Programming Practices

Chapter 1: The Programming Process

**1. What is a computer program?**

Ans: A computer program is a group of instructions for a computer that cause it to perform a desired task.

**2. What is Programming Process? What are the activities of computer programming process?**

Ans: The Programming Process is the procedure that are followed in developing  and solving a program.

Computer programming process includes:

1. Defining the problem
2. Preparing an algorithm
3. Preparing a program flowchart
4. Coding the program
5. Debugging and testing
6. Documenting

**3. What is input and output?**

**Input:** Input is the operation of reading data that is to be read and processed by a program.  
**Output:** Output is the result of processing data by the computer.

**4. What things the programmer must carry out before proceeding one activity to the next?**

Ans: The programmer must carry out checking procedures each time before proceeding to the next activity.

**5. What is program flowchart? Why do we use it?**

Ans: A program flowchart is a symbolic representation of algorithm. It is a representation using standard outline of the processing steps to be used to solve a problem.

A flow chart can be used to:

* Define and analyze processes.
* Build a step-by-step picture of the process for analysis, discussion, or communication.

**6 . Who provides the definition of the problem to the programmer?**

Ans: The definition of the problem is usually provided to the programmer by a systems analyst.

**7. Who is a System Analyst?**

Ans: A system analyst is the person who plans the collection of equipment, programs, people and, the procedure that make up a system.

**8. What do you mean by POSITIVE, NEGATIVE and ZERO numbers?**

Positive Number: A **positive number** is a number that is bigger than zero

Negative Number**:** A **Negative number** is a number that is less than zero

Zero Number: Zero is a number that describes no quantity or null quantity.

**9. Write down the computer’s limited capabilities.**

1. A computer can perform arithmetic operations; usually limited to addition, subtraction, multiplication and division.
2. It can compare two thing and on the basis of the result of the comparison, choose among alternative courses of action.
3. It can move data about in its memory.
4. The computer can also input data and output result.

**10. What do you know about Program Flowcharting outline?**

Ans: Program Flowcharting outlines are a representation using standard outlines of the processing steps to be used to solve a problem.

**11. What do you know about Debugging and Testing?**

Ans: The programmer's output must be carefully examined to ensure that it is correct. If it is not, the source of problem must be identified and corrected. The process of detecting and correcting errors is referred to as testing and debugging.

**12. What are compiler, assembler, generator & interpreter?**

**Compiler:** A Compiler is a program that translates a source program instruction into one or more object program instructions.

**Assembler:** Assembler is a low level language. An assembler is a type of computer program that interprets software programs written in assembly language into machine language, code and instructions that can be executed by a computer.

**Generator:** Generator is a translator program designed to create object program. A generator is a special routine that can be used to control the iteration behaviour of a loop.

**Interpreter:**  An interpreter is a computer program that directly executes instructions written in a programming or scripting language.

**13. What is Counter?**

**Counter:** A counter is a device for keeping track of the number of items something occurs.

**14. What do you know about Desk-Checking an Algorithm?**

**Desk checking is** a reviewing process in which a representative sample of data is manually processed through an algorithm, flowchart, pseudocode, or coded program to locate logic errors.

**15.  Write down five Flowcharting Guidelines.**

1. A flowchart should be read the way a printed page is read  from top to bottom and from left to right.
2. Every program flowchart starts with a single terminal outline and ends with one or more terminal outlines.
3. The descriptive names that identify data items being used and the operation being performed should be used consistently.
4. The words used inside the outlines should be chosen so that they will have meaning for anyone reading the flowchart.
5. The contents of a decision outline should consist of the two items being compared.

**16. What are the High level languages?**

Ans: A programming language in which one source program instruction may be translated into one or more object program instructions is called a high-level language. Hi-level are most widely used as they are easy to learn. Programs written in a high level language for one computer can easily be used on another computer with only minor modifications.

**17. What is logic Error?**

Ans: Logic Error is an error that occurs as a result of faulty reasoning. It can not be detected by a translation program, but will produce incorrect result.

**18. What is Syntax Error?**

Ans: Syntax Error is the violation of the rule of a particular programming language being used.

**19. What do you understand by Execution-time-error?**

Ans: Execution-time-error is an error, detected during execution of a program that is such a severe nature that execution cannot be continued.

