



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

COS 301 Main Project

Requirements and Design Specifications

ThinkTech

Group Members:

Goodness Adegbenro 13046412
Tshepiso Magagula 12274195
Hlavutelo Maluleke 12318109
Xoliswa Ntshingila 13410378
Lelethu Zazaza 13028023

Git repository link:

`https://github.com/COS301-ThinkTech/
Flowchart-planning-and-simulation-tool`

Version 0.1

September 25, 2015

Contents

1	Background, Vision and Scope	2
1.1	Project background	2
1.2	Project vision	2
1.3	Project scope	2
2	Use case prioritization	4
3	Use cases	5
3.1	createFlowchartProject	5
3.2	addFlowchartComponent	6
3.3	editFlowchartComponent	7
3.4	deleteFlowchartComponent	8
3.5	deleteFlowchart	9
3.6	saveFlowchart	10
3.7	loadFlowchart	11
3.8	executeFlowchart	12
4	The Domain Model - High-level	13

1 Background, Vision and Scope

1.1 Project background

Without the correct or adequate number of resources, learning a new concept may turn out to be a daunting task. This is especially true for students who are studying a Computer Science course yet are not equipped with a practical or theoretical programming background. The motivation behind this project is to develop a tool that is intended to bridge the gap between inexperience and practical application. The tool will provide the means to simulate program logic through flowcharts in a practical setting.

1.2 Project vision

The aim of this project is to develop a flowchart and planning simulation tool that is simple and intuitive to use. Firstly, this will be accomplished by enhancing the visual nature of the application by making tools in certain contexts more prominent. Additionally, the application should provide informative and clear feedback to the user during the flowchart development phase. It is important that the look-and-feel of the application is uncluttered and uncomplicated so that the user feels at ease to experiment with the tools thereby enhancing the learning experience.

1.3 Project scope

The application is comprised of 2 units: flowchart development and flowchart simulation. An explanation of each unit will follow below.

- Flowchart development

The user is presented with a canvas upon which he can drop flowchart components to create a complete flowchart. The application will perform error checking on the constructed flowchart, so that (for example) multiple entry points into a program or certain flowchart components are not allowed. The application should also warn the user of instances of infinite loops or other logical error possibilities.

- Flowchart simulation

The user should be able to run an error-free flowchart from start to finish. The system should allow for one-click execution of the entire program, as well as step-by-step execution. At all stages during execution, the currently executing component should be highlighted, as well as the connection path being followed. The program's execution should be very visually apparent and appealing. The output of the flowchart's execution should also be apparent.

The following components are specifically excluded from the scope of the project:

- No executable program code generation will be required for this project.
- No complex design elements (such as user-defined component assemblies) are required. Only the basic components of standard flowcharts are necessary.

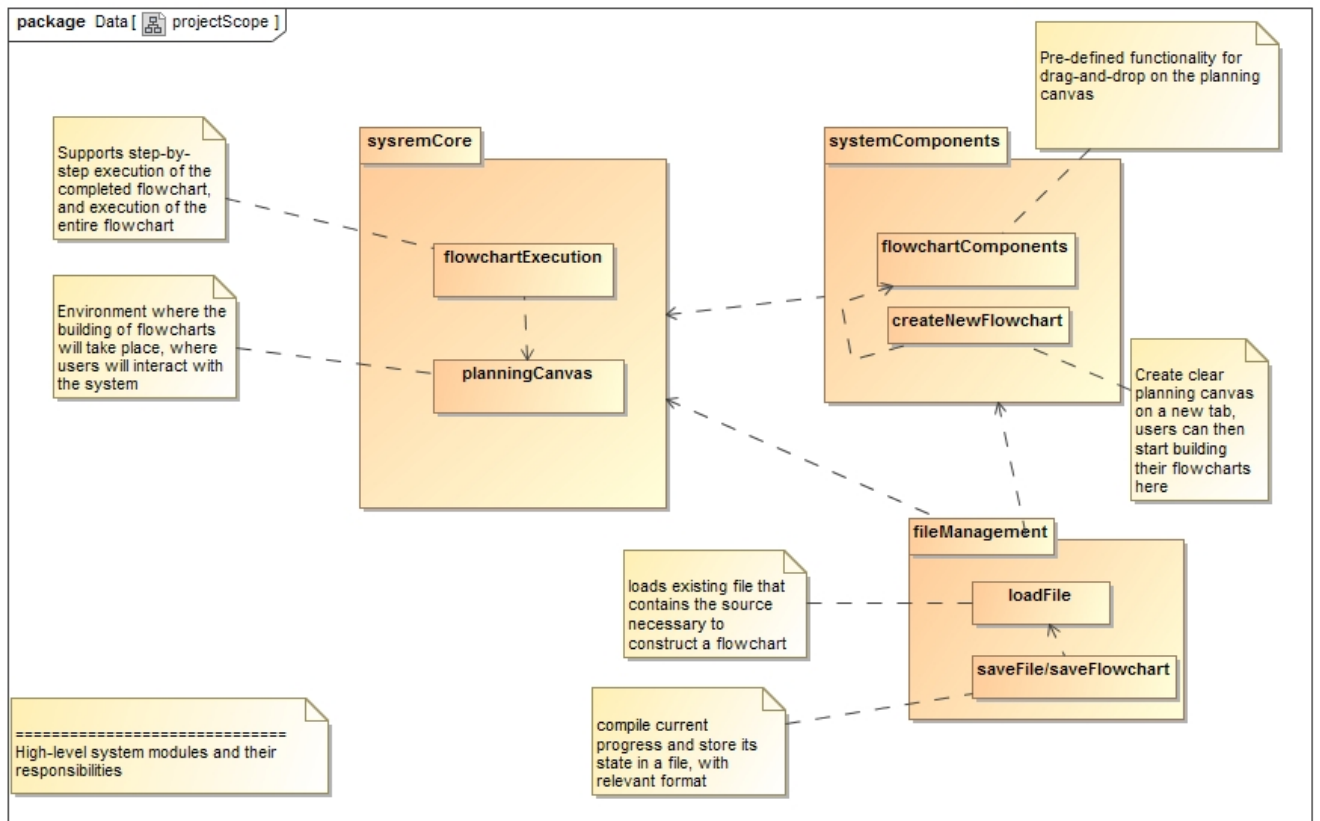


Figure 1: High-level system modules and their responsibilities

2 Use case prioritization

Critical	Important	Nice-To-Have
createFlowchartProject	addFlowchartComponent	drag-and-drop components into bin
deleteFlowchart	editFlowchartComponent	snap-to-grid development
	deleteFlowchartComponent	predefined math functions
	saveFlowchart	infinite-loop detection
	loadFlowchart	logical-error detection
	executeFlowchart	look-and-feel modification

