

COMPUTER SCIENCE AND INFORMATION TECHNOLOGY DEPARTMENT
PETROLEUM TRAINING INSTITUTE, EFFURUN

EXAMINATION: SEMESTER I, YEAR II 2019/2020 SESSION
COURSE CODE: COM 212
COURSE TITLE: SYSTEMS PROGRAMMING
CLASS: ND II COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
DATE: 10TH DECEMBER, 2020
TIME: TWO AND HALF HOURS
EXAMINER: OMOREGBE E. U.

DIVINE FAIRY BIZ
CENTRE 08037023166

INSTRUCTIONS TO CANDIDATE

1. ANSWER ANY FOUR QUESTIONS
2. NO OTHER THAN WRITING MATERIALS WILL BE BROUGHT INTO THE EXAMINATION HALL
3. ALL ANSWERS SHOULD BE IN INK EXCEPT DRAWINGS

QUESTION ONE

- a. List and explain the main functions of an operating system (10 marks)
- b. What are the services that operating system provide? (15 marks)

QUESTION TWO

- a. Explain clearly code generation and how is different from optimization (8 Marks)
- b. Distinguish between system programming and application programming (5 Marks)
- c. Describe the general format of the following Assembly Language Program Statement
 - i. label
 - ii. opcode
 - iii. Addresses
 - iv. operands
 - v. pseudo-operations
 - vi. pseudo-instructions(12 marks)

QUESTION THREE

- a. Explain the following in detail
 - i. Compiler
 - ii. Interpreter(4 Marks)
- b. Describe input buffering (5 Marks)
- c. Explain file device (5 Marks)
- d. What is spooling? And (5 Marks)
- e. Enumerate its associated advantages and disadvantages (6 Marks)

QUESTION FOUR

- a. What is an Assembler? (4 Marks)
- b. Explain Assembler module and lexical analysis in details (8 Marks)
- c. For each of the following types of language state its character set:
 - i. Machine language (2 Marks)
 - ii. Assembly language (3 Marks)
 - iii. High level language (5 Marks)
 - iv. State the order in which machine effort is required in its computation (3 Marks)

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QUESTION FIVE

- a. What is interrupts? (3 marks)
- b. Explain interrupts in details. (10 marks)
- c. Explain Interrupt handlers and Scheduler (12 marks)

QUESTION SIX

- a. Explain the following.
 - i. Batch Processing
 - ii. Time Sharing
 - iii. Real Time
 - iv. Network Oper (12½ m)
- b. Explain Multiprogramming, Multitasking and Multiprocessing Systems. (12½ m)

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19. List and explain the main functions of an operating system.

- i) To manage the Computer's resources, such as the Central processing unit, memory, disk drivers, and Printers
- ii) To establish a User Interface. The operating system acts as the interface between the user and the machine.
- iii) To execute and provide service for application software. User does not have to worry about the complexities it will take for a program to be executed by the computer. All the user needs to do is click and the job is done by the operating system.

Q1b what are the services that the operating system provide?

- i) Program Execution
- ii) Input and Output Operations
- iii) File System Manipulation
- iv) Communication
- v) Error Detection

Program Execution : This is done by the operating system it provides an environment whereby the user can conveniently run programs.

I/O Operations : Each program requires and input and produces output. This involves the use of I/O. The operating system hides the user the details of the underlying hardware for the I/O.

File System Manipulation : The user don't worry about secondary storage user gives command for reading or writing of a file and sees it done.

Communication: These are instances where processes need to communicate with each other to exchange info.

Error Detection:

An error in one part of the system may cause malfunctioning of the complete system, O/S constantly monitors the system for detecting the errors.

2a Explain clearly code generation

and how is different from optimization

2b Distinguish clearly between system-programming and application programming

System programming is the activity of programming system software that will provide services to the computer hardware

e.g.: disk defragmenter, operating system.

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Application Programming is concerned at producing software which can provide services to user e.g; word processor, Accounting packages.

2c Describe the general format of the following assembly language program statement.

i) label ii) op-code iii) Addressess iv) Operan

Label: may have any name that obeys the simple syntax rules of the assembler, label names should be descriptive.

OP Code: is the portion of a machine language instruction that specifies the operation to be performed

Pseudo-Operations: are directives obeyed by the assembler at assembly time instead of the CPU at run time

Pseudo-instructions : generate two or more machine instructions.

Operands can be either immediate or the addresses of data located elsewhere in storage, operands maybe register values, values in the stack, other memory values, I/O ports etc., specifies and accessed using more or less complex addressing modes.

Ques Explain in detail
i) Compiler ii) Interpreter

Compiler is a computer program that translates text written in a computer language into another computer language.

