

Tang

0.1

Generated by Doxygen 1.9.1

1 Tang: A Template Language	1
1.1 Quick Description	1
1.2 Features	1
1.3 License	1
2 Hierarchical Index	3
2.1 Class Hierarchy	3
3 Class Index	5
3.1 Class List	5
4 File Index	9
4.1 File List	9
5 Class Documentation	15
5.1 Tang::AstNode Class Reference	15
5.1.1 Detailed Description	18
5.1.2 Member Enumeration Documentation	18
5.1.2.1 PreprocessState	18
5.1.3 Constructor & Destructor Documentation	18
5.1.3.1 AstNode()	18
5.1.4 Member Function Documentation	19
5.1.4.1 compile()	19
5.1.4.2 compilePreprocess()	19
5.1.4.3 dump()	20
5.2 Tang::AstNodeArray Class Reference	20
5.2.1 Detailed Description	23
5.2.2 Member Enumeration Documentation	23
5.2.2.1 PreprocessState	23
5.2.3 Constructor & Destructor Documentation	23
5.2.3.1 AstNodeArray()	23
5.2.4 Member Function Documentation	24
5.2.4.1 compile()	24
5.2.4.2 compilePreprocess()	24
5.2.4.3 dump()	25
5.3 Tang::AstNodeAssign Class Reference	25
5.3.1 Detailed Description	27
5.3.2 Member Enumeration Documentation	27
5.3.2.1 PreprocessState	27
5.3.3 Constructor & Destructor Documentation	27
5.3.3.1 AstNodeAssign()	27
5.3.4 Member Function Documentation	28
5.3.4.1 compile()	28
5.3.4.2 compilePreprocess()	29

5.3.4.3 dump()	29
5.4 Tang::AstNodeBinary Class Reference	29
5.4.1 Detailed Description	32
5.4.2 Member Enumeration Documentation	32
5.4.2.1 Operation	32
5.4.2.2 PreprocessState	33
5.4.3 Constructor & Destructor Documentation	33
5.4.3.1 AstNodeBinary()	33
5.4.4 Member Function Documentation	33
5.4.4.1 compile()	33
5.4.4.2 compilePreprocess()	34
5.4.4.3 dump()	34
5.5 Tang::AstNodeBlock Class Reference	35
5.5.1 Detailed Description	37
5.5.2 Member Enumeration Documentation	37
5.5.2.1 PreprocessState	37
5.5.3 Constructor & Destructor Documentation	37
5.5.3.1 AstNodeBlock()	37
5.5.4 Member Function Documentation	38
5.5.4.1 compile()	38
5.5.4.2 compilePreprocess()	38
5.5.4.3 dump()	39
5.6 Tang::AstNodeBoolean Class Reference	39
5.6.1 Detailed Description	41
5.6.2 Member Enumeration Documentation	41
5.6.2.1 PreprocessState	41
5.6.3 Constructor & Destructor Documentation	41
5.6.3.1 AstNodeBoolean()	41
5.6.4 Member Function Documentation	42
5.6.4.1 compile()	42
5.6.4.2 compilePreprocess()	42
5.6.4.3 dump()	43
5.7 Tang::AstNodeBreak Class Reference	43
5.7.1 Detailed Description	45
5.7.2 Member Enumeration Documentation	45
5.7.2.1 PreprocessState	45
5.7.3 Constructor & Destructor Documentation	45
5.7.3.1 AstNodeBreak()	45
5.7.4 Member Function Documentation	45
5.7.4.1 compile()	46
5.7.4.2 compilePreprocess()	46
5.7.4.3 dump()	47

5.8 Tang::AstNodeCast Class Reference	47
5.8.1 Detailed Description	49
5.8.2 Member Enumeration Documentation	49
5.8.2.1 PreprocessState	49
5.8.2.2 Type	49
5.8.3 Constructor & Destructor Documentation	50
5.8.3.1 AstNodeCast()	50
5.8.4 Member Function Documentation	50
5.8.4.1 compile()	50
5.8.4.2 compilePreprocess()	51
5.8.4.3 dump()	51
5.9 Tang::AstNodeContinue Class Reference	52
5.9.1 Detailed Description	54
5.9.2 Member Enumeration Documentation	54
5.9.2.1 PreprocessState	54
5.9.3 Constructor & Destructor Documentation	54
5.9.3.1 AstNodeContinue()	54
5.9.4 Member Function Documentation	54
5.9.4.1 compile()	55
5.9.4.2 compilePreprocess()	55
5.9.4.3 dump()	56
5.10 Tang::AstNodeDoWhile Class Reference	56
5.10.1 Detailed Description	58
5.10.2 Member Enumeration Documentation	58
5.10.2.1 PreprocessState	58
5.10.3 Constructor & Destructor Documentation	58
5.10.3.1 AstNodeDoWhile()	58
5.10.4 Member Function Documentation	59
5.10.4.1 compile()	59
5.10.4.2 compilePreprocess()	59
5.10.4.3 dump()	60
5.11 Tang::AstNodeFloat Class Reference	60
5.11.1 Detailed Description	62
5.11.2 Member Enumeration Documentation	62
5.11.2.1 PreprocessState	62
5.11.3 Constructor & Destructor Documentation	62
5.11.3.1 AstNodeFloat()	62
5.11.4 Member Function Documentation	63
5.11.4.1 compile()	63
5.11.4.2 compilePreprocess()	63
5.11.4.3 dump()	64
5.12 Tang::AstNodeFor Class Reference	64

5.12.1 Detailed Description	66
5.12.2 Member Enumeration Documentation	66
5.12.2.1 PreprocessState	66
5.12.3 Constructor & Destructor Documentation	67
5.12.3.1 AstNodeFor()	67
5.12.4 Member Function Documentation	67
5.12.4.1 compile()	67
5.12.4.2 compilePreprocess()	68
5.12.4.3 dump()	68
5.13 Tang::AstNodeFunctionCall Class Reference	69
5.13.1 Detailed Description	70
5.13.2 Member Enumeration Documentation	70
5.13.2.1 PreprocessState	70
5.13.3 Constructor & Destructor Documentation	71
5.13.3.1 AstNodeFunctionCall()	71
5.13.4 Member Function Documentation	71
5.13.4.1 compile()	71
5.13.4.2 compilePreprocess()	72
5.13.4.3 dump()	72
5.14 Tang::AstNodeFunctionDeclaration Class Reference	72
5.14.1 Detailed Description	74
5.14.2 Member Enumeration Documentation	74
5.14.2.1 PreprocessState	74
5.14.3 Constructor & Destructor Documentation	74
5.14.3.1 AstNodeFunctionDeclaration()	74
5.14.4 Member Function Documentation	75
5.14.4.1 compile()	75
5.14.4.2 compilePreprocess()	75
5.14.4.3 dump()	76
5.15 Tang::AstNodelIdentifier Class Reference	76
5.15.1 Detailed Description	78
5.15.2 Member Enumeration Documentation	78
5.15.2.1 PreprocessState	78
5.15.3 Constructor & Destructor Documentation	79
5.15.3.1 AstNodelIdentifier()	79
5.15.4 Member Function Documentation	79
5.15.4.1 compile()	79
5.15.4.2 compilePreprocess()	80
5.15.4.3 dump()	80
5.16 Tang::AstNodelElse Class Reference	81
5.16.1 Detailed Description	83
5.16.2 Member Enumeration Documentation	83

5.16.2.1 PreprocessState	83
5.16.3 Constructor & Destructor Documentation	84
5.16.3.1 AstNodeIfElse() [1/2]	84
5.16.3.2 AstNodeIfElse() [2/2]	84
5.16.4 Member Function Documentation	84
5.16.4.1 compile()	84
5.16.4.2 compilePreprocess()	85
5.16.4.3 dump()	85
5.17 Tang::AstNodeIndex Class Reference	86
5.17.1 Detailed Description	88
5.17.2 Member Enumeration Documentation	88
5.17.2.1 PreprocessState	88
5.17.3 Constructor & Destructor Documentation	88
5.17.3.1 AstNodeIndex()	89
5.17.4 Member Function Documentation	89
5.17.4.1 compile()	89
5.17.4.2 compilePreprocess()	90
5.17.4.3 dump()	90
5.17.4.4 getCollection()	90
5.17.4.5 getIndex()	91
5.18 Tang::AstNodeInteger Class Reference	91
5.18.1 Detailed Description	93
5.18.2 Member Enumeration Documentation	93
5.18.2.1 PreprocessState	93
5.18.3 Constructor & Destructor Documentation	93
5.18.3.1 AstNodeInteger()	93
5.18.4 Member Function Documentation	94
5.18.4.1 compile()	94
5.18.4.2 compilePreprocess()	94
5.18.4.3 dump()	95
5.19 Tang::AstNodeMap Class Reference	95
5.19.1 Detailed Description	96
5.19.2 Member Enumeration Documentation	96
5.19.2.1 PreprocessState	96
5.19.3 Constructor & Destructor Documentation	97
5.19.3.1 AstNodeMap()	97
5.19.4 Member Function Documentation	97
5.19.4.1 compile()	97
5.19.4.2 compilePreprocess()	98
5.19.4.3 dump()	98
5.20 Tang::AstNodePeriod Class Reference	99
5.20.1 Detailed Description	101

5.20.2 Member Enumeration Documentation	101
5.20.2.1 PreprocessState	101
5.20.3 Constructor & Destructor Documentation	101
5.20.3.1 AstNodePeriod()	101
5.20.4 Member Function Documentation	102
5.20.4.1 compile()	102
5.20.4.2 compilePreprocess()	102
5.20.4.3 dump()	103
5.21 Tang::AstNodePrint Class Reference	103
5.21.1 Detailed Description	105
5.21.2 Member Enumeration Documentation	105
5.21.2.1 PreprocessState	105
5.21.2.2 Type	106
5.21.3 Constructor & Destructor Documentation	106
5.21.3.1 AstNodePrint()	106
5.21.4 Member Function Documentation	106
5.21.4.1 compile()	106
5.21.4.2 compilePreprocess()	107
5.21.4.3 dump()	107
5.22 Tang::AstNodeRangedFor Class Reference	108
5.22.1 Detailed Description	109
5.22.2 Member Enumeration Documentation	109
5.22.2.1 PreprocessState	109
5.22.3 Constructor & Destructor Documentation	110
5.22.3.1 AstNodeRangedFor()	110
5.22.4 Member Function Documentation	110
5.22.4.1 compile()	110
5.22.4.2 compilePreprocess()	111
5.22.4.3 dump()	112
5.23 Tang::AstNodeReturn Class Reference	112
5.23.1 Detailed Description	114
5.23.2 Member Enumeration Documentation	114
5.23.2.1 PreprocessState	114
5.23.3 Constructor & Destructor Documentation	114
5.23.3.1 AstNodeReturn()	114
5.23.4 Member Function Documentation	115
5.23.4.1 compile()	115
5.23.4.2 compilePreprocess()	115
5.23.4.3 dump()	116
5.24 Tang::AstNodeSlice Class Reference	116
5.24.1 Detailed Description	118
5.24.2 Member Enumeration Documentation	118

5.24.2.1 PreprocessState	118
5.24.3 Constructor & Destructor Documentation	119
5.24.3.1 AstNodeSlice()	119
5.24.4 Member Function Documentation	119
5.24.4.1 compile()	119
5.24.4.2 compilePreprocess()	120
5.24.4.3 dump()	120
5.25 Tang::AstNodeString Class Reference	121
5.25.1 Detailed Description	123
5.25.2 Member Enumeration Documentation	123
5.25.2.1 PreprocessState	123
5.25.3 Constructor & Destructor Documentation	123
5.25.3.1 AstNodeString() [1/2]	124
5.25.3.2 AstNodeString() [2/2]	124
5.25.4 Member Function Documentation	124
5.25.4.1 compile()	124
5.25.4.2 compileLiteral()	125
5.25.4.3 compilePreprocess()	125
5.25.4.4 dump()	126
5.26 Tang::AstNodeTernary Class Reference	126
5.26.1 Detailed Description	129
5.26.2 Member Enumeration Documentation	129
5.26.2.1 PreprocessState	129
5.26.3 Constructor & Destructor Documentation	129
5.26.3.1 AstNodeTernary()	130
5.26.4 Member Function Documentation	130
5.26.4.1 compile()	130
5.26.4.2 compilePreprocess()	131
5.26.4.3 dump()	131
5.27 Tang::AstNodeUnary Class Reference	131
5.27.1 Detailed Description	133
5.27.2 Member Enumeration Documentation	133
5.27.2.1 Operator	133
5.27.2.2 PreprocessState	134
5.27.3 Constructor & Destructor Documentation	134
5.27.3.1 AstNodeUnary()	134
5.27.4 Member Function Documentation	134
5.27.4.1 compile()	134
5.27.4.2 compilePreprocess()	136
5.27.4.3 dump()	136
5.28 Tang::AstNodeWhile Class Reference	137
5.28.1 Detailed Description	139

5.28.2 Member Enumeration Documentation	139
5.28.2.1 PreprocessState	139
5.28.3 Constructor & Destructor Documentation	139
5.28.3.1 AstNodeWhile()	139
5.28.4 Member Function Documentation	140
5.28.4.1 compile()	140
5.28.4.2 compilePreprocess()	141
5.28.4.3 dump()	141
5.29 Tang::ComputedExpression Class Reference	141
5.29.1 Detailed Description	144
5.29.2 Member Function Documentation	144
5.29.2.1 __add()	144
5.29.2.2 __asCode()	144
5.29.2.3 __assign_index()	145
5.29.2.4 __boolean()	145
5.29.2.5 __divide()	145
5.29.2.6 __equal()	146
5.29.2.7 __float()	146
5.29.2.8 __getIterator()	146
5.29.2.9 __index()	147
5.29.2.10 __integer()	147
5.29.2.11 __iteratorNext()	147
5.29.2.12 __lessThan()	148
5.29.2.13 __modulo()	148
5.29.2.14 __multiply()	149
5.29.2.15 __negative()	149
5.29.2.16 __not()	149
5.29.2.17 __period()	149
5.29.2.18 __slice()	150
5.29.2.19 __string()	150
5.29.2.20 __subtract()	151
5.29.2.21 dump()	151
5.29.2.22 is_equal() [1/6]	151
5.29.2.23 is_equal() [2/6]	152
5.29.2.24 is_equal() [3/6]	152
5.29.2.25 is_equal() [4/6]	152
5.29.2.26 is_equal() [5/6]	153
5.29.2.27 is_equal() [6/6]	153
5.29.2.28 isCopyNeeded()	154
5.29.2.29 makeCopy()	154
5.30 Tang::ComputedExpressionArray Class Reference	154
5.30.1 Detailed Description	157

5.30.2 Constructor & Destructor Documentation	157
5.30.2.1 ComputedExpressionArray()	157
5.30.3 Member Function Documentation	157
5.30.3.1 __add()	158
5.30.3.2 __asCode()	158
5.30.3.3 __assign_index()	158
5.30.3.4 __boolean()	159
5.30.3.5 __divide()	159
5.30.3.6 __equal()	160
5.30.3.7 __float()	160
5.30.3.8 __getIterator()	160
5.30.3.9 __index()	161
5.30.3.10 __integer()	161
5.30.3.11 __iteratorNext()	162
5.30.3.12 __lessThan()	162
5.30.3.13 __modulo()	162
5.30.3.14 __multiply()	163
5.30.3.15 __negative()	163
5.30.3.16 __not()	163
5.30.3.17 __period()	163
5.30.3.18 __slice()	164
5.30.3.19 __string()	165
5.30.3.20 __subtract()	165
5.30.3.21 append()	165
5.30.3.22 dump()	166
5.30.3.23 getContents()	166
5.30.3.24 getMethods()	166
5.30.3.25 is_equal() [1/6]	167
5.30.3.26 is_equal() [2/6]	167
5.30.3.27 is_equal() [3/6]	167
5.30.3.28 is_equal() [4/6]	168
5.30.3.29 is_equal() [5/6]	168
5.30.3.30 is_equal() [6/6]	168
5.30.3.31 isCopyNeeded()	169
5.30.3.32 makeCopy()	169
5.31 Tang::ComputedExpressionBoolean Class Reference	170
5.31.1 Detailed Description	172
5.31.2 Constructor & Destructor Documentation	172
5.31.2.1 ComputedExpressionBoolean()	172
5.31.3 Member Function Documentation	172
5.31.3.1 __add()	172
5.31.3.2 __asCode()	173

5.31.3.3 <code>__assign_index()</code>	173
5.31.3.4 <code>__boolean()</code>	173
5.31.3.5 <code>__divide()</code>	173
5.31.3.6 <code>__equal()</code>	174
5.31.3.7 <code>__float()</code>	174
5.31.3.8 <code>__getIterator()</code>	175
5.31.3.9 <code>__index()</code>	175
5.31.3.10 <code>__integer()</code>	175
5.31.3.11 <code>__iteratorNext()</code>	175
5.31.3.12 <code>__lessThan()</code>	176
5.31.3.13 <code>__modulo()</code>	176
5.31.3.14 <code>__multiply()</code>	177
5.31.3.15 <code>__negative()</code>	177
5.31.3.16 <code>__not()</code>	177
5.31.3.17 <code>__period()</code>	177
5.31.3.18 <code>__slice()</code>	178
5.31.3.19 <code>__string()</code>	178
5.31.3.20 <code>__subtract()</code>	179
5.31.3.21 <code>dump()</code>	179
5.31.3.22 <code>is_equal()</code> [1/6]	179
5.31.3.23 <code>is_equal()</code> [2/6]	180
5.31.3.24 <code>is_equal()</code> [3/6]	180
5.31.3.25 <code>is_equal()</code> [4/6]	180
5.31.3.26 <code>is_equal()</code> [5/6]	181
5.31.3.27 <code>is_equal()</code> [6/6]	181
5.31.3.28 <code>isCopyNeeded()</code>	181
5.31.3.29 <code>makeCopy()</code>	182
5.32 <code>Tang::ComputedExpressionCompiledFunction</code> Class Reference	182
5.32.1 Detailed Description	184
5.32.2 Constructor & Destructor Documentation	184
5.32.2.1 <code>ComputedExpressionCompiledFunction()</code>	185
5.32.3 Member Function Documentation	185
5.32.3.1 <code>__add()</code>	185
5.32.3.2 <code>__asCode()</code>	185
5.32.3.3 <code>__assign_index()</code>	186
5.32.3.4 <code>__boolean()</code>	186
5.32.3.5 <code>__divide()</code>	186
5.32.3.6 <code>__equal()</code>	187
5.32.3.7 <code>__float()</code>	187
5.32.3.8 <code>__getIterator()</code>	188
5.32.3.9 <code>__index()</code>	188
5.32.3.10 <code>__integer()</code>	188

5.32.3.11 <code>__iteratorNext()</code>	188
5.32.3.12 <code>__lessThan()</code>	189
5.32.3.13 <code>__modulo()</code>	189
5.32.3.14 <code>__multiply()</code>	190
5.32.3.15 <code>__negative()</code>	190
5.32.3.16 <code>__not()</code>	190
5.32.3.17 <code>__period()</code>	190
5.32.3.18 <code>__slice()</code>	191
5.32.3.19 <code>__string()</code>	191
5.32.3.20 <code>__subtract()</code>	192
5.32.3.21 <code>dump()</code>	192
5.32.3.22 <code>is_equal()</code> [1/6]	192
5.32.3.23 <code>is_equal()</code> [2/6]	193
5.32.3.24 <code>is_equal()</code> [3/6]	193
5.32.3.25 <code>is_equal()</code> [4/6]	193
5.32.3.26 <code>is_equal()</code> [5/6]	194
5.32.3.27 <code>is_equal()</code> [6/6]	194
5.32.3.28 <code>isCopyNeeded()</code>	194
5.32.3.29 <code>makeCopy()</code>	195
5.33 Tang::ComputedExpressionError Class Reference	195
5.33.1 Detailed Description	198
5.33.2 Constructor & Destructor Documentation	198
5.33.2.1 <code>ComputedExpressionError()</code>	198
5.33.3 Member Function Documentation	198
5.33.3.1 <code>__add()</code>	198
5.33.3.2 <code>__asCode()</code>	199
5.33.3.3 <code>__assign_index()</code>	199
5.33.3.4 <code>__boolean()</code>	199
5.33.3.5 <code>__divide()</code>	199
5.33.3.6 <code>__equal()</code>	200
5.33.3.7 <code>__float()</code>	200
5.33.3.8 <code>__getIterator()</code>	200
5.33.3.9 <code>__index()</code>	201
5.33.3.10 <code>__integer()</code>	201
5.33.3.11 <code>__iteratorNext()</code>	201
5.33.3.12 <code>__lessThan()</code>	202
5.33.3.13 <code>__modulo()</code>	202
5.33.3.14 <code>__multiply()</code>	203
5.33.3.15 <code>__negative()</code>	203
5.33.3.16 <code>__not()</code>	203
5.33.3.17 <code>__period()</code>	203
5.33.3.18 <code>__slice()</code>	204

5.33.3.19 <code>__string()</code>	204
5.33.3.20 <code>__subtract()</code>	205
5.33.3.21 <code>dump()</code>	206
5.33.3.22 <code>is_equal()</code> [1/6]	206
5.33.3.23 <code>is_equal()</code> [2/6]	207
5.33.3.24 <code>is_equal()</code> [3/6]	208
5.33.3.25 <code>is_equal()</code> [4/6]	208
5.33.3.26 <code>is_equal()</code> [5/6]	209
5.33.3.27 <code>is_equal()</code> [6/6]	209
5.33.3.28 <code>isCopyNeeded()</code>	209
5.33.3.29 <code>makeCopy()</code>	210
5.34 Tang::ComputedExpressionFloat Class Reference	210
5.34.1 Detailed Description	212
5.34.2 Constructor & Destructor Documentation	212
5.34.2.1 <code>ComputedExpressionFloat()</code>	212
5.34.3 Member Function Documentation	212
5.34.3.1 <code>__add()</code>	213
5.34.3.2 <code>__asCode()</code>	213
5.34.3.3 <code>__assign_index()</code>	213
5.34.3.4 <code>__boolean()</code>	214
5.34.3.5 <code>__divide()</code>	214
5.34.3.6 <code>__equal()</code>	215
5.34.3.7 <code>__float()</code>	215
5.34.3.8 <code>__getIterator()</code>	216
5.34.3.9 <code>__index()</code>	216
5.34.3.10 <code>__integer()</code>	216
5.34.3.11 <code>__iteratorNext()</code>	216
5.34.3.12 <code>__lessThan()</code>	217
5.34.3.13 <code>__modulo()</code>	217
5.34.3.14 <code>__multiply()</code>	218
5.34.3.15 <code>__negative()</code>	218
5.34.3.16 <code>__not()</code>	219
5.34.3.17 <code>__period()</code>	219
5.34.3.18 <code>__slice()</code>	219
5.34.3.19 <code>__string()</code>	220
5.34.3.20 <code>__subtract()</code>	220
5.34.3.21 <code>dump()</code>	221
5.34.3.22 <code>getValue()</code>	221
5.34.3.23 <code>is_equal()</code> [1/6]	221
5.34.3.24 <code>is_equal()</code> [2/6]	222
5.34.3.25 <code>is_equal()</code> [3/6]	222
5.34.3.26 <code>is_equal()</code> [4/6]	222

5.34.3.27 <code>is_equal()</code> [5/6]	223
5.34.3.28 <code>is_equal()</code> [6/6]	223
5.34.3.29 <code>isCopyNeeded()</code>	224
5.34.3.30 <code>makeCopy()</code>	224
5.35 Tang::ComputedExpressionInteger Class Reference	224
5.35.1 Detailed Description	226
5.35.2 Constructor & Destructor Documentation	226
5.35.2.1 <code>ComputedExpressionInteger()</code>	226
5.35.3 Member Function Documentation	227
5.35.3.1 <code>__add()</code>	227
5.35.3.2 <code>__asCode()</code>	227
5.35.3.3 <code>__assign_index()</code>	228
5.35.3.4 <code>__boolean()</code>	228
5.35.3.5 <code>__divide()</code>	228
5.35.3.6 <code>__equal()</code>	229
5.35.3.7 <code>__float()</code>	229
5.35.3.8 <code>__getIterator()</code>	230
5.35.3.9 <code>__index()</code>	230
5.35.3.10 <code>__integer()</code>	230
5.35.3.11 <code>__iteratorNext()</code>	231
5.35.3.12 <code>__lessThan()</code>	231
5.35.3.13 <code>__modulo()</code>	231
5.35.3.14 <code>__multiply()</code>	232
5.35.3.15 <code>__negative()</code>	233
5.35.3.16 <code>__not()</code>	233
5.35.3.17 <code>__period()</code>	233
5.35.3.18 <code>__slice()</code>	233
5.35.3.19 <code>__string()</code>	234
5.35.3.20 <code>__subtract()</code>	234
5.35.3.21 <code>dump()</code>	235
5.35.3.22 <code>getValue()</code>	235
5.35.3.23 <code>is_equal()</code> [1/6]	235
5.35.3.24 <code>is_equal()</code> [2/6]	236
5.35.3.25 <code>is_equal()</code> [3/6]	236
5.35.3.26 <code>is_equal()</code> [4/6]	237
5.35.3.27 <code>is_equal()</code> [5/6]	237
5.35.3.28 <code>is_equal()</code> [6/6]	237
5.35.3.29 <code>isCopyNeeded()</code>	238
5.35.3.30 <code>makeCopy()</code>	238
5.36 Tang::ComputedExpressionIterator Class Reference	239
5.36.1 Detailed Description	241
5.36.2 Constructor & Destructor Documentation	241

5.36.2.1 <code>ComputedExpressionIterator()</code>	241
5.36.3 Member Function Documentation	241
5.36.3.1 <code>__add()</code>	241
5.36.3.2 <code>__asCode()</code>	242
5.36.3.3 <code>__assign_index()</code>	242
5.36.3.4 <code>__boolean()</code>	243
5.36.3.5 <code>__divide()</code>	243
5.36.3.6 <code>__equal()</code>	243
5.36.3.7 <code>__float()</code>	244
5.36.3.8 <code>__getIterator()</code>	244
5.36.3.9 <code>__index()</code>	244
5.36.3.10 <code>__integer()</code>	245
5.36.3.11 <code>__iteratorNext()</code>	245
5.36.3.12 <code>__lessThan()</code>	246
5.36.3.13 <code>__modulo()</code>	246
5.36.3.14 <code>__multiply()</code>	246
5.36.3.15 <code>__negative()</code>	247
5.36.3.16 <code>__not()</code>	247
5.36.3.17 <code>__period()</code>	247
5.36.3.18 <code>__slice()</code>	248
5.36.3.19 <code>__string()</code>	248
5.36.3.20 <code>__subtract()</code>	248
5.36.3.21 <code>dump()</code>	249
5.36.3.22 <code>is_equal() [1/6]</code>	249
5.36.3.23 <code>is_equal() [2/6]</code>	250
5.36.3.24 <code>is_equal() [3/6]</code>	251
5.36.3.25 <code>is_equal() [4/6]</code>	251
5.36.3.26 <code>is_equal() [5/6]</code>	252
5.36.3.27 <code>is_equal() [6/6]</code>	252
5.36.3.28 <code>isCopyNeeded()</code>	252
5.36.3.29 <code>makeCopy()</code>	253
5.37 <code>Tang::ComputedExpressionIteratorEnd</code> Class Reference	253
5.37.1 Detailed Description	255
5.37.2 Member Function Documentation	255
5.37.2.1 <code>__add()</code>	255
5.37.2.2 <code>__asCode()</code>	255
5.37.2.3 <code>__assign_index()</code>	256
5.37.2.4 <code>__boolean()</code>	256
5.37.2.5 <code>__divide()</code>	256
5.37.2.6 <code>__equal()</code>	257
5.37.2.7 <code>__float()</code>	257
5.37.2.8 <code>__getIterator()</code>	257

5.37.2.9 __index()	258
5.37.2.10 __integer()	258
5.37.2.11 __iteratorNext()	258
5.37.2.12 __lessThan()	259
5.37.2.13 __modulo()	259
5.37.2.14 __multiply()	260
5.37.2.15 __negative()	260
5.37.2.16 __not()	260
5.37.2.17 __period()	260
5.37.2.18 __slice()	261
5.37.2.19 __string()	261
5.37.2.20 __subtract()	262
5.37.2.21 dump()	263
5.37.2.22 is_equal() [1/6]	263
5.37.2.23 is_equal() [2/6]	264
5.37.2.24 is_equal() [3/6]	265
5.37.2.25 is_equal() [4/6]	265
5.37.2.26 is_equal() [5/6]	266
5.37.2.27 is_equal() [6/6]	266
5.37.2.28 isCopyNeeded()	266
5.37.2.29 makeCopy()	267
5.38 Tang::ComputedExpressionMap Class Reference	267
5.38.1 Detailed Description	269
5.38.2 Constructor & Destructor Documentation	270
5.38.2.1 ComputedExpressionMap()	270
5.38.3 Member Function Documentation	270
5.38.3.1 __add()	270
5.38.3.2 __asCode()	270
5.38.3.3 __assign_index()	271
5.38.3.4 __boolean()	271
5.38.3.5 __divide()	271
5.38.3.6 __equal()	272
5.38.3.7 __float()	272
5.38.3.8 __getIterator()	272
5.38.3.9 __index()	273
5.38.3.10 __integer()	273
5.38.3.11 __iteratorNext()	274
5.38.3.12 __lessThan()	274
5.38.3.13 __modulo()	274
5.38.3.14 __multiply()	275
5.38.3.15 __negative()	275
5.38.3.16 __not()	275

5.38.3.17 __period()	275
5.38.3.18 __slice()	276
5.38.3.19 __string()	276
5.38.3.20 __subtract()	277
5.38.3.21 dump()	277
5.38.3.22 is_equal() [1/6]	278
5.38.3.23 is_equal() [2/6]	278
5.38.3.24 is_equal() [3/6]	278
5.38.3.25 is_equal() [4/6]	279
5.38.3.26 is_equal() [5/6]	279
5.38.3.27 is_equal() [6/6]	279
5.38.3.28 isCopyNeeded()	280
5.38.3.29 makeCopy()	280
5.39 Tang::ComputedExpressionNativeBoundFunction Class Reference	281
5.39.1 Detailed Description	283
5.39.2 Constructor & Destructor Documentation	283
5.39.2.1 ComputedExpressionNativeBoundFunction()	284
5.39.3 Member Function Documentation	284
5.39.3.1 __add()	284
5.39.3.2 __asCode()	285
5.39.3.3 __assign_index()	285
5.39.3.4 __boolean()	286
5.39.3.5 __divide()	286
5.39.3.6 __equal()	286
5.39.3.7 __float()	287
5.39.3.8 __getIterator()	287
5.39.3.9 __index()	287
5.39.3.10 __integer()	288
5.39.3.11 __iteratorNext()	288
5.39.3.12 __lessThan()	288
5.39.3.13 __modulo()	290
5.39.3.14 __multiply()	290
5.39.3.15 __negative()	291
5.39.3.16 __not()	291
5.39.3.17 __period()	291
5.39.3.18 __slice()	292
5.39.3.19 __string()	292
5.39.3.20 __subtract()	292
5.39.3.21 dump()	293
5.39.3.22 getArgc()	293
5.39.3.23 getFunction()	293
5.39.3.24 getTargetTypeIndex()	294

5.39.3.25 <code>is_equal()</code> [1/6]	294
5.39.3.26 <code>is_equal()</code> [2/6]	294
5.39.3.27 <code>is_equal()</code> [3/6]	295
5.39.3.28 <code>is_equal()</code> [4/6]	295
5.39.3.29 <code>is_equal()</code> [5/6]	295
5.39.3.30 <code>is_equal()</code> [6/6]	296
5.39.3.31 <code>isCopyNeeded()</code>	296
5.39.3.32 <code>makeCopy()</code>	296
5.40 <code>Tang::ComputedExpressionNativeFunction</code> Class Reference	297
5.40.1 Detailed Description	299
5.40.2 Constructor & Destructor Documentation	299
5.40.2.1 <code>ComputedExpressionNativeFunction()</code>	299
5.40.3 Member Function Documentation	299
5.40.3.1 <code>__add()</code>	300
5.40.3.2 <code>__asCode()</code>	300
5.40.3.3 <code>__assign_index()</code>	300
5.40.3.4 <code>__boolean()</code>	301
5.40.3.5 <code>__divide()</code>	301
5.40.3.6 <code>__equal()</code>	301
5.40.3.7 <code>__float()</code>	302
5.40.3.8 <code>__getIterator()</code>	302
5.40.3.9 <code>__index()</code>	303
5.40.3.10 <code>__integer()</code>	303
5.40.3.11 <code>__iteratorNext()</code>	303
5.40.3.12 <code>__lessThan()</code>	304
5.40.3.13 <code>__modulo()</code>	304
5.40.3.14 <code>__multiply()</code>	304
5.40.3.15 <code>__negative()</code>	305
5.40.3.16 <code>__not()</code>	305
5.40.3.17 <code>__period()</code>	305
5.40.3.18 <code>__slice()</code>	306
5.40.3.19 <code>__string()</code>	306
5.40.3.20 <code>__subtract()</code>	307
5.40.3.21 <code>dump()</code>	307
5.40.3.22 <code>getArgc()</code>	307
5.40.3.23 <code>getFunction()</code>	308
5.40.3.24 <code>is_equal()</code> [1/6]	308
5.40.3.25 <code>is_equal()</code> [2/6]	309
5.40.3.26 <code>is_equal()</code> [3/6]	309
5.40.3.27 <code>is_equal()</code> [4/6]	310
5.40.3.28 <code>is_equal()</code> [5/6]	310
5.40.3.29 <code>is_equal()</code> [6/6]	310

5.40.3.30 isCopyNeeded()	311
5.40.3.31 makeCopy()	311
5.41 Tang::ComputedExpressionString Class Reference	312
5.41.1 Detailed Description	314
5.41.2 Constructor & Destructor Documentation	314
5.41.2.1 ComputedExpressionString() [1/2]	315
5.41.2.2 ComputedExpressionString() [2/2]	316
5.41.3 Member Function Documentation	316
5.41.3.1 __add()	316
5.41.3.2 __asCode()	317
5.41.3.3 __assign_index()	317
5.41.3.4 __boolean()	318
5.41.3.5 __divide()	318
5.41.3.6 __equal()	318
5.41.3.7 __float()	319
5.41.3.8 __getIterator()	319
5.41.3.9 __index()	320
5.41.3.10 __integer()	320
5.41.3.11 __iteratorNext()	321
5.41.3.12 __lessThan()	321
5.41.3.13 __modulo()	322
5.41.3.14 __multiply()	322
5.41.3.15 __negative()	323
5.41.3.16 __not()	323
5.41.3.17 __period()	323
5.41.3.18 __slice()	324
5.41.3.19 __string()	325
5.41.3.20 __subtract()	325
5.41.3.21 bytesLength()	325
5.41.3.22 dump()	326
5.41.3.23 getMethods()	326
5.41.3.24 getValue()	326
5.41.3.25 is_equal() [1/6]	326
5.41.3.26 is_equal() [2/6]	327
5.41.3.27 is_equal() [3/6]	327
5.41.3.28 is_equal() [4/6]	328
5.41.3.29 is_equal() [5/6]	328
5.41.3.30 is_equal() [6/6]	329
5.41.3.31 isCopyNeeded()	329
5.41.3.32 length()	330
5.41.3.33 makeCopy()	330
5.41.3.34 operator+=()	330

