

7 Days To Die SDX Tutorial and Help

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Introduction

7D2D SDX Tutorials

SDX modding is an enhanced form of modding for the 7 Days to Die game. It allows us to add custom scripts, custom textures and blocks, as well as add entirely new biomes to the world, creating an immersive experience styled to your players and yourself.

While the SDX community has done some amazing things with the game since its introduction, there lacks a central distribution and documentation aspects to it. This has caused considerable confusion for people who are anxious to get started, since they don't necessarily know how to get started, or even what all of this SDX stuff is about.

That's where this site comes in, to de-mystify SDX and help you get started creating new mods, reaching more people, and finally helping you create a game play that is styled perfectly for you.

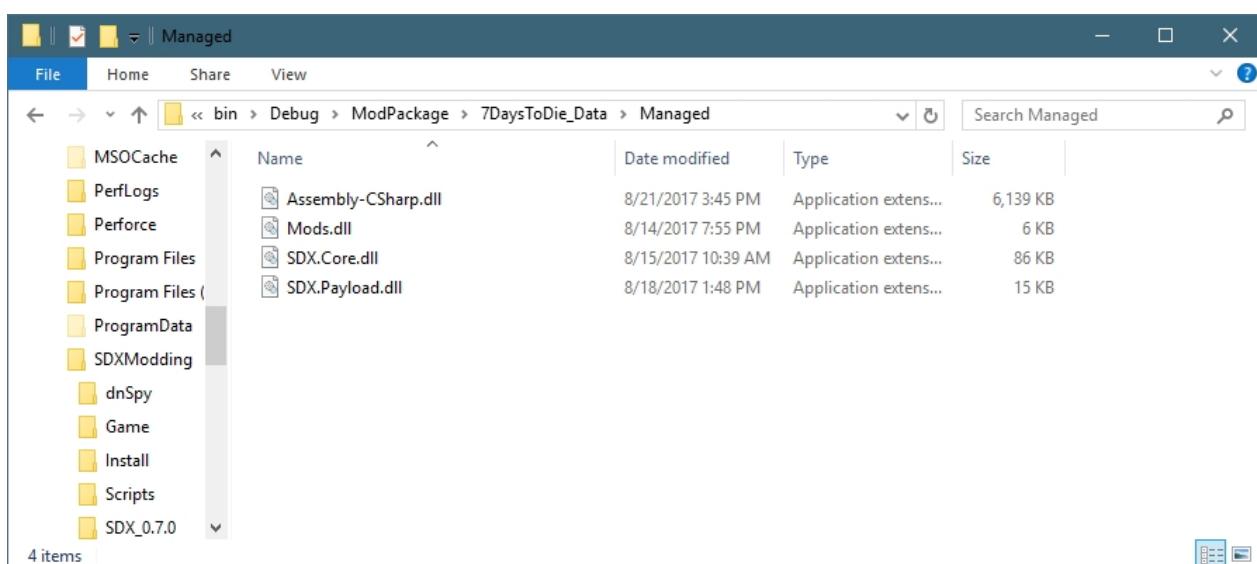
Note: SDX is not EAC compatible. If you attempt to load up SDX with EAC enabled, you will get an error.

Note: SDX Servers require a Client Install for players to connect to, and play.

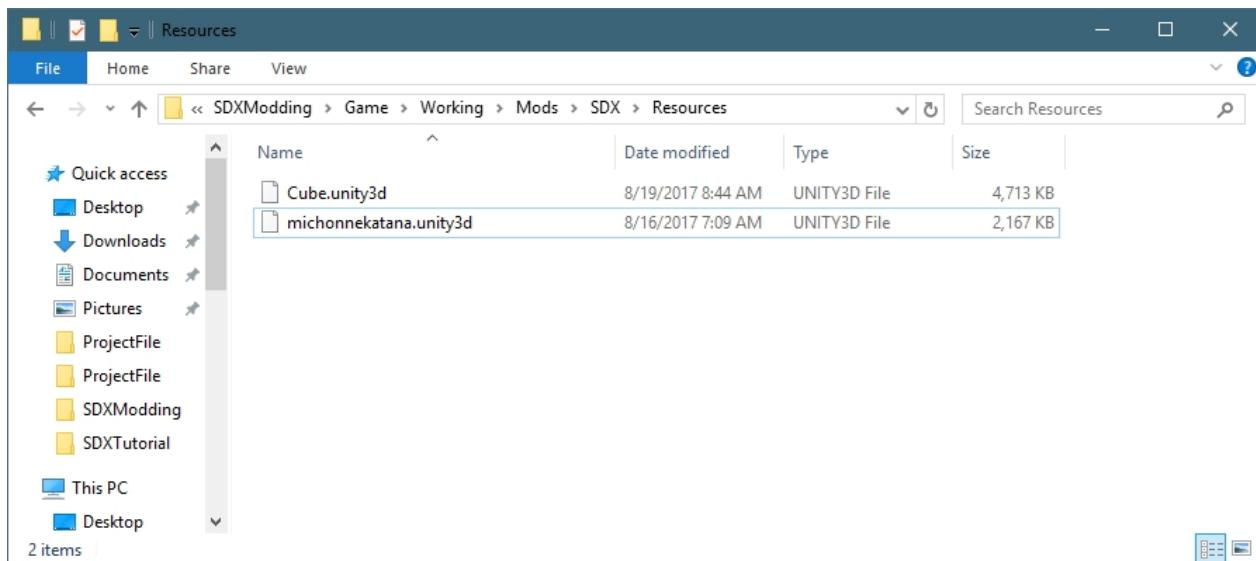
So what is SDX modding?

SDX modding lets you add your own textures, your own blocks, characters, animations, and complex code. It does so by instrumenting the Assembly-CSharp.dll with SDX hooks, allowing it to load up Unity3D texture bundles.

Custom scripts can be written that get compiled into the Mods.dll file, found in the 7DaysToDie_Data/Managed folder, and merged with the Assembly-CSharp.dll at run time.



The actual Unity3D bundles, which are the files where the textures and models are stored in, can be found under your Mods/SDX/Resources folder



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Getting Started



Getting set up to do SDX modding is not that difficult. However, you will need a few tools to help you get started.

This section will cover what your basic system requirements are before beginning. The more complex a mod is, the more memory you will need, above and beyond what you need to play the base game.

In addition to the system requirements, we also list the tools that you'll be using, where to get them, how to install them, and what they'll do for you.

The list of tools you'll need may look big and confusing, but we'll take a slow approach in showing you what each tool will do. To make getting started easier, we created an SDX Modding folder structure, which you can download to get you started. Inside of that download, there's everything you need to get started on building your first sample mod, The Katana Mod.

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System requirements

The following are the System Recommendation for 7 Days to Die base game. SDX is very memory heavy, so use this as a guide

RECOMMENDED:

OS: Windows 7 or higher

Processor: 3.0 Ghz Quad Core CPU or faster

Memory: 16 GB RAM

Graphics: 2 GB Dedicated Memory

DirectX: Version 10

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Initial Setup

In order to be fully successful with SDX, it's strongly recommend following this Getting Set up guide close.

You'll want a 100% vanilla install of 7 Days To Die, without any mods or any additional changes.

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Getting the SDX Modding Kit

This tutorial will guide you through step-by-step on how to make your first SDX mod, and set it up for distribution.

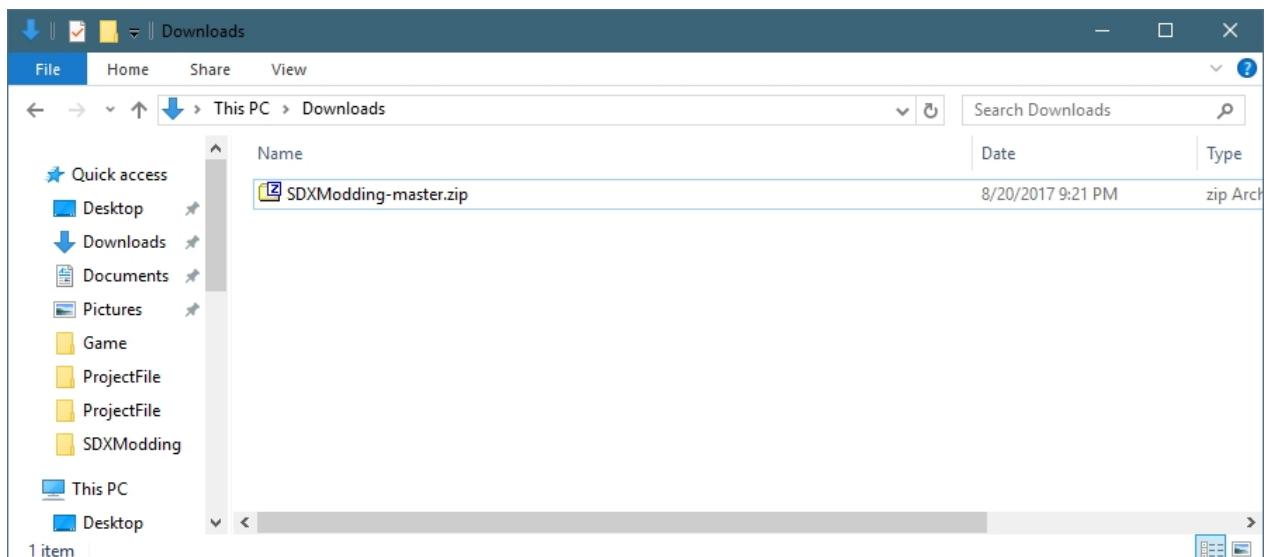
In order to do this, some software needs to be installed and set up. We've listed the tools you should install, including download links.

Most of the tool chain can be downloaded from the SDXModding Github depot, by downloading this link:

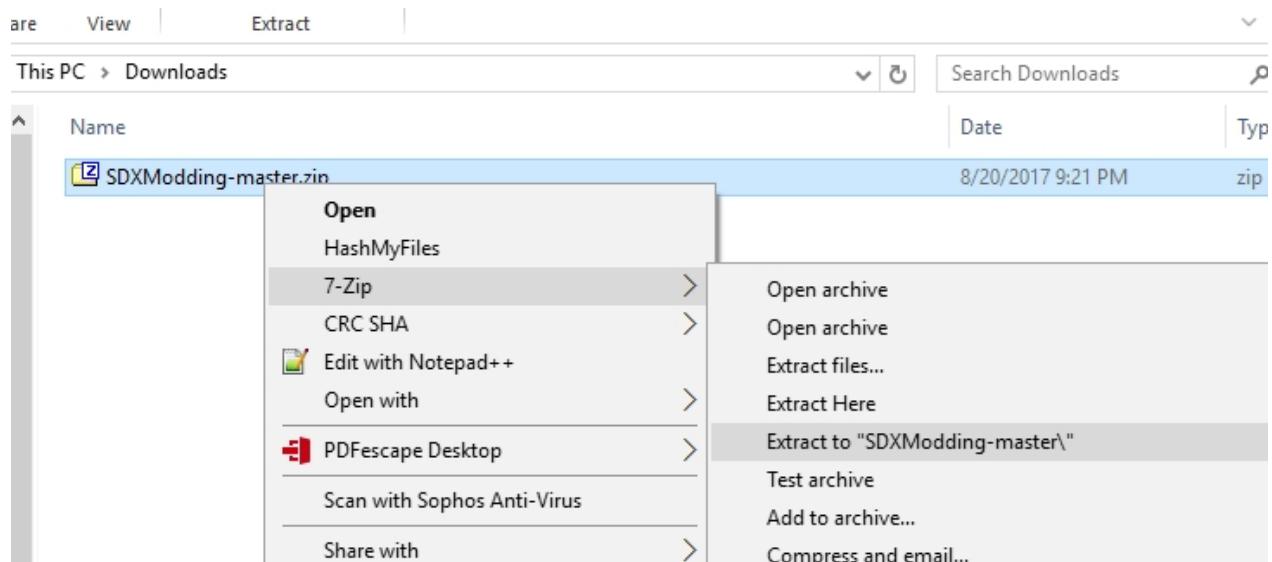
Direct Download Link: <https://github.com/7D2DSDX/SDXModding/archive/master.zip>

The SDXModding Download Package contains everything you need to get started with SDX mods.

Once downloaded, go to your Downloads folder



Right click on SDXModding-master.zip, and extract:

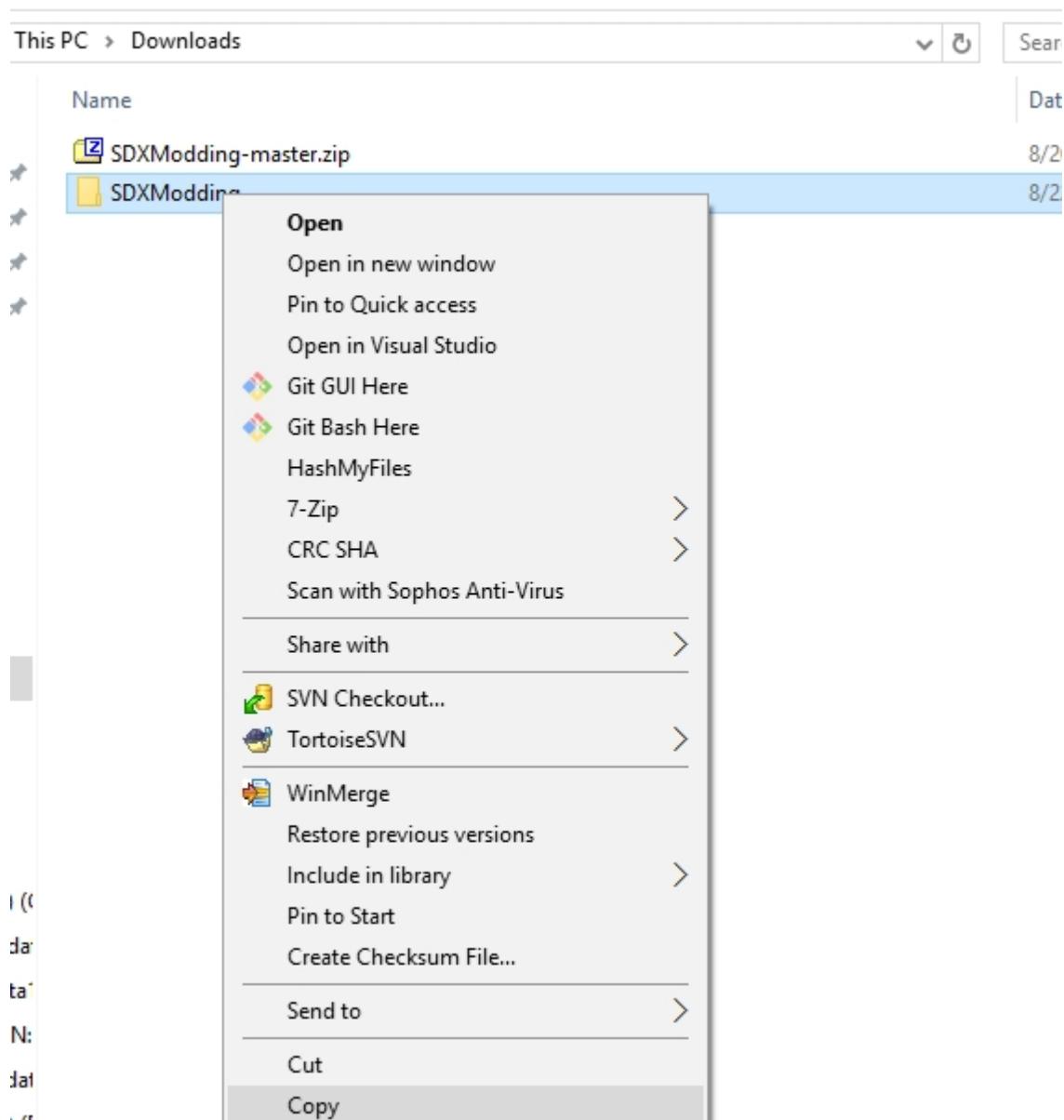


Once extract, right click on the new SDXModding-master folder, and click on rename:

Rename the folder to be SDXModding

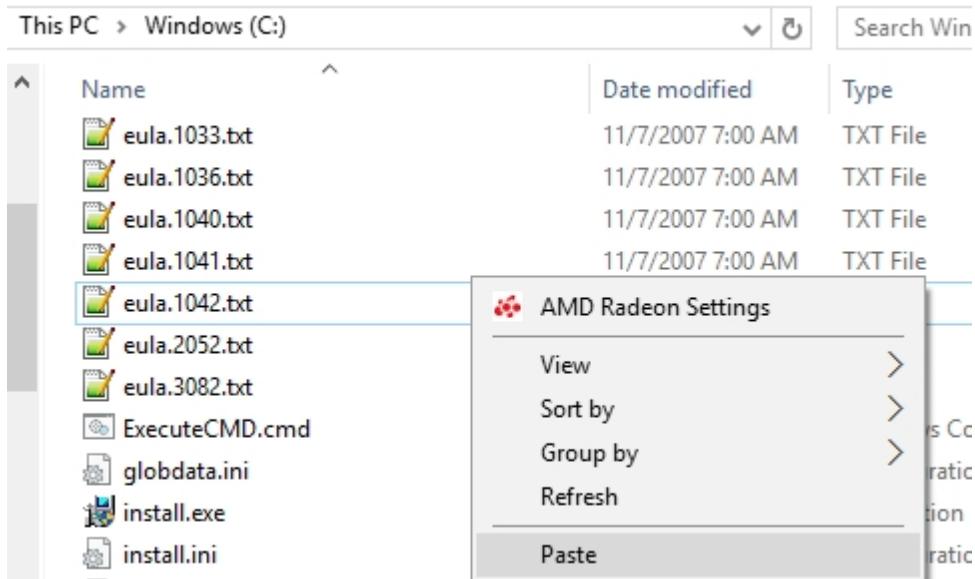
Now we want to copy it to your C:\ or D:\. For the purpose of this Tutorial, it's assumed to be under C:\ or D:\

Right click on the SDXModding folder, and select Copy

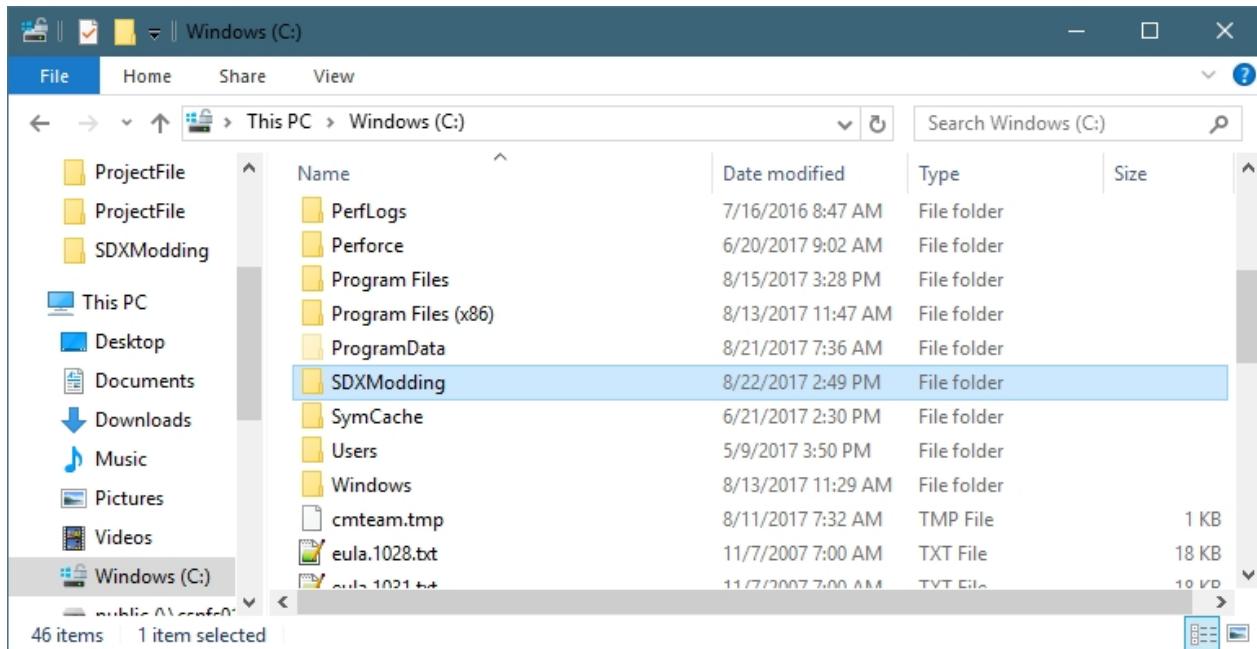


In Explorer, navigate to C:\ or D:\.

Right click on the C:\, and select Paste



You should see something like this:

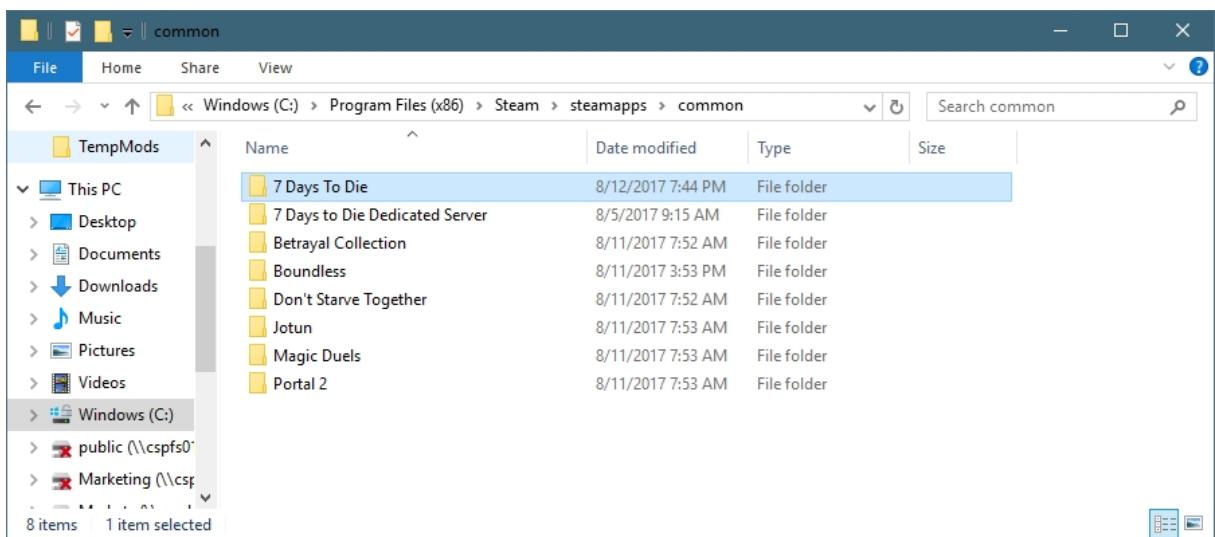


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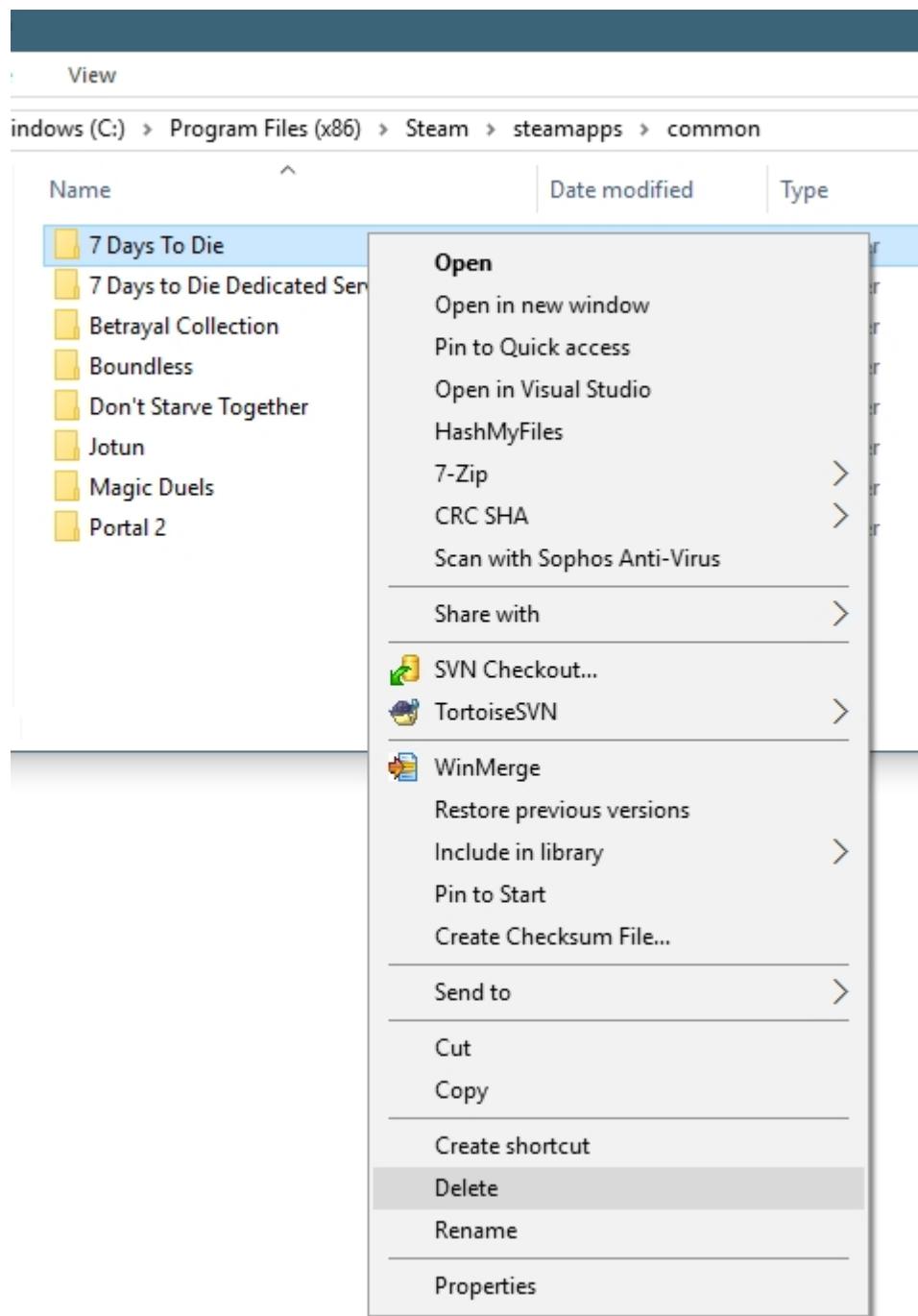
Starting off Clean

NOTE: This will remove any mods or any changes you've done to the game.

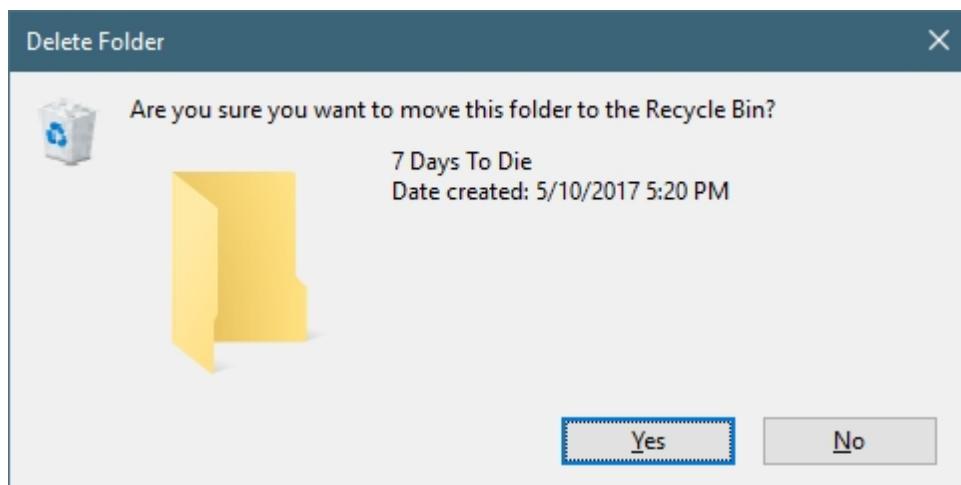
Using Windows explorer, navigate to your Steam Folder, which is by default "C:\Program Files (x86)\Steam\steamapps\common"



Right Click on the "7 Days To Die" folder, and select Delete



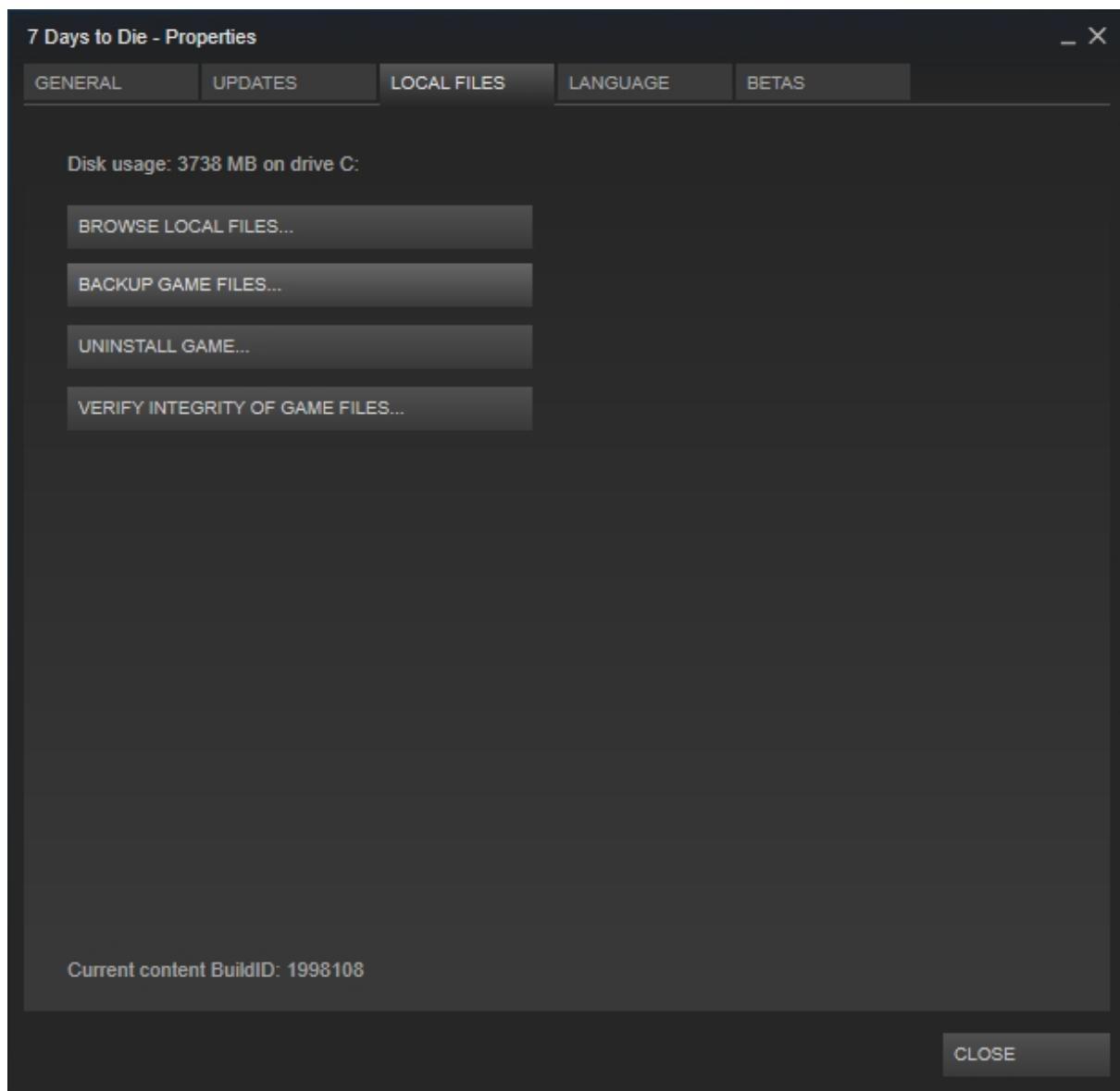
Confirm that you want to delete the "7 Days To Die" folder



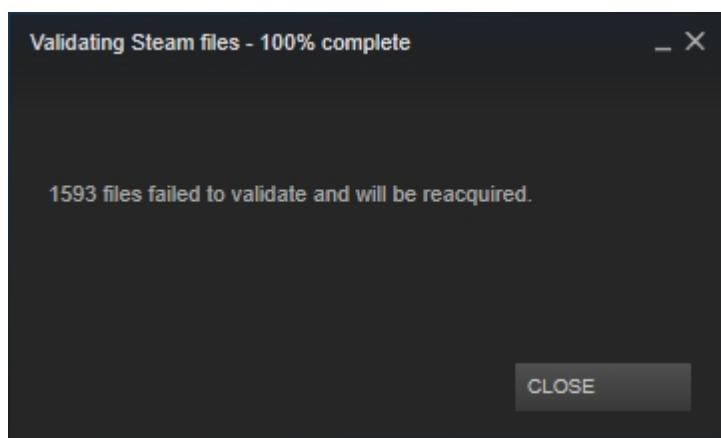
In Steam, right click on the "7 Days to Die", and click on Properties



Click on the "Local Files" tab



And click on "VERIFY INTEGRITY OF GAME FILES"



This will download a fresh install of 7 Days to Die of the latest stable release.

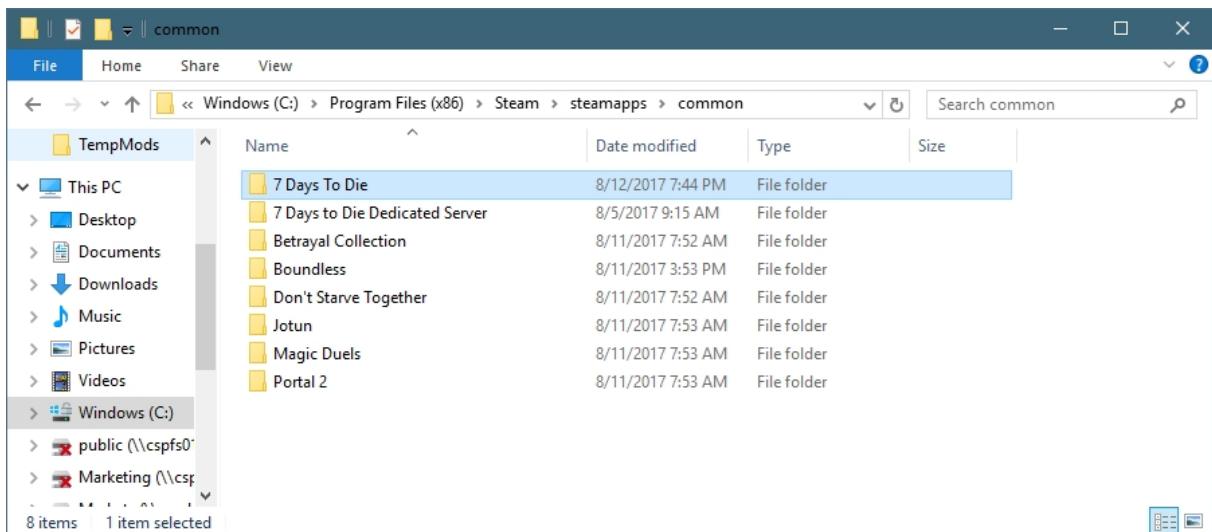
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Making a Clean Backup

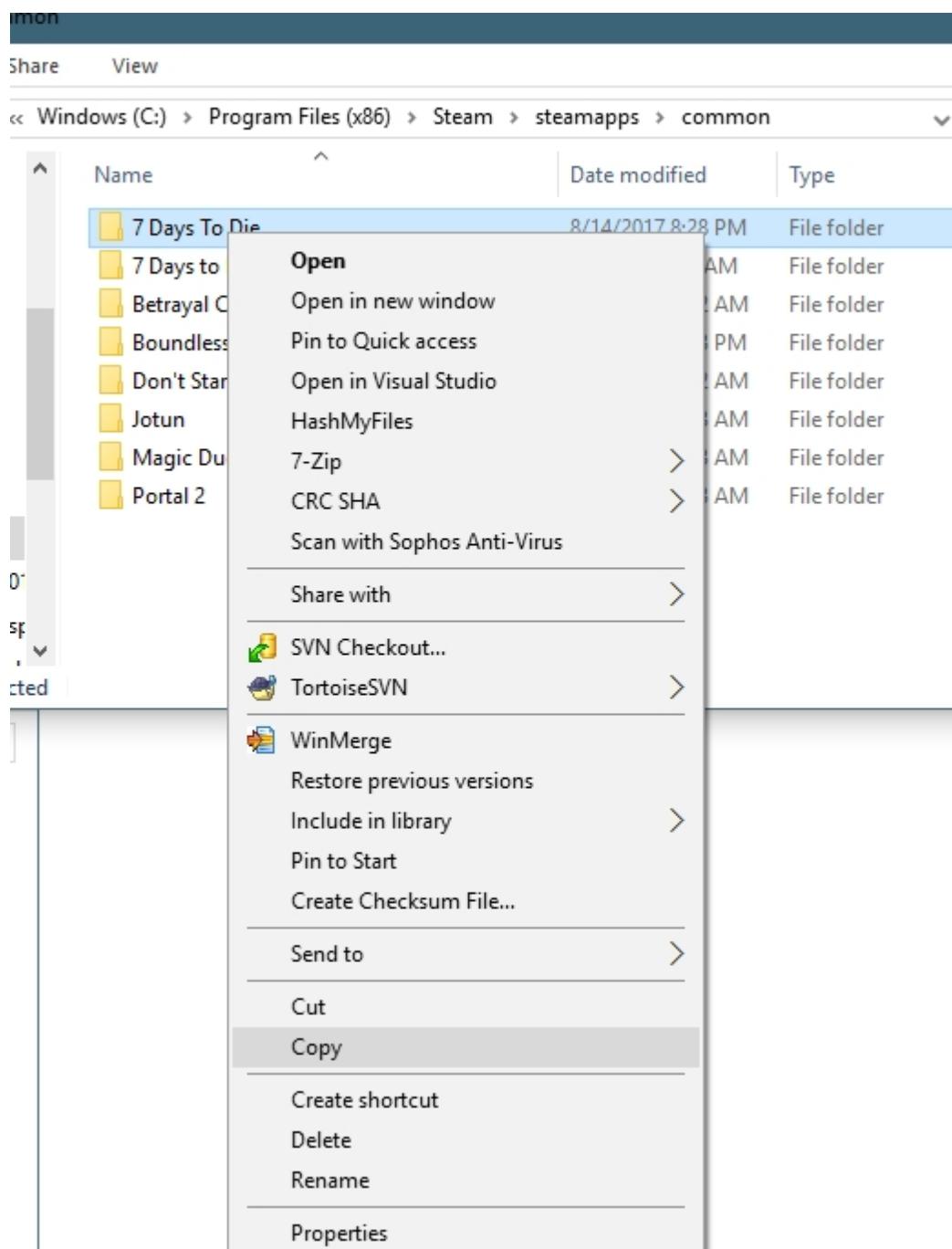
Once you have completed the "[Starting off Clean](#)" section, it's time to make two copies.

Why two copies? One copy will be used as a plain vanilla version. Since Steam will auto-update if a new release is pushed out, you may not be ready to jump to that new version just yet, especially if you are learning how to mod. The other copy will be your working copy, where you'll be applying mods.

