GENESIS - Applied SDLC with SoftwareTesting
Mini-project summary report

LTTS
GLOBAL
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Details

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Scientific Calculator

1 Requirements

1.1 State Of Art

There are three main types of calculators: basic, business, and scientific. You can't work chemistry, physics, engineering, or trigonometry problems on a basic or business calculator because they don't have functions you'll need to use. Scientific calculators include exponents, log, natural log (ln), trig functions, and memory. These functions are vital when you're working with scientific notation or any formula with a geometry component. Basic calculators can do addition, subtraction, multiplication, and division. Business calculators include buttons for interest rates. They typically ignore the order of operations.

1.1.1 Aging

- The first solid-state calculator was created in the early 1960s. Pocket-sized devices became available in the 1970s.
- Modern electronic calculators vary from cheap, give-away, credit-card sized models to sturdy desktop models with built-in printers. They became popular in the mid-1970s as the incorporation of integrated circuits reduced their size and cost.
- By the end of that decade, prices had dropped to the point where a basic calculator was affordable to most and they became common in schools.
- In addition to general purpose calculators, there are those designed for specific markets. For example, there are scientific calculator which include trigonometric and statistical calculations.
- In 1986, calculators still represented an estimated 41% of the world's general-purpose hardware capacity to compute information. By 2007, this had diminished to less than 0.05%.

1.1.2 Costing

Basic calculators are of low cost which is up to 200 and scientific calculators cost up to 900 as it has many functions.

1.2 SWOT Analysis

Strength	Weakness
• Innovative • User friendly • Long lasting and have all scientific functions	• Can't handle the exceptional cases like boundary overflow and division by zero
Opportunities	**Threats**
• Could be used by students for large-integer polynomial multiplication, matrix-vector multiplication, solving difference equations etc.	• Imaginary values cannot be displayed

1.3 WWWH

What is Scientific calculator –

- A scientific calculator is a type of electronic calculator, usually but not always handheld, designed to calculate problems in science, engineering, and mathematics. They have completely replaced slide rules in traditional applications, and are widely used in both education and professional settings.

Why it is used –

- Scientific calculators are used widely in situations that require quick access to certain mathematical functions, especially those that were once looked up in mathematical tables, such as trigonometric functions or logarithms.

When and Where it is used –

- Basic calculators are great for solving simple equations with one or two variables, but scientific calculators allow you to input a problem that has an order of operations. If you enter one of these equations into a regular calculator, it won't be able to correctly determine which numbers should be addressed first.
- The scientific calculator, however, is the only one that can handle certain functions in fields such as trigonometry, physics, chemistry, and engineering.

How it is used -

- Depending on the requirement of user, they're likely to have different labels for user functions. They need to check and click on it to perform the particular operation.

1.4 My product

1.4.1 High level requirements

ID	Description
HL01	Navigation bar containing Menu
HL02	Arithmetic
HL03	trigonometric
HL04	Logarithmic, probability , exponential functions

Table 1: High-Level Requirements

1.4.2 Low level requirements

ID	Description
LL01	A menu containing arithmetic, trigonometric, logarithmic, probability functions, exponential functions, other functions
LL02	Addition
LL03	Multiplication
LL04	Subtraction
LL05	Division
LL06	Square root
LL07	Square
LL08	modulus
LL09	Power operation
LL10	sin
LL11	cosine
LL12	tan
LL13	Sin Inverse
LL14	Cosine Inverse
LL15	Tan Inverse
LL16	Log exp
LL17	variance
LL18	Standard deviation

