

svg-reader

0.3

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Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

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Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Circle	Represents a circle in 2D space	5
Ell	Represents an ellipse in 2D space	8
Gradient	A class that represents a gradient	12
Group	A composite class that contains a vector of shape pointers (polymorphic)	16
Line	Represents a line in 2D space	20
LinearGradient	A class that represents a linear gradient	24
mColor	Utility class for manipulating RGBA mColors	26
Parser	To manipulate and parse an SVG file	29
Path	Represents a path element in 2D space	50
PathPoint	A struct that contains a point and a type of point	54
Polygon	Represents a polygon in 2D space	55
Polyline	Represents a polyline in 2D space	58
PolyShape	Abstract base class for polygon and polyline shapes in 2D space	60
RadialGradient	A class that represents a radial gradient	65
Rect	Represents a rectangle in 2D space	68
Renderer	Singleton class responsible for rendering shapes using GDI+	72
Stop	A class that represents a stop	88
SVGElement	Represents an element in an SVG file	90

Text	Represents text in 2D space	103
Vector2D< T >	Utility template class for manipulating 2-dimensional vectors	108
Viewer	Represents a viewer for rendering and interacting with a scene	110

Chapter 3

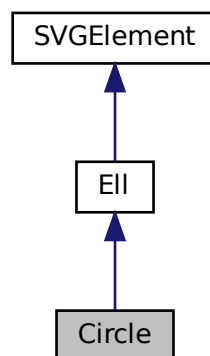
Class Documentation

3.1 Circle Class Reference

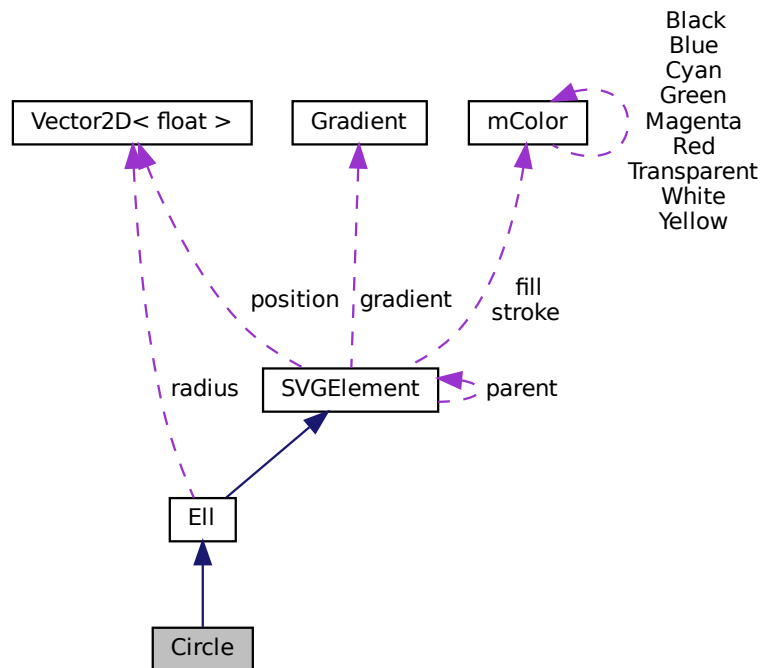
Represents a circle in 2D space.

```
#include <Circle.hpp>
```

Inheritance diagram for Circle:



Collaboration diagram for Circle:



Public Member Functions

- **Circle** (float [radius](#), const [Vector2Df](#) ¢er, [mColor](#) fill, [mColor](#) stroke, float [stroke_width](#))
Constructs a [Circle](#) object.
- std::string [getClass](#) () const override
Gets the type of the shape.

Additional Inherited Members

3.1.1 Detailed Description

Represents a circle in 2D space.

The [Circle](#) class is derived from the Ellipse class and defines a circle with a specified radius, center, fill color, stroke color, and stroke thickness.

Definition at line 13 of file Circle.hpp.

3.1.2 Constructor & Destructor Documentation

3.1.2.1 Circle()

```
Circle::Circle (
    float radius,
    const Vector2Df & center,
    mColor fill,
    mColor stroke,
    float stroke_width )
```

Constructs a [Circle](#) object.

Parameters

<i>radius</i>	The radius of the circle.
<i>center</i>	The center of the circle.
<i>fill</i>	Fill color of the circle.
<i>stroke</i>	Outline color of the circle.
<i>stroke_width</i>	Thickness of the circle outline.

Definition at line 3 of file Circle.cpp.

```
5      : Ell(Vector2Df(radius, radius), center, fill, stroke, stroke_width) {}
```

3.1.3 Member Function Documentation

3.1.3.1 getClass()

```
std::string Circle::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Circle".

Implements [SVGElement](#).

Definition at line 7 of file Circle.cpp.

```
7 { return "Circle"; }
```

The documentation for this class was generated from the following files:

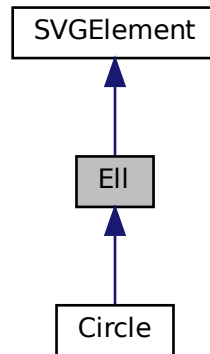
- src/graphics/Circle.hpp
- src/graphics/Circle.cpp

3.2 Ell Class Reference

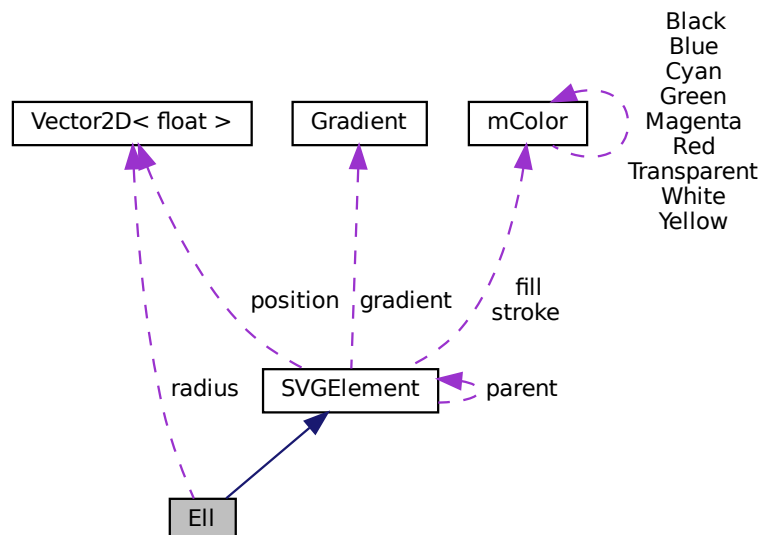
Represents an ellipse in 2D space.

```
#include <Ellipse.hpp>
```

Inheritance diagram for Ell:



Collaboration diagram for Ell:



Public Member Functions

- [Ell](#) (const [Vector2Df](#) &[radius](#), const [Vector2Df](#) &[center](#), [mColor](#) [fill](#), [mColor](#) [stroke](#), float [stroke_width](#))
Constructs an Ellipse object.
- std::string [getClass](#) () const override
Gets the type of the shape.
- void [setRadius](#) (const [Vector2Df](#) &[radius](#))
Sets the radius of the ellipse.
- [Vector2Df](#) [getRadius](#) () const
Gets the radius of the ellipse.
- [Vector2Df](#) [getMinBound](#) () const override
Gets the minimum bounding box of the shape.
- [Vector2Df](#) [getMaxBound](#) () const override
Gets the maximum bounding box of the shape.
- void [printData](#) () const override
Prints the data of the shape.

Private Attributes

- [Vector2Df](#) [radius](#)
Radii of the ellipse in the x and y directions.

Additional Inherited Members

3.2.1 Detailed Description

Represents an ellipse in 2D space.

The Ellipse class is derived from the [SVGElement](#) class and defines an ellipse with a variable radius in the x and y directions.

Definition at line 12 of file Ellipse.hpp.

3.2.2 Constructor & Destructor Documentation

3.2.2.1 Ell()

```
Ell::Ell (
    const Vector2Df & radius,
    const Vector2Df & center,
    mColor fill,
    mColor stroke,
    float stroke\_width )
```

Constructs an Ellipse object.

Parameters

<i>radius</i>	The radii of the ellipse in the x and y directions.
<i>center</i>	The center of the ellipse.
<i>fill</i>	Fill color of the ellipse.
<i>stroke</i>	Outline color of the ellipse.
<i>stroke_width</i>	Thickness of the ellipse outline.

Definition at line 5 of file Ellipse.cpp.

```
7 : SVGElement(fill, stroke, stroke_thickness, center), radius(radius) {}
```

3.2.3 Member Function Documentation

3.2.3.1 getClass()

```
std::string Ell::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Ellipse".

Note

This function is used for determining the type of the shape.

Implements [SVGElement](#).

Definition at line 9 of file Ellipse.cpp.

```
9 { return "Ellipse"; }
```

3.2.3.2 getMaxBound()

```
Vector2Df Ell::getMaxBound ( ) const [override], [virtual]
```

Gets the maximum bounding box of the shape.

Returns

The maximum bounding box of the shape.

Reimplemented from [SVGElement](#).

Definition at line 20 of file Ellipse.cpp.

```
20 {
21     return Vector2Df(getPosition().x + getRadius().x,
22                     getPosition().y + getRadius().y);
23 }
```

3.2.3.3 getMinBound()

```
Vector2Df Ell::getMinBound ( ) const [override], [virtual]
```

Gets the minimum bounding box of the shape.

Returns

The minimum bounding box of the shape.

Reimplemented from [SVGElement](#).

Definition at line 15 of file Ellipse.cpp.

```
15 {  
16     return Vector2Df(getPosition().x - getRadius().x,  
17                     getPosition().y - getRadius().y);  
18 }
```

3.2.3.4 getRadius()

```
Vector2Df Ell::getRadius ( ) const
```

Gets the radius of the ellipse.

Returns

The radius of the ellipse.

Definition at line 13 of file Ellipse.cpp.

```
13 { return radius; }
```

3.2.3.5 printData()

```
void Ell::printData ( ) const [override], [virtual]
```

Prints the data of the shape.

Note

This function is used for debugging purposes.

Reimplemented from [SVGElement](#).

Definition at line 25 of file Ellipse.cpp.

```
25 {  
26     SVGElement::printData();  
27     std::cout << "Radius: " << getRadius().x << " " << getRadius().y  
28               << std::endl;  
29 }
```

3.2.3.6 setRadius()

```
void Ell::setRadius (  
    const Vector2Df & radius )
```

Sets the radius of the ellipse.

Parameters

<i>radius</i>	The new radius of the ellipse.
---------------	--------------------------------

Definition at line 11 of file Ellipse.cpp.

```
11 { this->radius = radius; }
```

The documentation for this class was generated from the following files:

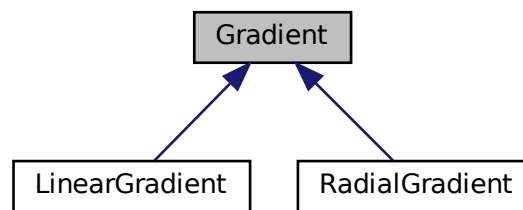
- src/graphics/Ellipse.hpp
- src/graphics/Ellipse.cpp

3.3 Gradient Class Reference

A class that represents a gradient.

```
#include <Gradient.hpp>
```

Inheritance diagram for Gradient:



Public Member Functions

- **Gradient** (std::vector< **Stop** > stops, std::pair< **Vector2Df**, **Vector2Df** > points, std::string units)
*Constructs a **Gradient** object.*
- virtual **~Gradient** ()=default
*Destructs a **Gradient** object.*
- virtual std::string **getClass** () const =0
Gets the type of the gradient.
- std::vector< **Stop** > **getStops** () const
Gets the stops of the gradient.
- std::pair< **Vector2Df**, **Vector2Df** > **getPoints** () const
Gets the start and end points of the gradient.
- void **setUnits** (std::string units)
Gets the units of the gradient.
- std::string **getUnits** () const
Gets the units of the gradient.
- void **setTransforms** (std::vector< std::string > transforms)
Gets the transforms of the gradient.
- std::vector< std::string > **getTransforms** () const
Gets the transforms of the gradient.
- void **addStop** (**Stop** stop)
Adds a stop to the gradient.

Private Attributes

- `std::vector< Stop > stops`
Stops of the gradient.
- `std::pair< Vector2Df, Vector2Df > points`
Start and end points of the gradient.
- `std::string units`
Units of the gradient.
- `std::vector< std::string > transforms`
Transforms of the gradient.

3.3.1 Detailed Description

A class that represents a gradient.

The [Gradient](#) class is an abstract class that represents a gradient. It contains a vector of [Stop](#) objects that represent the stops of the gradient. It also contains a pair of [Vector2D](#) objects that represent the start and end points of the gradient.

Definition at line 18 of file `Gradient.hpp`.

3.3.2 Constructor & Destructor Documentation

3.3.2.1 Gradient()

```
Gradient::Gradient (
    std::vector< Stop > stops,
    std::pair< Vector2Df, Vector2Df > points,
    std::string units )
```

Constructs a [Gradient](#) object.

Parameters

<i>stops</i>	The stops of the gradient.
<i>points</i>	The start and end points of the gradient.
<i>units</i>	The units of the gradient.

Definition at line 3 of file `Gradient.cpp`.

```
5 : stops(stops), points(points), units(units) {}
```

3.3.3 Member Function Documentation

3.3.3.1 addStop()

```
void Gradient::addStop (
    Stop stop )
```

Adds a stop to the gradient.

Parameters

<i>stop</i>	The stop to be added to the gradient.
-------------	---------------------------------------

Definition at line 23 of file Gradient.cpp.

```
23 { stops.push_back(stop); }
```

3.3.3.2 getClass()

```
virtual std::string Gradient::getClass ( ) const [pure virtual]
```

Gets the type of the gradient.

Returns

The string that represents the type of the gradient.

Implemented in [RadialGradient](#), and [LinearGradient](#).

3.3.3.3 getPoints()

```
std::pair< Vector2Df, Vector2Df > Gradient::getPoints ( ) const
```

Gets the start and end points of the gradient.

Returns

The start and end points of the gradient.

Definition at line 9 of file Gradient.cpp.

```
9 { return points; }
```

3.3.3.4 getStops()

```
std::vector< Stop > Gradient::getStops ( ) const
```

Gets the stops of the gradient.

Returns

The stops of the gradient.

Definition at line 7 of file Gradient.cpp.

```
7 { return stops; }
```

3.3.3.5 getTransforms()

```
std::vector< std::string > Gradient::getTransforms ( ) const
```

Gets the transforms of the gradient.

Returns

The transforms of the gradient.

Definition at line 19 of file Gradient.cpp.

```
19 {  
20     return transforms;  
21 }
```

3.3.3.6 getUnits()

```
std::string Gradient::getUnits ( ) const
```

Gets the units of the gradient.

Returns

The units of the gradient.

Definition at line 13 of file Gradient.cpp.

```
13 { return units; }
```

3.3.3.7 setTransforms()

```
void Gradient::setTransforms (
    std::vector< std::string > transforms )
```

Gets the transforms of the gradient.

Returns

The transforms of the gradient.

Definition at line 15 of file Gradient.cpp.

```
15                                     {
16     this->transforms = transforms;
17 }
```

3.3.3.8 setUnits()

```
void Gradient::setUnits (
    std::string units )
```

Gets the units of the gradient.

Returns

The units of the gradient.

Definition at line 11 of file Gradient.cpp.

```
11 { this->units = units; }
```

The documentation for this class was generated from the following files:

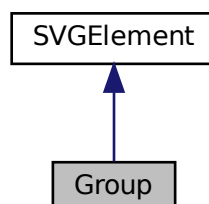
- src/graphics/Gradient.hpp
- src/graphics/Gradient.cpp

3.4 Group Class Reference

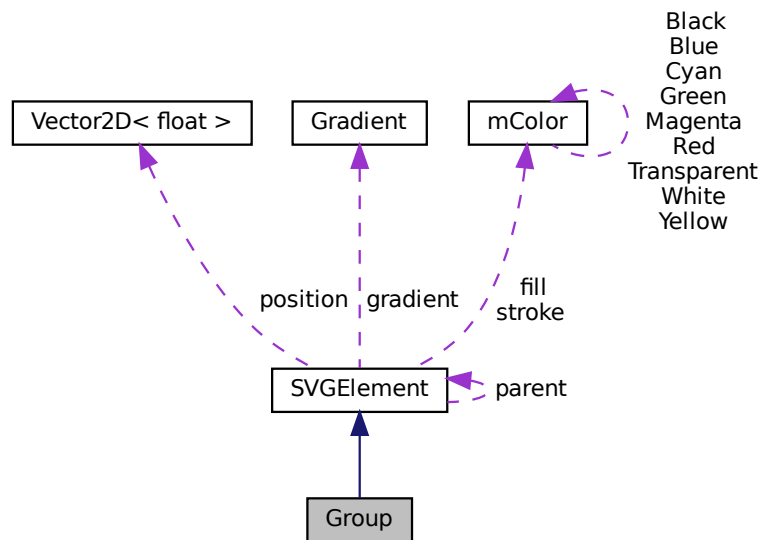
A composite class that contains a vector of shape pointers (polymorphic).

```
#include <Group.hpp>
```

Inheritance diagram for Group:



Collaboration diagram for Group:



Public Member Functions

- `Group ()`
Constructs a `Group` object.
- `Group (Attributes attributes)`
Constructs a `Group` object.
- `~Group ()`
Destructs a `Group` object.
- `std::string getClass ()` const override
Gets the type of the shape.
- `Attributes getAttributes ()` const
Gets the attributes of the shape.
- `void addElement (SVGElement *shape)` override
Adds a shape to the composite group.
- `std::vector< SVGElement * > getElements ()` const
Gets the vector of shapes in the composite group.
- `void printData ()` const override
Prints the data of the shape.

Private Attributes

- `std::vector< SVGElement * > shapes`
Vector of shapes in the group.
- `Attributes attributes`
Attributes of the group.

Additional Inherited Members

3.4.1 Detailed Description

A composite class that contains a vector of shape pointers (polymorphic).

The [Group](#) class is derived from the [SVGElement](#) class and defines a group of SVGElements. The [Group](#) class is a composite class that contains a vector of [SVGElement](#) pointers (polymorphic). The [Group](#) class is used to group SVGElements together.

Definition at line 19 of file Group.hpp.

3.4.2 Constructor & Destructor Documentation

3.4.2.1 Group()

```
Group::Group (  
    Attributes attributes )
```

Constructs a [Group](#) object.

Parameters

<i>attributes</i>	The attributes of the group.
-------------------	------------------------------

Definition at line 5 of file Group.cpp.

```
5 : attributes(attributes) {}
```

3.4.3 Member Function Documentation

3.4.3.1 addElement()

```
void Group::addElement (  
    SVGElement * shape ) [override], [virtual]
```

Adds a shape to the composite group.

Parameters

<i>shape</i>	The shape to be added to the composite group.
--------------	---

Reimplemented from [SVGElement](#).

Definition at line 17 of file Group.cpp.

```
17                                     {
18     shapes.push_back(shape);
19     shape->setParent(this);
20 }
```

3.4.3.2 getAttributes()

```
Attributes Group::getAttributes ( ) const
```

Gets the attributes of the shape.

Note

This function uses rapidXML to parse the SVG file and get the attributes of the shape.

Returns

The attributes of the shape that parsed from the SVG file.

Definition at line 15 of file Group.cpp.

```
15 { return attributes; }
```

3.4.3.3 getClass()

```
std::string Group::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string that represents the type of the shape.

Implements [SVGElement](#).

Definition at line 13 of file Group.cpp.

```
13 { return "Group"; }
```

3.4.3.4 getElements()

```
std::vector< SVGElement * > Group::getElements ( ) const
```

Gets the vector of shapes in the composite group.

Returns

The vector of shapes in the composite group.

Definition at line 22 of file Group.cpp.

```
22 { return shapes; }
```

3.4.3.5 printData()

```
void Group::printData ( ) const [override], [virtual]
```

Prints the data of the shape.

Note

This function is used for debugging purposes.

Reimplemented from [SVGElement](#).

Definition at line 24 of file Group.cpp.

```
24     {  
25         std::cout << "Group: " << std::endl;  
26         for (auto shape : shapes) {  
27             std::cout << "    ";  
28             shape->printData();  
29             std::cout << std::endl;  
30         }  
31 }
```

The documentation for this class was generated from the following files:

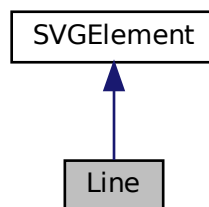
- src/graphics/Group.hpp
- src/graphics/Group.cpp

3.5 Line Class Reference

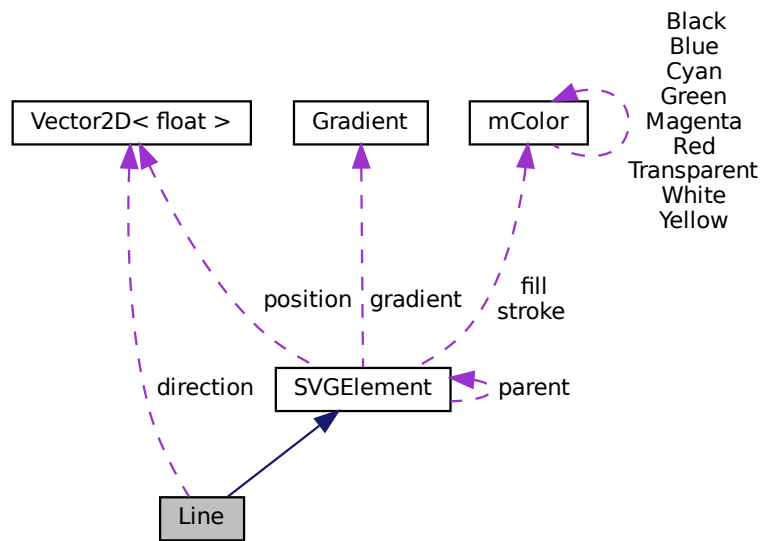
Represents a line in 2D space.