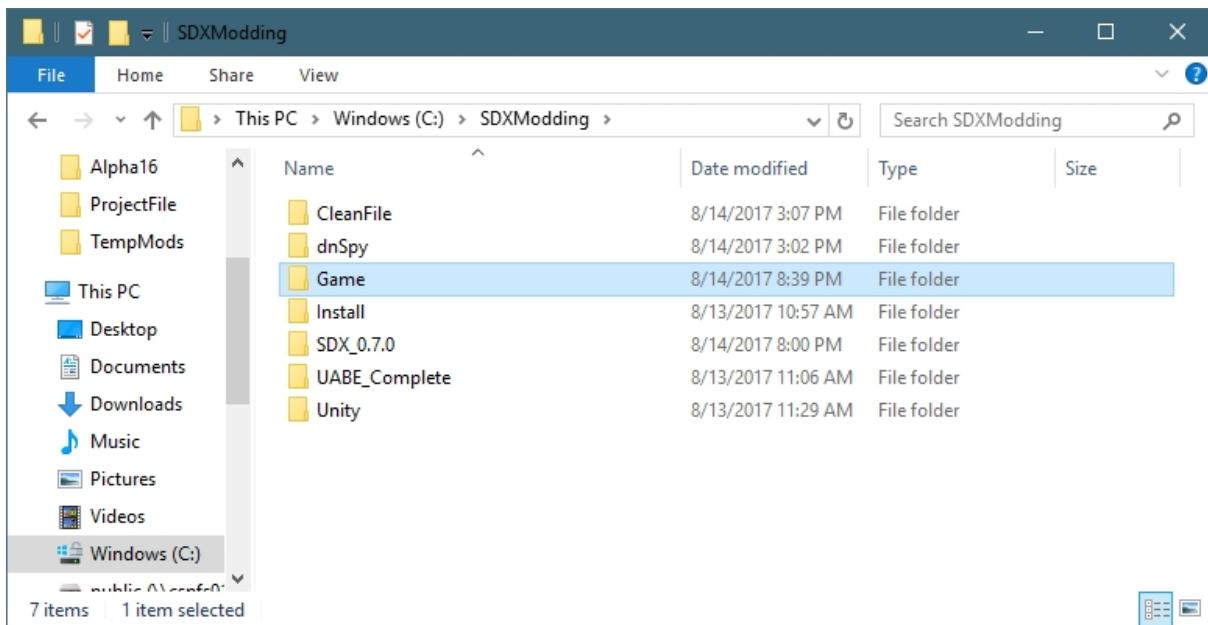
Using Windows explorer, navigate to your Steam Folder, which is by default "[C:\Program Files \(x86\)\Steam\steamapps\common](C:\Program Files (x86)\Steam\steamapps\common)"



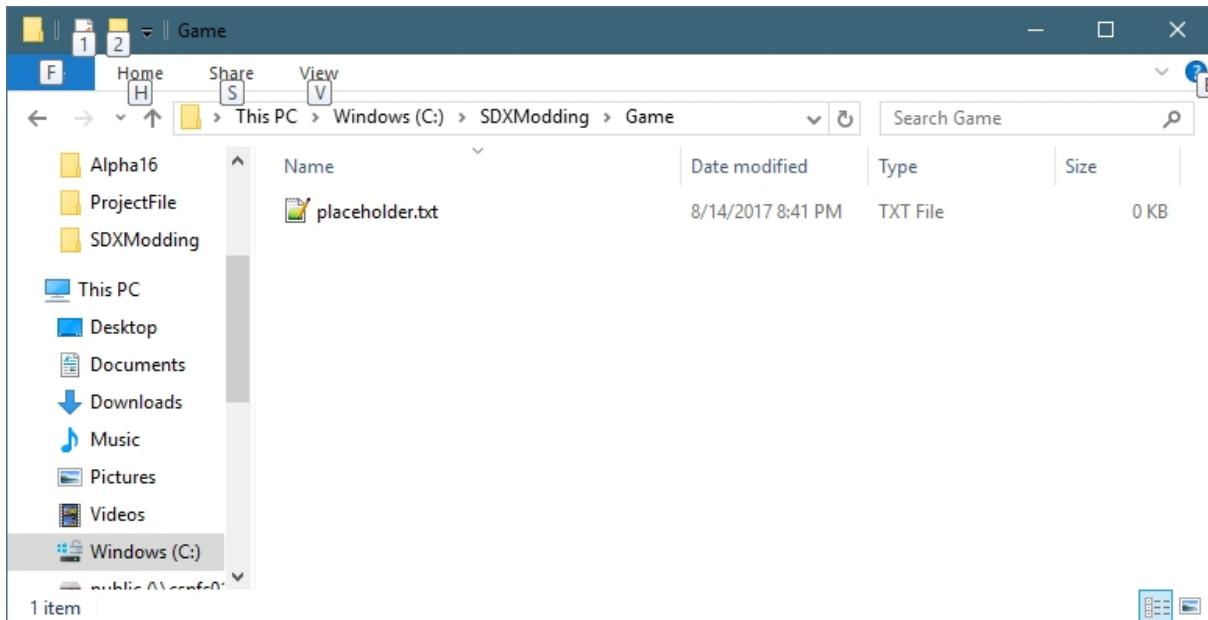
Right Click on the "[7 Days To Die](#)" folder, and select Copy



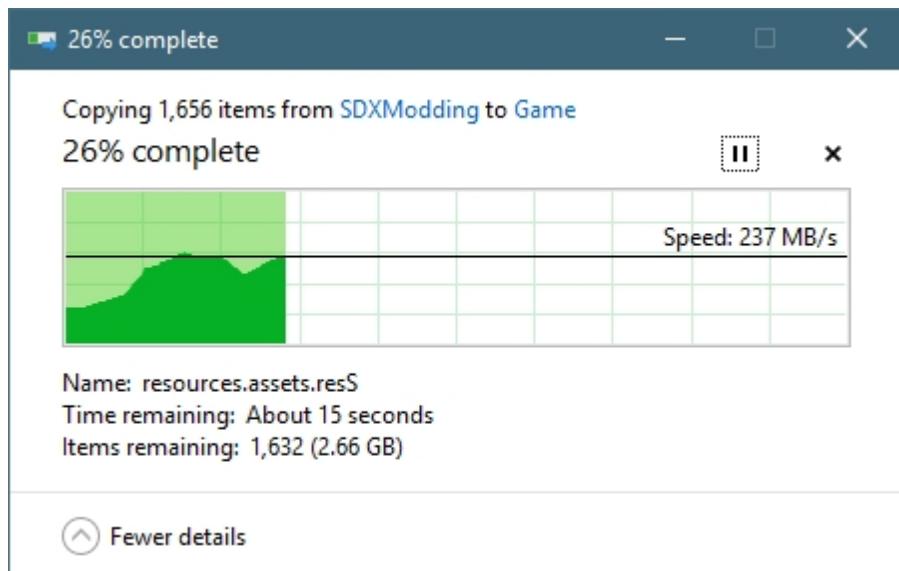
Open up an Explorer Window where you have installed the SDXModding, such as C:\SDXModding\Game\



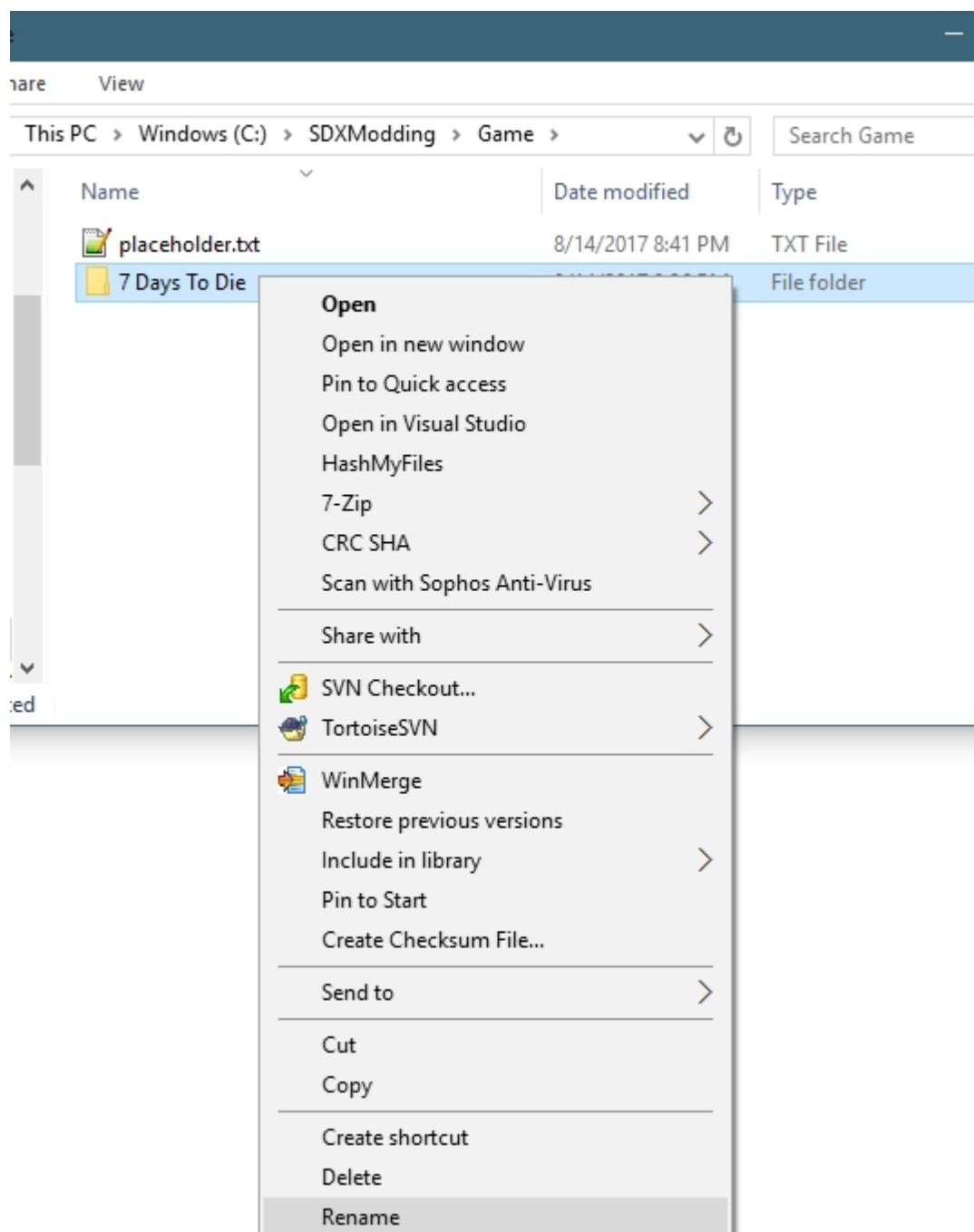
Double Click to open the "Game" Folder.



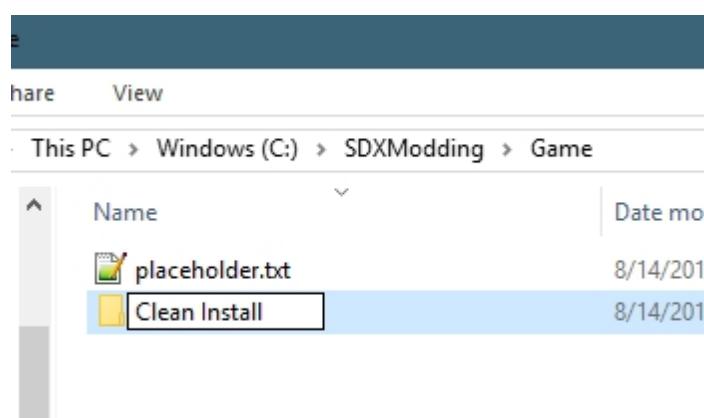
Right click on the folder, and select "Paste". It will then make a copy of the game:



Once it's finished, we'll rename the folder to "Clean Install". Right click on "7 Days To Die" in the "C:\SDXModding\Game\" folder, and select "Rename"



Rename the folder "Clean Install"



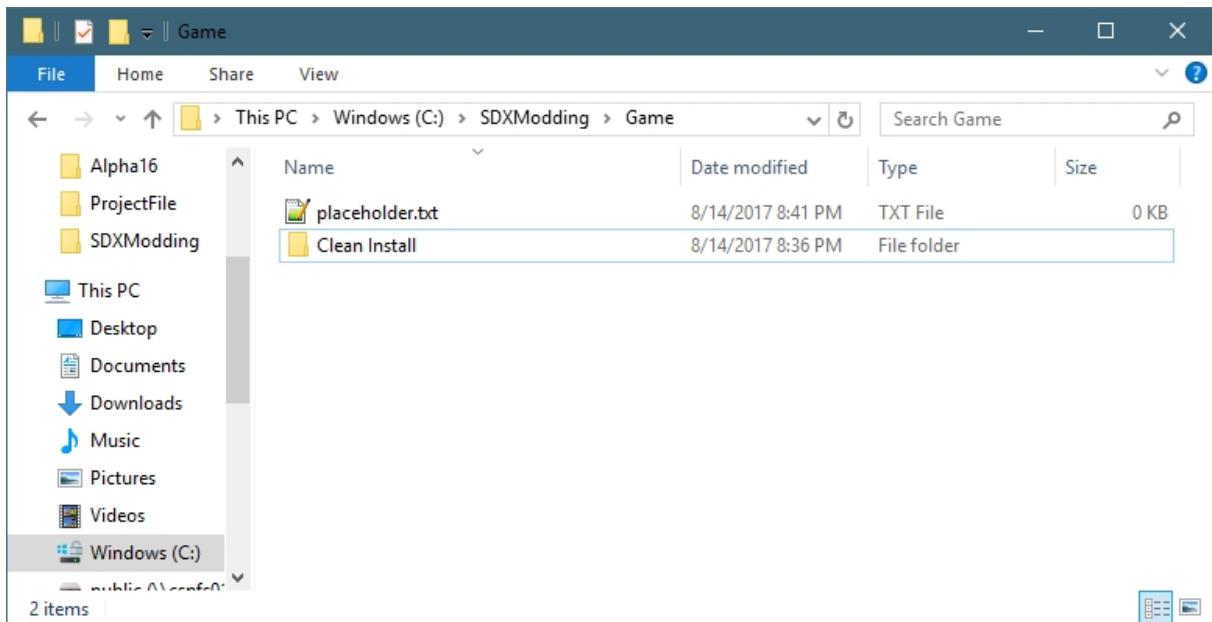
You now have a perfectly preserved copy of the game.

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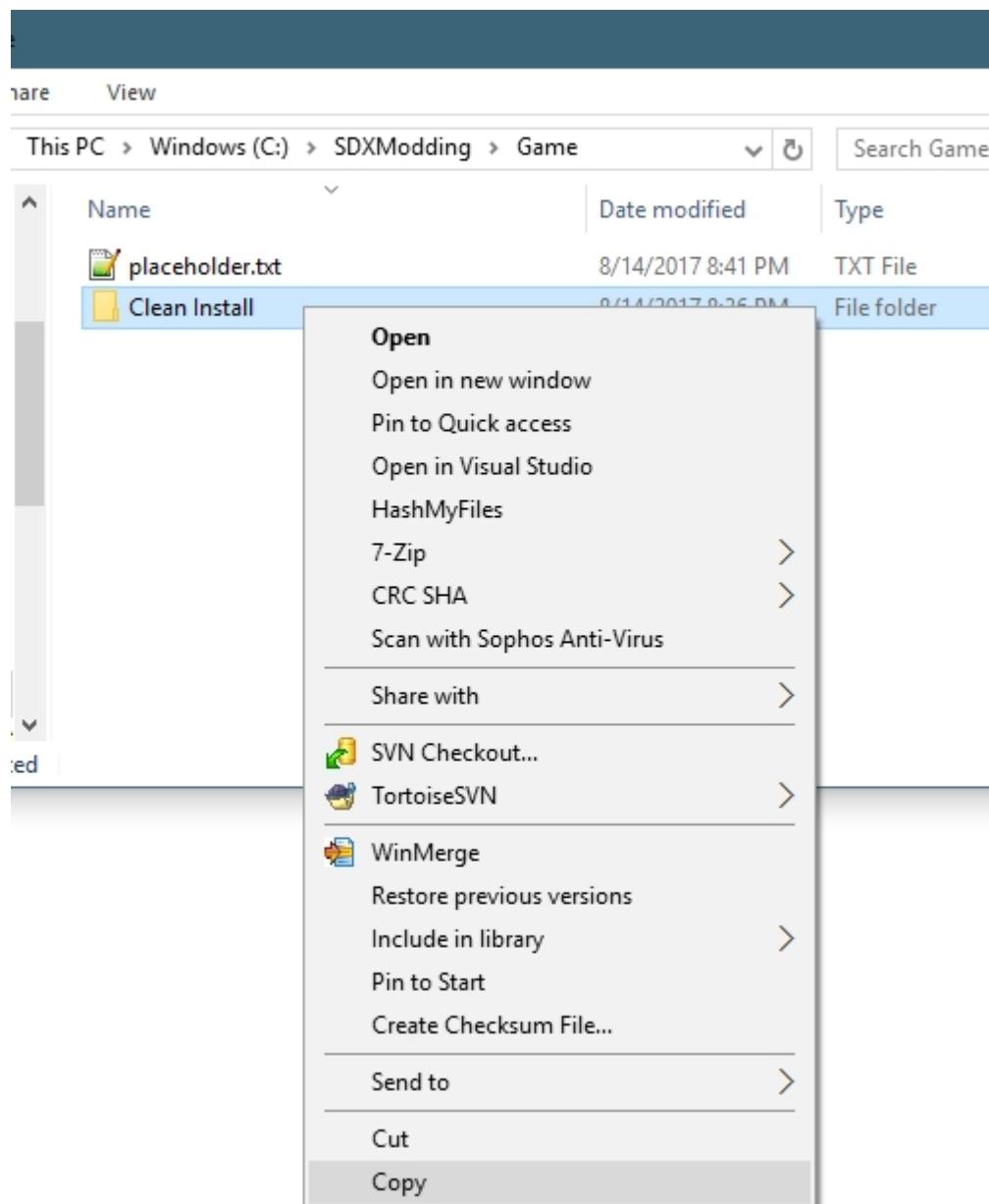
Making a Working Folder

The second folder you will create will be called a Working. This is where you will be adding your SDX mods, trying out new things.

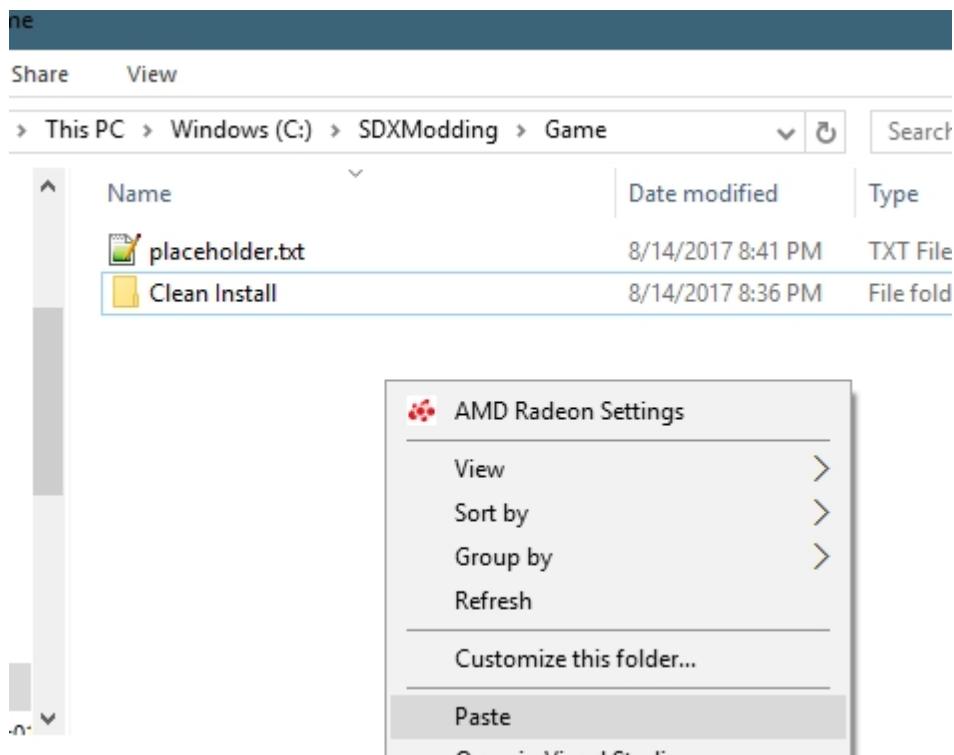
Using Explorer, navigate to your "C:\SDXModding\Game" Folder.



Right click on the "Clean Install" folder, and click on "Copy"

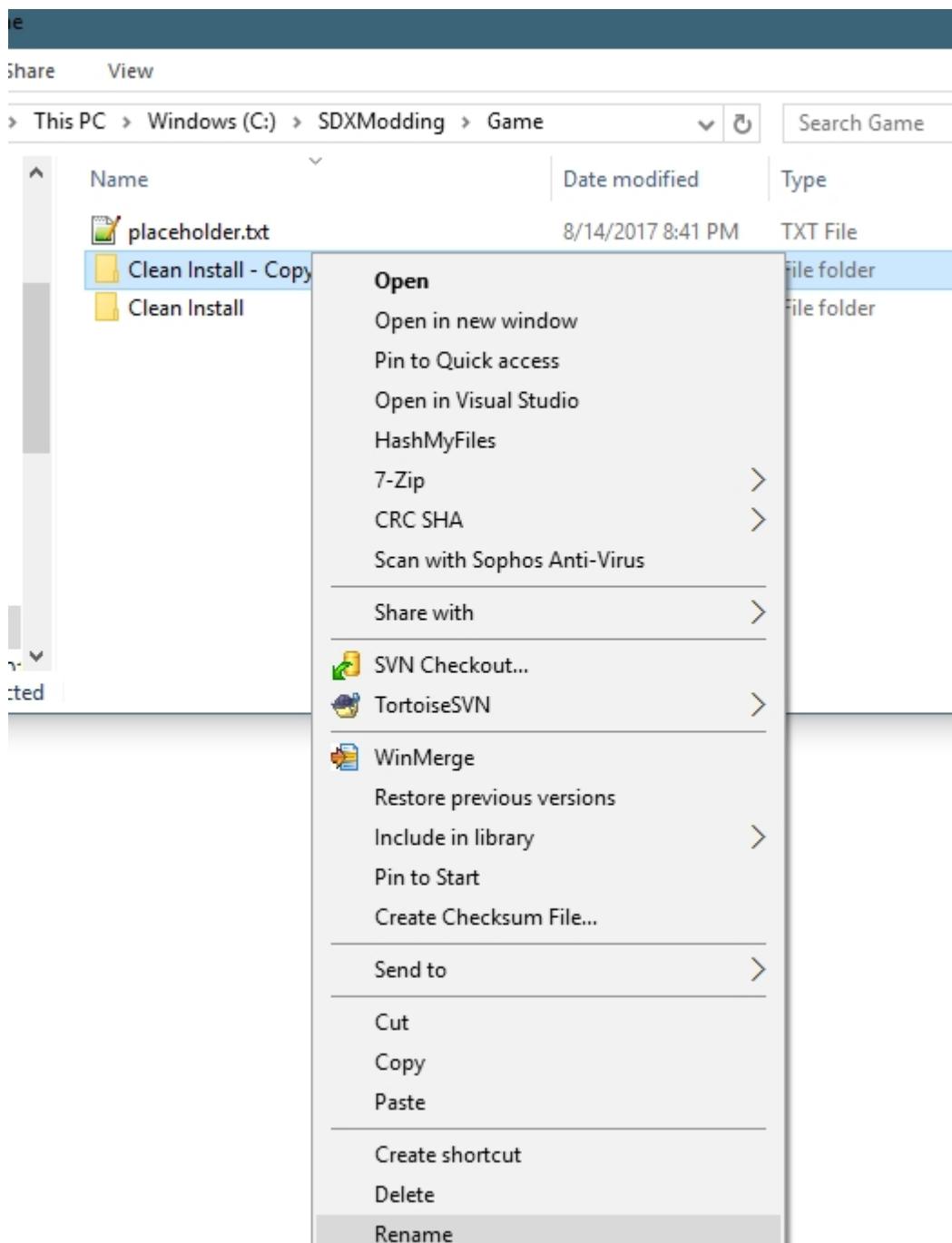


Right click on the Explorer Window again, and select "Paste"

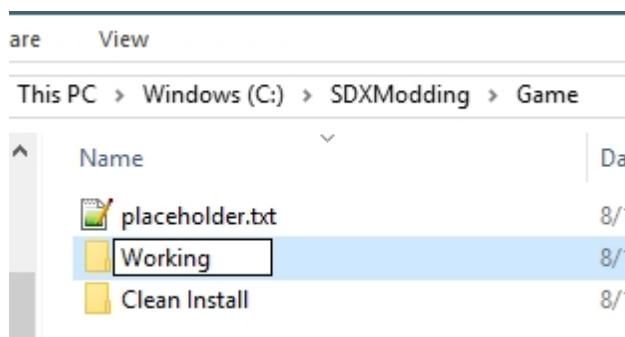


This will make a new copy called "Clean Install - Copy".

Right click on "Clean Install - Copy", and select "Rename"



Rename it to "Working"



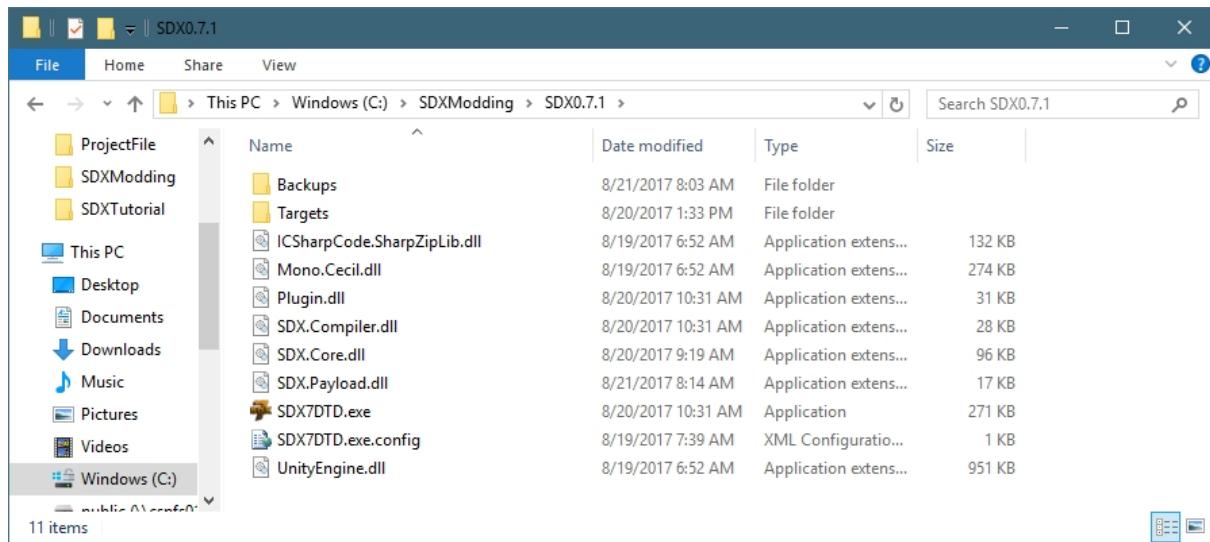
There we go! Now we have two copies of the game. One for a back up, and the other as our working folder.

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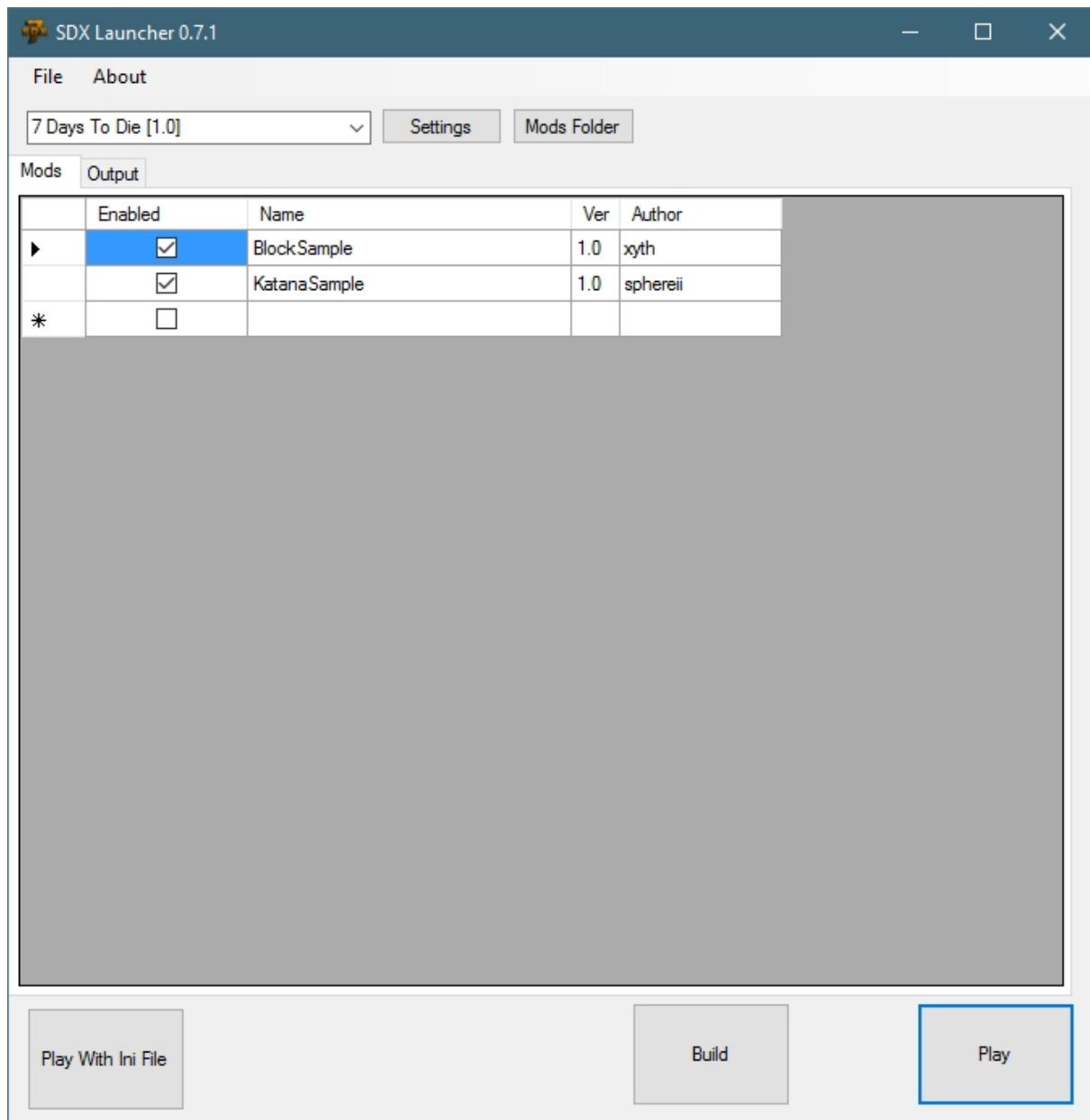
SDX Launcher

The SDX7DTD.exe is the GUI front end of the SDX Tool, and will be used to compile the mods.

In the "C:\SDXModding\SDX0.7.1\" folder, double click on SDX7DTD.exe



Once loaded, you'll see this screen:



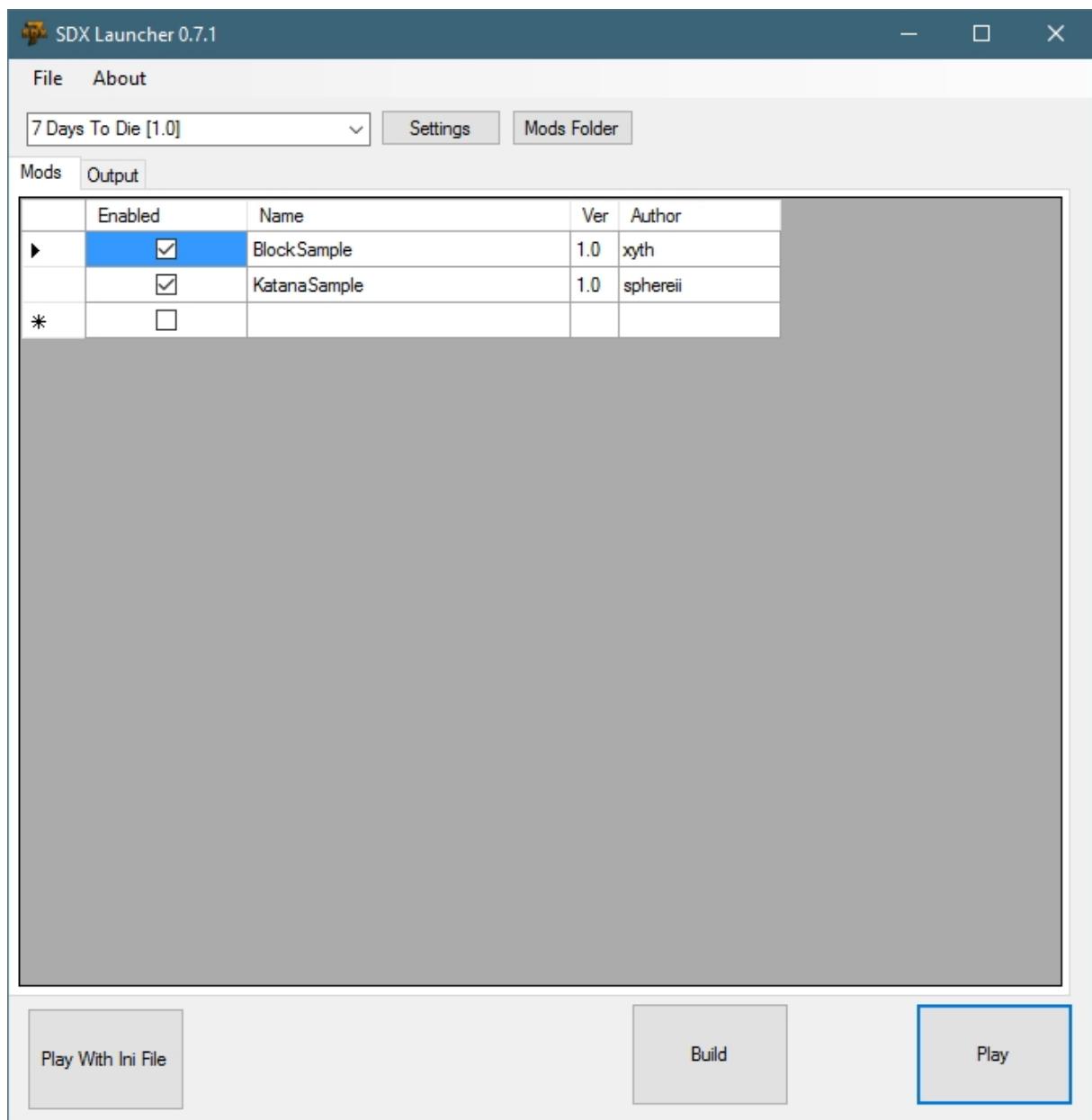
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Settings Button

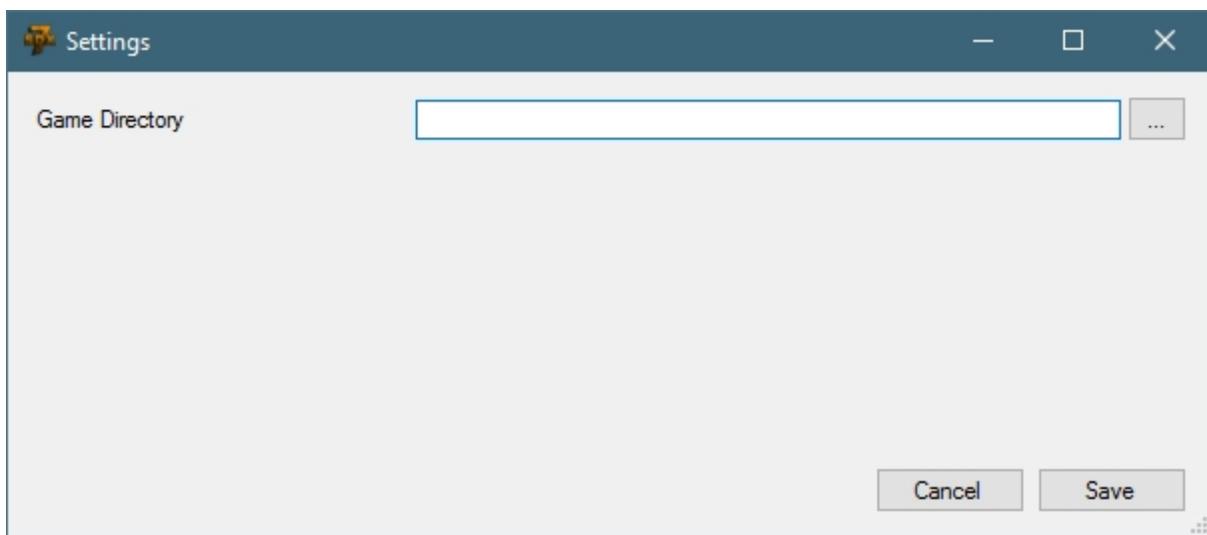
Once you have started the SDX Launcher 0.7.1, you will need to configure it for the first time.

In previous versions of the SDX Launcher, you had to select either 7 Days To Die, or 7 Days To Die Server. It is now auto-detected.

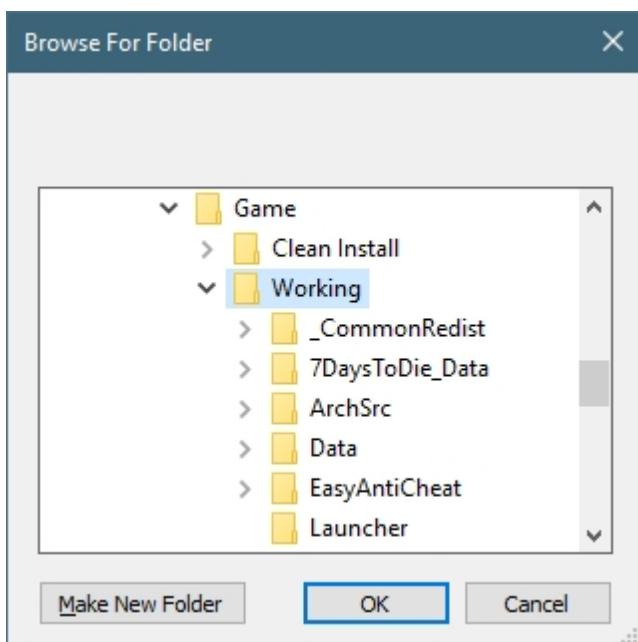
Click on the "Settings" button.



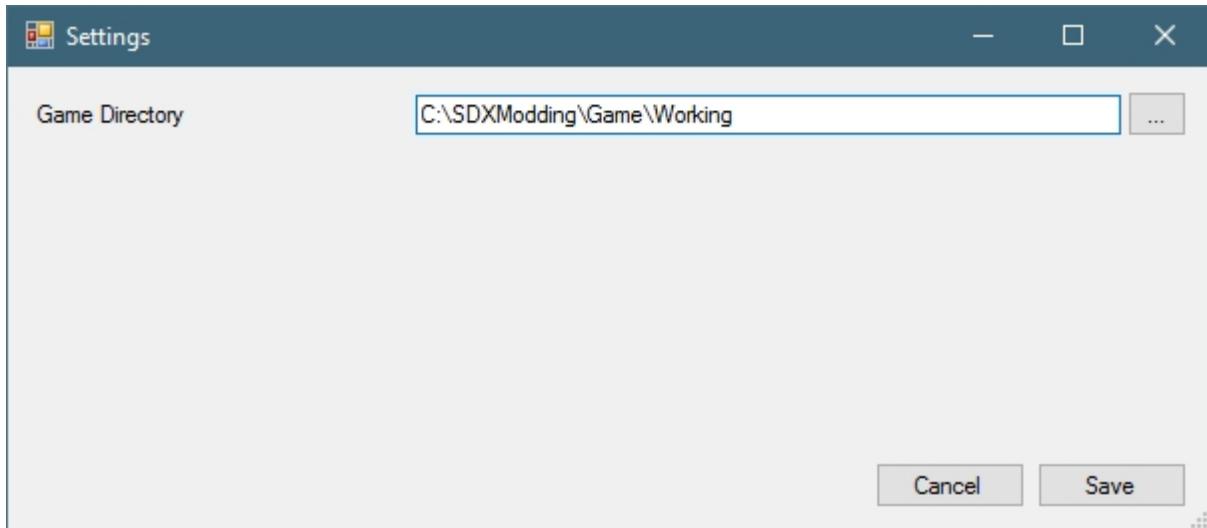
This is asking where your "Game Directory" exist. For us, it'll be that ["Working" Folder we created here "C:\SDXModding\Game\Working"](#).



Click on the "..." button and navigate to "C:\SDXModding\Game\Working", or Copy and Paste the URL.



