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EXA-115

Department of Computer Science

Operating Systems (CS-304)

**Mid Term Examination
Spring 2017**

Instructor: Dr. Fahad Javed

Time: 70 Minutes

Total Marks: 50

Candidate Name: _____

Candidate Roll No: 1137013

Instructions to Candidates:

- Candidates are required to sit on the seats assigned to them by the invigilators.
- Do not open this question paper until you have been told to do so by the Invigilator.
- Please fill in exam specific details in space provided (both Question Paper and Answer Sheet).
- This is a Closed Book Exam. "Closed book examinations" refer to examinations where the candidate may not take into the examination room any study materials (including textbooks, study guides, lecture notes, printed notes from web pages, hand written notes and any audio/visual aid).
- There are 3 questions. Attempt all questions.
- Do not write anything on question paper except Name and Roll Number.

(15 Marks)

Question 1:

Given the information you have so far from the operating systems and other related courses, Write pseudo-code or draw flow-chart explaining how you would accept input from following devices and as implementation of the `getTextInput()` function?

1. A standard key board 6
2. Keys of a keypad shown in a touch screen ✓
3. Mouse clicks on a keyboard shown on screen ✓

(20 Marks)

Question 2:

(10 Marks)

Question 2.a.)

Your dear friend from school is hired by a company where he is developing a program for a state of the art IOT system. He mentions to you that he has 24 registers thus he cannot use more than 24 variables in his program. Write your Explanation to him why he is wrong and how is the variable handled by a computing system.

6

Question 2.b.)

He further mentions that when a memory allocation is required they randomly allocate a chunk of memory. Explain to him why that is not a good idea. Give a possible reason why this would appear to be the case in C/C++ memory allocation.

7

(15 Marks)

Question 3:

Question 3.a.)

What is an interrupt and how can it be used for handling receiving an SMS in a mobile phone.

15

Question 3.b.)

What is re-locatable code and how does it help us in easing the workload of a programmer

Question 3.c.)

What is a dirty bit and what is it used for?

28
 9

 37

End of Question Paper.

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EKA-116



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EKA-116

Department of English

Operating Systems (CS-304)

**Final Term Examination
Spring 2017**

Instructor: Dr. Fahad Javed

Time: 2:30 Hours

Total Marks: 100

Candidate Name:

Muzaffar Tahis

Candidate Roll No:

14137033

Instructions to Candidates:

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- There are 5 questions. Attempt all questions.
- Do not write anything on question paper except Name and Roll Number.

~~Question 1:~~

(15 Marks)

Ankhain labs, who made their name through the image processing software that your seniors helped develop, are now aiming for a cloud based app which has an android client. The android client uploads an image to the cloud server which then applies filter to the image to identify if the image contains an Urdu text or not. In one of the meetings the junior engineer mentions that following the advice of your senior from two years ago, he is not running any threads as it was considered a bad practice. Understanding how servers work you ask: how many consumers you plan to service at any given time. The project manager asks why that is important.

Q1: Explain to the manager what impact multiple consumers will have on the response time of the system.

On hearing your answer the senior developer points to you that there are no blocking call for processing a single image.

Q2: What is a blocking call and in case multiple consumers request the service then what will be benefit of having multiple threads?

On hearing your explanation the senior architect says that then why don't you use more processes.

Q3: Explain the benefit and drawbacks of having more process when

- 1. You have a dedicated server only running your program
- 2. When you have multiple services on the same server in addition to this system

~~Question 2:~~

(20 Marks)

IoTLabPro is an upcoming Internet of things development company. They are developing four health care products and require your expert opinion in developing the support structure on which they can develop the software solution. Suggest the type of memory management and scheduling scheme that they should develop in each of their products to make it cost effective yet effective. You can refer different operating systems which we studied in course to give an idea of what type of system you choose (for example you may say that for heartchecker linux type of system maybe helpful as it provides all the functionality for this system [Note that this is wrong answer for heartchecker])

- 1. HeartChecker is a device which continuously monitors the heart pulse rate. In case the pulse rate is higher or lower than acceptable limit then it sends a message to the server at health.IoTLabPro.com. It doesn't receive any response since it does not have any way to change the condition of the wearer.
- 2. HeartSupport is the next device which in addition to monitoring receives messages from the server and provides limited dose of medicine that is stored inside the device. The device also checks the level of medication in the device and messages the server in case the medicine level is low. The communication is strictly between the server.
- 3. MultiSupport has multiple sensors each of which provide a feed (meaning raise interrupts) when a reading is made. The information from these sensors is displayed on a monitor attached with the device. The user has buttons to change the information from one sensor reading to the other. NOTE: This is the only type of interface that the user is provided so far.
- 4. MultiSupport++ is multiSupport integrated with patient management system. There are different types of roles which can access different types of data. For instance, pharmacy has access to the amount of medicine in the device, ambulance system has access to heart rate and pulse rate, the room AC has access to the temperature reading. To maintain security the IoTLabPro would like to request the access from one

Question 3:

Your friend comes to you with a brilliant idea of making an operating system for Chinese smart phones. The phone is a traditional Chinese phone with 4 GB of RAM, an option to have an SD card, a quad-core processor at 1 G-Hz and so on. From the OS features described below what should be incorporated given the size of RAM and speed requirements of current softwares. Give justification for your answer. (Limit your justification to half page for each technology):

(15 Marks)

- Overlays/paging
- Multithreading
- Background process for printing
- Background process for calling network
- Background processes for TCP/IP communication

Question 4:

(20 Marks)

Question 4.a.)