**20. Define the following Keywords:**

* **Algorithm:** An Algorithm is the sequence of steps that describe a method for solving problem.
* **ANSI:** ANSI stands for **American National Standards Institute.**
* **BASIC:** BASIC stands for Beginner’s All-Purpose Symbolic Instruction Code. Basic is widely used on personal computer.
* **Binary:** Binary refers to a numbering system that represents all values with a combination of one’s (1s) and zeros (0s).
* **Branch:** Transfer control to another part of a program.
* **Bug:**  An error in computer program.
* **Character:** A letter of the alphabet, a digit, or a special character ( $, %, +, etc).
* **Characters:** Characters are letters, numbers or special symbols, such as a comma, dollar sign or decimal point.
* **COBOL:** COBOL stands for Common Business Oriented Language for business data processing requirements.
* **Coding:** Writing instruction for a computer to perform a particular task.
* **CRT**: CRT stands for **Cathode Ray Tube***.*
* **Debugging:** Removing the error s from a program.
* **Desk checking:** A reviewing processes in which a representative sample of a data is manually processed through an algorithm, flowchart, pseudo code, or coded program to locate logic errors.
* **Documenting:** Preparing a written record of all activities associated with the programming process.
* **EOF:** End-Of-File condition. In computing, end of file is a condition where no more data can be read from a data source while reading file.
* **Execute:** Cause a program or group of instruction.
* **Field:** A collection of characters used to represent a unit of information about an entity; a subdivision of record. Also referred to as an item.
* **FORTAN:** Fortran (previously known as FORTRAN) stands for FORmula TRAnslator. IT is a general-purpose, imperative programming language that is especially suited to numeric computation and scientific computing. It was originally developed by IBM in the 1950s for scientific and engineering applications.
* **File:** A collection of related records..
* **Increment:** Increase the value of a counter.
* **Initialize**: Define an initial value for a field, e.g., set a counter or total field to zero.
* **Input:** Data that is to be read and processed by a program; the operation of reading such data.
* **Item:** A collection of characters used to represent a unit of information about an entity; a subdivision of record. Also   referred to as an item.
* **Listing:** Output on a printer
* **Logic error:** Logic error is an error that occurs as a result of faulty reasoning. It cannot be detected by translation program but will produce incorrect result.
* **Loop:** A **loop** is a sequence of instructions that is continually repeated until a certain condition is reached. When the condition is reached, it causes the control to be transferred to the instruction following the loop.
* **Memory:** A portion of the computer in which data, instructions, and the results of processing can be stored.
* **Object Program:** Object program is a computer program which is translated from the equivalent source program into machine language by the compiler or assembler.
* **Output:** That result of processing by the computer; the process of producing such  results.
* **Pascal:** Pascal is an influential imperative and procedural programming language, designed in 1968–1969 and published in 1970.
* **Record:** A record is a collection of data that pertains to a particular entity in a file.
* **RPG II:** RPG stands for Report Program Generator. Its a Powerful Programming language for business application, widely used on smaller business computers.
* **Run:** Cause a program or group of instruction.
* **Testing:** Running a program with sample data to identify logic errors..
* **Translation Program:** A program that converts a source program into machine-language object program. It also provides a listing of the source-program and diagnostic message.
* **VDT:** VDTstands for **Visual Display Terminal.**

**21. What is detail line and total line?**

* **Detail line:** A printed line in a report that contains information about a single entity is called a detail line.
* **Total Line:** A line that summarizes data obtained from one or more input records.

**22. What is interpreted program?**

Ans: Interpreted program is a program whose instructions are actually a logically sequenced series of operating system commands, handled one at a time by a command interpreter.

**23. What is documenting?**

Ans: Documenting means preparing a written record of all activities associated with the programming process.

**24. Why do we use compiler?**

Ans: We need to use the compiler because computers cannot understand coherent human language, and humans cannot understand coherent computer language. Compilers are like translators that convert human-readable/writable code into assembly code, which is very difficult to understand and use.

**25. What is source program?**

Ans:  Source Program are instructions for computer written in a form that is relatively easy for the programmer to work with, but must be converted to a machine language by a translation program before it can be run on a computer.

**26. Write An Initial Algorithm step’s for a problem: How many positive, negative and zero numbers are there in a list of numbers.**

An Initial Algorithm step’s are:

1. If the number is positive, add one to the positive counter.
2. If the number is negative, add one to the negative counter.
3. If the number is zero, add one to the zero counter.

**27. Write Refining the Algorithm step’s for the problem: How many positive, negative and zero numbers are there in a list of numbers.**

1. Read a number; if there are no more numbers, go to step 5.
2. If the number is positive, add one to the positive counter and go to step 1.
3. If the number is negative , add one to the negative counter and go to step 1.
4. If the number is zero, add one to the zero counter and go step 1
5. Print counter.

**28. Write down the steps for a number’s algorithm for the problem: How many positive, negative and zero numbers are there in a list of numbers.**

Numbers algorithm:

1. Set positive, negative and zero counter to zero
2. Read a card; if there are no more numbers, go to step 6
3. If the number is positive, add one to the positive counter and go to step 2
4. If the number is negative , add one to the negative counter and go to step 2
5. Add one to the zero counter and go to step 2
6. Print counter
7. Stop.

**29. Prepare a desk-checking numbers algorithm by following set of numbers for the problem:  How many positive, negative and zero numbers are there in a list of numbers. *(****See* ***Page 9)***

  15, 4,-2,-3, 0, 0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Step | Number | Counter | | |
| Positive | Negative | Zero |
| 1 | None | 0 | 0 | 0 |

**30. Write any five names and purposes of programming language?**

Name of five Programming language and their purposes:

* **BASIC**(beginner’s all purpose symbolic instruction code): BASIC was originally developed for students to solve algebraic problems but it has been modified to handle business data processing also. It is widely used on personal computers.
* **COBOL** (COmon Business Oriented Language): Designed for business data processing requirement s, originally used for large computers.
* **FORTAN** (FORmula TRANslatot): Designed for mathematical problem  solving.
* **RPG II**(Report Program Generator): Easy to learn language for business application .
* **Pascal:** A general purpose programming language designed with the needs of structured programming in mind.

**31. Write the difference between compiler and interpreter.**

The main differences between compiler and interpreter are listed below:

* The interpreter takes one statement then translates it and executes it and then takes another statement; while the compiler translates the entire program in one go and then executes it.
* Compiler generates the error report after the translation of the entire page while an interpreter will stop the translation after it gets the first error.
* Compiler takes a larger amount of time in analyzing and processing the high level language code; comparatively interpreter takes lesser time in the same process.
* Besides the processing and analyzing time the overall execution time of a code is faster for compiler relative to the interpreter.

**32. Write about Compiler and Interpreter.**

**Compiler:**

1. If a compiler is used, the entire program is processed as a unit.
2. Checks for Syntax Error and produce a list a detected syntax error.
3. If Syntax error is detected, then the compiler will go no further.
4. If there is no syntax error then, it checks the generated output. If output is incorrect then, the programmer checks the logical error. When the errors have been corrected, the program is resubmitted to the compiler. generator or assembler and the process of correcting the errors are repeated.

**Interpreter:**

1. Each instruction is checked as it is entered.
2. If the Instructions contain syntax error, they are corrected and reentered.
3. Instructions without errors are executed immediately.
4. Resulting output is examined for logical error.
5. Logical errors are corrected and interpreted and executed again.
6. This process continues until all bugs have been removed.
7. No object program is produced.

