Chapter 1

Basics on Plugin Creation

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This guide will help you with the basics of how to create a plugin for SRPG Studio.

Requirements

To use this guide, you will need this two things:

- Basic knowledge about programming: this software uses JavaScript, so ideally you need to know how to use that language. But if you have knowledge about other languages, you can adapt to it, specially if you already used other object-oriented languages. If you don't know how to use JavaScript, I recommend you check Chapter 0 of the guide, called "Introduction to JavaScript".
- A text editor: you can use a simple editor like Notepad++, or you can use a more advanced one like Visual Studio Code. The selection is up to personal preference. But avoid using the regular Notepad, as that editor lacks some features that are important to write code.

Creating the Plugin

Here we will explain the basics of how to create a plugin, explaining the different methods available and which ones you should use and which ones you should not use.

Method #1 - Editing the original scripts

This method is NOT recommended, but it is the easier to use and to explain.
You can use this to make quick changes if you don't want to make a new file. Keep in mind that any change to the code can be easily restored to default using an option in the editor. You need to go to Help→Restore Data→Script Folder and hit Ok.
Every project has a folder called Script, where all the JavaScript files reside. If you modify one of those files, you can change how the game works. But this is not the right way to create a plugin: those files will reset to default each time the software updates, and even if that wasn't the case, it would be difficult to keep track of each change.
For this reason, every change should have its own separate file. This is why the Plugin folder exists. That is the folder where you can put every custom plugin.

Method #2 – Creating new files

This is the recommended method to make new plugins.
The first step to make a plugin is to create a new file in the Plugin folder of your project. Every custom plugin must be inside that folder, although you can put the files in sub-folders too to organize it better.
It is important that each file must have the .js type. If you want to leave files of other formats in there, like for example a readme.txt file to explain how the plugin works, you need to make sure that the first character of the file's name is '$'. For example, use $readme.txt instead of readme.txt.
Also, if you want any plugin "disabled" while being in the Plugin folder, you can do the same as with the readme file, because the engine will ignore every file of the Plugin folder that starts with the '$' character.
Note that, inside this method, there are two ways to change the functions of the engine. You can overwrite a function or use the call function to make it use both the default and modified versions of the function. Keep in mind that both methods are valid, and can be used for different functions inside the same file.

Method #2.A – Overwriting functions

To use this method, we have to overwrite a function that already exists in the original files, making a new version of said function.
Let's use a small function as an example on how to do this. The next function shown is the function called getHit, and is part of the object in the variable AbilityCalculator. It is located in line 19 of singleton-calculator.js

```
var AbilityCalculator = {

// ...

  getHit: function(unit, weapon) {

        // Hit rate formula. Weapon hit rate + (Ski * 3)

        return weapon.getHit() + (RealBonus.getSki(unit) * 3);

  },

// ...

};
```

Before we can modify this function, we need to change how the function is declared. While you can copy and paste the entire object and do modifications like that, it is not recommended. You only need to grab the function that you are going

to modify. Here is how it would look if we write the getHit function without any changes to a new file.

```
AbilityCalculator.getHit = function(unit, weapon) {

    return weapon.getHit() + (RealBonus.getSki(unit) * 3);

}
```

There are a couple of changes to how the function is written in order to work:

- First, the function need to be called using the name of the object it belongs. In this case, the object is called AbilityCalculator, so instead of calling it getHit, we will call it AbilityCalculator.getHit.
- The other change, while it may seem very small, is importan to make it work. You have to change the ':' between the name of the function and the word function and replace it for a '='.

Method #2.B – Using the call() function

Some times, instead of completely overwriting the function, you would like to add some additional code without modifying the original script. For example, let's grab the same getHit function, but instead of modifying it, we will use the same formula and add the Luck stat of the unit to the result. If we used the method 2.A, the code would look like this.

```
AbilityCalculator.getHit = function(unit, weapon) {

  return weapon.getHit() + (RealBonus.getSki(unit) * 3) +
          RealBonus.getLuk(unit);

}
```

While this method works, it is not ideally. If you know that you are not going to modify the original code, just add new code to it, then you need to use the call() function. What this does is call the original function and returns the result. After this is done, you save the result in a local variable and do the modifications you need before returning the final result. For example, using the same code as before, using the call function would look like this.

```
var oldHitFunction = AbilityCalculator.getHit;
AbilityCalculator.getHit = function(unit, weapon) {
        var hit = oldHitFunction.call(this, unit, weapon);

        return hit + RealBonus.getLuk(unit);
}
```

As you can see, the original function was stored in a variable that can be called whenever you want in the new version of the function. In this example, it was called

at the first line of code, but it can also be called later, depending on what you want to do.

