

Touchstone Data is a easy to use code library that can convert entire C# data class objects into XML or JSON. That data can then be saved to a file and then loaded from the file back into an instance of the original data class object.

Fig.1 Simple Example

```
using TouchstoneData;
public class MyGame : MonoBehaviour
{
    string filename = "Save01";

    public class CharacterData
    {
        public string Name;
        public int XP;
    }

    public void SaveToFile()
    {
        CharacterData saveThis = new CharacterData();
        saveThis.Name = "Knight";
        saveThis.XP = 100;

        TData.SaveObject(filename, saveThis);
    }

    public void LoadFromFile()
    {
        CharacterData loadThis = new CharacterData();
        TData.LoadObject(filename, ref loadThis);
    }
}
```

The example shown in Fig.1 demonstrates a simple use case. In this example the code demonstrates how to save data to a file using `TData.SaveObject()`. And how to load the data from a file with `TData.LoadObject()`.

How to use:

1. Copy the TouchstoneData.dll file into your project files (Typically this is saved to your "scripts" folder).
2. Include the TouchstoneData using statement in your code file to include the library in your code (Add "using TouchstoneData;" to your C# code file.)
3. Specify a filename for the file you want to save.
4. Create a data class such as the example given for CharacterData.
5. Use the TData.SaveObject() method to save the class to a file.
6. And lastly to load the data from a file using the TData.LoadObject() method.

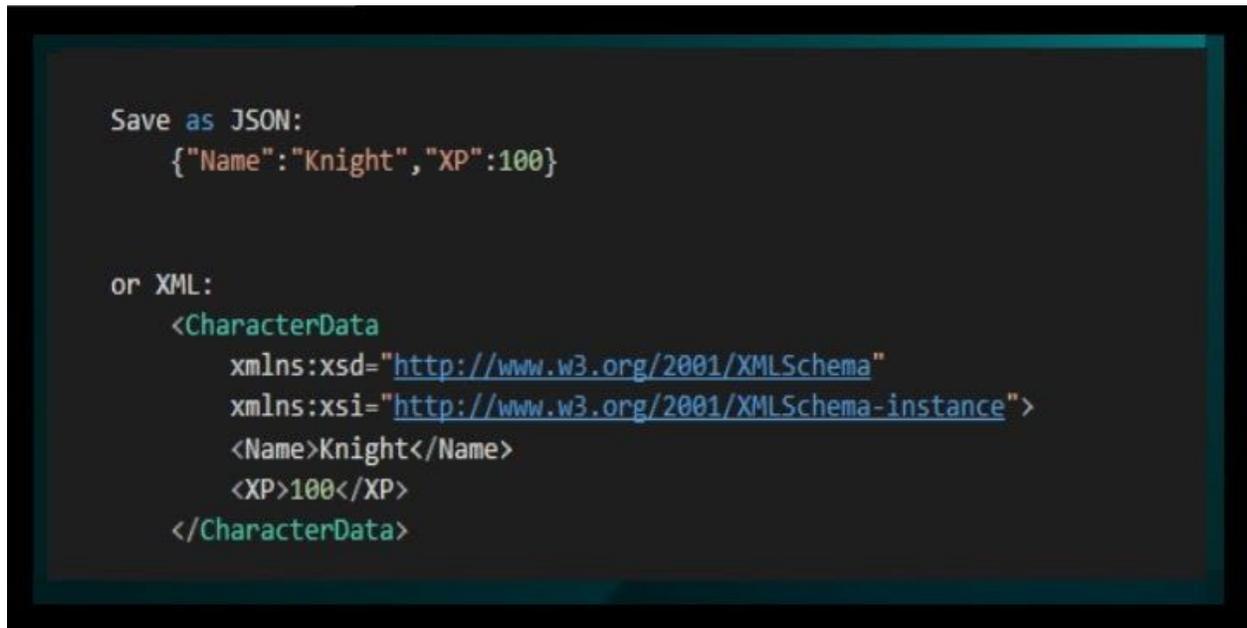
Save Example:

```
TData.SaveObject("myFile", objMyData);
```

Load Example: (Note: Pass your object into the function by reference to load it.)

```
TData.LoadObject("myFile", ref objMyData);
```

Fig.2 XML or JSON

A screenshot of a code editor with a dark background and light-colored text. The text is organized into two sections. The first section is titled "Save as JSON:" and shows a JSON object: {"Name": "Knight", "XP": 100}. The second section is titled "or XML:" and shows an XML snippet for a CharacterData class. The XML includes namespace declarations for xsd and xsi, and elements for Name and XP.

```
Save as JSON:  
{"Name": "Knight", "XP": 100}  
  
or XML:  
<CharacterData  
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"  
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">  
  <Name>Knight</Name>  
  <XP>100</XP>  
</CharacterData>
```

The example in Fig.2 shows basic examples of both JSON and XML data formats. This data was taken from the files saved by the code in Fig.1.

