VTK based primitive CAD modeller

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Introduction

This document outlines the plan for the "VTK based primitive CAD modeller" detailing its purpose, scope, system overview, functional requirements, tools, milestones, timeline, and conclusion.

Purpose

The purpose of the VTK based primitive CAD modeller is to develop a user- friendly software tool that allows users to view and model primitives (drag and drop primitives) With c#.

Scope

A VTK-based viewer in C# allows users to visualize, interact with, and manipulate primitive object like arc, circle, point, line, ellipse and other primitives through drag-and-drop actions. This approach is ideal for building interactive applications

for scientific visualization, educational tools, and design software, combining the flexibility of VTK with the user-friendly C# environment..

• System Overview

- The 3D Viewer and Modeling Application will feature a graphical user interface (GUI) built in C# with the Windows Presentation Foundation (WPF) framework, providing a user-friendly environment for interaction. VTK will be used to render high-quality 3D graphics, allowing users to view, drag, drop, and manipulate geometric primitives in real- time.

• Functional Requirements

VTK based primitive CAD modeller:

- **3D Viewer and Scene Manipulation:**

The system must be able to load, render, and display 3D primitives like arc, circle, point, line, ellipse.
Users must be able to pan, zoom, and rotate the 3D scene with mouse or keyboard interactions.

- **Drag-and-Drop Functionality:**

Users must be able to drag and drop primitives into the 3D scene from a UI component, such as a toolbox.
The system should allow users to reposition objects within the 3D scene by dragging them.

- **File Operations:**

The system must allow users to save the current scene to a file, preserving object positions and properties.
Users should be able to load saved scenes to continue work or to

share with others.

- **Delete:**
User can delete selected shape.

Tools

- Integrated Development Environment (IDE)(Visual Studio)
- Graphics and Visualization Toolkit(VTK (The Visualization Toolkit))
- VTK Wrapper for .NET(ActiViz.NET)
- Graphical User Interface Framework(WPF (Windows Presentation Foundation))

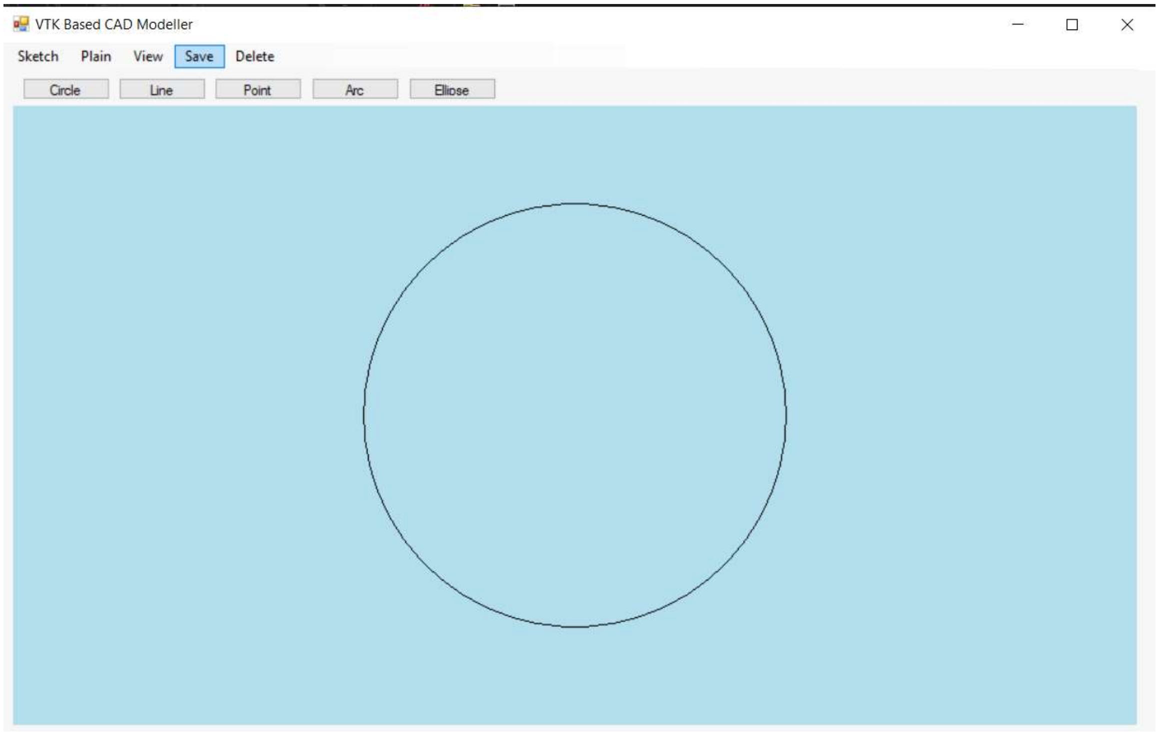
Milestones and Timeline

Sr. No.	Milestones	Date and Time
1.	Project Problem Statement	06 May 2024 05:00 PM IST
2.	SRS Preparation and Initial Presentation	07 May 2024 12:00 PM IST
3.	SRS Approval	07 Mar 2024 02:00 PM IST
4.	Setup for Project	07 May 2024 05:00 PM IST
5.	GUI Implementation	09 May 2024 07:00 PM IST
6.	VTK based primitive CAD modeller Development	12 May 2024 07:00 PM IST
7.	Real-Time Rendering Integration	14 May 2024 07:00 PM IST
8.	Finalization and Presentation	16 May 2024 01:00 PM IST

- ## Conclusion

A VTK-based 3D viewer project in C# allows users to visualize, drag, drop, and manipulate 3D primitives with a user-friendly interface. By combining the robust rendering capabilities of VTK with the flexibility of C#, the project demonstrates a practical and interactive approach to 3D graphics, ideal for a range of applications, from design to scientific visualization.

- ## User Interface



- **Main Workspace:**

This is the primary area where users draw, edit, and view shapes. It should be a large, open canvas with support for mouse interactions such as clicking and dragging.

- **Toolbar:**

A horizontal toolbar located at the top side of the workspace, providing quick access to shape creation tools and other functionalities.

- **Shape Tools:**

Circle: Button/icon to draw a circle on the workspace.
Line: Button/icon to draw a straight line between two points.
Point: Button/icon to create a single point in the workspace.

Ellipse: Button/icon to draw an ellipse.
Arc: Button/icon to draw an arc.

- **Actions:**

Sketch: Button to on sketch mode, then we use plain to draw premitive shapes.
XY-Plain: Button to choose XY-plain.
XZ-Plain: Button to choose XZ-plain.
YZ-Plain: Button to choose YZ-plain.
View: Button to on view mode, in view mode we can perform rotate, zoom in-out operations.
Save: Button to save the current design to a file. Prompts the user to choose a file format and location.
Delete: Button to delete selected shape.