Advantage of method 2.B over 2.A

When reading the script files, the software will give priority to the files inside the Plugin folder over those in the Script folder, so all custom plugins will overwrite the default files. But if there are two files in the Plugin folder that have the same function, only one of them will work.

A way to partially avoid this clash of plugins is to use the call() function, as explained in the method 2.B. For example, we have two plugins, where one overwrites the getHit function to add the Luck stat and the other does the same but add Speed instead. In this case there is a clash, so let's say that the software ends up grabbing the function that add the Luck stat. What happened is that the Speed version overwrote the default function, and then the Luck version overwrote the Speed version. That is a problem, so the solution in this case is to make both functions use the call function. This way, the Luck version, when using the call function, will call the Speed version and then the Speed version will call the default one. Note that if one of them doesn't have the call function, this chain of calls will break.

Warning about the use of method 2.B

If one of your files contains at least one function that uses the call() function, you face a potential problem. Each function that will be called needs to be stored into a variable first. So, if one of the variables of those functions has the same name as another variable storing another function, then you risk the problem of calling the wrong function. To avoid this, we wrap all those variables inside a new function, so their reach doesn’t go beyond the file and can’t be accessed by other plugins.

For example, this is how you should use the getHit function that was explained before.

```
(function() {
    var alias1 = AbilityCalculator.getHit;
    AbilityCalculator.getHit = function(unit, weapon) {

            var hit = alias1.call(this, unit, weapon);

            return hit + RealBonus.getLuk(unit);

    }
})()
```

Now that this is done, you don’t have to worry about the name of the variable, so you can use generic names like the one above: alias1, alias2, etc.

Conclusion

If possible, always use the call function to improve the compatibility of your plugin with others made by you or other people.

Specific Concepts for SRPG Studio

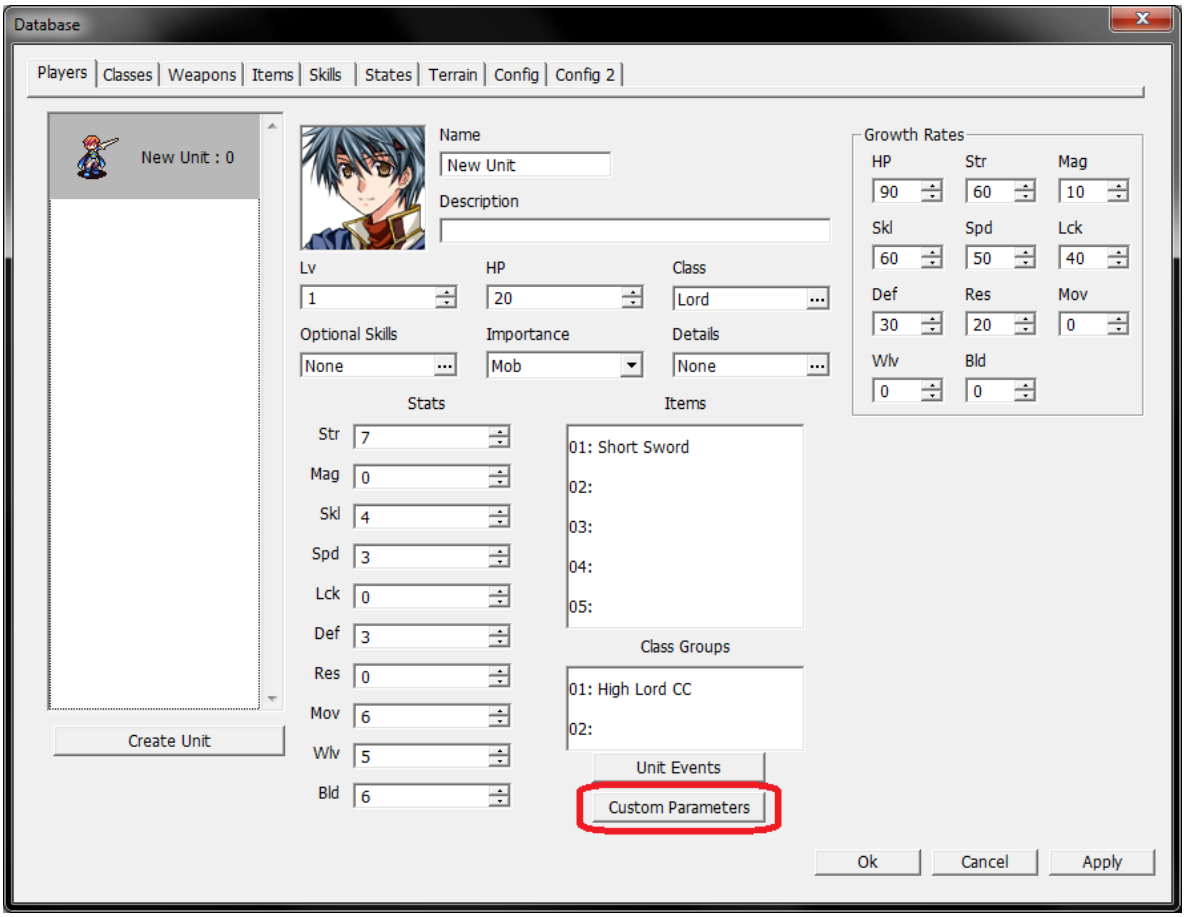
Now that we covered the basics on how to create a plugin, it is time to explain some of the concepts present only in the code of SRPG Studio. Note that the concepts itself are not unique to this engine, but the way the developers apply those concepts rely on objects and functions created for this engine.

