



uLua



**uLua**

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# uLua

[uLua](#) is a Lua Modding framework for Unity. It enables the development of a Lua API which may be used to mod your Unity Project.

[uLua](#) wraps around MoonSharp and provides an object oriented Lua Modding framework. It works by setting up an application-wide Lua context and exposing game objects to it. Objects exposed to the Lua context can then be accessed in Lua, allowing users to modify your game at runtime through the use of Lua scripts.

[uLua](#) includes the following features:

- Lua script execution from the Resources folder or an external directory.
- Event system which allows events to be invoked in C# and handled in Lua.
- Base classes to expose your game objects and data structures to Lua.
- Callback system for your Lua objects.
- Ability to override C# methods in Lua.

## Dependencies

- [MoonSharp for Unity](#)

## Documentation

This is the complete documentation for [uLua](#). For any further questions do not hesitate to contact [support@antsoftware.co.uk](mailto:support@antsoftware.co.uk).

I have put together a demo game which uses [uLua](#), and which comes with its own documentation of the API and source code. You may find it [here](#).

This project is the result of many hours of hard work. Please support me by leaving a review on the asset store! Follow my [Twitter](#)!

## Usage Tutorial

**Note: You must install the Unity MoonSharp plugin before you can use [uLua](#). Check the *Dependencies* section above.**

[uLua](#) consists of the following main scripts:

- [uLua.Lua](#): A wrapper class providing an application-wide Lua context.
- [uLua.API](#): Class that implements an event handling system and a script execution framework.
- [uLua.ExposedClass](#): Class which exposes its instances to Lua. To use as a base for data structures which will be accessible in your API.
- [uLua.ExposedMonoBehaviour](#): MonoBehaviour script which exposes its instances to Lua. To use as a base for game objects which will be accessible in your API.

The following tutorial is a thorough introduction to the different classes and scripts in the [uLua](#) toolkit and will walk you through performing basic tasks with [uLua](#).

### 1. The API class

The [uLua.API](#) class sets up various aspects of the [uLua](#) framework such as script execution directories and the event handling system.

To start using [uLua](#), add the [uLua.API](#) script to an object in your Unity scene.

The following settings can be configured in the inspector UI:

- **ResourcePath** : Path for Lua scripts within the Resources folder.
- **ExternalDirectory** : Directory for external Lua scripts.  
`Application.persistentDataPath` is used unless otherwise specified.
- **SaveDataPath** : Path for user save data under `ExternalDirectory`.
- **UserScriptsPath** : Path for user scripts under `ExternalDirectory`. Scripts in this path are loaded automatically and executed if `EnableUserScripts` is enabled.
- **LuaScriptsExtension** : The file extension for all external Lua scripts. Set to `lua` by default.
- **EnableSceneScript** : If enabled, the [uLua.API](#) class attempts to load a script by the name of the scene. The scene script may be located in the `ResourcePath` or in the `UserScriptsPath`.
- **EnableUserScripts** : If enabled, allows user scripts to be executed which extend the `SceneScript`.
- **EnableConsoleMessages** : If enabled, messages will be output to the console at runtime.

The [uLua.API](#) class implements various static methods which will be useful as you develop your API. These methods are introduced in the sections below.

For now, you can stick to the default settings and continue to the next section.

## 2. Executing Lua scripts

The [uLua.API](#) class provides a scripting framework which allows you to execute Lua code by wrapping around the MoonSharp Lua interpreter. Lua scripts may be executed from the Resources folder of your project or from an external directory.

In the following sections we will go through different approaches to executing Lua scripts.

### 2.1. Loading a Scene Script

A scene script is a Lua script which is executed as soon the scene is loaded. To enable scene scripts, use the `EnableSceneScript` option of the [uLua.API](#) class on the inspector UI.

As an example consider that your scene is named `MyGameScene`. You may create the following script to execute a print command.

***MyGameScene.lua***

```
print ("Hello World!");
```

To execute this script, create a file named ***MyGameScene.lua*** and place it at the `ResourcePath` under the Resources folder in your project. The `ResourcePath` is set to the folder "Scripts" by default, which means the scene script would have to be placed in the following path:

```
Resources/Scripts/MyGameScene.lua
```

When you run your scene in the editor, you should notice the message "Hello World!" output to the console. Congratulations, you have executed your first Lua script!

### 2.2. Loading a Scene Script Externally

The [uLua.API](#) class also allows you to load the scene script from an external directory. To do so, you must use the `EnableUserScripts` option of the [uLua.API](#) class from the inspector UI. You must then move your scene script to the external directory under the `UserScriptsPath`. When loaded externally, the scene script must be placed in a folder which is named after the scene.

The directory path would be the following in this example:

```
{ExternalDirectory}/{UserScriptsPath}/MyGameScene/MyGameScene.lua
```

*Note: The external directory is set to Unity's `Application.persistentDataPath` by default. For more information about this directory path, check the [relevant Unity documentation](#).*

*Note: The `UserScriptsPath` is set to the folder "Scripts" by default.*

Place your script in the appropriate directory and run the scene in the editor. You should notice the message "Hello World!" output to the console.

When the `EnableSceneScript` option is enabled, the [uLua.API](#) class will attempt to load the scene script from the external directory **first**. If the scene script is not found in the external directory, it will then be loaded from the Resources folder. The intended use of this feature is to allow users to override the default implementation of scene scripts by redefining them at runtime. This is very useful if you want to allow users to modify your game behaviour.

### 2.3. User Scripts

In the previous section we explained how users can override a scene script. While that is useful, there are times when simply extending your scene script is all that is needed.

The [uLua.API](#) class can load additional user scripts which are executed after the scene script. To enable user scripts, use the `EnableUserScripts` option in the inspector UI.

User scripts are indexed and loaded automatically as long as they are placed in an appropriate path under the external directory. The following paths are parsed for user scripts:

```
{ExternalDirectory}/{UserScriptsPath}/  
{ExternalDirectory}/{UserScriptsPath}/MyGameScene/
```

Any scripts found in these path will be executed by the [uLua.API](#) class **after** the scene script is executed. Scripts placed under the `MyGameScene` folder will only be loaded when that scene is active (i.e. a scene named `MyGameScene`). Scripts placed in the `UserScriptsPath` path will be loaded independently of which scene is loaded.

As an example, you may create the following Lua script and place it in one of those two directories:

#### ***MyUserScript.lua***

```
print ("This is a user script.");
```

Run your scene and you should notice the following two messages output to the console:

```
Hello World!  
This is a user script.
```

### 2.4. Manual Script Execution

So far we have used the different inspector settings of the [uLua.API](#) class to execute Lua scripts. However, the default functionality implemented in [uLua.API](#) may not always fit your project workflow. For this reason, the [uLua.API](#) class also allows you to execute Lua scripts on demand from anywhere in your project.

The following two static methods are available to use in your code:

[uLua.API.ExecuteExternalFile\(\)](#)

[uLua.API.ExecuteFile\(\)](#)

These methods make use of the script execution framework defined by [uLua.API](#). This means that you do not need to specify the execution directories when calling these functions. As long as a game object with your [uLua.API](#) settings is set up in your scene, you can execute external or internal Lua scripts by the path to their filename. Check the full documentation for a list of available parameters and more information on how to use these methods.

### 3. Using the Event System

In the previous section we went over the Lua script execution framework of [uLua.API](#). Another main feature of [uLua.API](#) is its event system. Events are very useful when implementing game behaviour, and [uLua](#) allows you to invoke game events and handle them by implementing event handlers in Lua.

#### 3.1. Invoking Events

Events are invoked by the [uLua.API](#) class. The related method is static, which means it can be executed from anywhere in your project. For instance, to invoke an event named `PlayerHealthChanged` you can use the following command anywhere in your scene:

```
uLua.API.Invoke("PlayerHealthChanged");
```

When invoking an event, you may pass any arguments as optional parameters following the event name. For instance:

```
uLua.API.Invoke("MyEventWithParameters", 5, 1, "text");
```

You may also invoke an event in a Lua script with the same syntax:

```
Invoke("MyEventWithParameters", 5, 1, "text");
```

You can name your game events whatever you like, however, the same event name must be used in the event handler registration.

