Learning Report – SMARTPHONE

GLOBAL ENGINEERING ACADEMY

Genesis

L&T Technology Services

Document History

Ver. Rel. No.	Release Date	Prepared. By	Reviewed By	Approved By	Remarks/Revision Details
1	17-09-2020	Sindhuja H	Pagala Prithvi Sekhar, Srinivas K, Dushyant Shekhar Singh, Kusu Venkata Rama Sai Lakshmi	Pagala Prithvi Sekhar, Srinivas K	Updated System/Software Development
2	18-09-2020	Sindhuja H	Pagala Prithvi Sekhar, Srinivas K, Dushyant Shekhar Singh, Kusu Venkata Rama Sai Lakshmi	Pagala Prithvi Sekhar, Srinivas K	Updated CI Workflow
3	19-09-2020	Sindhuja H	Pagala Prithvi Sekhar, Srinivas K, Dushyant Shekhar Singh, Kusu Venkata Rama Sai Lakshmi	Pagala Prithvi Sekhar, Srinivas K	Updated the final alignment

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Activity 1– System/Software Development

Consumer Goods: Smartphone

1. Requirements

A smartphone is a mobile device that combines cellular and mobile computing functions into one unit. They are distinguished from feature phones by their stronger hardware capabilities and extensive mobile operating systems, which facilitate wider software, internet and multimedia functionality (including music, video, cameras, and gaming), alongside core phone functions such as voice calls and text messaging.

2. Research

2.1 Ageing

The development of the smartphone was enabled by several key technological advances. The exponential scaling and miniaturization of MOS transistors down to sub-micron levels during the 1990s–2000s made it possible to build portable smart devices such as smartphones, as well as enabling the transition from analog to faster digital wireless mobile networks.

Like much of everything else, 2020 will be a lost year for the global smartphone market as consumers make do with the phones they've got, and save their money under the dark cloud of coronavirus. So say analysts who believe 2021 holds more promise for one big reason — aging phones. They base that on a smartphone survey conducted in March. It showed cell phone purchase plans over the next 12 months dropping from 67% a year ago to 62% in China, where the economic impact of the virus was already hitting. Elsewhere, it's still early days to see how much mobile shopping consumers will be willing to do.

The survey showed purchase intent in China for Apple's iPhones stabilizing after a multiyear downtrend, and improving in both the U.K. and the U.S. Apple is one of their preferred stocks in the mobile sector, and alongside Samsung, which uses Google's Android software. Both are names they like even in a low-growth environment.

The analysts noted Samsung purchase intent is slightly weaker across the U.S. and German while stable in the U.K., but interest in its newer GS20/Flip was better, considering the coronavirus cloud. Still, they added that the flip phone trend may need enthusiasm behind it to take off, they noted.

2.2 Cost Gradation

Features	Samsung galaxy S5	Apple iPhone 7	Xiaomi Mi A2
Cost	21,999Rs	21,499Rs	13,999Rs
Battery capacity	2800mAh	1960mAh	3000mAh

Operating System	Android 4.4.2	iOS 10	Android 8.1 Oreo
RAM	2GB	2GB	4GB
Phone Screen Size	5.10 inches	4.70 inches	5.99 inches
SD Card Storage	16GB	32GB	64GB
Resolution	1080x1920 pixels	750x1334 pixels	1080x2160 pixels

3. Product Definition

Features	Product
Cost	14,999Rs
Battery capacity	4300mAh
Operating System	Android 7.1.2
RAM	4GB
Phone Screen Size	5.5 inches
SD Card Storage	64GB
Resolution	1080x1920 pixels

4. SWOT Analysis

- Strengths – High quality, low production costs, focus on environment.
- Weakness – Lack of experience, low profit margin.
- Opportunities – High growth in the developing regions, Strong customer demand for innovative products.
- Threats – Low-end phones market has become very competitive, rapid technological change.

5. High level Requirements

The product has to meet the requirements of features specified like hardware specifications, software specifications, Input/output specifications, communication related actions, managing phone calls. Also upheld the strengths of the products.

6. Low level Requirements

- Product should meet the requirements of battery capacity of 4300mAh.
- Software requirements - Flexible Android Operating System
- Processor - At Least 2GHz octa-core processor is recommended.
- Product should have a minimum of 2GB RAM.
- Works with all connectivity options like Bluetooth, Wi-Fi etc.
- Product with best display with screen size, resolution, PPI.