Custom Parameters

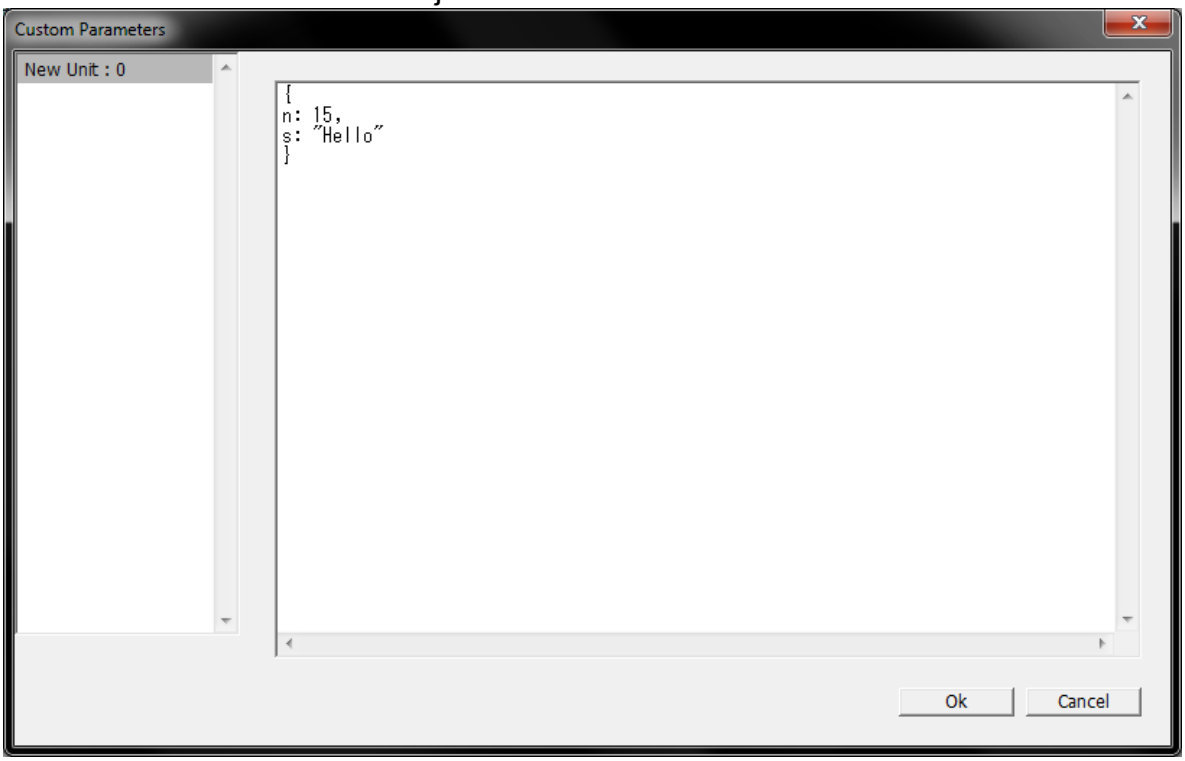
A lot of objects in SRPG Studio come with the “custom” property. Its value is an object, which is usually empty but you can add different values inside this object, like with any other object. This is done using the engine’s editor and can be applied to units, classes, weapons, items, skills, states, terrains, etc.

This can be useful at the time of creating a plugin. For example, giving a boost to a unit if it has a specific custom parameter.

Here we can see that a unit has its own custom parameters that can be accessed with the button circled in red.



Once you click the button, you will see a new window, where you can write the code for the contents of the object.