5.42 Tang::Context Class Reference	331
5.42.1 Detailed Description	332
5.43 Tang::Error Class Reference	332
5.43.1 Detailed Description	333
5.43.2 Constructor & Destructor Documentation	333
5.43.2.1 Error() [1/2]	333
5.43.2.2 Error() [2/2]	333
5.43.3 Friends And Related Function Documentation	334
5.43.3.1 operator<<	334
5.44 Tang::GarbageCollected Class Reference	334
5.44.1 Detailed Description	337
5.44.2 Constructor & Destructor Documentation	337
5.44.2.1 GarbageCollected() [1/3]	337
5.44.2.2 GarbageCollected() [2/3]	337
5.44.2.3 ~GarbageCollected()	337
5.44.2.4 GarbageCollected() [3/3]	338
5.44.3 Member Function Documentation	338
5.44.3.1 isCopyNeeded()	338
5.44.3.2 make()	338
5.44.3.3 makeCopy()	339
5.44.3.4 operator"!"()	339
5.44.3.5 operator"!="()	340
5.44.3.6 operator%()	340
5.44.3.7 operator*() [1/2]	341
5.44.3.8 operator*() [2/2]	341
5.44.3.9 operator+()	342
5.44.3.10 operator-() [1/2]	342
5.44.3.11 operator-() [2/2]	343
5.44.3.12 operator->()	343
5.44.3.13 operator/()	344
5.44.3.14 operator<()	344
5.44.3.15 operator<=()	345
5.44.3.16 operator>() [1/2]	345
5.44.3.17 operator>() [2/2]	345
5.44.3.18 operator==() [1/8]	347
5.44.3.19 operator==() [2/8]	347
5.44.3.20 operator==() [3/8]	347
5.44.3.21 operator==() [4/8]	348
5.44.3.22 operator==() [5/8]	348
5.44.3.23 operator==() [6/8]	349
5.44.3.24 operator==() [7/8]	349
5.44.3.25 operator==() [8/8]	349

5.44.3.26 operator>()	350
5.44.3.27 operator>=()	350
5.44.4 Friends And Related Function Documentation	351
5.44.4.1 operator<<	351
5.45 Tang::HtmlEscape Class Reference	351
5.45.1 Detailed Description	352
5.45.2 Constructor & Destructor Documentation	352
5.45.2.1 HtmlEscape()	353
5.45.3 Member Function Documentation	353
5.45.3.1 get_next_token()	353
5.46 Tang::HtmlEscapeAscii Class Reference	353
5.46.1 Detailed Description	354
5.46.2 Constructor & Destructor Documentation	355
5.46.2.1 HtmlEscapeAscii()	355
5.46.3 Member Function Documentation	355
5.46.3.1 get_next_token()	355
5.47 Tang::location Class Reference	356
5.47.1 Detailed Description	357
5.48 Tang::position Class Reference	357
5.48.1 Detailed Description	358
5.49 Tang::Program Class Reference	359
5.49.1 Detailed Description	361
5.49.2 Member Enumeration Documentation	361
5.49.2.1 CodeType	361
5.49.3 Constructor & Destructor Documentation	362
5.49.3.1 Program()	362
5.49.4 Member Function Documentation	362
5.49.4.1 addBreak()	362
5.49.4.2 addBytecode()	362
5.49.4.3 addContinue()	363
5.49.4.4 addIdentifier()	363
5.49.4.5 addIdentifierAssigned()	363
5.49.4.6 addString()	364
5.49.4.7 dumpBytecode()	364
5.49.4.8 execute()	364
5.49.4.9 getAst()	365
5.49.4.10 getBytecode()	365
5.49.4.11 getCode()	365
5.49.4.12 getIdentifiers()	365
5.49.4.13 getIdentifiersAssigned()	366
5.49.4.14 getResult()	366
5.49.4.15 getStrings()	366

5.49.4.16 popBreakStack()	366
5.49.4.17 popContinueStack()	367
5.49.4.18 pushEnvironment()	367
5.49.4.19 setFunctionStackDeclaration()	368
5.49.4.20 setJumpTarget()	368
5.49.5 Member Data Documentation	369
5.49.5.1 functionsDeclared	369
5.50 Tang::SingletonObjectPool< T > Class Template Reference	369
5.50.1 Detailed Description	370
5.50.2 Member Function Documentation	370
5.50.2.1 get()	371
5.50.2.2 getInstance()	371
5.50.2.3 recycle()	371
5.50.3 Member Data Documentation	371
5.50.3.1 currentIndex	371
5.50.3.2 currentRecycledIndex	372
5.51 Tang::TangBase Class Reference	372
5.51.1 Detailed Description	373
5.51.2 Constructor & Destructor Documentation	373
5.51.2.1 TangBase()	373
5.51.3 Member Function Documentation	374
5.51.3.1 compileScript()	374
5.51.3.2 make_shared()	374
5.52 Tang::TangScanner Class Reference	374
5.52.1 Detailed Description	376
5.52.2 Constructor & Destructor Documentation	376
5.52.2.1 TangScanner()	376
5.52.3 Member Function Documentation	376
5.52.3.1 get_next_token()	377
5.53 Tang::Unescape Class Reference	377
5.53.1 Detailed Description	378
5.53.2 Constructor & Destructor Documentation	378
5.53.2.1 Unescape()	378
5.53.3 Member Function Documentation	378
5.53.3.1 get_next_token()	378
5.54 Tang::UnicodeString Class Reference	379
5.54.1 Detailed Description	380
5.54.2 Member Enumeration Documentation	380
5.54.2.1 Type	380
5.54.3 Member Function Documentation	381
5.54.3.1 bytesLength()	381
5.54.3.2 length()	381

5.54.3.3 operator std::string()	382
5.54.3.4 operator+()	382
5.54.3.5 operator+=()	382
5.54.3.6 operator<()	383
5.54.3.7 operator==()	383
5.54.3.8 render()	383
5.54.3.9 renderAscii()	384
5.54.3.10 substr()	384
6 File Documentation	387
6.1 build/generated/location.hh File Reference	387
6.1.1 Detailed Description	388
6.1.2 Function Documentation	388
6.1.2.1 operator<<() [1/2]	388
6.1.2.2 operator<<() [2/2]	389
6.2 include/astNode.hpp File Reference	389
6.2.1 Detailed Description	390
6.3 include/astNodeArray.hpp File Reference	390
6.3.1 Detailed Description	391
6.4 include/astNodeAssign.hpp File Reference	391
6.4.1 Detailed Description	392
6.5 include/astNodeBinary.hpp File Reference	392
6.5.1 Detailed Description	392
6.6 include/astNodeBlock.hpp File Reference	393
6.6.1 Detailed Description	393
6.7 include/astNodeBoolean.hpp File Reference	394
6.7.1 Detailed Description	394
6.8 include/astNodeBreak.hpp File Reference	395
6.8.1 Detailed Description	395
6.9 include/astNodeCast.hpp File Reference	396
6.9.1 Detailed Description	396
6.10 include/astNodeContinue.hpp File Reference	397
6.10.1 Detailed Description	397
6.11 include/astNodeDoWhile.hpp File Reference	398
6.11.1 Detailed Description	398
6.12 include/astNodeFloat.hpp File Reference	399
6.12.1 Detailed Description	399
6.13 include/astNodeFor.hpp File Reference	400
6.13.1 Detailed Description	400
6.14 include/astNodeFunctionCall.hpp File Reference	401
6.14.1 Detailed Description	401
6.15 include/astNodeFunctionDeclaration.hpp File Reference	402

6.15.1 Detailed Description	402
6.16 include/astNodeIdentifier.hpp File Reference	403
6.16.1 Detailed Description	403
6.17 include/astNodeIfElse.hpp File Reference	404
6.17.1 Detailed Description	404
6.18 include/astNodeIndex.hpp File Reference	405
6.18.1 Detailed Description	405
6.19 include/astNodeInteger.hpp File Reference	406
6.19.1 Detailed Description	406
6.20 include/astNodeMap.hpp File Reference	407
6.20.1 Detailed Description	407
6.21 include/astNodePeriod.hpp File Reference	408
6.21.1 Detailed Description	408
6.22 include/astNodePrint.hpp File Reference	409
6.22.1 Detailed Description	409
6.23 include/astNodeRangedFor.hpp File Reference	410
6.23.1 Detailed Description	410
6.24 include/astNodeReturn.hpp File Reference	411
6.24.1 Detailed Description	411
6.25 include/astNodeSlice.hpp File Reference	412
6.25.1 Detailed Description	412
6.26 include/astNodeString.hpp File Reference	413
6.26.1 Detailed Description	413
6.27 include/astNodeTernary.hpp File Reference	413
6.27.1 Detailed Description	414
6.28 include/astNodeUnary.hpp File Reference	414
6.28.1 Detailed Description	415
6.29 include/astNodeWhile.hpp File Reference	415
6.29.1 Detailed Description	416
6.30 include/computedExpression.hpp File Reference	416
6.30.1 Detailed Description	417
6.31 include/computedExpressionArray.hpp File Reference	417
6.31.1 Detailed Description	418
6.32 include/computedExpressionBoolean.hpp File Reference	418
6.32.1 Detailed Description	419
6.33 include/computedExpressionCompiledFunction.hpp File Reference	419
6.33.1 Detailed Description	420
6.34 include/computedExpressionError.hpp File Reference	420
6.34.1 Detailed Description	421
6.35 include/computedExpressionFloat.hpp File Reference	421
6.35.1 Detailed Description	422
6.36 include/computedExpressionInteger.hpp File Reference	422

6.36.1 Detailed Description	423
6.37 include/computedExpressionIterator.hpp File Reference	423
6.37.1 Detailed Description	424
6.38 include/computedExpressionIteratorEnd.hpp File Reference	424
6.38.1 Detailed Description	425
6.39 include/computedExpressionMap.hpp File Reference	425
6.39.1 Detailed Description	426
6.40 include/computedExpressionNativeBoundFunction.hpp File Reference	426
6.40.1 Detailed Description	427
6.41 include/computedExpressionNativeFunction.hpp File Reference	427
6.41.1 Detailed Description	428
6.42 include/computedExpressionString.hpp File Reference	429
6.42.1 Detailed Description	429
6.43 include/context.hpp File Reference	429
6.43.1 Detailed Description	430
6.44 include/error.hpp File Reference	430
6.44.1 Detailed Description	431
6.45 include/garbageCollected.hpp File Reference	431
6.45.1 Detailed Description	432
6.46 include/htmlEscape.hpp File Reference	432
6.46.1 Detailed Description	433
6.47 include/htmlEscapeAscii.hpp File Reference	433
6.47.1 Detailed Description	434
6.48 include/macros.hpp File Reference	435
6.48.1 Detailed Description	435
6.49 include/opcode.hpp File Reference	436
6.49.1 Detailed Description	436
6.49.2 Enumeration Type Documentation	436
6.49.2.1 Opcode	436
6.50 include/program.hpp File Reference	437
6.50.1 Detailed Description	438
6.51 include/singletonObjectPool.hpp File Reference	438
6.51.1 Detailed Description	439
6.52 include/tang.hpp File Reference	439
6.52.1 Detailed Description	440
6.53 include/tangBase.hpp File Reference	440
6.53.1 Detailed Description	441
6.54 include/tangScanner.hpp File Reference	441
6.54.1 Detailed Description	442
6.55 include/unescape.hpp File Reference	442
6.55.1 Detailed Description	443
6.56 include/unicodeString.hpp File Reference	443

6.56.1 Detailed Description	444
6.56.2 Function Documentation	444
6.56.2.1 htmlEscape()	444
6.56.2.2 htmlEscapeAscii()	445
6.56.2.3 unescape()	446
6.57 src/astNode.cpp File Reference	446
6.57.1 Detailed Description	447
6.58 src/astNodeArray.cpp File Reference	447
6.58.1 Detailed Description	447
6.59 src/astNodeAssign.cpp File Reference	447
6.59.1 Detailed Description	448
6.60 src/astNodeBinary.cpp File Reference	448
6.60.1 Detailed Description	448
6.61 src/astNodeBlock.cpp File Reference	449
6.61.1 Detailed Description	449
6.62 src/astNodeBoolean.cpp File Reference	449
6.62.1 Detailed Description	450
6.63 src/astNodeBreak.cpp File Reference	450
6.63.1 Detailed Description	450
6.64 src/astNodeCast.cpp File Reference	450
6.64.1 Detailed Description	451
6.65 src/astNodeContinue.cpp File Reference	451
6.65.1 Detailed Description	451
6.66 src/astNodeDoWhile.cpp File Reference	452
6.66.1 Detailed Description	452
6.67 src/astNodeFloat.cpp File Reference	452
6.67.1 Detailed Description	453
6.68 src/astNodeFor.cpp File Reference	453
6.68.1 Detailed Description	453
6.69 src/astNodeFunctionCall.cpp File Reference	453
6.69.1 Detailed Description	454
6.70 src/astNodeFunctionDeclaration.cpp File Reference	454
6.70.1 Detailed Description	455
6.71 src/astNodeIdentifier.cpp File Reference	455
6.71.1 Detailed Description	455
6.72 src/astNodeIfElse.cpp File Reference	455
6.72.1 Detailed Description	456
6.73 src/astNodeIndex.cpp File Reference	456
6.73.1 Detailed Description	456
6.74 src/astNodeInteger.cpp File Reference	457
6.74.1 Detailed Description	457
6.75 src/astNodeMap.cpp File Reference	457

6.75.1 Detailed Description	458
6.76 src/astNodePeriod.cpp File Reference	458
6.76.1 Detailed Description	458
6.77 src/astNodePrint.cpp File Reference	458
6.77.1 Detailed Description	459
6.78 src/astNodeRangedFor.cpp File Reference	459
6.78.1 Detailed Description	460
6.79 src/astNodeReturn.cpp File Reference	460
6.79.1 Detailed Description	460
6.80 src/astNodeSlice.cpp File Reference	460
6.80.1 Detailed Description	461
6.81 src/astNodeString.cpp File Reference	461
6.81.1 Detailed Description	461
6.82 src/astNodeTernary.cpp File Reference	462
6.82.1 Detailed Description	462
6.83 src/astNodeUnary.cpp File Reference	462
6.83.1 Detailed Description	463
6.84 src/astNodeWhile.cpp File Reference	463
6.84.1 Detailed Description	463
6.85 src/computedExpression.cpp File Reference	463
6.85.1 Detailed Description	464
6.86 src/computedExpressionArray.cpp File Reference	464
6.86.1 Detailed Description	464
6.87 src/computedExpressionBoolean.cpp File Reference	465
6.87.1 Detailed Description	465
6.88 src/computedExpressionCompiledFunction.cpp File Reference	465
6.88.1 Detailed Description	466
6.89 src/computedExpressionError.cpp File Reference	466
6.89.1 Detailed Description	466
6.90 src/computedExpressionFloat.cpp File Reference	466
6.90.1 Detailed Description	467
6.91 src/computedExpressionInteger.cpp File Reference	467
6.91.1 Detailed Description	467
6.92 src/computedExpressionIterator.cpp File Reference	468
6.92.1 Detailed Description	468
6.93 src/computedExpressionIteratorEnd.cpp File Reference	468
6.93.1 Detailed Description	469
6.94 src/computedExpressionMap.cpp File Reference	469
6.94.1 Detailed Description	469
6.95 src/computedExpressionNativeBoundFunction.cpp File Reference	470
6.95.1 Detailed Description	470
6.96 src/computedExpressionNativeFunction.cpp File Reference	470

6.96.1 Detailed Description	471
6.97 src/computedExpressionString.cpp File Reference	471
6.97.1 Detailed Description	471
6.98 src/context.cpp File Reference	471
6.98.1 Detailed Description	472
6.99 src/error.cpp File Reference	472
6.99.1 Detailed Description	472
6.99.2 Function Documentation	472
6.99.2.1 operator<<()	472
6.100 src/garbageCollected.cpp File Reference	473
6.100.1 Function Documentation	473
6.100.1.1 operator<<()	473
6.101 src/program-dumpBytecode.cpp File Reference	474
6.101.1 Detailed Description	474
6.101.2 Macro Definition Documentation	474
6.101.2.1 DUMPPROGRAMCHECK	474
6.102 src/program-execute.cpp File Reference	475
6.102.1 Detailed Description	475
6.102.2 Macro Definition Documentation	475
6.102.2.1 EXECUTEPROGRAMCHECK	476
6.102.2.2 STACKCHECK	476
6.103 src/program.cpp File Reference	476
6.103.1 Detailed Description	477
6.104 src/tangBase.cpp File Reference	477
6.104.1 Detailed Description	477
6.105 src/unicodeString.cpp File Reference	478
6.105.1 Detailed Description	478
6.106 test/test.cpp File Reference	478
6.106.1 Detailed Description	480
6.107 test/testGarbageCollected.cpp File Reference	480
6.107.1 Detailed Description	480
6.108 test/testSingletonObjectPool.cpp File Reference	481
6.108.1 Detailed Description	481
6.109 test/testUnicodeString.cpp File Reference	481
6.109.1 Detailed Description	482
Index	483

Chapter 1

Tang: A Template Language

1.1 Quick Description

Tang is a C++ Template Language. It takes the form of a library which may be included in other projects. It is under active development, and you can follow its progress here:

- [YouTube playlist](#)
- [GitHub repository](#)

1.2 Features

The following features are planned:

- Native support for Unicode/Utf-8 strings.
- Change from template to script mode using escape tags like PHP.
- Loosely typed, with Python-like indexing and slicing of containers.
- Syntax similar to C/C++/PHP.
- Code compiles to a custom Bytecode and is executed by the Tang VM.
- Fast and thread-safe.

1.3 License

MIT License

Copyright (c) 2022 Corey Pennycuff

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Chapter 2

Hierarchical Index

2.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Tang::AstNode	15
Tang::AstNodeArray	20
Tang::AstNodeAssign	25
Tang::AstNodeBinary	29
Tang::AstNodeBlock	35
Tang::AstNodeBoolean	39
Tang::AstNodeBreak	43
Tang::AstNodeCast	47
Tang::AstNodeContinue	52
Tang::AstNodeDoWhile	56
Tang::AstNodeFloat	60
Tang::AstNodeFor	64
Tang::AstNodeFunctionCall	69
Tang::AstNodeFunctionDeclaration	72
Tang::AstNodeIdentifier	76
Tang::AstNodeIfElse	81
Tang::AstNodeIndex	86
Tang::AstNodeInteger	91
Tang::AstNodeMap	95
Tang::AstNodePeriod	99
Tang::AstNodePrint	103
Tang::AstNodeRangedFor	108
Tang::AstNodeReturn	112
Tang::AstNodeSlice	116
Tang::AstNodeString	121
Tang::AstNodeTernary	126
Tang::AstNodeUnary	131
Tang::AstNodeWhile	137
Tang::ComputedExpression	141
Tang::ComputedExpressionArray	154
Tang::ComputedExpressionBoolean	170
Tang::ComputedExpressionCompiledFunction	182
Tang::ComputedExpressionError	195
Tang::ComputedExpressionFloat	210
Tang::ComputedExpressionInteger	224

Tang::ComputedExpressionIterator	239
Tang::ComputedExpressionIteratorEnd	253
Tang::ComputedExpressionMap	267
Tang::ComputedExpressionNativeBoundFunction	281
Tang::ComputedExpressionNativeFunction	297
Tang::ComputedExpressionString	312
Tang::Context	331
std::enable_shared_from_this	
Tang::TangBase	372
Tang::Error	332
Tang::GarbageCollected	334
Tang::location	356
Tang::position	357
Tang::Program	359
Tang::SingletonObjectPool< T >	369
TangHtmlEscapeAsciiFlexLexer	
Tang::HtmlEscapeAscii	353
TangHtmlEscapeFlexLexer	
Tang::HtmlEscape	351
TangTangFlexLexer	
Tang::TangScanner	374
TangUnescapeFlexLexer	
Tang::Unescape	377
Tang::UnicodeString	379

Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Tang::AstNode	Base class for representing nodes of an Abstract Syntax Tree (AST)	15
Tang::AstNodeArray	An <code>AstNode</code> that represents an array literal	20
Tang::AstNodeAssign	An <code>AstNode</code> that represents a binary expression	25
Tang::AstNodeBinary	An <code>AstNode</code> that represents a binary expression	29
Tang::AstNodeBlock	An <code>AstNode</code> that represents a code block	35
Tang::AstNodeBoolean	An <code>AstNode</code> that represents a boolean literal	39
Tang::AstNodeBreak	An <code>AstNode</code> that represents a <code>break</code> statement	43
Tang::AstNodeCast	An <code>AstNode</code> that represents a typecast of an expression	47
Tang::AstNodeContinue	An <code>AstNode</code> that represents a <code>continue</code> statement	52
Tang::AstNodeDoWhile	An <code>AstNode</code> that represents a <code>do..while</code> statement	56
Tang::AstNodeFloat	An <code>AstNode</code> that represents an float literal	60
Tang::AstNodeFor	An <code>AstNode</code> that represents an <code>if()</code> statement	64
Tang::AstNodeFunctionCall	An <code>AstNode</code> that represents a function call	69
Tang::AstNodeFunctionDeclaration	An <code>AstNode</code> that represents a function declaration	72
Tang::AstNodeIdentifier	An <code>AstNode</code> that represents an identifier	76
Tang::AstNodeIfElse	An <code>AstNode</code> that represents an <code>if..else</code> statement	81
Tang::AstNodeIndex	An <code>AstNode</code> that represents an index into a collection	86
Tang::AstNodeInteger	An <code>AstNode</code> that represents an integer literal	91

Tang::AstNodeMap	An <code>AstNode</code> that represents a map literal	95
Tang::AstNodePeriod	An <code>AstNode</code> that represents a member access (period) into an object	99
Tang::AstNodePrint	An <code>AstNode</code> that represents a print typeeration	103
Tang::AstNodeRangedFor	An <code>AstNode</code> that represents a ranged for() statement	108
Tang::AstNodeReturn	An <code>AstNode</code> that represents a <code>return</code> statement	112
Tang::AstNodeSlice	An <code>AstNode</code> that represents a ternary expression	116
Tang::AstNodeString	An <code>AstNode</code> that represents a string literal	121
Tang::AstNodeTernary	An <code>AstNode</code> that represents a ternary expression	126
Tang::AstNodeUnary	An <code>AstNode</code> that represents a unary negation	131
Tang::AstNodeWhile	An <code>AstNode</code> that represents a while statement	137
Tang::ComputedExpression	Represents the result of a computation that has been executed	141
Tang::ComputedExpressionArray	Represents an Array that is the result of a computation	154
Tang::ComputedExpressionBoolean	Represents an Boolean that is the result of a computation	170
Tang::ComputedExpressionCompiledFunction	Represents a Compiled Function declared in the script	182
Tang::ComputedExpressionError	Represents a Runtime Error	195
Tang::ComputedExpressionFloat	Represents a Float that is the result of a computation	210
Tang::ComputedExpressionInteger	Represents an Integer that is the result of a computation	224
Tang::ComputedExpressionIterator	Represents an Iterator that is the result of a computation	239
Tang::ComputedExpressionIteratorEnd	Represents that a collection has no more values through which to iterate	253
Tang::ComputedExpressionMap	Represents an Map that is the result of a computation	267
Tang::ComputedExpressionNativeBoundFunction	Represents a NativeBound Function declared in the script	281
Tang::ComputedExpressionNativeFunction	Represents a Native Function provided by compiled C++ code	297
Tang::ComputedExpressionString	Represents a String that is the result of a computation	312
Tang::Context	Holds all environment variables specific to the execution of a program	331
Tang::Error	Used to report any error of the system, whether a syntax (parsing) error or a runtime (execution) error	332
Tang::GarbageCollected	A container that acts as a resource-counting garbage collector for the specified type	334
Tang::HtmlEscape	The Flex lexer class for the main Tang language	351
Tang::HtmlEscapeAscii	The Flex lexer class for the main Tang language	353

Tang::location		
Two points in a source file	356
Tang::position		
A point in a source file	357
Tang::Program		
Represents a compiled script or template that may be executed	359
Tang::SingletonObjectPool< T >		
A thread-safe, singleton object pool of the designated type	369
Tang::TangBase		
The base class for the Tang programming language	372
Tang::TangScanner		
The Flex lexer class for the main Tang language	374
Tang::Unescape		
The Flex lexer class for the main Tang language	377
Tang::UnicodeString		
Represents a UTF-8 encoded string that is Unicode-aware	379

Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

build/generated/ location.hh	Define the Tang ::location class	387
include/ astNode.hpp	Declare the Tang::AstNode base class	389
include/ astNodeArray.hpp	Declare the Tang::AstNodeArray class	390
include/ astNodeAssign.hpp	Declare the Tang::AstNodeAssign class	391
include/ astNodeBinary.hpp	Declare the Tang::AstNodeBinary class	392
include/ astNodeBlock.hpp	Declare the Tang::AstNodeBlock class	393
include/ astNodeBoolean.hpp	Declare the Tang::AstNodeBoolean class	394
include/ astNodeBreak.hpp	Declare the Tang::AstNodeBreak class	395
include/ astNodeCast.hpp	Declare the Tang::AstNodeCast class	396
include/ astNodeContinue.hpp	Declare the Tang::AstNodeContinue class	397
include/ astNodeDoWhile.hpp	Declare the Tang::AstNodeDoWhile class	398
include/ astNodeFloat.hpp	Declare the Tang::AstNodeFloat class	399
include/ astNodeFor.hpp	Declare the Tang::AstNodeFor class	400
include/ astNodeFunctionCall.hpp	Declare the Tang::AstNodeFunctionCall class	401
include/ astNodeFunctionDeclaration.hpp	Declare the Tang::AstNodeFunctionDeclaration class	402
include/ astNodeIdentifier.hpp	Declare the Tang::AstNodeIdentifier class	403
include/ astNodeIfElse.hpp	Declare the Tang::AstNodeIfElse class	404
include/ astNodeIndex.hpp	Declare the Tang::AstNodeIndex class	405

include/astNodeInteger.hpp	Declare the <code>Tang::AstNodeInteger</code> class	406
include/astNodeMap.hpp	Declare the <code>Tang::AstNodeMap</code> class	407
include/astNodePeriod.hpp	Declare the <code>Tang::AstNodePeriod</code> class	408
include/astNodePrint.hpp	Declare the <code>Tang::AstNodePrint</code> class	409
include/astNodeRangedFor.hpp	Declare the <code>Tang::AstNodeRangedFor</code> class	410
include/astNodeReturn.hpp	Declare the <code>Tang::AstNodeReturn</code> class	411
include/astNodeSlice.hpp	Declare the <code>Tang::AstNodeSlice</code> class	412
include/astNodeString.hpp	Declare the <code>Tang::AstNodeString</code> class	413
include/astNodeTernary.hpp	Declare the <code>Tang::AstNodeTernary</code> class	413
include/astNodeUnary.hpp	Declare the <code>Tang::AstNodeUnary</code> class	414
include/astNodeWhile.hpp	Declare the <code>Tang::AstNodeWhile</code> class	415
include/computedExpression.hpp	Declare the <code>Tang::ComputedExpression</code> base class	416
include/computedExpressionArray.hpp	Declare the <code>Tang::ComputedExpressionArray</code> class	417
include/computedExpressionBoolean.hpp	Declare the <code>Tang::ComputedExpressionBoolean</code> class	418
include/computedExpressionCompiledFunction.hpp	Declare the <code>Tang::ComputedExpressionCompiledFunction</code> class	419
include/computedExpressionError.hpp	Declare the <code>Tang::ComputedExpressionError</code> class	420
include/computedExpressionFloat.hpp	Declare the <code>Tang::ComputedExpressionFloat</code> class	421
include/computedExpressionInteger.hpp	Declare the <code>Tang::ComputedExpressionInteger</code> class	422
include/computedExpressionIterator.hpp	Declare the <code>Tang::ComputedExpressionIterator</code> class	423
include/computedExpressionIteratorEnd.hpp	Declare the <code>Tang::ComputedExpressionIteratorEnd</code> class	424
include/computedExpressionMap.hpp	Declare the <code>Tang::ComputedExpressionMap</code> class	425
include/computedExpressionNativeBoundFunction.hpp	Declare the <code>Tang::ComputedExpressionNativeBoundFunction</code> class	426
include/computedExpressionNativeFunction.hpp	Declare the <code>Tang::ComputedExpressionNativeFunction</code> class	427
include/computedExpressionString.hpp	Declare the <code>Tang::ComputedExpressionString</code> class	429
include/context.hpp	Declare the <code>Tang::Context</code> class	429
include/error.hpp	Declare the <code>Tang::Error</code> class used to describe syntax and runtime errors	430
include/garbageCollected.hpp	Declare the <code>Tang::GarbageCollected</code> class	431
include/htmlEscape.hpp	Declare the <code>Tang::HtmlEscape</code> used to tokenize a Tang script	432
include/htmlEscapeAscii.hpp	Declare the <code>Tang::HtmlEscapeAscii</code> used to tokenize a Tang script	433

include/macros.hpp	
Contains generic macros	435
include/opcode.hpp	
Declare the Opcodes used in the Bytecode representation of a program	436
include/program.hpp	
Declare the <code>Tang::Program</code> class used to compile and execute source code	437
include/singletonObjectPool.hpp	
Declare the <code>Tang::SingletonObjectPool</code> class	438
include/tang.hpp	
Header file supplied for use by 3rd party code so that they can easily include all necessary headers	439
include/tangBase.hpp	
Declare the <code>Tang::TangBase</code> class used to interact with Tang	440
include/tangScanner.hpp	
Declare the <code>Tang::TangScanner</code> used to tokenize a Tang script	441
include/unescape.hpp	
Declare the <code>Tang::Unescape</code> used to tokenize a Tang script	442
include/unicodeString.hpp	
Contains the code to interface with the ICU library	443
src/astNode.cpp	
Define the <code>Tang::AstNode</code> class	446
src/astNodeArray.cpp	
Define the <code>Tang::AstNodeArray</code> class	447
src/astNodeAssign.cpp	
Define the <code>Tang::AstNodeAssign</code> class	447
src/astNodeBinary.cpp	
Define the <code>Tang::AstNodeBinary</code> class	448
src/astNodeBlock.cpp	
Define the <code>Tang::AstNodeBlock</code> class	449
src/astNodeBoolean.cpp	
Define the <code>Tang::AstNodeBoolean</code> class	449
src/astNodeBreak.cpp	
Define the <code>Tang::AstNodeBreak</code> class	450
src/astNodeCast.cpp	
Define the <code>Tang::AstNodeCast</code> class	450
src/astNodeContinue.cpp	
Define the <code>Tang::AstNodeContinue</code> class	451
src/astNodeDoWhile.cpp	
Define the <code>Tang::AstNodeDoWhile</code> class	452
src/astNodeFloat.cpp	
Define the <code>Tang::AstNodeFloat</code> class	452
src/astNodeFor.cpp	
Define the <code>Tang::AstNodeFor</code> class	453
src/astNodeFunctionCall.cpp	
Define the <code>Tang::AstNodeFunctionCall</code> class	453
src/astNodeFunctionDeclaration.cpp	
Define the <code>Tang::AstNodeFunctionDeclaration</code> class	454
src/astNodeIdentifier.cpp	
Define the <code>Tang::AstNodeIdentifier</code> class	455
src/astNodeIfElse.cpp	
Define the <code>Tang::AstNodeIfElse</code> class	455
src/astNodeIndex.cpp	
Define the <code>Tang::AstNodeIndex</code> class	456
src/astNodeInteger.cpp	
Define the <code>Tang::AstNodeInteger</code> class	457
src/astNodeMap.cpp	
Define the <code>Tang::AstNodeMap</code> class	457

src/astNodePeriod.cpp	
Define the Tang::AstNodePeriod class	458
src/astNodePrint.cpp	
Define the Tang::AstNodePrint class	458
src/astNodeRangedFor.cpp	
Define the Tang::AstNodeRangedFor class	459
src/astNodeReturn.cpp	
Define the Tang::AstNodeReturn class	460
src/astNodeSlice.cpp	
Define the Tang::AstNodeSlice class	460
src/astNodeString.cpp	
Define the Tang::AstNodeString class	461
src/astNodeTernary.cpp	
Define the Tang::AstNodeTernary class	462
src/astNodeUnary.cpp	
Define the Tang::AstNodeUnary class	462
src/astNodeWhile.cpp	
Define the Tang::AstNodeWhile class	463
src/computedExpression.cpp	
Define the Tang::ComputedExpression class	463
src/computedExpressionArray.cpp	
Define the Tang::ComputedExpressionArray class	464
src/computedExpressionBoolean.cpp	
Define the Tang::ComputedExpressionBoolean class	465
src/computedExpressionCompiledFunction.cpp	
Define the Tang::ComputedExpressionCompiledFunction class	465
src/computedExpressionError.cpp	
Define the Tang::ComputedExpressionError class	466
src/computedExpressionFloat.cpp	
Define the Tang::ComputedExpressionFloat class	466
src/computedExpressionInteger.cpp	
Define the Tang::ComputedExpressionInteger class	467
src/computedExpressionIterator.cpp	
Define the Tang::ComputedExpressionIterator class	468
src/computedExpressionIteratorEnd.cpp	
Define the Tang::ComputedExpressionIteratorEnd class	468
src/computedExpressionMap.cpp	
Define the Tang::ComputedExpressionMap class	469
src/computedExpressionNativeBoundFunction.cpp	
Define the Tang::ComputedExpressionNativeBoundFunction class	470
src/computedExpressionNativeFunction.cpp	
Define the Tang::ComputedExpressionNativeFunction class	470
src/computedExpressionString.cpp	
Define the Tang::ComputedExpressionString class	471
src/context.cpp	
Define the Tang::Context class	471
src/error.cpp	
Define the Tang::Error class	472
src/garbageCollected.cpp	
Define the Tang::GarbageCollected class	473
src/program-dumpBytecode.cpp	
Define the Tang::Program::dumpBytecode method	474
src/program-execute.cpp	
Define the Tang::Program::execute method	475
src/program.cpp	
Define the Tang::Program class	476
src/tangBase.cpp	
Define the Tang::TangBase class	477

src/unicodeString.cpp	
Contains the function declarations for the <code>Tang::UnicodeString</code> class and the interface to ICU	478
test/test.cpp	
Test the general language behaviors	478
test/testGarbageCollected.cpp	
Test the generic behavior of the <code>Tang::GarbageCollected</code> class	480
test/testSingletonObjectPool.cpp	
Test the generic behavior of the <code>Tang::SingletonObjectPool</code> class	481
test/testUnicodeString.cpp	
Contains tests for the <code>Tang::UnicodeString</code> class	481

Chapter 5

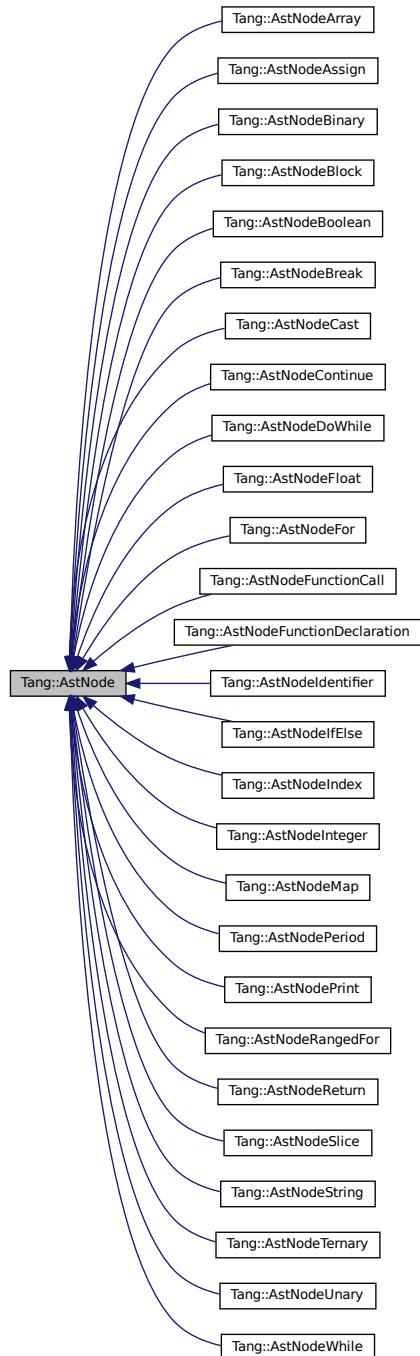
Class Documentation

5.1 Tang::AstNode Class Reference

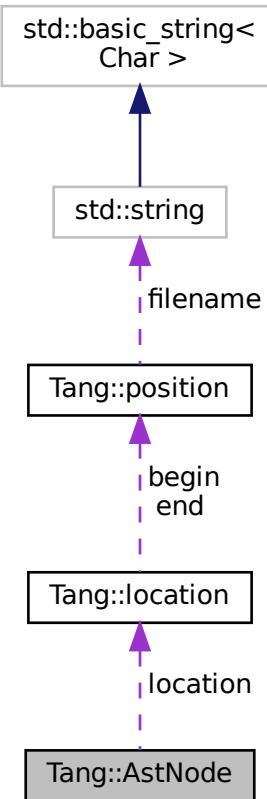
Base class for representing nodes of an Abstract Syntax Tree (AST).

```
#include <astNode.hpp>
```

Inheritance diagram for Tang::AstNode:



Collaboration diagram for Tang::AstNode:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNode (Tang::location location)`
The generic constructor.
- `virtual ~AstNode ()`
The object destructor.
- `virtual std::string dump (std::string indent="") const`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

5.1.1 Detailed Description

Base class for representing nodes of an Abstract Syntax Tree (AST).