```
#include <Line.hpp>
```

Inheritance diagram for Line:



Collaboration diagram for Line:



Public Member Functions

- [Line](#) (const [Vector2Df](#) &point1, const [Vector2Df](#) &point2, [mColor](#) stroke, float stroke_width)
Constructs a [Line](#) object.
- std::string [getClass](#) () const override
Gets the type of the shape.
- void [setDirection](#) (const [Vector2Df](#) &direction)
Sets the direction of the line.
- [Vector2Df](#) [getDirection](#) () const
Gets the direction of the line.
- float [getLength](#) () const
Gets the length of the line.

Private Attributes

- [Vector2Df](#) direction
Direction of the line.

Additional Inherited Members

3.5.1 Detailed Description

Represents a line in 2D space.

The [Line](#) class is derived from the [SVGElement](#) class and defines a line segment with a specified direction and thickness.

Definition at line 12 of file Line.hpp.

3.5.2 Constructor & Destructor Documentation

3.5.2.1 Line()

```
Line::Line (
    const Vector2Df & point1,
    const Vector2Df & point2,
    mColor stroke,
    float stroke_width )
```

Constructs a [Line](#) object.

Parameters

<i>point1</i>	The starting point of the line.
<i>point2</i>	The ending point of the line.
<i>stroke</i>	The color of the line (default is sf::Color::White).
<i>stroke_width</i>	The thickness of the line (default is 1.0).

Definition at line 5 of file Line.cpp.

```
7 : SVGElement(mColor::Transparent, stroke, stroke_width, point1),
8   direction(point2) {}
```

3.5.3 Member Function Documentation

3.5.3.1 getClass()

```
std::string Line::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Line".

Implements [SVGElement](#).

Definition at line 10 of file Line.cpp.

```
10 { return "Line"; }
```

3.5.3.2 getDirection()

```
Vector2Df Line::getDirection ( ) const
```

Gets the direction of the line.

Returns

The direction of the line.

Definition at line 16 of file Line.cpp.

```
16 { return direction; }
```

3.5.3.3 getLength()

```
float Line::getLength ( ) const
```

Gets the length of the line.

Returns

The length of the line.

Definition at line 18 of file Line.cpp.

```
18 {  
19     return std::sqrt(direction.x * direction.x + direction.y * direction.y);  
20 }
```

3.5.3.4 setDirection()

```
void Line::setDirection (  
    const Vector2Df & direction )
```

Sets the direction of the line.

Parameters

<i>direction</i>	The new direction of the line.
------------------	--------------------------------

Definition at line 12 of file Line.cpp.

```
12 {  
13     this->direction = direction;  
14 }
```

The documentation for this class was generated from the following files:

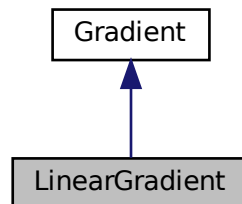
- src/graphics/Line.hpp
- src/graphics/Line.cpp

3.6 LinearGradient Class Reference

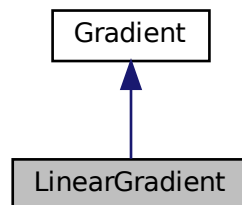
A class that represents a linear gradient.

```
#include <LinearGradient.hpp>
```

Inheritance diagram for LinearGradient:



Collaboration diagram for LinearGradient:



Public Member Functions

- `LinearGradient` (`std::vector< Stop > stops`, `std::pair< Vector2Df, Vector2Df > points`, `std::string units`)
Constructs a `LinearGradient` object.
- `std::string getClass ()` const override
Gets the type of the gradient.

3.6.1 Detailed Description

A class that represents a linear gradient.

The `LinearGradient` class is derived from the `Gradient` class and represents a linear gradient. It contains a vector of `Stop` objects that represent the stops of the gradient. It also contains a pair of `Vector2D` objects that represent the start and end points of the gradient.

Definition at line 14 of file `LinearGradient.hpp`.

3.6.2 Constructor & Destructor Documentation

3.6.2.1 LinearGradient()

```
LinearGradient::LinearGradient (
    std::vector< Stop > stops,
    std::pair< Vector2Df, Vector2Df > points,
    std::string units )
```

Constructs a [LinearGradient](#) object.

Parameters

<i>stops</i>	The stops of the gradient.
<i>points</i>	The start and end points of the gradient.
<i>units</i>	The units of the gradient.

Definition at line 3 of file LinearGradient.cpp.

```
6 : Gradient(stops, points, units) {}
```

3.6.3 Member Function Documentation

3.6.3.1 getClass()

```
std::string LinearGradient::getClass ( ) const [override], [virtual]
```

Gets the type of the gradient.

Returns

The string "LinearGradient".

Note

This function is used for determining the type of the gradient.

Implements [Gradient](#).

Definition at line 8 of file LinearGradient.cpp.

```
8 { return "LinearGradient"; }
```

The documentation for this class was generated from the following files:

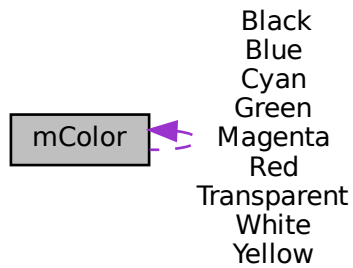
- src/graphics/LinearGradient.hpp
- src/graphics/LinearGradient.cpp

3.7 mColor Class Reference

Utility class for manipulating RGBA mColors.

```
#include <Color.hpp>
```

Collaboration diagram for mColor:



Public Member Functions

- `mColor ()`
Default constructor.
- `mColor (int red, int green, int blue, int alpha=255)`
Construct the `mColor` from its 4 RGBA components.
- `mColor (int color)`
Construct the color from 32-bit unsigned integer.

Public Attributes

- `int r`
Red component.
- `int g`
Green component.
- `int b`
Blue component.
- `int a`
Alpha (opacity) component.

Static Public Attributes

- static const [mColor Black](#)
Black predefined color.
- static const [mColor White](#)
White predefined color.
- static const [mColor Red](#)
Red predefined color.
- static const [mColor Green](#)
Green predefined color.
- static const [mColor Blue](#)
Blue predefined color.
- static const [mColor Yellow](#)
Yellow predefined color.
- static const [mColor Magenta](#)
Magenta predefined color.
- static const [mColor Cyan](#)
Cyan predefined color.
- static const [mColor Transparent](#)
Transparent (black) predefined color.

Friends

- `std::ostream & operator<< (std::ostream &os, const mColor &color)`
Prints the color.

3.7.1 Detailed Description

Utility class for manipulating RGBA mColors.

Definition at line 11 of file Color.hpp.

3.7.2 Constructor & Destructor Documentation

3.7.2.1 mColor() [1/3]

```
mColor::mColor ( )
```

Default constructor.

Constructs an opaque black [mColor](#). It is equivalent to [mColor\(0, 0, 0, 255\)](#).

Definition at line 14 of file Color.cpp.

```
14 : r(0), g(0), b(0), a(255) {}
```

3.7.2.2 mColor() [2/3]

```
mColor::mColor (
    int red,
    int green,
    int blue,
    int alpha = 255 )
```

Construct the [mColor](#) from its 4 RGBA components.

Parameters

<i>red</i>	Red component (in the range [0, 255])
<i>green</i>	Green component (in the range [0, 255])
<i>blue</i>	Blue component (in the range [0, 255])
<i>alpha</i>	Alpha (opacity) component (in the range [0, 255])

Definition at line 16 of file Color.cpp.

```

17     : r(red), g(green), b(blue), a(alpha) {
18     r = std::clamp(r, 0, 255);
19     g = std::clamp(g, 0, 255);
20     b = std::clamp(b, 0, 255);
21     a = std::clamp(a, 0, 255);
22 }
```

3.7.2.3 mColor() [3/3]

```

mColor::mColor (
    int color ) [explicit]
```

Construct the color from 32-bit unsigned integer.

Parameters

<i>color</i>	Number containing the RGBA components (in that order)
--------------	---

Definition at line 24 of file Color.cpp.

```

25     : r(static_cast< int >((color & 0xff000000) >> 24)),
26     g(static_cast< int >((color & 0x00ff0000) >> 16)),
27     b((color & 0x0000ff00) >> 8), a((color & 0x000000ff) >> 0) {}
```

3.7.3 Friends And Related Function Documentation

3.7.3.1 operator<<

```

std::ostream& operator<< (
    std::ostream & os,
    const mColor & color ) [friend]
```

Prints the color.

Parameters

<i>os</i>	output stream
<i>color</i>	color to be printed

Returns

output stream

Note

This function is used for printing the color.

Definition at line 29 of file Color.cpp.

```
29 {  
30     os << "Color(" << color.r << ", " << color.g << ", " << color.b << ", "  
31         << color.a << ")";  
32     return os;  
33 }
```

The documentation for this class was generated from the following files:

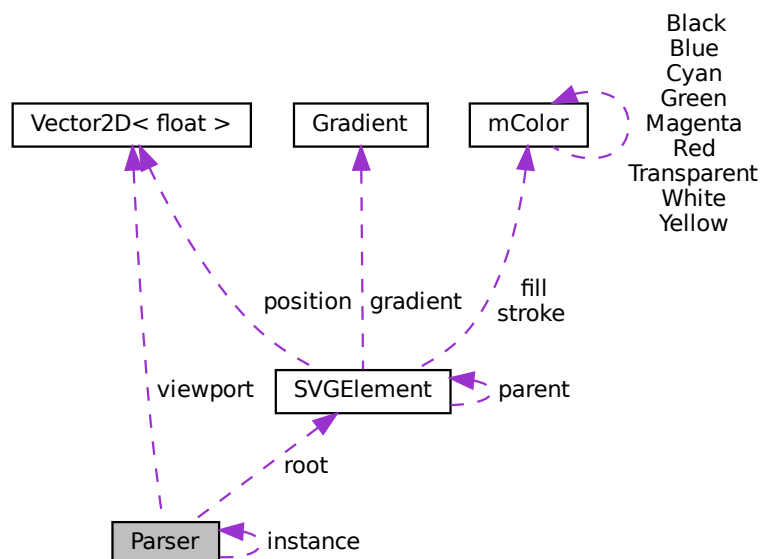
- src/graphics/Color.hpp
- src/graphics/Color.cpp

3.8 Parser Class Reference

To manipulate and parse an SVG file.

```
#include <Parser.hpp>
```

Collaboration diagram for Parser:



Public Member Functions

- [Parser](#) (const [Parser](#) &)=delete
Deleted copy constructor to enforce the singleton pattern.
- [~Parser](#) ()
Destructor for the [Parser](#) class.
- [Group](#) * [getRoot](#) ()
Gets the root of the tree of [SVGElements](#).
- void [printShapesData](#) ()
Prints the data of the shapes.
- std::pair< [Vector2Df](#), [Vector2Df](#) > [getViewBox](#) () const
Gets the viewBox of the SVG file.
- [Vector2Df](#) [getViewPort](#) () const
Gets the viewport of the SVG file.

Static Public Member Functions

- static [Parser](#) * [getInstance](#) (const std::string &file_name)
Gets the singleton instance of the [Parser](#) class.

Private Member Functions

- [Parser](#) (const std::string &file_name)
Construct a new [Parser](#) object.
- [SVGElement](#) * [parseElements](#) (std::string file_name)
Parses the SVG file and creates a tree of [SVGElements](#).
- std::string [getAttribute](#) (rapidxml::xml_node<> *node, std::string name)
Gets the attributes of a node.
- float [getFloatAttribute](#) (rapidxml::xml_node<> *node, std::string name)
Gets the floating point attributes of a node.
- std::vector< [Stop](#) > [getGradientStops](#) (rapidxml::xml_node<> *node)
Gets the gradient stops of a node.
- void [GetGradients](#) (rapidxml::xml_node<> *node)
Gets the gradients of a node.
- [Gradient](#) * [parseGradient](#) (std::string id)
Gets the gradient of a node.
- [mColor](#) [parseColor](#) (rapidxml::xml_node<> *node, std::string color, std::string &id)
Gets the color attributes of a node.
- std::vector< [Vector2Df](#) > [parsePoints](#) (rapidxml::xml_node<> *node)
Gets the points of the element.
- std::vector< [PathPoint](#) > [parsePathPoints](#) (rapidxml::xml_node<> *node)
Gets the points of the path element.
- std::vector< std::string > [getTransformOrder](#) (rapidxml::xml_node<> *node)
Gets the transform order of the element.
- [Line](#) * [parseLine](#) (rapidxml::xml_node<> *node, const [mColor](#) &stroke_color, float stroke_width)
Parses the line element.
- [Rect](#) * [parseRect](#) (rapidxml::xml_node<> *node, const [mColor](#) &fill_color, const [mColor](#) &stroke_color, float stroke_width)
Parses the rect element.

- class [Polyline](#) * [parsePolyline](#) (rapidxml::xml_node<> *node, const [mColor](#) &fill_color, const [mColor](#) &stroke_color, float stroke_width)
Parses the polyline element.
- class [Polygon](#) * [parsePolygon](#) (rapidxml::xml_node<> *node, const [mColor](#) &fill_color, const [mColor](#) &stroke_color, float stroke_width)
Parses the polygon element.
- [Circle](#) * [parseCircle](#) (rapidxml::xml_node<> *node, const [mColor](#) &fill_color, const [mColor](#) &stroke_color, float stroke_width)
Parses the circle element.
- class [Ell](#) * [parseEllipse](#) (rapidxml::xml_node<> *node, const [mColor](#) &fill_color, const [mColor](#) &stroke_color, float stroke_width)
Parses the ellipse element.
- [Path](#) * [parsePath](#) (rapidxml::xml_node<> *node, const [mColor](#) &fill_color, const [mColor](#) &stroke_color, float stroke_width)
Parses the path element.
- [Text](#) * [parseText](#) (rapidxml::xml_node<> *node, const [mColor](#) &fill_color, const [mColor](#) &stroke_color, float stroke_width)
Parses the text element.
- [SVGElement](#) * [parseShape](#) (rapidxml::xml_node<> *node)
Parses the group of elements.

Private Attributes

- [SVGElement](#) * [root](#)
The root of the SVG file.
- std::map< std::string, [Gradient](#) * > [gradients](#)
- std::pair< [Vector2Df](#), [Vector2Df](#) > [viewbox](#)
The viewbox of the SVG file.
- [Vector2Df](#) [viewport](#)
The viewport of the SVG file.

Static Private Attributes

- static [Parser](#) * [instance](#) = nullptr
The instance of the [Parser](#).

3.8.1 Detailed Description

To manipulate and parse an SVG file.

The [Parser](#) class is a singleton class that is used to parse an SVG file and create a tree of SVGElements.

Definition at line 24 of file Parser.hpp.

3.8.2 Constructor & Destructor Documentation

3.8.2.1 Parser()

```
Parser::Parser (
    const std::string & file_name ) [private]
```

Construct a new [Parser](#) object.

Parameters

<i>file_name</i>	The name of the file to be parsed.
------------------	------------------------------------

Definition at line 165 of file Parser.cpp.

```

165                                     {
166     root = parseElements(file_name);
167 }
```

3.8.3 Member Function Documentation

3.8.3.1 getAttribute()

```

std::string Parser::getAttribute (
    rapidxml::xml_node<> * node,
    std::string name ) [private]
```

Gets the attributes of a node.

Parameters

<i>node</i>	The node to be parsed.
<i>name</i>	The name of tag to be parsed.

Returns

The attributes of the node.

Definition at line 296 of file Parser.cpp.

```

296                                     {
297     if (name == "text") return removeExtraSpaces(node->value());
298     std::string result;
299     if (node->first_attribute(name.c_str()) == NULL) {
300         if (name == "fill" || name == "stop-color")
301             result = "black";
302         else if (name == "stroke" || name == "transform" || name == "rotate" ||
303                 name == "font-style")
304             result = "none";
305         else if (name == "text-anchor")
306             result = "start";
307         else if (name == "fill-rule")
308             result = "nonzero";
309         else if (name == "gradientUnits")
310             result = "objectBoundingBox";
311     } else {
312         result = node->first_attribute(name.c_str())->value();
313     }
314     return result;
315 }
```

3.8.3.2 getFloatAttribute()

```

float Parser::getFloatAttribute (
    rapidxml::xml_node<> * node,
    std::string name ) [private]
```


Gets the floating point attributes of a node.

Parameters

<i>node</i>	The node to be parsed.
<i>name</i>	The name of tag to be parsed.

Returns

The floating point attributes of the node.

Definition at line 317 of file Parser.cpp.

```

317                                     {
318     float result;
319     if (node->first_attribute(name.c_str()) == NULL) {
320         if (std::string(node->name()).find("Gradient") != std::string::npos) {
321             if (name == "x1" || name == "y1" || name == "fr")
322                 result = 0;
323             else if (name == "cx" || name == "cy")
324                 result = name == "cx" ? 0.5 * this->viewbox.second.x
325                                     : 0.5 * this->viewbox.second.y;
326             else if (name == "r") {
327                 result = sqrt((pow(this->viewbox.second.x, 2) +
328                               pow(this->viewbox.second.y, 2)) /
329                               2) /
330                               2;
331             } else if (name == "fx" || name == "fy")
332                 result = name == "fx" ? getFloatAttribute(node, "cx")
333                                     : getFloatAttribute(node, "cy");
334             else
335                 result = name == "x2" ? this->viewbox.second.x
336                                     : this->viewbox.second.y;
337         } else {
338             if (name == "stroke-width" || name == "stroke-opacity" ||
339                 name == "fill-opacity" || name == "opacity" ||
340                 name == "stop-opacity")
341                 result = 1;
342             else
343                 result = 0;
344         }
345     } else {
346         if (name == "width" || name == "height") {
347             std::string value = node->first_attribute(name.c_str())->value();
348             if (value.find("%") != std::string::npos) {
349                 result = std::stof(value.substr(0, value.find("%"))) *
350                           this->viewbox.second.x / 100;
351             } else if (value.find("pt") != std::string::npos) {
352                 result = std::stof(value.substr(0, value.find("pt"))) * 1.33;
353             } else {
354                 result = std::stof(value);
355             }
356         } else
357             result = std::stof(node->first_attribute(name.c_str())->value());
358     }
359     return result;
360 }
```

3.8.3.3 GetGradients()

```

void Parser::GetGradients (
    rapidxml::xml_node<> * node ) [private]
```

Gets the gradients of a node.

Parameters

<i>node</i>	The node to be parsed.
-------------	------------------------

Definition at line 428 of file Parser.cpp.

```

428                                     {
429     rapidxml::xml_node<> *gradient_node = node->first_node();
430     while (gradient_node) {
431         if (std::string(gradient_node->name()).find("Gradient") !=
432             std::string::npos) {
433             Gradient *gradient;
434             std::string id = getAttribute(gradient_node, "id");
435             std::string units = getAttribute(gradient_node, "gradientUnits");
436             std::vector< Stop > stops = getGradientStops(gradient_node);
437             std::string href = getAttribute(gradient_node, "xlink:href");
438             int pos = href.find("#");
439             if (pos != std::string::npos) {
440                 href = href.substr(pos + 1);
441             }
442             if (std::string(gradient_node->name()).find("linear") !=
443                 std::string::npos) {
444                 float x1 = getFloatAttribute(gradient_node, "x1");
445                 float y1 = getFloatAttribute(gradient_node, "y1");
446                 float x2 = getFloatAttribute(gradient_node, "x2");
447                 float y2 = getFloatAttribute(gradient_node, "y2");
448                 std::pair< Vector2Df, Vector2Df > points = {{x1, y1}, {x2, y2}};
449                 gradient = new LinearGradient(stops, points, units);
450                 if (this->gradients.find(id) == this->gradients.end())
451                     this->gradients[id] = gradient;
452             } else if (std::string(gradient_node->name()).find("radial") !=
453                 std::string::npos) {
454                 float cx = getFloatAttribute(gradient_node, "cx");
455                 float cy = getFloatAttribute(gradient_node, "cy");
456                 float fx = getFloatAttribute(gradient_node, "fx");
457                 float fy = getFloatAttribute(gradient_node, "fy");
458                 float r = getFloatAttribute(gradient_node, "r");
459                 float fr = getFloatAttribute(gradient_node, "fr");
460                 std::pair< Vector2Df, Vector2Df > points = {{cx, cy}, {fx, fy}};
461                 Vector2Df radius(r, fr);
462                 gradient = new RadialGradient(stops, points, radius, units);
463                 if (this->gradients.find(id) == this->gradients.end())
464                     this->gradients[id] = gradient;
465             }
466             if (href != "") {
467                 for (auto stop : parseGradient(href)->getStops()) {
468                     gradient->addStop(stop);
469                 }
470             }
471             if (gradient != NULL)
472                 gradient->setTransforms(getTransformOrder(gradient_node));
473         }
474         gradient_node = gradient_node->next_sibling();
475     }
476 }

```

3.8.3.4 getGradientStops()

```

std::vector< Stop > Parser::getGradientStops (
    rapidxml::xml_node<> * node ) [private]

```

Gets the gradient stops of a node.

Parameters

<i>node</i>	The node to be parsed.
-------------	------------------------

Returns

The gradient stops of the node.

Definition at line 412 of file Parser.cpp.

```

412                                     {
413     std::vector< Stop > stops;
414     rapidxml::xml_node<> *stop_node = node->first_node();

```

```

415     while (stop_node) {
416         if (std::string(stop_node->name()) == "stop") {
417             std::string id = "";
418             mColor color = parseColor(stop_node, "stop-color", id);
419             float offset = getFloatAttribute(stop_node, "offset");
420             if (offset > 1) offset /= 100;
421             stops.push_back(Stop(color, offset));
422         }
423         stop_node = stop_node->next_sibling();
424     }
425     return stops;
426 }

```

3.8.3.5 getInstance()

```

Parser * Parser::getInstance (
    const std::string & file_name ) [static]

```

Gets the singleton instance of the [Parser](#) class.

