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| Fontys university of applied sciences |
| User Requirements Specifications |
| Final version |
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Table of Contents

[Introduction 2](#_Toc440357262)

[Functional requirements (use-cases) 3](#_Toc440357263)

[User Interface 8](#_Toc440357264)

[Nonfunctional requirements 13](#_Toc440357265)

# Introduction

Our group consists of four members: Rosen Danev, Preslav Gerchev, Dimitar Vikentiev and Monica Stoica, students of class EI6S3.

The following document describes the implementation of an object-oriented software product by using UML techniques.

The goal of this software system is to build a flow network consisting of pipelines and components such as pump, sink, splitter, adjustable splitter and merger.In addition, the User Requirements Specification (URS) will be described such as functional and non-functional requirements and user interface.

The functional requirements are represented by use cases. We have chosen the most suitable use cases so that the most functionality of our system will be covered. In this way, we were able to determine the most appropriate user-friendly interface.

In the ‘User-interface’ chapter, the process of creating a simple flow network is explained.

# Functional requirements (use-cases)

The following use-cases represent the functional requirements that the Pipeline software will be providing.

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**I.**

**Goal:** Create a splitter, an adjustable splitter, a merger or a sink

**Actors**: User of the system

**MSS:**

1. The actor selects the element he/she wishes to create by clicking on it.
2. The actor clicks on the screen where he/she wants to place the element
3. The system adds the element to the internal structure
4. The system draws the element on the screen

**Extensions:**

**2a**: There is existing element.

1. The system displays a warning and the use case ends.

**3a**: If the element is a splitter, the system registers the default output and input flow (see Rules and decisions, second paragraph).

**II.**

**Goal:** Change the percentage of an adjustable splitter.

**Pre:** There must be at least one adjustable splitter placed on the screen.

**Actors**: User of the system

**MSS:**

1. The actor selects a splitter.
2. The actor double clicks the drawn splitter
3. The system displays a track bar
4. The actor selects the value
5. The system calculates the lower output percentage and updates the internal variables.

**Extensions:**

**3a**.The actor presses the ‘Cancel’ button and the use-case ends.

**III.**

**Goal:** Open an existing file

**Actors**: User of the system

**MSS:**

1. The actor presses the ‘Load file’ button.
2. The system displays a dialog box.
3. The actor presses the browse button and selects the file.
4. The actor confirms by clicking the Open button.
5. The system closes the dialog box.
6. The system loads the file.
7. The system displays all the information from the file.

**Extensions:**

**1a**.The system displays a dialog box asking the actor if he/she wishes to save the current file. If yes, go to use case save file and come back to step 2.

**3a**.The actor presses the ‘Cancel’ button and exits the use case

**5a**.The file is not in the correct form

1. The system displays a warning.
2. The actor is returned at MSS-step 3.

**IV.**

**Goal:** Save a file

**Actors**: User

**MSS:**

1. The actor presses the ‘Save’ button.
2. The system displays the time and date of the last save in a label informing the actor that the save is done.

**Extensions:**

1a.The file has no location or name on the disk then the system displays a dialog box asking the actor if he wants to save it.

1. b If the actor wants to save it, he is sent to ‘Save as file’ use case, step 2. If not, the use case ends.

**V.**

**Goal:** ‘Save as’ file

**Actors**: User

**MSS:**

1. The actor presses the ‘Save as’ button.
2. The system displays a dialog box.
3. The actor chooses a location.
4. The actor chooses a name for the file.
5. The actor confirms by clicking the Save button.
6. The system saves the file.
7. The system closes the dialog box.

**Extensions:**

**2a.**The actor presses the ‘Cancel’ button and the use case ends.

**4a.**There is already a file with that name

1. The system displays a warning and asking the actor if he/she wants to override the exiting file. If yes, the use case continues. If not, the actor is returned to step 4.

**VI**.

**Goal:** Delete an element.

**Pre:** There must be at least one element placed on the screen

**Actors**: User

**MSS:**

1. The actor selects the element he wishes to delete by double clicking on it.
2. The actor presses the Delete button.
3. The system deletes the element from the screen and updates the internal structure .

**Extensions:**

3.a) The element is not a pipeline, then the system also deletes the pipelines connected to the selected element.

