

SOEN 6481: SOFTWARE SYSTEMS REQUIREMENTS SPECIFICATION

Sandeep Singh - 40043110

DELIVERABLE 3 (D3)

Introduction

- In mathematics, two quantities are in the silver ratio (also silver mean or silver constant) if the ratio of the sum of the smaller and twice the larger of those quantities, to the larger quantity, is the same as the ratio of the larger one to the smaller one (see below). This defines the silver ratio as an irrational mathematical constant, whose value of one plus the square root of 2 is approximately **2.4142135623**.

- The silver ratio is denoted by δ_S .
- The relationship described above can be expressed algebraically:

$$\frac{2a+b}{a} = \frac{a}{b} \equiv \delta_S$$

- or equivalently,

$$2 + \frac{a}{b} = \frac{a}{b} \equiv \delta_S$$

- The silver ratio can also be defined by the simple continued fraction $[2; 2, 2, 2, \dots]$:

$$2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2 + \dots}}} = \delta_S$$

Calculation

For comparison, two quantities a, b with $a > b > 0$ are said to be in the golden ratio ϕ if,

$$\frac{a+b}{a} = \frac{a}{b} = \phi$$

However, they are in the silver ratio δ_S if,

$$\frac{2a+b}{a} = \frac{a}{b} = \delta_S$$

Therefore,

$$2 + \frac{1}{\delta_S} = \delta_S$$

Multiplying by δ_S and rearranging gives

$$\delta_S^2 - 2\delta_S - 1 = 0$$

Using the quadratic formula, two solutions can be obtained. Because δ_S is the ratio of positive quantities, it is necessarily positive, so,