Table 1: Use case prioritization

3 Use cases

3.1 createFlowchartProject

Creates an environment to enable users to start building flowcharts.

Pre Condition: Planning canvas must be blank.

Post Condition: New canvas with Start and Return component created.

Post Condition: Flowchart Planning and Simulation tools ready for use.

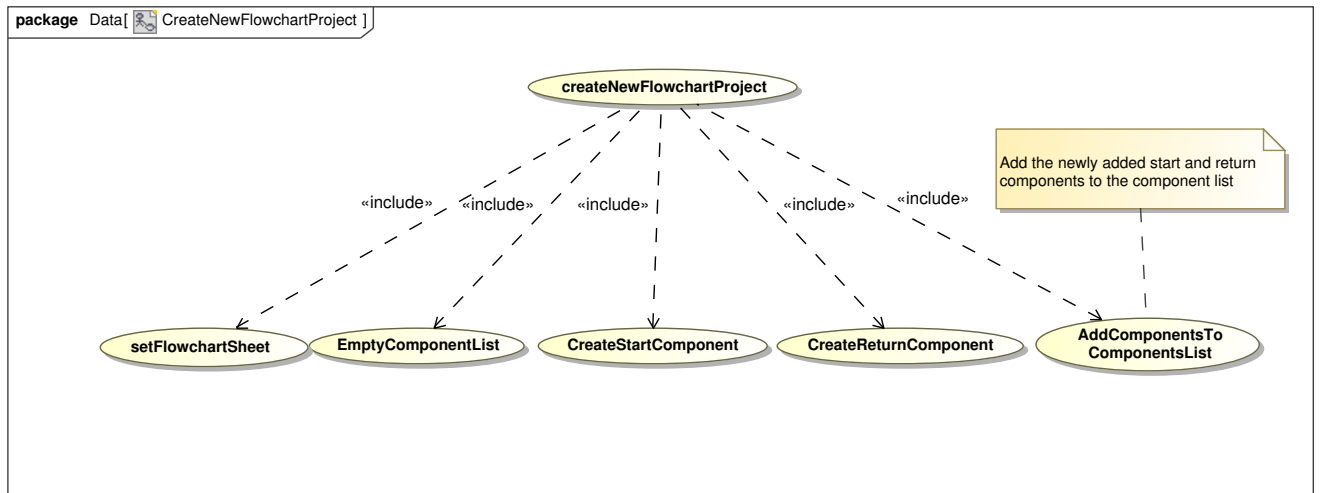


Figure 2: createFlowchartProject Use Case Diagram

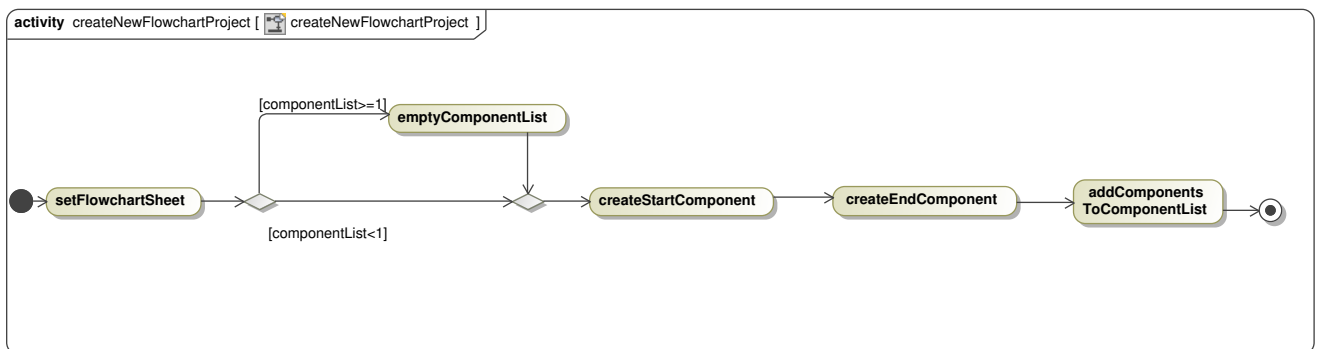


Figure 3: createFlowchartProject Activity Diagram

3.2 addFlowchartComponent

Provides users with functionality to select the flowchart components they wish to place on the planning canvas.

Pre Condition: Canvas is available.

Post Condition: Component has been added to flowchart and appears on canvas with the necessary connections, if any.

