**SWEndor**

**Version: v0.1**

SWEndor is a non-commercial flight-simulation game that was initially planned to be a remake of the games originally made by **Bruno. R. Marcos** back in the early 2000s. There are two such games to his name:

The [Battle of Endor](http://www.moddb.com/games/starwars-battle-of-endor) was the first of such game to be published by him, and the project name is thus named in this honor.  
The [Battle of Yavin](http://www.moddb.com/games/starwars-battle-of-yavin) was released soon after.

While Mr. Marcos had released a preview of the [Escape from Hoth](https://www.youtube.com/watch?v=u1ug51qrJwc), the game was unfortunately not yet published at the start of making of this project (January 2018). Eventually, I hope this project can bring even that into fruition.

This project aims to recreate the enjoyable (and rage-inducing, mostly rage-inducing) elements of the original projects by Mr. Marcos. The open-source nature of this project allows for expansion and improvement, which will hopefully bring about other elements that an fellow enthusiast can think up of.

While this project begins as a recreation of Mr. Marco's SW games, this project's core is a 3D flight/combat simulator, and is thus not limited in content. You may use this to recreate a WWII scenario, for instance, should the right models and logical sequence are available.

**Requirements**

The game requires **Microsoft .NET Framework v1.1** and **v2.0**. Note that higher .NET versions up to v3.5 can also support v2.0.

The game uses [TrueVision3D 6.5](http://www.truevision3d.com/) to perform 3D rendering and calculations with DirectX. TV3D can only be run on **32-bit Windows**. The minimum requirements for 3D rendering support are **DirectX 9** and a **matching graphics card (Shader Model 2.0 / 2.0a / 2.0b / 3.0)** to run properly.

While the resource specifications may change with the project, it is recommended to have at least 2 GHz and at least 2 CPU cores for a minimum performance. If you have difficulty running the Main Menu at 50 - 60 FPS, your machine may be not have sufficient capacity to play the game.

This project is created and maintained with **Visual Studio 2015**. It is recommended that programmers who wish to inspect or change the code use **Visual Studio 2015** to do so.

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| Minimum Requirements | Recommended Requirements |
| Microsoft .NET Framework v1.1 | >= 2 CPU cores |
| Microsoft .NET Framework v2.0 | 2 GHz processor |
| DirectX 9.0 |  |
| Graphics Card supporting Shader Model 2.0 / 2.0a / 2.0b / 3.0 |  |

**Installing the Game**

**Starting the game**

To install the game,

**Starting the Game**

**Starting the game**

To start the game,

**Scenario File**

**Format**: INI File.   
**Location**: Defined by the Scenario List file

Scenario files link scripts together into a playable scenario.  
Each scenario file must be placed in the /Data/Scenarios directory for the game to recognize it.

**[General]**

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| --- | --- | --- | --- |
| Key | Type | Default Value | Description |
| Name | **string** |  | The name of the scenario. This will be displayed in the mission selection screen. |
| PlayerName | **string** | “Luke” | The name other actors will call the player craft. |
| Description | **string** |  | The description of the scenario. This will be displayed in the mission selection screen. |
| Wings | **string[]** |  | The list of craft IDs the player is allowed to choose for this mission. |
| Difficulties | **string[]** |  | The list of difficulties the player is allowed to choose for this mission. The difficulty adjustment must be implemented by the scenario itself. |

**[Bindings]**

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| --- | --- | --- | --- |
| Key | Type | Default Value | Description |
| Fn\_load | **string** | “load” | The name of the load function. This function is called at initialisation, after Fn\_loadfaction and Fn\_loadscene. |
| Fn\_loadfaction | **string** | “loadfaction” | The name of the loadfaction function. This function is called at initialisation. |
| Fn\_loadscene | **string** | “loadscene” | The name of the loadscene function. This function is called at initialisation, after Fn\_loadfaction. |
| Fn\_makeplayer | **string** | “makeplayer” | The name of the makeplayer function. Defaults to 'makeplayer'. This function is called every time a player is supposed to respawn, both initially and after each death. The actual respawn logic must be implemented by the scenario itself. |
| Fns\_gametick | **string[]** |  | The list of the tick functions. This function is called every tick of the game. |

**[Bindings]**

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| --- | --- | --- | --- |
| Key | Type | Default Value | Description |
| Win | **string** |  | The audio played with the scenario is won. This path is relative to the /assets/music folder, and excludes the \*.mp3 extension. |
| Lose | **string** |  | The audio played with the scenario is lost. This path is relative to the /assets/music folder, and excludes the \*.mp3 extension. |

**[Scripts]**

The entries in Scripts are a list of script files to be included in this scenario. Each new line corresponds to a new file.  
Each entry is a relative path from this file’s location.  
Each file must be in a script file format.

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| Example |
| [Scripts]  ..\..\Common\Spawn.sw  ..\..\Common\ActorHealth.sw  Script.sw  Message.sw  #Suppose that this scenario file is located in <executable\_path>\data\scenarios\Imperial\13\_8  #The above entries indicate that the following script files will be loaded in order:  #  # <executable\_path>\data\scenarios\Common\Spawn.sw  # <executable\_path>\data\scenarios\Common\ActorHealth.sw  # <executable\_path>\data\scenarios\Imperial\13\_8\Script.sw  # <executable\_path>\data\scenarios\Imperial\13\_8\Message.sw |

**Execution order**

The game, when loading a custom scenario, will load script files defined in its Scenario file.

It will then execute the following functions in order:

- The script whose name is defined under **Fn\_loadfaction**. If a script by this name is not found, this step is skipped.

- The script whose name is defined under **Fn\_loadscene**. If a script by this name is not found, this step is skipped.

- The script whose name is defined under **Fn\_load**. If a script by this name is not found, this step is skipped.

When attempting to generate a player (at initialization or after player death), it will execute the following:

- The script whose name is defined under **Fn\_makeplayer**. If a script by this name is not found, this step is skipped.

Every game tick, the game will execute the following:

- The scripts whose names are defined under **Fns\_gametick**.