Parameters

<i>file_name</i>	The name of the file to be parsed.
------------------	------------------------------------

Returns

The singleton instance of the [Parser](#) class.

Definition at line 158 of file Parser.cpp.

```

158                                     {
159     if (instance == nullptr) {
160         instance = new Parser(file_name);
161     }
162     return instance;
163 }

```

3.8.3.6 getRoot()

```

Group * Parser::getRoot ( )

```

Gets the root of the tree of SVGElements.

Returns

The root of the tree of SVGElements.

Definition at line 169 of file Parser.cpp.

```

169 { return dynamic_cast< Group * >(root); }

```

3.8.3.7 getTransformOrder()

```

std::vector< std::string > Parser::getTransformOrder (
    rapidxml::xml_node<> * node ) [private]

```

Gets the transform order of the element.

Parameters

<i>node</i>	The node to be parsed.
-------------	------------------------

Returns

The transform order of the element

Definition at line 637 of file Parser.cpp.

```

638     {
639         std::string transform_tag;
640         if (std::string(node->name()).find("Gradient") != std::string::npos)
641             transform_tag = getAttribute(node, "gradientTransform");
642         else
643             transform_tag = getAttribute(node, "transform");
644         std::vector< std::string > order;
645         std::stringstream ss(transform_tag);
646         std::string type;
647         while (ss » type) {
648             if (type.find("translate") != std::string::npos ||
649                 type.find("scale") != std::string::npos ||
650                 type.find("rotate") != std::string::npos ||
651                 type.find("matrix") != std::string::npos) {
652                 while (type.find("(") == std::string::npos) {
653                     std::string temp;
654                     ss » temp;
655                     type += " " + temp;
656                 }
657                 std::string temp = type.substr(0, type.find("(") + 1);
658                 temp.erase(std::remove(temp.begin(), temp.end(), ' '), temp.end());
659                 type.erase(0, type.find("(") + 1);
660                 type = temp + type;
661                 order.push_back(temp);
662             }
663         }
664         return order;
665     }

```

3.8.3.8 [getViewBox\(\)](#)

```
std::pair< Vector2Df, Vector2Df > Parser::getViewBox ( ) const
```

Gets the viewBox of the SVG file.

Returns

The viewBox of the SVG file.

Definition at line 830 of file Parser.cpp.

```
830 { return viewbox; }
```

3.8.3.9 [getViewPort\(\)](#)

```
Vector2Df Parser::getViewPort ( ) const
```

Gets the viewport of the SVG file.

Returns

The viewport of the SVG file.

Definition at line 832 of file Parser.cpp.

```
832 { return viewport; }
```

3.8.3.10 parseCircle()

```
Circle * Parser::parseCircle (
    rapidxml::xml_node<> * node,
    const mColor & fill_color,
    const mColor & stroke_color,
    float stroke_width ) [private]
```

Parses the circle element.

Parameters

<i>node</i>	The node to be parsed.
<i>fill_color</i>	The color of the fill
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The circle element

Definition at line 732 of file Parser.cpp.

```
734 {
735     float cx = getFloatAttribute(node, "cx");
736     float cy = getFloatAttribute(node, "cy");
737     float radius = getFloatAttribute(node, "r");
738     Circle *shape = new Circle(radius, Vector2Df(cx, cy), fill_color,
739                               stroke_color, stroke_width);
740     return shape;
741 }
```

3.8.3.11 parseColor()

```
mColor Parser::parseColor (
    rapidxml::xml_node<> * node,
    std::string color,
    std::string & id ) [private]
```

Gets the color attributes of a node.

Parameters

<i>node</i>	The node to be parsed.
<i>color</i>	The name of the color tag to be parsed.
<i>id</i>	The id to check if the color is a reference.

Returns

The color attributes of the node.

Definition at line 362 of file Parser.cpp.

```
363 {
```

```

364     std::string color = getAttribute(node, name);
365     color.erase(std::remove(color.begin(), color.end(), ' '), color.end());
366     if (color.find("url") == std::string::npos) {
367         for (auto &c : color) c = tolower(c);
368     }
369     if (color == "none")
370         return mColor::Transparent;
371     else {
372         mColor result;
373         if (color.find("url") != std::string::npos) {
374             if (color.find("'") != std::string::npos) {
375                 id = color.substr(color.find("'") + 1);
376                 id.erase(id.find("'"));
377                 id.erase(id.find("#"), 1);
378             } else {
379                 id = color.substr(color.find("#") + 1);
380                 id.erase(id.find("#"));
381             }
382             result = mColor::Transparent;
383         } else if (color.find("#") != std::string::npos) {
384             result = getHexColor(color);
385         } else if (color.find("rgb") != std::string::npos) {
386             result = getRgbColor(color);
387         } else {
388             auto color_code = color_map.find(color);
389             if (color_code == color_map.end()) {
390                 std::cout << "Color " << color << " not found" << std::endl;
391                 exit(-1);
392             }
393             result = color_code->second;
394         }
395         if (name == "stop-color")
396             result.a = result.a * getFloatAttribute(node, "stop-opacity");
397         else
398             result.a = result.a * getFloatAttribute(node, name + "-opacity") *
399                 getFloatAttribute(node, "opacity");
400         return result;
401     }
402 }

```

3.8.3.12 parseElements()

```

SVGElement * Parser::parseElements (
    std::string file_name ) [private]

```

Parses the SVG file and creates a tree of SVGElements.

Parameters

<i>file_name</i>	The name of the file to be parsed.
------------------	------------------------------------

Returns

The root of the tree of SVGElements.

Definition at line 181 of file Parser.cpp.

```

181     {
182         rapidxml::xml_document<> doc;
183         std::ifstream file(file_name);
184         std::vector< char > buffer((std::istreambuf_iterator< char >(file)),
185                                   std::istreambuf_iterator< char >());
186         buffer.push_back('\0');
187         doc.parse< 0 >(&buffer[0]);
188
189         rapidxml::xml_node<> *svg = doc.first_node();
190         viewport.x = getFloatAttribute(svg, "width");
191         viewport.y = getFloatAttribute(svg, "height");
192         std::string viewBox = getAttribute(svg, "viewBox");
193         if (viewBox != "") {
194             std::stringstream ss(viewBox);

```

```

195         ss » this->viewbox.first.x » this->viewbox.first.y »
196         this->viewbox.second.x » this->viewbox.second.y;
197     }
198     rapidxml::xml_node<> *node = svg->first_node();
199     rapidxml::xml_node<> *prev = NULL;
200
201     SVGElement *root = new Group();
202     SVGElement *current = root;
203
204     while (node) {
205         if (std::string(node->name()) == "defs") {
206             GetGradients(node);
207             prev = node;
208             node = node->next_sibling();
209         } else if (std::string(node->name()) == "g") {
210             Group *group = dynamic_cast< Group * >(current);
211             for (auto group_attribute : group->getAttributes()) {
212                 bool found = false;
213                 for (auto attribute = node->first_attribute(); attribute;
214                     attribute = attribute->next_attribute()) {
215                     if (std::string(attribute->name()) ==
216                         group_attribute.first) {
217                         if (group_attribute.first == "opacity") {
218                             std::string opacity = std::to_string(
219                                 std::stof(attribute->value()) *
220                                 std::stof(group_attribute.second));
221                             char *value = doc.allocate_string(opacity.c_str());
222                             attribute->value(value);
223                         }
224                         found = true;
225                         break;
226                     }
227                 }
228                 if (!found && group_attribute.first != "transform") {
229                     char *name =
230                         doc.allocate_string(group_attribute.first.c_str());
231                     char *value =
232                         doc.allocate_string(group_attribute.second.c_str());
233                     rapidxml::xml_attribute<> *new_attribute =
234                         doc.allocate_attribute(name, value);
235                     node->append_attribute(new_attribute);
236                 }
237             }
238             Group *new_group = new Group(xmlToString(node->first_attribute()));
239             new_group->setTransforms(getTransformOrder(node));
240             current->addElement(new_group);
241             current = new_group;
242             prev = node;
243             node = node->first_node();
244         } else {
245             Group *group = dynamic_cast< Group * >(current);
246             for (auto group_attribute : group->getAttributes()) {
247                 bool found = false;
248                 for (auto attribute = node->first_attribute(); attribute;
249                     attribute = attribute->next_attribute()) {
250                     if (std::string(attribute->name()) ==
251                         group_attribute.first) {
252                         if (group_attribute.first == "opacity") {
253                             std::string opacity = std::to_string(
254                                 std::stof(attribute->value()) *
255                                 std::stof(group_attribute.second));
256                             char *value = doc.allocate_string(opacity.c_str());
257                             attribute->value(value);
258                         }
259                         found = true;
260                         break;
261                     }
262                 }
263                 if (!found && group_attribute.first != "transform") {
264                     char *name =
265                         doc.allocate_string(group_attribute.first.c_str());
266                     char *value =
267                         doc.allocate_string(group_attribute.second.c_str());
268                     rapidxml::xml_attribute<> *new_attribute =
269                         doc.allocate_attribute(name, value);
270                     node->append_attribute(new_attribute);
271                 }
272             }
273             SVGElement *shape = parseShape(node);
274             if (shape != NULL) current->addElement(shape);
275             prev = node;
276             node = node->next_sibling();
277         }
278         if (node == NULL && current != root) {
279             while (prev->parent()->next_sibling() == NULL) {
280                 current = current->getParent();
281                 prev = prev->parent();

```



```

282         if (prev == svg) {
283             break;
284         }
285     }
286     if (prev == svg) {
287         break;
288     }
289     current = current->getParent();
290     node = prev->parent()->next_sibling();
291 }
292 }
293 return root;
294 }

```

3.8.3.13 parseEllipse()

```

Ell * Parser::parseEllipse (
    rapidxml::xml_node<> * node,
    const mColor & fill_color,
    const mColor & stroke_color,
    float stroke_width ) [private]

```

Parses the ellipse element.

Parameters

<i>node</i>	The node to be parsed.
<i>fill_color</i>	The color of the fill
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The ellipse element

Definition at line 743 of file Parser.cpp.

```

744 {
745     float radius_x = getFloatAttribute(node, "rx");
746     float radius_y = getFloatAttribute(node, "ry");
747     float cx = getFloatAttribute(node, "cx");
748     float cy = getFloatAttribute(node, "cy");
749     Ell *shape = new Ell(Vector2Df(radius_x, radius_y), Vector2Df(cx, cy),
750                          fill_color, stroke_color, stroke_width);
751     return shape;
752 }

```

3.8.3.14 parseGradient()

```

Gradient * Parser::parseGradient (
    std::string id ) [private]

```

Gets the gradient of a node.

Parameters

<i>id</i>	The id of the gradient to be parsed.
-----------	--------------------------------------

Returns

The gradient of the node.

Definition at line 404 of file Parser.cpp.

```

404                                     {
405     if (gradients.find(id) == gradients.end()) {
406         std::cout << "Gradient " << id << " not found" << std::endl;
407         exit(-1);
408     }
409     return gradients.at(id);
410 }
```

3.8.3.15 parseLine()

```

Line * Parser::parseLine (
    rapidxml::xml_node<> * node,
    const mColor & stroke_color,
    float stroke_width ) [private]
```

Parses the line element.

Parameters

<i>node</i>	The node to be parsed.
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The line element

Definition at line 710 of file Parser.cpp.

```

711                                     {
712     Line *shape = new Line(
713         Vector2Df(getFloatAttribute(node, "x1"), getFloatAttribute(node, "y1")),
714         Vector2Df(getFloatAttribute(node, "x2"), getFloatAttribute(node, "y2")),
715         stroke_color, stroke_width);
716     return shape;
717 }
```

3.8.3.16 parsePath()

```

Path * Parser::parsePath (
    rapidxml::xml_node<> * node,
    const mColor & fill_color,
    const mColor & stroke_color,
    float stroke_width ) [private]
```

Parses the path element.

Parameters

<i>node</i>	The node to be parsed.
<i>fill_color</i>	The color of the fill
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The path element

Definition at line 807 of file Parser.cpp.

```

808
809     Path *shape = new Path(fill_color, stroke_color, stroke_width);
810     std::vector< PathPoint > points = parsePathPoints(node);
811     for (auto point : points) {
812         shape->addPoint(point);
813     }
814     std::string fill_rule = getAttribute(node, "fill-rule");
815     fill_rule.erase(std::remove(fill_rule.begin(), fill_rule.end(), ' '),
816                    fill_rule.end());
817     shape->setFillRule(fill_rule);
818     return shape;
819 }
```

3.8.3.17 parsePathPoints()

```

std::vector< PathPoint > Parser::parsePathPoints (
    rapidxml::xml_node<> * node ) [private]
```

Gets the points of the path element.

Parameters

<i>node</i>	The node to be parsed.
-------------	------------------------

Returns

The points of the path element

Definition at line 494 of file Parser.cpp.

```

494
495     std::vector< PathPoint > points;
496     std::string path_string = getAttribute(node, "d");
497
498     formatSvgPathString(path_string);
499
500     std::stringstream ss(path_string);
501     std::string element;
502     PathPoint pPoint{{0, 0}, 'M'};
503     while (ss > element) {
504         if (std::isalpha(element[0])) {
505             pPoint.tc = element[0];
506             if (tolower(pPoint.tc) == 'm' || tolower(pPoint.tc) == 'l' ||
507                 tolower(pPoint.tc) == 'c' || tolower(pPoint.tc) == 's' ||
508                 tolower(pPoint.tc) == 'q' || tolower(pPoint.tc) == 't')
509                 ss >> pPoint.point.x >> pPoint.point.y;
510             else if (tolower(pPoint.tc) == 'h') {
511                 ss >> pPoint.point.x;
512                 pPoint.point.y = 0;
513             }
514             points.push_back(pPoint);
515             pPoint = PathPoint{{0, 0}, 'M'};
516         }
517     }
```

```

513         } else if (tolower(pPoint.tc) == 'v') {
514             ss » pPoint.point.y;
515             pPoint.point.x = 0;
516         } else if (tolower(pPoint.tc) == 'a') {
517             ss » pPoint.radius.x » pPoint.radius.y;
518             ss » pPoint.x_axis_rotation;
519             ss » pPoint.large_arc_flag » pPoint.sweep_flag;
520             ss » pPoint.point.x » pPoint.point.y;
521         }
522     } else {
523         if (tolower(pPoint.tc) == 'm' || tolower(pPoint.tc) == 'l' ||
524             tolower(pPoint.tc) == 'c' || tolower(pPoint.tc) == 's' ||
525             tolower(pPoint.tc) == 'q' || tolower(pPoint.tc) == 't') {
526             if (tolower(pPoint.tc) == 'm') pPoint.tc = 'L';
527             pPoint.point.x = std::stof(element);
528             ss » pPoint.point.y;
529         } else if (tolower(pPoint.tc) == 'h') {
530             pPoint.point.x = std::stof(element);
531             pPoint.point.y = 0;
532         } else if (tolower(pPoint.tc) == 'v') {
533             pPoint.point.y = std::stof(element);
534             pPoint.point.x = 0;
535         } else if (tolower(pPoint.tc) == 'a') {
536             pPoint.radius.x = std::stof(element);
537             ss » pPoint.radius.y;
538             ss » pPoint.x_axis_rotation;
539             ss » pPoint.large_arc_flag » pPoint.sweep_flag;
540             ss » pPoint.point.x » pPoint.point.y;
541         }
542     }
543     points.push_back(pPoint);
544 }
545
546 std::vector< PathPoint > handle_points;
547
548 Vector2Df first_point{0, 0}, cur_point{0, 0};
549 int n = points.size();
550 for (int i = 0; i < n; i++) {
551     if (tolower(points[i].tc) == 'm') {
552         first_point = points[i].point;
553         if (points[i].tc == 'm') {
554             first_point.x = cur_point.x + points[i].point.x;
555             first_point.y = cur_point.y + points[i].point.y;
556         }
557         cur_point = first_point;
558         handle_points.push_back({first_point, 'm'});
559     } else if (tolower(points[i].tc) == 'l' ||
560                tolower(points[i].tc) == 't') {
561         Vector2Df end_point{cur_point.x + points[i].point.x,
562                             cur_point.y + points[i].point.y};
563         if (points[i].tc == 'L' || points[i].tc == 'T')
564             end_point = points[i].point;
565         cur_point = end_point;
566         char TC = tolower(points[i].tc);
567         handle_points.push_back({end_point, TC});
568     } else if (tolower(points[i].tc) == 'h') {
569         Vector2Df end_point{cur_point.x + points[i].point.x, cur_point.y};
570         if (points[i].tc == 'H')
571             end_point = Vector2Df(points[i].point.x, cur_point.y);
572         cur_point = end_point;
573         handle_points.push_back({end_point, 'h'});
574     } else if (tolower(points[i].tc) == 'v') {
575         Vector2Df end_point{cur_point.x, cur_point.y + points[i].point.y};
576         if (points[i].tc == 'V')
577             end_point = Vector2Df(cur_point.x, points[i].point.y);
578         cur_point = end_point;
579         handle_points.push_back({end_point, 'v'});
580     } else if (tolower(points[i].tc) == 'c') {
581         if (i + 2 < n) {
582             Vector2Df control_point1 =
583                 Vector2Df{cur_point.x + points[i].point.x,
584                           cur_point.y + points[i].point.y};
585             Vector2Df control_point2 =
586                 Vector2Df{cur_point.x + points[i + 1].point.x,
587                           cur_point.y + points[i + 1].point.y};
588             Vector2Df control_point3 =
589                 Vector2Df{cur_point.x + points[i + 2].point.x,
590                           cur_point.y + points[i + 2].point.y};
591             if (points[i].tc == 'C') {
592                 control_point1 = points[i].point;
593                 control_point2 = points[i + 1].point;
594                 control_point3 = points[i + 2].point;
595             }
596             i += 2;
597             cur_point = control_point3;
598             handle_points.push_back({control_point1, 'c'});
599             handle_points.push_back({control_point2, 'c'});

```

```

600         handle_points.push_back({control_point3, 'c'});
601     }
602     } else if (tolower(points[i].tc) == 'z') {
603         cur_point = first_point;
604         handle_points.push_back({first_point, 'z'});
605     } else if (tolower(points[i].tc) == 's' ||
606               tolower(points[i].tc) == 'q') {
607         if (i + 1 < n) {
608             Vector2Df control_point1 =
609                 Vector2Df{cur_point.x + points[i].point.x,
610                           cur_point.y + points[i].point.y};
611             Vector2Df control_point2 =
612                 Vector2Df{cur_point.x + points[i + 1].point.x,
613                           cur_point.y + points[i + 1].point.y};
614             if (points[i].tc == 'S' || points[i].tc == 'Q') {
615                 control_point1 = points[i].point;
616                 control_point2 = points[i + 1].point;
617             }
618             i += 1;
619             cur_point = control_point2;
620             char TC = tolower(points[i].tc);
621             handle_points.push_back({control_point1, TC});
622             handle_points.push_back({control_point2, TC});
623         }
624     } else if (tolower(points[i].tc) == 'a') {
625         Vector2Df end_point{cur_point.x + points[i].point.x,
626                             cur_point.y + points[i].point.y};
627         if (points[i].tc == 'A') end_point = points[i].point;
628         handle_points.push_back(
629             {end_point, 'a', points[i].radius, points[i].x_axis_rotation,
630              points[i].large_arc_flag, points[i].sweep_flag});
631         cur_point = end_point;
632     }
633 }
634 return handle_points;
635 }

```

3.8.3.18 parsePoints()

```

std::vector< Vector2Df > Parser::parsePoints (
    rapidxml::xml_node<> * node ) [private]

```

Gets the points of the element.

Parameters

<i>node</i>	The node to be parsed.
-------------	------------------------

Returns

The points of the element

Definition at line 478 of file Parser.cpp.

```

478 {
479     std::vector< Vector2Df > points;
480     std::string points_string = getAttribute(node, "points");
481
482     std::stringstream ss(points_string);
483     float x, y;
484
485     while (ss >> x) {
486         if (ss.peek() == ',') ss.ignore();
487         ss >> y;
488         points.push_back(Vector2Df(x, y));
489     }
490
491     return points;
492 }

```

3.8.3.19 parsePolygon()

```
Polygon * Parser::parsePolygon (
    rapidxml::xml_node<> * node,
    const mColor & fill_color,
    const mColor & stroke_color,
    float stroke_width ) [private]
```

Parses the polygon element.

Parameters

<i>node</i>	The node to be parsed.
<i>fill_color</i>	The color of the fill
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The polygon element

Definition at line 754 of file Parser.cpp.

```
756
757     Polygon *shape = new Polygon(fill_color, stroke_color, stroke_width);
758     std::vector< Vector2Df > points = parsePoints(node);
759     for (auto point : points) {
760         shape->addPoint(point);
761     }
762     std::string fill_rule = getAttribute(node, "fill-rule");
763     fill_rule.erase(std::remove(fill_rule.begin(), fill_rule.end(), ' '),
764                     fill_rule.end());
765     shape->setFillRule(fill_rule);
766     return shape;
767 }
```

3.8.3.20 parsePolyline()

```
Plyline * Parser::parsePolyline (
    rapidxml::xml_node<> * node,
    const mColor & fill_color,
    const mColor & stroke_color,
    float stroke_width ) [private]
```

Parses the polyline element.