**VII.**

**Goal**: Change the current flow of a pump.

**Pre**: There must be at least one pump placed on the screen.

**Actor**: User of the system

**MSS:**

1. The actor selects the pump for which he/she wants to change the current flow.
2. The actor writes in the desired value in a textbox for the current flow.
3. The actor presses the confirm button.
4. The system registers the pump’s flow and draws it on the screen

**Extensions:**

**3a.** The value is bigger than the max flow or a negative number

1. The system displays a warning and the actor is returned to step 2.

**4a**.If pipeline is connected to a splitter or a merger, the system calculates and updates the flow that passes through every output/input, draws it on the screen.

**4b.**The pipeline is connected to a sink or pump. Therefore, the system calculates and updates the new output/input and draws it on the screen

**VIII.**

**Goal**: Create a pipeline.

**Actor**: The user of the system

**MSS:**

1. The actor selects the pipeline icon from the toolbar.
2. The actor clicks on the element that will represent the input of the pipeline
3. The actor presses on the element that will represent the output of the pipeline
4. The system registers the pipeline’s input and output points, the elements that the pipeline is connected to, and draws the pipeline on the screen.

**Extensions:**

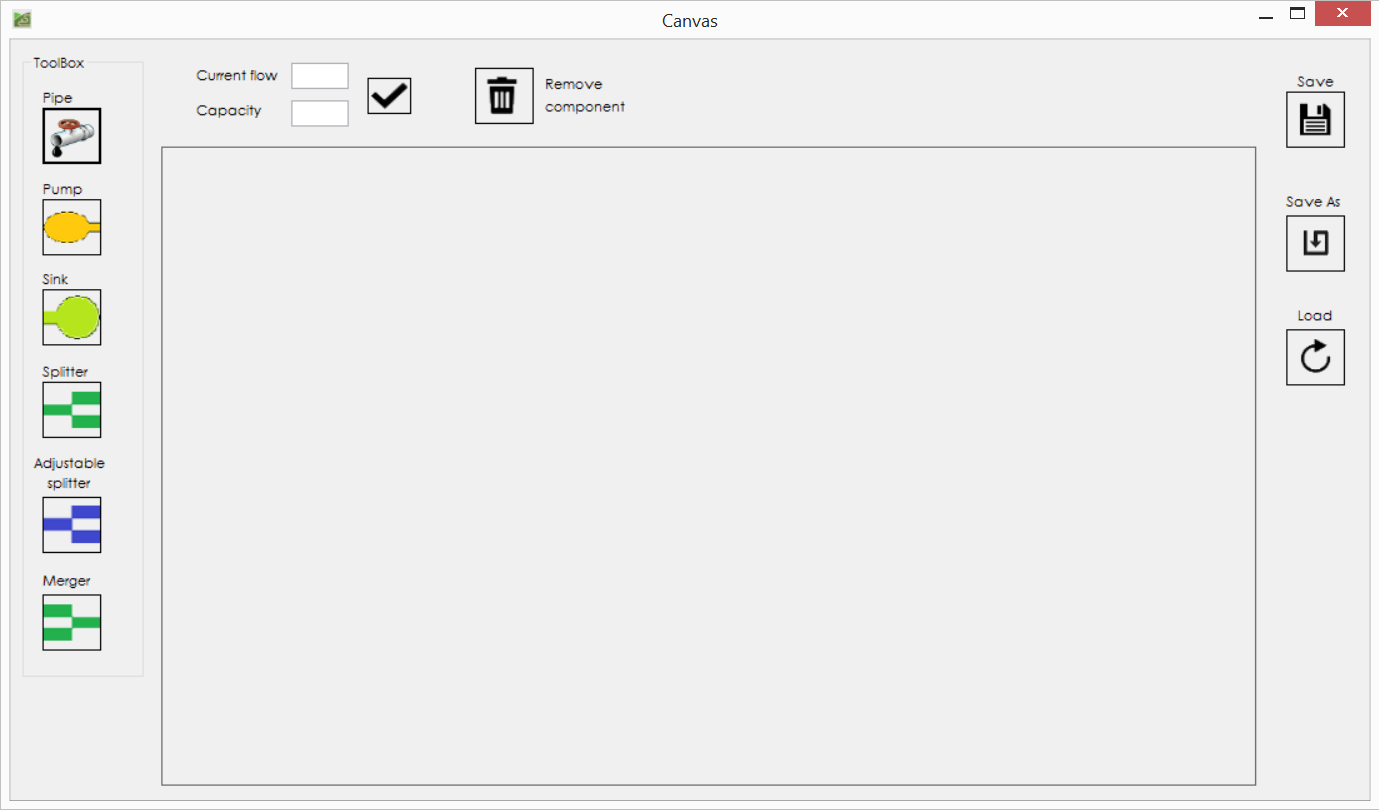
**2a**: If the actor does not click inside the component box, the system displays a warning and the use case ends

