

# Commit Messages

These are commit messages in chronological order. I used a software called git to keep track of changes to the code. It tracks which files were changed, how many files, how many lines, and the date of the commit. Every time I added a feature, fixed a bug, or made any change to the code it would be annotated and submitted to git.

To explore for yourself, the full git repository with all the code, commits, and the changes contained within each commit is available on GitHub at <https://github.com/krpaul/Eeloo>

# Eeloo Language Development Log

**15-03-2021**

Reordered exps for bracketedExp and added exp for singlePwrExp

**krpaul** - 03:12:40 PM

Files Modified	1
Lines Added	4
Lines Removed	2

**15-03-2021**

Added 'squared' and 'cubed' expression

**krpaul** - 03:12:23 PM

Files Modified	5
Lines Added	30
Lines Removed	17

**11-03-2021**

Optional 'new' keyword for creator + test file

**krpaul** - 03:34:05 PM

Files Modified	3
Lines Added	12
Lines Removed	1

**11-03-2021**

Continue statement test + new alias

**krpaul** - 03:30:09 PM

Files Modified	4
Lines Added	52
Lines Removed	34

**10-03-2021**

Added continue statement

**krpaul** - 11:06:08 PM

Files Modified	7
Lines Added	87
Lines Removed	34

**10-03-2021**

None object reworked

**krpaul** - 11:02:17 PM

Files Modified	3
Lines Added	8
Lines Removed	8

**10-03-2021**

removed experimental code

**krpaul** - 10:55:36 PM

Files Modified	1
Lines Added	None
Lines Removed	3

**10-03-2021**

Test program for new return system

**krpaul** - 10:51:03 PM

Files Modified	1
Lines Added	11
Lines Removed	6

## 10-03-2021

Return does not unpack values anymore

**krpaul** - 10:50:49 PM

Files Modified	1
Lines Added	6
Lines Removed	8

## 10-03-2021

Removed RETURN\_VALUE internal type.

**krpaul** - 10:49:46 PM

Files Modified	1
Lines Added	2
Lines Removed	3

## 10-03-2021

IfElse returns null now

**krpaul** - 10:47:56 PM

Files Modified	1
Lines Added	14
Lines Removed	8

## 10-03-2021

ForLoop returns null now.

**krpaul** - 10:47:20 PM

Files Modified	1
Lines Added	2
Lines Removed	1

## 10-03-2021

More syntax error message replacements

**krpaul** - 10:46:42 PM

Files Modified	1
Lines Added	4
Lines Removed	1

## 10-03-2021

Accounted for eeObject.None as a return value. LinesContext will skip it now.

**krpaul** - 10:46:00 PM

Files Modified	1
Lines Added	9
Lines Removed	7

## 04-03-2021

merge

**Kevin Paul** - 01:40:08 PM

Files Modified	-
Lines Added	-
Lines Removed	-

## 04-03-2021

Added InternalError

**Kevin Paul** - 01:39:28 PM

Files Modified	4
Lines Added	39
Lines Removed	13

## 03-03-2021

speedtest

**krpaul** - 10:30:01 PM

Files Modified	1
Lines Added	5
Lines Removed	14

## 03-03-2021

Added NoMethodError

**krpaul** - 10:24:08 PM

Files Modified	7
Lines Added	39
Lines Removed	21

## 03-03-2021

Added call representation for body function (\*)

**Kevin Paul** - 12:16:25 PM

Files Modified	2
Lines Added	2
Lines Removed	26

## 02-03-2021

Added support for empty parenthesis in function definition

**krpaul** - 10:52:25 PM

Files Modified	2
Lines Added	2
Lines Removed	2

## 02-03-2021

CallStack implemented

**krpaul** - 10:51:32 PM

Files Modified	5
Lines Added	32
Lines Removed	32

## 02-03-2021

Undid a mistake.

