15-410, Fall 2005, Homework Assignment 1.

Due Monday, October 10, 6:59:59 p.m.

Please observe the non-standard submission time... As we intend to make solutions available on the web site immediately thereafter for exam-study purposes, please turn your solutions in on time.

Homework must be submitted in either PostScript or PDF format (not: Microsoft Word, Word Perfect, Apple Works, LaTeX, XyWriter, WordStar, etc.). Submit your answers by placing them in the appropriate hand-in directory, e.g., `/afs/cs.cmu.edu/academic/class/15410-f05-users/$USER/hw1/$USER.ps`.

1   Run Away (10 pts.)

Consider the following "flee" facility, essentially a simplified version of `setjmp()`/`longjmp()` with more-suggestive names.

```
#include <unistd.h>
#include <flee.h>

flight_path all_the_way_home;

void main(void)
{
  char *relief;

  if (we_fled(&all_the_way_home)) {
    fprintf(stderr, "Run away!!!\n");
    exit(2);
  }

  relief = "Whew!";
  is_it_safe();
  printf("%s\n", relief);

  exit(0);
}

void is_it_safe(void)
{
  if (access("/dangerous", F_OK) == 0)
    flee(&all_the_way_home);
}
```

1.1   5pts

Explain roughly how `flee()` works.

1.2   5pts

What are the fields of a `flight_path`? Be specific if you can.

2 Racy (15 pts.)

Consider the following critical-section entry protocol.

```
boolean critical[2] = { false, false };

1.    do {
2.        ...think great thoughts...
3.        while (critical[j])
4.            continue;
5.        critical[i] = 1;
6.        ...begin critical section...
7.        ...end critical section...
8.        critical[i] = 0;
9.    } while (1);
```

(This protocol is presented in "standard form," i.e., if process 0 is running this code, $i == 0$ and $j == 1$; if process 1 is running this code, $i == 1$ and $j == 0$.)

For each critical-section protocol property, argue briefly but convincingly whether this protocol does or does not fulfill the property. You may wish to use the tabular process execution trace format found in the lecture slides.

3 Fascinating (10 pts.)

Consider a system with three processes and three tape drives. The maximal needs of each process are declared below:

Resource Declarations

Process A	Process B	Process C
2 tape drives	2 tape drives	2 tape drives

3.1 4 pts

Is the following state safe? Why or why not?

Who	Max	Has	Room
A	2	1	1
B	2	1	1
C	2	0	2
System	3	1	-

3.2 4 pts

Is the following state safe? Why or why not?

Who	Max	Has	Room
A	2	1	1
B	2	1	1
C	2	1	1
System	3	0	-

3.3 2 pts

Is there something odd about this system?