GENESIS - Mini-project Summary Report

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Details

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Contents

Miniproject -1: Calculator

Ageing

The history of the calculator began with the hand-operated Abacus in Ancient Sumeria and Egypt in around 2000-2500 BC. These are very simple devices compared to modern calculators consisting of sets of ten beads on a series of rods held in place on a quadrilateral frame usually made of wood. In 1617 a Scottish Mathematician, John Napier described the workings of a device that would come to be known as Napier's bones. The bones (rods) were very thin with each being inscribed with multiplication tables. In 1642 one Blaise Pascal created a device that could perform arithmetic operations with just two numbers. His machine comprised of geared wheels that could add and subtract two numbers directly and also multiply and divide them by repetition.

Europe saw the next stage in the development of Mechanical calculators during the 17th Century. As late as the 1980s the use of slide rules was part of many countries school curricula and was considered a fundamental requirement for millions of school children to learn. The first solid-state electronic calculator was created in the early 1960s. Pocket-sized devices became available in the 1970s, especially after the Intel 4004, the first microprocessor, was developed by Intel for the Japanese calculator company Busicom. The first calculator capable of symbolic computing was the HP-28C, released in 1987. It could solve quadratic equations symbolically.2D and 3D math plots began to appear as well as other features like data loggers from input sensors and Wi-Fi and other connectivity capabilities also began to appear.

Costing

Table 1: Costing

Year	Functionality	Cost
2020	Basic arithmetic operation	300
2022	Basic mathematical conversion	400
2024	Measurements dealing with area, perimeter and circumference	500
2026	Temperature conversions	600
2028	Banking functionalities	750

4W1H

An electronic calculator is typically a portable electronic device used to perform calculations, ranging from basic arithmetic to complex mathematics. The first solid-state electronic calculator was created in the early 1960s. Pocket-sized devices became available in the 1970s, especially after the Intel 4004, the first microprocessor, was developed by Intel. In addition to general purpose calculators, there are those designed for specific markets. For example, there are scientific calculators which include trigonometric and statistical calculations. Some calculators even have the ability to do computer algebra. Graphing calculators can be used to graph functions defined on the real line, or higher-dimensional Euclidean space.

My product

High level requirement:

Table 2: High level requirement

ID	Description
HL_01	The calculator should contain the LCD to display the operations under going
HL_02	The calculator should contain the keys such as 0-9, +, -, *, /, ±, =, C, CE
HL_03	In any situation the calculator has to produce a correct result defined by the well-known arithmetic rules
HL_04	The calculator size should be 6 inches in height and 3 inches in width
HL_05	The LCD display should be 2.5 inch in width and 1 inch in length

Low level requirement:

Table 3: Low level requirements

ID	Description
LL01	Numerical inputs should be of type int
LL02	4 digits input for basic arithmetic operation
LL03	4 digits input for banking function
LL04	Should raise flags for exceptions
LL05	Faster Execution
LL06	Insert main reset key

SWOT Analysis:

Table 4: SWOT Analysis

STRENGTH	• The ultimate strength of the scientific calculator is its user friendly. • And they have all types of operations such as basic calculator, measurement related to area, perimeter, circumference and conversions between different units of distance. • It also contains operations that include conversions of temperature units.
WEAKNESS	• Those who want continuous change in their electronic gadgets usually won't opt for a scientific calculator. • Even though the use of calculators cannot be overlooked, it should not be used as a replacement for the manual method of mathematical problem-solving. • If a student gets into the habit of using calculators to solve all their mathematical problems, he/she will never develop the math skills needed to solve basic mathematical problems.
OPPORTUNITIES	• It is easy to solve the mathematical calculations which are quite difficult. • It takes very less time to compute the very difficult problem.
THREATS	• To include all the operations in the desired space of the calculator.

