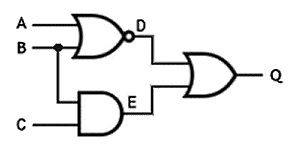
OOD2

DIGITAL CIRCUIT PROJECT



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# Introduction

During this course OOD, our assignment was to build a program which was named as Digital Circuit. Digital Circuit Project is a small part of a big project which deals with the creating and testing of the simple electrical circuits. The electrical circuit will try to make connection in source, AND gates, OR gates, NOT gates and sink. This process document is the part of this project.

In this report we discussed about all the requirements of the project, and the task assigned and task we did individually in group, and the problem we faced during the project and in the end we mention all our personal evaluation and recommendation for this project and course.

# Decision Made

During making of application there were several choices made which are as follows.

#### Use Microsoft Visual Studio 2012 and Microsoft Visio 2013

We used c# for the project because we all were familiar with this environment and it was easy to work with. Visual Studio provide good support for C# so we decided to use this software. To make class diagram and sequence diagram we used Microsoft Visio 2013.

#### Govinda to take a responsibility of the group as a leader

We decided Govinda as a leader with some responsibility; he was responsible for

* Communication within group
* Setting up meetings
* Distribution of task within group members
* Also to contact our mentor (Bert Gestel) and explain our progress every week

#### Use Facebook, Skype, and Dropbox

We decided to use Facebook, Skype, and Dropbox for communication and file sharing. Since every group member used Facebook and Skype in their daily life to be touch with friends, we thought it will be easy and fast means of communication. And for file sharing we used Dropbox because it is easy and handy.

#### Group meeting

We used to have meeting with mentor every Thursday to discuss about the progress done. Besides meeting with teacher we also meet every Monday to plan how to work on project and assign new task and discuss the problem faced. We make a note of everything and consult with mentor if can’t solve the problem within the group

#### We decided to use pictures to denote gates in circuit

To make a program user friendly we decided to use a picture of gates in the circuit. By seeing the circuit and gates in grid any one can tell that how many inputs a gate can have. Also user can easily read the values of connection and gates through color and

#### Save the file as binary file rather than text file or database file

This decision was made by consulting with mentor. He suggested us that it’s easy and better to save file in binary rather than text file or database file. Using binary saving we can re-use the saved circuit again.

#### Size of grid 50\*50 and the size of all gates will be of same size as the cell

# Project Requirements

|  |  |
| --- | --- |
| 1. Must be possible to place gates on grid | Done |
| 1. Overlap of gates not allowed | done |
| 1. Connection must be between output of gate and input of another gate | done |
| 1. Input of gate can be connected to 1 or 0 lines | done |
| 1. A line can be connected to an output of certain gate | done |
| 1. Must be possible to remove gate and connection | done |
| 1. When gate removed, all connection connected with that gate should be removed too. | done |
| 1. Change value of source gate | done |
| 1. Must be possible to have some sink gates | done |
| 1. Must be possible to see the logical value of every connection | done |
| 1. Should use 3 colours for connection value | done |
| 1. Must be possible to see the logical value of sink gate | done |
| 1. Must be possible to store the circuit | done |
| 1. Must be possible to use stored circuit again | done |
|  |  |
|  |  |

# Work done/distribution

As a group leader Govinda, split and keep record of the progress every week as follow:

|  |  |  |  |
| --- | --- | --- | --- |
| Particulars | Govinda | Juarni | Ali |
| Use Case | Make connection, Add items, Save, Open, Change Value | Remove Items and Clear All | New Circuit and Exit |
| URS | User Interface and Report | deigned images used in UID |  |
| Sequence Diagram | Add Gate , Make Connection | Remove Gates/Connection , Open circuit, Change value | New, Save, Exit |
| Class Diagram | Circuit,  Gate,  Connection | AND,  OR,  NOT | SINK,  SOURCE |
| Design Document | Class Description, finalize report | Make Report | Class Description |
| Implementation Gate & Sub-Class | Gate ,  And | NOT,  SINK,  SOURCE | OR |
| Methods IN Circuit Class | makeGrid,  PaintGate, PaintConnection,  SaveFile, OpenFile,  FORM | DrawAll,  checkOverlap,  slectItem,  PaintConnection,  PaintGate,  FORM |  |
| Implementation of Class | Connection | circuit | Gate |
|  | Testing | Testing | Testing |
|  | Final Report, Finalize Report | Final report | Final Report |

##### 

In a group we did all the research, brainstorming, designing user interface, design class diagram, discuss about the class, its attribute, methods and relations to be used. We also improved our URS and Design Diagram discussing together. And finally testing was done by everyone.

# Time spend:

Since we were just three people in a group and the deadline was 8th of July, we had to give much more time than the study load of this course. We divided our task in such a way that it could be finished within the deadline as mentioned. We had exam schedule during 7th week so we were busy finishing our exam. Following table shows the average time spend by individual member within this course.

|  |  |  |
| --- | --- | --- |
|  | Hours per week per person | Hours whole course per person |
| Group meeting with mentor | 1 | 6 |
| Group meeting with members | 5 | 40 |
| Research | 2 | 12 |
| Use Case | ------- | 3 |
| User interface design | ------- | 3 |
| URS report | ------- | 2 |
| Class Diagram (attribute, methods) | 3 | 12 |
| Sequence Diagram | 3 | 12 |
| Design Document | ------- | 2.5 |
| Implementation of class gate and sub gates | 4.5 | 9 |
| Implementation of class Connection | ------- | 3.5 |
| Implementation of class Circuit | 4 | 16 |
| Implementation form | 1 | 2 |
| Testing | 1 | 3 |
| Personal Report | ------- | 1 |
| Group report | ------- | 1 |

Group meeting with members also includes some part of research, URS and design document testing, group report. As a whole every student spend around **120 hours** to complete this course.

