wPlot2D

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Chapter 1

wPlot2D - ECS-Based 2D Plotting Engine

1.1 wPlot2D

1.1.1 Introduction

wPlot2D is a lightweight C++ plotting library designed to create clean and customizable 2D visualizations. It provides essential features such as axes, labels, titles, legends, and annotations, while allowing users to export high-quality graphics for reports, teaching, or research. The library is built with a modular design, making it easy to integrate into existing C++ projects. Its focus is on clarity, precision, and reproducibility, providing an accessible tool for academic and scientific work.

1.1.2 Features

- Entity and Component system
- Dynamic component management with type-safe access
- Support for SFML-based rendering

1.1.3 Links

- GitHub Repository
- itch.io Page
- Project Website

1.1.4 Author

Created by Wilfried Koch.

Chapter 2

Namespace Index

2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

Chapter 3

Hierarchical Index

3.1 Class Hierarchy

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

Chapter 4

Class Index

4.1 Class List

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

Chapter 5

File Index

5.1 File List

Here is a list of all files with brief descriptions:

Chapter 6

Namespace Documentation

6.1 wEngine Namespace Reference

Classes

- class AssetManager

  Manages graphical assets such as fonts for reuse across the application.
- class ColorComponent

  ECS component that holds a color value.
- class Component

  Abstract base class for all ECS components.
- class DiscontinuityComponent

  ECS component that manages excluded intervals for function plotting.
- class Entity

  Represents an entity in the ECS (Entity-Component System) architecture.
- class FontComponent

  Holds a reference to an SFML font for rendering text.
- class FunctionComponent

  ECS component that stores a mathematical function f(x).
- class LengthComponent

  ECS component that defines the length of a drawable object.
- class LineDrawer

  Utility class for rendering thick lines and polylines with style support.
- class LineStyleComponent

  ESC component that defines the style of a line (solid, dotted, dashed).
- class MathUtils

  Provides common mathematical helper functions for plotting and geometry.
- class NotchIntervalComponent

  ECS component that defines the interval between notches on an axis.
- class OffsetComponent

  ECS component that defines a logical coordinate offset.
- class PaddingComponent

  ECS component representing internal padding for UI-like elements.
- class PathUtils

  Utility class providing static functions for managing executable and resource paths across platforms.
- class PositionComponent

ECS component storing the position of an entity in 2D space and supports movement tracking.

- class RotationComponent

  ECS component that stores a rotation angle (in degrees).
- class ScaleComponent

  ECS component that defines the scaling factor for an entity in 2D space.
- class ThicknessComponent

  ECS component that defines the thickness of a drawable object.

Functions

- std::size_t getNextComponentTypeID ()
- template<typename ComponentType>
  std::size_t getComponentTypeID () noexcept

6.1.1 Function Documentation

6.1.1.1 getNextComponentTypeID()

```
std::size_t wEngine::getNextComponentTypeID ()  [inline]
```

6.1.1.2 getComponentTypeID()

```
template<typename ComponentType>
std::size_t wEngine::getComponentTypeID ()  [noexcept]
```

6.2 wPlot2D Namespace Reference

Classes

- class AxisEntity

  Represents a visual axis (X or Y) in a 2D plot with optional notches and title.
- class DataPlotEntity

  Entity for plotting raw data points as a connected polyline.
- class FrameEntity

  Entity representing a rectangular frame around content.
- class FunctionEntity

  Represents a mathematical function as a drawable entity in a 2D plot.
- class GraphicsEntity

  Central entity responsible for graphical rendering in wPlot2D.
- class LabelEntity

  Represents a textual label or a collection of axis labels.
- class LegendEntity

  Represents a legend box that describes functions and data plots.
- class LineEntity

  Entity representing a straight line segment with optional arrowhead.
- class NotchEntity

  Represents a single tick mark ("notch") on a 2D axis.
- class TitleEntity

  Represents a textual label (typically an axis title or main plot title) in a 2D plot.

Enumerations

- enum class AxisType { X_AXIS , Y_AXIS }

  Enum representing the type of axis to render.
- enum class NotchPosition { Center , Above , Below }

  Enum controlling the visual placement of notches relative to the axis.
- enum class TitleAlignment { Top , Bottom }

  Defines the vertical placement of the main plot title.

6.2.1 Enumeration Type Documentation

6.2.1.1 AxisType

```
enum class wPlot2D::AxisType  [strong]
```

Enum representing the type of axis to render.

Enumerator

X_AXIS	
Y_AXIS	

6.2.1.2 NotchPosition

```
enum class wPlot2D::NotchPosition  [strong]
```

Enum controlling the visual placement of notches relative to the axis.

Enumerator

Center	
Above	
Below	

6.2.1.3 TitleAlignment

```
enum class wPlot2D::TitleAlignment  [strong]
```

Defines the vertical placement of the main plot title.

Enumerator

Top	
Bottom	

Chapter 7

Class Documentation

7.1 wEngine::AssetManager Class Reference

Manages graphical assets such as fonts for reuse across the application.

`#include <wAssetManager.hpp>`

Public Member Functions

- AssetManager ()=default
- AssetManager (const AssetManager &)=delete
- AssetManager & operator= (const AssetManager &)=delete
- ~AssetManager ()=default
- void LoadFont (const std::string &name, const std::string &fileName)

  Loads a font from file and stores it under a given name.
- sf::Font & getFont (const std::string &name)

  Retrieves a reference to a previously loaded font.
- void RemoveFont (const std::string &name)

  Removes a previously loaded font from memory.
- void debugPrintFonts () const

  Prints the list of loaded fonts to standard output.

7.1.1 Detailed Description

Manages graphical assets such as fonts for reuse across the application.

This class provides a centralized way to load, access, and manage graphical assets, currently supporting fonts via SFML. Assets are identified by string keys and stored internally to avoid reloading them multiple times.

7.1.1.0.1 Key features:

- Load fonts from file and associate them with a name.
- Access loaded fonts via their name.
- Remove fonts from memory when no longer needed.
- Debug printing of loaded assets.

This manager is non-copyable to ensure centralized ownership and avoid accidental duplication of resources.

Note

If an asset fails to load or is accessed without being loaded first, a `std::runtime_error` is thrown.

Author

Wilfried Koch

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7.1.2 Constructor & Destructor Documentation

7.1.2.1 AssetManager() [1/2]

```
wEngine::AssetManager::AssetManager ()  [default]
```

7.1.2.2 AssetManager() [2/2]

```
wEngine::AssetManager::AssetManager (
            const AssetManager & )  [delete]
```

7.1.2.3 ~AssetManager()

```
wEngine::AssetManager::~AssetManager ()  [default]
```

7.1.3 Member Function Documentation

7.1.3.1 operator=()

```
AssetManager & wEngine::AssetManager::operator= (
            const AssetManager & )  [delete]
```

7.1.3.2 LoadFont()

```
void wEngine::AssetManager::LoadFont (
            const std::string & name,
            const std::string & fileName)
```

Loads a font from file and stores it under a given name.

If successful, the font is stored under the given `name` and can later be retrieved with `getFont( name )`. If loading fails, an exception is thrown.

Parameters

name	The unique name used to identify the font.
fileName	The path to the font file on disk.

Exceptions

std::runtime_error	if the font cannot be loaded from file.

7.1.3.3 getFont()

```
sf::Font & wEngine::AssetManager::getFont (
            const std::string & name)
```

Retrieves a reference to a previously loaded font.

Parameters

name	The name of the font previously loaded.

Returns

Reference to the corresponding sf::Font object.

Exceptions

std::runtime_error	if the font does not exist.

7.1.3.4 RemoveFont()

```
void wEngine::AssetManager::RemoveFont (
            const std::string & name)
```

Removes a previously loaded font from memory.

Parameters

name	The name of the font to remove.

Exceptions

std::runtime_error	if the font does not exist.

7.1.3.5 debugPrintFonts()

```
void wEngine::AssetManager::debugPrintFonts () const
```

Prints the list of loaded fonts to standard output.

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

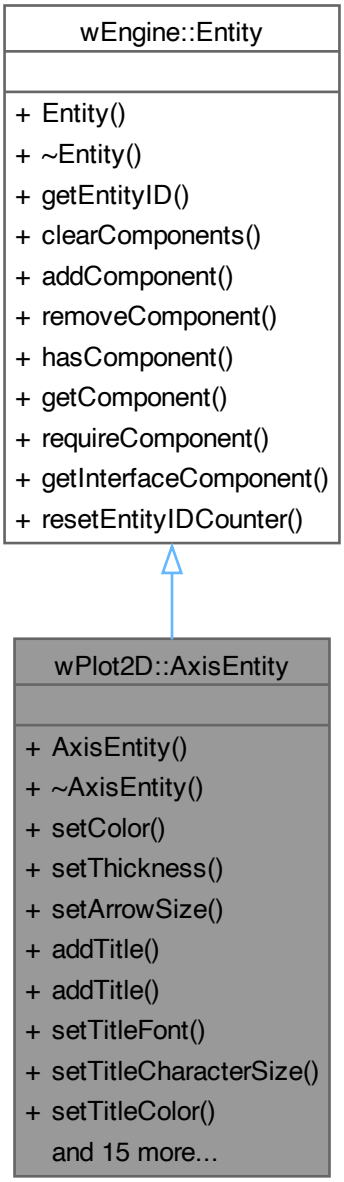
- wAssetManager.hpp
- wAssetManager.cpp

7.2 wPlot2D::AxisEntity Class Reference

Represents a visual axis (X or Y) in a 2D plot with optional notches and title.

```
#include <wAxisEntity.hpp>
```

Inheritance diagram for wPlot2D::AxisEntity:



Public Member Functions

- AxisEntity (sf::Font &font, sf::Vector2f origin, sf::Vector2f scale, sf::Vector2f offset, AxisType type, sf::Vector2f axisRange)

  Constructs an AxisEntity with a given orientation, origin, scale, and range.
- virtual ~AxisEntity ()=default

  Virtual destructor.
- void setColor (sf::Color color)

  Sets the color of the axis line.

- void setThickness (float thickness)

  Sets the thickness of the axis line (in pixels).
- void setArrowSize (float arrowSize)

  Sets the size of the arrowhead at the end of the axis.
- void addTitle (const std::string &title)

  Adds a title to the axis.
- void addTitle (const std::wstring &title)

  Adds a title to the axis.
- void setTitleFont (const sf::Font &font)

  Sets the font of the axis title.
- void setTitleCharacterSize (unsigned int size)

  Sets the character size of the axis title.
- void setTitleColor (sf::Color newColor)

  Sets the color of the axis title.
- void setTitleOffset (sf::Vector2f titleOffset)

  Sets a manual offset for the title position.
- sf::Vector2f getTitleOffset () const

  Gets the current title offset.
- void addNotches (float interval, NotchPosition position, bool hasLabels=false)

  Adds notches along the axis.
- void setNotchesColor (const sf::Color &color)

  Sets the color of all notches.
- void setNotchesThickness (float thickness)

  Sets the thickness of all notches.
- void setNotchesLength (float newLength)

  Sets the length of all notches.
- void setLabelsFont (const sf::Font &font)

  Sets the font of all labels.
- void setLabelsColor (const sf::Color &color)

  Sets the color of all labels.
- std::vector< sf::Vector2f > getLabelsOffset () const

  Gets the current offset of all labels.
- void setLabelsOffset (sf::Vector2f offset)

  Sets a new offset for all labels.
- void addLabelsOffset (sf::Vector2f delta)

  Applies an additional offset to all labels.
- void setLabelsCharacterSize (unsigned int newSize)

  Sets the character size of all labels.
- void setLabelsDecimalPlaces (int places)

  Sets the number of decimal places for numeric labels.
- void setCustomLabels (const std::vector< std::string > &labels)

  Replaces numeric labels with a custom set of strings.
- void render (sf::RenderWindow &window)

  Renders the axis (line, arrow, title, notches, labels).

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.2.1 Detailed Description

Represents a visual axis (X or Y) in a 2D plot with optional notches and title.

This class manages the rendering of a coordinate axis in a Cartesian 2D system. It supports:

- Rendering of an axis line with an arrowhead.
- Adding notches (tick marks) with optional labels.
- Attaching a customizable axis title.

See also

TitleEntity, LabelEntity, NotchEntity, LineEntity

Author

Wilfried Koch

Copyright

7.2.2 Constructor & Destructor Documentation

7.2.2.1 AxisEntity()

```
wPlot2D::AxisEntity::AxisEntity (
            sf::Font & font,
            sf::Vector2f origin,
            sf::Vector2f scale,
            sf::Vector2f offset,
            AxisType type,
            sf::Vector2f axisRange)
```

Constructs an AxisEntity with a given orientation, origin, scale, and range.

Parameters

font	Reference to a font used for the title and labels.
origin	Pixel position of the logical origin (typically from GraphicsEntity).
scale	Scaling factor (pixels per logical unit).
offset	Logical displacement of the axis system.
type	Axis type (`X_AXIS` or `Y_AXIS`).
axisRange	Logical range covered by the axis (e.g., [-5, 5]).

7.2.2.2 ~AxisEntity()

```
virtual wPlot2D::AxisEntity::~AxisEntity ()  [virtual], [default]
```

Virtual destructor.

7.2.3 Member Function Documentation

7.2.3.1 setColor()

```
void wPlot2D::AxisEntity::setColor (
            sf::Color color)
```

Sets the color of the axis line.

Parameters

color	New axis color.

Exceptions

std::runtime_error	if ColorComponent is missing.

7.2.3.2 setThickness()

```
void wPlot2D::AxisEntity::setThickness (
            float thickness)
```

Sets the thickness of the axis line (in pixels).

Parameters

thickness	New thickness (must be $>$ 0).

Exceptions

std::invalid_argument	if thickness $<=$ 0.
std::runtime_error	if ThicknessComponent is missing.

7.2.3.3 setArrowSize()

```
void wPlot2D::AxisEntity::setArrowSize (
            float arrowSize)
```

Sets the size of the arrowhead at the end of the axis.

Parameters

arrowSize	Arrowhead size in pixels.

7.2.3.4 addTitle() [1/2]

```
void wPlot2D::AxisEntity::addTitle (
            const std::string & title)
```

Adds a title to the axis.

Parameters

title	Title string (narrow string).

7.2.3.5 addTitle() [2/2]

```
void wPlot2D::AxisEntity::addTitle (
            const std::wstring & title)
```

Adds a title to the axis.

Parameters

title	Title string (wide string).

7.2.3.6 setTitleFont()

```
void wPlot2D::AxisEntity::setTitleFont (
            const sf::Font & font)
```

Sets the font of the axis title.

Parameters

font	Reference to an SFML font.

7.2.3.7 setTitleCharacterSize()

```
void wPlot2D::AxisEntity::setTitleCharacterSize (
            unsigned int size)
```

Sets the character size of the axis title.

Parameters

size	Character size in pixels.

7.2.3.8 setTitleColor()

```
void wPlot2D::AxisEntity::setTitleColor (
            sf::Color newColor)
```

Sets the color of the axis title.

Parameters

newColor	New text color.

7.2.3.9 setTitleOffset()

```
void wPlot2D::AxisEntity::setTitleOffset (
            sf::Vector2f titleOffset)
```

Sets a manual offset for the title position.

Parameters

titleOffset	Pixel offset applied to the title position.

7.2.3.10 getTitleOffset()

```
sf::Vector2f wPlot2D::AxisEntity::getTitleOffset () const  [nodiscard]
```

Gets the current title offset.

Returns

Offset vector in pixels.

7.2.3.11 addNotches()

```
void wPlot2D::AxisEntity::addNotches (
            float interval,
            NotchPosition position,
            bool hasLabels = false)
```

Adds notches along the axis.

Parameters

interval	Logical spacing between notches (> 0).
position	Placement relative to axis (Center, Above, Below).
hasLabels	If true, labels are displayed for each notch.

7.2.3.12 setNotchesColor()

```
void wPlot2D::AxisEntity::setNotchesColor (
            const sf::Color & color)
```

Sets the color of all notches.

Parameters

color	New notch color.

7.2.3.13 setNotchesThickness()

```
void wPlot2D::AxisEntity::setNotchesThickness (
            float thickness)
```

Sets the thickness of all notches.

Parameters

thickness	New thickness in pixels.

7.2.3.14 setNotchesLength()

```
void wPlot2D::AxisEntity::setNotchesLength (
            float newLength)
```

Sets the length of all notches.

Parameters

newLength	New length in pixels.

7.2.3.15 setLabelsFont()

```
void wPlot2D::AxisEntity::setLabelsFont (
            const sf::Font & font)
```

Sets the font of all labels.

Parameters

font	Reference to an SFML font.

7.2.3.16 setLabelsColor()

```
void wPlot2D::AxisEntity::setLabelsColor (
            const sf::Color & color)
```

Sets the color of all labels.

Parameters

color	New text color.

7.2.3.17 getLabelsOffset()

```
std::vector< sf::Vector2f > wPlot2D::AxisEntity::getLabelsOffset () const  [nodiscard]
```

Gets the current offset of all labels.

Returns

Vector of offsets (one per label).

7.2.3.18 setLabelsOffset()

```
void wPlot2D::AxisEntity::setLabelsOffset (
            sf::Vector2f offset)
```

Sets a new offset for all labels.

Parameters

offset	Offset vector in pixels.

7.2.3.19 addLabelsOffset()

```
void wPlot2D::AxisEntity::addLabelsOffset (
            sf::Vector2f delta)
```

Applies an additional offset to all labels.

Parameters

delta	Delta offset in pixels.

7.2.3.20 setLabelsCharacterSize()

```
void wPlot2D::AxisEntity::setLabelsCharacterSize (
            unsigned int newSize)
```

Sets the character size of all labels.

Parameters

newSize	Character size in pixels.

7.2.3.21 setLabelsDecimalPlaces()

```
void wPlot2D::AxisEntity::setLabelsDecimalPlaces (
            int places)
```

Sets the number of decimal places for numeric labels.

Parameters

places	Digits after decimal point (>= 0).

7.2.3.22 setCustomLabels()

```
void wPlot2D::AxisEntity::setCustomLabels (
            const std::vector< std::string > & labels)
```

Replaces numeric labels with a custom set of strings.

Parameters

labels	Vector of user-defined label strings.

7.2.3.23 render()

```
void wPlot2D::AxisEntity::render (
            sf::RenderWindow & window)
```

Renders the axis (line, arrow, title, notches, labels).

Parameters

window	Target render window.

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

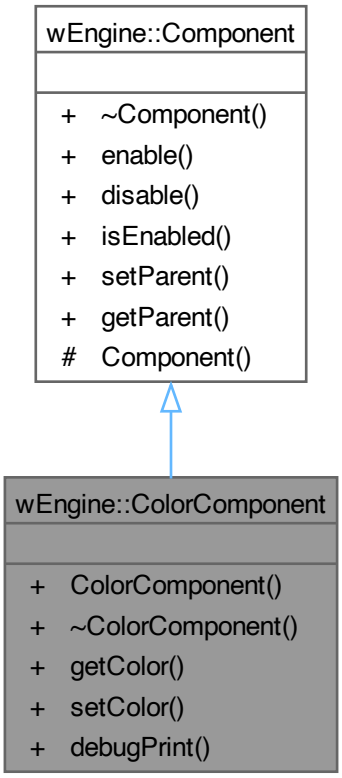
- wAxisEntity.hpp
- wAxisEntity.cpp

7.3 wEngine::ColorComponent Class Reference

ECS component that holds a color value.

`#include <wColorComponent.hpp>`

Inheritance diagram for wEngine::ColorComponent:



Public Member Functions

- ColorComponent (sf::Color color=sf::Color::Black)

  Constructor with optional color.
- virtual ~ColorComponent ()=default
- sf::Color getColor () const

  Gets the current color.
- void setColor (sf::Color newColor)

  Sets a new color.
- void debugPrint () const

  Outputs the RGBA values of the color to standard output.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.3.1 Detailed Description

ECS component that holds a color value.

This component stores an RGBA color (from SFML) associated with an entity. It can be used to define the rendering color of graphical elements.

7.3.1.0.1 Usage Examples:

- With predefined SFML colors:

```
addComponent< wEngine::ColorComponent >( sf::Color::Red );
```

- With a custom RGBA color:

```
sf::Color customColor(128, 64, 200, 255); // R, G, B, A
  addComponent< wEngine::ColorComponent >( customColor );
```

Author

Wilfried Koch

Copyright

7.3.2 Constructor & Destructor Documentation

7.3.2.1 ColorComponent()

```
wEngine::ColorComponent::ColorComponent (
            sf::Color color = sf::Color::Black)
```

Constructor with optional color.

Parameters

color	The initial color (default is sf::Color::Black).

7.3.2.2 ~ColorComponent()

```
virtual wEngine::ColorComponent::~ColorComponent ()  [virtual], [default]
```

7.3.3 Member Function Documentation

7.3.3.1 getColor()

```
sf::Color wEngine::ColorComponent::getColor () const  [nodiscard]
```

Gets the current color.

Returns

The color stored in the component.

7.3.3.2 setColor()

```
void wEngine::ColorComponent::setColor (
            sf::Color newColor)
```

Sets a new color.

Parameters

newColor	The new color to assign.

7.3.3.3 debugPrint()

```
void wEngine::ColorComponent::debugPrint () const
```

Outputs the RGBA values of the color to standard output.

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

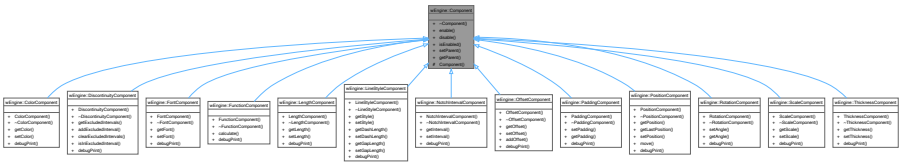
- wColorComponent.hpp
- wColorComponent.cpp

7.4 wEngine::Component Class Reference

Abstract base class for all ECS components.

`#include <wComponent.hpp>`

Inheritance diagram for wEngine::Component:



Public Member Functions

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Protected Member Functions

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.4.1 Detailed Description

Abstract base class for all ECS components.

Defines the minimal interface required by any component: activation control and access to its owning entity.

Intended to be subclassed by specific component implementations.

Created by Wilfried Koch.

7.4.2 Constructor & Destructor Documentation

7.4.2.1 ~Component()

`virtual wEngine::Component::~Component () [virtual], [default]`

7.4.2.2 Component()

```
wEngine::Component::Component () [protected]
```

Protected constructor to restrict instantiation to derived classes.

7.4.3 Member Function Documentation

7.4.3.1 enable()

```
void wEngine::Component::enable () [virtual]
```

7.4.3.2 disable()

```
void wEngine::Component::disable () [virtual]
```

7.4.3.3 isEnabled()

```
bool wEngine::Component::isEnabled () const [nodiscard]
```

Checks whether the component is currently active.

Returns

True if enabled, false if disabled.

7.4.3.4 setParent()

```
void wEngine::Component::setParent (
            Entity * parent)
```

Sets the parent entity of this component.

Parameters

parent	A pointer to the entity that owns this component.

7.4.3.5 getParent()

```
Entity * wEngine::Component::getParent () const [nodiscard]
```

Returns the parent entity of this component.

Returns

Pointer to the owning Entity.

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

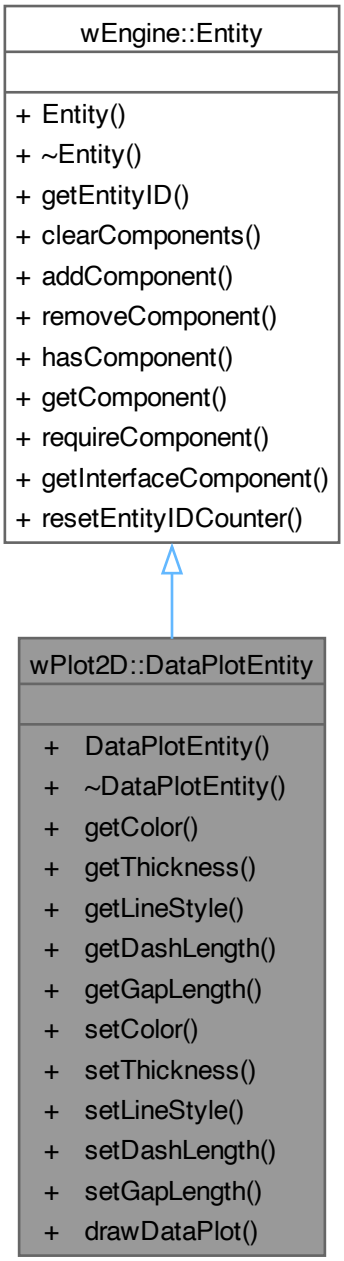
- wComponent.hpp
- wComponent.cpp

7.5 wPlot2D::DataPlotEntity Class Reference

Entity for plotting raw data points as a connected polyline.

`#include <wDataPlotEntity.hpp>`

Inheritance diagram for wPlot2D::DataPlotEntity:



Public Member Functions

- DataPlotEntity (const sf::Vector2f origin, const sf::Vector2f scale, const std::vector< sf::Vector2f > &data↩ Points)

  Constructs a DataPlotEntity with given origin, scale, and raw data points.
- virtual ~DataPlotEntity ()=default

  Virtual destructor.
- sf::Color getColor () const

  Get the current line color.
- float getThickness ()

  Get the line thickness in pixels.
- wEngine::LineStyleComponent::LineStyle getLineStyle ()

  Get the current line style.
- float getDashLength ()

  Get the dash length for dashed lines.
- float getGapLength ()

  Get the gap length for dashed/dotted lines.
- void setColor (sf::Color color)

  Sets the color of the plotted line.
- void setThickness (float thickness)

  Sets the line thickness in pixels.
- void setLineStyle (wEngine::LineStyleComponent::LineStyle style)

  Sets the line style (Solid, Dashed, or Dotted).
- void setDashLength (float dashLength)

  Sets the dash length for dashed lines.
- void setGapLength (float gapLength)

  Sets the gap length between dashes or dots.
- void drawDataPlot (sf::RenderWindow &window)

  Draws the connected data points to the window.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.

- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.5.1 Detailed Description

Entity for plotting raw data points as a connected polyline.

Stores a vector of raw (x,y) points and draws straight line segments between them. Each segment is rendered using the current line style (Solid, Dashed, Dotted), with configurable color, thickness, dash length, and gap length.

Note

Unlike FunctionEntity, this class does not evaluate a function — it directly uses the provided data points. The points are still transformed by the entity's origin and scale before rendering.

Author

Wilfried Koch

Copyright

7.5.2 Constructor & Destructor Documentation

7.5.2.1 DataPlotEntity()

```
wPlot2D::DataPlotEntity::DataPlotEntity (
            const sf::Vector2f origin,
            const sf::Vector2f scale,
            const std::vector< sf::Vector2f > & dataPoints)
```

Constructs a DataPlotEntity with given origin, scale, and raw data points.

Parameters

origin	Origin of the plot in window coordinates.
scale	Scaling factors applied to x and y values.
dataPoints	Vector of raw (x,y) points to plot.

7.5.2.2 ~DataPlotEntity()

```
virtual wPlot2D::DataPlotEntity::~DataPlotEntity ()  [virtual], [default]
```

Virtual destructor.

7.5.3 Member Function Documentation

7.5.3.1 getColor()

```
sf::Color wPlot2D::DataPlotEntity::getColor () const  [nodiscard]
```

Get the current line color.

Returns

The SFML color used for rendering the polyline.

7.5.3.2 getThickness()

```
float wPlot2D::DataPlotEntity::getThickness ()  [nodiscard]
```

Get the line thickness in pixels.

Returns

Current thickness value.

7.5.3.3 getLineStyle()

```
wEngine::LineStyleComponent::LineStyle wPlot2D::DataPlotEntity::getLineStyle ()  [nodiscard]
```

Get the current line style.

Returns

Solid, Dashed, or Dotted.

7.5.3.4 getDashLength()

```
float wPlot2D::DataPlotEntity::getDashLength ()  [nodiscard]
```

Get the dash length for dashed lines.

Returns

Dash length in pixels.

7.5.3.5 getGapLength()

```
float wPlot2D::DataPlotEntity::getGapLength ()  [nodiscard]
```

Get the gap length for dashed/dotted lines.

Returns

Gap length in pixels.

7.5.3.6 setColor()

```
void wPlot2D::DataPlotEntity::setColor (
            sf::Color color)
```

Sets the color of the plotted line.

Parameters

color	New SFML color.

7.5.3.7 setThickness()

```
void wPlot2D::DataPlotEntity::setThickness (
            float thickness)
```

Sets the line thickness in pixels.

Parameters

thickness	Line width.

7.5.3.8 setLineStyle()

```
void wPlot2D::DataPlotEntity::setLineStyle (
            wEngine::LineStyleComponent::LineStyle style)
```

Sets the line style (Solid, Dashed, or Dotted).

Parameters

style	New line style.

7.5.3.9 setDashLength()

```
void wPlot2D::DataPlotEntity::setDashLength (
            float dashLength)
```

Sets the dash length for dashed lines.

Parameters

dashLength	Length of each dash in pixels.

7.5.3.10 setGapLength()

```
void wPlot2D::DataPlotEntity::setGapLength (
            float gapLength)
```

Sets the gap length between dashes or dots.

Parameters

gapLength	Length of the gap in pixels.

7.5.3.11 drawDataPlot()

```
void wPlot2D::DataPlotEntity::drawDataPlot (
            sf::RenderWindow & window)
```

Draws the connected data points to the window.

The data points are transformed by scale and origin, then connected with styled line segments using LineDrawer↩ ::drawLine.

Parameters

window	Target SFML render window.

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

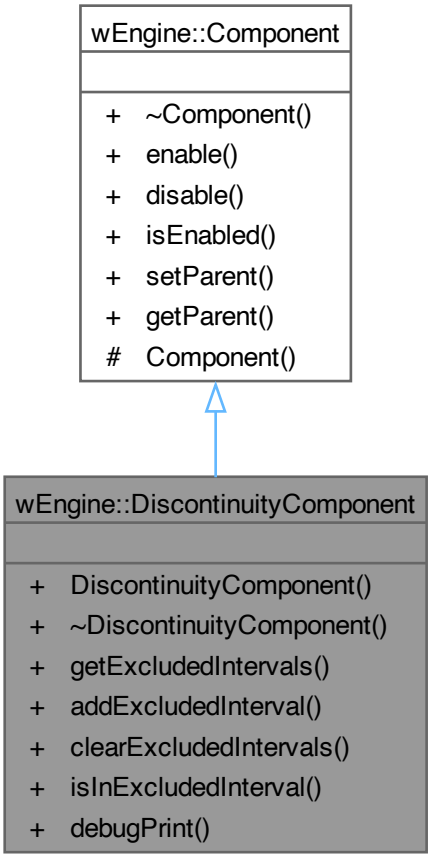
- wDataPlotEntity.hpp
- wDataPlotEntity.cpp

7.6 wEngine::DiscontinuityComponent Class Reference

ECS component that manages excluded intervals for function plotting.

```
#include <wDiscontinuityComponent.hpp>
```

Inheritance diagram for wEngine::DiscontinuityComponent:



Public Member Functions

- DiscontinuityComponent ()=default
- virtual ~DiscontinuityComponent ()=default
- const std::vector< std::pair< double, double > > & getExcludedIntervals () const

  Gives read-only access to the list of excluded intervals.
- void addExcludedInterval (double min, double max)

  Adds an excluded interval to the list.
- void clearExcludedIntervals ()

  Removes all excluded intervals.
- bool isInExcludedInterval (double x) const

  Checks if a value falls into one of the excluded intervals.
- void debugPrint () const

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default

- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.6.1 Detailed Description

ECS component that manages excluded intervals for function plotting.

This component allows the user to explicitly define intervals of the domain where a function should not be drawn (e.g., around asymptotes or undefined values). During rendering, points falling inside these intervals are skipped to avoid unwanted connections across discontinuities.

Author

Wilfried Koch

Copyright

7.6.2 Constructor & Destructor Documentation

7.6.2.1 DiscontinuityComponent()

```
wEngine::DiscontinuityComponent::DiscontinuityComponent () [default]
```

7.6.2.2 ~DiscontinuityComponent()

```
virtual wEngine::DiscontinuityComponent::~DiscontinuityComponent () [virtual], [default]
```

7.6.3 Member Function Documentation

7.6.3.1 getExcludedIntervals()

```
const std::vector< std::pair< double, double > > & wEngine::DiscontinuityComponent::get↩
ExcludedIntervals () const  [nodiscard]
```

Gives read-only access to the list of excluded intervals.

Returns

A constant reference to the vector of (min, max) pairs.

7.6.3.2 addExcludedInterval()

```
void wEngine::DiscontinuityComponent::addExcludedInterval (
            double min,
            double max)
```

Adds an excluded interval to the list.

Parameters

min	Lower bound of the interval.
max	Upper bound of the interval.

Exceptions

std::invalid_argument	if min >= max.

7.6.3.3 clearExcludedIntervals()

```
void wEngine::DiscontinuityComponent::clearExcludedIntervals ()
```

Removes all excluded intervals.

7.6.3.4 isInExcludedInterval()

```
bool wEngine::DiscontinuityComponent::isInExcludedInterval (
            double x) const  [nodiscard]
```

Checks if a value falls into one of the excluded intervals.

Parameters

x	Value to test.

Returns

True if x is inside any excluded interval, false otherwise.

7.6.3.5 debugPrint()

```
void wEngine::DiscontinuityComponent::debugPrint () const
```

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

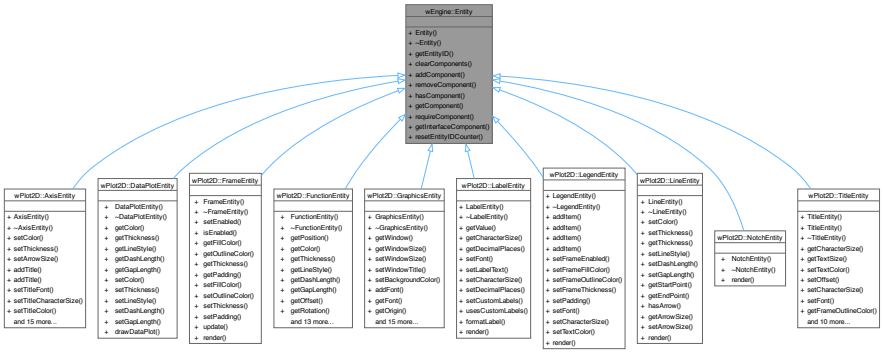
- wDiscontinuityComponent.hpp
- wDiscontinuityComponent.cpp

7.7 wEngine::Entity Class Reference

Represents an entity in the ECS (Entity-Component System) architecture.

```
#include <wEntity.hpp>
```

Inheritance diagram for wEngine::Entity:



Public Member Functions

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Static Public Member Functions

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.7.1 Detailed Description

Represents an entity in the ECS (Entity-Component System) architecture.