$$\delta_S = \sqrt{2} + 1 = 2.4142135623$$

Activity Diagram

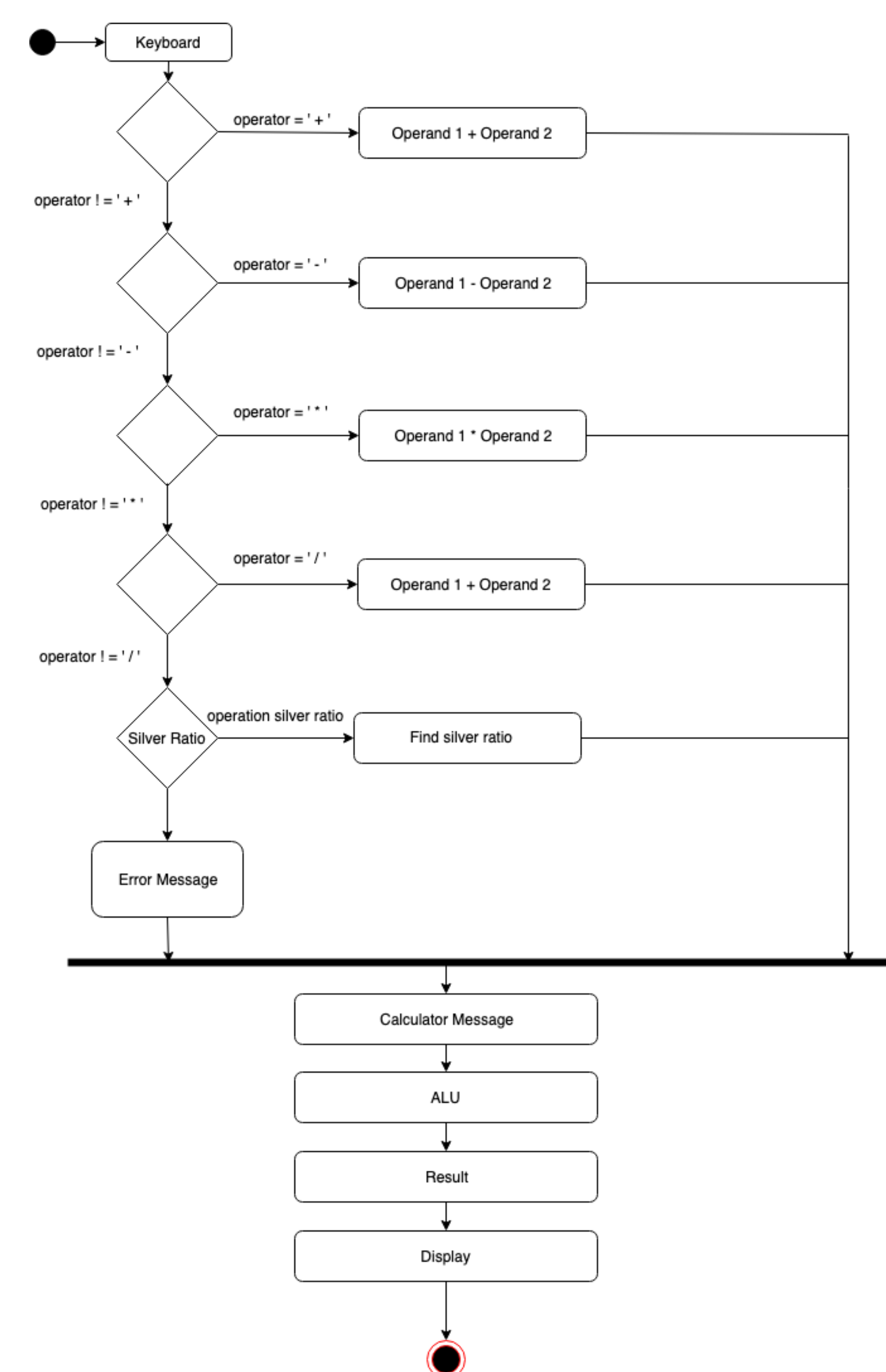


Figure 1: Activity Diagram

Lessons learnt from the project

The various parts of the project helped us to learn about the actual meaning, importance and differences between following:

- 1 Silver Ratio
- 2 Interviews
- 3 Persona
- 4 Domain model
- 5 Use case model
- 6 User Stories
- 7 Traceability matrix