# Problem encountered

Since this project was all about drawing which was completely new for our group we encountered many problem. Most of them were minor problems with drawing and some were major. Some of the problems that we encountered while working on this project are as follows:

* One of our group member left the course.
* Add function should not do the painting, it only adds gate to the list.
* Saving file and opening file so that it can be reused. We were not able to decide which method to use to save (binary or text)
* It was difficult for us to know which gate was selected in circuit
* When source value was changed or any gate or connection was removed , recalculating the circuit was creating a lot of problems

# Problem solved

Almost all of the problem were solved discussing with group member, mentor and researching through internet. Since we were only three people, we did our best to overcome the problems we faced. Some of the solution of problems we encountered are as follows:

* More time was spent by three members and were responsible to do more task.
* We added two more function to paint gates and connection in the circuit.
* We finally choose binary saving because file saved in this type can be re-used and is easy process. There are still some problems regarding binary saving.
* We first need to read the pixel from picture box then find the gate at that position from the list of gates. List of Gates has all the objects of gates
* We discuss with mentor and our friends and finally we were able

Some problem like intersection of connection was really a major problem, so we were not able to do that one. Because of intersection of connection it was problem for us which connection to remove first when user clicks on the intersection point. Then we decided, the connection which is in the top layer will be deleted first.

# Changes made in URS and class diagram

As per the requirement of the project we had to make some changes in our URS and class diagram. While implementing our class diagram and sequence diagram we found that parameters given in methods were not fully OK. We have Circuit constructor which accepts the size of cell and number of rows and column so we don’t have to pass those parameter again while making grid. Some methods like painting gates and connection were added. According to research and suggestion we decided to use Point object instead of using x-position and y-position because it was easy to return point object for coordinate. Some changes are listed below as before and after:

* Changes in URS

To remove item from circuit we decide to change some step:

**Before:** to remove, user first choose the item then clicks remove tool.

**After:** user need to choose remove tool first and then he clicks item that need to be deleted. User can delete as many item as he wants one by one by just clicking on items on circuit.

* Changes in Class Design

|  |  |
| --- | --- |
| Before | After |
| Public list<int> method | Public Point method |
| makeGrid(int rows, int column, int cellsize) | makeGrid(Graphics gr) |
| addGate(string name, int x, int y) | addGate(string name , Point coordinate) |
| changeValueSource(int orginalValue, int x, int y) | changeValuesource(point position) |
|  |  |
|  |  |

Methods added:

* private Gate getGate(Point position) //this function return the gate situated at certain position
* public void paintGateFunction(Gate gate, Graphics gr, Point coordinate) // this function is to paint added gate in the board ; to paint we need to provide the gate, to be painted ,place as graphics and position as point.
* public void paintConnection(Graphics gr, Point coordinateA, Point coordinateB) //to paint connection we need graphics and start position and end position.
* public void drawAll(Graphics grid) //this function paints all the gates and connection in the list. This function does the self painting.
* public void clearAll(Graphics grid) //to clear all the gates and connection and values.

Personal Evaluation and recommendation

# Personal view

## Govinda Poudel

It was wonderful experience working on the project “digital circuit” with mentor like Bert Gestel. His suggestion and guidance were very much helpful for our project. Because of this project I also have learnt more about drawing programming in c#. I like this course because it is practical base and encourages us to think more deeply about the good design for program. Following the steps taught in this course, I am now quite sure that I can do the designing in easy way.

The project was quite challenging and we had to face lots of problem during project. Since one of our group member left the course, we had to spend lots of time for this project. But as a final outcome I think we had done good job.

The only thing that I want to point out about the project is that it doesn’t give importance to the user Interface Design. We learnt UID and OOD in block 5, this project could be designed in such a way that it could involve UID also. So that students would also think about good user Interface.

## Juarni Sutedjo

OOD2 is a great course which we have never done before. It made me get more project experiences. I learned a lot from OOD2. Since OOD1, I learned about application developing and working in projects. Hence, it became easier to make a good application step by step from in the beginning. For instance make use case, sequence diagrams and the last is coding part. I don’t have any experience to make the good design especially like OOD2, but we still try to make it. We combined all our ideas into one and we think we can make a great application. But, in block 6 which have many projects which have to deliver, we almost give up for OOD2 Project because one of our group member left the course and we were just 3 people working. Then we think we can try to finish it until last minute and finally we did it.

## Ali Hamzehei

I would like to say thanks to Mr. Bert Gestel for his guidance in this project and also to my group members Juarni and Govinda to really have good teamwork.

The OOD2 subject was interesting and helps me to work in the group environment. Also I learnt how the software project should start in the structured way and practically used the knowledge which I gained in OOD1 and C#.

In my opinion it’s good if each group give the presentation to the other student and explain the process and also ask student to apply their knowledge which they learnt in UID (user interface design) course and better the project started by OOD1 and end by OOD2.