Each entity is uniquely identified and can dynamically manage a collection of components. Components are stored in a type-safe map and accessed by type.

The class provides utility methods to add, remove, retrieve and query components, as well as retrieve components through interfaces.

Note

Entities do not define behavior directly: behavior is defined by the components attached to them.

Author

Wilfried Koch

Copyright

7.7.2 Constructor & Destructor Documentation

7.7.2.1 Entity()

```
wEngine::Entity::Entity ()
```

7.7.2.2 ~Entity()

```
wEngine::Entity::~Entity ()  [virtual]
```

7.7.3 Member Function Documentation

7.7.3.1 getEntityID()

```
unsigned int wEngine::Entity::getEntityID () const  [nodiscard]
```

Returns the unique ID associated with this entity.

Returns

Unsigned integer representing the entity's ID.

7.7.3.2 clearComponents()

```
void wEngine::Entity::clearComponents ()
```

Removes all components currently attached to the entity.

7.7.3.3 resetEntityIDCounter()

```
void wEngine::Entity::resetEntityIDCounter ()  [static]
```

Resets the global entity ID counter to zero.

This affects all subsequently created entities. Use with caution, especially in multi-entity systems.

7.7.3.4 addComponent()

```
template<typename T, typename...  Args>
std::shared_ptr< T > wEngine::Entity::addComponent (
            Args &&...  args)  [inline]
```

Adds a new component of type T to the entity.

Constructs the component using the provided arguments and attaches it to the entity.

Template Parameters

T	Component type, must inherit from wEngine::Component.
Args	Variadic arguments used to construct the component.

Parameters

args	Constructor arguments forwarded to the component.

Returns

Shared pointer to the newly created component.

Exceptions

std::runtime_error	if a component of the same type already exists in the entity.

7.7.3.5 removeComponent()

```
template<typename T>
void wEngine::Entity::removeComponent ()  [inline]
```

Removes the component of type T from the entity.

If no such component exists, this operation does nothing.

Template Parameters

T	Component type to remove.

7.7.3.6 hasComponent()

```
template<typename T>
bool wEngine::Entity::hasComponent () const  [inline], [nodiscard], [noexcept]
```

Checks whether the entity has a component of type T.

Template Parameters

T	Component type to check.

Returns

True if the component is present, false otherwise.

7.7.3.7 getComponent()

```
template<typename T>
std::shared_ptr< T > wEngine::Entity::getComponent () const  [inline], [nodiscard]
```

Retrieves the component of type T attached to the entity.

Template Parameters

T	Component type to retrieve.

Returns

Shared pointer to the component if found, or nullptr otherwise.

7.7.3.8 requireComponent()

```
template<typename T>
std::shared_ptr< T > wEngine::Entity::requireComponent (
            const std::string & context = "") const  [inline], [nodiscard]
```

Retrieves the component of type T and throws if it's missing.

This method is similar to getComponent( ), but throws a std::runtime_error if the component is not found. Useful for critical systems where components must be present.

Template Parameters

T	The type of the component.

Parameters

context	Optional string to specify the context of the call (e.g., method name).

Returns

A shared pointer to the required component.

Exceptions

std::runtime_error	if the component is not found.

7.7.3.9 getInterfaceComponent()

```
template<typename Interface>
std::shared_ptr< Interface > wEngine::Entity::getInterfaceComponent () const  [inline], [nodiscard]
```

Returns the first component that implements the specified interface.

Checks all components attached to the entity using dynamic casting. If a component matches the given interface type, it is returned.

Template Parameters

Interface	The desired interface type.

Returns

A shared pointer to the matching component, or nullptr if none found.

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

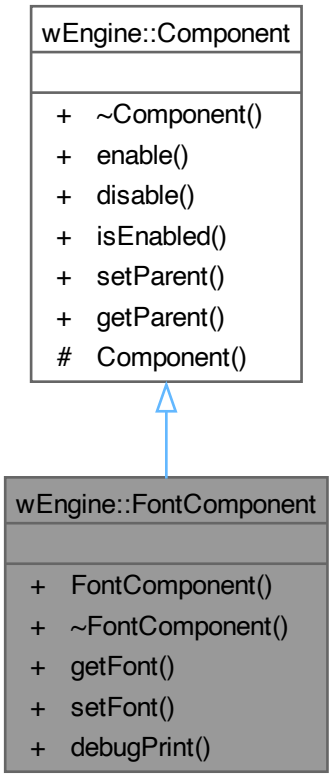
- wEntity.hpp
- wEntity.cpp

7.8 wEngine::FontComponent Class Reference

Holds a reference to an SFML font for rendering text.

`#include <wFontComponent.hpp>`

Inheritance diagram for wEngine::FontComponent:



Public Member Functions

- FontComponent (const sf::Font &font)

  Constructs the FontComponent with a reference to the font.
- ~FontComponent () override=default

  Virtual destructor.
- const sf::Font & getFont () const

  Returns the stored font reference.
- void setFont (const sf::Font &font)

  Updates the stored font reference.
- void debugPrint () const

  Prints debug information about the stored font.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.8.1 Detailed Description

Holds a reference to an SFML font for rendering text.

This component allows entities to store and access an `sf::Font` reference without needing to pass the AssetManager explicitly.

Note

The font must outlive the entity that uses it.

Author

Wilfried Koch

Copyright

7.8.2 Constructor & Destructor Documentation

7.8.2.1 FontComponent()

```
wEngine::FontComponent::FontComponent (
            const sf::Font & font)  [explicit]
```

Constructs the FontComponent with a reference to the font.

Parameters

font	Reference to an externally managed sf::Font.

7.8.2.2 ~FontComponent()

```
wEngine::FontComponent::~FontComponent () [override], [default]
```

Virtual destructor.

7.8.3 Member Function Documentation

7.8.3.1 getFont()

```
const sf::Font & wEngine::FontComponent::getFont () const
```

Returns the stored font reference.

Returns

A constant reference to the sf::Font.

7.8.3.2 setFont()

```
void wEngine::FontComponent::setFont (
            const sf::Font & font)
```

Updates the stored font reference.

Parameters

font	Reference to an externally managed sf::Font.

Note

The font must outlive this component.

7.8.3.3 debugPrint()

```
void wEngine::FontComponent::debugPrint () const
```

Prints debug information about the stored font.

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

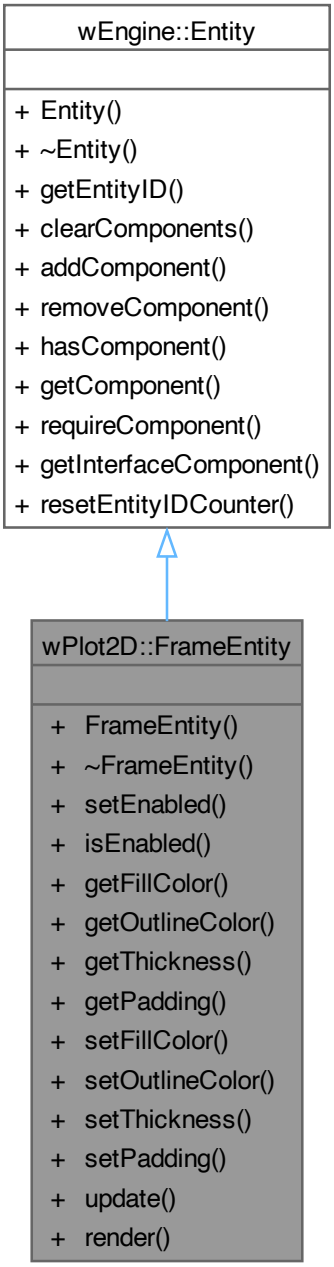
- wFontComponent.hpp
- wFontComponent.cpp

7.9 wPlot2D::FrameEntity Class Reference

Entity representing a rectangular frame around content.

`#include <wFrameEntity.hpp>`

Inheritance diagram for wPlot2D::FrameEntity:



Public Member Functions

- FrameEntity (bool enabled=true)

  Constructs a frame entity.
- virtual ~FrameEntity ()=default

  Virtual destructor.
- void setEnabled (bool enabled)

  Enables or disables the frame.
- bool isEnabled () const

  Checks whether the frame is currently enabled.
- sf::Color getFillColor () const

  Gets the current fill color of the frame.
- sf::Color getOutlineColor () const

  Gets the current outline color of the frame.
- float getThickness () const

  Gets the current outline thickness of the frame.
- sf::Vector2f getPadding () const

  Gets the current padding applied around the content.
- void setFillColor (const sf::Color &color)

  Sets the fill color of the frame.
- void setOutlineColor (const sf::Color &color)

  Sets the outline color of the frame.
- void setThickness (float thickness)

  Sets the outline thickness of the frame.
- void setPadding (const sf::Vector2f &padding)

  Sets the padding around the content.
- void update (const sf::FloatRect &contentBounds, const sf::Vector2f &position)

  Updates the size and position of the frame based on content bounds.
- void render (sf::RenderWindow &window)

  Renders the frame to the given render window.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.

- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.9.1 Detailed Description

Entity representing a rectangular frame around content.

A FrameEntity is typically used to visually surround titles, legends, or other graphical content. It supports:

- Toggle visibility (`enabled` flag),
- Fill and outline colors,
- Outline thickness,
- Padding around the content.

The size of the frame is dynamically updated from the content bounds (see `update( )`).

Author

Wilfried Koch

Copyright

7.9.2 Constructor & Destructor Documentation

7.9.2.1 FrameEntity()

```
wPlot2D::FrameEntity::FrameEntity (
            bool enabled = true)
```

Constructs a frame entity.

Parameters

enabled	Whether the frame should be enabled initially.

7.9.2.2 ~FrameEntity()

```
virtual wPlot2D::FrameEntity::~FrameEntity ()  [virtual], [default]
```

Virtual destructor.

7.9.3 Member Function Documentation

7.9.3.1 setEnabled()

```
void wPlot2D::FrameEntity::setEnabled (
            bool enabled)
```

Enables or disables the frame.

Parameters

enabled	New enabled state.

7.9.3.2 isEnabled()

```
bool wPlot2D::FrameEntity::isEnabled () const  [nodiscard]
```

Checks whether the frame is currently enabled.

Returns

True if the frame is enabled, false otherwise.

7.9.3.3 getFillColor()

```
sf::Color wPlot2D::FrameEntity::getFillColor () const  [nodiscard]
```

Gets the current fill color of the frame.

Returns

Fill color.

7.9.3.4 getOutlineColor()

```
sf::Color wPlot2D::FrameEntity::getOutlineColor () const  [nodiscard]
```

Gets the current outline color of the frame.

Returns

Outline color.

7.9.3.5 getThickness()

```
float wPlot2D::FrameEntity::getThickness () const  [nodiscard]
```

Gets the current outline thickness of the frame.

Returns

Outline thickness (in pixels).

7.9.3.6 getPadding()

```
sf::Vector2f wPlot2D::FrameEntity::getPadding () const  [nodiscard]
```

Gets the current padding applied around the content.

Returns

Padding as (x, y).

7.9.3.7 setFillColor()

```
void wPlot2D::FrameEntity::setFillColor (
            const sf::Color & color)
```

Sets the fill color of the frame.

Parameters

color	New fill color.

7.9.3.8 setOutlineColor()

```
void wPlot2D::FrameEntity::setOutlineColor (
            const sf::Color & color)
```

Sets the outline color of the frame.

Parameters

color	New outline color.

7.9.3.9 setThickness()

```
void wPlot2D::FrameEntity::setThickness (
            float thickness)
```

Sets the outline thickness of the frame.

Parameters

thickness	New outline thickness (must be > 0).

7.9.3.10 setPadding()

```
void wPlot2D::FrameEntity::setPadding (
            const sf::Vector2f & padding)
```

Sets the padding around the content.

Parameters

padding	Padding as (x, y).

7.9.3.11 update()

```
void wPlot2D::FrameEntity::update (
            const sf::FloatRect & contentBounds,
            const sf::Vector2f & position)
```

Updates the size and position of the frame based on content bounds.

Parameters

contentBounds	The bounding box of the content (width/height).
position	The position of the frame's center in pixels.

7.9.3.12 render()

```
void wPlot2D::FrameEntity::render (
            sf::RenderWindow & window)
```

Renders the frame to the given render window.

Parameters

window	Target render window.

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

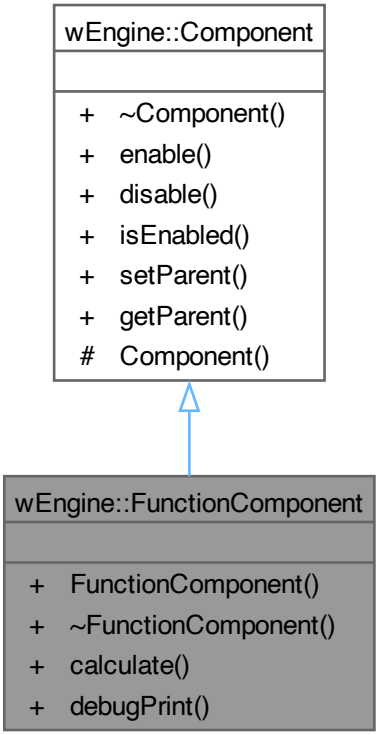
- wFrameEntity.hpp
- wFrameEntity.cpp

7.10 wEngine::FunctionComponent Class Reference

ECS component that stores a mathematical function f(x).

`#include <wFunctionComponent.hpp>`

Inheritance diagram for wEngine::FunctionComponent:



Public Member Functions

- FunctionComponent (std::function< double(double) > function)

  Constructs a FunctionComponent with a given function.
- virtual ~FunctionComponent ()=default
- double calculate (double x) const

  Evaluates the stored function at a given x.
- void debugPrint () const

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.10.1 Detailed Description

ECS component that stores a mathematical function f(x).

This component wraps a `std::function< double( double ) >` and provides an interface to evaluate the function at any given x-coordinate. It is mainly used by FunctionEntity to render mathematical curves.

Author

Wilfried Koch

Copyright

7.10.2 Constructor & Destructor Documentation

7.10.2.1 FunctionComponent()

```
wEngine::FunctionComponent::FunctionComponent (
            std::function< double(double) > function)
```

Constructs a FunctionComponent with a given function.

Parameters

function	A callable object of type double(double).

Exceptions

std::invalid_argument	if the provided function is empty.

7.10.2.2 ~FunctionComponent()

```
virtual wEngine::FunctionComponent::~FunctionComponent ()  [virtual], [default]
```

7.10.3 Member Function Documentation

7.10.3.1 calculate()

```
double wEngine::FunctionComponent::calculate (
            double x) const  [nodiscard]
```

Evaluates the stored function at a given x.

Parameters

x	The input value.

Returns

The result f(x).

Exceptions

std::runtime_error	if no function is set.

7.10.3.2 debugPrint()

```
void wEngine::FunctionComponent::debugPrint () const
```

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

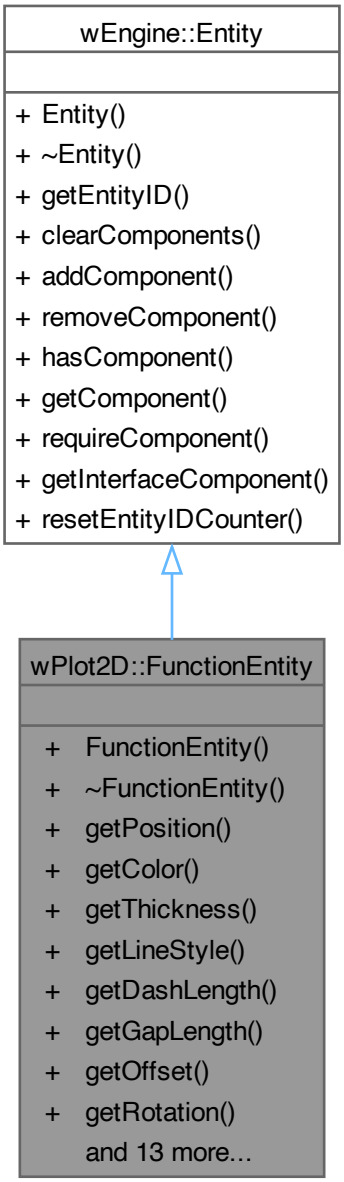
- wFunctionComponent.hpp
- wFunctionComponent.cpp

7.11 wPlot2D::FunctionEntity Class Reference

Represents a mathematical function as a drawable entity in a 2D plot.

`#include <wFunctionEntity.hpp>`

Inheritance diagram for wPlot2D::FunctionEntity:



Public Member Functions

- FunctionEntity (const sf::Vector2f origin, const sf::Vector2f scale, std::function< double(double) > func)

Construct a new FunctionEntity.

- virtual ~FunctionEntity ()=default

  Virtual destructor.
- sf::Vector2f getPosition () const

  Get the position (origin) of the function in pixel space.
- sf::Color getColor () const

  Get the color of the function curve.
- float getThickness () const

  Get the line thickness of the function curve.
- wEngine::LineStyleComponent::LineStyle getLineStyle () const

  Get the line style of the function curve.
- float getDashLength () const

  Get the dash length when the line style is Dashed.
- float getGapLength () const

  Get the gap length between dashes or dots.
- sf::Vector2f getOffset () const

  Get the current offset applied to the function curve.
- float getRotation () const

  Get the current rotation angle of the function curve.
- void setPosition (sf::Vector2f position)

  Set the position (origin) of the function in pixel space.
- void setColor (sf::Color color)

  Set the color of the function curve.
- void setThickness (float thickness)

  Set the line thickness of the function curve.
- void setLineStyle (wEngine::LineStyleComponent::LineStyle style)

  Set the line style of the function curve.
- void setDashLength (float dashLength)

  Set the length of each dash when the line style is Dashed.
- void setGapLength (float gapLength)

  Set the length of the gap between dashes or dots.
- void setOffset (float offsetX, float offsetY)

  Set an offset applied to the function curve.
- void setRotation (float angleDegrees)

  Set the rotation angle of the function curve.
- void setScale (sf::Vector2f scale)

  Sets the scaling factors for the function graph.
- void addExcludedInterval (double min, double max)

  Add an excluded interval where the function should not be drawn.
- void clearExcludedIntervals ()

  Clear all excluded intervals.
- void alignToYAxis (float normalizedOffsetX=0.0f, float normalizedOffsetY=0.0f)

  Rotates the function by 90 degrees and swaps scales accordingly.
- void drawFunction (sf::RenderWindow &window, double startX, double endX, size_t nbPoints=1000)

  Draw the function on the target window.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.11.1 Detailed Description

Represents a mathematical function as a drawable entity in a 2D plot.

A FunctionEntity manages all components required to render a curve:

- Origin and scale (mapping logical space to pixels).
- Color, thickness, and line style (solid, dashed, dotted).
- Offset and rotation of the curve.
- Discontinuities handled by excluded intervals.

The function is sampled at evenly spaced x-values and rendered as a polyline. Excluded intervals and invalid values (NaN, Inf) split the curve into separate segments.

Author

Wilfried Koch

Copyright

7.11.2 Constructor & Destructor Documentation

7.11.2.1 FunctionEntity()

```
wPlot2D::FunctionEntity::FunctionEntity (
            const sf::Vector2f origin,
            const sf::Vector2f scale,
            std::function< double(double) > func)
```

Construct a new FunctionEntity.

Parameters

origin	Logical origin of the coordinate system (pixels).
scale	Scale factors for x and y (pixels per unit).
func	Function of type double(double) to be plotted.

7.11.2.2 ~FunctionEntity()

```
virtual wPlot2D::FunctionEntity::~FunctionEntity ()  [virtual], [default]
```

Virtual destructor.

7.11.3 Member Function Documentation

7.11.3.1 getPosition()

```
sf::Vector2f wPlot2D::FunctionEntity::getPosition () const  [nodiscard]
```

Get the position (origin) of the function in pixel space.

Returns

The current origin as an sf::Vector2f.

7.11.3.2 getColor()

```
sf::Color wPlot2D::FunctionEntity::getColor () const  [nodiscard]
```

Get the color of the function curve.

Returns

The current curve color.

7.11.3.3 getThickness()

```
float wPlot2D::FunctionEntity::getThickness () const  [nodiscard]
```

Get the line thickness of the function curve.

Returns

The thickness in pixels.

7.11.3.4 getLineStyle()

```
wEngine::LineStyleComponent::LineStyle wPlot2D::FunctionEntity::getLineStyle () const  [nodiscard]
```

Get the line style of the function curve.

Returns

The current line style (Solid, Dashed, or Dotted).

7.11.3.5 getDashLength()

```
float wPlot2D::FunctionEntity::getDashLength () const  [nodiscard]
```

Get the dash length when the line style is Dashed.

Returns

Dash length in pixels.

Note

This value has no effect if the style is not Dashed.

7.11.3.6 getGapLength()

```
float wPlot2D::FunctionEntity::getGapLength () const  [nodiscard]
```

Get the gap length between dashes or dots.

Returns

Gap length in pixels.

Note

This setting affects both Dashed and Dotted line styles.

7.11.3.7 getOffset()

```
sf::Vector2f wPlot2D::FunctionEntity::getOffset () const  [nodiscard]
```

Get the current offset applied to the function curve.

Returns

A 2D vector containing the (x,y) offset in pixels.

7.11.3.8 getRotation()

```
float wPlot2D::FunctionEntity::getRotation () const  [nodiscard]
```

Get the current rotation angle of the function curve.

Returns

The rotation angle in degrees.

7.11.3.9 setPosition()

```
void wPlot2D::FunctionEntity::setPosition (
            sf::Vector2f position)
```

Set the position (origin) of the function in pixel space.

Parameters

position	The new origin as an sf::Vector2f.

7.11.3.10 setColor()

```
void wPlot2D::FunctionEntity::setColor (
            sf::Color color)
```

Set the color of the function curve.

Parameters

color	The new color as an sf::Color.

7.11.3.11 setThickness()

```
void wPlot2D::FunctionEntity::setThickness (
            float thickness)
```

Set the line thickness of the function curve.

Parameters

thickness	The new line thickness in pixels.

7.11.3.12 setLineStyle()

```
void wPlot2D::FunctionEntity::setLineStyle (
            wEngine::LineStyleComponent::LineStyle style)
```

Set the line style of the function curve.

Parameters

style	The new style (Solid, Dashed, or Dotted).

7.11.3.13 setDashLength()

```
void wPlot2D::FunctionEntity::setDashLength (
            float dashLength)
```

Set the length of each dash when the line style is Dashed.

Parameters

dashLength	The dash length in pixels (must be $>$ 0).

Exceptions

std::invalid_argument	if dashLength $<=$ 0.

Note

This setting has no effect if the line style is not Dashed.

7.11.3.14 setGapLength()

```
void wPlot2D::FunctionEntity::setGapLength (
            float gapLength)
```

Set the length of the gap between dashes or dots.

Parameters

gapLength	The gap length in pixels (must be $>=$ 0).

Exceptions

std::invalid_argument	if gapLength < 0.

Note

This setting affects both Dashed and Dotted line styles.

7.11.3.15 setOffset()

```
void wPlot2D::FunctionEntity::setOffset (
            float offsetX,
            float offsetY)
```

Set an offset applied to the function curve.

The offset is applied after scaling and rotation, allowing the curve to be shifted horizontally and vertically relative to its logical origin.

Parameters

offsetX	Horizontal offset in pixels.
offsetY	Vertical offset in pixels.

7.11.3.16 setRotation()

```
void wPlot2D::FunctionEntity::setRotation (
            float angleDegrees)
```

Set the rotation angle of the function curve.

The rotation is applied around the logical origin of the graph. The angle is expressed in degrees, with positive values corresponding to counter-clockwise rotation.

Parameters

angleDegrees	Rotation angle in degrees.

7.11.3.17 setScale()

```
void wPlot2D::FunctionEntity::setScale (
            sf::Vector2f scale)
```

Sets the scaling factors for the function graph.

This method updates the ScaleComponent so the user can control how much the x and y coordinates are stretched on screen.

Parameters

scale	The new scaling vector (scale.x, scale.y).

7.11.3.18 addExcludedInterval()

```
void wPlot2D::FunctionEntity::addExcludedInterval (
            double min,
            double max)
```

Add an excluded interval where the function should not be drawn.

Useful to handle discontinuities such as vertical asymptotes.

Parameters

min	Left bound of the interval.
max	Right bound of the interval.

7.11.3.19 clearExcludedIntervals()

```
void wPlot2D::FunctionEntity::clearExcludedIntervals ()
```

Clear all excluded intervals.

7.11.3.20 alignToYAxis()

```
void wPlot2D::FunctionEntity::alignToYAxis (
            float normalizedOffsetX = 0.0f,
            float normalizedOffsetY = 0.0f)
```

Rotates the function by 90 degrees and swaps scales accordingly.

This is a common operation when we want to interpret the function's values along the X-axis instead of the Y-axis (or vice versa). The method:

- Sets a 90 degrees rotation.
- Swaps scale.x and scale.y to preserve unit consistency.
- Applies an optional normalized offset for alignment.

Parameters

normalizedOffsetX	Relative offset along X after rotation, expressed in units of (oldScaleX / oldScaleY).
normalizedOffsetY	Relative offset along Y after rotation, expressed in units of (oldScaleY / oldScaleX).

7.11.3.21 drawFunction()

```
void wPlot2D::FunctionEntity::drawFunction (
            sf::RenderWindow & window,
            double startX,
            double endX,
            size_t nbPoints = 1000)
```

Draw the function on the target window.

Parameters

window	Render target.
startX	Start of the logical x-range.
endX	End of the logical x-range.
nbPoints	Number of points to sample (default: 1000).

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

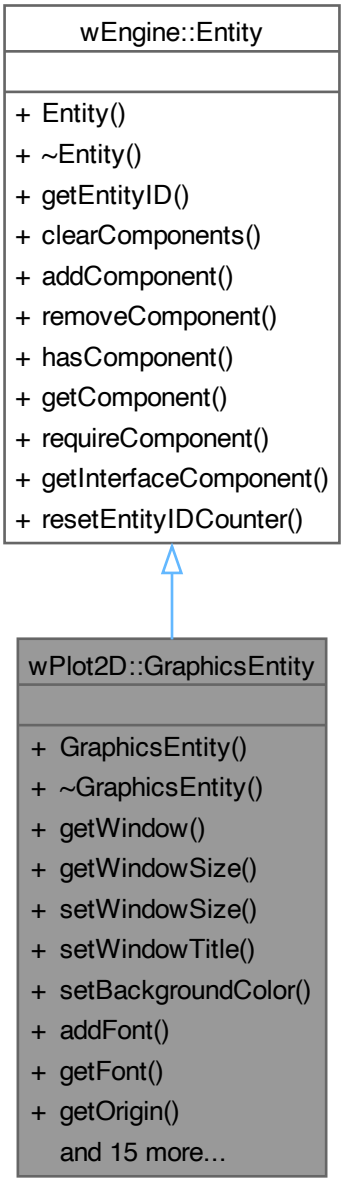
- wFunctionEntity.hpp
- wFunctionEntity.cpp

7.12 wPlot2D::GraphicsEntity Class Reference

Central entity responsible for graphical rendering in wPlot2D.

```
#include <wGraphicsEntity.hpp>
```

Inheritance diagram for wPlot2D::GraphicsEntity:



Public Member Functions

- GraphicsEntity (const std::string &windowTitle="wPlot2D", const sf::Vector2u &windowSize={ 1600, 1600 }, const sf::Vector2f &originFactor={ 0.5f, 0.5f }, const sf::Vector2f &scaleFactor={ 0.1f, 0.1f })

  Constructs the graphics entity and initializes the rendering window and components.
- virtual ~GraphicsEntity ()=default

  Virtual destructor.
- sf::RenderWindow & getWindow ()

  Gives access to the internal SFML window.

- sf::Vector2u getWindowSize () const

  Retrieves the current window size.
- void setWindowSize (const sf::Vector2u &newSize)

  Sets a new window size.
- void setWindowTitle (const std::string &title)

  Updates the window title.
- void setBackgroundColor (const sf::Color &color)

  Clears the window with a background color.
- void addFont (const std::string &name, const std::string &fileName)

  Adds a font to the AssetManager.
- sf::Font & getFont (const std::string name)

  Retrieves a previously loaded font.
- sf::Vector2f getOrigin () const

  Returns the current logical origin (in pixels).
- void setOrigin (sf::Vector2f originFactor)

  Sets a new logical origin (normalized).
- sf::Vector2f getScale () const

  Returns the scale factors (pixels per logical unit).
- void setScale (sf::Vector2f scaleFactor)

  Sets new scale factors (normalized).
- sf::Vector2f getOffset () const

  Returns the current logical offset.
- void setOffset (sf::Vector2f offset)

  Sets the logical offset applied to the axes.
- AxisEntity * addAxis (AxisType type, sf::Vector2f axisRange)

  Adds an axis (X or Y) to the scene.
- TitleEntity * addTitle (const std::string &title, TitleAlignment alignment=TitleAlignment::Bottom)

  Adds a main plot title (top or bottom).
- TitleEntity * addTitle (const std::wstring &title, TitleAlignment alignment=TitleAlignment::Bottom)

  Adds a main plot title (top or bottom).
- FunctionEntity * addFunction (std::function< double(double)> func, double startX, double endX, size_t nb↩ Points=1000)

  Adds a mathematical function to the scene.
- DataPlotEntity * addDataPlot (const std::vector< sf::Vector2f > &dataPoints)

  Adds a raw data plot (connected points).
- LegendEntity * addLegend (const sf::Vector2f &position, bool hasFrame=true)

  Adds a legend box at a given position.
- TitleEntity * addText (const std::string &text, sf::Vector2f position)

  Adds arbitrary text to the scene.
- TitleEntity * addText (const std::wstring &text, sf::Vector2f position)

  Adds arbitrary text to the scene.
- LineEntity * addLine (const sf::Vector2f &start, const sf::Vector2f &end, bool withArrow=false)

  Adds a line segment to the scene.
- void saveToFile (const std::string &filename)

  Saves a screenshot of the current window.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.12.1 Detailed Description

Central entity responsible for graphical rendering in wPlot2D.

The `GraphicsEntity` manages the creation and control of the SFML rendering window. It provides high-level methods to add and configure graphical entities:

- Axes (X and Y),
- Titles (main or custom text),
- Functions and raw data plots,
- Legends,
- Lines (with or without arrows).

It also handles window configuration (title, size, background color) and allows exporting the final rendering to an image file.

Note

This class is intended to be the main entry point for user interaction with the rendering system.

Author

Wilfried Koch

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7.12.2 Constructor & Destructor Documentation

7.12.2.1 GraphicsEntity()

```
wPlot2D::GraphicsEntity::GraphicsEntity (
            const std::string & windowTitle = "wPlot2D",
            const sf::Vector2u & windowSize = { 1600, 1600 },
            const sf::Vector2f & originFactor = { 0.5f, 0.5f },
            const sf::Vector2f & scaleFactor = { 0.1f, 0.1f })
```

Constructs the graphics entity and initializes the rendering window and components.

Parameters

windowTitle	The title displayed on the window (default: "wPlot2D").
windowSize	Window dimensions in pixels (default: 1600×1600).
originFactor	Normalized factor in [0,1]x[0,1] specifying the origin's relative position (default: (0.5f, 0.5f).
scaleFactor	Normalized factor specifying the size of one logical unit relative to window dimensions (default: (0.1f, 0.1f)).

Exceptions

std::invalid_argument	if originFactor not in [0,1].

7.12.2.2 ~GraphicsEntity()

```
virtual wPlot2D::GraphicsEntity::~GraphicsEntity ()  [virtual], [default]
```

Virtual destructor.

7.12.3 Member Function Documentation

7.12.3.1 getWindow()

```
sf::RenderWindow & wPlot2D::GraphicsEntity::getWindow ()  [nodiscard]
```

Gives access to the internal SFML window.

Returns

Reference to the internal `sf::RenderWindow`.

7.12.3.2 getWindowSize()

```
sf::Vector2u wPlot2D::GraphicsEntity::getWindowSize () const  [nodiscard]
```

Retrieves the current window size.

Returns

Window size in pixels.

7.12.3.3 setWindowSize()

```
void wPlot2D::GraphicsEntity::setWindowSize (
            const sf::Vector2u & newSize)
```

Sets a new window size.

Parameters

newSize	Window dimensions in pixels.

7.12.3.4 setWindowTitle()

```
void wPlot2D::GraphicsEntity::setWindowTitle (
            const std::string & title)
```

Updates the window title.

Parameters

title	New window title.

7.12.3.5 setBackgroundColor()

```
void wPlot2D::GraphicsEntity::setBackgroundColor (
            const sf::Color & color)
```

Clears the window with a background color.

Parameters

color	Background fill color.

7.12.3.6 addFont()

```
void wPlot2D::GraphicsEntity::addFont (
            const std::string & name,
            const std::string & fileName)
```

Adds a font to the AssetManager.

Parameters

name	Identifier string for the font.
fileName	Path to the font file.

7.12.3.7 getFont()

```
sf::Font & wPlot2D::GraphicsEntity::getFont (
            const std::string name)
```

Retrieves a previously loaded font.

Parameters

name	Identifier of the font.

Returns

Reference to the `sf::Font`.

Exceptions

std::runtime_error	if the font is not found.

7.12.3.8 getOrigin()

```
sf::Vector2f wPlot2D::GraphicsEntity::getOrigin () const  [nodiscard]
```

Returns the current logical origin (in pixels).

Returns

Origin position in pixel coordinates.

Exceptions

std::runtime_error	if the PositionComponent is missing.

7.12.3.9 setOrigin()

```
void wPlot2D::GraphicsEntity::setOrigin (
            sf::Vector2f originFactor)
```

Sets a new logical origin (normalized).

Parameters

originFactor	in [0,1]×[0,1] new relative origin.

Exceptions

std::invalid_argument	if originFactor is outside [0,1].

7.12.3.10 getScale()

```
sf::Vector2f wPlot2D::GraphicsEntity::getScale () const  [nodiscard]
```

Returns the scale factors (pixels per logical unit).

Returns

Scaling vector.

Exceptions

std::runtime_error	if the ScaleComponent is missing.