By default, it will represent a NULL value. There will be *many* derived classes, each one conveying the syntactic meaning of the code that it represents.

5.1.2 Member Enumeration Documentation

5.1.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.1.3 Constructor & Destructor Documentation

5.1.3.1 AstNode()

```
AstNode::AstNode (
    Tang::location location )
```

The generic constructor.

It should never be called on its own.

Parameters

<code>location</code>	The location associated with this node.
-----------------------	---

5.1.4 Member Function Documentation

5.1.4.1 compile()

```
void AstNode::compile (
    Tang::Program & program ) const [virtual]
```

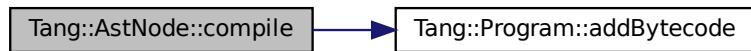
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented in [Tang::AstNodeWhile](#), [Tang::AstNodeUnary](#), [Tang::AstNodeTernary](#), [Tang::AstNodeString](#), [Tang::AstNodeSlice](#), [Tang::AstNodeReturn](#), [Tang::AstNodeRangedFor](#), [Tang::AstNodePrint](#), [Tang::AstNodePeriod](#), [Tang::AstNodeMap](#), [Tang::AstNodeInteger](#), [Tang::AstNodeIndex](#), [Tang::AstNodeIfElse](#), [Tang::AstNodeIdentifier](#), [Tang::AstNodeFunctionDeclaration](#), [Tang::AstNodeFunctionCall](#), [Tang::AstNodeFor](#), [Tang::AstNodeFloat](#), [Tang::AstNodeDoWhile](#), [Tang::AstNodeContinue](#), [Tang::AstNodeCast](#), [Tang::AstNodeBreak](#), [Tang::AstNodeBoolean](#), [Tang::AstNodeBlock](#), [Tang::AstNodeBinary](#), [Tang::AstNodeAssign](#), and [Tang::AstNodeArray](#).

Here is the call graph for this function:



5.1.4.2 compilePreprocess()

```
void AstNode::compilePreprocess (
    Program & program,
    PreprocessState state ) const [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented in [Tang::AstNodeWhile](#), [Tang::AstNodeUnary](#), [Tang::AstNodeTernary](#), [Tang::AstNodeString](#), [Tang::AstNodeSlice](#), [Tang::AstNodeReturn](#), [Tang::AstNodeRangedFor](#), [Tang::AstNodePrint](#), [Tang::AstNodePeriod](#),

`Tang::AstNodeMap`, `Tang::AstNodeIndex`, `Tang::AstNodeIfElse`, `Tang::AstNodeIdentifier`, `Tang::AstNodeFunctionDeclaration`, `Tang::AstNodeFunctionCall`, `Tang::AstNodeFor`, `Tang::AstNodeDoWhile`, `Tang::AstNodeCast`, `Tang::AstNodeBlock`, `Tang::AstNodeBinary`, `Tang::AstNodeAssign`, and `Tang::AstNodeArray`.

5.1.4.3 `dump()`

```
string AstNode::dump (
    std::string indent = "" ) const [virtual]
```

Return a string that describes the contents of the node.

Parameters

<code>indent</code>	A string used to indent the dump.
---------------------	-----------------------------------

Returns

The value as a string.

Reimplemented in `Tang::AstNodeWhile`, `Tang::AstNodeUnary`, `Tang::AstNodeTernary`, `Tang::AstNodeString`, `Tang::AstNodeSlice`, `Tang::AstNodeReturn`, `Tang::AstNodeRangedFor`, `Tang::AstNodePrint`, `Tang::AstNodePeriod`, `Tang::AstNodeMap`, `Tang::AstNodeInteger`, `Tang::AstNodeIndex`, `Tang::AstNodeIfElse`, `Tang::AstNodeIdentifier`, `Tang::AstNodeFunctionDeclaration`, `Tang::AstNodeFunctionCall`, `Tang::AstNodeFor`, `Tang::AstNodeFloat`, `Tang::AstNodeDoWhile`, `Tang::AstNodeContinue`, `Tang::AstNodeCast`, `Tang::AstNodeBreak`, `Tang::AstNodeBoolean`, `Tang::AstNodeBlock`, `Tang::AstNodeBinary`, `Tang::AstNodeAssign`, and `Tang::AstNodeArray`.

Here is the call graph for this function:



The documentation for this class was generated from the following files:

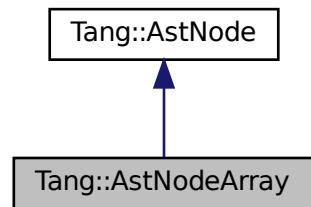
- `include/astNode.hpp`
- `src/astNode.cpp`

5.2 `Tang::AstNodeArray` Class Reference

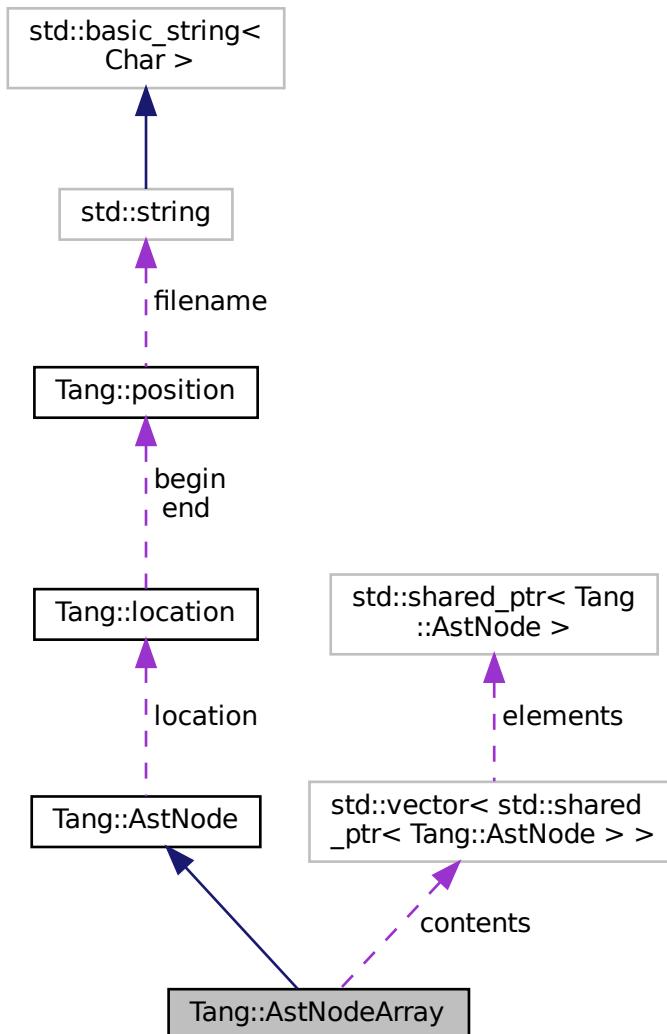
An `AstNode` that represents an array literal.

```
#include <astNodeArray.hpp>
```

Inheritance diagram for Tang::AstNodeArray:



Collaboration diagram for Tang::AstNodeArray:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeArray (std::vector< std::shared_ptr< Tang::AstNode >> contents, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`

Compile the ast of the provided [Tang::Program](#).

- virtual void [compilePreprocess](#) ([Program](#) &program, [PreprocessState](#) state) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location](#) location
The location associated with this node.

Private Attributes

- std::vector< std::shared_ptr< [Tang::AstNode](#) > > contents
The contents of the array.

5.2.1 Detailed Description

An [AstNode](#) that represents an array literal.

5.2.2 Member Enumeration Documentation

5.2.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.2.3 Constructor & Destructor Documentation

5.2.3.1 AstNodeArray()

```
AstNodeArray::AstNodeArray (
    std::vector< std::shared_ptr< Tang::AstNode > > contents,
    Tang::location location )
```

The constructor.

Parameters

<i>contents</i>	The contents of the array.
<i>location</i>	The location associated with the expression.

5.2.4 Member Function Documentation**5.2.4.1 compile()**

```
void AstNodeArray::compile (
    Tang::Program & program ) const [override], [virtual]
```

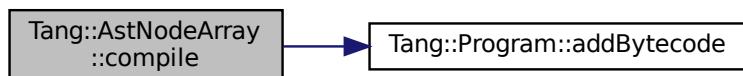
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.2.4.2 compilePreprocess()**

```
void AstNodeArray::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.2.4.3 dump()

```
string AstNodeArray::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

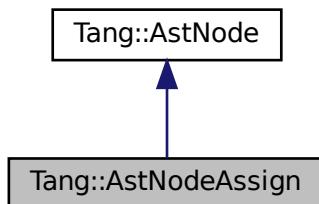
- [include/astNodeArray.hpp](#)
- [src/astNodeArray.cpp](#)

5.3 Tang::AstNodeAssign Class Reference

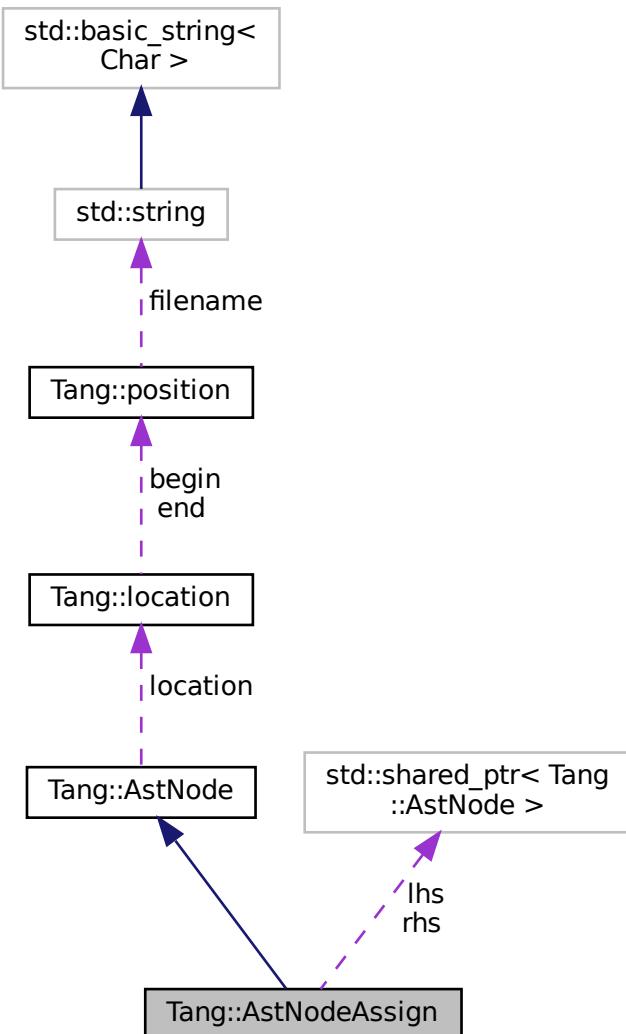
An [AstNode](#) that represents a binary expression.

```
#include <astNodeAssign.hpp>
```

Inheritance diagram for Tang::AstNodeAssign:



Collaboration diagram for Tang::AstNodeAssign:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeAssign (std::shared_ptr< AstNode > lhs, std::shared_ptr< AstNode > rhs, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`

Compile the ast of the provided [Tang::Program](#).

- virtual void [compilePreprocess](#) ([Program](#) &program, [PreprocessState](#) state) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location](#) location
The location associated with this node.

Private Attributes

- std::shared_ptr<[AstNode](#)> lhs
The left hand side expression.
- std::shared_ptr<[AstNode](#)> rhs
The right hand side expression.

5.3.1 Detailed Description

An [AstNode](#) that represents a binary expression.

5.3.2 Member Enumeration Documentation

5.3.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.3.3 Constructor & Destructor Documentation

5.3.3.1 AstNodeAssign()

```
AstNodeAssign::AstNodeAssign (
    std::shared_ptr<AstNode> lhs,
```

```
std::shared_ptr< AstNode > rhs,
Tang::location location )
```

The constructor.

Parameters

<i>lhs</i>	The left hand side expression.
<i>rhs</i>	The right hand side expression.
<i>location</i>	The location associated with the expression.

5.3.4 Member Function Documentation

5.3.4.1 compile()

```
void AstNodeAssign::compile (
    Tang::Program & program ) const [override], [virtual]
```

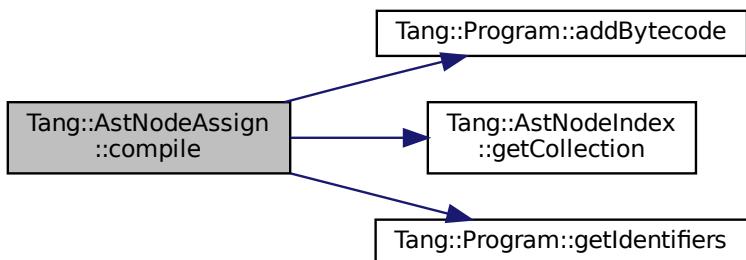
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.3.4.2 compilePreprocess()

```
void AstNodeAssign::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.3.4.3 dump()

```
string AstNodeAssign::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

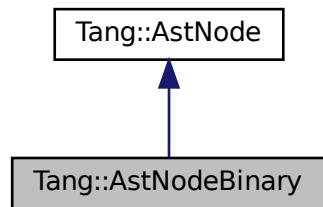
- [include/astNodeAssign.hpp](#)
- [src/astNodeAssign.cpp](#)

5.4 Tang::AstNodeBinary Class Reference

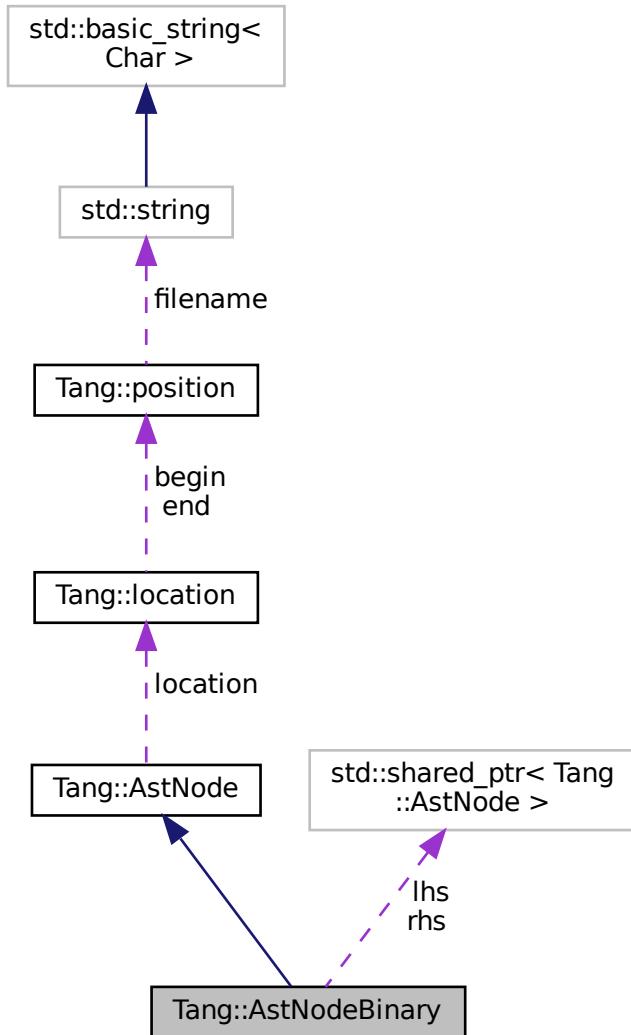
An [AstNode](#) that represents a binary expression.

```
#include <astNodeBinary.hpp>
```

Inheritance diagram for Tang::AstNodeBinary:



Collaboration diagram for Tang::AstNodeBinary:



Public Types

- enum `Operation` {
 `Add` , `Subtract` , `Multiply` , `Divide` ,
 `Modulo` , `LessThan` , `LessThanEqual` , `GreaterThan` ,
 `GreaterThanOrEqualTo` , `Equal` , `NotEqual` , `And` ,
 `Or` }

Indicates the type of binary expression that this node represents.
- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- `AstNodeBinary (Operation op, std::shared_ptr< AstNode > lhs, std::shared_ptr< AstNode > rhs, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `Operation op`
The binary operation performed.
- `std::shared_ptr< AstNode > lhs`
The left hand side expression.
- `std::shared_ptr< AstNode > rhs`
The right hand side expression.

5.4.1 Detailed Description

An `AstNode` that represents a binary expression.

5.4.2 Member Enumeration Documentation

5.4.2.1 Operation

```
enum Tang::AstNodeBinary::Operation
```

Indicates the type of binary expression that this node represents.

Enumerator

Add	Indicates lhs + rhs.
Subtract	Indicates lhs - rhs.
Multiply	Indicates lhs * rhs.
Divide	Indicates lhs / rhs.
Modulo	Indicates lhs % rhs.
LessThan	Indicates lhs < rhs.
LessThanEqual	Indicates lhs <= rhs.
GreaterThan	Indicates lhs > rhs.
GreaterThanEqual	Indicates lhs >= rhs.
Equal	Indicates lhs == rhs.

5.4.2.2 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.4.3 Constructor & Destructor Documentation

5.4.3.1 AstNodeBinary()

```
AstNodeBinary::AstNodeBinary (
    Operation op,
    std::shared_ptr< AstNode > lhs,
    std::shared_ptr< AstNode > rhs,
    Tang::location location )
```

The constructor.

Parameters

<i>op</i>	The Tang::AstNodeBinary::Operation to perform.
<i>lhs</i>	The left hand side expression.
<i>rhs</i>	The right hand side expression.
<i>location</i>	The location associated with the expression.

5.4.4 Member Function Documentation

5.4.4.1 compile()

```
void AstNodeBinary::compile (
    Tang::Program & program ) const [override], [virtual]
```

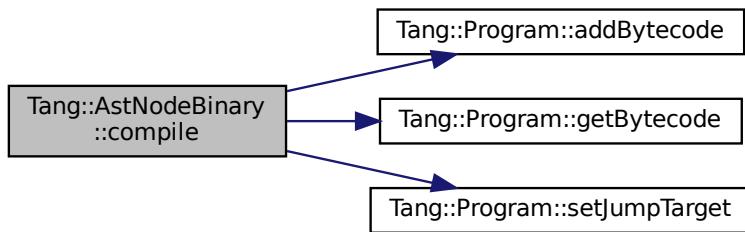
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Tang::Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.4.4.2 compilePreprocess()**

```
void AstNodeBinary::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.4.4.3 dump()

```
string AstNodeBinary::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

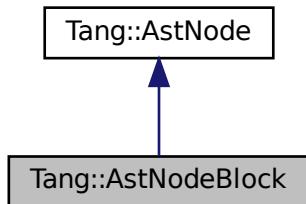
- [include/astNodeBinary.hpp](#)
- [src/astNodeBinary.cpp](#)

5.5 Tang::AstNodeBlock Class Reference

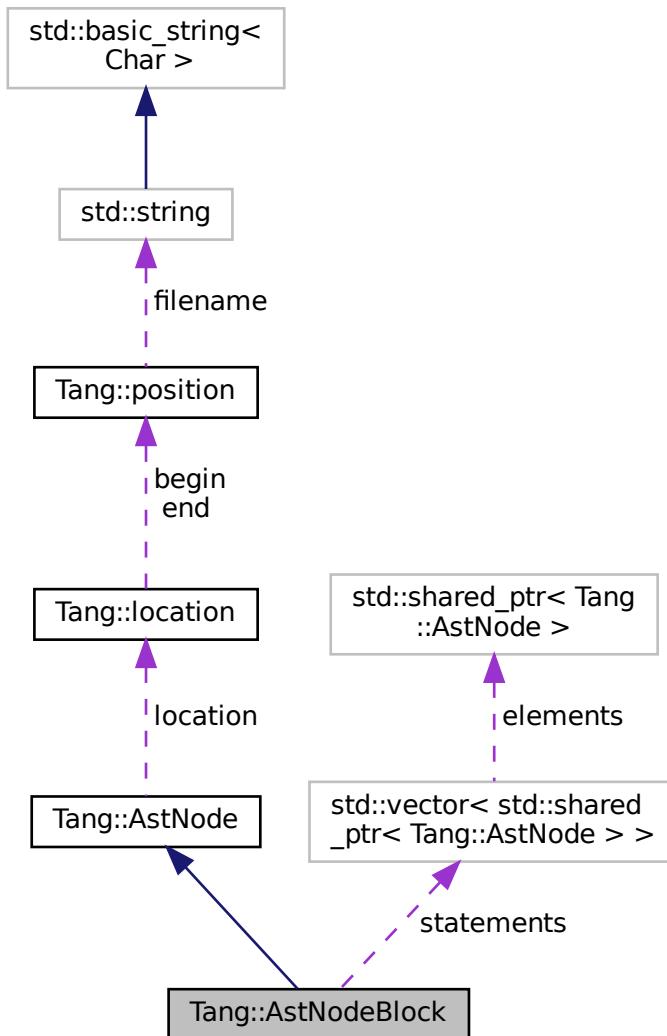
An [AstNode](#) that represents a code block.

```
#include <astNodeBlock.hpp>
```

Inheritance diagram for Tang::AstNodeBlock:



Collaboration diagram for Tang::AstNodeBlock:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeBlock (const std::vector< std::shared_ptr< AstNode >> &statements, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`

Compile the ast of the provided [Tang::Program](#).

- virtual void [compilePreprocess](#) ([Program](#) &program, [PreprocessState](#) state) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location](#) location
The location associated with this node.

Private Attributes

- std::vector< std::shared_ptr< [AstNode](#) > > statements
The statements included in the code block.

5.5.1 Detailed Description

An [AstNode](#) that represents a code block.

5.5.2 Member Enumeration Documentation

5.5.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.5.3 Constructor & Destructor Documentation

5.5.3.1 AstNodeBlock()

```
AstNodeBlock::AstNodeBlock (
    const std::vector< std::shared_ptr< AstNode >> & statements,
    Tang::location location )
```

The constructor.

Parameters

<i>statements</i>	The statements of the code block.
<i>location</i>	The location associated with the expression.

5.5.4 Member Function Documentation**5.5.4.1 compile()**

```
void AstNodeBlock::compile (
    Tang::Program & program ) const [override], [virtual]
```

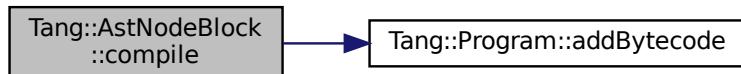
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.5.4.2 compilePreprocess()**

```
void AstNodeBlock::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.5.4.3 dump()

```
string AstNodeBlock::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

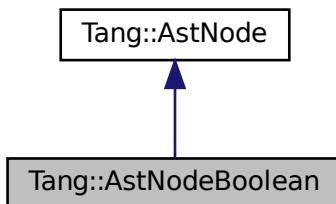
- [include/astNodeBlock.hpp](#)
- [src/astNodeBlock.cpp](#)

5.6 Tang::AstNodeBoolean Class Reference

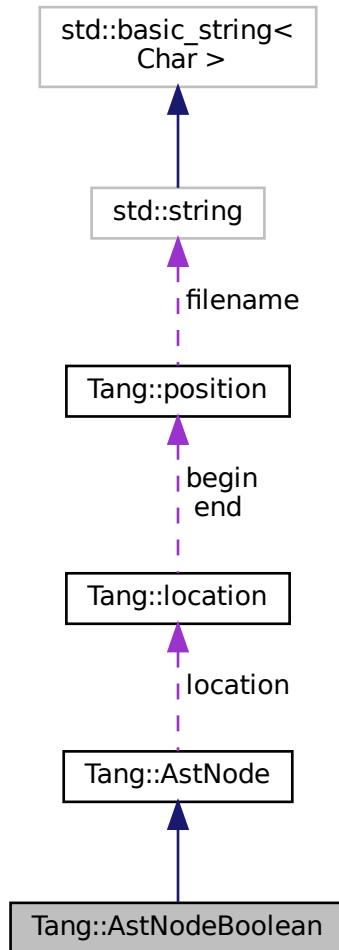
An [AstNode](#) that represents a boolean literal.

```
#include <astNodeBoolean.hpp>
```

Inheritance diagram for Tang::AstNodeBoolean:



Collaboration diagram for Tang::AstNodeBoolean:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeBoolean (bool val, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const`
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location location](#)
The location associated with this node.

Private Attributes

- bool [val](#)
The boolean value being stored.

5.6.1 Detailed Description

An [AstNode](#) that represents a boolean literal.

5.6.2 Member Enumeration Documentation

5.6.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.6.3 Constructor & Destructor Documentation

5.6.3.1 AstNodeBoolean()

```
AstNodeBoolean::AstNodeBoolean (
    bool val,
    Tang::location location )
```

The constructor.

Parameters

val	The boolean to represent.
location	The location associated with the expression.

5.6.4 Member Function Documentation

5.6.4.1 compile()

```
void AstNodeBoolean::compile (
    Tang::Program & program ) const [override], [virtual]
```

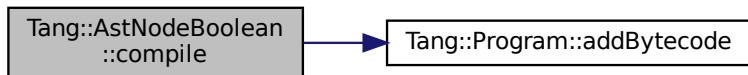
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.6.4.2 compilePreprocess()

```
void AstNode::compilePreprocess (
    Program & program,
    PreprocessState state ) const [virtual], [inherited]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented in [Tang::AstNodeWhile](#), [Tang::AstNodeUnary](#), [Tang::AstNodeTernary](#), [Tang::AstNodeString](#), [Tang::AstNodeSlice](#), [Tang::AstNodeReturn](#), [Tang::AstNodeRangedFor](#), [Tang::AstNodePrint](#), [Tang::AstNodePeriod](#), [Tang::AstNodeMap](#), [Tang::AstNodeIndex](#), [Tang::AstNodeIfElse](#), [Tang::AstNodeIdentifier](#), [Tang::AstNodeFunctionDeclaration](#), [Tang::AstNodeFunctionCall](#), [Tang::AstNodeFor](#), [Tang::AstNodeDoWhile](#), [Tang::AstNodeCast](#), [Tang::AstNodeBlock](#), [Tang::AstNodeBinary](#), [Tang::AstNodeAssign](#), and [Tang::AstNodeArray](#).

5.6.4.3 dump()

```
string AstNodeBoolean::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

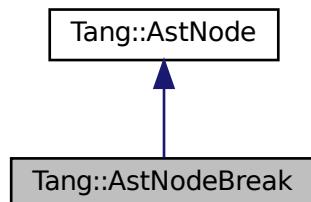
- [include/astNodeBoolean.hpp](#)
- [src/astNodeBoolean.cpp](#)

5.7 Tang::AstNodeBreak Class Reference

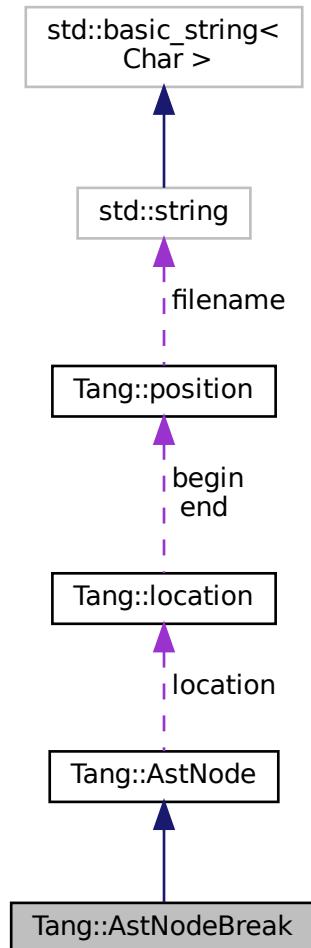
An [AstNode](#) that represents a `break` statement.

```
#include <astNodeBreak.hpp>
```

Inheritance diagram for Tang::AstNodeBreak:



Collaboration diagram for Tang::AstNodeBreak:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeBreak (Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided `Tang::Program`.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

5.7.1 Detailed Description

An `AstNode` that represents a `break` statement.

5.7.2 Member Enumeration Documentation

5.7.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.7.3 Constructor & Destructor Documentation

5.7.3.1 AstNodeBreak()

```
AstNodeBreak::AstNodeBreak (
    Tang::location location )
```

The constructor.

Parameters

<code>location</code>	The location associated with the expression.
-----------------------	--

5.7.4 Member Function Documentation

5.7.4.1 compile()

```
void AstNodeBreak::compile (
    Tang::Program & program ) const [override], [virtual]
```

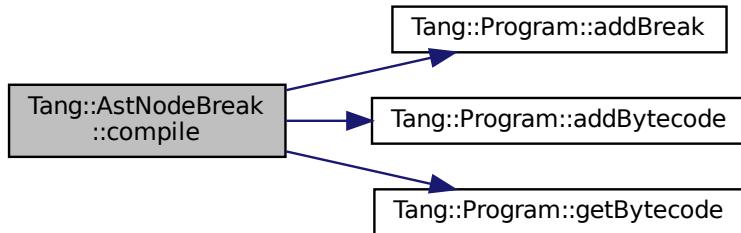
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.7.4.2 compilePreprocess()

```
void AstNode::compilePreprocess (
    Program & program,
    PreprocessState state ) const [virtual], [inherited]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented in [Tang::AstNodeWhile](#), [Tang::AstNodeUnary](#), [Tang::AstNodeTernary](#), [Tang::AstNodeString](#), [Tang::AstNodeSlice](#), [Tang::AstNodeReturn](#), [Tang::AstNodeRangedFor](#), [Tang::AstNodePrint](#), [Tang::AstNodePeriod](#), [Tang::AstNodeMap](#), [Tang::AstNodeIndex](#), [Tang::AstNodeIfElse](#), [Tang::AstNodeIdentifier](#), [Tang::AstNodeFunctionDeclaration](#), [Tang::AstNodeFunctionCall](#), [Tang::AstNodeFor](#), [Tang::AstNodeDoWhile](#), [Tang::AstNodeCast](#), [Tang::AstNodeBlock](#), [Tang::AstNodeBinary](#), [Tang::AstNodeAssign](#), and [Tang::AstNodeArray](#).

5.7.4.3 dump()

```
string AstNodeBreak::dump (
    std::string indent = "") const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

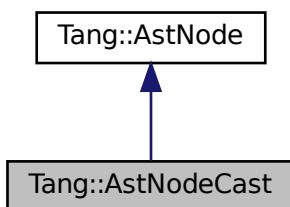
- [include/astNodeBreak.hpp](#)
- [src/astNodeBreak.cpp](#)

5.8 Tang::AstNodeCast Class Reference

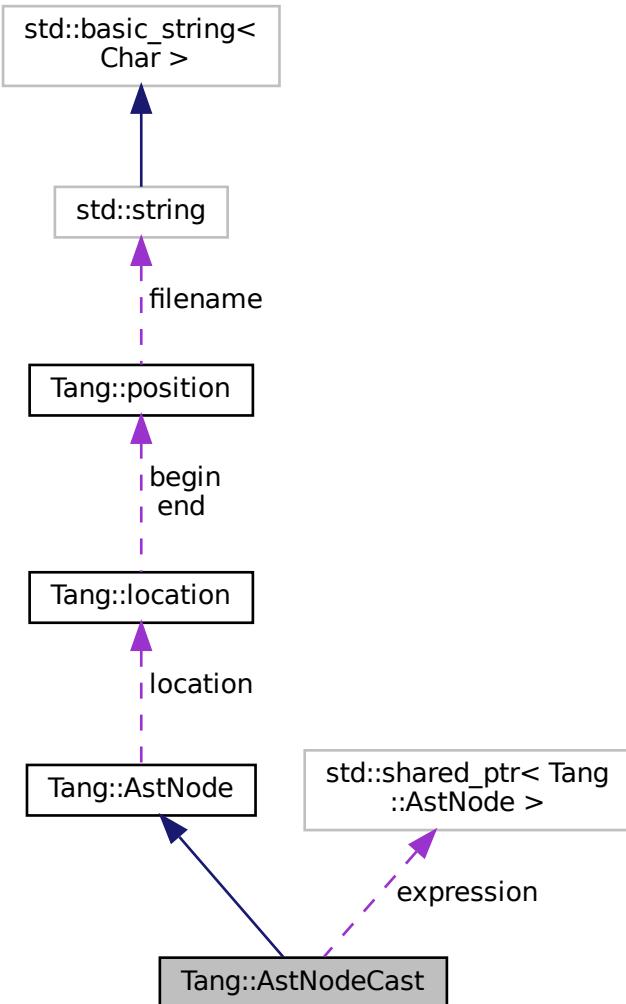
An [AstNode](#) that represents a typecast of an expression.