# User Interface

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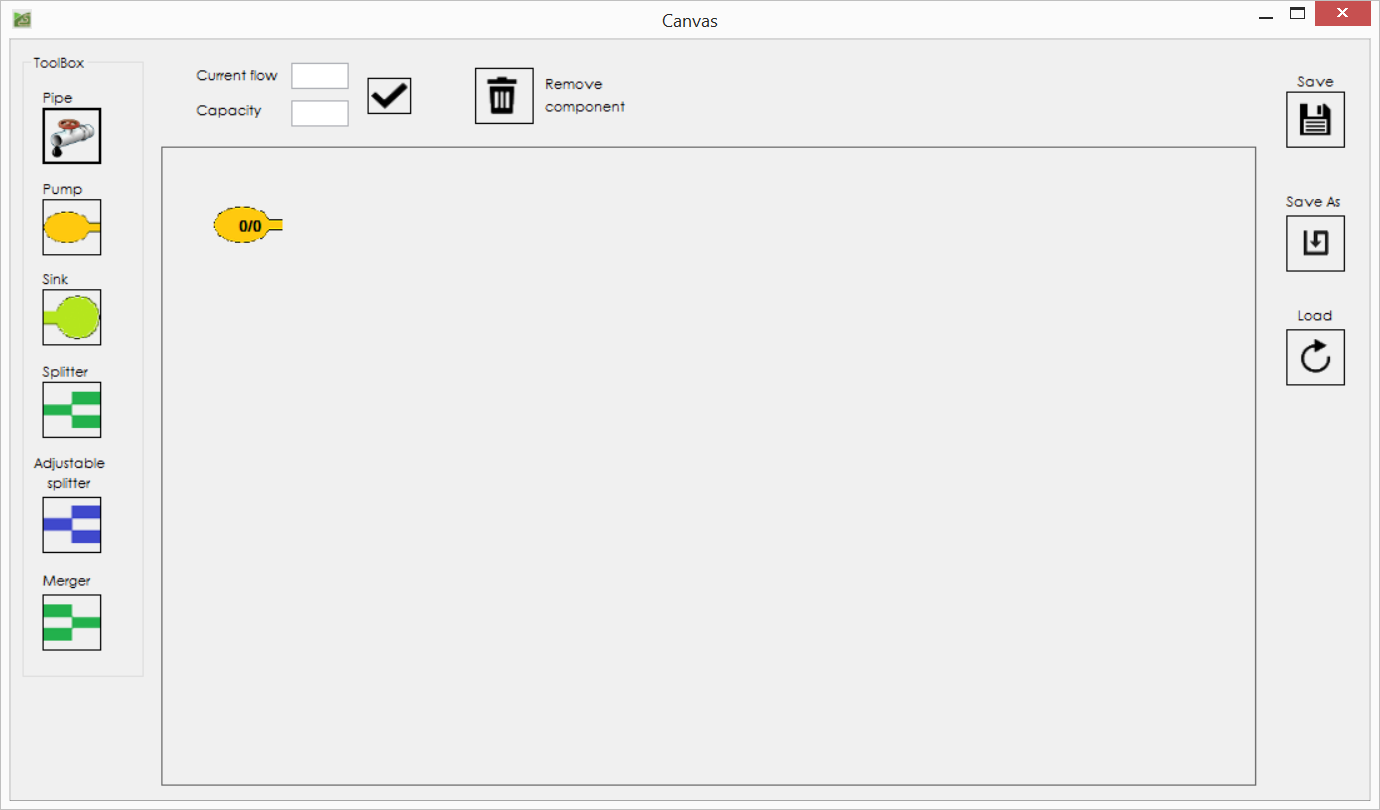
Start the application.