End result should look something like this:

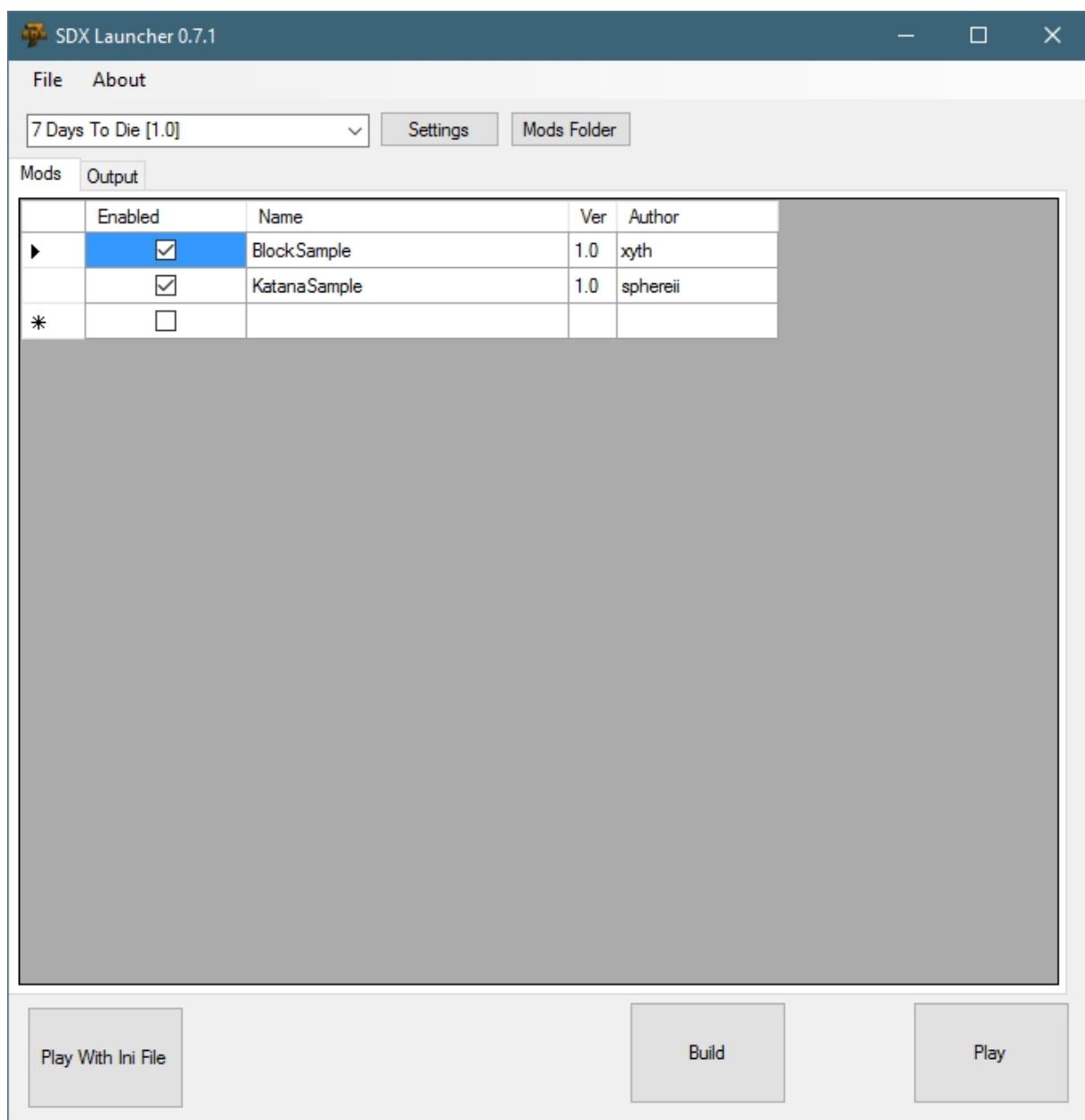


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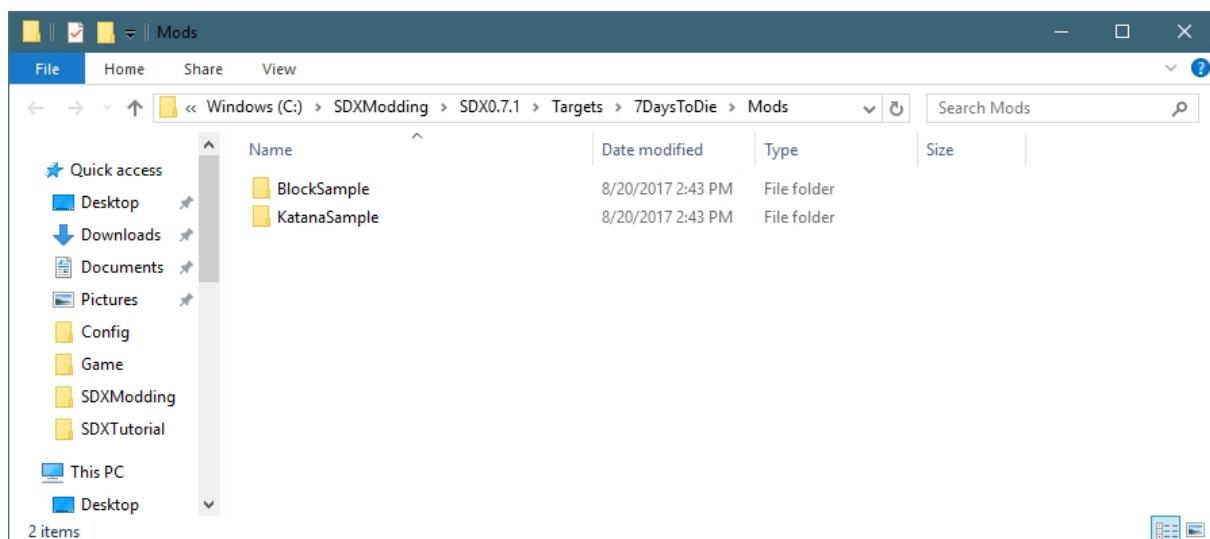
Mods Folder Button

The Mods Folder is where your SDX Mods will be located at. This is the Mod's code, resources, and other XML files that are needed.

Click on the "Mods Folder" button. This will open an Explorer window under "C:\SDXModding\SDX0.7.1\Targets\7DaysToDie\Mods"



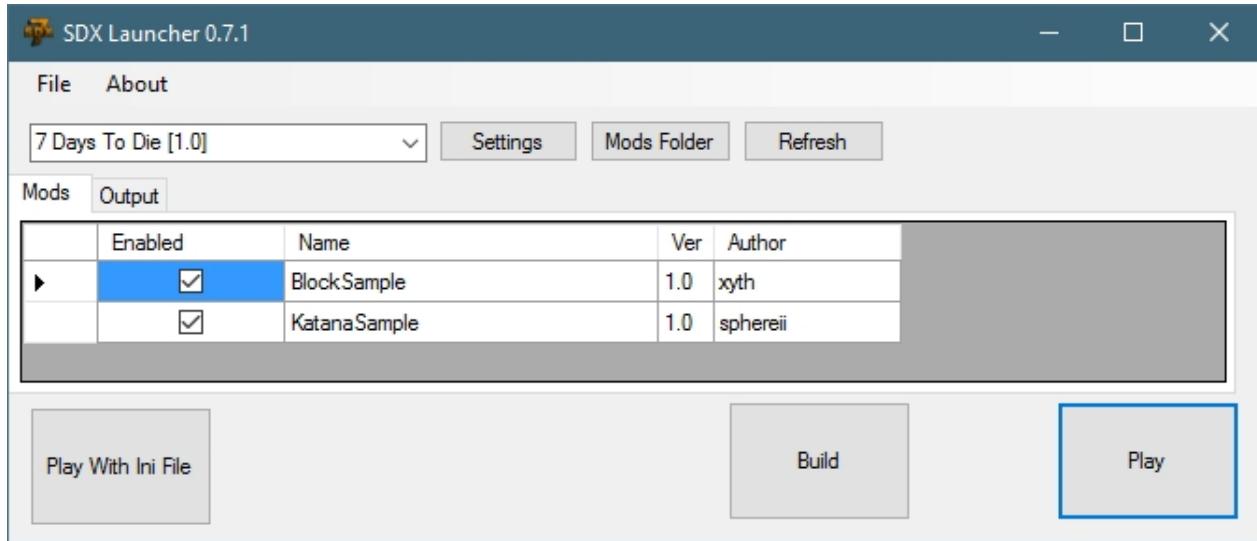
Mods Folder in Explorer



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The Play and Build Buttons

There are three key buttons at the bottom of the SDX Launcher.



Play With Ini File

SDX 0.7.0 and previous versions came with an `-sdxconfig=` parameter, that pointed where the SDX mods were located. In SDX 0.7.1 and above, this `-sdxconfig` parameter has been made optional. However, in order to support existing SDX mods, it is left for compatibility.

When the Play With Ini File is pressed, the game will launch as you would expect. However, rather than referencing the Games' Mods/SDX/Resources folder, it will reference SDX 0.7.1's Target/7DaysDie/Mods folder.

Build

The Build button will do the following:

- Restore the Assembly-CSharp.dll and all the XML files from its local back up, if it exists.
- If no back up exists, it will make a backup of the Assembly-CSharp and the XML files
- Builds and merges any SDX mods you have enabled
- Copy the resulting build to your Working folder you've set in the Settings button.

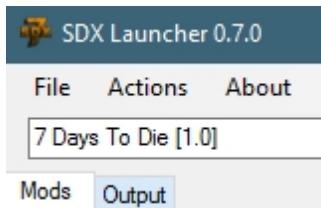
Play

The Play button will run the game's `7daystodie.exe` in your Working folder, using its copy of the Mods/SDX/Resources file.

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The Mods / Output tab

The SDX Launcher contains two Tabs, called "Mods", and "Output".



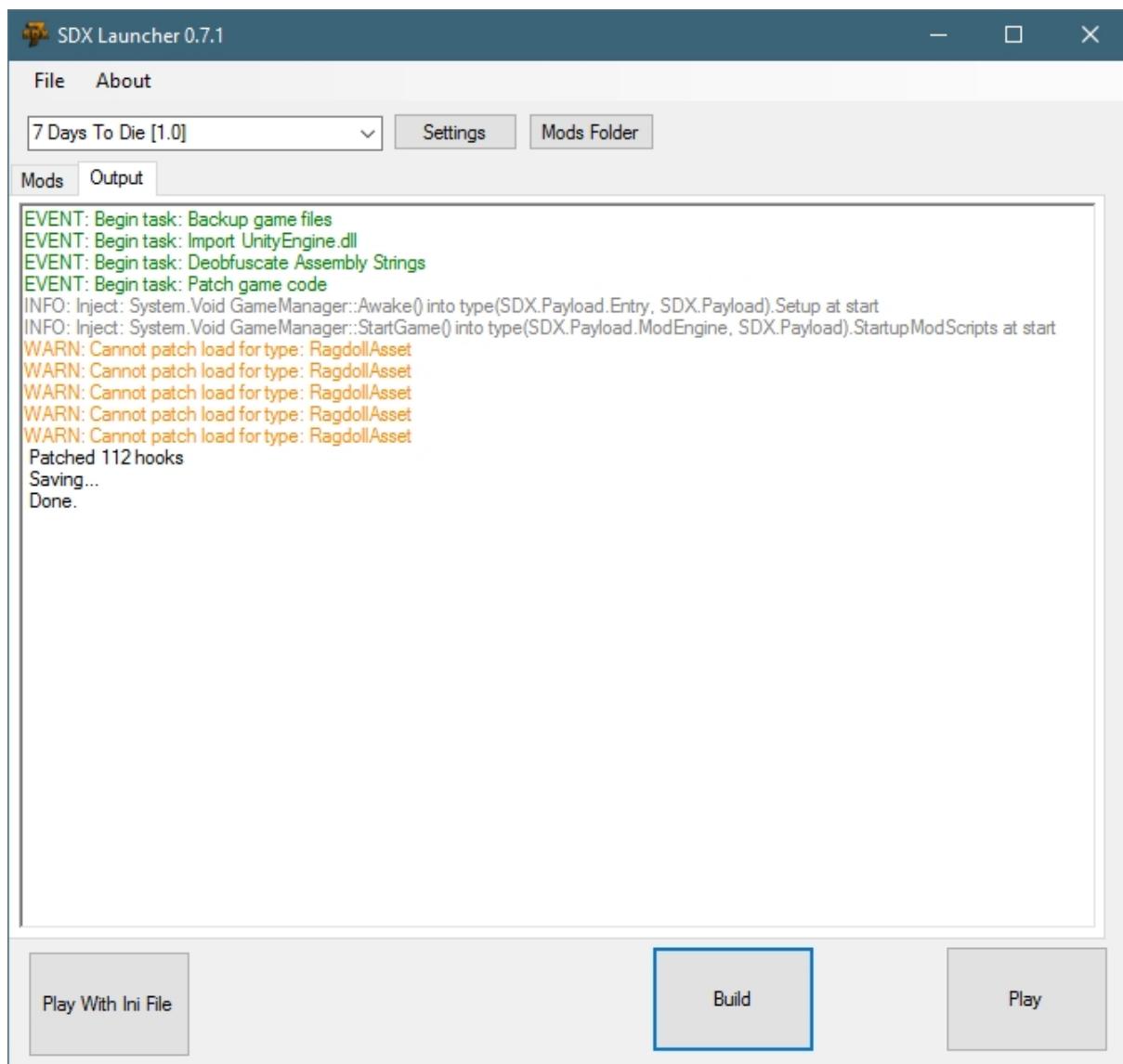
The "Mods" tab shows you the available Mods:

A screenshot of the "Mods" tab in the SDX Launcher. It shows a table with two columns: "Enabled" and "Name".

	Enabled	Name
▶	<input checked="" type="checkbox"/>	BlockSample
	<input checked="" type="checkbox"/>	KatanaSample
*	<input type="checkbox"/>	

The Enabled check box indicates whether or not that SDX mod will be included in your compile or not.

The "Output" tab shows you the SDX Launcher's actions.

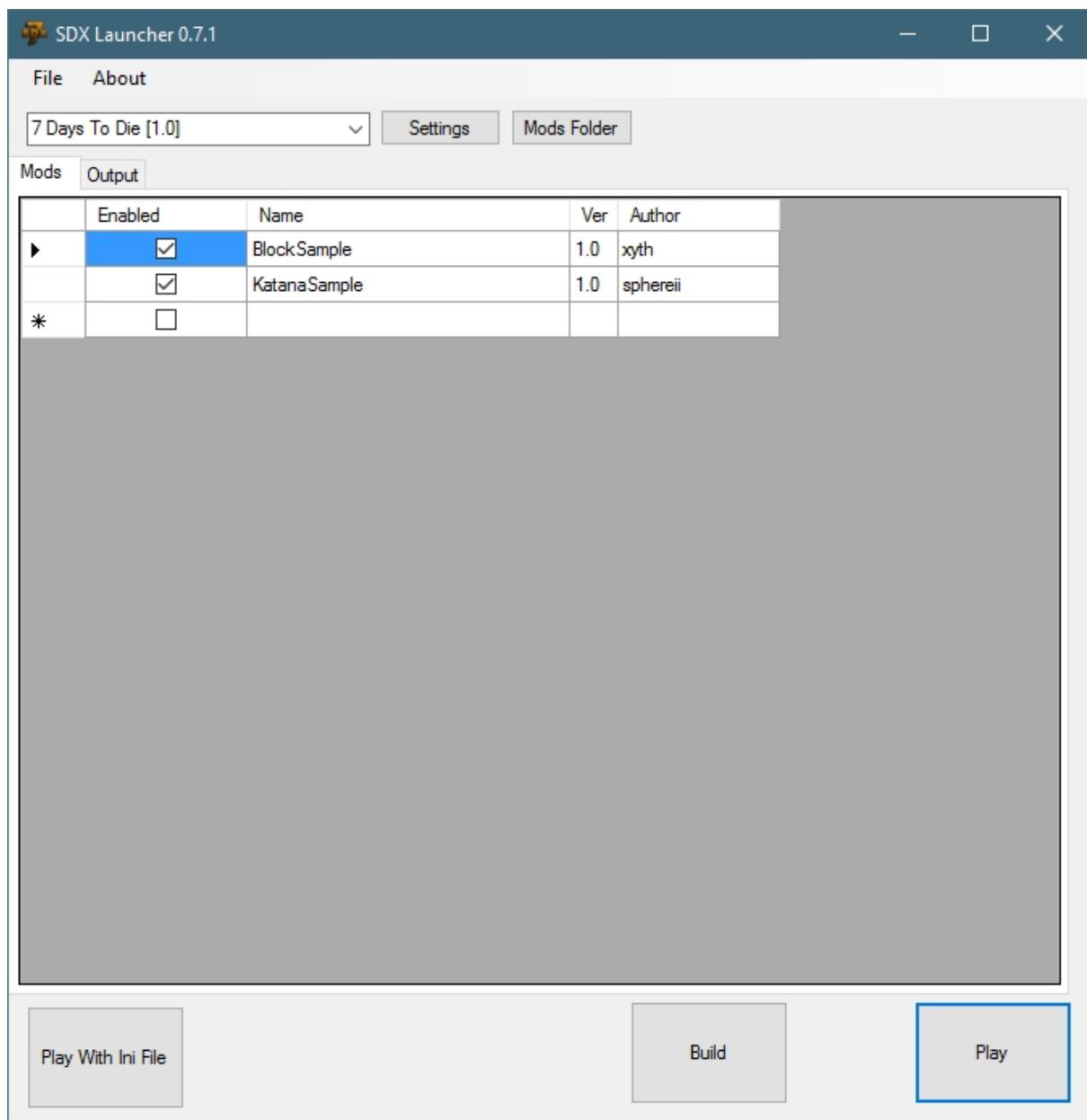


You can click back and forth between the Mods and Output folder.

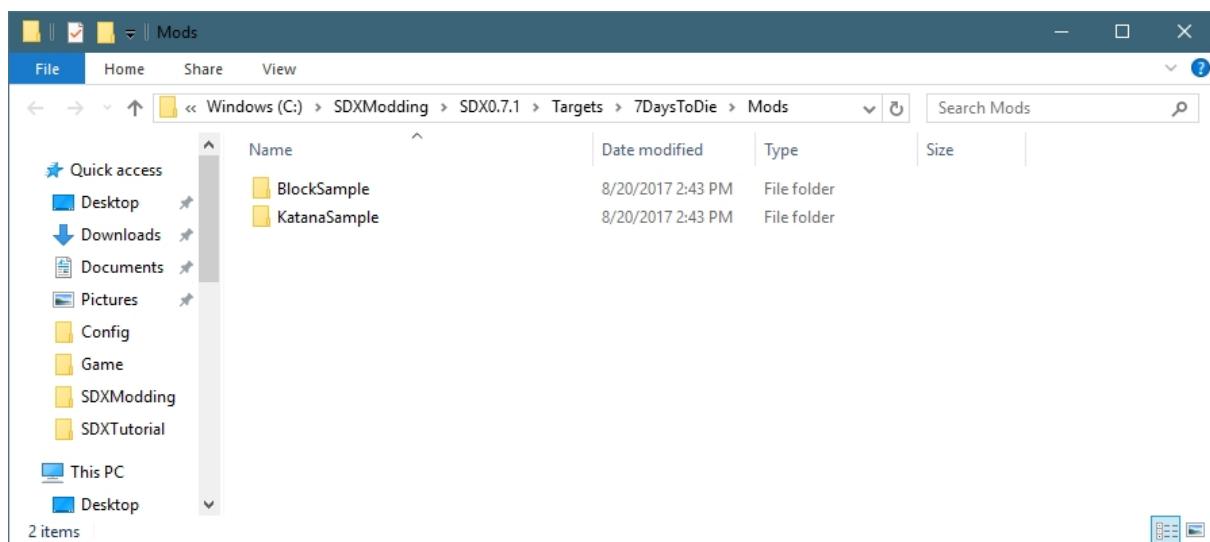
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Understanding an SDX mod

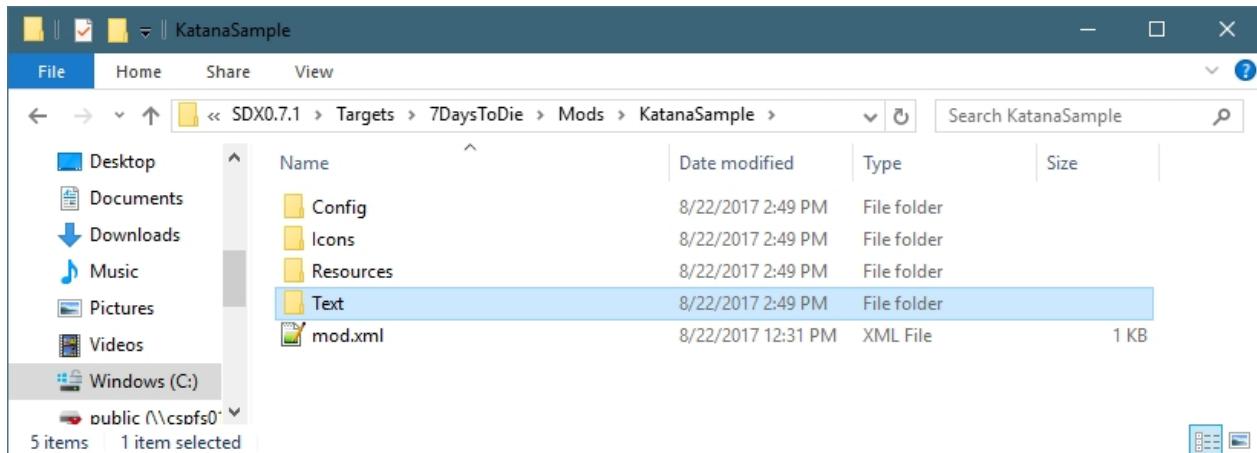
Start the SDX Launcher



Click on the "Mods Folder". This will open up the Explorer Window where the mods are installed.



Double click on the "KatanaSample" Folder, and look at the contents of the folder



The Config folder contains an XML file, that includes all the XML snippets and new items, blocks, and other items you want merged into SDX

The Resources folder contains the Unity3D bundles, which are the new items and blocks.

mod.xml is a basic XML configuration file for SDX

mod.xml:

The mod.xml gives information for the SDX Launcher, to show up in the tool.

```
<mod>
    <info>

        <author>spherei</author>
        <name>Sample</name>
        <description>Sample Basic SDX Mod</description>
        <mod_version>1.0</mod_version>
        <game_version>16.2</game_version>
        <launcher_version>0.0.0</launcher_version>
    </info>

    <!-- This references any config files that SDX needs to merge into
your files -->
    <config_mods>
        <import file="Config\Sample.xml" />
    </config_mods>
</mod>
```

Author: The name of the author who created this mod, shows up in the SDX Launcher

Name: The name of the mod, shows up in the SDX Launcher

Description: Short description on what the mod does; Shows up in the launcher

Mod version: Which version of the mod it is, determined by the author

game version: Which Game version the mod was designed for.

The <config_mods> points to where your mods' XML files are stored.

"Config" Folder:

Note: The use of the Config folder is optional. You can run your SDX Mod through the SDX7D2D without it merging any XML files. You can then edit your XML files manually as you normally would.

Double click on the "Config" folder, and open up the KatanaSample.xml in Notepad++. This XML adds a katana bundle using a unity3d bundle for its mesh.

```
<configs>
    <!-- This tells SDX to add to the Items.xml -->
    <config name="items">
        <!-- This tells SDX to add the following Items to the bottom of
the Items list -->
        <append xpath="/items">

            <!-- New item will be Katana -->
            <item id="" name="katanamichonne">
                <!-- Extend it from the machete, but add the custom
mesh -->
                <property name="Extends" value="machete"/>
                <property name="Meshfile" value="#michonnekatana?
katana" />
            </item>
        </append>
    </config>
</configs>
```

SDX will read this XML file, and add its contents to the right XML of the game. At the bottom of the file, it shows where it's adding the recipe on how to make a Katana using your new items.

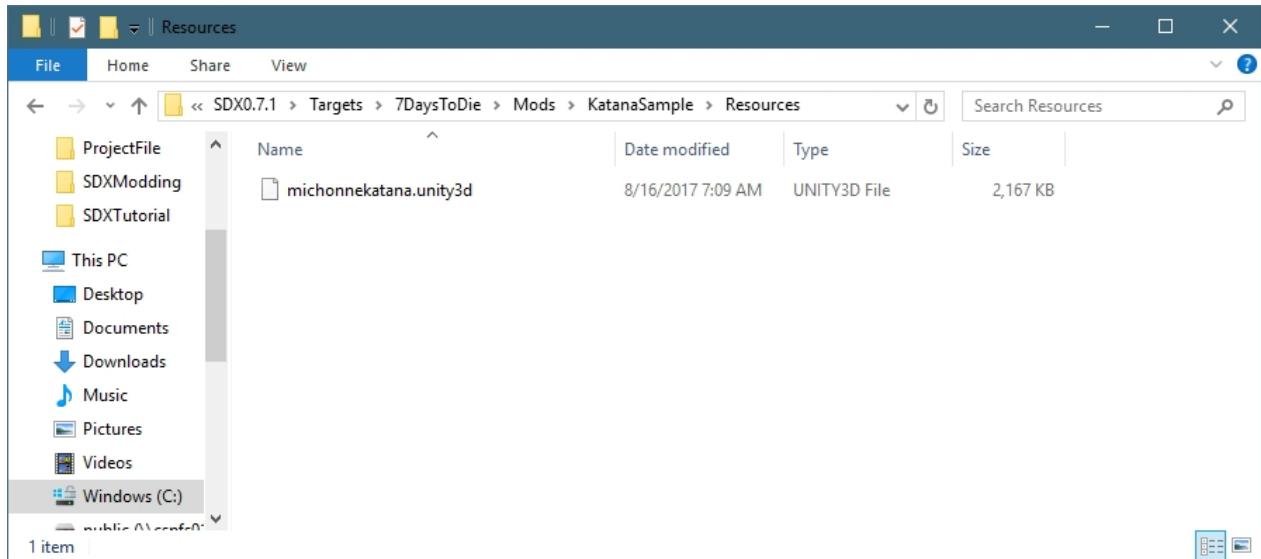
All of the <config> tags need to be in between the root node, which is the <configs> tags.

Sample Items Code	Description
<config name="items">	This tells SDX that everything in between the <config> tags will be included in the Items.xml file
<append xpath="/items">	This tells SDX that everything in between the <Append> path will be included inside of the <items> tag of items.xml
<item id="" name="katanamichonne">	This tells SDX the name of the new item to add. Notice there is no ID? SDX will auto-assign it an ID at build time.
<property name="Meshfile" value="#michonnekatana? katana" />	This will tell SDX, at run time, what the meshfile is called.
</append>	Closes the append tag
</config>	Closes the Items tag

Notice that there is no Item ID specified? When an Item ID, or block ID is not specified, SDX, at build time, will auto-assign an ID. Therefore, all your items and blocks will be auto-numbered.

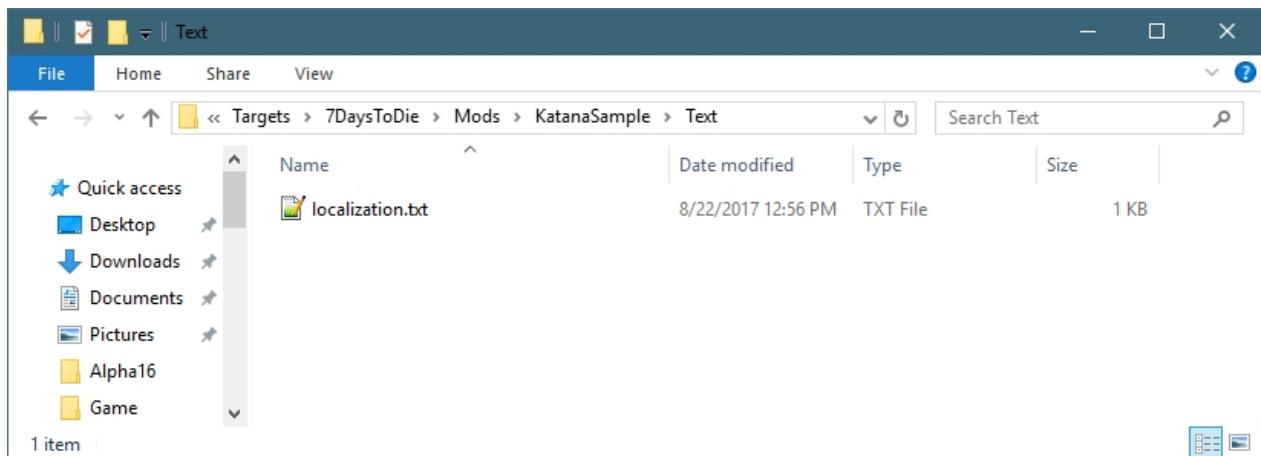
Resources:

The Resources folder contains all your Unity 3D models and textures, stored as Unity Bundle 3D files.



Text:

The Text folder is optional, but contains the localization files.

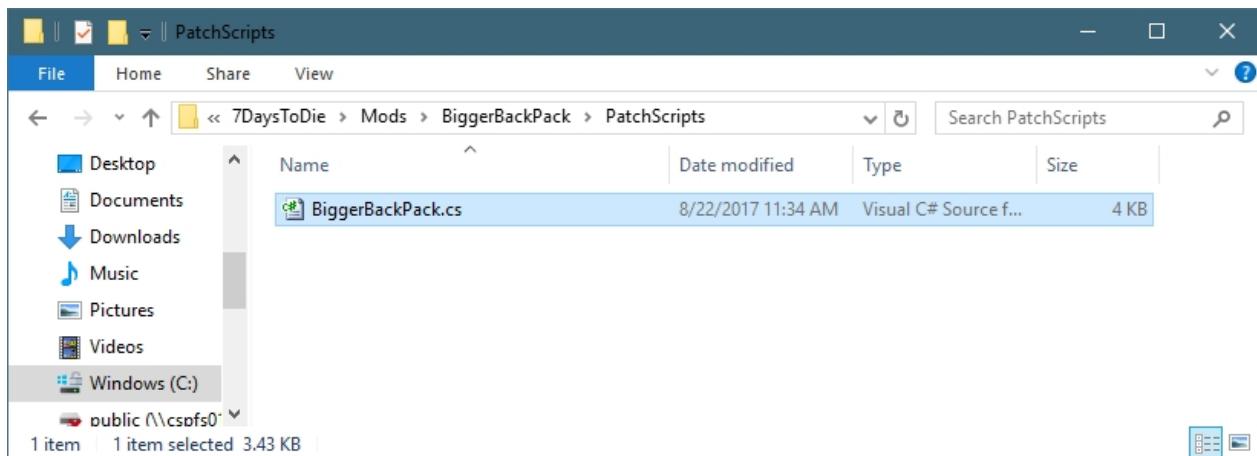


Example:

```
Key,Source,Context,Changes,English,French,German,Klingon,Spanish
katanamichonne,items,Melee,KgNone,Michonne's katana,,,
katanamichonneDesc,items,Melee,New,Michonne's katana is ready to slice and dice up the zombies,,,
```

PatchScript:

Some SDX Mods, like the Bigger Back Pack Mod, contains a PatchScript folder. A PatchScript is a C# script that is compiled at SDX Build time, and allows injection into the Assembly-CSharp. The SDX Launcher reads any files in this folder, and tries to compile it.



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SDX Beginner Tutorial



If you have never used SDX, or just want a refresher, this beginner tutorial is what you'll want to start with.

The Beginner Tutorial assumes you have already followed the "[Getting Set up](#)" guide.

It's so easy to get confused and lost during your SDX journey, so we crafted this guide to take you step by step on how to get your SDX environment up and running.

We'll guide you through the steps of making a clean 7 Days to Die game folder, since we don't want any extra mods or tweaks to interfere with this tutorial.

Once that's complete, we'll guide you through compiling an empty mod, and show you what each step does.

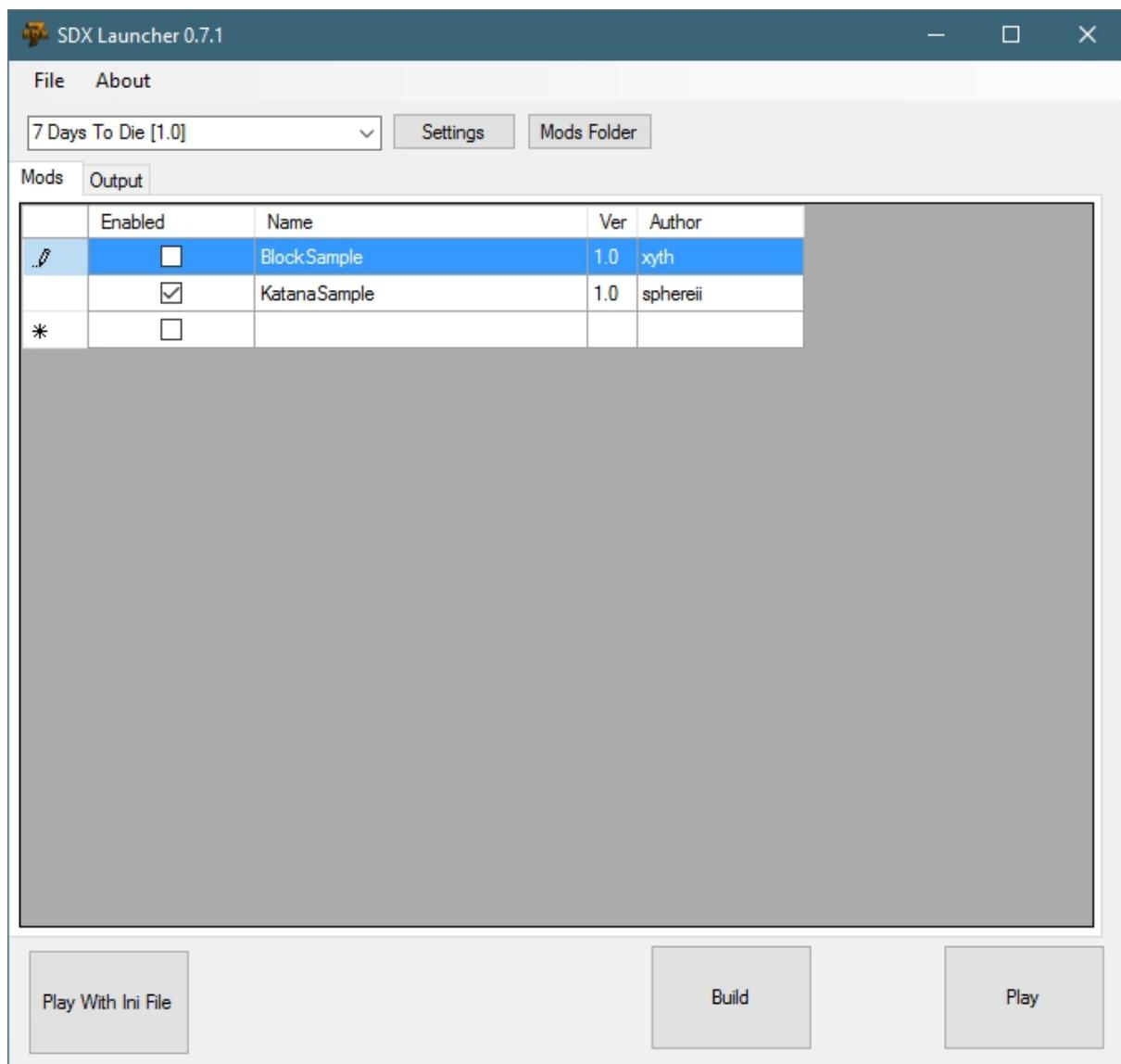
Finally, when you are ready, we'll add an actual item into the game, using the supplied Katana Mod.

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Building for the first time

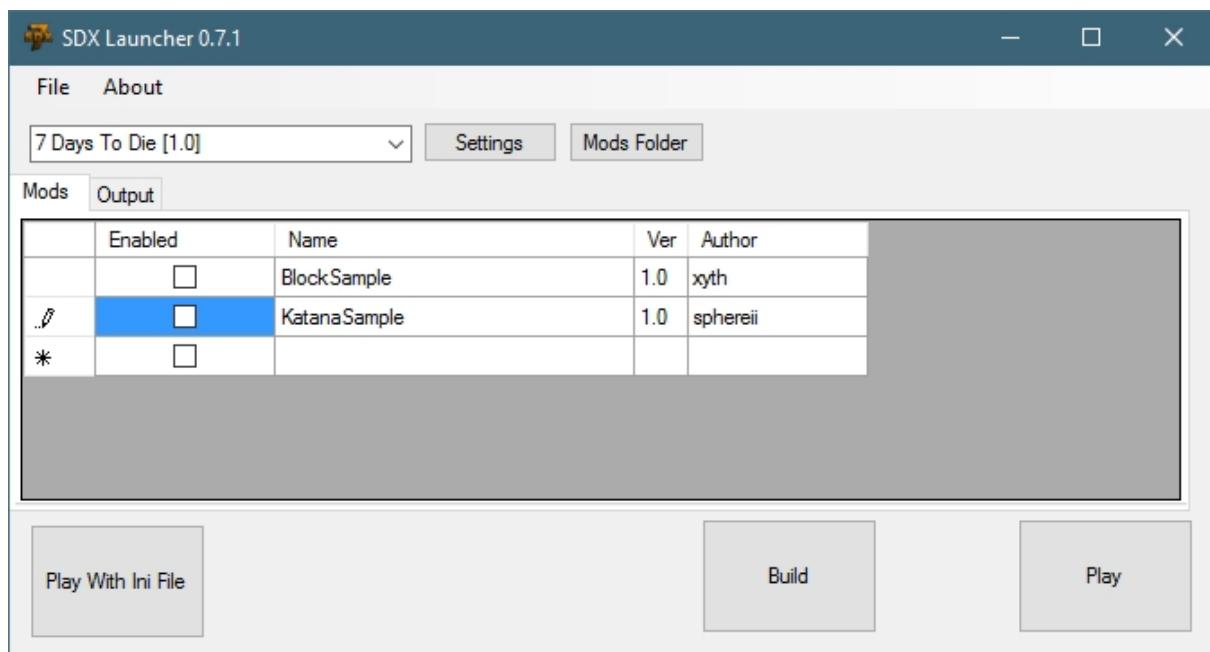
Once you have completed all the steps in the [Getting Started](#) section, it's time to trigger your first SDX compile!

Start the SDX Launcher



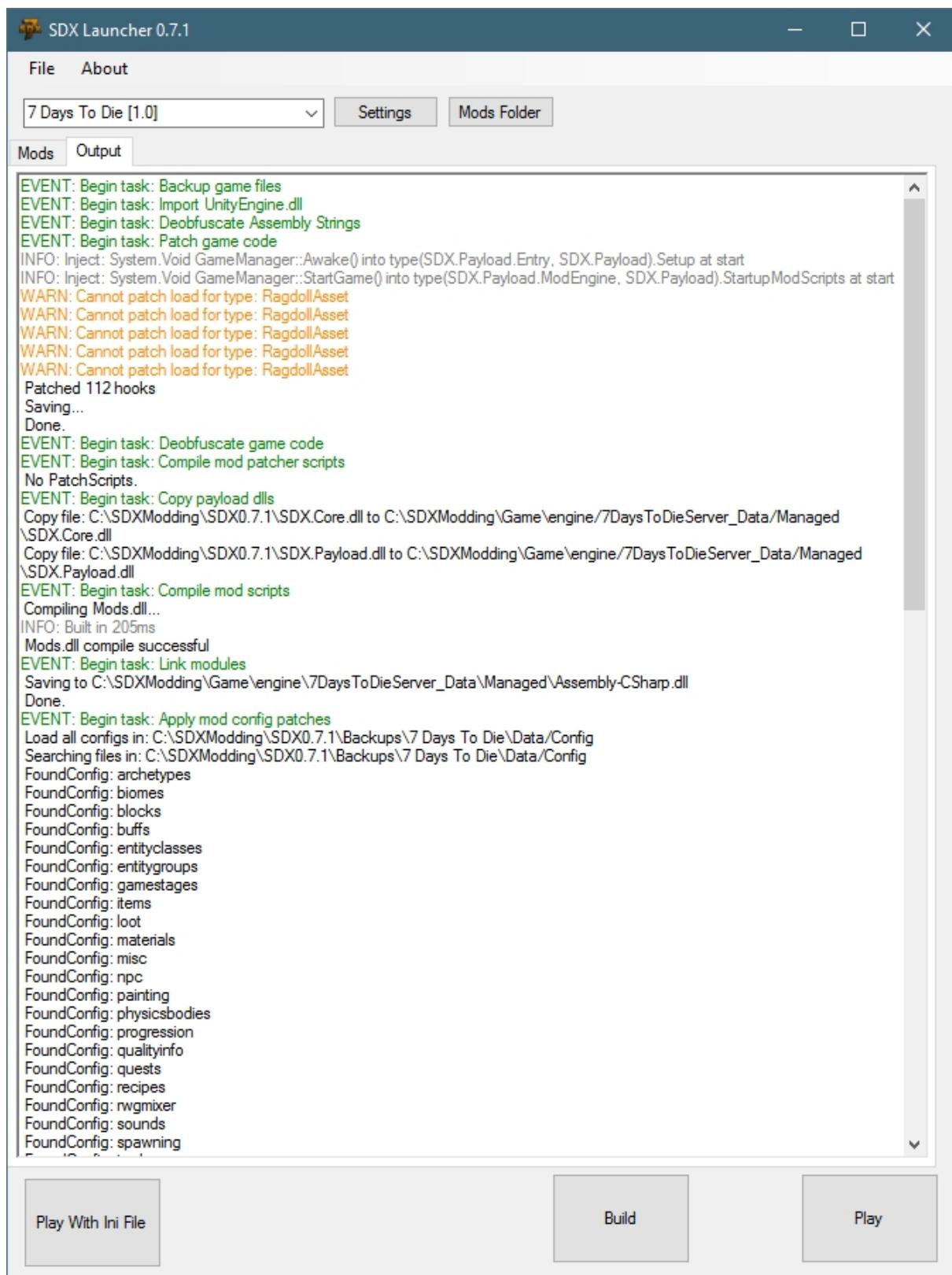
For the first compile, we want to disable all the available mods, to make sure everything is set up correctly.