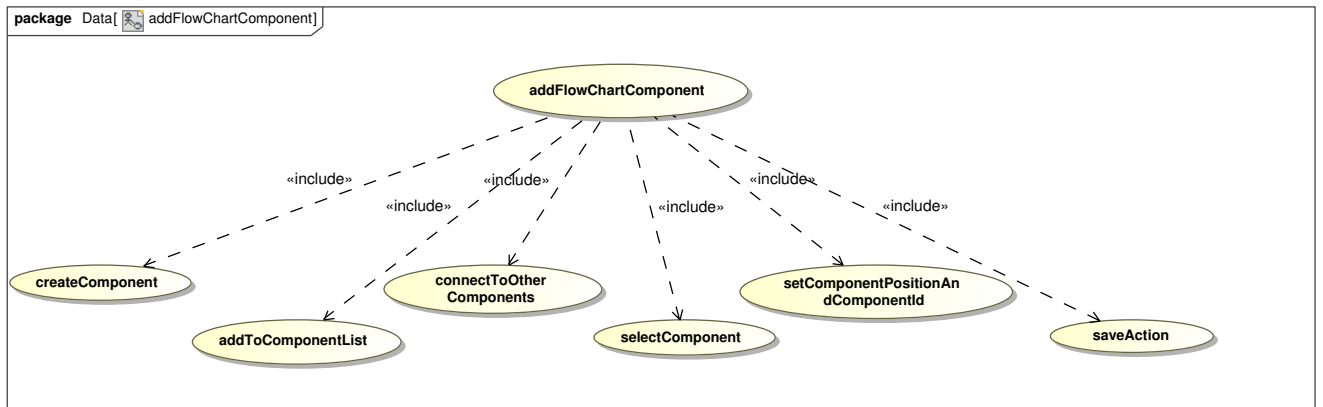


Figure 4: addFlowchartComponent Use Case Diagram

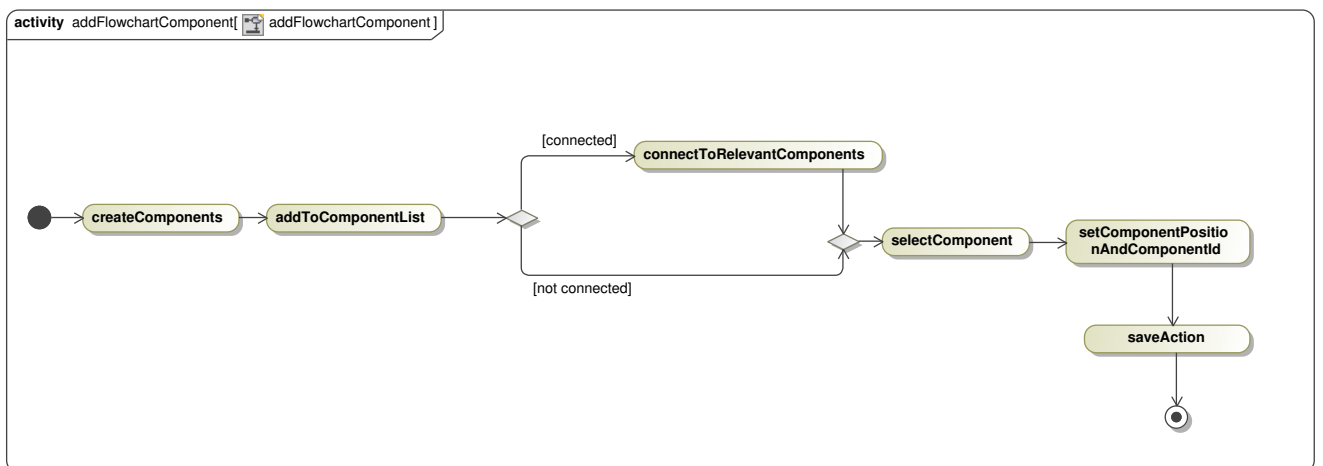


Figure 5: addFlowchartComponent Activity Diagram

3.3 editFlowchartComponent

The editFlowchartComponent use case provides functionality for the user to edit each component of the flowchart on the canvas

Pre Condition: Canavas must exist.

Pre Condition: Component must exist on active canvas.

Post Condition: Component has been edited.

Post Condition: Edited component has been saved.