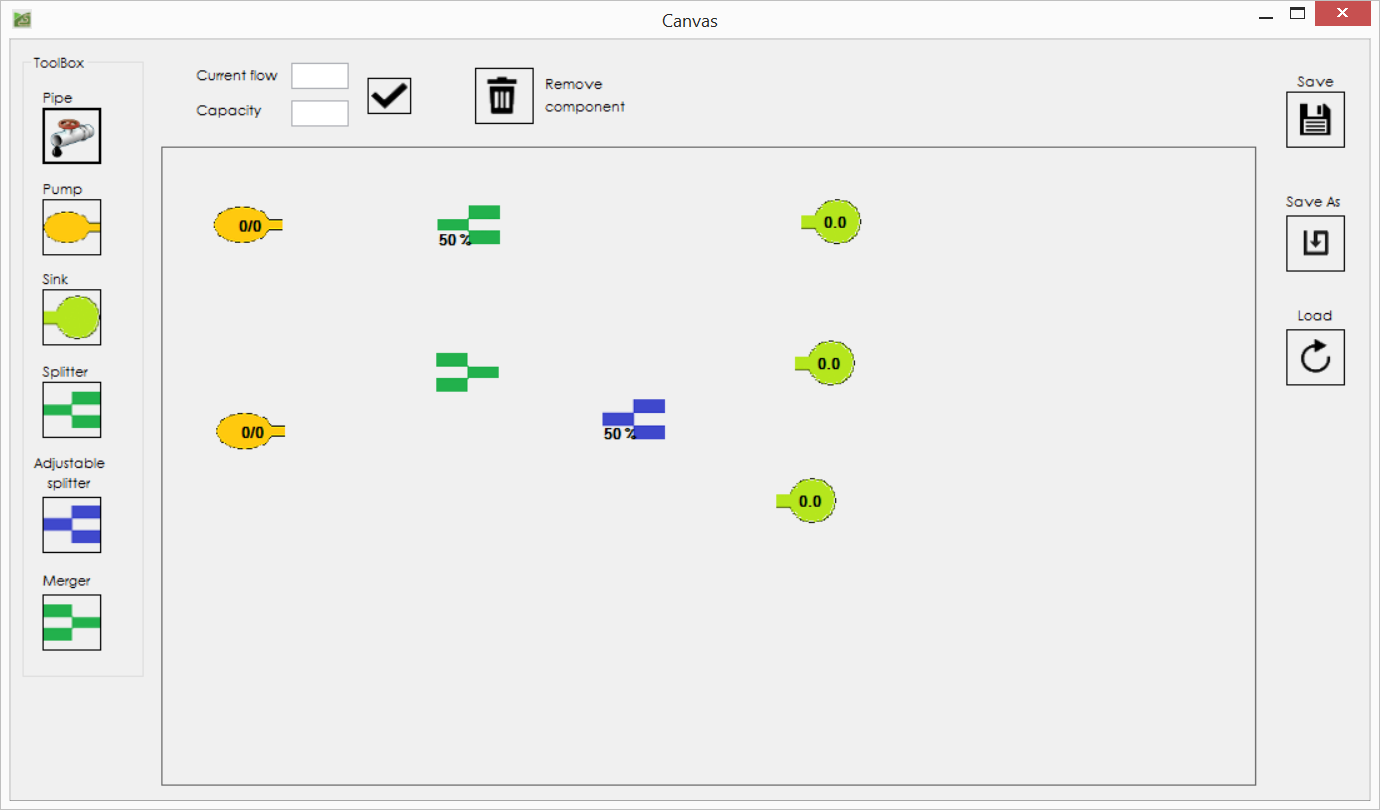
The following picture displays the user interface of the pipeline network design software. On the left side, the toolbox contains all the available elements that can be used. The panel in the center represents the ‘canvas’.



Choose an item.