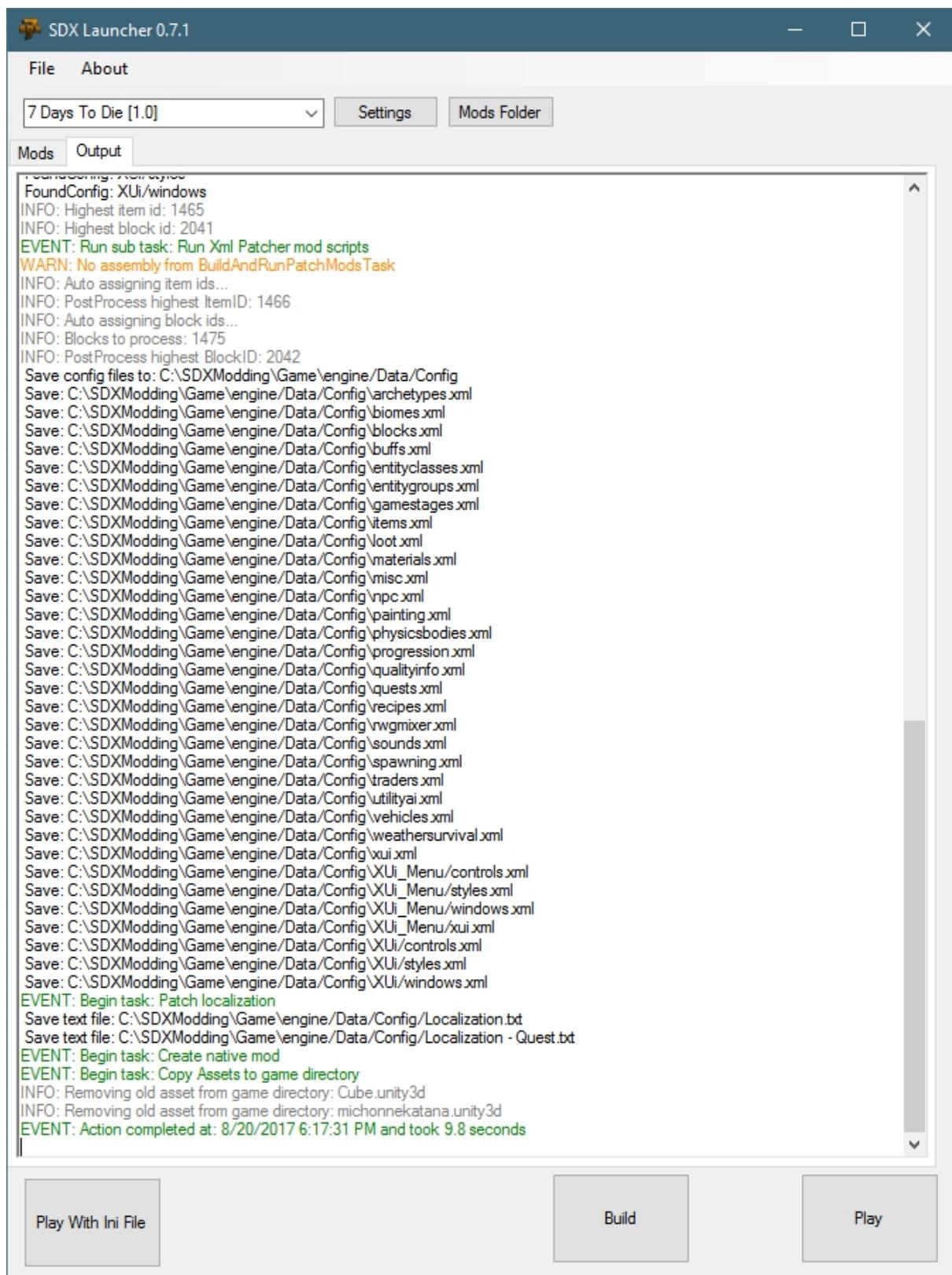
For each Mod listed in the "Mods" tab, click on the checkmark to disable it.



Click on the "Build" Button.

The SDX Launcher will print a lot of information in the "Output" window:





The Cube Mod



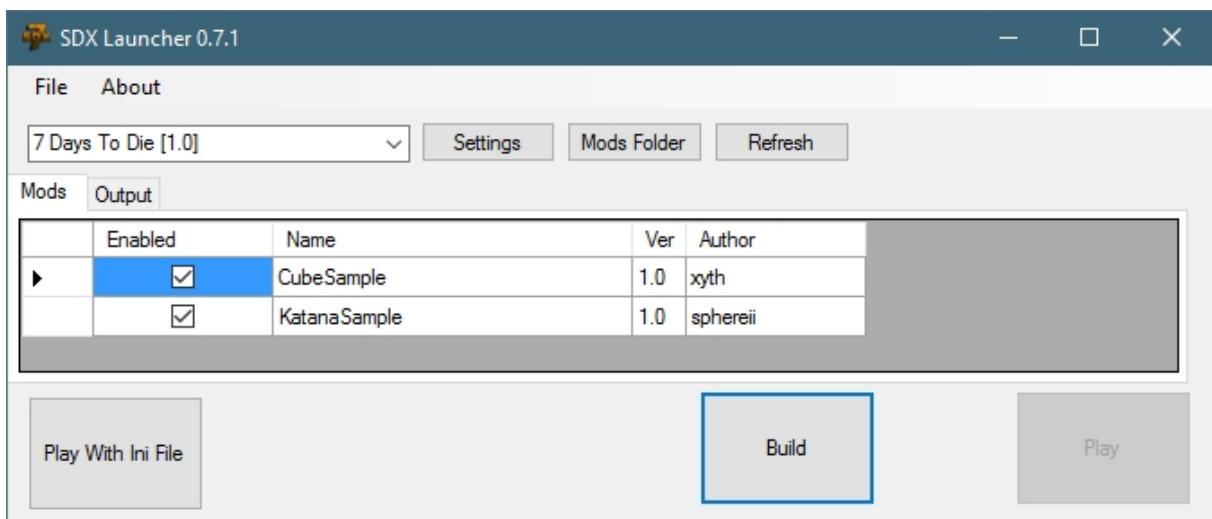
The first SDX Mod we are going to add is the Cube Mod. This will add a new cube to the game, letting you place it in game.

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Building the Cube Mod

Once you have completed all the steps in the "[Building for the first time](#)" option, it's time to trigger your first SDX compile!

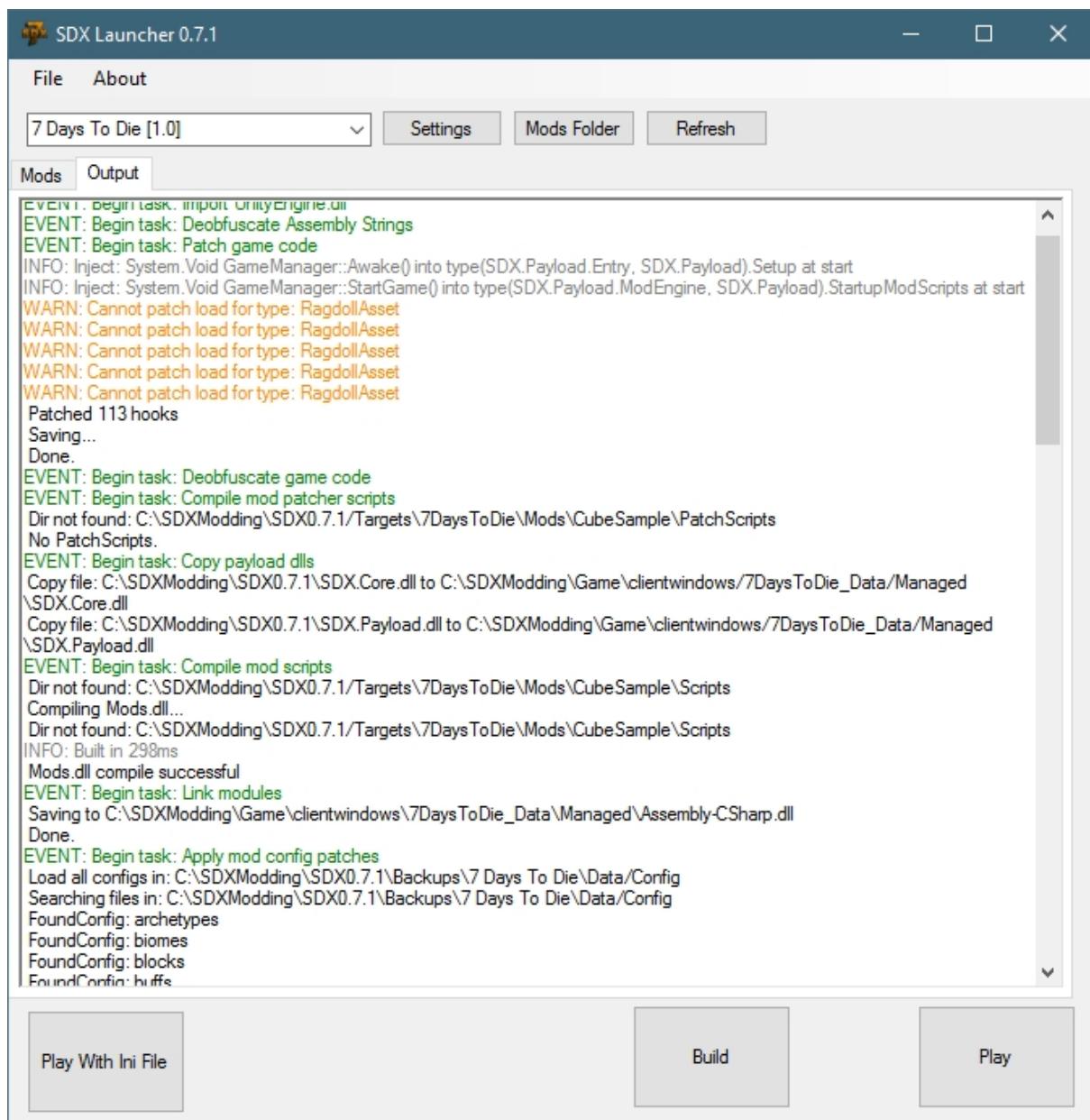
Click on the white square to enable the Cube Sample to enable it.



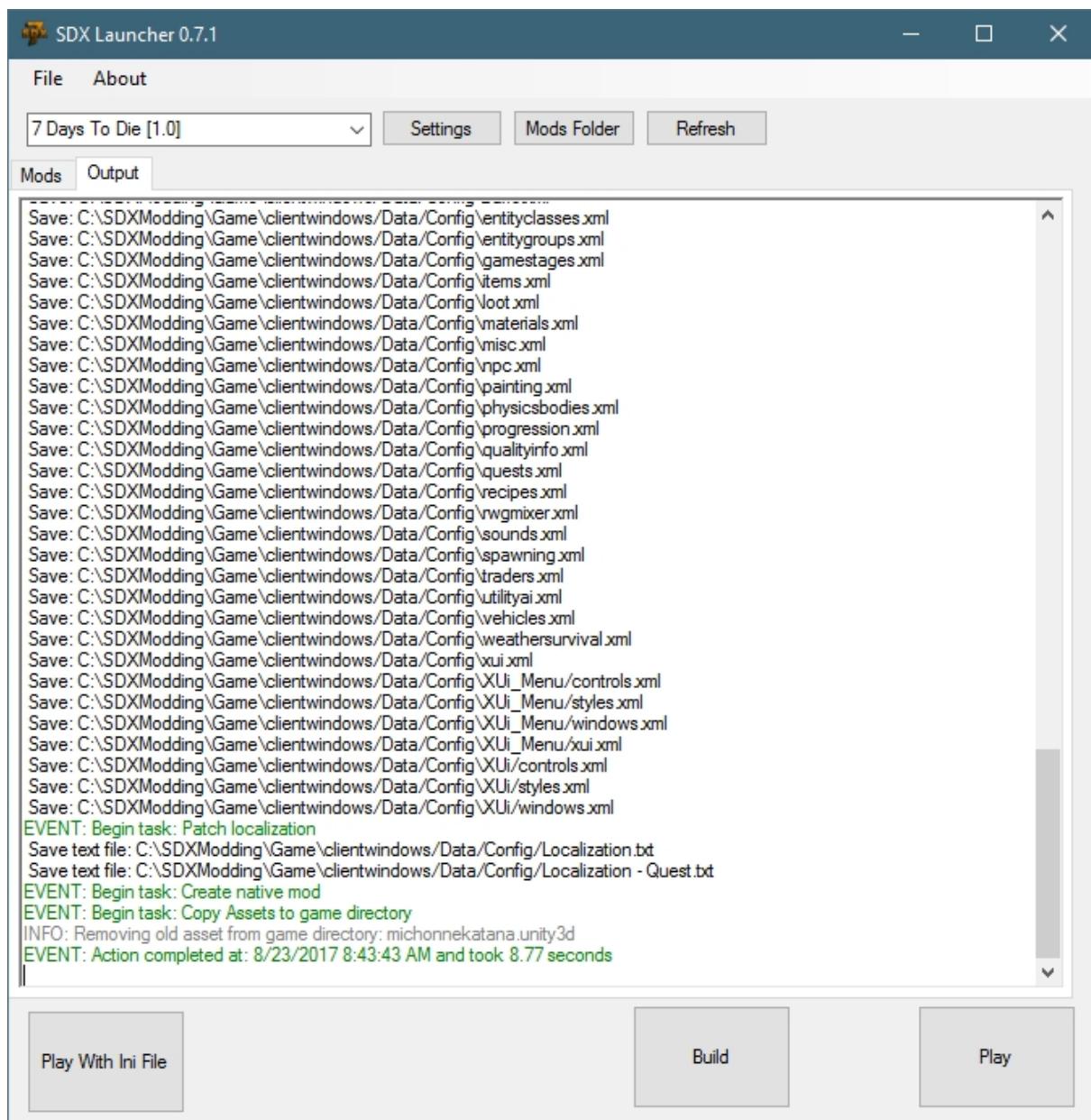
And click on Build.

The SDX Build starts by switching from the "Mods" tab to the "Output" tab.

You'll see the SDX compile start, and display the log file as it does its actions.



When SDX is finished, you'll see this at the end of the Output window

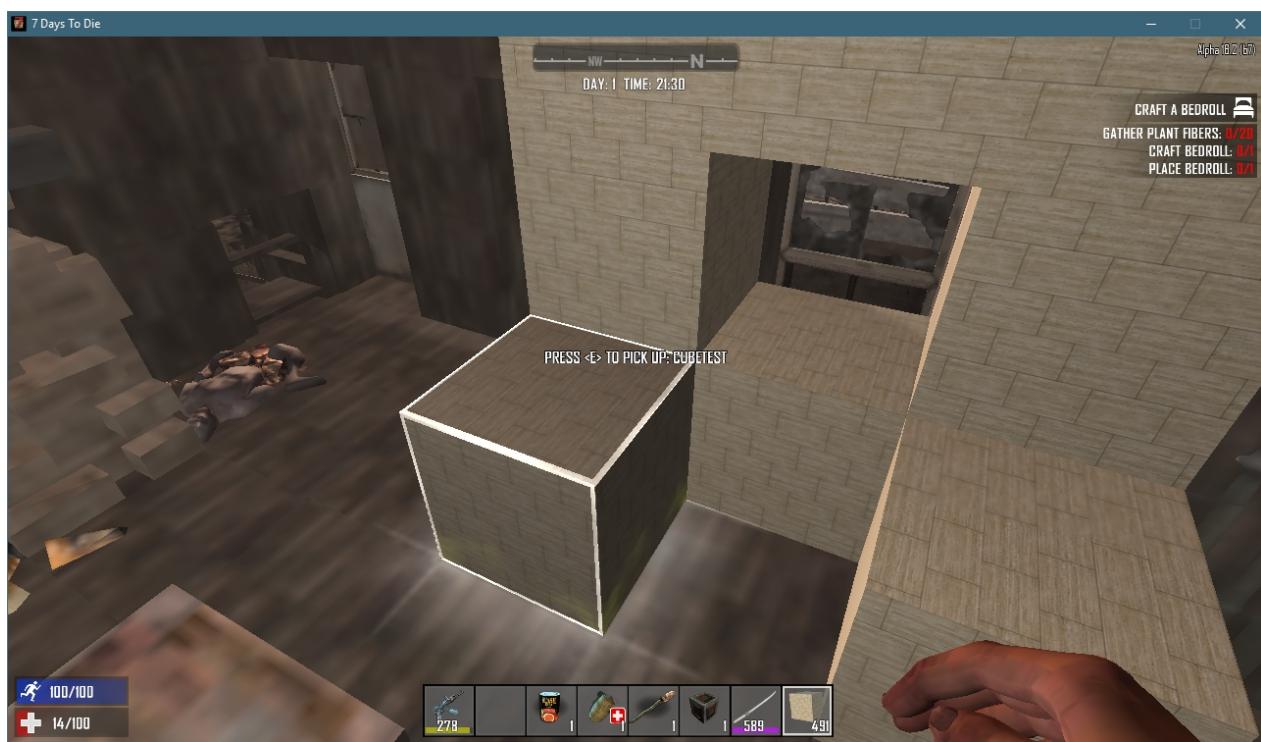


SDX is now compiled into your Working copy of the game.

You can now hit the Play button to launcher the game. Spawn a new world, or log into an existing one, and go into the Creative Menu. You'll see that the cube is now available.



And showing the cube in hand:



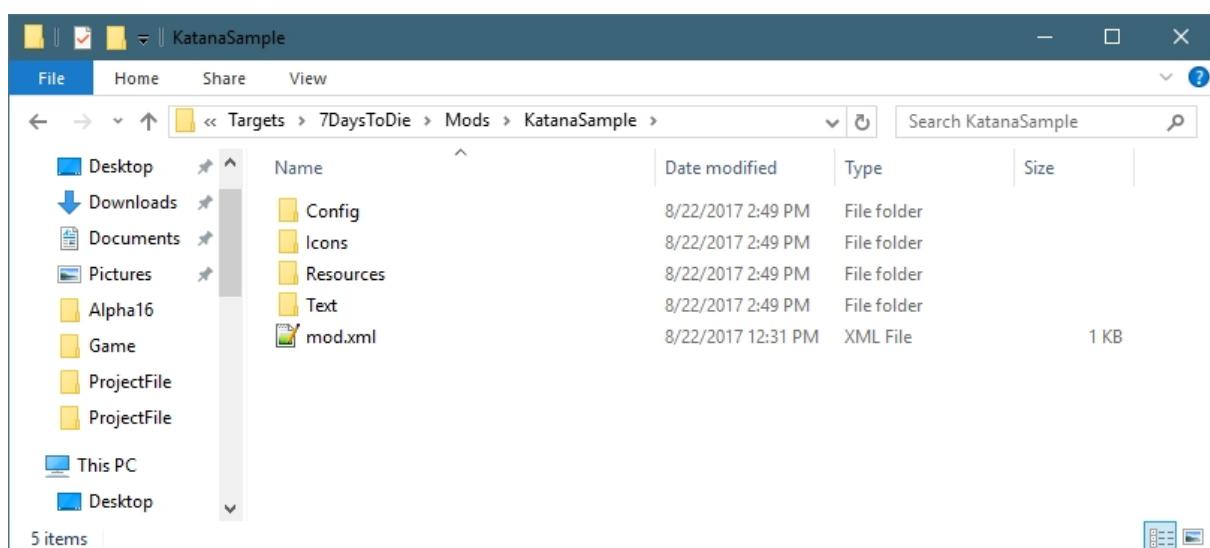
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The Katana Mod

The Katana Mod



The Katana Mod is a simple Mod to install and add to the game. It follows the same principles to the Cube Mod, but adds more details and features.



Config Folder

The Config Folder of the Katana Mod contains the XML snippet that will be included into the game's DLL files. For the Katana Mod, this includes an Item that simply extends the existing machete item, but uses a custom mesh file.

```
File: KatanaSample\Config\Katana.xml

<configs>
    <!-- This tells SDX to add to the Items.xml -->
    <config name="items">
        <!-- This tells SDX to add the following Items to the bottom
of the Items list -->
        <append xpath="/items">
```

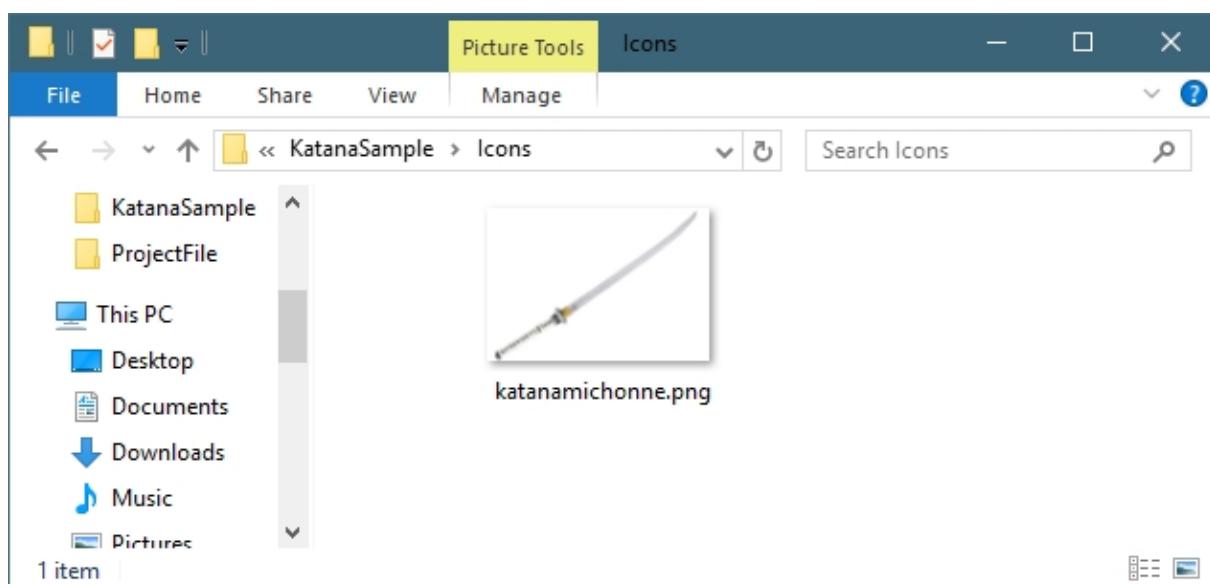
```

        <!-- New item will be Katana -->
        <item id="" name="katanamichonne">
            <!-- Extend it from the machete, but add the
custom mesh -->
            <property name="Extends" value="machete" />
            <property name="Meshfile" value="#michonnekatana?
katana" />
        </item>
    </append>
</config>
</configs>

```

Icons Folder

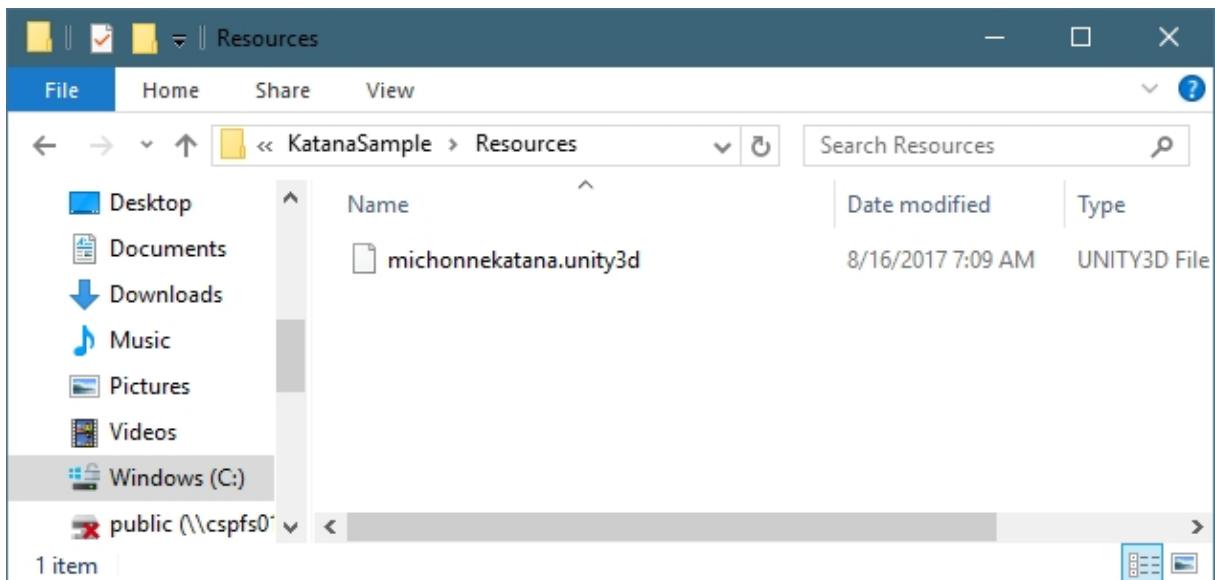
The Icons folder contains the item's inventory icons for the mod.



When the mod gets compiled, all files will be copied to your "Working\Mods\SDX\Item\icons\" folder.

Resource Folder

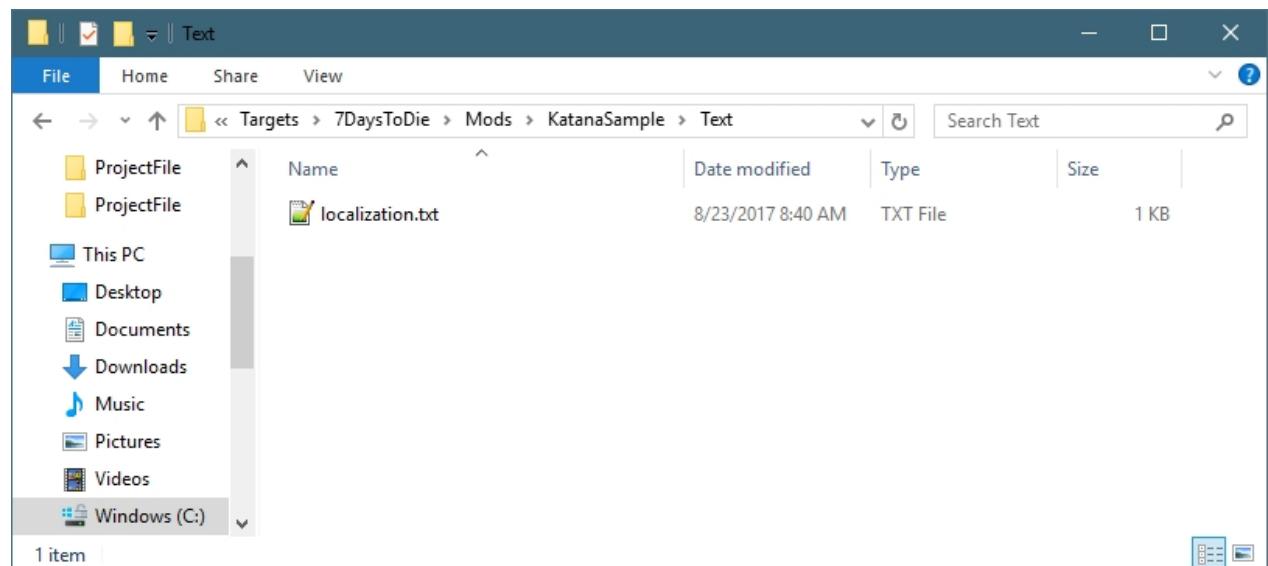
The Resource folder contains the unity3D bundle, which contains the 3D model of the Katana sword.



When the mod gets compiled, all files will be copied to your "Working\Mods\SDX\Resources\" folder.

Text Folder

The Text folder contains the localization files, either localization.txt or Localization - Quest.txt



Key,Source,Context,Changes,English,French,German,Klingon,Spanish
 katanamichonne,items,Melee,KgNone,Michonne's katana,,,
 katanamichonneDesc,items,Melee,New,Michonne's katana is ready to slice and dice up the zombies,,,

mod.xml

The mod.xml file is used by the SDX Launcher to compile and find its files. This information shows up in the SDX Launcher.



```

<info>
    <!-- Information about the Mod, the author and version
information -->
    <!-- These are displayed in the SDX Launcher -->
    <author>sphereii</author>
    <name>KatanaSample</name>
    <description>Sample Katana SDX Mod</description>
    <mod_version>1.0</mod_version>
    <game_version>16.2</game_version>
    <launcher_version>0.0.0</launcher_version>
</info>

    <!-- This references any config files that SDX needs to merge into
your files -->
    <config_mods>
        <import file="Config\Katana.xml" />
    </config_mods>
</mod>

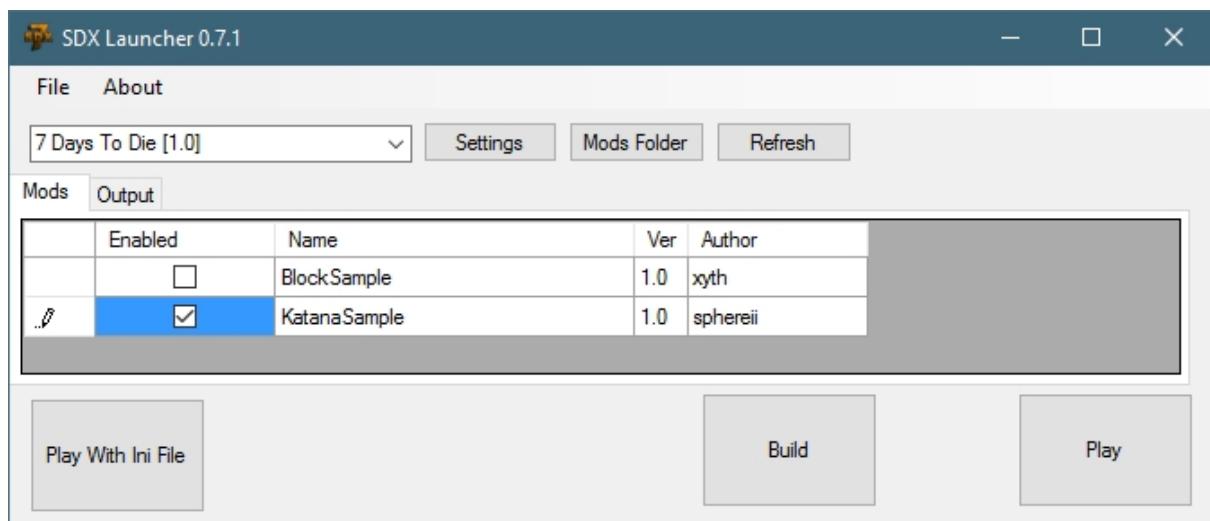
```

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Building the Katana Mod

Once you have completed all the steps in the ["Building for the first time"](#) option, it's time to trigger your first SDX compile!

Click on the white square to enable the KatanaSample to enable it.

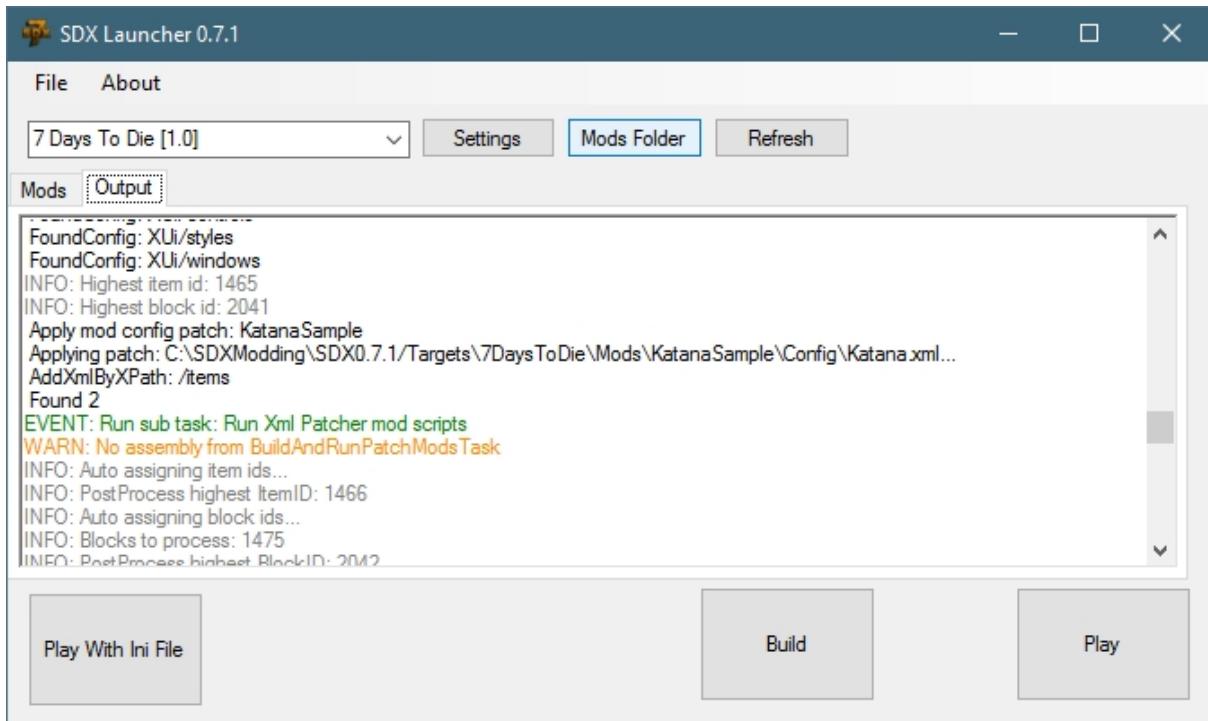


And click on Build.

The SDX Build starts by switching from the "Mods" tab to the "Output" tab.

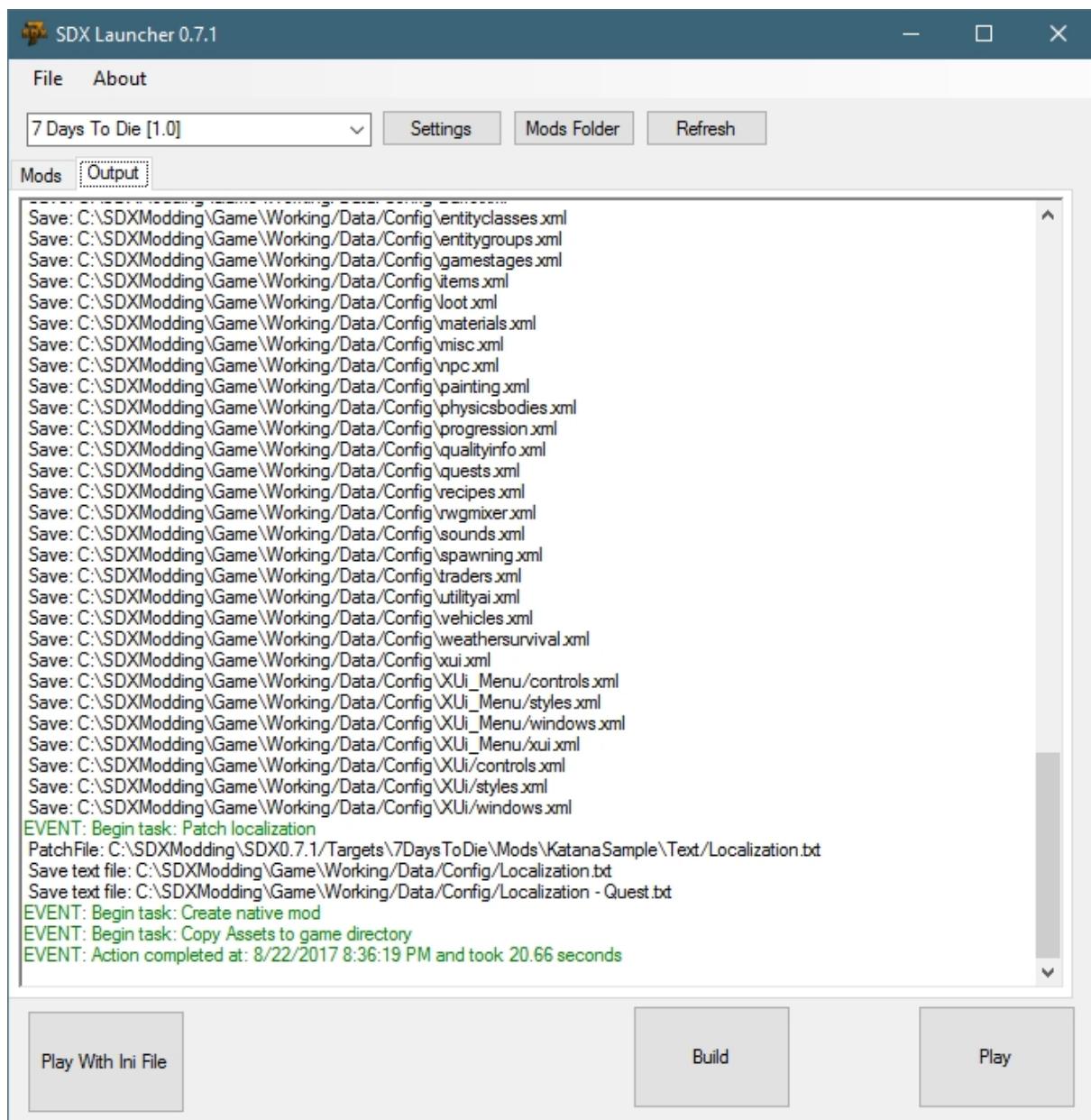
You'll see the SDX compile start, and display the log file as it does its actions.