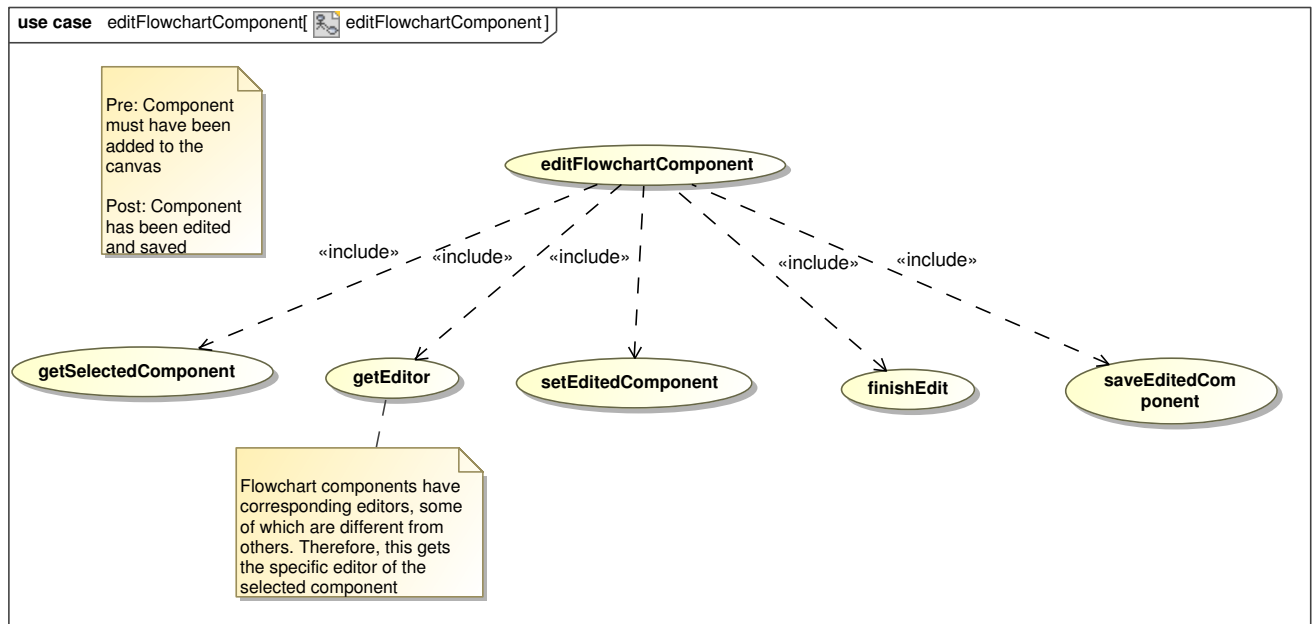


Figure 6: editFlowchartComponent Use Case Diagram

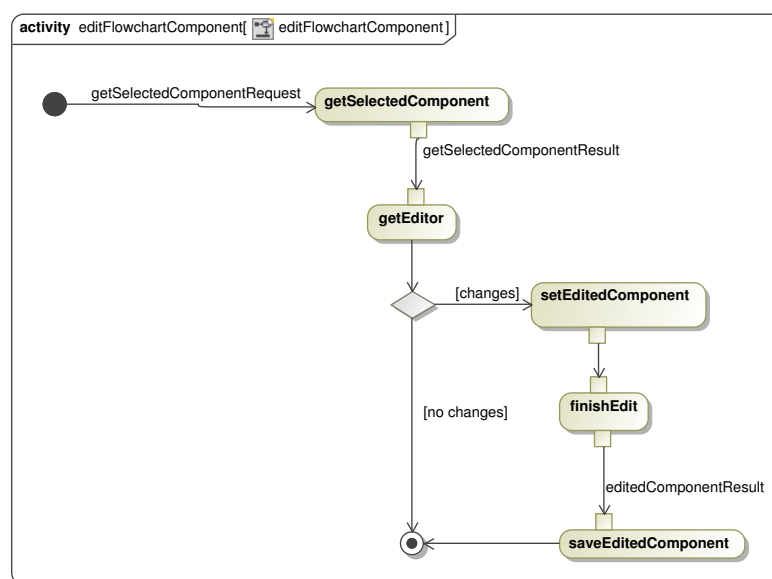


Figure 7: editFlowchartComponent Activity Diagram

3.4 deleteFlowchartComponent

The deleteFlowchartComponent use case enables the functionality to delete individual components from the canvas.

Pre Condition: The canvas has to be available.

Pre Condition: Component exists in the canvas space and is in the components list.

Post Condition: The canvas is clear of any components that were selected for removal.