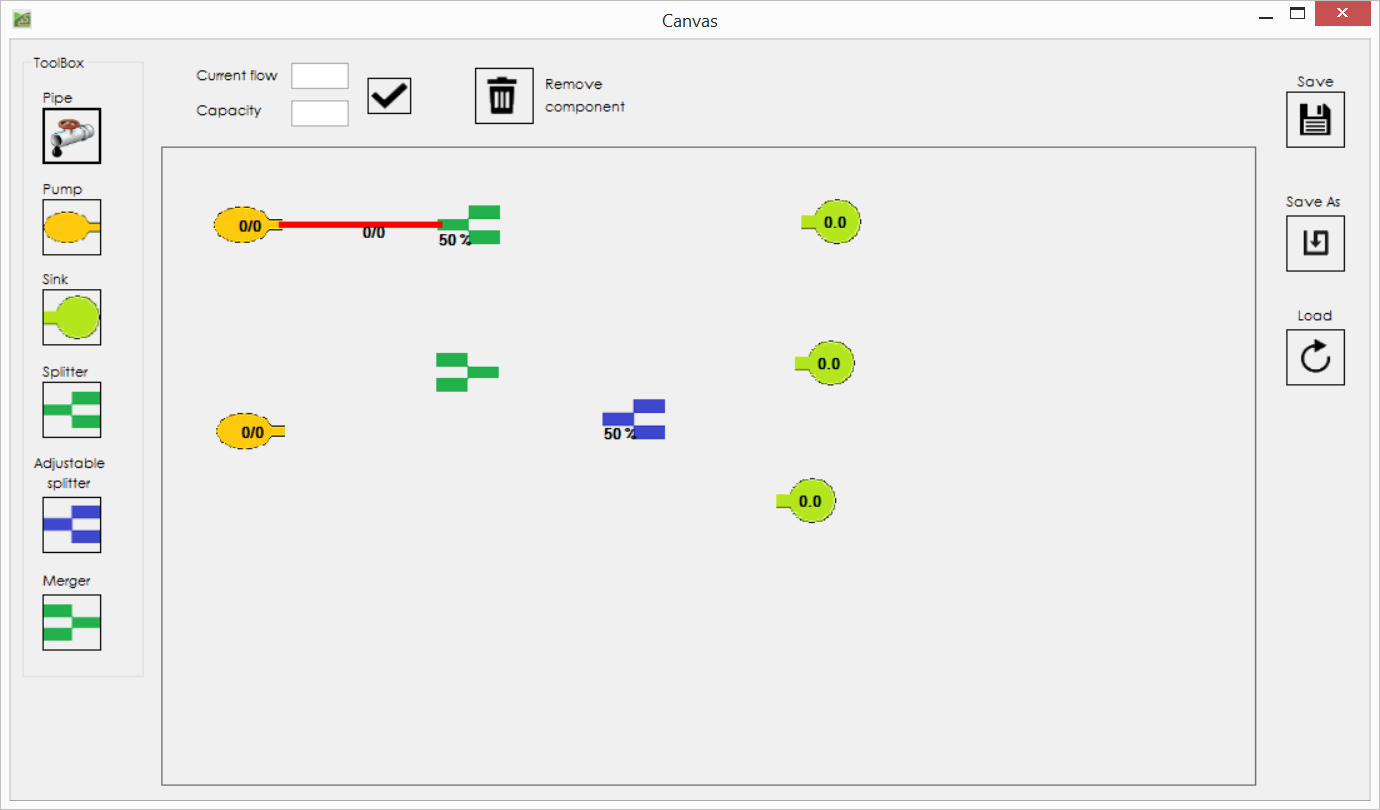
The user can click on an element and then click on the panel to display the element and begin creating the network.