Parameters

<i>node</i>	The node to be parsed.
<i>fill_color</i>	The color of the fill
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The polyline element

Definition at line 769 of file Parser.cpp.

```

771 {
772     Polyline *shape = new Polyline(fill_color, stroke_color, stroke_width);
773     std::vector< Vector2Df > points = parsePoints(node);
774     for (auto point : points) {
775         shape->addPoint(point);
776     }
777     std::string fill_rule = getAttribute(node, "fill-rule");
778     fill_rule.erase(std::remove(fill_rule.begin(), fill_rule.end(), ' '),
779                    fill_rule.end());
780     shape->setFillRule(fill_rule);
781     return shape;
782 }
```

3.8.3.21 parseRect()

```

Rect * Parser::parseRect (
    rapidxml::xml_node<> * node,
    const mColor & fill_color,
    const mColor & stroke_color,
    float stroke_width ) [private]
```

Parses the rect element.

Parameters

<i>node</i>	The node to be parsed.
<i>fill_color</i>	The color of the fill
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The rect element

Definition at line 719 of file Parser.cpp.

```

720 {
721     float x = getFloatAttribute(node, "x");
722     float y = getFloatAttribute(node, "y");
723     float rx = getFloatAttribute(node, "rx");
724     float ry = getFloatAttribute(node, "ry");
725     Rect *shape =
726         new Rect(getFloatAttribute(node, "width"),
727                getFloatAttribute(node, "height"), Vector2Df(x, y),
728                Vector2Df(rx, ry), fill_color, stroke_color, stroke_width);
729     return shape;
730 }
```

3.8.3.22 parseShape()

```

SVGElement * Parser::parseShape (
    rapidxml::xml_node<> * node ) [private]
```

Parses the group of elements.

Parameters

<i>node</i>	The node to be parsed.
-------------	------------------------

Returns

The group of elements

Definition at line 667 of file Parser.cpp.

```

667                                     {
668     SVGElement *shape = NULL;
669     std::string type = node->name();
670     std::string id = "";
671     mColor stroke_color = parseColor(node, "stroke", id);
672     mColor fill_color = parseColor(node, "fill", id);
673     float stroke_width = getFloatAttribute(node, "stroke-width");
674     if (type == "line") {
675         shape = parseLine(node, stroke_color, stroke_width);
676     } else if (type == "rect") {
677         shape = parseRect(node, fill_color, stroke_color, stroke_width);
678     } else if (type == "circle") {
679         shape = parseCircle(node, fill_color, stroke_color, stroke_width);
680     } else if (type == "ellipse") {
681         shape = parseEllipse(node, fill_color, stroke_color, stroke_width);
682     } else if (type == "polygon") {
683         shape = parsePolygon(node, fill_color, stroke_color, stroke_width);
684     } else if (type == "polyline") {
685         shape = parsePolyline(node, fill_color, stroke_color, stroke_width);
686     } else if (type == "path") {
687         shape = parsePath(node, fill_color, stroke_color, stroke_width);
688     } else if (type == "text") {
689         shape = parseText(node, fill_color, stroke_color, stroke_width);
690     }
691     if (shape != NULL) {
692         if (type == "text") {
693             float dx = getFloatAttribute(node, "dx");
694             float dy = getFloatAttribute(node, "dy");
695             std::string transform = "translate(" + std::to_string(dx) + " " +
696                                     std::to_string(dy) + ")";
697             std::vector< std::string > transform_order =
698                 getTransformOrder(node);
699             transform_order.push_back(transform);
700             shape->setTransforms(transform_order);
701         } else
702             shape->setTransforms(getTransformOrder(node));
703         if (id != "") {
704             shape->setGradient(parseGradient(id));
705         }
706     }
707     return shape;
708 }
```

3.8.3.23 parseText()

```

Text * Parser::parseText (
    rapidxml::xml_node<> * node,
    const mColor & fill_color,
    const mColor & stroke_color,
    float stroke_width ) [private]
```

Parses the text element.

Parameters

<i>node</i>	The node to be parsed.
<i>fill_color</i>	The color of the fill
<i>stroke_color</i>	The color of the stroke
<i>stroke_width</i>	The width of the stroke

Returns

The text element

Definition at line 784 of file Parser.cpp.

```

785                                     {
786     float x = getFloatAttribute(node, "x");
787     float y = getFloatAttribute(node, "y");
788     float font_size = getFloatAttribute(node, "font-size");
789     std::string text = getAttribute(node, "text");
790
791     Text *shape =
792         new Text(Vector2Df(x - (font_size * 6.6 / 40),
793                           y - font_size + (font_size * 4.4 / 40)),
794                 text, font_size, fill_color, stroke_color, stroke_width);
795
796     std::string anchor = getAttribute(node, "text-anchor");
797     anchor.erase(std::remove(anchor.begin(), anchor.end(), ' '), anchor.end());
798     shape->setAnchor(anchor);
799
800     std::string style = getAttribute(node, "font-style");
801     style.erase(std::remove(style.begin(), style.end(), ' '), style.end());
802     shape->setFontStyle(style);
803
804     return shape;
805 }
```

3.8.3.24 printShapesData()

```
void Parser::printShapesData ( )
```

Prints the data of the shapes.

Note

This function is used for debugging.

Definition at line 828 of file Parser.cpp.

```
828 { root->printData(); }
```

3.8.4 Member Data Documentation

3.8.4.1 gradients

```
std::map< std::string, Gradient* > Parser::gradients [private]
```

The gradients of the SVG file.

Definition at line 277 of file Parser.hpp.

The documentation for this class was generated from the following files:

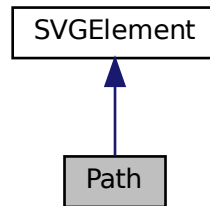
- src/Parser.hpp
- src/Parser.cpp

3.9 Path Class Reference

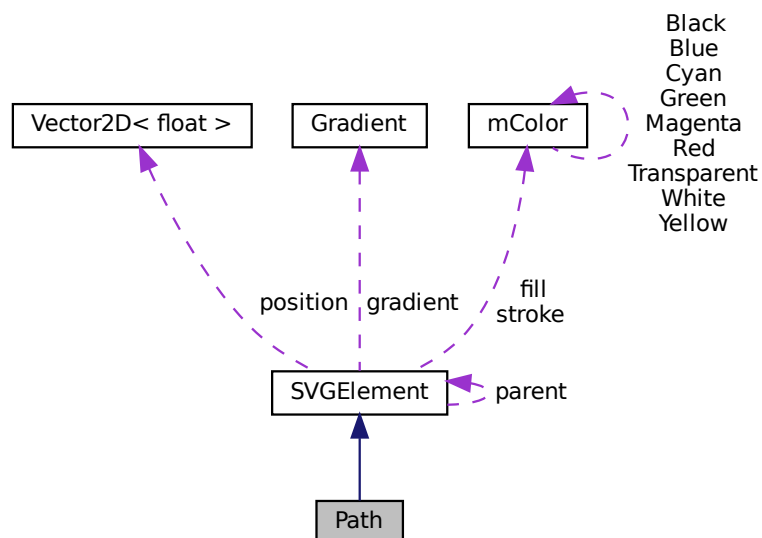
Represents a path element in 2D space.

```
#include <Path.hpp>
```

Inheritance diagram for Path:



Collaboration diagram for Path:



Public Member Functions

- `Path` (const `mColor` &fill, const `mColor` &stroke, float stroke_width)
Constructs a `Path` object.
- `std::string getClass ()` const override

- Gets the type of the shape.*
 • void [addPoint](#) ([PathPoint](#) point)
 - Adds a point to the path.*
- std::vector< [PathPoint](#) > [getPoints](#) () const
 - Gets the vector of points in the path.*
- void [setFillRule](#) (std::string [fill_rule](#))
 - Sets the fill rule of the path.*
- std::string [getFillRule](#) () const
 - Gets the current fill rule of the path.*
- void [printData](#) () const override
 - Prints the data of the shape.*

Private Attributes

- std::vector< [PathPoint](#) > [points](#)
 - Vector of points in the path.*
- std::string [fill_rule](#)
 - Fill rule of the path.*

Additional Inherited Members

3.9.1 Detailed Description

Represents a path element in 2D space.

The [Path](#) class is derived from the [SVGElement](#) class and represents a path element in 2D space. The [Path](#) class is used to draw lines, curves, arcs, and other shapes. The [Path](#) class contains a vector of [PathPoints](#) that represent the points in the path.

Definition at line 28 of file [Path.hpp](#).

3.9.2 Constructor & Destructor Documentation

3.9.2.1 Path()

```
Path::Path (
    const mColor & fill,
    const mColor & stroke,
    float stroke_width )
```

Constructs a [Path](#) object.

Parameters

<i>fill</i>	Fill color of the path.
<i>stroke</i>	Outline color of the path.
<i>stroke_width</i>	Thickness of the path outline.

Definition at line 3 of file Path.cpp.

```
4 : SVGElement(fill, stroke, stroke_width) {}
```

3.9.3 Member Function Documentation

3.9.3.1 addPoint()

```
void Path::addPoint (
    PathPoint point )
```

Adds a point to the path.

Parameters

<i>point</i>	The point to be added to the path.
--------------	------------------------------------

Note

This function is used for adding points to the path.

Definition at line 8 of file Path.cpp.

```
8 { points.push_back(point); }
```

3.9.3.2 getClass()

```
std::string Path::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Path".

Implements [SVGElement](#).

Definition at line 6 of file Path.cpp.

```
6 { return "Path"; }
```

3.9.3.3 getFillRule()

```
std::string Path::getFillRule ( ) const
```

Gets the current fill rule of the path.

Returns

The current fill rule of the path.

Note

The fill rule can be either "nonzero" or "evenodd".

The default fill rule is "nonzero".

Definition at line 14 of file Path.cpp.

```
14 { return fill_rule; }
```

3.9.3.4 getPoints()

```
std::vector< PathPoint > Path::getPoints ( ) const
```

Gets the vector of points in the path.

Returns

The vector of points in the path.

Definition at line 10 of file Path.cpp.

```
10 { return points; }
```

3.9.3.5 printData()

```
void Path::printData ( ) const [override], [virtual]
```

Prints the data of the shape.

Note

This function is used for debugging purposes.

Reimplemented from [SVGElement](#).

Definition at line 16 of file Path.cpp.

```
16 {
17     SVGElement::printData();
18     std::cout << "Points: ";
19     for (auto point : points) {
20         std::cout << point.tc << " " << point.point.x << " " << point.point.y
21             << " ";
22     }
23 }
```

3.9.3.6 setFillRule()

```
void Path::setFillRule (
    std::string fill_rule )
```

Sets the fill rule of the path.

Parameters

<i>fill_rule</i>	The new fill rule of the path.
------------------	--------------------------------

Note

This function is used for setting the fill rule of the path.

The fill rule can be either "nonzero" or "evenodd".

Definition at line 12 of file Path.cpp.

```
12 { this->fill_rule = fill_rule; }
```

The documentation for this class was generated from the following files:

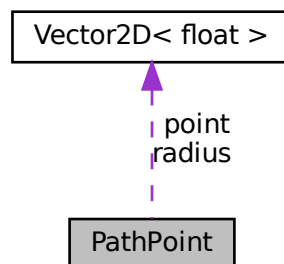
- src/graphics/Path.hpp
- src/graphics/Path.cpp

3.10 PathPoint Struct Reference

A struct that contains a point and a type of point.

```
#include <Path.hpp>
```

Collaboration diagram for PathPoint:



Public Attributes

- `Vector2Df` **point**
- char **tc**
- `Vector2Df` **radius** {0, 0}
- float **x_axis_rotation** = 0.f
- bool **large_arc_flag** = false
- bool **sweep_flag** = false

3.10.1 Detailed Description

A struct that contains a point and a type of point.

Definition at line 10 of file Path.hpp.

The documentation for this struct was generated from the following file:

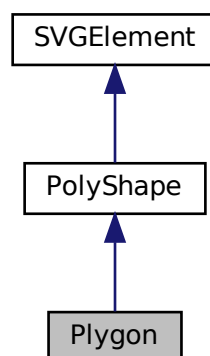
- src/graphics/Path.hpp

3.11 Plygon Class Reference

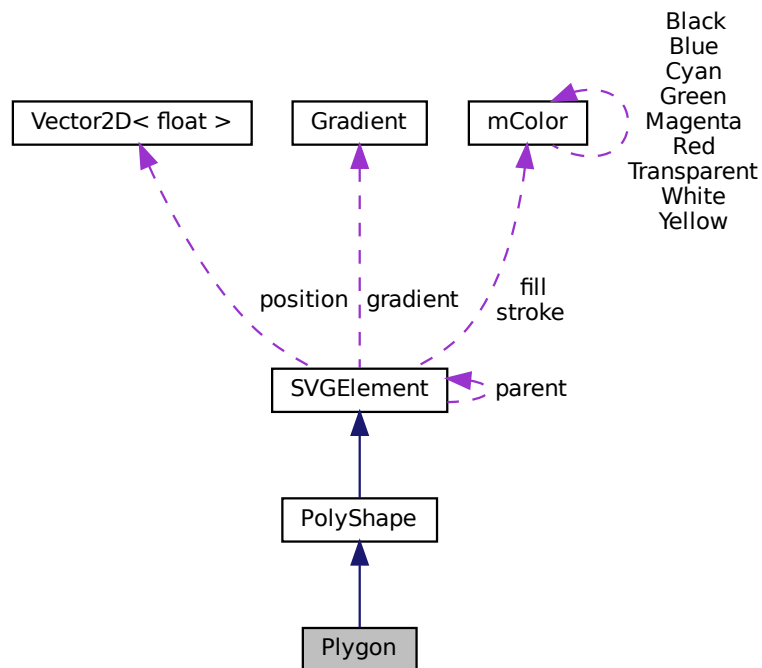
Represents a polygon in 2D space.

```
#include <Polygon.hpp>
```

Inheritance diagram for Plygon:



Collaboration diagram for Polygon:



Public Member Functions

- **Polygon** (**mColor** fill, **mColor** stroke, float stroke_width)
Constructs a Polygon object.
- std::string **getClass** () const override
Gets the type of the shape.

Additional Inherited Members

3.11.1 Detailed Description

Represents a polygon in 2D space.

The Polygon class is derived from the **PolyShape** class and defines a polygon with a variable number of vertices.

Definition at line 12 of file Polygon.hpp.

3.11.2 Constructor & Destructor Documentation

3.11.2.1 Plygon()

```
Plygon::Plygon (
    mColor fill,
    mColor stroke,
    float stroke_width )
```

Constructs a Polygon object.

Parameters

<i>fill</i>	Fill color of the polygon (default is sf::Color::Transparent).
<i>stroke</i>	Outline color of the polygon (default is sf::Color::White).
<i>stroke_width</i>	Thickness of the polygon outline (default is 0).

Definition at line 3 of file Polygon.cpp.

```
4      : PolyShape(fill, stroke, stroke_width) {}
```

3.11.3 Member Function Documentation

3.11.3.1 getClass()

```
std::string Plygon::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Polygon".

Implements [PolyShape](#).

Definition at line 6 of file Polygon.cpp.

```
6 { return "Polygon"; }
```

The documentation for this class was generated from the following files:

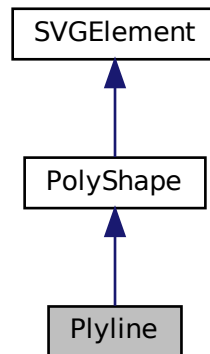
- src/graphics/Polygon.hpp
- src/graphics/Polygon.cpp

3.12 Plyline Class Reference

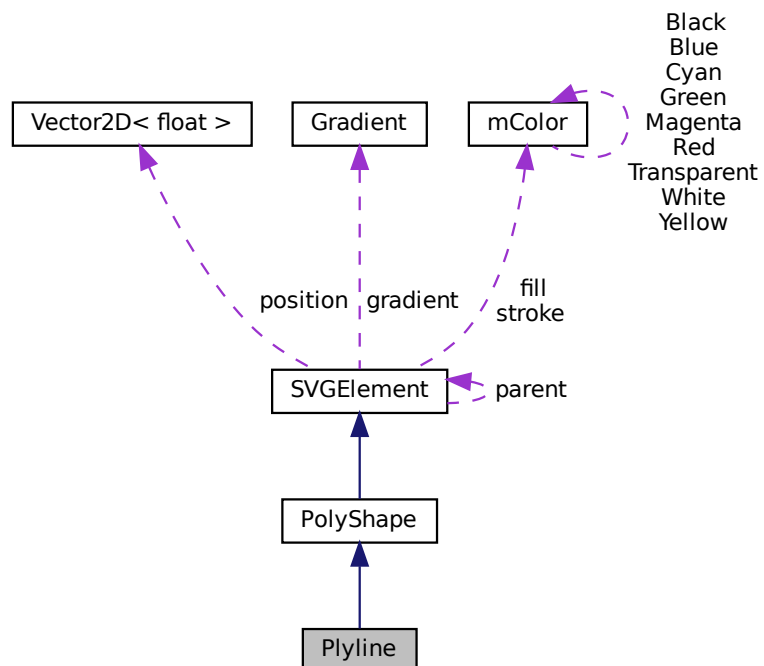
Represents a polyline in 2D space.

```
#include <Polyline.hpp>
```

Inheritance diagram for Plyline:



Collaboration diagram for Plyline:



Public Member Functions

- [Polyline](#) (const [mColor](#) &[fill](#), const [mColor](#) &[stroke](#), float [stroke_width](#))
Constructs a Polyline object.
- `std::string getClass ()` const override
Gets the type of the shape.

Additional Inherited Members

3.12.1 Detailed Description

Represents a polyline in 2D space.

The Polyline class is derived from the [PolyShape](#) class and defines a polyline with a variable number of vertices.

Definition at line 12 of file Polyline.hpp.

3.12.2 Constructor & Destructor Documentation

3.12.2.1 Polyline()

```
Polyline::Polyline (
    const mColor & fill,
    const mColor & stroke,
    float stroke_width )
```

Constructs a Polyline object.

Parameters

<i>stroke_width</i>	The stroke width of the polyline (default is 0).
<i>stroke</i>	The stroke color of the polyline (default is <code>sf::Color::White</code>).
<i>fill</i>	The fill color of the polyline (default is <code>sf::Color::Transparent</code>).

Definition at line 3 of file Polyline.cpp.

```
4 : PolyShape(fill, stroke, stroke_width) {}
```

3.12.3 Member Function Documentation

3.12.3.1 getClass()

```
std::string Polyline::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Polyline".

Implements [PolyShape](#).

Definition at line 6 of file Polyline.cpp.

```
6 { return "Polyline"; }
```

The documentation for this class was generated from the following files:

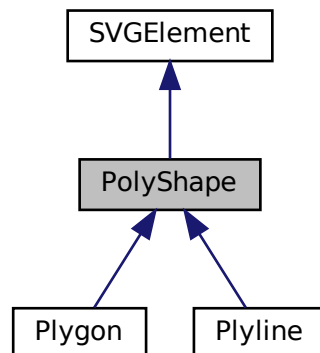
- src/graphics/Polyline.hpp
- src/graphics/Polyline.cpp

3.13 PolyShape Class Reference

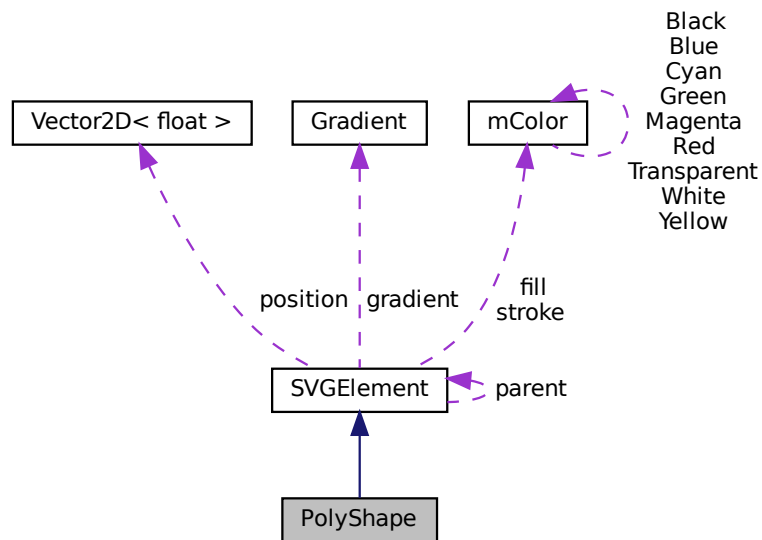
Abstract base class for polygon and polyline shapes in 2D space.

```
#include <PolyShape.hpp>
```

Inheritance diagram for PolyShape:



Collaboration diagram for PolyShape:



Public Member Functions

- `std::string getClass () const =0`
Gets the type of the shape.
- `virtual void addPoint (const Vector2Df &point)`
Adds a vertex to the shape.
- `const std::vector< Vector2Df > &getPoints () const`
Gets the total number of vertices representing the shape.
- `void setFillRule (std::string fill_rule)`
Sets the fill rule of the polyshape.
- `std::string getFillRule () const`
Gets the fill rule of the polyshape.
- `Vector2Df getMinBound () const override`
Gets the minimum bounding box of the shape.
- `Vector2Df getMaxBound () const override`
Gets the maximum bounding box of the shape.
- `void printData () const override`
Prints the data of the shape.

Protected Member Functions

- `PolyShape (const mColor &fill, const mColor &stroke, float stroke_width)`
Constructs a PolyShape object.

Protected Attributes

- `std::vector< Vector2Df > points`
Vertices of the polyshape.
- `std::string fill_rule`
Fill rule of the polyshape.

3.13.1 Detailed Description

Abstract base class for polygon and polyline shapes in 2D space.

The [PolyShape](#) class is derived from the [SVGElement](#) class and defines a common interface for polyline and polygon shapes.

Definition at line 12 of file PolyShape.hpp.

3.13.2 Constructor & Destructor Documentation

3.13.2.1 PolyShape()

```
PolyShape::PolyShape (
    const mColor & fill,
    const mColor & stroke,
    float stroke_width ) [protected]
```

Constructs a [PolyShape](#) object.

Parameters

<i>fill</i>	Fill color of the polyshape (default is <code>sf::Color::Transparent</code>).
<i>stroke</i>	Outline color of the polyshape (default is <code>sf::Color::White</code>).
<i>stroke_width</i>	Thickness of the polyshape outline (default is 0).

Definition at line 3 of file PolyShape.cpp.