**33. Write algorithm and flowchart of the following problem:**

1. Find the largest and smallest number from the list of numbers

Answer:

1. Read a number if there no number go to step 7
2. Set largest and smallest to number
3. Read a card; if there are no more number go to step 6
4. If the number is greater than largest set largest to number and go to step 3
5. If the number is smaller than smallest set smallest to number and go to step 3
6. Print largest and smallest
7. stop
8. Count the total even numbers and odd numbers from the list of numbers

Answer:

1. Set Even and Odd equal to 0
2. Read the list; if there are no more number, go to step 5
3. If number is divide by 2 & no remainder, add one to the even counter and go to step 2
4. Add one to the Odd counter and go to step 2
5. Print
6. A file containing the records of product id and product price is given. Calculate the MRP value of the product after adding 1.5% vat with the product price.

Answer:

1. Initialize MRP to 0
2. Read the file, at EOF go to step 8
3. Multiply price by 1.5 and store into a
4. Divide a by 100 and store into c
5. Add c to product price
6. Print the results.
7. Go to step 2
8. Stop
9. Find the largest number of a, b and c.

Answer:

1. Read three numbers a, b, c
2. If a is greater than b and c than the largest number is a
3. If b is greater than a and c than the largest number is b
4. C Is the largest number
5. Stop
6. Calculate the summation from 1-100

Answer:

1. Initialize total to 0 and to 1
2. Add total by n
3. Increment n by 1
4. If n is less than 100 than go to step 2
5. Print total
6. Stop
7. Find those numbers from 50-100 which are divisible by 5

Answer:

1. Set n equal to 50
2. Divide n by 5 and set the remainder value to R
3. If R is 0 than Print n
4. Increment n by 1
5. If n is less than 101 than go to step 2
6. Stop

**Chapter 2: Introduction to Structured Programming**

**1. What is Structured Programming? What are the benefits of structured programming?**

**Structure Programming**: A collection of techniques for the planning and writing of programs that increase programmer productivity. Such as, top-down programming and the use of loop, selection and sequence structure.

**Benefits of Structured Programming:**

1. Application programs are easier to read and understand.
2. Application programs are less likely to contain logic errors.
3. Errors are more easily found.
4. Higher productivity during application program development.
5. Improved application program design.
6. Application programs are more easily maintained.

**2. What do you mean by Modular Programming?**

**Modular Programming:** Modular Programming is an early stage in the development of structured programming. A program is broken down into pieces, or modules which can be coded and tested separately called modular programming.

**3. What is subroutine? What do you mean by internal and external subroutine?**

**Subroutine:** Subroutine is a set of instructions for performing a particular task which can be called when needed.

**Internal subroutine:** An internal subroutine is a part of the program. It is a set of instructions for performing a particular task that is written as a part of the using program.

**External subroutine:** External subroutine is a set of instructions for performing a particular task that can be used by any program because the instructions reside in a library that is external to the using program.

**4. What is structure chart?**

**Structure chart:** Structure chart is a tool to use in the top-down planning of a structured program that shows the modules that comprise the program.

**5. Describe the three logic pattern or structure of structured programming. Give an Overview of Structured Forms.**

1. Sequences structure
2. Iteration/loop structure
3. Selection structure

**Sequence Structure**: Sequence Structure isone of the three fundamental programming structures. It provides for the execution of instruction in the order in which they are encountered. No special logic is required because processing is always sequential.

**Iteration /Loop Structure:** The loop structure provides for the repetition of one or more instructions for as long as a given situation, referred to as a condition exists. An *iteration* is the repeated processing of the same code while, or until, a condition is true.

**Selection Structure:** A *selection* is the choice between two or more functions to be processed based on a condition.

**6. What is pseudocode ? What is the limitation of pseudocode?**

Ans: Pseudocode is a way to represent instruction that uses ordinary English. It is a planning tool for structured programming.

**Limitations of pseudocode :**

1. There is no accepted structure of Pseudocode.
2. Psuedocode use the ordinary English.

**7. Define: the following: Dummy Module, Priming Read, Condition**

**Dummy Module :** A dummy run is a trial or test procedure which is carried out in order to see if a plan or process works properly.

**Priming Read:** When we read a sentinel value to control a while loop we have to get the first value from user before we encounter the loop so that it will be tested and the loop can be entered. This is known as a priming read.

**Condition:** A situation which may be true or false, user to control a loop or  a select form among two alternatives for processing.

**8. What are the problems with the modular programming approach?**

Ans: The modular programming approach initially met with some resistance from programmers because it restricted their activities. When positions of a program are allocated to different programmers, no one program can be said to “own” the program; instead it belong to a team.

**9. What do you mean by main program module?**

Ans: Each Program contains a main program module which ultimately controls everything that happens.

**10. How does modular programming work?**

**Ans:** Modular programming works by breaking down a single program into modules (pieces), each of which performs a single, limited function and is written and debugged separately from other modules. Because the purpose and size of each module are limited, the likelihood of errors is reduced.

**11. What are the difference between flowchart and structural chart?**

* **S**tructure chart is a tool for planning the structure of a program. It show the functions to be performed and the relationship between modules, but it usually provides too little information to serve as a basis for coding a program.
* Flowchart show exact processing steps for coding the program.
* Structure chart requires less revisions but flowchart requires more revision.
* Structure chart is easier than flowchart for a user to understand.