**krpaul** - 10:02:05 PM

Files Modified	17
Lines Added	149
Lines Removed	43

## 11-02-2021

more errors

**krpaul** - 10:55:25 PM

Files Modified	2
Lines Added	13
Lines Removed	1

## 09-02-2021

implemented DivisionByZeroError

**krpaul** - 10:59:31 PM

Files Modified	3
Lines Added	19
Lines Removed	18

## 09-02-2021

Verbosity

**krpaul** - 10:49:50 PM

Files Modified	2
Lines Added	6
Lines Removed	1

## 09-02-2021

Fixed function contexting

**krpaul** - 10:43:05 PM

Files Modified	2
Lines Added	3
Lines Removed	1

## 07-02-2021

Moved scope object & changed all references

**krpaul** - 06:14:17 PM

Files Modified	24
Lines Added	53
Lines Removed	79

## 03-02-2021

Added children scopes for loops/if statements/functions

**krpaul** - 09:48:11 PM

Files Modified	8
Lines Added	67
Lines Removed	11

## 03-02-2021

Removed function pre-evaluator

**krpaul** - 09:06:15 PM

Files Modified	4
Lines Added	33
Lines Removed	53

## 02-02-2021

Better function signature

**krpaul** - 10:05:13 PM

Files Modified	4
Lines Added	16
Lines Removed	5

## 02-02-2021

Removed debugging code

**Kevin Paul** - 10:13:22 AM

Files Modified	2
Lines Added	5
Lines Removed	7

## 01-02-2021

comparison grammar changes

**krpaul** - 09:25:28 PM

Files Modified	4
Lines Added	33
Lines Removed	10

## 01-02-2021

auto-generated tokens

**krpaul** - 09:25:19 PM

Files Modified	2
Lines Added	82
Lines Removed	11

## 26-01-2021

More test cases

**Kevin Paul** - 08:59:17 AM

Files Modified	4
Lines Added	22
Lines Removed	9

## 26-01-2021

Fixed comparison grammar

**Kevin Paul** - 08:58:47 AM

Files Modified	3
Lines Added	12
Lines Removed	8

## 24-01-2021

Prevented simplification of eeNumber denominators which are powers of 10; Division is now non-destructive.

**krpaul** - 05:22:16 PM

**Files Modified** 2  
**Lines Added** 31  
**Lines Removed** 2

## 24-01-2021

added math.ee test cases

**krpaul** - 04:07:05 PM

**Files Modified** 2  
**Lines Added** 7  
**Lines Removed** 5

## 24-01-2021

Fixed multiplication data destruction bug

**krpaul** - 03:00:28 PM

**Files Modified** 3  
**Lines Added** 12  
**Lines Removed** 20

## 23-01-2021

Upgraded to .NET Core 3.1

**krpaul** - 11:52:42 PM

**Files Modified** 3  
**Lines Added** 3  
**Lines Removed** 3

## 21-01-2021

Deleted old unused code

**Kevin Paul** - 01:45:04 PM

**Files Modified** 5  
**Lines Added** None  
**Lines Removed** 44

## 21-01-2021

Removed unnecessary context parameters

**Kevin Paul** - 01:39:50 PM

**Files Modified** 17  
**Lines Added** 62  
**Lines Removed** 56

## 20-01-2021

Added context scope integration for expressions

**krpaul** - 11:54:04 PM

**Files Modified** 23  
**Lines Added** 146  
**Lines Removed** 7

## 20-01-2021

Fixed gcf bug

**krpaul** - 10:23:11 PM

**Files Modified** 3  
**Lines Added** 6  
**Lines Removed** 7

## 20-01-2021

assignment test

**Kevin Paul** - 09:52:42 PM

**Files Modified** 2  
**Lines Added** 20  
**Lines Removed** None

## 20-01-2021

Implemented augmented assign	<b>Files Modified</b> 6
<b>Kevin Paul</b> - 09:45:38 PM	<b>Lines Added</b> 108
	<b>Lines Removed</b> 10

## 18-01-2021

Implemented Digits method for numbers	<b>Files Modified</b> 3
<b>krpaul</b> - 12:06:41 AM	<b>Lines Added</b> 23
	<b>Lines Removed</b> 2

## 17-01-2021

Implemented factorial method	<b>Files Modified</b> 7
<b>krpaul</b> - 11:46:52 PM	<b>Lines Added</b> 53
	<b>Lines Removed</b> 22