```
5 : SVGElement(fill, stroke, stroke_width) {}
```

3.13.3 Member Function Documentation

3.13.3.1 addPoint()

```
void PolyShape::addPoint (
    const Vector2Df & point ) [virtual]
```

Adds a vertex to the shape.

Parameters

<i>point</i>	The position of the vertex to be added.
--------------	---

Definition at line 7 of file PolyShape.cpp.

```
7 { points.push_back(point); }
```

3.13.3.2 getClass()

```
std::string PolyShape::getClass ( ) const [pure virtual]
```

Gets the type of the shape.

Note

This function is pure virtual and must be implemented by derived classes.

Implements [SVGElement](#).

Implemented in [Plyline](#), and [Plygon](#).

3.13.3.3 getFillRule()

```
std::string PolyShape::getFillRule ( ) const
```

Gets the fill rule of the polyshape.

Returns

The fill rule of the polyshape.

Definition at line 15 of file PolyShape.cpp.

```
15 { return fill\_rule; }
```

3.13.3.4 getMaxBound()

```
Vector2Df PolyShape::getMaxBound ( ) const [override], [virtual]
```

Gets the maximum bounding box of the shape.

Returns

The maximum bounding box of the shape.

Reimplemented from [SVGElement](#).

Definition at line 27 of file PolyShape.cpp.

```
27 {
28     float max_x = points[0].x;
29     float max_y = points[0].y;
30     for (auto& point : points) {
31         max_x = std::max(max_x, point.x);
32         max_y = std::max(max_y, point.y);
33     }
34     return Vector2Df(max_x, max_y);
35 }
```

3.13.3.5 getMinBound()

```
Vector2Df PolyShape::getMinBound ( ) const [override], [virtual]
```

Gets the minimum bounding box of the shape.

Returns

The minimum bounding box of the shape.

Reimplemented from [SVGElement](#).

Definition at line 17 of file PolyShape.cpp.

```
17 {
18     float min_x = points[0].x;
19     float min_y = points[0].y;
20     for (auto& point : points) {
21         min_x = std::min(min_x, point.x);
22         min_y = std::min(min_y, point.y);
23     }
24     return Vector2Df(min_x, min_y);
25 }
```

3.13.3.6 getPoints()

```
const std::vector< Vector2Df > & PolyShape::getPoints ( ) const
```

Gets the total number of vertices representing the shape.

Returns

The number of vertices representing the shape.

Definition at line 9 of file PolyShape.cpp.

```
9 { return points; }
```

3.13.3.7 printData()

```
void PolyShape::printData ( ) const [override], [virtual]
```

Prints the data of the shape.

Note

This function is used for debugging purposes.

Reimplemented from [SVGElement](#).

Definition at line 37 of file PolyShape.cpp.

```
37 {
38     SVGElement::printData();
39     std::cout << "Points: ";
40     for (auto& point : getPoints()) {
41         std::cout << point.x << "," << point.y << " ";
42     }
43     std::cout << std::endl;
44 }
```

3.13.3.8 setFillRule()

```
void PolyShape::setFillRule (
    std::string fill_rule )
```

Sets the fill rule of the polyshape.

Parameters

<i>fill_rule</i>	The new fill rule of the polyshape.
------------------	-------------------------------------

Definition at line 11 of file PolyShape.cpp.

```
11      {  
12          this->fill_rule = fill_rule;  
13      }
```

The documentation for this class was generated from the following files:

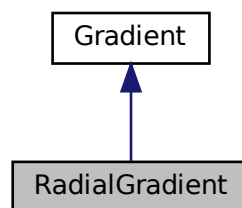
- src/graphics/PolyShape.hpp
- src/graphics/PolyShape.cpp

3.14 RadialGradient Class Reference

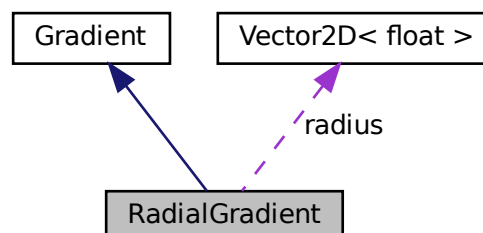
A class that represents a radial gradient.

```
#include <RadialGradient.hpp>
```

Inheritance diagram for RadialGradient:



Collaboration diagram for RadialGradient:



Public Member Functions

- [RadialGradient](#) (std::vector< [Stop](#) > stops, std::pair< [Vector2Df](#), [Vector2Df](#) > points, [Vector2Df](#) radius, std::string units)
Constructs a [RadialGradient](#) object.
- std::string [getClass](#) () const override
Gets the type of the gradient.
- [Vector2Df](#) [getRadius](#) () const
Gets the radius of the gradient.

Private Attributes

- [Vector2Df](#) radius
The radius of the gradient.

3.14.1 Detailed Description

A class that represents a radial gradient.

The [RadialGradient](#) class is derived from the [Gradient](#) class and represents a radial gradient. It contains a vector of [Stop](#) objects that represent the stops of the gradient. It also contains a pair of [Vector2D](#) objects that represent the start and end points of the gradient.

Definition at line 14 of file RadialGradient.hpp.

3.14.2 Constructor & Destructor Documentation

3.14.2.1 RadialGradient()

```
RadialGradient::RadialGradient (
    std::vector< Stop > stops,
    std::pair< Vector2Df, Vector2Df > points,
    Vector2Df radius,
    std::string units )
```

Constructs a [RadialGradient](#) object.

Parameters

<i>stops</i>	The stops of the gradient.
<i>points</i>	The start and end points of the gradient.
<i>radius</i>	The radius of the gradient.
<i>units</i>	The units of the gradient.

Definition at line 3 of file RadialGradient.cpp.

```
6     : Gradient(stops, points, units) {  
7     this->radius = radius;  
8 }
```

3.14.3 Member Function Documentation

3.14.3.1 getClass()

```
std::string RadialGradient::getClass ( ) const [override], [virtual]
```

Gets the type of the gradient.

Returns

The string "RadialGradient".

Note

This function is used for determining the type of the gradient.

Implements [Gradient](#).

Definition at line 10 of file RadialGradient.cpp.

```
10 { return "RadialGradient"; }
```

3.14.3.2 getRadius()

```
Vector2Df RadialGradient::getRadius ( ) const
```

Gets the radius of the gradient.

Returns

The radius of the gradient.

Definition at line 12 of file RadialGradient.cpp.

```
12 { return radius; }
```

The documentation for this class was generated from the following files:

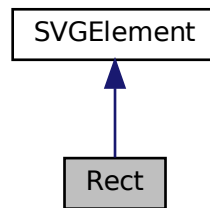
- src/graphics/RadialGradient.hpp
- src/graphics/RadialGradient.cpp

3.15 Rect Class Reference

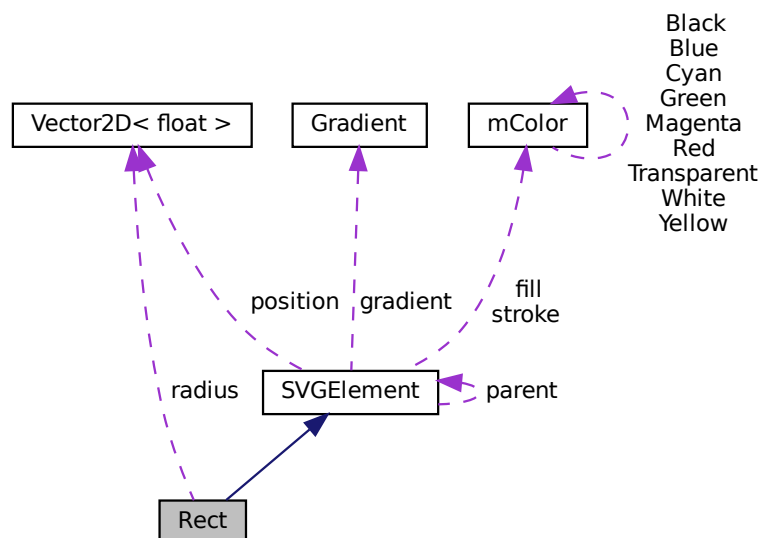
Represents a rectangle in 2D space.

```
#include <Rect.hpp>
```

Inheritance diagram for Rect:



Collaboration diagram for Rect:



Public Member Functions

- **Rect** (float **width**, float **height**, **Vector2Df** **position**, **Vector2Df** **radius**, const **mColor** &**fill**, const **mColor** &**stroke**, float **stroke_width**)
*Constructs a **Rect** object.*

- `std::string getClass ()` const override
Gets the type of the shape.
- `void setWidth (float width)`
Sets the width of the rectangle.
- `float getWidth ()` const
Gets the width of the rectangle.
- `void setHeight (float height)`
Sets the height of the rectangle.
- `float getHeight ()` const
Gets the height of the rectangle.
- `void setRadius (const Vector2Df &radius)`
Sets the radii of the rectangle.
- `Vector2Df getRadius ()` const
Gets the radii of the rectangle.
- `void printData ()` const override
Prints the data of the rectangle.

Private Attributes

- `float width`
Width of the rectangle.
- `float height`
Height of the rectangle.
- `Vector2Df radius`
Radii of the rectangle in the x and y directions.

Additional Inherited Members

3.15.1 Detailed Description

Represents a rectangle in 2D space.

The [Rect](#) class is derived from the [SVGElement](#) class and defines a rectangle with a specified width, height, position, fill color, stroke color, and stroke thickness.

Definition at line 13 of file `Rect.hpp`.

3.15.2 Constructor & Destructor Documentation

3.15.2.1 Rect()

```
Rect::Rect (
    float width,
    float height,
    Vector2Df position,
    Vector2Df radius,
    const mColor & fill,
    const mColor & stroke,
    float stroke_width )
```

Constructs a [Rect](#) object.

Parameters

<i>width</i>	The width of the rectangle.
<i>height</i>	The height of the rectangle.
<i>position</i>	The position of the rectangle.
<i>radius</i>	The radii of the rectangle in the x and y directions.
<i>fill</i>	Fill color of the rectangle.
<i>stroke</i>	Outline color of the rectangle.
<i>stroke_width</i>	Thickness of the rectangle outline.

Definition at line 3 of file Rect.cpp.

```
5 : SVGElement(fill, stroke, stroke_width, position), width(width),  
6   height(height), radius(radius) {}
```

3.15.3 Member Function Documentation

3.15.3.1 getClass()

```
std::string Rect::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Rect".

Implements [SVGElement](#).

Definition at line 8 of file Rect.cpp.

```
8 { return "Rect"; }
```

3.15.3.2 getHeight()

```
float Rect::getHeight ( ) const
```

Gets the height of the rectangle.

Returns

The height of the rectangle.

Definition at line 16 of file Rect.cpp.

```
16 { return height; }
```

3.15.3.3 getRadius()

```
Vector2Df Rect::getRadius ( ) const
```

Gets the radii of the rectangle.

Returns

The radii of the rectangle.

Definition at line 20 of file Rect.cpp.

```
20 { return radius; }
```

3.15.3.4 getWidth()

```
float Rect::getWidth ( ) const
```

Gets the width of the rectangle.

Returns

The width of the rectangle.

Definition at line 12 of file Rect.cpp.

```
12 { return width; }
```

3.15.3.5 printData()

```
void Rect::printData ( ) const [override], [virtual]
```

Prints the data of the rectangle.

Note

This function is used for debugging purposes.

Reimplemented from [SVGElement](#).

Definition at line 22 of file Rect.cpp.

```
22 {  
23     SVGElement::printData();  
24     std::cout << "Width: " << getWidth() << std::endl;  
25     std::cout << "Height: " << getHeight() << std::endl;  
26     std::cout << "Radius: " << getRadius().x << " " << getRadius().y  
27         << std::endl;  
28 }
```

3.15.3.6 setHeight()

```
void Rect::setHeight (  
    float height )
```

Sets the height of the rectangle.

Parameters

<i>height</i>	The new height of the rectangle.
---------------	----------------------------------

Definition at line 14 of file Rect.cpp.

```
14 { this->height = height; }
```

3.15.3.7 setRadius()

```
void Rect::setRadius (
    const Vector2Df & radius )
```

Sets the radii of the rectangle.

Parameters

<i>radius</i>	The new radii of the rectangle.
---------------	---------------------------------

Definition at line 18 of file Rect.cpp.

```
18 { this->radius = radius; }
```

3.15.3.8 setWidth()

```
void Rect::setWidth (
    float width )
```

Sets the width of the rectangle.

Parameters

<i>width</i>	The new width of the rectangle.
--------------	---------------------------------

Definition at line 10 of file Rect.cpp.

```
10 { this->width = width; }
```

The documentation for this class was generated from the following files:

- src/graphics/Rect.hpp
- src/graphics/Rect.cpp

3.16 Renderer Class Reference

Singleton class responsible for rendering shapes using GDI+.


```
#include <Renderer.hpp>
```

Collaboration diagram for Renderer:



Public Member Functions

- `Renderer (const Renderer &)=delete`
Deleted copy constructor to enforce the singleton pattern.
- `void operator= (const Renderer &)=delete`
Deleted copy assignment operator to enforce the singleton pattern.
- `void draw (Gdiplus::Graphics &graphics, Group *group) const`
Draws a shape using Gdiplus::Graphics based on its type.

Static Public Member Functions

- `static Renderer * getInstance ()`
Gets the singleton instance of the [Renderer](#) class.

Private Member Functions

- `void applyTransform (std::vector< std::string > transform_order, Gdiplus::Graphics &graphics) const`
Utility function to apply a series of transformations to the graphics context.
- `void drawLine (Gdiplus::Graphics &graphics, Line *line) const`
Draws a line shape using Gdiplus::Graphics.
- `void drawRectangle (Gdiplus::Graphics &graphics, Rect *rectangle) const`
Draws a rectangle shape using Gdiplus::Graphics.
- `void drawCircle (Gdiplus::Graphics &graphics, Circle *circle) const`
Draws a circle shape using Gdiplus::Graphics.
- `void drawEllipse (Gdiplus::Graphics &graphics, Eli *ellipse) const`
Draws an ellipse shape using Gdiplus::Graphics.
- `void drawPolygon (Gdiplus::Graphics &graphics, Polygon *polygon) const`
Draws a polygon shape using Gdiplus::Graphics.
- `void drawText (Gdiplus::Graphics &graphics, Text *text) const`
Draws text using Gdiplus::Graphics.
- `void drawPolyline (Gdiplus::Graphics &graphics, Polyline *polyline) const`
Draws a polyline shape using Gdiplus::Graphics.
- `void drawPath (Gdiplus::Graphics &graphics, Path *path) const`
Draws a path shape using Gdiplus::Graphics.
- `Gdiplus::Brush * getBrush (SVGElement *shape, Gdiplus::RectF bound) const`
Gets the Gdiplus::brush object for the shape fill.

- void [applyTransformsOnBrush](#) (std::vector< std::string > transform_order, Gdiplus::LinearGradientBrush *&brush) const
Utility function to apply a series of transformations to the brush object.
- void [applyTransformsOnBrush](#) (std::vector< std::string > transform_order, Gdiplus::PathGradientBrush *&brush) const
Utility function to apply a series of transformations to the brush object.
- [Renderer](#) ()
Private constructor for the [Renderer](#) class.

Static Private Attributes

- static [Renderer](#) * [instance](#) = nullptr
Singleton instance of the [Renderer](#) class.

3.16.1 Detailed Description

Singleton class responsible for rendering shapes using GDI+.

The [Renderer](#) class provides a singleton instance for drawing SVGElement-based shapes using Gdiplus::Graphics. It supports various shapes such as lines, rectangles, circles, ellipses, text, polygons, polylines, and paths. The shapes are drawn in a polymorphic manner using the draw function, which takes a Gdiplus::Graphics context and an [SVGElement](#). The draw function dynamically determines the type of the shape and invokes the corresponding draw method to render the shape with all necessary details. The detailed information for each shape is obtained from an SVG file and processed through the draw function in a polymorphic way.

Definition at line 24 of file [Renderer.hpp](#).

3.16.2 Member Function Documentation

3.16.2.1 [applyTransform\(\)](#)

```
void Renderer::applyTransform (
    std::vector< std::string > transform_order,
    Gdiplus::Graphics & graphics ) const [private]
```

Utility function to apply a series of transformations to the graphics context.

Parameters

<i>transform_order</i>	The order in which transformations should be applied.
<i>graphics</i>	The Gdiplus::Graphics context to apply transformations to.

Definition at line 50 of file [Renderer.cpp](#).

```
51
52     for (auto type : transform_order) {
53         if (type.find("translate") != std::string::npos) {
54             float trans_x = getTranslate(type).first,
```

```

55         trans_y = getTranslate(type).second;
56         graphics.TranslateTransform(trans_x, trans_y);
57     } else if (type.find("rotate") != std::string::npos) {
58         float degree = getRotate(type);
59         graphics.RotateTransform(degree);
60     } else if (type.find("scale") != std::string::npos) {
61         if (type.find(",") != std::string::npos) {
62             float scale_x = getScaleXY(type).first,
63                 scale_y = getScaleXY(type).second;
64             graphics.ScaleTransform(scale_x, scale_y);
65         } else {
66             float scale = getScale(type);
67             graphics.ScaleTransform(scale, scale);
68         }
69     }
70 }
71 }

```

3.16.2.2 applyTransformsOnBrush() [1/2]

```

void Renderer::applyTransformsOnBrush (
    std::vector< std::string > transform_order,
    Gdiplus::LinearGradientBrush *amp; brush ) const [private]

```

Utility function to apply a series of transformations to the brush object.

Parameters

<i>transform_order</i>	The order in which transformations should be applied.
<i>brush</i>	The Gdiplus::LinearGradientBrush object for the shape fill.

Definition at line 673 of file Renderer.cpp.

```

675     {
676         for (auto type : transform_order) {
677             if (type.find("translate") != std::string::npos) {
678                 float trans_x = getTranslate(type).first,
679                     trans_y = getTranslate(type).second;
680                 brush->TranslateTransform(trans_x, trans_y);
681             } else if (type.find("rotate") != std::string::npos) {
682                 float degree = getRotate(type);
683                 brush->RotateTranform(degree);
684             } else if (type.find("scale") != std::string::npos) {
685                 if (type.find(",") != std::string::npos) {
686                     float scale_x = getScaleXY(type).first,
687                         scale_y = getScaleXY(type).second;
688                     brush->ScaleTransform(scale_x, scale_y);
689                 } else {
690                     float scale = getScale(type);
691                     brush->ScaleTransform(scale, scale);
692                 }
693             } else if (type.find("matrix") != std::string::npos) {
694                 float a = 0, b = 0, c = 0, d = 0, e = 0, f = 0;
695                 if (type.find(",") != std::string::npos) {
696                     type.erase(std::remove(type.begin(), type.end(), ','),
697                                 type.end());
698                 }
699                 sscanf(type.c_str(), "matrix(%f %f %f %f %f %f)", &a, &b, &c, &d,
700                     &e, &f);
701                 Gdiplus::Matrix matrix(a, b, c, d, e, f);
702                 brush->SetTransform(&matrix);
703             }
704         }
705     }

```

3.16.2.3 applyTransformsOnBrush() [2/2]

```

void Renderer::applyTransformsOnBrush (

```

```
std::vector< std::string > transform_order,
Gdiplus::PathGradientBrush *& brush ) const [private]
```

Utility function to apply a series of transformations to the brush object.

Parameters

<i>transform_order</i>	The order in which transformations should be applied.
<i>brush</i>	The Gdiplus::PathGradientBrush object for the shape fill.

Definition at line 707 of file `Renderer.cpp`.

```
709                                     {
710     for (auto type : transform_order) {
711         if (type.find("translate") != std::string::npos) {
712             float trans_x = getTranslate(type).first,
713                 trans_y = getTranslate(type).second;
714             brush->TranslateTransform(trans_x, trans_y);
715         } else if (type.find("rotate") != std::string::npos) {
716             float degree = getRotate(type);
717             brush->RotateTransform(degree);
718         } else if (type.find("scale") != std::string::npos) {
719             if (type.find(",") != std::string::npos) {
720                 float scale_x = getScaleXY(type).first,
721                     scale_y = getScaleXY(type).second;
722                 brush->ScaleTransform(scale_x, scale_y);
723             } else {
724                 float scale = getScale(type);
725                 brush->ScaleTransform(scale, scale);
726             }
727         } else if (type.find("matrix") != std::string::npos) {
728             float a = 0, b = 0, c = 0, d = 0, e = 0, f = 0;
729             if (type.find(",") != std::string::npos) {
730                 type.erase(std::remove(type.begin(), type.end(), ','),
731                             type.end());
732             }
733             sscanf(type.c_str(), "matrix(%f %f %f %f %f %f)", &a, &b, &c, &d,
734                     &e, &f);
735             Gdiplus::Matrix matrix(a, b, c, d, e, f);
736             brush->SetTransform(&matrix);
737         }
738     }
739 }
```

3.16.2.4 draw()

```
void Renderer::draw (
    Gdiplus::Graphics & graphics,
    Group * group ) const
```

Draws a shape using Gdiplus::Graphics based on its type.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>shape</i>	The SVGElement representing the shape to be drawn.