**12. Define the following Keywords:**

* **Call**: Instruction that transfers control to a subroutine.
* **Condition:** Condition is a situation which may be true or false used to control a loop or to select from among two alternatives for processing.
* **DO WHILE:** The representation of the loop structure in pseudo code.
* **Dummy record:** A record placed at the end of a file to signal that there is no more data to be processed.
* **External Subroutine:** A set of instructions for performing a particular task that can be used by any program because the instructions reside in library that is external to the using program.
* **GOTOless Programming:** GOTOless Programming is programming without the use of branch instructions.
* **Hierarchy Chart:** Hierarchy Chart is another name for structure chart. It is a tool for top-down program planning.
* **IF-THEN-ELSE:** The representation of the selection structure in pseudo code.
* **Internal subroutine:** A set of instruction for performing a particular a particular task that is written as a part of the using program.
* **I/O:** input /output
* **Loop structure**: The loop structure provides for the repetition of one or more instructions for as long as a given situation, referred to as a condition exists . An *iteration* is the repeated processing of the same code while, or until, a condition is true.
* **Modular programming:** An early stage in the development of programming. A program is broken down into pieces, or modules which can be coded and tested separately.
* **Module:** A piece of a program that performs a single, limited function.
* **Nested:**Nested means included within another, as a loop structure within another loop structure (nested loop), or a selection structure within another selection structure (nested IF).
* **Null ELSE:** A situation in which no action is taken if the condition for an IF-THEN-ELSE is false.
* **Priming Read:** Reading the first record in a file prior to entering  a loop that is executed until EOF is detected.
* **Pseudo code:** A way to represent instruction that uses ordinary English; a planning tool for structure programming.
* **Return:** This instruction within a subroutine that returns control to the calling program.
* **Selection structure:** One of the three fundamental programming structure; provides the ability to choose between two alternative courses of action on the basis of whether a condition is true or false.

|  |
| --- |
| IF condition-B THEN  Instruction-T  ELSE  Instruction-F END IF |

* **Sequence structure:**Sequence Structure isone of the three fundamental programming structures. It provides for the execution of instruction in the order in which they are encountered.
* **Structure chart:** A tool to use in the top-down planning of a structured program that shows the modules that comprise the program, and also shows the modules called by each module.
* **Structure programming:** A collection of techniques for the planning and writing of programs that increases programmer productivity, e.g., top-down programming and the use of loop , selection , and sequence structures.
* **Subroutine:** A set of instructions for performing a particular task can be called when needed.
* **Top-down programming:** A technique for planning a structure program in which the entire program is first broken down into three modules:

1. The processing that takes place before any data is processed
2. The processing of the data, and
3. The processing that takes place after all data records have been read. These modules in turn are successively subdivided until each module performs a single, limited function.

* **User:** The people who will use the output produced by the computer.
* **VTOC (Visual table of contents):** Another name for a structure chart; a tool for the top down planning of a structure program.
* **IOCS:** Input Output Control System. It is a part of the Operating System of a computer that handles the reading and writing of records.

**Chapter 03: Introduction to Structured Programming**

**1. What is Boolean algebra? Mention the evaluating order of Boolean expression.**

Ans: Boolean Algebra is a form of algebra in which symbols have the values of either “true” or “false”, and are subject to the operations AND, OR, NOT. It is also known as Boolean logic.

**2. Define Truth Table. How can we develop a truth table by using AND, OR and NOT logic gate?**

Ans. Truth table is a tool for analyzing all possible combinations of values of a Boolean expression. Truth table is commonly used to represent the possible values of combinations of condition.

**Developing truth table:**

1. Set up a column for each condition.
2. List all possible combinations of conditions, one combination to a row.
3. Write expressions to be evaluated as a column heading, complex expressions may be subdivided into component parts for ease for ease of evaluation, with each part of a column heading.
4. Under each of these column heading, with the value of the expressions in the heading for the combination of conditions given for that row.

**3. Construct a truth table for four rules.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **A** | **B** | **A AND B** | **A OR B** | **NOT A** | **NOT B** |
| **T** | **T** | **T** | **T** | **F** | **F** |
| **T** | **F** | **F** | **T** | **F** | **F** |
| **F** | **T** | **F** | **T** | **T** | **F** |
| **F** | **F** | **F** | **F** | **T** | **T** |

**4. What do you mean by compound condition?**

Ans: Compound condition means more than one condition combined by means of the Boolean operators **AND** or **OR.**

**5. Discuss about the sequence checking, restricted value test and miscellaneous other test.**

**Sequence Checking:** Sequence checking is a method for verifying that a file is in order by comparing key fields of constructive records.

**Restricted Value:** A value applied to an input field to determine if its value is acceptable.

**Miscellaneous others test:** Depending on the situation, any of a number of other test may be performed on input data. A field that is supposed to be numeric can be checked to determine if in fact it contains numeric characters.

**6. What do you mean by EOF? Discuss sentinel value and counter.**

**EOF:** End Of File condition when reading a file.

**7. What do you mean by swap? Write a pseudocode for sorting 3 numbers.**

**Swap:** The act of swapping two variables refers to mutually exchanging the values of the variables. Usually, this is done with the data in memory.

**Pseduocode for sorting  3 numbers:**

IF A<B THEN

MOVE A to B

MOVE B to A

MOVE temp to B

ELSE

(null)

END IF

IF A <C THEN

MOVE A to temp

MOVE C to A

MOVE temp C

ELSE

(null)

END IF

IF B <C THEN

MOVE B to temp

MOVE C to B

MOVE temp to C

ELSE

(null)

END IF

**8. What approaches are followed to develop a truth table?**

Ans: The approach that is used to develop a truth table is as follows:

1. Set up a column for each condition.
2. List all possible combinations of condition.
3. Write each expression to be evaluated as a column heading.
4. Under each of column heading, write the value of the expression in the heading for the combination of condition given for that row.

**9. Truth table is used for what purpose?**

Ans: The truth table is commonly used to analyze the possible values of combinations of conditions.

**10. Explain the more widely used techniques in input editing.**

More widely used techniques in input editing are:

1. Sequence checking
2. Restricted- value test
3. Miscellaneous other tests

[See question No. 5]

**10. How an error message can be displayed when a sequence error or invalid data is fund?**

Ans: We must include *error routines* as part of the program to display the error message when a sequence error or invalid data is found.