As it builds, you may see the following error:



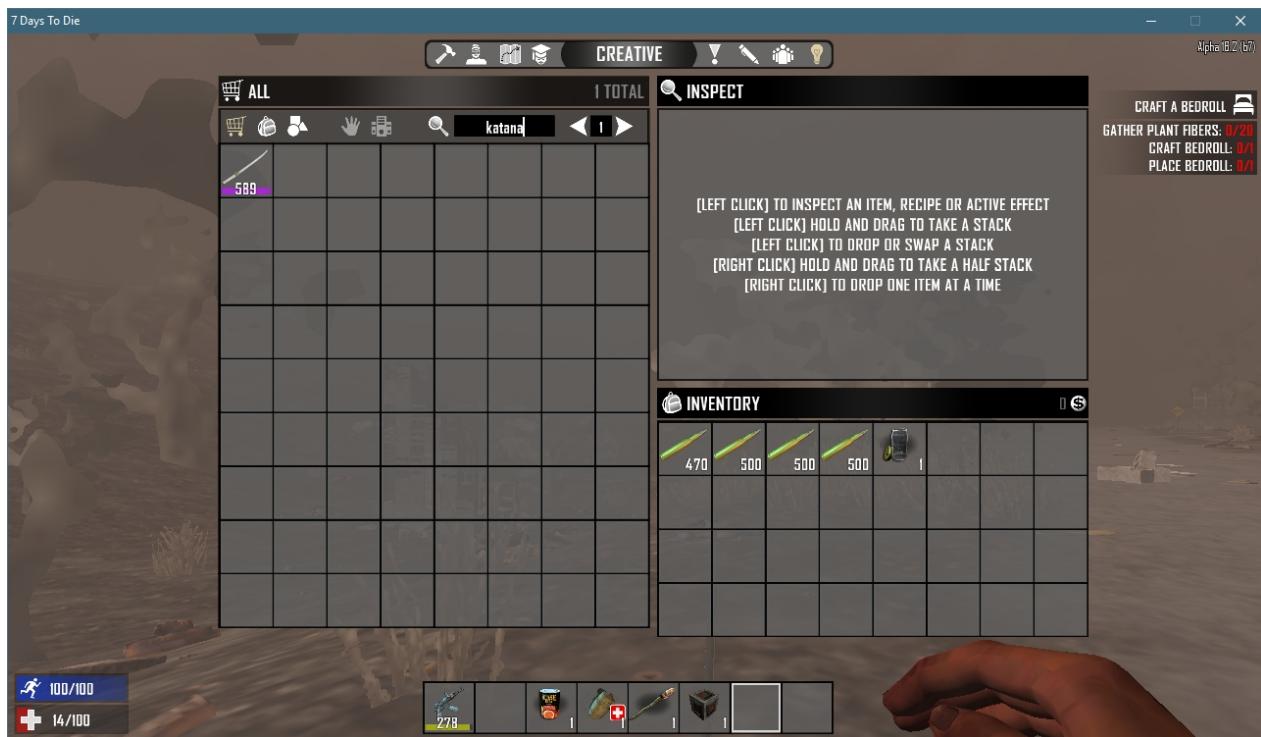
In this exercise, the "WARN: No assembly from BuildAndRunPatchModsTask" is a not a concern, since there is no Mods scripts yet enabled.

When SDX is finished, you'll see this at the end of the Output window



SDX is now compiled into your Working copy of the game.

You can now hit the Play button to launcher the game. Spawn a new world, or log into an existing one, and go into the Creative Menu. You'll see that the Katana sword is now available.



And showing the Katana in hand:

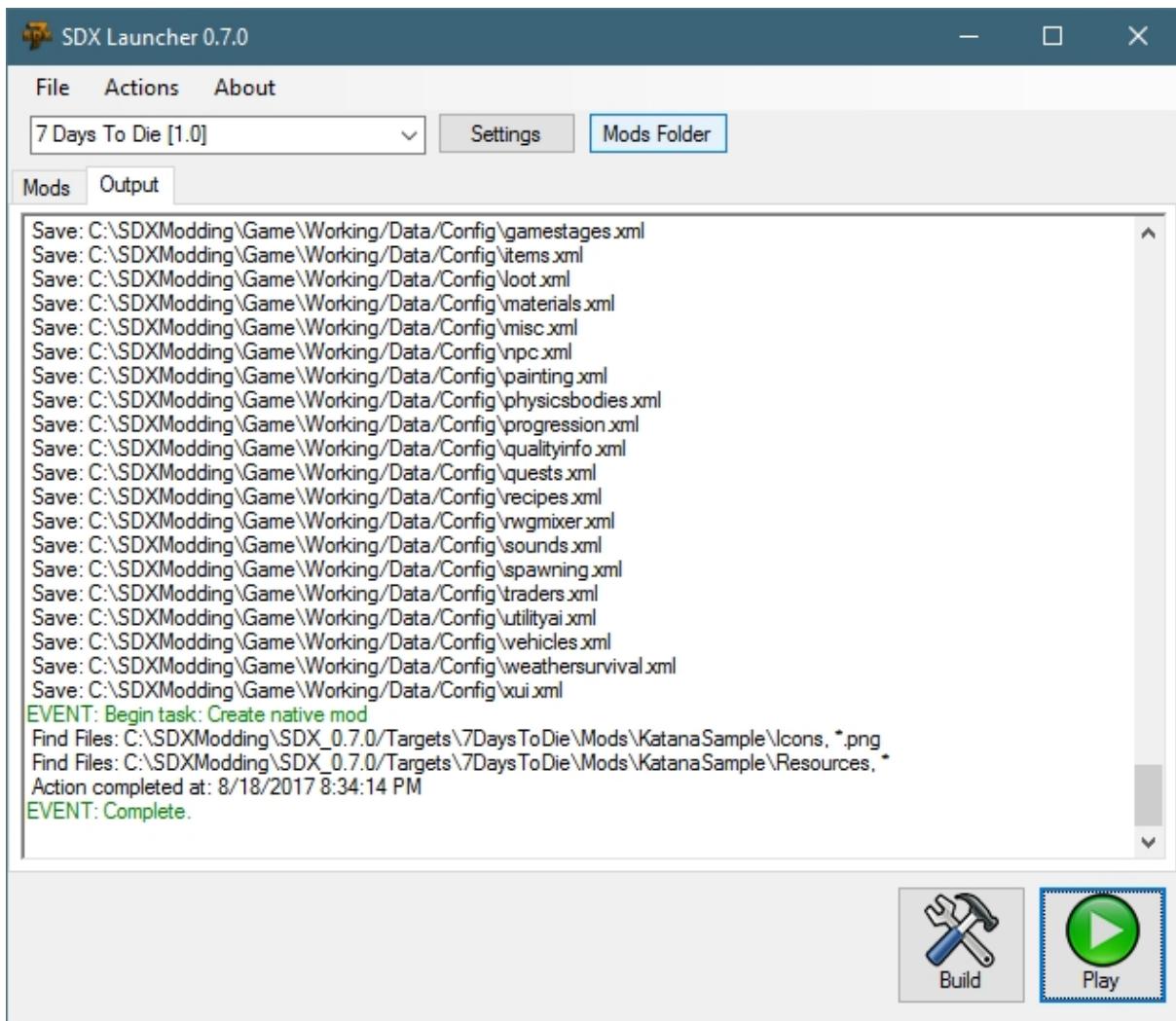


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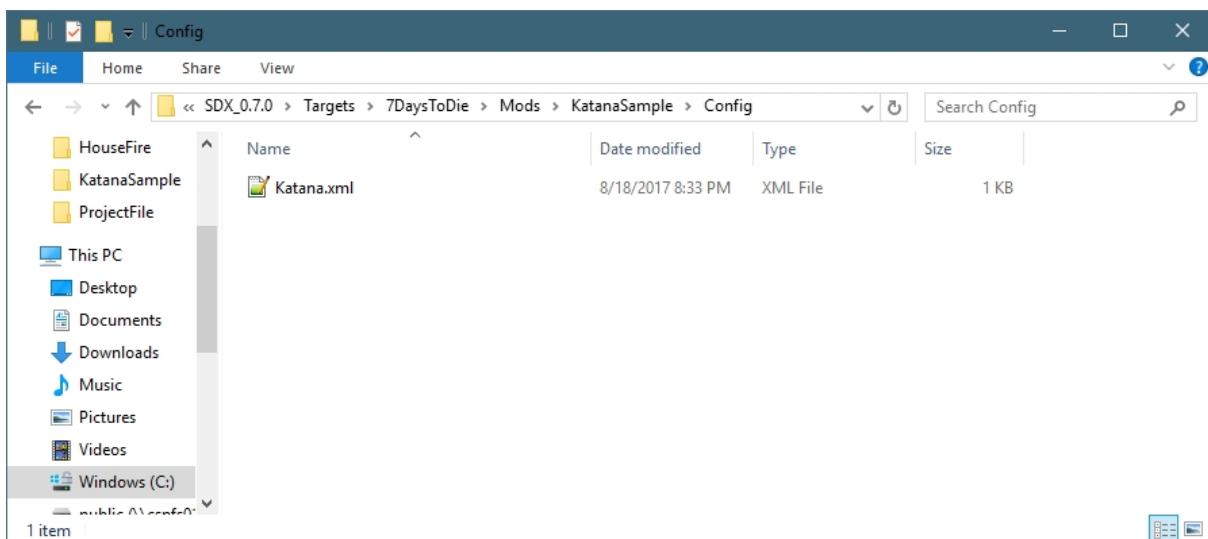
Adding a Recipe for the Katana Mod

What fun is the Katana if you can't make it in game? Let's go through the steps on adding a recipe list for it.

In the SDX Launcher, click on the Mods Folder.



Then navigate into the double click on the Katana Sample folder, then the Config folder:



Using Notepad++, edit the file

Add a new "<config>" node under the "katananichonne" item by copy and pasting the Recipes Snippet, highlighted in Blue for clarity

Recipes Snippet

```
<!-- Adding a new recipe for the mod -->
<config name="recipes">
    <append xpath="/recipes" >
        <recipe name="katanamichonne" count="1"
craft_area="workbench">
            <ingredient name="forgedSteel" count="20"/>
            <ingredient name="wood" count="4"/>
            <ingredient name="leather" count="4"/>
        </recipe>
    </append>
</config>
```

The new file will look like this:

File: KatanaSample\Config\Katana.xml

```
<configs>
    <!-- This tells SDX to add to the Items.xml -->
    <config name="items">
        <!-- This tells SDX to add the following Items to the bottom of
the Items list -->
        <append xpath="/items">

            <!-- New item will be Katana -->
            <item id="" name="katanamichonne">
                <!-- Extend it from the machete, but add the custom
mesh -->
                <property name="Extends" value="machete"/>
                <property name="Meshfile" value="#michonnekatana?
katana" />
            </item>
        </append>
    </config>

    <!-- Adding a new recipe for the mod -->
    <config name="recipes">
        <append xpath="/recipes" >
            <recipe name="katanamichonne" count="1"
craft_area="workbench">
                <ingredient name="forgedSteel" count="20"/>
                <ingredient name="wood" count="4"/>
                <ingredient name="leather" count="4"/>
            </recipe>
        </append>
    </config>
</configs>
```

Save your changes, and go back to the SDX Launcher, and do another Build.

Load up your save game, and search for the Katana sword in your Crafting menu

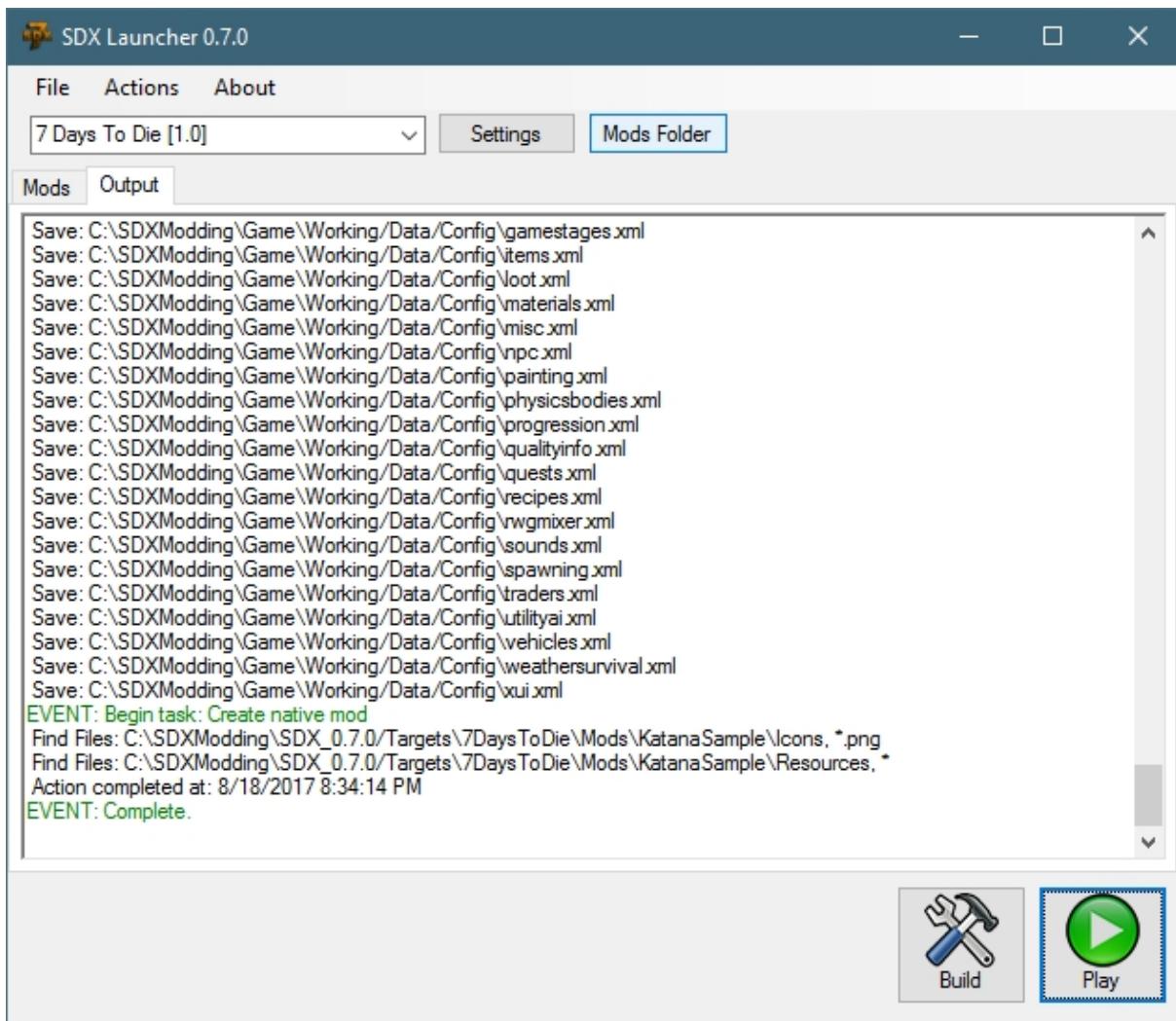


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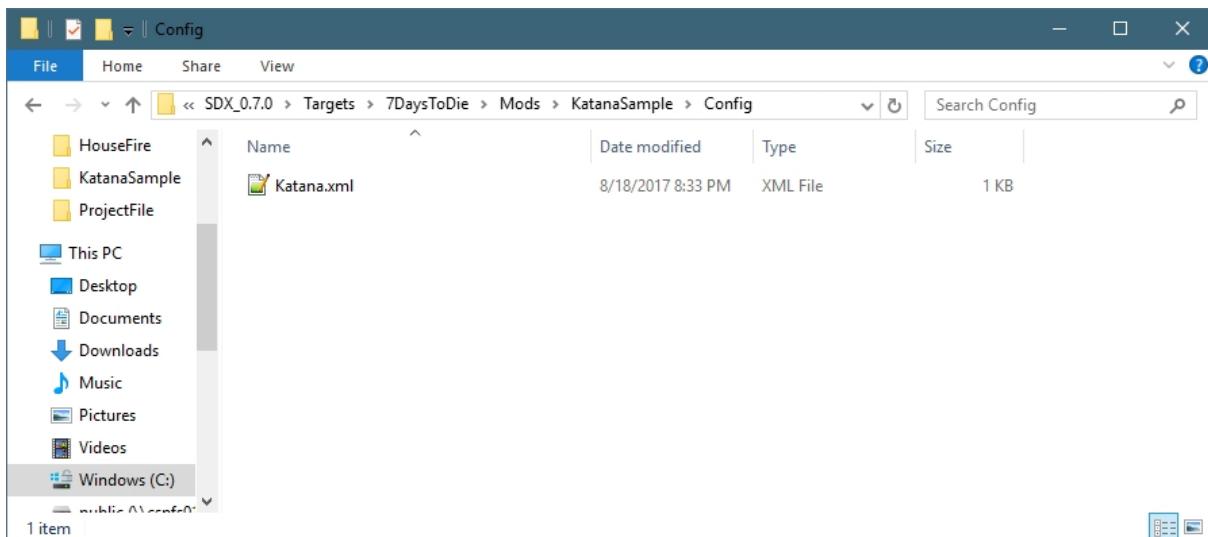
Adding Katana to a Loot Group

With Steel being an expensive resource for a katana, we want to give players the chance of finding one. Let's add the Katana to a loot group.

In the SDX Launcher, click on the Mods Folder.



Then navigate into the double click on the Katana Sample folder, then the Config folder:



Using Notepad++, edit the file

Add a new "<config>" node under the katanamichonne recipe by copy and pasting the Loot Snippet, highlighted in Blue for clarity

Loot Snippet

```
<!-- Let's add the Katana to the melee loot group -->
<config name="loot">
    <append xpath="/lootcontainers/lootgroup[@name='weaponsMelee']">
        <item name="katanamichonne" prob="0.05" />
    </append>
</config>
```

So this one is more complex than the other ones. Notice the "<append xpath"?

That's an xpath script that tells the SDX Launcher to look in the <lootcontainers> tag, find the <lootgroup> that has the attribute name='weaponsMelee', and appends it to the node list.

The Katana.xml should look like this now:

```
File: KatanaSample\Config\Katana.xml

<configs>
    <!-- This tells SDX to add to the Items.xml -->
    <config name="items">
        <!-- This tells SDX to add the following Items to the bottom of
the Items list -->
        <append xpath="/items">

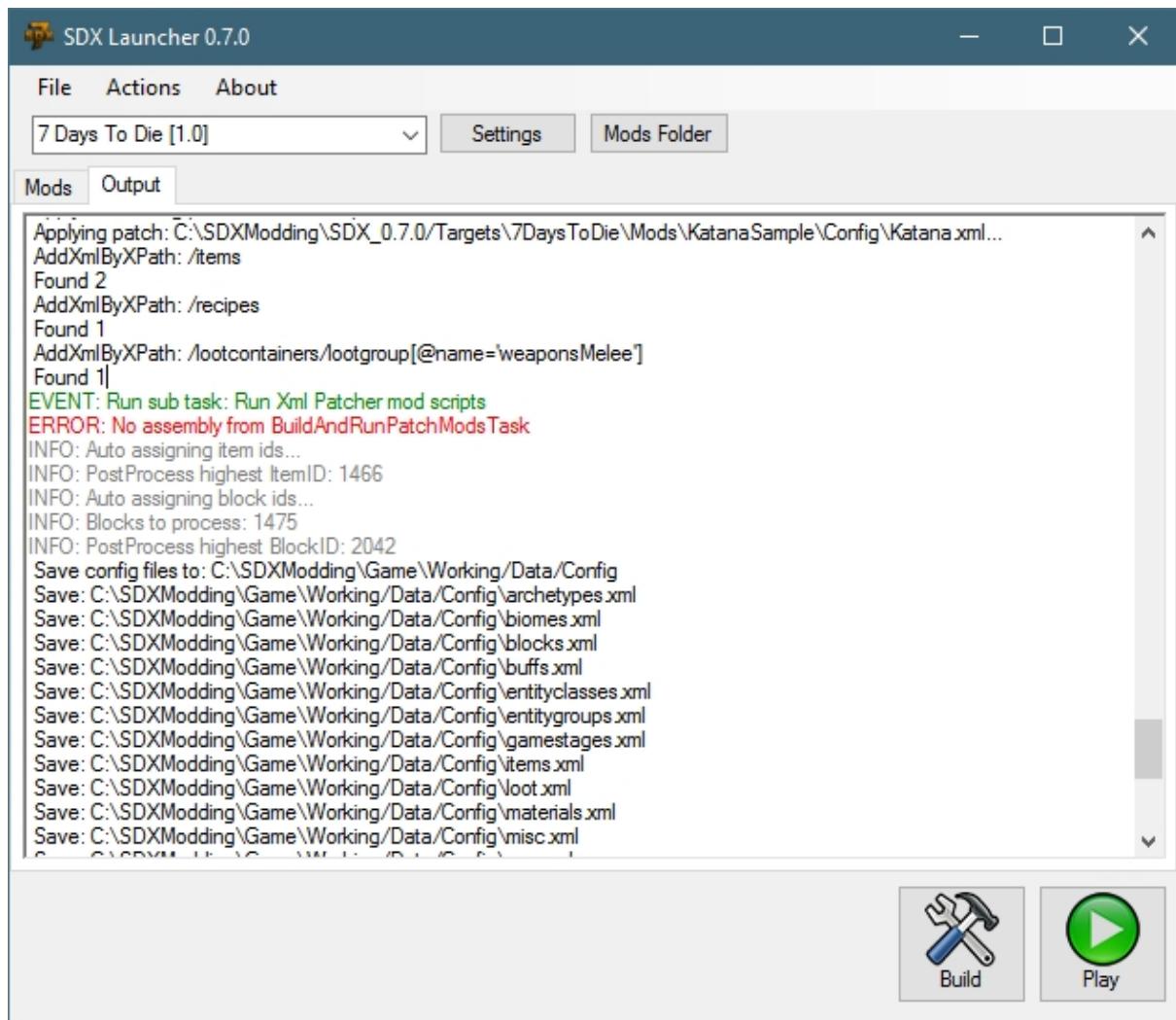
            <!-- New item will be Katana -->
            <item id="" name="katanamichonne">
                <!-- Extend it from the machete, but add the custom
mesh -->
                <property name="Extends" value="machete"/>
                <property name="Meshfile" value="#michonnekatana?
katana" />
            </item>
        </append>
    </config>

    <!-- Adding a new recipe for the mod -->
    <config name="recipes">
        <append xpath="/recipes" >
            <recipe name="katanamichonne" count="1"
craft_area="workbench">
                <ingredient name="forgedSteel" count="20"/>
                <ingredient name="wood" count="4"/>
                <ingredient name="leather" count="4"/>
            </recipe>
        </append>
    </config>

    <!-- Let's add the Katana to the melee loot group -->
    <config name="loot">
        <append xpath="/lootcontainers/lootgroup[@name='weaponsMelee']">
            <item name="katanamichonne" prob="0.05" />
        </append>
    </config>
</configs>
```

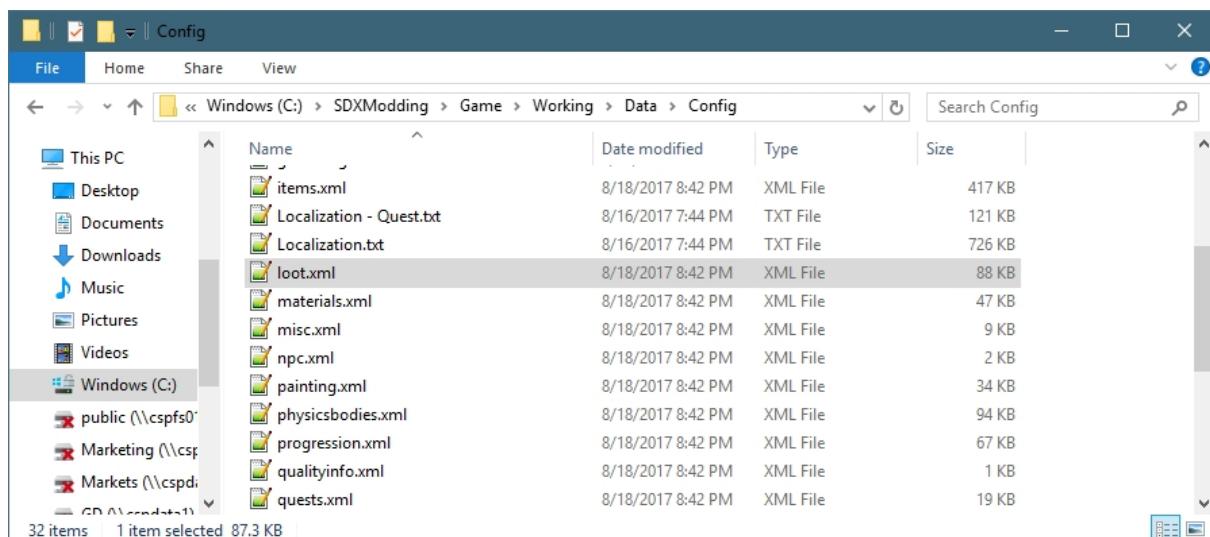
Once you've saved your changes, go back to the SDX Launcher, and click on the Build Button.

If you look through the log file, you'll see where it's adding the new XML:



Remember, the "ERROR: No assembly from BuildAndPatchModsTask" is not a fatal error right now, since we are not compiling any scripts for the Katana

Once compiled, look in the loot.xml of the Working game:



And search for "katana"

File: Data\Config\loot.xml

```

<item group="weaponsMagnumParts" prob="0.03" />
</lootgroup>
<lootgroup name="weaponsMelee">
    <item name="clubWood" />
    <item name="clubIron" />
    <item name="clubBarbed" prob="0.2" />
    <item name="clubSpiked" prob="0.15" />
    <item name="huntingKnife" prob="0.2" />
    <item name="machete" prob="0.1" />
    <item name="katanamichonne" prob="0.05" />
</lootgroup>
<lootgroup name="weaponsCrossbow+ammo" count="all">
    <item name="crossbow" count="1" />
    <item name="ironCrossbowBolt" count="10,30" />
</lootgroup>

```

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Tricks and Tips



Now that you've completed the Beginner Tutorial successfully, it's time to let you in on some tricks and tips.

[Building for the first time](#) step walked you through how to trigger your first SDX build. At first, we didn't enable the Katana mod, so *nothing* happened, right?

Actually, the SDX Launcher *did* do something to the Assembly-CSharp.dll even without using any SDX mods, and that was instrumenting it with some handy SDX hooks. The initial hooks that SDX does every time it builds, regardless of mods enabled, is to allow loading the unity3d bundles for adding new blocks and items to the game.

Adding new Resources

With these hooks, it's now possible to just copy the KatanaSample's Resource file, michonnekatana.unity3d, into the "WorkingMods\SDX\Resources\" folder, and reference it in your XML files, adding a new item as you would with traditional XML edits. The property Meshfile is then changed to point to #michonnekatana?katana.

File: Data\Config\items.xml

```

<item id="1466" name="katanamichonne">
    <!-- Extend it from the machete, but add the custom mesh -->
    <property name="Extends" value="machete" />

```

```
<property name="Meshfile" value="#michonnekatana?katana" />
</item>
```

When the game starts, the SDX hooks are activated, and as the game parses the XML files, it'll see the special model reference, and look under the Resources folder for a matching model.

```
#michonnekatana is translated to michonnekatana.unity3d
?katana is translated to look for the katana game object inside of michonnekatana.unity3d.
```

You can continue to do that, dropping the unity3d bundles into the Resources folder, and making references to the models, without using the SDX Launcher again.

Using Non-Vanilla Files as a Base

For our examples, we have been using the vanilla XML files as a base. This makes a good, consistent starting point to get you comfortable with SDX without getting too overwhelmed.

But that's not the only way you can enjoy SDX mods, nor does it mean you have to piece together a mod yourself. If you have an existing XML mod that you want to use, such as Clockwork Project, or Valmar Overhaul, you can use those mods as a base file.

All you need to do is install the mod, as per the modders instructions, into your Working folder. Verifying the Mod works as-is, and run it through the SDX Launcher. From there, you can copy and paste unity3d files into the Resources folder, and update the XML files to point to the new model.

The Mods/KatanaSample/Config/ Folder

In our examples, we included a Config/Katana.xml

```
<configs>
    <!-- This tells SDX to add to the Items.xml -->
    <config name="items">
        <!-- This tells SDX to add the following Items to the bottom of
the Items list -->
        <append xpath="/items">

            <!-- New item will be Katana -->
            <item id="" name="katanamichonne">
                <!-- Extend it from the machete, but add the custom
mesh -->
                <property name="Extends" value="machete"/>
                <property name="Meshfile" value="#michonnekatana?
katana" />
            </item>
        </append>
    </config>
</configs>
```

It's actually optional in SDX to need a Config/ folder. Once you add in your SDX hooks, you can edit the XML files as you normally would. Be sure to edit your mod.xml file and comment out the Config line:

```
<config_mods>
    <!--import file="Config\Katana.xml" /-->
```

```
</config_mods>
```

So why we do we start with a Config folder if we don't need it?

The reason to use a Config folder for a SDX mod is *ease of maintenance and distribution*.

If you code all your XML into the Config folder, using the recommended format, then your XML snippets will be merged into the vanilla files, or into whatever modded files you are using. When a new Alpha release comes out, you'll just need to re-run the SDX Launcher, and merge your changes. With some minor tweaks, which are necessary for each of the Alpha releases, your mod will be ready.

If you are creating a complete SDX overhaul, then you could probably skip the Config folder in your SDX Mod. However, if you are building individual mods to be used by others, then it's best to use the Config folder for your mod.

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SDX Intermediate Tutorial



The SDX Intermediate Tutorial assumes you have already followed the "[Getting Set up](#)" guide and completed the "[SDX Beginner Tutorial](#)"

In our Beginner Tutorial examples, we added in the Katana and a Cube block to the game. These mods added a new unity3d model, and made some XML changes. What it didn't do, was change or add any functionality in the game.

There's two types of coding that can be added in by SDX: PatchScripts and Scripts.

PatchScripts are code that is added as part of the Build process, and make changes directly in the Assembly-CSharp.dll, or more precisely, they *patch* the Assembly-CSharp.dll. PatchScripts are meant to update or change base game features.

Scripts are code that are compiled into the Mods.dll, and loaded at when the game starts. Scripts are meant to add new classes and functionality, often extending the base game.

For the Intermediate Tutorial, we'll explore the Patch Scripts by adding the Bigger Back Pack Mod.

HAL9000 has created a series of extremely valuable SDX 7 Videos that take you step by step through some of the advanced methods

The 7D2D SDX 7 Patch Scripts video takes you step by step through in how to create your first PatchScript.

https://www.youtube.com/watch?v=Yo092Z_Mirk&feature=youtu.be

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Adding the Bigger Back Pack Mod

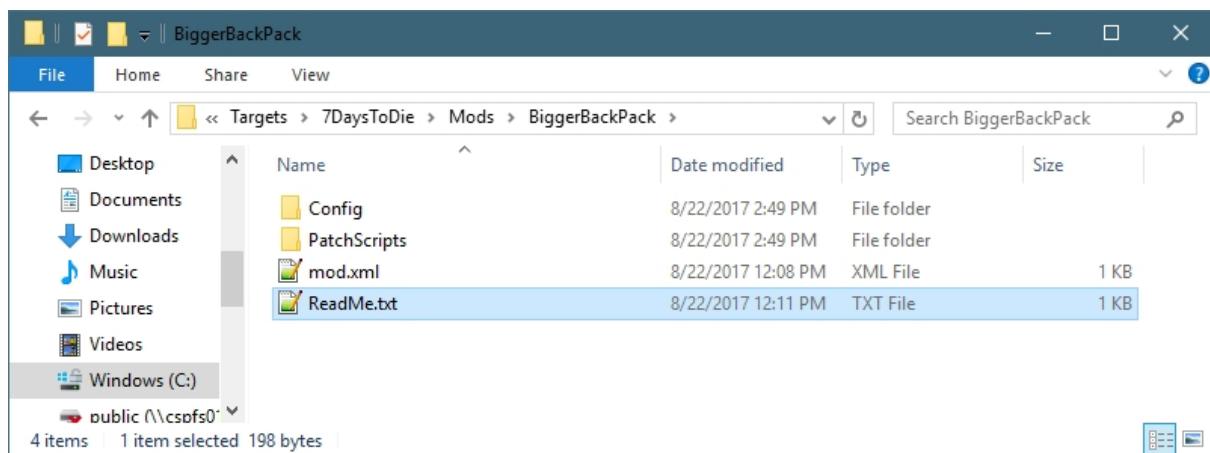


The Bigger Back Pack mod. A lot of users love the extra space that it gives you, especially for larger mods that add a lot more diverse lootable items.

We decided to port the Bigger Back Pack mod to SDX, to show how the Patch Script system works, as well as demonstrate another, more advanced Config file.

Download and install the Bigger Back Pack mod under your Target/Mods/ folder.

The Config folder contains the XML snippet, while the PatchScript contains the build scripts. We'll look at both, and explain what's going on in each one.



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Understanding the XML Config

Config\BiggerBackPack.xml:

This mod makes a few changes to files that the other SDX Mods haven't shown you yet. The Windows.xml under the XUi, and the xui.xml file under the Config folder.

```

<configs>
    <config name="XUi/windows">
        <!-- Back pack dimensions are set for 5 x 9, based on a 45 slot
back pack -->
        <set
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@
name='inventory']/@rows">5</set>
        <set
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@
name='inventory']/@cols">9</set>

        <set
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@
name='inventory']/@cell_width">67</set>
        <set
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@
name='inventory']/@cell_height">67</set>

        <remove
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@
name='inventory']/item_stack" />
        <append
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@
name='inventory']">
            <item_stack_inventory name="0"/>
        </append>

    </config>

    <config name="XUi/controls"
>https://raw.githubusercontent.com/7D2DSDX/Mods/master/BiggerBackPack/Config/BiggerBackPack.xml
        <append xpath="/controls">
            <item_stack_inventory>
                <rect controller="ItemStack" style="itemStack,
hover">
<!-- Snipped for brevity. Check out the full XML here:
https://raw.githubusercontent.com/7D2DSDX/Mods/master/BiggerBackPack/Config/BiggerBackPack.xml
                </rect>
            </item_stack_inventory>
        </append>
    </config>
    <!-- changing the scale of the panel to better fit -->
    <config name="xui">
        <set
xpath="/xui/ruleset[@name='default']/@stackpanel_scale">1.03</set>
    </config>
</configs>

```

Notice we are using `<config name="XUi/windows">` ? This lets SDX know that the windows.xml file is to be searched under the XUI folder. By default, SDX will search for the Data/Config/*.xml files, so for any subfolders off of Data/Config, you'll need to specify the folder name.

The next part about this Config is the <set xpath> line. This line lets us change *individual attributes* in XML nodes, rather than adding a new recipe or block, as we did in the other examples. The Lines look scary, but it's not that bad! It allows us a very precise change in XML files.

Let's break it down:

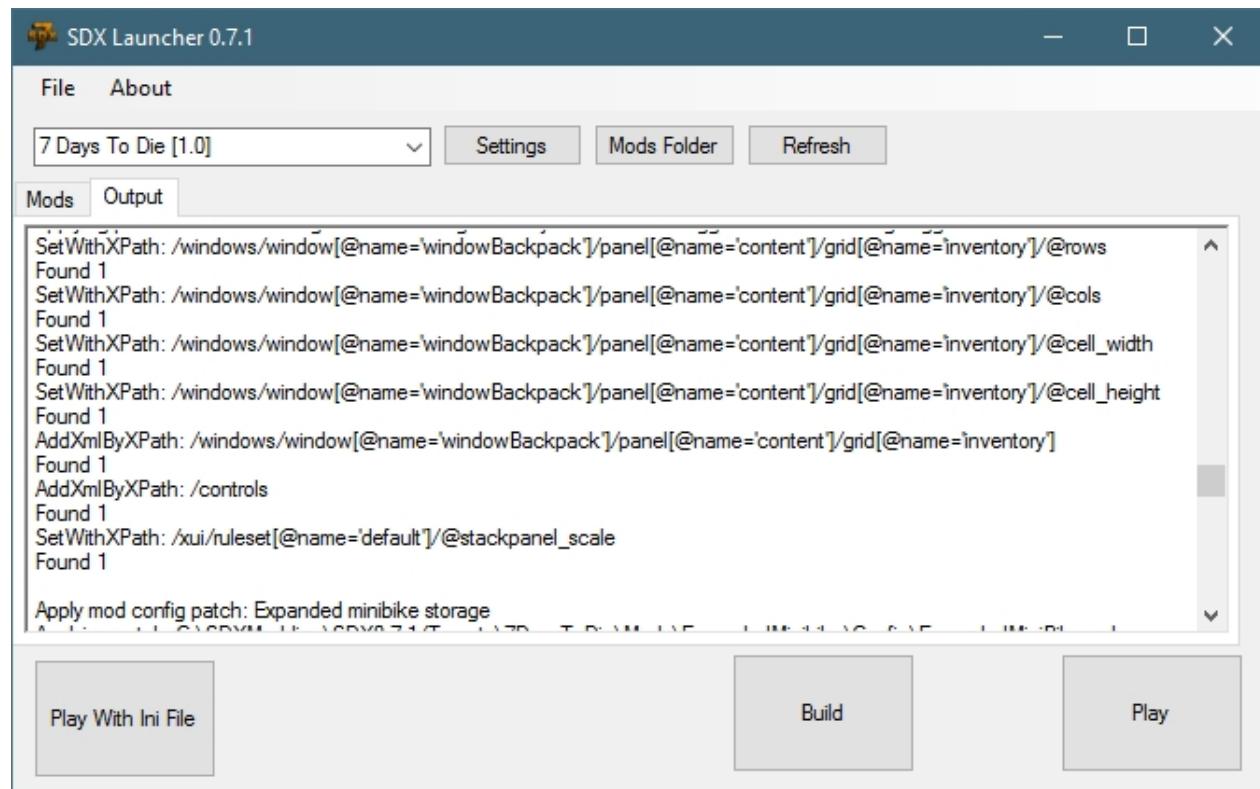
```
<set
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@name='inventory']/@rows">5</set>
```

/windows	Top level node in the file </windows>
/window[@name='windowBackpack']	Look for the <window> that has a name of "windowBackpack"
/panel[@name='content']	Look for the <panel> tag that has the name of 'content', that's inside of the above window
/grid[@name='inventory']	Look for the <grid> tag with the name inventory, that's inside of the above panel
/@rows	Look for the rows attribute

There's a website that'll help you building your more complicated xpath:

https://xmltoolbox.appspot.com/xpath_generator.html

When you run it through SDX Launcher, you'll see this:

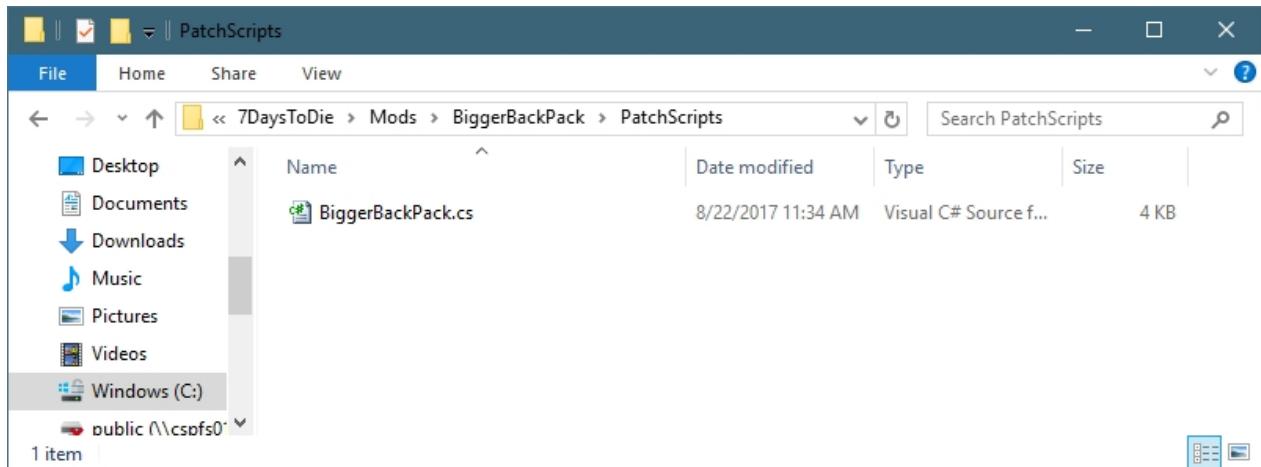


Set With XPath indicates what value it's looking for, and how many matching lines it found.

Take a look at the [SDX XPath Configurations](#) for more examples and help on this.

Understanding the PatchScript

The PatchScript for the Bigger Back Pack Mod let's us change the Assembly-CSharp.dll at build time, allowing us to increase the size of the Back Pack.



The PatchScripts are C# Scripts. You can either use Visual Studio, or even Notepad++ for them.