Definition at line 73 of file `Renderer.cpp`.

```
73                                     {
74     for (auto shape : group->getElements()) {
75         Gdiplus::Matrix original;
76         graphics.GetTransform(&original);
77         applyTransform(shape->getTransforms(), graphics);
78         if (shape->getClass() == "Group") {
79             Group* group = dynamic_cast< Group* >(shape);
```

```

80         draw(graphics, group);
81     } else if (shape->getClass() == "Polyline") {
82         Plyline* polyline = dynamic_cast< Plyline* >(shape);
83         drawPolyline(graphics, polyline);
84     } else if (shape->getClass() == "Text") {
85         Text* text = dynamic_cast< Text* >(shape);
86         drawText(graphics, text);
87     } else if (shape->getClass() == "Rect") {
88         Rect* rectangle = dynamic_cast< Rect* >(shape);
89         drawRectangle(graphics, rectangle);
90     } else if (shape->getClass() == "Circle") {
91         Circle* circle = dynamic_cast< Circle* >(shape);
92         drawCircle(graphics, circle);
93     } else if (shape->getClass() == "Ellipse") {
94         Ell* ellipse = dynamic_cast< Ell* >(shape);
95         drawEllipse(graphics, ellipse);
96     } else if (shape->getClass() == "Line") {
97         Line* line = dynamic_cast< Line* >(shape);
98         drawLine(graphics, line);
99     } else if (shape->getClass() == "Polygon") {
100         Polygon* polygon = dynamic_cast< Polygon* >(shape);
101         drawPolygon(graphics, polygon);
102     } else if (shape->getClass() == "Path") {
103         Path* path = dynamic_cast< Path* >(shape);
104         drawPath(graphics, path);
105     }
106     graphics.SetTransform(&original);
107 }
108 }

```

3.16.2.5 drawCircle()

```

void Renderer::drawCircle (
    Gdiplus::Graphics & graphics,
    Circle * circle ) const [private]

```

Draws a circle shape using Gdiplus::Graphics.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>circle</i>	The Circle object representing the circle to be drawn.

Definition at line 165 of file Renderer.cpp.

```

165 {
166     mColor outline_color = circle->getOutlineColor();
167     Gdiplus::Pen circle_outline(
168         Gdiplus::Color(outline_color.a, outline_color.r, outline_color.g,
169             outline_color.b),
170         circle->getOutlineThickness());
171     Vector2Df min_bound = circle->getMinBound();
172     Vector2Df max_bound = circle->getMaxBound();
173     Gdiplus::RectF bound(min_bound.x, min_bound.y, max_bound.x - min_bound.x,
174         max_bound.y - min_bound.y);
175     Gdiplus::Brush* circle_fill = getBrush(circle, bound);
176     if (Gdiplus::PathGradientBrush* brush =
177         dynamic_cast< Gdiplus::PathGradientBrush* >(circle_fill)) {
178         mColor color = circle->getGradient()->getStops().back().getColor();
179         Gdiplus::SolidBrush corner_fill(
180             Gdiplus::Color(color.a, color.r, color.g, color.b));
181         graphics.FillEllipse(
182             &corner_fill, circle->getPosition().x - circle->getRadius().x,
183             circle->getPosition().y - circle->getRadius().y,
184             circle->getRadius().x * 2, circle->getRadius().y * 2);
185     }
186     graphics.FillEllipse(circle_fill,
187         circle->getPosition().x - circle->getRadius().x,
188         circle->getPosition().y - circle->getRadius().y,
189         circle->getRadius().x * 2, circle->getRadius().y * 2);
190     graphics.DrawEllipse(&circle_outline,
191         circle->getPosition().x - circle->getRadius().x,

```

```

192             circle->getPosition().y - circle->getRadius().y,
193             circle->getRadius().x * 2, circle->getRadius().x * 2);
194     delete circle_fill;
195 }

```

3.16.2.6 drawEllipse()

```

void Renderer::drawEllipse (
    Gdiplus::Graphics & graphics,
    Ell * ellipse ) const [private]

```

Draws an ellipse shape using Gdiplus::Graphics.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>ellipse</i>	The Ell object representing the ellipse to be drawn.

Definition at line 197 of file Renderer.cpp.

```

197 {
198     mColor outline_color = ellipse->getOutlineColor();
199     Gdiplus::Pen ellipse_outline(
200         Gdiplus::Color(outline_color.a, outline_color.r, outline_color.g,
201             outline_color.b),
202         ellipse->getOutlineThickness());
203     Vector2Df min_bound = ellipse->getMinBound();
204     Vector2Df max_bound = ellipse->getMaxBound();
205     Gdiplus::RectF bound(min_bound.x, min_bound.y, max_bound.x - min_bound.x,
206         max_bound.y - min_bound.y);
207     Gdiplus::Brush* ellipse_fill = getBrush(ellipse, bound);
208     if (Gdiplus::PathGradientBrush* brush =
209         dynamic_cast< Gdiplus::PathGradientBrush* >(ellipse_fill)) {
210         mColor color = ellipse->getGradient()->getStops().back().getColor();
211         Gdiplus::SolidBrush corner_fill(
212             Gdiplus::Color(color.a, color.r, color.g, color.b));
213         graphics.FillEllipse(
214             &corner_fill, ellipse->getPosition().x - ellipse->getRadius().x,
215             ellipse->getPosition().y - ellipse->getRadius().y,
216             ellipse->getRadius().x * 2, ellipse->getRadius().y * 2);
217     }
218     graphics.FillEllipse(
219         ellipse_fill, ellipse->getPosition().x - ellipse->getRadius().x,
220         ellipse->getPosition().y - ellipse->getRadius().y,
221         ellipse->getRadius().x * 2, ellipse->getRadius().y * 2);
222     graphics.DrawEllipse(
223         &ellipse_outline, ellipse->getPosition().x - ellipse->getRadius().x,
224         ellipse->getPosition().y - ellipse->getRadius().y,
225         ellipse->getRadius().x * 2, ellipse->getRadius().y * 2);
226     delete ellipse_fill;
227 }

```

3.16.2.7 drawLine()

```

void Renderer::drawLine (
    Gdiplus::Graphics & graphics,
    Line * line ) const [private]

```

Draws a line shape using Gdiplus::Graphics.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>line</i>	The Line object representing the line to be drawn.

Definition at line 110 of file `Renderer.cpp`.

```

110                                     {
111     mColor color = line->getOutlineColor();
112     Gdiplus::Pen linePen(Gdiplus::Color(color.a, color.r, color.g, color.b),
113                         line->getOutlineThickness());
114     Gdiplus::PointF startPoint(line->getPosition().x, line->getPosition().y);
115     Gdiplus::PointF endPoint(line->getDirection().x, line->getDirection().y);
116     graphics.DrawLine(&linePen, startPoint, endPoint);
117 }
```

3.16.2.8 drawPath()

```

void Renderer::drawPath (
    Gdiplus::Graphics & graphics,
    Path * path ) const [private]
```

Draws a path shape using Gdiplus::Graphics.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>path</i>	The Path object representing the path to be drawn.

Definition at line 365 of file `Renderer.cpp`.

```

365                                     {
366     mColor outline_color = path->getOutlineColor();
367     Gdiplus::Pen path_outline(Gdiplus::Color(outline_color.a, outline_color.r,
368                                             outline_color.g, outline_color.b),
369                             path->getOutlineThickness());
370
371     Gdiplus::FillMode fill_mode;
372     if (path->getFillRule() == "evenodd") {
373         fill_mode = Gdiplus::FillModeAlternate;
374     } else if (path->getFillRule() == "nonzero") {
375         fill_mode = Gdiplus::FillModeWinding;
376     }
377     Gdiplus::GraphicsPath gdi_path(fill_mode);
378
379     const std::vector< PathPoint > & points = path->getPoints();
380     int n = points.size();
381     Vector2Df first_point{0, 0}, cur_point{0, 0};
382
383     for (int i = 0; i < n; ++i) {
384         if (points[i].tc == 'm') {
385             first_point = points[i].point;
386             gdi_path.StartFigure();
387             cur_point = first_point;
388         } else if (points[i].tc == 'l' || points[i].tc == 'h' ||
389                 points[i].tc == 'v') {
390             gdi_path.AddLine(cur_point.x, cur_point.y, points[i].point.x,
391                             points[i].point.y);
392             cur_point = points[i].point;
393         } else if (points[i].tc == 'c') {
394             if (i + 2 < n) {
395                 Vector2Df control_point1 = points[i].point;
396                 Vector2Df control_point2 = points[i + 1].point;
397                 Vector2Df control_point3 = points[i + 2].point;
398                 gdi_path.AddBezier(cur_point.x, cur_point.y, control_point1.x,
399                                 control_point1.y, control_point2.x,
400                                 control_point2.y, control_point3.x,
401                                 control_point3.y);

```

```

402         i += 2;
403         cur_point = control_point3;
404     }
405     } else if (points[i].tc == 'z') {
406         gdi_path.CloseFigure();
407         cur_point = first_point;
408     } else if (points[i].tc == 's') {
409         if (i + 1 < n) {
410             Vector2Df auto_control_point;
411             if (i > 0 &&
412                 (points[i - 1].tc == 'c' || points[i - 1].tc == 's')) {
413                 auto_control_point.x =
414                     cur_point.x * 2 - points[i - 2].point.x;
415                 auto_control_point.y =
416                     cur_point.y * 2 - points[i - 2].point.y;
417             } else {
418                 auto_control_point = cur_point;
419             }
420             Vector2Df control_point2 = points[i].point;
421             Vector2Df control_point3 = points[i + 1].point;
422             gdi_path.AddBezier(cur_point.x, cur_point.y,
423                               auto_control_point.x, auto_control_point.y,
424                               control_point2.x, control_point2.y,
425                               control_point3.x, control_point3.y);
426             i += 1;
427             cur_point = control_point3;
428         }
429     } else if (points[i].tc == 'q') {
430         if (i + 1 < n) {
431             Vector2Df control_point = points[i].point;
432             Vector2Df end_point = points[i + 1].point;
433
434             Gdiplus::PointF q_points[3];
435             q_points[0] = Gdiplus::PointF{cur_point.x, cur_point.y};
436             q_points[1] = Gdiplus::PointF{control_point.x, control_point.y};
437             q_points[2] = Gdiplus::PointF{end_point.x, end_point.y};
438             gdi_path.AddCurve(q_points, 3);
439             cur_point = points[i + 1].point;
440             i += 1;
441         }
442     } else if (points[i].tc == 't') {
443         Vector2Df auto_control_point;
444         if (i > 0 && (points[i - 1].tc == 'q' || points[i - 1].tc == 't')) {
445             auto_control_point.x = cur_point.x * 2 - points[i - 2].point.x;
446             auto_control_point.y = cur_point.y * 2 - points[i - 2].point.y;
447         } else {
448             auto_control_point = cur_point;
449         }
450         Vector2Df end_point = points[i].point;
451         Gdiplus::PointF t_points[3];
452         t_points[0] = Gdiplus::PointF{cur_point.x, cur_point.y};
453         t_points[1] =
454             Gdiplus::PointF{auto_control_point.x, auto_control_point.y};
455         t_points[2] = Gdiplus::PointF{end_point.x, end_point.y};
456         gdi_path.AddCurve(t_points, 3);
457         cur_point = points[i].point;
458     } else if (points[i].tc == 'a') {
459         float rx = points[i].radius.x;
460         float ry = points[i].radius.y;
461         if (rx == 0 || ry == 0) {
462             gdi_path.AddLine(cur_point.x, cur_point.y, points[i].point.x,
463                             points[i].point.y);
464             cur_point = points[i].point;
465             continue;
466         }
467         if (rx < 0) {
468             rx = std::fabs(rx);
469         }
470         if (ry < 0) {
471             ry = std::fabs(ry);
472         }
473
474         float x_axis_rotation = points[i].x_axis_rotation;
475         bool large_arc_flag = points[i].large_arc_flag;
476         bool sweep_flag = points[i].sweep_flag;
477         Vector2Df end_point{points[i].point.x, points[i].point.y};
478
479         float angle = x_axis_rotation * acos(-1) / 180.0;
480         float cosAngle = cos(angle);
481         float sinAngle = sin(angle);
482
483         Vector2Df point1;
484         float X = (cur_point.x - end_point.x) / 2.0;
485         float Y = (cur_point.y - end_point.y) / 2.0;
486         point1.x = (cosAngle * cosAngle + sinAngle * sinAngle) * X;
487         point1.y = (cosAngle * cosAngle + sinAngle * sinAngle) * Y;
488     }

```



```

489         float radii_check = (point1.x * point1.x) / (rx * rx) +
490                             (point1.y * point1.y) / (ry * ry);
491         if (radii_check > 1.0) {
492             rx = std::sqrt(radii_check) * rx;
493             ry = std::sqrt(radii_check) * ry;
494         }
495
496         float sign = (large_arc_flag == sweep_flag ? -1.0 : 1.0);
497         Vector2Df point2;
498         float numo = (rx * rx) * (ry * ry) -
499                     (rx * rx) * (point1.y * point1.y) -
500                     (ry * ry) * (point1.x * point1.x);
501         float deno = (rx * rx) * (point1.y * point1.y) +
502                     (ry * ry) * (point1.x * point1.x);
503
504         if (numo < 0) {
505             numo = std::fabs(numo);
506         }
507
508         point2.x = sign * std::sqrt(numo / deno) * ((rx * point1.y) / ry);
509         point2.y = sign * std::sqrt(numo / deno) * ((-ry * point1.x) / rx);
510
511         Vector2Df center;
512         X = (cur_point.x + end_point.x) / 2.0;
513         Y = (cur_point.y + end_point.y) / 2.0;
514         center.x =
515             (cosAngle * cosAngle + sinAngle * sinAngle) * point2.x + X;
516         center.y =
517             (cosAngle * cosAngle + sinAngle * sinAngle) * point2.y + Y;
518
519         float start_angle =
520             atan2((point1.y - point2.y) / ry, (point1.x - point2.x) / rx);
521         float end_angle =
522             atan2((-point1.y - point2.y) / ry, (-point1.x - point2.x) / rx);
523
524         float delta_angle = end_angle - start_angle;
525
526         if (sweep_flag && delta_angle < 0) {
527             delta_angle += 2.0 * acos(-1);
528         } else if (!sweep_flag && delta_angle > 0) {
529             delta_angle -= 2.0 * acos(-1);
530         }
531
532         float start_angle_degree =
533             std::fmod((start_angle * 180.0) / acos(-1), 360);
534         float delta_angle_degree =
535             std::fmod((delta_angle * 180.0) / acos(-1), 360);
536
537         gdi_path.AddArc(center.x - rx, center.y - ry, 2.0 * rx, 2.0 * ry,
538                        start_angle_degree, delta_angle_degree);
539
540         cur_point = end_point;
541     }
542 }
543
544 Gdiplus::RectF bound;
545 gdi_path.GetBounds(&bound);
546 Gdiplus::Brush* path_fill = getBrush(path, bound);
547 Gdiplus::Region region(&gdi_path);
548 if (Gdiplus::PathGradientBrush* brush =
549     dynamic_cast< Gdiplus::PathGradientBrush* >(path_fill)) {
550     mColor color = path->getGradient()->getStops().back().getColor();
551     Gdiplus::SolidBrush corner_fill(
552         Gdiplus::Color(color.a, color.r, color.g, color.b));
553     if (path->getGradient()->getUnits() == "userSpaceOnUse") {
554         float cx = path->getGradient()->getPoints().first.x;
555         float cy = path->getGradient()->getPoints().first.y;
556         float r = dynamic_cast< RadialGradient* >(path->getGradient())
557                 ->getRadius()
558                 .x;
559         Gdiplus::GraphicsPath fill_path(fill_mode);
560         fill_path.AddEllipse(cx - r, cy - r, 2 * r, 2 * r);
561         for (auto type : path->getGradient()->getTransforms()) {
562             if (type.find("matrix") != std::string::npos) {
563                 float a = 0, b = 0, c = 0, d = 0, e = 0, f = 0;
564                 if (type.find(",") != std::string::npos) {
565                     type.erase(std::remove(type.begin(), type.end(), ','),
566                                type.end());
567                 }
568                 sscanf(type.c_str(), "matrix(%f %f %f %f %f %f)", &a, &b,
569                        &c, &d, &e, &f);
570                 Gdiplus::Matrix matrix(a, b, c, d, e, f);
571                 fill_path.Transform(&matrix);
572             }
573         }
574         region.Exclude(&fill_path);
575     }

```

```

576         graphics.FillRegion(&corner_fill, &region);
577     }
578     graphics.FillPath(path_fill, &gdi_path);
579     graphics.DrawPath(&path_outline, &gdi_path);
580     delete path_fill;
581 }

```

3.16.2.9 drawPolygon()

```

void Renderer::drawPolygon (
    Gdiplus::Graphics & graphics,
    Polygon * polygon ) const [private]

```

Draws a polygon shape using Gdiplus::Graphics.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>polygon</i>	The Polygon object representing the polygon to be drawn.

Definition at line 229 of file Renderer.cpp.

```

229
230     mColor outline_color = polygon->getOutlineColor();
231     Gdiplus::Pen polygon_outline(
232         Gdiplus::Color(outline_color.a, outline_color.r, outline_color.g,
233             outline_color.b),
234         polygon->getOutlineThickness());
235
236     Gdiplus::PointF* points = new Gdiplus::PointF[polygon->getPoints().size()];
237     int idx = 0;
238     const std::vector< Vector2Df >& vertices = polygon->getPoints();
239     for (const Vector2Df vertex : vertices) {
240         points[idx++] = Gdiplus::PointF(vertex.x, vertex.y);
241     }
242
243     Gdiplus::FillMode fill_mode;
244     if (polygon->getFillRule() == "evenodd") {
245         fill_mode = Gdiplus::FillModeAlternate;
246     } else if (polygon->getFillRule() == "nonzero") {
247         fill_mode = Gdiplus::FillModeWinding;
248     }
249     Vector2Df min_bound = polygon->getMinBound();
250     Vector2Df max_bound = polygon->getMaxBound();
251     Gdiplus::RectF bound(min_bound.x, min_bound.y, max_bound.x - min_bound.x,
252         max_bound.y - min_bound.y);
253     Gdiplus::Brush* polygon_fill = getBrush(polygon, bound);
254     if (Gdiplus::PathGradientBrush* brush =
255         dynamic_cast< Gdiplus::PathGradientBrush* >(polygon_fill)) {
256         mColor color = polygon->getGradient()->getStops().back().getColor();
257         Gdiplus::SolidBrush corner_fill(
258             Gdiplus::Color(color.a, color.r, color.g, color.b));
259         graphics.FillPolygon(&corner_fill, points, idx, fill_mode);
260     }
261     graphics.FillPolygon(polygon_fill, points, idx, fill_mode);
262     graphics.DrawPolygon(&polygon_outline, points, idx);
263     delete[] points;
264     delete polygon_fill;
265 }

```

3.16.2.10 drawPolyline()

```

void Renderer::drawPolyline (
    Gdiplus::Graphics & graphics,
    Polyline * polyline ) const [private]

```

Draws a polyline shape using `Gdiplus::Graphics`.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>polyline</i>	The Polyline object representing the polyline to be drawn.

Definition at line 322 of file `Renderer.cpp`.

```

323                                     {
324     mColor outline_color = polyline->getOutlineColor();
325     Gdiplus::Pen polyline_outline(
326         Gdiplus::Color(outline_color.a, outline_color.r, outline_color.g,
327             outline_color.b),
328         polyline->getOutlineThickness());
329
330     Gdiplus::FillMode fill_mode;
331     if (polyline->getFillRule() == "evenodd") {
332         fill_mode = Gdiplus::FillModeAlternate;
333     } else if (polyline->getFillRule() == "nonzero") {
334         fill_mode = Gdiplus::FillModeWinding;
335     }
336     Gdiplus::GraphicsPath path(fill_mode);
337     const std::vector< Vector2Df >& points = polyline->getPoints();
338     if (points.size() < 2) {
339         return;
340     }
341
342     path.StartFigure();
343     path.AddLine(points[0].x, points[0].y, points[1].x, points[1].y);
344     for (size_t i = 2; i < points.size(); ++i) {
345         path.AddLine(points[i - 1].x, points[i - 1].y, points[i].x,
346             points[i].y);
347     }
348     Vector2Df min_bound = polyline->getMinBound();
349     Vector2Df max_bound = polyline->getMaxBound();
350     Gdiplus::RectF bound(min_bound.x, min_bound.y, max_bound.x - min_bound.x,
351         max_bound.y - min_bound.y);
352     Gdiplus::Brush* polyline_fill = getBrush(polyline, bound);
353     if (Gdiplus::PathGradientBrush* brush =
354         dynamic_cast< Gdiplus::PathGradientBrush* >(polyline_fill)) {
355         mColor color = polyline->getGradient()->getStops().back().getColor();
356         Gdiplus::SolidBrush corner_fill(
357             Gdiplus::Color(color.a, color.r, color.g, color.b));
358         graphics.FillPath(&corner_fill, &path);
359     }
360     graphics.FillPath(polyline_fill, &path);
361     graphics.DrawPath(&polyline_outline, &path);
362     delete polyline_fill;
363 }
```

3.16.2.11 drawRectangle()

```

void Renderer::drawRectangle (
    Gdiplus::Graphics & graphics,
    Rect * rectangle ) const [private]
```

Draws a rectangle shape using Gdiplus::Graphics.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>rectangle</i>	The Rect object representing the rectangle to be drawn.