Table 2: Low-Level Requirements

2 Design

2.1 Activity diagram

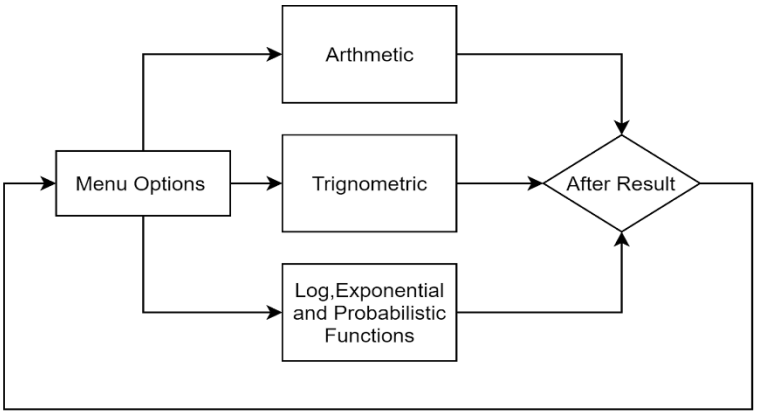


fig-2.1 Activity diagram

2.2 Behavioral diagram - Use case diagram

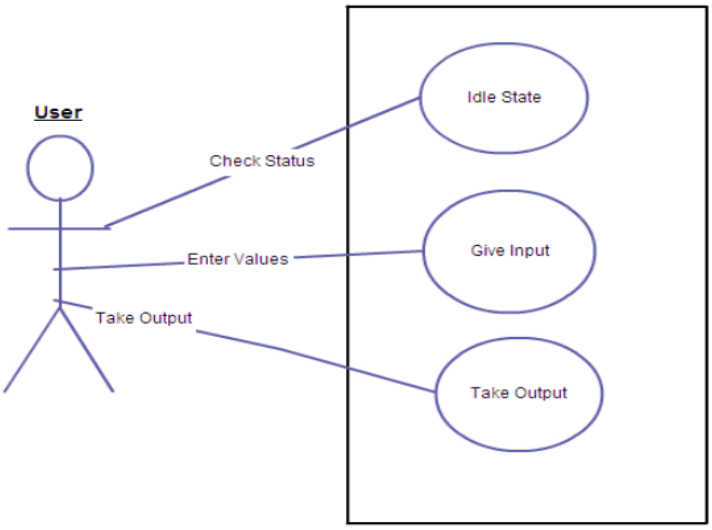


fig-2.2 Behavioral diagram - Use case diagram

2.3 - Activity diagram for arithmetic functions

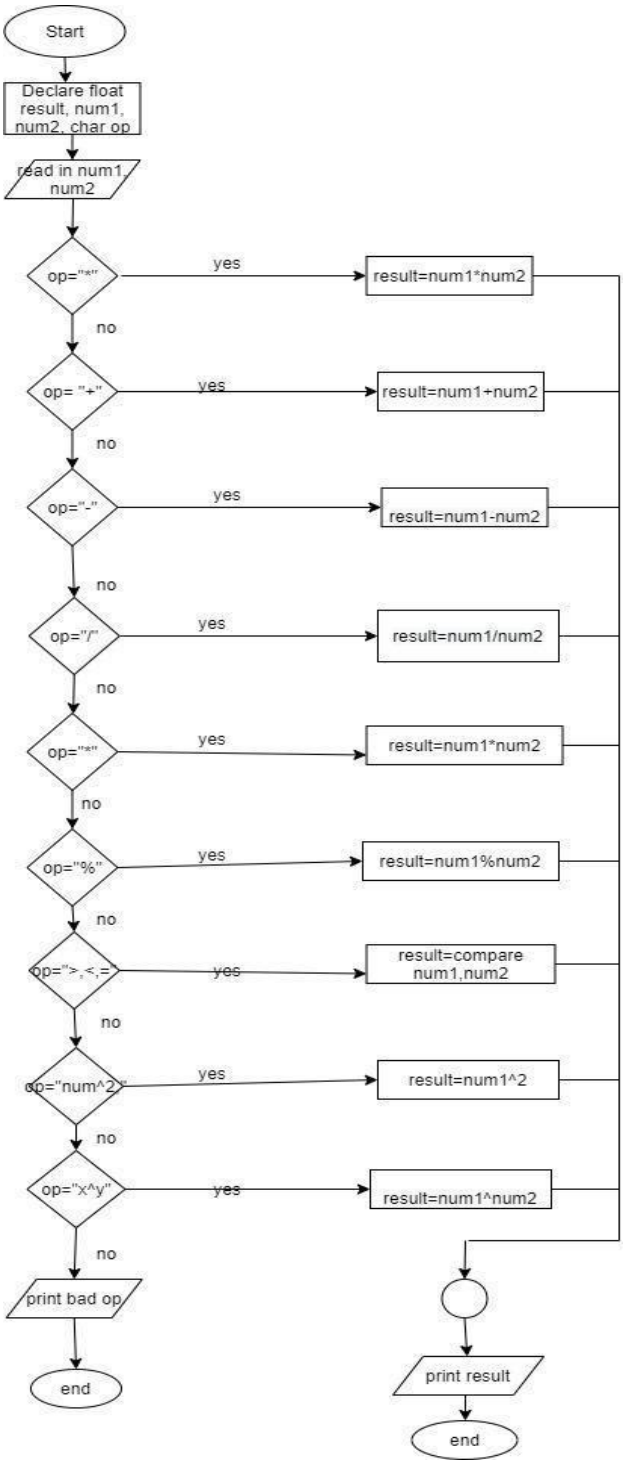


fig 2.3- Activity diagram for arithmetic functions

2.4 Activity diagram

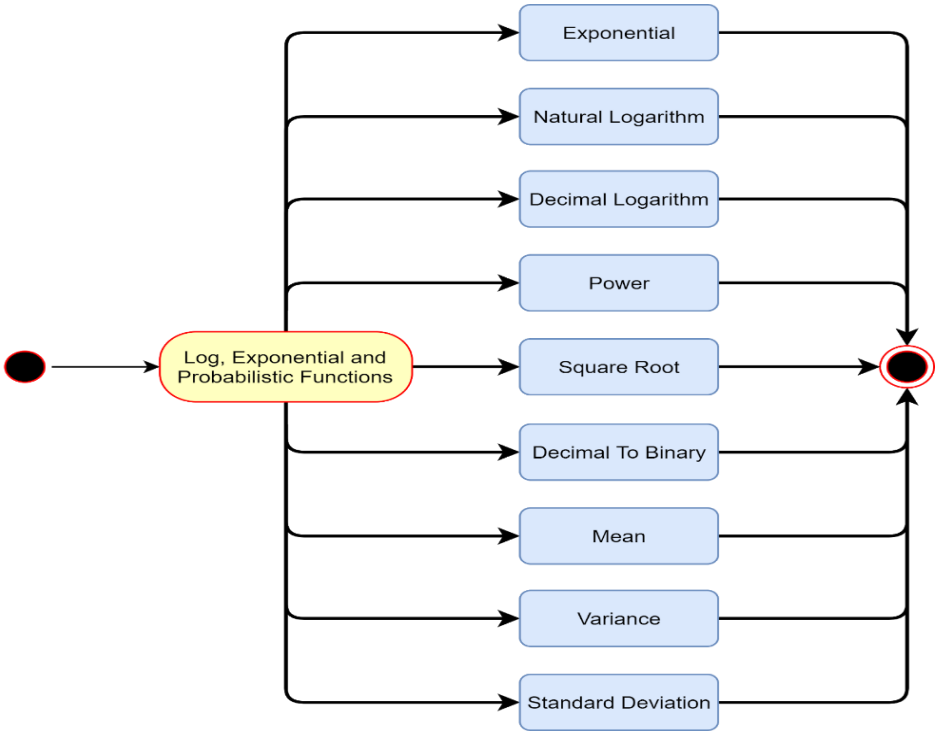


fig-2.4 Activity diagram

2.5 Activity diagram for Trigonometric functions

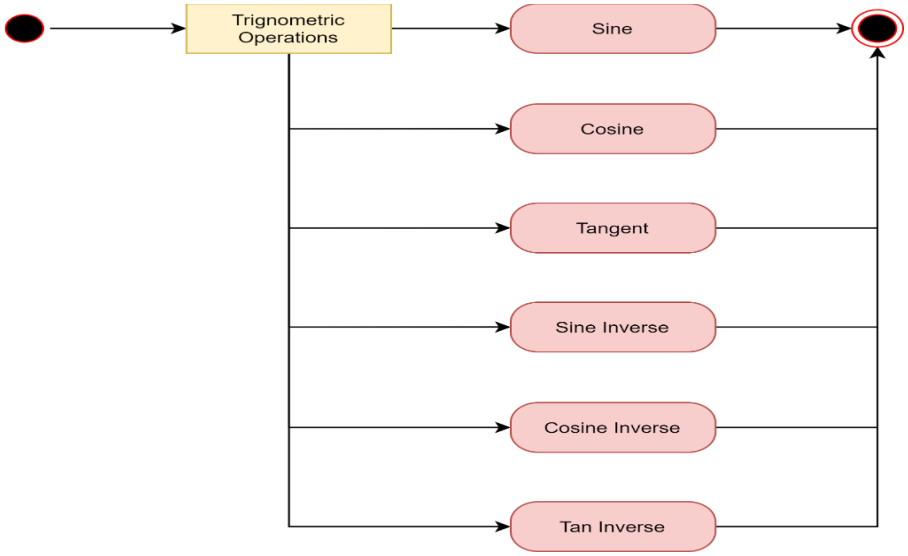


fig-2.5 Activity diagram for Trigonometric functions

3 Test Plan

3.1 High Level

Test ID	Req. ID Mapping	Description	Expected Input	Expected Output