#### 3.2. Registering Event Handlers

Event handlers are registered and removed by the [uLua.API](#) class. The related methods are static, which means they can be executed from anywhere in your project. Until an event handler has been registered, the [uLua.API.Invoke\(\)](#) command will have no effect.

To register an event handler for the `PlayerHealthChanged` event you can use the following command in C#:

```
uLua.API.RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
```

This command registers the `OnPlayerHealthChanged` global Lua function to be called when the `PlayerHealthChanged` event is invoked. The event handler `OnPlayerHealthChanged` must be defined **before** the [uLua.API.RegisterEventHandler\(\)](#) command is called, otherwise invoking the `PlayerHealthChanged` event will cause a runtime exception.

*Note: Keep in mind that event handlers can be registered as members of other objects in Lua by using an optional third argument. For the sake of simplicity, we use a global event handler in this step of the tutorial.*



You can now use your scene script to implement the `OnPlayerHealthChanged` function.

#### ***MyGameScene.lua***

```
function OnPlayerHealthChanged()
    -- Do stuff
end
```

Any arguments passed to the [uLua.API.Invoke\(\)](#) method are automatically handled in Lua and can be included in the event handler definition. For instance:

```
function MyHandlerWithParameters(arg1, arg2, arg3)
    -- Do stuff with arg1, arg2, arg3
end
```

The methods to register and remove event handlers are also available in Lua. As a result the same event handler may instead be registered in your Lua scene script using a similar syntax. Returning to our previous example:

#### ***MyGameScene.lua***

```
function OnPlayerHealthChanged()
    -- Do stuff
end

RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
```

These two approaches are equivalent in functionality. However, allowing event handlers to be registered by the user in Lua scripts allows for a lot more flexibility in script design.

### **3.3. Removing Event Handlers**

Event handlers may be removed by calling the following command in C#:

```
uLua.API.RemoveEventHandlers();
```

Or the following equivalent command in a Lua script:

```
RemoveEventHandlers();
```

These commands remove all *global* event handlers.

*Note: Again, keep in mind that event handlers are not exclusively globals. Event handlers for a specific object are removed by using an optional third argument. For the sake of simplicity, we use global event handlers in this step of the tutorial.*

### **3.4. The SceneLoaded / SceneUnloaded Events**

The [uLua.API](#) class invokes a few events by default, including the `SceneLoaded` and `SceneUnloaded` events. The `SceneLoaded` event is invoked after the scene script is executed, and before any user scripts are executed. The `SceneUnloaded` event is invoked when a scene is unloaded. You may register an event handler for these events as you would for any other event. For instance, you could add the following event handlers to set up your scene:

#### ***MyGameScene.lua***

```
function OnPlayerHealthChanged()
    -- Do stuff
end

function OnSceneLoaded()
    -- Do other stuff
end

function OnSceneUnloaded()
```

```

        RemoveEventHandlers();
    end

    RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
    RegisterEventHandler("SceneLoaded", "OnSceneLoaded");
    RegisterEventHandler("SceneUnloaded", "OnSceneUnloaded");

```

## 4. Exposing Objects to Lua

In the previous two sections we have shown how the scene script can be structured to handle events invoked in your Unity scene. However, the API that we have set up so far has no game objects exposed to it that would allow us to implement game behaviour.

To expose objects to the Lua API, [uLua](#) provides two approaches: the [uLua.ExposedClass](#) and [uLua.ExposedMonoBehaviour](#) classes. Any script that inherits these classes will automatically expose its instances as objects of the API.

When exposing game objects to the API, the [uLua](#) framework uses an object-oriented approach. Each game object is exposed to the API with a unique Lua handle. As we will explore in the following sections, this becomes important when developing your API and structuring your API object scripts.

### 4.1. The ExposedMonoBehaviour script

[uLua.ExposedMonoBehaviour](#) is a MonoBehaviour script. It may be used similarly to MonoBehaviour, but has the added functionality of exposing the game object to which it is attached to Lua.

When a class inherits [uLua.ExposedMonoBehaviour](#), all its public members are accessible in Lua. This makes [uLua.ExposedMonoBehaviour](#) the base for developing your API objects.

As an example, let's assume you want to expose your `Player` object to Lua. For simplicity, let's say the `Player` has only one member: its health. You may start by defining a `Player` script which inherits `ExposedMonoBehaviour`:

#### *Player.cs*

```

using uLua;

public class Player : ExposedMonoBehaviour {
    public int Health = 100;
}

```

You may now attach the `Player` script to a game object in your scene. As an example let's name that object `MyPlayer`. The [uLua.ExposedMonoBehaviour](#) class will use the game object's name to generate a handle in Lua. This means that a game object named `MyPlayer` in your Unity Scene will be accessible by the same name in Lua.

*Note: Game objects may not include spaces or special characters in their name if they are to be exposed to Lua. Object names must follow Lua naming conventions for variables.*

By default, all game objects which contain the `Player` script will be exposed to the API when the object's `Start()` method is called. This option may be changed by setting the `ExposeOn` parameter of [uLua.ExposedMonoBehaviour](#) to `Awake`, or to `None`, allowing you to expose objects manually by using [uLua.API.Expose<T>\(\)](#).

The `Player` script we defined above has a public field named `Health`. Building on the `MyGameScene.lua` script from the previous section, the following script shows how the object `MyPlayer` and its member `Health` are now accessible in Lua:

#### *MyGameScene.lua*

```

function OnPlayerHealthChanged()

```

```

    -- Do stuff
end

function OnSceneLoaded()
    print (MyPlayer.Health);
end

function OnSceneUnloaded()
    RemoveEventHandlers();
end

RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
RegisterEventHandler("SceneLoaded", "OnSceneLoaded");
RegisterEventHandler("SceneUnloaded", "OnSceneUnloaded");

```

The above script will output the health of the object `MyPlayer` to the console when the scene is loaded.

It is important to note that the Lua object `MyPlayer` is a reference, not a copy of the Unity object. This means that if the `Health` member is altered in Lua, its value in Unity will also change.

To make use of the `PlayerHealthChanged` event, we can build on the `Player` class design. In the modification below, we have made the `Health` variable private and renamed it to `_Health`. We then implement a public getter property named `Health`, and a public method named `Damage()`. The `Damage()` method changes the value of `_Health` and invokes the `PlayerHealthChanged` event.

### ***Player.cs***

```

using uLua;

public class Player : ExposedMonoBehaviour {
    private int _Health = 100;

    public void Damage(int Damage) {
        _Health -= Damage;

        API.Invoke("PlayerHealthChanged");
    }

    public int Health {
        get { return _Health; }
    }
}

```

You may then use the `Damage()` method in Lua, and also make use of the invoked event `PlayerHealthChanged` as shown below:

### ***MyGameScene.lua***

```

function OnPlayerHealthChanged()
    print (MyPlayer.Health);
end

function OnSceneLoaded()
    print (MyPlayer.Health);

    MyPlayer:Damage(5);
end

function OnSceneUnloaded()
    RemoveEventHandlers();
end

RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
RegisterEventHandler("SceneLoaded", "OnSceneLoaded");
RegisterEventHandler("SceneUnloaded", "OnSceneUnloaded");

```

The above example should be enough to get you started on developing your API. You should experiment until you find a design that works for your game objects. For instance, if your `Player` object is comprised of several components (as is common in Unity), and you need properties of these components to be accessible in Lua, then you will have to write part of your `Player` script as a wrapper class, implementing getter and setter properties for its components as necessary for your Lua API.

## 4.2. The `ExposedClass` script

[uLua.ExposedClass](#) is intended for data structures which need to be exposed to the Lua API. It is similar to [uLua.ExposedMonoBehaviour](#), however, the key difference is that [uLua.ExposedClass](#) is a simple C# class instead of a `MonoBehaviour` script.

