

Proteus

1.0.0

A 3D Visualization Framework for System Models



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# Chapter 1

## Proteus

# Proteus

### 1.1 Documentation

The documentation of Proteus can be found in the [documentation folder](#) and can be generated with [doxygen](#).

#### 1.1.1 Abstract

As systems continue to grow in size and complexity, the task of maintaining and understanding the entirety of a system and its structure becomes more challenging. To address this issue, the implementation of a Model-↔-Based Systems Engineering approach can prove beneficial. This approach simplifies the system design process by utilizing models to depict the structure and behavior of systems, which are typically represented through 2D diagrams.

The objective of this project is to investigate the transformation of current 2D system models into a 3D model format capable of capturing and representing the structure and behavior of a system. This format served as the foundation for the development of Proteus, a 3D visualization framework. Proteus aims to provide a framework that enables the visualization of 2D system models, originating from different Modeling-Tools, in a 3D environment. System architects and developers are able to integrate Proteus into their existing projects to explore and gain new insights into their own system models.

Digital Twins, a relatively recent technology, involve the creation of virtual models that accurately represent physical entities. Proteus seeks to seamlessly integrate 3D model visualization within the same environment as these Digital Twins. This integration allows for the utilization of 3D models during the design and testing phases of modeled systems. The abstract design of Proteus enabled effortless expansion of the framework. Therefore, the results of this project could be re-used beyond its own scope and offer perspective and interesting opportunities for future work.



## **Chapter 2**

# **CHANGELOG**



## Chapter 3

# .NET Community Toolkit

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## Chapter 4

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## **Chapter 5**

# **Third Party Notices**



## Chapter 6

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## Chapter 7

# Hierarchical Index

### 7.1 Class Hierarchy

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# Chapter 8

## Class Index

### 8.1 Class List

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

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<a href="#">co.koenraad.proteus.Runtime.Controllers.DigiTwinController</a>	Controls the connection between Proteus and the Digital Twin components. Furthermore, it handles high-level behavior of the exploded and xray views . . . . .	37
<a href="#">FreeFlyCamera</a>	A simple free camera to be added to a Unity game object . . . . .	40
<a href="#">GOButtonTriggers</a>	Used to debug / test the VR Experiment. Can be ignored . . . . .	43
<a href="#">GOCommsController</a>	GameObject for the communication controller which ensures the communication controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the communication controller . . . . .	44
<a href="#">GOConnectionUI</a>	Used to debug / test the VR Experiment. Can be ignored . . . . .	45
<a href="#">GODEbugger</a>	Functions and helpers used during the development of Proteus for debugging . . . . .	46
<a href="#">GODigiTwinComponent</a>	Digital Twin component that used to to connect existing parts of the digital twin to Proteus. This component can be inherited from to implement custom behavior for example when the linked states changes . . . . .	47
<a href="#">GODigiTwinController</a>	GameObject for the digital twin controller which ensures the digital twin controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the digital twin controller . . . . .	54
<a href="#">GOEdge</a>	Component that handles the behavior of the Edges that are used in the viewer to visually represent the edges in the 3DML formatted model . . . . .	55
<a href="#">GONode</a>	Component that handles the behavior of the nodes that are used in the viewer to visually represent the nodes in the 3DML formatted model . . . . .	59
<a href="#">GOProteus</a>	Game object that is the root of all gameobjects belonging directly to Proteus . . . . .	64
<a href="#">GOUConnIP</a>	Used to debug / test the VR Experiment. Can be ignored . . . . .	65

<a href="#">GOViewCubeWidget</a>	ViewCube widget that helps a user to orient themselves in 3D space . . . . .	65
<a href="#">GOViewer</a>	Component that implements and handle the behavior of a Proteus viewer . . . . .	66
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<a href="#">co.koenraad.proteus.Runtime.Repositories.ProteusRepository</a>	Part of the repository that holds all general Proteus related data . . . . .	120
<a href="#">co.koenraad.proteus.Runtime.ViewModels.PTEdge</a>	Class that holds the data for an edge of the 3DML formatted model . . . . .	125
<a href="#">co.koenraad.proteus.Runtime.ViewModels.PTGlobals</a>	Class that holds the global data / defaults of Proteus . . . . .	126
<a href="#">co.koenraad.proteus.Runtime.ViewModels.PTModelElement</a>	Class containing the data of a model element . . . . .	130
<a href="#">co.koenraad.proteus.Runtime.ViewModels.PTNode</a>	Class that holds the data for a node of the 3DML formatted model . . . . .	133
<a href="#">co.koenraad.proteus.Runtime.ViewModels.PTState</a>	Class used to hold the data of the states in the 3DML formatted model . . . . .	137
<a href="#">co.koenraad.proteus.Runtime.ViewModels.PTViewer</a>	Class containing the properties of a viewer of Proteus . . . . .	138
<a href="#">co.koenraad.proteus.Runtime.Repositories.Repository</a>	The repository holding all data of Proteus . . . . .	143
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<a href="#">co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationHandle</a>	. . . . .	148
<a href="#">co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle</a>	Created by Peter @sHTiF Stefcek 21.10.2020 Modified by Thijs Koenraad to work with Proteus . . . . .	149
<a href="#">SampleCarDigiTwinComponent</a>	Example of a custom digital twin component for a car that listens to changes of the engine's state and changes the car's offset accordingly / emits exhaust particles . . . . .	155
<a href="#">SampleCarPartDigiTwinComponent</a>	Example of a simple Digital Twin Component . . . . .	158
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## Chapter 9

# File Index

### 9.1 File List

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## Chapter 10

# Namespace Documentation

### 10.1 co Namespace Reference

#### Namespaces

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### 10.2 co.koenraadt Namespace Reference

#### Namespaces

- namespace [proteus](#)

### 10.3 co.koenraadt.proteus Namespace Reference

#### Namespaces

- namespace [Runtime](#)

### 10.4 co.koenraadt.proteus.Runtime Namespace Reference

#### Namespaces

- namespace [Controllers](#)
- namespace [Interfaces](#)
- namespace [Other](#)
- namespace [Repositories](#)
- namespace [ViewModels](#)

## 10.5 co.koenraadt.proteus.Runtime.Controllers Namespace Reference

### Classes

- class [CommsController](#)  
*Controls the communication of Proteus and implements an MQTT client and server.*
- class [DigiTwinController](#)  
*Controls the connection between Proteus and the Digital Twin components. Furthermore, it handles high-level behavior of the exploded and xray views.*

## 10.6 co.koenraadt.proteus.Runtime.Interfaces Namespace Reference

### Classes

- interface [IProteusInteraction](#)  
*Interface for the interaction of Proteus.*
- interface [IPTViewerComponent](#)  
*Interface used for components of the Viewer.*

## 10.7 co.koenraadt.proteus.Runtime.Other Namespace Reference

### Namespaces

- namespace [RuntimeHandle](#)

### Classes

- class [Helpers](#)  
*Collection of Helper function used by Proteus.*

## 10.8 co.koenraadt.proteus.Runtime.Other.RuntimeHandle Namespace Reference

### Classes

- class [HandleBase](#)
- class [HandleMathUtils](#)
- class [MeshUtils](#)
- class [PositionAxis](#)
- class [PositionHandle](#)
- class [PositionPlane](#)
- class [RotationAxis](#)
- class [RotationHandle](#)
- class [RuntimeTransformHandle](#)  
*Created by Peter @sHTiF Stefcek 21.10.2020 Modified by Thijs Koenraadt to work with Proteus.*
- class [ScaleAxis](#)
- class [ScaleGlobal](#)
- class [ScaleHandle](#)

## Enumerations

- enum [HandleAxes](#) {  
X, Y, Z, XY,  
XZ, YZ, XYZ }
- enum [HandleSnappingType](#) { ABSOLUTE, RELATIVE }
- enum [HandleSpace](#) { WORLD, LOCAL }
- enum [HandleType](#) { POSITION, ROTATION, SCALE }

### 10.8.1 Enumeration Type Documentation

#### 10.8.1.1 HandleAxes

enum [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleAxes](#)

Created by Peter @sHTiF Stefcek 20.10.2020

##### Enumerator

X	
Y	
Z	
XY	
XZ	
YZ	
XYZ	

#### 10.8.1.2 HandleSnappingType

enum [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleSnappingType](#)

Created by Peter @sHTiF Stefcek 20.10.2020

##### Enumerator

ABSOLUTE	
RELATIVE	

#### 10.8.1.3 HandleSpace

enum [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleSpace](#)

Created by Peter @sHTiF Stefcek 20.10.2020

##### Enumerator

WORLD	
LOCAL	

#### 10.8.1.4 HandleType

enum `co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleType`

Created by Peter @sHTiF Stefcek 20.10.2020

Enumerator

POSITION	
ROTATION	
SCALE	

## 10.9 co.koenraadt.proteus.Runtime.Repositories Namespace Reference

### Classes

- class [ModelsRepository](#)  
*Part of the repository that handles all model related data.*
- class [ProteusRepository](#)  
*Part of the repository that holds all general Proteus related data.*
- class [Repository](#)  
*The repository holding all data of Proteus.*
- class [StatesRepository](#)  
*Part of the repository that handles the state related data.*
- class [ViewersRepository](#)  
*Part of the repository that holds all viewer related data.*

## 10.10 co.koenraadt.proteus.Runtime.ViewModels Namespace Reference

### Classes

- class [PTEdge](#)  
*Class that holds the data for an edge of the 3DML formatted model.*
- class [PTGlobals](#)  
*Class that holds the global data / defaults of Proteus.*
- class [PTModelElement](#)  
*Class containing the data of a model element.*
- class [PTNode](#)  
*Class that holds the data for a node of the 3DML formatted model.*
- class [PTState](#)  
*Class used to hold the data of the states in the 3DML formatted model.*
- class [PTViewer](#)  
*Class containing the properties of a viewer of Proteus.*



# Chapter 11

## Class Documentation

### 11.1 co.koenraad.proteus.Runtime.Controllers.CommsController Class Reference

Controls the communication of Proteus and implements an MQTT client and server.

#### Public Member Functions

- async Task [Init](#) ()  
*Initialize the communication controller.*
- async Task [DisconnectClient](#) ()  
*Disconnect the client from the server.*
- async void [SendMessage](#) (string topic, string payload)  
*Send a message to the MQTT broker for a specific topic.*
- void [Update](#) ()  
*Update function which should be called by the CommsController gameobject on Unity Update, to ensure the messages are processed in the main thread. The CommsController does not inherit from MonoBehaviour and therefore has no Update override itself.*
- void [Destroy](#) ()  
*Destroys and cleans up the client / server created by the communication controller.*

#### Static Public Attributes

- static string [BROKER\\_IP](#) = ""  
*The IP address of the broker that Proteus should connect to. If left empty, Proteus will create its own broker server.*

#### Properties

- static [CommsController Instance](#) [get]  
*The singleton instance of the communication controller.*

## Private Member Functions

- async Task [InitClient](#) ()  
*Initializes the MQTT client for the communication controller.*
- async Task [InitServer](#) ()  
*Initialize the MQTT broker server used by Proteus.*
- async Task [ConnectClient](#) ()  
*Connect the communication client to the server.*
- void [ProcessMessage](#) (MqttApplicationMessage message)  
*Process a received message.*
- async Task [SubscribeTopics](#) ()  
*Subscribes to the desired communication topics.*

## Private Attributes

- IMqttClient [\\_mqttClient](#)
- MqttServer [\\_mqttServer](#)

## Static Private Attributes

- static [CommsController \\_instance](#) = null
- static MqttFactory [\\_mqttFactory](#) = new()
- static ConcurrentQueue< MqttApplicationMessage > [\\_mqttMessageQueue](#) = new()

### 11.1.1 Detailed Description

Controls the communication of Proteus and implements an MQTT client and server.

### 11.1.2 Member Function Documentation

#### 11.1.2.1 ConnectClient()

```
async Task co.koenraadt.proteus.Runtime.Controllers.CommsController.ConnectClient ( ) [private]
```

Connect the communication client to the server.

Returns

#### 11.1.2.2 Destroy()

```
void co.koenraadt.proteus.Runtime.Controllers.CommsController.Destroy ( )
```

Destroys and cleans up the client / server created by the communication controller.

### 11.1.2.3 DisconnectClient()

```
async Task co.koenraadt.proteus.Runtime.Controllers.CommsController.DisconnectClient ( )
```

Disconnect the client from the server.

Returns

### 11.1.2.4 Init()

```
async Task co.koenraadt.proteus.Runtime.Controllers.CommsController.Init ( )
```

Initialize the communication controller.

Returns

### 11.1.2.5 InitClient()

```
async Task co.koenraadt.proteus.Runtime.Controllers.CommsController.InitClient ( ) [private]
```

Initializes the MQTT client for the communication controller.

Returns

### 11.1.2.6 InitServer()

```
async Task co.koenraadt.proteus.Runtime.Controllers.CommsController.InitServer ( ) [private]
```

Initialize the MQTT broker server used by Proteus.

Returns

### 11.1.2.7 ProcessMessage()

```
void co.koenraadt.proteus.Runtime.Controllers.CommsController.ProcessMessage (
    MqttApplicationMessage message ) [private]
```

Process a received message.

**Parameters**

<i>message</i>	
----------------	--

**11.1.2.8 SendMessage()**

```
async void co.koenraad.proteus.Runtime.Controllers.CommsController.SendMessage (
    string topic,
    string payload )
```

Send a message to the MQTT broker for a specific topic.

**Parameters**

<i>topic</i>	The topic to send the message to.
<i>payload</i>	The string payload of the message.

**11.1.2.9 SubscribeTopics()**

```
async Task co.koenraad.proteus.Runtime.Controllers.CommsController.SubscribeTopics ( ) [private]
```

Subscribes to the desired communication topics.

**Returns****11.1.2.10 Update()**

```
void co.koenraad.proteus.Runtime.Controllers.CommsController.Update ( )
```

Update function which should be called by the CommsController gameobject on Unity Update, to ensure the messages are processed in the main thread. The CommsController does not inherit from MonoBehaviour and therefore has no Update override itself.

**11.1.3 Member Data Documentation****11.1.3.1 \_instance**

```
CommsController co.koenraad.proteus.Runtime.Controllers.CommsController._instance = null
[static], [private]
```

**11.1.3.2 \_mqttClient**

```
IMqttClient co.koenraad.proteus.Runtime.Controllers.CommsController._mqttClient [private]
```

### 11.1.3.3 `_mqttFactory`

```
MqttFactory co.koenraadt.proteus.Runtime.Controllers.CommsController._mqttFactory = new()  
[static], [private]
```

### 11.1.3.4 `_mqttMessageQueue`

```
ConcurrentQueue<MqttApplicationMessage> co.koenraadt.proteus.Runtime.Controllers.CommsController._  
_mqttMessageQueue = new() [static], [private]
```

### 11.1.3.5 `_mqttServer`

```
MqttServer co.koenraadt.proteus.Runtime.Controllers.CommsController._mqttServer [private]
```

### 11.1.3.6 `BROKER_IP`

```
string co.koenraadt.proteus.Runtime.Controllers.CommsController.BROKER_IP = "" [static]
```

The IP address of the broker that Proteus should connect to. If left empty, Proteus will create its own broker server.

## 11.1.4 Property Documentation

### 11.1.4.1 `Instance`

```
CommsController co.koenraadt.proteus.Runtime.Controllers.CommsController.Instance [static],  
[get]
```

The singleton instance of the communication controller.

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

- co.koenraadt.proteus/Runtime/Controllers/[CommsController.cs](#)

## 11.2 co.koenraadt.proteus.Runtime.Controllers.DigiTwinController Class Reference

Controls the connection between Proteus and the Digital Twin components. Furthermore, it handles high-level behavior of the exploded and xray views.

## Public Member Functions

- void [Init](#) ()  
*Initializes the Digital Twin controller.*
- void [LinkDigiTwinComponent](#) ([GODigiTwinComponent](#) obj)  
*Links a Digital Twin component to the DigiTwinController so it has a reference to it. These references are used to update the xray and exploded views.*
- void [UnlinkDigiTwinComponent](#) ([GODigiTwinComponent](#) obj)  
*Unlinks a Digital Twin component from the DigiTwinController so it no longer has a reference to it.*
- void [UpdateXrayView](#) ()  
*Calculates and updates the Xray view of Proteus.*
- void [UpdateExplodedView](#) ()  
*Calculates and updates the Exploded view of Proteus.*
- void [Update](#) ()  
*Update function which should be called by the digital twin controller's gameobject on Unity Update, to ensure the messages are processed in the main thread. The DigiTwinController does not inherit from MonoBehaviour and therefore has no Update override itself.*

## Properties

- static [DigiTwinController Instance](#) [get]  
*The singleton instance of the Digital Twin controller.*

## Private Member Functions

- void [OnGlobalsDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Callback function for the globalsData object to receive updates whenever properties of the global data changes.*

## Private Attributes

- List< [GODigiTwinComponent](#) > [\\_digiTwinComponents](#)

## Static Private Attributes

- static [DigiTwinController \\_instance](#) = null
- static [PTGlobals \\_globalsData](#)

## 11.2.1 Detailed Description

Controls the connection between Proteus and the Digital Twin components. Furthermore, it handles high-level behavior of the exploded and xray views.

## 11.2.2 Member Function Documentation

### 11.2.2.1 Init()

```
void co.koenraad.proteus.Runtime.Controllers.DigiTwinController.Init ( )
```

Initializes the Digital Twin controller.

### 11.2.2.2 LinkDigiTwinComponent()

```
void co.koenraad.proteus.Runtime.Controllers.DigiTwinController.LinkDigiTwinComponent (
    GODigiTwinComponent obj )
```

Links a Digital Twin component to the DigiTwinController so it has a reference to it. These references are used to update the xray and exploded views.

## Parameters

<i>obj</i>	The <a href="#">GODigiTwinComponent</a> to link.
------------	--

**11.2.2.3 OnGlobalsDataChanged()**

```
void co.koenraad.proteus.Runtime.Controllers.DigiTwinController.OnGlobalsDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Callback function for the globalsData object to receive updates whenever properties of the global data changes.

## Parameters

<i>obj</i>	the globals data object
<i>e</i>	object containing the arguments of the PropertyChanged event

**11.2.2.4 UnlinkDigiTwinComponent()**

```
void co.koenraad.proteus.Runtime.Controllers.DigiTwinController.UnlinkDigiTwinComponent (
    GODigiTwinComponent obj )
```

Unlinks a Digital Twin component from the DigiTwinController so it no longer has a reference to it.

## Parameters

<i>obj</i>	The <a href="#">GODigiTwinComponent</a> to unlink.
------------	--

**11.2.2.5 Update()**

```
void co.koenraad.proteus.Runtime.Controllers.DigiTwinController.Update ( )
```

Update function which should be called by the digital twin controller's gameobject on Unity Update, to ensure the messages are processed in the main thread. The DigiTwinController does not inherit from MonoBehaviour and therefore has no Update override itself.

**11.2.2.6 UpdateExplodedView()**

```
void co.koenraad.proteus.Runtime.Controllers.DigiTwinController.UpdateExplodedView ( )
```

Calculates and updates the Exploded view of Proteus.

**11.2.2.7 UpdateXrayView()**

```
void co.koenraad.proteus.Runtime.Controllers.DigiTwinController.UpdateXrayView ( )
```

Calculates and updates the Xray view of Proteus.

## 11.2.3 Member Data Documentation

### 11.2.3.1 `_digiTwinComponents`

```
List<GODigiTwinComponent> co.koenraad.proteus.Runtime.Controllers.DigiTwinController._digiTwinComponents [private]
```

### 11.2.3.2 `_globalsData`

```
PTGlobals co.koenraad.proteus.Runtime.Controllers.DigiTwinController._globalsData [static], [private]
```

### 11.2.3.3 `_instance`

```
DigiTwinController co.koenraad.proteus.Runtime.Controllers.DigiTwinController._instance = null [static], [private]
```

## 11.2.4 Property Documentation

### 11.2.4.1 Instance

```
DigiTwinController co.koenraad.proteus.Runtime.Controllers.DigiTwinController.Instance [static], [get]
```

The singleton instance of the Digital Twin controller.

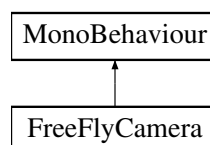
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Controllers/DigiTwinController.cs](#)

## 11.3 FreeFlyCamera Class Reference

A simple free camera to be added to a Unity game object.

Inheritance diagram for FreeFlyCamera:



### Public Member Functions

- void [StartLooking](#) ()  
*Enable free looking.*
- void [StopLooking](#) ()  
*Disable free looking.*



## Public Attributes

- float `movementSpeed` = 10f  
*Normal speed of camera movement.*
- float `fastMovementSpeed` = 100f  
*Speed of camera movement when shift is held down,.*
- float `freeLookSensitivity` = 3f  
*Sensitivity for free look.*
- float `zoomSensitivity` = 10f  
*Amount to zoom the camera when using the mouse wheel.*
- float `fastZoomSensitivity` = 50f  
*Amount to zoom the camera when using the mouse wheel (fast mode).*

## Private Member Functions

- void `Update` ()
- void `OnDisable` ()

## Private Attributes

- bool `looking` = false  
*Set to true when free looking (on right mouse button).*

### 11.3.1 Detailed Description

A simple free camera to be added to a Unity game object.

Created by ashley davis <https://gist.github.com/ashleydavis/f025c03a9221bc840a2b>  
Modified / used by Thijs Koenraadt for use in Proteus.

Keys: wasd / arrows - movement q/e - up/down (local space) r/f - up/down (world space) pageup/pagedown - up/down (world space) hold shift - enable fast movement mode right mouse - enable free look mouse - free look / rotation

### 11.3.2 Member Function Documentation

#### 11.3.2.1 OnDisable()

```
void FreeFlyCamera.OnDisable ( ) [private]
```

#### 11.3.2.2 StartLooking()

```
void FreeFlyCamera.StartLooking ( )
```

Enable free looking.

### 11.3.2.3 StopLooking()

```
void FreeFlyCamera.StopLooking ( )
```

Disable free looking.

### 11.3.2.4 Update()

```
void FreeFlyCamera.Update ( ) [private]
```

## 11.3.3 Member Data Documentation

### 11.3.3.1 fastMovementSpeed

```
float FreeFlyCamera.fastMovementSpeed = 100f
```

Speed of camera movement when shift is held down,.

### 11.3.3.2 fastZoomSensitivity

```
float FreeFlyCamera.fastZoomSensitivity = 50f
```

Amount to zoom the camera when using the mouse wheel (fast mode).

### 11.3.3.3 freeLookSensitivity

```
float FreeFlyCamera.freeLookSensitivity = 3f
```

Sensitivity for free look.

### 11.3.3.4 looking

```
bool FreeFlyCamera.looking = false [private]
```

Set to true when free looking (on right mouse button).

### 11.3.3.5 movementSpeed

```
float FreeFlyCamera.movementSpeed = 10f
```

Normal speed of camera movement.

### 11.3.3.6 zoomSensitivity

```
float FreeFlyCamera.zoomSensitivity = 10f
```

Amount to zoom the camera when using the mouse wheel.

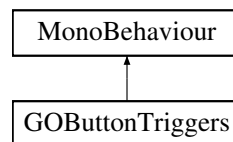
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/FreeFlyCamera.cs](#)

## 11.4 GOButtonTriggers Class Reference

Used to debug / test the VR Experiment. Can be ignored.

Inheritance diagram for GOButtonTriggers:



### Public Member Functions

- void [SpawnViewer](#) ()

### Private Member Functions

- void [Start](#) ()
- void [Update](#) ()

### 11.4.1 Detailed Description

Used to debug / test the VR Experiment. Can be ignored.

### 11.4.2 Member Function Documentation

#### 11.4.2.1 SpawnViewer()

```
void GOButtonTriggers.SpawnViewer ( )
```

#### 11.4.2.2 Start()

```
void GOButtonTriggers.Start ( ) [private]
```

### 11.4.2.3 Update()

```
void GOButtonTriggers.Update ( ) [private]
```

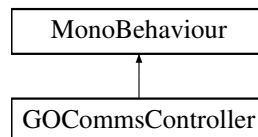
The documentation for this class was generated from the following file:

- co.koenraad.proteus/Runtime/Scripts/[GOButtonTriggers.cs](#)

## 11.5 GCommsController Class Reference

GameObject for the communication controller which ensures the communication controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the communication controller.

Inheritance diagram for GCommsController:



### Private Member Functions

- void [Update](#) ()  
*Updates the communication controller every unity update.*
- void [OnDestroy](#) ()  
*When destroyed also destroy the communication controller.*

### 11.5.1 Detailed Description

GameObject for the communication controller which ensures the communication controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the communication controller.

### 11.5.2 Member Function Documentation

#### 11.5.2.1 OnDestroy()

```
void GCommsController.OnDestroy ( ) [private]
```

When destroyed also destroy the communication controller.

### 11.5.2.2 Update()

```
void GOCommsController.Update ( ) [private]
```

Updates the communication controller every unity update.

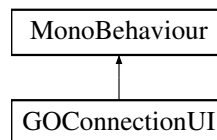
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/GOCommsController.cs](#)

## 11.6 GOConnectionUI Class Reference

Used to debug / test the VR Experiment. Can be ignored.

Inheritance diagram for GOConnectionUI:



### Private Member Functions

- void [Start](#) ()
- void [Update](#) ()

### 11.6.1 Detailed Description

Used to debug / test the VR Experiment. Can be ignored.

### 11.6.2 Member Function Documentation

#### 11.6.2.1 Start()

```
void GOConnectionUI.Start ( ) [private]
```

#### 11.6.2.2 Update()