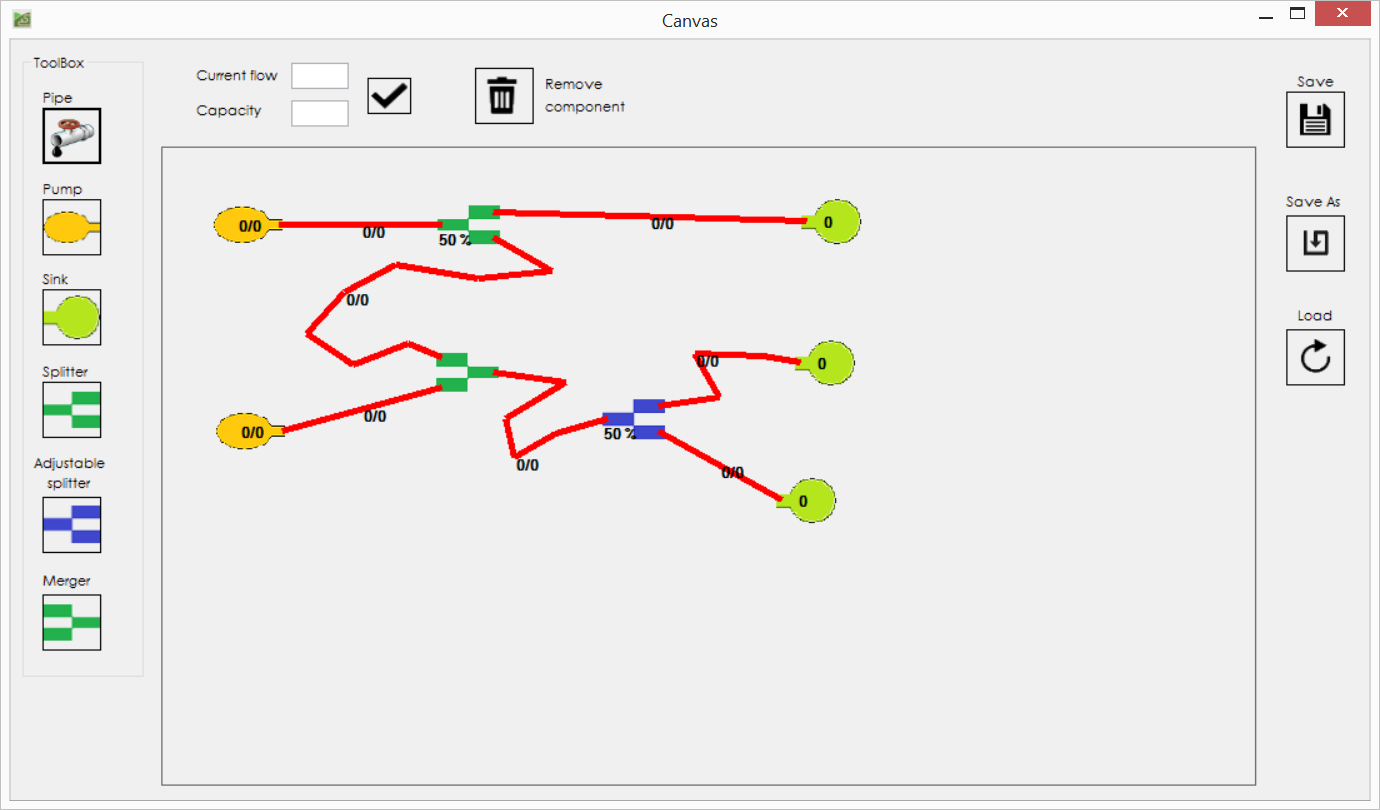




Draw a pipeline (connect two components).