**Script File**

**Format**: Script File.   
**Location**: Defined by the Scenario file

Script files are used by the game to define programmable logic.  
They have a custom syntax that is interpreted by the game engine to generate behaviour. This way you can define your own scenario without needing to modify the game program.

**Syntax**

Script files take a pseudo-C style language syntax.

A script may look a bit like this:

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| Example |
| float3 faction\_empire\_color = { 0, 0.8, 0 };  int tiea1;  loadfaction:  Faction.Add("Empire", faction\_empire\_color);  load:  // spawns the player  string tiea1\_type = GetPlayerActorType();  float3 tiea1\_pos = {100, 0, 10000};  float3 tiea1\_rot = {0, -180, 0};  tiea1 = Actor.Spawn(tiea1\_type, "Alpha-1", "", "", 0, "Empire", tiea1\_pos, tiea1\_rot);  Actor.SetProperty(tiea1, " Health.MaxShd", 25);  Actor.QueueLast(tiea1, "wait", 2.5);  Actor.AddToSquad(Player.GetActor(), tiea1); |

The base structure of a script takes the form of a series of statements separated by script headings:

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| **// global statements**  **float3** faction\_empire\_color = { 0, 0.8, 0 };  **int** tiea1; |
| **// script header - loadfaction**  **loadfaction:**  **// statements within script “loadfaction”**  **Faction.Add**("Empire", faction\_empire\_color); |
| **// script header - load**  **load:**  **// statements within script “load”**  // spawns the player  **string** tiea1\_type = **GetPlayerActorType**();  **float3** tiea1\_pos = {100, 0, 10000};  **float3** tiea1\_rot = {0, -180, 0};  tiea1 = **Actor.Spawn**(tiea1\_type, "Alpha-1", "", "", 0, "Empire", tiea1\_pos, tiea1\_rot);  **Actor.SetProperty**(tiea1, " Health.MaxShd", 25);  **Actor.QueueLast**(tiea1, "wait", 2.5);  **Actor.AddToSquad**(**Player.GetActor**(), tiea1); |

The script file begins with global statements, until a script header is encountered.

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| **// global statements**  **float3** faction\_empire\_color = { 0, 0.8, 0 };  **int** tiea1; |

The script header contains the name of the script, followed by the colon (':') sign.

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| **loadfaction:** |

The script header is followed by script body which consists of a number of statements, until either another header or end of file is encountered.

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| **loadfaction:**  **Faction.Add**("Empire", faction\_empire\_color); |

Each statement is terminated by the semicolon (';') literal.

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| **string** tiea1\_type = **GetPlayerActorType**();  **float3** tiea1\_pos = {100, 0, 10000};  **float3** tiea1\_rot = {0, -180, 0}; |

A statement may span multiple times, but must be ended by the semicolon (';') literal.

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| tiea1 = **Actor.Spawn**(  tiea1\_type,  "Alpha-1",  "",  "",  0,  "Empire",  tiea1\_pos,  tiea1\_rot); |

A statement usually comprises one or more expression phrases, which is a basic block of operations.

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| Examples of statements |
| float3 faction\_empire\_color = { 0, 0.8, 0 };  loadfaction:    load:  // spawns the player  string tiea1\_type = GetPlayerActorType();  float3 tiea1\_pos = {100, 0, 10000};  float3 tiea1\_rot = {0, -180, 0};  tiea1 = Actor.Spawn(tiea1\_type, "Alpha-1", "", "", 0, "Empire", tiea1\_pos, tiea1\_rot);  Actor.SetProperty(tiea1, " Health.MaxShd", 25);  Actor.QueueLast(tiea1, "wait", 2.5);  Actor.AddToSquad(Player.GetActor(), tiea1); |
| bool enabled; |
| Faction.Add("Empire", faction\_empire\_color); |
| float[] actor\_ids = {12, 24, 360}; |
| j += 1; |

An expression usually comprises one or more literal instances, joined by some operator or function block.

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| Examples of expressions |
| { 0, 1, 2 } |
| 2 + 1 |
| "Alpha-” + i |
| actor\_hp > 10 |

A literal is a single unit. It usually represents the smallest semantic unit of expression.

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| Examples of literals | | |
| Boolean | Represented by (true|false) | true | |
| Decimal integer | Represented by a series of digits. May be prefixed with a negative sign. | **256**  **-12** | |
| Hexadecimal integer | Represented by the prefix ‘0x’ followed by a series of digits | **0x12**  **0x0100** | |
| Floating-point | Represented by a decimal format with a decimal point | **0.025**  **10.0** | |
| String | Represented by quoted strings | “example”  “this is a string” | |
| Variable | Represented by any unquoted string beginning with a character beginning with alphabet (A-Z, a-Z) or an underscore (\_). | actor\_hp  \_x | |

Some words are reserved as keywords and cannot be used as variable names.

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| Reserved keywords | |
| if  else  then  for  foreach  in |

Unary operators are applied to a single operand. This operand can be a literal or an expression

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| Unary operators | | |
| +x | Identity | **+25** | |
| -x | Numeric negation. Use on numeric operands only. | **-12** | |
| !x | Logical Negation. Use on **bool** operands only. | **!true**  **!(x > 5)** | |
| ~x | Alias of !x | **~(y == 0)** | |

Binary operators are applied to two operands. Each operand can be a literal or an expression.