```
void GOConnectionUI.Update ( ) [private]
```

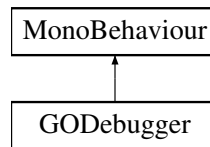
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/VR/GOConnectionUI.cs](#)

## 11.7 GODEbugger Class Reference

Functions and helpers used during the development of Proteus for debugging.

Inheritance diagram for GODEbugger:



### Private Member Functions

- void `Start ()`
- void `Update ()`

### Private Attributes

- bool `debugMode` = true
- KeyCode `debugKey` = KeyCode.F3
- bool `isHoldingDebugKey` = false

### 11.7.1 Detailed Description

Functions and helpers used during the development of Proteus for debugging.

### 11.7.2 Member Function Documentation

#### 11.7.2.1 Start()

```
void GODEbugger.Start ( ) [private]
```

#### 11.7.2.2 Update()

```
void GODEbugger.Update ( ) [private]
```

### 11.7.3 Member Data Documentation

#### 11.7.3.1 debugKey

```
KeyCode GODEbugger.debugKey = KeyCode.F3 [private]
```

### 11.7.3.2 debugMode

```
bool GODebugger.debugMode = true [private]
```

### 11.7.3.3 isHoldingDebugKey

```
bool GODebugger.isHoldingDebugKey = false [private]
```

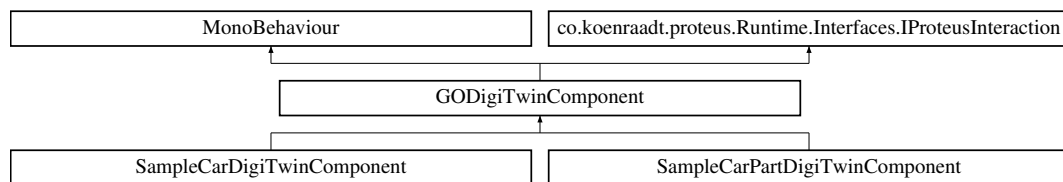
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/GODebugger.cs](#)

## 11.8 GODigiTwinComponent Class Reference

Digital Twin component that used to to connect existing parts of the digital twin to Proteus. This component can be inherited from to implement custom behavior for example when the linked states changes.

Inheritance diagram for GODigiTwinComponent:



### Public Member Functions

- bool [HasLinkedNodeInSelection](#) ()  
*Checks whether the digital twin component has a linked node that is currently selected.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [UpdateXrayView](#) ()  
*Updates the component to react to xray view. Changes the transparency of the object accordingly.*
- void [UpdateExplodedView](#) (Vector3 origin, bool isExploded)  
*Updates the component to react to exploded view. Calculates its new location and offset accordingly.*

## Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*

## Public Attributes

- string [MainDiagramName](#)  
*The name of the main diagrama that the digital twin component is linked to.*
- List< string > [LinkedNodes](#)  
*The list of nodes that the digital twin component is linked to.*
- List< string > [LinkedStates](#)  
*The list of states that the digital twin component is linked to.*
- float [XrayOpacityFactor](#) = .1f  
*The opacity factor that the component will change its material when xrayed.*
- float [ExplodeFactor](#) = 1.5f  
*The factor that the component should move away from the explode origin when exploded.*
- bool [DoXrayView](#) = true  
*Wether the component should trigger xray view.*
- bool [DoExplodedView](#) = true  
*Whether the component should trigger exploded view.*
- bool [ReactsToXray](#) = true  
*Whether the component should react to xray view.*
- bool [ReactsToExplodedView](#) = true  
*Whether the component should react to exploded view.*



### Protected Member Functions

- virtual void [Awake](#) ()  
*Sets the layer of the object to proteus viz so it can react to Proteus interaction events.*
- virtual void [Start](#) ()  
*Initializes and starts the digital twin component.*
- virtual void [Update](#) ()  
*Called on every unity update.*
- virtual void [OnDestroy](#) ()  
*Destroys and cleans up the digital twin component.*
- void [OnStateDataChanged](#) (object obj, PropertyChangedEventArgs e)
- virtual void [OnStateDataChanged](#) (PTState obj, PropertyChangedEventArgs e)  
*Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.*

### Private Member Functions

- void [Handle\\_Completed](#) (AsyncOperationHandle< Material > operation)  
*Whenever the xray material asset is loaded, store the result as a reference for the digital twin component to use.*
- void [OnStatesCollectionChanged](#) (object obj, NotifyCollectionChangedEventArgs e)  
*Ensure that the digital twin component maintains a reference to the states it is linked to.*

### Private Attributes

- string [\\_xrayMatAddress](#) = "Packages/co.koenraad.proteus/Runtime/Materials/Mat\_Xray.mat"
- bool [\\_originalRendererEnabled](#)
- ObservableCollection< [PTState](#) > [\\_statesCollection](#)
- [PTGlobals](#) [\\_globalsData](#)
- [Renderer](#) [\\_renderer](#)
- [Material](#) [\\_xrayMaterial](#)
- [Material](#) [\\_originalMaterial](#)
- [Vector3](#) [\\_explodedViewOffset](#)
- AsyncOperationHandle< [Material](#) > [handle](#)

## 11.8.1 Detailed Description

Digital Twin component that used to connect existing parts of the digital twin to Proteus. This component can be inherited from to implement custom behavior for example when the linked states changes.

## 11.8.2 Member Function Documentation

### 11.8.2.1 Awake()

```
virtual void GODigiTwinComponent.Awake ( ) [protected], [virtual]
```

Sets the layer of the object to proteus viz so it can react to Proteus interaction events.

### 11.8.2.2 Handle\_Completed()

```
void GODigiTwinComponent.Handle_Completed (
    AsyncOperationHandle< Material > operation ) [private]
```

Whenever the xray material asset is loaded, store the result as a reference for the digital twin component to use.

**Parameters**

<i>operation</i>	
------------------	--

**11.8.2.3 HasLinkedNodeInSelection()**

```
bool GODigiTwinComponent.HasLinkedNodeInSelection ( )
```

Checks whether the digital twin component has a linked node that is currently selected.

**Returns**

Returns true when one of the linked nodes is currently selected.

**11.8.2.4 OnDestroy()**

```
virtual void GODigiTwinComponent.OnDestroy ( ) [protected], [virtual]
```

Destroys and cleans up the digital twin component.

**11.8.2.5 OnPointerDown()**

```
void GODigiTwinComponent.OnPointerDown (
    RaycastHit hit )
```

Called when the user presses the pointer button down.

**Parameters**

<i>hit</i>	The raycastHit that triggered the event.
------------	--

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.8.2.6 OnStateDataChanged() [1/2]**

```
void GODigiTwinComponent.OnStateDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [protected]
```

**11.8.2.7 OnStateDataChanged() [2/2]**

```
virtual void GODigiTwinComponent.OnStateDataChanged (
    PTState obj,
    PropertyChangedEventArgs e ) [protected], [virtual]
```

Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.

## Parameters

<i>obj</i>	
<i>e</i>	

Reimplemented in [SampleCarDigiTwinComponent](#), and [SampleCarPartDigiTwinComponent](#).

**11.8.2.8 OnStatesCollectionChanged()**

```
void GODigiTwinComponent.OnStatesCollectionChanged (
    object obj,
    NotifyCollectionChangedEventArgs e ) [private]
```

Ensure that the digital twin component maintains a reference to the states it is linked to.

## Parameters

<i>obj</i>	
<i>e</i>	

**11.8.2.9 Start()**

```
virtual void GODigiTwinComponent.Start ( ) [protected], [virtual]
```

Initializes and starts the digital twin component.

Reimplemented in [SampleCarDigiTwinComponent](#), and [SampleCarPartDigiTwinComponent](#).

**11.8.2.10 Update()**

```
virtual void GODigiTwinComponent.Update ( ) [protected], [virtual]
```

Called on every unity update.

Reimplemented in [SampleCarDigiTwinComponent](#), and [SampleCarPartDigiTwinComponent](#).

**11.8.2.11 UpdateExplodedView()**

```
void GODigiTwinComponent.UpdateExplodedView (
    Vector3 origin,
    bool isExploded )
```

Updates the component to react to exploded view. Calculates its new location and offset accordingly.

## Parameters

<i>origin</i>	The origin of the explosion.
<i>isExploded</i>	Whether the component should explode.

### 11.8.2.12 UpdateXrayView()

```
void GODigiTwinComponent.UpdateXrayView ( )
```

Updates the component to react to xray view. Changes the transparency of the object accordingly.

## 11.8.3 Member Data Documentation

### 11.8.3.1 \_explodedViewOffset

```
Vector3 GODigiTwinComponent._explodedViewOffset [private]
```

### 11.8.3.2 \_globalsData

```
PTGlobals GODigiTwinComponent._globalsData [private]
```

### 11.8.3.3 \_originalMaterial

```
Material GODigiTwinComponent._originalMaterial [private]
```

### 11.8.3.4 \_originalRendererEnabled

```
bool GODigiTwinComponent._originalRendererEnabled [private]
```

### 11.8.3.5 \_renderer

```
Renderer GODigiTwinComponent._renderer [private]
```

### 11.8.3.6 \_statesCollection

```
ObservableCollection<PTState> GODigiTwinComponent._statesCollection [private]
```

### 11.8.3.7 \_xrayMatAddress

```
string GODigiTwinComponent._xrayMatAddress = "Packages/co.koenraad.proteus/Runtime/Materials/Mat↔  
_Xray.mat" [private]
```

### 11.8.3.8 \_xrayMaterial

```
Material GODigiTwinComponent._xrayMaterial [private]
```

### 11.8.3.9 DoExplodedView

```
bool GODigiTwinComponent.DoExplodedView = true
```

Whether the component should trigger exploded view.

### 11.8.3.10 DoXrayView

```
bool GODigiTwinComponent.DoXrayView = true
```

Whether the component should trigger xray view.

### 11.8.3.11 ExplodeFactor

```
float GODigiTwinComponent.ExplodeFactor = 1.5f
```

The factor that the component should move away from the explode origin when exploded.

### 11.8.3.12 handle

```
AsyncOperationHandle<Material> GODigiTwinComponent.handle [private]
```

### 11.8.3.13 LinkedNodes

```
List<string> GODigiTwinComponent.LinkedNodes
```

The list of nodes that the digital twin component is linked to.

### 11.8.3.14 LinkedStates

```
List<string> GODigiTwinComponent.LinkedStates
```

The list of states that the digital twin component is linked to.

### 11.8.3.15 MainDiagramName

```
string GODigiTwinComponent.MainDiagramName
```

The name of the main diagram that the digital twin component is linked to.

### 11.8.3.16 ReactsToExplodedView

```
bool GODigiTwinComponent.ReactsToExplodedView = true
```

Whether the component should react to exploded view.

### 11.8.3.17 ReactsToXray

```
bool GODigiTwinComponent.ReactsToXray = true
```

Whether the component should react to xray view.

### 11.8.3.18 XrayOpacityFactor

```
float GODigiTwinComponent.XrayOpacityFactor = .1f
```

The opacity factor that the component will change its material when xrayed.

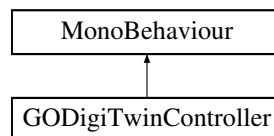
The documentation for this class was generated from the following file:

- [co.koenraadt.proteus/Runtime/Scripts/GODigiTwinComponent.cs](#)

## 11.9 GODigiTwinController Class Reference

GameObject for the digital twin controller which ensures the digital twin controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the digital twin controller.

Inheritance diagram for GODigiTwinController:



### Private Member Functions

- void [Start](#) ()
- void [Update](#) ()

### Private Attributes

- [DigiTwinController \\_controller](#)

### 11.9.1 Detailed Description

GameObject for the digital twin controller which ensures the digital twin controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the digital twin controller.

## 11.9.2 Member Function Documentation

### 11.9.2.1 Start()

```
void GODigiTwinController.Start ( ) [private]
```

### 11.9.2.2 Update()

```
void GODigiTwinController.Update ( ) [private]
```

## 11.9.3 Member Data Documentation

### 11.9.3.1 \_controller

```
DigiTwinController GODigiTwinController._controller [private]
```

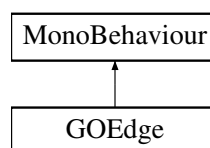
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/GODigiTwinController.cs](#)

## 11.10 GOEdge Class Reference

Component that handles the behavior of the Edges that are used in the viewer to visually represent the edges in the 3DML formatted model.

Inheritance diagram for GOEdge:



### Public Member Functions

- void [Init](#) (string edgId, string attachedViewerId)  
*Called to initialize the edge and obtain a reference to the viewer its attached to.*

## Private Member Functions

- void [Start](#) ()  
*Starts and initializes the edge. Obtains reference to the gameobjects in the edge prefab that are used to visualize the edge.*
- void [Update](#) ()  
*Updatest the shader of the edge with the attached viewer's world to local matrix so the edge is cropped to the viewwindow.*
- void [OnDestroy](#) ()  
*Destroys the edge and clears listeners and reference to the repository that it created to obtain edge data.*
- void [OnViewerDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Updates the edges presentation whenever the viewer's data changes.*
- void [LinkEventListeners](#) ()  
*Links the event listeners that the edge component uses to listen to data changed events from the repository.*
- void [OnEdgeDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Called whenever the edges data changes and then calls the function to update the edge's presentation.*
- void [UpdateEdgePresentation](#) ()  
*Updates the edge's visual representation.*

## Private Attributes

- string [\\_edgeld](#)
- string [\\_attachedViewerId](#)
- [PTEdge](#) [\\_edgeData](#)
- [PTViewer](#) [\\_attachedViewerData](#)
- GameObject [\\_splineGameObject](#)
- SplineContainer [\\_splineContainerComponent](#)
- MaterialPropertyBlock [\\_matPropBlock](#)

### 11.10.1 Detailed Description

Component that handles the behavior of the Edges that are used in the viewer to visually represent the edges in the 3DML formatted model.

### 11.10.2 Member Function Documentation

#### 11.10.2.1 Init()

```
void GOEdge.Init (
    string edgeId,
    string attachedViewerId )
```

Called to initialize the edge and obtain a reference to the viewer its attached to.

#### Parameters

<i>edgeld</i>	The id of the edge that the component is linked to.
<i>attached</i> ↔ <i>ViewerId</i>	The id of the viewer that the edge component is attached to.



### 11.10.2.2 LinkEventListeners()

```
void GOEdge.LinkEventListeners ( ) [private]
```

Links the event listeners that the edge component uses to listen to data changed events from the repository.

### 11.10.2.3 OnDestroy()

```
void GOEdge.OnDestroy ( ) [private]
```

Destroys the edge and clears listeners and reference to the repository that it created to obtain edge data.

### 11.10.2.4 OnEdgeDataChanged()

```
void GOEdge.OnEdgeDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Called whenever the edges data changes and then calls the function to update the edge's presentation.

#### Parameters

<i>obj</i>	
<i>e</i>	

### 11.10.2.5 OnViewerDataChanged()

```
void GOEdge.OnViewerDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Updates the edges presentation whenever the viewer's data changes.

#### Parameters

<i>obj</i>	
<i>e</i>	

### 11.10.2.6 Start()

```
void GOEdge.Start ( ) [private]
```

Starts and initializes the edge. Obtains reference to the gameobjects in the edge prefab that are used to visualize the edge.

### 11.10.2.7 Update()

```
void GOEdge.Update ( ) [private]
```

Update the shader of the edge with the attached viewer's world to local matrix so the edge is cropped to the viewwindow.

### 11.10.2.8 UpdateEdgePresentation()

```
void GOEdge.UpdateEdgePresentation ( ) [private]
```

Updates the edge's visual representation.

## 11.10.3 Member Data Documentation

### 11.10.3.1 \_attachedViewerData

```
PTViewer GOEdge._attachedViewerData [private]
```

### 11.10.3.2 \_attachedViewerId

```
string GOEdge._attachedViewerId [private]
```

### 11.10.3.3 \_edgeData

```
PTEdge GOEdge._edgeData [private]
```

### 11.10.3.4 \_edgeId

```
string GOEdge._edgeId [private]
```

### 11.10.3.5 \_matPropBlock

```
MaterialPropertyBlock GOEdge._matPropBlock [private]
```

### 11.10.3.6 \_splineContainerComponent

```
SplineContainer GOEdge._splineContainerComponent [private]
```

### 11.10.3.7 \_splineGameObject

GameObject GOEdge.\_splineGameObject [private]

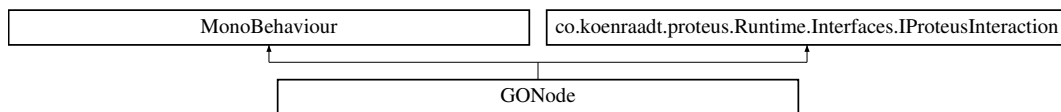
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/GOEdge.cs](#)

## 11.11 GONode Class Reference

Component that handles the behavior of the nodes that are used in the viewer to visually represent the nodes in the 3DML formatted model.

Inheritance diagram for GONode:



### Public Member Functions

- void [Init](#) (string nodeId, string attachedViewerId)  
*Called to initialize the node and obtain a reference to the viewer its attached to.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Selects the node whenever it is clicked.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Opens the behavioral nodes related to the node in a new viewer when the user alt clicks the node.*

### Public Member Functions inherited from [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*

## Private Member Functions

- void [Start](#) ()  
*Starts and initializes the node. Obtains references to the gameobjects in the node prefab that are used to visualize the node.*
- void [Update](#) ()  
*Updatest the shader of the node and node's text with the attached viewer's world to local matrix so the node and text is cropped to the viewwindow.*
- void [OnDestroy](#) ()  
*Destroys the node and clears any listeners and references to the repository that it created to obtain node data.*
- void [LinkEventListeners](#) ()  
*Links the event listeners to be notified of changes to viewer, node or the global Proteus data.*
- void [OnGlobalsDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Whenever the global Proteus data's node selection changes, the node change's its color to reflect if it is selected.*
- void [OnNodeDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Whenever the node's data changes the presentation is updated.*
- void [OnViewerDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Whenever the viewer's properties that affect the node, such as layout, zoom or scale, change the node's presentation is updated.*
- void [UpdateNodePresentation](#) ()  
*Updates the visual presentation of the node.*

## Private Attributes

- string [\\_nodeId](#)
- string [\\_attachedViewerId](#)
- [PTNode](#) [\\_nodeData](#)
- [PTViewer](#) [\\_attachedViewerData](#)
- [PTGlobals](#) [\\_globalsData](#)
- [TextMeshPro](#) [\\_displayNameTMP](#)
- [GameObject](#) [\\_nodeGameObject](#)
- [GameObject](#) [\\_displayNameObj](#)
- [MaterialPropertyBlock](#) [\\_matPropBlock](#)

### 11.11.1 Detailed Description

Component that handles the behavior of the nodes that are used in the viewer to visually represent the nodes in the 3DML formatted model.

### 11.11.2 Member Function Documentation

#### 11.11.2.1 Init()

```
void GONode.Init (
    string nodeId,
    string attachedViewerId )
```

Called to initialize the node and obtain a reference to the viewer its attached to.

## Parameters

<i>nodeId</i>	The id of the node that the component is linked to.
<i>attached</i> ↔ <i>ViewerId</i>	The id of the viewer that the edge component is attached to.

**11.11.2.2 LinkEventListeners()**

```
void GONode.LinkEventListeners ( ) [private]
```

Links the event listeners to be notified of changes to viewer, node or the global Proteus data.

**11.11.2.3 OnDestroy()**

```
void GONode.OnDestroy ( ) [private]
```

Destroys the node and clears any listeners and references to the repository that it created to obtain node data.

**11.11.2.4 OnGlobalsDataChanged()**

```
void GONode.OnGlobalsDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Whenever the global Proteus data's node selection changes, the node change's its color to reflect if it is selected.

## Parameters

<i>obj</i>	The object containing the globals data.
<i>e</i>	Object storing the arguments of the property changed event.

**11.11.2.5 OnNodeDataChanged()**

```
void GONode.OnNodeDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Whenever the node's data changes the presentation is updated.

## Parameters

<i>obj</i>	
<i>e</i>	

### 11.11.2.6 OnPointerAltClickDown()

```
void GONode.OnPointerAltClickDown (
    RaycastHit hit )
```

Opens the behavioral nodes related to the node in a new viewer when the user alt clicks the node.

#### Parameters

<i>hit</i>	Raycat result from the interaction.
------------	-------------------------------------

Implements [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#).

### 11.11.2.7 OnPointerDown()

```
void GONode.OnPointerDown (
    RaycastHit hit )
```

Selects the node whenever it is clicked.

#### Parameters

<i>hit</i>	Raycast result from the interaction.
------------	--------------------------------------

Implements [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#).

### 11.11.2.8 OnViewerDataChanged()

```
void GONode.OnViewerDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Whenever the viewer's properties that affect the node, such as layout, zoom or scale, change the node's presentation is updated.

#### Parameters

<i>obj</i>	
<i>e</i>	

### 11.11.2.9 Start()

```
void GONode.Start ( ) [private]
```

Starts and initializes the node. Obtains references to the gameobjects in the node prefab that are used to visualize the node.

#### 11.11.2.10 Update()

```
void GONode.Update ( ) [private]
```

Update the shader of the node and node's text with the attached viewer's world to local matrix so the node and text is cropped to the view window.

#### 11.11.2.11 UpdateNodePresentation()

```
void GONode.UpdateNodePresentation ( ) [private]
```

Updates the visual presentation of the node.

### 11.11.3 Member Data Documentation

#### 11.11.3.1 \_attachedViewerData

```
PTViewer GONode._attachedViewerData [private]
```

#### 11.11.3.2 \_attachedViewerId

```
string GONode._attachedViewerId [private]
```

#### 11.11.3.3 \_displayNameObj

```
GameObject GONode._displayNameObj [private]
```

#### 11.11.3.4 \_displayNameTMP

```
TextMeshPro GONode._displayNameTMP [private]
```

#### 11.11.3.5 \_globalsData

```
PTGlobals GONode._globalsData [private]
```

#### 11.11.3.6 \_matPropBlock

```
MaterialPropertyBlock GONode._matPropBlock [private]
```

#### 11.11.3.7 \_nodeData

```
PTNode GONode._nodeData [private]
```

### 11.11.3.8 `_nodeGameObject`

```
GameObject GONode._nodeGameObject [private]
```

### 11.11.3.9 `_nodeId`

```
string GONode._nodeId [private]
```

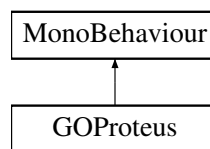
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/GONode.cs](#)

## 11.12 GOProteus Class Reference

Game object that is the root of all gameobjects belonging directly to Proteus.

Inheritance diagram for GOProteus:



### Private Member Functions

- void [Start](#) ()
- void [Update](#) ()

### 11.12.1 Detailed Description

Game object that is the root of all gameobjects belonging directly to Proteus.

### 11.12.2 Member Function Documentation

#### 11.12.2.1 `Start()`

```
void GOProteus.Start ( ) [private]
```

#### 11.12.2.2 `Update()`

```
void GOProteus.Update ( ) [private]
```

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

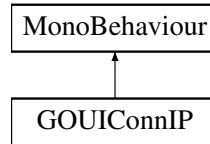
- [co.koenraad.proteus/Runtime/Scripts/GOProteus.cs](#)



## 11.13 GOUIConnIP Class Reference

Used to debug / test the VR Experiment. Can be ignored.

Inheritance diagram for GOUIConnIP:



### Private Member Functions

- void [Start](#) ()
- void [Update](#) ()

### 11.13.1 Detailed Description

Used to debug / test the VR Experiment. Can be ignored.

### 11.13.2 Member Function Documentation

#### 11.13.2.1 Start()

```
void GOUIConnIP.Start ( ) [private]
```

#### 11.13.2.2 Update()

```
void GOUIConnIP.Update ( ) [private]
```

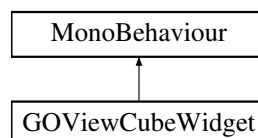
The documentation for this class was generated from the following file:

- [co.koenraadt.proteus/Runtime/VR/GOUConnIP.cs](#)

## 11.14 GOViewCubeWidget Class Reference

ViewCube widget that helps a user to orient themselves in 3D space.

Inheritance diagram for GOViewCubeWidget:



## Private Member Functions

- void [Update](#) ()  
*Updates the GOViewCubeWidgets rotation.*

### 11.14.1 Detailed Description

ViewCube widget that helps a user to orient themselves in 3D space.

### 11.14.2 Member Function Documentation

#### 11.14.2.1 Update()

```
void GOViewCubeWidget.Update ( ) [private]
```

Updates the GOViewCubeWidgets rotation.

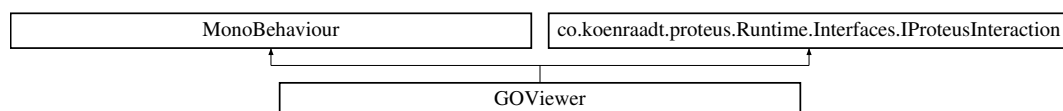
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/components/GOViewCubeWidgetComp.cs](#)

## 11.15 GOViewer Class Reference

Component that implements and handle the behavior of a Proteus viewer.