Definition at line 119 of file `Renderer.cpp`.

```

120                                     {
121     float x = rectangle->getPosition().x;
122     float y = rectangle->getPosition().y;
123     float width = rectangle->getWidth();
```

```

124     float height = rectangle->getHeight();
125     mColor outline_color = rectangle->getOutlineColor();
126     Gdiplus::Pen rect_outline(Gdiplus::Color(outline_color.a, outline_color.r,
127                                             outline_color.g, outline_color.b),
128                             rectangle->getOutlineThickness());
129     Gdiplus::RectF bound(x, y, width, height);
130     Gdiplus::Brush* rect_fill = getBrush(rectangle, bound);
131     if (rectangle->getRadius().x != 0 || rectangle->getRadius().y != 0) {
132         float dx = rectangle->getRadius().x * 2;
133         float dy = rectangle->getRadius().y * 2;
134         Gdiplus::GraphicsPath path;
135         path.AddArc(x, y, dx, dy, 180, 90);
136         path.AddArc(x + width - dx, y, dx, dy, 270, 90);
137         path.AddArc(x + width - dx, y + height - dy, dx, dy, 0, 90);
138         path.AddArc(x, y + height - dy, dx, dy, 90, 90);
139         path.CloseFigure();
140         if (Gdiplus::PathGradientBrush* brush =
141             dynamic_cast< Gdiplus::PathGradientBrush* >(rect_fill)) {
142             mColor color =
143                 rectangle->getGradient()->getStops().back().getColor();
144             Gdiplus::SolidBrush corner_fill(
145                 Gdiplus::Color(color.a, color.r, color.g, color.b));
146             graphics.FillPath(&corner_fill, &path);
147         }
148         graphics.FillPath(rect_fill, &path);
149         graphics.DrawPath(&rect_outline, &path);
150     } else {
151         if (Gdiplus::PathGradientBrush* brush =
152             dynamic_cast< Gdiplus::PathGradientBrush* >(rect_fill)) {
153             mColor color =
154                 rectangle->getGradient()->getStops().back().getColor();
155             Gdiplus::SolidBrush corner_fill(
156                 Gdiplus::Color(color.a, color.r, color.g, color.b));
157             graphics.FillRectangle(&corner_fill, x, y, width, height);
158         }
159         graphics.FillRectangle(rect_fill, x, y, width, height);
160         graphics.DrawRectangle(&rect_outline, x, y, width, height);
161     }
162     delete rect_fill;
163 }

```

3.16.2.12 drawText()

```

void Renderer::drawText (
    Gdiplus::Graphics & graphics,
    Text * text ) const [private]

```

Draws text using Gdiplus::Graphics.

Parameters

<i>graphics</i>	The Gdiplus::Graphics context for drawing.
<i>text</i>	The Text object representing the text to be drawn.

Definition at line 267 of file `Renderer.cpp`.

```

267
268     mColor outline_color = text->getOutlineColor();
269     graphics.SetTextRenderingHint(Gdiplus::TextRenderingHintAntiAliasGridFit);
270
271     Gdiplus::Pen text_outline(Gdiplus::Color(outline_color.a, outline_color.r,
272                                             outline_color.g, outline_color.b),
273                             text->getOutlineThickness());
274
275     Gdiplus::FontFamily font_family(L"Times New Roman");
276
277     Gdiplus::PointF position(text->getPosition().x, text->getPosition().y);
278     Gdiplus::GraphicsPath path;
279
280     std::wstring_convert< std::codecvt_utf8_utf16< wchar_t > > converter;
281     std::wstring wide_content = converter.from_bytes(text->getContent());
282     Gdiplus::StringFormat string_format;

```

```

283     if (text->getAnchor() == "middle") {
284         string_format.SetAlignment(Gdiplus::StringAlignmentCenter);
285         position.X += 7;
286     } else if (text->getAnchor() == "end") {
287         string_format.SetAlignment(Gdiplus::StringAlignmentFar);
288         position.X += 14;
289     } else {
290         string_format.SetAlignment(Gdiplus::StringAlignmentNear);
291     }
292     Gdiplus::FontStyle font_style = Gdiplus::FontStyleRegular;
293     if (text->getFontStyle() == "italic" || text->getFontStyle() == "oblique") {
294         font_style = Gdiplus::FontStyleItalic;
295         position.Y -= 1;
296     }
297
298     path.AddString(wide_content.c_str(), wide_content.size(), &font_family,
299                  font_style, text->getFontSize(), position, &string_format);
300     Gdiplus::RectF bound;
301     path.GetBounds(&bound);
302     Gdiplus::Brush* text_fill = getBrush(text, bound);
303     if (Gdiplus::PathGradientBrush* brush =
304         dynamic_cast< Gdiplus::PathGradientBrush* >(text_fill)) {
305         mColor color = text->getGradient()->getStops().back().getColor();
306         Gdiplus::SolidBrush corner_fill(
307             Gdiplus::Color(color.a, color.r, color.g, color.b));
308         graphics.FillPath(&corner_fill, &path);
309     }
310     graphics.FillPath(text_fill, &path);
311     if (text->getOutlineColor().a != 0 &&
312         text->getOutlineColor().a == text->getFillColor().a) {
313         text_outline.SetColor(Gdiplus::Color(255, 255, 255, 255));
314         graphics.DrawPath(&text_outline, &path);
315         text_outline.SetColor(Gdiplus::Color(outline_color.a, outline_color.r,
316                                             outline_color.g, outline_color.b));
317     }
318     graphics.DrawPath(&text_outline, &path);
319     delete text_fill;
320 }

```

3.16.2.13 getBrush()

```

Gdiplus::Brush * Renderer::getBrush (
    SVGElement * shape,
    Gdiplus::RectF bound ) const [private]

```

Gets the Gdiplus::brush object for the shape fill.

Parameters

<i>shape</i>	The SVGElement representing the shape.
<i>bound</i>	The bounding box of the shape.

Returns

The Gdiplus::brush object for the shape fill.

Definition at line 583 of file `Renderer.cpp`.

```

584                                     {
585     Gradient* gradient = shape->getGradient();
586     if (gradient != NULL) {
587         std::pair< Vector2Df, Vector2Df > points = gradient->getPoints();
588         std::vector< Stop > stops = gradient->getStops();
589         int stop_size = stops.size() + 2;
590         Gdiplus::Color* colors = new Gdiplus::Color[stop_size];
591         float* offsets = new float[stop_size];
592         if (gradient->getClass() == "LinearGradient") {
593             if (gradient->getUnits() == "objectBoundingBox") {
594                 points.first.x = bound.X;

```

```

595         points.first.y = bound.Y;
596         points.second.x = bound.X + bound.Width;
597         points.second.y = bound.Y + bound.Height;
598     }
599     offsets[0] = 0;
600     offsets[stop_size - 1] = 1;
601     colors[0] =
602         Gdiplus::Color(stops[0].getColor().a, stops[0].getColor().r,
603             stops[0].getColor().g, stops[0].getColor().b);
604     colors[stop_size - 1] =
605         Gdiplus::Color(stops[stop_size - 3].getColor().a,
606             stops[stop_size - 3].getColor().r,
607             stops[stop_size - 3].getColor().g,
608             stops[stop_size - 3].getColor().b);
609     for (size_t i = 1; i < stop_size - 1; ++i) {
610         colors[i] = Gdiplus::Color(
611             stops[i - 1].getColor().a, stops[i - 1].getColor().r,
612             stops[i - 1].getColor().g, stops[i - 1].getColor().b);
613         offsets[i] = stops[i - 1].getOffset();
614     }
615     Gdiplus::LinearGradientBrush* fill =
616         new Gdiplus::LinearGradientBrush(
617             Gdiplus::PointF(points.first.x, points.first.y),
618             Gdiplus::PointF(points.second.x, points.second.y),
619             colors[0], colors[stop_size - 1]);
620     fill->SetWrapMode(Gdiplus::WrapModeTileFlipX);
621     fill->SetInterpolationColors(colors, offsets, stop_size);
622     applyTransformsOnBrush(gradient->getTransforms(), fill);
623     delete[] colors;
624     delete[] offsets;
625     return fill;
626 } else if (gradient->getClass() == "RadialGradient") {
627     RadialGradient* radial_gradient =
628         dynamic_cast< RadialGradient* >(gradient);
629     Vector2Df radius = radial_gradient->getRadius();
630     if (gradient->getUnits() == "userSpaceOnUse") {
631         bound.X = points.first.x - radius.x;
632         bound.Y = points.first.y - radius.x;
633         bound.Width = radius.x * 2;
634         bound.Height = radius.x * 2;
635     }
636     Gdiplus::GraphicsPath path;
637     path.AddEllipse(bound);
638     Gdiplus::PathGradientBrush* fill =
639         new Gdiplus::PathGradientBrush(&path);
640     offsets[0] = 0;
641     offsets[stop_size - 1] = 1;
642     colors[0] = Gdiplus::Color(stops[stop_size - 3].getColor().a,
643         stops[stop_size - 3].getColor().r,
644         stops[stop_size - 3].getColor().g,
645         stops[stop_size - 3].getColor().b);
646     colors[stop_size - 1] =
647         Gdiplus::Color(stops[0].getColor().a, stops[0].getColor().r,
648             stops[0].getColor().g, stops[0].getColor().b);
649     for (size_t i = 1; i < stop_size - 1; ++i) {
650         colors[i] =
651             Gdiplus::Color(stops[stop_size - 2 - i].getColor().a,
652                 stops[stop_size - 2 - i].getColor().r,
653                 stops[stop_size - 2 - i].getColor().g,
654                 stops[stop_size - 2 - i].getColor().b);
655         offsets[i] = 1 - stops[stop_size - 2 - i].getOffset();
656     }
657     fill->SetInterpolationColors(colors, offsets, stop_size);
658     applyTransformsOnBrush(gradient->getTransforms(), fill);
659     delete[] colors;
660     delete[] offsets;
661     return fill;
662 }
663 }
664 } else {
665     mColor color = shape->getFillColor();
666     Gdiplus::SolidBrush* fill = new Gdiplus::SolidBrush(
667         Gdiplus::Color(color.a, color.r, color.g, color.b));
668     return fill;
669 }
670 return nullptr;
671 }

```

3.16.2.14 getInstance()

`Renderer * Renderer::getInstance () [static]`

Gets the singleton instance of the [Renderer](#) class.

Returns

The singleton instance of the [Renderer](#) class.

Definition at line 11 of file `Renderer.cpp`.

```
11     {
12         if (instance == nullptr) {
13             instance = new Renderer();
14         }
15         return instance;
16     }
```

The documentation for this class was generated from the following files:

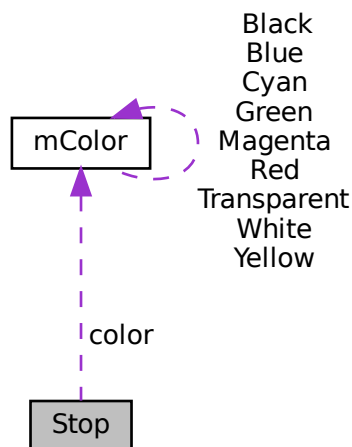
- `src/Renderer.hpp`
- `src/Renderer.cpp`

3.17 Stop Class Reference

A class that represents a stop.

```
#include <Stop.hpp>
```

Collaboration diagram for Stop:



Public Member Functions

- [Stop](#) (const [mColor](#) &[color](#), float [offset](#))
Constructs a [Stop](#) object.
- [mColor](#) [getColor](#) () const
Gets the color of the stop.
- float [getOffset](#) () const
Gets the offset of the stop.

Private Attributes

- `mColor color`
The color of the stop.
- `float offset`
The offset of the stop.

3.17.1 Detailed Description

A class that represents a stop.

The `Stop` class represents a stop. It contains a color and an offset.

Definition at line 11 of file `Stop.hpp`.

3.17.2 Constructor & Destructor Documentation

3.17.2.1 Stop()

```
Stop::Stop (
    const mColor & color,
    float offset )
```

Constructs a `Stop` object.

Parameters

<i>color</i>	The color of the stop.
<i>offset</i>	The offset of the stop.

Definition at line 3 of file `Stop.cpp`.

```
3 : color(color), offset(offset) {}
```

3.17.3 Member Function Documentation

3.17.3.1 getColor()

```
mColor Stop::getColor ( ) const
```

Gets the color of the stop.

Returns

The color of the stop.

Definition at line 5 of file Stop.cpp.

```
5 { return color; }
```

3.17.3.2 getOffset()

```
float Stop::getOffset ( ) const
```

Gets the offset of the stop.

Returns

The offset of the stop.

Definition at line 7 of file Stop.cpp.

```
7 { return offset; }
```

The documentation for this class was generated from the following files:

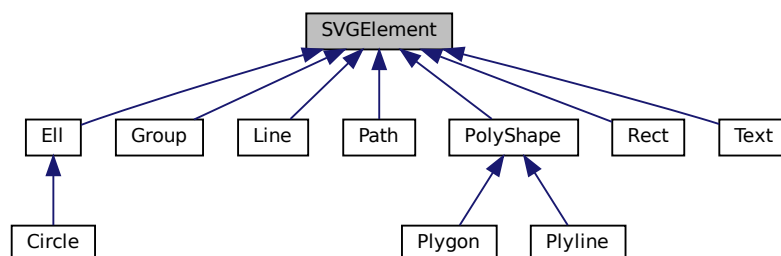
- src/graphics/Stop.hpp
- src/graphics/Stop.cpp

3.18 SVGElement Class Reference

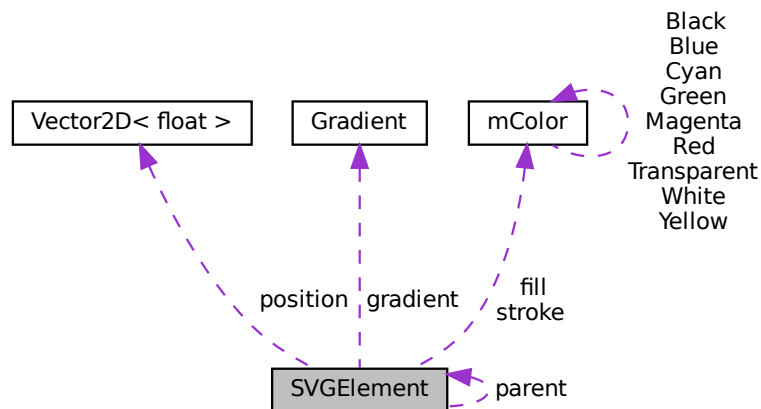
Represents an element in an SVG file.

```
#include <SVGElement.hpp>
```

Inheritance diagram for SVGElement:



Collaboration diagram for SVGELEMENT:



Public Member Functions

- virtual `~SVGELEMENT ()`=default
Virtual constructor.
- virtual `std::string getClass ()` const =0
Gets the type of the shape.
- void `setFillColor` (const `mColor` &color)
Sets the fill color of the shape.
- void `setOutlineColor` (const `mColor` &color)
Sets the outline color of the shape.
- void `setOutlineThickness` (float thickness)
Sets the outline thickness of the shape.
- void `setPosition` (float x, float y)
Sets the position of the shape.
- void `setPosition` (const `Vector2Df` &position)
Sets the position of the shape.
- const `mColor` & `getFillColor ()` const
Gets the fill color of the shape.
- const `mColor` & `getOutlineColor ()` const
Gets the outline color of the shape.
- float `getOutlineThickness ()` const
Gets the outline thickness of the shape.
- `Vector2Df` `getPosition ()` const
Get the current position of the shape.
- virtual `Vector2Df getMinBound ()` const
Gets the minimum bound of the shape.
- virtual `Vector2Df getMaxBound ()` const
Gets the maximum bound of the shape.
- virtual void `printData ()` const
Prints the data of the shape.

- void [setTransforms](#) (const std::vector< std::string > &[transforms](#))
Sets the transformations of the shape.
- std::vector< std::string > [getTransforms](#) () const
Gets the transformations of the shape.
- void [setParent](#) (SVGELEMENT *[parent](#))
Parent pointer setter to make the composite design pattern.
- SVGELEMENT * [getParent](#) () const
Parent pointer getter.
- void [setGradient](#) (Gradient *[gradient](#))
Sets the gradient of the shape.
- Gradient * [getGradient](#) () const
Gets the gradient of the shape.
- virtual void [addElement](#) (SVGELEMENT *[element](#))
Adds a shape to the composite group.

Protected Member Functions

- [SVGELEMENT](#) ()
Constructs a Shape object.
- [SVGELEMENT](#) (const [mColor](#) &[fill](#), const [mColor](#) &[stroke](#), float [stroke_width](#))
Constructs a Shape object.
- [SVGELEMENT](#) (const [mColor](#) &[fill](#), const [mColor](#) &[stroke](#), float [stroke_width](#), const [Vector2Df](#) &[position](#))
Constructs a Shape object.

Protected Attributes

- [SVGELEMENT](#) * [parent](#)
Pointer to the group that contains the shape.

Private Attributes

- [mColor](#) [fill](#)
Fill color.
- [mColor](#) [stroke](#)
Outline color.
- float [stroke_width](#)
Thickness of the shape's outline.
- [Vector2Df](#) [position](#)
Position of the shape.
- std::vector< std::string > [transforms](#)
List of transformations.
- Gradient * [gradient](#)
Pointer to the gradient that contains the shape.

3.18.1 Detailed Description

Represents an element in an SVG file.

Note

This class is abstract and cannot be instantiated.

This class is applied Abstract Factory design pattern and used as interface for other shapes.

This class is applied Composite design pattern and used as base class for other shapes.

Definition at line 18 of file SVGElement.hpp.

3.18.2 Constructor & Destructor Documentation

3.18.2.1 SVGElement() [1/3]

```
SVGElement::SVGElement ( ) [protected]
```

Constructs a Shape object.

Note

This constructor is protected because Shape is an abstract class that cannot be instantiated.

Definition at line 5 of file SVGElement.cpp.

```
6 : fill(mColor::Black), stroke(mColor::Transparent), stroke_width(1),  
7   gradient(NULL) {}
```

3.18.2.2 SVGElement() [2/3]

```
SVGElement::SVGElement (  
    const mColor & fill,  
    const mColor & stroke,  
    float stroke_width ) [protected]
```

Constructs a Shape object.

Parameters

<i>fill</i>	The fill color of the shape
<i>stroke</i>	The outline color of the shape
<i>stroke_width</i>	The outline thickness of the shape

Note

This constructor is protected because Shape is an abstract class that cannot be instantiated.

Definition at line 9 of file SVGElement.cpp.

```
11      : fill(fill), stroke(stroke), stroke_width(stroke_width), gradient(NULL) {}
```

3.18.2.3 SVGElement() [3/3]

```
SVGElement::SVGElement (
    const mColor & fill,
    const mColor & stroke,
    float stroke_width,
    const Vector2Df & position ) [protected]
```

Constructs a Shape object.

Parameters

<i>fill</i>	The fill color of the shape
<i>stroke</i>	The outline color of the shape
<i>stroke_width</i>	The outline thickness of the shape
<i>position</i>	The position of the shape

Note

This constructor is protected because Shape is an abstract class that cannot be instantiated.

Definition at line 13 of file SVGElement.cpp.

```
15      : fill(fill), stroke(stroke), stroke_width(stroke_width),
16        position(position), gradient(NULL) {}
```

3.18.3 Member Function Documentation**3.18.3.1 addElement()**

```
void SVGElement::addElement (
    SVGElement * element ) [virtual]
```

Adds a shape to the composite group.

Parameters

<i>element</i>	The shape to be added to the composite group.
----------------	---

Note

This function is used for composite design pattern

This function is virtual and can be overridden by derived classes.

Reimplemented in [Group](#).

Definition at line 83 of file SVGElement.cpp.

```
83 {}
```

3.18.3.2 getClass()

```
virtual std::string SVGElement::getClass ( ) const [pure virtual]
```

Gets the type of the shape.

Returns

The type of the shape

Note

This function is used for determining the type of the shape.

This function is pure virtual and must be implemented by derived classes.

Implemented in [Text](#), [Rect](#), [Polyline](#), [Polygon](#), [Path](#), [Line](#), [Group](#), [Ell](#), [Circle](#), and [PolyShape](#).

3.18.3.3 getFillColor()

```
const mColor & SVGElement::getFillColor ( ) const
```

Gets the fill color of the shape.

Returns

The fill color of the shape.

Note

The default fill color is white.

Definition at line 20 of file SVGElement.cpp.

```
20 { return fill; }
```

3.18.3.4 `getGradient()`

```
Gradient * SVGElement::getGradient ( ) const
```

Gets the gradient of the shape.

Returns

The gradient of the shape.

Note

The default gradient of the shape is NULL.

Definition at line 81 of file SVGElement.cpp.

```
81 { return gradient; }
```

3.18.3.5 `getMaxBound()`

```
Vector2Df SVGElement::getMaxBound ( ) const [virtual]
```

Gets the maximum bound of the shape.

Returns

The maximum bound of the shape.

Reimplemented in [PolyShape](#), and [EII](#).

Definition at line 45 of file SVGElement.cpp.

```
45 { return Vector2Df(); }
```

3.18.3.6 `getMinBound()`

```
Vector2Df SVGElement::getMinBound ( ) const [virtual]
```

Gets the minimum bound of the shape.

Returns

The minimum bound of the shape.

Reimplemented in [PolyShape](#), and [EII](#).

Definition at line 43 of file SVGElement.cpp.

```
43 { return Vector2Df(); }
```


3.18.3.7 getOutlineColor()

```
const mColor & SVGElement::getOutlineColor ( ) const
```

Gets the outline color of the shape.

Returns

The outline color of the shape.

Note

The default outline color is white.

Definition at line 24 of file SVGElement.cpp.

```
24 { return stroke; }
```

3.18.3.8 getOutlineThickness()

```
float SVGElement::getOutlineThickness ( ) const
```

Gets the outline thickness of the shape.

Returns

The outline thickness of the shape.

Note

The default outline thickness is 0.

Definition at line 30 of file SVGElement.cpp.

```
30 { return stroke_width; }
```

3.18.3.9 getParent()

```
SVGElement * SVGElement::getParent ( ) const
```

Parent pointer getter.