7.12.3.11 setScale()

```
void wPlot2D::GraphicsEntity::setScale (
            sf::Vector2f scaleFactor)
```

Sets new scale factors (normalized).

Parameters

scaleFactor	new scaling factor

7.12.3.12 getOffset()

```
sf::Vector2f wPlot2D::GraphicsEntity::getOffset () const  [nodiscard]
```

Returns the current logical offset.

Returns

Offset vector in logical units.

Exceptions

std::runtime_error	if the OffsetComponent is missing.

7.12.3.13 setOffset()

```
void wPlot2D::GraphicsEntity::setOffset (
            sf::Vector2f offset)
```

Sets the logical offset applied to the axes.

Parameters

offset	Displacement in logical units.

7.12.3.14 addAxis()

```
AxisEntity * wPlot2D::GraphicsEntity::addAxis (
            AxisType type,
            sf::Vector2f axisRange)  [nodiscard]
```

Adds an axis (X or Y) to the scene.

Parameters

type	Axis type.
axisRange	Logical range for the axis.

Returns

Pointer to the created AxisEntity.

7.12.3.15 addTitle() [1/2]

```
TitleEntity * wPlot2D::GraphicsEntity::addTitle (
            const std::string & title,
            TitleAlignment alignment = TitleAlignment::Bottom)  [nodiscard]
```

Adds a main plot title (top or bottom).

Parameters

title	Title text (UTF-8).
alignment	Vertical alignment (default: bottom).

Returns

Pointer to the created TitleEntity.

7.12.3.16 addTitle() [2/2]

```
TitleEntity * wPlot2D::GraphicsEntity::addTitle (
            const std::wstring & title,
            TitleAlignment alignment = TitleAlignment::Bottom)  [nodiscard]
```

Adds a main plot title (top or bottom).

Parameters

title	Title text (UTF-16/32).
alignment	Vertical alignment (default: bottom).

Returns

Pointer to the created TitleEntity.

7.12.3.17 addFunction()

```
FunctionEntity * wPlot2D::GraphicsEntity::addFunction (
            std::function< double(double)> func,
            double startX,
            double endX,
            size_t nbPoints = 1000)  [nodiscard]
```

Adds a mathematical function to the scene.

Parameters

func	Function of type double(double).
startX	Domain start (logical).
endX	Domain end (logical).
nbPoints	Sampling resolution (default 1000).

Returns

Pointer to the created FunctionEntity.

7.12.3.18 addDataPlot()

```
DataPlotEntity * wPlot2D::GraphicsEntity::addDataPlot (
            const std::vector< sf::Vector2f > & dataPoints)  [nodiscard]
```

Adds a raw data plot (connected points).

Parameters

dataPoints	Vector of (x,y) coordinates.

Returns

Pointer to the created DataPlotEntity.

7.12.3.19 addLegend()

```
LegendEntity * wPlot2D::GraphicsEntity::addLegend (
            const sf::Vector2f & position,
            bool hasFrame = true)  [nodiscard]
```

Adds a legend box at a given position.

Parameters

position	Normalized position inside window [0,1]x[0,1].
hasFrame	Whether the legend frame is visible (default true).

Returns

Pointer to the created LegendEntity.

7.12.3.20 addText() [1/2]

```
TitleEntity * wPlot2D::GraphicsEntity::addText (
            const std::string & text,
            sf::Vector2f position)  [nodiscard]
```

Adds arbitrary text to the scene.

Parameters

text	Text string (UTF-8).
position	Normalized position in [0,1]x[0,1].

Returns

Pointer to the created TitleEntity.

7.12.3.21 addText() [2/2]

```
TitleEntity * wPlot2D::GraphicsEntity::addText (
            const std::wstring & text,
            sf::Vector2f position)  [nodiscard]
```

Adds arbitrary text to the scene.

Parameters

text	Text string (UTF-16/32).
position	Normalized position in [0,1]x[0,1].

Returns

Pointer to the created TitleEntity.

7.12.3.22 addLine()

```
LineEntity * wPlot2D::GraphicsEntity::addLine (
            const sf::Vector2f & start,
            const sf::Vector2f & end,
            bool withArrow = false)  [nodiscard]
```

Adds a line segment to the scene.

Parameters

start	Start point in logical coordinates.
end	End point in logical coordinates.
withArrow	Whether to render an arrowhead at the end.

Returns

Pointer to the created LineEntity.

7.12.3.23 saveToFile()

```
void wPlot2D::GraphicsEntity::saveToFile (
            const std::string & filename)
```

Saves a screenshot of the current window.

Parameters

filename	Output file path (supported: png, bmp, tga, jpg).

Exceptions

std::runtime_error	if saving fails.

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

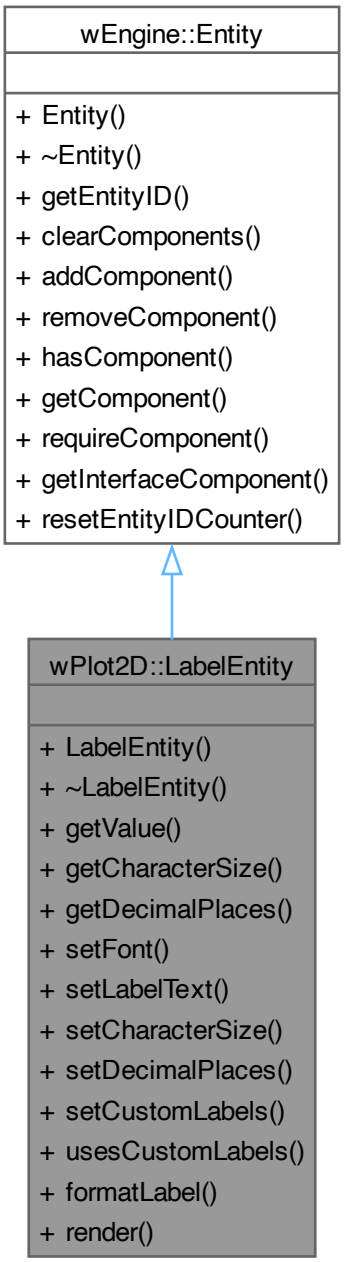
- wGraphicsEntity.hpp
- wGraphicsEntity.cpp

7.13 wPlot2D::LabelEntity Class Reference

Represents a textual label or a collection of axis labels.

```
#include <wLabelEntity.hpp>
```

Inheritance diagram for wPlot2D::LabelEntity:



Public Member Functions

- LabelEntity (const sf::Font &font, AxisType type, sf::Vector2f initialPosition)

  Constructs a LabelEntity with a given font, axis orientation and initial position.
- virtual ~LabelEntity ()=default

  Virtual destructor.
- float getValue () const

Returns the numeric value associated with the label.

- unsigned int getCharacterSize () const

  Returns the current character size of the label text.
- int getDecimalPlaces () const

  Returns the number of decimal places currently used for numeric formatting.
- void setFont (const sf::Font &font)

  Sets a new font for the label.
- void setLabelText (std::string text)

  Defines the text content of the label.
- void setCharacterSize (unsigned int newSize)

  Sets a new character size for the labels.
- void setDecimalPlaces (int places)

  Sets the number of decimal places for numeric labels.
- void setCustomLabels (const std::string &labels)

  Sets a custom label string.
- bool usesCustomLabels () const

  Indicates whether the entity is currently using custom labels.
- std::string formatLabel (float value)

  Formats a numeric value into a label string.
- void render (sf::RenderWindow &window)

  Renders the label on the given SFML window.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.13.1 Detailed Description

Represents a textual label or a collection of axis labels.

A LabelEntity manages the rendering of formatted text associated with axis notches. Labels can be generated dynamically (from numeric values, with controlled precision) or defined manually via custom strings.

The class relies on SFML's `sf::Text` for rendering and provides customization of style (font, color, character size) and placement (axis orientation, offset relative to the axis).

Note

Typically, a LabelEntity is aggregated inside an `AxisEntity` to display labels alongside axis notches.

See also

AxisEntity

Author

Wilfried Koch

Copyright

7.13.2 Constructor & Destructor Documentation

7.13.2.1 LabelEntity()

```
wPlot2D::LabelEntity::LabelEntity (
            const sf::Font & font,
            AxisType type,
            sf::Vector2f initialPosition)
```

Constructs a LabelEntity with a given font, axis orientation and initial position.

Parameters

font	Reference to an SFML font (must remain valid during the lifetime of the entity).
type	Axis orientation (`AxisType::X_AXIS` or `AxisType::Y_AXIS`).
initialPosition	Position where the label will be anchored.

7.13.2.2 ~LabelEntity()

```
virtual wPlot2D::LabelEntity::~LabelEntity ()  [virtual], [default]
```

Virtual destructor.

7.13.3 Member Function Documentation

7.13.3.1 getValue()

```
float wPlot2D::LabelEntity::getValue () const  [nodiscard]
```

Returns the numeric value associated with the label.

Returns

The value stored in the label.

7.13.3.2 getCharacterSize()

```
unsigned int wPlot2D::LabelEntity::getCharacterSize () const  [nodiscard]
```

Returns the current character size of the label text.

Returns

Character size in pixels.

7.13.3.3 getDecimalPlaces()

```
int wPlot2D::LabelEntity::getDecimalPlaces () const  [nodiscard]
```

Returns the number of decimal places currently used for numeric formatting.

Returns

Number of digits after the decimal point.

7.13.3.4 setFont()

```
void wPlot2D::LabelEntity::setFont (
            const sf::Font & font)
```

Sets a new font for the label.

Parameters

font	Reference to an SFML font (must remain valid during the lifetime of the entity).

7.13.3.5 setLabelText()

```
void wPlot2D::LabelEntity::setLabelText (
            std::string text)
```

Defines the text content of the label.

If custom labels are enabled, this method updates the string that will be rendered. Otherwise, it is generally managed internally via numeric formatting.

Parameters

text	The new string to assign to the label.

7.13.3.6 setCharacterSize()

```
void wPlot2D::LabelEntity::setCharacterSize (
            unsigned int newSize)
```

Sets a new character size for the labels.

Parameters

newSize	Character size in pixels.

7.13.3.7 setDecimalPlaces()

```
void wPlot2D::LabelEntity::setDecimalPlaces (
            int places)
```

Sets the number of decimal places for numeric labels.

Parameters

places	Digits after the decimal point (must be >= 0).

7.13.3.8 setCustomLabels()

```
void wPlot2D::LabelEntity::setCustomLabels (
            const std::string & labels)
```

Sets a custom label string.

This enables "custom label mode". When active, numeric formatting is ignored and the provided string is displayed instead.

Parameters

labels	Custom string to display as a label.

7.13.3.9 usesCustomLabels()

```
bool wPlot2D::LabelEntity::usesCustomLabels () const  [nodiscard]
```

Indicates whether the entity is currently using custom labels.

Returns

True if custom labels are active, false if numeric formatting is used.

7.13.3.10 formatLabel()

```
std::string wPlot2D::LabelEntity::formatLabel (
            float value)
```

Formats a numeric value into a label string.

If custom labels are active, the stored custom string is returned. Otherwise, the numeric value is converted using the current number of decimal places.

Parameters

value	Numeric value to format.

Returns

A string ready to be displayed as a label.

7.13.3.11 render()

```
void wPlot2D::LabelEntity::render (
            sf::RenderWindow & window)
```

Renders the label on the given SFML window.

Parameters

window	Reference to the render window.

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

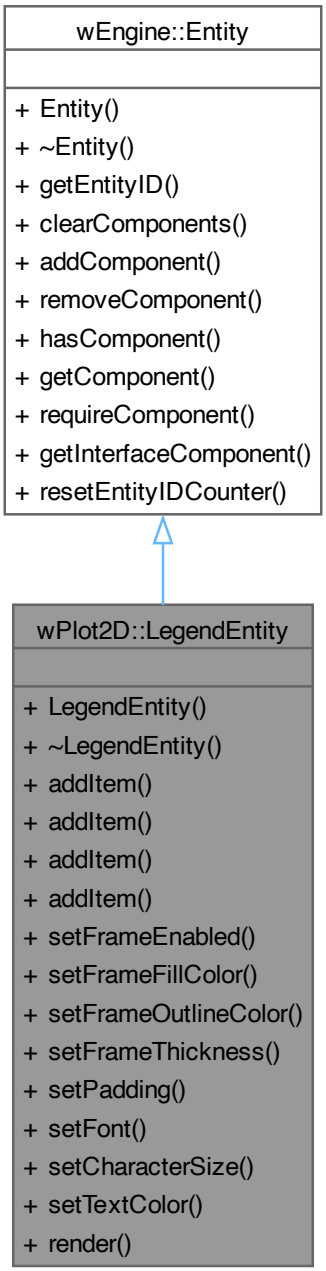
- wLabelEntity.hpp
- wLabelEntity.cpp

7.14 wPlot2D::LegendEntity Class Reference

Represents a legend box that describes functions and data plots.

`#include <wLegendEntity.hpp>`

Inheritance diagram for wPlot2D::LegendEntity:



Public Member Functions

- LegendEntity (const sf::Font &font, const sf::Vector2f &position, bool hasFrame=true)

  Constructs a LegendEntity.
- virtual ~LegendEntity ()=default

  Virtual destructor.
- void addItem (const std::string &label, FunctionEntity *function)

  Adds a new legend item associated with a function.
- void addItem (const std::wstring &label, FunctionEntity *function)

  Adds a new legend item associated with a function (wide string).
- void addItem (const std::string &label, DataPlotEntity *plot)

  Adds a new legend item associated with a data plot.
- void addItem (const std::wstring &label, DataPlotEntity *plot)

  Adds a new legend item associated with a data plot (wide string).
- void setFrameEnabled (bool enabled)

  Enables or disables the surrounding frame of the legend.
- void setFrameFillColor (const sf::Color &color)

  Sets the fill color of the legend frame.
- void setFrameOutlineColor (const sf::Color &color)

  Sets the outline color of the legend frame.
- void setFrameThickness (float thickness)

  Sets the outline thickness of the legend frame.
- void setPadding (const sf::Vector2f &padding)

  Sets the internal padding between items and the frame borders.
- void setFont (const sf::Font &font)

  Updates the font used for all legend labels.
- void setCharacterSize (unsigned int size)

  Sets the character size of the legend text.
- void setTextColor (const sf::Color &color)

  Sets the color of the legend labels.
- void render (sf::RenderWindow &window)

  Renders the legend (all items and optional frame) to the target window.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.

- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.14.1 Detailed Description

Represents a legend box that describes functions and data plots.

A `LegendEntity` provides a visual legend for plotted entities such as `FunctionEntity` and `DataPlotEntity`. Each legend item is composed of:

- A sample line (`LineEntity`) with the same style, thickness, and color as the source entity.
- A text label (`sf::Text`) describing the entity.

The legend can optionally be surrounded by a frame (`FrameEntity`) with configurable padding, outline color, thickness, and fill color.

7.14.1.0.1 Components and Features:

- Configurable font and text size.
- Support for UTF-8 and wide string labels.
- Dynamic addition of items from existing plotted entities.
- Automatic alignment of line + text pairs inside the legend box.

See also

FunctionEntity, DataPlotEntity, LineEntity, FrameEntity

Note

The font passed in the constructor must remain valid during the lifetime of the legend, as SFML does not copy font data internally.

Author

Wilfried Koch

Copyright

7.14.2 Constructor & Destructor Documentation

7.14.2.1 LegendEntity()

```
wPlot2D::LegendEntity::LegendEntity (
            const sf::Font & font,
            const sf::Vector2f & position,
            bool hasFrame = true)
```

Constructs a LegendEntity.

Initializes the legend with a given font, anchor position, and optional frame.

Parameters

font	Reference to the font used for labels (must remain valid).
position	Anchor position of the legend box in window coordinates.
hasFrame	Whether to display a surrounding frame (default: true).

7.14.2.2 ~LegendEntity()

```
virtual wPlot2D::LegendEntity::~LegendEntity ()  [virtual], [default]
```

Virtual destructor.

7.14.3 Member Function Documentation

7.14.3.1 addItem() [1/4]

```
void wPlot2D::LegendEntity::addItem (
            const std::string & label,
            FunctionEntity * function)
```

Adds a new legend item associated with a function.

Parameters

label	Label text (UTF-8 string).
function	Pointer to the source FunctionEntity.

7.14.3.2 addItem() [2/4]

```
void wPlot2D::LegendEntity::addItem (
            const std::wstring & label,
            FunctionEntity * function)
```

Adds a new legend item associated with a function (wide string).

Parameters

label	Label text (wide string).
function	Pointer to the source FunctionEntity.

7.14.3.3 addItem() [3/4]

```
void wPlot2D::LegendEntity::addItem (
            const std::string & label,
            DataPlotEntity * plot)
```

Adds a new legend item associated with a data plot.

Parameters

label	Label text (UTF-8 string).
plot	Pointer to the source DataPlotEntity.

7.14.3.4 addItem() [4/4]

```
void wPlot2D::LegendEntity::addItem (
            const std::wstring & label,
            DataPlotEntity * plot)
```

Adds a new legend item associated with a data plot (wide string).

Parameters

label	Label text (wide string).
plot	Pointer to the source DataPlotEntity.

7.14.3.5 setFrameEnabled()

```
void wPlot2D::LegendEntity::setFrameEnabled (
            bool enabled)
```

Enables or disables the surrounding frame of the legend.

Parameters

enabled	True to display the frame, false to hide it.

7.14.3.6 setFrameFillColor()

```
void wPlot2D::LegendEntity::setFrameFillColor (
            const sf::Color & color)
```

Sets the fill color of the legend frame.

Parameters

color	SFML color applied to the frame's background.

7.14.3.7 setFrameOutlineColor()

```
void wPlot2D::LegendEntity::setFrameOutlineColor (
            const sf::Color & color)
```

Sets the outline color of the legend frame.

Parameters

color	SFML color applied to the frame's border.

7.14.3.8 setFrameThickness()

```
void wPlot2D::LegendEntity::setFrameThickness (
            float thickness)
```

Sets the outline thickness of the legend frame.

Parameters

thickness	Thickness in pixels (positive for outside expansion).

7.14.3.9 setPadding()

```
void wPlot2D::LegendEntity::setPadding (
            const sf::Vector2f & padding)
```

Sets the internal padding between items and the frame borders.

Padding defines horizontal and vertical margins in pixels.

Parameters

padding	Vector (x, y) where: • `x` = horizontal padding (left/right), • `y` = vertical padding (top/bottom).

7.14.3.10 setFont()

```
void wPlot2D::LegendEntity::setFont (
            const sf::Font & font)
```

Updates the font used for all legend labels.

Note

The font must remain valid during the legend's lifetime, as SFML does not copy font data internally.

Parameters

font	Reference to an externally managed sf::Font.

7.14.3.11 setCharacterSize()

```
void wPlot2D::LegendEntity::setCharacterSize (
            unsigned int size)
```

Sets the character size of the legend text.

Parameters

size	Font size in pixels.

7.14.3.12 setTextColor()

```
void wPlot2D::LegendEntity::setTextColor (
            const sf::Color & color)
```

Sets the color of the legend labels.

Parameters

color	SFML color applied to all legend text.

7.14.3.13 render()

```
void wPlot2D::LegendEntity::render (
            sf::RenderWindow & window)
```

Renders the legend (all items and optional frame) to the target window.

Each item is drawn with its sample line and label text, aligned inside the legend box. The optional frame is drawn behind all items.

Parameters

window	The target SFML render window.

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

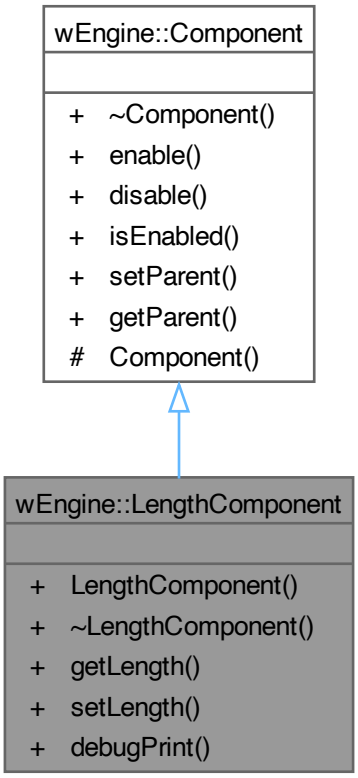
- wLegendEntity.hpp
- wLegendEntity.cpp

7.15 wEngine::LengthComponent Class Reference

ECS component that defines the length of a drawable object.

`#include <wLengthComponent.hpp>`

Inheritance diagram for wEngine::LengthComponent:



Public Member Functions

- LengthComponent (float length=2.0f)

  Constructs the component with an initial positive length.
- virtual ~LengthComponent ()=default
- float getLength () const

  Returns the current length.
- void setLength (float newLength)

  Sets a new length value.
- void debugPrint () const

  Outputs the current length value to the console for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.15.1 Detailed Description

ECS component that defines the length of a drawable object.

This component stores a positive float value representing the length (in pixels) of lines or shapes. The value must be strictly positive.

Exceptions

std::invalid_argument	if the value is zero or negative.

Author

Wilfried Koch

Copyright

7.15.2 Constructor & Destructor Documentation

7.15.2.1 LengthComponent()

```
wEngine::LengthComponent::LengthComponent (
            float length = 2.0f)
```

Constructs the component with an initial positive length.

Parameters

length	Initial length value (default is 2.0f).

Exceptions

std::invalid_argument	if the value is zero or negative.

7.15.2.2 ~LengthComponent()

```
virtual wEngine::LengthComponent::~LengthComponent ()  [virtual], [default]
```

7.15.3 Member Function Documentation

7.15.3.1 getLength()

```
float wEngine::LengthComponent::getLength () const  [nodiscard]
```

Returns the current length.

Returns

A positive float representing the line length (in pixels).

7.15.3.2 setLength()

```
void wEngine::LengthComponent::setLength (
            float newLength)
```

Sets a new length value.

Parameters

newLength	A strictly positive float.

Exceptions

std::invalid_argument	if the value is zero or negative.

7.15.3.3 debugPrint()

```
void wEngine::LengthComponent::debugPrint () const
```

Outputs the current length value to the console for debugging.

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

- wLengthComponent.hpp
- wLengthComponent.cpp

7.16 wEngine::LineDrawer Class Reference

Utility class for rendering thick lines and polylines with style support.

`#include <wLineDrawer.hpp>`

Static Public Member Functions

- static float drawLine (sf::RenderWindow &window, const sf::Vector2f &point1, const sf::Vector2f &point2, const sf::Color &color, float thickness, LineStyleComponent::LineStyle style=LineStyleComponent::LineStyle::Solid, float dashLength=20.0f, float gapLength=5.0f, float patternOffset=0.0f)

  Draws a single thick line segment between two points.
- static void drawPolylineRound (sf::RenderWindow &window, const std::vector< sf::Vector2f > &points, const sf::Color &color, float thickness, LineStyleComponent::LineStyle style=LineStyleComponent::LineStyle::Solid, float dashLength=20.0f, float gapLength=5.0f, unsigned int arcResolution=12)

  Draws a polyline (sequence of connected line segments) with optional round joins.

7.16.1 Detailed Description

Utility class for rendering thick lines and polylines with style support.

The LineDrawer provides static methods to draw line segments and polylines with configurable thickness, color, and style (Solid, Dashed, Dotted).

7.16.1.0.1 Features:

- Thick line rendering via quads (two triangles per segment).
- Support for dashed and dotted patterns using configurable dash/gap lengths.
- Dash/dot continuity across multiple connected segments using a shared pattern offset.
- Optional round joins at corners of polylines (applied only when style == Solid).

7.16.1.0.2 Usage:

- Use drawLine( ) to render a single thick segment.
- Use drawPolylineRound( ) to render a sequence of connected points with optional round joins.
- To maintain consistent dash/dot alignment across segments, pass the returned `patternOffset` from drawLine( ) into the next segment.

Warning

Round joins are currently only applied for `Solid` style. For dashed or dotted lines, joins would produce inconsistent results and are therefore omitted.

See also

LineStyleComponent for configuring line style options.

Author

Wilfried Koch

Copyright

7.16.2 Member Function Documentation

7.16.2.1 drawLine()

```
float wEngine::LineDrawer::drawLine (
            sf::RenderWindow & window,
            const sf::Vector2f & point1,
            const sf::Vector2f & point2,
            const sf::Color & color,
            float thickness,
            LineStyleComponent::LineStyle style = LineStyleComponent::LineStyle::Solid,
            float dashLength = 20.0f,
            float gapLength = 5.0f,
            float patternOffset = 0.0f)  [static]
```

Draws a single thick line segment between two points.

7.16.2.1.1 Style behavior:

- **Solid**: Renders a single quad covering the full segment.
- **Dashed**: Repeats a dash/gap pattern along the segment.
- **Dotted**: Places successive dots along the segment, using thickness as dot length.

7.16.2.1.2 Pattern control:

- `dashLength` sets the visible length of each dash (Dashed style).
- `gapLength` sets the empty space between dashes or dots.
- `thickness` is reused as the dot length if style == Dotted.
- `patternOffset` maintains pattern alignment between consecutive calls.

Parameters

window	Render target.
point1	First endpoint of the line.
point2	Second endpoint of the line.
color	Line color.
thickness	Line thickness in pixels.
style	Line style (Solid, Dashed, Dotted).
dashLength	Dash length (used if style == Dashed).
gapLength	Gap length between dashes or dots.
patternOffset	Initial offset within the dash/dot pattern.

Returns

Updated pattern offset after this segment (pass to next segment for continuity).

7.16.2.2 drawPolylineRound()

```
void wEngine::LineDrawer::drawPolylineRound (
            sf::RenderWindow & window,
            const std::vector< sf::Vector2f > & points,
            const sf::Color & color,
            float thickness,
            LineStyleComponent::LineStyle style = LineStyleComponent::LineStyle::Solid,
            float dashLength = 20.0f,
            float gapLength = 5.0f,
            unsigned int arcResolution = 12)  [static]
```

Draws a polyline (sequence of connected line segments) with optional round joins.

- Each segment [p1, p2] is rendered using drawLine( ), with pattern continuity preserved.
- If style == Solid and a next segment exists: a circular arc is approximated using triangles to smooth the corner at [p2].

Parameters

window	Render target.
points	List of polyline points (must contain at least 2).
color	Polyline color.
thickness	Line thickness in pixels.
style	Line style (Solid, Dashed, Dotted).
dashLength	Dash length (used if style == Dashed).
gapLength	Gap length between dashes or dots.
arcResolution	Number of triangles used to approximate each round join (higher = smoother).

Note

For Dashed or Dotted styles, round joins are skipped.

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

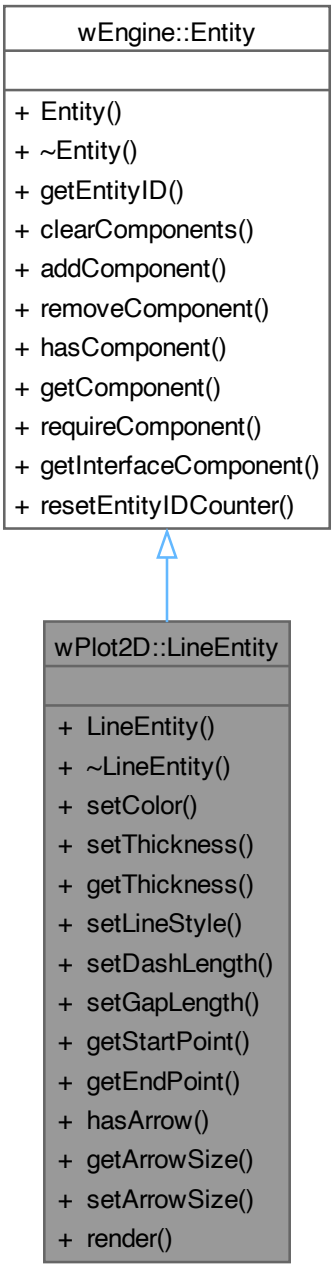
- wLineDrawer.hpp
- wLineDrawer.cpp

7.17 wPlot2D::LineEntity Class Reference

Entity representing a straight line segment with optional arrowhead.

```
#include <wLineEntity.hpp>
```

Inheritance diagram for wPlot2D::LineEntity:



Public Member Functions

- LineEntity (const sf::Vector2f &origin, const sf::Vector2f &scale, const sf::Vector2f &start, const sf::Vector2f &end, bool withArrow=false)

  Construct a line entity between two points.
- virtual ~LineEntity ()=default

  Virtual destructor.

- void setColor (sf::Color color)

  Sets the color of the line and arrowhead.
- void setThickness (float thickness)

  Sets the thickness of the line.
- float getThickness () const

  Returns the current thickness of the line.
- void setLineStyle (wEngine::LineStyleComponent::LineStyle style)

  Sets the visual style of the line.
- void setDashLength (float dashLength)

  Sets the dash length for dashed lines.
- void setGapLength (float gapLength)

  Sets the gap length between dashes or dots.
- sf::Vector2f getStartPoint () const

  Returns the starting point of the line.
- sf::Vector2f getEndPoint () const

  Returns the ending point of the line.
- bool hasArrow () const

  Checks if the line has an arrowhead.
- float getArrowSize () const

  Returns the arrowhead size factor.
- void setArrowSize (float arrowSize)

  Sets the arrowhead size factor.
- void render (sf::RenderWindow &window)

  Renders the line (and optional arrowhead).

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.17.1 Detailed Description

Entity representing a straight line segment with optional arrowhead.

This entity provides configurable line rendering within the plot area:

- Supports Solid, Dashed, and Dotted styles (via LineStyleComponent).
- Customizable color, thickness, dash length, and gap length.
- Optional arrowhead at the end (useful for axes or vectors).

Coordinates are expressed in logical units and transformed by the entity's origin and scale before being rendered.

See also

wEngine::LineDrawer for the rendering implementation

wEngine::LineStyleComponent for style configuration

Author

Wilfried Koch

Copyright

7.17.2 Constructor & Destructor Documentation

7.17.2.1 LineEntity()

```
wPlot2D::LineEntity::LineEntity (
            const sf::Vector2f & origin,
            const sf::Vector2f & scale,
            const sf::Vector2f & start,
            const sf::Vector2f & end,
            bool withArrow = false)
```

Construct a line entity between two points.

Parameters

origin	Origin of the plot (reference point).
scale	Scaling factor to convert logical coordinates into pixels.
start	Line starting point (logical coordinates).
end	Line ending point (logical coordinates).
withArrow	Whether to draw an arrowhead at the end.

7.17.2.2 ~LineEntity()

```
virtual wPlot2D::LineEntity::~LineEntity ()  [virtual], [default]
```

Virtual destructor.

7.17.3 Member Function Documentation

7.17.3.1 setColor()

```
void wPlot2D::LineEntity::setColor (
            sf::Color color)
```

Sets the color of the line and arrowhead.

Parameters

color	New color to apply.

7.17.3.2 setThickness()

```
void wPlot2D::LineEntity::setThickness (
            float thickness)
```

Sets the thickness of the line.

Parameters

thickness	Thickness in pixels.

7.17.3.3 getThickness()

```
float wPlot2D::LineEntity::getThickness () const  [nodiscard]
```

Returns the current thickness of the line.

Returns

Thickness in pixels.

7.17.3.4 setLineStyle()

```
void wPlot2D::LineEntity::setLineStyle (
            wEngine::LineStyleComponent::LineStyle style)
```

Sets the visual style of the line.

Parameters

style	Solid, Dashed, or Dotted.

7.17.3.5 setDashLength()

```
void wPlot2D::LineEntity::setDashLength (
            float dashLength)
```

Sets the dash length for dashed lines.

Parameters

dashLength	Length of each dash in pixels.

7.17.3.6 setGapLength()

```
void wPlot2D::LineEntity::setGapLength (
            float gapLength)
```

Sets the gap length between dashes or dots.

Parameters

gapLength	Length of the gap in pixels.

7.17.3.7 getStartPoint()

```
sf::Vector2f wPlot2D::LineEntity::getStartPoint () const  [nodiscard]
```

Returns the starting point of the line.

Returns

Start point in logical coordinates.

7.17.3.8 getEndPoint()

```
sf::Vector2f wPlot2D::LineEntity::getEndPoint () const  [nodiscard]
```

Returns the ending point of the line.

Returns

End point in logical coordinates.

7.17.3.9 hasArrow()

```
bool wPlot2D::LineEntity::hasArrow () const  [nodiscard]
```

Checks if the line has an arrowhead.

Returns

True if an arrowhead is drawn, false otherwise.

7.17.3.10 getArrowSize()

```
float wPlot2D::LineEntity::getArrowSize () const  [nodiscard]
```

Returns the arrowhead size factor.

Returns

Arrow size relative to line thickness.

7.17.3.11 setArrowSize()

```
void wPlot2D::LineEntity::setArrowSize (
            float arrowSize)
```

Sets the arrowhead size factor.

Parameters

arrowSize	Arrow size relative to line thickness.

7.17.3.12 render()

```
void wPlot2D::LineEntity::render (
            sf::RenderWindow & window)
```

Renders the line (and optional arrowhead).

Parameters

window	Target render window.

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

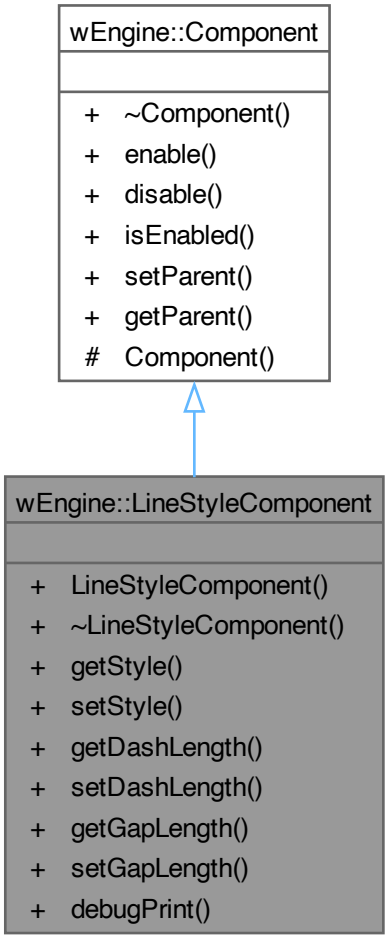
- wLineEntity.hpp
- wLineEntity.cpp

7.18 wEngine::LineStyleComponent Class Reference

ESC component that defines the style of a line (solid, dotted, dashed).

`#include <wLineStyleComponent.hpp>`

Inheritance diagram for wEngine::LineStyleComponent:



Public Types

- enum class LineStyle { Solid , Dotted , Dashed }

  Available styles for line rendering.