Inheritance diagram for GOViewer:



## Public Member Functions

- void [Init](#) (string viewerId)  
*Initializes the viewer and sets its related viewer id.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Select the viewer whenever its clicked.*

## Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*

## Public Attributes

- bool [Detached](#) = false  
*Whether the viewer should be detached from the visualization controller. Used in the VR experiment. Detached viewers are not automatically placed.*
- string[] [RootNodeIds](#)  
*The list of ids for the root nodes of the viewer. The viewer will visualize the hierarchy of all nodes that are descendants of this root node.*
- string [ViewerId](#) = null
- GameObject [NodePrefab](#)  
*Reference to the NodePrefab that the viewer instantiates for each node.*
- GameObject [EdgePrefab](#)  
*Reference to the EdgePrefab that the viewer instantiates for each edge.*

## Properties

- string [Id](#) [get, set]  
*The Id of the viewer that can be explicitly set when the viewer is detached.*

## Private Member Functions

- void [Start](#) ()  
*Initializes and starts the viewer. This will obtain references to the gameobjects used by the viewer and spawns the nodes and edges used to visualize the viewer's layout.*
- void [LinkEventListeners](#) ()  
*Links the event listeners so that the viewer is notified whenever data that the viewer relies on changes.*
- void [Update](#) ()  
*On every update save the viewwindow's WorldToLocalMatrix that is used to crop the contents of the viewer inside this viewwindow. The viewer is also rotated towards the user every update if billboarding is enabled.*
- void [OnDestroy](#) ()  
*Whenever the viewer is destroyed, clean up all data change listeners.*
- void [OnViewerDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Whenever the viewer's data changes, the viewer is updated so the visualization reflects the current state. For example, whenever the layout changes, edges and nodes are updated and spawned / removed accordingly.*
- void [OnGlobalsDataChanged](#) (object obj, PropertyChangedEventArgs e)  
*Whenever the viewer selection changes, update the viewer's presentation accordingly to reflect if it is selected.*
- void [SpawnEdges](#) ()  
*Spawns the edge prefabs that are used to create a visual representation of the edges in the model.*
- void [OnEdgesDataChanged](#) (object obj, NotifyCollectionChangedEventArgs e)  
*Regenerate the viewer's layout when the edges data collection has changed.*
- void [OnNodesDataChanged](#) (object obj, NotifyCollectionChangedEventArgs e)  
*Regenerate the viewer's layout when the nodes data collection has changed.*
- void [SpawnNodes](#) ()  
*Spawns the node prefabs that are used to create a visual representation of the edges in the model.*
- void [SpawnNode](#) (PTNode node)  
*Spawns a node prefab in the scene and links it to the viewer.*
- void [SpawnEdge](#) (PTEdge edge)  
*Spawn an edge prefab in the scene and links it to the viewer.*
- void [DestroyNode](#) (string id)  
*Destroy a Node in the viewer.*
- void [DestroyEdge](#) (string id)  
*Destroy a Edge in the viewer.*
- void [UpdateModelAnchorOffsetPresentation](#) ()  
*Updates the position of the viewer's model anchor to set its position and rotation to the offset that is controlled by the user when the user pans the viewer.*
- void [UpdateViewerPresentation](#) ()  
*Updates the viewer's presentation, such as scale and zoom level.*

## Private Attributes

- [PTViewer\\_viewerData](#)
- string [\\_linkedViewerId](#)
- GameObject [\\_viewerContainer](#)
- GameObject [\\_modelAnchor](#)
- GameObject [\\_viewWindow](#)
- List< GameObject > [\\_viewWindowBorders](#)
- PTGlobals [\\_globalsData](#)
- ObservableCollection< PTNode > [\\_nodesData](#)
- ObservableCollection< PTEdge > [\\_edgesData](#)
- Dictionary< string, GameObject > [\\_nodePrefabGOs](#)
- Dictionary< string, GameObject > [\\_edgePrefabGOs](#)
- List< IPTViewerComponent > [\\_viewerComponents](#)

### 11.15.1 Detailed Description

Component that implements and handle the behavior of a Proteus viewer.

### 11.15.2 Member Function Documentation

#### 11.15.2.1 DestroyEdge()

```
void GOViewer.DestroyEdge (
    string id ) [private]
```

Destroy a Edge in the viewer.

##### Parameters

<i>id</i>	id of the edge to destroy.
-----------	----------------------------

#### 11.15.2.2 DestroyNode()

```
void GOViewer.DestroyNode (
    string id ) [private]
```

Destroy a Node in the viewer.

##### Parameters

<i>id</i>	Id of the node to destroy.
-----------	----------------------------

#### 11.15.2.3 Init()

```
void GOViewer.Init (
    string viewerId )
```

Initializes the viewer and sets its related viewer id.

##### Parameters

<i>viewerId</i>	The id of the viewer.
<i>Id</i>	

#### 11.15.2.4 LinkEventListeners()

```
void GOViewer.LinkEventListeners ( ) [private]
```

Links the event listeners so that the viewer is notified whenever data that the viewer relies on changes.

### 11.15.2.5 OnDestroy()

```
void GOViewer.OnDestroy ( ) [private]
```

Whenever the viewer is destroyed, clean up all data change listeners.

### 11.15.2.6 OnEdgesDataChanged()

```
void GOViewer.OnEdgesDataChanged (
    object obj,
    NotifyCollectionChangedEventArgs e ) [private]
```

Regenerate the viewer's layout when the edges data collection has changed.

#### Parameters

<i>obj</i>	
<i>e</i>	

### 11.15.2.7 OnGlobalsDataChanged()

```
void GOViewer.OnGlobalsDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Whenever the viewer selection changes, update the viewer's presentation accordingly to reflect if it is selected.

#### Parameters

<i>obj</i>	
<i>e</i>	

### 11.15.2.8 OnNodesDataChanged()

```
void GOViewer.OnNodesDataChanged (
    object obj,
    NotifyCollectionChangedEventArgs e ) [private]
```

Regenerate the viewer's layout when the nodes data collection has changed.

#### Parameters

<i>obj</i>	
<i>e</i>	

**11.15.2.9 OnPointerDown()**

```
void GOViewer.OnPointerDown (
    RaycastHit hit )
```

Select the viewer whenever its clicked.

**Parameters**

<i>hit</i>	The raycast result from the interaction.
------------	--

Implements [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.15.2.10 OnViewerDataChanged()**

```
void GOViewer.OnViewerDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

Whenever the viewer's data changes, the viewer is updated so the visualization reflects the current state. For example, whenever the layout changes, edges and nodes are updated and spawned / removed accordingly.

**Parameters**

<i>obj</i>	
<i>e</i>	

**11.15.2.11 SpawnEdge()**

```
void GOViewer.SpawnEdge (
    PTEdge edge ) [private]
```

Spawn an edge prefab in the scene and links it to the viewer.

**Parameters**

<i>edgeData</i>	Data of the edge to add.
-----------------	--------------------------

**11.15.2.12 SpawnEdges()**

```
void GOViewer.SpawnEdges ( ) [private]
```

Spawns the edge prefabs that are used to create a visual representation of the edges in the model.

**11.15.2.13 SpawnNode()**

```
void GOViewer.SpawnNode (
    PTNode node ) [private]
```

Spawns a node prefab in the scene and links it to the viewer.



## Parameters

<i>nodeData</i>	Data of the node to add.
-----------------	--------------------------

**11.15.2.14 SpawnNodes()**

```
void GOViewer.SpawnNodes ( ) [private]
```

Spawns the node prefabs that are used to create a visual representation of the edges in the model.

**11.15.2.15 Start()**

```
void GOViewer.Start ( ) [private]
```

Initializes and starts the viewer. This will obtain references to the gameobjects used by the viewer and spawns the nodes and edges used to visualize the viewer's layout.

**11.15.2.16 Update()**

```
void GOViewer.Update ( ) [private]
```

On every update save the viewwindow's WorldToLocalMatrix that is used to crop the contents of the viewer inside this viewwindow. The viewer is also rotated towards the user every update if billboarding is enabled.

**11.15.2.17 UpdateModelAnchorOffsetPresentation()**

```
void GOViewer.UpdateModelAnchorOffsetPresentation ( ) [private]
```

Updates the position of the viewer's model anchor to set its position and rotation to the offset that is controlled by the user when the user pans the viewer.

**11.15.2.18 UpdateViewerPresentation()**

```
void GOViewer.UpdateViewerPresentation ( ) [private]
```

Updates the viewer's presentation, such as scale and zoom level.

**11.15.3 Member Data Documentation****11.15.3.1 \_edgePrefabGOs**

```
Dictionary<string, GameObject> GOViewer._edgePrefabGOs [private]
```

### 11.15.3.2 `_edgesData`

`ObservableCollection<PTEdge> GOViewer._edgesData [private]`

### 11.15.3.3 `_globalsData`

`PTGlobals GOViewer._globalsData [private]`

### 11.15.3.4 `_linkedViewerId`

`string GOViewer._linkedViewerId [private]`

### 11.15.3.5 `_modelAnchor`

`GameObject GOViewer._modelAnchor [private]`

### 11.15.3.6 `_nodePrefabGOs`

`Dictionary<string, GameObject> GOViewer._nodePrefabGOs [private]`

### 11.15.3.7 `_nodesData`

`ObservableCollection<PTNode> GOViewer._nodesData [private]`

### 11.15.3.8 `_viewerComponents`

`List<IPTViewerComponent> GOViewer._viewerComponents [private]`

### 11.15.3.9 `_viewerContainer`

`GameObject GOViewer._viewerContainer [private]`

### 11.15.3.10 `_viewerData`

`PTViewer GOViewer._viewerData [private]`

### 11.15.3.11 `_viewWindow`

`GameObject GOViewer._viewWindow [private]`

### 11.15.3.12 `_viewWindowBorders`

```
List<GameObject> GOViewer._viewWindowBorders [private]
```

### 11.15.3.13 `Detached`

```
bool GOViewer.Detached = false
```

Whether the viewer should be detached from the visualization controller. Used in the VR experiment. Detached viewers are not automatically placed.

### 11.15.3.14 `EdgePrefab`

```
GameObject GOViewer.EdgePrefab
```

Reference to the EdgePrefab that the viewer instantiates for each edge.

### 11.15.3.15 `NodePrefab`

```
GameObject GOViewer.NodePrefab
```

Reference to the NodePrefab that the viewer instantiates for each node.

### 11.15.3.16 `RootNodeIds`

```
string [] GOViewer.RootNodeIds
```

The list of ids for the root nodes of the viewer. The viewer will visualize the hierarchy of all nodes that are descendants of this root node.

### 11.15.3.17 `ViewerId`

```
string GOViewer.ViewerId = null
```

## 11.15.4 Property Documentation

### 11.15.4.1 `Id`

```
string GOViewer.Id [get], [set]
```

The Id of the viewer that can be explicitly set when the viewer is detached.

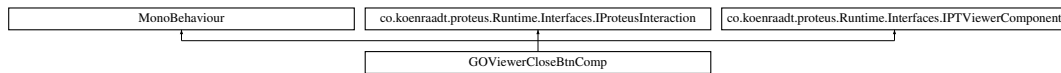
The documentation for this class was generated from the following file:

- `co.koenraad.proteus/Runtime/Scripts/GOViewer.cs`

## 11.16 GOViewerCloseBtnComp Class Reference

Button component that closes a viewer.

Inheritance diagram for GOViewerCloseBtnComp:



### Public Member Functions

- void [Init](#) (string linkedViewerId)  
*Initializes the component and saves the reference to its related viewer.*
- void [CloseViewer](#) ()  
*Action that closes the viewer that the component is linked to.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Whenever the user clicks the viewr that the component is linked to closes.*

### Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*
- void [Init](#) (string linkedViewerId)  
*Called on initialization by the viewer with a reference to the linked viewer's id.*

**Protected Attributes**

- [PTViewer\\_linkedViewerData](#)

**Private Member Functions**

- void [Start](#) ()  
*Starts and initializes the close button component.*

**Private Attributes**

- string [\\_attachedViewerId](#)

**11.16.1 Detailed Description**

Button component that closes a viewer.

**11.16.2 Member Function Documentation****11.16.2.1 CloseViewer()**

```
void GOViewerCloseBtnComp.CloseViewer ( )
```

Action that closes the viewer that the component is linked to.

**11.16.2.2 Init()**

```
void GOViewerCloseBtnComp.Init (
    string linkedViewerId )
```

Initializes the component and saves the reference to its related viewer.

**Parameters**

<i>linked</i> ↔ <i>ViewerId</i>	The id of the linked viewer.
------------------------------------	------------------------------

Implements [co.koenraad.proteus.Runtime.Interfaces.IPTViewerComponent](#).

**11.16.2.3 OnPointerDown()**

```
void GOViewerCloseBtnComp.OnPointerDown (
    RaycastHit hit )
```

Whenever the user clicks the viewr that the component is linked to closes.

## Parameters

<i>hit</i>	
------------	--

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

#### 11.16.2.4 Start()

```
void GOViewerCloseBtnComp.Start ( ) [private]
```

Starts and initializes the close button component.

### 11.16.3 Member Data Documentation

#### 11.16.3.1 \_attachedViewerId

```
string GOViewerCloseBtnComp._attachedViewerId [private]
```

#### 11.16.3.2 \_linkedViewerData

```
PtViewer GOViewerCloseBtnComp._linkedViewerData [protected]
```

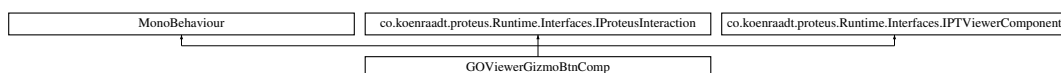
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/components/GOViewerCloseBtnComp.cs](#)

## 11.17 GOViewerGizmoBtnComp Class Reference

Button component for the viewer that can enable and disable the gizmo of the viewer.

Inheritance diagram for GOViewerGizmoBtnComp:



### Public Member Functions

- void [Init](#) (string linkedViewerId)  
*Initializes the gizmo button component and links the viewer its related to.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*

## Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*
- void [Init](#) (string linkedViewerId)  
*Called on initialization by the viewer with a reference to the linked viewer's id.*

## Protected Attributes

- [PTViewer \\_linkedViewerData](#)

## Private Member Functions

- void [Start](#) ()  
*Starts and initializes the gizmo button component.*
- void [Update](#) ()

## Private Attributes

- string [\\_attachedViewerId](#)

### 11.17.1 Detailed Description

Button component for the viewer that can enable and disable the gizmo of the viewer.

### 11.17.2 Member Function Documentation

#### 11.17.2.1 Init()

```
void GOViewerGizmoBtnComp.Init (
    string linkedViewerId )
```

Initializes the gizmo button component and links the viewer its related to.

## Parameters

<i>linked</i> ↔ <i>ViewerId</i>	The id of the linked viewer.
------------------------------------	------------------------------

Implements [co.koenraadt.proteus.Runtime.Interfaces.IPTViewerComponent](#).

**11.17.2.2 OnPointerDown()**

```
void GOViewerGizmoBtnComp.OnPointerDown (
    RaycastHit hit )
```

Called when the user presses the pointer button down.

## Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

Implements [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.17.2.3 Start()**

```
void GOViewerGizmoBtnComp.Start ( ) [private]
```

Starts and initializes the gizmo button component.

**11.17.2.4 Update()**

```
void GOViewerGizmoBtnComp.Update ( ) [private]
```

**11.17.3 Member Data Documentation****11.17.3.1 \_attachedViewerId**

```
string GOViewerGizmoBtnComp._attachedViewerId [private]
```

**11.17.3.2 \_linkedViewerData**

```
PTViewer GOViewerGizmoBtnComp._linkedViewerData [protected]
```

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

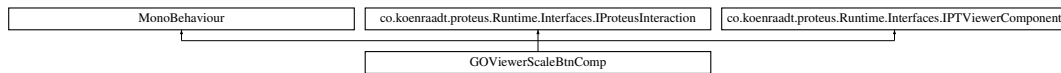
- [co.koenraadt.proteus/Runtime/Scripts/components/GOViewerGizmoBtn.cs](#)



## 11.18 GOViewerScaleBtnComp Class Reference

Button component for viewers that can control a viewer's scale.

Inheritance diagram for GOViewerScaleBtnComp:



### Public Member Functions

- void [Init](#) (string linkedViewerId)  
*Initializes the scale button component and links the viewer its related to.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*

### Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*
- void [Init](#) (string linkedViewerId)  
*Called on initialization by the viewer with a reference to the linked viewer's id.*

## Public Attributes

- float [ScaleStep](#) = 0.005f  
*The step that the viewer will scale when the button is clicked.*

## Protected Attributes

- [PTViewer\\_attachedViewerData](#)

## Private Member Functions

- void [Start](#) ()  
*Initializes and starts the button component that scales the viewer.*
- void [Update](#) ()  
*While the user holds down / presses the mouse the viewer will increment in scale with the scale step.*

## Private Attributes

- string [\\_attachedViewworld](#)
- bool [\\_isPressed](#) = false

## 11.18.1 Detailed Description

Button component for viewers that can control a viewer's scale.

## 11.18.2 Member Function Documentation

### 11.18.2.1 Init()

```
void GOViewerScaleBtnComp.Init (
    string linkedViewerId )
```

Initializes the scale button component and links the viewer its related to.

#### Parameters

<i>linked↔ ViewerId</i>	The id of the linked viewer.
-----------------------------	------------------------------

Implements [co.koenraad.proteus.Runtime.Interfaces.IPTViewerComponent](#).

### 11.18.2.2 OnPointerDown()

```
void GOViewerScaleBtnComp.OnPointerDown (
    RaycastHit hit )
```

Called when the user presses the pointer button down.

**Parameters**

<i>hit</i>	The raycasthit that triggered the event.
------------	--

Implements [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.18.2.3 OnPointerUp()**

```
void GOViewerScaleBtnComp.OnPointerUp (
    RaycastHit hit )
```

Called when the user releases the pointer.

**Parameters**

<i>hit</i>	The raycasthit that triggered the event.
------------	--

Implements [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.18.2.4 Start()**

```
void GOViewerScaleBtnComp.Start ( ) [private]
```

Initializes and starts the button component that scales the viewer.

**11.18.2.5 Update()**

```
void GOViewerScaleBtnComp.Update ( ) [private]
```

While the user holds down / presses the mouse the viewer will increment in scale with the scale step.

**11.18.3 Member Data Documentation****11.18.3.1 \_attachedViewerData**

```
PTViewer GOViewerScaleBtnComp._attachedViewerData [protected]
```

**11.18.3.2 \_attachedViewerId**

```
string GOViewerScaleBtnComp._attachedViewerId [private]
```

**11.18.3.3 \_isPressed**

```
bool GOViewerScaleBtnComp._isPressed = false [private]
```

### 11.18.3.4 ScaleStep

```
float GOViewerScaleBtnComp.ScaleStep = 0.005f
```

The step that the viewer will scale when the button is clicked.

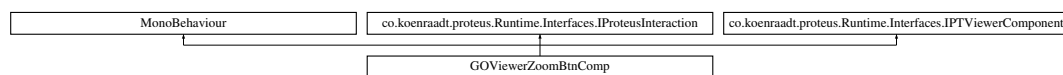
The documentation for this class was generated from the following file:

- [co.koenraadt.proteus/Runtime/Scripts/components/GOViewerScaleBtnComp.cs](#)

## 11.19 GOViewerZoomBtnComp Class Reference

Button component for viewer's that can control the level of zoom of a viewer.

Inheritance diagram for GOViewerZoomBtnComp:



### Public Member Functions

- void [Init](#) (string linkedViewerId)  
*Initialies the zoom button component and stores a refernece to the viewer its linked to.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*

### Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*

- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*
- void [Init](#) (string linkedViewerId)  
*Called on initialization by the viewer with a reference to the linked viewer's id.*

### Public Attributes

- float [ZoomScalar](#) = 0.001f  
*The step that the viewer should be scaled every update that the user presses the zoom button.*

### Protected Attributes

- [PTViewer \\_linkedViewerData](#)

### Private Member Functions

- void [Start](#) ()  
*Starts and initializes the zoom button component.*
- void [Update](#) ()  
*While the user presses down the zoom button component, increment or decrement the level of zoom with the zoom step.*

### Private Attributes

- bool [\\_isPressed](#)
- string [\\_attachedViewerId](#)

## 11.19.1 Detailed Description

Button component for viewer's that can control the level of zoom of a viewer.

## 11.19.2 Member Function Documentation

### 11.19.2.1 Init()

```
void GOViewerZoomBtnComp.Init (
    string linkedViewerId )
```

Initialies the zoom button component and stores a refernece to the viewer its linked to.

## Parameters

<i>linked</i> ↔ <i>ViewerId</i>	The id of the viewer that the component is linked to.
------------------------------------	---

Implements [co.koenraad.proteus.Runtime.Interfaces.IPTViewerComponent](#).

**11.19.2.2 OnPointerDown()**

```
void GOViewerZoomBtnComp.OnPointerDown (
    RaycastHit hit )
```

Called when the user presses the pointer button down.

## Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.19.2.3 OnPointerUp()**

```
void GOViewerZoomBtnComp.OnPointerUp (
    RaycastHit hit )
```

Called when the user releases the pointer.

## Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.19.2.4 Start()**

```
void GOViewerZoomBtnComp.Start ( ) [private]
```

Starts and initializes the zoom button component.

**11.19.2.5 Update()**

```
void GOViewerZoomBtnComp.Update ( ) [private]
```

While the user presses down the zoom button component, increment or decrement the level of zoom with the zoom step.

### 11.19.3 Member Data Documentation

#### 11.19.3.1 `_attachedViewerId`

```
string GOViewerZoomBtnComp._attachedViewerId [private]
```

#### 11.19.3.2 `_isPressed`

```
bool GOViewerZoomBtnComp._isPressed [private]
```

#### 11.19.3.3 `_linkedViewerData`

```
PTViewer GOViewerZoomBtnComp._linkedViewerData [protected]
```

#### 11.19.3.4 `ZoomScalar`

```
float GOViewerZoomBtnComp.ZoomScalar = 0.001f
```

The step that the viewer should be scaled every update that the user presses the zoom button.

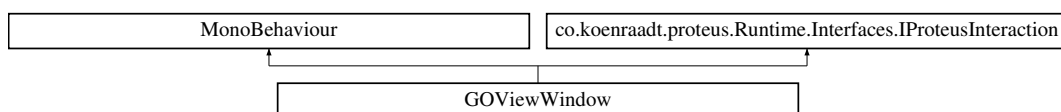
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/components/GOViewerZoomBtnComp.cs](#)

## 11.20 GOViewWindow Class Reference

The viewer's view window that the nodes and edges in the visualization are constraint to.

Inheritance diagram for GOViewWindow:



### Public Member Functions

- void [Init](#) (string attachedViewerId)  
*Initializes the view window and links the attached viewer.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Select the viewer when the view window is clicked.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*When the user control clicks the viewwindow, the panning / dragging is enabled.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Stop dragging / panning when the user releases the control click.*
- void [OnPointerMove](#) (RaycastHit hit)  
*When the user is dragging and moving the mouse, the offset position for the model anchor is updated so the viewer is panned.*

## Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*

## Private Member Functions

- void [Start](#) ()  
*Starts and initializes the view window.*
- void [Update](#) ()  
*Stop dragging when the user release the mouse.*

## Private Attributes

- bool [\\_isDragging](#)
- string [\\_attachedViewerId](#)
- Vector3 [\\_lastLocalHitPoint](#)
- [PTViewer\\_attachedViewerData](#)

### 11.20.1 Detailed Description

The viewer's view window that the nodes and edges in the visualization are constraint to.

### 11.20.2 Member Function Documentation

#### 11.20.2.1 Init()

```
void GOViewWindow.Init (
    string attachedViewerId )
```

Initializes the view window and links the attached viewer.



## Parameters

<i>attached</i> ↔	
<i>ViewerId</i>	

**11.20.2.2 OnPointerCtrlClickDown()**

```
void GOViewWindow.OnPointerCtrlClickDown (
    RaycastHit hit )
```

When the user control clicks the viewwindow, the panning / dragging is enabled.

## Parameters

<i>hit</i>	The raycast result from the interaction
------------	---

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.20.2.3 OnPointerCtrlClickUp()**

```
void GOViewWindow.OnPointerCtrlClickUp (
    RaycastHit hit )
```

Stop dragging / panning when the user releases the control click.

## Parameters

<i>hit</i>	
------------	--

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.20.2.4 OnPointerDown()**

```
void GOViewWindow.OnPointerDown (
    RaycastHit hit )
```

Select the viewer when the view window is clicked.

## Parameters

<i>hit</i>	The raycast result from the interaction
------------	---

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

**11.20.2.5 OnPointerMove()**

```
void GOViewWindow.OnPointerMove (
```

```
RaycastHit hit )
```

When the user is dragging and moving the mouse, the offset position for the model anchor is updated so the viewer is panned.

#### Parameters

<i>hit</i>	
------------	--

Implements [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#).

#### 11.20.2.6 Start()

```
void GOViewWindow.Start ( ) [private]
```

Starts and initializes the view window.

#### 11.20.2.7 Update()

```
void GOViewWindow.Update ( ) [private]
```

Stop dragging when the user release the mouse.

### 11.20.3 Member Data Documentation

#### 11.20.3.1 \_attachedViewerData

```
PTViewer GOViewWindow._attachedViewerData [private]
```

#### 11.20.3.2 \_attachedViewerId

```
string GOViewWindow._attachedViewerId [private]
```

#### 11.20.3.3 \_isDragging

```
bool GOViewWindow._isDragging [private]
```

#### 11.20.3.4 \_lastLocalHitPoint

```
Vector3 GOViewWindow._lastLocalHitPoint [private]
```

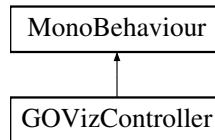
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/Scripts/GOViewWindow.cs](#)

## 11.21 GOVizController Class Reference

Gameobject used to implement / control the visualization controller for Proteus.