Fig.3 Additional Settings

```
//===== Additional Settings Example =====
//Specify Settings
TData.EncryptData = true; //Optional encryption
TData.EncryptionKey = "XYZ";
TData.TypeOfData = DataType.XML; //Select XML or JSON
TData.DirectoryName = "SavedData/save01"; //Custom folder
TData.ResourcesFolderPath = "Assets/Resources/"; //Overridable path

//Save entire C# object to file
CharacterData saveThis = new CharacterData();
TData.SaveObject("/savedgame.xml", saveThis);

//Load entire C# object from file
CharacterData loadThis = new CharacterData();
TData.LoadObject("/savedgame.xml", ref loadThis);

//Verify the last file loaded was successfully.
if (TData.IsValidFile)
{
    //YAY! Data was saved and loaded successfully.
}
```

The example shown in Fig.3 demonstrates how to use additional settings and functionality available in the TouchstoneData library.

Additional Settings:

EncryptData - true/false

EncryptionKey - A string value used to encrypt and decrypt data when EncryptData is set to true. The default value is "XYZ", change this to a unique value if you wish to secure your data.

TypeOfData - XML or JSON

DirectoryName - The path the file will be saved to within the Resources folder.

ResourcesFolderPath - The path to the Resources folder. The default path for this directory is "Assets/Resources/" unless specified otherwise.

File Path Example:

ResourcesFolderPath + DirectoryName + filename

(Note: The full path will be created when saving the file if it does not already exist)

ResourcesFolderPath	DirectoryName	filename
Assets/Resources/	SavedData/	GameData

(Default path and file name: "Assets/Resources/SavedData/GameData")

Verifying data files:

Files can easily be verified with the `TData.IsValidFile` property immediately after loading a file with the `LoadObject()` method. The `IsValidFile` property will be true if the file exists and its content loaded into the object successfully. If the file does not exist in the path specified or the data does not match the data structure of the loading object, the value of `IsValidFile` will be false.

Common usage example:

```
if(TData.IsValidFile){
    //success
}
else{
    //fail - display error
}
```

Instantiating Scriptable Objects

In some cases you may need your data class to inherit from `ScriptableObject` in order to instantiate your object. This can easily be done by adding `: ScriptableObject` to the end of your class name declaration.

ScriptableObject Example:

```
class CharacterData : ScriptableObject
{
    int Name;
}
```

```
CharacterData objMyData = ScriptableObject.CreateInstance<CharacterData>();
```

IMPORTANT: Some Unity classes such as `MonoBehaviour` and `Vector3` cannot be saved directly using Touchstone data. To save these classes you must first copy the data you wish to save into a custom class which can be saved.

Fig.4 Custom Vector3 example

```
class MyGame
{
    void SaveACustomVector3()
    {
        Vector3 v3 = new Vector3(10, 20, 30);
        MyCustomVector3 MyV3 = new MyCustomVector3(v3.x, v3.y, v3.z);
        TData.SaveObject("myFile", MyV3);
    }
}

class MyCustomVector3
{
    float X = 0;
    float Y = 0;
    float Z = 0;

    public MyCustomVector3(float x, float y, float z)
    {
        X = x;
        Y = y;
        Z = z;
    }
}
```

The example shown in Fig.4 demonstrates a crude example of a custom Vector3 class which can be saved using TouchstoneData.

Tips:

- **Common mistakes that can cause your file load to fail:**
 1. The **file path** or file name specified for loading the file does not match the path it was saved to.
 2. The **EncryptData** setting has been changed since the file was saved. If the file was encrypted it must be decrypted. If it was not encrypted but encryption has been turned on, it will attempt to decrypt the file and fail.
 3. The data class structure has changed since the file was last saved. This may cause the data load function to fail.
 4. Formatting, adding white space, and adding line breaks in saved files can often cause them to load incorrectly. You can edit the values of these files as needed but it is recommended not to reformat the data structure for readability as it may corrupt the file. We suggest copying the data to a data formatter for easier readability but keep the original file's data structure intact.
- **Leave encryption turned off until development is complete.** If your data is NOT encrypted you can easily edit the XML or JSON files to match changes to your data class and still load saved data.

Encryption: is based on System.Security.Cryptography.Net runtime assembly v4.0.30319 and implements password-based key derivation functionality, PBKDF2, by using a pseudo-random number generator based on HMACSHA1.

For more information see:

<https://docs.microsoft.com/en-us/dotnet/api/system.security.cryptography?view=netframework-4.0>

Requirements:

- Unity 2019 or newer - May or may not work with older versions of unity.
(backwards compatibility coming soon)
- .Net 4.0 - May or maynot work with older versions of .Net
(backwards compatibility coming soon)

The Future of Touchstone Data

We would like to build upon this library to make it as useful and easy to use as possible. Below are a few features we plan to implement in future releases.

- Backwards compatibility for older versions of Unity.
- Backwards compatibility for older versions of .Net.
- File saving/loading for various Unity classes and components.
- Saving/Loading object locations.
- Saving/Loading entire scenes of objects with a single command.

For support, feature requests, or if you have any suggestions contact us at:

Email: TouchstoneBros@gmail.com

Discord Channel: <https://discord.com/invite/qQPuHrK>

TouchstoneBros.com