This will not be an in depth tutorial on how to write C#, but rather just to show the anatomy of a SDX PatchScript

```
using System;
using SDX.Compiler;
using Mono.Cecil;
using Mono.Cecil.Cil;
using System.Linq;

public class BiggerBackPack : IPatcherMod
{
    private sbyte OldInventorySize = 32;
    private sbyte NewInventorySize = 45;

    public bool Patch(ModuleDefinition module)
    {

        private void SetAccessLevels(ModuleDefinition module)
        {

            private void SetBackpackSize( ModuleDefinition module)
            {

                // Helper function to update the backpack module
                public void UpdateBackpack(ModuleDefinition module, String strModuleName, String strMethodName, int maxCounter)
                {

                    // Called after the patching process and after scripts are compiled.
                    // Used to link references between both assemblies
                    // Return true if successful
                    public bool Link(ModuleDefinition gameModule, ModuleDefinition modModule)
                    {

                        // Helper functions to allow us to access and change variables that are otherwise unavailable.
                        private void SetMethodToVirtual(MethodDefinition meth)
                        {

                            private void SetFieldToPublic(FieldDefinition field)
                            {
                                private void SetMethodToPublic(MethodDefinition field)
                                {
                            }
                        }
                    }
                }
            }
        }
    }
}
```

The public class BiggerBackPack, inherits from the IPatcherMod. This IPatcherMod is an SDX class which allows patching. All your PatchScripts need this.

Two functions are required:

```
bool Patch( ModuleDefinition module )
bool Link( ModuleDefinition gameModule, ModuleDefinition modModule )
```

The Patch() call does the initial assembly, and is where most of the work gets called at. The Link() happens after the compile. In the Bigger Back Pack Mod, we do not use the Link() method, but it still needs to exists, even if it's only does a simple return true.

The rest of the methods, SetAccessLevels(), SetBackpackSize(), UpdateBackPack(), SetMethodToVirtual, SetMethodToPublic, and SetFieldToPublic() are methods we declared to help us out. Some of the fields in the Assembly-CSharp.dll are private, and therefore cannot be access by SDX without changing.

The SetMethodToVirtual, SetFieldToPublic and SetMethodToPublic are all helper functions that can be called to change these private variables, to public ones.

The supplied BiggerBackPack.cs is a documented C# script. We encourage you to review it, and understand what it's doing.

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SDX Advanced Tutorial



The SDX Advanced Tutorial assumes you have already followed the "[Getting Set up](#)" guide, and completed the [SDX Beginner Tutorial](#) and [SDX Intermediate Tutorial](#).

In our Beginner Tutorial examples, we added in the Katana and a Cube block to the game. These mods added a new unity3d model, and made some XML changes. What it didn't do, was change or add any functionality in the game.

There's two types of coding that can be added in by SDX: PatchScripts and Scripts.

PatchScripts are code that is added as part of the Build process, and make changes directly in the Assembly-CSharp.dll, or more precisely, they *patch* the Assembly-CSharp.dll. PatchScripts are meant to update or change base game features.

Scripts are code that are compiled into the Mods.dll, and loaded at when the game starts. Scripts are meant to add new classes and functionality, often extending the base game.

For the Advanced Tutorial, we'll explore the Scripts by adding in ZehMatt's View Sway / Bob Smoothed Mod.

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About the View Sway and Bob

So what is the view sway and bob?

When your characters walks around the world, the screen can sway from side to side to simulate a more realistic motion. In some people, this can produce nausea and isn't an otherwise positive experience.

ZehMatt's post can be found here, and has a few videos on the head bob and sway to demonstrate.

We've chosen this as an example on building a SDX mod from the ground up, since there isn't a lot of coding.

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Looking at the code changes

In ZehMatt's posting, he generously provided the source code to the mod, and we've posted it here for analysis and inclusion in the mod.

```
public class vp_FPWeapon : vp_Weapon
{
    protected override void FixedUpdate()
    {
        if (Time.timeScale != 0f)
        {
            this.UpdateZoom();
            this.UpdateEarthQuake();
            this.UpdateStep();
            this.UpdateShakes();
            this.UpdateRetraction(true);
            this.MJ();
        }
    }

    protected override void Update()
    {
        base.Update();
        if (Time.timeScale != 0f)
        {
            this.UpdateInput();
            this.UpdateSwaying();
            this.UpdateBob();
            this.UpdateSprings();
        }
    }

    protected virtual void UpdateSwaying()
    {
        this.m_SwayVel = this.Controller.velocity *
this.PositionInputVelocityScale;
        this.m_SwayVel = Vector3.Min(this.m_SwayVel, Vector3.one *
this.PositionMaxInputVelocity);
        this.m_SwayVel = Vector3.Max(this.m_SwayVel, Vector3.one * -
this.PositionMaxInputVelocity);
    }
}
```

```

        this.m_SwayVel *= Time.timeScale;
        Vector3 vector =
base.Transform.InverseTransformDirection(this.m_SwayVel * Time.deltaTime);
        this.m_RotationSpring.AddForce(new Vector3(this.m_LookInput.y *
(this.RotationLookSway.x * (Time.deltaTime * 0.75f)), this.m_LookInput.x *
(this.RotationLookSway.y * -(Time.deltaTime * 0.75f)), this.m_LookInput.z *
(this.RotationLookSway.z * -(Time.deltaTime * 0.75f))));;
        this.m_FallSway = this.RotationFallSway * (this.m_SwayVel.y *
(Time.deltaTime * 0.15f));
        if (this.Controller.isGrounded)
        {
            this.m_FallSway *= this.RotationSlopeSway;
        }
        this.m_FallSway.z = Mathf.Max(0f, this.m_FallSway.z);
        this.m_RotationSpring.AddForce(this.m_FallSway);
        this.m_PositionSpring.AddForce(Vector3.forward * -
Mathf.Abs(this.m_SwayVel.y * (this.PositionFallRetract * 2.5E-05f)));
        this.m_PositionSpring.AddForce(new Vector3(vector.x *
(this.PositionWalkSlide.x * (Time.deltaTime * 0.048f)), -Mathf.Abs(vector.x *
(this.PositionWalkSlide.y * (Time.deltaTime * 0.048f))), -vector.z *
(this.PositionWalkSlide.z * (Time.deltaTime * 0.048f))));;
        this.m_RotationSpring.AddForce(new Vector3(-Mathf.Abs(vector.x * *
(this.RotationStrafeSway.x * (Time.deltaTime * 4.8f))), -(vector.x * *
(this.RotationStrafeSway.y * (Time.deltaTime * 4.8f))), vector.x * *
(this.RotationStrafeSway.z * (Time.deltaTime * 4.8f))));;
    }

protected virtual void UpdateBob()
{
    if (!(this.BobAmplitude == Vector4.zero))
    {
        if (!(this.BobRate == Vector4.zero))
        {
            float arg_7E_1;

            arg_7E_1 = this.Controller.velocity.sqrMagnitude;
            if (this.BobRequireGroundContact)
            {
                if (!this.Controller.isGrounded)
                {
                    arg_7E_1 = 0f;
                }
            }
            this.m_BobSpeed = arg_7E_1;
            this.m_BobSpeed = Mathf.Min(this.m_BobSpeed *
this.BobInputVelocityScale, this.BobMaxInputVelocity);
            this.m_BobSpeed = Mathf.Round(this.m_BobSpeed *
1000f) / 1000f;
            if (this.m_BobSpeed == 0f)
            {
                this.m_BobSpeed =
Mathf.Min(this.m_LastBobSpeed * (Time.deltaTime * 27.9f),
this.BobMaxInputVelocity);
            }
            this.m_CurrentBobAmp.x = this.m_BobSpeed *
(this.BobAmplitude.x * -0.0001f);
            this.m_CurrentBobVal.x = Mathf.Cos(Time.time *
(this.BobRate.x * 10f)) * this.m_CurrentBobAmp.x;
        }
    }
}

```

```

        this.m_CurrentBobAmp.y = this.m_BobSpeed * 
(this.BobAmplitude.y * 0.0001f);
        this.m_CurrentBobVal.y = Mathf.Cos(Time.time * 
(this.BobRate.y * 10f)) * this.m_CurrentBobAmp.y;
        this.m_CurrentBobAmp.z = this.m_BobSpeed * 
(this.BobAmplitude.z * 0.0001f);
        this.m_CurrentBobVal.z = Mathf.Cos(Time.time * 
(this.BobRate.z * 10f)) * this.m_CurrentBobAmp.z;
        this.m_CurrentBobAmp.w = this.m_BobSpeed * 
(this.BobAmplitude.w * 0.0001f);
        this.m_CurrentBobVal.w = Mathf.Cos(Time.time * 
(this.BobRate.w * 10f)) * this.m_CurrentBobAmp.w;
        this.m_RotationSpring.AddForce(this.m_CurrentBobVal
* Time.timeScale);
        this.m_PositionSpring.AddForce(Vector3.forward *
this.m_CurrentBobVal.w * Time.timeScale);
        this.m_LastBobSpeed = this.m_BobSpeed;
        return;
    }
}
}

```

If you are not familiar with C# code, than this probably looks a bit like gibberish, with a lot of math. Even with C# experience, it looks confusing. However, Let's break it down:

```
public class vp_FPWeapon : vp_Weapon
```

The very first line is the Class name. A class is a construct that enables you to create your own custom types by grouping together variables of other types, methods and events. A class is like a blueprint. It defines the data and behavior of a type. Basically, it controls *something* in the game. In this case, it controls your view.

There's a fair amount of code in the above snippet, and we won't cover what it does, but we'll take a look at a few things involved:

```
public class vp_FPWeapon : vp_Weapon
{
    protected override void FixedUpdate()...
    protected override void Update()...
    protected virtual void UpdateSwaying()...
    protected virtual void UpdateBob()...
}
```

We've collapsed the methods that this class is going to be changing or adding.

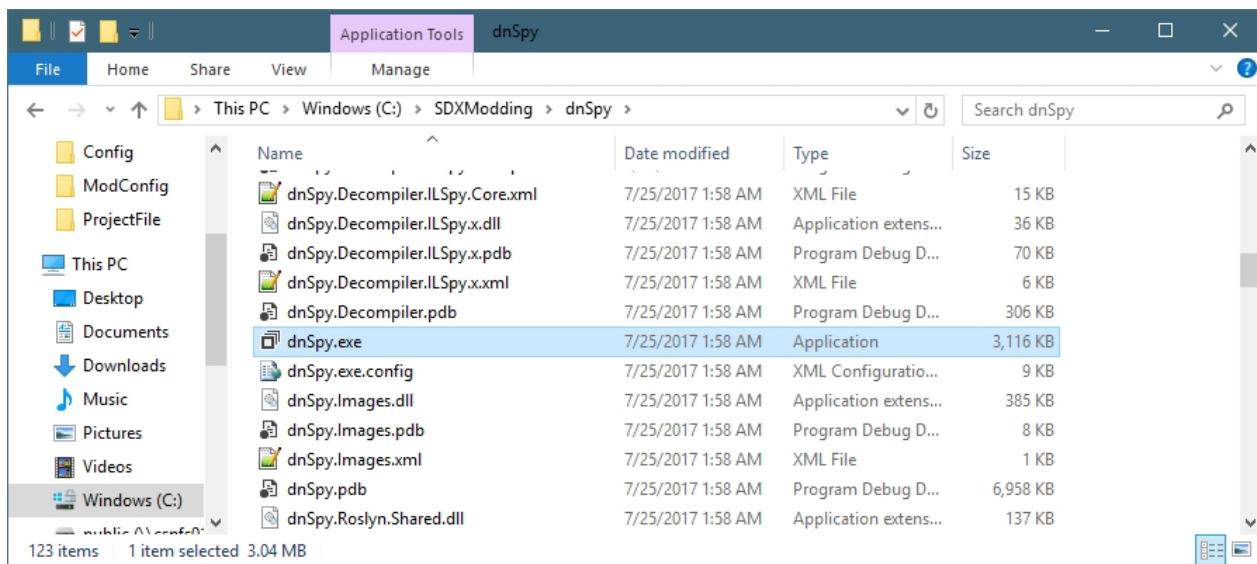
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Manually fixing the Class in the Assembly-CSharp

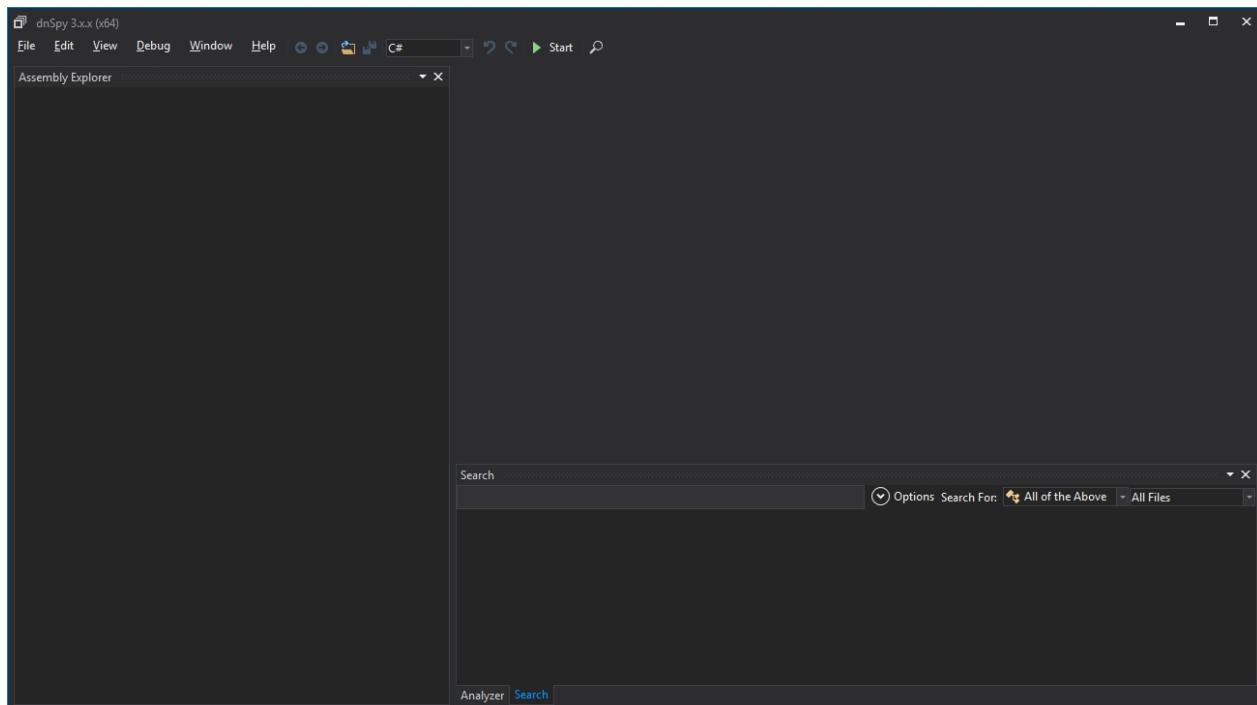
Let's take a look at the code in the Assembly-CSharp.dll, in order to know what changes are available.

For this example, we are going to use dnSpy, which is included as part of the [SDX Modding Kit](#).

In C:\SDXModding\dnSpy, double click on the dnspy.exe

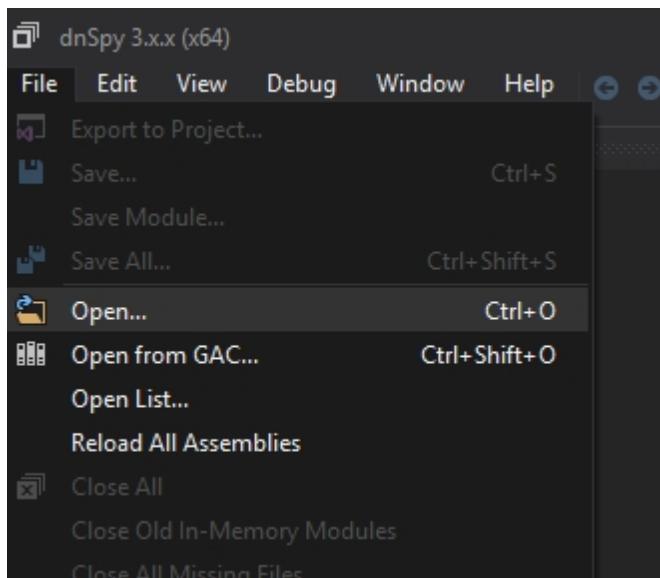


When it first starts, you may see it populate with a bunch of default libraries. If this is confusing for you, click on the File menu, then go to "Close All" before continuing this tutorial.

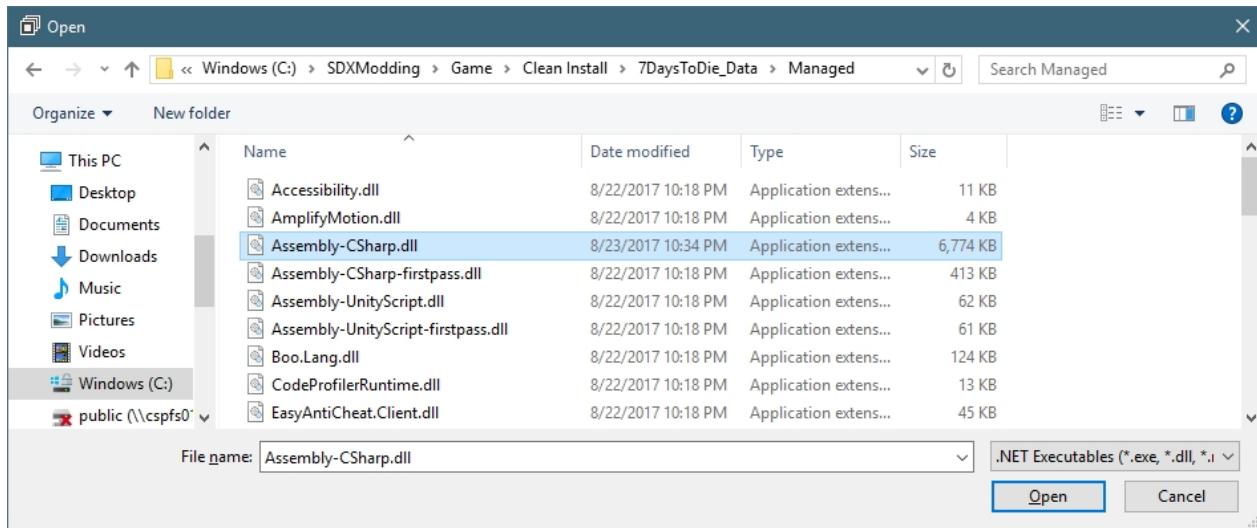


Now we want to open up the Assembly-CSharp.dll, and we'll use our [Clean Install](#) copy of the game to look at the file. We won't be making any changes in the tool, but rather we are only looking at the class.

Click on the File menu, then click on Open

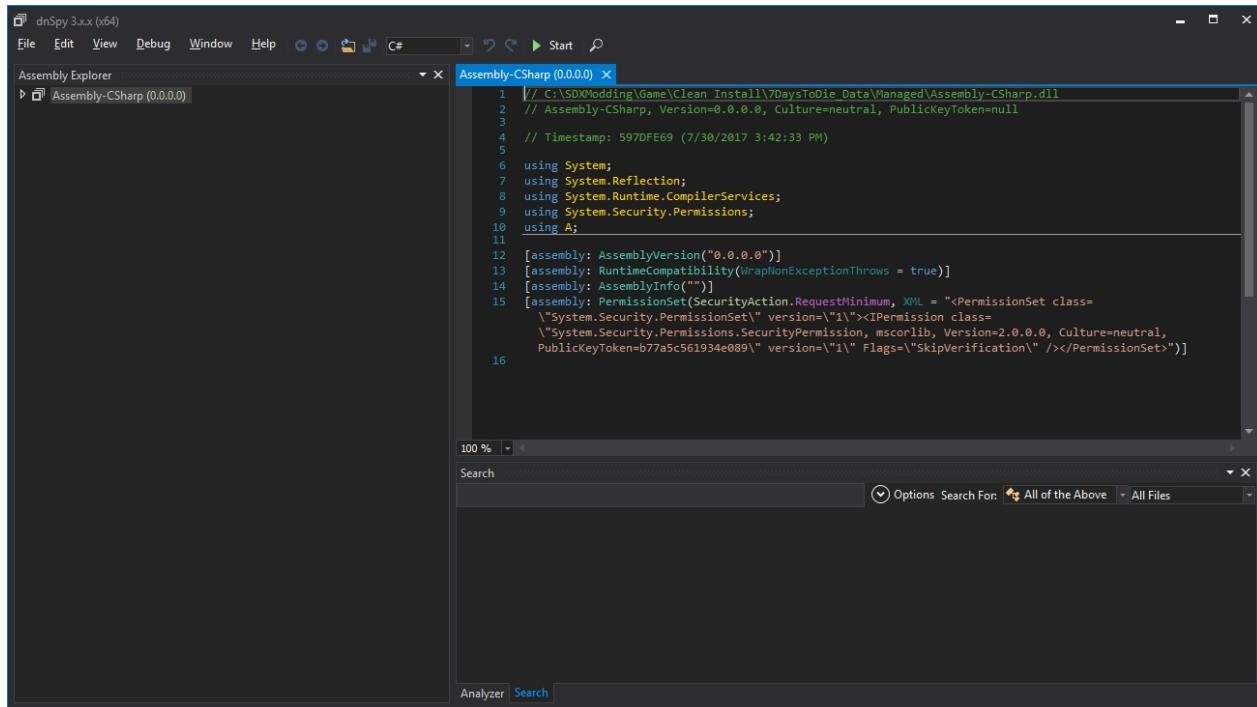


Navigate using the Open dialog box to `C:\SDXModding\Game\Clean install\7DaysToDie_Data\Managed`, or whoever the Assembly-CSharp.dll is.



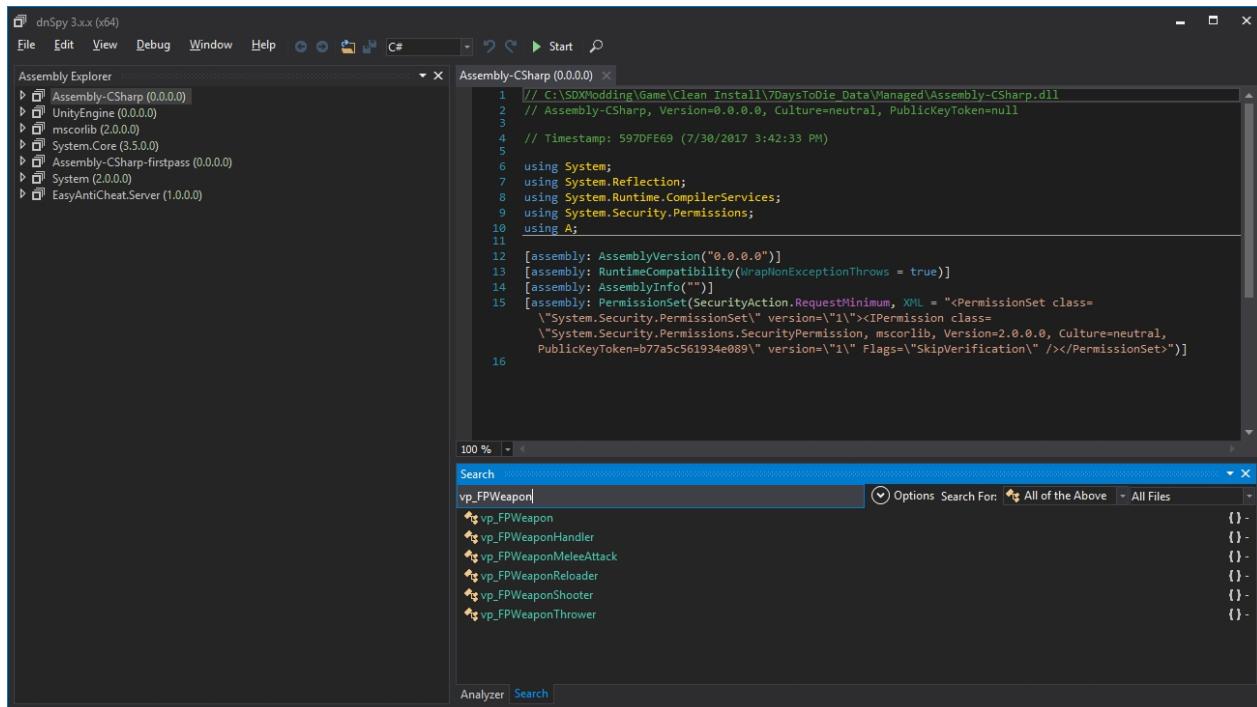
Clicking open will open up the Assembly-CSharp.dll:

7 Days To Die SDX Tutorial and Help



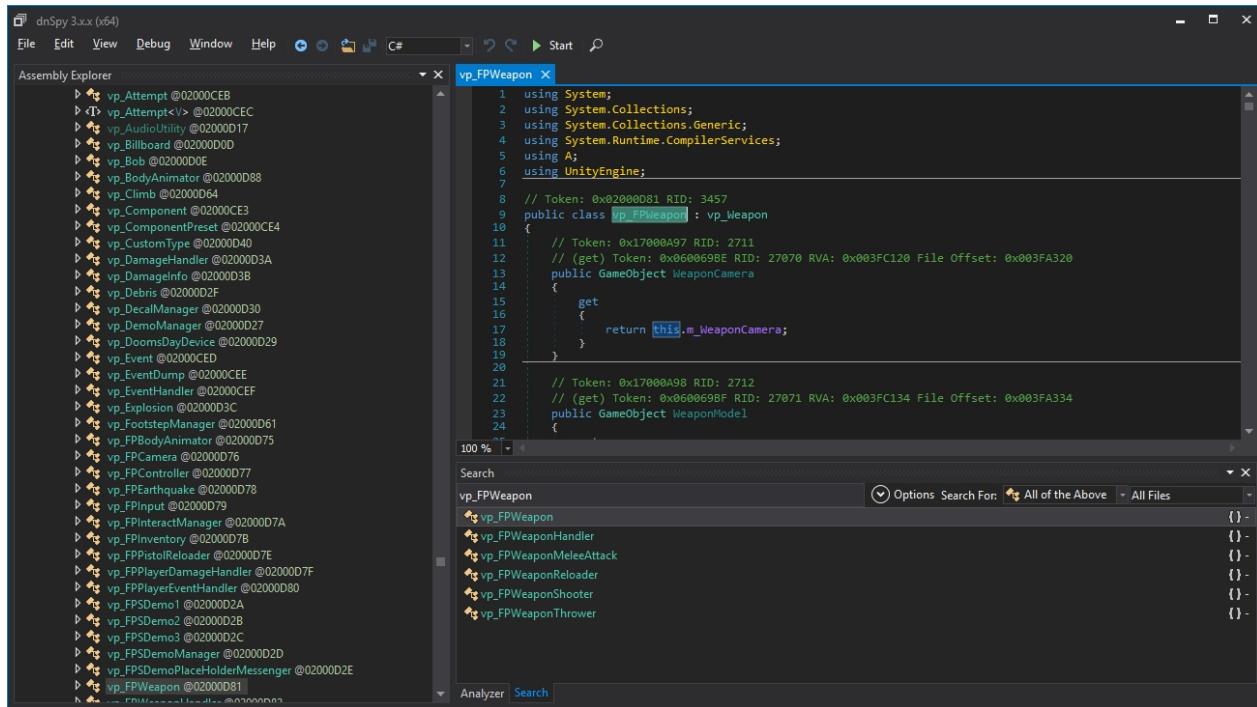
Remember that class name we pointed on? It was called: vp_FPSWeapon

Click on the Magnifying Glass, next to the Start button.



and enter in the vp_FPSWeapon in the search dialog box. You'll notice that under the Assembly Explorer, other libraries have been loaded. dnSpy will open up references that the searched for objects use, either in code or linking.

Click on the first entry in the search list that matches exactly the string we want. The class will load up:



```

        this.UpdateZoom();
        this.UpdateEarthQuake();
        this.UpdateStep();
        this.UpdateShakes();
        this.UpdateRetraction(true);
        this.MJ();
    }
}

```

Let's compare them:

Modified	Vanilla
<pre> protected override void FixedUpdate() { if (Time.timeScale != 0f) { this.UpdateZoom(); this.UpdateEarthQuake(); this.UpdateStep(); this.UpdateShakes(); this.UpdateRetraction(true); this.MJ(); } } </pre>	<pre> protected override void FixedUpdate() { if (Time.timeScale != 0f) { this.UpdateZoom(); this.UpdateSwaying(); this.UpdateBob(); this.UpdateEarthQuake(); this.UpdateStep(); this.UpdateShakes(); this.UpdateRetraction(true); this.UpdateSprings(); this.JU(); } } </pre>

The highlighted values are the values that is being removed from the method. Hmm.. I wonder where they went.

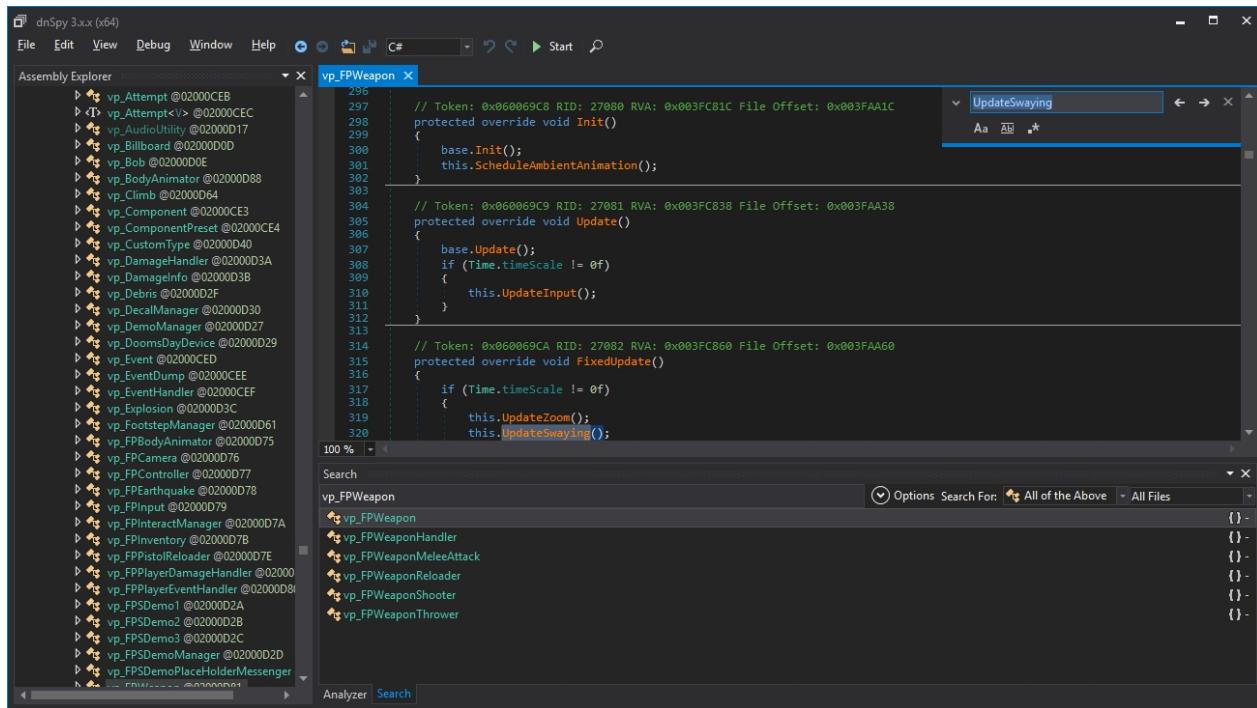
Let's look at the Update() method

Modified	Vanilla
<pre> protected override void Update() { base.Update(); if (Time.timeScale != 0f) { this.UpdateInput(); this.UpdateSwaying(); this.UpdateBob(); this.UpdateSprings(); } } </pre>	<pre> protected override void Update() { base.Update(); if (Time.timeScale != 0f) { this.UpdateInput(); } } </pre>

There they are! ZehMatt moved those vanilla files to the Update() method.

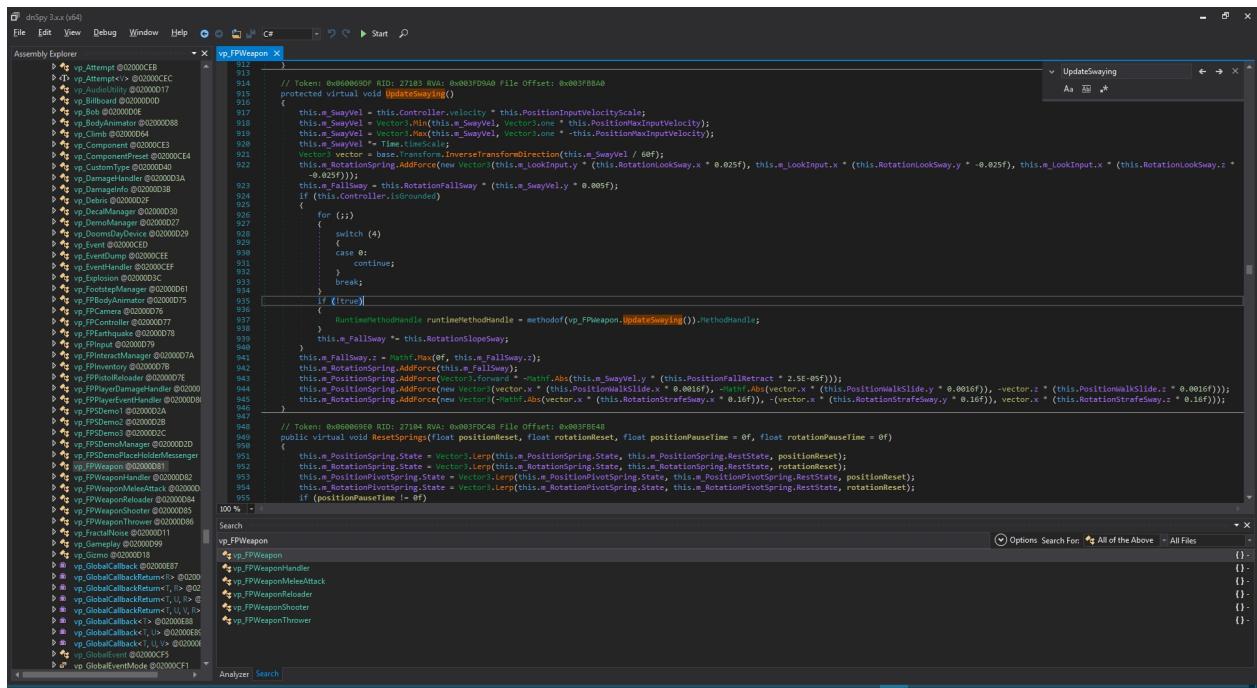
In his code posting, he referenced two other methods: UpdateSwaying() and UpdateBob().

Let's find those. In the vp_Weapon tab, press Ctrl-F to bring up a search function, and enter in "UpdateSwaying"



Press the F3 button to search for the next instance.

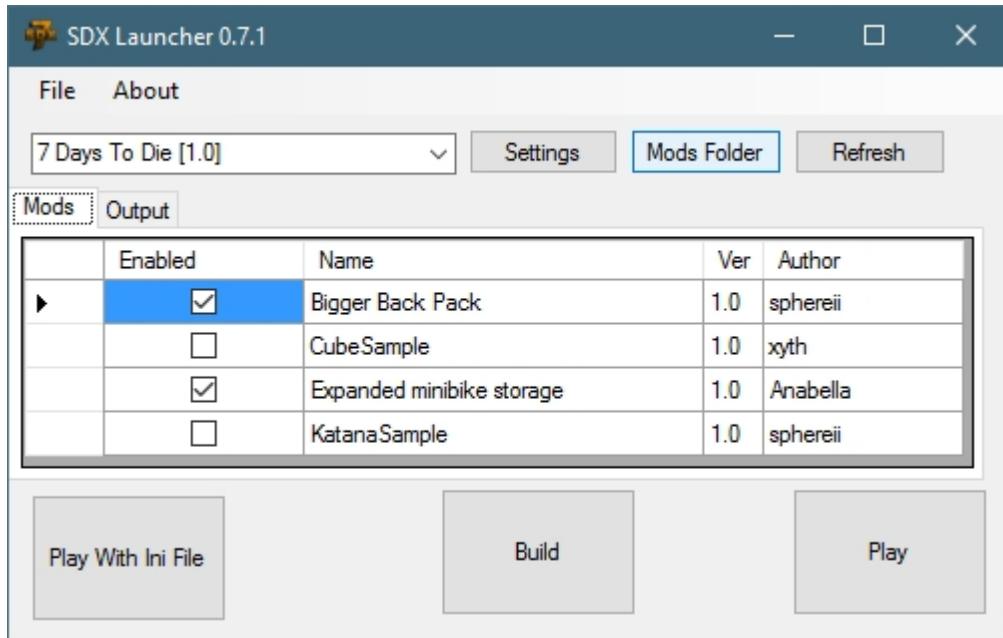
The next search result is the actual function we want



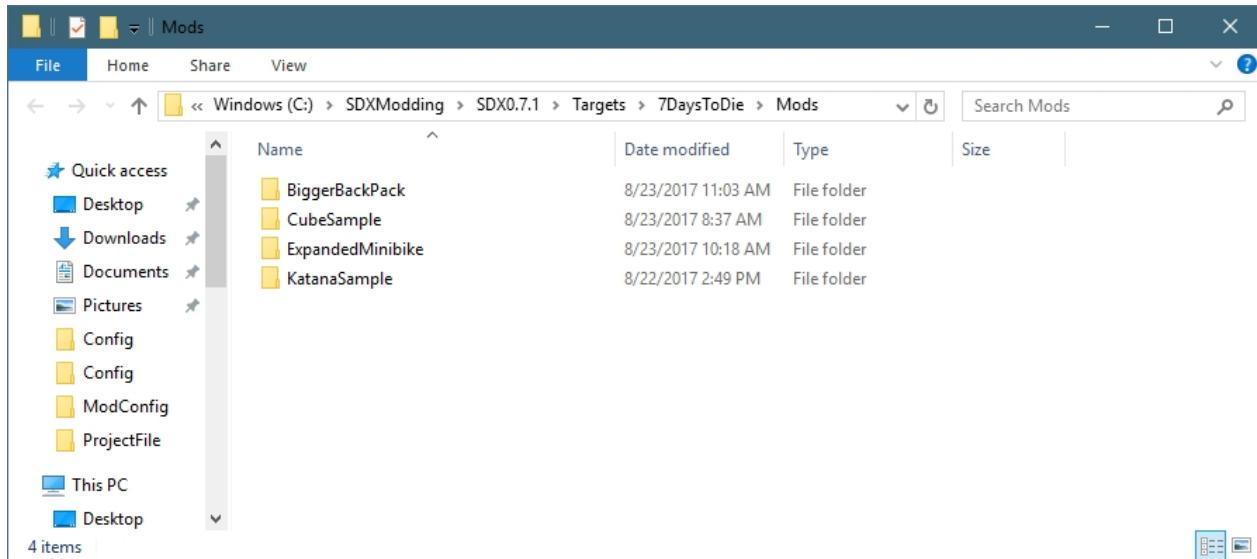
So this is a much bigger blurb, and not something we can easily compare in this tutorial. However, you can use the tool WinMerge to compare the code snippets.

Creating the Mod Structure

In the SDX Launcher, click on the Mods Folder.