7. System Design

(i) High level design

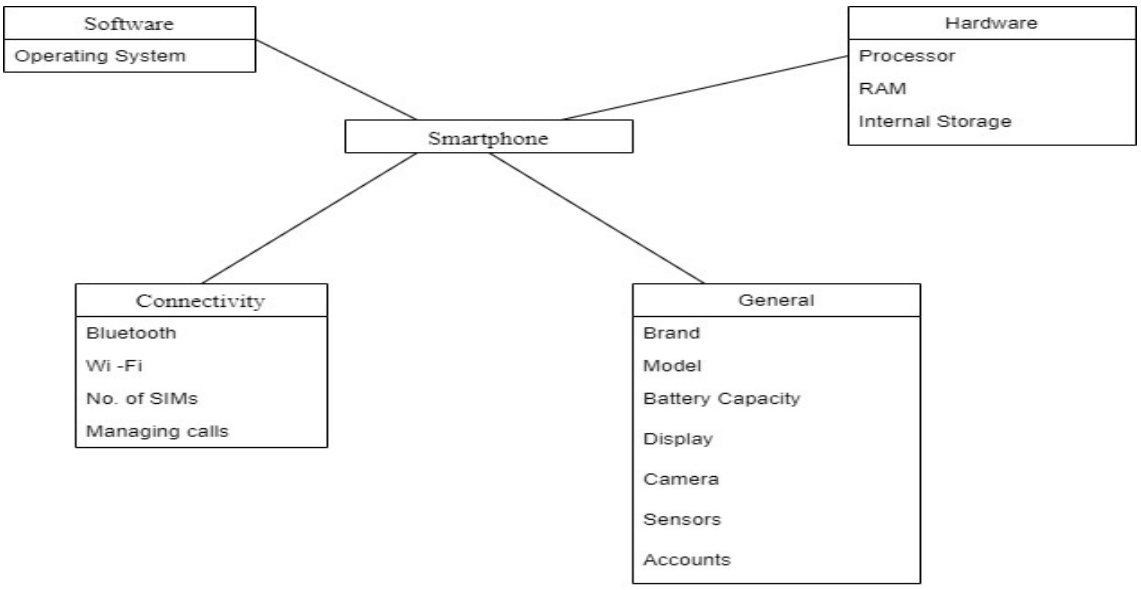


Figure 1 Class Diagram

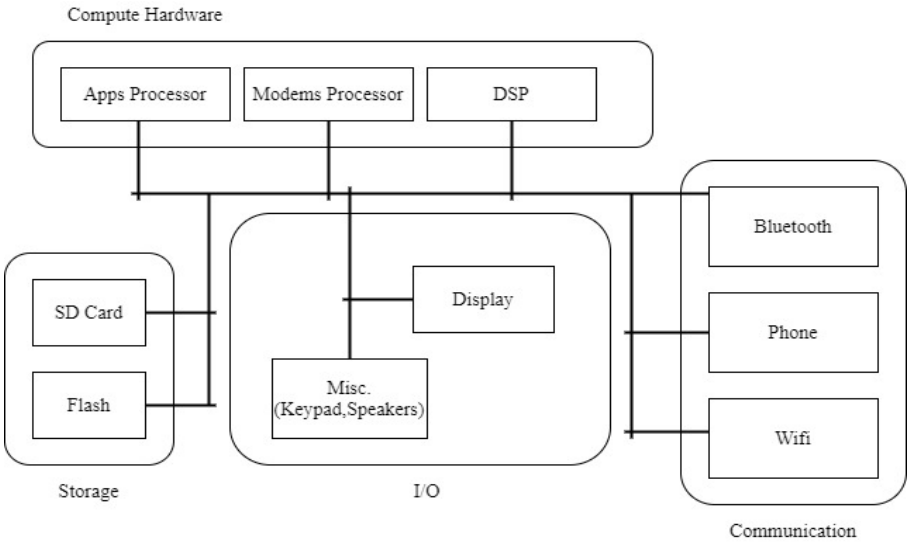


Figure 2 High Level design for mobile architecture

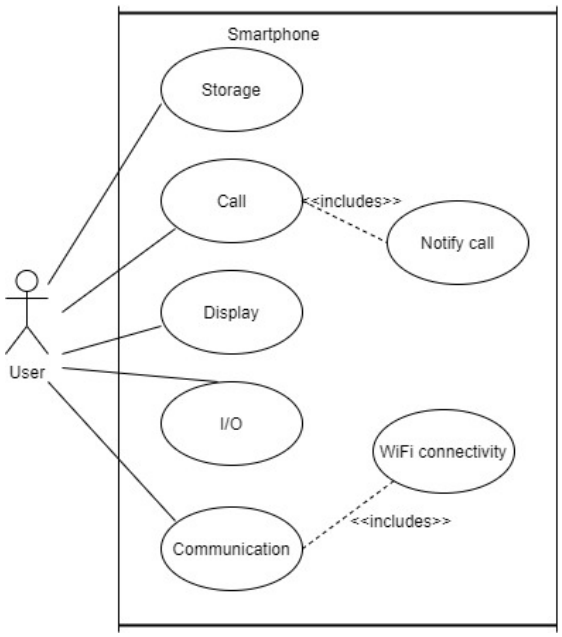


Figure 3 Use case diagram

(ii) Low level Design

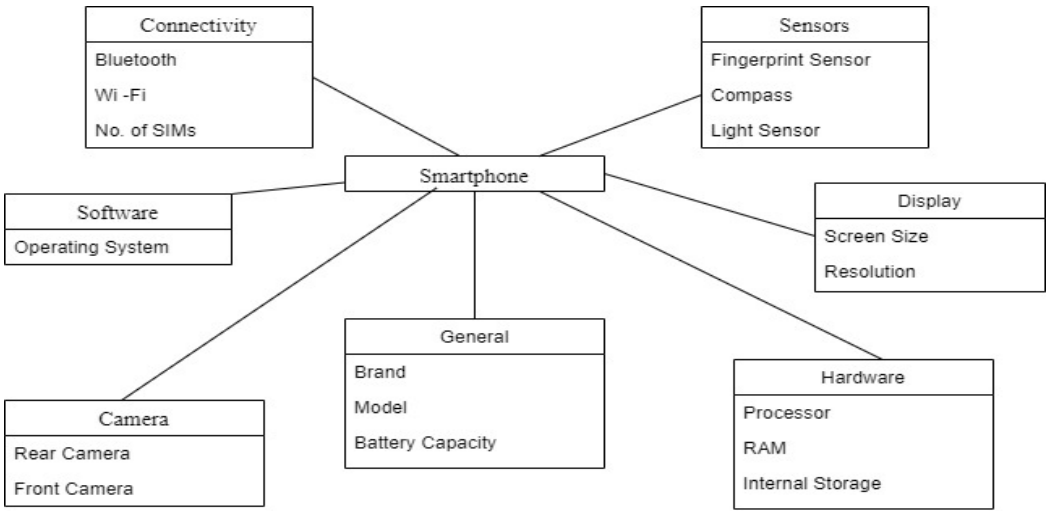


Figure 4 Low level design for mobile architecture with class diagram

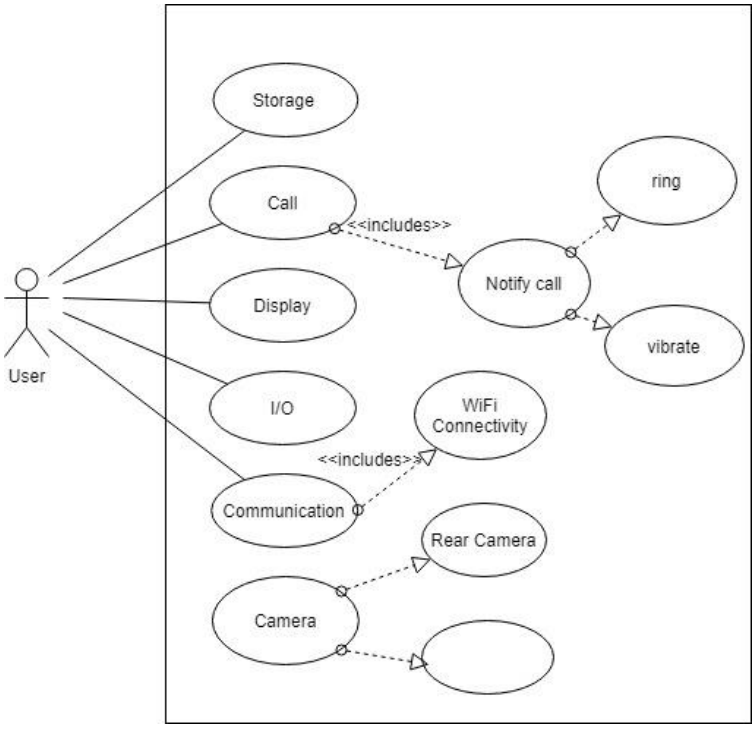


Figure 5 Low level design for mobile architecture with use case diagram

8. Test Plan

8.1 Requirement Based test plan

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check whether battery placed in phone or not	Mobile Phone, Battery	Battery should be placed in phone correctly	Battery is inserted and working	Pass
2	Check whether SIM card is placed in phone or not	Mobile Phone, SIM Card	SIM Card should be placed in phone correctly	SIM Card placed correctly and working	Pass
3	Check whether mobile phone is starting or not	Mobile Phone	After inserting battery and SIM Card, mobile	Phone started successfully	Pass

			phone should start and display welcome screen	with welcome screen	
4	Check whether speakers and microphone working or not	Mobile Phone	Speakers and microphone should function well for proper communication	Speakers and Microphone working properly	Pass
5	Check whether operating system in phone installed properly or not	Mobile Phone, Emulator	Operating system (Android) should be installed correctly	Operating system installed successfully	Pass
6	Check whether mobile phone is able to connect the network or not	Mobile Phone, Required network signal	Mobile Phone should accept the network signal and show network status	Mobile phone connected to mobile network and receiving signals	Pass