Inheritance diagram for GOVizController:



### Public Attributes

- GameObject [ViewerPrefab](#)

*The prefab the visualization controller should use to represent a viewer.*

### Private Member Functions

- void [Start](#) ()  
*Starts and initializes the visualiation controller.*
- void [linkEventListeners](#) ()  
*Links the event listeners so that the visualization is updated when the data it uses changes.*
- void [Update](#) ()  
*Handles the interaction for the visualization of Proteus and calls the components that are interacted with.*
- void [OnDestroy](#) ()  
*Detroy the visualization controller and unlink the event listeners for data the visualization controller uses.*
- void [OnViewersDataChanged](#) (object sender, NotifyCollectionChangedEventArgs e)  
*Update when the nodes data collection has changed.*
- void [OnGlobalsDataChanged](#) (object obj, PropertyChangedEventArgs e)
- void [SpawnViewers](#) (List< [PTViewer](#) > viewersData)  
*Spawn nodes in the Viewer.*
- void [SpawnViewer](#) ([PTViewer](#) viewerData)  
*Spawns a viewer in the scene.*
- void [DestroyViewer](#) (string viewerId)  
*Destroys a viewer.*

### Private Attributes

- [PTGlobals \\_globalsData](#)
- ObservableCollection< [PTViewer](#) > [\\_viewersData](#)
- Dictionary< string, GameObject > [\\_viewerPrefabGOs](#)

### 11.21.1 Detailed Description

Gameobject used to implement / control the visualization controller for Proteus.

### 11.21.2 Member Function Documentation

#### 11.21.2.1 DestroyViewer()

```
void GOVizController.DestroyViewer (
    string viewerId ) [private]
```

Destroys a viewer.

## Parameters

<i>viewer↔ Id</i>	The id of the viewer to destroy.
-----------------------	----------------------------------

**11.21.2.2 linkEventListeners()**

```
void GOVizController.linkEventListeners ( ) [private]
```

Links the event listeners so that the visualization is updated when the data it uses changes.

**11.21.2.3 OnDestroy()**

```
void GOVizController.OnDestroy ( ) [private]
```

Detroy the visualization controller and unlink the event listeners for data the visualization controller uses.

**11.21.2.4 OnGlobalsDataChanged()**

```
void GOVizController.OnGlobalsDataChanged (
    object obj,
    PropertyChangedEventArgs e ) [private]
```

**11.21.2.5 OnViewersDataChanged()**

```
void GOVizController.OnViewersDataChanged (
    object sender,
    NotifyCollectionChangedEventArgs e ) [private]
```

Update when the nodes data collection has changed.

## Parameters

<i>sender</i>	
<i>e</i>	

**11.21.2.6 SpawnViewer()**

```
void GOVizController.SpawnViewer (
    PTVIEWER viewerData ) [private]
```

Spawns a viewer in the scene.

## Parameters

<i>viewerData</i>	The data of the viewer to add.
-------------------	--------------------------------

## Exceptions

<i>System.Exception</i>	Thrown when a viewer is instantiated but the position is null.
-------------------------	--

**11.21.2.7 SpawnViewers()**

```
void GOVizController.SpawnViewers (
    List< PTVIEWER > viewersData ) [private]
```

Spawn nodes in the Viewer.

## Parameters

<i>node</i>	
-------------	--

**11.21.2.8 Start()**

```
void GOVizController.Start ( ) [private]
```

Starts and initializes the visualization controller.

**11.21.2.9 Update()**

```
void GOVizController.Update ( ) [private]
```

Handles the interaction for the visualization of Proteus and calls the components that are interacted with.

**11.21.3 Member Data Documentation****11.21.3.1 \_globalsData**

```
PTGlobals GOVizController._globalsData [private]
```

**11.21.3.2 \_viewerPrefabGOs**

```
Dictionary<string, GameObject> GOVizController._viewerPrefabGOs [private]
```

**11.21.3.3 \_viewersData**

```
ObservableCollection<PTVIEWER> GOVizController._viewersData [private]
```

### 11.21.3.4 ViewerPrefab

GameObject GOVizController.ViewerPrefab

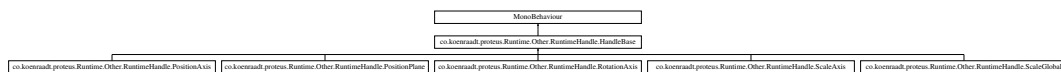
The prefab the visualization controller should use to represent a viewer.

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

- [co.koenraadt.proteus/Runtime/Scripts/GOVizController.cs](#)

## 11.22 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase Class Reference

Inheritance diagram for co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase:



### Public Member Functions

- void [SetDefaultColor](#) ()
- void [SetColor](#) (Color p\_color)
- virtual void [StartInteraction](#) (Vector3 p\_hitPoint)
- virtual bool [CanInteract](#) (Vector3 p\_hitPoint)
- virtual void [Interact](#) (Vector3 p\_previousPosition)
- virtual void [EndInteraction](#) ()

### Static Public Member Functions

- static Vector3 [GetVectorFromAxes](#) (HandleAxes p\_axes)

### Public Attributes

- float [delta](#)

### Protected Member Functions

- virtual void [InitializeMaterial](#) ()

### Protected Attributes

- [RuntimeTransformHandle \\_parentTransformHandle](#)
- Color [\\_defaultColor](#)
- Material [\\_material](#)
- Vector3 [\\_hitPoint](#)
- bool [\\_isInteracting](#) = false

## Events

- Action [InteractionStart](#)
- Action [InteractionEnd](#)
- Action< float > [InteractionUpdate](#)

### 11.22.1 Detailed Description

Created by Peter @sHTiF Stefcek 20.10.2020

### 11.22.2 Member Function Documentation

#### 11.22.2.1 CanInteract()

```
virtual bool co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase.CanInteract (
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented in [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis](#).

#### 11.22.2.2 EndInteraction()

```
virtual void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase.EndInteraction ( )
[virtual]
```

Reimplemented in [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis](#).

#### 11.22.2.3 GetVectorFromAxes()

```
static Vector3 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase.GetVectorFromAxes (
    HandleAxes p_axes ) [static]
```

#### 11.22.2.4 InitializeMaterial()

```
virtual void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase.InitializeMaterial (
) [protected], [virtual]
```

Reimplemented in [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis](#).

#### 11.22.2.5 Interact()

```
virtual void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase.Interact (
    Vector3 p_previousPosition ) [virtual]
```

Reimplemented in [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis](#), [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis](#), [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis](#), and [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal](#).

### 11.22.2.6 SetColor()

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase.SetColor (
    Color p_color )
```

### 11.22.2.7 SetDefaultColor()

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase.SetDefaultColor ( )
```

### 11.22.2.8 StartInteraction()

```
virtual void co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase.StartInteraction (
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented in [co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionAxis](#), [co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis](#), [co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleAxis](#), and [co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal](#).

## 11.22.3 Member Data Documentation

### 11.22.3.1 \_defaultColor

```
Color co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase._defaultColor [protected]
```

### 11.22.3.2 \_hitPoint

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase._hitPoint [protected]
```

### 11.22.3.3 \_isInteracting

```
bool co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase._isInteracting = false [protected]
```

### 11.22.3.4 \_material

```
Material co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase._material [protected]
```

### 11.22.3.5 \_parentTransformHandle

```
RuntimeTransformHandle co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase._parent↔
TransformHandle [protected]
```

### 11.22.3.6 delta

```
float co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase.delta
```



## 11.22.4 Event Documentation

### 11.22.4.1 InteractionEnd

Action co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase.InteractionEnd

### 11.22.4.2 InteractionStart

Action co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase.InteractionStart

### 11.22.4.3 InteractionUpdate

Action<float> co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase.InteractionUpdate

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

- co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/[HandleBase.cs](#)

## 11.23 co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleMathUtils Class Reference

### Static Public Member Functions

- static float [ClosestPointOnRay](#) (Ray ray, Ray other)

### Static Public Attributes

- const float [PRECISION\\_THRESHOLD](#) = 0.001f

## 11.23.1 Member Function Documentation

### 11.23.1.1 ClosestPointOnRay()

```
static float co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleMathUtils.ClosestPointOnRay (
    Ray ray,
    Ray other ) [static]
```

## 11.23.2 Member Data Documentation

### 11.23.2.1 PRECISION\_THRESHOLD

```
const float co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleMathUtils.PRECISION_THRESHOLD = 0.001f [static]
```

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

- co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Utils/[HandleMathUtils.cs](#)

## 11.24 co.koenraad.proteus.Runtime.Other.Helpers Class Reference

Collection of Helper function used by Proteus.

### Static Public Member Functions

- static void [CombineValues< T >](#) (T target, T source)  
*Merges values of a source into a target object. NOTE: This function ideally only be used to perform bulk updates. When changing specific properties, instead implement / use a function such as SetNodeTexture or SetViewerName.*
- static string [GenerateUniqueId](#) ()  
*Generates a new Proteus Guid.*
- static bool [IsEmpty< T >](#) (T value)  
*Checks for collections if they are empty.*
- static bool [IsBehavioralMetaClass](#) (string x)  
*Checks whether the given class is a behavioral class.*
- static RaycastHit[] [RayCastProteusViz](#) ()  
*Performs a raycast on the proteusviz layer originating from the user's mouse position.*
- static [IProteusInteraction](#) [FindInteractableComponentInParent](#) (GameObject source)  
*Find a proteus interactable component in parents of the given source game object.*

### 11.24.1 Detailed Description

Collection of Helper function used by Proteus.

### 11.24.2 Member Function Documentation

#### 11.24.2.1 CombineValues< T >()

```
static void co.koenraad.proteus.Runtime.Other.Helpers.CombineValues< T > (
    T target,
    T source ) [static]
```

Merges values of a source into a target object. NOTE: This function ideally only be used to perform bulk updates. When changing specific properties, instead implement / use a function such as SetNodeTexture or SetViewerName.

#### Template Parameters

<i>T</i>	the type of the objects to merge.
----------	-----------------------------------

#### Parameters

<i>target</i>	Object to merge into.
<i>source</i>	Object to take values from.

**11.24.2.2 FindInteractableComponentInParent()**

```
static IProteusInteraction co.koenraadt.proteus.Runtime.Other.Helpers.FindInteractableComponent↵
InParent (
    GameObject source ) [static]
```

Find a proteus interactable component in parents of the given source game object.

**Parameters**

<i>source</i>	The source object to start the search from
---------------	--

**Returns**

The first interactable component found

**11.24.2.3 GenerateUniqueId()**

```
static string co.koenraadt.proteus.Runtime.Other.Helpers.GenerateUniqueId ( ) [static]
```

Generates a new Proteus Guid.

**Returns**

A string containing the generated Guid.

**11.24.2.4 IsBehavioralMetaClass()**

```
static bool co.koenraadt.proteus.Runtime.Other.Helpers.IsBehavioralMetaClass (
    string x ) [static]
```

Checks whether the given class is a behavioral class.

**Parameters**

<i>x</i>	The class to check.
----------	---------------------

**Returns**

Whether the given class is marked as behavioral.

**11.24.2.5 IsEmpty< T >()**

```
static bool co.koenraadt.proteus.Runtime.Other.Helpers.IsEmpty< T > (
    T value ) [static]
```

Checks for collections if they are empty.

**Template Parameters**

<i>T</i>	the type of the object to check.
----------	----------------------------------

**Parameters**

<i>value</i>	the object to check
--------------	---------------------

**Returns**

whether the object / collection is empty.

**11.24.2.6 RayCastProteusViz()**

```
static RaycastHit[] co.koenraadt.proteus.Runtime.Other.Helpers.RayCastProteusViz ( ) [static]
```

Performs a raycast on the proteusviz layer originating from the user's mouse position.

**Returns**

The raycast hit result.

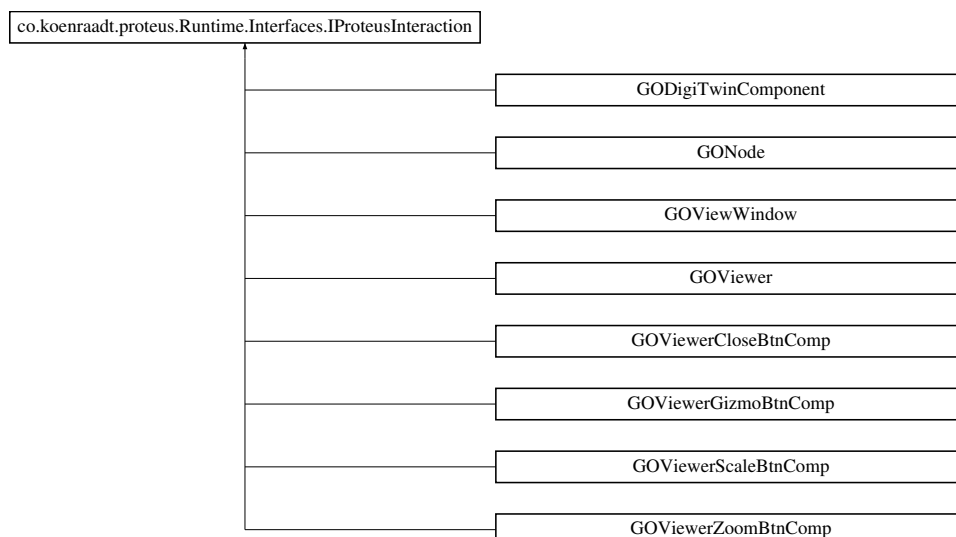
The documentation for this class was generated from the following file:

- co.koenraadt.proteus/Runtime/Other/[Helpers.cs](#)

## 11.25 co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction Interface Reference

Interface for the interaction of Proteus.

Inheritance diagram for co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction:



## Public Member Functions

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*

### 11.25.1 Detailed Description

Interface for the interaction of Proteus.

### 11.25.2 Member Function Documentation

#### 11.25.2.1 OnPointerAltClickDown()

```
void co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerAltClickDown (
    RaycastHit hit )
```

Called when the user presses the pointer down while holding alt.

#### Parameters

<i>hit</i>	The raycastHit that triggered the event.
------------	--

Implemented in [GONode](#).

#### 11.25.2.2 OnPointerAltClickUp()

```
void co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerAltClickUp (
    RaycastHit hit )
```

Called when the user releases the button when the alt key was held.

#### Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

### 11.25.2.3 OnPointerAltDown()

```
void co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerAltDown (
    RaycastHit hit )
```

Called when the user presses the alternative pointer button down.

#### Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

### 11.25.2.4 OnPointerAltUp()

```
void co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerAltUp (
    RaycastHit hit )
```

Called when the user release the alternative pointer button.

#### Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

### 11.25.2.5 OnPointerCtrlClickDown()

```
void co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerCtrlClickDown (
    RaycastHit hit )
```

Called when the user clicked while holding ctrl.

#### Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

Implemented in [GOViewWindow](#).

### 11.25.2.6 OnPointerCtrlClickUp()

```
void co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerCtrlClickUp (
    RaycastHit hit )
```

Called when the user releases the pointer and had ctrl clicked.

**Parameters**

<i>hit</i>	The raycastHit that triggered the event.
------------	--

Implemented in [GOViewWindow](#).

**11.25.2.7 OnPointerDown()**

```
void co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerDown (
    RaycastHit hit )
```

Called when the user presses the pointer button down.

**Parameters**

<i>hit</i>	The raycastHit that triggered the event.
------------	--

Implemented in [GOViewerCloseBtnComp](#), [GOViewerGizmoBtnComp](#), [GOViewerScaleBtnComp](#), [GOViewerZoomBtnComp](#), [GODigiTwinComponent](#), [GONode](#), [GOViewer](#), and [GOViewWindow](#).

**11.25.2.8 OnPointerMove()**

```
void co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerMove (
    RaycastHit hit )
```

Called when the user moves the pointer.

**Parameters**

<i>hit</i>	The raycastHit that triggered the event.
------------	--

Implemented in [GOViewWindow](#).

**11.25.2.9 OnPointerTertiaryDown()**

```
void co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerTertiaryDown (
    RaycastHit hit )
```

Called when the user presses the tertiary pointer button down.

**Parameters**

<i>hit</i>	The raycastHit that triggered the event.
------------	--

### 11.25.2.10 OnPointerTertiaryUp()

```
void co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerTertiaryUp (
    RaycastHit hit )
```

Called when the user release the tertiary pointer button.

#### Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

### 11.25.2.11 OnPointerUp()

```
void co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction.OnPointerUp (
    RaycastHit hit )
```

Called when the user releases the pointer.

#### Parameters

<i>hit</i>	The raycasthit that triggered the event.
------------	--

Implemented in [GOViewerScaleBtnComp](#), and [GOViewerZoomBtnComp](#).

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

- [co.koenraadt.proteus/Runtime/Interfaces/IProteusInteraction.cs](#)

## 11.26 co.koenraadt.proteus.Runtime.Interfaces.IPTViewerComponent Interface Reference

Interface used for components of the Viewer.

Inheritance diagram for co.koenraadt.proteus.Runtime.Interfaces.IPTViewerComponent:



### Public Member Functions

- void [Init](#) (string linkedViewerId)  
*Called on initialization by the viewer with a reference to the linked viewer's id.*

### 11.26.1 Detailed Description

Interface used for components of the Viewer.



## 11.26.2 Member Function Documentation

### 11.26.2.1 Init()

```
void co.koenraadt.proteus.Runtime.Interfaces.IPTViewerComponent.Init (
    string linkedViewerId )
```

Called on initialization by the viewer with a reference to the linked viewer's id.

#### Parameters

<i>linked</i> ↔ <i>ViewerId</i>	the id of the linked viewer
------------------------------------	-----------------------------

Implemented in [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle](#), [GOViewerCloseBtnComp](#), [GOViewerGizmoBtnComp](#), [GOViewerScaleBtnComp](#), and [GOViewerZoomBtnComp](#).

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

- [co.koenraadt.proteus/Runtime/Interfaces/IPTViewerComponent.cs](#)

## 11.27 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.MeshUtils Class Reference

### Static Public Member Functions

- static Mesh [CreateArc](#) (Vector3 p\_center, Vector3 p\_startPoint, Vector3 p\_axis, float p\_radius, float p\_angle, int p\_segmentCount)
- static Mesh [CreateArc](#) (float p\_radius, float p\_angle, int p\_segmentCount)
- static Mesh [CreateGrid](#) (float p\_width, float p\_height, int p\_segmentsX=1, int p\_segmentsY=1)
- static Mesh [CreateBox](#) (float p\_width, float p\_height, float p\_depth)
- static Mesh [CreateCone](#) (float p\_height, float p\_bottomRadius, float p\_topRadius, int p\_sideCount, int p↔heightSegmentCount)
- static Mesh [CreateTube](#) (float p\_height, int p\_sideCount, float p\_bottomRadius, float p\_bottomThickness, float p\_topRadius, float p\_topThickness)
- static Mesh [CreateTorus](#) (float p\_radius, float p\_thickness, int p\_radiusSegmentCount, int p\_sideCount)
- static Mesh [CreateSphere](#) (float p\_radius, int p\_longitudeCount, int p\_latitudeCount)

### 11.27.1 Detailed Description

Created by Peter @sHTiF Stefcek 20.10.2020, some functions based on Unity wiki

## 11.27.2 Member Function Documentation

### 11.27.2.1 CreateArc() [1/2]

```
static Mesh co.koenraadt.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateArc (
    float p_radius,
    float p_angle,
    int p_segmentCount ) [static]
```

### 11.27.2.2 CreateArc() [2/2]

```
static Mesh co.koenraad.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateArc (
    Vector3 p_center,
    Vector3 p_startPoint,
    Vector3 p_axis,
    float p_radius,
    float p_angle,
    int p_segmentCount ) [static]
```

### 11.27.2.3 CreateBox()

```
static Mesh co.koenraad.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateBox (
    float p_width,
    float p_height,
    float p_depth ) [static]
```

### 11.27.2.4 CreateCone()

```
static Mesh co.koenraad.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateCone (
    float p_height,
    float p_bottomRadius,
    float p_topRadius,
    int p_sideCount,
    int p_heightSegmentCount ) [static]
```

### 11.27.2.5 CreateGrid()

```
static Mesh co.koenraad.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateGrid (
    float p_width,
    float p_height,
    int p_segmentsX = 1,
    int p_segmentsY = 1 ) [static]
```

### 11.27.2.6 CreateSphere()

```
static Mesh co.koenraad.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateSphere (
    float p_radius,
    int p_longitudeCount,
    int p_latitudeCount ) [static]
```

### 11.27.2.7 CreateTorus()

```
static Mesh co.koenraad.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateTorus (
    float p_radius,
    float p_thickness,
    int p_radiusSegmentCount,
    int p_sideCount ) [static]
```

### 11.27.2.8 CreateTube()

```
static Mesh co.koenraadt.proteus.Runtime.Other.RuntimeHandle.MeshUtils.CreateTube (
    float p_height,
    int p_sideCount,
    float p_bottomRadius,
    float p_bottomThickness,
    float p_topRadius,
    float p_topThickness ) [static]
```

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

- co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Utils/[MeshUtils.cs](#)

## 11.28 co.koenraadt.proteus.Runtime.Repositories.ModelsRepository Class Reference

Part of the repository that handles all model related data.

### Public Member Functions

- void [UpdateNode](#) (PTNode newNode)  
*Adds a PTNode to the ModelsRepository or updates it.*
- void [UpdateNodeTexture](#) (string id, Texture2D tex)  
*Updates the texture of a node.*
- void [UpdateEdge](#) (PTEdge newEdge)  
*Adds a PTEdge to the ModelsRepository.*
- void [UpdateModelElement](#) (PTModelElement newModelElement)  
*Adds a PTModelElement to the ModelsRepository.*
- ObservableCollection< [PTNode](#) > [GetNodes](#) ()  
*Get the collection of nodes.*
- ObservableCollection< [PTEdge](#) > [GetEdges](#) ()  
*Get the collection of edges.*
- [PTNode](#) [GetNodeById](#) (string id)  
*Get a PTNode by its Id.*
- [PTEdge](#) [GetEdgeById](#) (string id)  
*Get a PTEdge by its Id.*
- [PTModelElement](#) [GetModelElementById](#) (string id)  
*Get a PTModelElement by its Id.*
- [PTNode](#) [GetNodeByName](#) (string name)  
*Get a PTNode by its name.*
- List< [PTNode](#) > [GetRelatedBehavioralNodesById](#) (string id)  
*Get all behavioral nodes / diagrams that are related to a specific node based on the id of the node.*
- Tuple< List< string >, List< string > > [FindRelatedNodesAndEdgesOfRootNode](#) (string rootNodeId)  
*Gets the related nodes and edges of a root node.*
- void [DeleteNodeById](#) (string id)  
*Removes a node by its id.*
- void [DeleteEdgeById](#) (string id)  
*Removes an edge by its id.*
- void [DeleteModelElementById](#) (string id)  
*Removes a model element by its id.*

## Properties

- static [ModelsRepository Instance](#) [get]  
*Singleton instance of the part of the repository that handles all model related data.*

## Private Member Functions

- void [Init](#) ()  
*Initializes the ModelsRepository.*

## Private Attributes

- ObservableCollection< [PTNode](#) > [\\_ptNodes](#)
- ObservableCollection< [PTEdge](#) > [\\_ptEdges](#)
- ObservableCollection< [PTModelElement](#) > [\\_ptModelElements](#)

## Static Private Attributes

- static [ModelsRepository \\_instance](#) = null

## 11.28.1 Detailed Description

Part of the repository that handles all model related data.

## 11.28.2 Member Function Documentation

### 11.28.2.1 DeleteEdgeById()

```
void co.koenraad.proteus.Runtime.Repositories.ModelsRepository.DeleteEdgeById (
    string id )
```

Removes an edge by its id.

#### Parameters

<i>id</i>	the edge's identifier.
-----------	------------------------

### 11.28.2.2 DeleteModelElementById()

```
void co.koenraad.proteus.Runtime.Repositories.ModelsRepository.DeleteModelElementById (
    string id )
```

Removes a model element by its id.

**Parameters**

<i>id</i>	the model element's identifier.
-----------	---------------------------------

**11.28.2.3 DeleteNodeById()**

```
void co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.DeleteNodeById (
    string id )
```

Removes a node by its id.

**Parameters**

<i>id</i>	the node's identifier
-----------	-----------------------

**11.28.2.4 FindRelatedNodesAndEdgesOfRootNode()**

```
Tuple< List< string >, List< string > > co.koenraadt.proteus.Runtime.Repositories.Models↵
Repository.FindRelatedNodesAndEdgesOfRootNode (
    string rootNodeId )
```

Gets the related nodes and edges of a root node.

**Parameters**

<i>root↵ NodeId</i>	the id of the root node
---------------------	-------------------------

**Returns**

a tuple containing the nodes and edges related to the root node.

**11.28.2.5 GetEdgeById()**

```
PTEdge co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.GetEdgeById (
    string id )
```

Get a PTEdge by its Id.

**Parameters**

<i>id</i>	the edge's identifier.
-----------	------------------------

**Returns**

The PTEdge with the respective Id.

### 11.28.2.6 GetEdges()

```
ObservableCollection< PTEdge > co.koenraad.proteus.Runtime.Repositories.ModelsRepository.↵  
GetEdges ( )
```

Get the collection of edges.

#### Returns

Collection of PTEdges.

### 11.28.2.7 GetModelElementById()

```
PTModelElement co.koenraad.proteus.Runtime.Repositories.ModelsRepository.GetModelElementById  
(  
    string id )
```

Get a PTModelElement by its Id.

#### Parameters

<i>id</i>	the element's identifier.
-----------	---------------------------

#### Returns

The PTModelElement with the respective Id.

### 11.28.2.8 GetNodeById()

```
PTNode co.koenraad.proteus.Runtime.Repositories.ModelsRepository.GetNodeById (  
    string id )
```

Get a PTNode by its Id.

#### Parameters

<i>id</i>	the node's identifier.
-----------	------------------------

#### Returns

The PTNode with the respective Id.

### 11.28.2.9 GetNodeByName()

```
PTNode co.koenraad.proteus.Runtime.Repositories.ModelsRepository.GetNodeByName (  
    string name )
```

Get a PTNode by its name.

**Parameters**

<i>id</i>	the node's name.
-----------	------------------

**Returns**

The PTNode with the respective Name.

**11.28.2.10 GetNodes()**

