head of the list. Use appropriate types. (15 points)
- A function `void save_state(void *addr, unsigned int size)` that given address and size of data, will create a `var_state` element, save the address, size and size bytes of data from address into the element. It will also insert the element to the beginning of `var_state_head` list. (30 points)
- A function `void restore_state()` that restores the data for each element that was saved. (30 points)
- A signal handler that handles *all* signals (Note: the same handler can be used for all signals). This handler will invoke a longjmp. The resumption point of longjmp will restore the state. (15 points)
- In order to avoid memory leak, you are required to handle memory deallocation appropriately. You will free the memory of each saved state (and the data within) after during state restoration. (10 points)

```
#include<stdio.h>
/* g is a global variable */
int g = 10;
/* TODO: Declare struct var_state here */
struct var_state *var_state_head;

/* TODO: Implement save_state() */
/* TODO: Implement restore_state() */
/* TODO: Implement signal handler() */

void f() {
int x;
```

```
13  char *p;
    x = 11;
15  p = (char *) malloc (ARRAY_SIZE);
    p[0] = p[1] = 'x';
17
    /* TODO: Register signal handler for all the signals */
19
    /* TODO: Save x, g and p by invoking save_state() on each of them */
21  /* NOTE: You must save not only p, but also the memory p points to! */

23  if(!setjmp(/* fix this, declare the jmp buffer */)) {
    g = 30;
25  x = 100;
    p = 0;
27  p[0] = p[1] = p[2] = 'x';
    } else {
29  restore_state();
    printf("%d, %d, %c, %c\n", g, x, p[0], p[1]);  /* Expected: 10, 11, x, x */
31  }
    }
33
```

2 Submitting the result

Create a directory Assn11 and store except.c in Assn11.

```
$ tar -cvzf assn11_submission.tar.gz ./Assn11
2
```

Submit assn11.tar.gz on Blackboard.