```
#include <astNodeCast.hpp>
```

Inheritance diagram for Tang::AstNodeCast:



Collaboration diagram for Tang::AstNodeCast:



Public Types

- enum `Type` { `Integer` , `Float` , `Boolean` , `String` }
The possible types that can be cast to.
- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- `AstNodeCast (Type targetType, shared_ptr< AstNode > expression, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`

Return a string that describes the contents of the node.

- virtual void `compile (Tang::Program &program)` const override
Compile the ast of the provided Tang::Program.
- virtual void `compilePreprocess (Program &program, PreprocessState state)` const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `Type targetType`
The target type.
- `shared_ptr< AstNode > expression`
The expression being typecast.

5.8.1 Detailed Description

An `AstNode` that represents a typecast of an expression.

5.8.2 Member Enumeration Documentation

5.8.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.8.2.2 Type

```
enum Tang::AstNodeCast::Type
```

The possible types that can be cast to.

Enumerator

Integer	Cast to a Tang::ComputedExpressionInteger .
Float	Cast to a Tang::ComputedExpressionFloat .
Boolean	Cast to a Tang::ComputedExpressionBoolean .
String	Cast to a Tang::ComputedExpressionString .

5.8.3 Constructor & Destructor Documentation**5.8.3.1 AstNodeCast()**

```
AstNodeCast::AstNodeCast (
    Type targetType,
    shared_ptr< AstNode > expression,
    Tang::location location )
```

The constructor.

Parameters

<i>targetType</i>	The target type that the expression will be cast to.
<i>expression</i>	The expression to be typecast.
<i>location</i>	The location associated with this node.

5.8.4 Member Function Documentation**5.8.4.1 compile()**

```
void AstNodeCast::compile (
    Tang::Program & program ) const [override], [virtual]
```

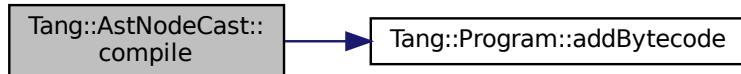
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.8.4.2 compilePreprocess()

```
void AstNodeCast::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.8.4.3 dump()

```
string AstNodeCast::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

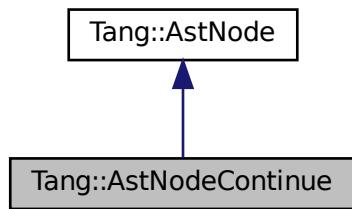
- [include/astNodeCast.hpp](#)
- [src/astNodeCast.cpp](#)

5.9 Tang::AstNodeContinue Class Reference

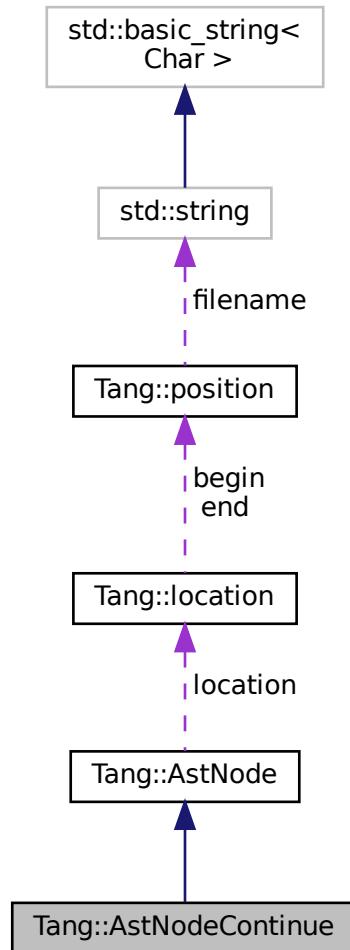
An [AstNode](#) that represents a `continue` statement.

```
#include <astNodeContinue.hpp>
```

Inheritance diagram for Tang::AstNodeContinue:



Collaboration diagram for Tang::AstNodeContinue:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeContinue (Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided `Tang::Program`.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

5.9.1 Detailed Description

An `AstNode` that represents a `continue` statement.

5.9.2 Member Enumeration Documentation

5.9.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.9.3 Constructor & Destructor Documentation

5.9.3.1 AstNodeContinue()

```
AstNodeContinue::AstNodeContinue (
    Tang::location location )
```

The constructor.

Parameters

<code>location</code>	The location associated with the expression.
-----------------------	--

5.9.4 Member Function Documentation

5.9.4.1 compile()

```
void AstNodeContinue::compile (
    Tang::Program & program ) const [override], [virtual]
```

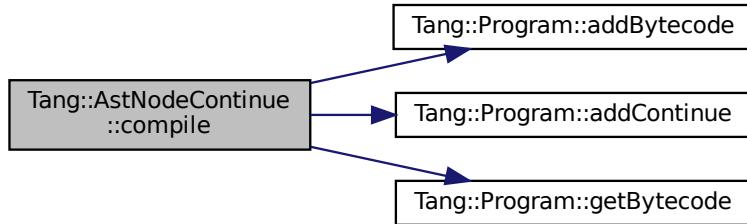
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.9.4.2 compilePreprocess()

```
void AstNode::compilePreprocess (
    Program & program,
    PreprocessState state ) const [virtual], [inherited]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented in [Tang::AstNodeWhile](#), [Tang::AstNodeUnary](#), [Tang::AstNodeTernary](#), [Tang::AstNodeString](#), [Tang::AstNodeSlice](#), [Tang::AstNodeReturn](#), [Tang::AstNodeRangedFor](#), [Tang::AstNodePrint](#), [Tang::AstNodePeriod](#), [Tang::AstNodeMap](#), [Tang::AstNodeIndex](#), [Tang::AstNodeIfElse](#), [Tang::AstNodeIdentifier](#), [Tang::AstNodeFunctionDeclaration](#), [Tang::AstNodeFunctionCall](#), [Tang::AstNodeFor](#), [Tang::AstNodeDoWhile](#), [Tang::AstNodeCast](#), [Tang::AstNodeBlock](#), [Tang::AstNodeBinary](#), [Tang::AstNodeAssign](#), and [Tang::AstNodeArray](#).

5.9.4.3 dump()

```
string AstNodeContinue::dump (
    std::string indent = "") const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

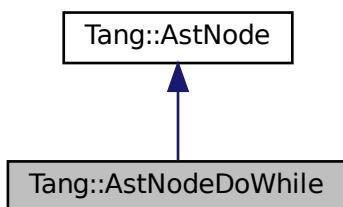
- [include/astNodeContinue.hpp](#)
- [src/astNodeContinue.cpp](#)

5.10 Tang::AstNodeDoWhile Class Reference

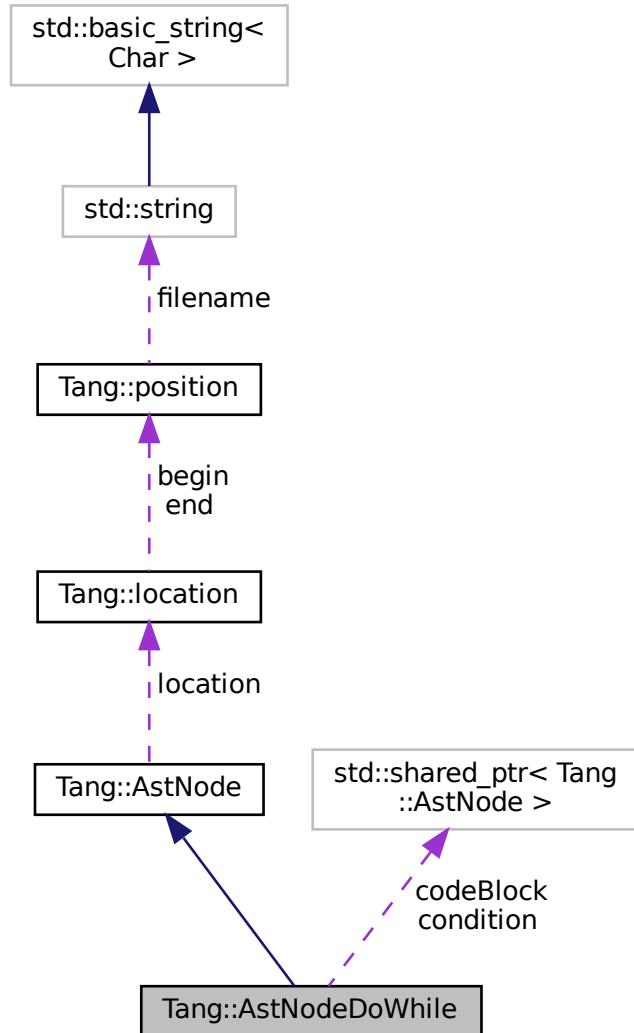
An [AstNode](#) that represents a do..while statement.

```
#include <astNodeDoWhile.hpp>
```

Inheritance diagram for Tang::AstNodeDoWhile:



Collaboration diagram for Tang::AstNodeDoWhile:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeDoWhile (shared_ptr< AstNode > condition, shared_ptr< AstNode > codeBlock, Tang::location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.

- virtual void `compile (Tang::Program &program)` const override
Compile the ast of the provided Tang::Program.
- virtual void `compilePreprocess (Program &program, PreprocessState state)` const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `shared_ptr< AstNode > condition`
The expression which determines whether or not the code block will continue to be executed.
- `shared_ptr< AstNode > codeBlock`
The code block executed when the condition is true.

5.10.1 Detailed Description

An `AstNode` that represents a do..while statement.

5.10.2 Member Enumeration Documentation

5.10.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.10.3 Constructor & Destructor Documentation

5.10.3.1 AstNodeDoWhile()

```
AstNodeDoWhile::AstNodeDoWhile (
    shared_ptr< AstNode > condition,
```

```
shared_ptr< AstNode > codeBlock,
Tang::location location )
```

The constructor.

Parameters

<i>condition</i>	The expression which determines whether the thenBlock or elseBlock is executed.
<i>codeBlock</i>	The statement executed when the condition is true.
<i>location</i>	The location associated with the expression.

5.10.4 Member Function Documentation

5.10.4.1 compile()

```
void AstNodeDoWhile::compile (
    Tang::Program & program ) const [override], [virtual]
```

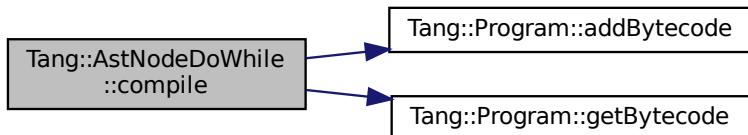
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.10.4.2 compilePreprocess()

```
void AstNodeDoWhile::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.10.4.3 dump()

```
string AstNodeDoWhile::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

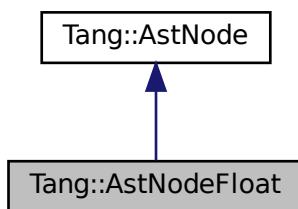
- include/astNodeDoWhile.hpp
- src/astNodeDoWhile.cpp

5.11 Tang::AstNodeFloat Class Reference

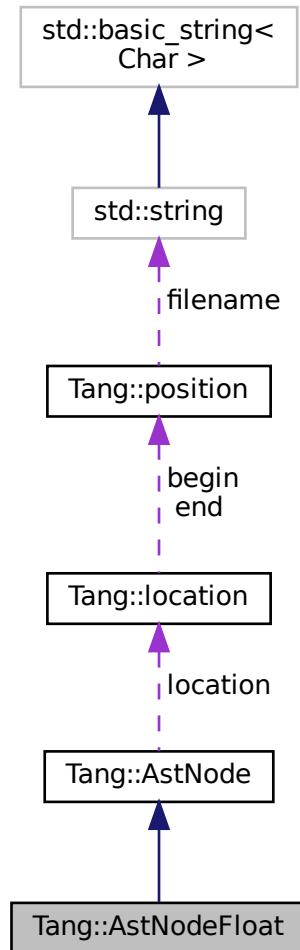
An [AstNode](#) that represents an float literal.

```
#include <astNodeFloat.hpp>
```

Inheritance diagram for Tang::AstNodeFloat:



Collaboration diagram for Tang::AstNodeFloat:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeFloat (Tang::float_t number, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `Tang::float_t val`
The float value being stored.

5.11.1 Detailed Description

An [AstNode](#) that represents an float literal.

Integers are represented by the `Tang::float_t` type, and so are limited in range by that of the underlying type.

5.11.2 Member Enumeration Documentation

5.11.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.11.3 Constructor & Destructor Documentation

5.11.3.1 AstNodeFloat()

```
AstNodeFloat::AstNodeFloat (
    Tang::float_t number,
    Tang::location location )
```

The constructor.

Parameters

<i>number</i>	The number to represent.
<i>location</i>	The location associated with the expression.

5.11.4 Member Function Documentation**5.11.4.1 compile()**

```
void AstNodeFloat::compile (
    Tang::Program & program ) const [override], [virtual]
```

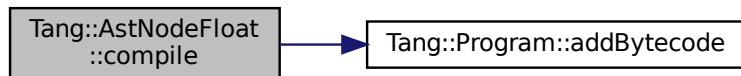
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.11.4.2 compilePreprocess()**

```
void AstNode::compilePreprocess (
    Program & program,
    PreprocessState state ) const [virtual], [inherited]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented in [Tang::AstNodeWhile](#), [Tang::AstNodeUnary](#), [Tang::AstNodeTernary](#), [Tang::AstNodeString](#), [Tang::AstNodeSlice](#), [Tang::AstNodeReturn](#), [Tang::AstNodeRangedFor](#), [Tang::AstNodePrint](#), [Tang::AstNodePeriod](#), [Tang::AstNodeMap](#), [Tang::AstNodeIndex](#), [Tang::AstNodeIfElse](#), [Tang::AstNodeIdentifier](#), [Tang::AstNodeFunctionDeclaration](#), [Tang::AstNodeFunctionCall](#), [Tang::AstNodeFor](#), [Tang::AstNodeDoWhile](#), [Tang::AstNodeCast](#), [Tang::AstNodeBlock](#), [Tang::AstNodeBinary](#), [Tang::AstNodeAssign](#), and [Tang::AstNodeArray](#).

5.11.4.3 dump()

```
string AstNodeFloat::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

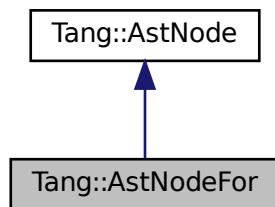
- [include/astNodeFloat.hpp](#)
- [src/astNodeFloat.cpp](#)

5.12 Tang::AstNodeFor Class Reference

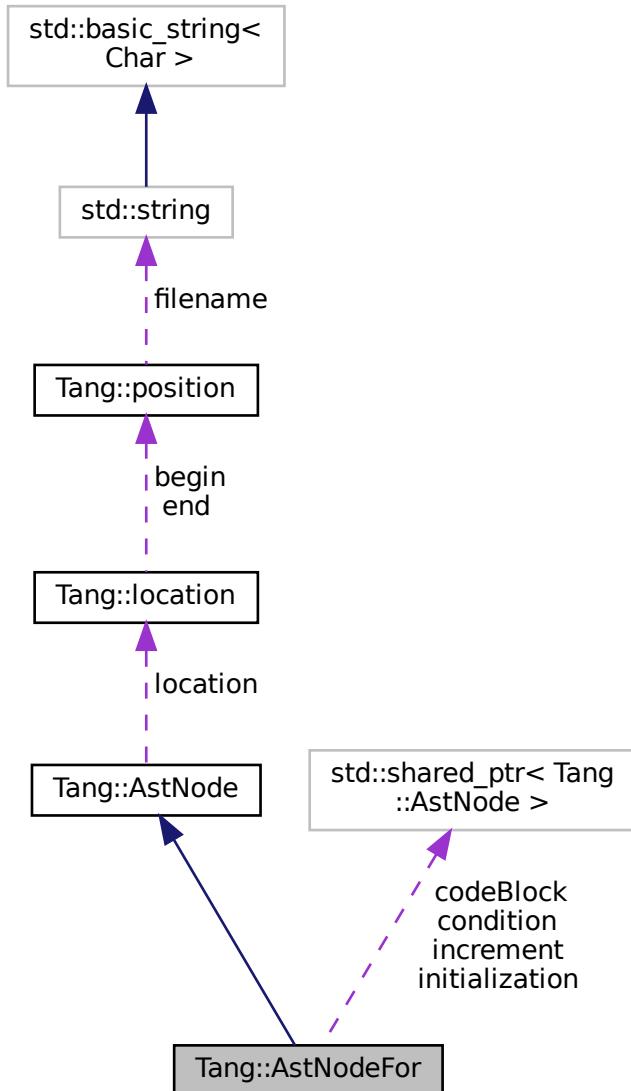
An [AstNode](#) that represents an if() statement.

```
#include <astNodeFor.hpp>
```

Inheritance diagram for Tang::AstNodeFor:



Collaboration diagram for Tang::AstNodeFor:



Public Types

- enum **PreprocessState** : int { **Default** = 0 , **IsAssignment** = 1 }
Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- AstNodeFor** (`shared_ptr<AstNode> initialization, shared_ptr<AstNode> condition, shared_ptr<AstNode> > increment, shared_ptr<AstNode> codeBlock, Tang::location location)`
- The constructor.*

- virtual std::string `dump` (std::string `indent=""`) const override
Return a string that describes the contents of the node.
- virtual void `compile` (`Tang::Program` &`program`) const override
Compile the ast of the provided `Tang::Program`.
- virtual void `compilePreprocess` (`Program` &`program`, `PreprocessState` `state`) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `shared_ptr< AstNode > initialization`
The expression to be executed first to set up the for() loop.
- `shared_ptr< AstNode > condition`
The expression which determines whether or not the code block will continue to be executed.
- `shared_ptr< AstNode > increment`
The expression to be executed immediately after the code block.
- `shared_ptr< AstNode > codeBlock`
The code block executed when the condition is true.

5.12.1 Detailed Description

An `AstNode` that represents an if() statement.

5.12.2 Member Enumeration Documentation

5.12.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

<code>Default</code>	The default state.
<code>IsAssignment</code>	<code>AstNode</code> is part of an assignment expression.

5.12.3 Constructor & Destructor Documentation

5.12.3.1 AstNodeFor()

```
AstNodeFor::AstNodeFor (
    shared_ptr< AstNode > initialization,
    shared_ptr< AstNode > condition,
    shared_ptr< AstNode > increment,
    shared_ptr< AstNode > codeBlock,
    Tang::location location )
```

The constructor.

Parameters

<i>initialization</i>	The expression to be executed first.
<i>condition</i>	The expression which determines whether the codeBlock is executed.
<i>increment</i>	The expression to be executed after each codeBlock.
<i>codeBlock</i>	The statement executed when the condition is true.
<i>location</i>	The location associated with the expression.

5.12.4 Member Function Documentation

5.12.4.1 compile()

```
void AstNodeFor::compile (
    Tang::Program & program ) const [override], [virtual]
```

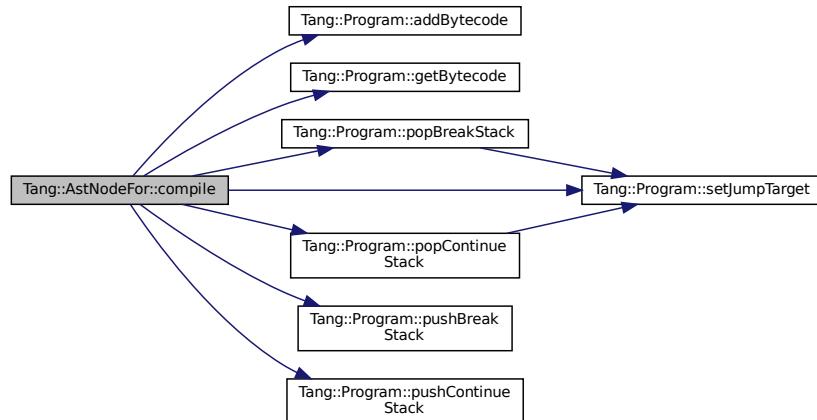
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.12.4.2 compilePreprocess()

```
void AstNodeFor::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.12.4.3 dump()

```
string AstNodeFor::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

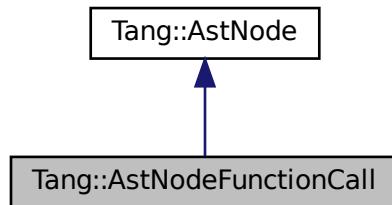
- [include/astNodeFor.hpp](#)
- [src/astNodeFor.cpp](#)

5.13 Tang::AstNodeFunctionCall Class Reference

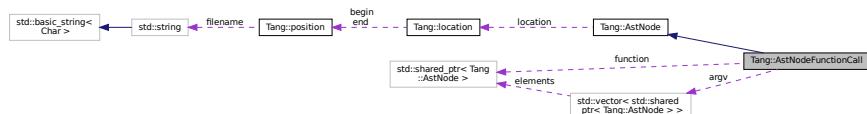
An [AstNode](#) that represents a function call.

```
#include <astNodeFunctionCall.hpp>
```

Inheritance diagram for Tang::AstNodeFunctionCall:



Collaboration diagram for Tang::AstNodeFunctionCall:



Public Types

- enum [PreprocessState](#) : int { [Default](#) = 0 , [IsAssignment](#) = 1 }

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- `AstNodeFunctionCall` (`std::shared_ptr< AstNode > function, std::vector< std::shared_ptr< AstNode > > argv, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `std::shared_ptr< AstNode > function`
The function being invoked.
- `std::vector< std::shared_ptr< AstNode > > argv`
The list of arguments provided to the function.

5.13.1 Detailed Description

An `AstNode` that represents a function call.

5.13.2 Member Enumeration Documentation

5.13.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.13.3 Constructor & Destructor Documentation

5.13.3.1 AstNodeFunctionCall()

```
AstNodeFunctionCall::AstNodeFunctionCall (
    std::shared_ptr< AstNode > function,
    std::vector< std::shared_ptr< AstNode >> argv,
    Tang::location location )
```

The constructor.

Parameters

<i>function</i>	The function being invoked.
<i>argv</i>	The list of arguments provided to the function.
<i>location</i>	The location associated with the expression.

5.13.4 Member Function Documentation

5.13.4.1 compile()

```
void AstNodeFunctionCall::compile (
    Tang::Program & program ) const [override], [virtual]
```

Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.13.4.2 compilePreprocess()

```
void AstNodeFunctionCall::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.13.4.3 dump()

```
string AstNodeFunctionCall::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

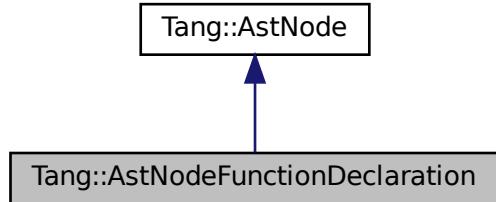
- [include/astNodeFunctionCall.hpp](#)
- [src/astNodeFunctionCall.cpp](#)

5.14 Tang::AstNodeFunctionDeclaration Class Reference

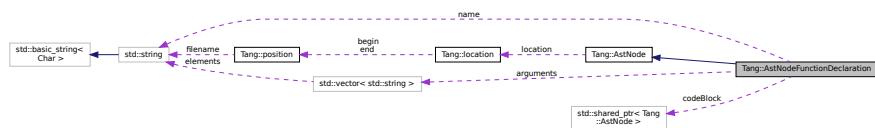
An [AstNode](#) that represents a function declaration.

```
#include <astNodeFunctionDeclaration.hpp>
```

Inheritance diagram for Tang::AstNodeFunctionDeclaration:



Collaboration diagram for Tang::AstNodeFunctionDeclaration:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeFunctionDeclaration (std::string name, std::vector< std::string > arguments, shared_ptr< AstNode > codeBlock, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- std::string `name`
The name of the function.
- std::vector< std::string > `arguments`
The arguments expected to be provided.
- shared_ptr< `AstNode` > `codeBlock`
The code block executed when the condition is true.

5.14.1 Detailed Description

An `AstNode` that represents a function declaration.

5.14.2 Member Enumeration Documentation

5.14.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.14.3 Constructor & Destructor Documentation

5.14.3.1 AstNodeFunctionDeclaration()

```
AstNodeFunctionDeclaration::AstNodeFunctionDeclaration (
    std::string name,
    std::vector< std::string > arguments,
    shared_ptr< AstNode > codeBlock,
    Tang::location location )
```

The constructor.

Parameters

<code>name</code>	The name of the function.
<code>arguments</code>	The arguments expected to be provided.
<code>codeBlock</code>	The code executed as part of the function.
<code>location</code>	The location associated with the function declaration.

5.14.4 Member Function Documentation

5.14.4.1 compile()

```
void AstNodeFunctionDeclaration::compile (
    Tang::Program & program ) const [override], [virtual]
```

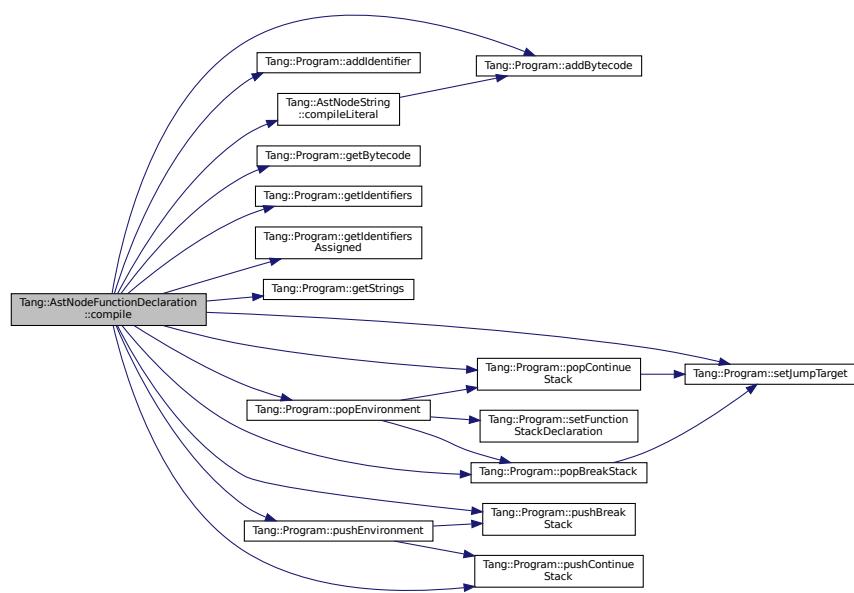
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.14.4.2 compilePreprocess()

```
void AstNodeFunctionDeclaration::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.14.4.3 dump()**

```
string AstNodeFunctionDeclaration::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

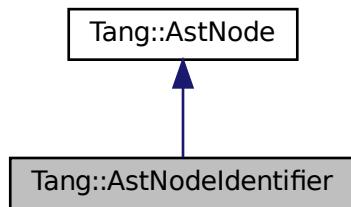
- include/astNodeFunctionDeclaration.hpp
- src/astNodeFunctionDeclaration.cpp

5.15 Tang::AstNodeIdentifier Class Reference

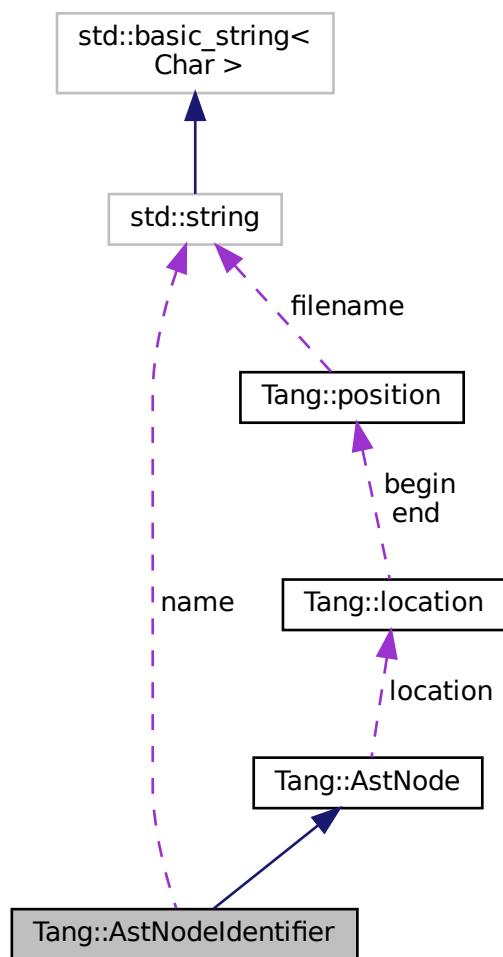
An [AstNode](#) that represents an identifier.

```
#include <astNodeIdentifier.hpp>
```

Inheritance diagram for Tang::AstNodeIdentifier:



Collaboration diagram for Tang::AstNodeIdentifier:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeIdentifier` (const std::string &`name`, Tang::location `location`)
The constructor.
- virtual std::string `dump` (std::string `indent`= "") const override
Return a string that describes the contents of the node.
- virtual void `compile` (Tang::Program &`program`) const override
Compile the ast of the provided Tang::Program.
- virtual void `compilePreprocess` (Program &`program`, PreprocessState `state`) const override
Run any preprocess analysis needed before compilation.

Public Attributes

- std::string `name`
The name of the identifier.

Protected Attributes

- Tang::location `location`
The location associated with this node.

5.15.1 Detailed Description

An `AstNode` that represents an identifier.

Identifier names are represented by a string.

5.15.2 Member Enumeration Documentation

5.15.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.15.3 Constructor & Destructor Documentation

5.15.3.1 AstNodeIdentifier()

```
AstNodeIdentifier::AstNodeIdentifier (
    const std::string & name,
    Tang::location location )
```

The constructor.

Parameters

<i>name</i>	The name of the identifier
<i>location</i>	The location associated with the expression.

5.15.4 Member Function Documentation

5.15.4.1 compile()

```
void AstNodeIdentifier::compile (
    Tang::Program & program ) const [override], [virtual]
```

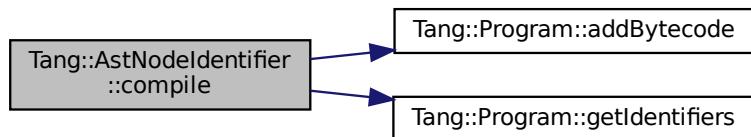
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.15.4.2 compilePreprocess()

```
void AstNodeIdentifier::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

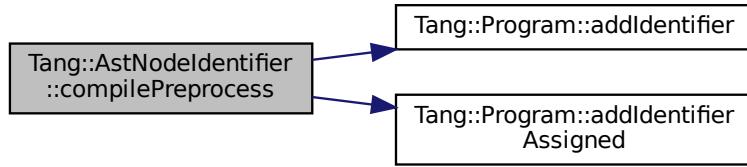
Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.15.4.3 dump()

```
string AstNodeIdentifier::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

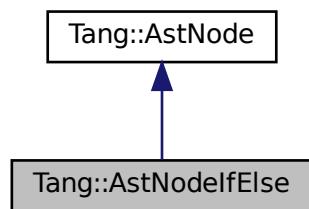
- [include/astNodeIdentifier.hpp](#)
- [src/astNodeIdentifier.cpp](#)

5.16 Tang::AstNodeIfElse Class Reference

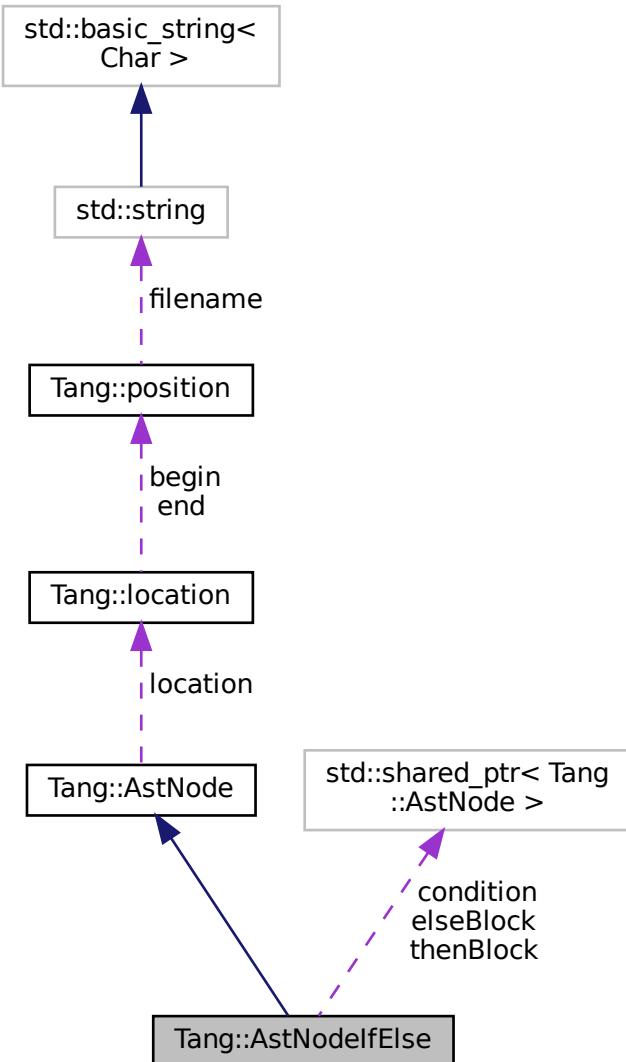
An [AstNode](#) that represents an if..else statement.