Calculator

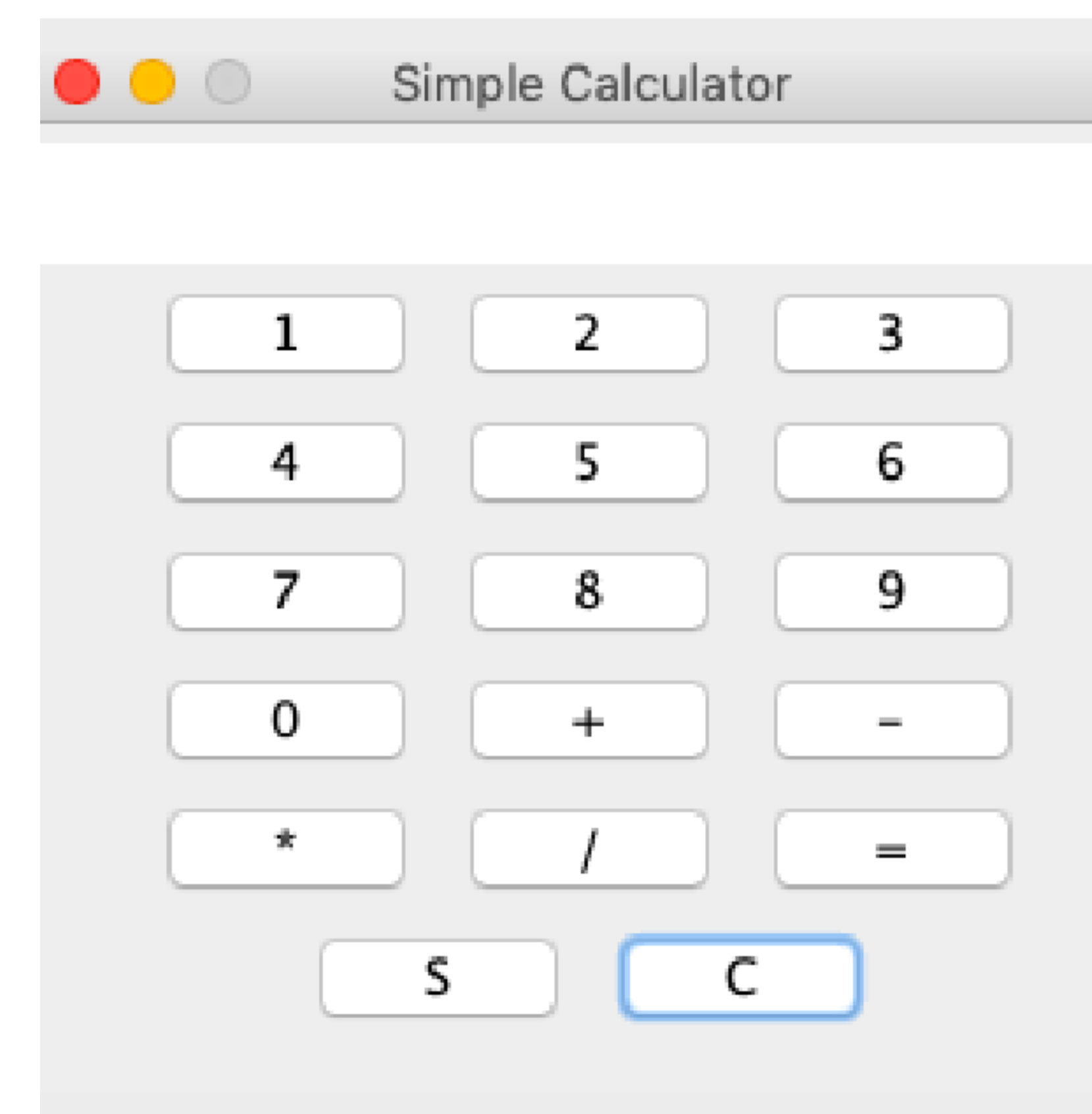


Figure 2: Calculator

For the implementation of the User stories Java is used. Swing is used for graphical user interface. Swing is a GUI widget toolkit for Java. An API for providing a graphical user interface (GUI) for Java programs.

The basic arithmetics operations (+, -, *, /) are implemented.

The area of the octagon is calculated using the silver ratio: $A = 2(1 + \sqrt{2})a^2$

Other lessons learnt from the project

This project help us to improve our skills in the following areas:

- 1 Time management.
- 2 Understanding of the problem.
- 3 Presentation of information.
- 4 Documentation in LATEX.
- 5 Github (distributed version control system.)
- 6 Choosing and use of tools in project development.

Critical decisions made

The Critical decisions that we made during the project are as follows:

- 1 Tool used to make domain model and two different views of a use case model. The decision was critical because there are many tools and applications available in the market and choosing the one which best suited our need is tough.
- 2 Finding the right resource for the collection of the data for **ETERNITY: NUMBERS**. There is not too much resources available for the collection of data and deciding which one is more correct, accurate and reliable is difficult for us.
- 3 Come up with different interview question for each team members.
- 4 Using mind map and come up with common template for persona for the whole team.

Conclusion

- 1 This project was overall a great learning experience.
- 2 Understanding of the problem.
- 3 Presentation of information.
- 4 Choosing and use of tools in project development.

Reference

- 1 <https://users.encs.concordia.ca/~kamthan/courses/soen-6481/#project>
- 2 https://en.wikipedia.org/wiki/Silver_ratio
- 3 <https://www.math.uh.edu/~shanyuji/History/2016/2016-2-3.pdf>
- 4 <https://github.com/pH-7/Simple-Java-Calculator>