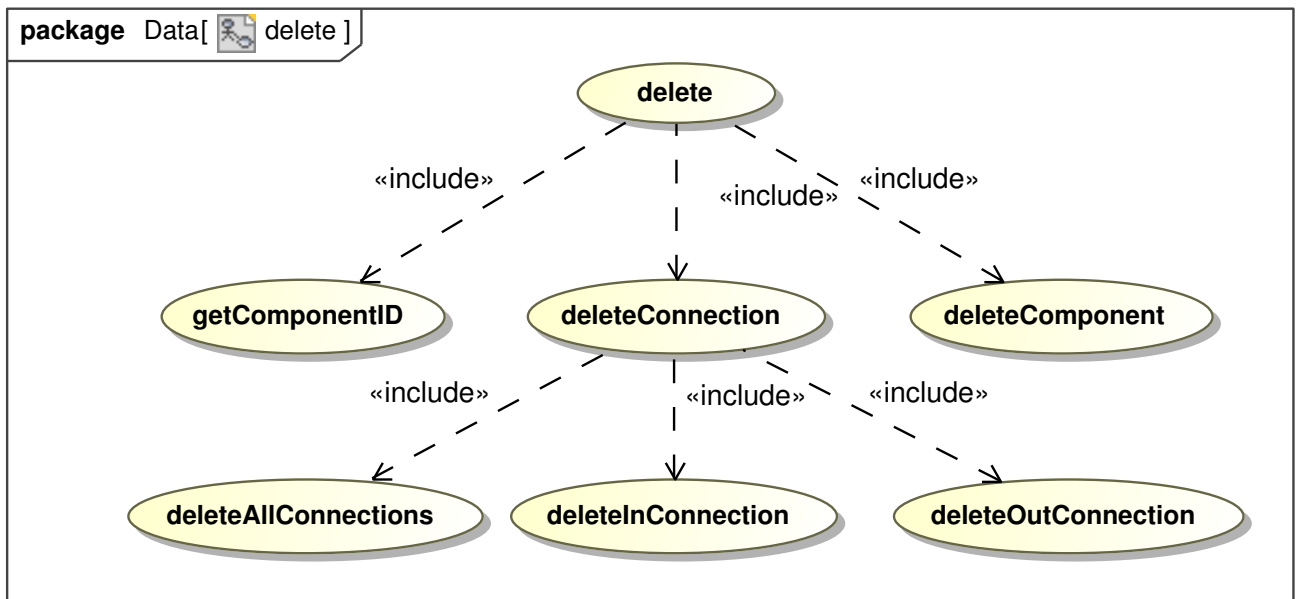


Figure 8: deleteFlowchartComponent Use Case Diagram

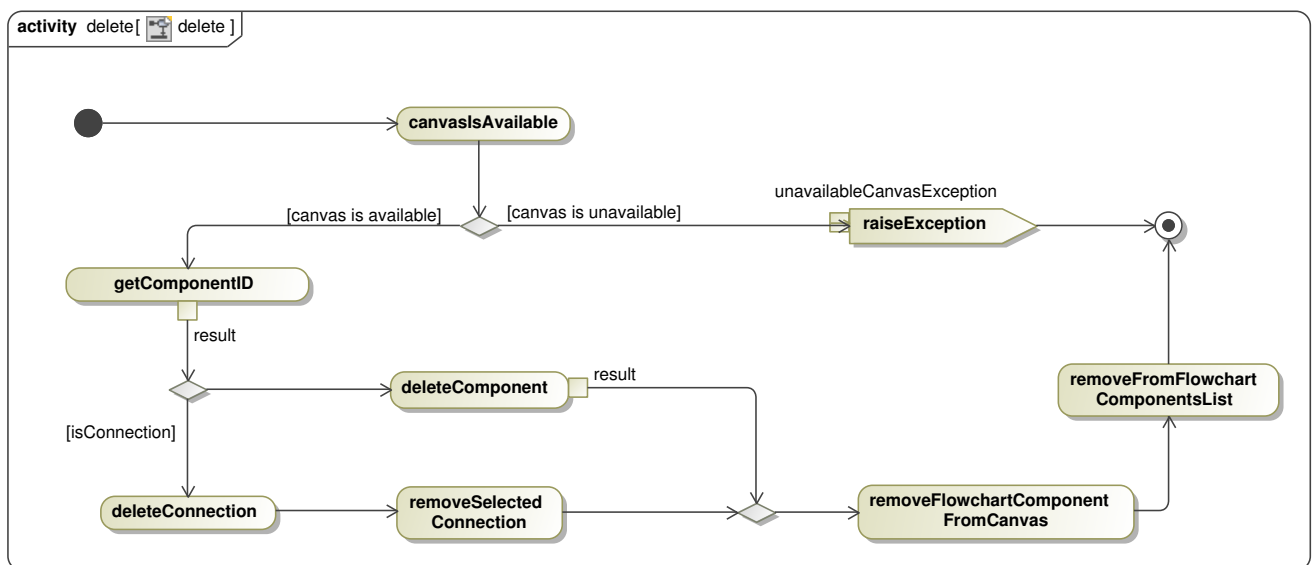


Figure 9: deleteFlowchartComponent Activity Diagram

3.5 deleteFlowchart

The deleteFlowchartProject use case serves the purpose of removing a flowchart project.

Pre Condition: Canvas exists.

Pre Condition: Canvas is active.

Pre Condition: The flowchart to be deleted must exist.

Pre Condition: The flowchart to be deleted must be active.

Post Condition: The flowchart must be removed from the workspace and a new flowchart must then be created and made active on the workspace.

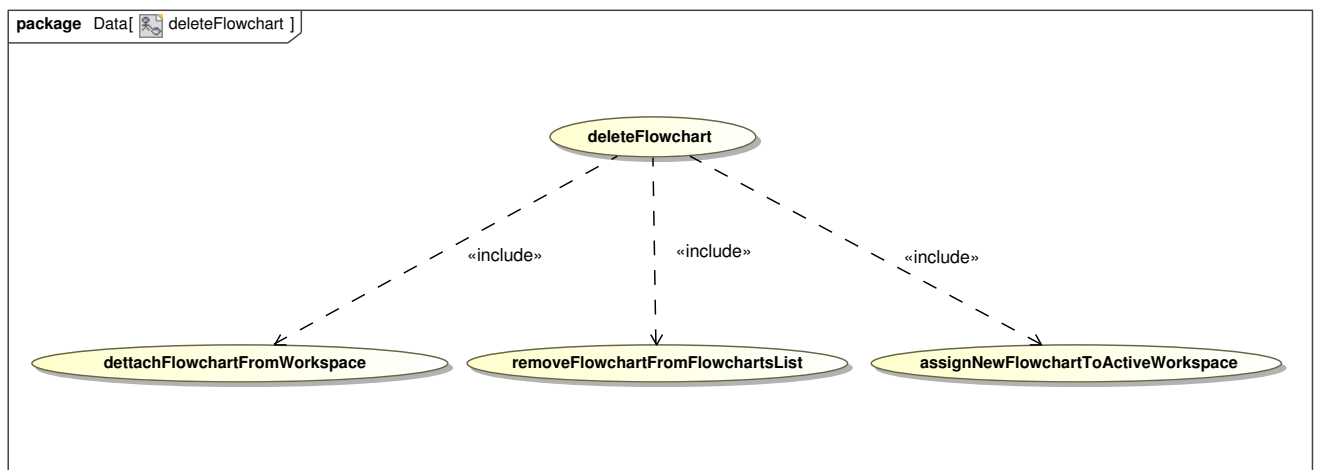


Figure 10: deleteFlowchart Use Case Diagram

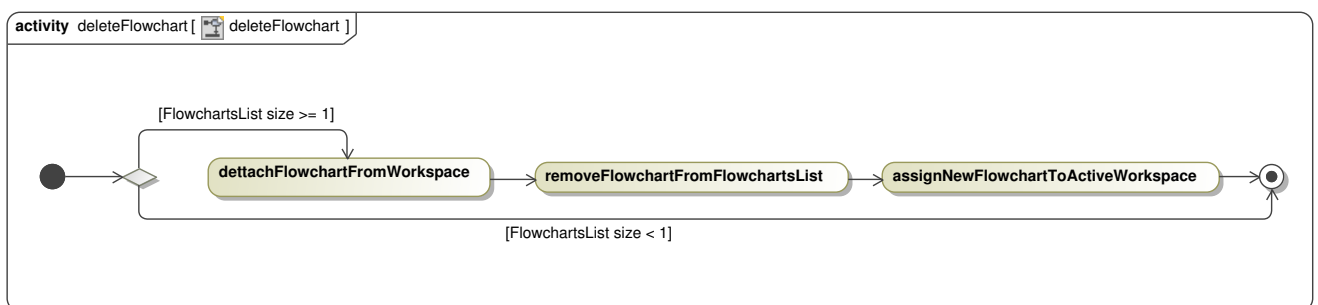


Figure 11: deleteFlowchart Activity Diagram

3.6 saveFlowchart

The saveFlowchart use case provides functionality for the user to save a flowchart.

Pre Condition: Canvas exists.

Pre Condition: Canvas is active.

Post Condition: Flowchart has been saved to file.

