**Eon Engine Manual**

Version: 1.0

Last Updated: 15/03/16

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**Section 1:** Introduction

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Eon engine is a 2D/ 3D game engine, which uses a derivative COM (Component object model) as its architecture. The basic principal of Eon Engine is to be a flexible multiplatform game engine which can have engine modules included by scripting their usage. Thus allowing for the flexibility required for many separate projects whilst maintaining the same code base, throughout each use. Meaning that the game engine can be used for multiple types of games, which is ideal.

Eon Engine Architecture

Image 1.1

**Section 2:** Eon Library

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**Introduced:** Version 1.0

Eon Library Layout

Image 2.1

The function of Eon is to provide a base set of classes that are common to each/ most of the libraries involved in Eon Engine. This to ensure library cross compatibility, among each of the libraries involved in Eon Engine. Also, the Eon library establishes the architecture used in Eon Engine through define several important classes.

**Section 2.1:** Eon

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Classes:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Location** | **Introduced** | **Last Updated** |
| Assembly Manager | Eon | Version 1.0 | 20/01/2015 |
| Command | Eon | Version 1.0 | 05/04/2015 |
| Common | Eon | Version 1.0 | 11/10/2015 |
| Game Object | Eon | Version 1.0 | 18/10/2015 |
| Message | Eon | Version 1.0 | 05/12/2014 |
| Object Component | Eon | Version 1.0 | 03/10/2015 |
| Property Set | Eon | Version 1.0 | 21/08/2015 |
| Misc | Eon | Version 1.0 |  |

Notes:

* When an object is active it can be updated.

**Public Sealed (Single Instance) Class:** Assembly Manager

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**Library:** Eon

**Location:** Eon

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

To manage assemblies used in a games development. Providing; methods of allowing access, loading and creation of other assemblies and objects in assemblies attached to the Assembly Manager.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Instance | Public Static | AssemblyManager | Returns an instance of the Assembly Manager. |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| AddAssemblyRef | Public Static | void | string | Adds an assembly reference. |
| HasReferenceTo | Public Static | bool | string | A check to see if the AssemblyManager has reference to a particular assembly. |
| GetType | Public Static | Type | string | Gets a type of object from a type name. |
| GetType | Public Static | Type | string, string | Gets a type of object from an assembly. |
| CreateInstance | Public Static | object | ParameterCollection | Creates an instance of an object. |
| CreateInstance | Public Static | object | string | Creates an instance of an object. |
| CreateInstance | Public Static | object | string, string | Creates an instance of an object. |
| FindDerivedTypes | Public Static | List<Type> | string, string | Finds object inherits. |

**Public Class:** Command

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**Library:** Eon

**Location:** Eon

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

Used to send multiple Message’s to a particular object.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Messages | Public | Message[] | Returns an array of messages to be sent. |

**Public Sealed Class:** Common

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Library:** Eon

**Location:** Eon

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

To define and manage common elements used in Eon Engine. Only one instance of Common should exist in a game, as it is created and managed by Eon.Engine.Framework.Framework.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| OnExit | Public Static | ExitEvent | An event that is thrown when the game is being exited. |
| OnTextureQualityChanged | Public Static | TextureQualityChangedEvent | An event that is thrown when the texture quality changes. |
| OnShowMouse | Public Static | ShowMouseEvent | An event that is thrown when the mouse visibility has changed. |
| GraphicsDevice | Public Static | GraphicsDevice |  |
| DeviceManager | Public Static | GraphicsDeviceManager |  |
| AspectRatio | Public Static | float | The aspect ratio for the render-able screen. |
| TextureQuality | Public Static | Vector2 | The quality of the render targets. |
| ContentBuilder | Public Static | ContentBuilder |  |
| SpriteBatch | Public Static | Batch |  |
| ElapsedTimeDelta | Public Static | TimeSpan |  |
| TotalGameTime | Public Static | TimeSpan | The total amount of time that the game has been running for. |
| DefaultScreenResolution | Public Static | Rectangle | Default render area. |
| UpScale | Public Static | float | Defines the percentage of change in texture qualities. |
| VerticleRetrace | Public Static | bool |  |
| CurrentTextureQuality | Public Static | TextureQuality | The current texture quality of the game. |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| Common | Public | Common | Game |  |
| Initialize | Public | void |  |  |
| SetDefaults | Public | void | Int,int,byte,bool |  |
| ChangeScreenSize | Public Static | void | ScreenResolution | Changes the screen size. |
| ChangeScreenSize | Public Static | void | int | Changes the screen size. |
| ChangeScreenResolution | Public Static | void | ScreenResolution | Changes the screen resolution |
| ChangeTextureQuality | Public Static | void | TextureQuality | Changes texture quality. |
| SetTimeDelta | Public | void | TimeSpan | Sets the elapsed time. |
| ExitGame | Public Static | void |  | Used to exit the game. |
| ShowMouse | Public Static | void | bool | Shows the mouse |
| ChangeRootDirectory | Public | void | string | Changes where the game loads in assets. |
| ConvertToScreenSpace | Public Static | vector2 | vector3, matrix, matrix, matrix | Converts a world position into screen space. |
| CastUnProjectedRay | Public Static | Ray | vector2, matrix, matrix | Casts a ray using a vector2. |
| GetReScaled | Public Static | vector3 | vector3 | Calculates a rescaled vector. |
| GetReScaled | Public Static | vector2 | vector2 | Calculates a rescaled vector. |
| GetReScaled | Public Static | float | float | Calculates a rescaled float. |

