PROJECT REPORT
DRAWING GEOMETRY APPLICATION
Sie, David Immanuel Muis
11.02.0038
2014/2015

FACULTY OF COMPUTER SCIENCE
SOEGIAPRANATA CATHOLIC UNIVERSITY
Jl. Pawiyatan Luhur IV/1, Bendan Duwur, SEMARANG 50234
Telp. 024-8441555 (hunting) Web: http://www.unika.ac.id
http://ikomunika.web.id/
This project report has been approved and ratified by the Dean of Faculty of Computer Science and Supervisor on 11 December 2014.
STATEMENT OF ORIGINALITY

I, the undersigned:

Name: Sie, David Immanuel Muis
ID: 11.02.0038

Certify that this project was made by myself and not copy or plagiarize from other people, except that in writing expressed to the other article. If it is proven that this project was plagiarizes or copy the other, I am ready to accept a sanction.

Semarang, 18 December 2014

[Signature]

Sie, David Immanuel Muis
11.02.0038
ABSTRACT

Geometric objects are basic shapes consisting of a collection of dots arranged in a way that would form a particular shape. Some examples of simple geometric shapes are lines, rectangles, triangles, and circles.

In computer graphics, a dot is drawn onto the computer screen by manipulating the color attributes of pixels. The computer screen acts as the drawing canvas with two coordinate attributes, namely horizontal (x) and vertical (y) attributes. A shape is drawn by drawing multiple dots over and over again until a whole shape is fully drawn. These dots are drawn by certain calculations which involve the concept of linear algebra.

This project is titled Drawing Geometry in which various geometric objects are built from the most basic object, which is dot, as the building blocks. After an object has been drawn, this application also allows the user to apply various translations or rotations to the object. These transformations will demonstrate how 3D objects can be rendered properly on a 2D drawing plane, especially in a computer screen.

Java, object-oriented programming, 3D line drawing, 3D rotation.
FOREWORD

After about four months since the beginning of this Drawing Geometry Application project, finally the project comes to a satisfying end. It has never been easy to develop this application into the current state, but the support of many has made all of this possible. In particular, much gratitude goes to:

- Our Lord Jesus Christ who has been with me all my life and the Holy Spirit who gave me guidance, inspiration, and the ability to persevere through every hardship that comes with this project.
- My father and mother, who have given much time in their life supporting me and my whole family in many aspects, including finance, health, spiritual guidance, character building, and many more.
- My brother and sisters, who have given much support in small things, like buying me delicious foods and beverages, having conversations with me, watching movies together, and other daily activities that we enjoy together.
- My lecturers, who have given me much guidance on how to properly develop this application, from designing classes to the making of this project report.
- All my friends from the Computer Science faculty for having discussions with me and giving me inspirations both directly and indirectly.

Semarang, 15 December 2014

Sig. David Inmanuell Muis
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>APPROVAL AND RATIFICATION PAGE</th>
<th>ii</th>
</tr>
</thead>
<tbody>
<tr>
<td>LETTER OF STATEMENT</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iv</td>
</tr>
<tr>
<td>FOREWORD</td>
<td>v</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>vi-vii</td>
</tr>
<tr>
<td>TABLE OF FIGURES</td>
<td>viii</td>
</tr>
<tr>
<td>TABLE OF TABLES</td>
<td>ix</td>
</tr>
</tbody>
</table>

## CHAPTER I INTRODUCTION
1.1 Background.............................................................1
1.2 Scope............................................................................2
1.3 Objectives........................................................................2

## CHAPTER II LITERATURE STUDY
2.1 Data Structures..........................................................3
   2.1.1 Array.........................................................................3
2.2 Algorithm.........................................................................4
   2.2.1 3D Line Drawing....................................................4
   2.2.2 3D Rotation............................................................6

## CHAPTER III PLANNING
3.1 Research Methodology..................................................7
3.2 Project Management.....................................................7
CHAPTER IV ANALYSIS AND DESIGN

4.1 Design.................................................................................................................. 8
4.1.1 Class Diagram......................................................................................... 8

CHAPTER V IMPLEMENTATION AND TESTING

5.1 Implementation.......................................................................................... 9
5.1.1 Building Basic Objects........................................................................ 9
5.1.2 Lines and Polygons............................................................................... 13
5.1.3 3D Boxes................................................................................................. 17

CHAPTER VI CONCLUSION

6.1 Conclusion.................................................................................................. 19
6.2 Further Research........................................................................................ 19

REFERENCES.................................................................................................... 20
TABLE OF FIGURES

Figure 4.1 Class Diagram...........................................................................................................8
Figure 5.1 Drawable Class Source Code..................................................................................9
Figure 5.2 Axis Rotation Snapshot.........................................................................................10
Figure 5.3 Dot Class Draw Method.......................................................................................11
Figure 5.4 Dot Rotation Snapshot.........................................................................................12
Figure 5.5 Dot Translation Snapshot....................................................................................12
Figure 5.6 Line Draw Method.................................................................................................13
Figure 5.7 Line Transformation Methods...............................................................................14
Figure 5.8 Polygon Class Snapshot.......................................................................................15
Figure 5.9 Polygon Transformation and Draw Methods......................................................16
Figure 5.10 Box Class Snapshot............................................................................................17
Figure 5.11 Box Transformation and Draw Methods............................................................18
TABLE OF TABLES

Table 2.1 An Illustration of Two-dimensional Array........................................4
Table 3.1 Project Management.........................................................................7