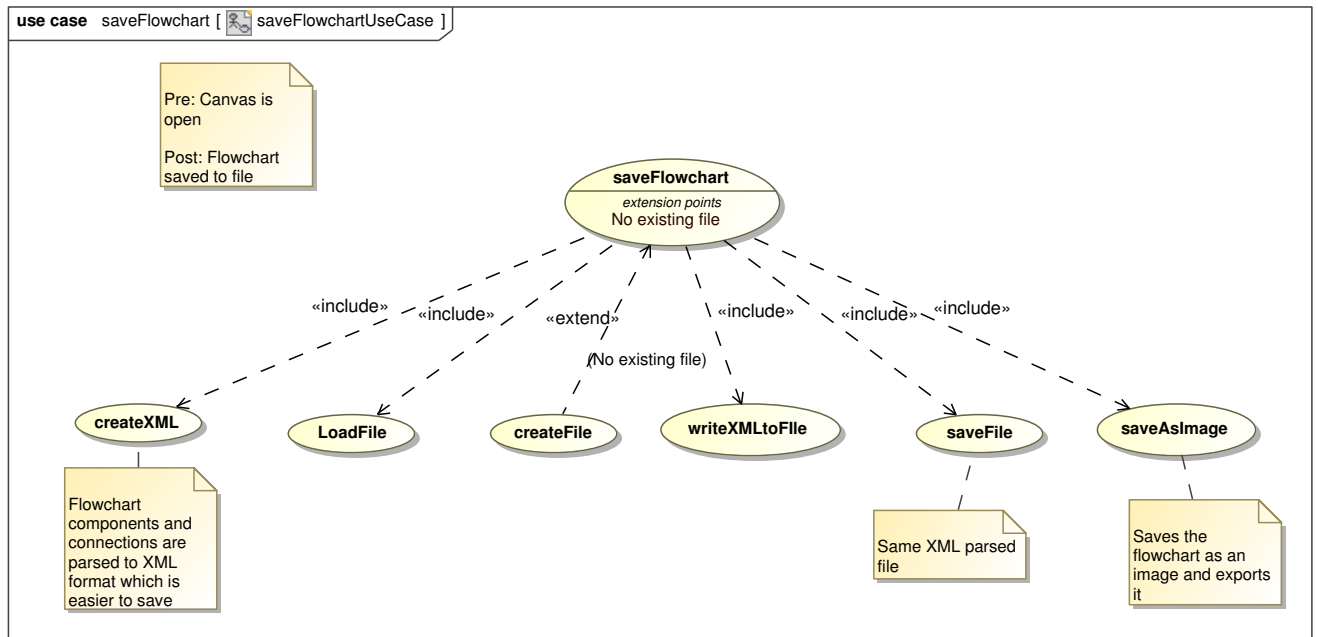


Figure 12: saveFlowchart Use Case Diagram

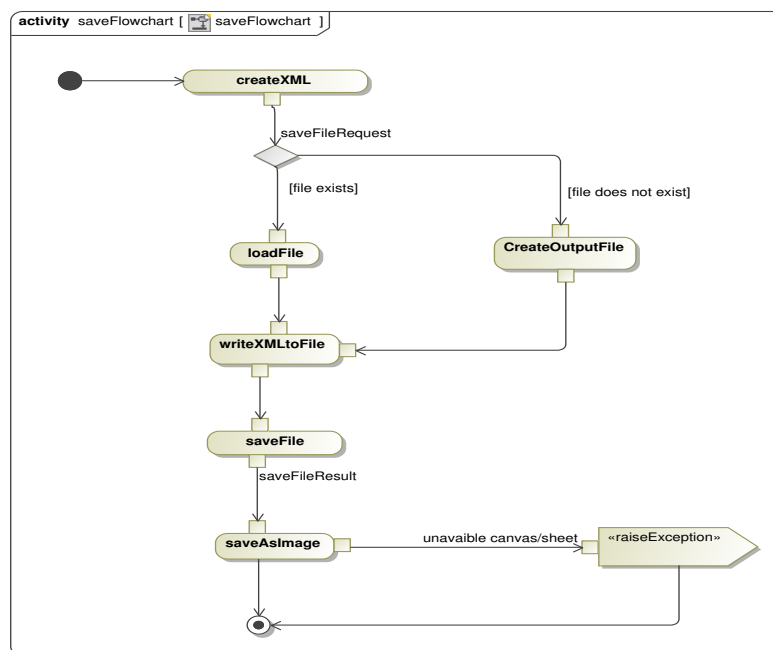


Figure 13: saveFlowchart Activity Diagram

3.7 loadFlowchart

The loadFlowchart use case allows users load flowcharts from existing files. The file is editable and can be modified by the user.

Pre Condition: File with correct extension exists.

Post Condition: File contents have been converted and loaded on to the canvas.