Public Member Functions

- LineStyleComponent (LineStyle style=LineStyle::Solid)

  Constructs a LineStyleComponent with an optional style.

- virtual ~LineStyleComponent ()=default
- LineStyle getStyle () const

  Returns the current line style.
- void setStyle (LineStyle style)

  Sets the current line style.
- float getDashLength () const

  Returns the dash length (used for Dashed style).
- void setDashLength (float dashLength)

  Sets the dash length.
- float getGapLength () const

  Returns the gap length (used for Dotted and Dashed styles).
- void setGapLength (float gapLength)

  Sets the gap length.
- void debugPrint () const

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.18.1 Detailed Description

ESC component that defines the style of a line (solid, dotted, dashed).

This component controls how lines are drawn in the rendering pipeline. For dotted and dashed styles, both dash length and gap length can be configured.

Author

Wilfried Koch

Copyright

7.18.2 Member Enumeration Documentation

7.18.2.1 LineStyle

```
enum class wEngine::LineStyleComponent::LineStyle  [strong]
```

Available styles for line rendering.

Enumerator

Solid	
Dotted	
Dashed	

7.18.3 Constructor & Destructor Documentation

7.18.3.1 LineStyleComponent()

```
wEngine::LineStyleComponent::LineStyleComponent (
            LineStyle style = LineStyle::Solid)
```

Constructs a LineStyleComponent with an optional style.

Parameters

style	Line style to use (default: Solid).

7.18.3.2 ~LineStyleComponent()

```
virtual wEngine::LineStyleComponent::~LineStyleComponent ()  [virtual], [default]
```

7.18.4 Member Function Documentation

7.18.4.1 getStyle()

```
LineStyleComponent::LineStyle wEngine::LineStyleComponent::getStyle () const  [nodiscard]
```

Returns the current line style.

Returns

The style as LineStyle.

7.18.4.2 setStyle()

```
void wEngine::LineStyleComponent::setStyle (
            LineStyle style)
```

Sets the current line style.

Parameters

style	New line style to apply.

7.18.4.3 getDashLength()

```
float wEngine::LineStyleComponent::getDashLength () const  [nodiscard]
```

Returns the dash length (used for Dashed style).

Returns

Dash length in pixels.

7.18.4.4 setDashLength()

```
void wEngine::LineStyleComponent::setDashLength (
            float dashLength)
```

Sets the dash length.

Parameters

dashLength	Dash length in pixels.

Exceptions

std::invalid_argument	if dashLength <= 0.

7.18.4.5 getGapLength()

```
float wEngine::LineStyleComponent::getGapLength () const  [nodiscard]
```

Returns the gap length (used for Dotted and Dashed styles).

Returns

Gap length in pixels.

7.18.4.6 setGapLength()

```
void wEngine::LineStyleComponent::setGapLength (
            float gapLength)
```

Sets the gap length.

Parameters

gapLength	Gap length in pixels.

Exceptions

std::invalid_argument	if gapLength < 0.

7.18.4.7 debugPrint()

```
void wEngine::LineStyleComponent::debugPrint () const
```

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

- wLineStyleComponent.hpp
- wLineStyleComponent.cpp

7.19 wEngine::MathUtils Class Reference

Provides common mathematical helper functions for plotting and geometry.

`#include <wMathUtils.hpp>`

Static Public Member Functions

- static std::vector< double > linspace (double start, double end, size_t nbPoints)
  Generates a linearly spaced vector of values between two bounds.

7.19.1 Detailed Description

Provides common mathematical helper functions for plotting and geometry.

This utility class groups static methods that are frequently needed when working with numerical data, discretization, and rendering curves.

Note

All methods are static and do not require instantiation.

Author

Wilfried Koch

Copyright

7.19.2 Member Function Documentation

7.19.2.1 linspace()

```
std::vector< double > wEngine::MathUtils::linspace (
            double start,
            double end,
            size_t nbPoints)  [static], [nodiscard]
```

Generates a linearly spaced vector of values between two bounds.

This function produces a vector of evenly spaced points between `start` and `end` (inclusive).

Parameters

start	Starting value.
end	Ending value.
nbPoints	Number of points to generate (must be >= 2).

Returns

A std::vector< double > containing evenly spaced values.

Exceptions

std::invalid_argument	if start >= end or nbPoints < 2.

```
auto values = MathUtils::linspace( 0.0, 1.0, 5 );
// values = { 0.0, 0.25, 0.5, 0.75, 1.0 }
```

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

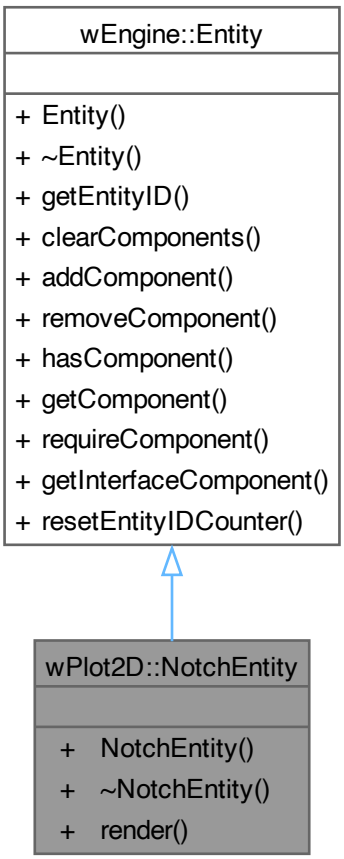
- wMathUtils.hpp
- wMathUtils.cpp

7.20 wPlot2D::NotchEntity Class Reference

Represents a single tick mark ("notch") on a 2D axis.

`#include <wNotchEntity.hpp>`

Inheritance diagram for wPlot2D::NotchEntity:



Public Member Functions

- NotchEntity (AxisType type)

  Constructs a `NotchEntity` aligned to a given axis.
- virtual ~NotchEntity ()=default

  Virtual destructor.
- void render (sf::RenderWindow &window)

  Renders the notch using SFML.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.

- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

  Adds a new component of type T to the entity.
- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.20.1 Detailed Description

Represents a single tick mark ("notch") on a 2D axis.

A `NotchEntity` is a visual element used to mark intervals along a coordinate axis, helping users interpret scale in a plot. It is rendered as a small filled rectangle, oriented perpendicularly to its associated axis (`X_AXIS` or `Y_AXIS`).

7.20.1.0.1 Components required:

- `PositionComponent`: specifies the top-left pixel position.
- `ColorComponent`: defines the notch color.
- `ThicknessComponent`: defines the thickness (along the axis).
- `LengthComponent`: defines the length (perpendicular to the axis).

7.20.1.0.2 Orientation:

- `AxisType::X_AXIS` : vertical notch (aligned with Y),
- `AxisType::Y_AXIS` : horizontal notch (aligned with X).

The actual rendering logic is handled internally using `sf::RectangleShape`.

Note

Components must be added externally (typically by `AxisEntity::addNotches( )`).

See also

AxisEntity, AxisType, PositionComponent, LengthComponent, ThicknessComponent

Author

Wilfried Koch

Copyright

7.20.2 Constructor & Destructor Documentation

7.20.2.1 NotchEntity()

```
wPlot2D::NotchEntity::NotchEntity (
            AxisType type)
```

Constructs a `NotchEntity` aligned to a given axis.

Parameters

type	The axis type (X or Y) which determines notch orientation.

7.20.2.2 ~NotchEntity()

```
virtual wPlot2D::NotchEntity::~NotchEntity ()  [virtual], [default]
```

Virtual destructor.

7.20.3 Member Function Documentation

7.20.3.1 render()

```
void wPlot2D::NotchEntity::render (
            sf::RenderWindow & window)
```

Renders the notch using SFML.

Builds a rectangle from ECS components (position, thickness, length, color) and draws it in the render window.

Exceptions

std::runtime_error	if any required component is missing.

Parameters

window	The render window to draw onto.

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

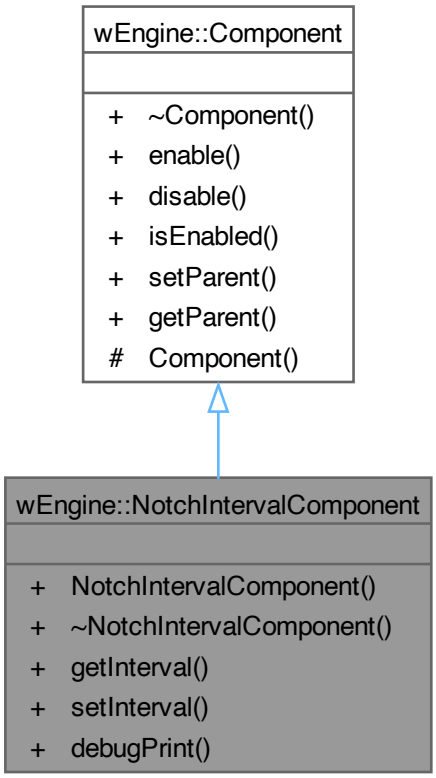
- wNotchEntity.hpp
- wNotchEntity.cpp

7.21 wEngine::NotchIntervalComponent Class Reference

ECS component that defines the interval between notches on an axis.

`#include <wNotchIntervalComponent.hpp>`

Inheritance diagram for wEngine::NotchIntervalComponent:



Public Member Functions

- NotchIntervalComponent (float interval=1.0f)

  Constructs a NotchIntervalComponent with a given interval.
- virtual ~NotchIntervalComponent ()=default
- float getInterval () const

  Returns the current spacing between notches.
- void setInterval (float newInterval)

  Sets a new interval between notches.
- void debugPrint () const

  Outputs the current interval to standard output for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.21.1 Detailed Description

ECS component that defines the interval between notches on an axis.

This component stores the spacing (in logical units) between visual ticks or markers on an axis, such as those used in coordinate grids or charts.

It enables the placement of regular visual markers and may be queried by rendering systems.

Author

Wilfried Koch

Copyright

7.21.2 Constructor & Destructor Documentation

7.21.2.1 NotchIntervalComponent()

```
wEngine::NotchIntervalComponent::NotchIntervalComponent (
            float interval = 1.0f)
```

Constructs a NotchIntervalComponent with a given interval.

Parameters

interval	Distance between notches in logical units (must be > 0). Default is 1.0f.

Exceptions

std::invalid_argument	if interval is not strictly positive.

7.21.2.2 ~NotchIntervalComponent()

```
virtual wEngine::NotchIntervalComponent::~NotchIntervalComponent ()  [virtual], [default]
```

7.21.3 Member Function Documentation

7.21.3.1 getInterval()

```
float wEngine::NotchIntervalComponent::getInterval () const  [nodiscard]
```

Returns the current spacing between notches.

Returns

The interval, expressed in logical units.

7.21.3.2 setInterval()

```
void wEngine::NotchIntervalComponent::setInterval (
            float newInterval)
```

Sets a new interval between notches.

Parameters

newInterval	New spacing value (must be > 0).

Exceptions

std::invalid_argument	if newInterval is not strictly positive.

7.21.3.3 debugPrint()

```
void wEngine::NotchIntervalComponent::debugPrint () const
```

Outputs the current interval to standard output for debugging.

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

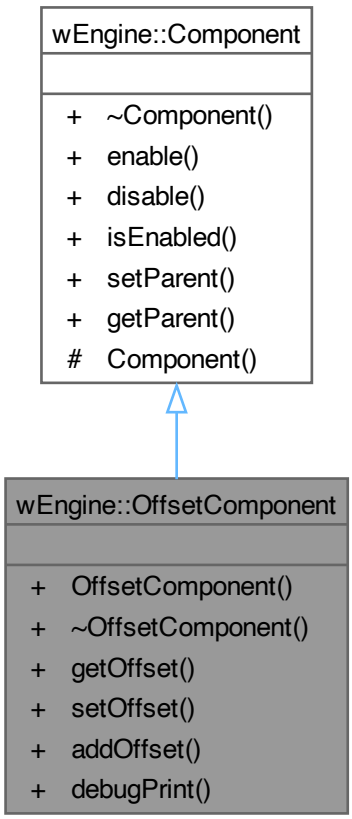
- wNotchIntervalComponent.hpp
- wNotchIntervalComponent.cpp

7.22 wEngine::OffsetComponent Class Reference

ECS component that defines a logical coordinate offset.

`#include <wOffsetComponent.hpp>`

Inheritance diagram for wEngine::OffsetComponent:



Public Member Functions

- OffsetComponent (sf::Vector2f offset=sf::Vector2f(0.0f, 0.0f))

  Constructs the component with an optional offset.
- virtual ~OffsetComponent ()=default
- sf::Vector2f getOffset () const

  Returns the current offset.
- void setOffset (sf::Vector2f offset)

  Updates the logical offset value.
- void addOffset (sf::Vector2f delta)

  Increments the current offset by a given vector.
- void debugPrint () const

  Outputs the current offset value to the console for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.22.1 Detailed Description

ECS component that defines a logical coordinate offset.

This component stores a 2D offset (in logical units) applied to graphical elements such as axes, curves, titles, labels and data points. It allows changing the visual reference frame without affecting pixel-based positioning.

7.22.1.0.1 Usage Examples:

- With offset = (0, 0), logical coordinates are drawn as-is.
- With offset = (-20, 0), the visual origin is shifted 20 units to the right.

The offset is often combined with the origin and scale to compute actual pixel positions.

Author

Wilfried Koch

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7.22.2 Constructor & Destructor Documentation

7.22.2.1 OffsetComponent()

```
wEngine::OffsetComponent::OffsetComponent (
            sf::Vector2f offset = sf::Vector2f( 0.0f, 0.0f ))
```

Constructs the component with an optional offset.

Parameters

offset	A 2D vector representing the logical offset (default is (0.0f, 0.0f)).

7.22.2.2 ~OffsetComponent()

```
virtual wEngine::OffsetComponent::~OffsetComponent ()  [virtual], [default]
```

7.22.3 Member Function Documentation

7.22.3.1 getOffset()

```
sf::Vector2f wEngine::OffsetComponent::getOffset () const  [nodiscard]
```

Returns the current offset.

Returns

A 2D vector representing the logical offset.

7.22.3.2 setOffset()

```
void wEngine::OffsetComponent::setOffset (
            sf::Vector2f offset)
```

Updates the logical offset value.

Parameters

offset	The new offset to apply.

7.22.3.3 addOffset()

```
void wEngine::OffsetComponent::addOffset (
            sf::Vector2f delta)
```

Increments the current offset by a given vector.

Parameters

delta	The additional offset to add to the current value.

7.22.3.4 debugPrint()

```
void wEngine::OffsetComponent::debugPrint () const
```

Outputs the current offset value to the console for debugging.

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

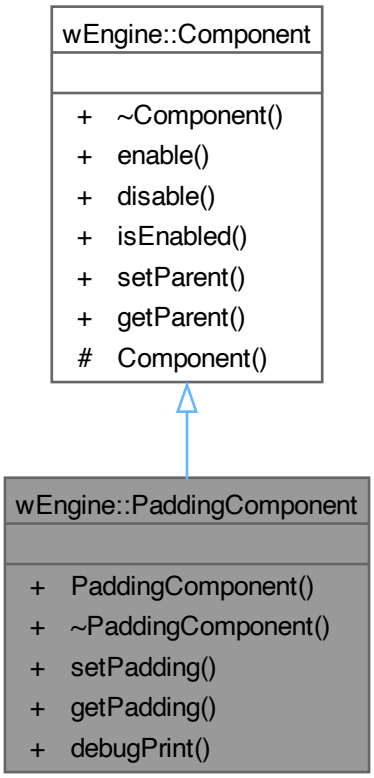
- wOffsetComponent.hpp
- wOffsetComponent.cpp

7.23 wEngine::PaddingComponent Class Reference

ECS component representing internal padding for UI-like elements.

```
#include <wPaddingComponent.hpp>
```

Inheritance diagram for wEngine::PaddingComponent:



Public Member Functions

- PaddingComponent (sf::Vector2f padding=sf::Vector2f(0.0f, 0.0f))

  Constructs a PaddingComponent with optional initial padding.
- virtual ~PaddingComponent ()=default
- void setPadding (sf::Vector2f padding)

  Sets the padding vector.
- sf::Vector2f getPadding () const

  Returns the current padding values.
- void debugPrint () const

  Prints the current padding values to standard output for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.23.1 Detailed Description

ECS component representing internal padding for UI-like elements.

This component encapsulates a 2D padding vector (horizontal and vertical) that can be used to add internal spacing between a visual element (e.g., a title or a frame) and its boundary.

7.23.1.0.1 Padding Convention:

- `x` corresponds to horizontal padding (left and right),
- `y` corresponds to vertical padding (top and bottom).

Author

Wilfried Koch

Copyright

7.23.2 Constructor & Destructor Documentation

7.23.2.1 PaddingComponent()

```
wEngine::PaddingComponent::PaddingComponent (
            sf::Vector2f padding = sf::Vector2f( 0.0f, 0.0f ))
```

Constructs a PaddingComponent with optional initial padding.

Parameters

padding	Padding vector (x, y) (default is (0.0f, 0.0f)).

7.23.2.2 ~PaddingComponent()

```
virtual wEngine::PaddingComponent::~PaddingComponent ()  [virtual], [default]
```

7.23.3 Member Function Documentation

7.23.3.1 setPadding()

```
void wEngine::PaddingComponent::setPadding (
            sf::Vector2f padding)
```

Sets the padding vector.

Parameters

padding	New padding values (x, y).

7.23.3.2 getPadding()

```
sf::Vector2f wEngine::PaddingComponent::getPadding () const  [nodiscard]
```

Returns the current padding values.

Returns

Padding vector (x, y).

7.23.3.3 debugPrint()

```
void wEngine::PaddingComponent::debugPrint () const
```

Prints the current padding values to standard output for debugging.

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

- wPaddingComponent.hpp
- wPaddingComponent.cpp

7.24 wEngine::PathUtils Class Reference

Utility class providing static functions for managing executable and resource paths across platforms.

`#include <wPathUtils.hpp>`

Static Public Member Functions

- static std::string getExecutablePath ()

  Returns the absolute path to the current executable.
- static std::string getExecutableDir ()

  Returns the directory containing the current executable.

7.24.1 Detailed Description

Utility class providing static functions for managing executable and resource paths across platforms.

This class retrieves the absolute path of the current executable or its parent directory, in a portable way (macOS, Windows, Linux). It is particularly useful for locating resources such as fonts, images, or configuration files relative to the application binary.

All methods are static and do not require instantiation.

Note

If the path cannot be determined, a std::runtime_error is thrown.

7.24.1.0.1 Notes on unusual headers:

- `<mach-o/dyld.h>` (macOS): provides `_NSGetExecutablePath`, part of the Mach-O dynamic loader API. Documentation: see Apple Developer docs (man page: `man 3 dyld`).
- `<windows.h>` (Windows): provides `GetModuleFileNameA`, part of the Win32 API. Documentation: see Microsoft Learn (GetModuleFileName function).
- `<unistd.h>` + `/proc/self/exe` (Linux): `/proc/self/exe` is a symbolic link exposing the running executable, documented in `man 5 proc`.

These APIs are not C++ standard and must be used with care, as they are platform-dependent.

See also

std::filesystem for path manipulations.

Author

Wilfried Koch

Copyright

7.24.2 Member Function Documentation

7.24.2.1 getExecutablePath()

```
std::string wEngine::PathUtils::getExecutablePath ()  [static], [nodiscard]
```

Returns the absolute path to the current executable.

Platform-specific APIs are used:

- macOS: `_NSGetExecutablePath`
- Windows: `GetModuleFileNameA`
- Linux: `/proc/self/exe`

Returns

Absolute path to the binary (e.g., "/path/to/MyApp.app/Contents/MacOS/MyApp").

Exceptions

std::runtime_error	if the path cannot be resolved.

7.24.2.2 getExecutableDir()

```
std::string wEngine::PathUtils::getExecutableDir ()  [static], [nodiscard]
```

Returns the directory containing the current executable.

This is often used as a base path to resolve relative resource paths.

Returns

Directory containing the binary (e.g., "/path/to/MyApp.app/Contents/MacOS").

Exceptions

std::runtime_error	if the path cannot be resolved.

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

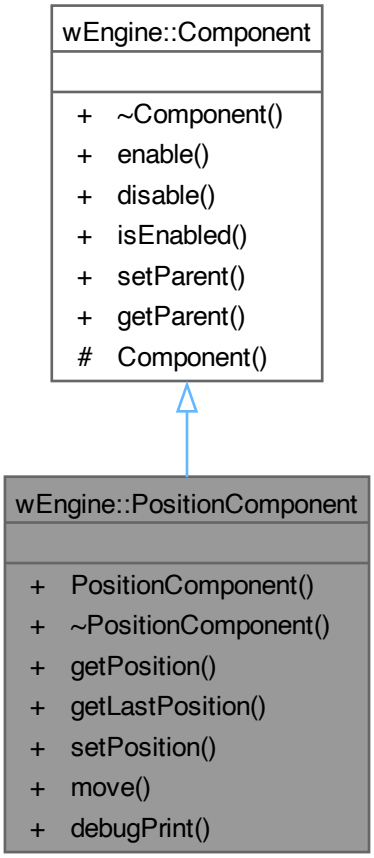
- wPathUtils.hpp
- wPathUtils.cpp

7.25 wEngine::PositionComponent Class Reference

ECS component storing the position of an entity in 2D space and supports movement tracking.

`#include <wPositionComponent.hpp>`

Inheritance diagram for wEngine::PositionComponent:



Public Member Functions

- PositionComponent (sf::Vector2f position=sf::Vector2f(0.0f, 0.0f))

  Constructs a PositionComponent with the given position.
- virtual ~PositionComponent ()=default
- sf::Vector2f getPosition () const

  Gets the current position of the component.
- sf::Vector2f getLastPosition () const

  Returns the previous position (before the last move).
- void setPosition (sf::Vector2f newPosition)

  Sets the 2D position to a new value.
- void move (const sf::Vector2f &offset)

  Moves the position by an offset.
- void debugPrint () const

  Outputs the position (x, y) to standard output for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.25.1 Detailed Description

ECS component storing the position of an entity in 2D space and supports movement tracking.

This component holds a 2D vector representing the current and previous spatial position of its parent entity.

7.25.1.0.1 Usage Examples:

- Default position at origin:
  ```
  addComponent< wEngine::PositionComponent >( );
  ```
- Custom position:
  ```
  addComponent< wEngine::PositionComponent >( sf::Vector2f( 100.0f, 200.0f ) );
  ```

Author

Wilfried Koch

Copyright

7.25.2 Constructor & Destructor Documentation

7.25.2.1 PositionComponent()

```
wEngine::PositionComponent::PositionComponent (
            sf::Vector2f position = sf::Vector2f( 0.0f, 0.0f ))
```

Constructs a PositionComponent with the given position.

Parameters

position	Initial position (default is (0.0f, 0.0f)).

7.25.2.2 ~PositionComponent()

```
virtual wEngine::PositionComponent::~PositionComponent ()  [virtual], [default]
```

7.25.3 Member Function Documentation

7.25.3.1 getPosition()

```
sf::Vector2f wEngine::PositionComponent::getPosition () const  [nodiscard]
```

Gets the current position of the component.

Returns

The current 2D position vector.

7.25.3.2 getLastPosition()

```
sf::Vector2f wEngine::PositionComponent::getLastPosition () const  [nodiscard]
```

Returns the previous position (before the last move).

Returns

The last recorded position.

7.25.3.3 setPosition()

```
void wEngine::PositionComponent::setPosition (
            sf::Vector2f newPosition)
```

Sets the 2D position to a new value.

Parameters

newPosition	The new position.

7.25.3.4 move()

```
void wEngine::PositionComponent::move (
            const sf::Vector2f & offset)
```

Moves the position by an offset.

Parameters

offset	The offset to add to the current position.

Stores the current position as the last position before applying the offset.

7.25.3.5 debugPrint()

```
void wEngine::PositionComponent::debugPrint () const
```

Outputs the position (x, y) to standard output for debugging.

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

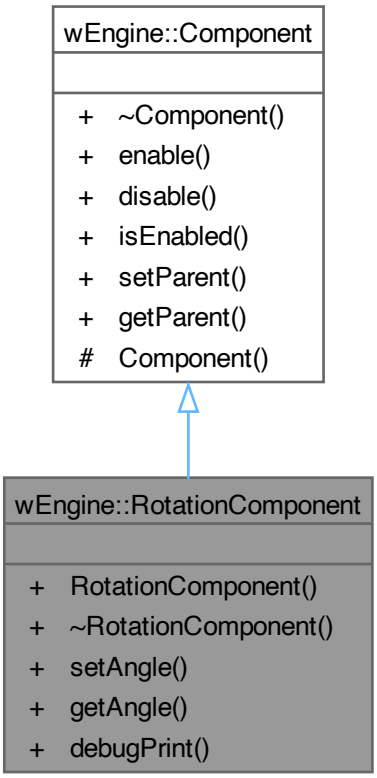
- wPositionComponent.hpp
- wPositionComponent.cpp

7.26 wEngine::RotationComponent Class Reference

ECS component that stores a rotation angle (in degrees).

```
#include <wRotationComponent.hpp>
```

Inheritance diagram for wEngine::RotationComponent:



Public Member Functions

- RotationComponent (float angle=0.0f)

  Construct a RotationComponent with an initial angle.
- virtual ~RotationComponent ()=default
- void setAngle (float angle)

  Set the rotation angle.
- float getAngle () const

  Get the current rotation angle.
- void debugPrint () const

  Outputs the current angle value to the console for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.26.1 Detailed Description

ECS component that stores a rotation angle (in degrees).

This component can be attached to any entity that needs to be rotated relative to its logical origin. The angle is expressed in degrees (positive values correspond to counter-clockwise rotation).

7.26.1.0.1 Usage Example:

```
addComponent< wEngine::RotationComponent >( 45.0f ); // Rotate 45° counter-clockwise
```

Author

Wilfried Koch

Copyright

7.26.2 Constructor & Destructor Documentation

7.26.2.1 RotationComponent()

```
wEngine::RotationComponent::RotationComponent (
            float angle = 0.0f)
```

Construct a RotationComponent with an initial angle.

Parameters

angle	Initial rotation angle in degrees (default: 0.0f).

7.26.2.2 ~RotationComponent()

```
virtual wEngine::RotationComponent::~RotationComponent ()  [virtual], [default]
```

7.26.3 Member Function Documentation

7.26.3.1 setAngle()

```
void wEngine::RotationComponent::setAngle (
            float angle)
```

Set the rotation angle.

Parameters

angle	New rotation angle in degrees.

7.26.3.2 getAngle()

```
float wEngine::RotationComponent::getAngle () const  [nodiscard]
```

Get the current rotation angle.

Returns

The stored angle in degrees.

7.26.3.3 debugPrint()

```
void wEngine::RotationComponent::debugPrint () const
```

Outputs the current angle value to the console for debugging.

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

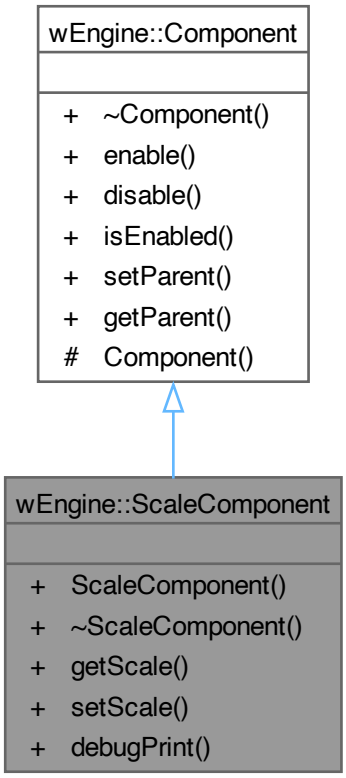
- wRotationComponent.hpp
- wRotationComponent.cpp

7.27 wEngine::ScaleComponent Class Reference

ECS component that defines the scaling factor for an entity in 2D space.

`#include <wScaleComponent.hpp>`

Inheritance diagram for wEngine::ScaleComponent:



Public Member Functions

- ScaleComponent (sf::Vector2f scale={ 1.0f, 1.0f })

  Constructs a ScaleComponent with the given scale.
- virtual ~ScaleComponent ()=default
- sf::Vector2f getScale () const

  Retrieves the current scale factor.
- void setScale (sf::Vector2f newScale)

  Sets a new scale factor.
- void debugPrint () const

  Outputs the scale to standard output for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.27.1 Detailed Description

ECS component that defines the scaling factor for an entity in 2D space.

The scale determines how much the entity is scaled along the X and Y axes. It is typically used to transform logical coordinates into pixel coordinates.

Author

Wilfried Koch

Copyright

7.27.2 Constructor & Destructor Documentation

7.27.2.1 ScaleComponent()

```
wEngine::ScaleComponent::ScaleComponent (
            sf::Vector2f scale = { 1.0f, 1.0f })
```

Constructs a ScaleComponent with the given scale.

Parameters

scale	Initial scale vector (must be strictly positive, defaults is (1.0f, 1.0f).

Exceptions

std::invalid_argument	if any scale component is non-positive.

7.27.2.2 ~ScaleComponent()

```
virtual wEngine::ScaleComponent::~ScaleComponent ()  [virtual], [default]
```

7.27.3 Member Function Documentation

7.27.3.1 getScale()

```
sf::Vector2f wEngine::ScaleComponent::getScale () const  [nodiscard]
```

Retrieves the current scale factor.

Returns

The scale as an sf::Vector2f (X and Y scale).

7.27.3.2 setScale()

```
void wEngine::ScaleComponent::setScale (
            sf::Vector2f newScale)
```

Sets a new scale factor.

Parameters

newScale	New scale vector (must be strictly positive).

Exceptions

std::invalid_argument	if newScale has non-positive values.

7.27.3.3 debugPrint()

```
void wEngine::ScaleComponent::debugPrint () const
```

Outputs the scale to standard output for debugging.

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

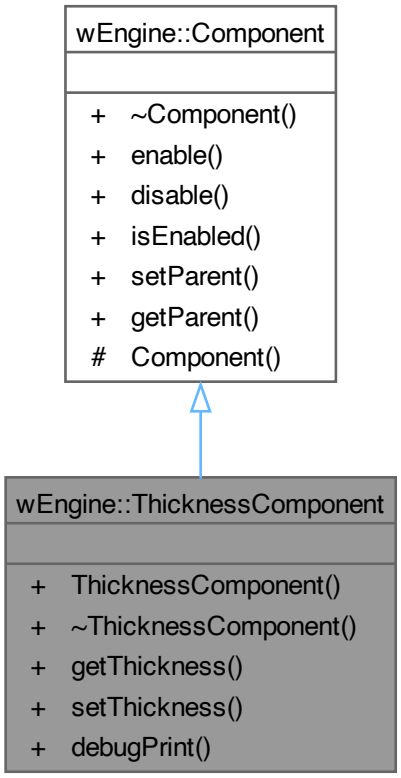
- wScaleComponent.hpp
- wScaleComponent.cpp

7.28 wEngine::ThicknessComponent Class Reference

ECS component that defines the thickness of a drawable object.

`#include <wThicknessComponent.hpp>`

Inheritance diagram for wEngine::ThicknessComponent:



Public Member Functions

- ThicknessComponent (float thickness=2.0f)

  Constructs the component with an initial positive thickness.
- virtual ~ThicknessComponent ()=default
- float getThickness () const

  Returns the current thickness.
- void setThickness (float newThickness)

  Sets a new thickness value.
- void debugPrint () const

  Outputs the current thickness value to the console for debugging.

Public Member Functions inherited from wEngine::Component

- virtual ~Component ()=default
- virtual void enable ()
- virtual void disable ()
- bool isEnabled () const

  Checks whether the component is currently active.
- void setParent (Entity *parent)

  Sets the parent entity of this component.
- Entity * getParent () const

  Returns the parent entity of this component.

Additional Inherited Members

Protected Member Functions inherited from wEngine::Component

- Component ()

  Protected constructor to restrict instantiation to derived classes.

7.28.1 Detailed Description

ECS component that defines the thickness of a drawable object.

This component stores a positive float value representing the thickness (in pixels) of lines or shapes (e.g., axes, borders). The value must be strictly positive.

Examples:

- A thickness of 1.0f draws a thin line.
- A thickness of 4.0f produces a bold axis.

Exceptions

std::invalid_argument	if the value is zero or negative.

7.28.1.0.1 Usage Examples:

- A thickness of 1.0f draws a thin line.
- A thickness of 4.0f produces a bold axis.

Author

Wilfried Koch

Copyright

7.28.2 Constructor & Destructor Documentation

7.28.2.1 ThicknessComponent()

```
wEngine::ThicknessComponent::ThicknessComponent (
            float thickness = 2.0f)
```

Constructs the component with an initial positive thickness.

Parameters

thickness	Initial thickness value (default is 2.0f).

Exceptions

std::invalid_argument	if the value is zero or negative.

7.28.2.2 ~ThicknessComponent()

```
virtual wEngine::ThicknessComponent::~ThicknessComponent ()  [virtual], [default]
```

7.28.3 Member Function Documentation

7.28.3.1 getThickness()

```
float wEngine::ThicknessComponent::getThickness () const  [nodiscard]
```

Returns the current thickness.

Returns

A positive float representing the line thickness (in pixels).

7.28.3.2 setThickness()

```
void wEngine::ThicknessComponent::setThickness (
            float newThickness)
```

Sets a new thickness value.

Parameters

newThickness	A strictly positive float.

Exceptions

std::invalid_argument	if the value is zero or negative.

7.28.3.3 debugPrint()

```
void wEngine::ThicknessComponent::debugPrint () const
```

Outputs the current thickness value to the console for debugging.

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

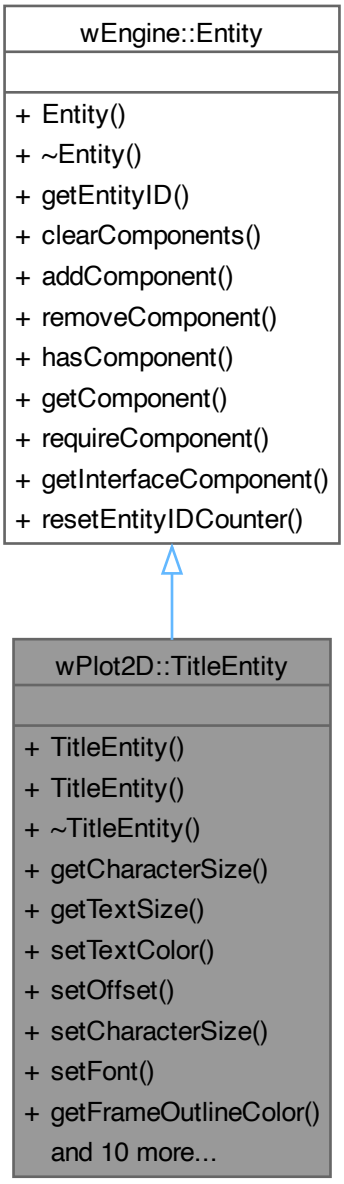
- wThicknessComponent.hpp
- wThicknessComponent.cpp

7.29 wPlot2D::TitleEntity Class Reference

Represents a textual label (typically an axis title or main plot title) in a 2D plot.