**11. What techniques are used to detect end of data?**

Ans: The technique of using a dummy record as sentinel value is used to detect end of data.

**12. Develop the truth table for the following expressions:**

**(i)   (NOT A OR B) OR C**

**(ii) A AND (B AND NOT C)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **(NOT A OR B) OR C** | **A AND (B AND NOT C)** |
| **T** | **T** | **T** | **T** | **F** |
| **T** | **T** | **F** | **T** | **T** |
| **T** | **F** | **F** | **F** | **F** |
| **F** | **F** | **F** | **F** | **F** |
| **F** | **F** | **T** | **T** | **F** |
| **F** | **T** | **T** | **T** | **F** |
| **T** | **F** | **T** | **F** | **F** |
| **F** | **T** | **F** | **T** | **F** |

**13. What is batch processing?**

Ans: Batch processing is processing in which data is accumulated over a period of time and then processed as a group or batch.

**14. What is sentinel value?**

Ans: Sentinel Value is a specific value placed in a field in  a dummy record to signal the end of the file.

**15. Define the following Keywords:**

* **AND:** AND is a Boolean operation, as in the statement A AND B, in which the statement is true only if both A and B are true.
* **Constant:** A value that does not change.
* **Dummy record:** A record placed at the end of a file to signal that there is no more data to be processed.
* **Error routine:** Error routines are the instructions that are executed when an error is encountered during processing.
* **Input editing:** Processing that checks the validity of data.
* **NOT:** A Boolean operation, as in NOT A, that changes the value of a statement from true to false or from false to true.
* **OR:** A Boolean operation, as in A OR B , in which the statement is true if either A or B (or both )is true
* **Parameter:** Value used in a program where the value is subject to change and is read in at the time the program is executed.
* **Restricted-value test:** A test applied to an input field to determine if its value is acceptable, e.g., equal to one or several values, or within range of value.
* **Sentinel value:** A specific value placed in a field in a dummy record to signal the end of the file.
* **Sequence checking:** Sequence checking is a method for verifying that a file is in order by comparing key fields of consecutive records.
* **Simple condition:** Simple condition is a single condition that by itself controls a loop or selects one of two alternatives for processing.
* **Variable:** A field whose contents can be changed.

**Chapter 04: Complex Conditions of Conditions**

**1. How can we identify redundancy?**

Ans: We can identify redundancy by:

1. Looking for two files that have the same actions.
2. Then if all condition entries but one are exactly the same, there is redundancy between the two rules.

**2. How can we prepare a problem definition?**

Ans: To prepare a problem definition, we need to follow the steps below:

1. Prepare the truth table
2. Prepare the Structure chart
3. Write the Pseudocode
4. Draw the Program flowchart
5. Test input data
6. Test output data

**3. Define the Keywords below.**

* **Action entry:** An indication of an action to be taken under a rule in a decision table.
* **Action stub:** The list of actions in a decision table.
* **Condition entry:** An indication of the status of a relevant condition for a rule in a decision table.
* **Condition stub:** The list of condition in a decision table.
* **Contradiction:** A situation in a decision table in which the same combination of condition lead to different actions.
* **Decision table:** A tool for planning and documenting processing that involves complex combination of condition.
* **Program switch:** A field in memory, having the value of true or false that is used to record a condition.
* **Redundancy:** A situation in which more than one rule of a decision table may be applied for a given combination of conditions.
* **Rule:** A part of decision table that indicates what actions are to be taken under a given combination of conditions.
* **Stub:** That portion of a decision table that list all the condition to be examined and the various possible actions to be taken.

**4. What are the advantages of decision table? Or, Why do we use decision table?**

Ans: Decision tables are best suited to documenting complex decisions involving combinations of conditions.

**5. What is a program flowchart?**

Ans: A program flowcharts is a representation using standard outlines of processing step to be used to solved the problem.

**6. What is postscript?**

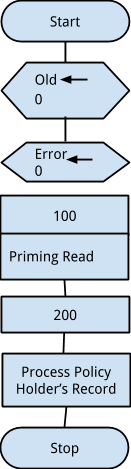
Postscript is a programming language designed to specify the layout of the printed page. Postscript printers and postscript display software use an interpreter to convert the page description into the displayed graphics.

**7. How many components are there in a decision table?**

Ans: There are four components in a decision table. They are as flows:

1. Condition STUB.
2. Action STUB.
3. Condition Entry
4. Action Entries.

**8. Make a pseudo code from below flowchart.**



**Ans:** Pseudo Code

000- File- inquiry

Set old policy number to zero

Set error to ‘F’

Call 100- priming-read

Call 200-process-policyholder-record

Stop

**9. Explain redundancy problems of decision table with example.**

Redundancy exists when there are more rules than are necessary. We can identify redundancy  in table below.

For example, if any company want a list of policy numbers in ascending order for males aged 50 or over, then-

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Screen employee |  | 1 | 2 | 3 | 4 |
| Sex= ‘M’ |  | Y | N | Y | N |
| Age > 65 |  | Y | Y | N | N |
| Print employee name |  | X |  |  |  |
| Disregard employee |  |  | X | X | X |

We look for two rules. There is redundancy between rule 2 and 4, and between rules 3 and 4. In the case of  rules 2 and 4 , we see ‘N’ for the first condition for both rules. But a ‘Y’ and ‘N’ for the second. Therefore  the second condition does not matter ;if  first condition is ‘N’. Regardless of  second condition is. We want to disregard the employee. In the case of rule 3 and 4 , we  see that  the first condition is immaterial as long as second condition is ‘N’.  Either rule 2 or rule 3  could apply, and that violates one of requirements of decision table: only one rule may apply in any situation. So rule 2, 3, 4 are redundancy for given table.