UT_01	HL01	Navigation bar containing menu	Arithmetic Trigonometric Other operation Exit	Arithmetic Trigonometric Other operation Exit
UT_02	HL02	Arithmetic	Multiplication, Addition, Subtraction, Division, modulus	Multiplication, Addition, Subtraction, Division, modulus
UT_03	HL03	Trigonometric	Sin, Cosine, Tan, Sin inverse Cosine inverse Tan inverse	Sin, Cosine, Tan, Sin inverse, Cosine inverse Tan inverse
UT_04	HL04	Logarithmic Probability functions Other functions	Log exp Variance, Standard deviation, Square, Square root	Log exp Log exp Variance, Standard deviation, Square, Square root

Table 3 high Level Testplan

3.2 Low Level

Test ID	Req. ID Mapping	Description	Expected Input	Expected Output	Actual Output
IT_01	LL01	Addition	Add(2,3)	5	5
IT_02	LL02	Subtraction	Subtract(8,3)	5	5
IT_03	LL03	multiplication	Multiply(2,3)	6	6
IT_04	LL04	Division	Divide(15,3)	5	5
IT_05	LL05	sine	Sine(30.0)	0.500000	0.500000
IT_06	LL06	cosine	Cosine(60.0)	0.500000	0.500000
IT_08	LL08	Tan	Tan(30.0)	-5.405331	-5.405001

IT_09	LL09	Sin Inv	Sin Inv(0.5)	30.00000	30.00000
IT_10	LL10	Cosine Inv	Cosine Inv(0.5)	60.00000	60.00000
IT_11	LL11	Tan Inverse	Tan Inverse(1.0)	45.00000	45.00000
IT_12	LL12	exponent	exponent(0.5)	148.413162	148.413162
IT_13	LL13	Natural log	Natural log(5.0)	1.609438	1.609438
IT_14	LL14	logarithm	Logarithm(5.0)	0.698970	0.698970
IT_15	LL15	Square root	Square root(5.0)	2.236068	2.236068
IT_16	LL16	power	Power(5.0,2.0)	25	25
IT_17	LL17	mean	Mean(array,4)	6.25000	6.25000
IT_18	LL18	Variance	Variance(array,4)	9.00000	9.00000
IT_19	LL19	Standard deviation	Standard deviation(array,4)	3.00000	3.00000