`#include <wTitleEntity.hpp>`

Inheritance diagram for wPlot2D::TitleEntity:



Public Member Functions

- TitleEntity (const sf::Font &font, const std::string &title, bool hasFrame=false)

Constructs a title entity with specified font and text (UTF-8).

- TitleEntity (const sf::Font &font, const std::wstring &title, bool hasFrame=false)

  Constructs a title entity with specified font and wide string (UTF-16/32).
- virtual ~TitleEntity ()=default

  Virtual destructor.
- unsigned int getCharacterSize () const

  Returns the current character size.
- sf::FloatRect getTextSize () const

  Returns the local bounding box of the title text.
- void setTextColor (sf::Color textColor)

  Sets the text color.
- void setOffset (sf::Vector2f offset)

  Sets the offset relative to the base anchor position.
- void setCharacterSize (unsigned int size)

  Sets the font size (character size) of the title.
- void setFont (const sf::Font &font)

  Sets the font reference for the title.
- sf::Color getFrameOutlineColor () const

  Returns the current outline color of the frame.
- sf::Color getFrameFillColor () const

  Returns the current fill color of the frame.
- float getFrameThickness () const

  Returns the frame's outline thickness.
- sf::Vector2f getPadding () const

  Returns the internal padding of the frame.
- bool isFrameEnabled () const

  Returns whether the title has a visible frame.
- void setFrameEnabled (bool enabled)

  Enables or disables the visual frame.
- void setFrameOutlineColor (const sf::Color &color)

  Sets the frame's outline color.
- void setFrameFillColor (const sf::Color &color)

  Sets the fill color of the frame.
- void setFrameThickness (float thickness)

  Sets the thickness of the frame's outline.
- void setPadding (sf::Vector2f padding)

  Sets the internal padding of the frame (horizontal and vertical).
- void render (sf::RenderWindow &window)

  Renders the title and its frame (if enabled) to the window.

Public Member Functions inherited from wEngine::Entity

- Entity ()
- virtual ~Entity ()
- unsigned int getEntityID () const

  Returns the unique ID associated with this entity.
- void clearComponents ()

  Removes all components currently attached to the entity.
- template<typename T, typename... Args>
  std::shared_ptr< T > addComponent (Args &&... args)

Adds a new component of type T to the entity.

- template<typename T>
  void removeComponent ()

  Removes the component of type T from the entity.
- template<typename T>
  bool hasComponent () const noexcept

  Checks whether the entity has a component of type T.
- template<typename T>
  std::shared_ptr< T > getComponent () const

  Retrieves the component of type T attached to the entity.
- template<typename T>
  std::shared_ptr< T > requireComponent (const std::string &context="") const

  Retrieves the component of type T and throws if it's missing.
- template<typename Interface>
  std::shared_ptr< Interface > getInterfaceComponent () const

  Returns the first component that implements the specified interface.

Additional Inherited Members

Static Public Member Functions inherited from wEngine::Entity

- static void resetEntityIDCounter ()

  Resets the global entity ID counter to zero.

7.29.1 Detailed Description

Represents a textual label (typically an axis title or main plot title) in a 2D plot.

A `TitleEntity` displays text using SFML's `sf::Text`, styled and positioned using ECS components (`PositionComponent`, `OffsetComponent`, `ColorComponent`, `FontComponent`). Optionally, it can display a surrounding rectangular frame (`FrameEntity`) with customizable outline, fill color, thickness, and padding.

7.29.1.0.1 Notes:

- The font passed to the constructor must remain valid during the lifetime of the entity (SFML does not copy font data).
- The frame is disabled by default unless explicitly enabled at construction or later.

See also

FrameEntity, AxisEntity, GraphicsEntity

Author

Wilfried Koch

Copyright

7.29.2 Constructor & Destructor Documentation

7.29.2.1 TitleEntity() [1/2]

```
wPlot2D::TitleEntity::TitleEntity (
            const sf::Font & font,
            const std::string & title,
            bool hasFrame = false)
```

Constructs a title entity with specified font and text (UTF-8).

Parameters

font	Reference to an externally managed font (must remain valid).
title	The string to display.
hasFrame	Whether a surrounding frame should be displayed.

7.29.2.2 TitleEntity() [2/2]

```
wPlot2D::TitleEntity::TitleEntity (
            const sf::Font & font,
            const std::wstring & title,
            bool hasFrame = false)
```

Constructs a title entity with specified font and wide string (UTF-16/32).

Parameters

font	Reference to an externally managed font (must remain valid).
title	The wide string to display.
hasFrame	Whether a surrounding frame should be displayed.

7.29.2.3 ~TitleEntity()

```
virtual wPlot2D::TitleEntity::~TitleEntity ()  [virtual], [default]
```

Virtual destructor.

7.29.3 Member Function Documentation

7.29.3.1 getCharacterSize()

```
unsigned int wPlot2D::TitleEntity::getCharacterSize () const  [nodiscard]
```

Returns the current character size.

Returns

Character size (font size in pixels).

7.29.3.2 getTextSize()

```
sf::FloatRect wPlot2D::TitleEntity::getTextSize () const  [nodiscard]
```

Returns the local bounding box of the title text.

Returns

A FloatRect representing the size and local origin of the text.

7.29.3.3 setTextColor()

```
void wPlot2D::TitleEntity::setTextColor (
            sf::Color textColor)
```

Sets the text color.

Parameters

textColor	New SFML color.

7.29.3.4 setOffset()

```
void wPlot2D::TitleEntity::setOffset (
            sf::Vector2f offset)
```

Sets the offset relative to the base anchor position.

Parameters

offset	Displacement vector in pixels.

7.29.3.5 setCharacterSize()

```
void wPlot2D::TitleEntity::setCharacterSize (
            unsigned int size)
```

Sets the font size (character size) of the title.

Parameters

size	Size in pixels.

7.29.3.6 setFont()

```
void wPlot2D::TitleEntity::setFont (
            const sf::Font & font)
```

Sets the font reference for the title.

Parameters

font	Reference to an externally managed font (must remain valid).

Note

The font must outlive this entity, otherwise rendering will be invalid.

7.29.3.7 getFrameOutlineColor()

```
sf::Color wPlot2D::TitleEntity::getFrameOutlineColor () const  [nodiscard]
```

Returns the current outline color of the frame.

Returns

SFML color.

7.29.3.8 getFrameFillColor()

```
sf::Color wPlot2D::TitleEntity::getFrameFillColor () const  [nodiscard]
```

Returns the current fill color of the frame.

Returns

SFML color.

7.29.3.9 getFrameThickness()

```
float wPlot2D::TitleEntity::getFrameThickness () const  [nodiscard]
```

Returns the frame's outline thickness.

Returns

Thickness in pixels.

7.29.3.10 getPadding()

```
sf::Vector2f wPlot2D::TitleEntity::getPadding () const  [nodiscard]
```

Returns the internal padding of the frame.

Returns

Padding vector `{ x, y }` in pixels.

7.29.3.11 isFrameEnabled()

```
bool wPlot2D::TitleEntity::isFrameEnabled () const  [nodiscard]
```

Returns whether the title has a visible frame.

Returns

True if frame is enabled.

7.29.3.12 setFrameEnabled()

```
void wPlot2D::TitleEntity::setFrameEnabled (
            bool enabled)
```

Enables or disables the visual frame.

Parameters

enabled	True to show the frame, false to hide it.

7.29.3.13 setFrameOutlineColor()

```
void wPlot2D::TitleEntity::setFrameOutlineColor (
            const sf::Color & color)
```

Sets the frame's outline color.

Parameters

color	SFML color.

7.29.3.14 setFrameFillColor()

```
void wPlot2D::TitleEntity::setFrameFillColor (
            const sf::Color & color)
```

Sets the fill color of the frame.

Parameters

color	SFML color.

7.29.3.15 setFrameThickness()

```
void wPlot2D::TitleEntity::setFrameThickness (
            float thickness)
```

Sets the thickness of the frame's outline.

Parameters

thickness	Outline thickness in pixels.

7.29.3.16 setPadding()

```
void wPlot2D::TitleEntity::setPadding (
            sf::Vector2f padding)
```

Sets the internal padding of the frame (horizontal and vertical).

This creates a margin between the text and the frame borders. Expressed as (horizontal, vertical) padding in pixels.

Parameters

padding	Vector of type (left/right, top/bottom) padding.

7.29.3.17 render()

```
void wPlot2D::TitleEntity::render (
            sf::RenderWindow & window)
```

Renders the title and its frame (if enabled) to the window.

The title position is computed from:

- `PositionComponent` (anchor point),
- `OffsetComponent` (displacement),
- the text's local bounds (centered origin).

If the frame is enabled, it is rendered behind the text, centered with the same anchor point and adjusted using the specified padding.

Parameters

window	The target SFML render window.

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

- wTitleEntity.hpp
- wTitleEntity.cpp

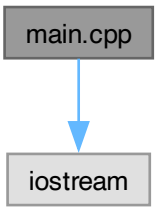
Chapter 8

File Documentation

8.1 main.cpp File Reference

```
#include <iostream>
```

Include dependency graph for main.cpp:



Functions

- int main ()

8.1.1 Function Documentation

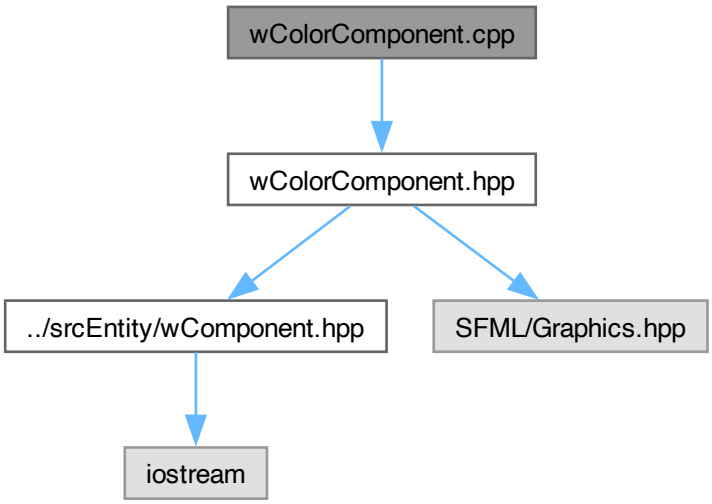
8.1.1.1 main()

```
int main ()
```

8.2 wColorComponent.cpp File Reference

Implementation of the ColorComponent class.

```
#include "wColorComponent.hpp"
```
Include dependency graph for wColorComponent.cpp:



Namespaces

- namespace wEngine

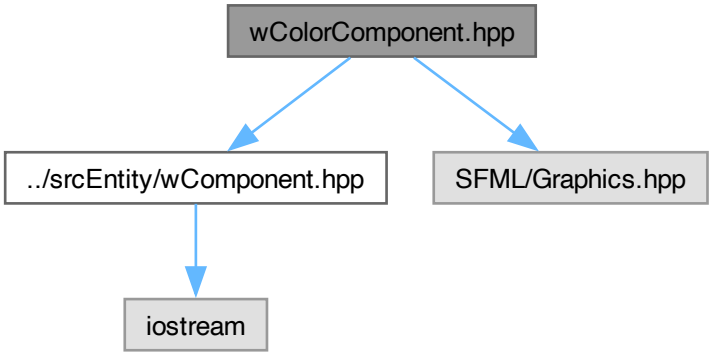
8.2.1 Detailed Description

Implementation of the ColorComponent class.

8.3 wColorComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wColorComponent.hpp:



This graph shows which files directly or indirectly include this file:

Classes

- class wEngine::ColorComponent

  ECS component that holds a color value.

Namespaces

- namespace wEngine

8.4 wColorComponent.hpp

Go to the documentation of this file.

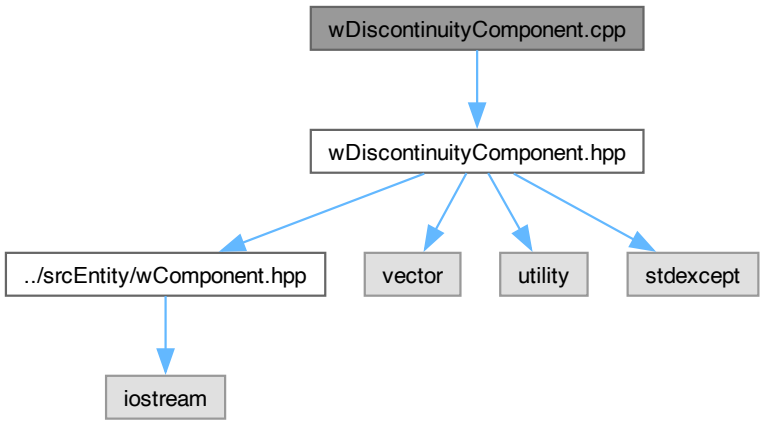
```
00001 /*
00002
      +-------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_COLOR_COMPONENT_HPP
00009 #define W_COLOR_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
```

```
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00045     class ColorComponent : public Component
00046     {
00047         public:
00052             ColorComponent( sf::Color color = sf::Color::Black );
00053
00054             /*
00055              * @brief Virtual destructor.
00056              */
00057             virtual ~ColorComponent( ) = default;
00058
00063             [[nodiscard]] sf::Color getColor( ) const;
00064
00069             void setColor( sf::Color newColor );
00070
00074             void debugPrint( ) const;
00075         private:
00076             sf::Color mColor;
00077     };
00078
00079 }//End of namespace wEngine
00080
00081 #endif
```

8.5 wDiscontinuityComponent.cpp File Reference

Implementation of the DiscontinuityComponent class.

`#include "wDiscontinuityComponent.hpp"`
Include dependency graph for wDiscontinuityComponent.cpp:



Namespaces

- namespace wEngine

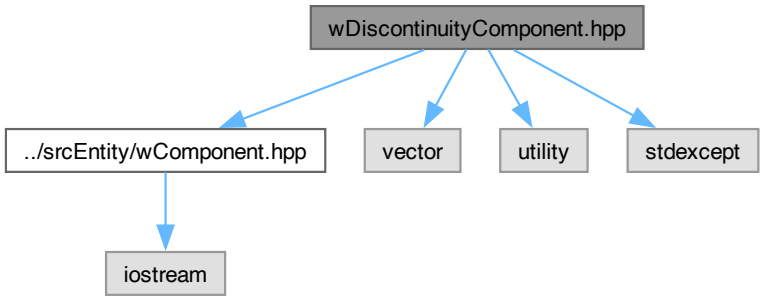
8.5.1 Detailed Description

Implementation of the DiscontinuityComponent class.

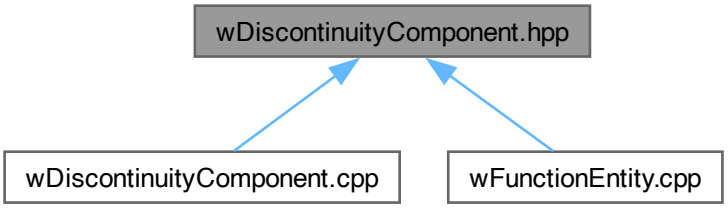
8.6 wDiscontinuityComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <vector>
#include <utility>
#include <stdexcept>
```

Include dependency graph for wDiscontinuityComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::DiscontinuityComponent

  ECS component that manages excluded intervals for function plotting.

Namespaces

- namespace wEngine

8.7 wDiscontinuityComponent.hpp

Go to the documentation of this file.

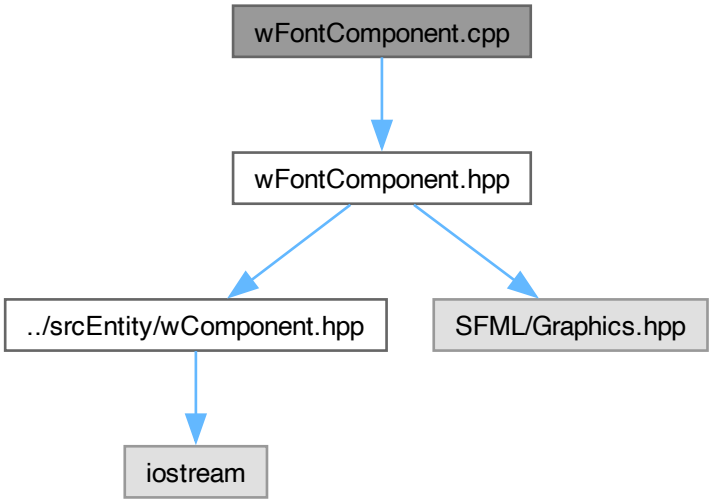
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_DISCONTINUITY_COMPONENT_HPP
00009 #define W_DISCONTINUITY_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #include <vector>
00014 #include <utility>
00015 #include <stdexcept>
00016
00017 namespace wEngine
00018 {
00019
00033     class DiscontinuityComponent : public Component
00034     {
00035         public:
00036             /*
00037              * @brief Default constructor.
00038              */
00039             DiscontinuityComponent( ) = default;
00040
00041             /*
00042              * @brief Virtual destructor.
00043              */
00044             virtual ~DiscontinuityComponent( ) = default;
00045
00050             [[nodiscard]] const std::vector< std::pair< double,double > >& getExcludedIntervals( )
      const;
00051
00058             void addExcludedInterval( double min, double max );
00059
00063             void clearExcludedIntervals( );
00064
00070             [[nodiscard]] bool isInExcludedInterval( double x ) const;
00071
00072             /*
00073              * @brief Outputs the excluded intervals to the console for debugging.
00074              */
00075             void debugPrint( ) const;
00076         private:
00077             std::vector< std::pair< double, double > > mExcludedIntervals;
00078     };
00079
00080 }//End of namespace wEngine
00081
00082 #endif
```

8.8 wFontComponent.cpp File Reference

Implementation of the FontComponent class.

```
#include "wFontComponent.hpp"
```

Include dependency graph for wFontComponent.cpp:



Namespaces

- namespace wEngine

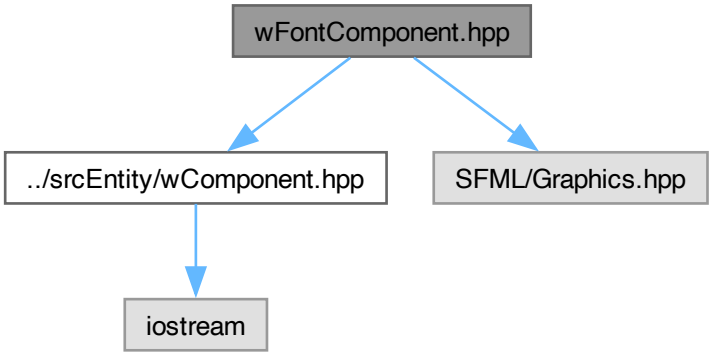
8.8.1 Detailed Description

Implementation of the FontComponent class.

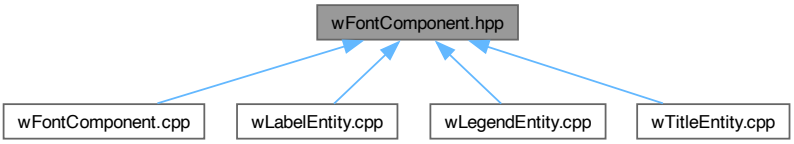
8.9 wFontComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wFontComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::FontComponent

  Holds a reference to an SFML font for rendering text.

Namespaces

- namespace wEngine

8.10 wFontComponent.hpp

Go to the documentation of this file.

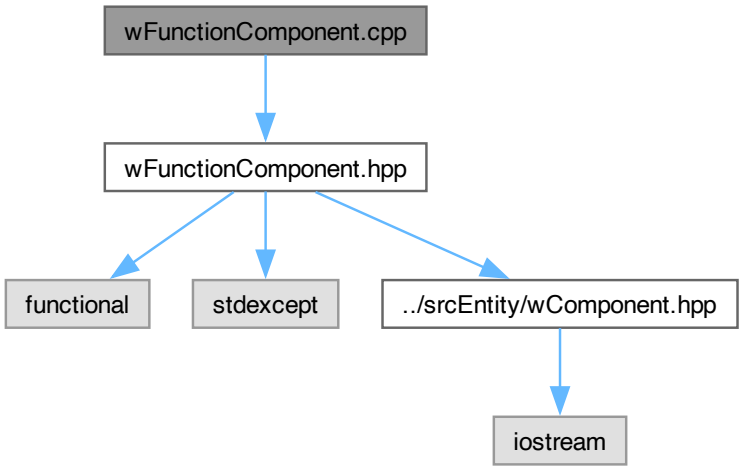
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------------------------
00006 */
```

```
00007
00008 #ifndef W_FONT_COMPONENT_HPP
00009 #define W_FONT_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00035     class FontComponent : public Component
00036     {
00037         public:
00042             explicit FontComponent( const sf::Font& font );
00043
00047             ~FontComponent( ) override = default;
00048
00053             const sf::Font& getFont( ) const;
00054
00060             void setFont( const sf::Font& font );
00061
00065             void debugPrint( ) const;
00066
00067         private:
00068             const sf::Font* mFont;
00069     };
00070
00071 }//End of namespace wEngine
00072
00073 #endif
```

8.11 wFunctionComponent.cpp File Reference

Implementation of the FunctionComponent class.

`#include "wFunctionComponent.hpp"`
Include dependency graph for wFunctionComponent.cpp:



Namespaces

- namespace wEngine

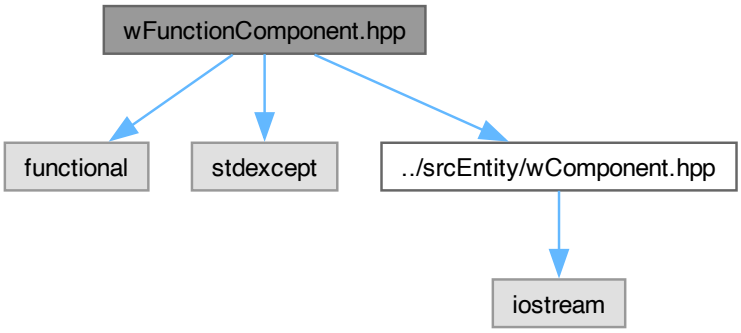
8.11.1 Detailed Description

Implementation of the FunctionComponent class.

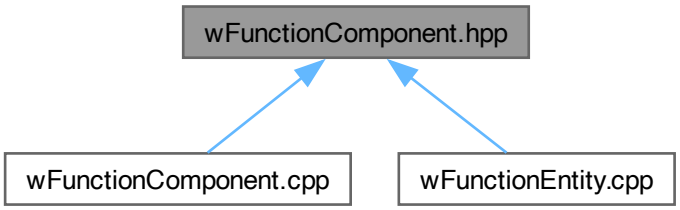
8.12 wFunctionComponent.hpp File Reference

```
#include <functional>
#include <stdexcept>
#include "../srcEntity/wComponent.hpp"
```

Include dependency graph for wFunctionComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::FunctionComponent

  ECS component that stores a mathematical function f(x).

Namespaces

- namespace wEngine

8.13 wFunctionComponent.hpp

Go to the documentation of this file.

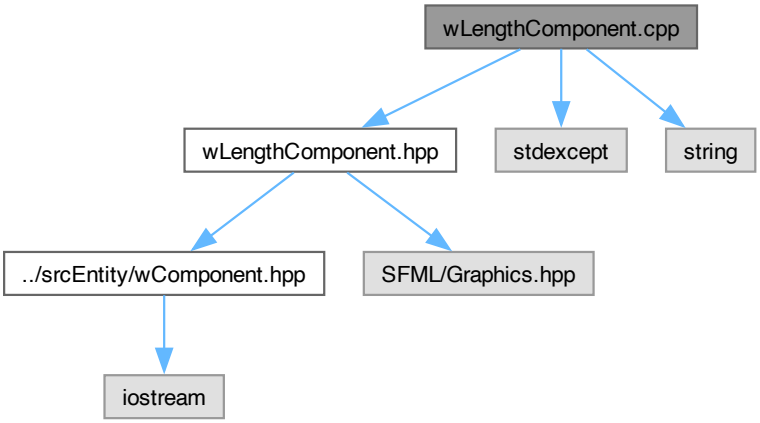
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_FUNCTION_COMPONENT_HPP
00009 #define W_FUNCTION_COMPONENT_HPP
00010
00011 #include <functional>
00012 #include <stdexcept>
00013
00014 #include "../srcEntity/wComponent.hpp"
00015
00016 namespace wEngine
00017 {
00018
00031     class FunctionComponent : public Component
00032     {
00033         public:
00039             FunctionComponent( std::function< double( double ) > function );
00040
00041             /*
00042              * @brief Virtual destructor.
00043              */
00044             virtual ~FunctionComponent( ) = default;
00045
00052             [[nodiscard]] double calculate( double x ) const;
00053
00054             /*
00055              * @brief Prints a message confirming that the function is set.
00056              */
00057             void debugPrint( ) const;
00058         private:
00059             std::function< double( double ) > mFunction;
00060     };
00061
00062 }//End of namespace wEngine
00063
00064 #endif
```

8.14 wLengthComponent.cpp File Reference

Implementation of the LengthComponent class.

```
#include "wLengthComponent.hpp"
#include <stdexcept>
#include <string>
```

Include dependency graph for wLengthComponent.cpp:



Namespaces

- namespace wEngine

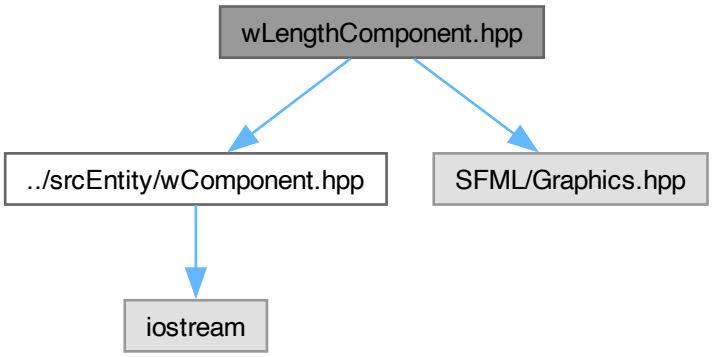
8.14.1 Detailed Description

Implementation of the LengthComponent class.

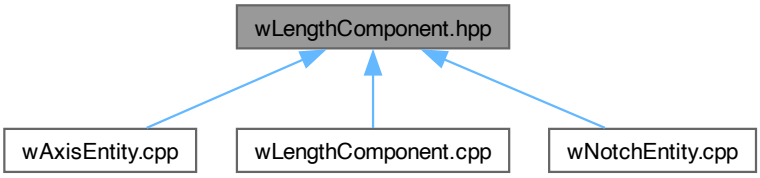
8.15 wLengthComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wLengthComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::LengthComponent

  ECS component that defines the length of a drawable object.

Namespaces

- namespace wEngine

8.16 wLengthComponent.hpp

Go to the documentation of this file.

```
00001 /*
00002
    +-----------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
    +-----------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_LENGTH_COMPONENT_HPP
00009 #define W_LENGTH_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00035     class LengthComponent : public Component
00036     {
00037         public:
00043             LengthComponent( float length = 2.0f );
00044
00045             /*
00046              * @brief Virtual destructor.
00047              */
00048             virtual ~LengthComponent( ) = default;
00049
00054             [[nodiscard]] float getLength( ) const;
00055
00061             void setLength( float newLength );
00062
00066             void debugPrint( ) const;
00067         private:
```

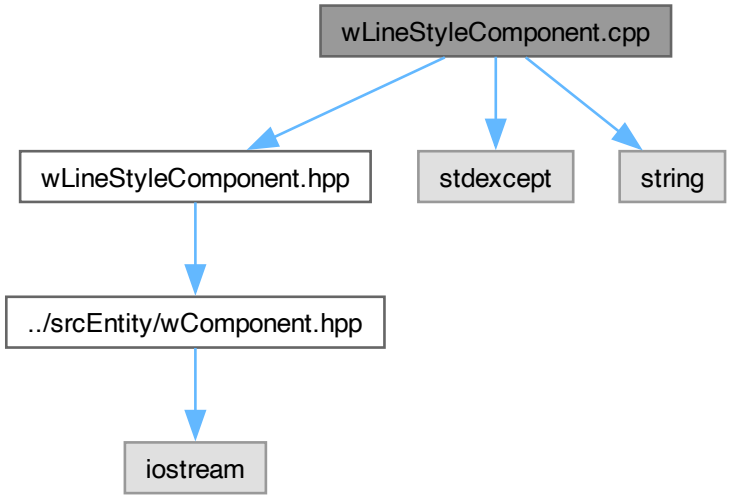
```
00068             float mLength;
00069
00075             void validatePositive( float value ) const;
00076     };
00077
00078 }//End of namespace wEngine
00079
00080 #endif
```

8.17 wLineStyleComponent.cpp File Reference

Implementation of the LineStyleComponent class.

```
#include "wLineStyleComponent.hpp"
#include <stdexcept>
#include <string>
```

Include dependency graph for wLineStyleComponent.cpp:



Namespaces

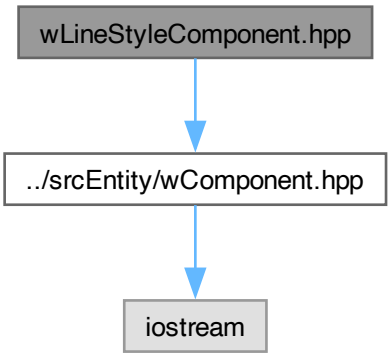
- namespace wEngine

8.17.1 Detailed Description

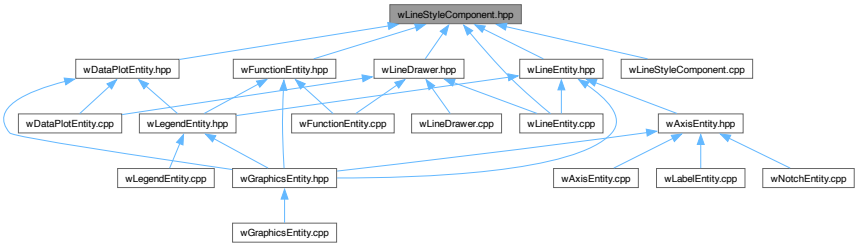
Implementation of the LineStyleComponent class.

8.18 wLineStyleComponent.hpp File Reference

`#include "../srcEntity/wComponent.hpp"`
Include dependency graph for wLineStyleComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::LineStyleComponent

  ESC component that defines the style of a line (solid, dotted, dashed).

Namespaces

- namespace wEngine

8.19 wLineStyleComponent.hpp

Go to the documentation of this file.

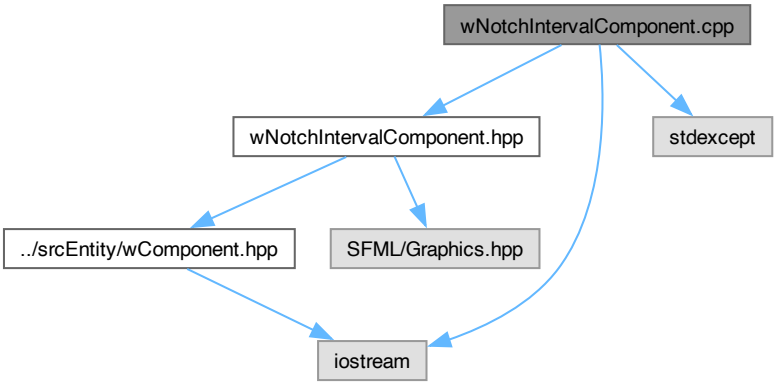
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_LINE_STYLE_COMPONENT_HPP
00009 #define W_LINE_STYLE_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 namespace wEngine
00014 {
00015
00027     class LineStyleComponent : public Component
00028     {
00029         public:
00034             enum class LineStyle
00035             {
00036                 Solid,
00037                 Dotted,
00038                 Dashed
00039             };
00040
00045             LineStyleComponent( LineStyle style = LineStyle::Solid );
00046
00047             /*
00048              * @brief Virtual destructor.
00049              */
00050             virtual ~LineStyleComponent( ) = default;
00051
00056             [[nodiscard]] LineStyle getStyle( ) const;
00057
00062             void setStyle( LineStyle style );
00063
00068             [[nodiscard]] float getDashLength( ) const;
00069
00075             void setDashLength( float dashLength );
00076
00081             [[nodiscard]] float getGapLength( ) const;
00082
00088             void setGapLength( float gapLength );
00089
00090             /*
00091              * @brief Outputs the current style and parameters to the console.
00092              */
00093             void debugPrint( ) const;
00094         private:
00095             LineStyle mStyle;
00096             float mDashLength;
00097             float mGapLength;
00098     };
00099
00100 }//End of namespace wEngine
00101
00102 #endif
```

8.20 wNotchIntervalComponent.cpp File Reference

Implementation of the wNotchIntervalComponent class.

