

Experiment-1 : Write a program in Java or C to develop a simple calculator that would be able to take a number, an operator (addition/ subtraction / multiplication / division / modulo) and another number consecutively as input and the program will display the output after pressing the '=' sign.

Algorithm

step 1 : start

step - 2 : Enter operands

step - 3 : use a switch

step - 4 : save and exit

step 5 : choose each case until get the appropriate match.

Experiment - 2 : To write a program in Java or C that will take two n integers as input until a particular operator and produce n output.

sample input : 4 5 7 8 20 40 + ;

Sample output : 9 15 30

Algorithm

Step 1 : start

step - 2 : take user input from user

step - 3 : use if condition

step - 4 : if - elif condition for n output

step - 5 : save and exit.

Experiment -3 : To write a program in Java or C to check whether a number or string is palindrome or not.

Theory: Palindrome number is a number that remains the same when its digits are reversed. In other words, it has reflectional symmetry across a vertical axis. The term palindrome refers to a word whose spelling is unchanged when its letters are reversed.

Algorithm:

~~step 1: start~~

step 1: start

step 2: Declare variable

step - 3: use a while loop

step - 4: use if for checking if reversed

step 5: if it is to equal then print

step: save and ~~exit~~ exit.

Experiment 4 : Write down the ATM system specifications and report the various bugs

Solution

An atm is electronic banking outlet that allows customers with to complete the basic transactions without the aid of branch representative or teller. ATMs are convenient, allowing customers to perform quick self service transactions such as deposits, cash withdrawals, bill payments and transfers between accounts.

ATM Design Elements

Although the design of each ATM is different, they all contain the same basic parts.

⇒ card reader: this part reads the chip on the front of the card or the magnetic stripe on the back of the card.

⇒ keypad: the keypad is used by the customer to input information, including PIN number, type of transaction required, and amount of the transaction.

⇒ Cash dispenser: Bills are dispensed through a slot in the machine which is connected to a safe at the

bottom of the machine

⇒ Printer: If required, customers can request receipts that are printed out of the ATM. The receipt records the type of transaction, the amount and the account balance.

⇒ Screen: The ATM issues prompts that guide the consumer through the process of executing the transaction. Information is also transmitted on the screen, such as account information and balances.

Feature to be tested

- (I) validity of the card
- (II) withdraw transaction
- (III) ~~Authel~~ Authentication of users
- (IV) verify Balance.

Bugs identified

<u>Bug Id</u>	<u>Bug name</u>
ATM-01	invalid card
ATM-02	invalid PIN
ATM-03	invalid account

Bug report

Bug id = ATM 01

Description : Invalid Card

step: → keep valid card

~~Expected result:~~

Status : Pass / Fail

Bug id : ATM-02

Description : Invalid PIN

step to reproduce: (I) keep valid PIN

(II) Enter new PIN

Status : Pass / Fail.

Experiment - 5 To write a program in Java or C to find out the factorial of a number using while or for loop. Also verify the results obtained from each case.

Theory: The factorial number of a given number is the product of all integer from 1 to that given number. Factorial of zero is one

$$0! = 1$$

$$6! = 1 \times 2 \times 3 \times 4 \times 5 \times 6 = 720$$

Algorithm

Step - 1 : start

Step - 2 : Declare ~~var~~ variable

Step - 3 : use for loop

Step 4 : Display output

Step 5 : Save and exist.

Experiment 6 To write down a program in Java or C that will find sum and average of array using do while loop and 2 user defined function.

Algorithm

step 1 : start

step-2 : Declare variable

step-3 : use ~~do~~ Do { } , while ()

step-4 : Display sum and average

step-5 : save and exist.

Experiment -7 To write down a program in Java or C that will ~~read~~ explain class Not Found Exception and end of File (EOF) exception.

Algorithm

step-1 : start

step-2 : define public class

step-3 : using try { } and catch { }

step 4 : Display output

step 5 : save and exit.

Experiment 8 To write a program in Java or C that will read a 'input.txt' file containing n positive integers and calculate addition, subtraction, multiplication and division in separate output.txt file.

Algorithm

Step 1 : Start

Step 2 : Create new input file

Step 3 : Print read file

Step 4 : Open output.txt

Step 5 : use conditions

Step 6 : Display output

Step 7 : Save and exit.

Experiment 9 Explain the role of software engineering in Biomedical engineering and in the field of Artificial Intelligence and Robotics.

Solution:

Role of Software engineering in biomedical:

⇒ Image and Signal Processing: there is a great need for software engineering in the field of image and signal processing for biomedicine. Complex imaging such as CT and MRI devices depends on software to create image from complex signals.