```
#include <astNodeIfElse.hpp>
```

Inheritance diagram for Tang::AstNodeIfElse:



Collaboration diagram for Tang::AstNodeIfElse:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeIfElse` (`shared_ptr< AstNode > condition`, `shared_ptr< AstNode > thenBlock`, `shared_ptr< AstNode > elseBlock`, `Tang::location location`)

The constructor.

- `AstNodeIfElse` (`shared_ptr< AstNode > condition, shared_ptr< AstNode > thenBlock, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent = "") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `shared_ptr< AstNode > condition`
The expression which determines whether the thenBlock or elseBlock is executed.
- `shared_ptr< AstNode > thenBlock`
The statement executed when the condition is true.
- `shared_ptr< AstNode > elseBlock`
The statement executed when the condition is false.

5.16.1 Detailed Description

An `AstNode` that represents an if..else statement.

5.16.2 Member Enumeration Documentation

5.16.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.16.3 Constructor & Destructor Documentation

5.16.3.1 AstNodeIfElse() [1/2]

```
AstNodeIfElse::AstNodeIfElse (
    shared_ptr< AstNode > condition,
    shared_ptr< AstNode > thenBlock,
    shared_ptr< AstNode > elseBlock,
    Tang::location location )
```

The constructor.

Parameters

<i>condition</i>	The expression which determines whether the thenBlock or elseBlock is executed.
<i>thenBlock</i>	The statement executed when the condition is true.
<i>elseBlock</i>	The statement executed when the condition is false.
<i>location</i>	The location associated with the expression.

5.16.3.2 AstNodeIfElse() [2/2]

```
AstNodeIfElse::AstNodeIfElse (
    shared_ptr< AstNode > condition,
    shared_ptr< AstNode > thenBlock,
    Tang::location location )
```

The constructor.

Parameters

<i>condition</i>	The expression which determines whether the thenBlock or elseBlock is executed.
<i>thenBlock</i>	The statement executed when the condition is true.
<i>location</i>	The location associated with the expression.

5.16.4 Member Function Documentation

5.16.4.1 compile()

```
void AstNodeIfElse::compile (
    Tang::Program & program ) const [override], [virtual]
```

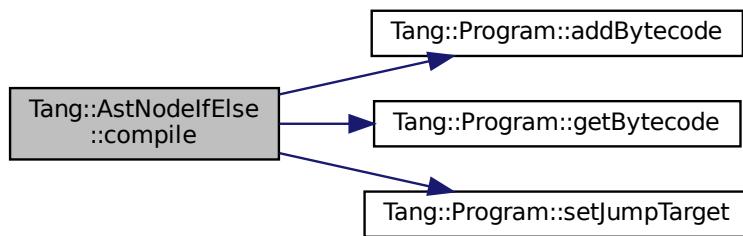
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Tang::Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.16.4.2 compilePreprocess()**

```
void AstNodeIfElse::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.16.4.3 dump()

```
string AstNodeIfElse::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

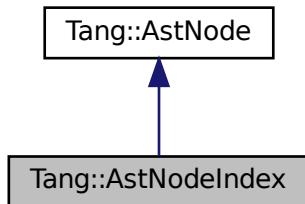
- [include/astNodeIfElse.hpp](#)
- [src/astNodeIfElse.cpp](#)

5.17 Tang::AstNodeIndex Class Reference

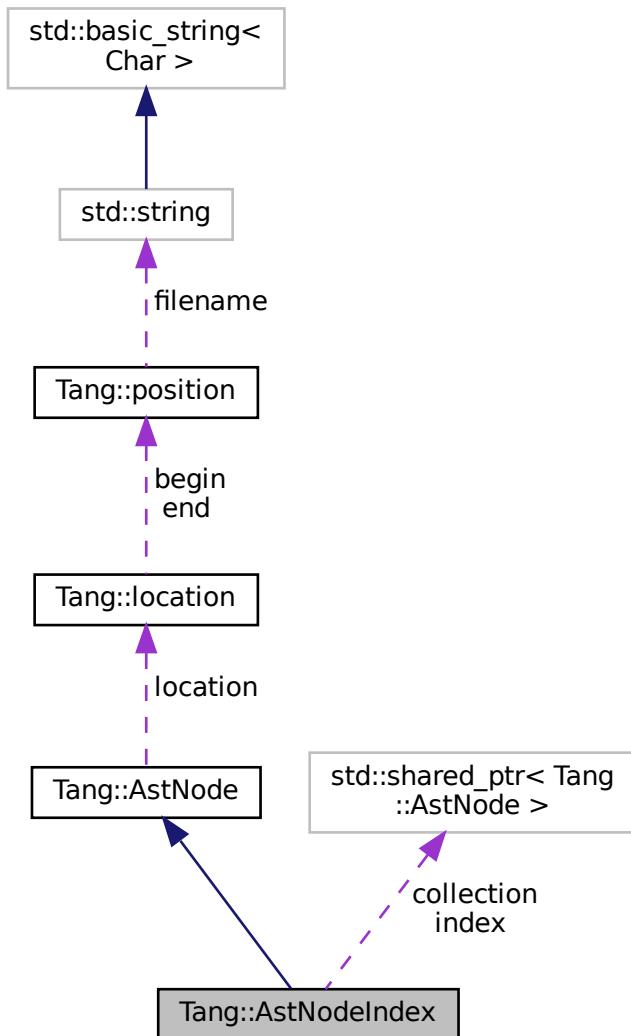
An [AstNode](#) that represents an index into a collection.

```
#include <astNodeIndex.hpp>
```

Inheritance diagram for Tang::AstNodeIndex:



Collaboration diagram for Tang::AstNodeIndex:



Public Types

- enum **PreprocessState** : int { **Default** = 0 , **IsAssignment** = 1 }

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- AstNodeIndex** (`std::shared_ptr< AstNode > collection, std::shared_ptr< AstNode > index, Tang::location)`
The constructor.
- virtual std::string dump (std::string indent="") const override**
Return a string that describes the contents of the node.

- virtual void `compile (Tang::Program &program)` const override
Compile the ast of the provided Tang::Program.
- virtual void `compilePreprocess (Program &program, PreprocessState state)` const override
Run any preprocess analysis needed before compilation.
- const std::shared_ptr< const AstNode > `getCollection ()` const
Return a shared pointer to the AstNode serving as the Collection.
- const std::shared_ptr< const AstNode > `getIndex ()` const
Return a shared pointer to the AstNode serving as the Index.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `std::shared_ptr< AstNode > collection`
The collection into which we will index.
- `std::shared_ptr< AstNode > index`
The index expression.

5.17.1 Detailed Description

An `AstNode` that represents an index into a collection.

5.17.2 Member Enumeration Documentation

5.17.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.17.3 Constructor & Destructor Documentation

5.17.3.1 AstNodeIndex()

```
AstNodeIndex::AstNodeIndex (
    std::shared_ptr< AstNode > collection,
    std::shared_ptr< AstNode > index,
    Tang::location location )
```

The constructor.

Parameters

<i>collection</i>	The collection into which we will index.
<i>index</i>	The index expression.
<i>location</i>	The location associated with the expression.

5.17.4 Member Function Documentation

5.17.4.1 compile()

```
void AstNodeIndex::compile (
    Tang::Program & program ) const [override], [virtual]
```

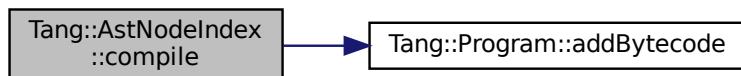
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.17.4.2 compilePreprocess()

```
void AstNodeIndex::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.17.4.3 dump()

```
string AstNodeIndex::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

5.17.4.4 getCollection()

```
const std::shared_ptr< const AstNode > AstNodeIndex::getCollection ( ) const
```

Return a shared pointer to the [AstNode](#) serving as the Collection.

Returns

The collection into which we will index.

5.17.4.5 getIndex()

```
const std::shared_ptr< const AstNode > AstNodeIndex::getIndex ( ) const
```

Return a shared pointer to the [AstNode](#) serving as the Index.

Returns

The index expression.

The documentation for this class was generated from the following files:

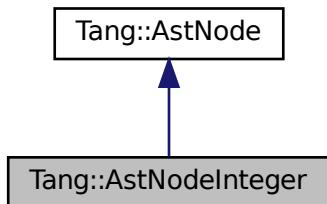
- [include/astNodeIndex.hpp](#)
- [src/astNodeIndex.cpp](#)

5.18 Tang::AstNodeInteger Class Reference

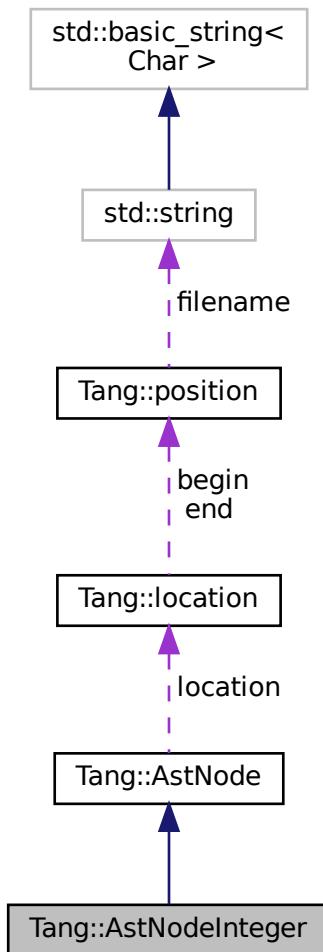
An [AstNode](#) that represents an integer literal.

```
#include <astNodeInteger.hpp>
```

Inheritance diagram for Tang::AstNodeInteger:



Collaboration diagram for Tang::AstNodeInteger:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeInteger (Tang::integer_t number, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const`
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location location](#)
The location associated with this node.

Private Attributes

- [Tang::integer_t val](#)
The integer value being stored.

5.18.1 Detailed Description

An [AstNode](#) that represents an integer literal.

Integers are represented by the `Tang::integer_t` type, and so are limited in range by that of the underlying type.

5.18.2 Member Enumeration Documentation

5.18.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.18.3 Constructor & Destructor Documentation

5.18.3.1 AstNodeInteger()

```
AstNodeInteger::AstNodeInteger (
    Tang::integer\_t number,
    Tang::location location )
```

The constructor.

Parameters

<i>number</i>	The number to represent.
<i>location</i>	The location associated with the expression.

5.18.4 Member Function Documentation**5.18.4.1 compile()**

```
void AstNodeInteger::compile (
    Tang::Program & program ) const [override], [virtual]
```

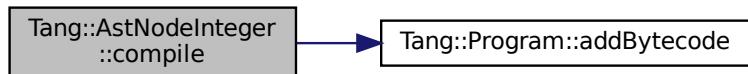
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.18.4.2 compilePreprocess()**

```
void AstNode::compilePreprocess (
    Program & program,
    PreprocessState state ) const [virtual], [inherited]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented in [Tang::AstNodeWhile](#), [Tang::AstNodeUnary](#), [Tang::AstNodeTernary](#), [Tang::AstNodeString](#), [Tang::AstNodeSlice](#), [Tang::AstNodeReturn](#), [Tang::AstNodeRangedFor](#), [Tang::AstNodePrint](#), [Tang::AstNodePeriod](#), [Tang::AstNodeMap](#), [Tang::AstNodeIndex](#), [Tang::AstNodeIfElse](#), [Tang::AstNodeIdentifier](#), [Tang::AstNodeFunctionDeclaration](#), [Tang::AstNodeFunctionCall](#), [Tang::AstNodeFor](#), [Tang::AstNodeDoWhile](#), [Tang::AstNodeCast](#), [Tang::AstNodeBlock](#), [Tang::AstNodeBinary](#), [Tang::AstNodeAssign](#), and [Tang::AstNodeArray](#).

5.18.4.3 dump()

```
string AstNodeInteger::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

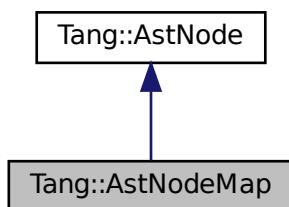
- [include/astNodeInteger.hpp](#)
- [src/astNodeInteger.cpp](#)

5.19 Tang::AstNodeMap Class Reference

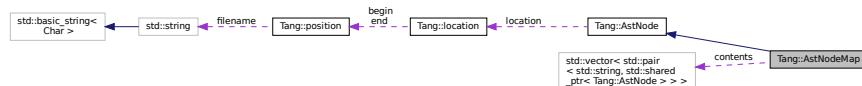
An [AstNode](#) that represents a map literal.

```
#include <astNodeMap.hpp>
```

Inheritance diagram for Tang::AstNodeMap:



Collaboration diagram for Tang::AstNodeMap:



Public Types

- enum [PreprocessState](#) : int { [Default](#) = 0 , [IsAssignment](#) = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- [AstNodeMap](#) ([std::vector< std::pair< std::string, std::shared_ptr< Tang::AstNode > >>](#) [contents](#), [Tang::location](#) [location](#))
The constructor.
- virtual [std::string](#) [dump](#) ([std::string](#) [indent](#)= "") const override
Return a string that describes the contents of the node.
- virtual void [compile](#) ([Tang::Program](#) &[program](#)) const override
Compile the ast of the provided [Tang::Program](#).
- virtual void [compilePreprocess](#) ([Program](#) &[program](#), [PreprocessState](#) [state](#)) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location](#) [location](#)
The location associated with this node.

Private Attributes

- [std::vector< std::pair< std::string, std::shared_ptr< Tang::AstNode > >>](#) [contents](#)
The contents of the array.

5.19.1 Detailed Description

An [AstNode](#) that represents a map literal.

Keys can only be strings.

5.19.2 Member Enumeration Documentation

5.19.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.19.3 Constructor & Destructor Documentation**5.19.3.1 AstNodeMap()**

```
AstNodeMap::AstNodeMap (
    std::vector< std::pair< std::string, std::shared_ptr< Tang::AstNode >>> contents,
    Tang::location location )
```

The constructor.

Parameters

<i>contents</i>	The contents of the map.
<i>location</i>	The location associated with the expression.

5.19.4 Member Function Documentation**5.19.4.1 compile()**

```
void AstNodeMap::compile (
    Tang::Program & program ) const [override], [virtual]
```

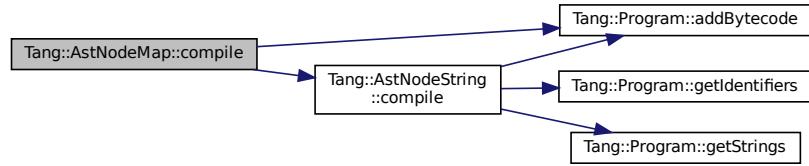
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.19.4.2 compilePreprocess()

```
void AstNodeMap::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.19.4.3 dump()

```
string AstNodeMap::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

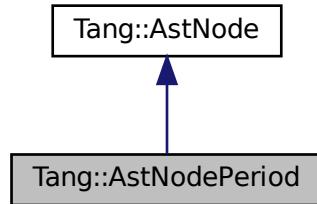
- [include/astNodeMap.hpp](#)
- [src/astNodeMap.cpp](#)

5.20 Tang::AstNodePeriod Class Reference

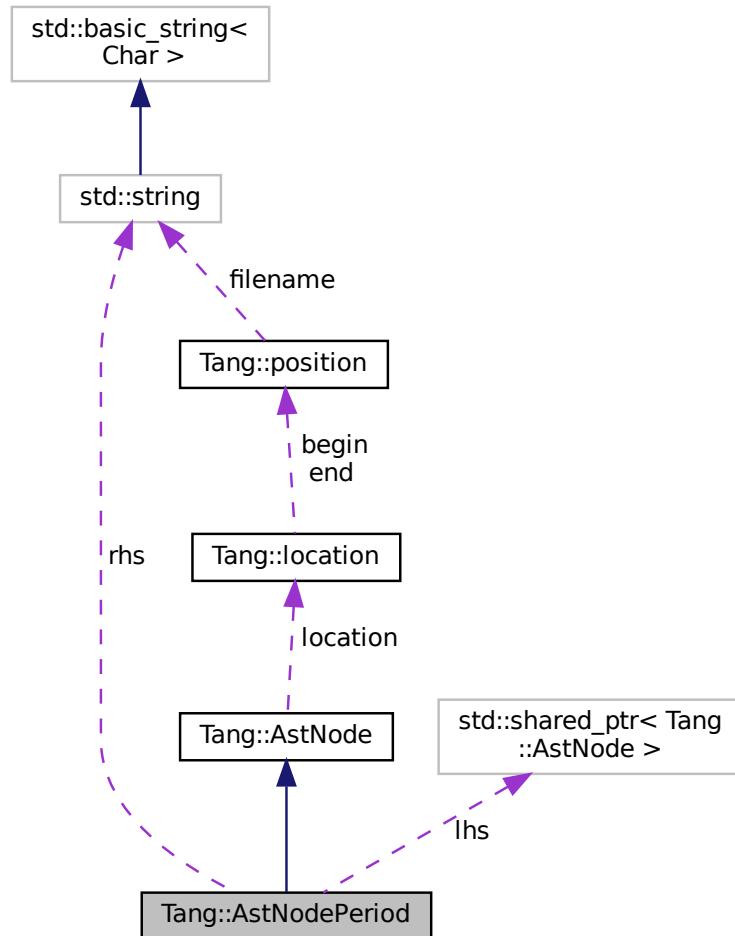
An [AstNode](#) that represents a member access (period) into an object.

```
#include <astNodePeriod.hpp>
```

Inheritance diagram for Tang::AstNodePeriod:



Collaboration diagram for Tang::AstNodePeriod:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodePeriod (std::shared_ptr< AstNode > lhs, std::string rhs, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided `Tang::Program`.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location location](#)
The location associated with this node.

Private Attributes

- [std::shared_ptr< AstNode > lhs](#)
The lhs into which we will rhs.
- [std::string rhs](#)
The rhs expression.

5.20.1 Detailed Description

An [AstNode](#) that represents a member access (period) into an object.

5.20.2 Member Enumeration Documentation

5.20.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.20.3 Constructor & Destructor Documentation

5.20.3.1 AstNodePeriod()

```
AstNodePeriod::AstNodePeriod (
    std::shared_ptr< AstNode > lhs,
    std::string rhs,
    Tang::location location )
```

The constructor.

Parameters

<i>lhs</i>	The lhs on which the member access will be performed
<i>rhs</i>	The rhs identifier.
<i>location</i>	The location associated with the expression.

5.20.4 Member Function Documentation**5.20.4.1 compile()**

```
void AstNodePeriod::compile (
    Tang::Program & program ) const [override], [virtual]
```

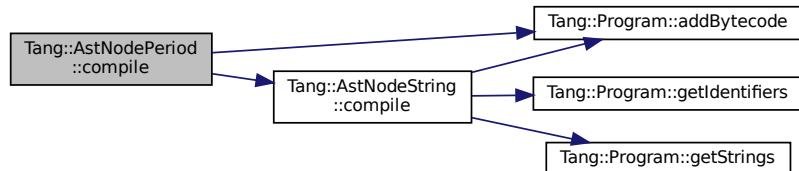
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.20.4.2 compilePreprocess()**

```
void AstNodePeriod::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

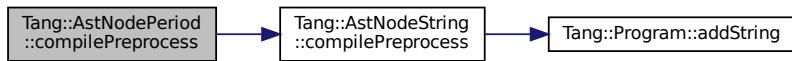
Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.20.4.3 dump()**

```
string AstNodePeriod::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

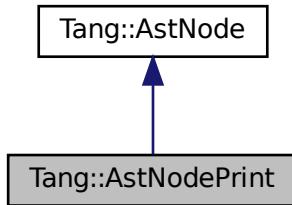
- include/astNodePeriod.hpp
- src/astNodePeriod.cpp

5.21 Tang::AstNodePrint Class Reference

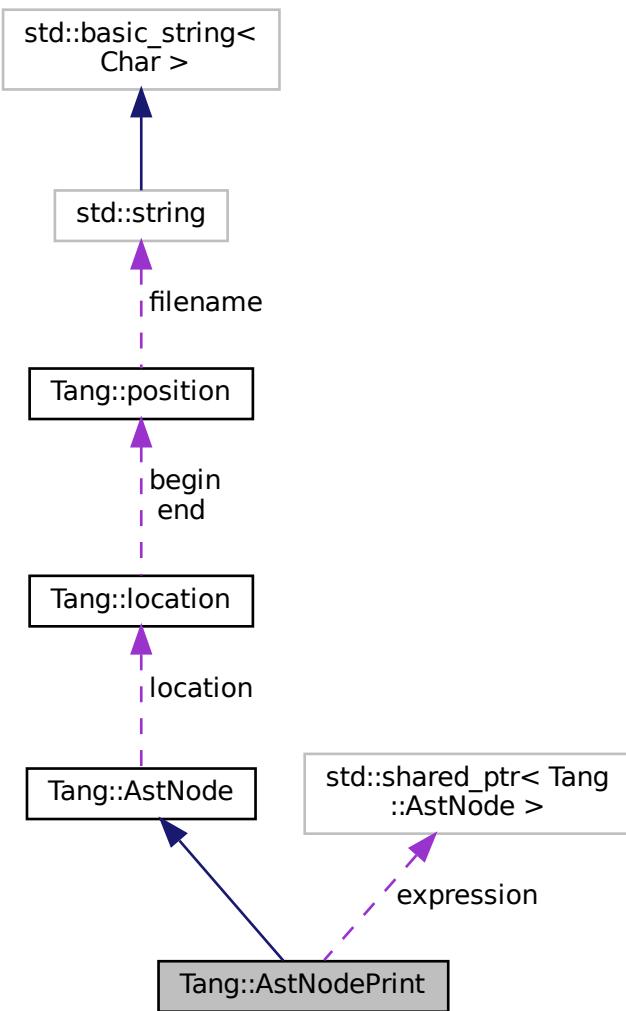
An [AstNode](#) that represents a print typeeration.

```
#include <astNodePrint.hpp>
```

Inheritance diagram for Tang::AstNodePrint:



Collaboration diagram for Tang::AstNodePrint:



Public Types

- enum `Type` { `Default` }
The type of print() requested.
- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- `AstNodePrint (Type type, shared_ptr< AstNode > expression, Tang::location location)`
The constructor.
- virtual std::string `dump` (std::string indent="") const override
Return a string that describes the contents of the node.
- virtual void `compile` (Tang::Program &program) const override
Compile the ast of the provided Tang::Program.
- virtual void `compilePreprocess` (Program &program, PreprocessState state) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `Type type`
The type of print() being requested.
- `shared_ptr< AstNode > expression`
The expression to be printed.

5.21.1 Detailed Description

An `AstNode` that represents a print typeeration.

5.21.2 Member Enumeration Documentation

5.21.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.21.2.2 Type

```
enum Tang::AstNodePrint::Type
```

The type of print() requested.

Enumerator

Default	Use the default print.
---------	------------------------

5.21.3 Constructor & Destructor Documentation**5.21.3.1 AstNodePrint()**

```
AstNodePrint::AstNodePrint (
    Type type,
    shared_ptr<AstNode> expression,
    Tang::location location )
```

The constructor.

Parameters

<i>type</i>	The Tang::AstNodePrint::Type being requested.
<i>expression</i>	The expression to be printed.
<i>location</i>	The location associated with the expression.

5.21.4 Member Function Documentation**5.21.4.1 compile()**

```
void AstNodePrint::compile (
    Tang::Program & program ) const [override], [virtual]
```

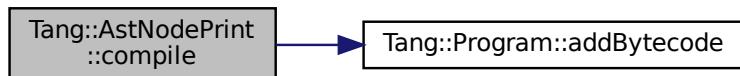
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Tang::Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.21.4.2 compilePreprocess()**

```
void AstNodePrint::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.21.4.3 dump()

```
string AstNodePrint::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

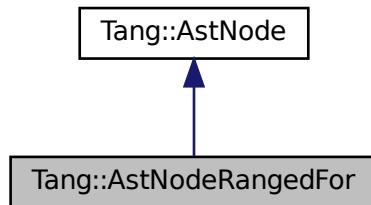
- [include/astNodePrint.hpp](#)
- [src/astNodePrint.cpp](#)

5.22 Tang::AstNodeRangedFor Class Reference

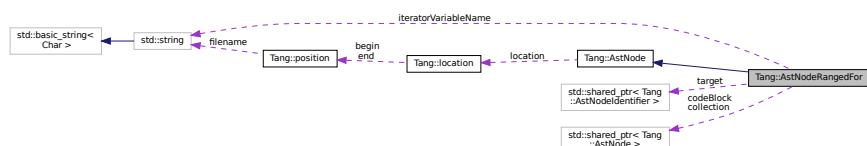
An [AstNode](#) that represents a ranged for() statement.

```
#include <astNodeRangedFor.hpp>
```

Inheritance diagram for Tang::AstNodeRangedFor:



Collaboration diagram for Tang::AstNodeRangedFor:



Public Types

- enum [PreprocessState](#) : int { [Default](#) = 0 , [IsAssignment](#) = 1 }

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- `AstNodeRangedFor (shared_ptr< AstNodelIdentifier > target, shared_ptr< AstNode > collection, shared_ptr< AstNode > codeBlock, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `shared_ptr< AstNodelIdentifier > target`
The target variable to hold the value for the current loop iteration.
- `shared_ptr< AstNode > collection`
The collection through which to iterate.
- `shared_ptr< AstNode > codeBlock`
The code block executed when the condition is true.
- `string iteratorVariableName`
The unique variable name that this iterator will use to persist its state on the stack.

5.22.1 Detailed Description

An `AstNode` that represents a ranged for() statement.

5.22.2 Member Enumeration Documentation

5.22.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.22.3 Constructor & Destructor Documentation

5.22.3.1 AstNodeRangedFor()

```
AstNodeRangedFor::AstNodeRangedFor (
    shared_ptr< AstNodeIdentifier > target,
    shared_ptr< AstNode > collection,
    shared_ptr< AstNode > codeBlock,
    Tang::location location )
```

The constructor.

Parameters

<i>target</i>	The target variable to hold the value for the current loop iteration.
<i>collection</i>	The collection through which to iterate.
<i>codeBlock</i>	The statement executed when the condition is true.
<i>location</i>	The location associated with the expression.

5.22.4 Member Function Documentation

5.22.4.1 compile()

```
void AstNodeRangedFor::compile (
    Tang::Program & program ) const [override], [virtual]
```

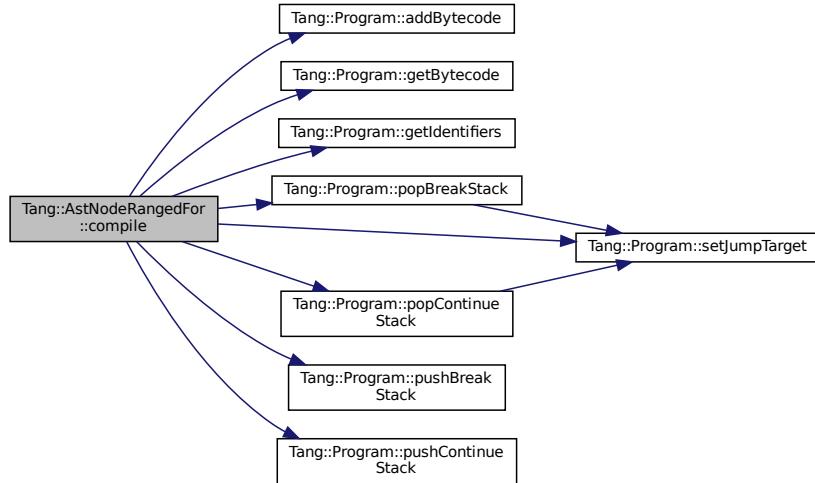
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.22.4.2 compilePreprocess()

```
void AstNodeRangedFor::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

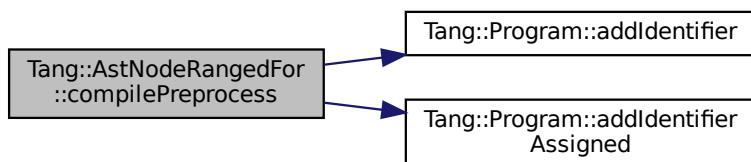
Run any preprocess analysis needed before compilation.

Parameters

<code>program</code>	The <code>Tang::Program</code> that is being compiled.
<code>state</code>	Any preprocess flags that need to be considered.

Reimplemented from `Tang::AstNode`.

Here is the call graph for this function:



5.22.4.3 `dump()`

```
string AstNodeRangedFor::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

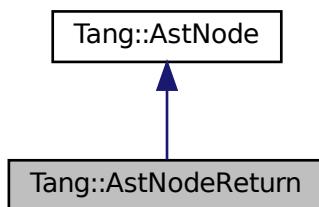
- [include/astNodeRangedFor.hpp](#)
- [src/astNodeRangedFor.cpp](#)

5.23 Tang::AstNodeReturn Class Reference

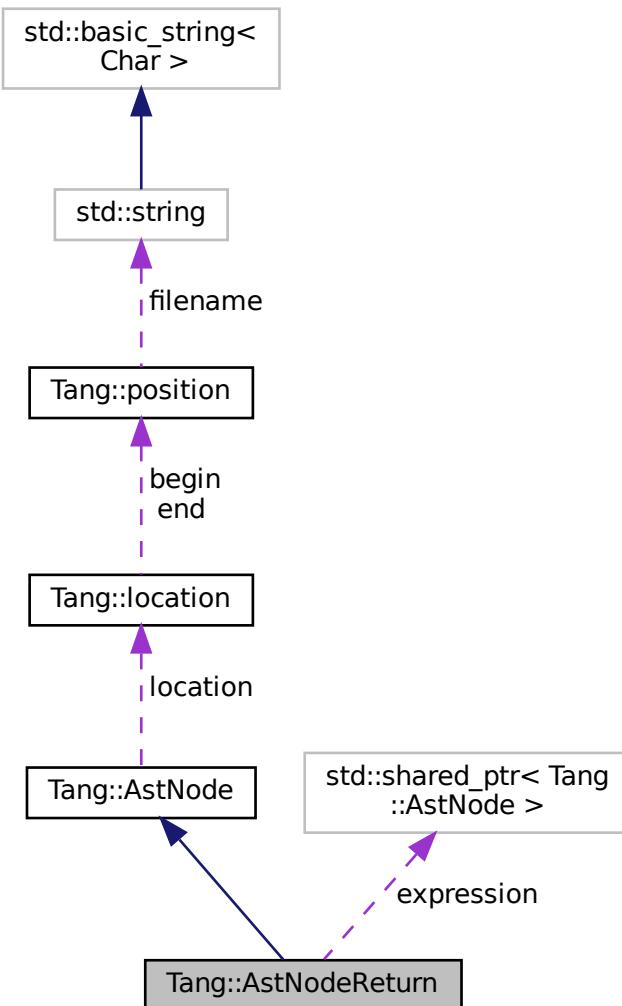
An [AstNode](#) that represents a `return` statement.

```
#include <astNodeReturn.hpp>
```

Inheritance diagram for Tang::AstNodeReturn:



Collaboration diagram for Tang::AstNodeReturn:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeReturn (shared_ptr< AstNode > expression, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.
- `virtual void compile (Tang::Program &program) const override`
Compile the ast of the provided Tang::Program.
- `virtual void compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `shared_ptr< AstNode > expression`
The expression to which the operation will be applied.

5.23.1 Detailed Description

An `AstNode` that represents a `return` statement.

5.23.2 Member Enumeration Documentation

5.23.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.23.3 Constructor & Destructor Documentation

5.23.3.1 AstNodeReturn()

```
AstNodeReturn::AstNodeReturn (
    shared_ptr< AstNode > expression,
    Tang::location location )
```

The constructor.

Parameters

<code>expression</code>	The expression to be returned.
<code>location</code>	The location associated with the return statement.

5.23.4 Member Function Documentation

5.23.4.1 compile()

```
void AstNodeReturn::compile (
    Tang::Program & program ) const [override], [virtual]
```

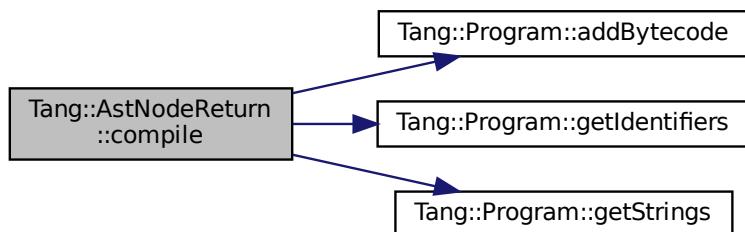
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.23.4.2 compilePreprocess()

```
void AstNodeReturn::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.23.4.3 `dump()`

```
string AstNodeReturn::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

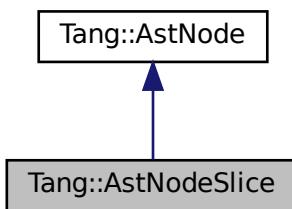
- [include/astNodeReturn.hpp](#)
- [src/astNodeReturn.cpp](#)

5.24 Tang::AstNodeSlice Class Reference

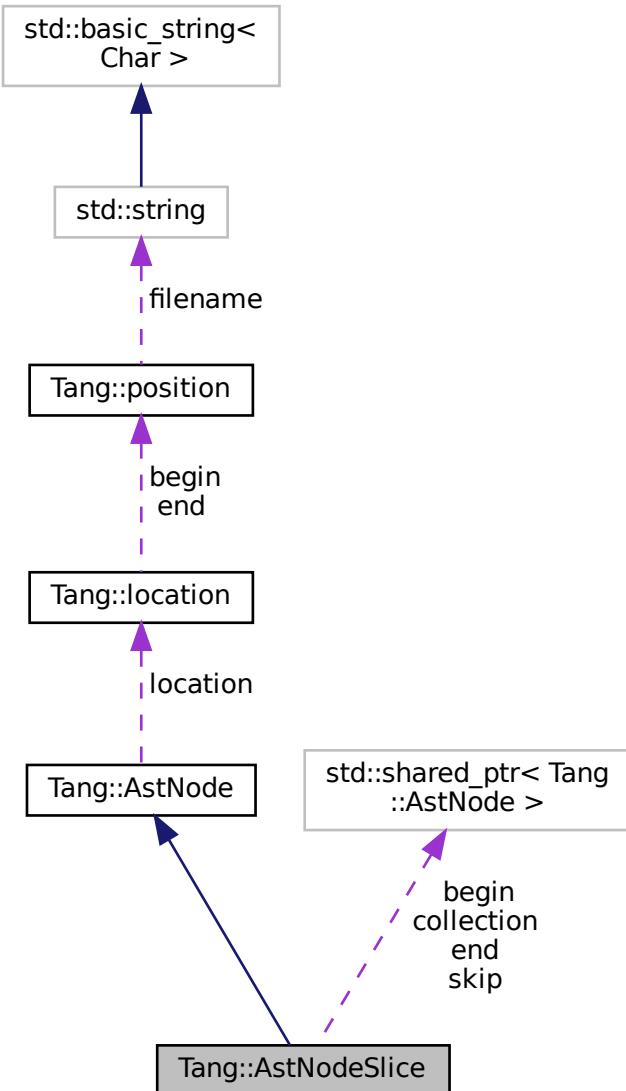
An [AstNode](#) that represents a ternary expression.

