GENESIS - Mini-project Summary Report

LTTS
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L&T Technology Services

Details

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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

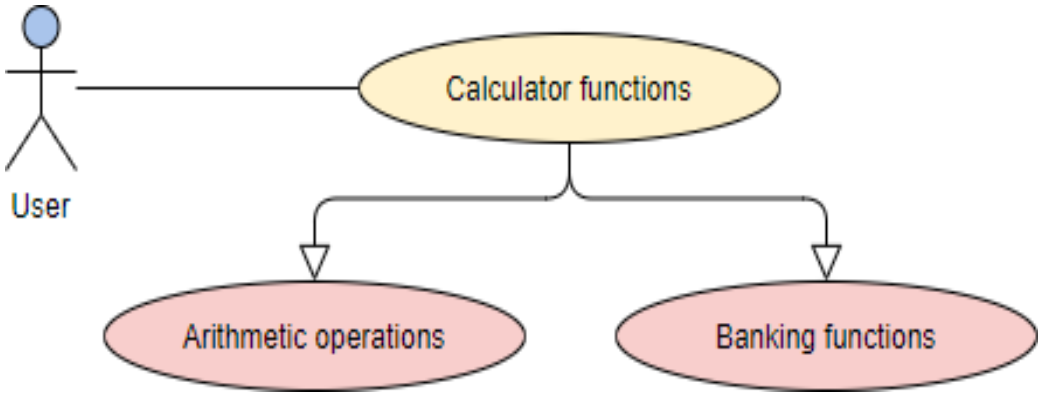


Fig1. High level design

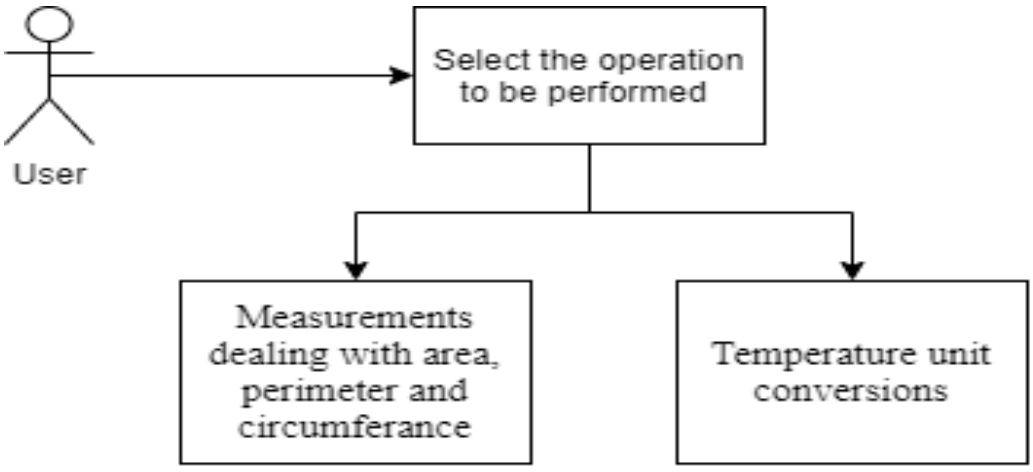