## 17-01-2021

Switched power function to use right shift instead of multiplication	<b>Files Modified</b> 3
<b>krpaul</b> - 11:25:03 PM	<b>Lines Added</b> 20
	<b>Lines Removed</b> 27

## 16-01-2021

Preliminary implementation of left and right shift	<b>Files Modified</b> 2
<b>Kevin Paul</b> - 08:43:40 PM	<b>Lines Added</b> 6
	<b>Lines Removed</b> 10

## 14-01-2021

Partial implementation of bit shifting	<b>Files Modified</b> 2
<b>Kevin Paul</b> - 06:10:57 PM	<b>Lines Added</b> 65
	<b>Lines Removed</b> 3

## 14-01-2021

Added bitwise &, and created a region within the operators for bitwise operators.	<b>Files Modified</b> 1
<b>Kevin Paul</b> - 10:32:17 AM	<b>Lines Added</b> 46
	<b>Lines Removed</b> 23

## 14-01-2021

Made number subtraction function non-destructive.	<b>Files Modified</b> 2
<b>Kevin Paul</b> - 10:29:24 AM	<b>Lines Added</b> 5
	<b>Lines Removed</b> 11

## 14-01-2021

Bug fixes, improvments, renames, etc in eeNumber implementation	<b>Files Modified</b> 2
<b>Kevin Paul</b> - 10:27:25 AM	<b>Lines Added</b> 35
	<b>Lines Removed</b> 15

## 11-01-2021

Added addition tests

**Kevin Paul** - 02:23:35 PM

Files Modified	1
Lines Added	2
Lines Removed	None

## 11-01-2021

Accounted for fractions when adding

**Kevin Paul** - 02:16:13 PM

Files Modified	2
Lines Added	18
Lines Removed	1

## 11-01-2021

Fixed some arcane syntax in function test

**Kevin Paul** - 02:10:52 PM

Files Modified	3
Lines Added	5
Lines Removed	5

## 11-01-2021

Accounted for fractions when subtracting

**Kevin Paul** - 11:29:17 AM

Files Modified	3
Lines Added	21
Lines Removed	6

## 08-01-2021

Fixed time

**krpaul** - 11:46:03 AM

Files Modified	4
Lines Added	12
Lines Removed	23

## 07-01-2021

Added fast GCF function

**krpaul** - 02:16:37 PM

Files Modified	2
Lines Added	16
Lines Removed	21

## 07-01-2021

Fixed bitwise or on numbers

**krpaul** - 02:08:48 PM

Files Modified	3
Lines Added	58
Lines Removed	3

## 06-01-2021

Merge branch 'master' of <https://github.com/krpaul/Eeloo>

**krpaul** - 04:57:13 PM

Files Modified	-
Lines Added	-
Lines Removed	-

## 06-01-2021

added number to binary conversion

**krpaul** - 04:56:53 PM

Files Modified	3
Lines Added	49
Lines Removed	1



## 06-01-2021

merged	<b>Files Modified</b> -
<b>Kevin Paul</b> - 02:51:56 PM	<b>Lines Added</b> -
	<b>Lines Removed</b> -

## 06-01-2021

Started implementing built-in time function	<b>Files Modified</b> 3
<b>krpaul</b> - 02:46:26 PM	<b>Lines Added</b> 25
	<b>Lines Removed</b> 6

## 16-11-2020

Rename	<b>Files Modified</b> 1
<b>Kevin Paul</b> - 02:45:19 PM	<b>Lines Added</b> 4
	<b>Lines Removed</b> 4

## 16-11-2020

Fixed negative number constraint	<b>Files Modified</b> 5
<b>Kevin Paul</b> - 02:45:13 PM	<b>Lines Added</b> 26
	<b>Lines Removed</b> 18

## 16-11-2020

Formatting	<b>Files Modified</b> 2
<b>Kevin Paul</b> - 12:19:50 PM	<b>Lines Added</b> 10
	<b>Lines Removed</b> 8

## 16-11-2020

fixed typo	<b>Files Modified</b> 1
<b>Kevin Paul</b> - 11:51:20 AM	<b>Lines Added</b> 1
	<b>Lines Removed</b> 1