```
ObservableCollection< PTNode > co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.GetNodes ( )
```

Get the collection of nodes.

**Returns**

Collection of PTNodes

**11.28.2.11 GetRelatedBehavioralNodesById()**

```
List< PTNode > co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.GetRelatedBehavioralNodesById (
    string id )
```

Get all behavioral nodes / diagrams that are related to a specific node based on the id of the node.

**Parameters**

<i>id</i>	The id of the node to find the related behavioral nodes for.
-----------	--

**Returns**

List containing all behavioral nodes related to the given node.

**11.28.2.12 Init()**

```
void co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.Init ( ) [private]
```

Initializes the ModelsRepository.

**11.28.2.13 UpdateEdge()**

```
void co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.UpdateEdge (
    PTEdge newEdge )
```

Adds a PTEdge to the ModelsRepository.

## Parameters

<i>edge</i>	The PTEdge to add.
-------------	--------------------

**11.28.2.14 UpdateModelElement()**

```
void co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.UpdateModelElement (
    PTModelElement newModelElement )
```

Adds a PTModelElement to the ModelsRepository.

## Parameters

<i>modelElement</i>	The PTModelElement to add.
---------------------	----------------------------

**11.28.2.15 UpdateNode()**

```
void co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.UpdateNode (
    PTNode newNode )
```

Adds a PTNode to the ModelsRepository or updates it.

## Parameters

<i>node</i>	The PTNode to add.
-------------	--------------------

**11.28.2.16 UpdateNodeTexture()**

```
void co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.UpdateNodeTexture (
    string id,
    Texture2D tex )
```

Updates the texture of a node.

## Parameters

<i>id</i>	The id of the node to update the texture for.
<i>tex</i>	The texture to set for the node.

**11.28.3 Member Data Documentation****11.28.3.1 \_instance**

```
ModelsRepository co.koenraadt.proteus.Runtime.Repositories.ModelsRepository._instance = null
[static], [private]
```



### 11.28.3.2 `_ptEdges`

```
ObservableCollection<PTEdge> co.koenraadt.proteus.Runtime.Repositories.ModelsRepository._pt↵
Edges [private]
```

### 11.28.3.3 `_ptModelElements`

```
ObservableCollection<PTModelElement> co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.↵
_ptModelElements [private]
```

### 11.28.3.4 `_ptNodes`

```
ObservableCollection<PTNode> co.koenraadt.proteus.Runtime.Repositories.ModelsRepository._pt↵
Nodes [private]
```

## 11.28.4 Property Documentation

### 11.28.4.1 Instance

```
ModelsRepository co.koenraadt.proteus.Runtime.Repositories.ModelsRepository.Instance [static],
[get]
```

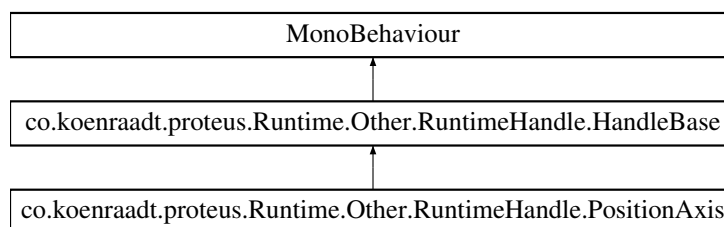
Singleton instance of the part of the repository that handles all model related data.

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

- co.koenraadt.proteus/Runtime/Repositories/[Repository.Models.cs](#)

## 11.29 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis Class Reference

Inheritance diagram for co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis:



### Public Member Functions

- [PositionAxis Initialize](#) ([RuntimeTransformHandle](#) p\_runtimeHandle, Vector3 p\_axis, Color p\_color)
- override void [Interact](#) (Vector3 p\_previousPosition)
- override void [StartInteraction](#) (Vector3 p\_hitPoint)

## Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- void [SetDefaultColor](#) ()
- void [SetColor](#) (Color p\_color)
- virtual void [StartInteraction](#) (Vector3 p\_hitPoint)
- virtual bool [CanInteract](#) (Vector3 p\_hitPoint)
- virtual void [Interact](#) (Vector3 p\_previousPosition)
- virtual void [EndInteraction](#) ()

## Protected Attributes

- Vector3 [\\_startPosition](#)
- Vector3 [\\_axis](#)

## Protected Attributes inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- [RuntimeTransformHandle](#) [\\_parentTransformHandle](#)
- Color [\\_defaultColor](#)
- Material [\\_material](#)
- Vector3 [\\_hitPoint](#)
- bool [\\_isInteracting](#) = false

## Private Attributes

- Vector3 [\\_interactionOffset](#)
- Ray [\\_axisRay](#)

## Additional Inherited Members

## Static Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- static Vector3 [GetVectorFromAxes](#) ([HandleAxes](#) p\_axes)

## Public Attributes inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- float [delta](#)

## Protected Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- virtual void [InitializeMaterial](#) ()

**Events inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- Action [InteractionStart](#)
- Action [InteractionEnd](#)
- Action< float > [InteractionUpdate](#)

**11.29.1 Detailed Description**

Created by Peter @sHTiF Stefcek 20.10.2020

**11.29.2 Member Function Documentation****11.29.2.1 Initialize()**

```
PositionAxis co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis.Initialize (
    RuntimeTransformHandle p_runtimeHandle,
    Vector3 p_axis,
    Color p_color )
```

**11.29.2.2 Interact()**

```
override void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis.Interact (
    Vector3 p_previousPosition ) [virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

**11.29.2.3 StartInteraction()**

```
override void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis.StartInteraction (
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

**11.29.3 Member Data Documentation****11.29.3.1 \_axis**

```
Vector3 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis._axis [protected]
```

**11.29.3.2 \_interactionOffset**

```
Vector3 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis._interactionOffset [private]
```

### 11.29.3.3 `_raxisRay`

`Ray co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionAxis._raxisRay` [private]

### 11.29.3.4 `_startPosition`

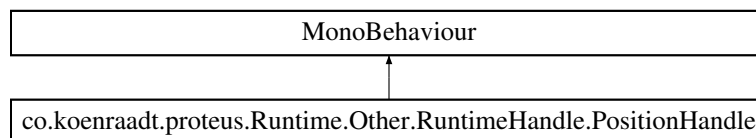
`Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionAxis._startPosition` [protected]

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

- `co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Position/PositionAxis.cs`

## 11.30 `co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle`↔ Handle Class Reference

Inheritance diagram for `co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle`:



### Public Member Functions

- `PositionHandle Initialize` (`RuntimeTransformHandle p_runtimeHandle`)
- `void Destroy` ()

### Protected Attributes

- `RuntimeTransformHandle _parentTransformHandle`
- `List< PositionAxis > _axes`
- `List< PositionPlane > _planes`

### Private Attributes

- `GameObject _gizmoRoot`

### 11.30.1 Detailed Description

Created by Peter @SHTiF Stefcek 20.10.2020

## 11.30.2 Member Function Documentation

### 11.30.2.1 Destroy()

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle.Destroy ( )
```

### 11.30.2.2 Initialize()

```
PositionHandle co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle.Initialize (
    RuntimeTransformHandle p_runtimeHandle )
```

## 11.30.3 Member Data Documentation

### 11.30.3.1 \_axes

```
List<PositionAxis> co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle._axes
[protected]
```

### 11.30.3.2 \_gizmoRoot

```
GameObject co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle._gizmoRoot [private]
```

### 11.30.3.3 \_parentTransformHandle

```
RuntimeTransformHandle co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle._↵
parentTransformHandle [protected]
```

### 11.30.3.4 \_planes

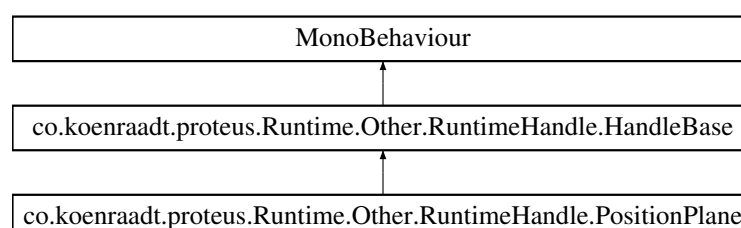
```
List<PositionPlane> co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionHandle._planes
[protected]
```

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

- co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Position/[PositionHandle.cs](#)

## 11.31 co.koenraad.proteus.Runtime.Other.RuntimeHandle.Position↵ Plane Class Reference

Inheritance diagram for co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane:



### Public Member Functions

- [PositionPlane Initialize](#) ([RuntimeTransformHandle](#) p\_runtimeHandle, Vector3 p\_axis1, Vector3 p\_axis2, Vector3 p\_perp, Color p\_color)
- override void [Interact](#) (Vector3 p\_previousPosition)
- override void [StartInteraction](#) (Vector3 p\_hitPoint)

### Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- void [SetDefaultColor](#) ()
- void [SetColor](#) (Color p\_color)
- virtual void [StartInteraction](#) (Vector3 p\_hitPoint)
- virtual bool [CanInteract](#) (Vector3 p\_hitPoint)
- virtual void [Interact](#) (Vector3 p\_previousPosition)
- virtual void [EndInteraction](#) ()

### Protected Attributes

- Vector3 [\\_startPosition](#)
- Vector3 [\\_axis1](#)
- Vector3 [\\_axis2](#)
- Vector3 [\\_perp](#)
- Plane [\\_plane](#)
- Vector3 [\\_interactionOffset](#)
- GameObject [\\_handle](#)

### Protected Attributes inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- [RuntimeTransformHandle](#) [\\_parentTransformHandle](#)
- Color [\\_defaultColor](#)
- Material [\\_material](#)
- Vector3 [\\_hitPoint](#)
- bool [\\_isInteracting](#) = false

### Private Member Functions

- void [Update](#) ()

### Additional Inherited Members

### Static Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- static Vector3 [GetVectorFromAxes](#) ([HandleAxes](#) p\_axes)

## Public Attributes inherited from

[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- float [delta](#)

## Protected Member Functions inherited from

[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- virtual void [InitializeMaterial](#) ()

## Events inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- Action [InteractionStart](#)
- Action [InteractionEnd](#)
- Action< float > [InteractionUpdate](#)

### 11.31.1 Detailed Description

Created by Peter @sHTiF Stefcek 20.10.2020

### 11.31.2 Member Function Documentation

#### 11.31.2.1 Initialize()

```
PositionPlane co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionPlane.Initialize (
    RuntimeTransformHandle p_runtimeHandle,
    Vector3 p_axis1,
    Vector3 p_axis2,
    Vector3 p_perp,
    Color p_color )
```

#### 11.31.2.2 Interact()

```
override void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionPlane.Interact (
    Vector3 p_previousPosition ) [virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

#### 11.31.2.3 StartInteraction()

```
override void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionPlane.StartInteraction
(
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

#### 11.31.2.4 Update()

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane.Update ( ) [private]
```

### 11.31.3 Member Data Documentation

#### 11.31.3.1 \_axis1

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane._axis1 [protected]
```

#### 11.31.3.2 \_axis2

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane._axis2 [protected]
```

#### 11.31.3.3 \_handle

```
GameObject co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane._handle [protected]
```

#### 11.31.3.4 \_interactionOffset

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane._interactionOffset  
[protected]
```

#### 11.31.3.5 \_perp

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane._perp [protected]
```

#### 11.31.3.6 \_plane

```
Plane co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane._plane [protected]
```

#### 11.31.3.7 \_startPosition

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.PositionPlane._startPosition [protected]
```

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

- co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Position/[PositionPlane.cs](#)

## 11.32 co.koenraad.proteus.Runtime.Repositories.ProteusRepository Class Reference

Part of the repository that holds all general Proteus related data.



## Public Member Functions

- [PTGlobals GetGlobals](#) ()  
*Gets the global state of proteus.*
- void [UpdateGlobals](#) ([PTGlobals](#) update)  
*Updates the global state of Proteus.*
- void [SelectNode](#) (string nodeId)  
*Sets the selected node. Clears the selection when the nodeId is null.*
- void [SelectNodeByName](#) (string nodeName)  
*Selects a node based on its name.*
- void [SelectNodes](#) (List< string > nodeIds)  
*Sets the node selection to the provided list.*
- void [SelectNodesByNames](#) (string[] names)  
*Select nodes based on names instead of ids.*
- void [ClearNodeSelection](#) ()  
*Clears the selection of nodes.*
- List< string > [GetNodeSelectionDisplayNames](#) ()  
*Get the display names of the selected nodes.*
- [PTViewer GetSelectedViewer](#) ()  
*Gets the currently selected viewer.*
- bool [IsViewerSelected](#) (string viewerId)  
*Checks whether a viewer is selected.*
- void [SelectViewer](#) (string viewerId)  
*Selects a viewer. Clears the selection when viewerId is null.*
- void [ClearViewerSelection](#) ()  
*Clears the viewer selection.*

## Properties

- static [ProteusRepository Instance](#) [get]  
*Singleton instance of the Proteus part of the repository.*

## Static Private Attributes

- static [ProteusRepository \\_instance](#) = null
- static [PTGlobals \\_globalsInstance](#) = null

### 11.32.1 Detailed Description

Part of the repository that holds all general Proteus related data.

### 11.32.2 Member Function Documentation

#### 11.32.2.1 ClearNodeSelection()

```
void co.koenraad.proteus.Runtime.Repositories.ProteusRepository.ClearNodeSelection ( )
```

Clears the selection of nodes.

### 11.32.2.2 ClearViewerSelection()

```
void co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.ClearViewerSelection ( )
```

Clears the viewer selection.

### 11.32.2.3 GetGlobals()

```
PTGlobals co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.GetGlobals ( )
```

Gets the global state of proteus.

### 11.32.2.4 GetNodeSelectionDisplayNames()

```
List< string > co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.GetNodeSelection↔  
DisplayNames ( )
```

Get the display names of the selected nodes.

### 11.32.2.5 GetSelectedViewer()

```
PTViewer co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.GetSelectedViewer ( )
```

Gets the currently selected viewer.

#### Returns

selected viewer

### 11.32.2.6 IsViewerSelected()

```
bool co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.IsViewerSelected (   
    string viewerId )
```

Checks whether a viewer is selected.

#### Parameters

<i>viewer↔ Id</i>	The id of the viewer to check.
-----------------------	--------------------------------

#### Returns

### 11.32.2.7 SelectNode()

```
void co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.SelectNode (
    string nodeId )
```

Sets the selected node. Clears the selection when the nodeId is null.

#### Parameters

<i>nodeId</i>	Id of the node to select.
---------------	---------------------------

### 11.32.2.8 SelectNodeByName()

```
void co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.SelectNodeByName (
    string nodeName )
```

Selects a node based on its name.

#### Parameters

<i>nodeName</i>	Name of the node to select.
-----------------	-----------------------------

### 11.32.2.9 SelectNodes()

```
void co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.SelectNodes (
    List< string > nodeIds )
```

Sets the node selection to the provided list.

#### Parameters

<i>nodeIds</i>	List of node ids to select.
----------------	-----------------------------

### 11.32.2.10 SelectNodesByNames()

```
void co.koenraadt.proteus.Runtime.Repositories.ProteusRepository.SelectNodesByNames (
    string[] names )
```

Select nodes based on names instead of ids.

#### Parameters

<i>names</i>	Names of the nodes to select.
--------------	-------------------------------

**11.32.2.11 SelectViewer()**

```
void co.koenraad.proteus.Runtime.Repositories.ProteusRepository.SelectViewer (
    string viewerId )
```

Selects a viewer. Clears the selection when viewerId is null.

**Parameters**

<i>viewerId</i>	The id of the viewer to select.
-----------------	---------------------------------

**11.32.2.12 UpdateGlobals()**

```
void co.koenraad.proteus.Runtime.Repositories.ProteusRepository.UpdateGlobals (
    PTGlobals update )
```

Updates the global state of Proteus.

**Parameters**

<i>update</i>	
---------------	--

**11.32.3 Member Data Documentation****11.32.3.1 \_globalsInstance**

```
PTGlobals co.koenraad.proteus.Runtime.Repositories.ProteusRepository._globalsInstance = null
[static], [private]
```

**11.32.3.2 \_instance**

```
ProteusRepository co.koenraad.proteus.Runtime.Repositories.ProteusRepository._instance = null
[static], [private]
```

**11.32.4 Property Documentation****11.32.4.1 Instance**

```
ProteusRepository co.koenraad.proteus.Runtime.Repositories.ProteusRepository.Instance [static],
[get]
```

Singleton instance of the Proteus part of the repository.

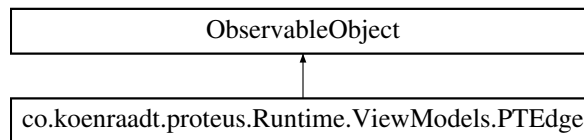
The documentation for this class was generated from the following file:

- co.koenraad.proteus/Runtime/Repositories/[Repository.Globals.cs](#)

## 11.33 co.koenraadt.proteus.Runtime.ViewModels.PTEdge Class Reference

Class that holds the data for an edge of the 3DML formatted model.

Inheritance diagram for co.koenraadt.proteus.Runtime.ViewModels.PTEdge:



### Public Member Functions

- [PTEdge\(\)](#)

### Properties

- string [Id](#) [get, set]  
*The identifier of the edge.*
- string [Source](#) [get, set]  
*The id of the source node of the edge.*
- string [Target](#) [get, set]  
*The id of the target node of the edge.*

### Private Attributes

- string [\\_id](#)
- string [\\_source](#)
- string [\\_target](#)

### 11.33.1 Detailed Description

Class that holds the data for an edge of the 3DML formatted model.

### 11.33.2 Constructor & Destructor Documentation

#### 11.33.2.1 PTEdge()

```
co.koenraadt.proteus.Runtime.ViewModels.PTEdge.PTEdge ( )
```

### 11.33.3 Member Data Documentation

#### 11.33.3.1 \_id

```
string co.koenraadt.proteus.Runtime.ViewModels.PTEdge._id [private]
```

**11.33.3.2 \_source**

```
string co.koenraad.proteus.Runtime.ViewModels.PTEdge._source [private]
```

**11.33.3.3 \_target**

```
string co.koenraad.proteus.Runtime.ViewModels.PTEdge._target [private]
```

**11.33.4 Property Documentation****11.33.4.1 Id**

```
string co.koenraad.proteus.Runtime.ViewModels.PTEdge.Id [get], [set]
```

The identifier of the edge.

**11.33.4.2 Source**

```
string co.koenraad.proteus.Runtime.ViewModels.PTEdge.Source [get], [set]
```

The id of the source node of the edge.

**11.33.4.3 Target**

```
string co.koenraad.proteus.Runtime.ViewModels.PTEdge.Target [get], [set]
```

The id of the target node of the edge.

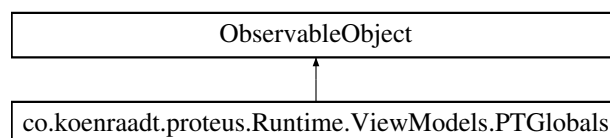
The documentation for this class was generated from the following file:

- co.koenraad.proteus/Runtime/ViewModels/[PTEdge.cs](#)

**11.34 co.koenraad.proteus.Runtime.ViewModels.PTGlobals Class Reference**

Class that holds the global data / defaults of Proteus.

Inheritance diagram for co.koenraad.proteus.Runtime.ViewModels.PTGlobals:



## Public Member Functions

- [PTGlobals](#) ()

## Properties

- List< string > [SelectedNodes](#) [get, set]
- string[] [SelectedViewers](#) [get, set]  
*Array containing the ids of the viewers that are selected.*
- bool [XrayViewEnabled](#) [get, set]  
*Whether xray view is enabled globally.*
- bool [ExplodedViewEnabled](#) [get, set]  
*Whether exploded view is enabled globally.*
- Vector3 [DefaultViewerPosition](#) [get, set]  
*The default position that a viewer is spawned at.*
- Vector3 [DefaultViewerScale](#) [get, set]  
*The default scale that a viewer should have.*
- float [DefaultNodeUnitHeight](#) [get, set]  
*The default height that a node should have.*
- float [DefaultNodeUnitWidth](#) [get, set]  
*The default width that a node should have.*
- float [DefaultNodeInViewTriggerPercentage](#) [get, set]  
*The default percentage that should trigger a node to change from LOD in semantic zooming.*

## Private Attributes

- Vector3 [\\_defaultViewerPosition](#) = new Vector3(-4,7,3)
- Vector3 [\\_defaultViewerScale](#) = new Vector3(2,2,2)
- List< string > [\\_selectedNodes](#)
- string[] [\\_selectedViewers](#)
- bool [\\_xrayViewEnabled](#) = true
- bool [\\_explodedViewEnabled](#) = true
- float [\\_defaultNodeUnitWidth](#) = 10.0f
- float [\\_defaultNodeUnitHeight](#) = 10.0f
- float [\\_defaultNodeInViewTriggerPercentage](#) = .5f

### 11.34.1 Detailed Description

Class that holds the global data / defaults of Proteus.

### 11.34.2 Constructor & Destructor Documentation

#### 11.34.2.1 PTGlobals()

```
co.koenraad.proteus.Runtime.ViewModels.PTGlobals.PTGlobals ( )
```

### 11.34.3 Member Data Documentation

#### 11.34.3.1 `_defaultNodeInViewTriggerPercentage`

```
float co.koenraad.proteus.Runtime.ViewModels.PTGlobals._defaultNodeInViewTriggerPercentage =  
.5f [private]
```

#### 11.34.3.2 `_defaultNodeUnitHeight`

```
float co.koenraad.proteus.Runtime.ViewModels.PTGlobals._defaultNodeUnitHeight = 10.0f [private]
```

#### 11.34.3.3 `_defaultNodeUnitWidth`

```
float co.koenraad.proteus.Runtime.ViewModels.PTGlobals._defaultNodeUnitWidth = 10.0f [private]
```

#### 11.34.3.4 `_defaultViewerPosition`

```
Vector3 co.koenraad.proteus.Runtime.ViewModels.PTGlobals._defaultViewerPosition = new Vector3(-4,7,3)  
[private]
```

#### 11.34.3.5 `_defaultViewerScale`

```
Vector3 co.koenraad.proteus.Runtime.ViewModels.PTGlobals._defaultViewerScale = new Vector3(2,2,2)  
[private]
```

#### 11.34.3.6 `_explodedViewEnabled`

```
bool co.koenraad.proteus.Runtime.ViewModels.PTGlobals._explodedViewEnabled = true [private]
```

#### 11.34.3.7 `_selectedNodes`

```
List<string> co.koenraad.proteus.Runtime.ViewModels.PTGlobals._selectedNodes [private]
```

#### 11.34.3.8 `_selectedViewers`

```
string [] co.koenraad.proteus.Runtime.ViewModels.PTGlobals._selectedViewers [private]
```

#### 11.34.3.9 `_xrayViewEnabled`

```
bool co.koenraad.proteus.Runtime.ViewModels.PTGlobals._xrayViewEnabled = true [private]
```



## 11.34.4 Property Documentation

### 11.34.4.1 DefaultNodeInViewTriggerPercentage

```
float co.koenraadt.proteus.Runtime.ViewModels.PTGlobals.DefaultNodeInViewTriggerPercentage [get], [set]
```

The default percentage that should trigger a node to change from LOD in semantic zooming.

### 11.34.4.2 DefaultNodeUnitHeight

```
float co.koenraadt.proteus.Runtime.ViewModels.PTGlobals.DefaultNodeUnitHeight [get], [set]
```

The default height that a node should have.

### 11.34.4.3 DefaultNodeUnitWidth

```
float co.koenraadt.proteus.Runtime.ViewModels.PTGlobals.DefaultNodeUnitWidth [get], [set]
```

The default width that a node should have.

### 11.34.4.4 DefaultViewerPosition

```
Vector3 co.koenraadt.proteus.Runtime.ViewModels.PTGlobals.DefaultViewerPosition [get], [set]
```

The default position that a viewer is spawned at.

### 11.34.4.5 DefaultViewerScale

```
Vector3 co.koenraadt.proteus.Runtime.ViewModels.PTGlobals.DefaultViewerScale [get], [set]
```

The default scale that a viewer should have.

### 11.34.4.6 ExplodedViewEnabled

```
bool co.koenraadt.proteus.Runtime.ViewModels.PTGlobals.ExplodedViewEnabled [get], [set]
```

Whether exploded view is enabled globally.

### 11.34.4.7 SelectedNodes

```
List<string> co.koenraadt.proteus.Runtime.ViewModels.PTGlobals.SelectedNodes [get], [set]
```

List containing the identifiers of the nodes that are selected.

#### 11.34.4.8 SelectedViewers

```
string [] co.koenraad.proteus.Runtime.ViewModels.PTGlobals.SelectedViewers [get], [set]
```

Array containing the ids of the viewers that are selected.

#### 11.34.4.9 XrayViewEnabled

```
bool co.koenraad.proteus.Runtime.ViewModels.PTGlobals.XrayViewEnabled [get], [set]
```

Whether xray view is enabled globally.

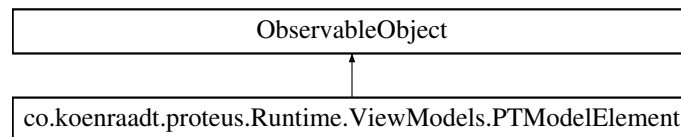
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Runtime/ViewModels/PTGlobals.cs](#)

### 11.35 co.koenraad.proteus.Runtime.ViewModels.PTModelElement Class Reference

Class containing the data of a model element.