8.2 Scenario based test plan

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Check that call should be made to valid contact no. (contact no. must be equal to 10 digits)	Mobile Phone, Required network signal	User should be able to make call to valid mobile no. only	Call made successfully to valid contact no.	Pass
2	Check that whether all keys, functional keys like space, enter key, calling button, call rejection button working correctly or not	Mobile Phone	All keys, functional keys like space, enter key, calling button, call rejection button should work correctly	All keys functioning properly	Pass
3	Check that user can set alarm on required time or not	Mobile Phone	User should be able to set alarm on required time, date with alarm	User can set alarm successfully	Pass

			notification tone and volume level		
4	Check that if operating system in phone is updated then it should be installed and work correctly	Mobile Phone	Updation successful and does not affect the working of other functions on phone	Operating system installed successfully	Pass

8.3 Boundary condition based test plan

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	To check the working of the phone when the battery is low.	Mobile Phone, Battery	Phone must work on Power saver/Battery saver mode	Mobile phone uses battery saver mode and works successfully	Pass
2	Check the accessibility of the phone when memory is fully loaded with contacts, images and videos.	Mobile Phone	Phone should not get slow and functions well if memory get fulfilled	Phone gets slow when memory is full.	Fail
3	Check that how quality of call get affected with low network signals	Mobile Phone, network signal	Phone calling quality get affected by low network signal	Call gets disconnected and noise in the network	Fail