**Chapter 05: Control Breaks**

**Define the following Keywords:**

* **Control break:** Control Break is a change in the value in a control field between consecutive record s in a file.
* **Control field:** A field in input records that is used to sequence the file and that is checked to determine when a subtotal is to be printed.
* **False Control Break:** A False Control Break is a control break encountered when processing the first record in an ordered file that does not actually reflect a change in the value in a control field.
* **Heading line:** Line printed at the top of the pages of a report.
* **Nassi-Shneiderman flowchart:**  A compact and easily understood technique for planning and documenting structured program; includes no provision for branching.

**Chapter 06: Multi Level Control Break**

**1. Define the following Keywords:**

* **Detail-printed:** Refers to a report which contains detail lines.
* **Group-indicated:**  The printing in a report of only those control field values that have changed since they were last printed.
* **Group-printed:**  Refers to a report in which a line of data summarizes information from more than one record; a report without detail line.
* **HIPO:** HIPO stands for **Hierarchical Input Process Output.** It **is** a technique for planning and documenting structured programs that’s utilizes a hierarchy ( structure) chart, a description of the input and output for each module, and a description in pseudo code of the processing steps for each module.
* **Intermediate Control Field:** A control field, other than the major or minor control field, present only when there are three or more control field.
* **Major Control Field:** The most significant field in the ordering of a file; the one that changes least frequently.
* **Minor Control Field:** The least significant field in the ordering of a file; the one that changes most frequently.
* **Multilevel control Break**: Refers to processing that produces more than one level of subtotal, i.e., subtotal for groupings of records on more than one field.

**2. Write the advantages and disadvantages of HIPO Charts.**

**The main advantages of HIPO Charts are:**

1. HIPO Chart provides more information.
2. The input and output of each module are clearly indentified so that we can easily determine what modules call the module being examined.

**The main disadvantages of HIPO Charts are:**

1. The documentation for a program gets bulky.
2. There is a page for each module regardless of the actual size of the module.

**Chapter 07: Tables**

**1. What is a table?**

Ans:A table isa collection of homogenous data type (Numeric, Alphabetic, records) and size (length). Table holds information and the results of processing.

**2. Define Function and Argument table.**

**Argument Table**: A table that is searched.

**Function table:** A table that contains values that are to be retrieved for use in processing.

**3. Write the drawbacks of sequence checking.**

Ans: In sequence checking, the search argument is **first compared** with **the last table argument** to identify erroneous search arguments. Otherwise it would cause the search argument **to extend beyond that last valid entry.**

**4. Express sequential and binary search.**

**Sequential search:** Sequential Search is a method for searching an argument table that examines the entries in the order in which they appear in the table, starting with the  first entry.

**More Information:**

* The sequential search is the most commonly used algorithm for searching **an argument table.**
* It start with the first table argument and takes each succeeding argument in turn until a match is found.
* The search argument is **first compared** with **the last table argument** to identify erroneous search arguments.
* If table **argument <search argument,** we must check the **next table argument.**
* If table **argument >=search argument,** the search is over.
* If table **argument = search argument,** the match is found.

**Binary search:** A technique for searching an ordered argument table that is efficient for large tables.

**More Information:**

* The binary search is more efficient searching technique for large tables.  
  The argument table must be in either ascending or descending order.
* Binary searches are used mostly with discrete tables.

**5. How many ways are there to get table data into memory?**

Ans. We can get data into memory in two ways:

1. Referencing table entries
2. Getting the tables into memory

**6. What type of tables are mostly used in business application?**

Ans: Segmented table are mostly used in business application. Because segmented table are consisted of a series of ranges for each of which there is a corresponding function value.

**7. How many types of search can be applied in a discrete table?**

Ans: Two types of search can be applied in a discrete table:

1. Sequential search
2. Binary search

**8. What is the most efficient technique of searching a large table?**

**Ans: Binary search** is the most efficient technique of searching a large table.

**9. Write the formula to access into Two Dimensional tables in one Dimension.**

j = n(i-1)+K

Where, j= Index of elements in one dimensional table

n = Number of elements in each module.

I = Index of desired subtable

K = Index of desired element in subtable.

**10. What is the difference between one-dimensional and two dimensional table?**

A one-dimensional table is a table that can be visualized as containing more than a single column but a two-dimensional table contains rows and columns.

**11. Define the following Keywords:**

* **Argument table**: A table that is searched.
* **Array:** The tables are known as an array in some language. *See* ***Table***
* **Binary search:** A technique for searching an ordered argument table that is efficient for large tables.
* **Direct table addressing:** A technique for accessing a function table (without searching an argument table) by deriving the position in the function table directly from the search argument.
* **Discrete table:** An argument table in which each entry represents a particular value that will be compared with a search argument in an attempt to find an exact match.
* **Function table:** A table that contains values that are to be retrieved for use in processing.
* **Index (Subscript):** Used in conjunction with a table name to specify a particular element of a table; a part of an indexed file.
* **Multidimensional table**: A table that can be visualized as containing more than a single column. A two-dimensional table contains rows and columns. A three-dimensional table is a stack of two-dimensional table.
* **One dimensional table:** A table that can be visualized as containing a single column of values.
* **Paired Table:** When Argument and Function table are used together, they are called Paired table. When the proper entry in the argument table is found, the corresponding element of the function table is retrieved.
* **Search argument:** Search argument is the value that is compared with argument table entries.
* **Segment table:** Segment table is an Argument table in which the argument entry is the upper (for an ascending table) or lower (for a descending table) limit of a range of values.
* **Sequential search:** Sequential Search is a method for searching an argument table that examines the entries in the order in which they appear in the table, starting with the  first entry.
* **Single table:** Single table is an argument table with no corresponding function table (used in editing data) or a function table with no corresponding argument table (used in discrete table addressing).
* **Subscript:** *See* ***Index***
* **Table file:** A file in which the data that makes up a table is stored.
* **Table lookup:** Searching a table is referred to as doing a table look up.
* **Table search:** The examination of an argument table to find any entry that is equal to the search argument (in the case of discrete table), greater than or equal to the search argument (in the case of a segmented table in ascending order), or less than or equal to the search argument (in the case of a segmented table in descending order).
* **Table:** A table isa collection of homogenous data type (Numeric, Alphabetic, Records) and size (length). Table holds information and the results of processing.

