Printed by Michael Walfish

Page 2/4

handout03.txt

What happens if two threads execute insert() at once and we get the

struct List_elem {

int data;

List elem* head = 0;

l->data = data;

1->next = head;

following interleaving?

thread 1: 1->next = head

thread 2: 1->next = head

thread 2: head = 1;

thread 1: head = 1;

insert(int data) {

head = 1;

};

}

struct List_elem* next;

List_elem* l = new List_elem;

```
handout03.txt
Jan 31, 24 9:00
                                                                                Page 1/4
                                                                                                 Jan 31, 24 9:00
   CS 202, Spring 2024
                                                                                                    2. Linked list example
                                                                                                 64
1
2 Handout 3 (Class 4)
                                                                                                 65
                                                                                                 66
3
4
   1. Example to illustrate interleavings: say that thread tid1 executes f()
                                                                                                 67
    and thread tid2 executes g(). (Here, we are using the term "thread"
5
                                                                                                 68
6
   abstractly. This example applies to any of the approaches that fall
                                                                                                 69
   under the word "thread".)
7
                                                                                                 70
                                                                                                 71
8
        a. [this is pseudocode]
9
                                                                                                 72
10
                                                                                                 73
            int x;
11
                                                                                                 74
12
                                                                                                 75
            int main(int argc, char** argv) {
13
                                                                                                 76
14
                                                                                                 77
15
                tid tid1 = thread_create(f, NULL);
                                                                                                 78
16
                tid tid2 = thread_create(g, NULL);
                                                                                                 79
17
                                                                                                 80
                thread_join(tid1);
18
                                                                                                 81
19
                thread_join(tid2);
                                                                                                 82
20
                                                                                                 83
21
                printf("%d\n", x);
                                                                                                 84
                                                                                                 85
22
            }
23
                                                                                                 86
            void f()
                                                                                                 87
24
25
            {
                x = 1;
26
27
                thread_exit();
            }
28
29
            void g()
30
31
            {
32
                x = 2;
33
                thread_exit();
34
            }
35
36
37
            What are possible values of \boldsymbol{x} after tidl has executed f() and tid2 has
38
            executed q()? In other words, what are possible outputs of the
            program above?
39
40
41
42
        b. Same question as above, but f() and g() are now defined as
43
44
        follows:
45
            int y = 12;
46
47
            f() { x = y + 1; }
48
49
            g() \{ y = y * 2; \}
50
51
            What are the possible values of x?
52
53
54
        c. Same question as above, but f() and g() are now defined as
55
56
        follows:
57
58
            int x = 0;
59
            f() \{ x = x + 1; \}
60
            q() \{ x = x + 2; \}
61
            What are the possible values of x?
62
63
```

```
Wednesday January 31, 2024
```