9. Requirements

ID	Description
RT01	Product should meet the requirements of battery capacity of 4300mAh.
RT02	Android Operating System with version 7.1.2

RT03	2GHz octa-core processor
RT04	4GB RAM and 64 GB Internal Storage
RT05	Sensors like Fingerprint sensor, Compass
RT06	Connectivity options like Wi-Fi, Bluetooth, Headphones

10. Test Plan

ID	Description	Pre Condition	Expected Input	Expected Output	Actual Output
RT01	Check whether battery placed in phone or not	Tester should know how to handle mobile phone and functioning on it	Mobile Phone, Battery	Battery should be placed in phone correctly	Battery is inserted and working
RT02	Check whether operating system in phone installed properly or not	Tester should have knowledge of operating system used in phone	Mobile Phone, Emulator	Operating system (Android) should be installed correctly	Operating system installed successfully
RT02	Check that if operating system in phone is updated then it should be installed and work correctly	New version of software should be installed successfully	Mobile Phone	Updation successful and does not affect the working of other functions on phone	Operating system installed successfully
RT04	Check the accessibility of the phone when memory is fully loaded with contacts, images and videos.	All requirements given by user should be implemented and tested	Mobile Phone	Phone should not get slow and functions well if memory get fulfilled	Phone gets slow when memory is full.
RT06	Check whether SIM card is placed in phone or not	Mobile Phone should be in working condition i.e. fully charged and	Mobile Phone, SIM Card	SIM Card should be placed in phone correctly	SIM Card placed correctly and working

