

CMPE 230: Systems Programming
Final, Fall 2001

Problem 1 (12 pts)

Fill in the blanks (you can write multiple words in some blank entries)

- (a) If multiple concurrent processes will read from the same file but no one will write to the file, then it is _____ to lock the file.
- (b) If multiple concurrent processes (readers) will read from the same file and it is possible to have a writer processes, then the reader processes should lock the file as _____.
- (c) Blocking call means _____ for the operation to complete.
- (d) Non-blocking call means _____ for the operation to complete.
- (e) The `fcntl` lock setting command `F_SETLKW` is _____.
- (f) The `fcntl` lock setting command `F_SETLK` is _____.

Problem 2 (10 pts)

Suppose there are `STUDENT` records in a `datafile`. Fill in the missing entries in the following program segment so that the 10th student record is write-locked with a blocking call. You can assume existence of a `struct STUDENT` definition.

```
int fd ;
fd = open("datafile", O_RDWR, 0666);

.....

struct flock lock ;

lock.l_type   = _____ ; /* (a) */
lock.l_start  = _____ ; /* (b) */
lock.l_whence = _____ ; /* (c) */
lock.l_len    = _____ ; /* (d) */

fcntl(fd, _____, &lock) ;
```

Problem 3 (13 pts)

Draw the layout of memory for the following program at the point it reaches statement marked `/* HERE */`.

```
#include <stdio.h>

void A(int) ;
void B(int) ;
void C(int) ;

int x[4] = {1,2,3,4};
int n = 4 ;

void C(
int n )
{
    char *t ;

    if (n) {
        t = (char *) malloc(n) ;
        A(n-1) ;
    }
    /* HERE */
}

void B(
int n )
{
    char *x ;

    if (n) {
        x = (char *) malloc(2*n) ;
        C(n-1) ;
    }
}

void A(
int n )
{
    char *x ;

    if (n) {
        x = (char *) malloc(n) ;
        B(n-1) ;
    }
}

main()
{

    A(n) ;
}
```

Problem 4 (10 pts)

What is the output of the following PERL program ?

```
#!/usr/bin/perl

sub sub2 {
    print "$a $b $c\n" ;
}

sub sub1 {
    my $a = "joe" ;
    $b = "john" ;
    local $c = "nicole" ;

    sub2 ;
    print "$a $b $c\n" ;
}

sub1 ;
my $a = "veli" ;
$b = "ali" ;
$c = "ayse" ;
print "$a $b $c\n" ;

sub1 ;
sub2 ;
print "$a $b $c\n" ;
```

Problem 5 (15 pts)

Answer the following questions briefly:

(a) What is the contents of the DX register after instruction 4 is executed.

```
code segment
    MOV SI,4d
    MOV DX,10h
    MOV AX,10h
    DIV SI ;instruction 4
    INT 20h
code ends
```

(b) Can segments overlap ? Explain.

(c) Give an example of A86 instruction that has register-indirect addressing mode.

(d) What is the disadvantage of immediate addressing mode ?

(e) Write down three instructions that will swap the contents of registers AX and BX without making any memory reference(s) and without using any extra register.

Problem 6 (20 pts)

Suppose you are given a datafile called `TRANSLATIONFILE` that contains two words on each line. You should implement a PERL program called `mytranslator` that uses `LWP` and `HTML` modules to parse a web page given on the command line and print the translated word if it exists in the file `TRANSLATIONFILE`. You should not print the word if it does not exist in the file. As an example, suppose that you have the following web page at the address: `http://localhost/hello.html`

```
<html>
<body>
<p> hello world jana</p>
</body> </html>
```

Suppose also that you have the `TRANSLATIONFILE` file that contains:

```
car araba
hello merhaba
world dunya
```

Then if you invoke your program as follows, it should produce:

```
>mytranslator http://localhost/hello.html
hello merhaba
world dunya
```

Problem 7 (20 pts)

Write a perl program called `mysearch` which accepts a string followed by a list of files on the command line. The program will then search (using case insensitive search) each file for the occurrence of the string and print file name and line number of where the string occurs. As an example consider the following:

```
% mysearch ali data*
data1:2
data1:2
data1:5
datahello:1
data8:3
```

What the above command did is search the files that start with `data` in the current directory. If a line with the substring `ali` is found, then the filename followed by the line number is printed. NOTE: your search should be case insensitive.