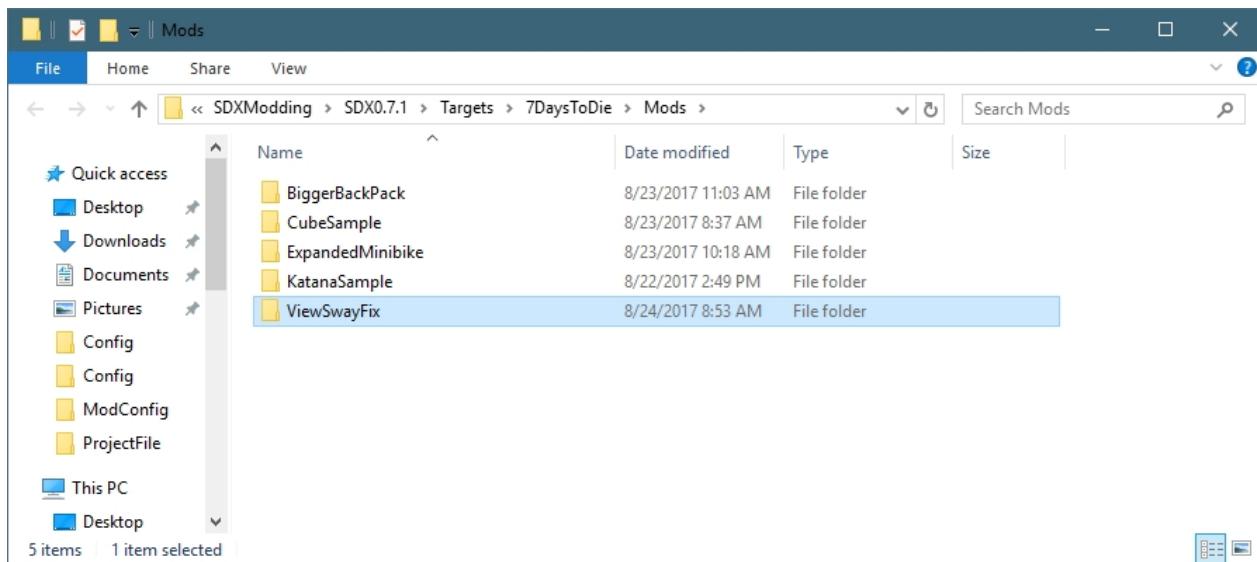


We'll need to create a folder for your mod here:



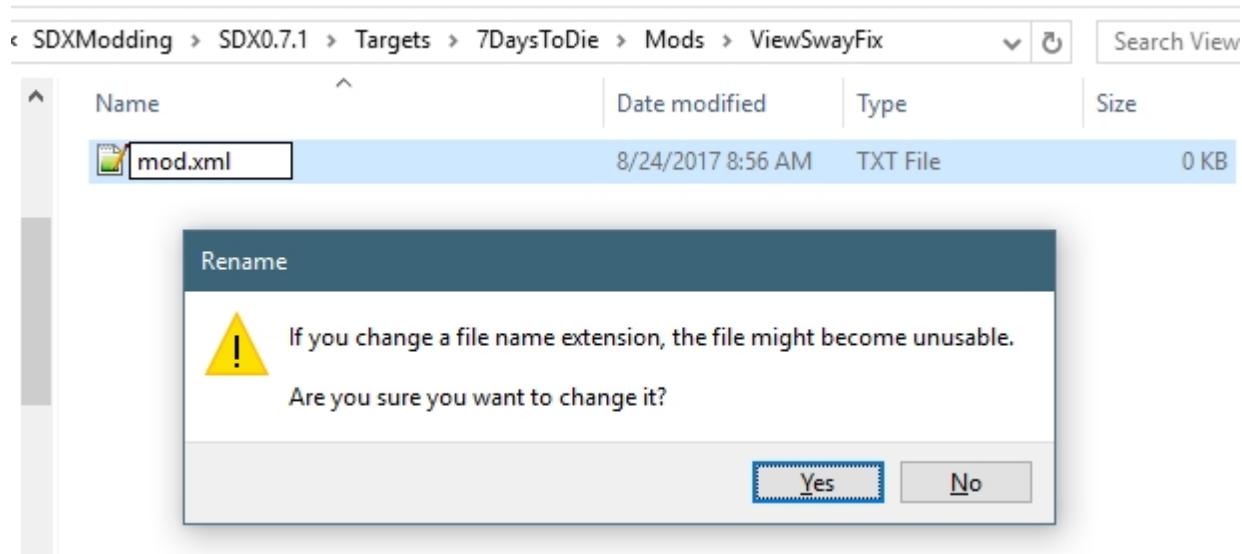
Right click on the background, and click on New -> Folder

We'll call it "ViewSwayFix"



Double click on the ViewSwayFix folder.

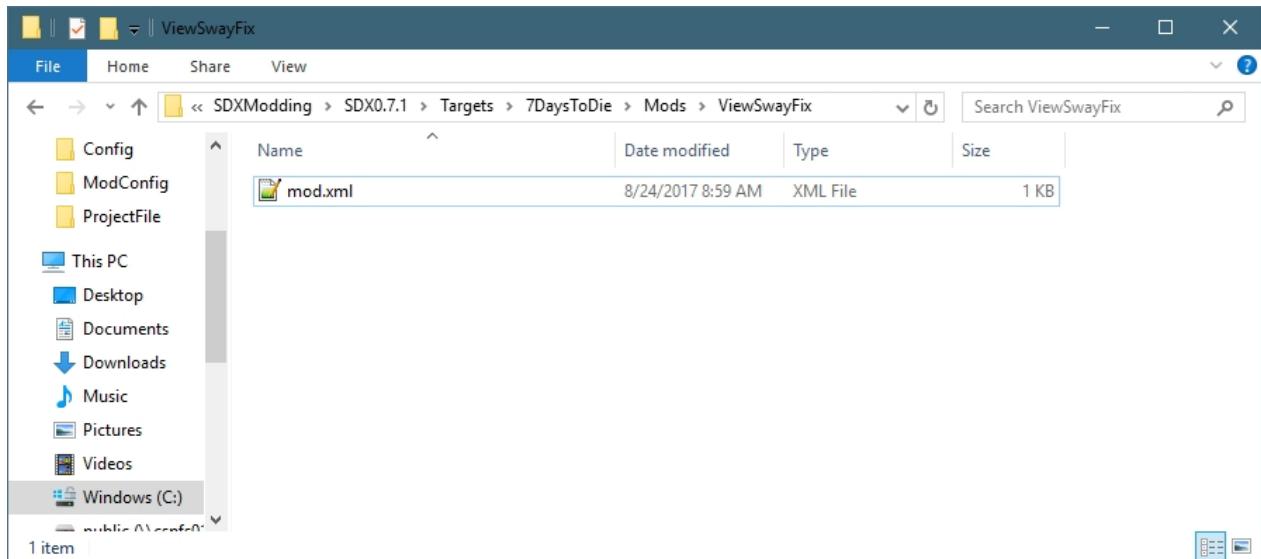
Let's make the mod.xml, which is what SDX Launcher uses to display the mod. Right click on the Folder, and click on New -> Text Document, and call it "mod.xml".



Accept the warning. We want it to be xml, rather than text. Open up the file using notepad++, and enter the following:

```
<mod>
    <info>
        <!-- Information about the Mod, the author and version
information -->
        <!-- These are displayed in the SDX Launcher -->
        <author>sphereii</author>
        <name>ViewSway Fix</name>
        <description>Fix for the View Sway and Head bob</description>
        <mod_version>1.0</mod_version>
        <game_version>16.2</game_version>
        <launcher_version>0.0.0</launcher_version>
    </info>
</mod>
```

We don't need a <config> node, because we aren't changing any XML files. Save the file, and go back to Explorer.



Next, right click on Explorer, and select New -> Folder, and call it "Scripts". Double click on the folder and enter it.

Then, right click on Explorer, and select New -> Text Document, and call it ViewSwayFix.cs

Open the file using Notepad++, and copy and paste the following:

```
public class vp_FPWeapon : vp_Weapon
{
    protected override void FixedUpdate()
    {
        if (Time.timeScale != 0f)
        {
            this.UpdateZoom();
            this.UpdateEarthQuake();
            this.UpdateStep();
            this.UpdateShakes();
            this.UpdateRetraction(true);
            this.MJ();
        }
    }

    protected override void Update()
    {
        base.Update();
        if (Time.timeScale != 0f)
        {
            this.UpdateInput();
            this.UpdateSwaying();
            this.UpdateBob();
            this.UpdateSprings();
        }
    }

    protected virtual void UpdateSwaying()
```

```

    {
        this.m_SwayVel = this.Controller.velocity *
this.PositionInputVelocityScale;
        this.m_SwayVel = Vector3.Min(this.m_SwayVel, Vector3.one *
this.PositionMaxInputVelocity);
        this.m_SwayVel = Vector3.Max(this.m_SwayVel, Vector3.one * -
this.PositionMaxInputVelocity);
        this.m_SwayVel *= Time.timeScale;
        Vector3 vector =
base.Transform.InverseTransformDirection(this.m_SwayVel * Time.deltaTime);
        this.m_RotationSpring.AddForce(new Vector3(this.m_LookInput.y *
(this.RotationLookSway.x * (Time.deltaTime * 0.75f)), this.m_LookInput.x * -
(this.RotationLookSway.y * -(Time.deltaTime * 0.75f)), this.m_LookInput.z * -
(this.RotationLookSway.z * -(Time.deltaTime * 0.75f))));

        this.m_FallSway = this.RotationFallSway * (this.m_SwayVel.y * -
(Time.deltaTime * 0.15f));
        if (this.Controller.isGrounded)
        {
            this.m_FallSway *= this.RotationSlopeSway;
        }
        this.m_FallSway.z = Mathf.Max(0f, this.m_FallSway.z);
        this.m_RotationSpring.AddForce(this.m_FallSway);
        this.m_PositionSpring.AddForce(Vector3.forward * -
Mathf.Abs(this.m_SwayVel.y * (this.PositionFallRetract * 2.5E-05f)));
        this.m_PositionSpring.AddForce(new Vector3(vector.x * -
(this.PositionWalkSlide.x * (Time.deltaTime * 0.048f)), -Mathf.Abs(vector.x * -
(this.PositionWalkSlide.y * (Time.deltaTime * 0.048f))), -vector.z * -
(this.PositionWalkSlide.z * (Time.deltaTime * 0.048f))));

        this.m_RotationSpring.AddForce(new Vector3(-Mathf.Abs(vector.x * -
(this.RotationStrafeSway.x * (Time.deltaTime * 4.8f))), -(vector.x * -
(this.RotationStrafeSway.y * (Time.deltaTime * 4.8f))), vector.z * -
(this.RotationStrafeSway.z * (Time.deltaTime * 4.8f))));

    }

    protected virtual void UpdateBob()
    {
        if (!(this.BobAmplitude == Vector4.zero))
        {
            if (!(this.BobRate == Vector4.zero))
            {
                float arg_7E_1;

                arg_7E_1 = this.Controller.velocity.sqrMagnitude;
                if (this.BobRequireGroundContact)
                {
                    if (!this.Controller.isGrounded)
                    {
                        arg_7E_1 = 0f;
                    }
                }
            }

            this.m_BobSpeed = arg_7E_1;
            this.m_BobSpeed = Mathf.Min(this.m_BobSpeed * -
this.BobInputVelocityScale, this.BobMaxInputVelocity);
            this.m_BobSpeed = Mathf.Round(this.m_BobSpeed * -
1000f) / 1000f;
            if (this.m_BobSpeed == 0f)
            {
                this.m_BobSpeed =

```

```

        Mathf.Min(this.m_LastBobSpeed * (Time.deltaTime * 27.9f),
this.BobMaxInputVelocity);
    }
    this.m_CurrentBobAmp.x = this.m_BobSpeed *
(this.BobAmplitude.x * -0.0001f);
    this.m_CurrentBobVal.x = Mathf.Cos(Time.time *
(this.BobRate.x * 10f)) * this.m_CurrentBobAmp.x;
    this.m_CurrentBobAmp.y = this.m_BobSpeed *
(this.BobAmplitude.y * 0.0001f);
    this.m_CurrentBobVal.y = Mathf.Cos(Time.time *
(this.BobRate.y * 10f)) * this.m_CurrentBobAmp.y;
    this.m_CurrentBobAmp.z = this.m_BobSpeed *
(this.BobAmplitude.z * 0.0001f);
    this.m_CurrentBobVal.z = Mathf.Cos(Time.time *
(this.BobRate.z * 10f)) * this.m_CurrentBobAmp.z;
    this.m_CurrentBobAmp.w = this.m_BobSpeed *
(this.BobAmplitude.w * 0.0001f);
    this.m_CurrentBobVal.w = Mathf.Cos(Time.time *
(this.BobRate.w * 10f)) * this.m_CurrentBobAmp.w;
    this.m_RotationSpring.AddForce(this.m_CurrentBobVal *
Time.timeScale);
    this.m_PositionSpring.AddForce(Vector3.forward *
this.m_CurrentBobVal.w * Time.timeScale);
    this.m_LastBobSpeed = this.m_BobSpeed;
    return;
}
}
}

```

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SDX XPath Configurations

SDX supports different ways to insert XML files from your mod's Config folder.

set - Replaces attributes

append - Adds a node or nodes

remove - Removes a node or nodes

insertBefore - Allows you to add a node before another node

insertAfter - Allows you add a node before another node
insertAfter - Allows you add a node directly after another node

Set Example:

The Bigger Back Pack mod includes an example for the <set> tag

```
<set  
xpath="/windows/window[@name='windowBackpack']/panel[@name='content']/grid[@na-  
me='inventory']/@rows">5</set>
```

Append Example:

The Katana Mod includes an example for the `<append>`. Basically, it tells SDX to add the following snippets

to the bottom of the node.

```
<append xpath="/items">
    <!-- more XML Nodes -->
</append>
```

In the above example, it will include all the subsequent nodes at the bottom of the Items list.

remove Example:

The remove node can be used to remove a complete node.

```
<remove xpath="/items/item[@name='club']" />
```

This tells SDX to remove the club item.

insertBefore / insertAfter

This tells SDX to insert the node before, or after the xpath location.

```
<insertAfter xpath="/items/item[@name='club']" >
    <!-- mode XML Nodes -->
</insertAfter>
```

Any XML nodes will be inserted after the Club item.

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Creating an XPath Line



Now that you've completed the Intermediate Tutorial successfully, it's time to show you a bit about XPath

The XML portion of the Bigger Back Pack mod can be a bit confusing, because of the xpath.

I recommend using a site like https://xmltoolbox.appspot.com/xpath_generator.html to help generate your xpath. You will still need to make some changes, but it'll go a long way.

XmlToolBox

[Xml formatter](#) ➔ [Xpath generator](#) [Xpath evaluator](#) [Features](#) [About](#) [Blog](#)

Xpath generator

1. Insert your xml in to the big field.
2. To generate an xpath. Place the cursor in the text, attribute or element you want an xpath to.

Xml field.

In the XML Input, copy and paste the window.xml file, found under your Data/Config/XUi/windows.xml

Xml field.

```
<windows>
    <window name="HUDLeftStatBars">
        <grid name="hud" pos="9,98" rows="2" cols="1" width="168" cell_width="168" cell_height="46" repeat_content="false" side="left">
            <rect width="168" height="43" controller="HUDStatBar" stat_type="Stamina" visible="(statvisible)">
                <sprite depth="1" name="border" color="0,0,0,100" height="43" type="sliced" />
                <sprite depth="2" pos="3,-3" name="background" height="37" width="162" color="64,64,64,100" type="sliced" />
                <sprite depth="3" pos="3,-3" name="BarContent" sprite="(statimage|once)" type="filled" height="37" width="162" fill="0" />
                <sprite depth="4" name="Icon" atlas="{staticonatlas|once}" sprite="{staticon|once}" size="32,32" pos="8,-6" foregroundlayer="true" />
                <label depth="6" name="TextContent" pos="0,-8" font_size="28" color="white" justify="center" pivot="topleft" text="(statcurrentwithmax)" height="30" />
            </rect>
            <rect width="168" height="43" controller="HUDStatBar" stat_type="Health" visible="(statvisible)">
                <sprite depth="1" name="border" color="0,0,0,100" height="43" type="sliced" />
                <sprite depth="2" pos="3,-3" name="background" height="37" width="162" color="64,64,64,100" type="sliced" />
                <sprite depth="3" pos="3,-3" name="BarContent" sprite="(statimage|once)" type="filled" height="37" width="162" fill="0" />
                <sprite depth="4" name="Icon" atlas="{staticonatlas|once}" sprite="{staticon|once}" size="32,32" pos="8,-6" foregroundlayer="true" />
                <label depth="6" name="TextContent" pos="0,-8" font_size="28" color="white" justify="center" pivot="topleft" text="(statcurrentwithmax)" height="30" />
            </rect>
        </grid>
        <rect name="hud" pos="93,124" side="left" controller="BuffPopoutList" pivot="BottomLeft">
            <panel width="168" height="43" name="item" visible="false" pivot="right" disableautobackground="true" pos="70, 0">
                <sprite depth="2" pos="0,0" name="Background" sprite="ui_game_popup" height="43" width="162" pivot="center" flip="Horizontally" color="transparent" />
                <sprite depth="4" name="Icon" size="36,32" pos="-58,0" pivot="center" color="transparent" />
                <label depth="6" name="TextContent" pos="0,-8" font_size="28" color="white" justify="center" height="30" pivot="center" />
            </panel>
        </rect>
    </window>
</windows>
```

Once the XML is copy / pasted, you can now click on different values inside of the XML box to get it's Xpath result:

Note: I highlighted the 'controller' name for visibility. In order to get the XPath value, you do not need to highlight, just click on it.

Xml field.

```
<windows>
    <window name="HUDLeftStatBars">
        <grid name="hud" pos="9,98" rows="2" cols="1" width="168" cell_width="168" cell_height="46" repeat_content="false" side="left">
            <rect width="168" height="43" controller="HUDStatBar" stat_type="Stamina" visible="(statvisible)">
                <sprite depth="1" name="border" color="0,0,0,100" height="43" type="sliced" />
                <sprite depth="2" pos="3,-3" name="background" height="37" width="162" color="64,64,64,100" type="sliced" />
                <sprite depth="3" pos="3,-3" name="BarContent" sprite="(statimage|once)" type="filled" height="37" width="162" fill="0" />
                <sprite depth="4" name="Icon" atlas="{staticonatlas|once}" sprite="{staticon|once}" size="32,32" pos="8,-6" foregroundlayer="true" />
                <label depth="6" name="TextContent" pos="0,-8" font_size="28" color="white" justify="center" pivot="topleft" text="(statcurrentwithmax)" height="30" />
            </rect>
            <rect width="168" height="43" controller="HUDStatBar" stat_type="Health" visible="(statvisible)">
                <sprite depth="1" name="border" color="0,0,0,100" height="43" type="sliced" />
                <sprite depth="2" pos="3,-3" name="background" height="37" width="162" color="64,64,64,100" type="sliced" />
                <sprite depth="3" pos="3,-3" name="BarContent" sprite="(statimage|once)" type="filled" height="37" width="162" fill="0" />
                <sprite depth="4" name="Icon" atlas="{staticonatlas|once}" sprite="{staticon|once}" size="32,32" pos="8,-6" foregroundlayer="true" />
                <label depth="6" name="TextContent" pos="0,-8" font_size="28" color="white" justify="center" pivot="topleft" text="(statcurrentwithmax)" height="30" />
            </rect>
        </grid>
        <rect name="hud" pos="93,124" side="left" controller="BuffPopoutList" pivot="BottomLeft">
            <panel width="168" height="43" name="item" visible="false" pivot="right" disableautobackground="true" pos="70, 0">
                <sprite depth="2" pos="0,0" name="Background" sprite="ui_game_popup" height="43" width="162" pivot="center" flip="Horizontally" color="transparent" />
                <sprite depth="4" name="Icon" size="36,32" pos="-58,0" pivot="center" color="transparent" />
                <label depth="6" name="TextContent" pos="0,-8" font_size="28" color="white" justify="center" height="30" pivot="center" />
            </panel>
        </rect>
    </window>
</windows>
```

Xpath results:

```
/windows/window[1]/grid[@name="hud"]//rect[1]@controller
```

The XPath result it came up with is: /windows/window[1]/grid[@name="hud"]//rect[1]@controller

While it may work, we can actually fix it to be even more reliable. By default, it's trying to use /window[1]/, so the first window in the file. However, if we are using a modded windows.xml, or if the vanilla one changes in the future, then this script won't return what you want. Looking at the xml, we know that the window name is actually "HUDLeftStatBars"

Let's fix it:

```
/windows/window[@name='HUDLeftStatBars']/grid[@name="hud"]//rect[1]
@controller
```

The @name= allows us to specify the name attribute as a string. For this example, we want to specify exactly HUDLeftStatBars. If this window ever changes spots in the future, the xpath with the name will still return the right window, while the generated one would likely fail.

The grid, mysteriously, has used the @name tag to make sure the right one is found. So we don't need to fix that one.

The rect[1] value, however, does need to be fixed. For this, we don't have a name attribute, so we need to find another unique attribute to use.

```
<rect width="168" height="43" controller="HUDStatBar" stat_type="Stamina"
visible="{statvisible}">
```

Width, Height, Controller, and visible are not unique, as other <Rect> nodes have it. But the stat_type is unique.

Let's flesh it out:

```
/windows/window[@name='HUDLeftStatBars']/grid[@name="hud"]//rect[@stat_type
="Stamina"]@controller
```

By default, that website uses double quotes to wrap around strings. We'll want to change those to single quotes, as our entire xpath will be wrapped around double quotes.

If we wanted to change that line, our Config xpath command would look like this:

```
<set
xpath="/windows/window[@name='HUDLeftStatBars']/grid[@name='hud']//rect[@stat_t
ype='Stamina']@controller">HUDStatBar2</set>
```

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Quick Start

Impatient? Already went through the Tutorial and just looking to get started without going through each step?

Here's the short and sweet story of building and running your first SDX mod.

- 1) Download the [SDX Modding Kit](#)
- 2) Extract the SDX Modding Kit. *For the purpose of this tutorial, it's assumed to be under C:\SDXModding or D:\SDXModding*
- 3) Copy a vanilla copy of 7 Days To Die to C:\SDXModding\Game\Clean Install\
 - This will be your back up, in case Steam pushes an update.
- 4) Copy another copy of 7 Days to Die to C:\SDXModding\Game\Working
 - This will be the copy of the game that will have SDX added
- 5) Go into C:\SDXModding\SDX0.7.1\ in Explorer
- 6) Double click on SDX7DTD.exe

- 7) Click on the Settings button, and navigate to C:\SDXModding\Game\Working\
- 8) Click on Build
- 9) Click on Play

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Video Tutorials

This tutorial was meant to guide you through the initial steps of getting SDX, installing it and its support tools, as well as compiling the sample mods.

A series of video tutorials have been created to help you with other tools, and to give you different perspectives of some of the items listed in this document.

Unity

xyth has created some great tutorials, and they can be found [here](#)

PatchScripts and Custom Entities

HAL9000 has created some very helpful YouTube videos showing different things you can do with SDX

[7D2D SDX7 - Patch Scripts](#)

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Advanced Tools

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Overview of Tools



The Included Software

[SDX 0.7.x](#)

SDX is used to compile the individual SDX scripts into Mods.dll, add hooks into the Assembly-CSharp.dll, and copies the Resources and icons over.

[GitHub Desktop](#)

For the 7 Days To Die modding community, it is recommended to use GitHub to store and distribute mods. It's free to use, provides a history of changes, and persistent download links.

[Unity Assets Bundle Extractor \(UABE \)](#)

Unity Assets Bundle Extractor (UABE) is a stylish tool that allows editing asset bundles and .assets. It can export .assets files from bundles, import them back, modify most asset formats with plugins and dumps with type information and create a standalone installer from the modifications.

[dnSpy](#)

dnSpy is a tool to reverse engineer .NET assemblies. It includes a decompiler, a debugger and an assembly editor (and more) and can be easily extended by writing your own extension. It uses dnlib to read and write assemblies so it can handle obfuscated assemblies (eg. malware) without crashing.

Optional Software

The following software will be useful when you get more comfortable with SDX, and ready to do more advanced tasks, such as converting and creating your own textures.

[Unity 5.3.8](#)

Unity will allow to manipulate assets, and convert them into a format that SDX needs.

[Blender](#)

Blender is the free and open source 3D creation suite. It supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, even video editing and game creation. This is useful for making new textures and meshes.

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[Unity 5.3.8p2](#)

[Referenced Article](#)

For us, in the 7 Days To Die Community, Unity is the programming environment that is used by 7 Days to Die, as well as the SDX Mods. It allows us to add new models, new textures, and add in scripts that can manipulate the game in ways you've always dreamed about, and in some cases, things you haven't dreamed about.

This section will show you how to install and set up Unity 5.3.8p2.

What is Unity3D?

Unity3D is a powerful cross-platform 3D engine and a user friendly development environment. Easy enough for the beginner and powerful enough for the expert; Unity should interest anybody who wants to easily create 3D games and applications for mobile, desktop, the web, and consoles.

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Installing Unity 5.3.8p2

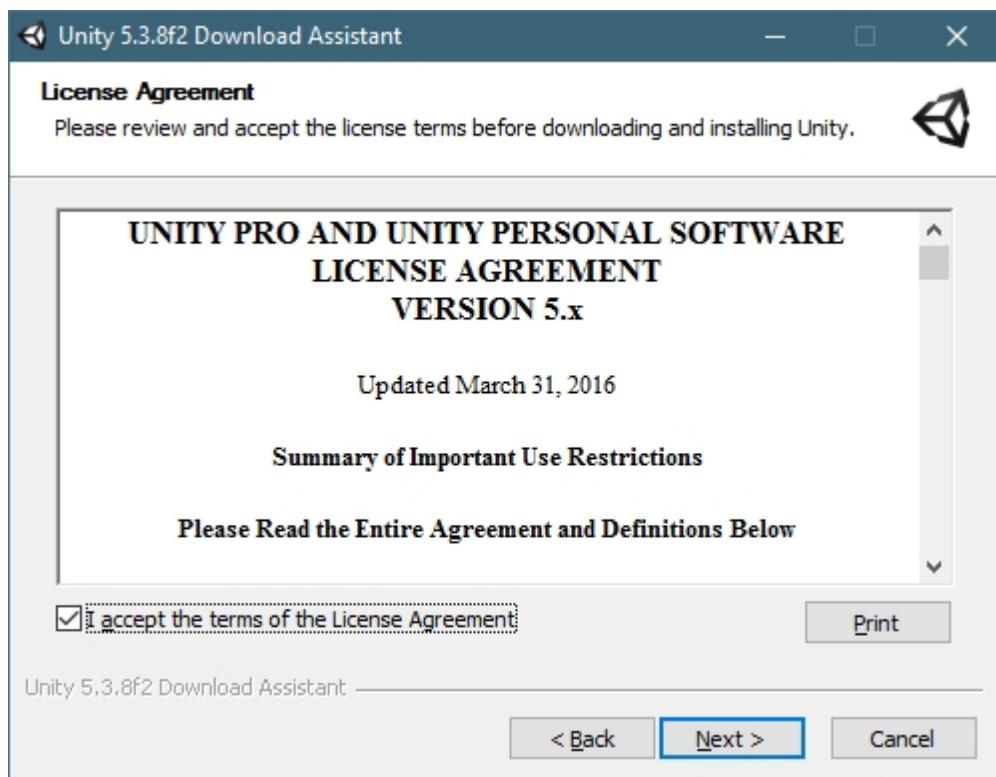
Unity 5.3.8p2

Download and install Unity 5.3.8p2 [here](#). Unity 5.3.8 will allow you to create custom Unity3D bundles, which will be used by SDX to add prefabs, and new blocks.

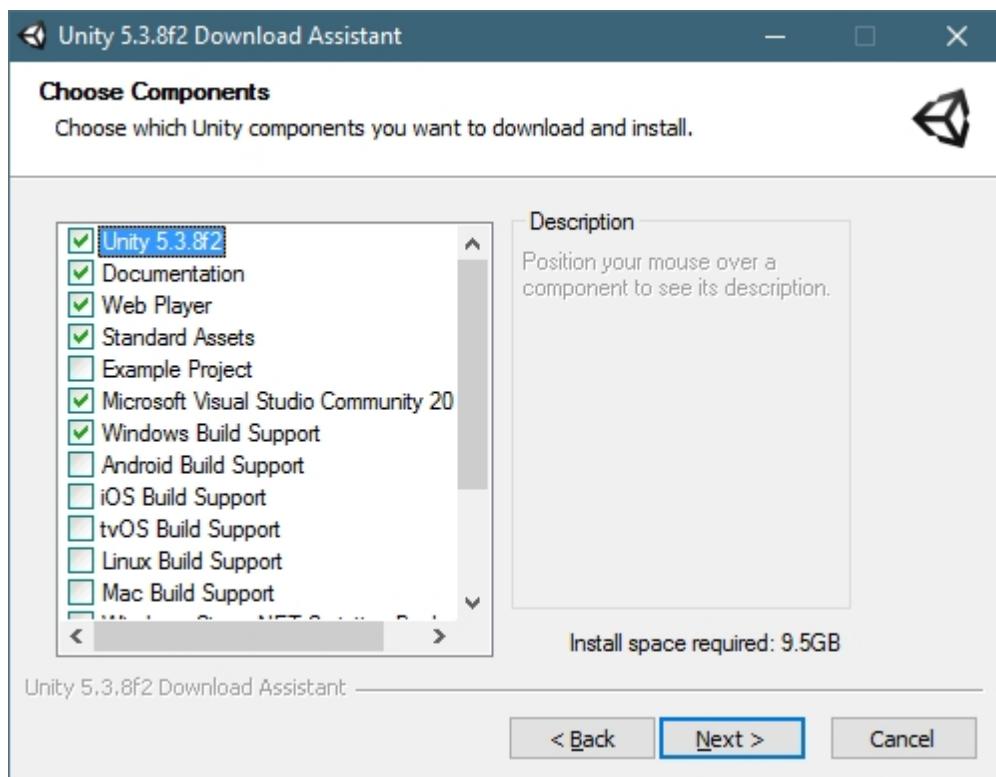
Once downloaded, double click on the UnityDownloadAssistant-5.3.8f2.exe



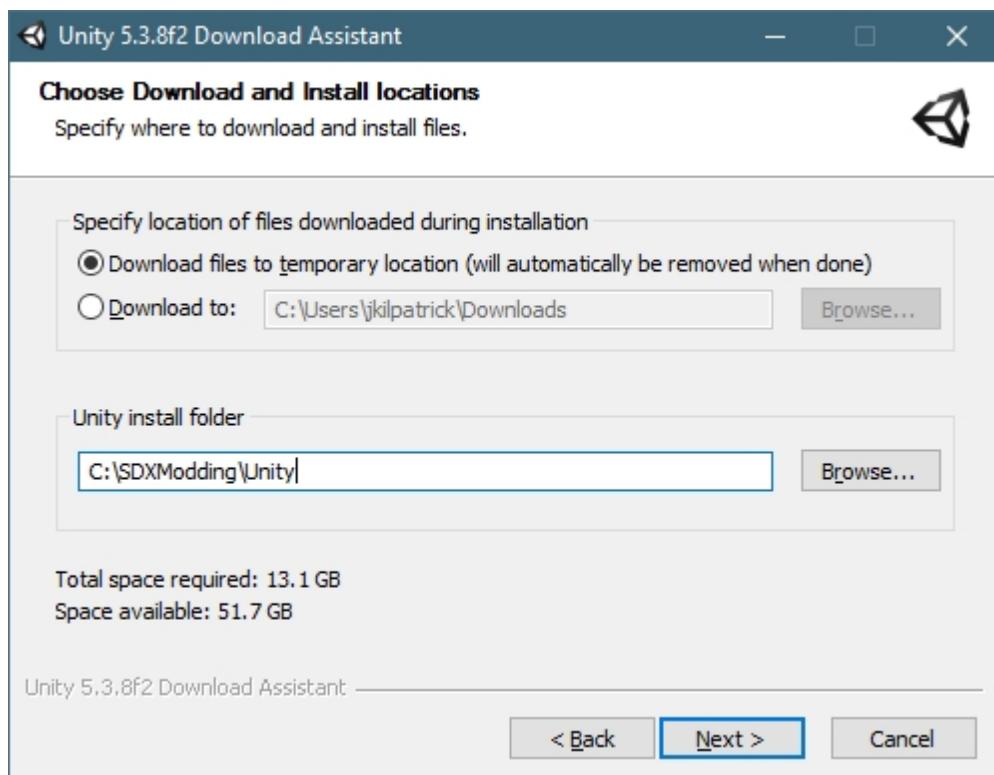
Accept the License Agreement



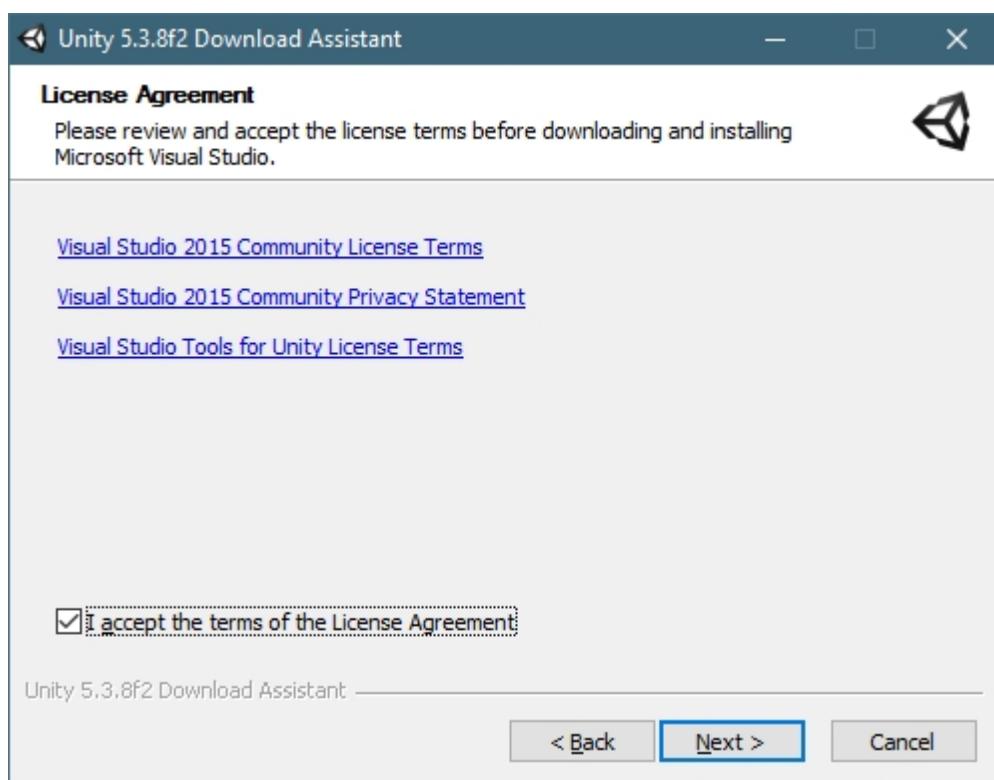
Accept Defaults:



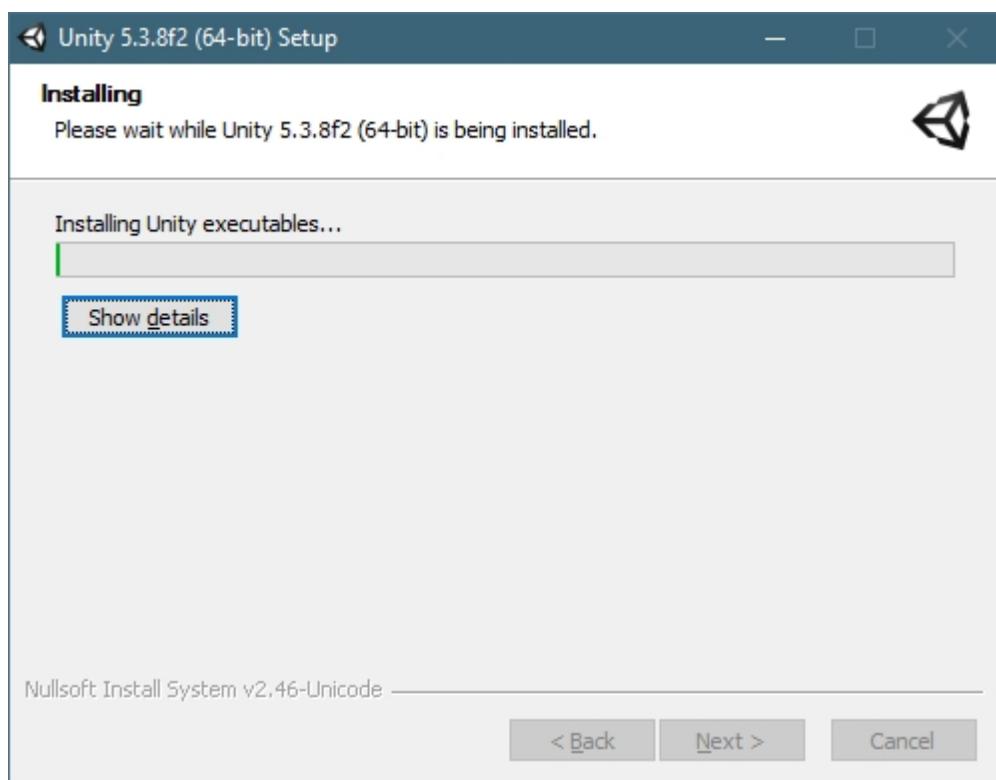
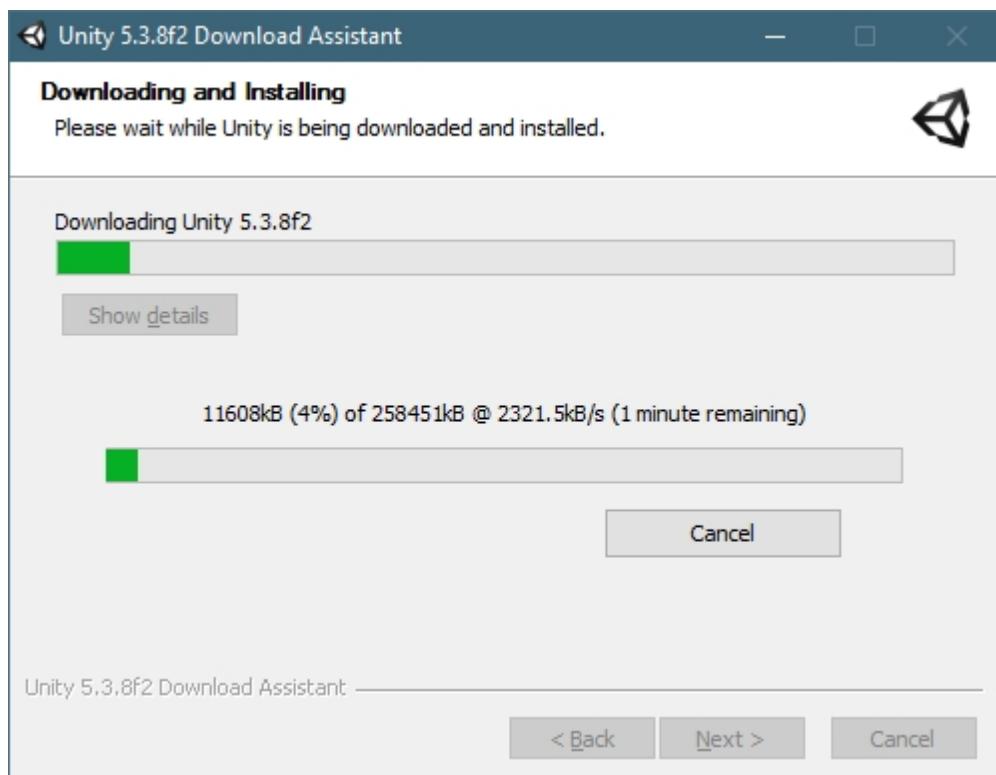
Select the Unity Install location, either as default, or under your C:\SDXModding\ folder.