Inheritance diagram for co.koenraad.proteus.Runtime.ViewModels.PTModelElement:



#### Public Member Functions

- [PTModelElement\(\)](#)

#### Properties

- string [Id](#) [get, set]
- string [Name](#) [get, set]
- string [DisplayName](#) [get, set]
- string [Description](#) [get, set]
- string [MetaClass](#) [get, set]  
*The MetaClass of model element.*
- string[] [RelatedNodes](#) [get, set]  
*The related diagrams of the model element.*

## Private Attributes

- string [\\_id](#)
- string [\\_metaClass](#)
- string [\\_name](#)
- string [\\_description](#)
- string [\\_displayName](#)
- string[] [\\_relatedNodes](#)

### 11.35.1 Detailed Description

Class containing the data of a model element.

### 11.35.2 Constructor & Destructor Documentation

#### 11.35.2.1 PTModelElement()

```
co.koenraadt.proteus.Runtime.ViewModels.PTModelElement.PTModelElement ( )
```

### 11.35.3 Member Data Documentation

#### 11.35.3.1 [\\_description](#)

```
string co.koenraadt.proteus.Runtime.ViewModels.PTModelElement._description [private]
```

#### 11.35.3.2 [\\_displayName](#)

```
string co.koenraadt.proteus.Runtime.ViewModels.PTModelElement._displayName [private]
```

#### 11.35.3.3 [\\_id](#)

```
string co.koenraadt.proteus.Runtime.ViewModels.PTModelElement._id [private]
```

#### 11.35.3.4 [\\_metaClass](#)

```
string co.koenraadt.proteus.Runtime.ViewModels.PTModelElement._metaClass [private]
```

#### 11.35.3.5 [\\_name](#)

```
string co.koenraadt.proteus.Runtime.ViewModels.PTModelElement._name [private]
```

### 11.35.3.6 `_relatedNodes`

```
string [] co.koenraad.proteus.Runtime.ViewModels.PTModelElement._relatedNodes [private]
```

## 11.35.4 Property Documentation

### 11.35.4.1 Description

```
string co.koenraad.proteus.Runtime.ViewModels.PTModelElement.Description [get], [set]
```

The description name of the model element

### 11.35.4.2 DisplayName

```
string co.koenraad.proteus.Runtime.ViewModels.PTModelElement.DisplayName [get], [set]
```

The display name of the model element

### 11.35.4.3 Id

```
string co.koenraad.proteus.Runtime.ViewModels.PTModelElement.Id [get], [set]
```

The identifier of the edge.

### 11.35.4.4 MetaClass

```
string co.koenraad.proteus.Runtime.ViewModels.PTModelElement.MetaClass [get], [set]
```

The MetaClass of model element.

### 11.35.4.5 Name

```
string co.koenraad.proteus.Runtime.ViewModels.PTModelElement.Name [get], [set]
```

The name of the model element

### 11.35.4.6 RelatedNodes

```
string [] co.koenraad.proteus.Runtime.ViewModels.PTModelElement.RelatedNodes [get], [set]
```

The related diagrams of the model element.

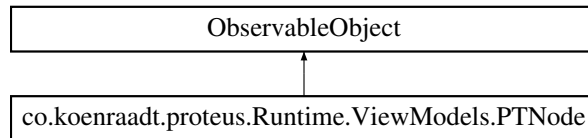
The documentation for this class was generated from the following file:

- `co.koenraad.proteus/Runtime/ViewModels/PTModelElement.cs`

## 11.36 co.koenraadt.proteus.Runtime.ViewModels.PTNode Class Reference

Class that holds the data for a node of the 3DML formatted model.

Inheritance diagram for co.koenraadt.proteus.Runtime.ViewModels.PTNode:



### Public Member Functions

- [PTNode](#) ()

### Properties

- string [Id](#) [get, set]
- string [Name](#) [get, set]
- string [DisplayName](#) [get, set]  
*The label of the node.*
- string [Description](#) [get, set]  
*The description of the node.*
- string [MetaClass](#) [get, set]  
*The MetaClass of the node.*
- Texture2D [ImageTexture](#) [get, set]  
*Texture of the node's diagram image.*
- float [UnitWidth](#) [get, set]  
*The width of the node in the viewer.*
- float [UnitHeight](#) [get, set]  
*The height of the node in the viewer.*
- float [UnitDepth](#) [get, set]  
*The depth of the node in the viewer.*
- string[] [Edges](#) [get, set]  
*The ids of the edges that the node is connected to.*
- string[] [ModelElements](#) [get, set]  
*The ids of the model elements that are used by the node.*

### Private Attributes

- string [\\_id](#)
- string [\\_name](#)
- string [\\_displayName](#)
- string [\\_description](#)
- string [\\_metaClass](#)
- Texture2D [\\_imageTexture](#)
- string[] [\\_modelElements](#)
- string[] [\\_edges](#)
- float [\\_unitWidth](#) = 10f
- float [\\_unitHeight](#) = 10f
- float [\\_unitDepth](#) = 1.0f

### 11.36.1 Detailed Description

Class that holds the data for a node of the 3DML formatted model.

### 11.36.2 Constructor & Destructor Documentation

#### 11.36.2.1 PTNode()

```
co.koenraad.proteus.Runtime.ViewModels.PTNode.PTNode ( )
```

### 11.36.3 Member Data Documentation

#### 11.36.3.1 \_description

```
string co.koenraad.proteus.Runtime.ViewModels.PTNode._description [private]
```

#### 11.36.3.2 \_displayName

```
string co.koenraad.proteus.Runtime.ViewModels.PTNode._displayName [private]
```

#### 11.36.3.3 \_edges

```
string [] co.koenraad.proteus.Runtime.ViewModels.PTNode._edges [private]
```

#### 11.36.3.4 \_id

```
string co.koenraad.proteus.Runtime.ViewModels.PTNode._id [private]
```

#### 11.36.3.5 \_imageTexture

```
Texture2D co.koenraad.proteus.Runtime.ViewModels.PTNode._imageTexture [private]
```

#### 11.36.3.6 \_metaClass

```
string co.koenraad.proteus.Runtime.ViewModels.PTNode._metaClass [private]
```

#### 11.36.3.7 \_modelElements

```
string [] co.koenraad.proteus.Runtime.ViewModels.PTNode._modelElements [private]
```

### 11.36.3.8 `_name`

```
string co.koenraadt.proteus.Runtime.ViewModels.PTNode._name [private]
```

### 11.36.3.9 `_unitDepth`

```
float co.koenraadt.proteus.Runtime.ViewModels.PTNode._unitDepth = 1.0f [private]
```

### 11.36.3.10 `_unitHeight`

```
float co.koenraadt.proteus.Runtime.ViewModels.PTNode._unitHeight = 10f [private]
```

### 11.36.3.11 `_unitWidth`

```
float co.koenraadt.proteus.Runtime.ViewModels.PTNode._unitWidth = 10f [private]
```

## 11.36.4 Property Documentation

### 11.36.4.1 `Description`

```
string co.koenraadt.proteus.Runtime.ViewModels.PTNode.Description [get], [set]
```

The description of the node.

### 11.36.4.2 `DisplayName`

```
string co.koenraadt.proteus.Runtime.ViewModels.PTNode.DisplayName [get], [set]
```

The label of the node.

### 11.36.4.3 `Edges`

```
string [] co.koenraadt.proteus.Runtime.ViewModels.PTNode.Edges [get], [set]
```

The ids of the edges that the node is connected to.

### 11.36.4.4 `Id`

```
string co.koenraadt.proteus.Runtime.ViewModels.PTNode.Id [get], [set]
```

The identifier of the node.

#### 11.36.4.5 ImageTexture

```
Texture2D co.koenraadt.proteus.Runtime.ViewModels.PTNode.ImageTexture [get], [set]
```

Texture of the node's diagram image.

#### 11.36.4.6 MetaClass

```
string co.koenraadt.proteus.Runtime.ViewModels.PTNode.MetaClass [get], [set]
```

The MetaClass of the node.

#### 11.36.4.7 ModelElements

```
string [] co.koenraadt.proteus.Runtime.ViewModels.PTNode.ModelElements [get], [set]
```

The ids of the model elements that are used by the node.

#### 11.36.4.8 Name

```
string co.koenraadt.proteus.Runtime.ViewModels.PTNode.Name [get], [set]
```

The name of the node.

#### 11.36.4.9 UnitDepth

```
float co.koenraadt.proteus.Runtime.ViewModels.PTNode.UnitDepth [get], [set]
```

The depth of the node in the viewer.

#### 11.36.4.10 UnitHeight

```
float co.koenraadt.proteus.Runtime.ViewModels.PTNode.UnitHeight [get], [set]
```

The height of the node in the viewer.

#### 11.36.4.11 UnitWidth

```
float co.koenraadt.proteus.Runtime.ViewModels.PTNode.UnitWidth [get], [set]
```

The width of the node in the viewer.

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

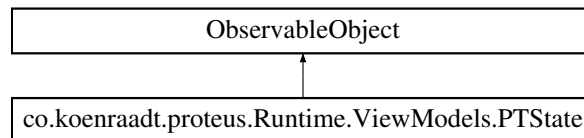
- [co.koenraadt.proteus/Runtime/ViewModels/PTNode.cs](#)



## 11.37 co.koenraadt.proteus.Runtime.ViewModels.PTState Class Reference

Class used to hold the data of the states in the 3DML formatted model.

Inheritance diagram for co.koenraadt.proteus.Runtime.ViewModels.PTState:



### Public Member Functions

- [PTState](#) ()

### Properties

- string [Id](#) [get, set]
- Dictionary< string, object > [Values](#) [get, set]

*Dictionary containing the values of the state object. Each value is identified by its key and holds a value.*

### Private Attributes

- string [\\_id](#)
- Dictionary< string, object > [\\_values](#)

### 11.37.1 Detailed Description

Class used to hold the data of the states in the 3DML formatted model.

### 11.37.2 Constructor & Destructor Documentation

#### 11.37.2.1 PTState()

```
co.koenraadt.proteus.Runtime.ViewModels.PTState.PTState ( )
```

### 11.37.3 Member Data Documentation

#### 11.37.3.1 \_id

```
string co.koenraadt.proteus.Runtime.ViewModels.PTState._id [private]
```

### 11.37.3.2 `_values`

`Dictionary<string, object> co.koenraad.proteus.Runtime.ViewModels.PTState._values [private]`

## 11.37.4 Property Documentation

### 11.37.4.1 `Id`

`string co.koenraad.proteus.Runtime.ViewModels.PTState.Id [get], [set]`

The identifier of the edge.

### 11.37.4.2 `Values`

`Dictionary<string, object> co.koenraad.proteus.Runtime.ViewModels.PTState.Values [get], [set]`

Dictionary containing the values of the state object. Each value is identified by its key and holds a value.

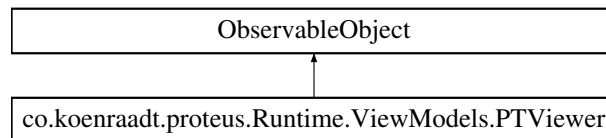
The documentation for this class was generated from the following file:

- `co.koenraad.proteus/Runtime/ViewModels/PTState.cs`

## 11.38 `co.koenraad.proteus.Runtime.ViewModels.PTViewer` Class Reference

Class containing the properties of a viewer of Proteus.

Inheritance diagram for `co.koenraad.proteus.Runtime.ViewModels.PTViewer`:



### Properties

- string `Id` [get, set]
- bool `Detached` [get, set]
- string?[] `RootNodeIds` [get, set]
- Vector3? `Position` [get, set]
- Vector3? `Scale` [get, set]
- Vector3? `ModelAnchorOffset` [get, set]
- Vector3? `ZoomScale` [get, set]  
*The zoom level of the viewer.*
- Vector3? `MaxZoomScale` [get, set]  
*The maximum zoom level of the viewer.*
- Vector3? `MinZoomScale` [get, set]  
*The minimum zoom level of the viewer.*
- Quaternion? `Rotation` [get, set]
- Matrix4x4? `ViewWindowWorldToLocal` [get, set]
- bool? `IsBillboarding` [get, set]
- bool? `GizmoVisible` [get, set]
- Dictionary< string, Vector3 >? `LayoutNodes` [get, set]
- Dictionary< string, List< Spline > >? `LayoutEdges` [get, set]  
*Layout containing the curves of the edges in the viewer.*

## Private Attributes

- string [\\_id](#)
- bool [\\_detached](#) = false
- bool? [\\_gizmoVisible](#) = false
- bool? [\\_isBillboarding](#) = true
- string?[] [\\_rootNodeIds](#)
- Vector3? [\\_position](#)
- Vector3? [\\_scale](#)
- Vector3? [\\_modelAnchorOffset](#) = null
- Vector3? [\\_zoomScale](#)
- Vector3? [\\_maxZoomScale](#)
- Vector3? [\\_minZoomScale](#)
- Quaternion? [\\_rotation](#)
- Matrix4x4? [\\_viewWindowWorldToLocal](#)
- Dictionary< string, Vector3 >? [\\_layoutNodes](#)
- Dictionary< string, List< Spline > >? [\\_layoutEdges](#)

### 11.38.1 Detailed Description

Class containing the properties of a viewer of Proteus.

### 11.38.2 Member Data Documentation

#### 11.38.2.1 [\\_detached](#)

```
bool co.koenraadt.proteus.Runtime.ViewModels.PTViewer._detached = false [private]
```

#### 11.38.2.2 [\\_gizmoVisible](#)

```
bool? co.koenraadt.proteus.Runtime.ViewModels.PTViewer._gizmoVisible = false [private]
```

#### 11.38.2.3 [\\_id](#)

```
string co.koenraadt.proteus.Runtime.ViewModels.PTViewer._id [private]
```

#### 11.38.2.4 [\\_isBillboarding](#)

```
bool? co.koenraadt.proteus.Runtime.ViewModels.PTViewer._isBillboarding = true [private]
```

#### 11.38.2.5 [\\_layoutEdges](#)

```
Dictionary<string, List<Spline> >? co.koenraadt.proteus.Runtime.ViewModels.PTViewer._↵  
layoutEdges [private]
```

### 11.38.2.6 `_layoutNodes`

Dictionary<string, Vector3>? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_layoutNodes [private]

### 11.38.2.7 `_maxZoomScale`

Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_maxZoomScale [private]

### 11.38.2.8 `_minZoomScale`

Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_minZoomScale [private]

### 11.38.2.9 `_modelAnchorOffset`

Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_modelAnchorOffset = null [private]

### 11.38.2.10 `_position`

Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_position [private]

### 11.38.2.11 `_rootNodeIds`

string? [] co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_rootNodeIds [private]

### 11.38.2.12 `_rotation`

Quaternion? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_rotation [private]

### 11.38.2.13 `_scale`

Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_scale [private]

### 11.38.2.14 `_viewWindowWorldToLocal`

Matrix4x4? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_viewWindowWorldToLocal [private]

### 11.38.2.15 `_zoomScale`

Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.\_zoomScale [private]

### 11.38.3 Property Documentation

#### 11.38.3.1 Detached

```
bool co.koenraad.proteus.Runtime.ViewModels.PTViewer.Detached [get], [set]
```

Whether or not the viewer is spawned by Proteus. Set to false if you wish to spawn the viewer manually.

#### 11.38.3.2 GizmoVisible

```
bool? co.koenraad.proteus.Runtime.ViewModels.PTViewer.GizmoVisible [get], [set]
```

Whether billboarding should be enabled for the viewer.

#### 11.38.3.3 Id

```
string co.koenraad.proteus.Runtime.ViewModels.PTViewer.Id [get], [set]
```

The identifier of the viewer.

#### 11.38.3.4 IsBillboarding

```
bool? co.koenraad.proteus.Runtime.ViewModels.PTViewer.IsBillboarding [get], [set]
```

Whether billboarding should be enabled for the viewer.

#### 11.38.3.5 LayoutEdges

```
Dictionary<string, List<Spline> >? co.koenraad.proteus.Runtime.ViewModels.PTViewer.Layout↔  
Edges [get], [set]
```

Layout containing the curves of the edges in the viewer.

#### 11.38.3.6 LayoutNodes

```
Dictionary<string, Vector3>? co.koenraad.proteus.Runtime.ViewModels.PTViewer.LayoutNodes  
[get], [set]
```

Layout containing the positions of the nodes in the viewer.

#### 11.38.3.7 MaxZoomScale

```
Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.MaxZoomScale [get], [set]
```

The maximum zoom level of the viewer.

### 11.38.3.8 MinZoomScale

```
Vector3? co.koenraadte.proteus.Runtime.ViewModels.PTViewer.MinZoomScale [get], [set]
```

The minimum zoom level of the viewer.

### 11.38.3.9 ModelAnchorOffset

```
Vector3? co.koenraadte.proteus.Runtime.ViewModels.PTViewer.ModelAnchorOffset [get], [set]
```

The local position of the view window

### 11.38.3.10 Position

```
Vector3? co.koenraadte.proteus.Runtime.ViewModels.PTViewer.Position [get], [set]
```

The position of the viewer.

### 11.38.3.11 RootNodeIds

```
string? [] co.koenraadte.proteus.Runtime.ViewModels.PTViewer.RootNodeIds [get], [set]
```

The ids of the root nodes for the viewer.

### 11.38.3.12 Rotation

```
Quaternion? co.koenraadte.proteus.Runtime.ViewModels.PTViewer.Rotation [get], [set]
```

The rotation of the viewer.

### 11.38.3.13 Scale

```
Vector3? co.koenraadte.proteus.Runtime.ViewModels.PTViewer.Scale [get], [set]
```

The position of the viewer.

### 11.38.3.14 ViewWindowWorldToLocal

```
Matrix4x4? co.koenraadte.proteus.Runtime.ViewModels.PTViewer.ViewWindowWorldToLocal [get],  
[set]
```

The world to local matrix of the viewer's view window.

### 11.38.3.15 ZoomScale

Vector3? co.koenraad.proteus.Runtime.ViewModels.PTViewer.ZoomScale [get], [set]

The zoom level of the viewer.

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

- co.koenraad.proteus/Runtime/ViewModels/[PTViewer.cs](#)

## 11.39 co.koenraad.proteus.Runtime.Repositories.Repository Class Reference

The repository holding all data of Proteus.

### Properties

- static [Repository Instance](#) [get]  
*The singleton instance of the repository.*
- [ProteusRepository Proteus](#) [get]  
*Singleton instance of the repository part that holds all general Proteus data.*
- [ModelsRepository Models](#) [get]  
*Singleton instance of the repository part that holds all models related data.*
- [StatesRepository States](#) [get]  
*Singleton instance of the repository part that holds all states related data.*
- [ViewersRepository Viewers](#) [get]  
*Singleton instance of the repository part that holds all viewer related data.*

### Static Private Attributes

- static [Repository \\_instance](#) = null

### 11.39.1 Detailed Description

The repository holding all data of Proteus.

### 11.39.2 Member Data Documentation

#### 11.39.2.1 \_instance

[Repository](#) co.koenraad.proteus.Runtime.Repositories.Repository.\_instance = null [static], [private]

### 11.39.3 Property Documentation

#### 11.39.3.1 Instance

`Repository` `co.koenraadt.proteus.Runtime.Repositories.Repository.Instance` [static], [get]

The singleton instance of the repository.

#### 11.39.3.2 Models

`ModelsRepository` `co.koenraadt.proteus.Runtime.Repositories.Repository.Models` [get]

Singleton instance of the repository part that holds all models related data.

#### 11.39.3.3 Proteus

`ProteusRepository` `co.koenraadt.proteus.Runtime.Repositories.Repository.Proteus` [get]

Singleton instance of the repository part that holds all general Proteus data.

#### 11.39.3.4 States

`StatesRepository` `co.koenraadt.proteus.Runtime.Repositories.Repository.States` [get]

Singleton instance of the repository part that holds all states related data.

#### 11.39.3.5 Viewers

`ViewersRepository` `co.koenraadt.proteus.Runtime.Repositories.Repository.Viewers` [get]

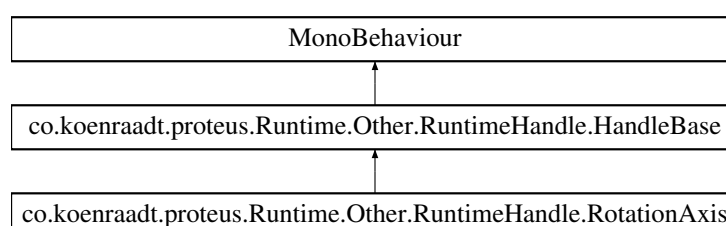
Singleton instance of the repository part that holds all viewer related data.

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

- `co.koenraadt.proteus/Runtime/Repositories/Repository.cs`

## 11.40 `co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis` Class Reference

Inheritance diagram for `co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis`:





### Public Member Functions

- [RotationAxis Initialize](#) ([RuntimeTransformHandle](#) p\_runtimeHandle, [Vector3](#) p\_axis, [Color](#) p\_color)
- void [Update](#) ()
- override void [Interact](#) ([Vector3](#) p\_previousPosition)
- override bool [CanInteract](#) ([Vector3](#) p\_hitPoint)
- override void [StartInteraction](#) ([Vector3](#) p\_hitPoint)
- override void [EndInteraction](#) ()

### Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- void [SetDefaultColor](#) ()
- void [SetColor](#) ([Color](#) p\_color)
- virtual void [StartInteraction](#) ([Vector3](#) p\_hitPoint)
- virtual bool [CanInteract](#) ([Vector3](#) p\_hitPoint)
- virtual void [Interact](#) ([Vector3](#) p\_previousPosition)
- virtual void [EndInteraction](#) ()

### Protected Member Functions

- override void [InitializeMaterial](#) ()
- virtual void [InitializeMaterial](#) ()

### Private Member Functions

- void [DrawArc](#) ()

### Private Attributes

- [Mesh](#) \_arcMesh
- [Material](#) \_arcMaterial
- [Vector3](#) \_axis
- [Vector3](#) \_rotatedAxis
- [Plane](#) \_axisPlane
- [Vector3](#) \_tangent
- [Vector3](#) \_biTangent
- [Quaternion](#) \_startRotation

### Additional Inherited Members

### Static Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- static [Vector3](#) [GetVectorFromAxes](#) ([HandleAxes](#) p\_axes)

**Public Attributes inherited from****[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- float [delta](#)

**Protected Attributes inherited from****[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- [RuntimeTransformHandle](#) [\\_parentTransformHandle](#)
- Color [\\_defaultColor](#)
- Material [\\_material](#)
- Vector3 [\\_hitPoint](#)
- bool [\\_isInteracting](#) = false

**Events inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- Action [InteractionStart](#)
- Action [InteractionEnd](#)
- Action< float > [InteractionUpdate](#)

**11.40.1 Detailed Description**

Created by Peter @sHTiF Stefcek 20.10.2020

**11.40.2 Member Function Documentation****11.40.2.1 CanInteract()**

```
override bool co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis.CanInteract (
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

**11.40.2.2 DrawArc()**

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis.DrawArc ( ) [private]
```

**11.40.2.3 EndInteraction()**

```
override void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis.EndInteraction ( )
[virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

#### 11.40.2.4 Initialize()

```
RotationAxis co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.Initialize (
    RuntimeTransformHandle p_runtimeHandle,
    Vector3 p_axis,
    Color p_color )
```

#### 11.40.2.5 InitializeMaterial()

```
override void co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.InitializeMaterial
( ) [protected], [virtual]
```

Reimplemented from [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

#### 11.40.2.6 Interact()

```
override void co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.Interact (
    Vector3 p_previousPosition ) [virtual]
```

Reimplemented from [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

#### 11.40.2.7 StartInteraction()

```
override void co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.StartInteraction (
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented from [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

#### 11.40.2.8 Update()

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.Update ( )
```

### 11.40.3 Member Data Documentation

#### 11.40.3.1 \_arcMaterial

```
Material co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis._arcMaterial [private]
```

#### 11.40.3.2 \_arcMesh

```
Mesh co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis._arcMesh [private]
```

#### 11.40.3.3 \_axis

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis._axis [private]
```

**11.40.3.4 \_axisPlane**

Plane co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.\_axisPlane [private]

**11.40.3.5 \_biTangent**

Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.\_biTangent [private]

**11.40.3.6 \_rotatedAxis**

Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.\_rotatedAxis [private]

**11.40.3.7 \_startRotation**

Quaternion co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.\_startRotation [private]

**11.40.3.8 \_tangent**

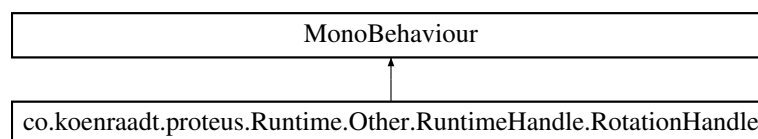
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationAxis.\_tangent [private]

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

- co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Rotation/[RotationAxis.cs](#)

## 11.41 co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationHandle Class Reference

Inheritance diagram for co.koenraad.proteus.Runtime.Other.RuntimeHandle.RotationHandle:

**Public Member Functions**

- [RotationHandle Initialize](#) ([RuntimeTransformHandle](#) p\_parentTransformHandle)
- void [Destroy](#) ()

**Protected Attributes**

- [RuntimeTransformHandle](#) \_parentTransformHandle
- List< [RotationAxis](#) > \_axes

### 11.41.1 Detailed Description

Created by Peter @sHTiF Stefcek 20.10.2020

### 11.41.2 Member Function Documentation

#### 11.41.2.1 Destroy()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationHandle.Destroy ( )
```

#### 11.41.2.2 Initialize()

```
RotationHandle co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationHandle.Initialize (
    RuntimeTransformHandle p_parentTransformHandle )
```

### 11.41.3 Member Data Documentation

#### 11.41.3.1 \_axes

```
List<RotationAxis> co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationHandle._axes
[protected]
```

#### 11.41.3.2 \_parentTransformHandle

```
RuntimeTransformHandle co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationHandle._↔
parentTransformHandle [protected]
```

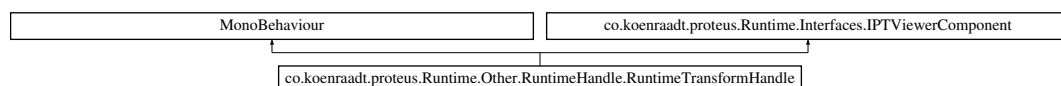
The documentation for this class was generated from the following file:

- co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Rotation/[RotationHandle.cs](#)

## 11.42 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.Runtime↔ TransformHandle Class Reference

Created by Peter @sHTiF Stefcek 21.10.2020 Modified by Thijs Koenraadt to work with Proteus.

Inheritance diagram for co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle:



## Public Member Functions

- void [Init](#) (string linkedViewerId)  
*Called on initialization by the viewer with a reference to the linked viewer's id.*
- void [Init](#) (string linkedViewerId)  
*Called on initialization by the viewer with a reference to the linked viewer's id.*

## Static Public Member Functions

- static [RuntimeTransformHandle Create](#) (Transform p\_target, [HandleType](#) p\_handleType)

## Public Attributes

- [HandleAxes](#) axes = [HandleAxes.XYZ](#)
- [HandleSpace](#) space = [HandleSpace.LOCAL](#)
- [HandleType](#) type = [HandleType.POSITION](#)
- [HandleSnappingType](#) snappingType = [HandleSnappingType.RELATIVE](#)
- Vector3 [positionSnap](#) = Vector3.zero
- float [rotationSnap](#) = 0
- Vector3 [scaleSnap](#) = Vector3.zero
- bool [autoScale](#) = false
- float [autoScaleFactor](#) = 1
- Camera [handleCamera](#)
- Transform [target](#)

## Private Member Functions

- void [Start](#) ()
- void [CreateHandles](#) ()
- void [Clear](#) ()
- void [Update](#) ()
- void [HandleOverEffect](#) ([HandleBase](#) p\_axis, Vector3 p\_hitPoint)
- void [GetHandle](#) (ref [HandleBase](#) p\_handle, ref Vector3 p\_hitPoint)
- void [OnViewerDataChanged](#) (object obj, PropertyChangedEventArgs e)
- void [OnDestroy](#) ()

## Private Attributes

- string [\\_linkedViewerId](#)
- [PTViewer](#) [\\_linkedViewerData](#)
- Vector3 [\\_previousMousePosition](#)
- [HandleBase](#) [\\_previousAxis](#)
- [HandleBase](#) [\\_draggingHandle](#)
- [HandleType](#) [\\_previousType](#)
- [HandleAxes](#) [\\_previousAxes](#)
- [PositionHandle](#) [\\_positionHandle](#)
- [RotationHandle](#) [\\_rotationHandle](#)
- [ScaleHandle](#) [\\_scaleHandle](#)

### 11.42.1 Detailed Description

Created by Peter @sHTiF Stefcek 21.10.2020 Modified by Thijs Koenraadt to work with Proteus.

### 11.42.2 Member Function Documentation

#### 11.42.2.1 Clear()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.Clear ( ) [private]
```

#### 11.42.2.2 Create()

```
static RuntimeTransformHandle co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.Create (
    Transform p_target,
    HandleType p_handleType ) [static]
```

#### 11.42.2.3 CreateHandles()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.CreateHandles ( )
[private]
```

#### 11.42.2.4 GetHandle()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.GetHandle (
    ref HandleBase p_handle,
    ref Vector3 p_hitPoint ) [private]
```

#### 11.42.2.5 HandleOverEffect()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.HandleOverEffect
(
    HandleBase p_axis,
    Vector3 p_hitPoint ) [private]
```

#### 11.42.2.6 Init()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.Init (
    string linkedViewerId )
```

Called on initialization by the viewer with a reference to the linked viewer's id.