## 16-11-2020

fixes to array indexing and alternative function call syntax	<b>Files Modified</b> 6
<b>Kevin Paul</b> - 11:46:52 AM	<b>Lines Added</b> 13
	<b>Lines Removed</b> 8

## 16-11-2020

merge	<b>Files Modified</b> -
<b>Kevin Paul</b> - 09:12:30 AM	<b>Lines Added</b> -
	<b>Lines Removed</b> -

## 15-11-2020

Fixed small bug in subtraction	<b>Files Modified</b> 2
<b>krpaul</b> - 03:37:33 PM	<b>Lines Added</b> 5
	<b>Lines Removed</b> 9

## 13-11-2020

Removed debugging code

[krpaul](#) - 11:22:26 PM

Files Modified	1
Lines Added	2
Lines Removed	7

## 13-11-2020

Fixed negative number comparison

[krpaul](#) - 11:12:16 PM

Files Modified	2
Lines Added	23
Lines Removed	4

## 11-11-2020

fixed test

[krpaul](#) - 03:03:34 PM

Files Modified	1
Lines Added	1
Lines Removed	1

## 11-11-2020

Added reverse method for list

[krpaul](#) - 03:02:56 PM

Files Modified	1
Lines Added	15
Lines Removed	None

## 11-11-2020

fixes

[krpaul](#) - 03:02:49 PM

Files Modified	1
Lines Added	1
Lines Removed	1

## 11-11-2020

Accounted for negative numbers in eeNumber comparison

[krpaul](#) - 03:02:29 PM

Files Modified	5
Lines Added	34
Lines Removed	3

## 08-11-2020

Fixed range bug and moved getRange into RangeGenerator helper function

[krpaul](#) - 01:24:54 PM

Files Modified	4
Lines Added	43
Lines Removed	27

## 08-11-2020

Removed old code

[krpaul](#) - 01:24:31 PM

Files Modified	1
Lines Added	None
Lines Removed	35

## 22-10-2020

Added equality alises

[Kevin Paul](#) - 12:04:49 PM

Files Modified	5
Lines Added	19
Lines Removed	10

## 15-10-2020

Range and ArraySlice improvements

**Kevin Paul** - 10:05:02 AM

**Files Modified** 8  
**Lines Added** 161  
**Lines Removed** 197

## 08-10-2020

cleaned up

**krpaul** - 02:18:30 PM

**Files Modified** 1  
**Lines Added** 18  
**Lines Removed** 8

## 08-10-2020

Example programe with new grammar features

**krpaul** - 02:03:05 PM

**Files Modified** 1  
**Lines Added** 101  
**Lines Removed** 17

## 08-10-2020

Added sum method for list

**krpaul** - 02:02:40 PM

**Files Modified** 1  
**Lines Added** 20  
**Lines Removed** None

## 08-10-2020

Added optional newlines in exps, list grammars

**krpaul** - 02:02:09 PM

**Files Modified** 1  
**Lines Added** 4  
**Lines Removed** 4

## 07-10-2020

Removed unnecessary rule and fixed string reverse method

**krpaul** - 10:03:55 PM

**Files Modified** 3  
**Lines Added** 5  
**Lines Removed** 4

## 07-10-2020

Switched method call from a statement to an expression

**krpaul** - 10:03:26 PM

**Files Modified** 2  
**Lines Added** 20  
**Lines Removed** 5

## 07-10-2020

Some stack trace additions

**krpaul** - 08:54:03 PM

**Files Modified** 3  
**Lines Added** 23  
**Lines Removed** 4

## 06-10-2020

Began implementing stack trace

**krpaul** - 11:19:20 PM

**Files Modified** 1  
**Lines Added** 15  
**Lines Removed** None

## 06-10-2020

some changes to grammar and methods

[krpaul](#) - 09:17:26 PM

Files Modified	8
Lines Added	35
Lines Removed	29

## 06-10-2020

implemented InvalidOperationError

[krpaul](#) - 09:57:35 AM

Files Modified	5
Lines Added	31
Lines Removed	16

## 23-09-2020

Added UniterableValueError

[krpaul](#) - 04:04:01 PM

Files Modified	2
Lines Added	13
Lines Removed	1

## 23-09-2020

Implemented NegationError

[Kevin Paul](#) - 12:12:57 PM

Files Modified	6
Lines Added	15
Lines Removed	8

## 23-09-2020

Added NoFunctionError

[krpaul](#) - 12:07:31 PM

Files Modified	1
Lines Added	19