```
#include "wNotchIntervalComponent.hpp"
#include <iostream>
#include <stdexcept>
```

Include dependency graph for wNotchIntervalComponent.cpp:



Namespaces

- namespace wEngine

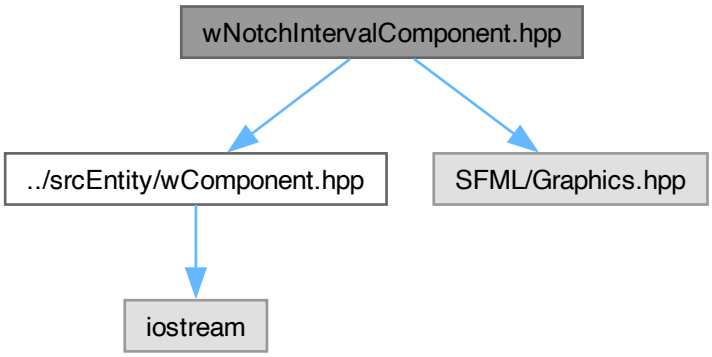
8.20.1 Detailed Description

Implementation of the wNotchIntervalComponent class.

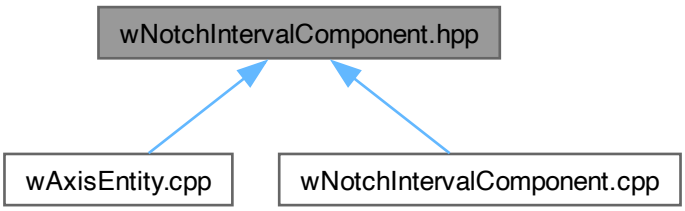
8.21 wNotchIntervalComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wNotchIntervalComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::NotchIntervalComponent

  ECS component that defines the interval between notches on an axis.

Namespaces

- namespace wEngine

8.22 wNotchIntervalComponent.hpp

Go to the documentation of this file.

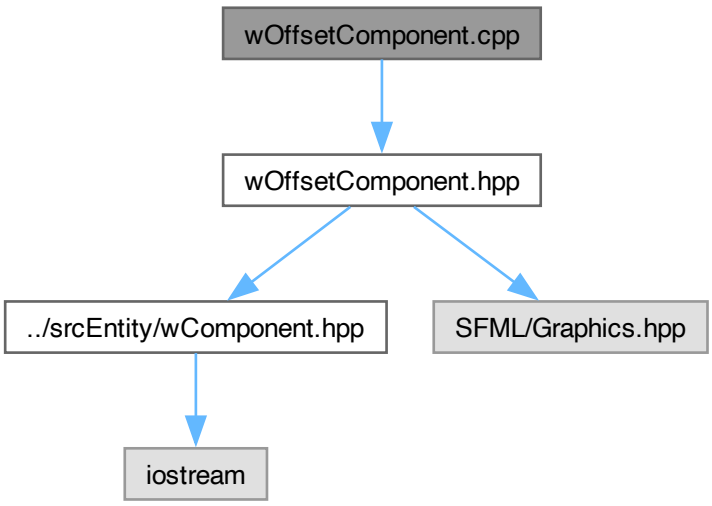
```
00001 /*
00002
      +----------------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +----------------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_NOTCH_INTERVAL_COMPONENT_HPP
00009 #define W_NOTCH_INTERVAL_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00035     class NotchIntervalComponent : public Component
00036     {
00037         public:
00043             NotchIntervalComponent( float interval = 1.0f );
00044
00045             /*
00046              * @brief Virtual destructor.
00047              */
00048             virtual ~NotchIntervalComponent( ) = default;
00049
00054             [[nodiscard]] float getInterval( ) const;
00055
00061             void setInterval( float newInterval );
```

```
00062
00066             void debugPrint( ) const;
00067
00068         private:
00069             float mInterval;
00070
00076             void validateInterval( float value ) const;
00077     };
00078
00079 }// End of namespace wEngine
00080
00081 #endif
```

8.23 wOffsetComponent.cpp File Reference

Implementation of the OffsetComponent class.

`#include "wOffsetComponent.hpp"`
Include dependency graph for wOffsetComponent.cpp:



Namespaces

- namespace wEngine

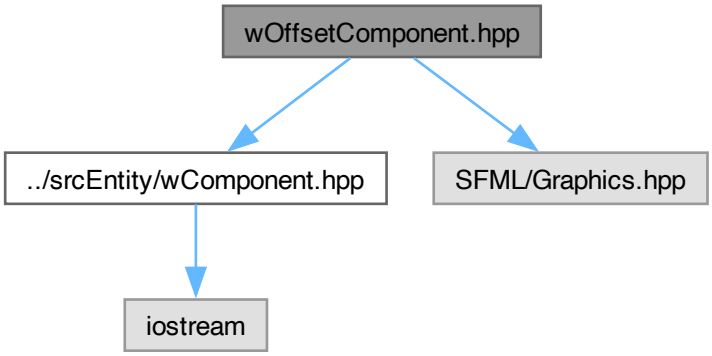
8.23.1 Detailed Description

Implementation of the OffsetComponent class.

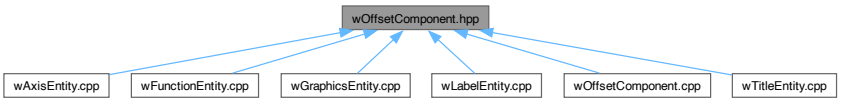
8.24 wOffsetComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wOffsetComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::OffsetComponent

  ECS component that defines a logical coordinate offset.

Namespaces

- namespace wEngine

8.25 wOffsetComponent.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
```

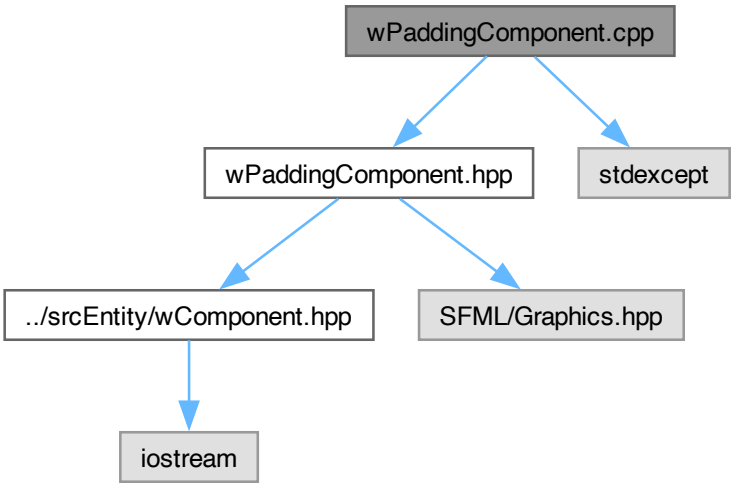
```
00005
      +----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_OFFSET_COMPONENT_HPP
00009 #define W_OFFSET_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00040     class OffsetComponent : public Component
00041     {
00042         public:
00047             OffsetComponent( sf::Vector2f offset = sf::Vector2f( 0.0f, 0.0f ) );
00048
00049             /*
00050              * @brief Virtual destructor.
00051              */
00052             virtual ~OffsetComponent( ) = default;
00053
00058             [[nodiscard]] sf::Vector2f getOffset( ) const;
00059
00064             void setOffset( sf::Vector2f offset );
00065
00070             void addOffset( sf::Vector2f delta );
00071
00075             void debugPrint( ) const;
00076         private:
00077             sf::Vector2f mOffset;
00078     };
00079
00080 }//End of namespace wEngine
00081
00082 #endif
```

8.26 wPaddingComponent.cpp File Reference

Implementation of the PaddingComponent class.

```
#include "wPaddingComponent.hpp"
#include <stdexcept>
```

Include dependency graph for wPaddingComponent.cpp:



Namespaces

- namespace wEngine

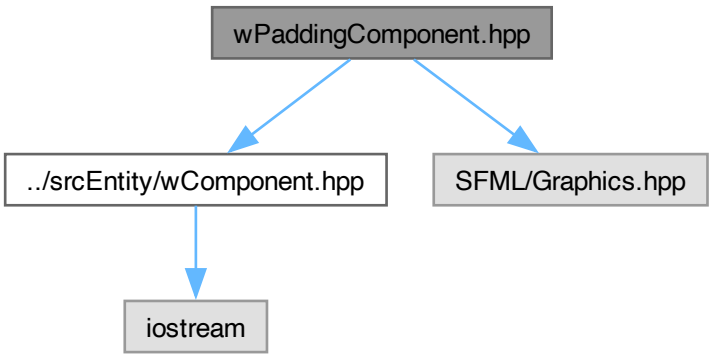
8.26.1 Detailed Description

Implementation of the PaddingComponent class.

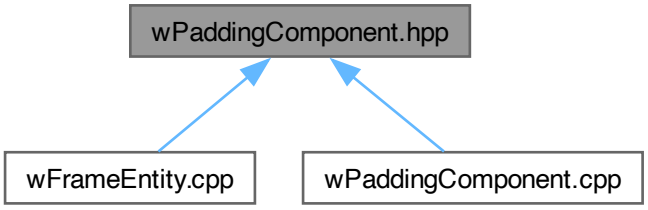
8.27 wPaddingComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wPaddingComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::PaddingComponent

  ECS component representing internal padding for UI-like elements.

Namespaces

- namespace wEngine

8.28 wPaddingComponent.hpp

Go to the documentation of this file.

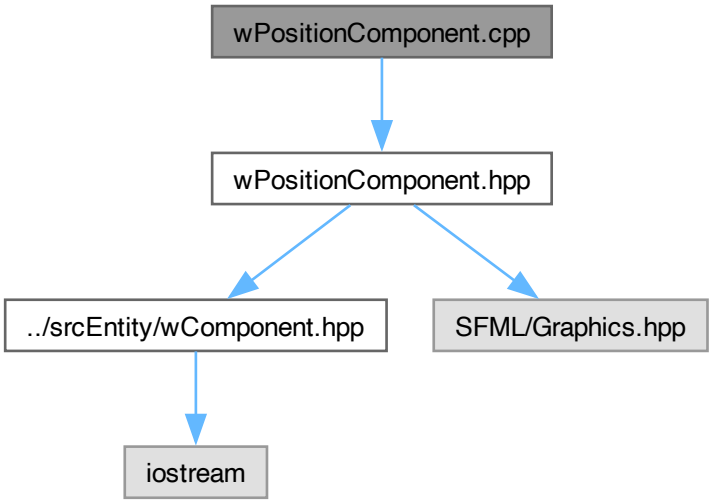
```
00001 #ifndef W_PADDING_COMPONENT_HPP
00002 #define W_PADDING_COMPONENT_HPP
```

```
00003
00004 #include "../srcEntity/wComponent.hpp"
00005
00006 #pragma GCC diagnostic push
00007 #pragma GCC diagnostic ignored "-Wfloat-equal"
00008 #pragma GCC diagnostic ignored "-Wswitch-default"
00009 #include <SFML/Graphics.hpp>
00010 #pragma GCC diagnostic pop
00011
00012 namespace wEngine
00013 {
00014
00031     class PaddingComponent : public Component
00032     {
00033         public:
00038             PaddingComponent( sf::Vector2f padding = sf::Vector2f( 0.0f, 0.0f ) );
00039
00040             /*
00041              * @brief Virtual destructor.
00042              */
00043             virtual ~PaddingComponent( ) = default;
00044
00049             void setPadding( sf::Vector2f padding );
00050
00055             [[nodiscard]] sf::Vector2f getPadding( ) const;
00056
00060             void debugPrint( ) const;
00061         private:
00062             sf::Vector2f mPadding;
00063
00069             void validatePositive( const sf::Vector2f& value ) const;
00070     };
00071
00072 }//End of namespace wEngine
00073
00074 #endif
```

8.29 wPositionComponent.cpp File Reference

Implementation of the PositionComponent class.

`#include "wPositionComponent.hpp"`
Include dependency graph for wPositionComponent.cpp:



Namespaces

- namespace wEngine

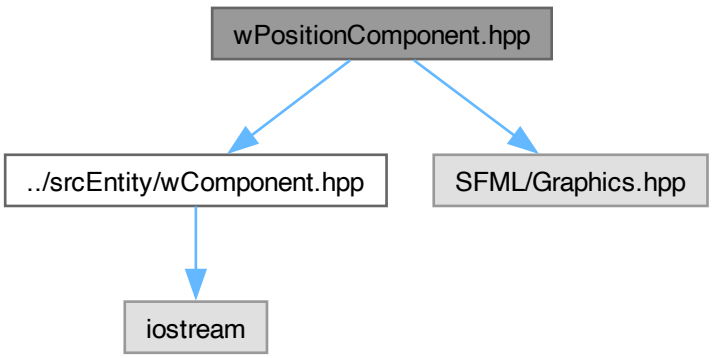
8.29.1 Detailed Description

Implementation of the PositionComponent class.

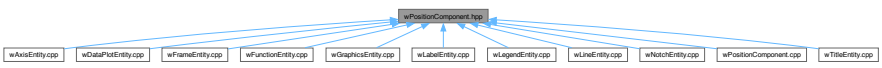
8.30 wPositionComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wPositionComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::PositionComponent

  ECS component storing the position of an entity in 2D space and supports movement tracking.

Namespaces

- namespace wEngine

8.31 wPositionComponent.hpp

Go to the documentation of this file.

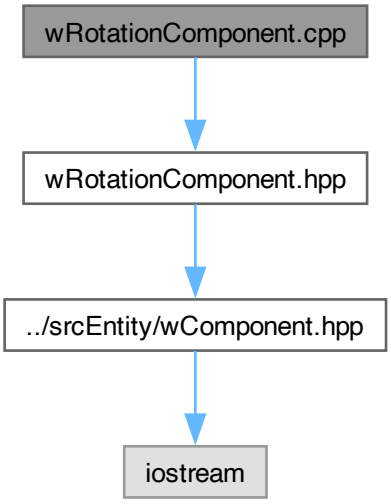
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_POSITION_COMPONENT_HPP
00009 #define W_POSITION_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00043     class PositionComponent : public Component
00044     {
00045         public:
00050             PositionComponent( sf::Vector2f position = sf::Vector2f( 0.0f, 0.0f ) );
00051
00052             /*
00053              * @brief Virtual destructor.
00054              */
00055             virtual ~PositionComponent( ) = default;
00056
00061             [[nodiscard]] sf::Vector2f getPosition( ) const;
00062
00067             [[nodiscard]] sf::Vector2f getLastPosition( ) const;
00068
00073             void setPosition( sf::Vector2f newPosition );
00074
00081             void move( const sf::Vector2f& offset );
00082
00086             void debugPrint( ) const;
00087         private:
00088             sf::Vector2f mPosition;
00089             sf::Vector2f mLastPosition;
00090     };
00091
00092 }//End of namespace wEngine
00093
00094 #endif
```

8.32 wRotationComponent.cpp File Reference

Implementation of the RotationComponent class.

```
#include "wRotationComponent.hpp"
```

Include dependency graph for wRotationComponent.cpp:



Namespaces

- namespace wEngine

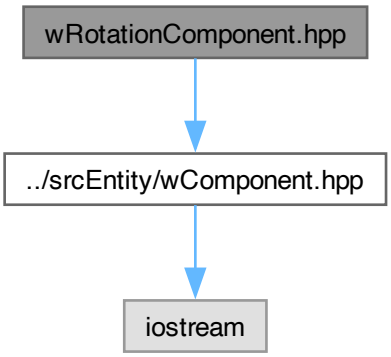
8.32.1 Detailed Description

Implementation of the RotationComponent class.

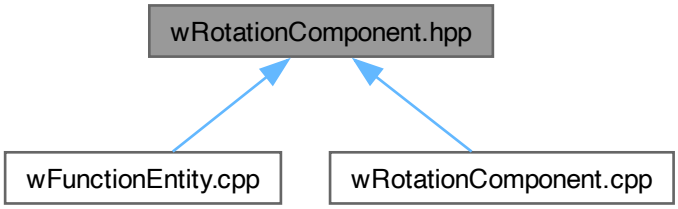
8.33 wRotationComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
```

Include dependency graph for wRotationComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::RotationComponent

  ECS component that stores a rotation angle (in degrees).

Namespaces

- namespace wEngine

8.34 wRotationComponent.hpp

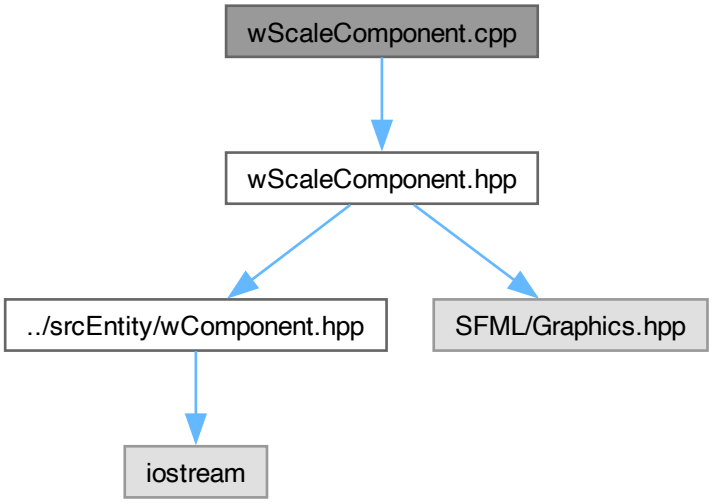
Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_ROTATION_COMPONENT_HPP
00009 #define W_ROTATION_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 namespace wEngine
00014 {
00015
00033     class RotationComponent : public Component
00034     {
00035         public:
00040             RotationComponent( float angle = 0.0f );
00041
00042             /*
00043              * @brief Virtual destructor.
00044              */
00045             virtual ~RotationComponent( ) = default;
00046
00051             void setAngle( float angle );
00052
00057             [[nodiscard]] float getAngle( ) const;
00058
00062             void debugPrint( ) const;
00063
00064         private:
00065             float mAngle;
00066     };
00067
00068 }//End of namespace wEngine
00069
00070 #endif
```

8.35 wScaleComponent.cpp File Reference

Implementation of the ScaleComponent class.

```
#include "wScaleComponent.hpp"
```
Include dependency graph for wScaleComponent.cpp:



Namespaces

- namespace wEngine

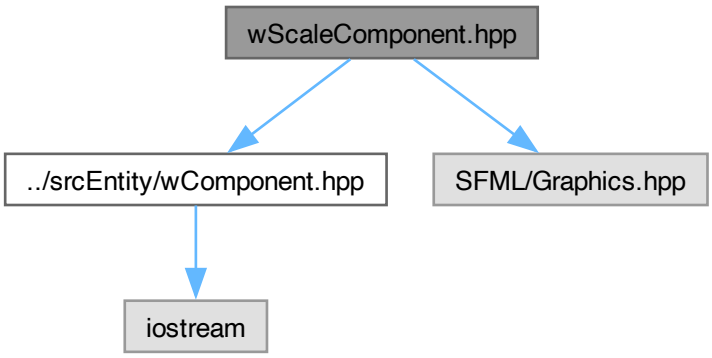
8.35.1 Detailed Description

Implementation of the ScaleComponent class.

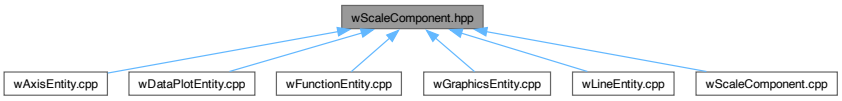
8.36 wScaleComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wScaleComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::ScaleComponent

  ECS component that defines the scaling factor for an entity in 2D space.

Namespaces

- namespace wEngine

8.37 wScaleComponent.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_SCALE_COMPONENT_HPP
00009 #define W_SCALE_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
```

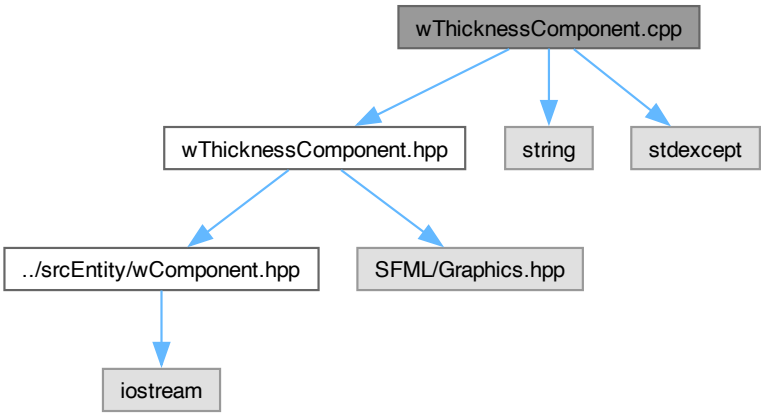
```
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00033     class ScaleComponent : public Component
00034     {
00035         public:
00041             ScaleComponent( sf::Vector2f scale = { 1.0f, 1.0f } );
00042
00043             /*
00044              * @brief Virtual destructor.
00045              */
00046             virtual ~ScaleComponent( ) = default;
00047
00052             [[nodiscard]] sf::Vector2f getScale( ) const;
00053
00059             void setScale( sf::Vector2f newScale );
00060
00064             void debugPrint( ) const;
00065         private:
00066             sf::Vector2f mScale;
00067
00073             void validatePositive( const sf::Vector2f& value ) const;
00074     };
00075
00076 }//End of namespace wEngine
00077
00078 #endif
```

8.38 wThicknessComponent.cpp File Reference

Implementation of the ThicknessComponent class.

```
#include "wThicknessComponent.hpp"
#include <string>
#include <stdexcept>
```

Include dependency graph for wThicknessComponent.cpp:



Namespaces

- namespace wEngine

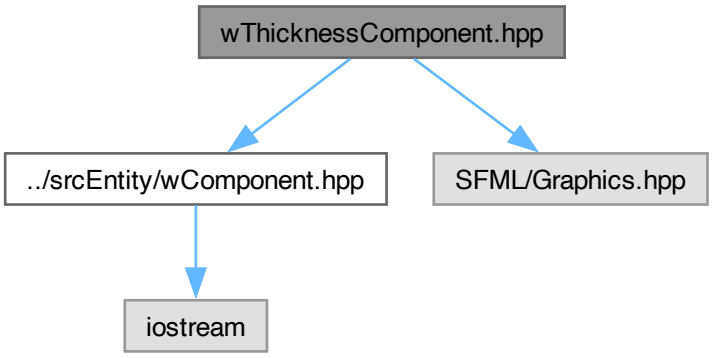
8.38.1 Detailed Description

Implementation of the ThicknessComponent class.

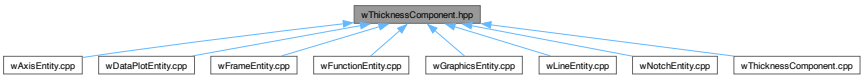
8.39 wThicknessComponent.hpp File Reference

```
#include "../srcEntity/wComponent.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wThicknessComponent.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::ThicknessComponent

  ECS component that defines the thickness of a drawable object.

Namespaces

- namespace wEngine

8.40 wThicknessComponent.hpp

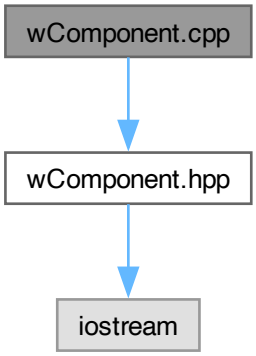
Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_THICKNESS_COMPONENT_HPP
00009 #define W_THICKNESS_COMPONENT_HPP
00010
00011 #include "../srcEntity/wComponent.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wEngine
00020 {
00021
00043     class ThicknessComponent : public Component
00044     {
00045         public:
00051             ThicknessComponent( float thickness = 2.0f );
00052
00053             /*
00054              * @brief Virtual destructor.
00055              */
00056             virtual ~ThicknessComponent( ) = default;
00057
00062             [[nodiscard]] float getThickness( ) const;
00063
00069             void setThickness( float newThickness );
00070
00074             void debugPrint( ) const;
00075         private:
00076             float mThickness;
00077
00078             /*
00079              * @brief Validates that the thickness value is strictly positive.
00080              * @param value The thickness value to validate.
00081              * @throws std::invalid_argument if value <= 0.
00082              */
00083             void validatePositive( float value ) const;
00084     };
00085
00086 }//End of namespace wEngine
00087
00088 #endif
```

8.41 wComponent.cpp File Reference

Implementation of the Component class.

`#include "wComponent.hpp"`
Include dependency graph for wComponent.cpp:



Namespaces

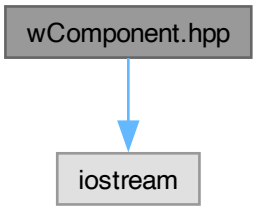
- namespace wEngine

8.41.1 Detailed Description

Implementation of the Component class.

8.42 wComponent.hpp File Reference

`#include <iostream>`
Include dependency graph for wComponent.hpp:



This graph shows which files directly or indirectly include this file:

Classes

- class wEngine::Component

  Abstract base class for all ECS components.

Namespaces

- namespace wEngine

8.43 wComponent.hpp

Go to the documentation of this file.

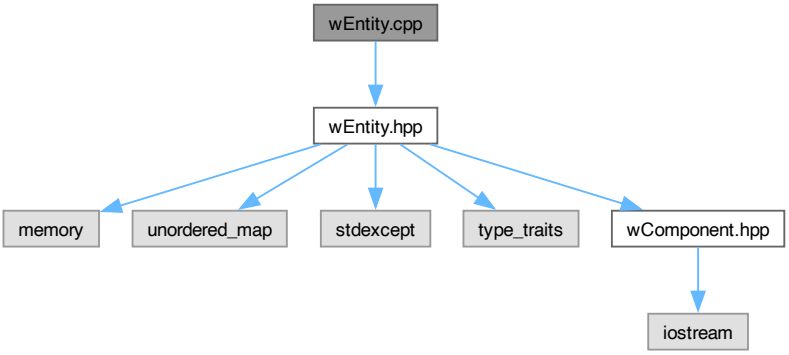
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_COMPONENT_HPP
00009 #define W_COMPONENT_HPP
00010
00011 #include <iostream>
00012
00013 namespace wEngine
00014 {
00015
00016     class Entity;
00017
00031     class Component
00032     {
00033         public:
00034             /*
00035              * @brief Virtual destructor.
00036              */
00037             virtual ~Component( ) = default;
00038
00039             /*
00040              * @brief Enables the component (makes it active).
00041              */
00042             virtual void enable( );
00043
00044             /*
00045              * @brief Disables the component (makes it inactive).
00046              */
00047             virtual void disable( );
00048
00053             [[nodiscard]] bool isEnabled( ) const;
00054
00059             void setParent( Entity* parent );
00060
00065             [[nodiscard]] Entity* getParent( ) const;
00066
00067         protected:
00068
00072             Component( );
00073
00074         private:
```

```
00075             bool mEnabled;
00076             Entity* mParent;
00077     };
00078
00079 }// End of namespace wEngine
00080
00081 #endif
```

8.44 wEntity.cpp File Reference

Implementation of the Entity class.

`#include "wEntity.hpp"`
Include dependency graph for wEntity.cpp:



Namespaces

- namespace wEngine

8.44.1 Detailed Description

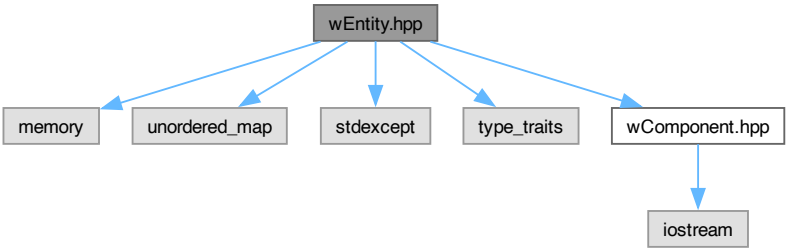
Implementation of the Entity class.

8.45 wEntity.hpp File Reference

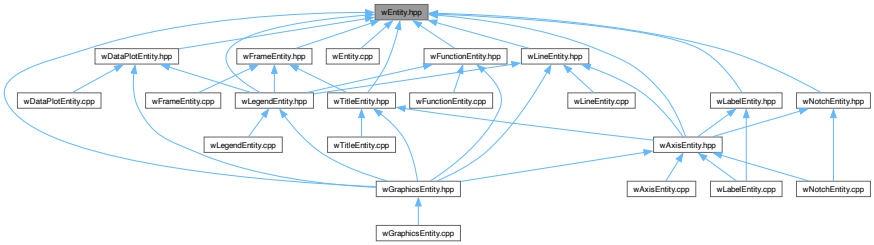
```
#include <memory>
#include <unordered_map>
#include <stdexcept>
#include <type_traits>
```

```
#include "wComponent.hpp"
```

Include dependency graph for wEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::Entity

  Represents an entity in the ECS (Entity-Component System) architecture.

Namespaces

- namespace wEngine

Functions

- std::size_t wEngine::getNextComponentTypeID ()
- template<typename ComponentType>
  std::size_t wEngine::getComponentTypeID () noexcept

8.46 wEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +----------------------------------------------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +----------------------------------------------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_ENTITY_HPP
00009 #define W_ENTITY_HPP
00010
00011 #include <memory>
00012 #include <unordered_map>
00013 #include <stdexcept>
00014 #include <type_traits>
00015
00016 #include "wComponent.hpp"
00017
00018 namespace wEngine
00019 {
00020
00021     /*
00022      * @brief Generates a new unique component type ID.
00023      * @return A unique integer for component type identification.
00024      */
00025     inline std::size_t getNextComponentTypeID( )
00026     {
00027         static std::size_t componentTypeCounter = 0;
00028         return componentTypeCounter++;
00029     }
00030
00031     /*
00032      * @brief Returns the unique type ID associated with a specific component type.
00033      * @tparam ComponentType The type of the component.
00034      * @return A unique integer identifying the component type.
00035      */
00036     template< typename ComponentType >
00037     std::size_t getComponentTypeID( ) noexcept
00038     {
00039         static std::size_t componentTypeID = getNextComponentTypeID( );
00040         return componentTypeID;
00041     }
00042
00059     class Entity
00060     {
00061         public:
00062             /*
00063              * @brief Default constructor. Generates a new entity with a unique ID.
00064              */
00065             Entity( );
00066
00067             /*
00068              * @brief Destructor. Disables all attached components before destruction.
00069              */
00070             virtual ~Entity( );
00071
00076             [[nodiscard]] unsigned int getEntityID( ) const;
00077
00081             void clearComponents( );
00082
00089             static void resetEntityIDCounter( );
00090
00103             template< typename T, typename... Args >
00104             std::shared_ptr< T > addComponent( Args&&... args )
00105             {
00106                 static_assert( std::is_base_of< Component, T >::value, "T must be derived from
      Component" );
00107
00108                 auto typeID = getComponentTypeID< T >( );
00109                 if (mComponents.contains( typeID ))
00110                 {
00111                     std::cerr « "Warning: Component " « typeid( T ).name( )
00112                               « " already exists in entity " « mEntityID « std::endl;
00113                     throw std::runtime_error( "Component already exists in entity" );
00114                 }
00115
00116                 auto component = std::make_shared< T >( std::forward< Args >( args )... );
00117                 component->setParent( this );
00118                 mComponents[ typeID ] = component;
00119
00120                 return component;
```

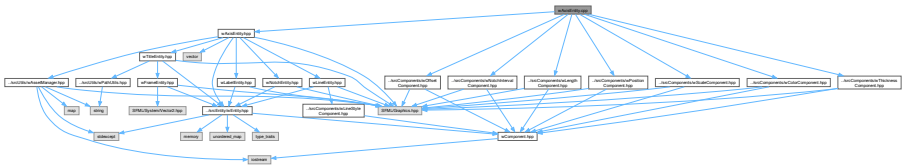
```
00121             }
00122
00130             template< typename T >
00131             void removeComponent( )
00132             {
00133                 static_assert( std::is_base_of< Component, T >::value, "T must be derived from
      Component" );
00134
00135                 auto typeID = getComponentTypeID< T >( );
00136                 mComponents.erase( typeID );
00137             }
00138
00145             template< typename T >
00146             [[nodiscard]] bool hasComponent( ) const noexcept
00147             {
00148                 static_assert( std::is_base_of< Component, T >::value, "T must be derived from
      Component" );
00149
00150                 return mComponents.contains( getComponentTypeID< T >( ) );
00151             }
00152
00159             template< typename T >
00160             [[nodiscard]] std::shared_ptr< T > getComponent( ) const
00161             {
00162                 static_assert( std::is_base_of< Component, T >::value, "T must be derived from
      Component" );
00163
00164                 auto typeID = getComponentTypeID< T >( );
00165                 auto it = mComponents.find( typeID );
00166                 if (it != mComponents.end( ))
00167                 {
00168                     return std::dynamic_pointer_cast< T >( it->second );
00169                 }
00170
00171                 return nullptr;
00172             }
00173
00186             template< typename T >
00187             [[nodiscard]] std::shared_ptr< T > requireComponent( const std::string& context = "" )
      const
00188             {
00189                 static_assert( std::is_base_of< Component, T >::value, "T must be derived from
      Component" );
00190
00191                 if (!hasComponent< T >( ))
00192                 {
00193                     std::string msg = "Missing required component: ";
00194                     msg += typeid( T ).name( );
00195                     if (!context.empty( ))
00196                     {
00197                         msg += " in context: " + context;
00198                     }
00199                     throw std::runtime_error( msg );
00200                 }
00201
00202                 return getComponent< T >( );
00203             }
00204
00214             template< typename Interface >
00215             [[nodiscard]] std::shared_ptr< Interface > getInterfaceComponent( ) const
00216             {
00217                 for (const auto& [ typeID, component ] : mComponents)
00218                 {
00219                     auto interfaceComponent = std::dynamic_pointer_cast< Interface >( component );
00220                     if (interfaceComponent)
00221                     {
00222                         return interfaceComponent;
00223                     }
00224                 }
00225                 return nullptr;
00226             }
00227
00228         private:
00229             unsigned int mEntityID;
00230             std::unordered_map< std::size_t, std::shared_ptr< Component > > mComponents;
00231
00232             static unsigned int sEntityIDCounter;
00233             static unsigned int generateNextEntityID( );
00234     };
00235
00236 }// End of namespace wEngine
00237
00238 #endif
```

8.47 wAxisEntity.cpp File Reference

Implementation of the AxisEntity class.

```
#include "wAxisEntity.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wScaleComponent.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wThicknessComponent.hpp"
#include "../srcComponents/wOffsetComponent.hpp"
#include "../srcComponents/wNotchIntervalComponent.hpp"
#include "../srcComponents/wLengthComponent.hpp"
```

Include dependency graph for wAxisEntity.cpp:



Namespaces

- namespace wPlot2D

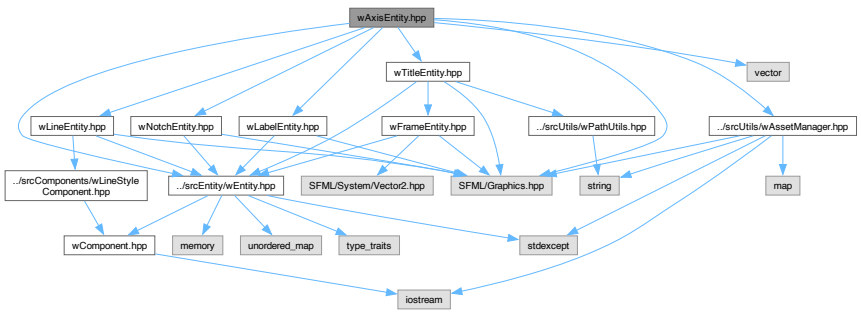
8.47.1 Detailed Description

Implementation of the AxisEntity class.

