Department of Computer Science and Software Engineering

SOEN 6481: SOFTWARE SYSTEMS REQUIREMENTS SPECIFICATION

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Contents

1. Abstract

This project investigates and describes the concept of Champernowne Constant C_{10} which is a transcendental real constant. For base 10, the number is defined by concatenating representations of successive integers i.e. 0.12345678910111213141516...

Since it's decimal expansion has important and unique properties, many mathematicians and teachers have found this number profoundly useful. It is constructed in such a way that it's decimal digits are easy to investigate. This allows establishing easily that it is normal in its base.

During the project, I have also interviewed two people with strong mathematical background regarding this constant and its application. Moreover, I have created a persona based on the analysis of the interview that was conducted.

In this report, I have discussed concepts relevant to Calculator for Champernowne Constant. It includes a description of each concept, relationships between concepts and a Domain Model.

Additionally, illustration with the description of each Use Case, Use Case Diagram and Activity Diagram for the Use Cases and UML for the normal scenario of each use case has also been included in this report.

2. Acknowledgement

I would like to express my deepest appreciation to all those who helped me and provided me the possibility to complete this project.

This project would not have been possible without the essential and gracious support of Prof. P. Kamthan whose contribution in stimulating suggestions and encouragement guided me throughout.

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Finally, I would like to thank my family and friends for all their understanding and support.

3. Changes made in the Deliverable 1 (D1)

For problem 5 (Use Case Model)[Chapter 7, Page no. 12]- Identifiers for use cases have been changed from 1,2,3.. to UC1, UC2, UC3.., so that they can be referenced accordingly in traceability matrix.

4. User Stories (Problem 6)

In this section, I will cover user stories relevant to Calculator for Champernowne Constant.

4.1 User Stories relevant to calculator for Champernowne Constant

Identifier	User Stories	Constraint	Priority	Estimate
US1	As a user, I want to generate the Champernowne Constant.	Generated number must be a decimal number.	5	13
US2	As a user, I want to choose the number of digits after the decimal point in generated Champernowne Constant.	Chosen number of digits must be a positive integer.	4	5
US3	As a user, I want to calculate the number of occurrences of a particular number in generated Champernowne Constant.	Desired number must be a positive integer.	4	13
US4	As a user, I want to calculate the position of the first occurrence of a particular number in generated Champernowne Constant.	Calculated place must be for first occurrence.	4	13
US5	As a user, I want to store the result, to use it at a later time, if needed.	Stored number must be reusable.	2	3
US6	As a user, I want to retrieve the stored result, whenever needed.	Retrieved result be same as stored result.	2	3
US7	As a user, I want to delete the content of the input field one by one, from end.	Only one value must be deleted at a time.	3	1
US8	As a user, I want to clear the content of the input field.	Complete input field must get cleared at once.	3	1
US9	As a user, I want to clear the content of the output screen.	Complete output screen must get cleared at once.	2	1
US10	As a user, I want to do basic calculations: Addition, Subtraction, Multiplication, and Division.	Calculations must be correct	4	8
US11	As a user, I want to insert values in input field, either using calculator keys or using a keyboard or both.	Both input ways must produce same results	5	8

4.2 ACCEPTANCE TESTS FOR USER STORIES

S. No.	User Stories	Acceptance Tests
1	US1	a). Must be in base 10. b). Must have a decimal point at second place. c). Complete number must be readable. d). Number must get displayed within 10 seconds.
2	US2	a). Number of digits entered must be integer only.
3	US3	a). Occurrences obtained must be for the entered number only. b). The result must get displayed within 10 seconds.
4	US4	a). Position obtained must be for the entered number only. b). The position displayed must be of the first occurrence only. c). The result must get displayed within 10 seconds.
5	US5	a). User must get the confirmation regarding the operation.
6	US6	a). User must get the stored result only.
7	US7	a). Only one input must get deleted at a time.
8	US8	a). Input field must get cleared at once.
9	US9	a). Output screen must get cleared at once.
10	US10	a). Results must be correct. b). The result must get displayed within 10 seconds.
11	US11	a). User must be able to provide inputs using both keyboard and keypad available on the screen.

5. Backward Traceability Matrix (Problem 7)

In this section, I will cover backward traceability matrix relevant to Calculator for Champernowne Constant.

5.1 Backward Traceability Matrix relevant to calculator for Champernowne Constant

S. No.	User Stories	UC	US	Interview	Survey	Global	Persona
1.	US1	UC1					
2	US2			Question: 16, 18			
3	US3	UC4		Question: 13			
4	US4	UC5		Question: 13			
5	US5	UC8					
6	US6	UC9	US5				
7	US7	UC6				Windows Calculator	
8	US8	UC7				Windows Calculator	
9	US9					Windows Calculator	
10	US10	UC2				Windows Calculator	
11	US11					Windows Calculator	

6. References

https://en.wikipedia.org/wiki/Champernowne_constant

http://mathworld.wolfram.com/ChampernowneConstant.html

GitHub Project Workspace Address: https://github.com/ariesabhi55/SOEN6481TeamFProject