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| Binary operators | | |
| x + y | Returns the sum of x and y if both are numeric, or the concatenation of x and y if at least one of them is a string. Does not work on **bool** or other formats. | **1.05 + 2**  **“part ” + “one”**  **“part “ + 1** | |
| x – y | Returns the difference of x and y if both are numeric, the result is negative if y is larger than x. Does not work on **bool**, **string** or other formats. | **90 – 45.1** | |
| x \* y | Returns the multiplicative result of x and y if both are numeric. Does not work on **bool**, **string** or other formats. | **0.1 \* 0.8** | |
| x / y | Returns the division result of x and y if both are numeric. Does not work on **bool**, **string** or other formats. | **0.2 / 45** | |
| x % y | Returns the modulus result of x and y if both are numeric. Does not work on **bool**, **string** or other formats. | **10.1 % 3** | |
| x || y | Returns the logical OR of x and y. This operation performs lazy evaluation; y need not be evaluated if x is true. Both operands must be **bool**. | **(i == 3) || (j == 2)** | |
| x && y | Returns the logical AND of x and y. This operation performs lazy evaluation; y need not be evaluated if x is false. Both operands must be **bool**. | **(i == 3) && (j == 2)** | |
| x == y | Returns true if x and y are equal. Incompatible types return false (float and int are compatible for equality checks, but int and bool are not). | **t == 5** | |
| x != y | Returns false if x and y are equal. Incompatible types return true. | **action != “wait”** | |
| x <> y | Alias of **x != y** | **action <> “run”** | |
| x > y | Returns true if x is more than y, otherwise returns false. | **positive > 0** | |
| x < y | Returns true if x is less than y, otherwise returns false. | **negative < 0** | |
| x >= y | Returns true if x is more than or equal to y, otherwise returns false. | **zero >= 0** | |
| x <= y | Returns true if x is less than or equal to y, otherwise returns false. | **zero <= 0** | |

Ternary operators are applied to three operands. Each operand can be a literal or an expression.

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| Ternary operators | | |
| b ? x : y | Returns x if b evaluates to true, otherwise returns y. | **shield = (a > 1) ? 15 : 12.5;** | |

[EXPRESSION] Function call expressions

f() Calls function f with 0 parameter

f(x) Calls function f with 1 parameter: x

f(x, y) Calls function f with 2 parameters: x and y. Each function is seperated by a comma (',').

f(g(x), y) Nested function calls. Function g(x) will be evaluated before passing the result to f()

All functions accept any number of parameters. However, most functions perform checks and throw errors

if wrong types or wrong parameter numbers are supplied. Check the documentation for each function for

details.

Variables must be declared before they can be used. Variables cannot be declared more than once in the same scope

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| Variable declaration statements | | |
| type x; | Declares an unassigned variable with a value type and a variable name x. | **int first\_var;** | |
| type x = y; | Declares a variable with a value type and a variable name x. The variable is assigned the value of y. | **string word = “assigned”;** | |

Assignment operator statements perform an assignment of a value to a variable. Some assignment statements double as a binary operator.

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| Assignment statements | | |
| x = y; | Assigns the value of y to the variable x. y may be a literal or an expression. The value type of y must be compatible with the type of x. | **int count;**  **count = 1; //count is now 1** | |
| x += y; | Alias of **x = x + y** | **count += 1; //count is now 2** | |
| x -= y; | Alias of **x = x - y** | **count -= -1; //count is now 3** | |
| x \*= y; | Alias of **x = x \* y** | **count \*= 6; //count is now 18** | |
| x /= y; | Alias of **x = x / y** | **count /= 3; //count is now 6** | |
| x %= y; | Alias of **x = x % y** | **count %= 3; //count is now 0** | |
| x |= y; | Alias of **x = x || y** | **bool tick = false;**  **tick |= (count >= 0); // tick is now true** | |
| x &= y; | Alias of **x = x && y** | **tick &= (count > 1); // tick is now false** | |

[STATEMENT] Multiple statement blocks

if-then-else block

Syntax:

if (EXPRESSION\_BOOL) then {LIST\_OF\_STATEMENTS}

or if (EXPRESSION\_BOOL) then {LIST\_OF\_STATEMENTS} else {LIST\_OF\_STATEMENTS}

Evaluates LIST\_OF\_STATEMENTS in the then block if EXPRESSION\_BOOL evaluates to true.

Otherwise, evaluates LIST\_OF\_STATEMENTS in the else block, if available

Context:

EXPRESSION\_BOOL An EXPRESSION that returns a bool

LIST\_OF\_STATEMENTS A list of statements (each statement ending with (';'))

If only one statement is used, the encapsulating braces ('{' ... '}') is optional.

foreach-in block

Syntax:

foreach(VARIABLE in VARIABLE\_LIST) {LIST\_OF\_STATEMENTS}

For each value in VARIABLE\_LIST, assign this value to VARIABLE, then evaluate LIST\_OF\_STATEMENTS.

Context:

VARIABLE A variable used to contain each member of VARIABLE\_LIST

VARIABLE\_LIST A variable assigned to an array structure.

Array structures are currently not yet supported by literals. However, they can be returned

from a function.

LIST\_OF\_STATEMENTS A list of statements (each statement ending with (';'))

If only one statement is used, the encapsulating braces ('{' ... '}') is optional.

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Execution

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In your script, you may link the execution of other scripts via one of two functions:

- CallScript function

CallScript("scriptname");

This jumps execution into the script "scriptname".

- AddEvent function

AddEvent(1.0, "scriptname");

This defers execution of script "scriptname" to 1.0 in-game seconds after the current time.

**Context Functions**

Context functions are the link between script code to in-game functions. These functions allow you to access parts of the game operation necessary for you build your own scenario.

**Format**

Context functions are called with the following format

Parameterless null function  
 Context function contract: **void Scene.FadeOut()** Example call in script: **Scene.FadeOut();**

Parameterized null function  
 Context function contract: **void Scene.SetMaxBounds(float3 value)** Example call in script: **Scene.SetMaxBounds({10000,200,30000});**

Parameterless value function  
 Context function contract: **int Player.GetActor()** Example call in script: **int playerID = Player.GetActor();**

Parameterized value function  
 Context function contract: **string Actor.GetActorType(int actorID)** Example call in script: **string type = Actor.GetActorType(playerID);**

**void** functions will return NULL, which hold no intrinsic value and cannot be operated with other values except equality / inequality checks. Other functions may return a value depending on the function’s purpose.

**Scripting**

**bool Script.TryCall(string script\_name)**

Attempts to call the script function with the name **script\_name**. If the script is not found, returns **false**.

**void Script.Call(string script\_name)**

Transfers execution to the script function with the name **script\_name**. If the script is not found, a runtime error will be thrown.

Error: Attempted to call non-existent script ‘<script\_name>’

**Scene**

**void Scene.SetMaxBounds(float3 value)**

Sets the coordinate of the upper bound of the scenario boundary to this **value**. The scenario boundary limits the space where the player can travel in.

