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| Fontys university of applied sciences |
| User Requirements Specifications |
| Final version |
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| **12/2/2015** |

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Table of Contents

Introduction 2

Functional requirements (use-cases) 3

User Interface 8

Nonfunctional requirements 9

Rules and decisions 10

# Introduction

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

The following document follows the development 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 will be analyzed using use-cases and used in determining the most appropriate user interface.

# 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.
2. The actor exits the use case

**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 saves it

**Extensions:**

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

**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 1

**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 -> the file is saved as Network.XML in the Bin folder.

**V.**

**Goal:** Save as a file

**Pre:**

**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 he/she exits the use case

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

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

**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 from 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.
2. The actor is returned at MSS-step 2.

**4a**.The pipeline is connected to a splitter or a merger -> the system calculates registers the flow that passes through every output and draws it on the screen

**4b.**The pipeline is connected to a sink or pump. Therefore, the system calculates and registers the new output or 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**: The actor doesn’t press on an element.

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

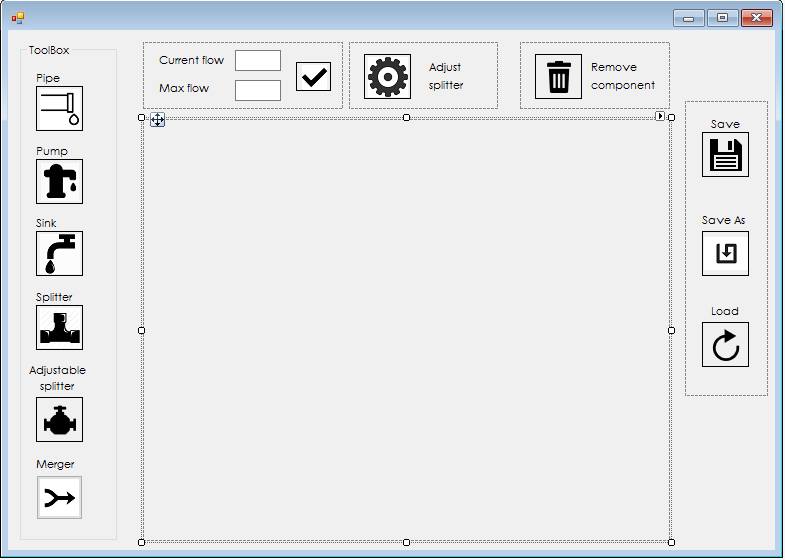
# User Interface

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

The current and the maximum flow can be adjusted in the textboxes placed on top of the panel. To save the changes, the user has to press on the button represented by a ‘tick’. If the user whishes 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, simply select the element by double clicking on it and press the button remove element.

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 capacity by adding as many elements as wanted and reliability by assuring the user that the application will not crash at unexpected times.

# Rules and decisions

First of all, we decided that the user will have a limited working space. This working space will be designated by a non-resizable panel. When an element has to be drawn on the screen, the user selects the point and the system will calculate the center of the element (picture) and draw it on the place selected by the user. The elements will be represented by pictures while the pipeplines will be drawn as a lines.

Both adjustable and normal splitter will have a default value of 50% on both outputs.

The current and the maximum flow cannot be negative numbers and the current flow must be a lower or an equal number to the maximum flow.

When drawing one of the elements on the screen we decided that the system will register the X and Y coordinates as the top-left corner of the figure. However, this does not apply for pipelines as well.

The pipeline flow will be shown next to its starting point.

To make sure that there will not be compatibility problems when loading and existing network, the file will be saved in binary format (.XML).