As an example, you may use [uLua.ExposedClass](#) to describe a weapon item in your game. A simple class definition is the following:

### *Weapon.cs*

```
using uLua;

public class Weapon : ExposedClass {
    public int Damage = 0;

    // Public constructor
    public Weapon(string Name, LuaMonoBehaviour Context = null, bool ExposeOnInit = true,
        bool EnableResourceScript = false): base(Name, Context, ExposeOnInit,
        EnableResourceScript) {
    }
}
```

Classes which inherit [uLua.ExposedClass](#) need to implement the public constructor as shown in the example code above. This is because the base constructor is used to expose the object to the API and to initialise its `Name` and `Context` properties.

*Note: We have not yet covered what the `Context` object is, or how to use the `EnableResourceScript` parameter. These will be explained at a later section.*

Therefore, to expose an instance of `Weapon` to Lua, all you need to do is instantiate it with the `new` keyword. In the following example, we instantiate a `Weapon` named `Sword` in the `Awake()` method of the `Player` script.

### *Player.cs*

```
using uLua;

public class Player : ExposedMonoBehaviour {
    private int _Health = 100;

    public void Damage(int Damage) {
        _Health -= Damage;

        API.Invoke("PlayerHealthChanged");
    }

    public int Health {
        get { return _Health; }
    }

    private void Awake() {
        Weapon Sword = new Weapon("Sword");
    }
}
```

As long as this object instantiation is made somewhere in your code, you may access the `Sword` instance of the `Weapon` class as a global in Lua. Again, building on the `MyGameScene.lua` script from the previous section:

### *MyGameScene.lua*

```

Sword.Damage = 5;

function OnPlayerHealthChanged()
    print (MyPlayer.Health);
end

function OnSceneLoaded()
    print (MyPlayer.Health);

    MyPlayer:Damage (Sword.Damage);
end

function OnSceneUnloaded()
    RemoveEventHandlers();
end

RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
RegisterEventHandler("SceneLoaded", "OnSceneLoaded");
RegisterEventHandler("SceneUnloaded", "OnSceneUnloaded");

```

In this example we set the value of the `Sword.Damage` property to 5, and use that as a parameter when calling the method `Damage()`.

Similarly to [uLua.ExposedMonoBehaviour](#), the class definition given above will expose all `Weapon` objects to Lua when they are instantiated. This feature may be disabled by setting the optional `ExposeOnInit` parameter of the [uLua.ExposedClass](#) constructor to `false`, allowing you to expose objects manually by using [uLua.API.Expose<T>\(\)](#). An example of a modified constructor is shown below.

#### ***Weapon.cs***

```

using uLua;

public class Weapon : ExposedClass {
    public int Damage = 0;

    // Public constructor
    public Weapon(string Name, LuaMonoBehaviour Context = null): base(Name, Context,
false) {
    }
}

```

### **4.3. Using the Object Context**

In the previous two sections we went over the basics of using [uLua.ExposedClass](#) and [uLua.ExposedMonoBehaviour](#) classes to expose objects to your API. The `Context` object is an important feature of these classes.

The `Context` object allows you to set a hierarchy for objects exposed to your API. If a `Context` object is not specified, a Lua object is defined as a global by default. This is what we have done so far.

If a `Context` object is specified, a Lua object is defined as a field of the `Context` object. This feature may be used for organisation purposes as your API grows in scope.

As an example, we return to the `Player` and `Weapon` scripts from the previous section:

#### ***Player.cs***

```

using uLua;

public class Player : ExposedMonoBehaviour {
    private int _Health = 100;

    public void Damage(int Damage) {
        _Health -= Damage;

        API.Invoke("PlayerHealthChanged");
    }
}

```

```

public int Health {
    get { return _Health; }
}

private void Awake() {
    Weapon Sword = new Weapon("Sword");
    Weapon PlayerSword = new Weapon("Sword", this);
}
}

```

In this case we have instantiated a second instance of `Weapon`. Both instances are named `Sword`. However, the `PlayerSword` instance is in the context of the `Player` object. This is indicated by the second parameter (keyword `this`) in the `Weapon()` constructor.

To access the non-global `Sword` object in Lua, you may use the syntax `MyPlayer.Sword`, as shown below:

#### ***MyGameScene.lua***

```

Sword.Damage = 5;
MyPlayer.Sword.Damage = 2;

function OnPlayerHealthChanged()
    print (MyPlayer.Health);
end

function OnSceneLoaded()
    print (MyPlayer.Health);

    MyPlayer:Damage (Sword.Damage);
end

function OnSceneUnloaded()
    RemoveEventHandlers();
end

RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
RegisterEventHandler("SceneLoaded", "OnSceneLoaded");
RegisterEventHandler("SceneUnloaded", "OnSceneUnloaded");

```

Here we have added a command to set the `Sword.Damage` property to 2 for the `Sword` object which is in the context of our `MyPlayer` object.

The `Context` is of type [uLua.LuaMonoBehaviour](#), which is the base of [uLua.ExposedMonoBehaviour](#). As a result, the `Context` must be a game object, and cannot be a [uLua.ExposedClass](#) object. To set the context of a [uLua.ExposedMonoBehaviour](#) game object, you can use its public member `Context` or the inspector UI.

### **4.4. Using Object Callback Functions**

In this section we will go over invoking and implementing callback functions for your API objects. This is a feature of both [uLua.ExposedClass](#) and [uLua.LuaMonoBehaviour](#) which allows callback methods to be invoked in Unity and handled in Lua.

The callback system is similar to the event handling system. The key difference is that callbacks are object-specific. In contrast, event handlers may be defined as globals or as members of any object.

Invoking a callback function is as simple as invoking an API event. It is achieved using the methods [uLua.ExposedClass.InvokeLua\(\)](#) and [uLua.ExposedMonoBehaviour.InvokeLua\(\)](#).

All instances of [uLua.ExposedClass](#) and [uLua.ExposedMonoBehaviour](#) invoke the "OnLoad" and "OnExit" callbacks by default. "OnLoad" is invoked after the object is first exposed to the API. "OnExit" is invoked when an object is destroyed.

You may invoke these callbacks as needed in your code, and you may invoke custom callbacks as well. In the following piece of code I have invoked the `OnDamageTaken` callback in the `Player` script.

### ***Player.cs***

```
using uLua;

public class Player : ExposedMonoBehaviour {
    private int _Health = 100;

    public void Damage(int Damage) {
        _Health -= Damage;

        API.Invoke("PlayerHealthChanged");
        InvokeLua("OnDamageTaken");
    }

    public int Health {
        get { return _Health; }
    }

    public void Awake() {
        Weapon Sword = new Weapon("Sword");
        Weapon PlayerSword = new Weapon("Sword", this);
    }
}
```

You may implement this callback function anywhere in Lua. The callback function must be a member of a `Player` object, because it is invoked by the `Player` script. In this case, our `Player` object is named `MyPlayer`, so we implement the `OnDamageTaken` callback function as member of `MyPlayer`.

### ***MyGameScene.lua***

```
Sword.Damage = 5;
MyPlayer.Sword.Damage = 2;

function OnPlayerHealthChanged()
    print (MyPlayer.Health);
end

function OnSceneLoaded()
    print (MyPlayer.Health);

    MyPlayer:Damage(Sword.Damage);
end

function MyPlayer:OnDamageTaken()
    print (self.Health);
end

function OnSceneUnloaded()
    RemoveEventHandlers();
end

RegisterEventHandler("PlayerHealthChanged", "OnPlayerHealthChanged");
RegisterEventHandler("SceneLoaded", "OnSceneLoaded");
RegisterEventHandler("SceneUnloaded", "OnSceneUnloaded");
```

In Lua, the `:"` syntax in `MyPlayer:OnDamageTaken()` is used as syntactic sugar to mimic object oriented design. Defining the callback function as `MyPlayer:OnDamageTaken()` allows use of the `self` keyword to access members of this object.

In our example, the event `PlayerHealthChanged` and the callback function `OnDamageTaken` achieve the same effect. There are operational differences between the two so you must choose whether to use a callback function or an event on a case by case basis. The main differences between the two options are the following:

- Event handlers may be defined as globals or as a member of any object. Callback functions are object-specific.
- To implement a callback function, you must know the Lua handle of an object (`Context.Name`) or have a reference to the object, e.g. returned from a function.