Fig2. High level design

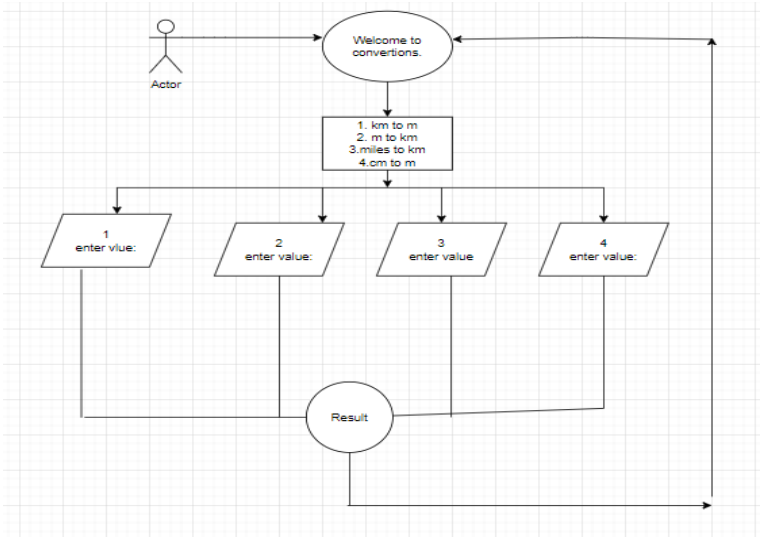


Fig3. High level design

Low level design

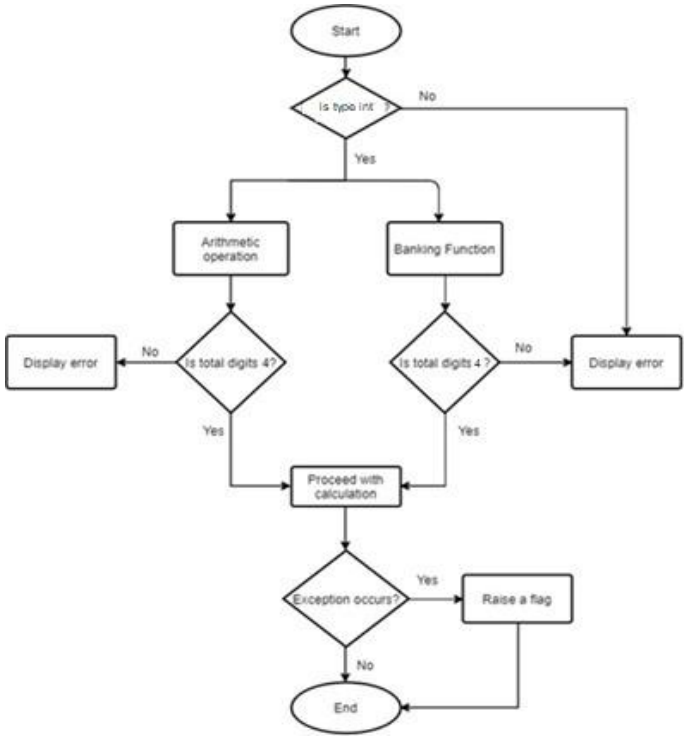


Fig4. Low level design

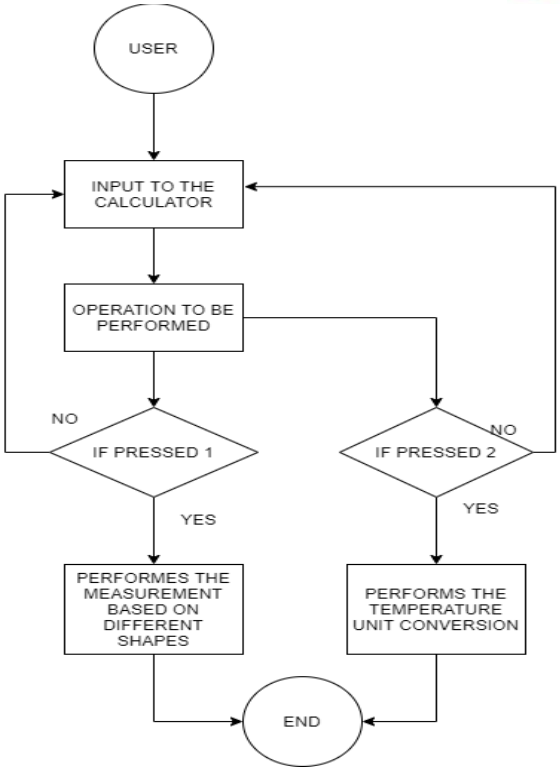


Fig5. Low level design

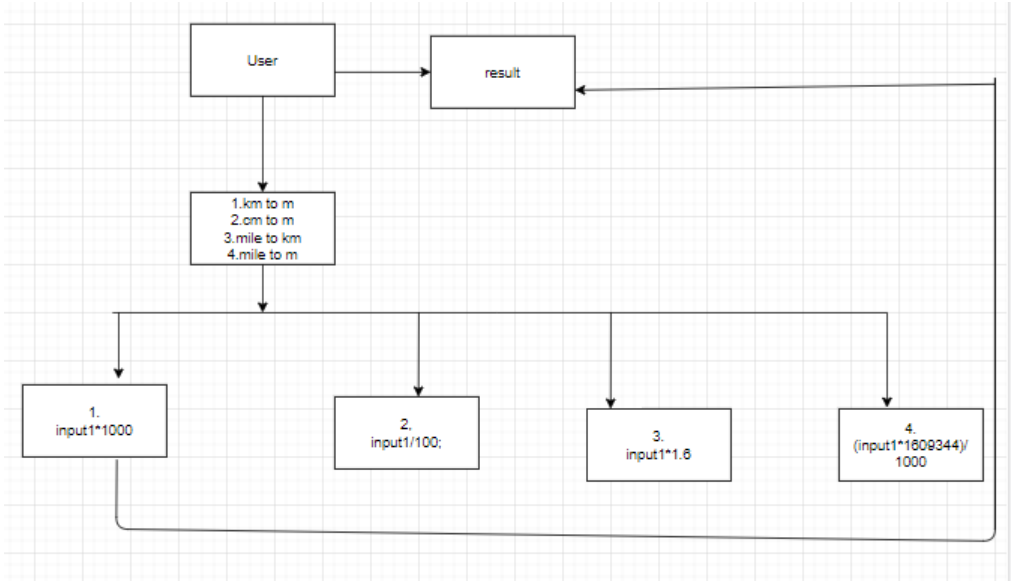


Fig6. Low level design

Structural diagram:

High level design

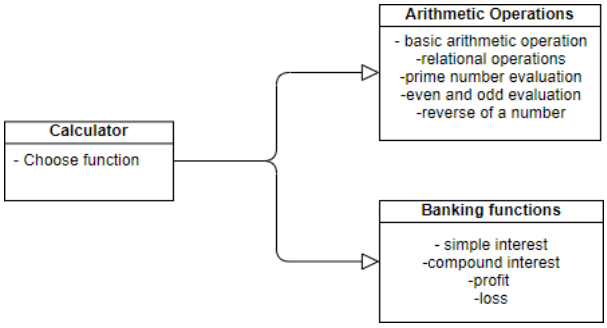


Fig7. High level design

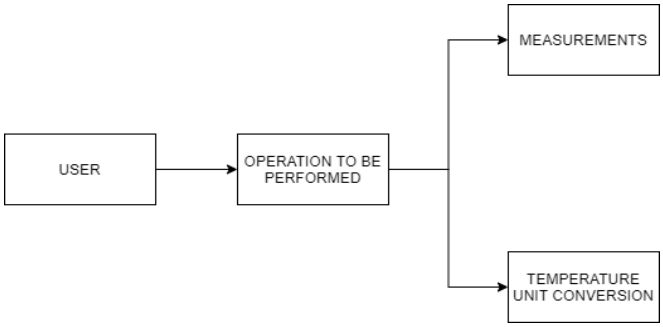


Fig8. High level design

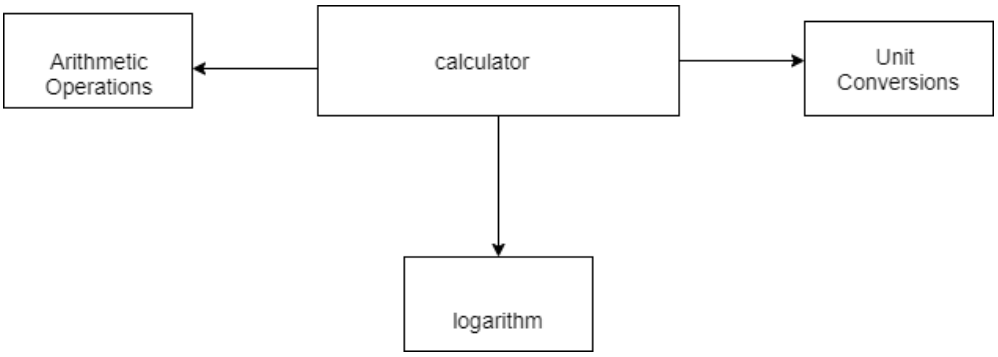


Fig9. High level design

Low level design

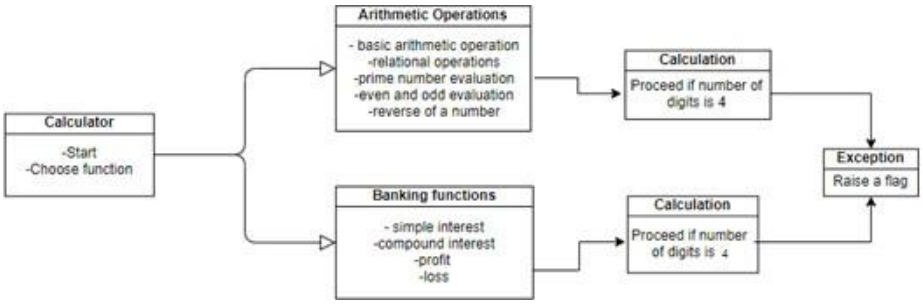


Fig10. Low level design

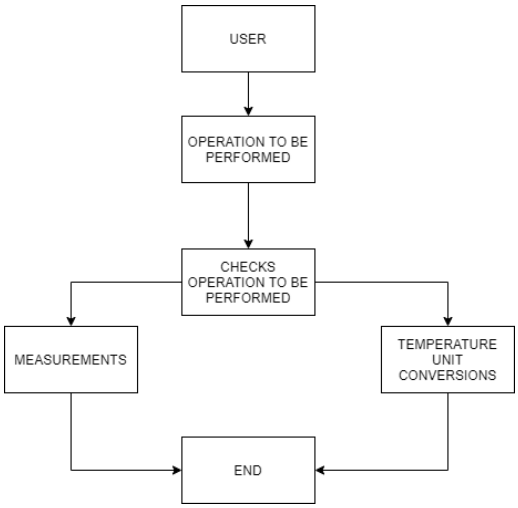


Fig11. Low level design

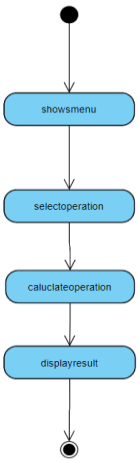


Fig12. Low level design

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

ID	DESCRIPTION	PRE-CONDITION	EXPECTED INPUT	EXPECTED OUTPUT	ACTUAL OUTPUT
1	The first User Entered digits should be considered as operand1	No input is given yet before by the user	The system takes it as operation to be performed	Performs the expected task	Performs the expected task
2	The second input by user must be treated as operand2	First input is given by the user	Based on the previous input it performs the specified operation	If 1 is pressed it performs the measurement operation. If 2 is pressed it performs the temperature unit conversions.	If 1 is pressed it performs the measurement operation. If 2 is pressed it performs the temperature unit conversions.

3	If the user wants to know the area of the circle or square or triangle or rectangle	User should specify the required values to calculate the area.	User should specify: If circle: Radius of the circle. If square: Side of the square. If Triangle: Mention the dimension of base and the height of the triangle. If Rectangle: Specify the dimension of the adjacent sides of the rectangle.	Should specify the area of the required shape.	Should specify the area of the required shape.
4	If the user wants to know the temperature in different unit.	User should specify the temperature in any one unit and tell which unit they wants to convert.	Specify the temperature in any one unit.	Specific operation entered by the user should be performed.	Specific operation entered by the user should be performed.
5	User wants to know the area of the triangle.	User should enter the two inputs height and base values	Height = 10m Base = 5m	25m	25m
6	User wants to convert the temperature from Fahrenheit to Celsius.	User must mention the temperature in Fahrenheit.	97F	36.11C	36.11C