Lines Removed	None

## 23-09-2020

Added NegationError

[krpaul](#) - 12:07:17 PM

Files Modified	1
Lines Added	13
Lines Removed	None

## 23-09-2020

Added InvalidOperationError

[krpaul](#) - 12:07:01 PM

Files Modified	1
Lines Added	14
Lines Removed	None

## 23-09-2020

Tweaked constructors

[krpaul](#) - 12:06:32 PM

Files Modified	1
Lines Added	14
Lines Removed	17

## 23-09-2020

Added helper function to convert object types into strings

[krpaul](#) - 12:06:11 PM

Files Modified	1
Lines Added	30
Lines Removed	None

## 22-09-2020

Added SpecificError abstract class

**krpaul** - 09:11:31 AM

Files Modified 1  
Lines Added 17  
Lines Removed 1

## 21-09-2020

Added directory for error files.

**Kevin Paul** - 06:21:21 PM

Files Modified 1  
Lines Added 21  
Lines Removed None

## 17-09-2020

removed quotes when printing strings

**Kevin Paul** - 10:45:19 AM

Files Modified 1  
Lines Added 1  
Lines Removed 1

## 17-09-2020

Added uppercase and lowercase string methods

**Kevin Paul** - 10:41:25 AM

Files Modified 1  
Lines Added 27  
Lines Removed 6

## 17-09-2020

Fixed function call with no arguments

**Kevin Paul** - 10:41:10 AM

Files Modified 2  
Lines Added 16  
Lines Removed 7

## 15-09-2020

More function syntax

**Kevin Paul** - 01:33:00 PM

Files Modified 5  
Lines Added 46  
Lines Removed 4

## 15-09-2020

Fixed bug that prevented InterpreterTests project from loading

**krpaul** - 11:22:42 AM

Files Modified 1  
Lines Added 1  
Lines Removed 1

## 22-08-2020

attribute.ee test

**krpaul** - 10:55:06 PM

Files Modified 2  
Lines Added 10  
Lines Removed 1

## 22-08-2020

Implemented verbose attributes

**krpaul** - 10:39:57 PM

Files Modified 5  
Lines Added 34  
Lines Removed 7

## 21-08-2020

Repeat loop alternative <a href="#">krpaul</a> - 05:31:11 PM	<b>Files Modified</b> 2 <b>Lines Added</b> 2 <b>Lines Removed</b> 1
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## 21-08-2020

Count By alias for extended range <a href="#">krpaul</a> - 05:22:40 PM	<b>Files Modified</b> 6 <b>Lines Added</b> 103 <b>Lines Removed</b> 110
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## 20-08-2020

Fixed Range.cs, added eeNumber.AbsoluteValue(), added loop.ee test <a href="#">krpaul</a> - 04:48:56 PM	<b>Files Modified</b> 4 <b>Lines Added</b> 51 <b>Lines Removed</b> 14
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## 19-08-2020

Added list test <a href="#">krpaul</a> - 04:50:51 PM	<b>Files Modified</b> 2 <b>Lines Added</b> 16 <b>Lines Removed</b> None
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## 19-08-2020

Added remove and removeAll methods to eeListObject <a href="#">krpaul</a> - 03:42:38 PM	<b>Files Modified</b> 2 <b>Lines Added</b> 35 <b>Lines Removed</b> 2
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## 19-08-2020

Implemented infrastructure for object attributes <a href="#">krpaul</a> - 03:11:43 PM	<b>Files Modified</b> 9 <b>Lines Added</b> 47 <b>Lines Removed</b> 13
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## 27-07-2020

tweaks <a href="#">krpaul</a> - 01:57:38 PM	<b>Files Modified</b> 5 <b>Lines Added</b> 32 <b>Lines Removed</b> 15
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## 27-07-2020

eeList now makes copies of every object which enters it <a href="#">krpaul</a> - 12:46:05 AM	<b>Files Modified</b> 5 <b>Lines Added</b> 43 <b>Lines Removed</b> 14
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## 16-07-2020