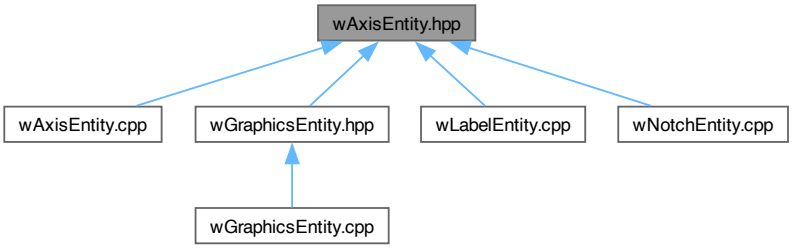
8.48 wAxisEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include "../srcUtils/wAssetManager.hpp"
#include "wLineEntity.hpp"
#include "wNotchEntity.hpp"
#include "wTitleEntity.hpp"
#include "wLabelEntity.hpp"
#include <SFML/Graphics.hpp>
#include <vector>
```

Include dependency graph for wAxisEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::AxisEntity

  Represents a visual axis (X or Y) in a 2D plot with optional notches and title.

Namespaces

- namespace wPlot2D

Enumerations

- enum class wPlot2D::AxisType { wPlot2D::X_AXIS , wPlot2D::Y_AXIS }

  Enum representing the type of axis to render.
- enum class wPlot2D::NotchPosition { wPlot2D::Center , wPlot2D::Above , wPlot2D::Below }

  Enum controlling the visual placement of notches relative to the axis.

8.49 wAxisEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +----------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +----------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_AXIS_ENTITY_HPP
00009 #define W_AXIS_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012 #include "../srcUtils/wAssetManager.hpp"
00013
00014 #include "wLineEntity.hpp"
00015 #include "wNotchEntity.hpp"
00016 #include "wTitleEntity.hpp"
00017 #include "wLabelEntity.hpp"
00018
00019 #pragma GCC diagnostic push
00020 #pragma GCC diagnostic ignored "-Wfloat-equal"
00021 #pragma GCC diagnostic ignored "-Wswitch-default"
00022 #include <SFML/Graphics.hpp>
```

```
00023 #pragma GCC diagnostic pop
00024
00025 #include <vector>
00026
00027 namespace wPlot2D
00028 {
00029
00034     enum class AxisType
00035     {
00036         X_AXIS,
00037         Y_AXIS
00038     };
00039
00044     enum class NotchPosition
00045     {
00046         Center,
00047         Above,
00048         Below
00049     };
00050
00066     class AxisEntity : public wEngine::Entity
00067     {
00068         public:
00078             AxisEntity( sf::Font& font, sf::Vector2f origin, sf::Vector2f scale, sf::Vector2f offset,
      AxisType type, sf::Vector2f axisRange );
00079
00083             virtual ~AxisEntity( ) = default;
00084
00090             void setColor( sf::Color color );
00091
00098             void setThickness( float thickness );
00099
00104             void setArrowSize( float arrowSize );
00105
00110             void addTitle( const std::string& title );
00111
00116             void addTitle( const std::wstring& title );
00117
00122             void setTitleFont( const sf::Font& font );
00123
00128             void setTitleCharacterSize( unsigned int size );
00129
00134             void setTitleColor( sf::Color newColor );
00135
00140             void setTitleOffset( sf::Vector2f titleOffset );
00141
00146             [[nodiscard]] sf::Vector2f getTitleOffset( ) const;
00147
00154             void addNotches( float interval, NotchPosition position, bool hasLabels = false );
00155
00160             void setNotchesColor( const sf::Color& color );
00161
00166             void setNotchesThickness( float thickness );
00167
00172             void setNotchesLength( float newLength );
00173
00178             void setLabelsFont( const sf::Font& font );
00179
00184             void setLabelsColor( const sf::Color& color );
00185
00190             [[nodiscard]] std::vector< sf::Vector2f > getLabelsOffset( ) const;
00191
00196             void setLabelsOffset( sf::Vector2f offset );
00197
00202             void addLabelsOffset( sf::Vector2f delta );
00203
00208             void setLabelsCharacterSize( unsigned int newSize );
00209
00214             void setLabelsDecimalPlaces( int places );
00215
00220             void setCustomLabels( const std::vector< std::string >& labels );
00221
00226             void render( sf::RenderWindow& window );
00227         private:
00228             sf::Font& mTitleFont;
00229             sf::Font& mLabelsFont;
00230             AxisType mAxisType;
00231             sf::Vector2f mAxisRange;
00232             std::unique_ptr< LineEntity > mAxisLine;
00233             float mArrowSize;
00234
00235             std::vector< std::unique_ptr< NotchEntity > > mNotches;
00236             NotchPosition mNotchPosition;
00237
00238             std::unique_ptr< TitleEntity > mTitle;
00239
00240             bool mHasLabels;
```

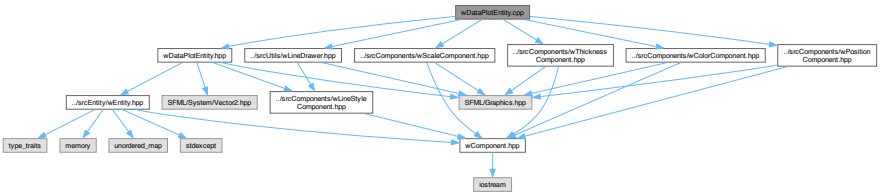
```
00241             std::vector< std::unique_ptr< LabelEntity > > mLabels;
00242
00246             void construct( );
00247
00251             template < typename T >
00252             void initTitle( const T& title );
00253
00257             void initNotches( );
00258     };
00259
00260 }//End of namespace wPlot2D
00261
00262 #endif
```

8.50 wDataPlotEntity.cpp File Reference

Implementation of the DataPlotEntity class.

```
#include "wDataPlotEntity.hpp"
#include "../srcUtils/wLineDrawer.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wScaleComponent.hpp"
#include "../srcComponents/wThicknessComponent.hpp"
```

Include dependency graph for wDataPlotEntity.cpp:



Namespaces

- namespace wPlot2D

8.50.1 Detailed Description

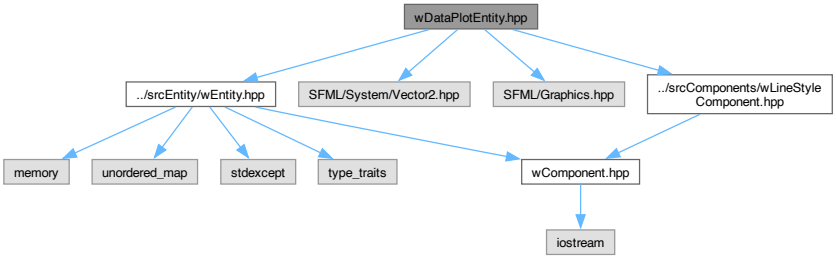
Implementation of the DataPlotEntity class.

8.51 wDataPlotEntity.hpp File Reference

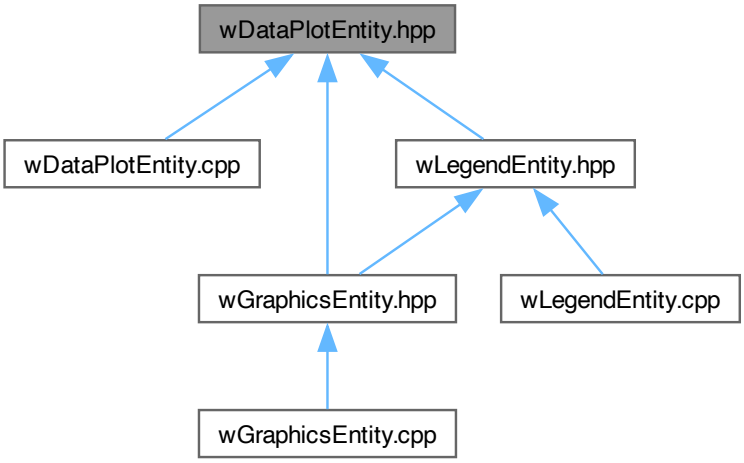
```
#include "../srcEntity/wEntity.hpp"
#include <SFML/System/Vector2.hpp>
#include <SFML/Graphics.hpp>
```

```
#include "../srcComponents/wLineStyleComponent.hpp"
```

Include dependency graph for wDataPlotEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::DataPlotEntity

  Entity for plotting raw data points as a connected polyline.

Namespaces

- namespace wPlot2D

8.52 wDataPlotEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_DATA_PLOT_ENTITY_HPP
00009 #define W_DATA_PLOT_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/System/Vector2.hpp>
00017 #include <SFML/Graphics.hpp>
00018 #pragma GCC diagnostic pop
00019
00020 #include "../srcComponents/wLineStyleComponent.hpp"
00021
00022 namespace wPlot2D
00023 {
00024
00041     class DataPlotEntity : public wEngine::Entity
00042     {
00043         public:
00051             DataPlotEntity( const sf::Vector2f origin, const sf::Vector2f scale, const std::vector<
      sf::Vector2f >& dataPoints );
00052
00056             virtual ~DataPlotEntity( ) = default;
00057
00062             [[nodiscard]] sf::Color getColor( ) const;
00063
00064
00069             [[nodiscard]] float getThickness( );
00070
00075             [[nodiscard]] wEngine::LineStyleComponent::LineStyle getLineStyle( );
00076
00077
00082             [[nodiscard]] float getDashLength( );
00083
00088             [[nodiscard]] float getGapLength( );
00089
00094             void setColor( sf::Color color );
00095
00100             void setThickness( float thickness );
00101
00106             void setLineStyle( wEngine::LineStyleComponent::LineStyle style );
00107
00112             void setDashLength( float dashLength );
00113
00118             void setGapLength( float gapLength );
00119
00128             void drawDataPlot( sf::RenderWindow &window );
00129
00130         private:
00131             std::vector< sf::Vector2f > mDataPoints;
00132     };
00133
00134 }//End of namespace wPlot2D
00135
00136 #endif
```

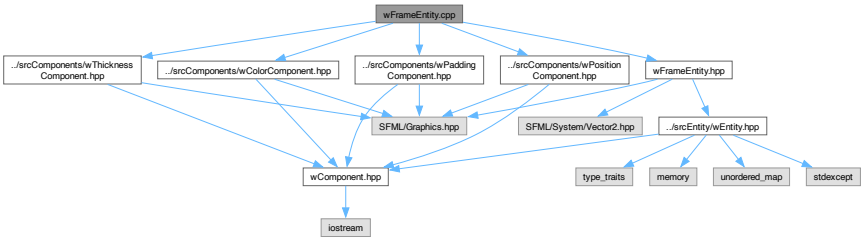
8.53 wFrameEntity.cpp File Reference

Implementation of the FrameEntity class.

```
#include "wFrameEntity.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wThicknessComponent.hpp"
```

```
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wPaddingComponent.hpp"
```

Include dependency graph for wFrameEntity.cpp:



Namespaces

- namespace wPlot2D

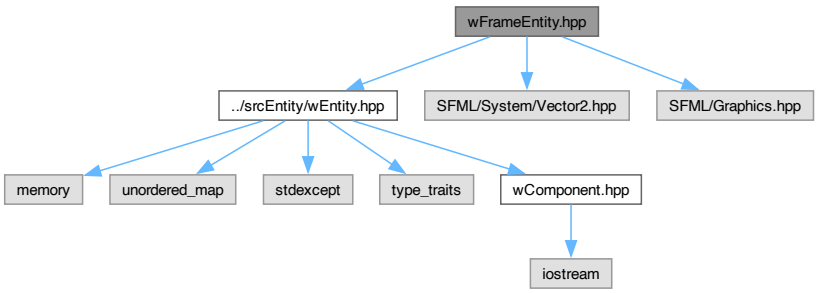
8.53.1 Detailed Description

Implementation of the FrameEntity class.

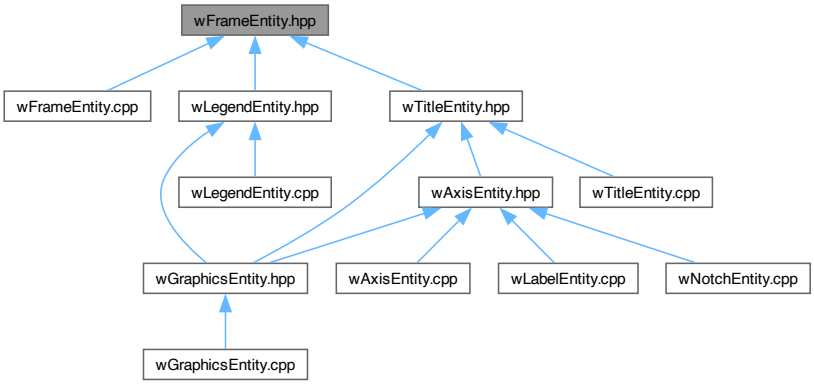
8.54 wFrameEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include <SFML/System/Vector2.hpp>
#include <SFML/Graphics.hpp>
```

Include dependency graph for wFrameEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::FrameEntity

  Entity representing a rectangular frame around content.

Namespaces

- namespace wPlot2D

8.55 wFrameEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +----------------------------------------------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +----------------------------------------------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_FRAME_ENTITY_HPP
00009 #define W_FRAME_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/System/Vector2.hpp>
00017 #include <SFML/Graphics.hpp>
00018 #pragma GCC diagnostic pop
00019
00020 namespace wPlot2D
00021 {
00022
00023
00042     class FrameEntity : public wEngine::Entity
00043     {
00044         public:
00049             FrameEntity( bool enabled = true );
00050
00054             virtual ~FrameEntity( ) = default;
00055
```

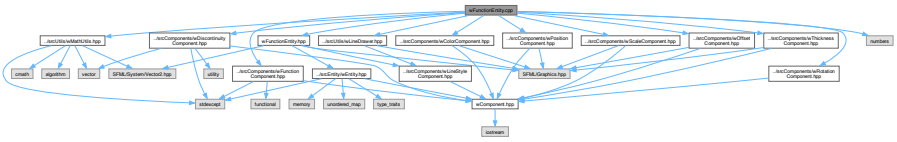
```
00060             void setEnabled( bool enabled );
00061
00066             [[nodiscard]] bool isEnabled( ) const;
00067
00072             [[nodiscard]] sf::Color getFillColor( ) const;
00073
00078             [[nodiscard]] sf::Color getOutlineColor( ) const;
00079
00084             [[nodiscard]] float getThickness( ) const;
00085
00090             [[nodiscard]] sf::Vector2f getPadding( ) const;
00091
00096             void setFillColor( const sf::Color& color );
00097
00102             void setOutlineColor( const sf::Color& color );
00103
00108             void setThickness( float thickness );
00109
00114             void setPadding( const sf::Vector2f& padding );
00115
00121             void update( const sf::FloatRect& contentBounds, const sf::Vector2f& position );
00122
00127             void render( sf::RenderWindow& window );
00128         private:
00129             bool mEnabled;
00130             sf::RectangleShape mFrame;
00131     };
00132
00133 }//End of namespace wPlot2D
00134
00135 #endif
```

8.56 wFunctionEntity.cpp File Reference

Implementation of the FunctionEntity class.

```
#include "wFunctionEntity.hpp"
#include "../srcUtils/wLineDrawer.hpp"
#include "../srcUtils/wMathUtils.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wScaleComponent.hpp"
#include "../srcComponents/wOffsetComponent.hpp"
#include "../srcComponents/wThicknessComponent.hpp"
#include "../srcComponents/wFunctionComponent.hpp"
#include "../srcComponents/wDiscontinuityComponent.hpp"
#include "../srcComponents/wRotationComponent.hpp"
#include <numbers>
```

Include dependency graph for wFunctionEntity.cpp:



Namespaces

- namespace wPlot2D

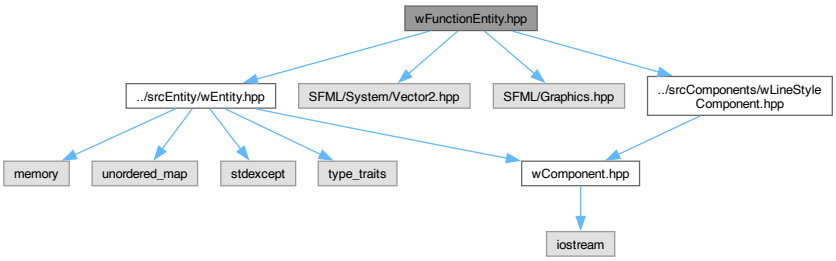
8.56.1 Detailed Description

Implementation of the FunctionEntity class.

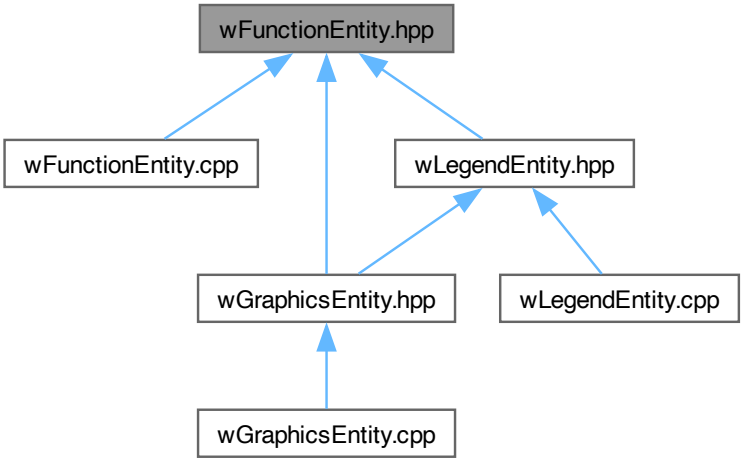
8.57 wFunctionEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include <SFML/System/Vector2.hpp>
#include <SFML/Graphics.hpp>
#include "../srcComponents/wLineStyleComponent.hpp"
```

Include dependency graph for wFunctionEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::FunctionEntity

  Represents a mathematical function as a drawable entity in a 2D plot.

Namespaces

- namespace wPlot2D

8.58 wFunctionEntity.hpp

Go to the documentation of this file.

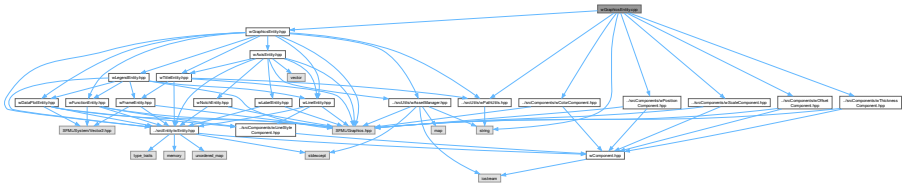
```
00001 /*
00002
      +----------------------------------------------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +----------------------------------------------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_FUNCTION_ENTITY_HPP
00009 #define W_FUNCTION_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/System/Vector2.hpp>
00017 #include <SFML/Graphics.hpp>
00018 #pragma GCC diagnostic pop
00019
00020 #include "../srcComponents/wLineStyleComponent.hpp"
00021
00022 namespace wPlot2D
00023 {
00024
00042     class FunctionEntity : public wEngine::Entity
00043     {
00044         public:
00051             FunctionEntity( const sf::Vector2f origin, const sf::Vector2f scale, std::function<
      double( double ) > func );
00052
00056             virtual ~FunctionEntity( ) = default;
00057
00062             [[nodiscard]] sf::Vector2f getPosition( ) const;
00063
00068             [[nodiscard]] sf::Color getColor( ) const;
00069
00074             [[nodiscard]] float getThickness( ) const;
00075
00080             [[nodiscard]] wEngine::LineStyleComponent::LineStyle getLineStyle( ) const;
00081
00087             [[nodiscard]] float getDashLength( ) const;
00088
00094             [[nodiscard]] float getGapLength( ) const;
00095
00100             [[nodiscard]] sf::Vector2f getOffset( ) const;
00101
00106             [[nodiscard]] float getRotation( ) const;
00107
00112             void setPosition( sf::Vector2f position );
00113
00118             void setColor( sf::Color color );
00119
00124             void setThickness( float thickness );
00125
00130             void setLineStyle( wEngine::LineStyleComponent::LineStyle style );
00131
00138             void setDashLength( float dashLength );
00139
00146             void setGapLength( float gapLength );
00147
00158             void setOffset( float offsetX, float offsetY );
00159
00169             void setRotation( float angleDegrees );
00170
00179             void setScale( sf::Vector2f scale );
00180
00189             void addExcludedInterval( double min, double max );
00190
00194             void clearExcludedIntervals( );
00195
00208             void alignToYAxis( float normalizedOffsetX = 0.0f, float normalizedOffsetY = 0.0f );
00209
00217             void drawFunction( sf::RenderWindow &window, double startX, double endX, size_t nbPoints =
      1000 );
00218         private:
00219     };
00220
00221 }//End of namespace wPlot2D
00222
00223 #endif
```

8.59 wGraphicsEntity.cpp File Reference

Implementation of the GraphicsEntity class.

```
#include "wGraphicsEntity.hpp"
#include <string>
#include "../srcUtils/wPathUtils.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wScaleComponent.hpp"
#include "../srcComponents/wOffsetComponent.hpp"
#include "../srcComponents/wThicknessComponent.hpp"
```

Include dependency graph for wGraphicsEntity.cpp:



Namespaces

- namespace wPlot2D

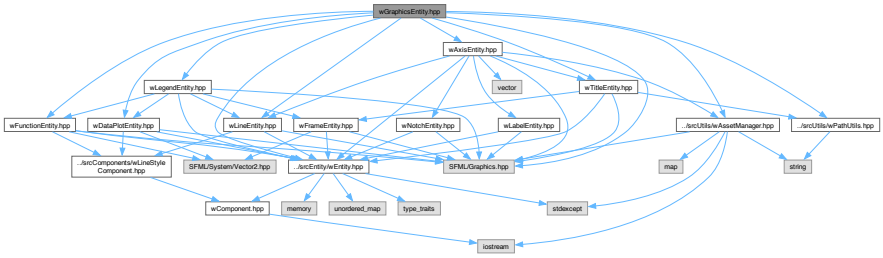
8.59.1 Detailed Description

Implementation of the GraphicsEntity class.

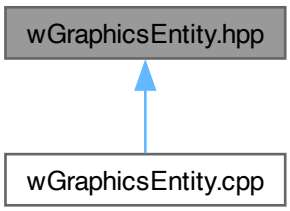
8.60 wGraphicsEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include "../srcUtils/wAssetManager.hpp"
#include "../srcUtils/wPathUtils.hpp"
#include "wAxisEntity.hpp"
#include "wTitleEntity.hpp"
#include "wFunctionEntity.hpp"
#include "wDataPlotEntity.hpp"
#include "wLegendEntity.hpp"
#include "wLineEntity.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wGraphicsEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::GraphicsEntity

  Central entity responsible for graphical rendering in wPlot2D.

Namespaces

- namespace wPlot2D

Enumerations

- enum class wPlot2D::TitleAlignment { wPlot2D::Top , wPlot2D::Bottom }

  Defines the vertical placement of the main plot title.

8.61 wGraphicsEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_GRAPHICS_ENTITY_HPP
00009 #define W_GRAPHICS_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012
00013 #include "../srcUtils/wAssetManager.hpp"
00014 #include "../srcUtils/wPathUtils.hpp"
00015
00016 #include "wAxisEntity.hpp"
00017 #include "wTitleEntity.hpp"
00018 #include "wFunctionEntity.hpp"
00019 #include "wDataPlotEntity.hpp"
00020 #include "wLegendEntity.hpp"
00021 #include "wLineEntity.hpp"
00022
00023 #pragma GCC diagnostic push
00024 #pragma GCC diagnostic ignored "-Wfloat-equal"
```

```
00025 #pragma GCC diagnostic ignored "-Wswitch-default"
00026 #include <SFML/Graphics.hpp>
00027 #pragma GCC diagnostic pop
00028
00029 namespace wPlot2D
00030 {
00031
00036     enum class TitleAlignment
00037     {
00038         Top,
00039         Bottom
00040     };
00041
00064     class GraphicsEntity : public wEngine::Entity
00065     {
00066         public:
00077             GraphicsEntity(
00078                 const std::string& windowTitle  = "wPlot2D",
00079                 const sf::Vector2u& windowSize = { 1600, 1600 },
00080                 const sf::Vector2f& originFactor = { 0.5f, 0.5f },
00081                 const sf::Vector2f& scaleFactor  = { 0.1f, 0.1f } );
00082
00086             virtual ~GraphicsEntity( ) = default;
00087
00092             [[nodiscard]] sf::RenderWindow& getWindow( );
00093
00098             [[nodiscard]] sf::Vector2u getWindowSize( ) const;
00099
00104             void setWindowSize( const sf::Vector2u& newSize );
00105
00110             void setWindowTitle( const std::string& title );
00111
00116             void setBackgroundColor( const sf::Color& color );
00117
00123             void addFont( const std::string& name, const std::string& fileName );
00124
00131             sf::Font& getFont( const std::string name );
00132
00138             [[nodiscard]] sf::Vector2f getOrigin( ) const;
00139
00145             void setOrigin( sf::Vector2f originFactor );
00146
00152             [[nodiscard]] sf::Vector2f getScale( ) const;
00153
00158             void setScale( sf::Vector2f scaleFactor );
00159
00165             [[nodiscard]] sf::Vector2f getOffset( ) const;
00166
00171             void setOffset( sf::Vector2f offset );
00172
00179             [[nodiscard]] AxisEntity* addAxis( AxisType type, sf::Vector2f axisRange );
00180
00187             [[nodiscard]] TitleEntity* addTitle( const std::string& title, TitleAlignment alignment =
      TitleAlignment::Bottom );
00188
00195             [[nodiscard]] TitleEntity* addTitle( const std::wstring& title, TitleAlignment alignment =
      TitleAlignment::Bottom );
00196
00205             [[nodiscard]] FunctionEntity* addFunction( std::function< double( double )> func,
00206                 double startX, double endX, size_t nbPoints = 1000 );
00207
00213             [[nodiscard]] DataPlotEntity* addDataPlot( const std::vector< sf::Vector2f >& dataPoints
      );
00214
00221             [[nodiscard]] LegendEntity* addLegend( const sf::Vector2f& position, bool hasFrame = true
      );
00222
00229             [[nodiscard]] TitleEntity* addText( const std::string& text, sf::Vector2f position );
00230
00237             [[nodiscard]] TitleEntity* addText( const std::wstring& text, sf::Vector2f position );
00238
00246             [[nodiscard]] LineEntity* addLine( const sf::Vector2f& start, const sf::Vector2f& end,
      bool withArrow = false );
00247
00253             void saveToFile( const std::string& filename );
00254         private:
00255             sf::RenderWindow mWindow;
00256             wEngine::AssetManager mAssets;
00257             std::unique_ptr< AxisEntity > mAxisX;
00258             std::unique_ptr< AxisEntity > mAxisY;
00259             std::unique_ptr< TitleEntity > mTitle;
00260             TitleAlignment mAlignment;
00261
00262             template < typename T >
00263             TitleEntity* addTitleImpl( const T& title, TitleAlignment alignment );
00264
00265             template < typename T >
```

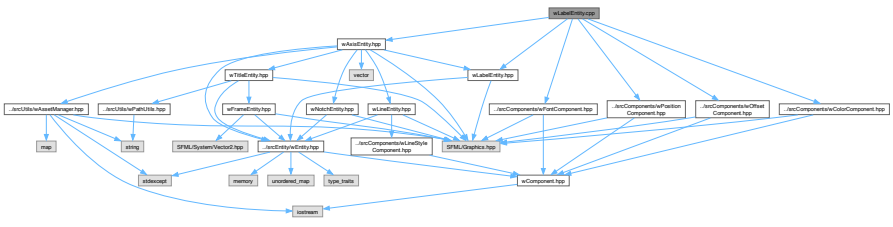
```
00266             TitleEntity* initText( const T& title, sf::Vector2f position );
00267
00268             struct FunctionData
00269             {
00270                 std::unique_ptr< FunctionEntity > entity;
00271                 double startX;
00272                 double endX;
00273                 size_t nbPoints;
00274             };
00275             std::vector< FunctionData > mFunctions;
00276
00277             struct DataPlotData
00278             {
00279                 std::unique_ptr< DataPlotEntity > entity;
00280             };
00281             std::vector< DataPlotData > mDataPlots;
00282
00283             std::unique_ptr< LegendEntity > mLegend;
00284
00285             struct TextData
00286             {
00287                 std::unique_ptr< TitleEntity > entity;
00288             };
00289             std::vector< TextData > mTexts;
00290
00291             struct LineData
00292             {
00293                 std::unique_ptr< LineEntity > entity;
00294             };
00295             std::vector< LineData > mLines;
00296
00313             void render( );
00314
00325             void validateNormalizedFactor( const sf::Vector2f& factor ) const;
00326
00338             [[nodiscard]] sf::Vector2f convertNormalizedToPixels( const sf::Vector2f& factor ) const;
00339     };
00340
00341 }//End of namespace wPlot2D
00342
00343 #endif
```

8.62 wLabelEntity.cpp File Reference

Implementation of the LabelEntity class.

```
#include "wLabelEntity.hpp"
#include "wAxisEntity.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wOffsetComponent.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wFontComponent.hpp"
```

Include dependency graph for wLabelEntity.cpp:



Namespaces

- namespace wPlot2D

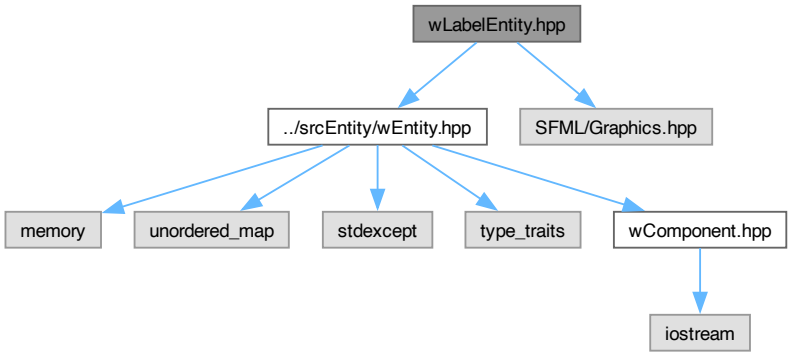
8.62.1 Detailed Description

Implementation of the LabelEntity class.

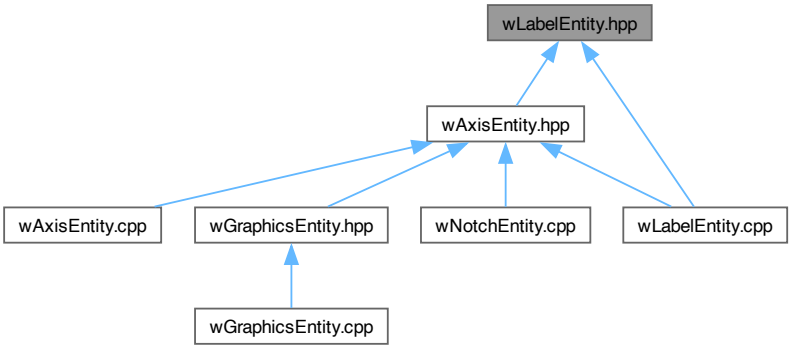
8.63 wLabelEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wLabelEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::LabelEntity

  Represents a textual label or a collection of axis labels.

Namespaces

- namespace wPlot2D

8.64 wLabelEntity.hpp

Go to the documentation of this file.

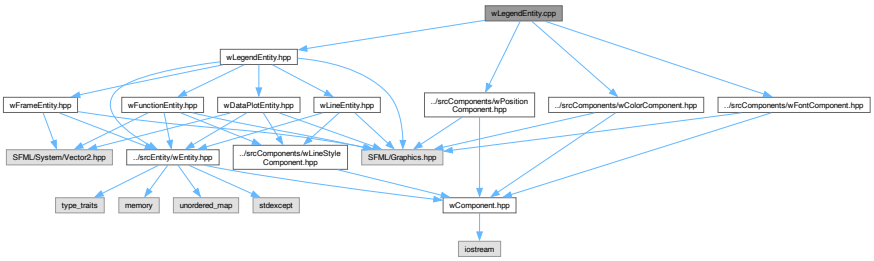
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_LABEL_ENTITY_HPP
00009 #define W_LABEL_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wPlot2D
00020 {
00021
00022     enum class AxisType;
00023
00043     class LabelEntity : public wEngine::Entity
00044     {
00045         public:
00052             LabelEntity( const sf::Font& font, AxisType type, sf::Vector2f initialPosition );
00053
00057             virtual ~LabelEntity( ) = default;
00058
00063             [[nodiscard]] float getValue( ) const;
00064
00069             [[nodiscard]] unsigned int getCharacterSize( ) const;
00070
00075             [[nodiscard]] int getDecimalPlaces( ) const;
00076
00081             void setFont( const sf::Font& font );
00082
00091             void setLabelText( std::string text );
00092
00097             void setCharacterSize( unsigned int newSize );
00098
00103             void setDecimalPlaces( int places );
00104
00113             void setCustomLabels( const std::string& labels );
00114
00119             [[nodiscard]] bool usesCustomLabels( ) const;
00120
00130             std::string formatLabel( float value );
00131
00136             void render( sf::RenderWindow& window );
00137         private:
00138             AxisType mAlignment;
00139             unsigned int mCharacterSize;
00140             float mValue;
00141             int mDecimalPlaces;
00142             sf::Vector2f mOffset;
00143
00144             std::string mCustomLabels;
00145             bool mUseCustomLabels;
00146
00147             sf::Text mLabel;
00148     };
00149
00150 } // namespace wPlot2D
00151
00152 #endif
```

8.65 wLegendEntity.cpp File Reference

Implementation of the LegendEntity class.

```
#include "wLegendEntity.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wFontComponent.hpp"
```

Include dependency graph for wLegendEntity.cpp:



Namespaces

- namespace wPlot2D

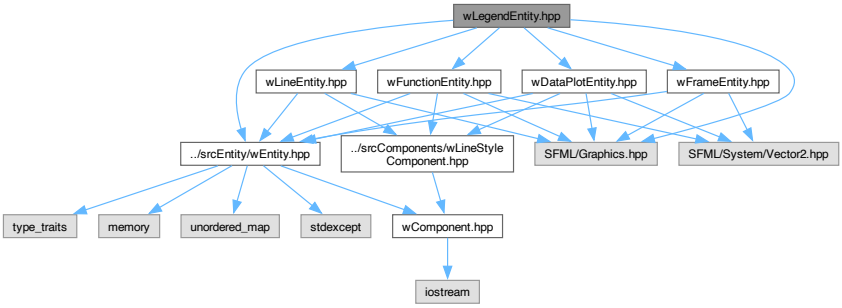
8.65.1 Detailed Description

Implementation of the LegendEntity class.