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Interpreter: is a Computer Program that performs Instructions written in a programming language, usually executes source Code directly.

2b Describe input buffering:

Buffer Stores all requests then process can go on to do other things
Buffer smooths out the peaks

2c Explain file device : Are Computer or electronic device that allow and supports the reading of files in and out of them e.g; disk drive, cd disc etc

2d what is Spooling

Spooling is a higher level of buffering to even out heavy demands for unshareable resources e.g; printers,

Advantages

- ① Even's out pressure on heavily used devices.
- ② Reduces possibility of deadlock caused by injudicious peripheral allocation
- ③ Easier to produce several copies with re-running jobs.

Disadvantages

- ① Need large amount of disc space
- ② Heavy traffic on the disc channel
- ③ Not feasible for real time I/O

4a. What is an Assembler?
Assembler is a translator that translates a machine oriented language into machine language.

4b Explain Assembler module and lexical analysis in detail

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Assembler module

Thus an assembler has 4 modules

- i) A scanner
- ii) A pass 1 module
- iii) A pass 2 module
- iv) A main program module

Lexical Analysis

It process characters into higher level units that are more meaningful for pass 1 and pass 2 modules. These units are called tokens.

4c Machine language 0, 1

Assembly language 0-9 A-Z

High level language 0-9 A-Z

All special characters.

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5a what is Interrupts?

Can be viewed as a hardware-initiated call to a procedure, it eliminates the need for explicit calls to a polling procedure from within application's code.

5b Explain interrupt in details

Once an interrupt service routine has been called, it is essential that the hardware request for that service be disabled or withdrawn. Interrupt mechanism check all of the relevant device status bits just after executing each and every machine instruction.

In general, an interrupt can be viewed as a hardware-initiated call to a procedure, the interrupt handler or interrupt service routine.

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5c Explain interrupt handlers and scheduler.

Since an interrupt handler blocks the highest priority task from being run and since real time operating systems are designed to keep thread latency to a minimum, interrupt handlers are typically kept as short as possible.

6. The scheduler often provides the ability to unblock a task from interrupt handler context.

6a Explain the following
Batch processing: Can be defined as the executing a series of non interactive jobs all at one time, is useful for operations that require the computer or a peripheral device for an external period of time; there is no interaction with user while the program is executed.

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Time sharing: This involves the CPU allocating individual slices of time to a number of users on the computer system.

Real Time: is a multitasking operating system intended for real time applications, such applications include: embedded systems, industrial robots, space craft etc

Network operating system:
Coordinate the activities of multiple computers across a network. It acts as a director to keep the network running smoothly.

e.g.: Peer to Peer
Client / server

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6b Explain multiprogramming.
In multiprogramming systems, the running task keeps running until it performs an operation that requires waiting for an external event. They are designed to minimize CPU usage.

Multitasking: is a method by which tasks, also known as processes, share common processing resources such as a CPU.

Multiprocessing: is a generic term for the use of two or more central processing units within a single computer system, sometimes refers to the execution of multiple concurrent software processes in a system as opposed to a single process at any one instant.

CW 2017
MultiTasking

COMPUTER SCIENCE AND INFORMATION TECHNOLOGY DEPARTMENT
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EXAMINATION:
COURSE CODE:
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SEMESTER I, YEAR I, 2018/2019 SESSION
COM 212
SYSTEM PROGRAMMING
ND II COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
26TH APRIL, 2019
TWO AND HALF HOURS
OMOREGBEE E. U.

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QUESTION ONE

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- b. Explain Assembler module and lexical analysis in details (3 Marks)
- c. For each of the following types of languages state its character set:
 - i. Machine language (2 Marks)
 - ii. Assembly language (3 Marks)
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QUESTION TWO

- a. Explain the following in details
 - i. Compiler ii. Interpreter (4 Marks)
- b. Describe input buffering (5 Marks)
- c. Explain file device (5 Marks)
- d. What is spooling? And enumerate its associated advantages and disadvantages (5 Marks)

QUESTION THREE

- a. Explain clearly code generation and how is different from optimization (8 Marks)
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QUESTION FOUR

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- b. What are the services that operating system provide? (15 marks)

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QUESTION FIVE

- a. Explain the following.
- i. Batch Processing ii. Time Sharing iii. Real Time Systems iv. Network Operations
- b. Explain Multiprogramming, Multitasking and Multiprocessing Systems

QUESTION SIX

- a. What is interrupts?
- b. Explain Interrupt in details.
- c. Explain Interrupt handlers and Scheduler

System Programming

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1A. What is an Assembler

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Ans An assembler is a translator that translates source instructions (in symbolic language) into target instructions (in machine language) on a one to one basis. This means that each source instruction is translated into exactly one target instruction.