Started implementation of eeList <a href="#">krpaul</a> - 01:32:21 AM	<b>Files Modified</b> 5 <b>Lines Added</b> 124 <b>Lines Removed</b> 8
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## 15-07-2020

assert now uses dynamic cast to bool instead of strict cast

**krpaul** - 08:45:57 PM

**Files Modified** 3  
**Lines Added** 4  
**Lines Removed** 3

## 15-07-2020

added bool test

**krpaul** - 08:41:53 PM

**Files Modified** 4  
**Lines Added** 11  
**Lines Removed** 5

## 15-07-2020

Fixed LIST equality check

**krpaul** - 03:35:16 PM

**Files Modified** 3  
**Lines Added** 22  
**Lines Removed** 3

## 12-07-2020

Added casting test function

**krpaul** - 05:53:27 PM

**Files Modified** 2  
**Lines Added** 5  
**Lines Removed** None

## 12-07-2020

Added negative checking for division

**krpaul** - 05:28:04 PM

**Files Modified** 3  
**Lines Added** 35  
**Lines Removed** 8

## 12-07-2020

Fixed bugs

**krpaul** - 05:04:34 PM

**Files Modified** 5  
**Lines Added** 21  
**Lines Removed** 7

## 10-07-2020

Added remaining negation checks.

**krpaul** - 02:02:48 PM

**Files Modified** 1  
**Lines Added** 22  
**Lines Removed** 2

## 10-07-2020

Fixed negation

**krpaul** - 01:53:25 PM

**Files Modified** 7  
**Lines Added** 24  
**Lines Removed** 12

## 09-07-2020

added bool test

**krpaul** - 11:22:34 PM

**Files Modified** 1  
**Lines Added** 1  
**Lines Removed** None

## 09-07-2020

Fixed fractional comparison in eeNumber

[krpaul](#) - 11:21:56 PM

Files Modified	2
Lines Added	44
Lines Removed	23

## 06-07-2020

Began replacing instances of DECIMAL and INTEGER types with eeNumber NUMBER type

[krpaul](#) - 02:15:18 PM

Files Modified	4
Lines Added	19
Lines Removed	38

## 06-07-2020

Added better zero checking for eeNumber

[krpaul](#) - 01:38:29 PM

Files Modified	3
Lines Added	10
Lines Removed	14

## 06-07-2020

Fixed some eeNumber issues

[krpaul](#) - 01:04:33 PM

Files Modified	3
Lines Added	13
Lines Removed	2

## 06-07-2020

Accounted for fractional numbers in eeNumber comparison

[krpaul](#) - 12:26:12 PM

Files Modified	1
Lines Added	35
Lines Removed	6

## 02-07-2020

Replaces references to long.Parse with new eeNumber declarations

[krpaul](#) - 10:03:31 PM

Files Modified	9
Lines Added	61
Lines Removed	52

## 02-07-2020

Fixed arithmetic

[krpaul](#) - 08:57:31 PM

Files Modified	7
Lines Added	74
Lines Removed	49

## 02-07-2020

Tweaked list addition

[krpaul](#) - 01:28:55 PM

Files Modified	1
Lines Added	16
Lines Removed	17

## 02-07-2020

Fixed list multiplication

[krpaul](#) - 01:22:52 PM

Files Modified	8
Lines Added	40
Lines Removed	33



## 02-07-2020

Tweaked string multiplication

[krpaul](#) - 11:26:08 AM

Files Modified	3
Lines Added	9
Lines Removed	1

## 02-07-2020

Restructured arithmetic visitors & functions to be more centred around expression math as opposed to purely numerical math.