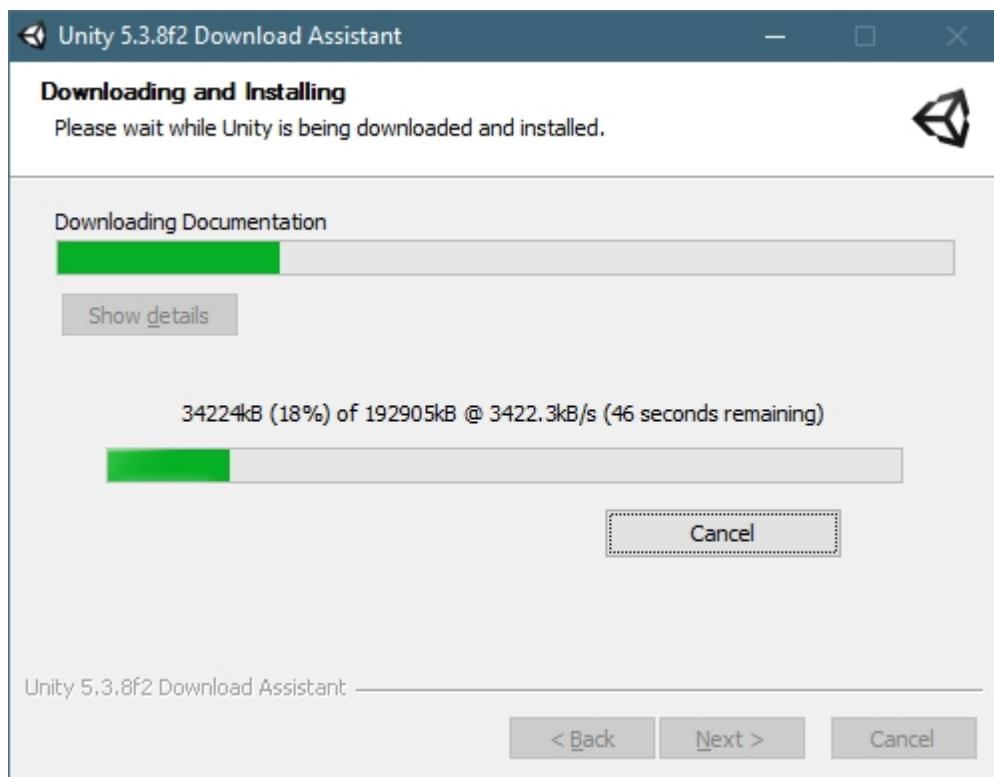


Accept the License Agreement by checking on the check box, once you have reviewed and accepted the licenses

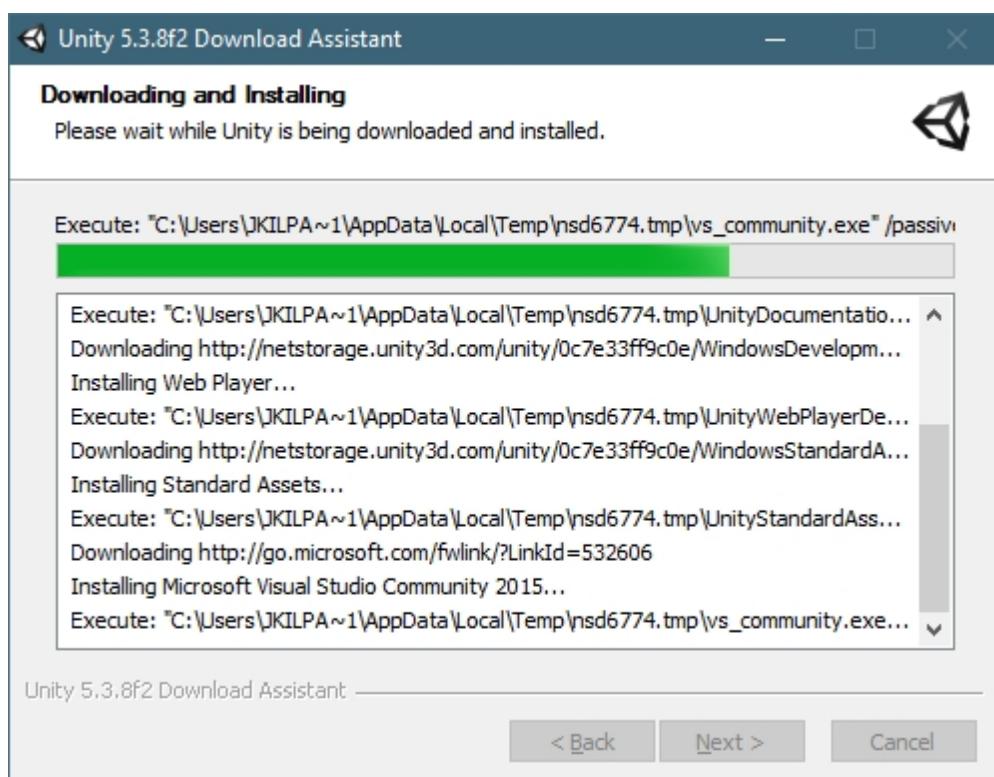


Wait for the automated download and install to be completed

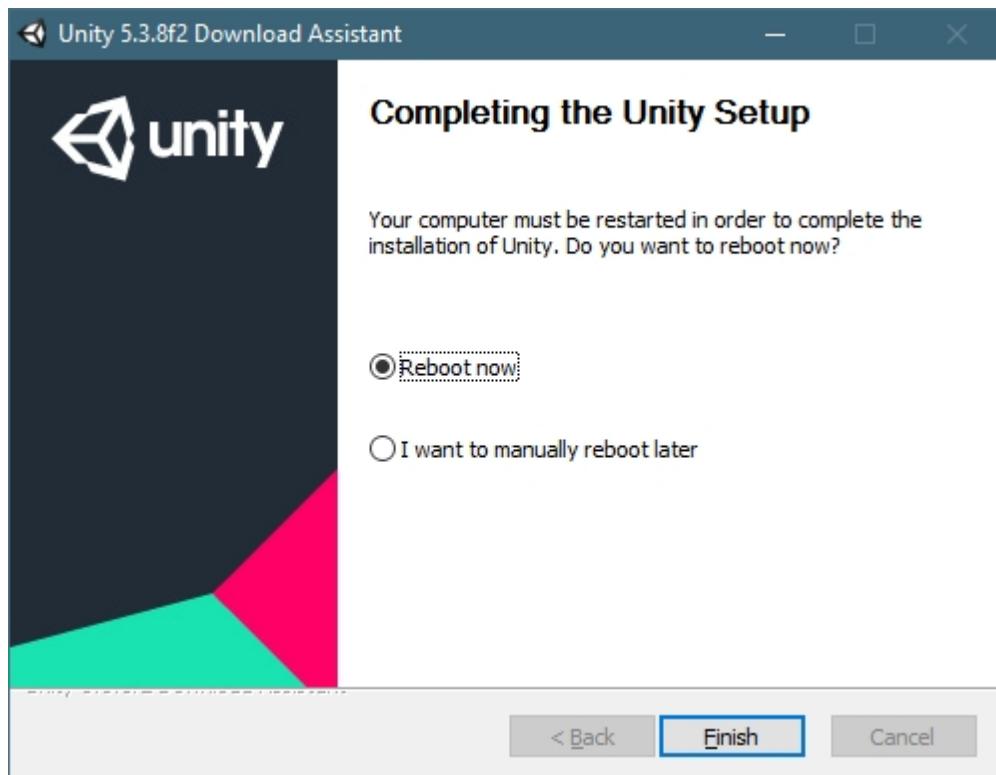




During the installation process, other tools will be installed as needed, such as Visual Studio 2015 Community Edition.



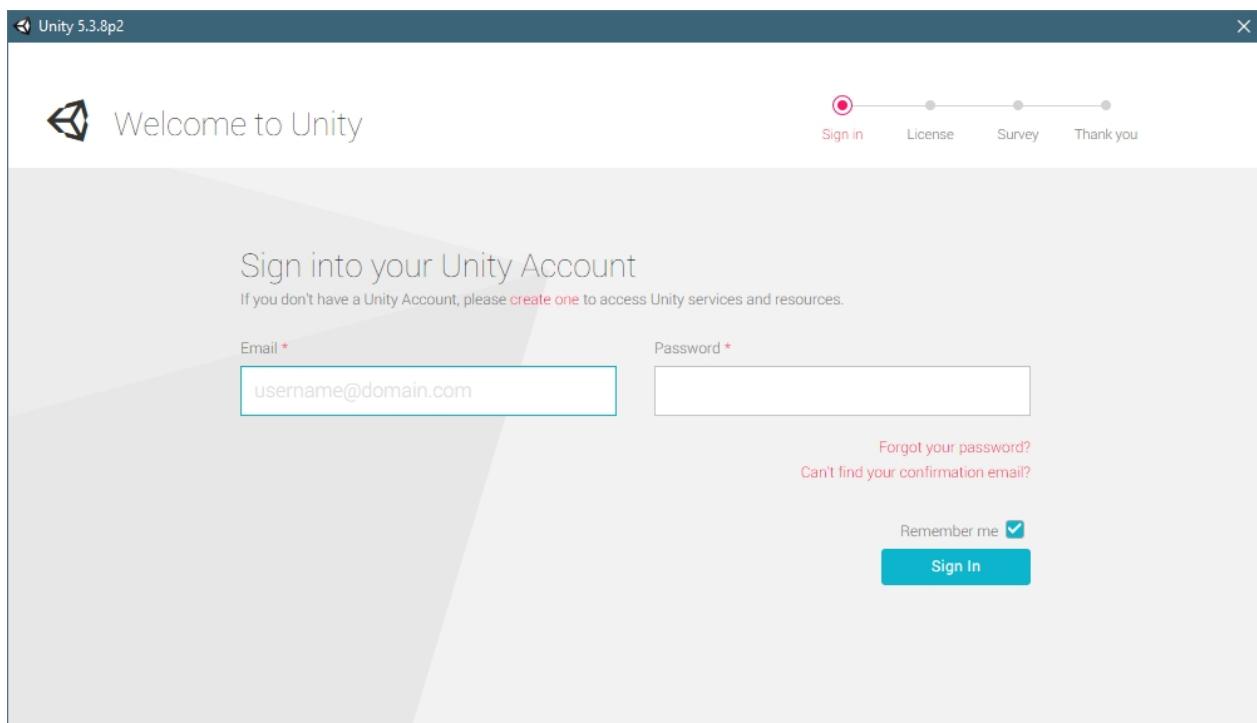
Reboot when done.



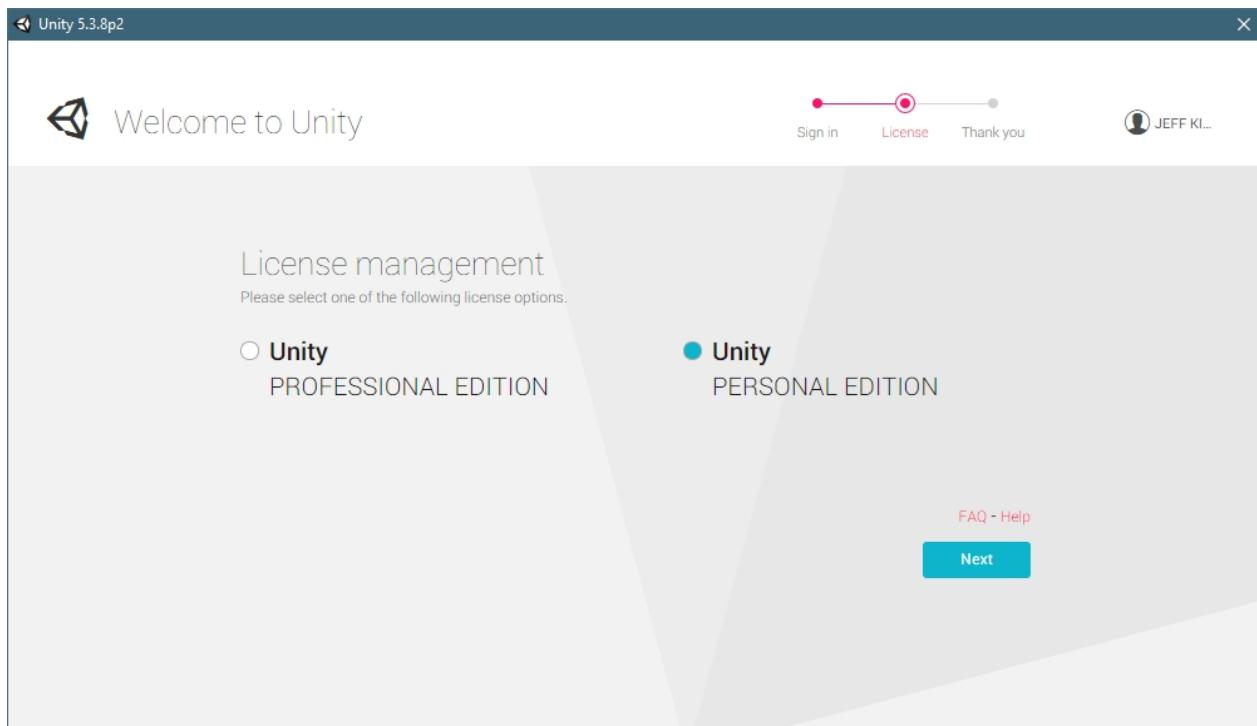
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Starting Unity for the first time

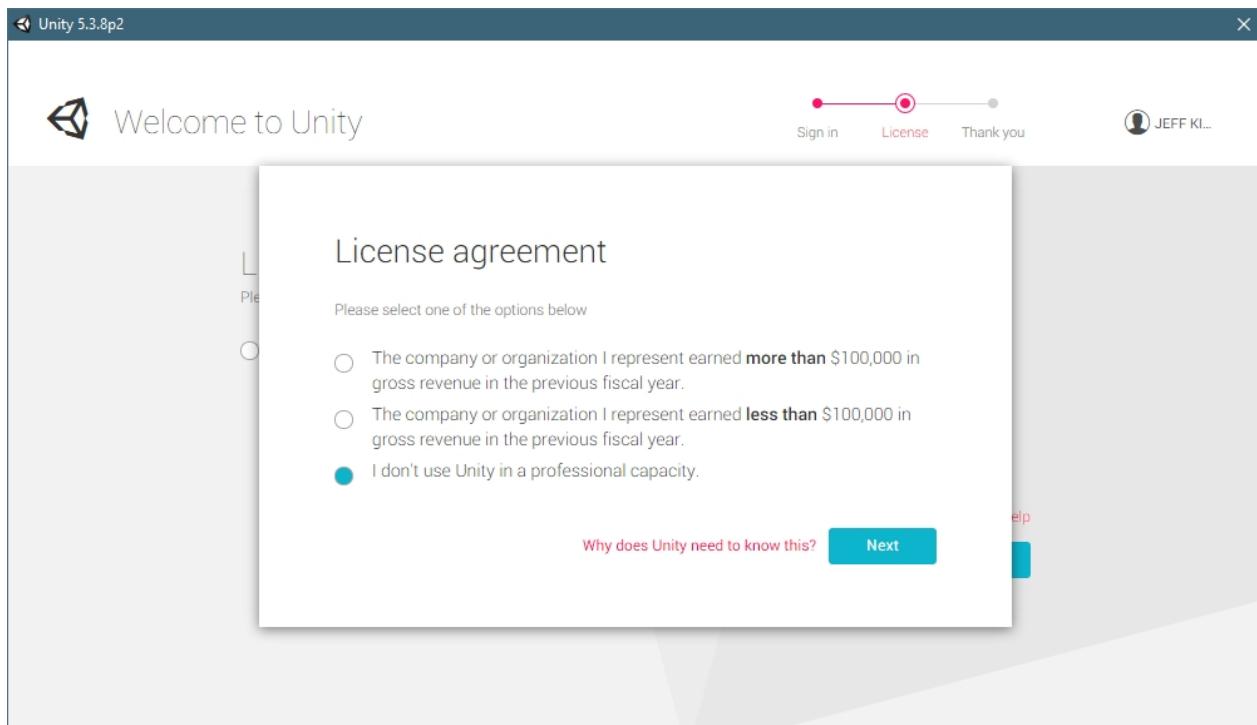
When Unity is started, it will ask you to either login, or create a new account. This will allow you to download assets from the Unity store.



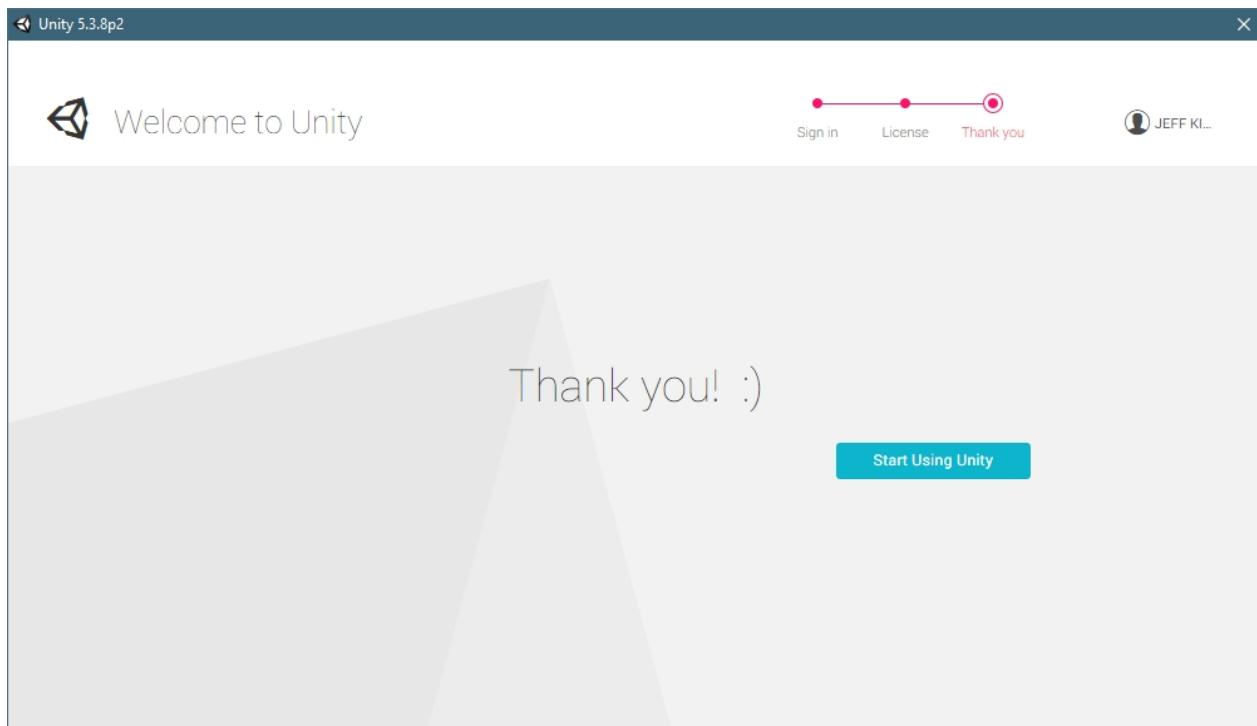
Unity offers two options, Professional Edition or Personal Edition. For this tutorial, we'll select Personal Edition.



Unity is a paid program once your organization makes over \$100,000, and then you must buy a license. Unless you are doing exceptionally well in your modding, you'll want to select the "I don't use Unity in a professional capacity"



After a quick config, Unity is ready for you



GitHub

Referenced Article

For us, in the 7 Days To Die Community, Github is the preferred way to host mods and code, that allows free storage, persistent download links, and a versioning system, so you can see how your mod, or your favorite mod, has evolved over time.

This section will show you how to install and set up GitHub Desktop.

The “Git” in GitHub

To understand GitHub, you must first have an understanding of Git. Git is an open-source version control system that was started by Linus Torvalds – the same person who created Linux. Git is similar to other version control systems – [Subversion](#), CVS, and Mercurial to name a few.

Version control systems

So, Git is a “version control system,” what’s that mean? When developers are creating something (an application, for example), they are making constant changes to the code and releasing new versions, up to and after the first official (non-beta) release.

Version control systems keep these revisions straight, and store the modifications in a central repository. This allows developers to easily collaborate, as they can download a new version of the software, make changes, and upload the newest revision. Every

developer can see these new changes, download them, and contribute.

Similarly, people who have nothing to do with the development of a project can still download the files and use them. Most Linux users should be familiar with this process, as using Git, Subversion, or some other similar method is pretty common for downloading needed files, especially in preparation for compiling a program from source code (a rather common practice for Linux geeks).

In case you are wondering why Git is the preferred version control system of most developers, it has multiple advantages over the other systems available, including a more efficient way to store file changes and ensuring file integrity. If you're interested in knowing the details, check out [this page](#) to read a thorough explanation on how Git works.

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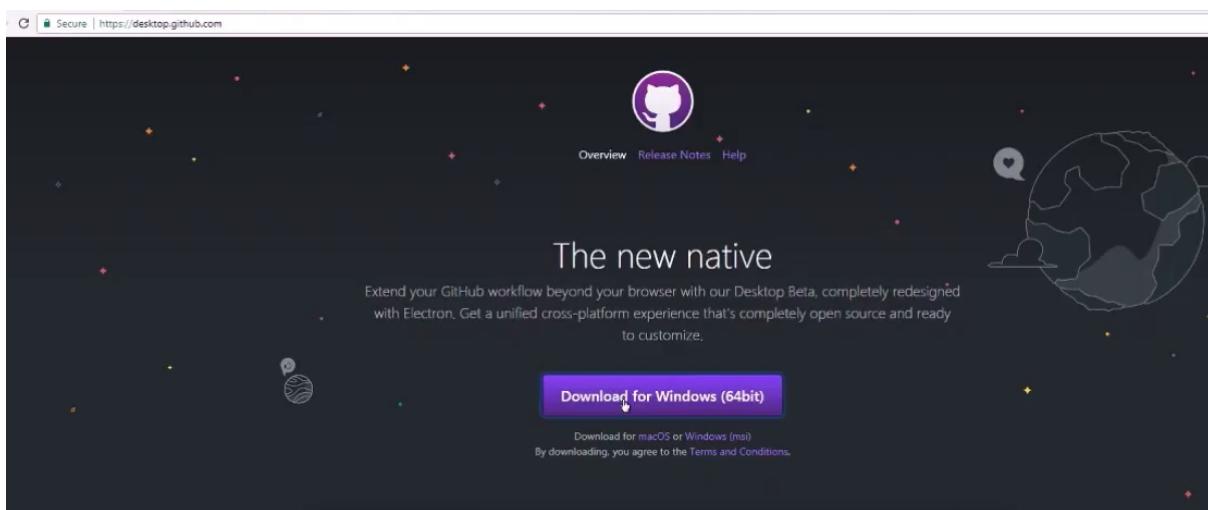
Installing and Configuring Github

GitHub Desktop

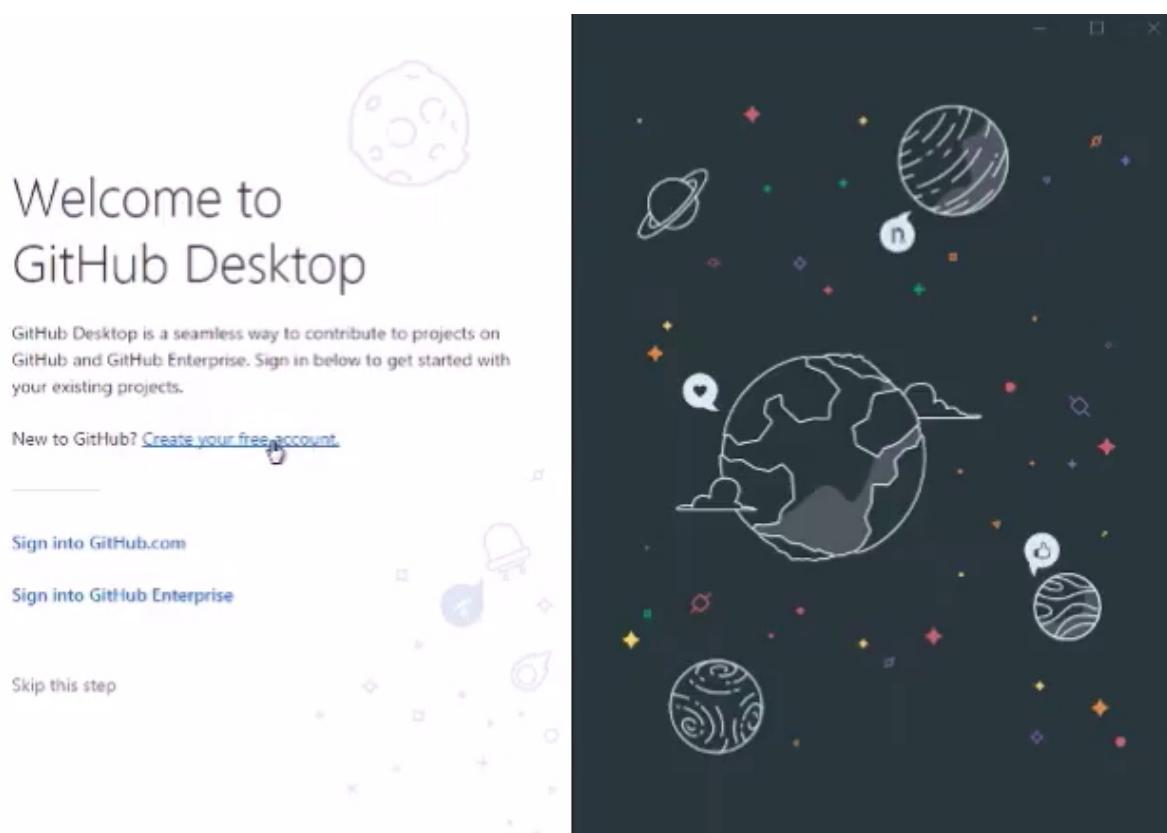
GitHub Desktop is an easy to use tool to manage code. You can download it [here](#).

GitHub is a free hosting site, useful for making small web sites, storing code, and distributing files to other people.

To get started, install [GitHub Desktop](#)



Click on "Create your free account". This will open a new browser window or tab:



Enter in a user name, your email address (you'll get a verify email link), and your password.

Join GitHub

The best way to design, build, and ship software.

Step 1: Create personal account	Step 2: Choose your plan	Step 3: Tailor your experience
------------------------------------	-----------------------------	-----------------------------------

Create your personal account

Username

This will be your username — you can enter your organization's username next.

Email Address

You will occasionally receive account related emails. We promise not to share your email with anyone.

Password

Use at least one lowercase letter, one numeral, and seven characters.

By clicking on "Create an account" below, you are agreeing to the Terms of Service and the Privacy Policy.

[Create an account](#)

You'll love GitHub

- ✓ Unlimited collaborators
- ✓ Unlimited public repositories
- ✓ Great communication
- ✓ Frictionless development
- ✓ Open source community

Accept the default of "Unlimited public repositories for free"

Welcome to GitHub

You've taken your first step into a larger world, @spheretest54.

The screenshot shows the GitHub 'Welcome to GitHub' page. At the top, there are three steps: 'Completed' (Set up a personal account), 'Step 2: Choose your plan' (highlighted in blue), and 'Step 3: Tailor your experience'. The main section is titled 'Choose your personal plan' and contains two options: 'Unlimited public repositories for free.' (selected) and 'Unlimited private repositories for \$7/month.'. Below these options is a note: 'Don't worry, you can cancel or upgrade at any time.' There is also a checkbox for 'Help me set up an organization next' with a descriptive note about organizations. A green 'Continue' button is at the bottom.

Completed
Set up a personal account

Step 2:
Choose your plan

Step 3:
Tailor your experience

Choose your personal plan

Unlimited public repositories for free.

Unlimited private repositories for \$7/month.

Don't worry, you can cancel or upgrade at any time.

Help me set up an organization next

Organizations are separate from personal accounts and are best suited for businesses who need to manage permissions for many employees.

[Learn more about organizations.](#)

Continue

Optionally, you may fill out their small questionnaire

Welcome to GitHub

You'll find endless opportunities to learn, code, and create, @spheretest54.

 Completed
Set up a personal account

 Step 2:
Choose your plan

 Step 3:
Tailor your experience

How would you describe your level of programming experience?

- Very experienced Somewhat experienced Totally new to programming

What do you plan to use GitHub for? (check all that apply)

- School projects Design Project Management
 Research Development Other (please specify)

Which is closest to how you would describe yourself?

- I'm a hobbyist I'm a student I'm a professional
 Other (please specify)


What are you interested in?

e.g. tutorials, android, ruby, web-development, machine-learning, open-source

Submit

[skip this step](#)

Create a New Project

Learn Git and GitHub without any code!

Using the Hello World guide, you'll create a repository, start a branch, write comments, and open a pull request.

[Read the guide](#)

[Start a project](#)



Check your email for the Verification link

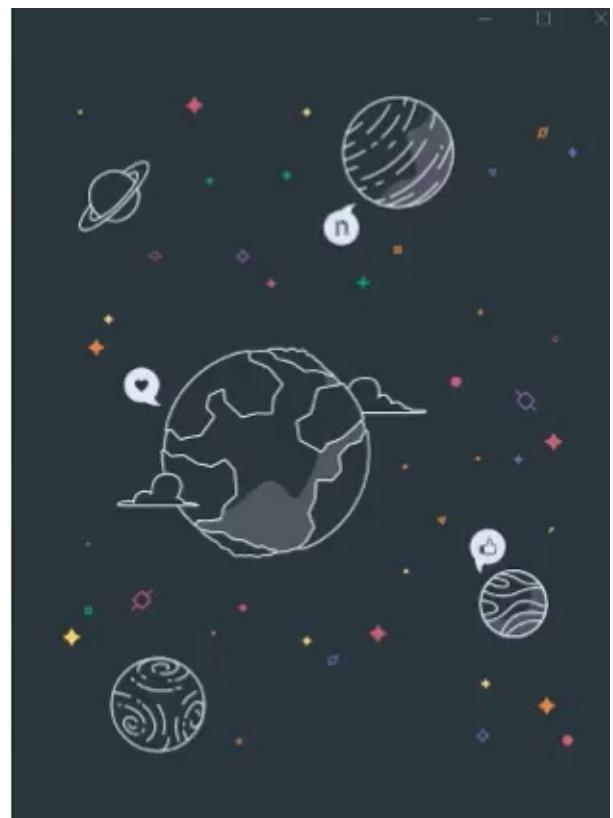
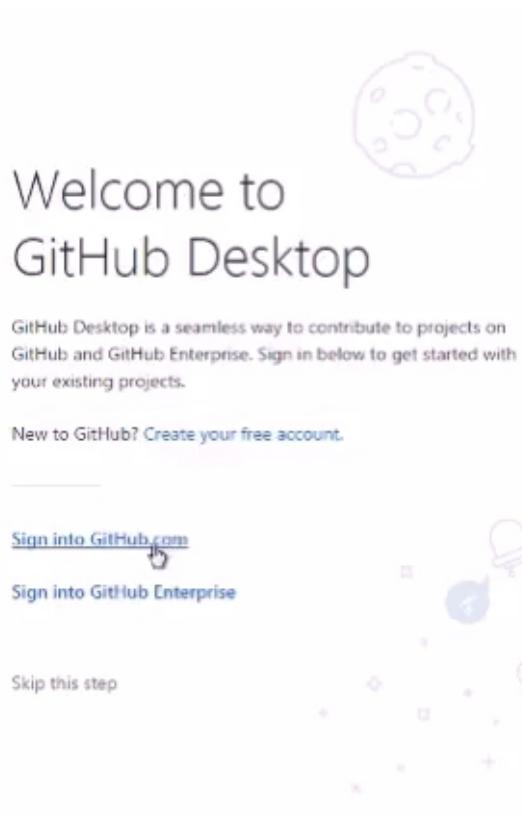


Please verify your email address

Before you can contribute on GitHub, we need you to verify your email address.
An email containing verification instructions was sent to spheretest54@7d2dmodlauncher.org.

[Didn't get the email? Resend verification email or change your email settings.](#)

After verifying your email address, go back to the Github Desktop, and click on "Sign into Github.com"



Enter in your username or email address, and your password.

Sign in to GitHub.com

Username or email address

spheretest54

Password

Sign in

Cancel

[Forgot password](#)

[Sign in using your browser ↗](#)



Configure Git. You can just accept the defaults.

Configure Git

This is used to identify the commits you create. Anyone will be able to see this information if you publish commits.

Name

spheretest54

Email

30330567+spheretest54@users.noreply.github.com

Continue

Cancel

Do more things
2 minutes ago by Hubot

Fix all the things
30 minutes ago by spheretest54

Add some things
an hour ago by Hubot



Click on Finish.

Make GitHub Desktop better!

Would you like to help us improve GitHub Desktop by periodically submitting anonymous usage data?

Yes, submit anonymized usage data

Finish | Cancel



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Unity Asset Bundle Extractor

Unity Assets Bundle Extractor (UABE) is a stylish tool that allows editing asset bundles and .assets. It can export .assets files from bundles, import them back, modify most asset formats with plugins and dumps with type information and create a standalone installer from the modifications.

[You can find DerPopo's thread here on the 7 Days to Die Forum.](#)

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Installing UABE

Unity Asset Bundle Extract

UABE can extract existing unity assets from the game, allow changes, then re-add them.

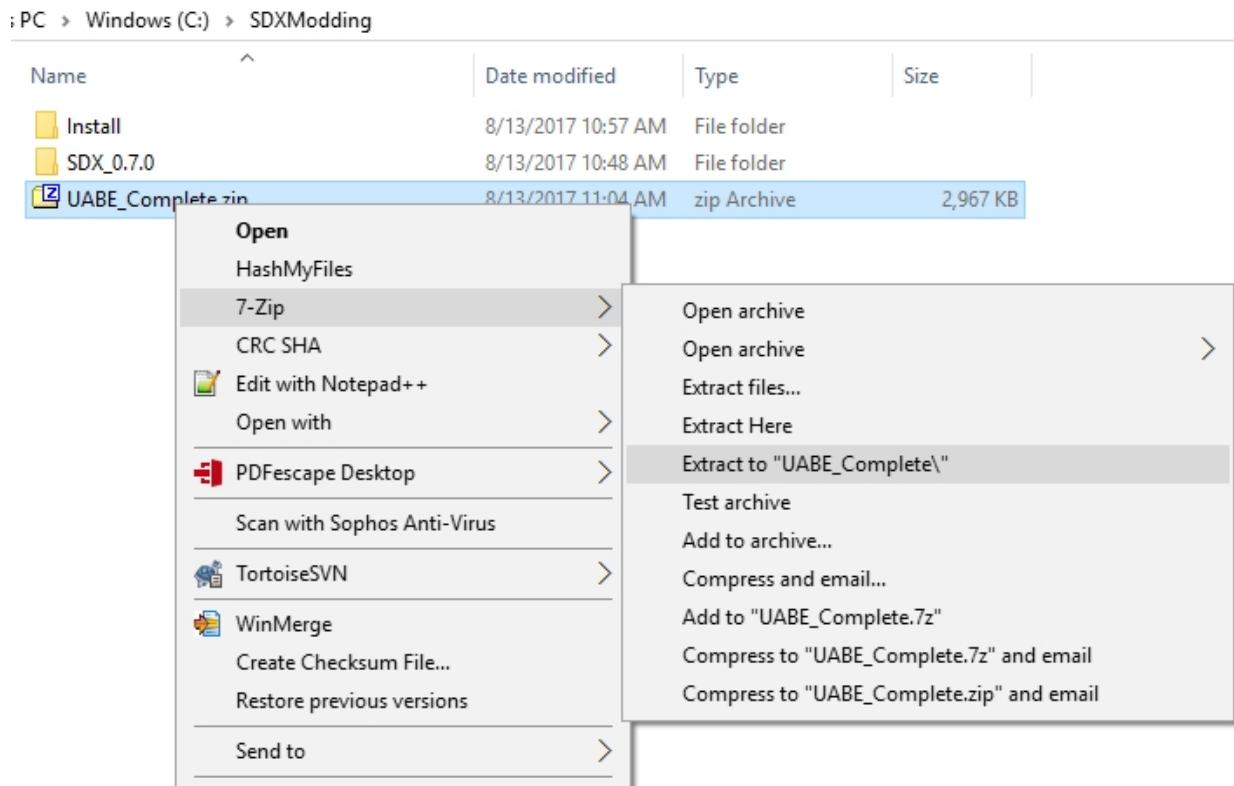
Download UABE tool from [here](#) or [here](#) (mirror).

Note: The mirror link is all of the UABE combined into a merged zip file.

In [this thread](#), find the following and download:

2.0 (32bit : [here](#) or [here](#), 64bit : [here](#) or [here](#))
7dtd UMAMesh plugin for 2.0 ([here](#) or [here](#))
2.0b bugfix, download 2.0 first (32/64bit : [here](#) or [here](#))
New type package with 5.6.0f3 : [here](#) or [here](#)

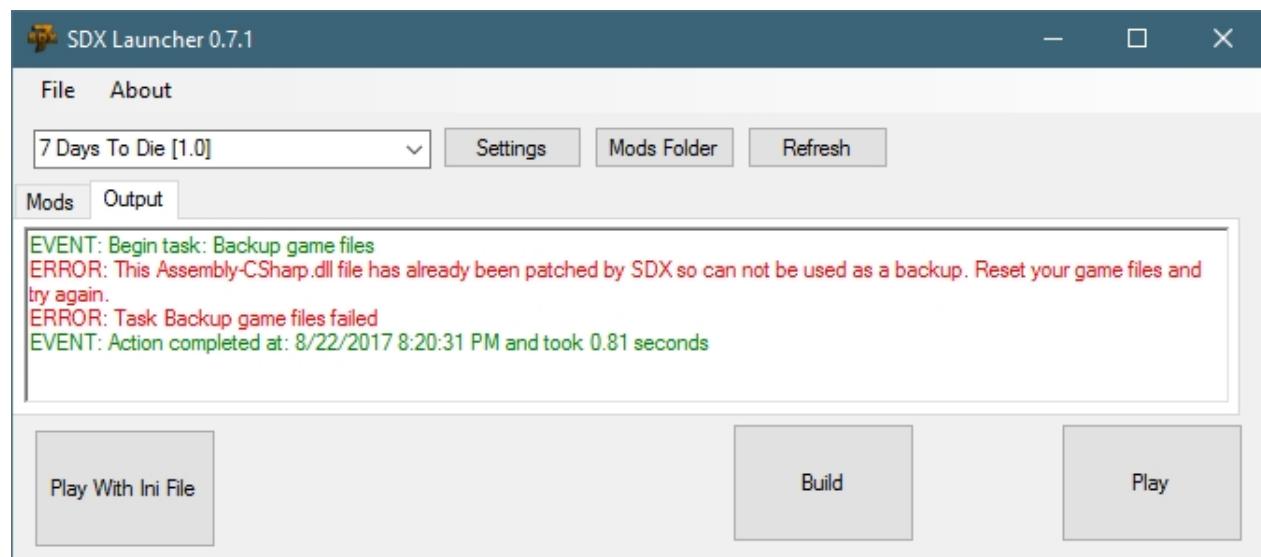
Alternatively, you can download from the mirrored link, with the UABE_Complete.zip.
 Copy the UABE_Complete.zip to your Modding Folder (C:\SDXModding\)
 Right click on UABE_Complete.zip and choose to extract to UABE_Complete



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Troubleshooting

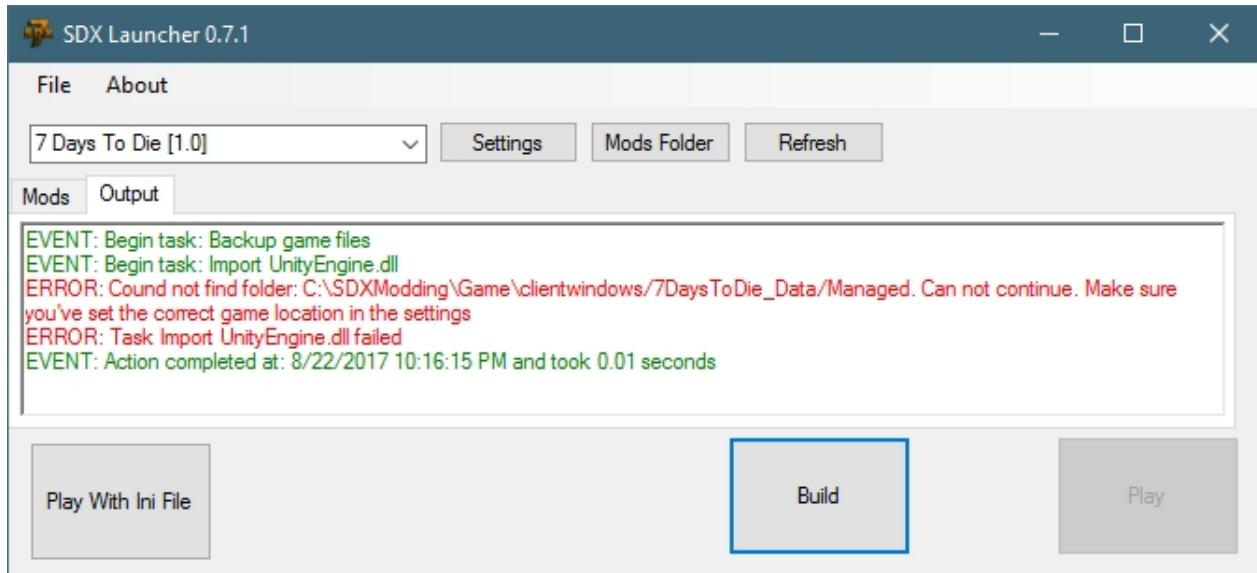
When you press the Build button, you get the following error:



This error gets displayed when you have no local back up of a vanilla file, and the Working folder has already been re-instrumented.

To Fix, follow the instructions in the [Start off Clean section](#).

When you press the Build button, you get the following error:



This indicates that the Path specified in the Settings button isn't pointing to a 7 Days To Die folder.

To Fix, click on the Settings button, and navigate to a valid 7 Days To Die directory.

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