#### 4.5. Using Object Resource Scripts

Another feature of the [uLua.ExposedClass](#) and [uLua.ExposedMonoBehaviour](#) classes is the ability to execute a Lua script for each object that is exposed to the Lua API. You may use this feature to implement base functionality for your game objects which cannot be modified by external user scripts.

- To use this feature for instances of [uLua.ExposedMonoBehaviour](#), you must enable the `EnableResourceScript` option in the inspector UI of a certain object.
- To use this feature for instances of [uLua.ExposedClass](#), you must use the `EnableResourceScript` parameter in the constructor definition of that class. For an example refer to previous implementation of a `Weapon` class in section 4.2.

When the object resource script is enabled, [uLua](#) will execute a Lua script by the name of the object after it is exposed to the API. Object scripts are executed from the `ResourcePath` under the resource directory in your project.

For instance, for a `Player` object named `MyPlayer`, you may place a resource script in the following path:

```
Resources/Scripts/MyPlayer.lua
```

*Note: This is assuming that the `UserScriptsPath` is set to its default value of "Scripts".*

#### 4.6. Overriding and Hiding Members in Lua

##### 4.6.1. Overriding Methods

Allowing users to override a method in a modding framework enables mods to significantly change object behaviour. By default, methods defined in `ExposedClass` and `ExposedMonoBehaviour` scripts may not be overridden in Lua.

To allow a method to be overridden in Lua, you may use the `[AllowLuaOverride]` attribute. This is demonstrated below for the `Damage()` method.

##### *Player.cs*

```
using uLua;

public class Player : ExposedMonoBehaviour {
    private int _Health = 100;

    [AllowLuaOverride]
    public void Damage(int Damage) {
        Health -= Damage;

        API.Invoke("PlayerHealthChanged");
        InvokeLua("OnDamageTaken");
    }

    public int Health {
        get { return _Health; }
    }
}
```



```

    public void Awake() {
        Weapon Sword = new Weapon("Sword");
        Weapon PlayerSword = new Weapon("Sword", this);
    }
}

```

You may now use a Lua script (e.g. the object resource script) to override the implementation of that method.

#### ***MyPlayer.lua***

```

function MyPlayer:Damage(Value)
    self.Health = self.Health - Value;

    Invoke("PlayerHealthChanged");
end

```

### **4.6.2. Hiding Members**

Sometimes it is unsafe to expose certain class members to your Lua API. To prevent a public member from being exposed to Lua, you may add the relevant MoonSharp attribute to a class:

```
[MoonSharpHideMember("MemberName")]
```

For instance, if you wanted to hide the `Awake()` method of the `Player` script described above, you may use the following syntax:

#### ***Player.cs***

```

using MoonSharp.Interpreter;
using uLua;

[MoonSharpHideMember("Awake")]
public class Player : ExposedMonoBehaviour {
    private int _Health = 100;

    public void Damage(int Damage) {
        _Health -= Damage;

        API.Invoke("PlayerHealthChanged");
        InvokeLua("OnDamageTaken");
    }

    public int Health {
        get { return _Health; }
    }

    public void Awake() {
        Weapon Sword = new Weapon("Sword");
        Weapon PlayerSword = new Weapon("Sword", this);
    }
}

```

This would prevent the `Awake()` method from being called within the Lua API. This could also be achieved by defining the `Awake()` method as `protected` or `private`. However, that is not an option in cases where a specific member must be public so that other scripts in your project can have access to it.

## 5. Saving and Loading Object Data

The [uLua.API](#) script allows you to save variables of a Lua API object into a file which can then be loaded again at runtime. This feature may be used to save settings or other information and load it seamlessly back into your API in-between playthroughs.

To save data and load for a Lua object, you can use the following commands anywhere in your scene:

```
uLua.API.SaveData();  
uLua.API.LoadSavedData();
```

These methods take 2 arguments:

- *LuaMonoBehaviour Object* : The object for which data will be saved or loaded.
- *string Index* : (Optional) The index of the data to be saved or loaded. Default value is "SaveData".

For more information, check out the full documentation below:

[uLua.API.SaveData\(\)](#);

[uLua.API.LoadSavedData\(\)](#);

You may save any number of variables, however, the save data must be in the format of a Lua table. The data with the index "SaveData" is saved by default, unless specified otherwise by the second argument of `SaveData()` and `LoadSavedData()`.

For instance, the following Lua table could be used to store the position of the `MyPlayer` object we defined in section 4.

```
MyPlayer.SaveData = {  
    ["X"] = 10,  
    ["Y"] = -10,  
}
```

The members of the table determine what information will be saved. Nested tables are not supported.

The `SaveData` table may be defined anywhere in Lua:

- in a scene script,
- in an object resource script, or
- in user scripts.

You can then call the the saving/loading methods as required in your code. For instance, you may use Unity's `Start()` and `OnDestroy()` methods. Returning to the previous example of a `Player` script:

### ***Player.cs***

```
using uLua;  
  
public class Player : ExposedMonoBehaviour {  
    private int _Health = 100;  
  
    public void Damage(int Damage) {  
        _Health -= Damage;  
  
        API.Invoke("PlayerHealthChanged");  
        InvokeLua("OnDamageTaken");  
    }  
  
    public int Health {  
        get { return _Health; }  
    }  
  
    public void Awake() {
```

```

        Weapon Sword = new Weapon("Sword");
        Weapon PlayerSword = new Weapon("Sword", this);
    }

    protected override Start()
    {
        base.Start();

        API.LoadSavedData(this);
    }

    protected override void OnDestroy() {
        base.OnDestroy();

        API.SaveData(this);
    }
}

```

These methods are also available in the Lua API as globals with the same arguments:

```

SaveData();
LoadSavedData();

```

and may be implemented similarly in `OnLoad` and `OnExit` callbacks. For example:

#### ***MyUserScript.lua***

```

function MyPlayer:OnLoad()
    LoadSavedData(self);
end

function MyPlayer:OnExit()
    SaveData(self);
end

```

Keep in mind that in both cases the `MyPlayer.SaveData` table always has to be updated with the current values of `X` and `Y` before calling the `SaveData()` method. The Lua callback `OnExit` would be a suitable place to do this in both cases.

## **6. Message, warning, and error logging**

You may use the following commands for message logging and error reporting in Lua:

```

print("Hello World!");
LogWarning("Hello World!");
LogError("Hello World!");

```

These commands are linked to Unity's corresponding `Debug.Log()`, `Debug.LogWarning()`, and `Debug.LogError()`, which means that any messages printed in Lua will also be printed to the console in the Unity editor.

Finally, these commands trigger the following events in Lua:

```

LuaMessageLogged
LuaWarningLogged
LuaErrorLogged

```

The first parameter passed in an event handler for these events contains the string that was logged. For instance:

```

function OnLuaMessageLogged(Text)
    -- 'Text' contains the string "Hello World!"
    -- Do stuff

```

```
end  
  
RegisterEventHandler("LuaMesageLogged", "OnLuaMessageLogged");  
  
print("Hello World!");
```

## 7. Further Support

This covers a large portion of the features in uLua! I hope that this tutorial together with the documentation are enough to get you started on your API development. However, for any further questions do not hesitate to contact [support@antsoftware.co.uk](mailto:support@antsoftware.co.uk).

I have put together a demo paddle game project which utilises [uLua](#), and which comes with its own documentation of the API and source code. You may find it [here](#).

This project is the result of many hours of hard work. Please support me by leaving a review on the asset store! Also, follow my [Twitter](#)!

