W228/205

DUBLIN INSTITUTE OF TECHNOLOGY

DT228 BSc. (Honours) Degree in Computer Science

Year 2

WINTER EXAMINATIONS 2015/2016

OPERATING SYSTEMS 2 [CMPU2017]

DR. JOHN GILLIGAN

MONDAY 11TH JANUARY 1.00 P.M. – 3.00 P.M.

TWO HOURS

Answer Questions 1 and any two others

Question 1 is worth 30 marks, all the rest are worth 35

1:
a) Describe three basic operating system functions.

(6 Marks)

b) What is an i-node and what information does it contain?

(8 Marks)

b) Describe how the i-node references file blocks and say what happens when a file is opened and closed

(8 Marks)

d) Describe with the aid of a suitable example, how pointers are used to pass data by reference to functions in C. Your answer should say why pointers are needed for this purpose.

(8 Marks)

2:
a) Describe in your own words with the aid of a diagram what is meant by a linked list.

(6 marks)

b) How in C do linked lists achieve greater economies of space in comparison to arrays.

(8 marks)

c) Given the following list_add function describe in your own words with the aid of a diagram what the following three statements do.

```
LLIST *n1 = NULL;
list_add(&n1, 0);
list_add(&n1, 1);
```

Your answer should make reference to the way parameters are passed to the function. Assume node is defined as follows:

```
struct node {
int data;
struct node* next;
} LLIST;
```

// **Function**

```
LLIST *list_add(LLIST **p, int i)
{
        if (p == NULL)
        return NULL;
        LLIST *n = (LLIST *) malloc(sizeof(LLIST));
        if (n == NULL)
                return NULL;
        n->next = *p;
        *p = n;
        n->data = i;
        return *p;
}
```

(21 marks)

3:

a) Define in your own words what is meant by a thread and how they differ from processes.

(6 marks)

b) What are the key attributes of a process representation in Unix

(8 marks)

c) Outline two situations when synchronization between processes is necessary.

(8 Marks)

d) How does the pthread_join() subroutine contribute to synchronization between threads.

(13 marks)

4

a) What are the optimization criteria of a scheduler?

(6 marks)

b) Describe the Round Robin Algorithm algorithm for scheduling using the following process table to illustrate your answer.

Process		CPU TIME
P1		24
P2		15
P3		12

(12 marks)

c) Describe how Linux Schedules processes.

(8 Marks)

d) Describe how the Linux's goodness function chooses the next process to run.

(9 Marks)