**void Scene.SetMinBounds(float3 value)**

Sets the coordinate of the lower bound of the scenario boundary to this **value**. The scenario boundary limits the space where the player can travel in.

**void Scene.SetMaxAIBounds(float3 value)**

Sets the coordinate of the upper bound of the AI boundary to this **value**. The AI will attempt to stay in the space within the boundary limits.

**void Scene.SetMinAIBounds(float3 value)**

Sets the coordinate of the lower bound of the AI boundary to this **value**. The AI will attempt to stay in the space within the boundary limits.

**void Scene.FadeOut()**

Initiate the fade out sequence. After fading out, the game checks if the GameWon game state is enabled. If yes, the scenario diverts to the Game Over menu, otherwise the game checks whether the GameWon game state is enabled. If yes, the scenario diverts to the Game Won menu, otherwise the game will fade in as normal.

**Message**

**void Message(string text, float duration, float3 color)  
void Message(string text, float duration, float3 color, int priority)**

Displays a message **text** on the center of the screen with this **color** and for this **duration**. This message will not override any existing message with a higher **priority**. If **priority** is not defined, a value of zero is used.

**Camera**

**void Camera.SetPlayerLook()**

Sets the camera to use the player vision. (Follow the player craft)

**void Camera.SetSceneLook()**

Sets the camera to use the scene vision. Set the position of the camera and its target using Camera.SetSceneLook\_LookAtX and Camera.SetSceneLook\_LookFromX functions.

**void Camera.SetDeathLook()**

Sets the camera to use the death vision. (Circle the player craft)

**void Camera.EnableFreeLook(bool enabled)**

Enables / Disables free vision. When enabled, this removes player mouse control from the player craft. Instead, the player may use the mouse to rotate the camera around the craft.

**void Camera.SetSceneLook\_LookAtActor(int actorID)  
void Camera.SetSceneLook\_LookAtActor(int actorID, float3 offsetXYZ)  
void Camera.SetSceneLook\_LookAtActor(int actorID, float3 offsetXYZ, float3 offsetRelative)**

Sets the scene camera target to the actor with the given **actorID**. If no such actor is found, do nothing.

If provided, **offsetXYZ** and/or **offsetRelative** determine world and relative offset positions from the actor body respectively.

**void Camera.SetSceneLook\_LookAtPoint(float3 point)**

Sets the scene camera target to a fixed **point**.

**void Camera.SetSceneLook\_LookFromActor(int actorID)  
void Camera.SetSceneLook\_LookFromActor(int actorID, float3 offsetXYZ)  
void Camera.SetSceneLook\_LookFromActor(int actorID, float3 offsetXYZ, float3 offsetRelative)**

Sets the scene camera position to the actor with the given **actorID**. If no such actor is found, do nothing.

If provided, **offsetXYZ** and/or **offsetRelative** determine world and relative offset positions from the actor body respectively.

**void Camera.SetSceneLook\_LookAtPoint(float3 point)**

Sets the scene camera position to a fixed **point**.

**Squad**

**int[] Squad.Spawn(string actorType, string squadName, string faction, int count, float spawnDelay, bool entryByHyperspace, float3 position, float3 rotation, string formation, float formationSpacing, float aiWaitDelay, string huntTargetType, string[] registries)**

Spawns a squad of actors of this **actorType**, owned by this **faction**. The squad will have **count** number of members, will bear designations **squadName** followed by a number from 1 up to **count**. The squad will spawn in **spawnDelay** in-game seconds after this function call, at the specified **position** and **rotation**. If **entryByHyperspace** is enabled, the spawned craft will hyperspace in using **rotation** as the entry vector. Otherwise, the craft simply appears. All actors will be placed in **formation** with a spacing distance defined by **formationSpacing**. All actors will be in a squad with the first actor as the squad leader. All actors in the squad will register themselves in each group specified in **registries**.

After spawning in, the AI governing actors will first wait for **aiWaitDelay** seconds, then proceed to hunt the targets that matches the type given by **huntTargetType**.

This function returns an **int[]** with the actorIDs of the spawned actors.

**bool Squad.AddToSquad(int actorID, int actor2ID)**

The actor of this **actor2ID** will join the squad with actor **actorID**. If neither actor exists, do nothing and return **false**. Otherwise, returns **true**.

**bool Squad.RemoveFromSquad(int actorID)**

The actor of this **actorID** will be removed from any existing squad it is in. If the actor does not exist, do nothing and return **false**. Otherwise, returns **true**.

**bool Squad.MakeSquadLeader(int actorID)**

The actor of this **actorID** will be made the squad leader (hence first member) of its current squad. If the actor does not exist, do nothing and return **false**. Otherwise, returns **true**.

**Actor**

**int Actor.Spawn(string actorType, string name, string faction, string sidebarName, float spawnDelay, float3 position, float3 rotation, string[] registries)**

Spawns an actor of this **actorType**, owned by this **faction**. The actor will bear a designation **name**. If the actor appears on the sidebar, the display name **sidebarName** will be used. The actor will spawn in **spawnDelay** in-game seconds after this function call, at the specified **position** and **rotation**. The actor will register itself in each group specified in **registries**.

This function returns an **int** with the actorID of the spawned actor.

**void Actor.QueueAtSpawner(int actorID, int spawnerID)**

Removes an actor of this **actorID** from the world and place it in the spawn queue of an actor of this **spawnerID**. If neither actor exists, do nothing. Note that the spawner should have a hangar or equivalent spawner add-on if this actor is to be spawned into the world.

**string Actor.GetActorType(int actorID)**

Returns the actor type ID of an actor by this **actorID**. If the actor does not exist, return an empty string **“”**.

**bool Actor.IsFighter(int actorID)**

Returns whether the actor with this **actorID** is a fighter. An actor is positively identified as a fighter if its TargetType definition includes the FIGHTER flag. If the actor does not exist, return **false**.

**bool Actor.IsLargeShip(int actorID)**

Returns whether the actor with this **actorID** is a large ship. An actor is positively identified as a large ship if its TargetType definition includes the SHIP flag. If the actor does not exist, return **false**.