# Namespace Index

## Namespace List

Here is a list of all documented namespaces with brief descriptions:

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---	----

# Hierarchical Index

## Class Hierarchy

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

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uLua.IHasLuaIndexer .....31

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uLua.ExposedClass .....28

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### MonoBehaviour

uLua.API .....23

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### StandardUserDataDescriptor

uLua.IndexedUserDataDescriptor .....33

# Class Index

## Class List

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

<a href="#"><u>uLua.AllowLuaOverrideAttribute</u></a> (Custom attribute which allows a userdata method to be overridden in a <a href="#"><u>Lua</u></a> script. Intended for use with <a href="#"><u>ExposedClass</u></a> and <a href="#"><u>ExposedMonoBehaviour</u></a> .)	22
<a href="#"><u>uLua.API</u></a> (This script sets up the <a href="#"><u>API</u></a> framework to your Unity scene.)	23
<a href="#"><u>uLua.ExposedClass</u></a> (Class structure exposed to <a href="#"><u>Lua</u></a> . You should use this class as a base for your <a href="#"><u>API</u></a> data structures.)	28
<a href="#"><u>uLua.ExposedMonoBehaviour</u></a> (MonoBehaviour script exposed to <a href="#"><u>Lua</u></a> . You should use this class as a base for your <a href="#"><u>API</u></a> game objects.)	29
<a href="#"><u>uLua.IHasLuaIndexer</u></a> (Interface used to implement a fully indexed <a href="#"><u>Lua</u></a> object.)	31
<a href="#"><u>uLua.IndexedUserDataDescriptor</u></a> (Custom user data descriptor to more accurately implement <a href="#"><u>Lua</u></a> syntax in the Moonsharp interpreter. Makes use of the <a href="#"><u>IHasLuaIndexer</u></a> interface.)	33
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# Namespace Documentation

## uLua Namespace Reference

Namespace containing the [uLua](#) project.

### Classes

- class [AllowLuaOverrideAttribute](#)  
*Custom attribute which allows a userdata method to be overridden in a [Lua](#) script. Intended for use with [ExposedClass](#) and [ExposedMonoBehaviour](#).*
- class [API](#)  
*This script sets up the [API](#) framework to your Unity scene.*
- class [ExposedClass](#)  
*Class structure exposed to [Lua](#). You should use this class as a base for your [API](#) data structures.*
- class [ExposedMonoBehaviour](#)  
*MonoBehaviour script exposed to [Lua](#). You should use this class as a base for your [API](#) game objects.*
- interface [IHasLuaIndexer](#)  
*Interface used to implement a fully indexed [Lua](#) object.*
- class [IndexedUserDataDescriptor](#)  
*Custom user data descriptor to more accurately implement [Lua](#) syntax in the Moonsharp interpreter. Makes use of the [IHasLuaIndexer](#) interface.*
- class [Lua](#)  
*Wrapper class which streamlines use of the MoonSharp [Lua](#) context.*
- class [LuaClass](#)  
*Class structure which establishes a [Lua](#) object framework. For internal use.*
- class [LuaMonoBehaviour](#)  
*MonoBehaviour script which establishes a [Lua](#) object framework. For internal use.*

### Enumerations

- enum [ExposeOn](#)  
*Indicates when to expose an object to Lua.*

---

## Detailed Description

Namespace containing the [uLua](#) project.



# Class Documentation

## uLua.AllowLuaOverrideAttribute Class Reference

Custom attribute which allows a userdata method to be overridden in a [Lua](#) script. Intended for use with [ExposedClass](#) and [ExposedMonoBehaviour](#).

---

### Detailed Description

Custom attribute which allows a userdata method to be overridden in a [Lua](#) script. Intended for use with [ExposedClass](#) and [ExposedMonoBehaviour](#).

You may add the [AllowLuaOverride] attribute to any method of a class which uses the [IndexedUserDataDescriptor](#) structure.

## uLua.API Class Reference

This script sets up the [API](#) framework to your Unity scene.

### Public Member Functions

- void [AddUserScript](#) (string Name)  
*Adds a script to the user scripts by name.*
- void [ClearUserScripts](#) ()  
*Clears the user scripts list.*
- void [RemoveUserScript](#) (string Name)  
*Removes the specified script from the user scripts.*

### Static Public Member Functions

- static bool [ExecuteExternalFile](#) (string File, string Index="", bool Force=false)  
*Executes a script from the external directory.*
- static bool [ExecuteFile](#) (string File, string Index="", bool Force=false)  
*Executes a script from the resource directory.*
- static void [Expose< T >](#) (T Object, [LuaMonoBehaviour](#) Context=null)  
*Exposes an object to [Lua](#).*
- static void [Invoke](#) (string Event, params object[] args)  
*Invokes a game event.*
- static void [LoadSavedData](#) ([LuaMonoBehaviour](#) Object, string Index="SaveData")  
*Loads table data saved for the specified object.*
- static void [RegisterEventHandler](#) (string Event, string HandlerName, [LuaMonoBehaviour](#) Context=null)  
*Registers an event handler to be called when an event is invoked.*
- static void [RemoveEventHandlers](#) ([LuaMonoBehaviour](#) Context=null)  
*Removes all global event handlers or event handlers registered in a specific context.*
- static void [RegisterIndexedType](#) (Type Type)  
*Registers a type that implements the [IHasLuaIndexer](#) interface to [Lua](#).*
- static void [RegisterType< T >](#) ()  
*Registers a type to [Lua](#).*
- static void [SaveData](#) ([LuaMonoBehaviour](#) Object, string Index="SaveData")  
*Saves table data from the specified object.*

## Static Public Attributes

- static string **ExternalDirectory** = ""  
*Directory for external [Lua](#) scripts. The path is determined at run-time.*
- static string **ResourcePath** = ""  
*Path for [Lua](#) scripts within the Resources folder.*
- static string **SaveDataPath** = ""  
*Path for user save data under the external directory.*
- static string **UserScriptsPath** = ""  
*Path for user scripts under the external directory.*
- static string **LuaScriptsExtension** = ""  
*File extension for all external [Lua](#) scripts.*

---

## Detailed Description

This script sets up the [API](#) framework to your Unity scene.

Includes methods to execute [Lua](#) scripts, expose game objects to the [API](#), and invoke events. Inherits from MonoBehaviour. Intended use is to add to an object in the scene and set up for use.

This script invokes the SceneLoaded event when the scene is loaded.

---

## Member Function Documentation

**void uLua.API.AddUserScript (string *Name*) [inline]**

Adds a script to the user scripts by name.

User scripts are executed from the specified path in the ExternalDirectory after the scene is loaded.

**void uLua.API.ClearUserScripts () [inline]**

Clears the user scripts list.

This method has no effect on the [API](#) if the user scripts have already been executed.

**static bool uLua.API.ExecuteExternalFile (string *File*, string *Index* = "", bool *Force* = false) [inline], [static]**

Executes a script from the external directory.

### Parameters

<i>File</i>	The <a href="#">Lua</a> file to execute. The file extension must be omitted.
-------------	--

<i>Index</i>	(Optional) A unique identifier for this script. Not recommended to leave blank, especially if the same script is likely to be executed more than once.
<i>Force</i>	(Optional) If true, the method will overwrite any previous script with the same Index. Otherwise, any previous script with the same Index will be called from a hash table.

```
static bool uLua.API.ExecuteFile (string File, string Index = "", bool Force = false)[inline], [static]
```

Executes a script from the resource directory.

#### Parameters

<i>File</i>	The <a href="#">Lua</a> file to execute. The file extension must be omitted.
<i>Index</i>	(Optional) A unique identifier for this script. Not recommended to leave blank, especially if the same script is likely to be executed more than once.
<i>Force</i>	(Optional) If true, the method will overwrite any previous script with the same Index. Otherwise, any previous script with the same Index will be called from a hash table.

```
static void uLua.API.Expose< T > (T Object, LuaMonoBehaviour Context = null)[inline], [static]
```

Exposes an object to [Lua](#).

Called internally by [uLua.ExposedMonoBehaviour.Start\(\)](#). Can be called manually at an earlier point or for objects which have `ExposeOnStart` disabled.

#### Parameters

<i>Object</i>	The object to be exposed to <a href="#">Lua</a> . The generic type T must implement the <a href="#">IHasLuaIndexer</a> interface.
<i>Context</i>	The <a href="#">Lua</a> context of the object. If null, the object will be exposed as a global.

#### Type Constraints

*T* : class

*T* : [IHasLuaIndexer](#)

```
static void uLua.API.Invoke (string Event, params object[] args)[inline], [static]
```

Invokes a game event.

This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

#### Parameters

<i>Event</i>	The name of the event to be invoked.
<i>args</i>	(Optional) Parameters for the event handler.

```
static void uLua.API.LoadSavedData (LuaMonoBehaviour Object, string Index = "SaveData")[inline], [static]
```

Loads table data saved for the specified object.