		SIM card should be inserted in it			
RT06	Check whether speakers and microphone working or not	Tester should know how to handle mobile phone and functioning on it	Mobile Phone	Speakers and microphone should function well for proper communication	Speakers and Microphone working properly
RT06	Check whether mobile phone is able to connect the network or not	Tester should know how to handle mobile phone and functioning on it	Mobile Phone, Required network signal	Mobile Phone should accept the network signal and show network status	Mobile phone connected to mobile network and receiving signals
RT06	Check that call should be made to valid contact no. (contact no. must be equal to 10 digits)	Tester should have the knowledge of how to handle mobile phone and functioning of it	Mobile Phone, Required network signal	User should be able to make call to valid mobile no. only	Call made successfully to valid contact no

Activity 2 – Agile Aspects

1. Agile Methodology

Agile software development refers to a group of software development methodologies based on iterative development, where requirements and solutions evolve through collaboration between self-organizing cross-functional teams. Agile is a continuous iteration of development and testing in the software development process. Agile methodology delivers the software on a regular basis for feedback.

Agile model's four main values are expressed as:

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

Seven things should be done when implementing any type of agile methodology like customer collaboration, user stories, continuous integration, automated tests, pair programming, test-driven development, burndown charts.

Among these user stories are important to build a product. A tool used to explain a software feature from an end-user perspective, the purpose of a User Story is to create a simplified description of a requirement. It helps to picture the type of user of the product, what they want, and the reason(s) for it. A common User Story format that is used is:

As a [role], I want [feature], because [reason].

Epic

An epic is a large story which is comprised of potential smaller stories for implementation. The stories in an epic have a common objective. And thus, it often makes more sense to deliver all user stories of a single epic at one go. It is a large story that cannot be completed in a single sprint.

Theme

A Theme is a group of user stories that share a common attribute, and for convenience they are grouped together. The individual user stories, however, can each be accomplished in a single sprint.

2. User Stories

ID	User Story	Effort Time

U01	As a user, I want a smartphone with better battery life with 4300mAh with all specifications, so that the phone works properly. When the battery is low check for additional options such as battery saver/power save mode which keeps the phone on for some time so that it can make use of it if there is need. Acceptance criteria: Battery capacity must be 4300mAh, the phone switches on the power save mode at the minimum level of battery.	
U02	As a user, I want a smartphone with better quality camera features to click pictures so that we can capture the pictures with high quality with the phone itself no need of digital cameras. Also, there must be enough storage space to store all the images and videos. In case storage space is full it has to make some alternatives like back up. Acceptance Criteria: Smartphones runs with at least 2GHz with octa-core processor is better, the internal storage of 64GB and RAM 4GB is required and the device must have expandable storage type. And the camera features, rare 12MP camera, and a 5MP front camera with rare flash Dual LED.	
U03	As a user, I want a smartphone which has good connectivity options with respect to managing calls, Wi-Fi connectivity, Bluetooth, Headphones added to that sensors for various usage. It is required to have capacity to manage calls during low network signals. Acceptance Criteria: Smartphone has to meet the requirement of all connectivity options like it has to support the Bluetooth with v 4.20, Dual SIM options with type Nano-SIM which supports 3G, 4G/LTE network ranges. It has to support options like headphones with 3.5mm. And sensors like Fingerprint sensor, Compass, Proximity Sensor, Ambient light sensor.	10 Hours

Activity 3 –CI Workflow for C Programming

CALCULATOR

1. Requirements

ID	Description
R01	To display numbers and the result
R02	Numbers from 0-9
R03	Operations such as addition, subtraction, multiplication, division, modulus, power, factorial
R04	Get correct output
R05	Display Result
R06	Store Result