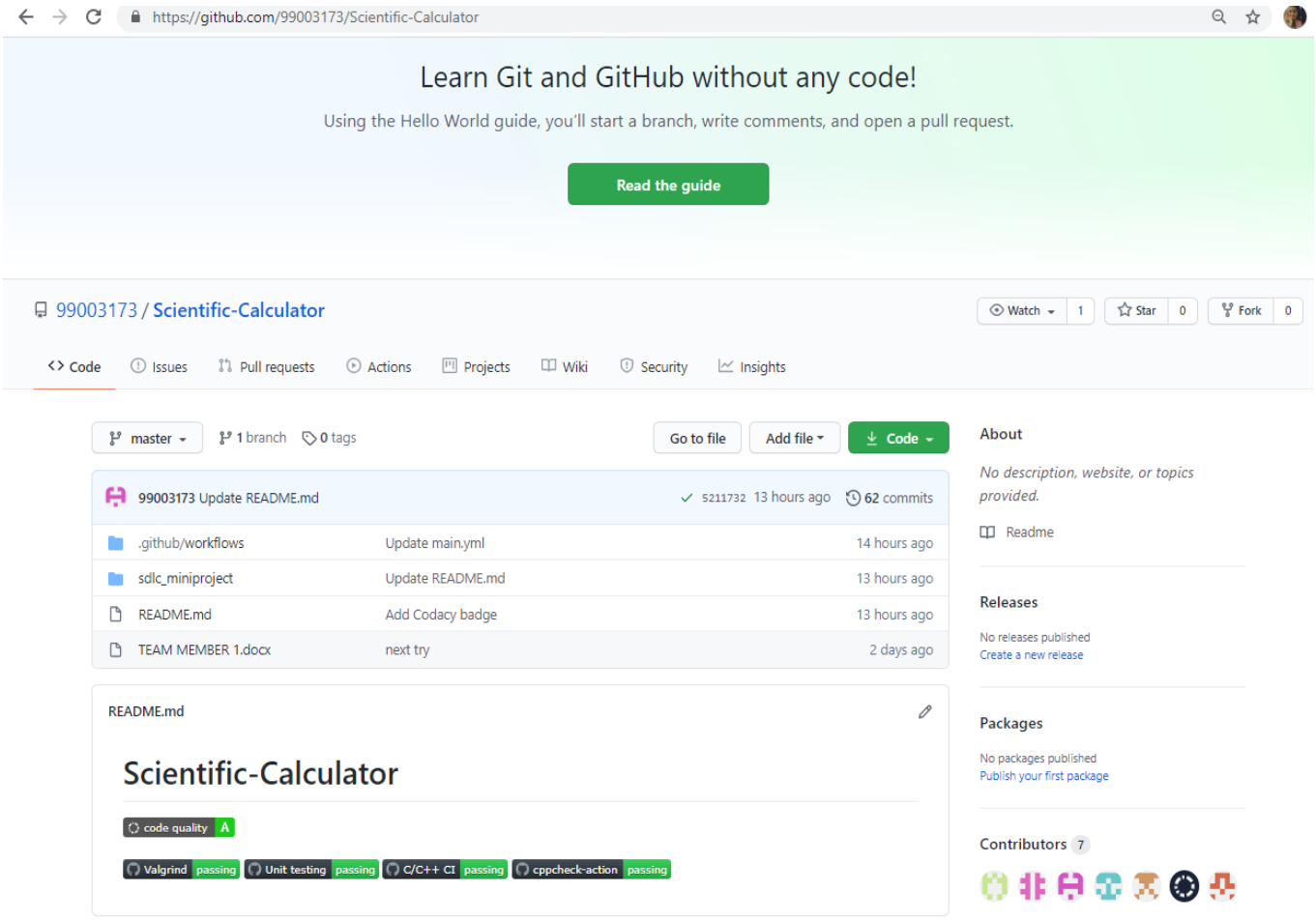
Table 4 Low Level Testplan

4 Summary

Name	No of Code lines	No of functions	No of test cases
M Reethu	81	6	6
Hareesh unnikrishnan	75	7	7
Shriram M S	79	7	7

Table 5 summary

5 Github dashboard



Reference: https://en.wikipedia.org/wiki/Scientific_calculator

Appendix: https://github.com/99003173/Scientific-Calculator