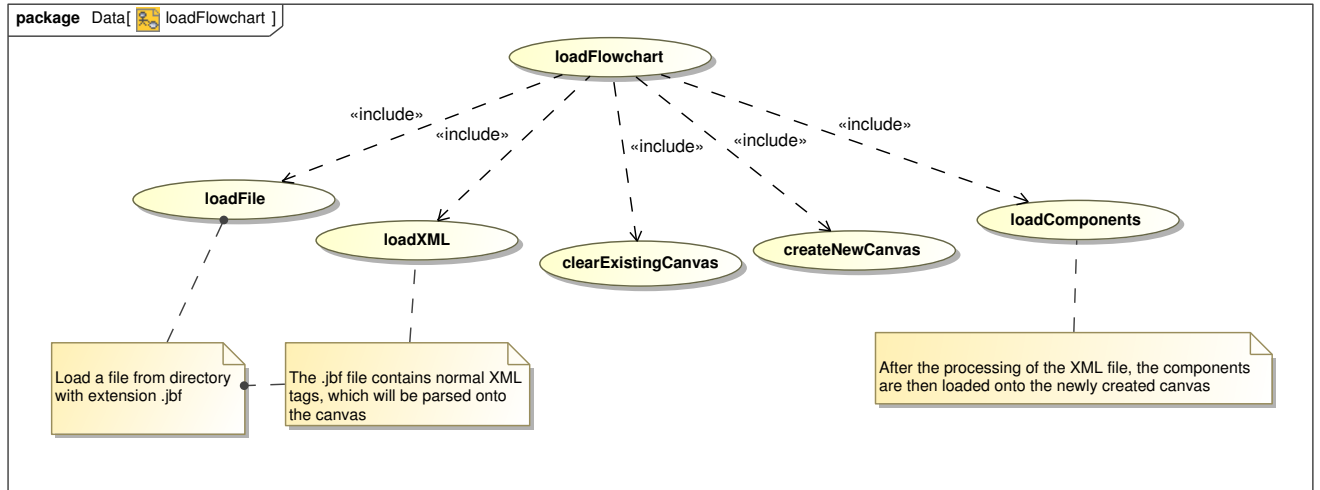


Figure 14: loadFlowchart Use Case Diagram

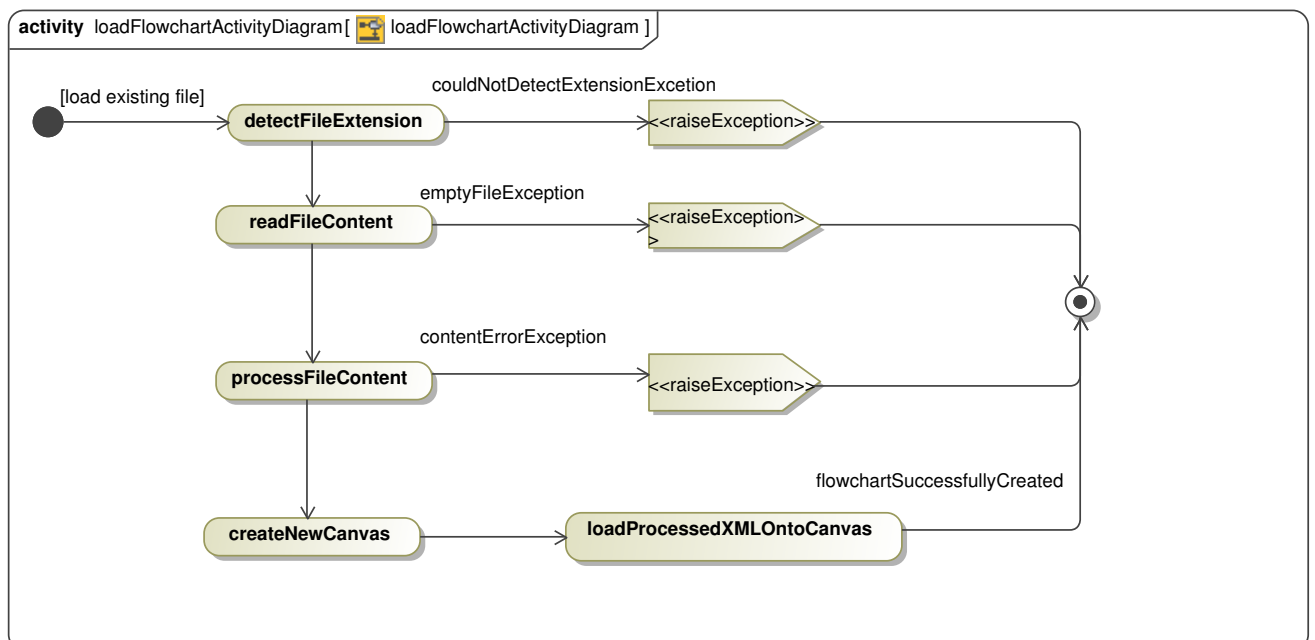


Figure 15: loadFlowchart Activity Diagram

3.8 executeFlowchart

The executeFlowchart use case enables the functionality to execute the flowchart step-by-step or from start-to-end.

Pre Condition: Canvas has to be available.

Post Condition: Flowchart will return feedback of any errors, warnings or successful execution along with the results of any calculations.