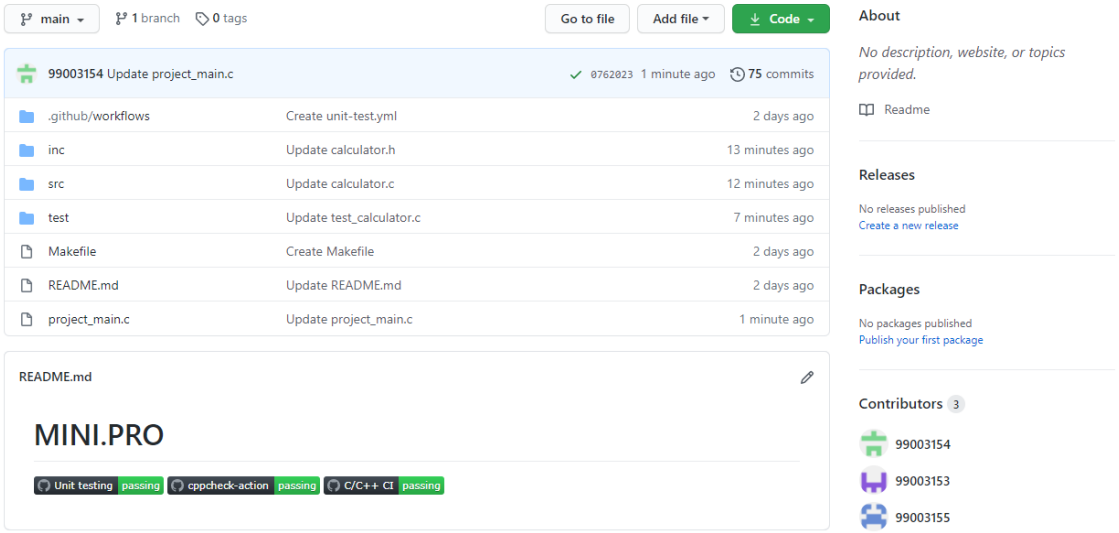
ID	DESCRIPTION	PRE-CONDITION	EXPECTED INPUT	EXPECTED OUTPUT	ACTUAL OUTPUT
1	The User Entered digits should be considered as case 1	No input is given yet before by the user	The system takes it as Km to m conversion.	Performs the expected task	Performs the expected task
2	The input by user case 2	No input is given yet before by the user	The system takes it as Cm to m conversion.	Performs the expected task	Performs the expected task
3	If the user wants to the case 3	No input is given yet before by the user	The system takes it as Km to Mile conversion.	Performs the expected task.	Performs the expected task
4	If the user wants to know the case 4	No input is given yet before by the user	The system takes it as Mile to Km conversion.	Performs the expected task	Performs the expected task.
5	User wants to know the Distance a travel Km to M	User should enter the input	Kilometers=30	30,000m	30,000m
6	User wants to convert the Cm to M	User must mention the Cm	Cm=200	2m	2m

ID	DESCRIPTION	EXPECTED INPUT	EXPECTED OUTPUT	ACTUAL OUTPUT
1	KM to M	3	3000m	3000m
2	KM to M	5	5000m	5000m
3	Miles to Km	3	4.8km	4.8km
4	Miles to Km	7	11.2km	11.2km

Git Link

https://github.com/99003154/MINI.PRO.git

Git Dashboard



References

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

ACTIVITY – 5

Epics and User story:

- As a banker
  I want to calculate the basic functions for everyday accounts
  So that I know the details of all payments to be made by the account holder
  - To calculate simple interest and compound interest
  - To determine profit and loss

- As a business owner
  I want to calculate the daily transactions involved in my business
  So that I am aware of the profits and losses
  - To determine profit or loss incurred in the business

- As a daily user
  I want to calculate the basic arithmetic functions for daily activities
  So that it becomes easy for calculation

- For users to do basic arithmetic operations like addition, Subtraction, multiplication, division, modulus, square root, square, cube and relational operations

- As a student
  I want to perform arithmetic operations for my studies
  So that it can be used for my learning
  - For students to carry out basic arithmetic operations like addition, Subtraction, multiplication, division, modulus, square root, square, cube and relational operations
  - To perform others functions like determining prime number, odd number and even number

- As an engineer
  I want to perform mathematical calculations
  So that it can be used for my projects
  - For engineers to perform basic arithmetic operations like addition, Subtraction, multiplication, division, modulus, square root, square, cube and relational operations

- To know the temperature in different units.
  - As a weather reporter to update the public about the temperature in their locality in different units.
  - As a student to do the mathematical conversions of the temperature.
  - As a normal user to check the status of the AC in desired units.

- To know the measurements of different shapes.
  - As a civil engineer to do the on-site measurements.
  - As a student to do mathematical calculations.
  - As a road constructor to the construction measurements.

Epic: Distance conversation.
User Stories:

- Description -As a user I need to perform distance conversion operation.
  I need to calculate km to meter conversion
  Test case - A km is entered
  If km was entered as 10km it should provide an output of 10,000.

- Description -As a user I need to perform distance conversion operation.
  I need to calculate cm to meter
  Test case - A cm is entered
  If cm was entered as 100 it should provide an output of -1m

- Description -As a user I need to perform distance conversion operation.
  I need to calculate miles to km.
  Test case - A mile is entered
  If mile was entered as 10 it should provide an output of 6.25km.

- Description -As a user I need to perform distance conversion operation.
  I need to calculate mile to m
  Test case - A mile is entered
  If mile was entered as 4 it should provide an output of 6423m

- Description -As a user I need to perform distance conversion operation.
  I need to mile to km.
  Test case - A mile is entered
  If mile was entered as 1 it should provide an output of 1.69km.