⇒ Bioinformatics: software engineering is involved in collection and analysis of the biomedical information collected by clinicians and researchers. Software engineering plays a vital role in developing and implementation of sophisticated data analysis algorithms, models of biomedical processes.

Information Technology: Virtual reality systems are valuable in diagnostics and teaching. Software engineers may work on artificial intelli-

gence algorithms which aid in diagnostics and decision making in patient care.

Role of software engineering in Artificial intelligence and Robotics; The job duties of a software engineering in robotics are to develop software for robot control and automation. Software engineering can work on an embedded system that controls automated equipment. Software engineers may build new software or test, improve or debug current software.

Software engineering may be responsible for developing, programming and training complex networks of algorithms that make up AI so that they can function like a human brain. The role of software engineers require combined expertise in software development, programming, data science and data engineering. Artificial intelligence developers locate and pull data from a variety of sources, create, develop and test machine learning models and then utilize application program interface (API) calls or embedded code to build and implement AI applications.

Experiment - 10 Study the various phases of waterfall model, which phase is the most dominated one?

Solution : Waterfall model is the simplest model of software development paradigm. All the phases of SDLC will function one after another in linear manner. That is when the first phase is finished then only the second phase will start and so on.

Requirement gathering

↓
System Analysis

↓
Coding

↓
Testing

↓
Implementation

↓
Operations and maintenance

Study of various phases

Requirement gathering: This phase involves understand-

ding what needs to design and what is its function.

system design: the requirement specifications from the first phase are studied in this phase and system design is prepared, this phase helps specifying hardware and software requirements,

coding: This phase is also known as programming phase. The implementation of phase system design starts in terms of writing program code in the suitable programming language.

Testing: The software designed needs to go through constant software testing to find out if there are any flaws or errors. Testing is done so that the client does not face any problem during the installation of the software.

Implementation: once the functional and non-functional testing is done, the product is deployed in the customer environment or released into the market.

operations and Maintenance: This step occurs after installation and involves making modifications to the system or an individual component to alter attributes or improve performance. The client is provided with regular maintenance and support for the developed software.

Experiment-1.1 : Using COCOMO model estimate effort for specific problem in industrial domain.

Solution : Cocomo (constructive cost model) is a regression model based on LOC, i.e. number of lines of code. It is procedural cost estimate model for software projects and is often used as a process of reliably predicting the various parameters associated with making a project such as size, effort, cost, time and quality.

Basic model :

$$E = a (KLOC)^b$$

$$\text{Time} = c (\text{Effort})^d$$

$$\text{person required} = \text{Effort} / \text{Time}$$

The above formula is used for the cost estimation of for the basic cocomo model, and also is used in the subsequent models.

The key parameters which define the quality of any software products, which are also an outcome of the cocomo are primarily Effort and Schedule.

Effort : Amount of labor that will be required ~~for the~~ to complete a task. It is measured in person

- months units.

Schedule: Simply means the amount of time required for the completion of the job, which is, of course, proportional to the effort put in. It is measured in the units of time such as weeks, months.

The necessary steps in this model are:

1. Get an initial estimate of the development effort from the evaluation of thousands of delivered lines of source code (KLOC).
2. Determine a set of 15 multiplying factors from various attributes of the project.
3. Calculate the effort estimate by multiplying the initial estimate with all the multiplying factors, i.e. multiply the values in step 1 and step 2.

In COCOMO, projects are categorized into three types:

1. organic
2. Semidetached
3. Embedded.

Experiment - 12 : Identify the reasons behind software crisis and explain the possible solutions for the following scenarios.

Case 1 : Air ticket reservation software was delivered to the customer and was installed in an airport 12:00 AM (mid-night) as per the plan. The system worked quite fine till the next day 12:00 pm (noon). The system crashed at 12:00 pm and the airport authorities could not continue using software for ticket reservation till 5:00 pm. It took 5 hours to fix the defect in the software.

Case 2 : Software for financial systems was delivered to the customer. Customer informed the development team about a mal-function in the system. As the software was huge and complex, the development team could not identify the defect in the software.

Sot Solution

Case - 1 : In the crisis of the software on air ticket reservation, "failure at customer's site"

In this situation the customers can not do their checking or other necessary work on this airport for the failure of the reservation software.

The situations are collectively termed as software crisis :

- (I) time slippage
- (II) cost slippage
- (III) failure custom site
- (IV) In tracable error

Case - 2 : we can see that, in case 2 scenario, a user confirmed product by the development team about malfunction in the system. As the software become huge and complex, this is called the 'Interactive Error after delivery'.