Saved data will be loaded from the `SaveDataPath` under the external directory. This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

### Parameters

<i>Object</i>	The object of which the saved data will be loaded.
<i>Index</i>	(Optional) The index of <code>Object</code> which contains the table data to be saved. Default value is "SaveData".

**static void uLua.API.RegisterEventHandler (string *Event*, string *HandlerName*, [LuaMonoBehaviour](#) *Context* = null)[inline], [static]**

Registers an event handler to be called when an event is invoked.

This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

### Parameters

<i>Event</i>	The name of the event.
<i>HandlerName</i>	The name of the event handler function.
<i>Context</i>	(Optional) The object that contains the event handler implementation. If not specified, the event handler will be global.

**static void uLua.API.RegisterIndexedType (Type *Type*)[inline], [static]**

Registers a type that implements the [IHasLuaIndexer](#) interface to [Lua](#).

Intended for use with [LuaMonoBehaviour](#) and [LuaClass](#).

**static void uLua.API.RegisterType< T > ()[inline], [static]**

Registers a type to [Lua](#).

Any C# or Unity type may be registered to use within the [API](#). Use with caution.

**static void uLua.API.RemoveEventHandlers ([LuaMonoBehaviour](#) *Context* = null)[inline], [static]**

Removes all global event handlers or event handlers registered in a specific context.

This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

### Parameters

<i>Context</i>	(Optional) The object that contains the event handler implementation. If not specified, all global event handlers will be removed.
----------------	--

**void uLua.API.RemoveUserScript (string *Name*)[inline]**

Removes the specified script from the user scripts.

User scripts are executed from the specified path in the `ExternalDirectory` after the scene is loaded.

**static void uLua.API.SaveData ([LuaMonoBehaviour](#) *Object*, string *Index* = "SaveData")[inline], [static]**

Saves table data from the specified object.

Data will be saved to the `SaveDataPath` under the external directory. This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

#### Parameters

<i>Object</i>	The object for which the data will be saved.
<i>Index</i>	(Optional) The index of <code>Object</code> which contains the table data to be saved. Default value is "SaveData".

## uLua.ExposedClass Class Reference

Class structure exposed to [Lua](#). You should use this class as a base for your [API](#) data structures.

### Public Member Functions

- [ExposedClass](#) (string [Name](#), [LuaMonoBehaviour](#) [Context](#)=null, bool [ExposeOnInit](#)=true, bool [EnableResourceScript](#)=false)  
*Public constructor. Exposes this object to [Lua](#).*

### Additional Inherited Members

---

#### Detailed Description

Class structure exposed to [Lua](#). You should use this class as a base for your [API](#) data structures.

Instances of this class are automatically exposed to [Lua](#). All public members of derived classes will also be exposed to [Lua](#). Inherits [LuaClass](#).

---

### Constructor & Destructor Documentation

**uLua.ExposedClass.ExposedClass** (string *Name*, [LuaMonoBehaviour](#) *Context* = null, bool *ExposeOnInit* = true, bool *EnableResourceScript* = false)[inline]

Public constructor. Exposes this object to [Lua](#).

If the object is exposed here, this method will also invoke an OnLoad callback.

#### Parameters

<i>Name</i>	Sets the name of the object exposed to <a href="#">Lua</a> .
<i>Context</i>	Sets the context of the object exposed to <a href="#">Lua</a> .
<i>ExposeOnInit</i>	(Optional) Enables/disables the automatic exposure of this object to <a href="#">Lua</a> .
<i>EnableResourceScript</i>	(Optional) If set to true, executes a resource script after exposing the object to <a href="#">Lua</a> . Resource scripts are only executed for objects which are globals in <a href="#">Lua</a> (i.e. Context is set to null).

## uLua.ExposedMonoBehaviour Class Reference

MonoBehaviour script exposed to [Lua](#). You should use this class as a base for your [API](#) game objects.

### Public Attributes

- [ExposeOn](#) **ExposeOn** = `ExposeOn.Start`  
*Indicates when this object will be exposed to [Lua](#).*
- `bool` **EnableResourceScript** = `false`  
*Indicates whether to execute a resource script for this object after it is exposed.*

### Protected Member Functions

- `virtual void` [Awake](#) ()  
*Exposes the game object to [Lua](#) if `ExposeOn` is set to 'Awake'.*
- `virtual void` [Start](#) ()  
*Exposes the game object to [Lua](#) if `ExposeOn` is set to 'Start'.*

### Additional Inherited Members

---

### Detailed Description

MonoBehaviour script exposed to [Lua](#). You should use this class as a base for your [API](#) game objects.

Instances of this class are automatically exposed to [Lua](#). All public members of derived classes will also be exposed to [Lua](#). Inherits [LuaMonoBehaviour](#).

---

### Member Function Documentation

**`virtual void uLua.ExposedMonoBehaviour.Awake () [inline], [protected], [virtual]`**

Exposes the game object to [Lua](#) if `ExposeOn` is set to 'Awake'.

The Context object must be set prior to this method being called. Objects will not be exposed to [Lua](#) if `ExposeOn` is set to `None`. If the object is exposed here, this method will also invoke an `OnLoad` callback and execute a resource script for the object if `EnableResourceScript` is set to `true`. This method is called by Unity Engine during game object initialisation.

**`virtual void uLua.ExposedMonoBehaviour.Start () [inline], [protected], [virtual]`**

Exposes the game object to [Lua](#) if `ExposeOn` is set to 'Start'.

The Context object must be set prior to this method being called. Objects will not be exposed to [Lua](#) if `ExposeOn` is set to `None`. If the object is exposed here, this method



will also invoke an `OnLoad` callback and execute a resource script for the object if `EnableResourceScript` is set to true. Resource scripts are only executed for objects which are globals in [Lua](#) (i.e. Context is set to null). This method is called by Unity Engine during game object initialisation.

## uLua.IHasLuaIndexer Interface Reference

Interface used to implement a fully indexed [Lua](#) object.

### Properties

- DynValue [this\[DynValue Key\]](#) [get, set]  
*Returns a [Lua](#) value indexed by the DynValue Key.*
- DynValue [this\[string Key\]](#) [get, set]  
*Returns a [Lua](#) value indexed by the string key.*
- [LuaMonoBehaviour Context](#) [get, set]  
*Used to access/set the context of an object.*
- string [Handle](#) [get]  
*Used to access the unique Handle of a [Lua](#) object.*
- bool [IsExposed](#) [get]  
*Used to track if an object has been exposed to [Lua](#).*
- string [Name](#) [get]  
*Used to access the name of an object.*

---

### Detailed Description

Interface used to implement a fully indexed [Lua](#) object.

Defines various properties (Context, Name, Handle, etc.) which are implemented in [LuaClass](#) and [LuaMonoBehaviour](#).

---

### Property Documentation

[LuaMonoBehaviour](#) **uLua.IHasLuaIndexer.Context** [get], [set]

Used to access/set the context of an object.

The `Context` object represents the parent of an object in [Lua](#). If the `Context` is null, the object will be global in [Lua](#). Must be of type [uLua.LuaMonoBehaviour](#).

Implemented in [uLua.LuaClass](#), and [uLua.LuaMonoBehaviour](#).

**string uLua.IHasLuaIndexer.Handle** [get]

Used to access the unique Handle of a [Lua](#) object.

The unique `Handle` of a [Lua](#) object is defined as: `Context.Name`. If an object's context is null, its unique handle is simply its name.

Implemented in [uLua.LuaClass](#), and [uLua.LuaMonoBehaviour](#).

**bool uLua.IHasLuaIndexer.IsExposed [get]**

Used to track if an object has been exposed to [Lua](#).

Objects may be marked as exposed by calling the `Expose()` method.

Implemented in [uLua.LuaClass](#), and [uLua.LuaMonoBehaviour](#).

**string uLua.IHasLuaIndexer.Name [get]**

Used to access the name of an object.

The name of an object cannot be changed after it has been exposed to [Lua](#).

Implemented in [uLua.LuaClass](#), and [uLua.LuaMonoBehaviour](#).

**DynValue uLua.IHasLuaIndexer.this[DynValue Key] [get], [set]**

Returns a [Lua](#) value indexed by the DynValue Key.