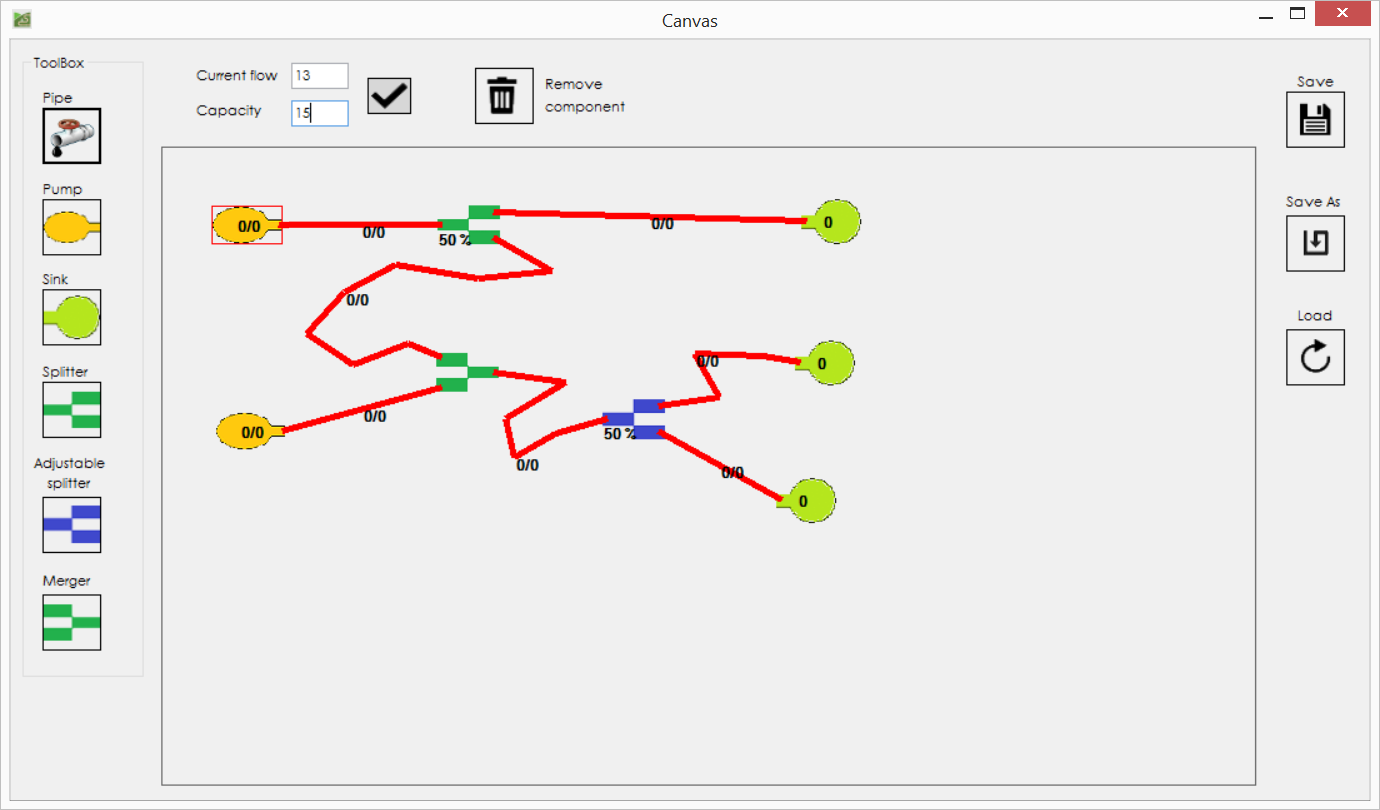
Once you draw at least two components, you can connect them by selecting the pipeline element from the toolbox and click on those two components which will represent the starting and the ending point, respectively. It is also possible to draw a pipeline with a specific trajectory. To do so, the user clicks on the starting component, chooses the path that the line will have by clicking on different spots on the screen and the clicks on the ending component.