**bool Actor.IsAlive(int actorID)**

Returns whether the actor with this **actorID** exists on the world and is not in the dead state. Note that the dying state still considered alive by this function.

**float3 Actor.GetLocalPosition(int actorID)**

Returns the local position vector of the actor with this **actorID**. If the actor does not exist, return an empty **float3 {0,0,0}**.

**float3 Actor.GetLocalRotation(int actorID)**

Returns the local rotation vector of the actor with this **actorID**. Rotation is given in degrees. If the actor does not exist, return an empty **float3 {0,0,0}**.

**float3 Actor.GetLocalDirection(int actorID)**

Returns the local direction vector of the actor with this **actorID**. If the actor does not exist, return an empty **float3 {0,0,0}**.

**float3 Actor.GetGlobalPosition(int actorID)**

Returns the world position vector of the actor with this **actorID**. If the actor does not exist, return an empty **float3 {0,0,0}**.

**float3 Actor.GetGlobalRotation(int actorID)**

Returns the world rotation vector of the actor with this **actorID**. Rotation is given in degrees. If the actor does not exist, return an empty **float3 {0,0,0}**.

**float3 Actor.GetGlobalDirection(int actorID)**

Returns the world direction vector of the actor with this **actorID**. If the actor does not exist, return an empty **float3 {0,0,0}**.

**void Actor.SetLocalPosition(int actorID, float3 value)**

Sets the local position vector of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.SetLocalRotation(int actorID, float3 value)**

Sets the local rotation vector of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.SetLocalDirection(int actorID, float3 value)**

Sets the local direction vector of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.LookAtPoint(int actorID, float3 point)**

Sets the rotation vector of the actor with this **actorID** so that it faces the position with the coordinate **point**. The roll (z-rotation) of the actor will be zeroed. If the actor does not exist, do nothing.

**int[] Actor.GetChildren(int actorID)**

Returns an **int[]** with the actorIDs of the children of the actor with this **actorID**. If the actor does not exist, or if the children of the actor has not yet been spawned, return an empty **int[]** **{}**. Note that only children that have been spawned will count. As actors spawn their children after they are spawned in, it is recommended to use this function at least a few frames after requesting their spawn.

**float Actor.GetHP(int actorID)**

Returns the HP (shield + hull ratings) of the actor with this **actorID**. If the actor does not exist, return **0**.

**float Actor.GetShd(int actorID)**

Returns the shield rating of the actor with this **actorID**. If the actor does not exist, return **0**.

**float Actor.GetHull(int actorID)**

Returns the hull rating of the actor with this **actorID**. If the actor does not exist, return **0**.

**float Actor.GetMaxHP(int actorID)**

Returns the maximum HP (shield + hull ratings) of the actor with this **actorID**. If the actor does not exist, return **0**.

**float Actor.GetMaxShd(int actorID)**

Returns the maximum shield rating of the actor with this **actorID**. If the actor does not exist, return **0**.

**float Actor.GetMaxHull(int actorID)**

Returns the maximum hull rating of the actor with this **actorID**. If the actor does not exist, return **0**.

**void Actor.SetHP(int actorID, float value)**

Sets the HP (shield + hull ratings) of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.SetShd(int actorID, float value)**

Sets the shield rating of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.SetHull(int actorID, float value)**

Sets the hull rating of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.SetMaxHP(int actorID, float value)**

Sets the maximum HP (shield + hull ratings) of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.SetMaxShd(int actorID, float value)**

Sets the maximum shield rating of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.SetMaxHull(int actorID, float value)**

Sets the maximum hull rating of the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**float Actor.GetArmor(int actorID, string damageType)**

Returns the damage multiplier on the **damageType** to the actor with this **actorID**. If the actor does not exist, return **0**.

As of version 0.1, the accepted **damageType** values are: **COLLISION**, **LASER**, **LIGHT**, **HEAVY**.

**void Actor.SetArmor(int actorID, string damageType, float value)**

Sets the damage multiplier on the **damageType** to the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

As of version 0.1, the accepted **damageType** values are: **COLLISION**, **LASER**, **LIGHT**, **HEAVY**.

**void Actor.SetArmorAll(int actorID, float value)**

Sets the damage multiplier on all damage types to the actor with this **actorID** to this **value**. If the actor does not exist, do nothing.

**void Actor.RestoreArmor(int actorID)**

Restores the damage multipliers to the actor with this **actorID** back to its actor type definitions. If the actor does not exist, do nothing.

**var Actor.SetProperty(int actorID, string propertyName)  
void Actor.SetProperty(int actorID, string propertyName, var value)**

Gets / Sets a property of the actor with this **actorID**.

As of version 0.1, the following is a list of supported properties:

|  |  |  |
| --- | --- | --- |
| Property | Type | Description |
| Regen | | |
| Regen.NoRegen | **bool** | If set to **true**, the actor will be immune to regeneration, although it can still apply regeneration to its parent / children / siblings. |
| Regen.Self | **float** | The rate in which an actor replenishes its shield rating per in-game second. |
| Regen.Child | **float** | The rate in which an actor replenishes each of its children’s shield rating per in-game second. |
| Regen.Parent | **float** | The rate in which an actor replenishes its parent’s shield rating per in-game second. |
| Regen.Sibling | **float** | The rate in which an actor replenishes each of its sibling’s shield rating per in-game second. |
| AI | | |
| AI.CanEvade | **bool** | Determines whether the AI governing this actor is allowed to evade upon getting hit. |
| AI.CanRetaliate | **bool** | Determines whether the AI governing this actor is allowed to retaliate upon getting hit. |
| AI.HuntWeight | **float** | Determines the weight for AI hunt calculations. The greater the number, the more probable the actor will be selected as a hunt target. |
| Movement | | |
| Movement.ApplyZBalance | **bool** | Determines whether an actor will self-correct its z-rotation towards zero. |
| Movement.MinSpeed | **float** | Determines the actor’s minimum speed |
| Movement.MaxSpeed | **float** | Determines the actor’s maximum speed |
| Movement.Speed | **float** | Determines the actor’s current speed |
| Movement.MaxSpeedChangeRate | **float** | Determines the maximum rate where the actor can change its speed. |
| Movement.MaxTurnRate | **float** | Determines the maximum rate of turn for the actor |
| Health | | |
| Health.HP | **float** | Determines the actors current HP (shield + hull ratings) |
| Health.Shd | **float** | Determines the actors current shield rating |
| Health.Hull | **float** | Determines the actors current hull rating |
| Health.MaxHP | **float** | Determines the actors maximum HP (shield + hull ratings) |
| Health.MaxShd | **float** | Determines the actors maximum shield rating |
| Health.MaxHull | **float** | Determines the actors maximum hull rating |
| Spawner | | |
| Spawner.Enabled | **float** | Determines whether the actor spawner is enabled. To achieve full functionality of the spawner functions, a hangar-type actor must be assigned as a child of this actor |
| Spawner.SpawnTypes | **string[]** | Determines the possible of actor types to spawn. Each iteration is selected randomly. |
| Spawner.SpawnsRemaining | **int** | Determines the number of spawns remaining. This refers to the number of spawn sets. If the actor’s hangar spawns 4 actors at a time, the effective number of spawned actors is 4 times the number of spawned sets. |
| Transform | | |
| Transform.Scale | **float** | Determines whether an actor will self-correct its z-rotation towards zero. |
| Transform.Position | **float3** | Determines the actor’s local position |
| Transform.Rotation | **float3** | Determines the actor’s local rotation (in degrees) |
| Transform.Direction | **float3** | Determines the actor’s local direction |
| Misc | | |
| InCombat | **bool** | Determines whether the actor is considered a combat object. If set to **false**, it is ignored in AI hunt calculations and aggressive tracking calculations. |
| SideBarName | **string** | Determines the display name of this actor on the side bar, if shown. |

**AI**

**bool AI.QueueFirst(int actorID, string actionType, …)  
bool AI.QueueNext(int actorID, string actionType, …)  
bool AI.QueueLast(int actorID, string actionType, …)**

Queues an action to the AI of an actor of this **actorID**.

QueueFirst queues the action before the current action, replacing it.   
QueueNext queues the action immediately after the current action.  
QueueLast queues the action after the last queued action.

If the actor does not exist or the **actionType** is not well defined, return **false**. An error may be thrown if a valid **actionType** is used with malformed input (e.g. incorrect number / types of parameters).

The rest of the parameters depend on what action type is used. The following table lists the possible combinations:

|  |  |  |
| --- | --- | --- |
| Action Type | Parameters  (#Optional parameters) | Description |
| “idle” | **none** | Brings the actor to Idle. Usually this action generates a Hunt action and completes instantly. If there is nothing to hunt, then simply wait. |
| “hunt” | **#string targetType** | The actor calculates its next target.  Accepted **targetType** values:  LASER,  MUNITION,  FLOATING,  FIGHTER,  SHIP,  STRUCTURE,  ADDON,  SHIELDGENERATOR,  ANY  Default **targetType** value is “ANY”. |
| “selfdestruct” | **none** | Sets the actor to DEAD. |
| “delete” | **none** | Removes the actor from the world. The dead state is skipped. |
| “lock” | **none** | Applies a lock on the actor. This lock can be unlocked using **AI.UnlockOne** |
| “wait” | **#float duration** | Sets the actor to wait for a specified number of in-game seconds.  Default **duration** value is 5. |
| “evade” | **#float duration** | Sets the actor to take evasion action for a specified number of in-game seconds.  Default **duration** value is 2.5. |
| “move” | **float3 destination,**  **float speed,**  **#float close\_distance,**  **#bool can\_interrupt** | The actor will move towards a specific **destination**, maintaining a certain **speed**, until the actor is within **close\_distance** distance from the point.  Default **close\_distance** value is -1. (Determined by actor type)  Default **can\_interrupt** value is true. |
| “forcedmove” | **float3 destination, float speed,**  **#float close\_distance,**  **#float duration** | The actor will move towards a specific **destination**, maintaining a certain **speed**, until the actor is within **close\_distance** distance from the point or when **duration** is reached.  Default **close\_distance** value is -1. (Determined by actor type)  Default **duration** value is 999999. |
| “rotate” | **float3 destination, float speed,**  **#float close\_distance,**  **#bool can\_interrupt** | The actor will rotate towards a specific **destination**, maintaining a certain **speed**, until the actor is within **close\_distance** distance from the point.  Default **close\_distance** value is -1. (Determined by actor type)  Default **can\_interrupt** value is true. |
| “hyperspacein” | **float3 destination** | The actor travels by hyperspace into this **destination**. |
| “hyperspaceout” | **none** | The actor begins hyperspace sequence exiting this battlefield. |
| “attackactor” | **int actorid,**  **#float follow\_distance,**  **#float close\_distance,**  **#bool can\_interrupt,**  **#bool hunt\_interval** | The actor will attack an actor of this **actorid**, maintaining a certain **follow\_distance**, for up to **hunt\_interval** in-game seconds. It attempts to evade if the distance is less than **close\_distance.**  Default **follow\_distance** value is -1. (Determined by actor type)  Default **close\_distance** value is -1. (Determined by actor type)  Default **can\_interrupt** value is true.  Default **hunt\_interval** value is 15. |
| “followactor” | **int actorid,**  **#float follow\_distance,**  **#bool can\_interrupt** | The actor will follow an actor of this **actorid**, maintaining a certain **follow\_distance**.  Default **follow\_distance** value is 500.  Default **can\_interrupt** value is true. |
| “setgamestateb” | **string state\_name,**  **bool state** | Sets the game state of this **state\_name** to a **state** value. |

**void AI.UnlockOne(int actorID)**

Removes an AI lock from the actor of this **actorID**. If the actor does not exist, return **false**.

**string AI.ClearQueue(int actorID)  
string AI.ForceClearQueue(int actorID)**

Clears the AI queue for the actor of this **actorID**. If the actor does not exist, return **false**.

ClearQueue will only clear actions until the first non-interruptible action.  
ForceClearQueue will empty the queue regardless.