```
#include <astNodeSlice.hpp>
```

Inheritance diagram for Tang::AstNodeSlice:



Collaboration diagram for Tang::AstNodeSlice:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeSlice (shared_ptr< AstNode > collection, shared_ptr< AstNode > begin, shared_ptr< AstNode > end, shared_ptr< AstNode > slice, Tang::location location)`
- The constructor.*

- virtual std::string `dump` (std::string `indent=""`) const override
Return a string that describes the contents of the node.
- virtual void `compile` (`Tang::Program` &`program`) const override
Compile the ast of the provided `Tang::Program`.
- virtual void `compilePreprocess` (`Program` &`program`, `PreprocessState` `state`) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `shared_ptr< AstNode > collection`
The collection which will be sliced.
- `shared_ptr< AstNode > begin`
The begin index position of the slice.
- `shared_ptr< AstNode > end`
The end index position of the slice.
- `shared_ptr< AstNode > skip`
The skip index position of the slice.

5.24.1 Detailed Description

An `AstNode` that represents a ternary expression.

5.24.2 Member Enumeration Documentation

5.24.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.24.3 Constructor & Destructor Documentation

5.24.3.1 AstNodeSlice()

```
AstNodeSlice::AstNodeSlice (
    shared_ptr< AstNode > collection,
    shared_ptr< AstNode > begin,
    shared_ptr< AstNode > end,
    shared_ptr< AstNode > slice,
    Tang::location location )
```

The constructor.

Parameters

<i>collection</i>	The collection which will be sliced.
<i>begin</i>	The begin index position of the slice.
<i>end</i>	The end index position of the slice.
<i>skip</i>	The skip index position of the slice.
<i>location</i>	The location associated with the expression.

5.24.4 Member Function Documentation

5.24.4.1 compile()

```
void AstNodeSlice::compile (
    Tang::Program & program ) const [override], [virtual]
```

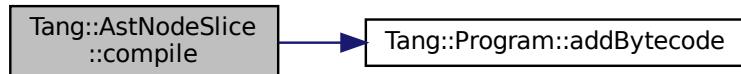
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.24.4.2 compilePreprocess()

```
void AstNodeSlice::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.24.4.3 dump()

```
string AstNodeSlice::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

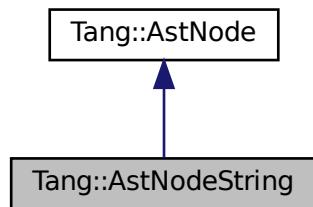
- [include/astNodeSlice.hpp](#)
- [src/astNodeSlice.cpp](#)

5.25 Tang::AstNodeString Class Reference

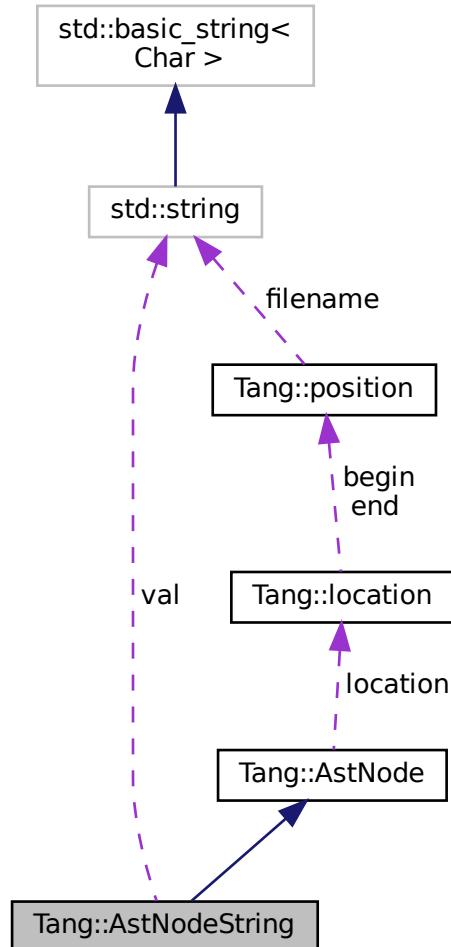
An [AstNode](#) that represents a string literal.

```
#include <astNodeString.hpp>
```

Inheritance diagram for Tang::AstNodeString:



Collaboration diagram for Tang::AstNodeString:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeString` (const string &text, `Tang::location` location)
Construct a Trusted string.
- `AstNodeString` (const string &text, bool isTrusted, `Tang::location` location)
Construct a string that is either Trusted or Untrusted.
- virtual std::string `dump` (std::string indent="") const override
Return a string that describes the contents of the node.
- virtual void `compile` (`Tang::Program` &program) const override

Compile the ast of the provided Tang::Program.

- virtual void `compilePreprocess (Program &program, PreprocessState state) const override`
Run any preprocess analysis needed before compilation.
- void `compileLiteral (Tang::Program &program) const`
Compile the string and push it onto the stack.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `std::string val`
The string value being stored.
- `bool isTrusted`
Whether or not the string is trusted.

5.25.1 Detailed Description

An `AstNode` that represents a string literal.

5.25.2 Member Enumeration Documentation

5.25.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.25.3 Constructor & Destructor Documentation

5.25.3.1 AstNodeString() [1/2]

```
AstNodeString::AstNodeString (
    const string & text,
    Tang::location location )
```

Construct a Trusted string.

Parameters

<i>text</i>	The string to represent.
<i>location</i>	The location associated with the expression.

5.25.3.2 AstNodeString() [2/2]

```
AstNodeString::AstNodeString (
    const string & text,
    bool isTrusted,
    Tang::location location )
```

Construct a string that is either Trusted or Untrusted.

Parameters

<i>text</i>	The string to represent.
<i>isTrusted</i>	Whether or not the string literal is trusted.
<i>location</i>	The location associated with the expression.

5.25.4 Member Function Documentation

5.25.4.1 compile()

```
void AstNodeString::compile (
    Tang::Program & program ) const [override], [virtual]
```

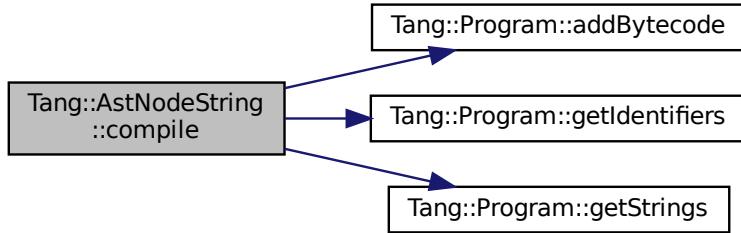
Compile the ast of the provided Tang::Program.

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from Tang::AstNode.

Here is the call graph for this function:



5.25.4.2 compileLiteral()

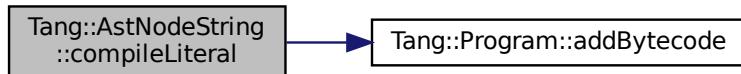
```
void AstNodeString::compileLiteral (
    Tang::Program & program ) const
```

Compile the string and push it onto the stack.

Parameters

<code>program</code>	The Program which will hold the generated Bytecode.
----------------------	---

Here is the call graph for this function:



5.25.4.3 compilePreprocess()

```
void AstNodeString::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

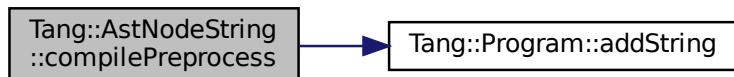
Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.25.4.4 dump()**

```
string AstNodeString::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

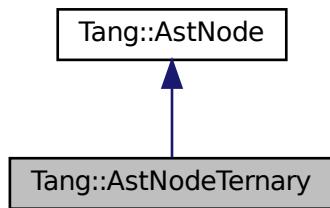
- [include/astNodeString.hpp](#)
- [src/astNodeString.cpp](#)

5.26 Tang::AstNodeTernary Class Reference

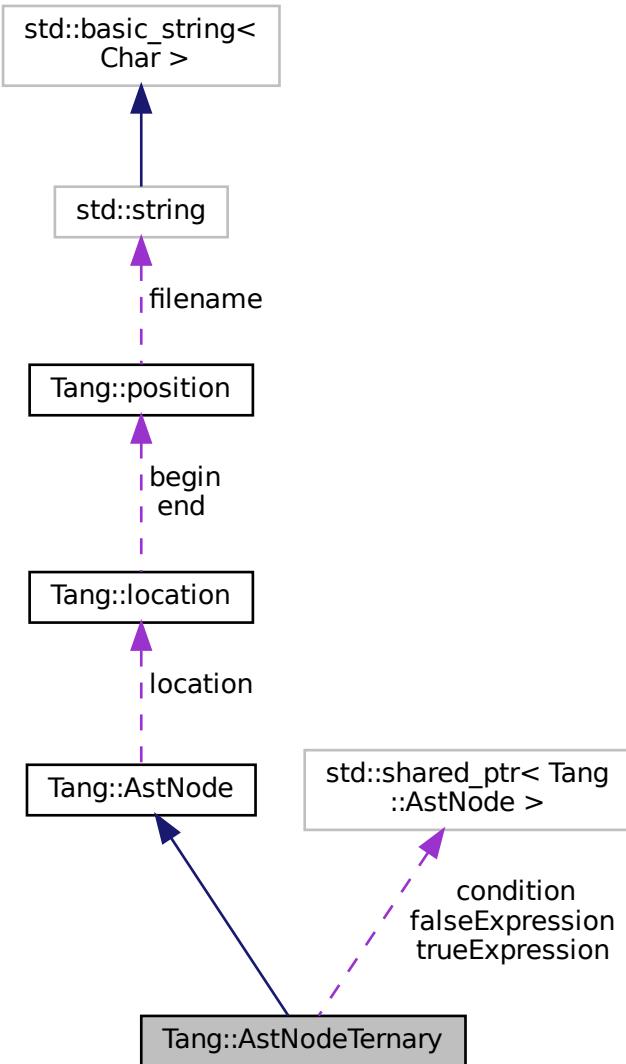
An [AstNode](#) that represents a ternary expression.

```
#include <astNodeTernary.hpp>
```

Inheritance diagram for Tang::AstNodeTernary:



Collaboration diagram for Tang::AstNodeTernary:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeTernary (shared_ptr< AstNode > condition, shared_ptr< AstNode > trueExpression, shared_ptr< AstNode > falseExpression, Tang::location location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`

Return a string that describes the contents of the node.

- virtual void [compile](#) ([Tang::Program](#) &program) const override
Compile the ast of the provided [Tang::Program](#).
- virtual void [compilePreprocess](#) ([Program](#) &program, [PreprocessState](#) state) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- [Tang::location](#) location
The location associated with this node.

Private Attributes

- shared_ptr< [AstNode](#) > condition
The expression which determines whether the trueExpression or falseExpression is executed.
- shared_ptr< [AstNode](#) > trueExpression
The expression executed when the condition is true.
- shared_ptr< [AstNode](#) > falseExpression
The expression executed when the condition is false.

5.26.1 Detailed Description

An [AstNode](#) that represents a ternary expression.

5.26.2 Member Enumeration Documentation

5.26.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.26.3 Constructor & Destructor Documentation

5.26.3.1 AstNodeTernary()

```
AstNodeTernary::AstNodeTernary (
    shared_ptr< AstNode > condition,
    shared_ptr< AstNode > trueExpression,
    shared_ptr< AstNode > falseExpression,
    Tang::location location )
```

The constructor.

Parameters

<i>condition</i>	The expression which determines whether the trueExpression or falseExpression is executed.
<i>trueExpression</i>	The expression executed when the condition is true.
<i>falseExpression</i>	The expression executed when the condition is false.
<i>location</i>	The location associated with the expression.

5.26.4 Member Function Documentation

5.26.4.1 compile()

```
void AstNodeTernary::compile (
    Tang::Program & program ) const [override], [virtual]
```

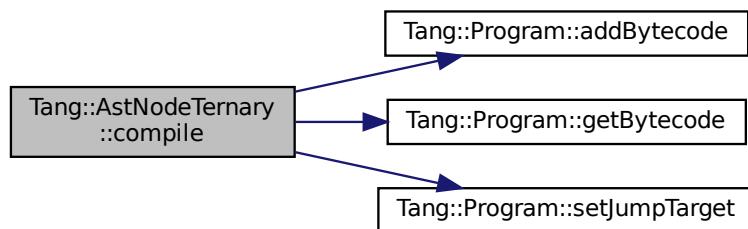
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.26.4.2 compilePreprocess()

```
void AstNodeTernary::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.26.4.3 dump()

```
string AstNodeTernary::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

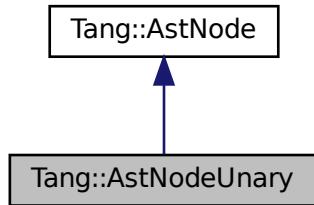
- [include/astNodeTernary.hpp](#)
- [src/astNodeTernary.cpp](#)

5.27 Tang::AstNodeUnary Class Reference

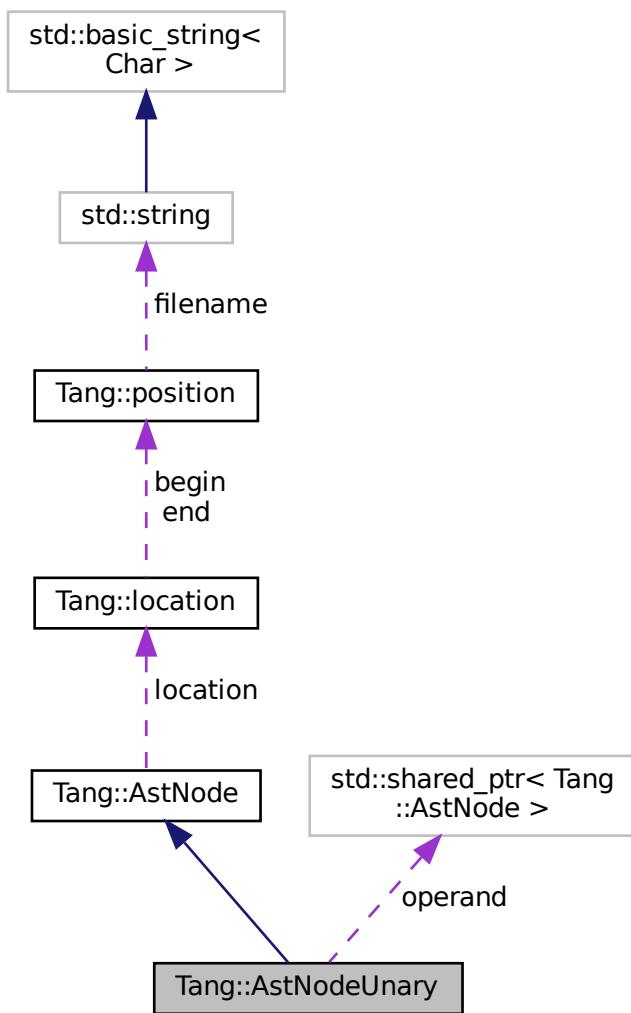
An [AstNode](#) that represents a unary negation.

```
#include <astNodeUnary.hpp>
```

Inheritance diagram for Tang::AstNodeUnary:



Collaboration diagram for Tang::AstNodeUnary:



Public Types

- enum `Operator` { `Negative` , `Not` }
The type of operation.
- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Public Member Functions

- `AstNodeUnary (Operator op, shared_ptr< AstNode > operand, Tang::location location)`
The constructor.
- virtual std::string `dump` (std::string indent="") const override
Return a string that describes the contents of the node.
- virtual void `compile` (Tang::Program &program) const override
Compile the ast of the provided Tang::Program.
- virtual void `compilePreprocess` (Program &program, PreprocessState state) const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `Operator op`
The operation which will be applied to the operand.
- `shared_ptr< AstNode > operand`
The operand to which the operation will be applied.

5.27.1 Detailed Description

An `AstNode` that represents a unary negation.

5.27.2 Member Enumeration Documentation

5.27.2.1 Operator

```
enum Tang::AstNodeUnary::Operator
```

The type of operation.

Enumerator

Negative	Compute the negative (-).
Not	Compute the logical not (!).

5.27.2.2 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	AstNode is part of an assignment expression.

5.27.3 Constructor & Destructor Documentation**5.27.3.1 AstNodeUnary()**

```
AstNodeUnary::AstNodeUnary (
    Operator op,
    shared_ptr< AstNode > operand,
    Tang::location location )
```

The constructor.

Parameters

<i>op</i>	The Tang::AstNodeUnary::Operator to apply to the operand.
<i>operand</i>	The expression to be operated on.
<i>location</i>	The location associated with the expression.

5.27.4 Member Function Documentation**5.27.4.1 compile()**

```
void AstNodeUnary::compile (
    Tang::Program & program ) const [override], [virtual]
```

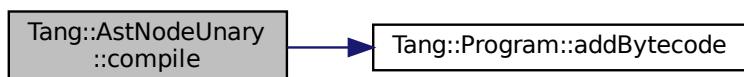
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:

**5.27.4.2 compilePreprocess()**

```
void AstNodeUnary::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.27.4.3 dump()

```
string AstNodeUnary::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

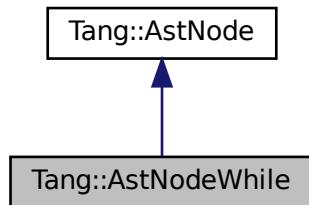
- [include/astNodeUnary.hpp](#)
- [src/astNodeUnary.cpp](#)

5.28 Tang::AstNodeWhile Class Reference

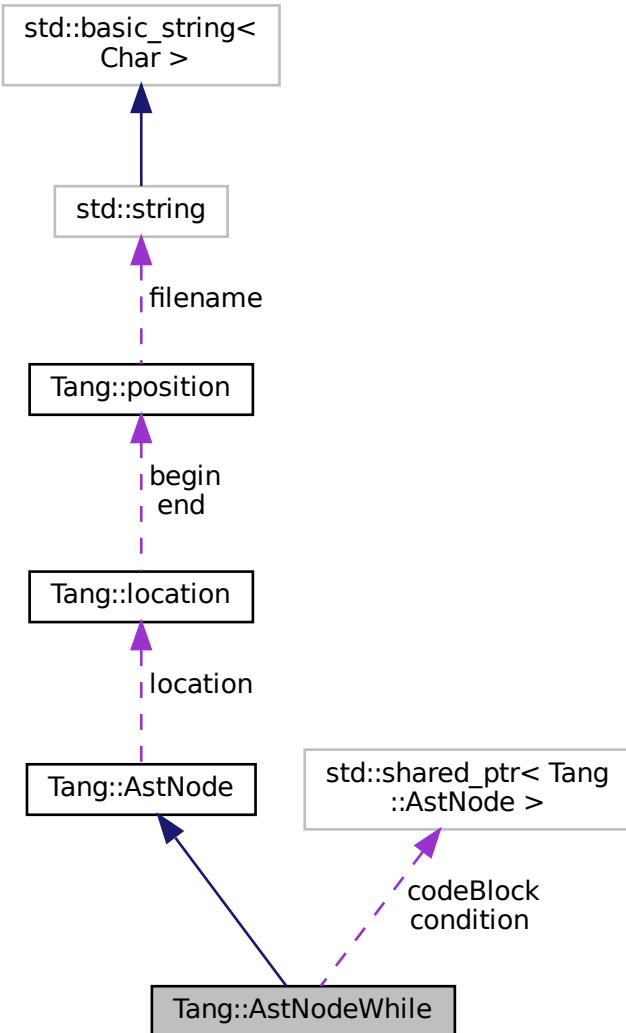
An [AstNode](#) that represents a while statement.

```
#include <astNodeWhile.hpp>
```

Inheritance diagram for Tang::AstNodeWhile:



Collaboration diagram for Tang::AstNodeWhile:



Public Types

- enum `PreprocessState` : int { `Default` = 0 , `IsAssignment` = 1 }
- Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.*

Public Member Functions

- `AstNodeWhile (shared_ptr< AstNode > condition, shared_ptr< AstNode > codeBlock, Tang::location)`
The constructor.
- `virtual std::string dump (std::string indent="") const override`
Return a string that describes the contents of the node.

- virtual void `compile (Tang::Program &program)` const override
Compile the ast of the provided Tang::Program.
- virtual void `compilePreprocess (Program &program, PreprocessState state)` const override
Run any preprocess analysis needed before compilation.

Protected Attributes

- `Tang::location location`
The location associated with this node.

Private Attributes

- `shared_ptr< AstNode > condition`
The expression which determines whether or not the code block will continue to be executed.
- `shared_ptr< AstNode > codeBlock`
The code block executed when the condition is true.

5.28.1 Detailed Description

An `AstNode` that represents a while statement.

5.28.2 Member Enumeration Documentation

5.28.2.1 PreprocessState

```
enum Tang::AstNode::PreprocessState : int [inherited]
```

Bit flags to indicate the state of the preprocess scan as it recursively evaluates the AST.

Enumerator

Default	The default state.
IsAssignment	<code>AstNode</code> is part of an assignment expression.

5.28.3 Constructor & Destructor Documentation

5.28.3.1 AstNodeWhile()

```
AstNodeWhile::AstNodeWhile (
    shared_ptr< AstNode > condition,
```

```
shared_ptr< AstNode > codeBlock,
Tang::location location )
```

The constructor.

Parameters

<i>condition</i>	The expression which determines whether the thenBlock or elseBlock is executed.
<i>codeBlock</i>	The statement executed when the condition is true.
<i>location</i>	The location associated with the expression.

5.28.4 Member Function Documentation

5.28.4.1 compile()

```
void AstNodeWhile::compile (
    Tang::Program & program ) const [override], [virtual]
```

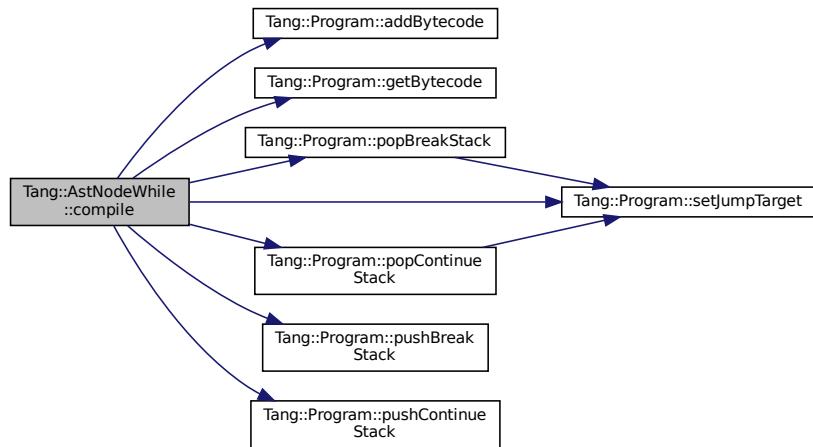
Compile the ast of the provided [Tang::Program](#).

Parameters

<i>program</i>	The Program which will hold the generated Bytecode.
----------------	---

Reimplemented from [Tang::AstNode](#).

Here is the call graph for this function:



5.28.4.2 compilePreprocess()

```
void AstNodeWhile::compilePreprocess (
    Program & program,
    PreprocessState state ) const [override], [virtual]
```

Run any preprocess analysis needed before compilation.

Parameters

<i>program</i>	The Tang::Program that is being compiled.
<i>state</i>	Any preprocess flags that need to be considered.

Reimplemented from [Tang::AstNode](#).

5.28.4.3 dump()

```
string AstNodeWhile::dump (
    std::string indent = "" ) const [override], [virtual]
```

Return a string that describes the contents of the node.

Parameters

<i>indent</i>	A string used to indent the dump.
---------------	-----------------------------------

Returns

The value as a string.

Reimplemented from [Tang::AstNode](#).

The documentation for this class was generated from the following files:

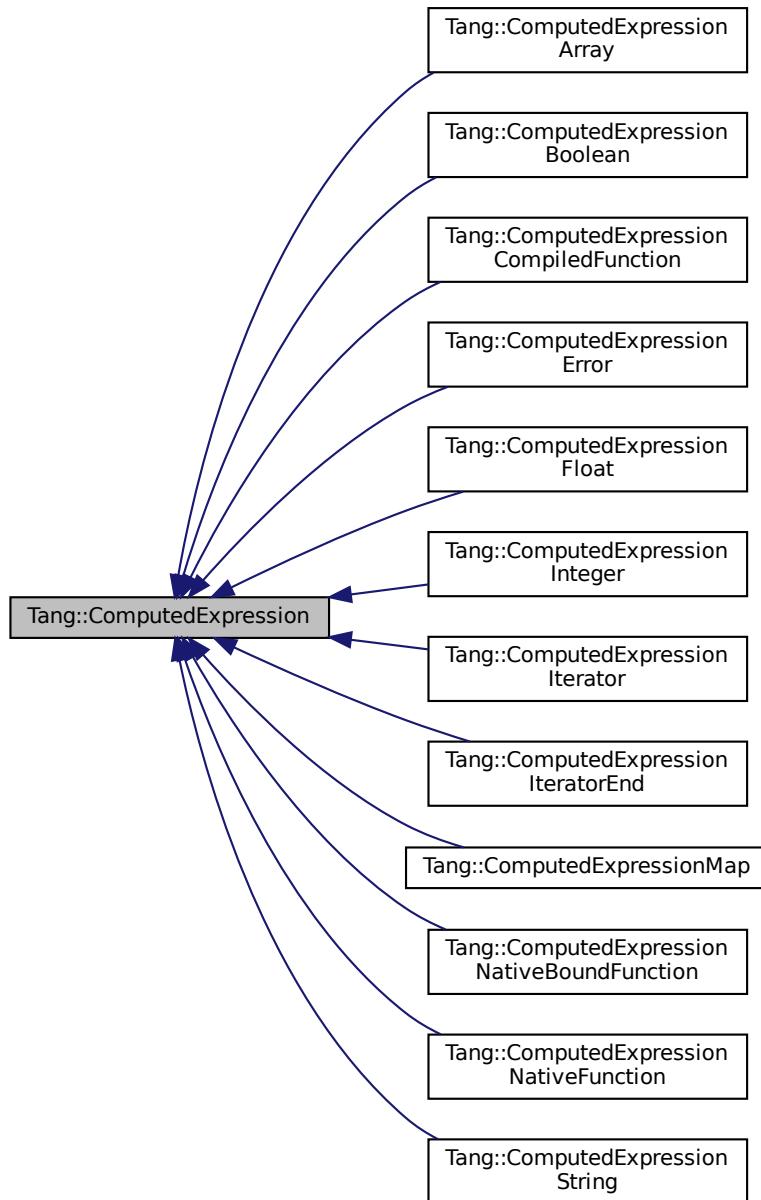
- [include/astNodeWhile.hpp](#)
- [src/astNodeWhile.cpp](#)

5.29 Tang::ComputedExpression Class Reference

Represents the result of a computation that has been executed.

```
#include <computedExpression.hpp>
```

Inheritance diagram for Tang::ComputedExpression:



Public Member Functions

- `virtual ~ComputedExpression ()`
The object destructor.
- `virtual std::string dump () const`
Output the contents of the `ComputedExpression` as a string.
- `virtual std::string __asCode () const`
Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- `virtual bool isCopyNeeded () const`

- **Determine whether or not a copy is needed.**
 - virtual `GarbageCollected makeCopy () const`

Make a copy of the `ComputedExpression` (recursively, if appropriate).
 - virtual bool `is_equal (const Tang::integer_t &val) const`

Check whether or not the computed expression is equal to another value.
 - virtual bool `is_equal (const Tang::float_t &val) const`

Check whether or not the computed expression is equal to another value.
 - virtual bool `is_equal (const bool &val) const`

Check whether or not the computed expression is equal to another value.
 - virtual bool `is_equal (const string &val) const`

Check whether or not the computed expression is equal to another value.
 - virtual bool `is_equal (const Error &val) const`

Check whether or not the computed expression is equal to another value.
 - virtual bool `is_equal (const std::nullptr_t &val) const`

Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value)`

Perform an index assignment to the supplied value.
- virtual `GarbageCollected __add (const GarbageCollected &rhs) const`

Compute the result of adding this value and the supplied value.
- virtual `GarbageCollected __subtract (const GarbageCollected &rhs) const`

Compute the result of subtracting this value and the supplied value.
- virtual `GarbageCollected __multiply (const GarbageCollected &rhs) const`

Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __divide (const GarbageCollected &rhs) const`

Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __modulo (const GarbageCollected &rhs) const`

Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __negative () const`

Compute the result of negating this value.
- virtual `GarbageCollected __not () const`

Compute the logical not of this value.
- virtual `GarbageCollected __lessThan (const GarbageCollected &rhs) const`

Compute the "less than" comparison.
- virtual `GarbageCollected __equal (const GarbageCollected &rhs) const`

Perform an equality test.
- virtual `GarbageCollected __period (const GarbageCollected &member, std::shared_ptr<TangBase> &tang) const`

Perform a member access (period) operation.
- virtual `GarbageCollected __index (const GarbageCollected &index) const`

Perform an index operation.
- virtual `GarbageCollected __slice (const GarbageCollected &begin, const GarbageCollected &end, const GarbageCollected &skip) const`

Perform a slice operation.
- virtual `GarbageCollected __getIterator (const GarbageCollected &collection) const`

Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext (size_t index=0) const`

Get the next iterative value.
- virtual `GarbageCollected __integer () const`

Perform a type cast to integer.
- virtual `GarbageCollected __float () const`

Perform a type cast to float.

- virtual `GarbageCollected __boolean () const`
Perform a type cast to boolean.
- virtual `GarbageCollected __string () const`
Perform a type cast to string.

5.29.1 Detailed Description

Represents the result of a computation that has been executed.

By default, it will represent a NULL value.

5.29.2 Member Function Documentation

5.29.2.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual]
```

Compute the result of adding this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to add to this.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.29.2.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual]
```

Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.29.2.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.29.2.4 __boolean()

```
GarbageCollected ComputedExpression::__boolean () const [virtual]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.29.2.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.29.2.6 __equal()

```
GarbageCollected ComputedExpression::__equal (
    const GarbageCollected & rhs ) const [virtual]
```

Perform an equality test.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionNativeObject](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionObject](#), and [Tang::ComputedExpressionBoolean](#).

5.29.2.7 __float()

```
GarbageCollected ComputedExpression::__float () const [virtual]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.29.2.8 __getIterator()

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.29.2.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual]
```

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.29.2.10 __integer()

```
GarbageCollected ComputedExpression::__integer ( ) const [virtual]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.29.2.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.29.2.12 __lessThan()

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.29.2.13 __modulo()

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.29.2.14 `__multiply()`

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to multiply to this.
------------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.29.2.15 `__negative()`

```
GarbageCollected ComputedExpression::__negative () const [virtual]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.29.2.16 `__not()`

```
GarbageCollected ComputedExpression::__not () const [virtual]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.29.2.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.29.2.18 `__slice()`

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.29.2.19 `__string()`

```
GarbageCollected ComputedExpression::__string ( ) const [virtual]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionArray](#).

5.29.2.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The <code>GarbageCollected</code> value to subtract from this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.29.2.21 `dump()`

```
string ComputedExpression::dump () const [virtual]
```

Output the contents of the `ComputedExpression` as a string.

Returns

A string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionIterator](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionBoolean](#), and [Tang::ComputedExpressionArray](#).

5.29.2.22 `is_equal()` [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.29.2.23 is_equal() [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.29.2.24 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.29.2.25 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.29.2.26 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.29.2.27 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.29.2.28 `isCopyNeeded()`

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.29.2.29 `makeCopy()`

```
GarbageCollected ComputedExpression::makeCopy ( ) const [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionBoolean](#), [Tang::ComputedExpressionCompiledFunction](#), [Tang::ComputedExpressionBoolean](#), and [Tang::ComputedExpressionArray](#).

The documentation for this class was generated from the following files:

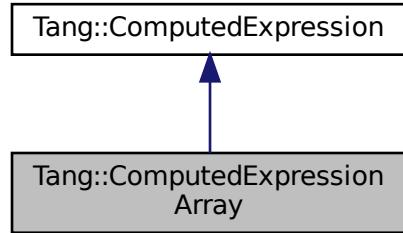
- include/computedExpression.hpp
- src/computedExpression.cpp

5.30 Tang::ComputedExpressionArray Class Reference

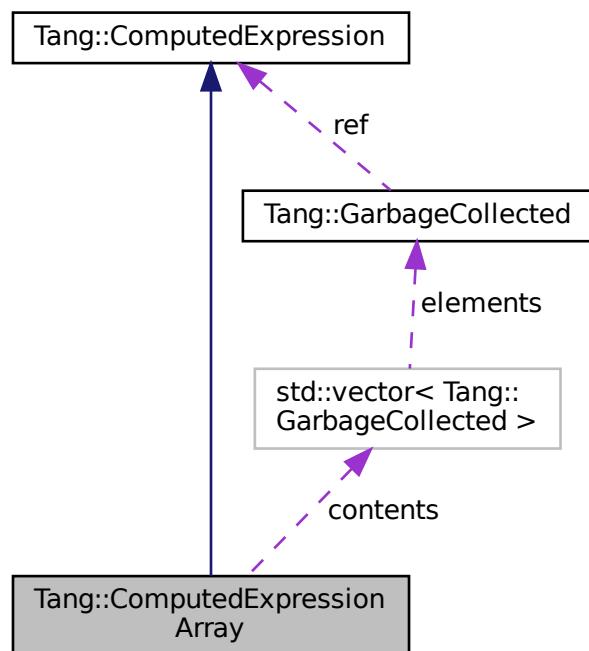
Represents an Array that is the result of a computation.

```
#include <computedExpressionArray.hpp>
```

Inheritance diagram for Tang::ComputedExpressionArray:



Collaboration diagram for Tang::ComputedExpressionArray:



Public Member Functions

- [ComputedExpressionArray \(std::vector< Tang::GarbageCollected > contents\)](#)
Construct an Array result.
- virtual std::string [dump \(\) const override](#)
Output the contents of the `ComputedExpression` as a string.

- virtual bool `isCopyNeeded () const override`
Determine whether or not a copy is needed.
- `GarbageCollected makeCopy () const override`
Make a copy of the `ComputedExpression` (recursively, if appropriate).
- virtual `GarbageCollected __index (const GarbageCollected &index) const override`
Perform an index operation.
- virtual `GarbageCollected __slice (const GarbageCollected &begin, const GarbageCollected &end, const GarbageCollected &skip) const override`
Perform a slice operation.
- virtual `GarbageCollected __getIterator (const GarbageCollected &collection) const override`
Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext (size_t index) const override`
Get the next iterative value.
- virtual `GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value) const override`
Perform an index assignment to the supplied value.
- virtual `GarbageCollected __string () const override`
Perform a type cast to string.
- const std::vector< Tang::GarbageCollected > & `getContents () const`
Return the contents of this object.
- void `append (const Tang::GarbageCollected &item)`
Append an item to the contents of this array object.
- virtual std::string `__asCode () const`
Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- virtual bool `is_equal (const Tang::integer_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual bool `is_equal (const Tang::float_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual bool `is_equal (const bool &val) const`
Check whether or not the computed expression is equal to another value.
- virtual bool `is_equal (const string &val) const`
Check whether or not the computed expression is equal to another value.
- virtual bool `is_equal (const Error &val) const`
Check whether or not the computed expression is equal to another value.
- virtual bool `is_equal (const std::nullptr_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __add (const GarbageCollected &rhs) const`
Compute the result of adding this value and the supplied value.
- virtual `GarbageCollected __subtract (const GarbageCollected &rhs) const`
Compute the result of subtracting this value and the supplied value.
- virtual `GarbageCollected __multiply (const GarbageCollected &rhs) const`
Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __divide (const GarbageCollected &rhs) const`
Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __modulo (const GarbageCollected &rhs) const`
Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __negative () const`
Compute the result of negating this value.
- virtual `GarbageCollected __not () const`
Compute the logical not of this value.
- virtual `GarbageCollected __lessThan (const GarbageCollected &rhs) const`

- *Compute the "less than" comparison.*
 - virtual `GarbageCollected __equal` (const `GarbageCollected &rhs`) const
Perform an equality test.
 - virtual `GarbageCollected __period` (const `GarbageCollected &member`, std::shared_ptr<`TangBase`> `&tang`) const
Perform a member access (period) operation.
 - virtual `GarbageCollected __integer` () const
Perform a type cast to integer.
 - virtual `GarbageCollected __float` () const
Perform a type cast to float.
 - virtual `GarbageCollected __boolean` () const
Perform a type cast to boolean.

Static Public Member Functions

- static `NativeBoundFunctionMap getMethods` ()
Return the member functions implemented for this particular expression type.

Private Attributes

- `std::vector< Tang::GarbageCollected > contents`
The array contents.

5.30.1 Detailed Description

Represents an Array that is the result of a computation.

5.30.2 Constructor & Destructor Documentation

5.30.2.1 ComputedExpressionArray()

```
ComputedExpressionArray::ComputedExpressionArray (
    std::vector< Tang::GarbageCollected > contents )
```

Construct an Array result.

Parameters

<code>val</code>	The integer value.
------------------	--------------------

5.30.3 Member Function Documentation

5.30.3.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.30.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.30.3.3 __assign_index()

```
GarbageCollected ComputedExpressionArray::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [override], [virtual]
```

Perform an index assignment to the supplied value.

Parameters

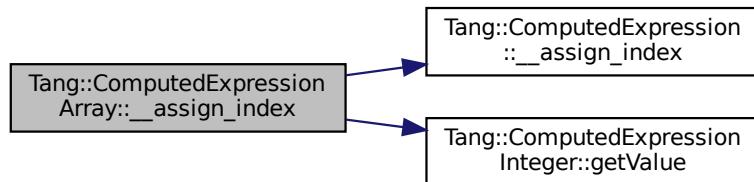
<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.30.3.4 __boolean()**

[GarbageCollected](#) `ComputedExpression::__boolean () const [virtual], [inherited]`

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.30.3.5 __divide()

[GarbageCollected](#) `ComputedExpression::__divide (`
`const GarbageCollected & rhs) const [virtual], [inherited]`

Compute the result of dividing this value and the supplied value.

Parameters

<code>rhs</code>	The GarbageCollected value to divide this by.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.30.3.6 `__equal()`

```
GarbageCollected ComputedExpression::__equal (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Perform an equality test.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionNativeObject](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionBoolean](#), and [Tang::ComputedExpressionObject](#).