**Public Class:** Game Object

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**Library:** Eon

**Location:** Eon

**Introduced:** Version 1.0

**Parent Class:** IID, IEnabled

Function:

The Game Object class is one of the most important classes in Eon Engine as it defines the architectural structure of the game engine. This class is used to define an auto-managing class (a class that is partly managed by a dedicated Engine Module).

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| ID | Public | string | The unique ID of the Game Object |
| Initialized | Public | bool | Has the Game Object been initialized |
| IsDestroyed | Public | bool | Has the Game Object been destroyed |
| World | Public | Transformation | The Transformation defining the world matrix of the Game Object |
| Precedence | Public | GameStates | The game state in which the Game Object is active in |
| Enabled | Public | bool | Is the Game Object currently active |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| GameObject | Public | GameObject | string | Creates a new GameObject |
| AttachComponent | Public | void | ObjectComponent | Attaches an ObjectComponent to the GameObject |
| AttachComponent Action | Protected virtual | void | ObjectComponent | An action that happens when an ObjectComponent has been attached |
| Initialize | Protected virtual | void | null | Initializes the GameObject. |
| Update | Protected virtual | void | null | Updates the GameObject. |
| PostUpdate | Protected virtual | void | null | Performs post update actions |
| AddReference | Public | void | IHoldReferences | Adds an IHoldReference object to this |
| RemoveReference | Public | void | IHoldReference | Removes an IHoldReference object to this |
| FindComponent | Public | Object Component | string | Find a particular ObjectComponent attached to the GameObject |
| FindComponent | Public | Object Component | Type | Find a particular ObjectComponent attached to the GameObject |
| RemoveComponent | Public | Object Component | ObjectComponent | Removes a particular ObjectComponent attached to the GameObject. |
| RemoveComponent | Public | Object Component | string | Removes a particular ObjectComponent attached to the GameObject. |
| Destroy | Public virtual | void | null | Destroys the GameObject |
| SendMessage | Public | object | Message | Sends a message to the GameObject’s components. |
| SendMessage | Public | object | string, string, object[] | Sends a message to the GameObject’s components. |
| Destroy | Public virtual | void | null | Destroys the GameObject |
| ToggleEnable | Public | void | null | Toggles Enabled |
| Enable | Public | void | null | Enables the GameObject |
| Disable | Public | void | null | Disables the GameObject |
| TextureQuality Changed | Protected virtual | void | null | Called when Common has changed the TextureQuality |
| BaseType | Public | Type | null | Finds the base type for the GameObject |

**Public Class:** Message

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**Library:** Eon

**Location:** Eon

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

To define a message that can be sent to objects, so as to perform reflection based tasks.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| TargetID | Public | string | ID of the recipient |
| MethodName | Public | string | Name of the method to be called |
| Parameters | Public | object[] | Method parameters |

**Public Class:** Object Component

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**Library:** Eon

**Location:** Eon

**Introduced:** Version 1.0

**Parent Class:** IID, IEnabled, IDestructable

Function:

The Object Component class is one of the fundamental classes in Eon Engine as it helps to define the architecture of Eon Engine. This class is used to define components that can be attached to Game Objects. These components should only do one task.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| ID | Public | string | The unique ID of the Object Component |
| Priority | Public | int | Update priority of the Object Component |
| Initialized | protected | bool | Has the Object Component been initialized |
| IsDestroyed | Public | bool | Has the Object Component been destroyed |
| Destroyed | Public | bool | Has the Object Component been destroyed |
| Owner | Public | GameObject | The owner of the Object Component |
| Enabled | Public virtual | bool | Is the Object Component currently active |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| Object Component | Public | Object Component | string | Creates a new ObjectComponent |
| Initialize | Protected virtual | void | null | Initializes the ObjectComponent. |
| Update | Protected virtual | void | null | Updates the ObjectComponent. |
| PostUpdate | Protected virtual | void | null | Performs post update actions |
| AddReference | Public | void | IHoldReferences | Adds an IHoldReference |
| Remove Reference | Public | void | IHoldReferences | Removes an IHoldReferences |
| Attached | Protected virtual | void | null | Is called when the ObjectComponent has been attached to a GameObject |
| SendMessage | Public | object | string, object[] | Sends a message to the ObjectComponent |
| Destroy | Public virtual | void | null | Destroys the ObjectComponent |
| Destroy | Protected virtual | void | null | Destroys the ObjectComponent |
| ToggleEnable | Public virtual | void | null | Toggles Enabled |
| Enable | Public virtual | void | null | Enables the ObjectComponent |
| Disable | Public virtual | void | null | Disables the ObjectComponent |

**Public Sealed Class:** Property Set

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**Library:** Eon

**Location:** Eon

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

Defines a serializable class. This is used for setting the properties of objects.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| ID | Public | string | ID of the recipient |
| PropertyName | Public | string | Name of the property to be called |
| Value | Public | object | Value to set the property to |

**Misc**

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**Library:** Eon

**Available At:** Eon

Delegates:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| ExitingEvent | Public | void | null | Used to signal when the game is being exited |
| TextureQuality  ChangedEvent | Public | void | null | Used to signal when the current texture quality of the game has changed |
| ShowMouseEvent | Public | void | bool | Used to signal when the mouse cursor is to be shown |
| GameState  ChangedEvent | Public | void | GameStates | Used to signal when the current game state has changed |
| OnActiveEvent | Public | void | IActive | Used to signal when an IActive object has been activated |

**Section 2.2:** Collections

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Classes:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Location** | **Introduced** | **Last Updated** |
| EonDictionary | Eon.Collections | Version 1.0 | 14/04/2015 |
| EonKeyValuePair | Eon.Collections | Version 1.0 | 09/06/2013 |
| EonList | Eon.Collections | Version 1.0 | 09/06/2013 |
| ParameterCollection | Eon.Collections | Version 1.0 | 09/06/2013 |
| BinaryTree | Eon.Collections.Tree | Version 1.0 | 10/08/2013 |
| BinaryTreeNode | Eon.Collections.Tree | Version 1.0 | 10/08/2013 |

**Public Class:** Eon Dictionary<key, value>

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**Library:** Eon

**Location:** Eon.Collections

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

A serializable dictionary, that is optimized for use in Eon Engine.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Keys | Public | List<key> | The keys in the Eon Dictionary |
| Values | Public | List<value> | The values in the Eon Dictionary |
| Count | Public | int | Number of key value pairs in the Eon Dictionary |
| this[int index] | Public | EonKeyValuePair <key, value> |  |
| this[key key] | Public | value | Gets the value of a particular key |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| Add | Public | void | Key, value | Adds an item to the Eon Dictionary |
| Add | Public | void | EonKeyValuePair  <key, value> | Adds an item to the Eon Dictionary |
| GetValueByIndex | Public | value | int | Gets a value of an EonKeyValuePair stored |
| GetRemove | Public | key | value | Gets and removes an item from the Eon Dictionary |
| Remove | Public | void | key | Removes an EonKeyValuePair from the Eon Dictionary |
| GetValue | Public | value | key | Gets the value of an item in the Eon Dictionary |
| Remove | Public | void | int | Removes an item in the Eon Dictionary |
| Contains | Public | bool | key | Does the key exist |
| Clear | Public | void | null | Clears the Eon Dictionary |

**Public Struct:** Eon Key Value Pair<key, value>

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**Library:** Eon

**Location:** Eon.Collections

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

Defines a relationship between; two separate object types. Used in Eon Dictionary.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Key | Public | key | Key |
| Value | Public | Value | Value |