**Game**

**float GetGameTime()**

Returns the current game time.

**float GetLastFrameTime()**

Returns the duration of the last frame. This is related to FPS. (Typically a frame lasts 0.033 seconds in 30 FPS)

**string GetDifficulty()**

Returns the selected difficulty of the scenario.

**string GetPlayerActorType()**

Returns the selected actor type of the scenario.

**string GetPlayerName()**

Returns the player name, defined by the scenario.

**int GetStageNumber()**

Returns the current stage number.

**void SetStageNumber(int value)**

Sets the current stage number to this **value**.

**bool GetGameStateB(string state\_name)  
bool GetGameStateB(string state\_name, bool defaultValue)**

Gets the value of a boolean game state with this **state\_name**.

If defined, **defaultValue** is return if the game state is not defined (no value assigned).

**float GetGameStateF(string state\_name)  
float GetGameStateF(string state\_name, float defaultValue)**

Gets the value of a floating-point game state with this **state\_name**.

If defined, **defaultValue** is return if the game state is not defined (no value assigned).

**string GetGameStateB(string state\_name)  
string GetGameStateB(string state\_name, string defaultValue)**

Gets the value of a string game state with this **state\_name**.

If defined, **defaultValue** is return if the game state is not defined (no value assigned).

**void SetGameStateB(string state\_name, bool value)**

Sets the value of a boolean game state with this **state\_name** to **value**.

**void SetGameStateF(string state\_name, float value)**

Sets the value of a floating-point game state with this **state\_name** to **value**.

**void SetGameStateS(string state\_name, string value)**

Sets the value of a string game state with this **state\_name** to **value**.

**int GetRegisterCount(string register\_name)**

Gets the number of actors attached to the game register with this **register\_name**.

As of v0.1, the supported registers are:

CriticalAllies (allies shown in cyan in the side-bar)  
 CriticalEnemies (enemies shown in red in the side-bar)



**float GetTimeSinceLostWing()  
float GetTimeSinceLostShip()  
float GetTimeSinceLostStructure()**

Returns the number of in-game seconds since the player’s faction lost an actor of a specific target type.

GetTimeSinceLostWing tracks actors with the target type FIGHTER.  
GetTimeSinceLostShip tracks actors with the target type SHIP.  
GetTimeSinceLostStructure tracks actors with the target type STRUCTURE.

**void AddEvent(float delay, string script\_name)**

Queues a script by this **script\_name** to be played after a **delay** in in-game seconds. If the script does not exist, a runtime error will be thrown:

Error: "Script event '<script\_name>' does not exist!"

**Player**

**bool Player.AssignPlayer(int actorID)**

Assigns the player to an actor of this **actorID**. If the actor does not exist, return **false**.

**int Player.GetActor()**

Returns the **actorID** of the player actor. If the actor does not exist, return **-1**.

**void Player.RequestSpawn()**

Sets the state to allow spawners (hangars, player spawners) to spawn the player. Note that the spawner may not spawn the player immediately.

**void Player.SetMovementEnabled(bool enabled)**

Sets whether the player movement controls are enabled.

**void Player.SetAI(bool enabled)**

Sets whether the player is controlled by AI. Overrides movement controls.

**void Player.SetLives(int lives)**

Sets the number of player lives.

**void Player.DecreaseLives()**

Decrements the player lives by 1.

**Score**

**void Score.SetScorePerLife(float score)**

Sets the increment to the score requirement for a new +1 life every time the score requirement is reached.

**void Score.SetScoreForNextLife(float score)**

Sets the score requirement for a new +1 life. When this score is reached, the player receives +1 life, and this value is incremented by the value set in **Score.SetScorePerLife**.

**void Score.ResetScore(float score)**

Resets the score records to default. This resets the current score, kill count, hit count, death count and kill records to 0.

**Faction**

**void Faction.Add(string name, float3 color)**

Creates a new faction with an identifier **name**. Units belonging to this faction will be represented by this **color**.

**void Faction.MakeAlly(string faction1, string faction2)**

Sets two factions by the name of **faction1** and **faction2** to be allied to each other. The relationship is mutual. If at least one of the factions does not exist, a runtime error will be thrown:

Error: At least one of the factions is not defined.

**void Faction.MakeEnemy(string faction1, string faction2)**

Sets two factions by the name of **faction1** and **faction2** to be enemies of each other. The relationship is mutual. If at least one of the factions does not exist, a runtime error will be thrown:

Error: At least one of the factions is not defined.

**int Faction.GetWingCount(string faction)  
int Faction.GetShipCount(string faction)  
int Faction.GetStructureCount(string faction)**

Gets the number of actors of a certain target type belonging to the faction.

GetWingCount counts the number of actors with the target type FIGHTER.  
GetShipCount counts the number of actors with the target type SHIP.  
GetStructureCount counts the number of actors with the target type STRUCTURE.

If the faction does not exist, a runtime error will be thrown:

Error: The faction is not defined.

**int Faction.GetWingLimit(string faction)  
int Faction.GetShipLimit (string faction)  
int Faction.GetStructureLimit (string faction)**

Gets the limit of actors of a certain target type belonging to the faction. The limit counts down whenever a new actor of matching type is spawned. When the limit reaches zero, spawner will be blocked from spawning more actors of the matching type. The player craft is not affected by this limitation.

If the limit is set to **-1**, the limit is ignored.  
Actors spawned using either **Squad.Spawn** or **Actor.Spawn** ignores this limit.

GetWingCount gets the limit of actors with the target type FIGHTER.  
GetShipCount gets the limit of actors with the target type SHIP.  
GetStructureCount gets the limit of actors with the target type STRUCTURE.

If the faction does not exist, a runtime error will be thrown:

Error: The faction is not defined.

**void Faction.SetWingLimit(string faction, int limit)  
void Faction.SetShipLimit (string faction, int limit)  
void Faction.SetStructureLimit (string faction, int limit)**

Sets the limit of actors of a certain target type belonging to the faction. The limit counts down whenever a new actor of matching type is spawned. When the limit reaches zero, spawners will be blocked from spawning more actors of the matching type. The player craft is not affected by this limitation.