This indexer may be used in [Lua](#) or within C# to access any member of a [Lua](#) object.

Implemented in [uLua.LuaClass](#), and [uLua.LuaMonoBehaviour](#).

**DynValue uLua.IHasLuaIndexer.this[string Key] [get], [set]**

Returns a [Lua](#) value indexed by the string key.

This indexer may be used in [Lua](#) or within C# to access any member of a [Lua](#) object.

Implemented in [uLua.LuaClass](#), and [uLua.LuaMonoBehaviour](#).

## uLua.IndexedUserDataDescriptor Class Reference

Custom user data descriptor to more accurately implement [Lua](#) syntax in the Moonsharp interpreter. Makes use of the [IHasLuaIndexer](#) interface.

---

### Detailed Description

Custom user data descriptor to more accurately implement [Lua](#) syntax in the Moonsharp interpreter. Makes use of the [IHasLuaIndexer](#) interface.

Allows objects in [Lua](#) to be indexed with both the '.' and '[]' operators. Credit to user tw39124 from the MoonSharp forum for the original implementation.

## uLua.Lua Class Reference

Wrapper class which streamlines use of the MoonSharp [Lua](#) context.

### Static Public Member Functions

- static void [Call](#) (DynValue Function, params object[] args)  
*Calls a [Lua](#) function with optional parameters.*
- static void [ExecuteScript](#) (string Code, string Index="", bool Force=false)  
*Executes the specified code within the [Lua](#) context.*
- static void [Log](#) (string String)  
*Logs a message to the console.*
- static void [LogError](#) (string String)  
*Logs an error to the console.*
- static void [LogWarning](#) (string String)  
*Logs a warning to the console.*
- static T [Get< T >](#) (string Name)  
*Finds and returns the [Lua](#) global with the specified name.*
- static void [ObjectCall< T >](#) (T Object, string FunctionName, params object[] args)  
*Calls a [Lua](#) object's function.*
- static void [Remove](#) (string Name)  
*Removes a global from the [Lua](#) context.*
- static void [Set](#) (string Index, object Value)  
*Exposes an object as a global with the specified index in [Lua](#).*
- static DynValue [ValueToLuaValue](#) (object Value)  
*Converts an object to a DynValue.*

### Properties

- static DynValue [NewFunction](#) [get]  
*Returns a new [Lua](#) function.*
  - static Table [NewTable](#) [get]  
*Returns a new [Lua](#) table.*
-

## Detailed Description

Wrapper class which streamlines use of the MoonSharp [Lua](#) context.

Implemented as a static class to ensure the [Lua](#) context is available application-wide.

---

## Member Function Documentation

**static void uLua.Lua.Call (DynValue *Function*, params object[] *args*)[inline], [static]**

Calls a [Lua](#) function with optional parameters.

### Parameters

<i>Function</i>	The DynValue of a <a href="#">Lua</a> function.
<i>args</i>	(Optional) Parameters for the <a href="#">Lua</a> function.

**static void uLua.Lua.ExecuteScript (string *Code*, string *Index* = "", bool *Force* = false)[inline], [static]**

Executes the specified code within the [Lua](#) context.

### Parameters

<i>Code</i>	The <a href="#">Lua</a> code to execute.
<i>Index</i>	(Optional) A unique identifier for this script. Not recommended to leave blank, especially if the same script is likely to be executed more than once.
<i>Force</i>	(Optional) If true, the method will overwrite any previous script with the same index. Otherwise, any previous script with the same index will be called from a hash table.

**static T uLua.Lua.Get< T > (string *Name*)[inline], [static]**

Finds and returns the [Lua](#) global with the specified name.

The returned object is converted to the type specified by the generic type parameter T .

**static void uLua.Lua.Log (string *String*)[inline], [static]**

Logs a message to the console.

Invokes the event 'LuaMessageLogged' which may be handled in [Lua](#). This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

**static void uLua.Lua.LogError (string *String*)[inline], [static]**

Logs an error to the console.

Invokes the event 'LuaErrorLogged' which may be handled in [Lua](#). This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

**static void uLua.Lua.LogWarning (string *String*) [inline], [static]**

Logs a warning to the console.

Invokes the event 'LuaWarningLogged' which may be handled in [Lua](#). This method is exposed to [Lua](#) as a global and may be called from a [Lua](#) script or within C#.

**static void uLua.Lua.ObjectCall< T > (T *Object*, string *FunctionName*, params object[] *args*) [inline], [static]**

Calls a [Lua](#) object's function.

#### Parameters

<i>Object</i>	The object whose function will be called. The generic type T must implement the <a href="#">IHasLuaIndexer</a> interface.
<i>FunctionName</i>	The name of the callback function to be called.
<i>args</i>	(Optional) Parameters for the callback function.

#### Type Constraints

*T* : [IHasLuaIndexer](#)

**static void uLua.Lua.Remove (string *Name*) [inline], [static]**

Removes a global from the [Lua](#) context.

Any [Lua](#) objects defined as members of the global are invalidated.

**static void uLua.Lua.Set (string *Index*, object *Value*) [inline], [static]**

Exposes an object as a global with the specified index in [Lua](#).

For object types that implement the [IHasLuaIndexer](#) interface, use `uLua.API.Expose()` instead.

#### Parameters

<i>Index</i>	The index, or name, of the value within <a href="#">Lua</a> .
<i>Value</i>	The value to be defined as a global within <a href="#">Lua</a> .

**static DynValue uLua.Lua.ValueToLuaValue (object *Value*) [inline], [static]**

Converts an object to a DynValue.

May be used with any C# object type.

---

## Property Documentation

**DynValue uLua.Lua.NewFunction [static], [get]**

Returns a new [Lua](#) function.

Used as a placeholder for empty callback functions.

**Table uLua.Lua.NewTable**[static], [get]

Returns a new [Lua](#) table.

Creates a new Table type [Lua](#) value.



## uLua.LuaClass Class Reference

Class structure which establishes a [Lua](#) object framework. For internal use.

### Public Member Functions

- [LuaClass](#) (string [Name](#), [LuaMonoBehaviour Context](#)=null)  
*Public constructor.*
- void [Expose](#) ()  
*Used to raise a flag when an object is exposed to [Lua](#).*
- void [InvokeLua](#) (string FunctionName, params object[] args)  
*Invokes a [Lua](#) callback function.*
- void [Register](#) (string FunctionName, string Code="", string args="")  
*Registers a [Lua](#) callback function. This method is available in [Lua](#).*

### Properties

- DynValue [this\[DynValue Key\]](#) [get, set]  
*Returns a [Lua](#) value indexed by the DynValue Key.*
- DynValue [this\[string Key\]](#) [get, set]  
*Returns a [Lua](#) value indexed by the string key.*
- [LuaMonoBehaviour Context](#) [get, set]  
*Used to access/set the context of an object.*
- string [Handle](#) [get]  
*Used to access the unique Handle of a [Lua](#) object.*
- bool [IsExposed](#) [get]  
*Used to track if an object has been exposed to [Lua](#).*
- string [Name](#) [get, protected set]  
*Used to access the name of an object.*

---

### Detailed Description

Class structure which establishes a [Lua](#) object framework. For internal use.

Instances of this class can be exposed to [Lua](#) by calling `uLua.API.Expose()`. All public members of derived classes will be exposed to [Lua](#). Prior to exposing an object of type [uLua.LuaClass](#), the derived type `T` must be registered to [Lua](#) by calling [uLua.API.RegisterIndexedType\(\)](#).

---

## Constructor & Destructor Documentation

**uLua.LuaClass.LuaClass (string *Name*, [LuaMonoBehaviour](#) *Context* = null)[inline]**

Public constructor.

### Parameters

<i>Name</i>	Sets the name of the object exposed to <a href="#">Lua</a> .
<i>Context</i>	Sets the context of the object exposed to <a href="#">Lua</a> .

---

## Member Function Documentation

**void uLua.LuaClass.Expose ()[inline]**

Used to raise a flag when an object is exposed to [Lua](#).

The property `IsExposed` can be used to check if this method has been called. The `IsExposed` flag cannot be reset.