#### Parameters

<i>linkedViewerId</i>	the id of the linked viewer
-----------------------	-----------------------------

Implements [co.koenraadt.proteus.Runtime.Interfaces.IPTViewerComponent](#).

#### 11.42.2.7 OnDestroy()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.OnDestroy ( )  
[private]
```

#### 11.42.2.8 OnViewerDataChanged()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.OnViewerData↔  
Changed (   
    object obj,  
    PropertyChangedEventArgs e ) [private]
```

#### 11.42.2.9 Start()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.Start ( ) [private]
```

#### 11.42.2.10 Update()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.Update ( ) [private]
```

### 11.42.3 Member Data Documentation

#### 11.42.3.1 \_draggingHandle

```
HandleBase co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle._dragging↔  
Handle [private]
```

#### 11.42.3.2 \_linkedViewerData

```
PTViewer co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle._linked↔  
ViewerData [private]
```

#### 11.42.3.3 \_linkedViewerId

```
string co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle._linkedViewerId  
[private]
```

#### 11.42.3.4 \_positionHandle

```
PositionHandle co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle._↔  
positionHandle [private]
```



**11.42.3.5 \_previousAxes**

[HandleAxes](#) co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.\_previous↔  
 Axes [private]

**11.42.3.6 \_previousAxis**

[HandleBase](#) co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.\_previous↔  
 Axis [private]

**11.42.3.7 \_previousMousePosition**

Vector3 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.\_previous↔  
 MousePosition [private]

**11.42.3.8 \_previousType**

[HandleType](#) co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.\_previous↔  
 Type [private]

**11.42.3.9 \_rotationHandle**

[RotationHandle](#) co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.\_↔  
 rotationHandle [private]

**11.42.3.10 \_scaleHandle**

[ScaleHandle](#) co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.\_scale↔  
 Handle [private]

**11.42.3.11 autoScale**

bool co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.autoScale = false

**11.42.3.12 autoScaleFactor**

float co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.autoScaleFactor  
 = 1

**11.42.3.13 axes**

[HandleAxes](#) co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.axes =  
[HandleAxes.XYZ](#)

#### 11.42.3.14 handleCamera

```
Camera co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.handleCamera
```

#### 11.42.3.15 positionSnap

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.positionSnap =  
Vector3.zero
```

#### 11.42.3.16 rotationSnap

```
float co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.rotationSnap = 0
```

#### 11.42.3.17 scaleSnap

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.scaleSnap =  
Vector3.zero
```

#### 11.42.3.18 snappingType

```
HandleSnappingType co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.↔  
snappingType = HandleSnappingType.RELATIVE
```

#### 11.42.3.19 space

```
HandleSpace co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.space =  
HandleSpace.LOCAL
```

#### 11.42.3.20 target

```
Transform co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.target
```

#### 11.42.3.21 type

```
HandleType co.koenraad.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle.type =  
HandleType.POSITION
```

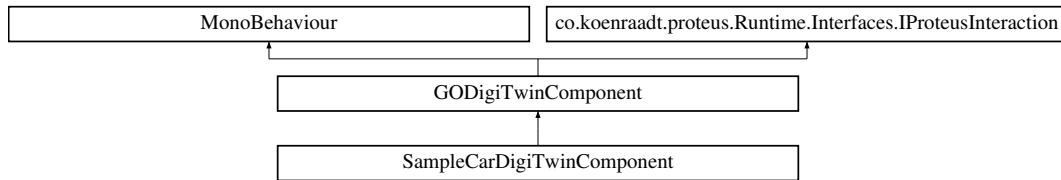
The documentation for this class was generated from the following file:

- co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/[RuntimeTransformHandle.cs](#)

## 11.43 SampleCarDigiTwinComponent Class Reference

Example of a custom digital twin component for a car that listens to changes of the engine's state and changes the car's offset accordingly / emits exhaust particles.

Inheritance diagram for SampleCarDigiTwinComponent:



### Public Attributes

- Vector3 [RunningOffset](#) = new Vector3(0,0,0)  
*The position that the car should be offset when the engine starts running.*
- float [Speed](#) = .01f  
*The speed that the car should move to the new offset.*
- ParticleSystem [ExhaustParticleSystem](#)  
*Reference to the particle system that should play when the engine starts running.*

### Public Attributes inherited from [GODigiTwinComponent](#)

- string [MainDiagramName](#)  
*The name of the main diagram that the digital twin component is linked to.*
- List< string > [LinkedNodes](#)  
*The list of nodes that the digital twin component is linked to.*
- List< string > [LinkedStates](#)  
*The list of states that the digital twin component is linked to.*
- float [XrayOpacityFactor](#) = .1f  
*The opacity factor that the component will change its material when xrayed.*
- float [ExplodeFactor](#) = 1.5f  
*The factor that the component should move away from the explode origin when exploded.*
- bool [DoXrayView](#) = true  
*Whether the component should trigger xray view.*
- bool [DoExplodedView](#) = true  
*Whether the component should trigger exploded view.*
- bool [ReactsToXray](#) = true  
*Whether the component should react to xray view.*
- bool [ReactsToExplodedView](#) = true  
*Whether the component should react to exploded view.*

### Protected Member Functions

- override void [Start](#) ()  
*Initializes and starts the digital twin component.*
- override void [OnStateDataChanged](#) (PTState obj, PropertyChangedEventArgs e)  
*Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.*
- override void [Update](#) ()  
*Called on every unity update.*

## Protected Member Functions inherited from [GODigiTwinComponent](#)

- virtual void [Awake](#) ()  
*Sets the layer of the object to proteus viz so it can react to Proteus interaction events.*
- virtual void [Start](#) ()  
*Initializes and starts the digital twin component.*
- virtual void [Update](#) ()  
*Called on every unity update.*
- virtual void [OnDestroy](#) ()  
*Destroys and cleans up the digital twin component.*
- void [OnStateDataChanged](#) (object obj, PropertyChangedEventArgs e)
- virtual void [OnStateDataChanged](#) (PTState obj, PropertyChangedEventArgs e)  
*Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.*

## Private Attributes

- Vector3 [\\_startPos](#)
- bool [\\_isRunning](#) = false

## Additional Inherited Members

## Public Member Functions inherited from [GODigiTwinComponent](#)

- bool [HasLinkedNodeInSelection](#) ()  
*Checks whether the digital twin component has a linked node that is currently selected.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [UpdateXrayView](#) ()  
*Updates the component to react to xray view. Changes the transparency of the object accordingly.*
- void [UpdateExplodedView](#) (Vector3 origin, bool isExploded)  
*Updates the component to react to exploded view. Calculates its new location and offset accordingly.*

## Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*
- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)

*Called when the user release the alternative pointer button.*

- void [OnPointerTertiaryUp](#) (RaycastHit hit)

*Called when the user release the tertiary pointer button.*

- void [OnPointerAltClickUp](#) (RaycastHit hit)

*Called when the user releases the button when the alt key was held.*

- void [OnPointerCtrlClickUp](#) (RaycastHit hit)

*Called when the user releases the pointer and had ctrl clicked.*

- void [OnPointerMove](#) (RaycastHit hit)

*Called when the user moves the pointer.*

### 11.43.1 Detailed Description

Example of a custom digital twin component for a car that listens to changes of the engine's state and changes the car's offset accordingly / emits exhaust particles.

### 11.43.2 Member Function Documentation

#### 11.43.2.1 OnStateDataChanged()

```
override void SampleCarDigiTwinComponent.OnStateDataChanged (
    PTState obj,
    PropertyChangedEventArgs e ) [protected], [virtual]
```

Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.

##### Parameters

<i>obj</i>	
<i>e</i>	

Reimplemented from [GODigiTwinComponent](#).

#### 11.43.2.2 Start()

```
override void SampleCarDigiTwinComponent.Start ( ) [protected], [virtual]
```

Initializes and starts the digital twin component.

Reimplemented from [GODigiTwinComponent](#).

#### 11.43.2.3 Update()

```
override void SampleCarDigiTwinComponent.Update ( ) [protected], [virtual]
```

Called on every unity update.

Reimplemented from [GODigiTwinComponent](#).

### 11.43.3 Member Data Documentation

#### 11.43.3.1 `_isRunning`

```
bool SampleCarDigiTwinComponent._isRunning = false [private]
```

#### 11.43.3.2 `_startPos`

```
Vector3 SampleCarDigiTwinComponent._startPos [private]
```

#### 11.43.3.3 `ExhaustParticleSystem`

```
ParticleSystem SampleCarDigiTwinComponent.ExhaustParticleSystem
```

Reference to the particle system that should play when the engine starts running.

#### 11.43.3.4 `RunningOffset`

```
Vector3 SampleCarDigiTwinComponent.RunningOffset = new Vector3(0,0,0)
```

The position that the car should be offset when the engine starts running.

#### 11.43.3.5 `Speed`

```
float SampleCarDigiTwinComponent.Speed = .01f
```

The speed that the car should move to the new offset.

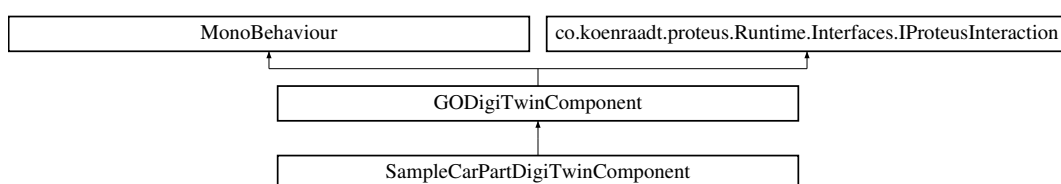
The documentation for this class was generated from the following file:

- [co.koenraad.proteus/Samples~/Demo/Components/SampleCarDigiTwinComponent.cs](#)

## 11.44 SampleCarPartDigiTwinComponent Class Reference

Example of a simple Digital Twin Component.

Inheritance diagram for SampleCarPartDigiTwinComponent:



### Protected Member Functions

- override void [Start](#) ()  
*Initializes and starts the digital twin component.*
- override void [OnStateDataChanged](#) (PTState obj, PropertyChangedEventArgs e)  
*Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.*
- override void [Update](#) ()  
*Called on every unity update.*

### Protected Member Functions inherited from [GODigiTwinComponent](#)

- virtual void [Awake](#) ()  
*Sets the layer of the object to proteus viz so it can react to Proteus interaction events.*
- virtual void [Start](#) ()  
*Initializes and starts the digital twin component.*
- virtual void [Update](#) ()  
*Called on every unity update.*
- virtual void [OnDestroy](#) ()  
*Destroys and cleans up the digital twin component.*
- void [OnStateDataChanged](#) (object obj, PropertyChangedEventArgs e)
- virtual void [OnStateDataChanged](#) (PTState obj, PropertyChangedEventArgs e)  
*Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.*

### Additional Inherited Members

### Public Member Functions inherited from [GODigiTwinComponent](#)

- bool [HasLinkedNodeInSelection](#) ()  
*Checks whether the digital twin component has a linked node that is currently selected.*
- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [UpdateXrayView](#) ()  
*Updates the component to react to xray view. Changes the transparency of the object accordingly.*
- void [UpdateExplodedView](#) (Vector3 origin, bool isExploded)  
*Updates the component to react to exploded view. Calculates its new location and offset accordingly.*

### Public Member Functions inherited from [co.koenraad.proteus.Runtime.Interfaces.IProteusInteraction](#)

- void [OnPointerDown](#) (RaycastHit hit)  
*Called when the user presses the pointer button down.*
- void [OnPointerAltDown](#) (RaycastHit hit)  
*Called when the user presses the alternative pointer button down.*
- void [OnPointerTertiaryDown](#) (RaycastHit hit)  
*Called when the user presses the tertiary pointer button down.*
- void [OnPointerCtrlClickDown](#) (RaycastHit hit)  
*Called when the user clicked while holding ctrl.*

- void [OnPointerAltClickDown](#) (RaycastHit hit)  
*Called when the user presses the pointer down while holding alt.*
- void [OnPointerUp](#) (RaycastHit hit)  
*Called when the user releases the pointer.*
- void [OnPointerAltUp](#) (RaycastHit hit)  
*Called when the user release the alternative pointer button.*
- void [OnPointerTertiaryUp](#) (RaycastHit hit)  
*Called when the user release the tertiary pointer button.*
- void [OnPointerAltClickUp](#) (RaycastHit hit)  
*Called when the user releases the button when the alt key was held.*
- void [OnPointerCtrlClickUp](#) (RaycastHit hit)  
*Called when the user releases the pointer and had ctrl clicked.*
- void [OnPointerMove](#) (RaycastHit hit)  
*Called when the user moves the pointer.*

## Public Attributes inherited from [GODigiTwinComponent](#)

- string [MainDiagramName](#)  
*The name of the main diagram that the digital twin component is linked to.*
- List< string > [LinkedNodes](#)  
*The list of nodes that the digital twin component is linked to.*
- List< string > [LinkedStates](#)  
*The list of states that the digital twin component is linked to.*
- float [XrayOpacityFactor](#) = .1f  
*The opacity factor that the component will change its material when xrayed.*
- float [ExplodeFactor](#) = 1.5f  
*The factor that the component should move away from the explode origin when exploded.*
- bool [DoXrayView](#) = true  
*Whether the component should trigger xray view.*
- bool [DoExplodedView](#) = true  
*Whether the component should trigger exploded view.*
- bool [ReactsToXray](#) = true  
*Whether the component should react to xray view.*
- bool [ReactsToExplodedView](#) = true  
*Whether the component should react to exploded view.*

### 11.44.1 Detailed Description

Example of a simple Digital Twin Component.

### 11.44.2 Member Function Documentation

#### 11.44.2.1 OnStateDataChanged()

```
override void SampleCarPartDigiTwinComponent.OnStateDataChanged (
    PTState obj,
    PropertyChangedEventArgs e ) [protected], [virtual]
```

Method called whenever the state changes for an object that the digital twin component is linked to. Can be overridden to define custom behavior on state changes.



## Parameters

<i>obj</i>	
<i>e</i>	

Reimplemented from [GODigiTwinComponent](#).

**11.44.2.2 Start()**

```
override void SampleCarPartDigiTwinComponent.Start ( ) [protected], [virtual]
```

Initializes and starts the digital twin component.

Reimplemented from [GODigiTwinComponent](#).

**11.44.2.3 Update()**

```
override void SampleCarPartDigiTwinComponent.Update ( ) [protected], [virtual]
```

Called on every unity update.

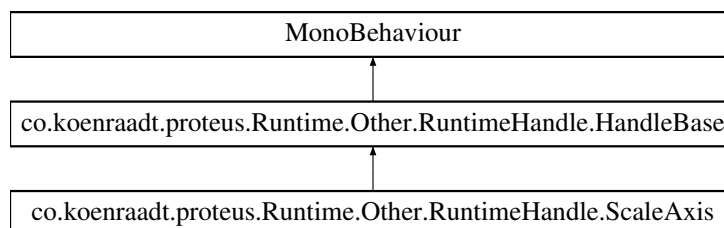
Reimplemented from [GODigiTwinComponent](#).

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

- co.koenraadt.proteus/Samples~/Demo/Components/[SampleCarPartDigiTwinComponent.cs](#)

## 11.45 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis Class Reference

Inheritance diagram for co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis:

**Public Member Functions**

- [ScaleAxis Initialize](#) ([RuntimeTransformHandle](#) p\_parentTransformHandle, Vector3 p\_axis, Color p\_color)
- override void [Interact](#) (Vector3 p\_previousPosition)
- override void [StartInteraction](#) (Vector3 p\_hitPoint)

## Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- void [SetDefaultColor](#) ()
- void [SetColor](#) (Color p\_color)
- virtual void [StartInteraction](#) (Vector3 p\_hitPoint)
- virtual bool [CanInteract](#) (Vector3 p\_hitPoint)
- virtual void [Interact](#) (Vector3 p\_previousPosition)
- virtual void [EndInteraction](#) ()

## Protected Member Functions

- void [Update](#) ()

## Protected Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- virtual void [InitializeMaterial](#) ()

## Private Attributes

- Vector3 [\\_axis](#)
- Vector3 [\\_startScale](#)
- float [\\_interactionDistance](#)
- Ray [\\_raxisRay](#)

## Static Private Attributes

- const float [SIZE](#) = 2

## Additional Inherited Members

## Static Public Member Functions inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- static Vector3 [GetVectorFromAxes](#) ([HandleAxes](#) p\_axes)

## Public Attributes inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- float [delta](#)

## Protected Attributes inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

- [RuntimeTransformHandle](#) [\\_parentTransformHandle](#)
- Color [\\_defaultColor](#)
- Material [\\_material](#)
- Vector3 [\\_hitPoint](#)
- bool [\\_isInteracting](#) = false

**Events inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- Action [InteractionStart](#)
- Action [InteractionEnd](#)
- Action< float > [InteractionUpdate](#)

**11.45.1 Detailed Description**

Created by Peter @sHTiF Stefcek 20.10.2020

**11.45.2 Member Function Documentation****11.45.2.1 Initialize()**

```
ScaleAxis co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis.Initialize (
    RuntimeTransformHandle p_parentTransformHandle,
    Vector3 p_axis,
    Color p_color )
```

**11.45.2.2 Interact()**

```
override void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis.Interact (
    Vector3 p_previousPosition ) [virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

**11.45.2.3 StartInteraction()**

```
override void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis.StartInteraction (
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

**11.45.2.4 Update()**

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis.Update ( ) [protected]
```

**11.45.3 Member Data Documentation****11.45.3.1 \_axis**

```
Vector3 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis._axis [private]
```

### 11.45.3.2 `_interactionDistance`

```
float co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleAxis._interactionDistance [private]
```

### 11.45.3.3 `_raxisRay`

```
Ray co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleAxis._raxisRay [private]
```

### 11.45.3.4 `_startScale`

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleAxis._startScale [private]
```

### 11.45.3.5 `SIZE`

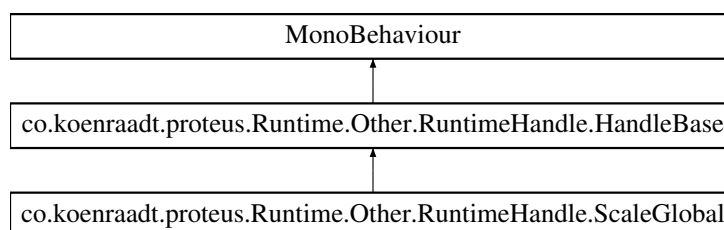
```
const float co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleAxis.SIZE = 2 [static],  
[private]
```

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

- `co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Scale/ScaleAxis.cs`

## 11.46 `co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal` Class Reference

Inheritance diagram for `co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal`:



### Public Member Functions

- `ScaleGlobal Initialize` (`RuntimeTransformHandle` p\_parentTransformHandle, `Vector3` p\_axis, `Color` p\_color)
- `override void Interact` (`Vector3` p\_previousPosition)
- `override void StartInteraction` (`Vector3` p\_hitPoint)

**Public Member Functions inherited from****[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- void [SetDefaultColor](#) ()
- void [SetColor](#) (Color p\_color)
- virtual void [StartInteraction](#) (Vector3 p\_hitPoint)
- virtual bool [CanInteract](#) (Vector3 p\_hitPoint)
- virtual void [Interact](#) (Vector3 p\_previousPosition)
- virtual void [EndInteraction](#) ()

**Protected Attributes**

- Vector3 [\\_axis](#)
- Vector3 [\\_startScale](#)

**Protected Attributes inherited from****[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- [RuntimeTransformHandle](#) [\\_parentTransformHandle](#)
- Color [\\_defaultColor](#)
- Material [\\_material](#)
- Vector3 [\\_hitPoint](#)
- bool [\\_isInteracting](#) = false

**Additional Inherited Members****Static Public Member Functions inherited from****[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- static Vector3 [GetVectorFromAxes](#) ([HandleAxes](#) p\_axes)

**Public Attributes inherited from****[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- float [delta](#)

**Protected Member Functions inherited from****[co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- virtual void [InitializeMaterial](#) ()

**Events inherited from [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)**

- Action [InteractionStart](#)
- Action [InteractionEnd](#)
- Action< float > [InteractionUpdate](#)

### 11.46.1 Detailed Description

Created by Peter @sHTiF Stefcek 20.10.2020

### 11.46.2 Member Function Documentation

#### 11.46.2.1 Initialize()

```
ScaleGlobal co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal.Initialize (
    RuntimeTransformHandle p_parentTransformHandle,
    Vector3 p_axis,
    Color p_color )
```

#### 11.46.2.2 Interact()

```
override void co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal.Interact (
    Vector3 p_previousPosition ) [virtual]
```

Reimplemented from [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

#### 11.46.2.3 StartInteraction()

```
override void co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal.StartInteraction (
    Vector3 p_hitPoint ) [virtual]
```

Reimplemented from [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase](#).

### 11.46.3 Member Data Documentation

#### 11.46.3.1 \_axis

```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal._axis [protected]
```

#### 11.46.3.2 \_startScale

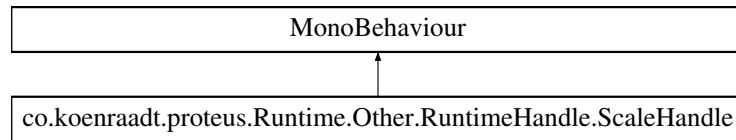
```
Vector3 co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal._startScale [protected]
```

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

- [co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Scale/ScaleGlobal.cs](#)

## 11.47 co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleHandle Class Reference

Inheritance diagram for co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleHandle:



### Public Member Functions

- [ScaleHandle Initialize](#) ([RuntimeTransformHandle](#) p\_parentTransformHandle)
- void [Destroy](#) ()

### Protected Attributes

- [RuntimeTransformHandle](#) \_parentTransformHandle
- List< [ScaleAxis](#) > \_axes
- [ScaleGlobal](#) \_globalAxis

### Private Member Functions

- void [OnGlobalInteractionStart](#) ()
- void [OnGlobalInteractionUpdate](#) (float p\_delta)
- void [OnGlobalInteractionEnd](#) ()

### 11.47.1 Detailed Description

Created by Peter @sHTiF Stefcek 20.10.2020

### 11.47.2 Member Function Documentation

#### 11.47.2.1 Destroy()

```
void co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleHandle.Destroy ( )
```

#### 11.47.2.2 Initialize()

```
ScaleHandle co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleHandle.Initialize (
    RuntimeTransformHandle p_parentTransformHandle )
```

**11.47.2.3 OnGlobalInteractionEnd()**

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleHandle.OnGlobalInteractionEnd ( )
[private]
```

**11.47.2.4 OnGlobalInteractionStart()**

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleHandle.OnGlobalInteractionStart ( )
[private]
```

**11.47.2.5 OnGlobalInteractionUpdate()**

```
void co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleHandle.OnGlobalInteractionUpdate (
    float p_delta ) [private]
```

**11.47.3 Member Data Documentation****11.47.3.1 \_axes**

```
List<ScaleAxis> co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleHandle._axes [protected]
```

**11.47.3.2 \_globalAxis**

```
ScaleGlobal co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleHandle._globalAxis [protected]
```

**11.47.3.3 \_parentTransformHandle**

```
RuntimeTransformHandle co.koenraad.proteus.Runtime.Other.RuntimeHandle.ScaleHandle._parent↔
TransformHandle [protected]
```

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

- co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Scale/ScaleHandle.cs

## 11.48 co.koenraad.proteus.Runtime.Repositories.StatesRepository

### Class Reference

Part of the repository that handles the state related data.



