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.. respectively so that they can be referenced accordingly in a 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

US1
As a user, I want to generate the Champernowne Constant.
Constraint Generated number must be a decimal number.
Priority 5
Estimate 13
Acceptance Tests 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.

US2
As a user, I want to choose the number of digits after the decimal point in generated Champernowne Constant.
Constraint Chosen number of digits must be a positive integer.
Priority 4
Estimate 5
Acceptance Tests a). Number of digits entered must be integer only.

US3
As a user, I want to calculate the number of occurrences of a particular number in generated Champernowne Constant.
Constraint Desired number must be a positive integer.
Priority 4
Estimate 13
Acceptance Tests a). Occurrences obtained must be for the entered number only. b). The result must get displayed within 10 seconds.

US4
As a user, I want to calculate the position of the first occurrence of a particular number in generated Champernowne Constant.
Constraint Calculated place must be for first occurrence.
Priority 4
Estimate 13
Acceptance Tests 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.

US5
As a user, I want to store the result, to use it at a later time, if needed.
Constraint Stored number must be reusable.
Priority 2
Estimate 3
Acceptance Tests a). User must get the confirmation regarding the operation.

US6
As a user, I want to retrieve the stored result, whenever needed.
Constraint Retrieved result be same as stored result.
Priority 2
Estimate 3
Acceptance Tests a). User must get the stored result only.

US7
As a user, I want to delete the content of the input field one by one, from end.
Constraint Only one value must be deleted at a time.
Priority 3
Estimate 1
Acceptance Tests a). Only one input must get deleted at a time.

US8
As a user, I want to clear the content of the input field.
Constraint Complete input field must get cleared at once.
Priority 3
Estimate 1
Acceptance Tests a). Input field must get cleared at once.

US9
As a user, I want to clear the content of the output screen.
Constraint Complete output screen must get cleared at once.
Priority 2
Estimate 1
Acceptance Tests a). Output screen must get cleared at once.

US10
As a user, I want to do basic calculations: Addition, Subtraction, Multiplication, and Division.
Constraint Calculations must be correct.
Priority 4
Estimate 8
Acceptance Tests a). Results must be correct. b). The result must get displayed within 10 seconds.

US11
As a user, I want to insert values in input field, either using calculator keys or using a keyboard or both.
Constraint Both input ways must produce same results.
Priority 5
Estimate 8
Acceptance Tests 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. Glossary

Traceability Matrix is a document, usually in the form of a table, used to assist in determining the completeness of a relationship by correlating any two base-lined documents using a many-to-many relationship comparison. 1, 9

User Stories are informal, natural language description of one or more features of a software system. 1, 5

7. Project Workspace Address

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

8. References

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

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

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