5.30.3.7 `__float()`

```
GarbageCollected ComputedExpression::__float () const [virtual], [inherited]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.30.3.8 `__getIterator()`

```
GarbageCollected ComputedExpressionArray::__getIterator (
    const GarbageCollected & collection ) const [override], [virtual]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented from [Tang::ComputedExpression](#).

5.30.3.9 __index()

```
GarbageCollected ComputedExpressionArray::__index (
    const GarbageCollected & index ) const [override], [virtual]
```

Perform an index operation.

Parameters

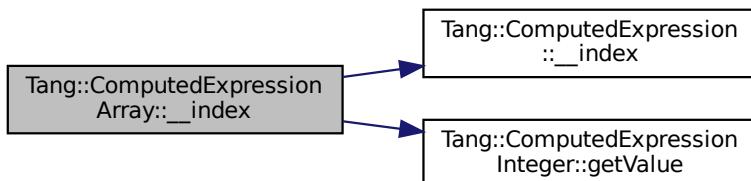
<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.30.3.10 __integer()**

```
GarbageCollected ComputedExpression::__integer () const [virtual], [inherited]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.30.3.11 `__iteratorNext()`

```
GarbageCollected ComputedExpressionArray::__iteratorNext (
    size_t index ) const [override], [virtual]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented from [Tang::ComputedExpression](#).

5.30.3.12 `__lessThan()`

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.30.3.13 `__modulo()`

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.30.3.14 `__multiply()`

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<code>rhs</code>	The GarbageCollected value to multiply to this.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.30.3.15 `__negative()`

```
GarbageCollected ComputedExpression::__negative () const [virtual], [inherited]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.30.3.16 `__not()`

```
GarbageCollected ComputedExpression::__not () const [virtual], [inherited]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.30.3.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.30.3.18 `__slice()`

```
GarbageCollected ComputedExpressionArray::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [override], [virtual]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

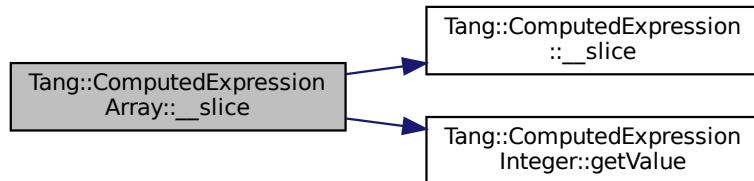
<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.30.3.19 `__string()`

```
GarbageCollected ComputedExpressionArray::__string ( ) const [override], [virtual]
```

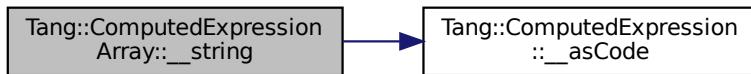
Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.30.3.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (   
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<code>rhs</code>	The GarbageCollected value to subtract from this.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.30.3.21 `append()`

```
void ComputedExpressionArray::append (   
    const Tang::GarbageCollected & item )
```

Append an item to the contents of this array object.

Parameters

<i>item</i>	The value to append to the this array.
-------------	--

5.30.3.22 dump()

```
string ComputedExpressionArray::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.30.3.23 getContents()

```
const std::vector< Tang::GarbageCollected > & ComputedExpressionArray::getContents ( ) const
```

Return the contents of this object.

Returns

The contents of this object.

5.30.3.24 getMethods()

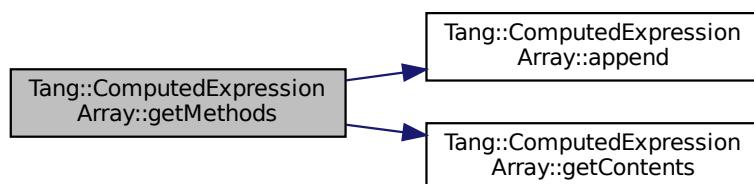
```
NativeBoundFunctionMap ComputedExpressionArray::getMethods ( ) [static]
```

Return the member functions implemented for this particular expression type.

Returns

The member functions implemented.

Here is the call graph for this function:



5.30.3.25 is_equal() [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.30.3.26 is_equal() [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.30.3.27 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.30.3.28 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.30.3.29 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.30.3.30 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.30.3.31 isCopyNeeded()

```
bool ComputedExpressionArray::isCopyNeeded ( ) const [override], [virtual]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented from [Tang::ComputedExpression](#).

5.30.3.32 makeCopy()

```
GarbageCollected ComputedExpressionArray::makeCopy ( ) const [override], [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

The documentation for this class was generated from the following files:

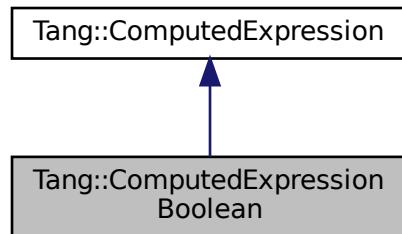
- [include/computedExpressionArray.hpp](#)
- [src/computedExpressionArray.cpp](#)

5.31 Tang::ComputedExpressionBoolean Class Reference

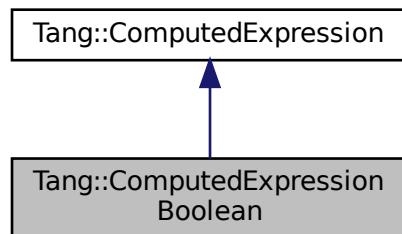
Represents an Boolean that is the result of a computation.

```
#include <computedExpressionBoolean.hpp>
```

Inheritance diagram for Tang::ComputedExpressionBoolean:



Collaboration diagram for Tang::ComputedExpressionBoolean:



Public Member Functions

- [ComputedExpressionBoolean \(bool val\)](#)
Construct an Boolean result.
- virtual std::string [dump \(\) const override](#)
Output the contents of the [ComputedExpression](#) as a string.
- [GarbageCollected makeCopy \(\) const override](#)
Make a copy of the [ComputedExpression](#) (recursively, if appropriate).
- virtual bool [is_equal \(const bool &val\) const override](#)
Check whether or not the computed expression is equal to another value.
- virtual [GarbageCollected __not \(\) const override](#)
Compute the logical not of this value.

- virtual `GarbageCollected __equal` (const `GarbageCollected &rhs`) const override

Perform an equality test.
- virtual `GarbageCollected __integer` () const override

Perform a type cast to integer.
- virtual `GarbageCollected __float` () const override

Perform a type cast to float.
- virtual `GarbageCollected __boolean` () const override

Perform a type cast to boolean.
- virtual `std::string __asCode` () const

Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- virtual `bool isCopyNeeded` () const

Determine whether or not a copy is needed.
- virtual `bool is_equal` (const `Tang::integer_t &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `Tang::float_t &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `string &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `Error &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `std::nullptr_t &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __assign_index` (const `GarbageCollected &index`, const `GarbageCollected &value`)

Perform an index assignment to the supplied value.
- virtual `GarbageCollected __add` (const `GarbageCollected &rhs`) const

Compute the result of adding this value and the supplied value.
- virtual `GarbageCollected __subtract` (const `GarbageCollected &rhs`) const

Compute the result of subtracting this value and the supplied value.
- virtual `GarbageCollected __multiply` (const `GarbageCollected &rhs`) const

Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __divide` (const `GarbageCollected &rhs`) const

Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __modulo` (const `GarbageCollected &rhs`) const

Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __negative` () const

Compute the result of negating this value.
- virtual `GarbageCollected __lessThan` (const `GarbageCollected &rhs`) const

Compute the "less than" comparison.
- virtual `GarbageCollected __period` (const `GarbageCollected &member`, `std::shared_ptr<TangBase> &tang`) const

Perform a member access (period) operation.
- virtual `GarbageCollected __index` (const `GarbageCollected &index`) const

Perform an index operation.
- virtual `GarbageCollected __slice` (const `GarbageCollected &begin`, const `GarbageCollected &end`, const `GarbageCollected &skip`) const

Perform a slice operation.
- virtual `GarbageCollected __getIterator` (const `GarbageCollected &collection`) const

Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext` (`size_t index=0`) const

Get the next iterative value.
- virtual `GarbageCollected __string` () const

Perform a type cast to string.

Private Attributes

- bool `val`
The boolean value.

5.31.1 Detailed Description

Represents an Boolean that is the result of a computation.

5.31.2 Constructor & Destructor Documentation

5.31.2.1 ComputedExpressionBoolean()

```
ComputedExpressionBoolean::ComputedExpressionBoolean (
    bool val )
```

Construct an Boolean result.

Parameters

<code>val</code>	The boolean value.
------------------	--------------------

5.31.3 Member Function Documentation

5.31.3.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to add to this.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.31.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.31.3.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.31.3.4 __boolean()

```
GarbageCollected ComputedExpressionBoolean::__boolean ( ) const [override], [virtual]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.31.3.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.31.3.6 __equal()

```
GarbageCollected ComputedExpressionBoolean::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

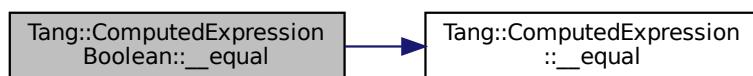
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.31.3.7 __float()**

```
GarbageCollected ComputedExpressionBoolean::__float () const [override], [virtual]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.31.3.8 __getIterator()

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual], [inherited]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.31.3.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.31.3.10 __integer()

```
GarbageCollected ComputedExpressionBoolean::__integer () const [override], [virtual]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.31.3.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual], [inherited]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.31.3.12 __lessThan()

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.31.3.13 __modulo()

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.31.3.14 `__multiply()`

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to multiply to this.
------------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.31.3.15 `__negative()`

```
GarbageCollected ComputedExpression::__negative () const [virtual], [inherited]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.31.3.16 `__not()`

```
GarbageCollected ComputedExpressionBoolean::__not () const [override], [virtual]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.31.3.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.31.3.18 `__slice()`

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.31.3.19 `__string()`

```
GarbageCollected ComputedExpression::__string () const [virtual], [inherited]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionArray](#).

5.31.3.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The <code>GarbageCollected</code> value to subtract from this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.31.3.21 `dump()`

```
string ComputedExpressionBoolean::dump () const [override], [virtual]
```

Output the contents of the `ComputedExpression` as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.31.3.22 `is_equal()` [1/6]

```
bool ComputedExpressionBoolean::is_equal (
    const bool & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.31.3.23 `is_equal()` [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.31.3.24 `is_equal()` [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

5.31.3.25 `is_equal()` [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.31.3.26 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.31.3.27 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.31.3.28 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for `ComputedExpressions` which serve as containers, such as `ComputedExpressionArray` and `ComputedExpressionObject`.

Returns

Whether or not a copy is needed.

Reimplemented in `Tang::ComputedExpressionMap`, and `Tang::ComputedExpressionArray`.

5.31.3.29 `makeCopy()`

`GarbageCollected` `ComputedExpressionBoolean::makeCopy () const [override], [virtual]`

Make a copy of the `ComputedExpression` (recursively, if appropriate).

Returns

A `Tang::GarbageCollected` value for the new `ComputedExpression`.

Reimplemented from `Tang::ComputedExpression`.

The documentation for this class was generated from the following files:

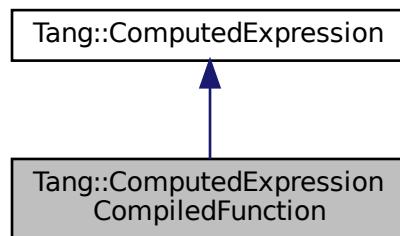
- `include/computedExpressionBoolean.hpp`
- `src/computedExpressionBoolean.cpp`

5.32 `Tang::ComputedExpressionCompiledFunction` Class Reference

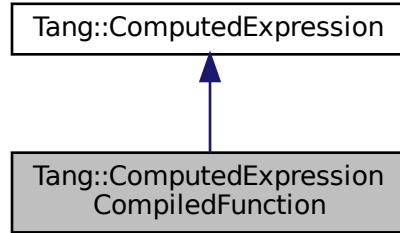
Represents a Compiled Function declared in the script.

```
#include <computedExpressionCompiledFunction.hpp>
```

Inheritance diagram for `Tang::ComputedExpressionCompiledFunction`:



Collaboration diagram for Tang::ComputedExpressionCompiledFunction:



Public Member Functions

- **ComputedExpressionCompiledFunction** (uint32_t argc, Tang::integer_t pc)
Construct an CompiledFunction.
- virtual std::string **dump** () const override
Output the contents of the [ComputedExpression](#) as a string.
- **GarbageCollected makeCopy** () const override
Make a copy of the [ComputedExpression](#) (recursively, if appropriate).
- virtual **GarbageCollected __equal** (const [GarbageCollected](#) &rhs) const override
Perform an equality test.
- uint32_t **getArgc** () const
Get the argc value.
- Tang::integer_t **getPc** () const
Get the bytecode target.
- virtual std::string **__asCode** () const
Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.
- virtual bool **isCopyNeeded** () const
Determine whether or not a copy is needed.
- virtual bool **is_equal** (const Tang::integer_t &val) const
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal** (const Tang::float_t &val) const
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal** (const bool &val) const
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal** (const string &val) const
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal** (const Error &val) const
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal** (const std::nullptr_t &val) const
Check whether or not the computed expression is equal to another value.
- virtual **GarbageCollected __assign_index** (const [GarbageCollected](#) &index, const [GarbageCollected](#) &value)
Perform an index assignment to the supplied value.
- virtual **GarbageCollected __add** (const [GarbageCollected](#) &rhs) const
Compute the result of adding this value and the supplied value.

- virtual `GarbageCollected __subtract` (const `GarbageCollected &rhs`) const
Compute the result of subtracting this value and the supplied value.
- virtual `GarbageCollected __multiply` (const `GarbageCollected &rhs`) const
Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __divide` (const `GarbageCollected &rhs`) const
Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __modulo` (const `GarbageCollected &rhs`) const
Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __negative` () const
Compute the result of negating this value.
- virtual `GarbageCollected __not` () const
Compute the logical not of this value.
- virtual `GarbageCollected __lessThan` (const `GarbageCollected &rhs`) const
Compute the "less than" comparison.
- virtual `GarbageCollected __period` (const `GarbageCollected &member`, std::shared_ptr<`TangBase`> &tang) const
Perform a member access (period) operation.
- virtual `GarbageCollected __index` (const `GarbageCollected &index`) const
Perform an index operation.
- virtual `GarbageCollected __slice` (const `GarbageCollected &begin`, const `GarbageCollected &end`, const `GarbageCollected &skip`) const
Perform a slice operation.
- virtual `GarbageCollected __getIterator` (const `GarbageCollected &collection`) const
Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext` (size_t index=0) const
Get the next iterative value.
- virtual `GarbageCollected __integer` () const
Perform a type cast to integer.
- virtual `GarbageCollected __float` () const
Perform a type cast to float.
- virtual `GarbageCollected __boolean` () const
Perform a type cast to boolean.
- virtual `GarbageCollected __string` () const
Perform a type cast to string.

Private Attributes

- `uint32_t argc`
The count of arguments that this function expects.
- `Tang::integer_t pc`
The bytecode address of the start of the function.

5.32.1 Detailed Description

Represents a Compiled Function declared in the script.

5.32.2 Constructor & Destructor Documentation

5.32.2.1 ComputedExpressionCompiledFunction()

```
ComputedExpressionCompiledFunction::ComputedExpressionCompiledFunction (
    uint32_t argc,
    Tang::integer_t pc )
```

Construct an CompiledFunction.

Parameters

<i>argc</i>	The count of arguments that this function expects.
<i>pc</i>	The bytecode address of the start of the function.

5.32.3 Member Function Documentation

5.32.3.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.32.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.32.3.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.32.3.4 __boolean()

```
GarbageCollected ComputedExpression::__boolean () const [virtual], [inherited]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.32.3.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.32.3.6 `__equal()`

```
GarbageCollected ComputedExpressionCompiledFunction::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.32.3.7 `__float()`

```
GarbageCollected ComputedExpression::__float () const [virtual], [inherited]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.32.3.8 __getIterator()

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual], [inherited]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.32.3.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.32.3.10 __integer()

```
GarbageCollected ComputedExpression::__integer () const [virtual], [inherited]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.32.3.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual], [inherited]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.32.3.12 __lessThan()

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.32.3.13 __modulo()

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.32.3.14 `__multiply()`

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to multiply to this.
------------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.32.3.15 `__negative()`

```
GarbageCollected ComputedExpression::__negative () const [virtual], [inherited]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.32.3.16 `__not()`

```
GarbageCollected ComputedExpression::__not () const [virtual], [inherited]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.32.3.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.32.3.18 __slice()

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.32.3.19 __string()

```
GarbageCollected ComputedExpression::__string () const [virtual], [inherited]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionArray](#).

5.32.3.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The <code>GarbageCollected</code> value to subtract from this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.32.3.21 `dump()`

```
string ComputedExpressionCompiledFunction::dump () const [override], [virtual]
```

Output the contents of the `ComputedExpression` as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.32.3.22 `is_equal()` [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.32.3.23 is_equal() [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.32.3.24 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.32.3.25 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.32.3.26 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.32.3.27 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.32.3.28 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.32.3.29 makeCopy()

[GarbageCollected](#) ComputedExpressionCompiledFunction::makeCopy () const [override], [virtual]

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

The documentation for this class was generated from the following files:

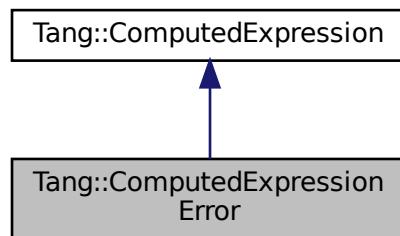
- include/computedExpressionCompiledFunction.hpp
- src/computedExpressionCompiledFunction.cpp

5.33 Tang::ComputedExpressionError Class Reference

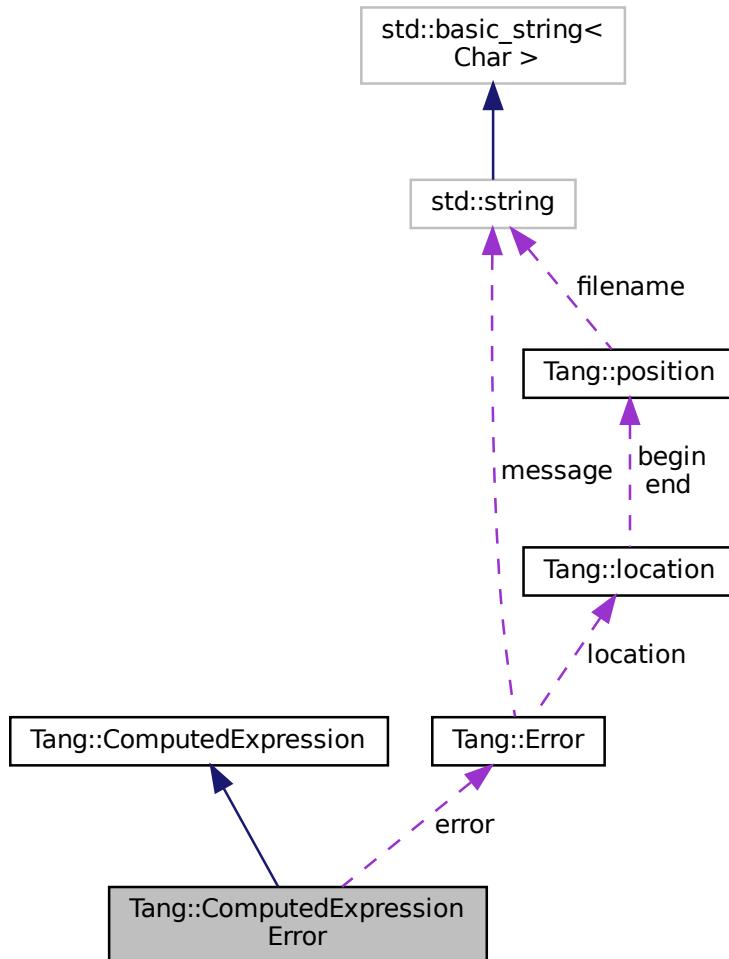
Represents a Runtime [Error](#).

```
#include <computedExpressionError.hpp>
```

Inheritance diagram for Tang::ComputedExpressionError:



Collaboration diagram for Tang::ComputedExpressionError:



Public Member Functions

- **ComputedExpressionError (Tang::Error error)**
Construct a Runtime Error.
- **virtual std::string dump () const override**
Output the contents of the [ComputedExpression](#) as a string.
- **GarbageCollected makeCopy () const override**
Make a copy of the [ComputedExpression](#) (recursively, if appropriate).
- **virtual bool is_equal (const Error &val) const override**
Check whether or not the computed expression is equal to another value.
- **virtual GarbageCollected __add (const GarbageCollected &rhs) const override**
Compute the result of adding this value and the supplied value.
- **virtual GarbageCollected __subtract (const GarbageCollected &rhs) const override**
Compute the result of subtracting this value and the supplied value.
- **virtual GarbageCollected __multiply (const GarbageCollected &rhs) const override**

- virtual `GarbageCollected __divide` (const `GarbageCollected &rhs`) const override

Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __modulo` (const `GarbageCollected &rhs`) const override

Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __negative` () const override

Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __not` () const override

Compute the logical not of this value.
- virtual `GarbageCollected __lessThan` (const `GarbageCollected &rhs`) const override

Compute the "less than" comparison.
- virtual `GarbageCollected __equal` (const `GarbageCollected &rhs`) const override

Perform an equality test.
- virtual `GarbageCollected __integer` () const override

Perform a type cast to integer.
- virtual `GarbageCollected __float` () const override

Perform a type cast to float.
- virtual `GarbageCollected __boolean` () const override

Perform a type cast to boolean.
- virtual `GarbageCollected __string` () const override

Perform a type cast to string.
- virtual `std::string __asCode` () const

Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- virtual `bool isCopyNeeded` () const

Determine whether or not a copy is needed.
- virtual `bool is_equal` (const `Tang::integer_t &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `Tang::float_t &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `bool &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `string &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal` (const `std::nullptr_t &val`) const

Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __assign_index` (const `GarbageCollected &index`, const `GarbageCollected &value`)

Perform an index assignment to the supplied value.
- virtual `GarbageCollected __period` (const `GarbageCollected &member`, `std::shared_ptr<TangBase> &tang`) const

Perform a member access (period) operation.
- virtual `GarbageCollected __index` (const `GarbageCollected &index`) const

Perform an index operation.
- virtual `GarbageCollected __slice` (const `GarbageCollected &begin`, const `GarbageCollected &end`, const `GarbageCollected &skip`) const

Perform a slice operation.
- virtual `GarbageCollected __getIterator` (const `GarbageCollected &collection`) const

Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext` (`size_t index=0`) const

Get the next iterative value.

Private Attributes

- `Tang::Error error`

The `Error` object.

5.33.1 Detailed Description

Represents a Runtime `Error`.

5.33.2 Constructor & Destructor Documentation

5.33.2.1 ComputedExpressionError()

```
ComputedExpressionError::ComputedExpressionError (
    Tang::Error error )
```

Construct a Runtime `Error`.

Parameters

<code>error</code>	The <code>Tang::Error</code> object.
--------------------	--------------------------------------

5.33.3 Member Function Documentation

5.33.3.1 __add()

```
GarbageCollected ComputedExpressionError::__add (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of adding this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to add to this.
------------------	---

Returns

The result of the operation.

Reimplemented from `Tang::ComputedExpression`.

5.33.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.33.3.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.33.3.4 __boolean()

```
GarbageCollected ComputedExpressionError::__boolean ( ) const [override], [virtual]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.5 __divide()

```
GarbageCollected ComputedExpressionError::__divide (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.6 __equal()

```
GarbageCollected ComputedExpressionError::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.7 __float()

```
GarbageCollected ComputedExpressionError::__float ( ) const [override], [virtual]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.8 __getIterator()

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual], [inherited]
```

Get an iterator for the expression.

Parameters

<code>collection</code>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.33.3.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<code>index</code>	The index expression provided by the script.
--------------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.33.3.10 __integer()

```
GarbageCollected ComputedExpressionError::__integer ( ) const [override], [virtual]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual], [inherited]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.33.3.12 __lessThan()

```
GarbageCollected ComputedExpressionError::__lessThan (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.13 __modulo()

```
GarbageCollected ComputedExpressionError::__modulo (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.14 `__multiply()`

```
GarbageCollected ComputedExpressionError::__multiply (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of multiplying this value and the supplied value.

Returns

<code>rhs</code>	The <code>GarbageCollected</code> value to multiply to this.
------------------	--

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.15 `__negative()`

```
GarbageCollected ComputedExpressionError::__negative () const [override], [virtual]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.16 `__not()`

```
GarbageCollected ComputedExpressionError::__not () const [override], [virtual]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.33.3.18 `__slice()`

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.33.3.19 `__string()`

```
GarbageCollected ComputedExpressionError::__string ( ) const [override], [virtual]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.20 `__subtract()`

```
GarbageCollected ComputedExpressionError::__subtract (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.21 dump()

```
std::string ComputedExpressionError::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.22 is_equal() [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.33.3.23 `is_equal()` [2/6]

```
bool ComputedExpressionError::is_equal (
    const Error & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.33.3.24 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.33.3.25 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.33.3.26 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

val	The value to compare against.
-----	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.33.3.27 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

val	The value to compare against.
-----	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.33.3.28 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.33.3.29 makeCopy()

`GarbageCollected` `ComputedExpressionError::makeCopy () const [override], [virtual]`

Make a copy of the `ComputedExpression` (recursively, if appropriate).

Returns

A `Tang::GarbageCollected` value for the new `ComputedExpression`.

Reimplemented from `Tang::ComputedExpression`.

The documentation for this class was generated from the following files:

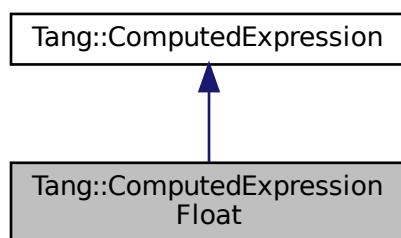
- `include/computedExpressionError.hpp`
- `src/computedExpressionError.cpp`

5.34 Tang::ComputedExpressionFloat Class Reference

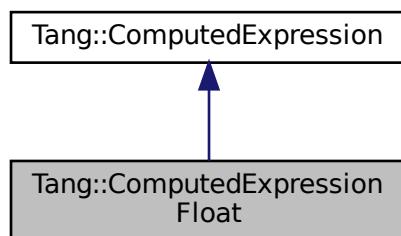
Represents a Float that is the result of a computation.

```
#include <computedExpressionFloat.hpp>
```

Inheritance diagram for `Tang::ComputedExpressionFloat`:



Collaboration diagram for `Tang::ComputedExpressionFloat`:



Public Member Functions

- **ComputedExpressionFloat (Tang::float_t val)**
Construct a Float result.
- **virtual std::string dump () const override**
Output the contents of the [ComputedExpression](#) as a string.
- **GarbageCollected makeCopy () const override**
Make a copy of the [ComputedExpression](#) (recursively, if appropriate).
- **virtual bool is_equal (const Tang::integer_t &val) const override**
Check whether or not the computed expression is equal to another value.
- **virtual bool is_equal (const Tang::float_t &val) const override**
Check whether or not the computed expression is equal to another value.
- **virtual bool is_equal (const bool &val) const override**
Check whether or not the computed expression is equal to another value.
- **virtual GarbageCollected __add (const GarbageCollected &rhs) const override**
Compute the result of adding this value and the supplied value.
- **virtual GarbageCollected __subtract (const GarbageCollected &rhs) const override**
Compute the result of subtracting this value and the supplied value.
- **virtual GarbageCollected __multiply (const GarbageCollected &rhs) const override**
Compute the result of multiplying this value and the supplied value.
- **virtual GarbageCollected __divide (const GarbageCollected &rhs) const override**
Compute the result of dividing this value and the supplied value.
- **virtual GarbageCollected __negative () const override**
Compute the result of negating this value.
- **virtual GarbageCollected __not () const override**
Compute the logical not of this value.
- **virtual GarbageCollected __lessThan (const GarbageCollected &rhs) const override**
Compute the "less than" comparison.
- **virtual GarbageCollected __equal (const GarbageCollected &rhs) const override**
Perform an equality test.
- **virtual GarbageCollected __integer () const override**
Perform a type cast to integer.
- **virtual GarbageCollected __float () const override**
Perform a type cast to float.
- **virtual GarbageCollected __boolean () const override**
Perform a type cast to boolean.
- **virtual GarbageCollected __string () const override**
Perform a type cast to string.
- **Tang::float_t getValue () const**
Helper function to get the value associated with this expression.
- **virtual std::string __asCode () const**
Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.
- **virtual bool isCopyNeeded () const**
Determine whether or not a copy is needed.
- **virtual bool is_equal (const string &val) const**
Check whether or not the computed expression is equal to another value.
- **virtual bool is_equal (const Error &val) const**
Check whether or not the computed expression is equal to another value.
- **virtual bool is_equal (const std::nullptr_t &val) const**
Check whether or not the computed expression is equal to another value.
- **virtual GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value)**

- virtual `GarbageCollected __modulo` (const `GarbageCollected &rhs`) const

Perform an index assignment to the supplied value.

Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __period` (const `GarbageCollected &member`, std::shared_ptr<`TangBase`> `&tang`) const

Perform a member access (period) operation.
- virtual `GarbageCollected __index` (const `GarbageCollected &index`) const

Perform an index operation.
- virtual `GarbageCollected __slice` (const `GarbageCollected &begin`, const `GarbageCollected &end`, const `GarbageCollected &skip`) const

Perform a slice operation.
- virtual `GarbageCollected __getIterator` (const `GarbageCollected &collection`) const

Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext` (size_t `index=0`) const

Get the next iterative value.

Private Attributes

- `Tang::float_t val`

The float value.

5.34.1 Detailed Description

Represents a Float that is the result of a computation.

5.34.2 Constructor & Destructor Documentation

5.34.2.1 ComputedExpressionFloat()

```
ComputedExpressionFloat::ComputedExpressionFloat (
    Tang::float_t val )
```

Construct a Float result.

Parameters

<code>val</code>	The float value.
------------------	------------------

5.34.3 Member Function Documentation

5.34.3.1 __add()

```
GarbageCollected ComputedExpressionFloat::__add (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of adding this value and the supplied value.

Parameters

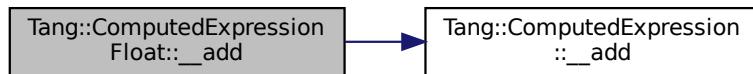
<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.34.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.34.3.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.34.3.4 __boolean()

```
GarbageCollected ComputedExpressionFloat::__boolean ( ) const [override], [virtual]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.5 __divide()

```
GarbageCollected ComputedExpressionFloat::__divide (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of dividing this value and the supplied value.

Parameters

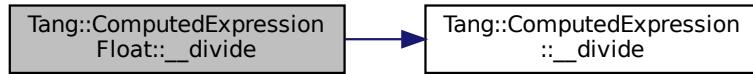
<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.34.3.6 __equal()

```
GarbageCollected ComputedExpressionFloat::__equal (\n    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

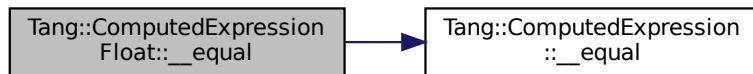
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.34.3.7 __float()

```
GarbageCollected ComputedExpressionFloat::__float ( ) const [override], [virtual]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.8 __getIterator()

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual], [inherited]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.34.3.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.34.3.10 __integer()

```
GarbageCollected ComputedExpressionFloat::__integer ( ) const [override], [virtual]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual], [inherited]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.34.3.12 __lessThan()

```
GarbageCollected ComputedExpressionFloat::__lessThan (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the "less than" comparison.

Parameters

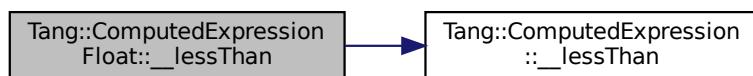
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.34.3.13 __modulo()

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.34.3.14 __multiply()

```
GarbageCollected ComputedExpressionFloat::__multiply (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to multiply to this.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.34.3.15 __negative()**

```
GarbageCollected ComputedExpressionFloat::__negative () const [override], [virtual]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.16 __not()

```
GarbageCollected ComputedExpressionFloat::__not ( ) const [override], [virtual]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.17 __period()

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.34.3.18 __slice()

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.34.3.19 __string()

```
GarbageCollected ComputedExpressionFloat::__string ( ) const [override], [virtual]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.34.3.20 __subtract()**

```
GarbageCollected ComputedExpressionFloat::__subtract (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of subtracting this value and the supplied value.

Parameters

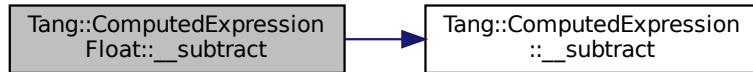
<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.34.3.21 dump()

```
string ComputedExpressionFloat::dump( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.22 getValue()

```
Tang::float_t ComputedExpressionFloat::getValue( ) const
```

Helper function to get the value associated with this expression.