[krpaul](#) - 02:26:25 AM

Files Modified	7
Lines Added	243
Lines Removed	111

## 14-06-2020

Split eeObject.cs into organized regions

[krpaul](#) - 11:22:59 AM

Files Modified	1
Lines Added	21
Lines Removed	None

## 11-06-2020

More tests

[krpaul](#) - 08:27:39 PM

Files Modified	3
Lines Added	14
Lines Removed	9

## 11-06-2020

Split ExpressionEvaluator.cs into Logic.cs and Math.cs

[krpaul](#) - 08:23:30 PM

Files Modified	3
Lines Added	121
Lines Removed	101

## 10-06-2020

Made test infrastructure work

[krpaul](#) - 11:09:23 PM

Files Modified	7
Lines Added	27
Lines Removed	11

## 10-06-2020

Split main function into file/stream methods

[krpaul](#) - 09:32:49 PM

Files Modified	1
Lines Added	10
Lines Removed	21

## 05-06-2020

Added unit testing

[krpaul](#) - 04:03:16 PM

# Handwritten Notes

These are notes I wrote on my iPad whenever I needed to figure something out on paper or write something important down. These notes are over the span of 4 months.

I've added some annotations as to roughly what the notes were describing.

2 → 10

Bit Shifting

15 →  $\begin{matrix} 1 & 1 & 1 & 1 \\ 8 & 4 & 2 & 1 \end{matrix}$

12 →  $\begin{matrix} 1 & 1 & 0 & 0 \end{matrix}$

$\frac{12}{2} = 6$  0

$\frac{6}{2} = 3$  0

$\frac{3}{2} = 1$  1  
↘ 1

12

25

$\begin{matrix} 1 & 1 & 0 & 0 \\ 8 & 4 & 2 & 1 \end{matrix}$

$\begin{matrix} 1 & 1 & 0 & 0 & 1 \\ 16 & 8 & 4 & 2 & 1 \end{matrix}$

$\boxed{1 \ 1 \ 0 \ 0 \ 1}^{25}$

$$\begin{array}{|c|c|c|c|c|c|} \hline 0 & 1 & 1 & 0 & 0 & 12 \\ \hline 1 & 1 & 1 & 0 & 1 & \\ \hline 16 & 8 & 4 & 2 & 1 & \\ \hline \end{array} = 29$$

## Timing

(later realized that the numbers were wrong)

old: Average runtime ( $n = 500$ )

29.404 ms

new: 1.096 ms

1.002 ms  $\rightarrow$  division  
3.886  $\rightarrow$  rshift

## Contexts

```
for every i from 6 to 10 ctxA
  if i is 8 ctxB
    print  $\leftarrow$  i ctxC
  end
```

end

## Displaying Errors

Ctx A  
↳ Ctx B  
↳ Ctx C

- 
- Pop Denominator
  - \*, /
  - Approximate Division
  - ~~Numerator To String~~
  - ~~Integer Division~~
- 

## Decimal Precision

$$343 \begin{array}{c} / \\ \rightarrow \end{array} 100 = 3.34$$

$$34 \begin{array}{c} / \\ \leftarrow \end{array} 100 = 0.34$$

$$3 \div 100 = 0.03$$

.00123456  
1.23456

1000000000  
1000000

## Definitive Usages for CallStack and Scope Objects

### CallStack vs. Scope

example code {

```

define func(): → Scope
  for a from 0 to 5 - Scope
    print ← a - Scope
    var b = "test" - Scope
  end
end

```

func() - CallStack

\* CallStack and Scope can  
be mutually independant objects

## When to use Each:

↳ Scope is to be appended to whenever we enter a new code block (anything that requires an "end" keyword)

The Scope will be unappended from once we have reached the end of that code block

All newly-assigned variables will belong to that block's Scope and will be destroyed upon exit.

A new scope will also be appended for any called function. Each function, upon creation, will carry with it a Scope, with its parameters already defined as Variables. This Carried Scope will then be appended to the Scope Stack when the function is called.

Functions are stored as variables in a scope. They can not be called outside of that scope or children of

that scope

↳ CallStack is a current recount of all called functions up to the current point. It will only show "open" functions, i.e. functions that have not reached their return Statement.

## RETURN VALUES

Figuring out how return values should work

→ return values must be passed up the Visitor tree.

{ if ~~~~~  
return ~~~~~  
end

Lines Context:

internal\_RETURN\_VAL  
vs.



non-internal < type /

Nope, we're reworking it . . .

→ Return values will now be  
eeObjects flagged with  
'is Return Value' to true.