If the limit is set to **-1**, the limit is ignored.  
Actors spawned using either **Squad.Spawn** or **Actor.Spawn** ignores this limit.

SetWingCount sets the limit of actors with the target type FIGHTER.  
SetShipCount sets the limit of actors with the target type SHIP.  
SetStructureCount sets the limit of actors with the target type STRUCTURE.

If the faction does not exist, a runtime error will be thrown:

Error: The faction is not defined.

**int Faction.GetWingSpawnLimit(string faction)  
int Faction.GetShipSpawnLimit (string faction)  
int Faction.GetStructureSpawnLimit (string faction)**

Gets the spawn limit of actors of a certain target type belonging to the faction. If the number of actors of a certain type present equals or exceeds this value, spawners will be blocked from spawning more actors of the matching type. The player craft is not affected by this limitation.

If the limit is set to **-1**, the limit is ignored.  
Actors spawned using either **Squad.Spawn** or **Actor.Spawn** ignores this limit.

GetWingSpawnCount gets the limit of actors with the target type FIGHTER.  
GetShipSpawnCount gets the limit of actors with the target type SHIP.  
GetStructureSpawnCount gets the limit of actors with the target type STRUCTURE.

If the faction does not exist, a runtime error will be thrown:

Error: The faction is not defined.

**void Faction.SetWingSpawnLimit(string faction, int limit)  
void Faction.SetShipSpawnLimit (string faction, int limit)  
void Faction.SetStructureSpawnLimit (string faction, int limit)**

Sets the spawn limit of actors of a certain target type belonging to the faction. If the number of actors of a certain type present equals or exceeds this value, spawners will be blocked from spawning more actors of the matching type. The player craft is not affected by this limitation.

If the limit is set to **-1**, the limit is ignored.  
Actors spawned using either **Squad.Spawn** or **Actor.Spawn** ignores this limit.

SetWingSpawnCount sets the limit of actors with the target type FIGHTER.  
SetShipSpawnCount sets the limit of actors with the target type SHIP.  
SetStructureSpawnCount sets the limit of actors with the target type STRUCTURE.

If the faction does not exist, a runtime error will be thrown:

Error: The faction is not defined.

**Audio**

**void Audio.SetMood(int mood)**

Used for dynamic music only. Sets the audio mood to **mood**. Negative values can be used to trigger interrupts.

**void Audio.SetMusic(string piece\_name)  
void Audio.SetMusic(string piece\_name, bool loop)  
void Audio.SetMusic(string piece\_name, bool loop, int position\_ms)  
void Audio.SetMusic(string piece\_name, bool loop, int position\_ms, int end\_ms)**

Sets the current music to the piece **piece\_name**. This will stop any music that is currently playing.

If defined, **loop** determines whether the music piece will loop, **position\_ms** determines the start position (in milliseconds) of the piece, and **end\_ms** determines the end position of the piece.

**void Audio.SetMusicLoop(string piece\_name)   
void Audio.SetMusicLoop(string piece\_name, int position\_ms)**

Sets the loop music to the piece **piece\_name**. If the current music is not looped, the loop music will begin after the current music has finished playing.

If defined, **position\_ms** determines the start position (in milliseconds) of the piece.

**void Audio.SetDynMusic(string piece\_name)**

Sets the dynamic music to the piece **piece\_name**. This piece must be identified as a dynamic music piece. This will stop any music that is currently playing.

**void Audio.StopMusic()**

Stops the currently playing music.

**void Audio.PauseMusic()**

Pauses the currently playing music.

**void Audio.ResumeMusic()**

Resumes the previous paused music.

**void Audio.SetSound(string sound\_name)  
void Audio.SetSound(string sound\_name, bool interrupt)  
void Audio.SetSound(string sound\_name, bool interrupt, float volume)  
void Audio.SetSound(string sound\_name, bool interrupt, float volume, bool loop)**

Plays the sound **sound\_name**. Multiple instances of the same sound can be played concurrently with this function.

If defined, **interrupt** determines whether the music piece will interrupt, **volume** determines the sound volume (1.0 being 100%), and **loop** determines the sound will loop.

**void Audio.SetSoundSingle(string sound\_name)  
void Audio.SetSoundSingle(string sound\_name, bool interrupt)  
void Audio.SetSoundSingle(string sound\_name, bool interrupt, float volume)  
void Audio.SetSoundSingle(string sound\_name, bool interrupt, float volume, bool loop)**

Plays the sound **sound\_name**. Other instances of the same sound will be stopped.

If defined, **interrupt** determines whether the music piece will interrupt, **volume** determines the sound volume (1.0 being 100%), and **loop** determines the sound will loop.

**void Audio.StopSound(string sound\_name)**

Stops playing the sound **sound\_name**.

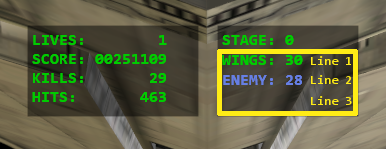
**void Audio.StopAllSounds ()**

Stops all sounds.

**UI**

**void UI.SetLine1Color(float3 color)  
void UI.SetLine2Color(float3 color)  
void UI.SetLine3Color(float3 color)**

Sets the color of line X on the programmable UI display (below Stage number).

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**void UI.SetLine1Text(string text)  
void UI.SetLine2Text(string text)  
void UI.SetLine3Text(string text)**

Sets the text of line X on the programmable UI display (below Stage number).

**Miscellaneous**

**bool IsNull(var value)**

Returns **true** if the value is a **null** value. (**null** is returned by **void** functions, or if a variable has not been assigned any value)

**var GerArrayElement(var[] array, int index)**

Returns the value at position **index** of the **array**. If the array is not a valid array, a runtime error is thrown:

Error: Attempted to apply GetArrayElement on a non-array object.

The table below indicates the valid variable types that can be used:

|  |  |  |
| --- | --- | --- |
| Array Type (var[]) | Element Type (var) | Effect |
| bool[] | bool | Returns **array[index]** |
| int[] | int |
| float[] | **float** |
| string[] | string |
| string | string | Returns a string with the character at position **index** of the **array** |