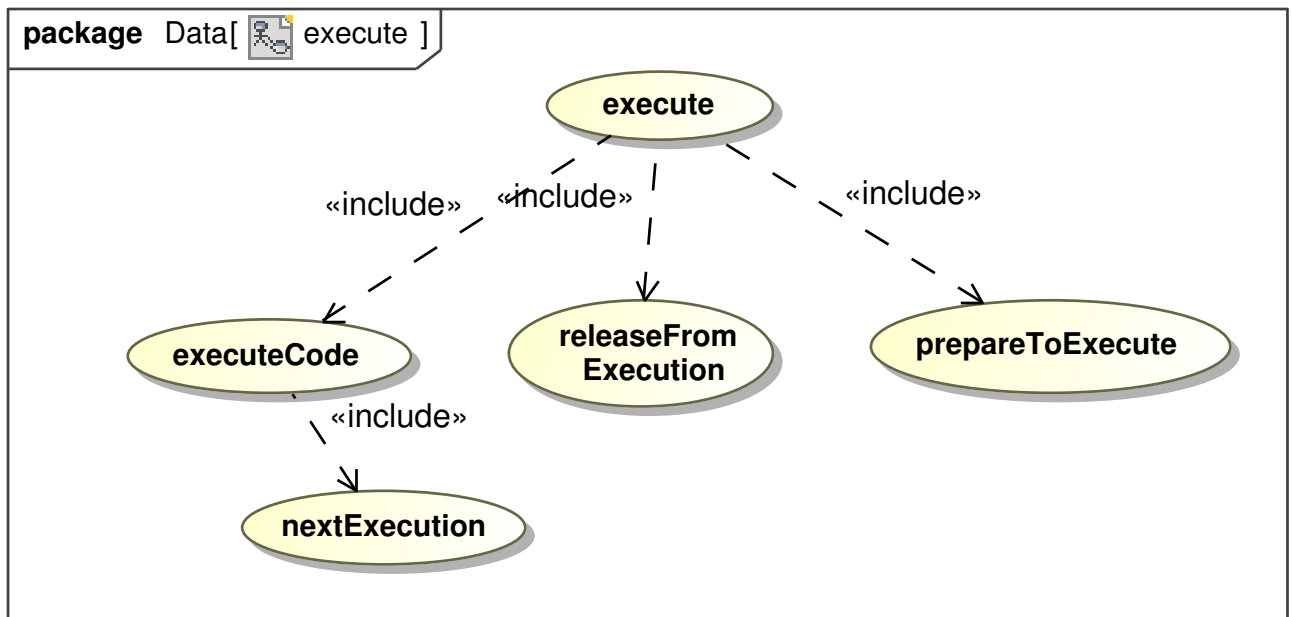


Figure 16: executeFlowchart Use Case Diagram

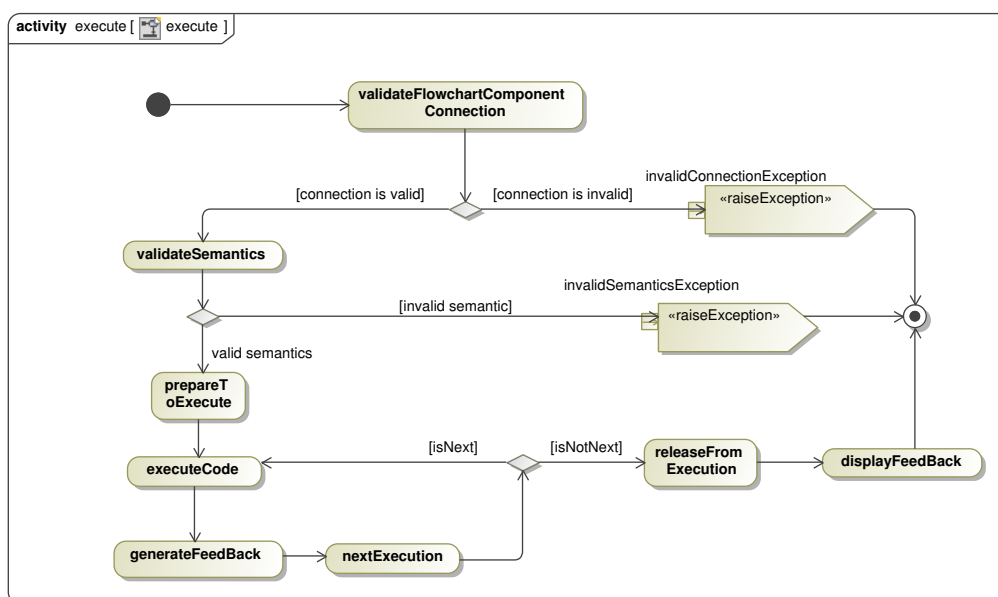


Figure 17: executeFlowchart Activity Diagram

4 The Domain Model - High-level

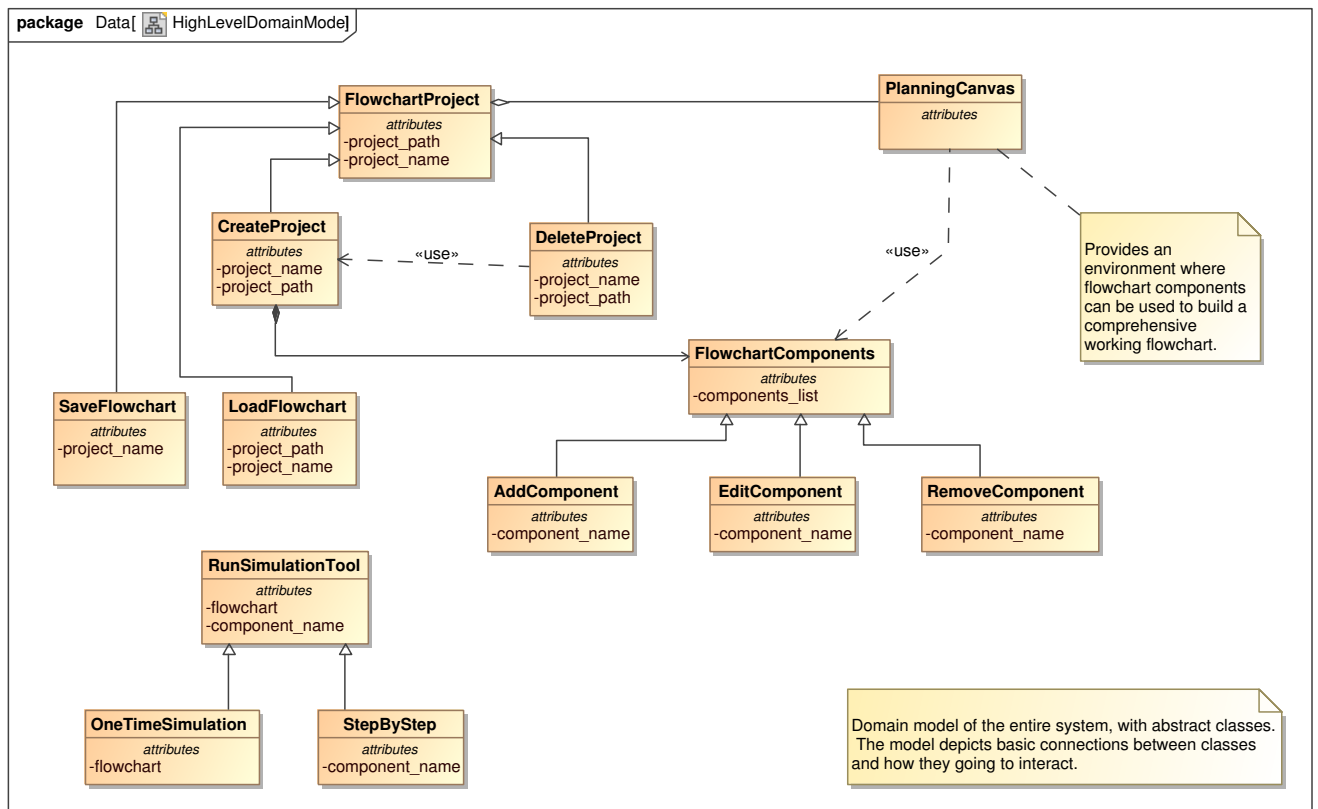


Figure 18: Domain Model Diagram