Returns

The parent pointer

Note

This function is used for composite design pattern

Definition at line 77 of file SVGElement.cpp.

```
77 { return parent; }
```

3.18.3.10 getPosition()

```
Vector2Df SVGElement::getPosition ( ) const
```

Get the current position of the shape.

Returns

The current position of the shape

Note

The default position of the shape is (0, 0).

Definition at line 41 of file SVGElement.cpp.

```
41 { return position; }
```

3.18.3.11 getTransforms()

```
std::vector< std::string > SVGElement::getTransforms ( ) const
```

Gets the transformations of the shape.

Returns

The transformations of the shape.

Note

The default transformations of the shape is empty.

The transformations can be either "translate", "rotate", "scale",

Definition at line 71 of file SVGElement.cpp.

```
71                                     {  
72     return transforms;  
73 }
```

3.18.3.12 printData()

```
void SVGElement::printData ( ) const [virtual]
```

Prints the data of the shape.

Note

This function is used for debugging purposes.

This function is virtual and can be overridden by derived classes.

Reimplemented in [Text](#), [Rect](#), [PolyShape](#), [Path](#), [Group](#), and [Ell](#).

Definition at line 47 of file SVGElement.cpp.

```
47     {
48         std::cout << "Shape: " << getClass() << std::endl;
49         std::cout << "Fill: " << getFillColor() << std::endl;
50         std::cout << "Stroke: " << getOutlineColor() << std::endl;
51         std::cout << "Stroke width: " << getOutlineThickness() << std::endl;
52         std::cout << "Position: " << getPosition().x << " " << getPosition().y
53             << std::endl;
54         std::cout << "Transforms: ";
55         for (auto transform : transforms) {
56             std::cout << transform << " ";
57         }
58         std::cout << std::endl;
59         if (gradient != NULL)
60             std::cout << "Gradient: " << gradient->getClass() << " "
61                 << gradient->getPoints().first.x << " "
62                 << gradient->getPoints().first.y << " "
63                 << gradient->getPoints().second.x << " "
64                 << gradient->getPoints().second.y << std::endl;
65     }
```

3.18.3.13 setFillColor()

```
void SVGElement::setFillColor (
    const mColor & color )
```

Sets the fill color of the shape.

Parameters

<i>color</i>	The new fill color of the shape.
--------------	----------------------------------

Definition at line 18 of file SVGElement.cpp.

```
18 { fill = color; }
```

3.18.3.14 setGradient()

```
void SVGElement::setGradient (
    Gradient * gradient )
```

Sets the gradient of the shape.

Parameters

<i>gradient</i>	The new gradient of the shape.
-----------------	--------------------------------

Note

The default gradient of the shape is NULL.

Definition at line 79 of file SVGElement.cpp.

```
79 { this->gradient = gradient; }
```

3.18.3.15 setOutlineColor()

```
void SVGElement::setOutlineColor (
    const mColor & color )
```

Sets the outline color of the shape.

Parameters

<i>color</i>	The new outline color of the shape.
--------------	-------------------------------------

Definition at line 22 of file SVGElement.cpp.

```
22 { stroke = color; }
```

3.18.3.16 setOutlineThickness()

```
void SVGElement::setOutlineThickness (
    float thickness )
```

Sets the outline thickness of the shape.

Parameters

<i>thickness</i>	The new outline thickness of the shape.
------------------	---

Note

If the thickness is negative, the outline will be inside the shape. If the thickness is positive, the outline will be outside the shape. If the thickness is zero, no outline will be drawn.

The default outline thickness is 0.

The outline thickness cannot be greater than the radius of the shape.

Definition at line 26 of file SVGElement.cpp.

```
26
```

```
{
```

```

27     stroke_width = thickness;
28 }

```

3.18.3.17 setParent()

```

void SVGElement::setParent (
    SVGElement * parent )

```

Parent pointer setter to make the composite design pattern.

Parameters

<i>parent</i>	The parent pointer
---------------	--------------------

Note

This function is used for composite design pattern

Definition at line 75 of file SVGElement.cpp.

```

75 { this->parent = parent; }

```

3.18.3.18 setPosition() [1/2]

```

void SVGElement::setPosition (
    const Vector2Df & position )

```

Sets the position of the shape.

Parameters

<i>position</i>	The new position of the shape (Vector2f is a typedef of coordination vector)
-----------------	--

Note

The default position of the shape is (0, 0).

The position of the shape is relative to its origin.

Definition at line 37 of file SVGElement.cpp.

```

37                                     {
38     setPosition(position.x, position.y);
39 }

```

3.18.3.19 setPosition() [2/2]

```
void SVGElement::setPosition (
    float x,
    float y )
```

Sets the position of the shape.

Parameters

<i>x</i>	The x coordinate of the new position
<i>y</i>	The y coordinate of the new position

Note

The default position of the shape is (0, 0).

The position of the shape is relative to its origin.

Definition at line 32 of file SVGElement.cpp.

```
32 {
33     position.x = x;
34     position.y = y;
35 }
```

3.18.3.20 setTransforms()

```
void SVGElement::setTransforms (
    const std::vector< std::string > & transforms )
```

Sets the transformations of the shape.

Parameters

<i>transforms</i>	The new transformations of the shape.
-------------------	---------------------------------------

Note

The default transformations of the shape is empty.

The transformations can be either "translate", "rotate", "scale",

Definition at line 67 of file SVGElement.cpp.

```
67 {
68     this->transforms = transforms;
69 }
```

The documentation for this class was generated from the following files:

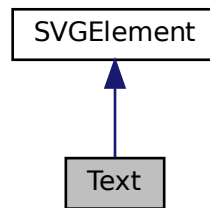
- src/graphics/SVGElement.hpp
- src/graphics/SVGElement.cpp

3.19 Text Class Reference

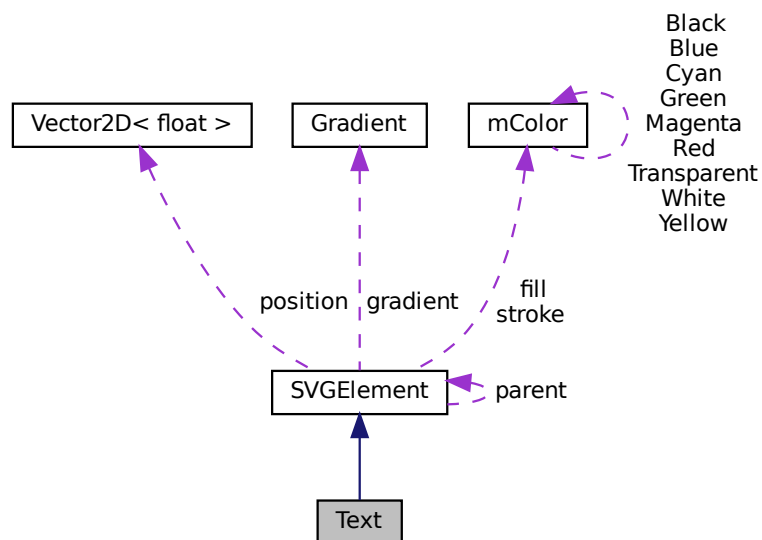
Represents text in 2D space.

```
#include <Text.hpp>
```

Inheritance diagram for Text:



Collaboration diagram for Text:



Public Member Functions

- `Text` (`Vector2Df` pos, `std::string` text, float `font_size`, const `mColor` &fill, const `mColor` &stroke, float `stroke_width`)
Constructs a `Text` object.

- `std::string getClass ()` const override
Gets the type of the shape.
- `void setContent (std::string content)`
Sets the string of the text.
- `std::string getContent ()` const
Gets the string of the text.
- `void setFontSize (float font_size)`
Sets the font size of the text.
- `float getFontSize ()` const
Gets the font size of the text.
- `void setAnchor (std::string anchor)`
Sets the anchor of the text.
- `std::string getAnchor ()` const
Gets the anchor of the text.
- `void setFontStyle (std::string style)`
Sets the style of the text.
- `std::string getFontStyle ()` const
Gets the style of the text.
- `void printData ()` const override
Prints the data of the text.

Private Attributes

- `std::string content`
Text element.
- `float font_size`
Font size of the text.
- `std::string anchor`
Anchor of the text.
- `std::string style`
Style of the text.

Additional Inherited Members

3.19.1 Detailed Description

Represents text in 2D space.

The `Text` class is derived from the `SVGElement` class and defines a text element with a specified position, string, fill color, and font size.

Definition at line 12 of file `Text.hpp`.

3.19.2 Constructor & Destructor Documentation

3.19.2.1 Text()

```
Text::Text (
    Vector2Df pos,
    std::string text,
    float font_size,
    const mColor & fill,
    const mColor & stroke,
    float stroke_width )
```

Constructs a [Text](#) object.

Parameters

<i>pos</i>	The position of the text.
<i>text</i>	The string of the text.
<i>fill</i>	The fill color of the text
<i>font_size</i>	The font size of the text (default is 1).

Definition at line 3 of file Text.cpp.

```
5 : SVGElement(fill, stroke, stroke_width, pos), content(text),
6   font_size(font_size) {}
```

3.19.3 Member Function Documentation

3.19.3.1 getAnchor()

```
std::string Text::getAnchor ( ) const
```

Gets the anchor of the text.

Returns

The anchor of the text.

Definition at line 20 of file Text.cpp.

```
20 { return anchor; }
```

3.19.3.2 getClass()

```
std::string Text::getClass ( ) const [override], [virtual]
```

Gets the type of the shape.

Returns

The string "Text".

Implements [SVGElement](#).

Definition at line 8 of file Text.cpp.

```
8 { return "Text"; }
```

3.19.3.3 getContent()

```
std::string Text::getContent ( ) const
```

Gets the string of the text.

Returns

The string of the text.

Definition at line 16 of file Text.cpp.

```
16 { return content; }
```

3.19.3.4 getFontSize()

```
float Text::getFontSize ( ) const
```

Gets the font size of the text.

Returns

The font size of the text.

Definition at line 12 of file Text.cpp.

```
12 { return font_size; }
```

3.19.3.5 getFontStyle()

```
std::string Text::getFontStyle ( ) const
```

Gets the style of the text.

Returns

The style of the text.

Definition at line 24 of file Text.cpp.

```
24 { return style; }
```

3.19.3.6 setAnchor()

```
void Text::setAnchor (
    std::string anchor )
```

Sets the anchor of the text.

Parameters

<i>anchor</i>	The new anchor of the text.
---------------	-----------------------------

Definition at line 18 of file Text.cpp.

```
18 { this->anchor = anchor; }
```

3.19.3.7 setContent()

```
void Text::setContent (
    std::string content )
```

Sets the string of the text.

Parameters

<i>content</i>	The new string of the text.
----------------	-----------------------------

Definition at line 14 of file Text.cpp.

```
14 { this->content = content; }
```

3.19.3.8 setFontSize()

```
void Text::setFontSize (
    float font_size )
```

Sets the font size of the text.

Parameters

<i>font_size</i>	The new font size of the text.
------------------	--------------------------------

Definition at line 10 of file Text.cpp.

```
10 { this->font_size = font_size; }
```

3.19.3.9 setFontStyle()

```
void Text::setFontStyle (
    std::string style )
```

Sets the style of the text.

Parameters

<i>style</i>	The new style of the text.
--------------	----------------------------

Definition at line 22 of file Text.cpp.

```
22 { this->style = font_style; }
```

The documentation for this class was generated from the following files:

- src/graphics/Text.hpp
- src/graphics/Text.cpp

3.20 Vector2D< T > Class Template Reference

Utility template class for manipulating 2-dimensional vectors.

```
#include <Vector2D.hpp>
```

Public Member Functions

- [Vector2D](#) ()
Default constructor.
- [Vector2D](#) (T X, T Y)
Construct the vector from its coordinates.
- `template<typename U >`
[Vector2D](#) (const [Vector2D](#)< U > &vector)
Construct the vector from another type of vector.

Public Attributes

- T [x](#)
X coordinate of the vector.
- T [y](#)
Y coordinate of the vector.

3.20.1 Detailed Description

```
template<typename T>  
class Vector2D< T >
```

Utility template class for manipulating 2-dimensional vectors.

[Vector2D](#) is a simple class that defines a mathematical vector with two coordinates (x and y). It can be used to represent anything that has two dimensions: a size, a point, a velocity, etc.

The template parameter T is the type of the coordinates. It can be any type that supports arithmetic operations (+, -, /, *) and comparisons (==, !=), for example int or float.

Definition at line 17 of file Vector2D.hpp.

3.20.2 Constructor & Destructor Documentation

3.20.2.1 Vector2D() [1/3]

```
template<typename T >
Vector2D< T >::Vector2D [inline]
```

Default constructor.

Creates a Vector2(0, 0).

Definition at line 197 of file Vector2D.hpp.

```
197 : x(0), y(0) {}
```

3.20.2.2 Vector2D() [2/3]

```
template<typename T >
Vector2D< T >::Vector2D (
    T X,
    T Y ) [inline]
```

Construct the vector from its coordinates.

Parameters

<i>X</i>	X coordinate
<i>Y</i>	Y coordinate

Definition at line 200 of file Vector2D.hpp.

```
200 : x(X), y(Y) {}
```

3.20.2.3 Vector2D() [3/3]

```
template<typename T >
template<typename U >
Vector2D< T >::Vector2D (
    const Vector2D< U > & vector ) [inline], [explicit]
```

Construct the vector from another type of vector.

This constructor doesn't replace the copy constructor, it's called only when $U \neq T$. A call to this constructor will fail to compile if U is not convertible to T .

Definition at line 204 of file Vector2D.hpp.

```
205 : x(static_cast< T >(vector.x)), y(static_cast< T >(vector.y)) {}
```

The documentation for this class was generated from the following file:

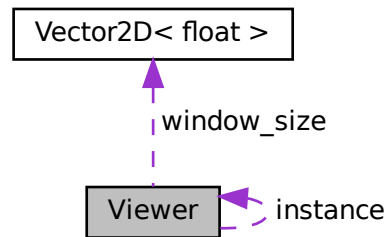
- src/graphics/Vector2D.hpp

3.21 Viewer Class Reference

Represents a viewer for rendering and interacting with a scene.

```
#include <Viewer.hpp>
```

Collaboration diagram for Viewer:



Public Member Functions

- [~Viewer](#) ()
Destructor for the [Viewer](#) class.
- void [handleMouseEvent](#) (UINT message, WPARAM wParam, LPARAM lParam)
Handles mouse events, such as wheel, move, left button down, and left button up.
- void [handleKeyEvent](#) (WPARAM wParam)
Handles keyboard events.
- void [getWindowSize](#) (HWND hWnd) const
Get the current window size.

Static Public Member Functions

- static [Viewer](#) * [getInstance](#) ()
Gets the singleton instance of the [Viewer](#) class.

Public Attributes

- float [offset_x](#)
X-coordinate offset of the viewer.
- float [offset_y](#)
Y-coordinate offset of the viewer.
- float [zoom_factor](#)
Zoom factor for scaling the view.
- float [rotate_angle](#)
Rotation angle of the view.
- bool [needs_repaint](#)
- [Vector2Df](#) [window_size](#)
Size of the window.

Private Member Functions

- [Viewer](#) ()
Private constructor for the [Viewer](#) class.
- [Viewer](#) (const [Viewer](#) &)=delete
Copy constructor for the [Viewer](#) class (deleted to enforce singleton pattern).
- void [operator=](#) (const [Viewer](#) &)=delete
Copy assignment operator for the [Viewer](#) class (deleted to enforce singleton pattern).
- void [handleMouseWheel](#) (WPARAM wParam)
Handles the mouse wheel event for zooming.
- void [handleMouseMove](#) (LPARAM lParam)
Handles the mouse move event for panning.
- void [handleLeftButtonDown](#) (LPARAM lParam)
Handles the left button down event for initiating dragging.
- void [handleLeftButtonUp](#) ()
Handles the left button up event for ending dragging.
- void [handleKeyDown](#) (WPARAM wParam)
Handles the key down event for rotating.

Private Attributes

- bool [is_dragging](#)
Flag indicating whether the mouse is being dragged.
- POINT [last_mouse_pos](#)
Last recorded mouse position.

Static Private Attributes

- static [Viewer](#) * [instance](#) = nullptr
Singleton instance of the [Viewer](#) class.

3.21.1 Detailed Description

Represents a viewer for rendering and interacting with a scene.

The viewer supports the following interactions:

- Rotation: Press 'Q' to rotate the view counterclockwise and 'E' to rotate clockwise.
- Zooming: Use the scroll wheel to zoom in and out of the scene.
- Translation: Click and drag the left mouse button to translate the view.

Definition at line 16 of file [Viewer.hpp](#).

3.21.2 Member Function Documentation

3.21.2.1 getInstance()

```
Viewer * Viewer::getInstance ( ) [static]
```

Gets the singleton instance of the [Viewer](#) class.

Returns

The singleton instance of the [Viewer](#) class.

Definition at line 4 of file [Viewer.cpp](#).

```
4      {
5      if (!instance) {
6          instance = new Viewer();
7      }
8      return instance;
9  }
```

3.21.2.2 getWindowSize()

```
void Viewer::getWindowSize (
    HWND hWnd ) const
```

Get the current window size.

Parameters

<i>hWnd</i>	The handle to the window.
-------------	---------------------------

Definition at line 103 of file [Viewer.cpp](#).

```
103      {
104      RECT rect;
105      GetClientRect(hWnd, &rect);
106      instance->window_size.x = static_cast< float >(rect.right - rect.left);
107      instance->window_size.y = static_cast< float >(rect.bottom - rect.top);
108  }
```

3.21.2.3 handleKeyDown()

```
void Viewer::handleKeyDown (
    WPARAM wParam ) [private]
```

Handles the key down event for rotating.

Parameters

<i>wParam</i>	The WPARAM parameter of the message.
---------------	--------------------------------------

Definition at line 90 of file [Viewer.cpp](#).

```
90      {
```



```

91     char key = static_cast< char >(wParam);
92     switch (tolower(key)) {
93         case 'q':
94             rotate_angle -= 1.0f;
95             break;
96
97         case 'e':
98             rotate_angle += 1.0f;
99             break;
100     }
101 }
```

3.21.2.4 handleKeyEvent()

```

void Viewer::handleKeyEvent (
    WPARAM wParam )
```

Handles keyboard events.

Parameters

<i>wParam</i>	The WPARAM parameter of the message.
---------------	--------------------------------------

Definition at line 47 of file Viewer.cpp.

```
47 { handleKeyDown(wParam); }
```

3.21.2.5 handleLeftButtonDown()

```

void Viewer::handleLeftButtonDown (
    LPARAM lParam ) [private]
```

Handles the left button down event for initiating dragging.

Parameters

<i>lParam</i>	The LPARAM parameter of the message.
---------------	--------------------------------------

Definition at line 74 of file Viewer.cpp.

```

74     {
75         is_dragging = true;
76         last_mouse_pos.x = static_cast< int >(LOWORD(lParam));
77         last_mouse_pos.y = static_cast< int >(HIWORD(lParam));
78         SetCapture(GetActiveWindow());
79     }
```

3.21.2.6 handleMouseEvent()

```

void Viewer::handleMouseEvent (
    UINT message,
```

```
WPARAM wParam,
LPARAM lParam )
```

Handles mouse events, such as wheel, move, left button down, and left button up.

Parameters

<i>message</i>	The Windows message identifier.
<i>wParam</i>	The WPARAM parameter of the message.
<i>lParam</i>	The LPARAM parameter of the message.

Definition at line 26 of file Viewer.cpp.

```
26
27     switch (message) {
28         case WM_MOUSEWHEEL:
29             handleMouseWheel(wParam);
30             break;
31
32         case WM_MOUSEMOVE:
33             if (wParam & MK_LBUTTON) {
34                 handleMouseMove(lParam);
35             }
36
37         case WM_LBUTTONDOWN:
38             handleLeftButtonDown(lParam);
39             break;
40
41         case WM_LBUTTONUP:
42             handleLeftButtonUp();
43             break;
44     }
45 }
```

3.21.2.7 handleMouseMove()

```
void Viewer::handleMouseMove (
    LPARAM lParam ) [private]
```

Handles the mouse move event for panning.

Parameters

<i>lParam</i>	The LPARAM parameter of the message.
---------------	--------------------------------------

Definition at line 59 of file Viewer.cpp.

```
59
60     if (is_dragging) {
61         int x = static_cast< int >(LOWORD(lParam));
62         int y = static_cast< int >(HIWORD(lParam));
63
64         if (x != last_mouse_pos.x || y != last_mouse_pos.y) {
65             offset_x += (x - last_mouse_pos.x) * zoom_factor;
66             offset_y += (y - last_mouse_pos.y) * zoom_factor;
67             last_mouse_pos.x = x;
68             last_mouse_pos.y = y;
69             needs_repaint = true;
70         }
71     }
72 }
```

3.21.2.8 handleMouseWheel()

```
void Viewer::handleMouseWheel (
    WPARAM wParam ) [private]
```

Handles the mouse wheel event for zooming.

Parameters

<i>wParam</i>	The WPARAM parameter of the message.
---------------	--------------------------------------

Definition at line 49 of file Viewer.cpp.

```
49
50     if (GET_WHEEL_DELTA_WPARAM(wParam) > 0) {
51         zoom_factor *= 1.1f;
52         needs_repaint = true;
53     } else {
54         zoom_factor /= 1.1f;
55         needs_repaint = true;
56     }
57 }
```

3.21.3 Member Data Documentation

3.21.3.1 needs_repaint

```
bool Viewer::needs_repaint
```

Flag indicating whether the view needs to be repainted

Definition at line 22 of file Viewer.hpp.

The documentation for this class was generated from the following files:

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