## Public Member Functions

- void [UpdateState](#) ([PTState](#) newState)  
*Adds a PTState to the StatesRepository or updates it.*
- void [UpdateStateValue](#) (string id, string key, object value)  
*Sets a new value based on the value's key for a state.*
- [ObservableCollection](#)< [PTState](#) > [GetStates](#) ()  
*Get the collection of states.*
- [PTState](#) [GetStateById](#) (string id)  
*Get a PTState by its Id.*
- void [DeleteStateById](#) (string id)  
*Removes a state by its id.*

## Properties

- static [StatesRepository Instance](#) [get]  
*The singleton instance of the StatesRepository.*

## Private Member Functions

- void [Init](#) ()  
*Initialize the states repository.*

## Private Attributes

- [ObservableCollection](#)< [PTState](#) > [\\_ptStates](#)

## Static Private Attributes

- static [StatesRepository \\_instance](#) = null

### 11.48.1 Detailed Description

Part of the repository that handles the state related data.

### 11.48.2 Member Function Documentation

#### 11.48.2.1 DeleteStateById()

```
void co.koenraad.proteus.Runtime.Repositories.StatesRepository.DeleteStateById (
    string id )
```

Removes a state by its id.

**Parameters**

<i>id</i>	The state's identifier.
-----------	-------------------------

**11.48.2.2 GetStateById()**

```
PTState co.koenraadt.proteus.Runtime.Repositories.StatesRepository.GetStateById (
    string id )
```

Get a PTState by its Id.

**Parameters**

<i>id</i>	the state's identifier.
-----------	-------------------------

**Returns**

The PTState with its respective Id

**11.48.2.3 GetStates()**

```
ObservableCollection< PTState > co.koenraadt.proteus.Runtime.Repositories.StatesRepository.↵
GetStates ( )
```

Get the collection of states.

**Returns**

Collection of PTStates

**11.48.2.4 Init()**

```
void co.koenraadt.proteus.Runtime.Repositories.StatesRepository.Init ( ) [private]
```

Initialize the states repository.

**11.48.2.5 UpdateState()**

```
void co.koenraadt.proteus.Runtime.Repositories.StatesRepository.UpdateState (
    PTState newState )
```

Adds a PTState to the StatesRepository or updates it.

**Parameters**

<i>newState</i>	The PTState to add.
-----------------	---------------------

### 11.48.2.6 UpdateStateValue()

```
void co.koenraad.proteus.Runtime.Repositories.StatesRepository.UpdateStateValue (
    string id,
    string key,
    object value )
```

Sets a new value based on the value's key for a state.

#### Parameters

<i>id</i>	The id of the state.
<i>key</i>	The key of the value to update.
<i>value</i>	The new value.

## 11.48.3 Member Data Documentation

### 11.48.3.1 \_instance

```
StatesRepository co.koenraad.proteus.Runtime.Repositories.StatesRepository._instance = null
[static], [private]
```

### 11.48.3.2 \_ptStates

```
ObservableCollection<PTState> co.koenraad.proteus.Runtime.Repositories.StatesRepository._pt↔
States [private]
```

## 11.48.4 Property Documentation

### 11.48.4.1 Instance

```
StatesRepository co.koenraad.proteus.Runtime.Repositories.StatesRepository.Instance [static],
[get]
```

The singleton instance of the StatesRepository.

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

- co.koenraad.proteus/Runtime/Repositories/[Repository.States.cs](#)

## 11.49 co.koenraad.proteus.Runtime.Repositories.ViewersRepository Class Reference

Part of the repository that holds all viewer related data.

## Public Member Functions

- void [CreateViewer](#) ([PTViewer](#) viewerData, bool autoPlace=true)  
*Creates a new viewer.*
- void [UpdateViewer](#) ([PTViewer](#) newViewer)  
*Adds a PTViewer to the ViewersRepository.*
- [PTViewer GetViewerById](#) (string id)  
*Get a PTViewer by its Id.*
- [ObservableCollection< PTViewer > GetViewers](#) ()  
*Get the collection of viewers.*
- void [DeleteViewerById](#) (string id)  
*Removes a viewer by its id.*
- void [SetViewerPosition](#) (string id, [Vector3](#) position)  
*Updates the position of the viewer.*
- void [SetViewWindowWorldToLocal](#) (string id, [Matrix4x4](#) viewWindowWorldToLocal)  
*Updates the ViewWindow's WorldToLocal matrix for the viewer.*
- void [SetViewerRotation](#) (string id, [Quaternion](#) rotation)  
*Updates the rotation of the viewer.*
- void [SetGizmoVisible](#) (string id, bool visible)  
*Set the visibility of the gizmo of a viewer.*
- void [AddModelAnchorOffset](#) (string id, [Vector3](#) offset)  
*Updates the local position of the view window.*
- void [RegenerateViewerLayouts](#) ()  
*Regenerate the layouts of all viewers.*
- void [RegenerateViewerLayout](#) (string id)  
*Regenerates the layout of a viewer.*
- [List< PTNode > GetRelatedNodesOfViewer](#) (string viewerId)  
*Get the edges that are related to the viewer.*
- [List< PTEdge > GetRelatedEdgesOfViewer](#) (string viewerId)  
*Get the edges that are related to the viewer.*
- void [ScaleViewer](#) (string viewerId, [Vector3](#) scaleDelta)  
*Sets a new scale of a viewer.*
- void [ZoomViewer](#) (string viewerId, float delta=0.0f)  
*Adds the zoom delta to the specified viewer.*

## Properties

- static [ViewersRepository Instance](#) [get]  
*The singleton instance of the ViewersRepository.*

## Private Member Functions

- void [Init](#) ()  
*Initialize the ViewersRepository.*

## Private Attributes

- [ObservableCollection< PTViewer > \\_ptViewers](#)

## Static Private Attributes

- static [ViewersRepository](#) \_instance = null

## 11.49.1 Detailed Description

Part of the repository that holds all viewer related data.

## 11.49.2 Member Function Documentation

### 11.49.2.1 AddModelAnchorOffset()

```
void co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.AddModelAnchorOffset (
    string id,
    Vector3 offset )
```

Updates the local position of the view window.

#### Parameters

<i>id</i>	the id of the viewer to update.
<i>position</i>	the local position of the view window.

### 11.49.2.2 CreateViewer()

```
void co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.CreateViewer (
    PTVIEWER viewerData,
    bool autoPlace = true )
```

Creates a new viewer.

#### Parameters

<i>viewerData</i>	The data of the viewer to created.
<i>autoPlace</i>	Whether the viewer should be automatically placed in the scene.

### 11.49.2.3 DeleteViewerById()

```
void co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.DeleteViewerById (
    string id )
```

Removes a viewer by its id.

#### Parameters

<i>id</i>	the viewer's identifier.
-----------	--------------------------

#### 11.49.2.4 GetRelatedEdgesOfViewer()

```
List< PTEdge > co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.GetRelatedEdgesOf↵
Viewer (
    string viewerId )
```

Get the edges that are related to the viewer.

**Returns**

#### 11.49.2.5 GetRelatedNodesOfViewer()

```
List< PTNode > co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.GetRelatedNodesOf↵
Viewer (
    string viewerId )
```

Get the edges that are related to the viewer.

**Parameters**

<i>viewer↵ Id</i>	The id of the viewer to get the related nodes of.
-----------------------	---

**Returns**

List of nodes that are related to a viewer

#### 11.49.2.6 GetViewerById()

```
PTViewer co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.GetViewerById (
    string id )
```

Get a PTViewer by its Id.

**Parameters**

<i>id</i>	the viewer's identifier.
-----------	--------------------------

**Returns**

The PTViewer with the respective Id.

#### 11.49.2.7 GetViewers()

```
ObservableCollection< PTViewer > co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.↵
GetViewers ( )
```

Get the collection of viewers.

**Returns**

Collection of PTViewers.

**11.49.2.8 Init()**

```
void co.koenraad.proteus.Runtime.Repositories.ViewersRepository.Init ( ) [private]
```

Initialize the ViewersRepository.

**11.49.2.9 RegenerateViewerLayout()**

```
void co.koenraad.proteus.Runtime.Repositories.ViewersRepository.RegenerateViewerLayout (
    string id )
```

Regenerates the layout of a viewer.

**Parameters**

<i>id</i>	The id of the viewer to regenerate the layout for.
-----------	--

**11.49.2.10 RegenerateViewerLayouts()**

```
void co.koenraad.proteus.Runtime.Repositories.ViewersRepository.RegenerateViewerLayouts ( )
```

Regenerate the layouts of all viewers.

**11.49.2.11 ScaleViewer()**

```
void co.koenraad.proteus.Runtime.Repositories.ViewersRepository.ScaleViewer (
    string viewerId,
    Vector3 scaleDelta )
```

Sets a new scale of a viewer.

**Parameters**

<i>viewerId</i>	The id of the viewer to update.
<i>scaleDelta</i>	The scale delta that is added to the viewer's current scale.

**11.49.2.12 SetGizmoVisible()**

```
void co.koenraad.proteus.Runtime.Repositories.ViewersRepository.SetGizmoVisible (
    string id,
    bool visible )
```

Set the visibility of the gizmo of a viewer.

## Parameters

<i>id</i>	the id of the viewer to update.
<i>visible</i>	the visibility of the gizmo for the viewer.

**11.49.2.13 SetViewerPosition()**

```
void co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.SetViewerPosition (
    string id,
    Vector3 position )
```

Updates the position of the viewer.

## Parameters

<i>id</i>	the id of the viewer to update.
<i>position</i>	the position of the viewer to update.

**11.49.2.14 SetViewerRotation()**

```
void co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.SetViewerRotation (
    string id,
    Quaternion rotation )
```

Updates the rotation of the viewer.

## Parameters

<i>id</i>	the id of the viewer to update.
<i>rotation</i>	the rotation of the viewer to update.

**11.49.2.15 SetViewWindowWorldToLocal()**

```
void co.koenraadt.proteus.Runtime.Repositories.ViewersRepository.SetViewWindowWorldToLocal (
    string id,
    Matrix4x4 viewWindowWorldToLocal )
```

Updates the ViewWindow's WorldToLocal matrix for the viewer.

## Parameters

<i>id</i>	the id of the viewer to update.
<i>viewWindowWorldToLocal</i>	the ViewWindowWorldToLocalMatrix of the viewer to update.



### 11.49.2.16 UpdateViewer()

```
void co.koenraad.proteus.Runtime.Repositories.ViewersRepository.UpdateViewer (
    PTVIEWER newViewer )
```

Adds a PTVIEWER to the ViewersRepository.

#### Parameters

<i>newViewer</i>	The viewer data to add.
------------------	-------------------------

### 11.49.2.17 ZoomViewer()

```
void co.koenraad.proteus.Runtime.Repositories.ViewersRepository.ZoomViewer (
    string viewerId,
    float delta = 0::0f )
```

Adds the zoom delta to the specified viewer.

#### Parameters

<i>viewerId</i>	Id of the viewer to zoom.
<i>delta</i>	The zoom delta that will be added to the viewer's scale.

## 11.49.3 Member Data Documentation

### 11.49.3.1 \_instance

```
ViewersRepository co.koenraad.proteus.Runtime.Repositories.ViewersRepository._instance = null
[static], [private]
```

### 11.49.3.2 \_ptViewers

```
ObservableCollection<PTVIEWER> co.koenraad.proteus.Runtime.Repositories.ViewersRepository._ptViewers
[private]
```

## 11.49.4 Property Documentation

### 11.49.4.1 Instance

```
ViewersRepository co.koenraad.proteus.Runtime.Repositories.ViewersRepository.Instance [static],
[get]
```

The singleton instance of the ViewersRepository.

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

- co.koenraad.proteus/Runtime/Repositories/Repository.Viewer.cs



## Chapter 12

# File Documentation

### 12.1 [co.koenraadt.proteus/CHANGELOG.md](#) File Reference

### 12.2 [co.koenraadt.proteus/libs/CommunityToolkit.Mvvm.8.1.0/↵](#) [License.md](#) File Reference

### 12.3 [co.koenraadt.proteus/LICENSE.md](#) File Reference

### 12.4 [co.koenraadt.proteus/README.md](#) File Reference

### 12.5 [co.koenraadt.proteus/Runtime/Controllers/CommsController.cs](#) File Reference

#### Classes

- class [co.koenraadt.proteus.Runtime.Controllers.CommsController](#)  
*Controls the communication of Proteus and implements an MQTT client and server.*

#### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Controllers](#)

### 12.6 [co.koenraadt.proteus/Runtime/Controllers/DigiTwinController.cs](#) File Reference

#### Classes

- class [co.koenraadt.proteus.Runtime.Controllers.DigiTwinController](#)  
*Controls the connection between Proteus and the Digital Twin components. Furthermore, it handles high-level behavior of the exploded and xray views.*

## Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Controllers](#)

## 12.7 co.koenraadt.proteus/Runtime/Interfaces/IProteusInteraction.cs File Reference

### Classes

- interface [co.koenraadt.proteus.Runtime.Interfaces.IProteusInteraction](#)  
*Interface for the interaction of Proteus.*

## Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Interfaces](#)

## 12.8 co.koenraadt.proteus/Runtime/Interfaces/IPTViewerComponent.cs File Reference

### Classes

- interface [co.koenraadt.proteus.Runtime.Interfaces.IPTViewerComponent](#)  
*Interface used for components of the Viewer.*

## Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Interfaces](#)

## 12.9 co.koenraadt.proteus/Runtime/Other/Helpers.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Other.Helpers](#)  
*Collection of Helper function used by Proteus.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)

## 12.10 co.koenraadt.proteus/Runtime/Repositories/Repository.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Repositories.Repository](#)  
*The repository holding all data of Proteus.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Repositories](#)

## 12.11 co.koenraadt.proteus/Runtime/Repositories/Repository.Globals.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Repositories.ProteusRepository](#)  
*Part of the repository that holds all general Proteus related data.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Repositories](#)

## 12.12 co.koenraadt.proteus/Runtime/Repositories/Repository.Models.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Repositories.ModelsRepository](#)  
*Part of the repository that handles all model related data.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Repositories](#)

## 12.13 co.koenraadt.proteus/Runtime/Repositories/Repository.States.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Repositories.StatesRepository](#)  
*Part of the repository that handles the state related data.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Repositories](#)

## 12.14 co.koenraadt.proteus/Runtime/Repositories/Repository.Viewer.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Repositories.ViewersRepository](#)  
*Part of the repository that holds all viewer related data.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Repositories](#)

## 12.15 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/↔ Handles/HandleAxes.cs File Reference

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## Enumerations

- enum [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleAxes](#) {  
    [co.koenraad.proteus.Runtime.Other.RuntimeHandle.X](#) , [co.koenraad.proteus.Runtime.Other.RuntimeHandle.Y](#)  
    , [co.koenraad.proteus.Runtime.Other.RuntimeHandle.Z](#) , [co.koenraad.proteus.Runtime.Other.RuntimeHandle.XY](#)  
    ,  
    [co.koenraad.proteus.Runtime.Other.RuntimeHandle.XZ](#) , [co.koenraad.proteus.Runtime.Other.RuntimeHandle.YZ](#)  
    , [co.koenraad.proteus.Runtime.Other.RuntimeHandle.XYZ](#) }

## 12.16 co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/HandleBase.cs File Reference ↩

### Classes

- class [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleBase](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraad](#)
- namespace [co.koenraad.proteus](#)
- namespace [co.koenraad.proteus.Runtime](#)
- namespace [co.koenraad.proteus.Runtime.Other](#)
- namespace [co.koenraad.proteus.Runtime.Other.RuntimeHandle](#)

## 12.17 co.koenraad.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/HandleSnappingType.cs File Reference ↩

### Namespaces

- namespace [co](#)
- namespace [co.koenraad](#)
- namespace [co.koenraad.proteus](#)
- namespace [co.koenraad.proteus.Runtime](#)
- namespace [co.koenraad.proteus.Runtime.Other](#)
- namespace [co.koenraad.proteus.Runtime.Other.RuntimeHandle](#)

### Enumerations

- enum [co.koenraad.proteus.Runtime.Other.RuntimeHandle.HandleSnappingType](#) { [co.koenraad.proteus.Runtime.Other.RuntimeHandle.RELATIVE](#) }

## 12.18 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/HandleSpace.cs File Reference

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

### Enumerations

- enum [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleSpace](#) { [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.LOCAL](#) }

## 12.19 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/HandleType.cs File Reference

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

### Enumerations

- enum [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleType](#) { [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ROTATION](#), [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.SCALAR](#) }

## 12.20 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Position/PositionAxis.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionAxis](#)



### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.21 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Position/PositionHandle.cs File Reference ↩

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionHandle](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.22 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Position/PositionPlane.cs File Reference ↩

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.PositionPlane](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.23 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Rotation/RotationAxis.cs File Reference ↩

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationAxis](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.24 [co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Rotation/RotationHandle.cs](#) File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RotationHandle](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.25 [co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Scale/ScaleAxis.cs](#) File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleAxis](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.26 [co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Scale/ScaleGlobal.cs](#) File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleGlobal](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.27 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Handles/Scale/ScaleHandle.cs File Reference ↩

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.ScaleHandle](#)

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.28 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/RuntimeTransformHandle.cs File Reference ↩

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.RuntimeTransformHandle](#)

*Created by Peter @sHTiF Stefcek 21.10.2020 Modified by Thijs Koenraadt to work with Proteus.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.29 co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Utils/HandleMathUtils.cs File Reference ↩

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.HandleMathUtils](#)

## Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.30 [co.koenraadt.proteus/Runtime/RuntimeTransformHandle/Scripts/Utils/MeshUtils.cs](#) File Reference ↩

### Classes

- class [co.koenraadt.proteus.Runtime.Other.RuntimeHandle.MeshUtils](#)

## Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.Other](#)
- namespace [co.koenraadt.proteus.Runtime.Other.RuntimeHandle](#)

## 12.31 [co.koenraadt.proteus/Runtime/Scripts/components/GOViewCubeWidgetComp.cs](#) File Reference ↩

### Classes

- class [GOViewCubeWidget](#)

*ViewCube widget that helps a user to orient themselves in 3D space.*

## 12.32 [co.koenraadt.proteus/Runtime/Scripts/components/GOViewerCloseBtnComp.cs](#) File Reference ↩

### Classes

- class [GOViewerCloseBtnComp](#)

*Button component that closes a viewer.*

## 12.33 co.koenraadt.proteus/Runtime/Scripts/components/GOViewerGizmoBtn.cs File Reference ↩↪

### Classes

- class [GOViewerGizmoBtnComp](#)

*Button component for the viewer that can enable and disable the gizmo of the viewer.*

## 12.34 co.koenraadt.proteus/Runtime/Scripts/components/GOViewerScaleBtnComp.cs File Reference ↩↪

### Classes

- class [GOViewerScaleBtnComp](#)

*Button component for viewers that can control a viewer's scale.*

## 12.35 co.koenraadt.proteus/Runtime/Scripts/components/GOViewerZoomBtnComp.cs File Reference ↩↪

### Classes

- class [GOViewerZoomBtnComp](#)

*Button component for viewer's that can control the level of zoom of a viewer.*

## 12.36 co.koenraadt.proteus/Runtime/Scripts/FreeFlyCamera.cs File Reference

### Classes

- class [FreeFlyCamera](#)

*A simple free camera to be added to a Unity game object.*

## 12.37 co.koenraadt.proteus/Runtime/Scripts/GOButtonTriggers.cs File Reference

### Classes

- class [GOButtonTriggers](#)

*Used to debug / test the VR Experiment. Can be ignored.*

## 12.38 co.koenraadt.proteus/Runtime/Scripts/GOCommsController.cs File Reference

### Classes

- class [GOCommsController](#)

*GameObject for the communication controller which ensures the communication controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the communication controller.*

## 12.39 co.koenraadt.proteus/Runtime/Scripts/GODEbugger.cs File Reference

### Classes

- class [GODEbugger](#)

*Functions and helpers used during the development of Proteus for debugging.*

## 12.40 co.koenraadt.proteus/Runtime/Scripts/GODigiTwinComponent.cs File Reference

### Classes

- class [GODigiTwinComponent](#)

*Digital Twin component that used to connect existing parts of the digital twin to Proteus. This component can be inherited from to implement custom behavior for example when the linked states changes.*

## 12.41 co.koenraadt.proteus/Runtime/Scripts/GODigiTwinController.cs File Reference

### Classes

- class [GODigiTwinController](#)

*GameObject for the digital twin controller which ensures the digital twin controller's update function is called on the same loop as Unity's update function. Furthermore, on destroy it will also destroy the digital twin controller.*

## 12.42 co.koenraadt.proteus/Runtime/Scripts/GOEdge.cs File Reference

### Classes

- class [GOEdge](#)

*Component that handles the behavior of the Edges that are used in the viewer to visually represent the edges in the 3DML formatted model.*

## 12.43 co.koenraad.proteus/Runtime/Scripts/GONode.cs File Reference

### Classes

- class [GONode](#)

*Component that handles the behavior of the nodes that are used in the viewer to visually represent the nodes in the 3DML formatted model.*

## 12.44 co.koenraad.proteus/Runtime/Scripts/GOProteus.cs File Reference

### Classes

- class [GOProteus](#)

*Game object that is the root of all gameobjects belonging directly to Proteus.*

## 12.45 co.koenraad.proteus/Runtime/Scripts/GOViewer.cs File Reference

### Classes

- class [GOViewer](#)

*Component that implements and handle the behavior of a Proteus viewer.*

## 12.46 co.koenraad.proteus/Runtime/Scripts/GOViewWindow.cs File Reference

### Classes

- class [GOViewWindow](#)

*The viewer's view window that the nodes and edges in the visualization are constraint to.*

## 12.47 co.koenraad.proteus/Runtime/Scripts/GOVizController.cs File Reference

### Classes

- class [GOVizController](#)

*Gameobject used to implement / control the visualization controller for Proteus.*

## 12.48 co.koenraadt.proteus/Runtime/ViewModels/PTEdge.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.ViewModels.PTEdge](#)  
*Class that holds the data for an edge of the 3DML formatted model.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.ViewModels](#)

## 12.49 co.koenraadt.proteus/Runtime/ViewModels/PTGlobals.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.ViewModels.PTGlobals](#)  
*Class that holds the global data / defaults of Proteus.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.ViewModels](#)

## 12.50 co.koenraadt.proteus/Runtime/ViewModels/PTModelElement.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.ViewModels.PTModelElement](#)  
*Class containing the data of a model element.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.ViewModels](#)



## 12.51 co.koenraadt.proteus/Runtime/ViewModels/PTNode.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.ViewModels.PTNode](#)  
*Class that holds the data for a node of the 3DML formatted model.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.ViewModels](#)

## 12.52 co.koenraadt.proteus/Runtime/ViewModels/PTState.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.ViewModels.PTState](#)  
*Class used to hold the data of the states in the 3DML formatted model.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.ViewModels](#)

## 12.53 co.koenraadt.proteus/Runtime/ViewModels/PTViewer.cs File Reference

### Classes

- class [co.koenraadt.proteus.Runtime.ViewModels.PTViewer](#)  
*Class containing the properties of a viewer of Proteus.*

### Namespaces

- namespace [co](#)
- namespace [co.koenraadt](#)
- namespace [co.koenraadt.proteus](#)
- namespace [co.koenraadt.proteus.Runtime](#)
- namespace [co.koenraadt.proteus.Runtime.ViewModels](#)

## 12.54 co.koenraadt.proteus/Runtime/VR/GOConnectionUI.cs File Reference

### Classes

- class [GOConnectionUI](#)  
*Used to debug / test the VR Experiment. Can be ignored.*

## 12.55 co.koenraadt.proteus/Runtime/VR/GOUConnIP.cs File Reference

### Classes

- class [GOUConnIP](#)  
*Used to debug / test the VR Experiment. Can be ignored.*

## 12.56 co.koenraadt.proteus/Samples~/Demo/Components/SampleCar↔ DigiTwinComponent.cs File Reference

### Classes

- class [SampleCarDigiTwinComponent](#)  
*Example of a custom digital twin component for a car that listens to changes of the engine's state and changes the car's offset accordingly / emits exhaust particles.*

## 12.57 co.koenraadt.proteus/Samples~/Demo/Components/SampleCar↔ PartDigiTwinComponent.cs File Reference

### Classes

- class [SampleCarPartDigiTwinComponent](#)  
*Example of a simple Digital Twin Component.*

## 12.58 co.koenraadt.proteus/Third Party Notices.md File Reference

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