**12. Draw the flowchart of search a discrete.**

1

1

ERROR

‘T’

TABLEPC(I)< SEARCH

ERROR

‘T’

TABLEPC(I)< SEARCH

TABLEPC(10)< SEARCH

PPC

260

RETURN

I 1

I

I+1

**Chapter 08: Multi-file Processing: Sequential Access**

**1. What is the master file and transaction file?**

**Master file:** A relatively permanent file that contains information used regularly; a file that must be updated and maintained.

Example: The inventory file.

**Transaction file:** A file that is retained for only a short time. It is a relatively temporary file that contains information that is used to update or maintain a master file.

Note : Master files and transaction files will be accessed sequentially.

**2. What do you mean by sequential access and serial access?**

**Serial Access:** Sequential access is a special case of serial access in which the records in the file are in order on one or more fields.

**More information:**

* Sequential access is one form of serial access.
* The value in a field in each record is called key field.
* When the master and transaction files are in sequence on the same key field the matching process is much more efficient.

**Serial access:** Processing records in a file by starting with the first record and taking each succeeding record in turn.

**3. What is the key field?**  **Why do we use a key field?**

Ans: The field or fields that are used to identify a record.

**Key field used in:**

1. Sorting a sequential file and in
2. Retrieving records from a direct file.

**4. What are the categories in file-processing activities?**

Ans: File processing activities can be categorized as:

1. Maintaining
2. Updating
3. Referencing

**5. How many types of forms media we will use for sequential files or master files?**

Ans: We will use two types of forms media for sequential or master files.

1. Magnetic tape &
2. Magnetic disk.

**More information:**

* Magnetic tape is used today primarily as a medium for-
  + backing up files that are stored on disc
  + for long term storage of transaction data
  + for transferring data &
  + programs from one computer to another.
* Tape is strictly a **serial medium**.
* The computer is unable to go to directly to **a specific record stored on tape.**

**6. Why do we check sequence from a master file?**

Ans:

**7. Why a unique key exists in a file?**

Ans:

**8. If unique key does not exists then what will happen.**

Ans:

**9. If unique key exists then what will happen.**

Ans:

**10. When the master record is updated?**

Ans:

**11. When the old master record is copied to the new master file.**

Ans:

**12. When the transaction record waiting to be processed?**

Ans:

**13. What do you mean by maintaining?**

Ans: Maintaining refers to the activities that change the number of records in a master file.

**More information:**

* The most common maintenance activities are-
  + **Adding** &
  + **Deleting** records from a master file.

**14. What do you mean by updating?**

Ans: Changing the contents of records in a master file to keep it current without changing the number of records in the file.

**15. What do you mean by referencing?**

Answer: Retrieving information from a file without altering its contents.

**16. Define the following Keywords:**

* **Activity rate:** A measure of the relative number of records in a file that are altered in an updating
* **Backing up:** Providing a way to restore a master file in case the current version of the file can no longer be used.
* **Grandfather- father- son backup:** A technique for backing up master files stored on magnetic tape.
* **Key field:** The field or fields that are use to identify a record. It is used in sorting a sequential file and in retrieving records from a direct file.
* **Maintain:**  Processing with the purpose of keeping a master file current that change the number of records in a file. For example, adding or deleting records.
* **Master file:**  A relatively permanent file that contains information used regularly; a file that must be updated and maintained.
* **Piggyback file**: A file to which records are added by placing them after the records already in file.
* **Referencing:** Retrieving information from a file without altering its content.
* **Sequential access:**  A special case of serial access in which the records in the file are in order on one or more fields.
* **Serial access:** Processing records in a file by starting with the first record and taking two alternatives for processing.
* **Transaction file:** A relatively temporary file that contains information that is used to update or maintain a master file.
* **Updating:** Changing the contents of records in a master file to keep it current without changing the number of record in the file.
* **Volatility rate:** A measure of the relative amount of change in the number of records in a master file.

**Chapter 09: Multiple Processing: Direct Access**

**1. Define cylinder, track and sector.**

**Cylinder:** Cylinder is the collection of tracks of the same numbers on a disk i.e. the tracks that can be read from or written to with a single positioning of the accessing mechanism.

**Track:** One of a series of concentric rings on the surface of a magnetic disc on which data is recorded.

**Sector:** In computer disk storage, a sector is a subdivision of a track on a magnetic disk or optical disc. Each sector stores a fixed amount of user-accessible data.

**2. What does it mean by indexed file?**

Ans: A file from which records may be retrieved directly by means of one or more indexes; can be accessed sequential as well.

**3. What does it mean by ISAM?**

Ans: ISAM means Indexed Sequential Access Method. It is a means of organizing record on a direct access storage device that provides for both direct and sequential.

**4. What does mean by IOCS?**

Ans: A part of the operating system of a computer that handles the reading and writing of records.

**5. How to update an ISAM file?**

Ans: To update an ISAM file, the programmer must supply IOCS with the key of the record needed and then issue a read command. When the read command is executed, IOCS retrieves from the field the key that it uses as a search argument in searching the indexes and the prime data area.

**6. What does it mean by adding a record to an ISAM file?**

Answer: The key of the record is moved to the record key field, and the command to write an additional record is given. IOCS will set the I/O switch to zero unless a record with that key already exists in the file; in that case the I/O switch is set to one.

**More information:**

* Adding record to an ISAM file may be batch or online.
* If batch is used Access may be direct or sequential. Normally used direct access.

**7. What does mean by VSAM file?**

Ans: A means of organizing records on a direct –access storage device that provides for beth direct and sequential access.

VSAM file is capable of handling both fixed-length records and variable length-records.