2. UML Diagrams

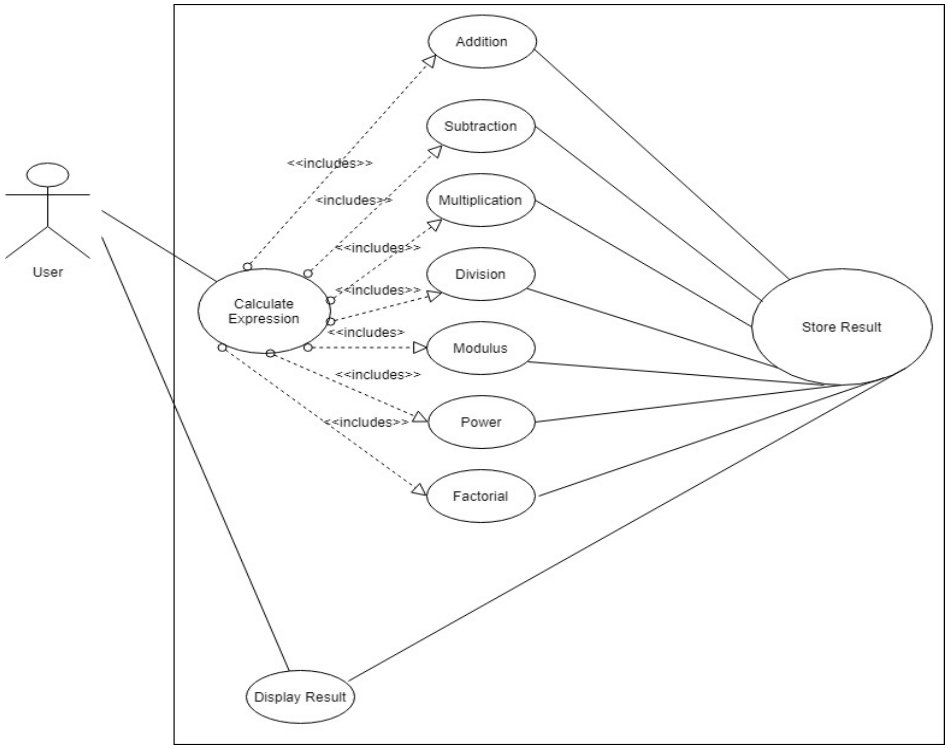


Figure 6 Use case diagram for simple calculator