Design

Behavioral diagram:

High level design

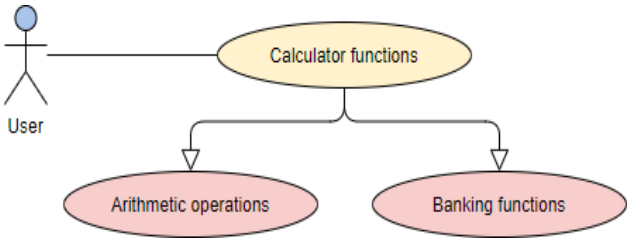


Fig1. High level design

Low level design

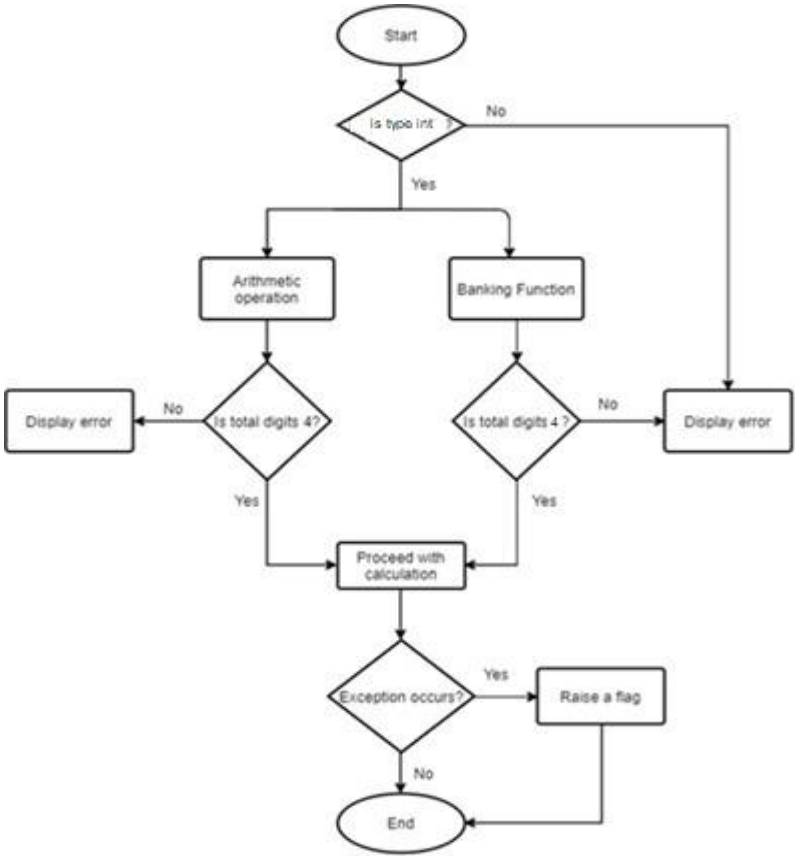


Fig2. Low level design

Structural diagram:

High level design

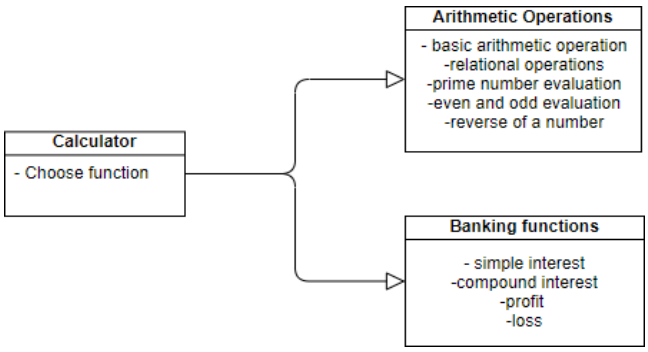


Fig3. High level design

Low level design

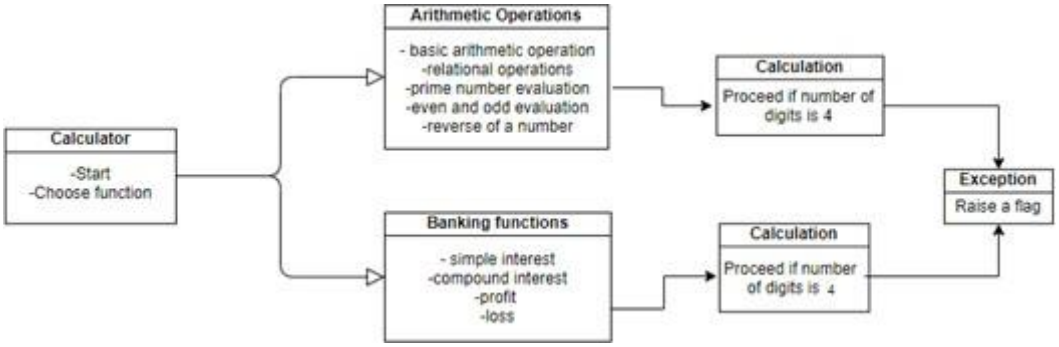


Fig4. Low level design

Test Plan

Table 5: Test plan

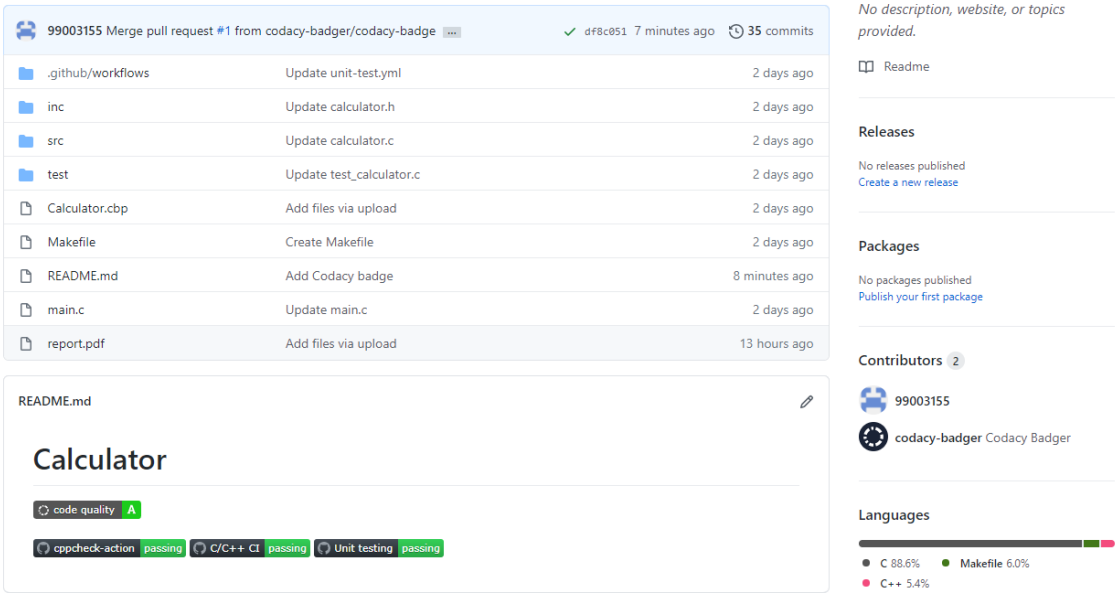
Test case ID	Action	Input	Expected output	Actual output
TC_01	Addition	10,2	12	12
TC_02	Subtraction	10,2	8	8
TC_03	Multiplication	10,2	20	20
TC_04	Division	10,2	5	5
TC_05	Modulus	10,2	0	0
TC_06	Square	2	4	4
TC_07	Cube	2	8	8
TC_08	Square root	4	2	2
TC_09	Greater than	10,2	TRUE(1)	TRUE(1)
TC_10	Lesser than	2,10	TRUE(1)	TRUE(1)

TC_11	Equal to	2,2	TRUE(1)	TRUE(1)
TC_12	Prime number	2	TRUE(1)	TRUE(1)
TC_13	Odd	3	TRUE(1)	TRUE (1)
TC_14	Even	2	TRUE(1)	TRUE (1)
TC_15	Reverse	12	21	21
TC_16	Simple interest	5000,6%,5	6500	6500
TC_17	Compound interest	5000,6%,5	6,744.25	6,744.25
TC_18	Profit	6500,5000	1500	1500
TC_19	Loss	5000,4000	1000	1000

Git Link

https://github.com/99003155/Calculator.git

Git Dashboard



References

1. The People's Best Friend: The Calculators' Brief History (interestingengineering.com)
2. Calculator - Wikipedia