Fixed length-records: Records which require differing amount of storage is called fixed length-records.

Variable-length records: The record which may change in over time is called fixed-length records.

**8. What is random file?**

Ans: A file which records appear to be in particular order because the location of a record is determined by manipulations performed on the key of the record (hashing)

**9. What is hashing algorithm?**

Ans: The location or address at which a record is stored in a random file is determined by manipulations performed on the record. The manipulation are expressed as a hashing algorithm.

**10. What is index set?**

Ans: In a VDSM file, the index that contains the highest key in each control area; also includes any higher-level indexes that may be required.

**11. What is sequence set?**

 Ans: In a VISAM file the lowest level index is called the sequence set.

It contains-

            i. The highest key in each control interval within the control area &

            ii. The starting location of each control interval.

**12. What are full index files?**

Ans: An index in order by record key that contains the key and location of every record in the file. The entry contains the record key and the address on the disk of the record.

Note: The records do not need to be stored in sequence and the may be fixed variable in length.

**More information:**

* The index is order by record key.
* A fully indexed file needs on overflow area, nor does it needs to reserve free space to add records.

**Creating a fully indexed file:**

Create fully indexed file may be in any order.

As record is stored on the disk, an entry is made in the index to record to both in the key and the location of the record.

When all records have been stored, the index is sorted.

**13. What is DASD?**

Ans: DASD means Direct-Access Storage Device. The most common example of DASD is magnetic disc.

**14. What is master index?**

Ans: In an ISAM file, the highest-level index. Master index is an optional index that contains the highest key in each track of the cylinder index.

**15. What is direct access?**

Ans: The ability to retrieve a specific record from a file without having to first read all preceding records.

**16. Define the following Keywords:**

* **Control Area:** In a VASM file, control area is a collection of control intervals.
* **Control Interval**: In a VASM file, the unit of storage that is transferred on a read or write operation.
* **Cylinder:** The collection of tracks of the same number on a disk, that is, the tracks that can be read or written to with a single positioning of the accessing mechanism.
* **Cylinder Index:** In an ISAM file, the tracks set aside in a cylinder to provide for records that overflow from the cylinder’s prime data area when additions are made to the data.
* **Cylinder Overflow Area** : In an ISAM file, the tracks set aside in a cylinder to provide for records that overflow from the cylinder’s prime data area when additions are made to the file.
* **Direct Access:** The ability to go directly to a record without having to first read all preceding records.
* **DASD:** DASDstands for Direct Access Storage Device. The most common example of a DASD is magnetic disk.
* **File reorganization :** Creating a new version of a direct-access file to eliminate inefficiency in storage utilization and/or processing as a result of the addition and/or deletion of records.
* **Fixed length record:** A record that will never change in size.
* **Free space:** In a VSAM file, space set aside for the adding of records.
* **Full index:** An index in order by record key that contains the key and location of every record in a file.
* **Hashing:** Deriving the location for a record in a random file from the record key.
* **Independent overflow area:** In an ISAM file, one or more cylinders that are used for records that have overflowed from the prime data area when there is no longer any room left in the appropriate cylinder overflow area.
* **Index set:** In a VSAM file, the index that contains the highest key in each control area; also includes any higher-level indexes that may be required.
* **Indexed file: A** file from which records may be retrieved directly by means of one or moiré indexes; can be accessed sequentially as well.
* **Indexed sequential-access method (ISAM):** A means of organizing records on a direct-access storage device that provides for both direct and sequential access.
* **IOCS:** A part of the operating system of a computer that handles the reading and writing of records.
* **Master Index:**  In an ISAM file, the highest-level index; an optional index that contains the highest key in each track of the cylinder index.
* **Online real-time:** A system, such as a reservation system, in which the output from processing a transaction is received immediately and affects the activity taking place.
* **Prime data area:** In an ISAM file, the area in which records are placed when the file is created.
* **Random file:** A way to represent instructions that uses ordinary English; a planning tool for structured programming.
* **Relative track number:** A way of identifying the location of a track for a file on disk by determining how far it is from the first track used for the file.
* **Sequence set:** In a VSAM file, the lowest-level index. Consists of a record for each control area containing the highest key in each control interval in the control area; allows for the sequential processing of the file.
* **Spaced sequential search:** A Searching method in which table or index entries at fixed intervals are examined until either the desired entry is found or it can be determined that the desired entry has been passed over. In the latter case, the entries between the last two entries examined are then searched serially.
* **Track:**  One of a series of concentric rings on the surface of a magnetic disk on which data is recorded.
* **Track index:** In an **ISAM** file, **track index** is the lowest-level index. It is located on track 0 of each cylinder for the file. The track index contains the highest key on each prime data track in the cylinder as well as pointers to records that have overflowed from those tracks.
* **Variable length record:** A record which may change in size over the time because of a change in the number of fields in the records. It is a change in the size of fields or both.
* **VSAM (Virtual-storage access method):** A means of organizing records on a direct-access storage device that provides for both direct and sequential access.

**More Question for evidence:**

**1. Suppose a list of student records (roll, name, GPA, passing year) is given in a file. Find those students whose GPA is 5.0 and passing year is 2010. Define the structure chart and pseudo code.**

**2. Assume that the file being processed contains records of 500 students with the following Characteristics:**

**Characteristics:                                         Number**

**CGP<5                                                         350**

**Passing year=2010                                  250**

**Which comparison you will do first according to question no 1 & why?**

**3. Draw the binary search flowchart.**

**4. Draw the flowchart of search a discrete table**

**5. How can you determine the index of a function table when index of argument table is not start with one. Explain with example.  
6. Draw the flowchart of loading one dimensional table.  
7. Draw the flowchart of loading two dimensional table.  
8. Draw the flowchart of searching one dimensional table.  
9. Draw the flowchart of searching two dimensional tables.  
10. If you convert a two dimensional table of 5 rows and 3 columns into one dimensional then how can you define the index?**