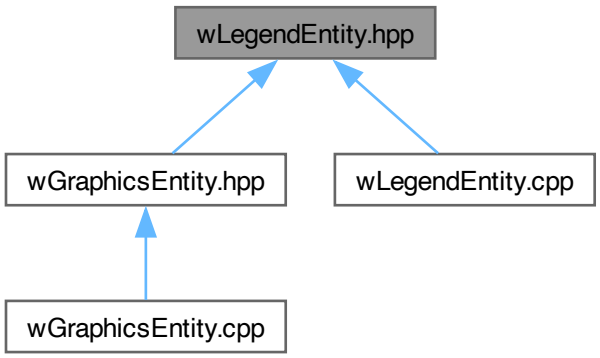
8.66 wLegendEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include "wLineEntity.hpp"
#include "wFrameEntity.hpp"
#include "wFunctionEntity.hpp"
#include "wDataPlotEntity.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wLegendEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::LegendEntity

  Represents a legend box that describes functions and data plots.

Namespaces

- namespace wPlot2D

8.67 wLegendEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
    +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
    +-----------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_LEGEND_ENTITY_HPP
00009 #define W_LEGEND_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012 #include "wLineEntity.hpp"
00013 #include "wFrameEntity.hpp"
00014
00015 #include "wFunctionEntity.hpp"
00016 #include "wDataPlotEntity.hpp"
00017
00018 #pragma GCC diagnostic push
00019 #pragma GCC diagnostic ignored "-Wfloat-equal"
00020 #pragma GCC diagnostic ignored "-Wswitch-default"
00021 #include <SFML/Graphics.hpp>
00022 #pragma GCC diagnostic pop
00023
00024 namespace wPlot2D
00025 {
00026
00027
```

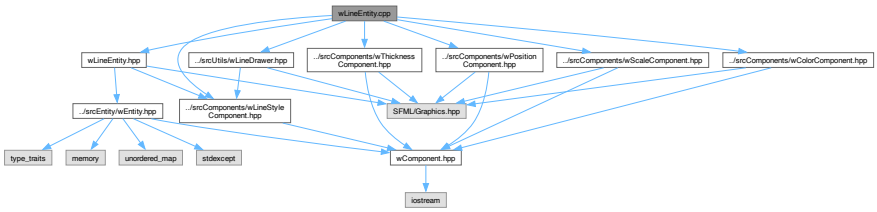
```
00055     class LegendEntity : public wEngine::Entity
00056     {
00057         public:
00067             LegendEntity( const sf::Font& font, const sf::Vector2f& position, bool hasFrame = true );
00068
00072             virtual ~LegendEntity( ) = default;
00073
00079             void addItem( const std::string& label, FunctionEntity* function );
00080
00086             void addItem( const std::wstring& label, FunctionEntity* function );
00087
00093             void addItem( const std::string& label, DataPlotEntity* plot );
00094
00100             void addItem( const std::wstring& label, DataPlotEntity* plot );
00101
00106             void setFrameEnabled( bool enabled );
00107
00112             void setFrameFillColor( const sf::Color& color );
00113
00118             void setFrameOutlineColor( const sf::Color& color );
00119
00124             void setFrameThickness( float thickness );
00125
00135             void setPadding( const sf::Vector2f& padding );
00136
00143             void setFont( const sf::Font& font );
00144
00149             void setCharacterSize( unsigned int size );
00150
00155             void setTextColor( const sf::Color& color );
00156
00165             void render( sf::RenderWindow& window );
00166         private:
00171             struct LegendItem
00172             {
00173                 std::string label;
00174                 std::unique_ptr< LineEntity > line;
00175                 sf::Text labelText;
00176
00177                 LegendItem( std::unique_ptr< LineEntity > line, sf::Text&& txt )
00178                 :   line{ std::move( line ) },
00179                     labelText{ std::move( txt ) }
00180                     {
00181
00182                     }
00183             };
00184
00197             template < typename LabelT, typename SourceT >
00198             void addItemGeneric( const LabelT& label, SourceT* source );
00199
00211             template< typename T >
00212             void createItem( const T& label, std::unique_ptr< LineEntity > line );
00213
00214             std::vector< LegendItem > mItems;
00215             const sf::Font& mFont;
00216             unsigned int mCharacterSize = 30;
00217             FrameEntity mFrame;
00218     };
00219
00220 } // namespace wPlot2D
00221
00222 #endif
```

8.68 wLineEntity.cpp File Reference

Implementation of the LineEntity class.

```
#include "wLineEntity.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wScaleComponent.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wThicknessComponent.hpp"
#include "../srcComponents/wLineStyleComponent.hpp"
```

```
#include "../srcUtils/wLineDrawer.hpp"
```
Include dependency graph for wLineEntity.cpp:



Namespaces

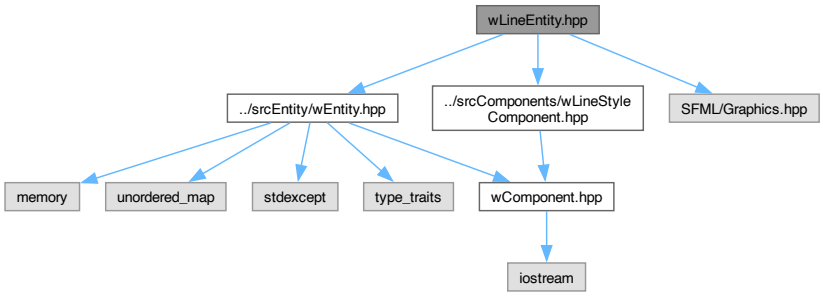
- namespace wPlot2D

8.68.1 Detailed Description

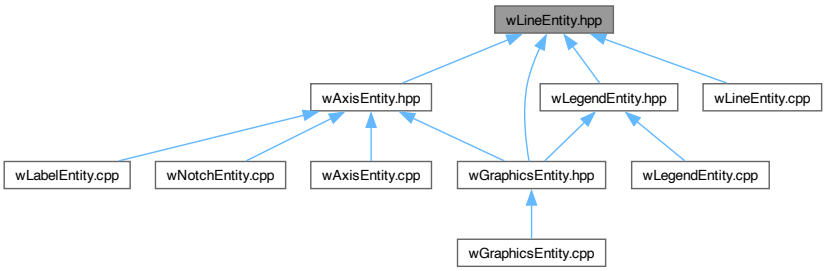
Implementation of the LineEntity class.

8.69 wLineEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include "../srcComponents/wLineStyleComponent.hpp"
#include <SFML/Graphics.hpp>
```
Include dependency graph for wLineEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::LineEntity

  Entity representing a straight line segment with optional arrowhead.

Namespaces

- namespace wPlot2D

8.70 wLineEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_LINE_ENTITY_HPP
00009 #define W_LINE_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012 #include "../srcComponents/wLineStyleComponent.hpp"
00013
00014 #pragma GCC diagnostic push
00015 #pragma GCC diagnostic ignored "-Wfloat-equal"
00016 #pragma GCC diagnostic ignored "-Wswitch-default"
00017 #include <SFML/Graphics.hpp>
00018 #pragma GCC diagnostic pop
00019
00020 namespace wPlot2D
00021 {
00022
00042     class LineEntity : public wEngine::Entity
00043     {
00044         public:
00054             LineEntity( const sf::Vector2f& origin, const sf::Vector2f& scale, const sf::Vector2f&
      start, const sf::Vector2f& end,
00055                 bool withArrow = false );
00056
00060             virtual ~LineEntity( ) = default;
00061
00066             void setColor( sf::Color color );
00067
00072             void setThickness( float thickness );
00073
00078             [[nodiscard]] float getThickness( ) const;
```

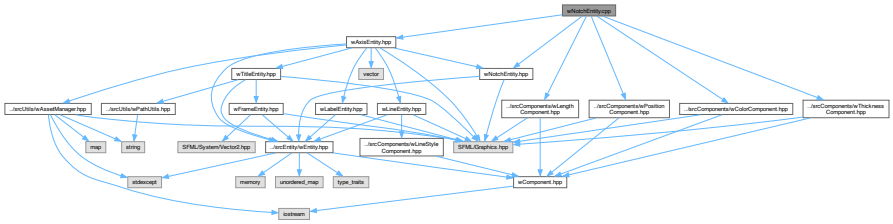
```
00079
00084             void setLineStyle( wEngine::LineStyleComponent::LineStyle style );
00085
00090             void setDashLength( float dashLength );
00091
00096             void setGapLength( float gapLength );
00097
00102             [[nodiscard]] sf::Vector2f getStartPoint( ) const;
00103
00108             [[nodiscard]] sf::Vector2f getEndPoint( ) const;
00109
00114             [[nodiscard]] bool hasArrow( ) const;
00115
00120             [[nodiscard]] float getArrowSize( ) const;
00121
00126             void setArrowSize( float arrowSize );
00127
00132             void render( sf::RenderWindow& window );
00133
00134         private:
00135             sf::Vector2f mStart;
00136             sf::Vector2f mEnd;
00137             bool mWithArrow;
00138             sf::ConvexShape mArrowHead;
00139             float mArrowSize;
00140
00152             void initArrowHead( const sf::Vector2f& lineEnd, const sf::Vector2f& dir, float arrowSize,
      sf::Color color );
00153     };
00154
00155 }//End of namespace wPlot2D
00156
00157 #endif
```

8.71 wNotchEntity.cpp File Reference

Implementation of the NotchEntity class.

```
#include "wNotchEntity.hpp"
#include "wAxisEntity.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wThicknessComponent.hpp"
#include "../srcComponents/wLengthComponent.hpp"
```

Include dependency graph for wNotchEntity.cpp:



Namespaces

- namespace wPlot2D

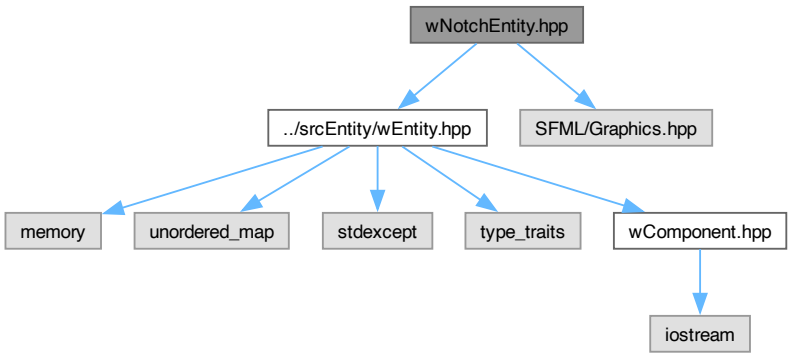
8.71.1 Detailed Description

Implementation of the NotchEntity class.

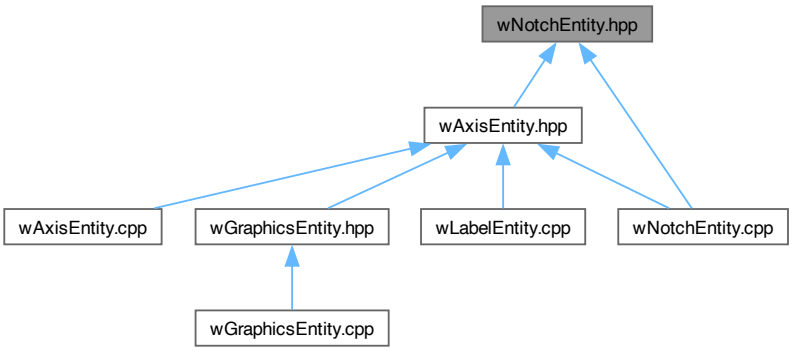
8.72 wNotchEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wNotchEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::NotchEntity

  Represents a single tick mark ("notch") on a 2D axis.

Namespaces

- namespace wPlot2D

8.73 wNotchEntity.hpp

Go to the documentation of this file.

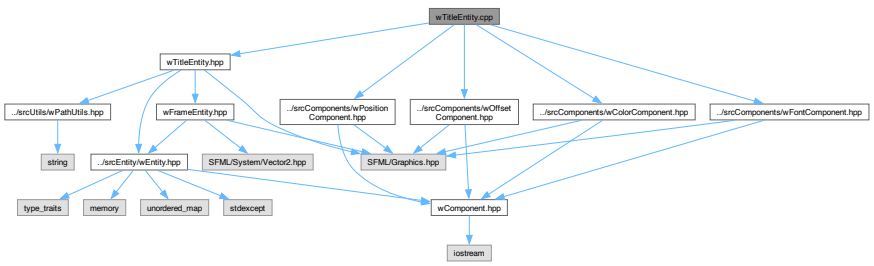
```
00001 /*
00002
    +-----------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
    +-----------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_NOTCH_ENTITY_HPP
00009 #define W_NOTCH_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012
00013 #pragma GCC diagnostic push
00014 #pragma GCC diagnostic ignored "-Wfloat-equal"
00015 #pragma GCC diagnostic ignored "-Wswitch-default"
00016 #include <SFML/Graphics.hpp>
00017 #pragma GCC diagnostic pop
00018
00019 namespace wPlot2D
00020 {
00021
00022     enum class AxisType;
00023
00051     class NotchEntity : public wEngine::Entity
00052     {
00053         public:
00058             NotchEntity( AxisType type );
00059
00063             virtual ~NotchEntity( ) = default;
00064
00074             void render( sf::RenderWindow& window );
00075
00076         private:
00077             AxisType mAlignment;
00078     };
00079
00080 } // namespace wPlot2D
00081
00082 #endif
```

8.74 wTitleEntity.cpp File Reference

Implementation of the TitleEntity class.

```
#include "wTitleEntity.hpp"
#include "../srcComponents/wPositionComponent.hpp"
#include "../srcComponents/wOffsetComponent.hpp"
#include "../srcComponents/wColorComponent.hpp"
#include "../srcComponents/wFontComponent.hpp"
```

Include dependency graph for wTitleEntity.cpp:



Namespaces

- namespace wPlot2D

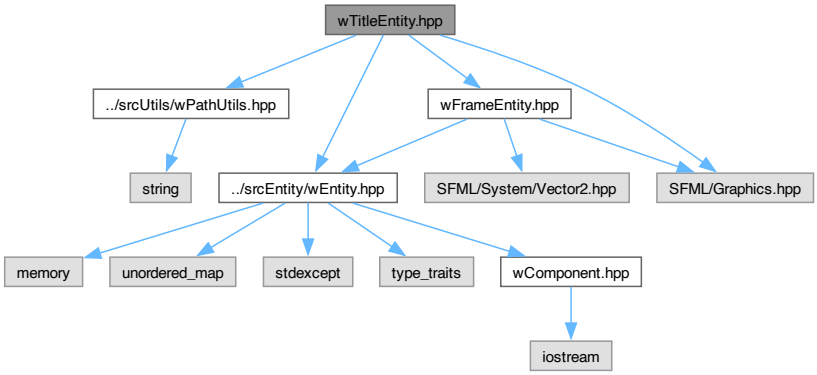
8.74.1 Detailed Description

Implementation of the TitleEntity class.

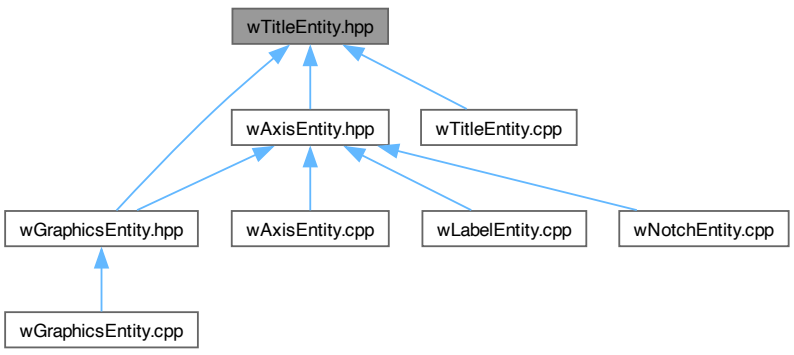
8.75 wTitleEntity.hpp File Reference

```
#include "../srcEntity/wEntity.hpp"
#include "../srcUtils/wPathUtils.hpp"
#include "wFrameEntity.hpp"
#include <SFML/Graphics.hpp>
```

Include dependency graph for wTitleEntity.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wPlot2D::TitleEntity

  Represents a textual label (typically an axis title or main plot title) in a 2D plot.

Namespaces

- namespace wPlot2D

8.76 wTitleEntity.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_TITLE_ENTITY_HPP
00009 #define W_TITLE_ENTITY_HPP
00010
00011 #include "../srcEntity/wEntity.hpp"
00012 #include "../srcUtils/wPathUtils.hpp"
00013 #include "wFrameEntity.hpp"
00014
00015 #pragma GCC diagnostic push
00016 #pragma GCC diagnostic ignored "-Wfloat-equal"
00017 #pragma GCC diagnostic ignored "-Wswitch-default"
00018 #include <SFML/Graphics.hpp>
00019 #pragma GCC diagnostic pop
00020
00021 namespace wPlot2D
00022 {
00023
00044     class TitleEntity : public wEngine::Entity
00045     {
00046         public:
00053             TitleEntity( const sf::Font& font, const std::string& title, bool hasFrame = false );
00054
00061             TitleEntity( const sf::Font& font, const std::wstring& title, bool hasFrame = false );
00062
00066             virtual ~TitleEntity( ) = default;
00067
00072             [[nodiscard]] unsigned int getCharacterSize(  ) const;
00073
00078             [[nodiscard]] sf::FloatRect getTextSize( ) const;
00079
00084             void setTextColor( sf::Color textColor );
00085
00090             void setOffset( sf::Vector2f offset );
00091
00096             void setCharacterSize( unsigned int size );
00097
00103             void setFont( const sf::Font& font );
00104
00109             [[nodiscard]] sf::Color getFrameOutlineColor( ) const;
00110
00115             [[nodiscard]] sf::Color getFrameFillColor( ) const;
00116
00121             [[nodiscard]] float getFrameThickness( ) const;
00122
00127             [[nodiscard]] sf::Vector2f getPadding( ) const;
00128
00133             [[nodiscard]] bool isFrameEnabled( ) const;
00134
00139             void setFrameEnabled( bool enabled );
00140
00145             void setFrameOutlineColor( const sf::Color& color );
00146
00151             void setFrameFillColor( const sf::Color& color );
00152
00157             void setFrameThickness( float thickness );
```

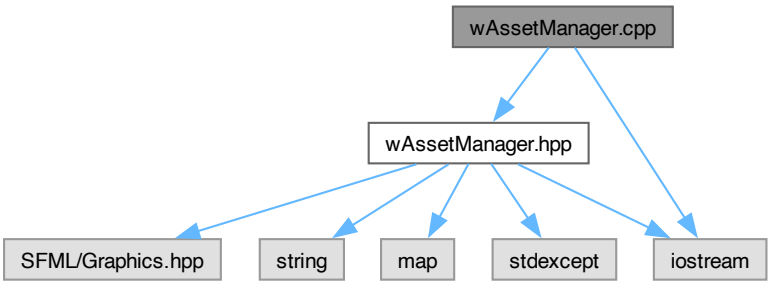
```
00158
00167             void setPadding( sf::Vector2f padding );
00168
00182             void render( sf::RenderWindow& window );
00183
00184         private:
00185             sf::Text mTitleText;
00186             FrameEntity mFrame;
00187
00193             template < typename T >
00194             void init( const T& title );
00195     };
00196
00197 } // namespace wPlot2D
00198
00199 #endif
```

8.77 wAssetManager.cpp File Reference

Implementation of the AssetManager class.

```
#include "wAssetManager.hpp"
#include <iostream>
```

Include dependency graph for wAssetManager.cpp:



Namespaces

- namespace wEngine

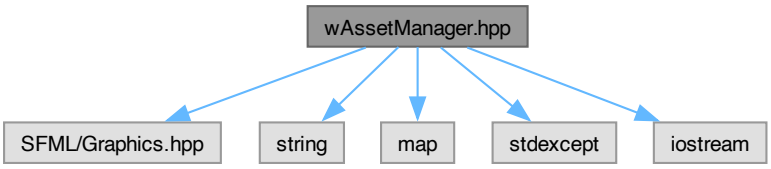
8.77.1 Detailed Description

Implementation of the AssetManager class.

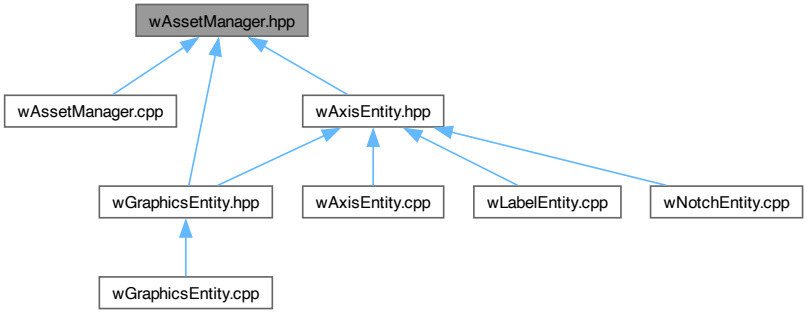
8.78 wAssetManager.hpp File Reference

```
#include <SFML/Graphics.hpp>
#include <string>
#include <map>
#include <stdexcept>
#include <iostream>
```

Include dependency graph for wAssetManager.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::AssetManager

  Manages graphical assets such as fonts for reuse across the application.

Namespaces

- namespace wEngine

8.79 wAssetManager.hpp

Go to the documentation of this file.

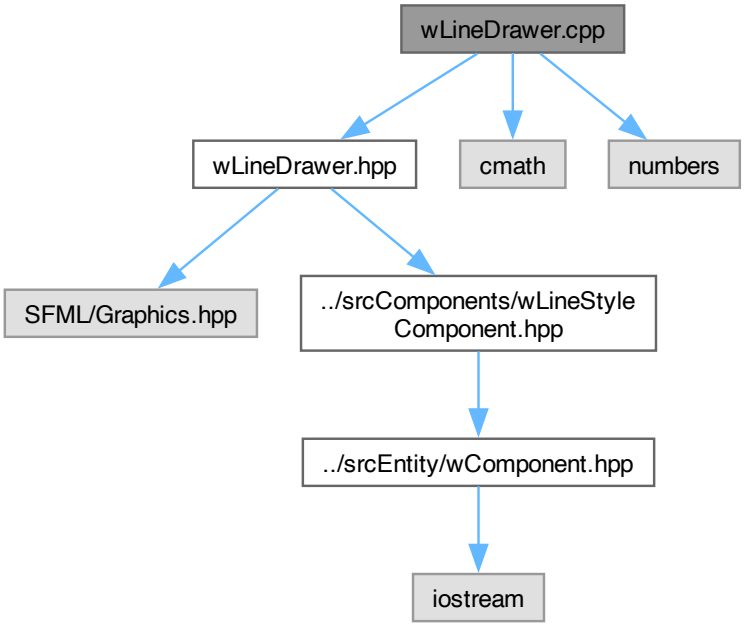
```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_ASSET_MANAGER_HPP
00009 #define W_ASSET_MANAGER_HPP
00010
00011 #pragma GCC diagnostic push
00012 #pragma GCC diagnostic ignored "-Wfloat-equal"
00013 #pragma GCC diagnostic ignored "-Wswitch-default"
00014 #include <SFML/Graphics.hpp>
00015 #pragma GCC diagnostic pop
00016
00017 #include <string>
00018 #include <map>
00019 #include <stdexcept>
00020 #include <iostream>
00021
00022 namespace wEngine
00023 {
00024
00049     class AssetManager
00050     {
00051         public:
00052             AssetManager( ) = default;
00053             AssetManager( const AssetManager& ) = delete;
00054             AssetManager& operator=( const AssetManager& ) = delete;
00055             ~AssetManager( ) = default;
00056
00068             void LoadFont( const std::string& name, const std::string& fileName );
00069
00076             sf::Font& getFont( const std::string& name );
00077
00083             void RemoveFont( const std::string& name );
00084
00088             void debugPrintFonts( ) const;
00089         private:
00090             std::map< std::string, sf::Font > mFont;
00091
00105             template < typename Map >
00106             static void EnsureExists( const Map& map, const std::string& name, const std::string& type
      );
00107     };
00108
00109 }//End of namespace wEngine
00110
00111 #endif
```

8.80 wLineDrawer.cpp File Reference

Implementation of the LineDrawer class.

```
#include "wLineDrawer.hpp"
#include <cmath>
#include <numbers>
```

Include dependency graph for wLineDrawer.cpp:



Namespaces

- namespace wEngine

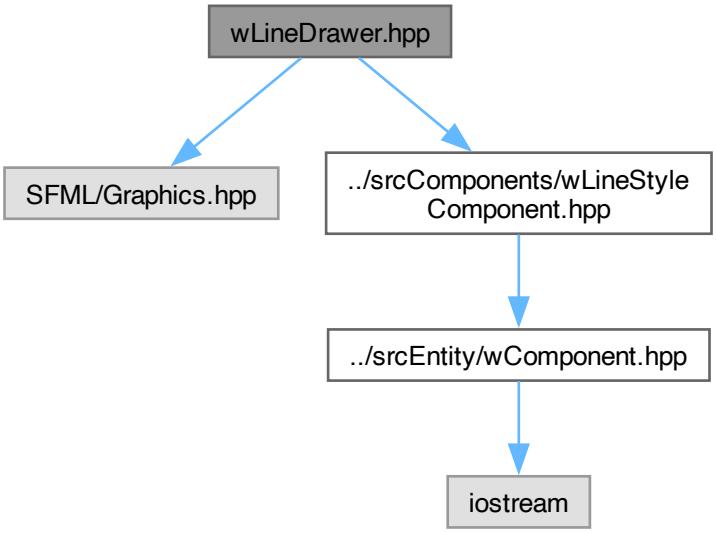
8.80.1 Detailed Description

Implementation of the LineDrawer class.

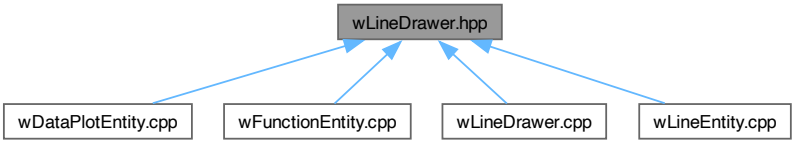
8.81 wLineDrawer.hpp File Reference

```
#include <SFML/Graphics.hpp>
#include "../srcComponents/wLineStyleComponent.hpp"
```

Include dependency graph for wLineDrawer.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::LineDrawer

  Utility class for rendering thick lines and polylines with style support.

Namespaces

- namespace wEngine

8.82 wLineDrawer.hpp

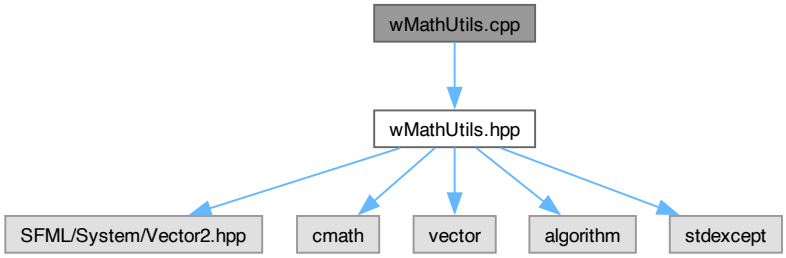
Go to the documentation of this file.

```
00001 /*
00002
    +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
    +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_LINE_DRAWER_HPP
00009 #define W_LINE_DRAWER_HPP
00010
00011 #pragma GCC diagnostic push
00012 #pragma GCC diagnostic ignored "-Wfloat-equal"
00013 #pragma GCC diagnostic ignored "-Wswitch-default"
00014 #include <SFML/Graphics.hpp>
00015 #pragma GCC diagnostic pop
00016
00017 #include "../srcComponents/wLineStyleComponent.hpp"
00018
00019 namespace wEngine
00020 {
00021
00051     class LineDrawer
00052     {
00053         public:
00054
00081             static float drawLine( sf::RenderWindow& window, const sf::Vector2f& point1, const
    sf::Vector2f& point2,
00082                 const sf::Color& color, float thickness, LineStyleComponent::LineStyle style =
    LineStyleComponent::LineStyle::Solid,
00083                 float dashLength = 20.0f, float gapLength = 5.0f, float patternOffset = 0.0f );
00084
00102             static void drawPolylineRound( sf::RenderWindow& window, const std::vector<sf::Vector2f>&
    points, const sf::Color& color,
00103                 float thickness, LineStyleComponent::LineStyle style =
    LineStyleComponent::LineStyle::Solid, float dashLength = 20.0f,
00104                 float gapLength = 5.0f, unsigned int arcResolution = 12 );
00105     };
00106
00107 }//End of namespace wEngine
00108
00109 #endif
```

8.83 wMathUtils.cpp File Reference

Implementation of the MathUtils class.

`#include "wMathUtils.hpp"`
Include dependency graph for wMathUtils.cpp:



Namespaces

- namespace wEngine

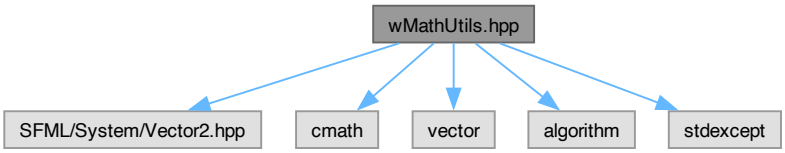
8.83.1 Detailed Description

Implementation of the MathUtils class.

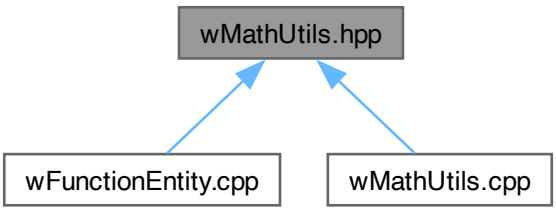
8.84 wMathUtils.hpp File Reference

```
#include <SFML/System/Vector2.hpp>
#include <cmath>
#include <vector>
#include <algorithm>
#include <stdexcept>
```

Include dependency graph for wMathUtils.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::MathUtils

  Provides common mathematical helper functions for plotting and geometry.

Namespaces

- namespace wEngine

8.85 wMathUtils.hpp

Go to the documentation of this file.

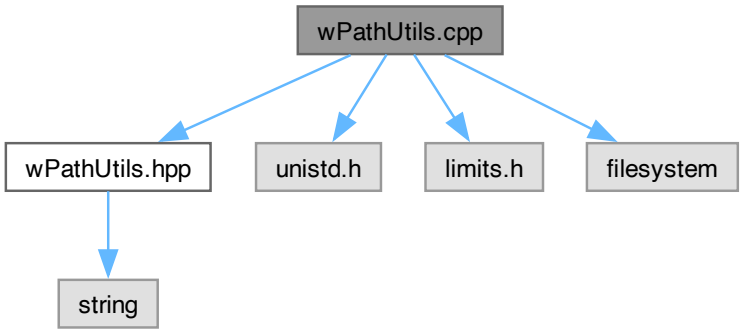
```
00001 /*
00002
      +----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_MATH_UTILS_HPP
00009 #define W_MATH_UTILS_HPP
00010
00011 #pragma GCC diagnostic push
00012 #pragma GCC diagnostic ignored "-Wfloat-equal"
00013 #include <SFML/System/Vector2.hpp>
00014 #pragma GCC diagnostic pop
00015
00016 #include <cmath>
00017 #include <vector>
00018 #include <algorithm>
00019 #include <stdexcept>
00020
00021 namespace wEngine
00022 {
00023
00037     class MathUtils
00038     {
00039         public:
00057             [[nodiscard]] static std::vector< double > linspace( double start, double end, size_t
      nbPoints );
00058     };
00059
00060 }//End of namespace wEngine
00061
00062 #endif
```

8.86 wPathUtils.cpp File Reference

Implementation of the PathUtils class.

```
#include "wPathUtils.hpp"
#include <unistd.h>
#include <limits.h>
#include <filesystem>
```

Include dependency graph for wPathUtils.cpp:



Namespaces

- namespace wEngine

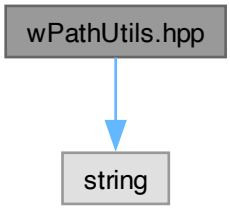
8.86.1 Detailed Description

Implementation of the PathUtils class.

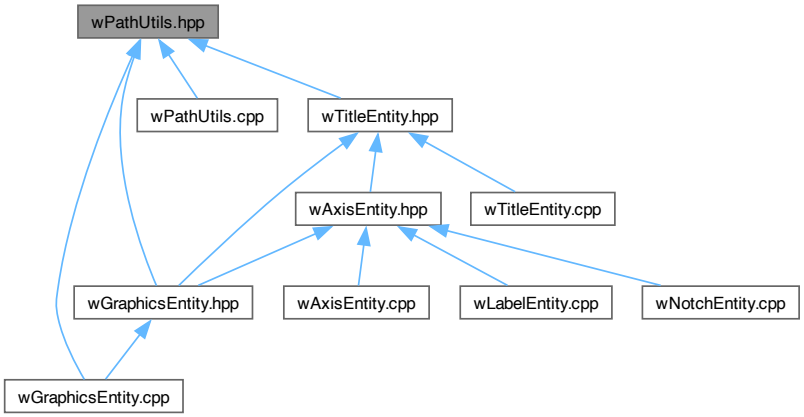
8.87 wPathUtils.hpp File Reference

```
#include <string>
```

Include dependency graph for wPathUtils.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class wEngine::PathUtils

  Utility class providing static functions for managing executable and resource paths across platforms.

Namespaces

- namespace wEngine

8.88 wPathUtils.hpp

Go to the documentation of this file.

```
00001 /*
00002
      +-----------------------------------------------------------------------------------------------------------------------------
00003 Created by Wilfried Koch.
00004 Copyright @ 2025 Wilfried Koch. All rights reserved.
00005
      +-----------------------------------------------------------------------------------------------------------------------------
00006 */
00007
00008 #ifndef W_PATH_UTILS_HPP
00009 #define W_PATH_UTILS_HPP
00010
00011 #include <string>
00012
00013 namespace wEngine
00014 {
00015
00044     class PathUtils
00045     {
00046         public:
00059             [[nodiscard]] static std::string getExecutablePath( );
00060
00070             [[nodiscard]] static std::string getExecutableDir( );
00071     };
00072
00073 }//End of namespace wEngine
00074
00075 #endif
```

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