**Public Sealed Class:** Eon List<value>

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Library:** Eon

**Location:** Eon.Collections

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

A list that has been optimized for use in Eon Engine.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Min Size | Public const | int | The minimum size of an Eon List |
| Count | Public | int | The number of items in the Eon List |
| Count | Public | int | Number of key value pairs in the Eon Dictionary |
| this[int index] | Public | key |  |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| ctor | Public | EonList<value> | int | Creates a new Eon List of a predetermined size |
| Add | Public | void | value | Adds an item to the Eon List |
| RemoveAt | Public | void | int | Removes an item at a given index |
| Remove | Public | bool | value | Removes an item from the Eon List |
| Contains | Public | bool | value | Does the Eon List contain a particular item |
| ClearAll | Public | void | null | Clears all items from the Eon List |
| Clear | Public | void | int | Clears a number of items from the Eon List |
| GetIndex | Public | int | value | Gets the index of an item |
| ToArray | Public | Value[] | null | Returns the Eon List as an array |

**Public Sealed Class:** Parameter Collection

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**Library:** Eon

**Location:** Eon.Collections

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

Used to define an object that can be created by the Assembly Manager.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Count | Public | int | Number of parameters in the object to be created |
| ObjectType | Public | string | Type name of the object to be created |
| Parameters | Public | object[] | Parameters of the created object |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| Ctor | Public | Parameter Collection | string, object[] | Creates a new ParameterCollection |
| Ctor | Public | Parameter Collection | string | Creates a new ParameterCollection |
| Ctor | Public | Parameter Collection | null | Creates a new ParameterCollection |
| Add | Public | void | object | Adds a parameter to the ParameterCollection |
| Contains | Public | bool | object | Does the ParameterColletion contain the object |
| Clear | Public | void | null | Clears the ParameterCollection of data |
| Contains | Public | bool | key | Does the key exist |

**Public Sealed Class:** Binary Tree<T>

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**Library:** Eon

**Location:** Eon.Collections.Trees

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

Defines a tree structure that con only have two child nodes per tree node.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Root | Public | T | The root node of the Binary Tree |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| Add | Public | void | T | Adds an item to the Binary Tree |
| FindNode | Public | BinaryTreeNode<T> | T | Finds a BinaryTreeNode at given value |
| FindNode | Public | BinaryTreeNode<T> | int | Finds a BinaryTreeNode at given depth |
| RemoveNode | Public | bool | BinaryTreeNode<T> | Removes a BinaryTreeNode |
| GetSucessor | Public | BinaryTreeNode<T> | BinaryTreeNode<T> | Gets the parent node of a given BinaryTreeNode |

**Public Class:** Binary Tree Node<T>

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**Library:** Eon

**Location:** Eon.Collections.Trees

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

Defines a node on a Binary Tree.

Properties:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Description** |
| Value | Public | T | The value of the Binary Tree Node. |
| TreeDepth | Public | int | Where this Binary Tree Node is at in the Binary Tree |
| LeftNode | Public | BinaryTreeNode<T> | Child left Binary Tree Node |
| RightNode | Public | BinaryTreeNode<T> | Child right Binary Tree Node |

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| Ctor | Public | BinaryTreeNode<T> | T | Creates a new BinaryTreeNode<T> |

**Section 2.3:** Graphics

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Classes:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Location** | **Introduced** | **Last Updated** |
| ImageOrientation | Eon.Graphics | Version 1.0 | 24/09/2015 |

**Public Enum:** Image Orientations

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**Library:** Eon

**Location:** Eon.Graphics

**Introduced:** Version 1.0

**Parent Class:** byte

Function:

Used to make various image orientations accessible to users.

Values:

|  |  |
| --- | --- |
| **Name** | **Values** |
| None | 0 |
| FlipX | 1 |
| FlipY | 2 |
| FlipXY | 3 |

**Section 2.4:** Helpers

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Classes:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Location** | **Introduced** | **Last Updated** |
| ArrayHelper | Eon.Helpers | Version 1.0 | 09/11/2013 |
| SerializationHelper | Eon.Helpers | Version 1.0 |  |
| StringHelper | Eon.Helpers | Version 1.0 |  |

**Public Sealed Class:** Array Helper

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**Library:** Eon

**Location:** Eon.Helpers

**Introduced:** Version 1.0

**Parent Class:** [None]

Function:

Used to perform array operations.

Methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Accessibility** | **Return Type** | **Parameters** | **Description** |
| InsertAt<T> | Public | T[] | int, T, T[] | Inserts an object into an array at a specific index |
| RemoveAt<T> | Public | T[] | int | Removes an object at a specific index |
| RemoveItem<T> | Public | T[] | T, T[] | Removes an object from an array |
| AddItem<T> | Public | T[] | T, T[] | Adds an object to an array |
| AddItems<T> | Public | T[] | T[], T[] | Adds a number of objects to an array |
| Contains | Public | bool | T, T[] | Does a particular item exist in the given array |