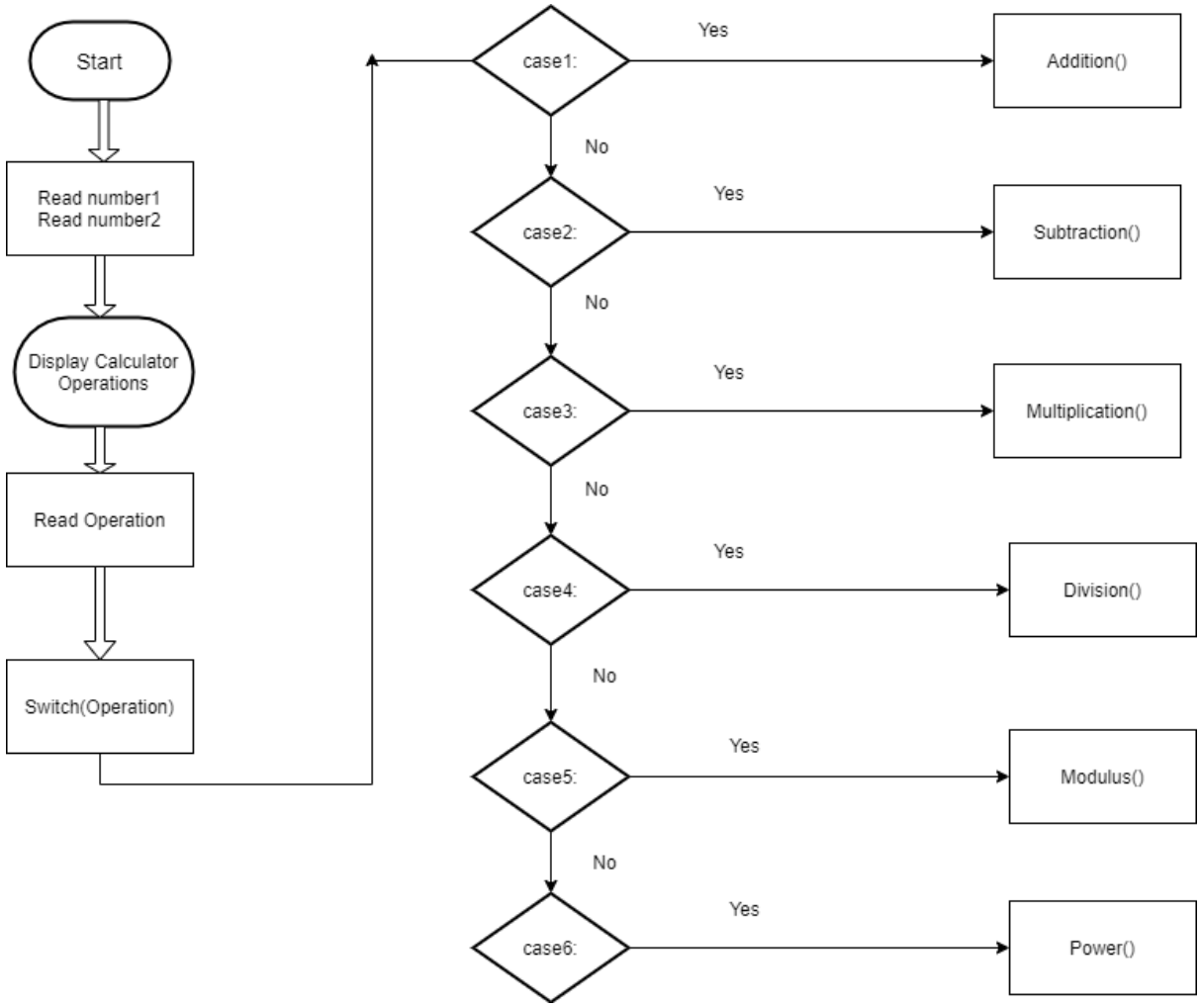


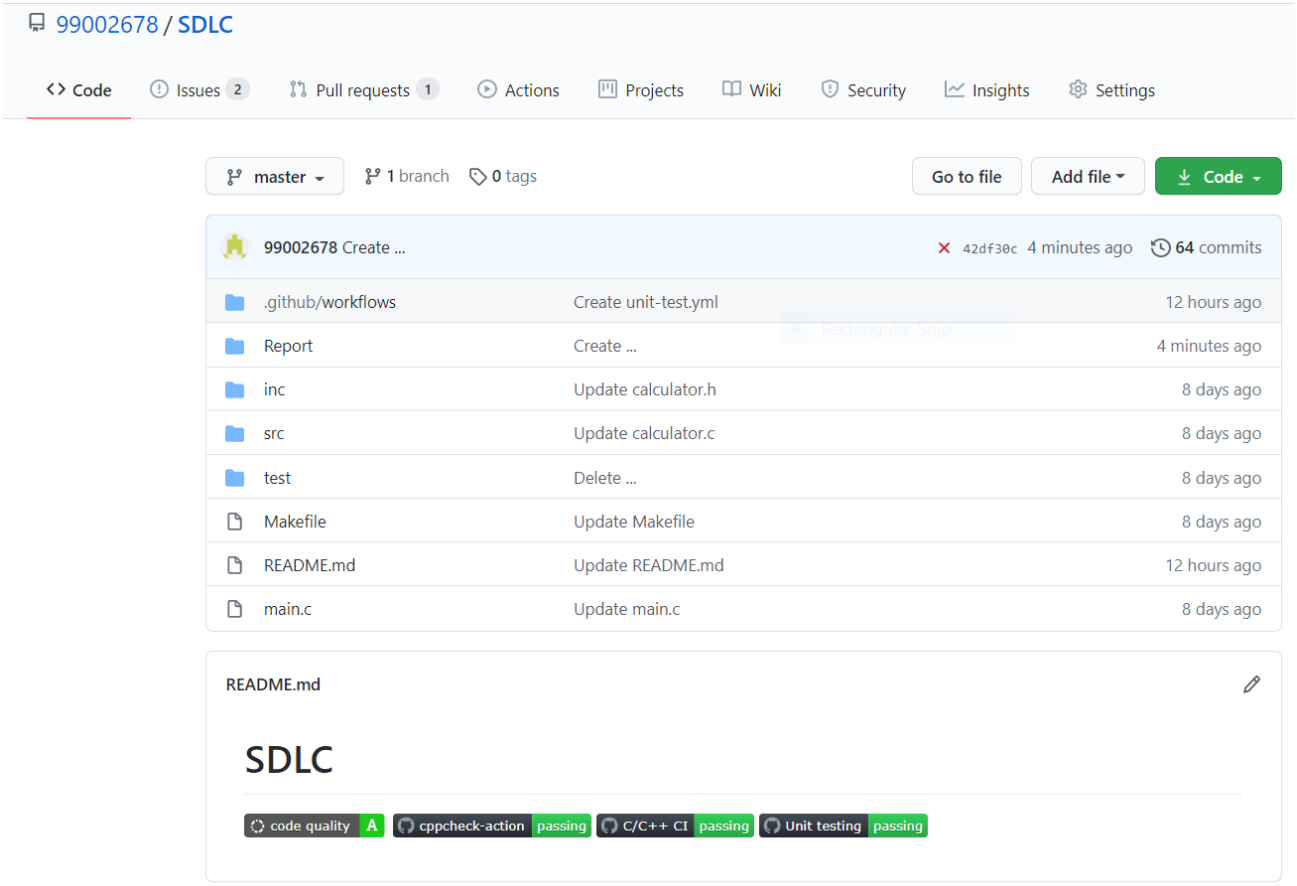
Figure 7 Flowchart for simple calculator