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B. Explain Assembler module and lexical analysis in details

Ans Lexical analysis or scanner : the primary purpose of scanner module is processing characters into higher level units that are more meaningful for the pass 1 and pass 2 modules.

C. For each of the following types of languages state its characteristics

- i. machine language
- ii. Assembly language.
- iii. High level language
- iv. State the order in which machine effort required in its compilation.

Ans:

2. Explain the following in detail
i) Computer ii) Interpreter

Ans. Interpreter normally means a Computer program that executes i.e. performs, instruction written in a programming language. While interpretation and compilation are the two principles.

Compiler is a computer program (or set of programs) that translates text written in a computer language (the source language) into another computer language (the target language).

B: Describe input buffering

Ans: Input buffering: buffer stores all request then process can go onto do other things. This is buffering. Similarly for input, a buffer can be filled from device.

C: Explain file device

Ans: File device is an interface to a device driver that appears in a file system as if it were an ordinary file. These special files allow an application program to interact with a device by using its device drivers.

Q) what is spooling

i) enumerate its associated Advantages and disadvantages.

Ans) Spooling is a higher level buffering to even out demand for unshareable resources e.g. printers. during period of high demand several processes are held up waiting for use of scarce resources

Advantages of spooling

- even's out pressure on heavily used devices
- Reduces possibility of deadlock - caused by induces peripheral allocation
- easier to produce several copies without re-running jobs.

Disadvantages of spooling

- Need large amount of disk space
- Heavy traffic on the disc channels
- not feasible for real-time I/O S/I

3. Explain clearly code generation, and how it is different from optimization.

Ans: Code generation is the process by which a compiler code generates converts some intermediate representation of source code into machine language.

B: Distinguish between system programming and application programming

Ans: System programming is the action of programming system software. The primary distinguishing characteristic of system programming when compared to app programming

Application programming aims at programs which provides services to user (e.g. word processor, spreadsheet, databases, accounting packages)

C. Describe the general format of the following Assembly language program statement

- i. label ii. opcode iii. Address or operands
- ✓ pseudo-operations , pseudo-instruction

— opcode (operation code) is the portion of a machine language instruction that specifies the operation to be performed. their specifications and format are laid out in the instruction set.

— address can be defined as the location in which data are being stored. this can be called the storage of the computer.

— pseudo-instructions are directives that obey the assembler at the assembly time instead of the CPU at run time.

- pseudo instruction that can be defined in language that generate two or more machine language
- operands can be defined as a register value, values in the stack, other memory, alias input and output etc
- label may be refer to any of the
- label is a sticker that is placed on a floppy diskette drive, hard drive, CD-ROM or other equipment that contains printed information

Q1. List and explain the main functions of an operating system

- Ans :-
- to manage the computer's resources, such as the central processing unit, memory, disk drives and printers
 - to establish a user interface
 - to execute and provide services for application software

B: what are the services that operating system provides

- Ans
- : program execution
 - : I/O operations
 - : file system manipulation
 - : communication
 - : error detection

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program execution is the purpose of a Computer System is to allow the user to execute programs. So the

5. Explain the following

- i. Batch processing & Time sharing
- ii. Real time in network operating system

Ans - Batch processing can be defined as executing a series of non interactive jobs all at one time

- Time sharing: this involves the CPU allocating in dividend slices of time a number of users on the computer systems

- Real time operating system
Multi tasking operating system
For real time applications such as applications include embedded systems

- Network operating systems are designed for single users to control one computer.
- Network operating system (NOS) co-ordinate the activities of multiple computers across a network.

B: Explain Multi programming, Multitasking and multiprocessing systems.

- Ans:- Multiprocessing is a generic term for the use of two or more central processing units (CPUs) within a single computer system. Multiprocessing can vary with ~~task~~ context.
- Multi programming in multiprogramming system the running tasks keeps running until it performs an operations that requires waiting for an external event (e.g. reading from a tape)

- multitasking is a method by which multiple task also known as process share common processing resources such as a CPU

Q: what is interrupt?

Ans: interrupt is an hardware that was invented to eliminate the need for explicit calls to a polling procedure from within application code.

B: Explain Interrupts in details.

Ans: interrupts generally are viewed as a hardware-initiated call to a procedure the interrupt handler or interrupt service routine. Essential all computers on the market today

- From the smallest microcontrollers to
 - the highest performance super computers
 - include such hardware.
- C. Explain Interrupt handlers and Schedulers.

Ans. Since an interrupt handler blocks the highest priority task from running and since real time operating systems are designed to keep thread latency to a minimum, interrupt handlers are typically kept as short as possible.

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