Implements [uLua.IHasLuaIndexer](#).

**void uLua.LuaClass.InvokeLua (string *FunctionName*, params object[] *args*)[inline]**

Invokes a [Lua](#) callback function.

The callback function must be implemented in a [Lua](#) script as a member of this object. Alternatively, you can register a callback function by explicitly calling [uLua.LuaMonoBehaviour.Register\(\)](#) with the relevant [Lua](#) code.

### Parameters

<i>FunctionName</i>	The name of the callback function to be called.
<i>args</i>	(Optional) Parameters for the callback function.

**void uLua.LuaClass.Register (string *FunctionName*, string *Code* = "", string *args* = "")[inline]**

Registers a [Lua](#) callback function. This method is available in [Lua](#).

Used to register a callback function by providing the relevant [Lua](#) code.

### Parameters

<i>FunctionName</i>	The name of the callback function to be registered.
<i>Code</i>	(Optional) The body of the function to be registered in <a href="#">Lua</a> . If omitted, an empty function with the specified name is defined.
<i>args</i>	(Optional) Parameters for the callback function. Must be separated by comma as they would be in a <a href="#">Lua</a> function definition, e.g. 'arg1,arg2'.

## Property Documentation

### **[LuaMonoBehaviour](#) `uLua.LuaClass.Context` [get], [set]**

Used to access/set the context of an object.

The `Context` object represents the parent of an object in [Lua](#). If the `Context` is null, the object will be global in [Lua](#). Must be of type [uLua.LuaMonoBehaviour](#).

Implements [uLua.IHasLuaIndexer](#).

### **`string uLua.LuaClass.Handle` [get]**

Used to access the unique Handle of a [Lua](#) object.

The unique `Handle` of a [Lua](#) object is defined as: `Context.Name`. If an object's context is null, its unique handle is simply its name.

Implements [uLua.IHasLuaIndexer](#).

### **`bool uLua.LuaClass.IsExposed` [get]**

Used to track if an object has been exposed to [Lua](#).

Objects may be marked as exposed by calling the [Expose\(\)](#) method.

Implements [uLua.IHasLuaIndexer](#).

### **`string uLua.LuaClass.Name` [get], [protected set]**

Used to access the name of an object.

The name of an object cannot be changed after it has been exposed to [Lua](#).

Implements [uLua.IHasLuaIndexer](#).

### **`DynValue uLua.LuaClass.this`[DynValue Key] [get], [set]**

Returns a [Lua](#) value indexed by the DynValue Key.

This indexer may be used in [Lua](#) or within C# to access any member of a [Lua](#) object.

Implements [uLua.IHasLuaIndexer](#).

### **`DynValue uLua.LuaClass.this`[string Key] [get], [set]**

Returns a [Lua](#) value indexed by the string key.

This indexer may be used in [Lua](#) or within C# to access any member of a [Lua](#) object.

Implements [uLua.IHasLuaIndexer](#).

## uLua.LuaMonoBehaviour Class Reference

MonoBehaviour script which establishes a [Lua](#) object framework. For internal use.

### Public Member Functions

- void [Expose](#) ()  
*Used to raise a flag when an object is exposed to [Lua](#).*
- void [InvokeLua](#) (string FunctionName, params object[] args)  
*Invokes a [Lua](#) callback function.*
- void [Register](#) (string FunctionName, string Code="", string args="")  
*Registers a [Lua](#) callback function. This method is available in [Lua](#).*

### Protected Member Functions

- virtual void [OnDestroy](#) ()  
*Invokes the OnExit callback and removes the object from [Lua](#).*

### Properties

- DynValue [this\[DynValue Key\]](#) [get, set]  
*Returns a [Lua](#) value indexed by the DynValue Key.*
- DynValue [this\[string Key\]](#) [get, set]  
*Returns a [Lua](#) value indexed by the string key.*
- [LuaMonoBehaviour Context](#) [get, set]  
*Used to access/set the context of an object.*
- string [Handle](#) [get]  
*Used to access the unique Handle of a [Lua](#) object.*
- bool [IsExposed](#) [get]  
*Used to track if an object has been exposed to [Lua](#).*
- string [Name](#) [get]  
*Used to access the name of an object.*

---

### Detailed Description

MonoBehaviour script which establishes a [Lua](#) object framework. For internal use.

Instances of this class can be exposed to [Lua](#) by calling `uLua.API.Expose()`. All public members of derived classes will be exposed to [Lua](#). Prior to exposing an object of type

[uLua.LuaMonoBehaviour](#), the derived type `T` must be registered to [Lua](#) by calling [API.RegisterIndexedType\(\)](#).

---

## Member Function Documentation

**void [uLua.LuaMonoBehaviour.Expose\(\)](#) [[inline](#)]**

Used to raise a flag when an object is exposed to [Lua](#).

The property `IsExposed` can be used to check if this method has been called. The `IsExposed` flag cannot be reset.

Implements [uLua.IHasLuaIndexer](#).

**void [uLua.LuaMonoBehaviour.InvokeLua](#) (string *FunctionName*, params object[] *args*) [[inline](#)]**

Invokes a [Lua](#) callback function.

The callback function must be implemented in a [Lua](#) script as a member of this object. Alternatively, you can register a callback function by explicitly calling [uLua.LuaMonoBehaviour.Register\(\)](#) with the relevant [Lua](#) code.

### Parameters

<i>FunctionName</i>	The name of the callback function to be called.
<i>args</i>	(Optional) Parameters for the callback function.

**virtual void [uLua.LuaMonoBehaviour.OnDestroy](#) () [[inline](#)], [[protected](#)], [[virtual](#)]**

Invokes the `OnExit` callback and removes the object from [Lua](#).

This method is called by Unity Engine when a game object is destroyed.

**void [uLua.LuaMonoBehaviour.Register](#) (string *FunctionName*, string *Code* = "", string *args* = "") [[inline](#)]**

Registers a [Lua](#) callback function. This method is available in [Lua](#).

Used to register a callback function by providing the relevant [Lua](#) code.

### Parameters

<i>FunctionName</i>	The name of the callback function to be registered.
<i>Code</i>	(Optional) The body of the function to be registered in <a href="#">Lua</a> . If omitted, an empty function with the specified name is defined.
<i>args</i>	(Optional) Parameters for the callback function. Must be separated by comma as they would be in a <a href="#">Lua</a> function definition, e.g. 'arg1,arg2'.

---

## Property Documentation

[LuaMonoBehaviour](#) [uLua.LuaMonoBehaviour.Context](#) [[get](#)], [[set](#)]

Used to access/set the context of an object.

The `Context` object represents the parent of an object in [Lua](#). If the `Context` is null, the object will be global in [Lua](#). Must be of type [uLua.LuaMonoBehaviour](#).

Implements [uLua.IHasLuaIndexer](#).

#### **string uLua.LuaMonoBehaviour.Handle [get]**

Used to access the unique Handle of a [Lua](#) object.

The unique `Handle` of a [Lua](#) object is defined as: `Context.Name`. If an object's context is null, its unique handle is simply its name.

Implements [uLua.IHasLuaIndexer](#).

#### **bool uLua.LuaMonoBehaviour.IsExposed [get]**

Used to track if an object has been exposed to [Lua](#).

Objects may be marked as exposed by calling the [Expose\(\)](#) method.

Implements [uLua.IHasLuaIndexer](#).

#### **string uLua.LuaMonoBehaviour.Name [get]**

Used to access the name of an object.

The name of an object cannot be changed after it has been exposed to [Lua](#).

Implements [uLua.IHasLuaIndexer](#).

#### **DynValue uLua.LuaMonoBehaviour.this[DynValue Key] [get], [set]**

Returns a [Lua](#) value indexed by the DynValue Key.

This indexer may be used in [Lua](#) or within C# to access any member of a [Lua](#) object.

Implements [uLua.IHasLuaIndexer](#).

#### **DynValue uLua.LuaMonoBehaviour.this[string Key] [get], [set]**

Returns a [Lua](#) value indexed by the string key.

This indexer may be used in [Lua](#) or within C# to access any member of a [Lua](#) object.

Implements [uLua.IHasLuaIndexer](#).

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