In this example, we created two values for the object: a number and a string. These values by their self don't do anything, but can be used in a plugin.

```
(function() {
    var alias1 = AbilityCalculator.getHit;
    AbilityCalculator.getHit = function(unit, weapon) {
        var hit = alias1.call(this, unit, weapon);
        var bonus = 0;
        if (unit.custom.n != null) {
            bonus = unit.custom.n;
        }

        return hit + bonus;
    }
})()
```

In this case, the function would change the hit rate formula, so the unit gets a bonus to their hit rate equal to the value specified in the "n" custom parameter. If the unit doesn't have the parameter, then the hit rate is not changed.
It is important to note that if you release a plugin that uses custom parameters to the public, you have to write instructions on how the parameters work. In this case, you would have to explain that the "n" parameter is a number used by units.

Testing Code

There are two functions that are particularly useful to test part of your code before it is done. One of them is msg(), which make a window pop up with the value that is given as parameter. While this is useful for seeing one value at a time, the game is paused every time a message appears. If you want to see several message quickly without pausing the game, it is better to use log(), which shows the message in the console. While the message can be any type of data, it is only useful for numbers, booleans and strings. Other types of values don't properly show in the window or console.

Note: to activate the console, open a game (using either Map Test or Test Play) and then go to Debug→Show Console.

```
(function() {
    var alias1 = AbilityCalculator.getPower;
    AbilityCalculator.getPower = function(unit, weapon) {
        var pow = alias1.call(this, unit, weapon);
        root.msg("Power: " + pow);
        root.log(pow);
        return power;
    }
})()
```

Creation of Objects

There is a function called createObject that is used to create an object based on another already created. This is equivalent to creating a copy of an object. This new object will be independent to the original, so both objects can be used for a different purpose. For example, the function _prepareSceneMemberData from the file scene-freearea.js creates several objects used to handle the logic of the turns of each army on the game.

```
var FreeAreaScene = {

    //...

    _prepareSceneMemberData: function() {
        this._turnChangeStart = createObject(TurnChangeStart);
        this._turnChangeEnd = createObject(TurnChangeEnd);
        this._playerTurnObject = createObject(PlayerTurn);
        this._enemyTurnObject = createObject(EnemyTurn);
        this._partnerTurnObject = createObject(EnemyTurn);
    },

    //...

}
```

TurnChangeStart, TurnChangeEnd, PlayerTurn and EnemyTurn are variables that were created in another place. All of them represent different objects, and with the use of the createObject function, it is possible to create new copies of them.

Creating and Inserting Objects in an Array

There is also another way of creating objects by using functions of an array. There are two functions: appendObject and insertObject. The first one inserts an object at the end of an array, while the second lets you choose the index on where the object will be inserted. Note that using this way is equivalent to creating a new object and then inserting it into an array, so you don't need to call the createObject function.

```
var CombinationBuilder = {
    //...
    _configureCombinationCollector: function(groupArray) {
        groupArray.appendObject(CombinationCollector.Weapon);
        groupArray.appendObject(CombinationCollector.Item);
        groupArray.appendObject(CombinationCollector.Skill);
    }
    //...
}
```

In this example, from the file map-enemyturn.js, an array is filled with three different objects using the appendObject function.

Defining New Objects

There is one function that is used to create new objects based on the functionality of another.

```
var RecoveryItemUse = defineObject(BaseItemUse,
    {
        //...
    }
)
```

This example comes from the file item-recovery.js. The object RecoveryItemUse has the functions necessary for using healing items. But there are some functions that are common to all items, so the object BaseItemUse has all those functions, and RecoveryItemUse copies all those functions and values, adding new functionality. This helps in reducing the amount of repeated code.

So, in conclusion, BaseItemUse has all the generic functions for all items, and then RecoveryItemUse copies those functions. Then, it can overwrite how some functions work and also add new functions.

In this type of relation between objects, we call RecoveryItemUse the "child" and BaseItemUse the "parent".

BaseObject

This is the main object of all the code written by the developers. It contains very little functions and values, and it presents a foundation on which all objects are created. Almost all objects area created by using the defineObject, which makes them childen of BaseObject or children of another object that is a child of BaseObject.

```
var BaseObject = {
    _masterMode: 0,

    changeCycleMode: function(mode) {
        this._masterMode = mode;
    },

    getCycleMode: function() {
        return this._masterMode;
    }
};
```

This object is located in the file base-top.js

Final Notes

The functions defineObject and createObject will be vital at the time of creating complex plugins. There are more functions dedicated to the creation of objects, but those are only usable by some specifics objects, so we will not discuss those here. With the concepts explained in this guide, you should be able to understand more complex guides on how to do major modifications on the engine, including things like changing UI, enemy AI, battle formulas, adding new skills, among others.