3. Test Plan

ID	Description	Pre - condition	Expected input	Expected output	Actual output
T01	To add two integers and display the result.	Calculator is switched on	Two numbers and addition operator	Both numbers should be added and give correct result	It displayed correct answer
T02	To subtract two integers and display the result.	Calculator is switched on	Two numbers and	Number2 should be subtracted from	It displayed correct answer

			subtraction operator	number1 and give correct result	
T03	To multiply two integers and display the result	Calculator is switched on	Two numbers and multiplication operator	Both numbers should be multiplied and give correct result	It displayed correct answer
T04	To divide two numbers and display the result	Calculator is switched on	Two numbers and division operator	Divide number1 by number2 and get correct result	It displayed correct answer
T05	To check the modulus of two numbers and display the result	Calculator is switched on	Two numbers and modulus operator	Get modulus of number1 and number2 and display correct result	It displayed correct answer
T06	To check the power of the digit and display the result	Calculator is switched on	A digit and power	Get the power of given input and display the correct result	It displayed correct answer
T07	To check the factorial of a digit and get correct result	Calculator is switched on	A digit	To get the factorial of given digit and display the correct result	It displayed correct answer
T08	To check division by zero	Calculator is switched on	A digit and zero	When a digit is divided by zero the result should be invalid	The result displayed is zero
T09	To check the factorial of a negative number	Calculator is switched on	A digit	When a digit is negative the result should say “Factorial for negative number is not found	The output is not displayed

4. CI Workflow for C Programming



Link: https://github.com/99002678/SDLC

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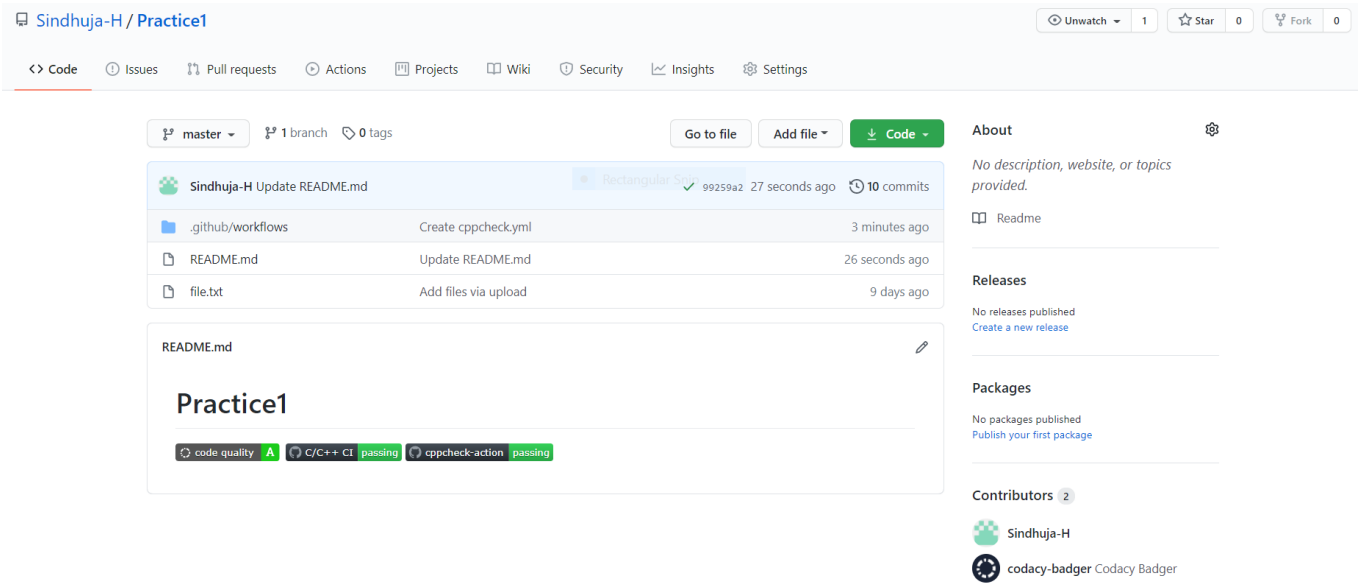
Appendix



Link: https://github.com/Sindhuja-H/Practice1