(10 Marks)

Discuss in your view how chrome, excel and notepad handle opening of multiple tabs/windows. Discuss how they may use threads, processes and memory allocation.

Question 4.b.)

(10 Marks)

From a programming perspective what is the difference between youtube's base version and paid version in terms of playing sounds in the background? What will it require to add this functionality in the youtube's application code

Question 5:

(40 Marks)

Explain the following terms

- Switcher in MAC OS
- Virtual memory
- Background process
- FAT 16 & FAT 32
- Chunk of memory
- Cooperative multitasking
- Linus Trovald
- PCB

End of Question Paper.



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EXA-115

Department of Computer Science

Operating Systems

Final Term Examination
Fall 2016

Lecturer: Dr. Fahad Javed

Time: 3 Hours

Total Marks: 100

Candidate Name: Muhammad Sharif Candidate Roll No: 13137023

Instructions to Candidates:

- Candidates are required to sit on the seats assigned to them by the Invigilators.
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- There are 4 questions. Attempt all questions.
- Do not write anything on question paper except Name and Roll Number.

Question 1:**(20 Marks)**

Gaana lab is an up-coming speech and sound processing expertise company and given your expertise in OS has hired you to be part of the team. Their newest application is a tool which finds songs in their database which matches the tunes uploaded by the users. As the processing takes a good amount of time and the maximum utilization of processing resources is critical you call a meeting of the engineering team. In the meeting the junior engineer mentions that he notices that the processor usage is jumpy in that the processor usage is high and then disk usage increases followed by high processor usage.

- a. Explain possible reasons for this sort of resource utilization

On hearing your possible reasons the engineer says that he doesn't know much about blocking calls and threading but he is loading entire song at one time and then writing a loop comparing each data point with the uploaded song. Apart from algorithmic issues you see this as a possible use of threads.

- b. Explain what are blocking calls in this context? Explain why using a thread will be good idea in this case?

On hearing your explanation the senior architect says that then why don't you use more processes. Explain the benefit and drawbacks of having more process when

- c. Other programs are running on the computer
d. All other processes are closed and only system operations and image processing is running on the system.

Question 2:**(20 Marks)**

Your friend comes to you with a brilliant idea of making an operating system for Chinese smart phones. The phone is a traditional Chinese phone with 4 GB of RAM, an option to have an SD card, a quad-core processor at 1 G-Hz and so on. From the OS features described below what should be incorporated given the size of RAM and speed requirements of current softwares. Give justification for your answer. (Limit your justification to half page for each technology):

- a. Overlays/paging
b. Multithreading
c. Background process for printing
d. Background process for calling network
e. Background processes for TCP/IP communication

Question 3:

(20 Marks)

```
class Adder extends Thread {
    Adder() {
        start();
    }
    public void run() {
        while(count < 10)
            System.out.println(count);
        count++;
    }
}

class Subtractor extends Thread {
    Subtractor () {
        start();
    }
    public void run() {
        while(count > 0)
            System.out.println(count);
        count--;
    }
}

class ExamQuestion {
    public int count;
    public void main(String args[]) {
        count = 0;
        Adder adder = new Adder();
        Subtractor sub = new Subtractor();
        Thread.sleep(1500);
    }
}
```

- Assume that `System.out.println` is NOT a blocking call, the time slice given to the process is sufficient to run a loop ten times, and the order the threads run is the order in which they are created then what will be the output of this code.
- Assume that `System.out.println` IS a blocking call, cooperative multitasking is used, the time slice given to the process is sufficient to run a loop ten times and the order the threads run is the order in which they are created then what will be the output of this code.
- Assume that the order of execution for the threads is random then if subtractor runs first then what will be the output for case a and b?

Question 4:

(40 Marks)

Explain the following terms. Limit your explanation to five lines for each term.

- a. Overlays
- b. Multi-user multi-task operating system
- c. Cooperative multi-tasking
- d. Micro-kernel
- e. Round-robin scheduling
- f. Interrupt vector table
- g. Single user multi process system
- h. Blocking call
- i. Virtual memory
- j. Linus Trovald
- k. FAT32 filing system

End of Question Paper.