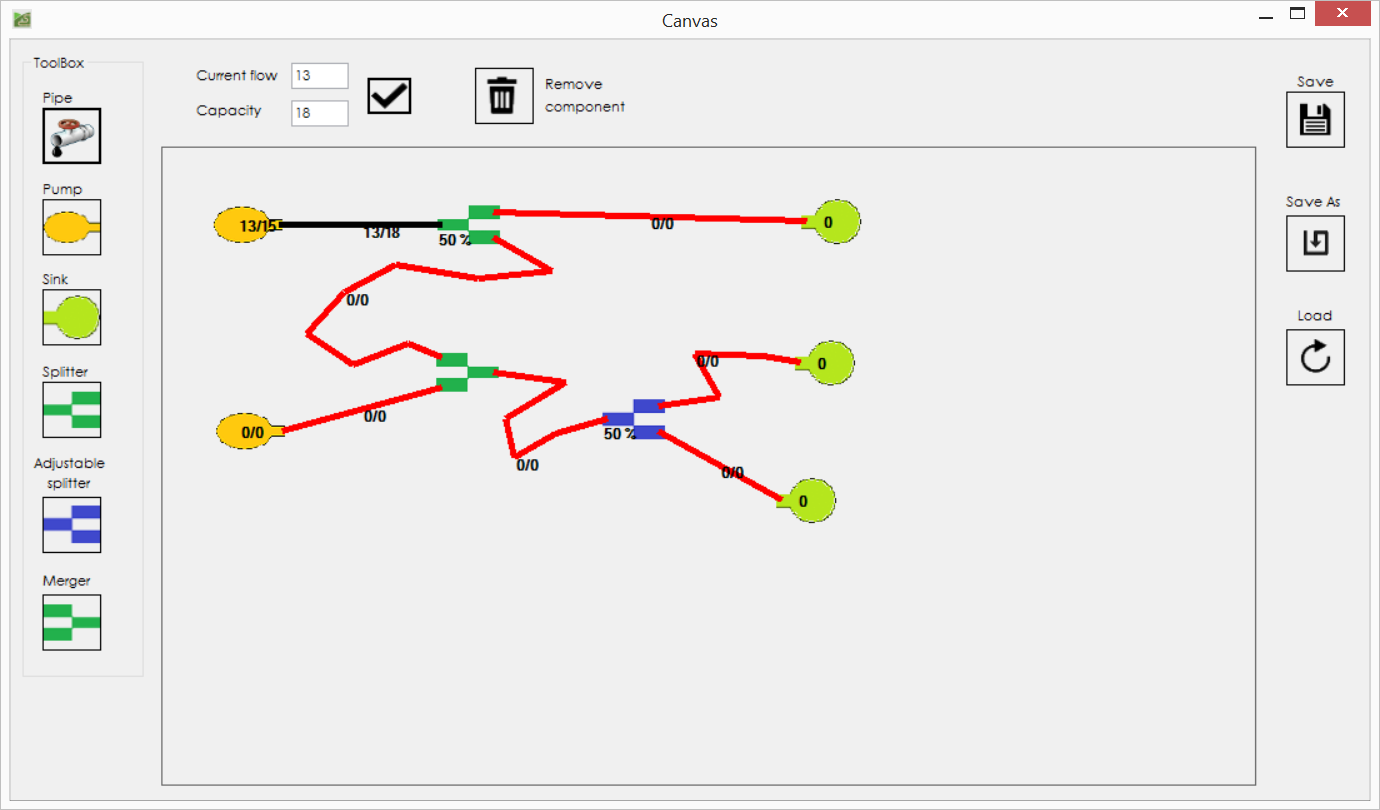




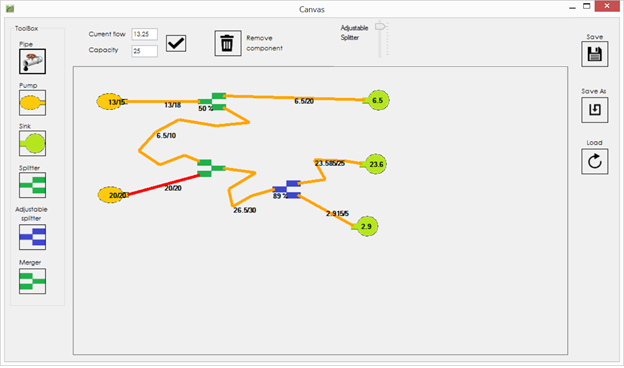
Change the flow.

The current and the maximum flow can be adjusted in the textboxes placed on top of the panel. Select the component by double clicking on it and then insert the values for ‘Current flow’ and ‘Capacity’. To confirm, press the ‘tick’ button. If the current flow exceeds the capacity, the values will not be updated.





Change the flow of an adjustable splitter.

If the user wants to adjust the percentage of the flow of a splitter, he/she has to double click on the element and the system will display a progress bar and the user will be able to set the upper percentage of the splitter

To ***remove*** an element, select the component by double clicking on it and press the button ‘Remove component’.

The user has also the possibility to ***save*** and ***load*** an already existing design. These options are located on the right of the panel.

# Nonfunctional requirements

To begin with, the software system will have a user-friendly interface so that all users, no matter how experienced they are, will be able to create a simple pipeline flow. Also reliability by assuring the user that the application will not crash at unexpected times.