Returns

The value associated with this expression.

5.34.3.23 is_equal() [1/6]

```
bool ComputedExpressionFloat::is_equal( <br>const bool & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

val	The value to compare against.
-----	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.24 is_equal() [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.34.3.25 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

5.34.3.26 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.34.3.27 is_equal() [5/6]

```
bool ComputedExpressionFloat::is_equal (
    const Tang::float_t & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.28 is_equal() [6/6]

```
bool ComputedExpressionFloat::is_equal (
    const Tang::integer_t & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.34.3.29 `isCopyNeeded()`

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.34.3.30 `makeCopy()`

```
GarbageCollected ComputedExpressionFloat::makeCopy ( ) const [override], [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

The documentation for this class was generated from the following files:

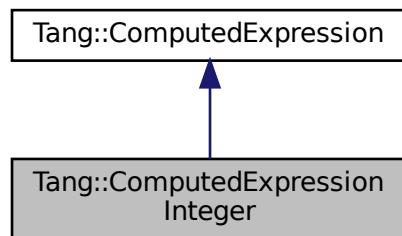
- [include/computedExpressionFloat.hpp](#)
- [src/computedExpressionFloat.cpp](#)

5.35 Tang::ComputedExpressionInteger Class Reference

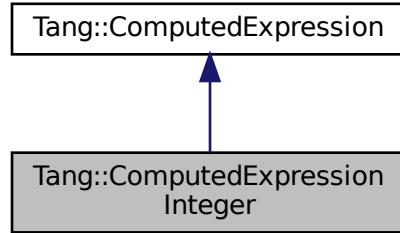
Represents an Integer that is the result of a computation.

```
#include <computedExpressionInteger.hpp>
```

Inheritance diagram for Tang::ComputedExpressionInteger:



Collaboration diagram for Tang::ComputedExpressionInteger:



Public Member Functions

- **ComputedExpressionInteger (Tang::integer_t val)**
Construct an Integer result.
- virtual std::string **dump () const override**
Output the contents of the [ComputedExpression](#) as a string.
- **GarbageCollected makeCopy () const override**
Make a copy of the [ComputedExpression](#) (recursively, if appropriate).
- virtual bool **is_equal (const Tang::integer_t &val) const override**
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal (const Tang::float_t &val) const override**
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal (const bool &val) const override**
Check whether or not the computed expression is equal to another value.
- virtual **GarbageCollected __add (const GarbageCollected &rhs) const override**
Compute the result of adding this value and the supplied value.
- virtual **GarbageCollected __subtract (const GarbageCollected &rhs) const override**
Compute the result of subtracting this value and the supplied value.
- virtual **GarbageCollected __multiply (const GarbageCollected &rhs) const override**
Compute the result of multiplying this value and the supplied value.
- virtual **GarbageCollected __divide (const GarbageCollected &rhs) const override**
Compute the result of dividing this value and the supplied value.
- virtual **GarbageCollected __modulo (const GarbageCollected &rhs) const override**
Compute the result of moduloing this value and the supplied value.
- virtual **GarbageCollected __negative () const override**
Compute the result of negating this value.
- virtual **GarbageCollected __not () const override**
Compute the logical not of this value.
- virtual **GarbageCollected __lessThan (const GarbageCollected &rhs) const override**
Compute the "less than" comparison.
- virtual **GarbageCollected __equal (const GarbageCollected &rhs) const override**
Perform an equality test.
- virtual **GarbageCollected __integer () const override**
Perform a type cast to integer.

- virtual `GarbageCollected __float () const override`
Perform a type cast to float.
- virtual `GarbageCollected __boolean () const override`
Perform a type cast to boolean.
- virtual `GarbageCollected __string () const override`
Perform a type cast to string.
- `Tang::integer_t getValue () const`
Helper function to get the value associated with this expression.
- virtual `std::string __asCode () const`
Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- virtual `bool isCopyNeeded () const`
Determine whether or not a copy is needed.
- virtual `bool is_equal (const string &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const Error &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const std::nullptr_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value)`
Perform an index assignment to the supplied value.
- virtual `GarbageCollected __period (const GarbageCollected &member, std::shared_ptr< TangBase > &tang)`
const
Perform a member access (period) operation.
- virtual `GarbageCollected __index (const GarbageCollected &index) const`
Perform an index operation.
- virtual `GarbageCollected __slice (const GarbageCollected &begin, const GarbageCollected &end, const GarbageCollected &skip)`
const
Perform a slice operation.
- virtual `GarbageCollected __getIterator (const GarbageCollected &collection) const`
Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext (size_t index=0) const`
Get the next iterative value.

Private Attributes

- `Tang::integer_t val`
The integer value.

5.35.1 Detailed Description

Represents an Integer that is the result of a computation.

5.35.2 Constructor & Destructor Documentation

5.35.2.1 ComputedExpressionInteger()

```
ComputedExpressionInteger::ComputedExpressionInteger (
    Tang::integer_t val )
```

Construct an Integer result.

Parameters

<i>val</i>	The integer value.
------------	--------------------

5.35.3 Member Function Documentation

5.35.3.1 __add()

```
GarbageCollected ComputedExpressionInteger::__add (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of adding this value and the supplied value.

Parameters

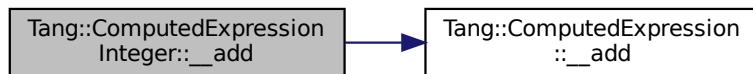
<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.35.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.35.3.3 `__assign_index()`

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<code>index</code>	The index to which the value should be applied.
<code>value</code>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.35.3.4 `__boolean()`

```
GarbageCollected ComputedExpressionInteger::__boolean () const [override], [virtual]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.5 `__divide()`

```
GarbageCollected ComputedExpressionInteger::__divide (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of dividing this value and the supplied value.

Parameters

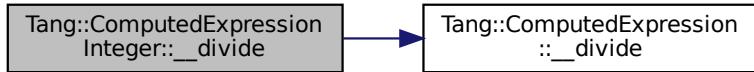
<code>rhs</code>	The GarbageCollected value to divide this by.
------------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.35.3.6 __equal()

```
GarbageCollected ComputedExpressionInteger::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

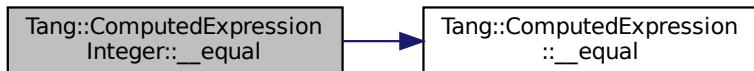
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.35.3.7 __float()

```
GarbageCollected ComputedExpressionInteger::__float () const [override], [virtual]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.8 __getIterator()

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual], [inherited]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.35.3.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.35.3.10 __integer()

```
GarbageCollected ComputedExpressionInteger::__integer ( ) const [override], [virtual]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual], [inherited]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.35.3.12 __lessThan()

```
GarbageCollected ComputedExpressionInteger::__lessThan (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.35.3.13 __modulo()

```
GarbageCollected ComputedExpressionInteger::__modulo (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of moduloing this value and the supplied value.

Parameters

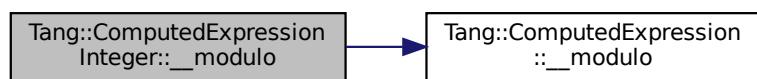
<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.35.3.14 __multiply()**

```

GarbageCollected ComputedExpressionInteger::__multiply (
    const GarbageCollected & rhs ) const [override], [virtual]

```

Compute the result of multiplying this value and the supplied value.

Parameters

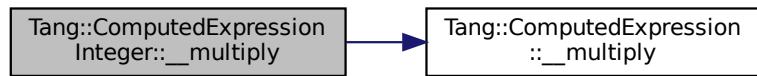
<i>rhs</i>	The GarbageCollected value to multiply to this.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.35.3.15 `__negative()`

```
GarbageCollected ComputedExpressionInteger::__negative ( ) const [override], [virtual]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.16 `__not()`

```
GarbageCollected ComputedExpressionInteger::__not ( ) const [override], [virtual]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<code>member</code>	The member expression provided by the script.
---------------------	---

Returns

The result of the operation.

5.35.3.18 `__slice()`

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
```

```
const GarbageCollected & end,
const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.35.3.19 `__string()`

```
GarbageCollected ComputedExpressionInteger::__string () const [override], [virtual]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.35.3.20 `__subtract()`

```
GarbageCollected ComputedExpressionInteger::__subtract (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.35.3.21 dump()**

```
string ComputedExpressionInteger::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.22 getValue()

```
Tang::integer_t ComputedExpressionInteger::getValue ( ) const
```

Helper function to get the value associated with this expression.

Returns

The value associated with this expression.

5.35.3.23 is_equal() [1/6]

```
bool ComputedExpressionInteger::is_equal (
    const bool & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.24 is_equal() [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.35.3.25 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.35.3.26 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.35.3.27 is_equal() [5/6]

```
bool ComputedExpressionInteger::is_equal (
    const Tang::float_t & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.28 is_equal() [6/6]

```
bool ComputedExpressionInteger::is_equal (
    const Tang::integer_t & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

5.35.3.29 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.35.3.30 makeCopy()

```
GarbageCollected ComputedExpressionInteger::makeCopy ( ) const [override], [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

The documentation for this class was generated from the following files:

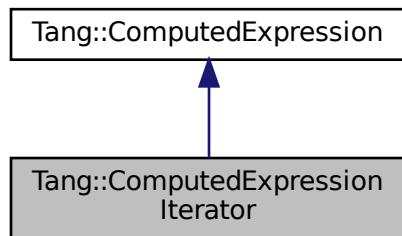
- include/computedExpressionInteger.hpp
- src/computedExpressionInteger.cpp

5.36 Tang::ComputedExpressionIterator Class Reference

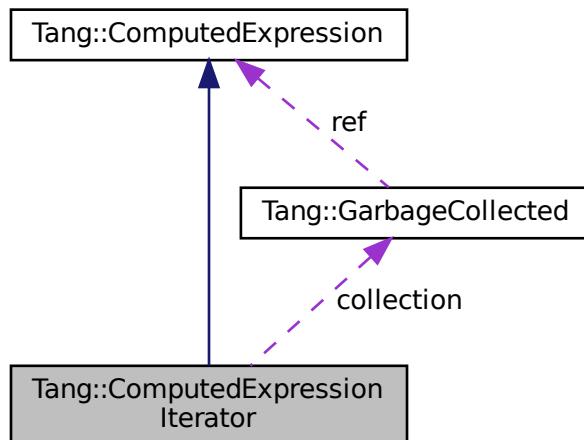
Represents an iterator that is the result of a computation.

```
#include <computedExpressionIterator.hpp>
```

Inheritance diagram for Tang::ComputedExpressionIterator:



Collaboration diagram for Tang::ComputedExpressionIterator:



Public Member Functions

- [ComputedExpressionIterator \(Tang::GarbageCollected collection\)](#)
Construct an iterator result.
- virtual std::string [dump \(\) const override](#)
Output the contents of the [ComputedExpression](#) as a string.

- virtual `GarbageCollected __iteratorNext (size_t index) const override`
Get the next iterative value.
- virtual `std::string __asCode () const`
Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- virtual `bool isCopyNeeded () const`
Determine whether or not a copy is needed.
- virtual `GarbageCollected makeCopy () const`
Make a copy of the `ComputedExpression` (recursively, if appropriate).
- virtual `bool is_equal (const Tang::integer_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const Tang::float_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const bool &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const string &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const Error &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const std::nullptr_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value)`
Perform an index assignment to the supplied value.
- virtual `GarbageCollected __add (const GarbageCollected &rhs) const`
Compute the result of adding this value and the supplied value.
- virtual `GarbageCollected __subtract (const GarbageCollected &rhs) const`
Compute the result of subtracting this value and the supplied value.
- virtual `GarbageCollected __multiply (const GarbageCollected &rhs) const`
Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __divide (const GarbageCollected &rhs) const`
Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __modulo (const GarbageCollected &rhs) const`
Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __negative () const`
Compute the result of negating this value.
- virtual `GarbageCollected __not () const`
Compute the logical not of this value.
- virtual `GarbageCollected __lessThan (const GarbageCollected &rhs) const`
Compute the "less than" comparison.
- virtual `GarbageCollected __equal (const GarbageCollected &rhs) const`
Perform an equality test.
- virtual `GarbageCollected __period (const GarbageCollected &member, std::shared_ptr< TangBase > &tang) const`
Perform a member access (period) operation.
- virtual `GarbageCollected __index (const GarbageCollected &index) const`
Perform an index operation.
- virtual `GarbageCollected __slice (const GarbageCollected &begin, const GarbageCollected &end, const GarbageCollected &skip) const`
Perform a slice operation.
- virtual `GarbageCollected __getIterator (const GarbageCollected &collection) const`
Get an iterator for the expression.
- virtual `GarbageCollected __integer () const`

- *Perform a type cast to integer.*
 - virtual `GarbageCollected __float () const`
Perform a type cast to float.
 - virtual `GarbageCollected __boolean () const`
Perform a type cast to boolean.
 - virtual `GarbageCollected __string () const`
Perform a type cast to string.

Private Attributes

- `Tang::GarbageCollected collection`
The target collection.
- `size_t index`
The next index.

5.36.1 Detailed Description

Represents an iterator that is the result of a computation.

5.36.2 Constructor & Destructor Documentation

5.36.2.1 ComputedExpressionIterator()

```
ComputedExpressionIterator::ComputedExpressionIterator (
    Tang::GarbageCollected collection )
```

Construct an iterator result.

Parameters

<code>collection</code>	The collection through which the iterator processes
-------------------------	---

5.36.3 Member Function Documentation

5.36.3.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.36.3.2 [__asCode\(\)](#)

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.36.3.3 [__assign_index\(\)](#)

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.36.3.4 __boolean()

```
GarbageCollected ComputedExpression::__boolean ( ) const [virtual], [inherited]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.36.3.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.36.3.6 __equal()

```
GarbageCollected ComputedExpression::__equal (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Perform an equality test.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionNativeObject](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionObject](#) and [Tang::ComputedExpressionBoolean](#).

5.36.3.7 `__float()`

```
GarbageCollected ComputedExpression::__float () const [virtual], [inherited]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.36.3.8 `__getIterator()`

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual], [inherited]
```

Get an iterator for the expression.

Parameters

<code>collection</code>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.36.3.9 `__index()`

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<code>index</code>	The index expression provided by the script.
--------------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.36.3.10 __integer()

`GarbageCollected ComputedExpression::__integer () const [virtual], [inherited]`

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.36.3.11 __iteratorNext()

`GarbageCollected ComputedExpressionIterator::__iteratorNext (size_t index) const [override], [virtual]`

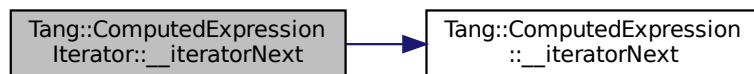
Get the next iterative value.

Parameters

<code>index</code>	The desired index value.
--------------------	--------------------------

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.36.3.12 __lessThan()

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.36.3.13 __modulo()

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.36.3.14 __multiply()

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to multiply to this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.36.3.15 `__negative()`

```
GarbageCollected ComputedExpression::__negative () const [virtual], [inherited]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.36.3.16 `__not()`

```
GarbageCollected ComputedExpression::__not () const [virtual], [inherited]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.36.3.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.36.3.18 __slice()

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.36.3.19 __string()

```
GarbageCollected ComputedExpression::__string () const [virtual], [inherited]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionArray](#).

5.36.3.20 __subtract()

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.36.3.21 dump()

```
string ComputedExpressionIterator::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.36.3.22 is_equal() [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.36.3.23 `is_equal()` [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.36.3.24 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.36.3.25 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.36.3.26 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

val	The value to compare against.
-----	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.36.3.27 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

val	The value to compare against.
-----	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.36.3.28 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.36.3.29 makeCopy()

`GarbageCollected` `ComputedExpression::makeCopy () const [virtual], [inherited]`

Make a copy of the `ComputedExpression` (recursively, if appropriate).

Returns

A `Tang::GarbageCollected` value for the new `ComputedExpression`.

Reimplemented in `Tang::ComputedExpressionString`, `Tang::ComputedExpressionNativeFunction`, `Tang::ComputedExpressionNativeFunction`, `Tang::ComputedExpressionMap`, `Tang::ComputedExpressionInteger`, `Tang::ComputedExpressionFloat`, `Tang::ComputedExpressionBoolean`, `Tang::ComputedExpressionCompiledFunction`, `Tang::ComputedExpressionBoolean`, and `Tang::ComputedExpressionArray`.

The documentation for this class was generated from the following files:

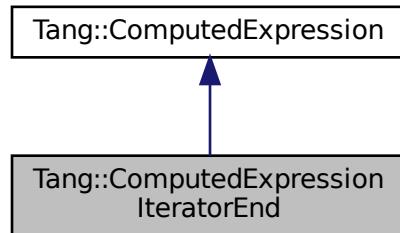
- `include/computedExpressionIterator.hpp`
- `src/computedExpressionIterator.cpp`

5.37 Tang::ComputedExpressionIteratorEnd Class Reference

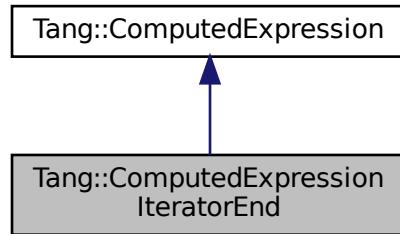
Represents that a collection has no more values through which to iterate.

```
#include <computedExpressionIteratorEnd.hpp>
```

Inheritance diagram for `Tang::ComputedExpressionIteratorEnd`:



Collaboration diagram for `Tang::ComputedExpressionIteratorEnd`:



Public Member Functions

- **ComputedExpressionIteratorEnd ()**
Construct an IteratorEnd result.
- virtual std::string **dump () const override**
Output the contents of the [ComputedExpression](#) as a string.
- virtual **GarbageCollected __string () const override**
Perform a type cast to string.
- virtual std::string **__asCode () const**
Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.
- virtual bool **isCopyNeeded () const**
Determine whether or not a copy is needed.
- virtual **GarbageCollected makeCopy () const**
Make a copy of the [ComputedExpression](#) (recursively, if appropriate).
- virtual bool **is_equal (const Tang::integer_t &val) const**
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal (const Tang::float_t &val) const**
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal (const bool &val) const**
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal (const string &val) const**
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal (const Error &val) const**
Check whether or not the computed expression is equal to another value.
- virtual bool **is_equal (const std::nullptr_t &val) const**
Check whether or not the computed expression is equal to another value.
- virtual **GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value)**
Perform an index assignment to the supplied value.
- virtual **GarbageCollected __add (const GarbageCollected &rhs) const**
Compute the result of adding this value and the supplied value.
- virtual **GarbageCollected __subtract (const GarbageCollected &rhs) const**
Compute the result of subtracting this value and the supplied value.
- virtual **GarbageCollected __multiply (const GarbageCollected &rhs) const**
Compute the result of multiplying this value and the supplied value.
- virtual **GarbageCollected __divide (const GarbageCollected &rhs) const**
Compute the result of dividing this value and the supplied value.
- virtual **GarbageCollected __modulo (const GarbageCollected &rhs) const**
Compute the result of moduloing this value and the supplied value.
- virtual **GarbageCollected __negative () const**
Compute the result of negating this value.
- virtual **GarbageCollected __not () const**
Compute the logical not of this value.
- virtual **GarbageCollected __lessThan (const GarbageCollected &rhs) const**
Compute the "less than" comparison.
- virtual **GarbageCollected __equal (const GarbageCollected &rhs) const**
Perform an equality test.
- virtual **GarbageCollected __period (const GarbageCollected &member, std::shared_ptr<TangBase> &tang) const**
Perform a member access (period) operation.
- virtual **GarbageCollected __index (const GarbageCollected &index) const**
Perform an index operation.

- virtual `GarbageCollected __slice` (const `GarbageCollected &begin`, const `GarbageCollected &end`, const `GarbageCollected &skip`) const
Perform a slice operation.
- virtual `GarbageCollected __getIterator` (const `GarbageCollected &collection`) const
Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext` (size_t index=0) const
Get the next iterative value.
- virtual `GarbageCollected __integer` () const
Perform a type cast to integer.
- virtual `GarbageCollected __float` () const
Perform a type cast to float.
- virtual `GarbageCollected __boolean` () const
Perform a type cast to boolean.

5.37.1 Detailed Description

Represents that a collection has no more values through which to iterate.

5.37.2 Member Function Documentation

5.37.2.1 `__add()`

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to add to this.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.37.2.2 `__asCode()`

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.37.2.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.37.2.4 __boolean()

```
GarbageCollected ComputedExpression::__boolean () const [virtual], [inherited]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.37.2.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<code>rhs</code>	The GarbageCollected value to divide this by.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.37.2.6 `__equal()`

```
GarbageCollected ComputedExpression::__equal (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Perform an equality test.

Parameters

<code>rhs</code>	The GarbageCollected value to compare against.
------------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionNativeObject](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionBoolean](#), and [Tang::ComputedExpressionBoolean](#).

5.37.2.7 `__float()`

```
GarbageCollected ComputedExpression::__float () const [virtual], [inherited]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.37.2.8 `__getIterator()`

```
GarbageCollected ComputedExpression::__getIterator (
    const GarbageCollected & collection ) const [virtual], [inherited]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.37.2.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.37.2.10 __integer()

```
GarbageCollected ComputedExpression::__integer ( ) const [virtual], [inherited]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.37.2.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual], [inherited]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.37.2.12 __lessThan()

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.37.2.13 __modulo()

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.37.2.14 `__multiply()`

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to multiply to this.
------------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.37.2.15 `__negative()`

```
GarbageCollected ComputedExpression::__negative () const [virtual], [inherited]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.37.2.16 `__not()`

```
GarbageCollected ComputedExpression::__not () const [virtual], [inherited]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.37.2.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.37.2.18 __slice()

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.37.2.19 __string()

```
GarbageCollected ComputedExpressionIteratorEnd::__string () const [override], [virtual]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.37.2.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.37.2.21 dump()

```
string ComputedExpressionIteratorEnd::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.37.2.22 is_equal() [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.37.2.23 `is_equal()` [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.37.2.24 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.37.2.25 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.37.2.26 `is_equal()` [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.37.2.27 `is_equal()` [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.37.2.28 `isCopyNeeded()`

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.37.2.29 makeCopy()

`GarbageCollected` `ComputedExpression::makeCopy () const [virtual], [inherited]`

Make a copy of the `ComputedExpression` (recursively, if appropriate).

Returns

A `Tang::GarbageCollected` value for the new `ComputedExpression`.

Reimplemented in `Tang::ComputedExpressionString`, `Tang::ComputedExpressionNativeFunction`, `Tang::ComputedExpressionNativeExpression`, `Tang::ComputedExpressionMap`, `Tang::ComputedExpressionInteger`, `Tang::ComputedExpressionFloat`, `Tang::ComputedExpressionBoolean`, `Tang::ComputedExpressionCompiledFunction`, `Tang::ComputedExpressionBoolean`, and `Tang::ComputedExpressionArray`.

The documentation for this class was generated from the following files:

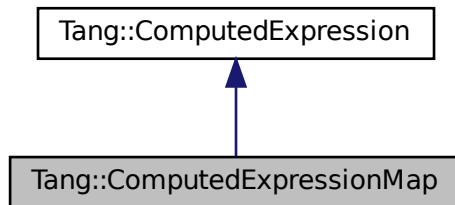
- `include/computedExpressionIteratorEnd.hpp`
- `src/computedExpressionIteratorEnd.cpp`

5.38 Tang::ComputedExpressionMap Class Reference

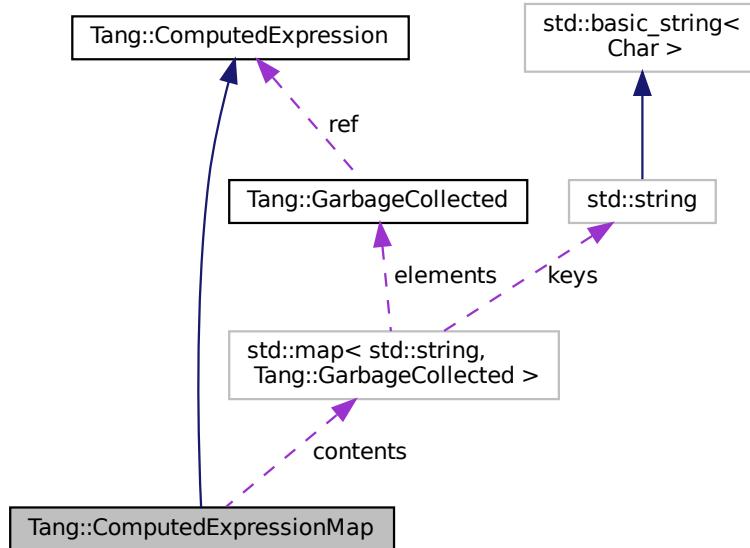
Represents an Map that is the result of a computation.

```
#include <computedExpressionMap.hpp>
```

Inheritance diagram for `Tang::ComputedExpressionMap`:



Collaboration diagram for Tang::ComputedExpressionMap:



Public Member Functions

- `ComputedExpressionMap (std::map< std::string, Tang::GarbageCollected > contents)`
Construct an Map result.
- `virtual std::string dump () const override`
Output the contents of the `ComputedExpression` as a string.
- `virtual bool isCopyNeeded () const override`
Determine whether or not a copy is needed.
- `GarbageCollected makeCopy () const override`
Make a copy of the `ComputedExpression` (recursively, if appropriate).
- `virtual GarbageCollected __index (const GarbageCollected &index) const override`
Perform an index operation.
- `virtual GarbageCollected __getIterator (const GarbageCollected &collection) const override`
Get an iterator for the expression.
- `virtual GarbageCollected __iteratorNext (size_t index) const override`
Get the next iterative value.
- `virtual GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value) const override`
Perform an index assignment to the supplied value.
- `virtual GarbageCollected __string () const override`
Perform a type cast to string.
- `virtual GarbageCollected __boolean () const override`
Perform a type cast to boolean.
- `virtual std::string __asCode () const`
Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- `virtual bool is_equal (const Tang::integer_t &val) const`

- `virtual bool is_equal (const Tang::float_t &val) const`
Check whether or not the computed expression is equal to another value.
- `virtual bool is_equal (const bool &val) const`
Check whether or not the computed expression is equal to another value.
- `virtual bool is_equal (const string &val) const`
Check whether or not the computed expression is equal to another value.
- `virtual bool is_equal (const Error &val) const`
Check whether or not the computed expression is equal to another value.
- `virtual bool is_equal (const std::nullptr_t &val) const`
Check whether or not the computed expression is equal to another value.
- `virtual GarbageCollected __add (const GarbageCollected &rhs) const`
Compute the result of adding this value and the supplied value.
- `virtual GarbageCollected __subtract (const GarbageCollected &rhs) const`
Compute the result of subtracting this value and the supplied value.
- `virtual GarbageCollected __multiply (const GarbageCollected &rhs) const`
Compute the result of multiplying this value and the supplied value.
- `virtual GarbageCollected __divide (const GarbageCollected &rhs) const`
Compute the result of dividing this value and the supplied value.
- `virtual GarbageCollected __modulo (const GarbageCollected &rhs) const`
Compute the result of moduloing this value and the supplied value.
- `virtual GarbageCollected __negative () const`
Compute the result of negating this value.
- `virtual GarbageCollected __not () const`
Compute the logical not of this value.
- `virtual GarbageCollected __lessThan (const GarbageCollected &rhs) const`
Compute the "less than" comparison.
- `virtual GarbageCollected __equal (const GarbageCollected &rhs) const`
Perform an equality test.
- `virtual GarbageCollected __period (const GarbageCollected &member, std::shared_ptr< TangBase > &tang) const`
Perform a member access (period) operation.
- `virtual GarbageCollected __slice (const GarbageCollected &begin, const GarbageCollected &end, const GarbageCollected &skip) const`
Perform a slice operation.
- `virtual GarbageCollected __integer () const`
Perform a type cast to integer.
- `virtual GarbageCollected __float () const`
Perform a type cast to float.

Private Attributes

- `std::map< std::string, Tang::GarbageCollected > contents`
The map contents.

5.38.1 Detailed Description

Represents an Map that is the result of a computation.

5.38.2 Constructor & Destructor Documentation

5.38.2.1 ComputedExpressionMap()

```
ComputedExpressionMap::ComputedExpressionMap (
    std::map< std::string, Tang::GarbageCollected > contents )
```

Construct an Map result.

Parameters

<i>contents</i>	The map of key value pairs.
-----------------	-----------------------------

5.38.3 Member Function Documentation

5.38.3.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to add to this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.38.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the **ComputedExpression** as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.38.3.3 __assign_index()

```
GarbageCollected ComputedExpressionMap::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [override], [virtual]
```

Perform an index assignment to the supplied value.

Parameters

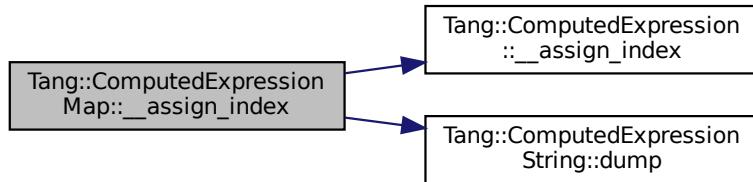
<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.38.3.4 __boolean()

```
GarbageCollected ComputedExpressionMap::__boolean () const [override], [virtual]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.38.3.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.38.3.6 __equal()

```
GarbageCollected ComputedExpression::__equal (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Perform an equality test.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionNativeObject](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionBoolean](#), and [Tang::ComputedExpressionBoolean](#).

5.38.3.7 __float()

```
GarbageCollected ComputedExpression::__float () const [virtual], [inherited]
```

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.38.3.8 __getIterator()

```
GarbageCollected ComputedExpressionMap::__getIterator (
    const GarbageCollected & collection ) const [override], [virtual]
```

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented from [Tang::ComputedExpression](#).

5.38.3.9 __index()

```
GarbageCollected ComputedExpressionMap::__index (
    const GarbageCollected & index ) const [override], [virtual]
```

Perform an index operation.

Parameters

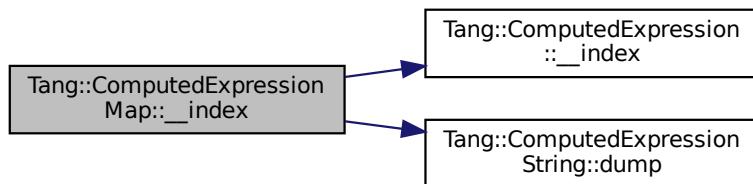
<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.38.3.10 __integer()**

```
GarbageCollected ComputedExpression::__integer () const [virtual], [inherited]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.38.3.11 `__iteratorNext()`

```
GarbageCollected ComputedExpressionMap::__iteratorNext (
    size_t index ) const [override], [virtual]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented from [Tang::ComputedExpression](#).

5.38.3.12 `__lessThan()`

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.38.3.13 `__modulo()`

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.38.3.14 `__multiply()`

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<code>rhs</code>	The GarbageCollected value to multiply to this.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.38.3.15 `__negative()`

```
GarbageCollected ComputedExpression::__negative () const [virtual], [inherited]
```

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.38.3.16 `__not()`

```
GarbageCollected ComputedExpression::__not () const [virtual], [inherited]
```

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.38.3.17 `__period()`

```
GarbageCollected ComputedExpression::__period (
    const GarbageCollected & member,
    std::shared_ptr< TangBase > & tang ) const [virtual], [inherited]
```

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.38.3.18 `__slice()`

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.38.3.19 `__string()`

```
GarbageCollected ComputedExpressionMap::__string ( ) const [override], [virtual]
```

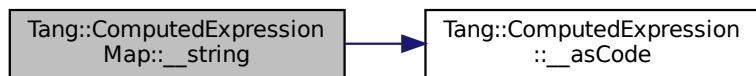
Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.38.3.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.38.3.21 `dump()`

```
string ComputedExpressionMap::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.38.3.22 `is_equal()` [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.38.3.23 `is_equal()` [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.38.3.24 `is_equal()` [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

5.38.3.25 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.38.3.26 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.38.3.27 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.38.3.28 isCopyNeeded()

```
bool ComputedExpressionMap::isCopyNeeded ( ) const [override], [virtual]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented from [Tang::ComputedExpression](#).

5.38.3.29 makeCopy()

```
GarbageCollected ComputedExpressionMap::makeCopy ( ) const [override], [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

The documentation for this class was generated from the following files:

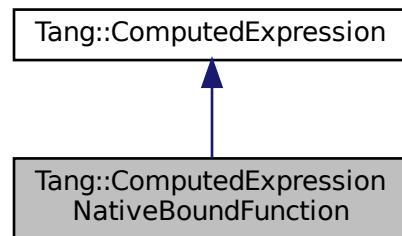
- [include/computedExpressionMap.hpp](#)
- [src/computedExpressionMap.cpp](#)

5.39 Tang::ComputedExpressionNativeBoundFunction Class Reference

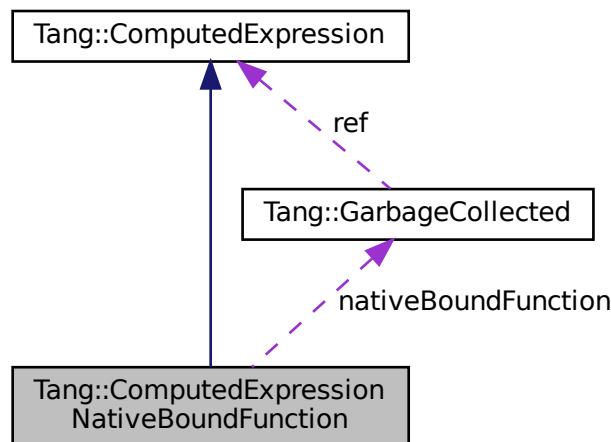
Represents a NativeBound Function declared in the script.

```
#include <computedExpressionNativeBoundFunction.hpp>
```

Inheritance diagram for Tang::ComputedExpressionNativeBoundFunction:



Collaboration diagram for Tang::ComputedExpressionNativeBoundFunction:



Public Member Functions

- [ComputedExpressionNativeBoundFunction](#) (`NativeBoundFunction nativeBoundFunction, size_t argc, std::type_index targetTypeIndex`)
Construct an NativeBoundFunction.
- `virtual std::string dump () const override`

- **`Output the contents of the ComputedExpression as a string.`**
- **`GarbageCollected makeCopy () const override`**

*Make a copy of the *ComputedExpression* (recursively, if appropriate).*
- **`virtual GarbageCollected __equal (const GarbageCollected &rhs) const override`**

Perform an equality test.
- **`NativeBoundFunction getFunction () const`**

Get the native bound function to be executed.
- **`size_t getArgc () const`**

Get the count of arguments that this function expects.
- **`const std::type_index & getTargetTypeIndex () const`**

Get the type of the value to which the function is bound.
- **`virtual std::string __asCode () const`**

*Output the contents of the *ComputedExpression* as a string similar to how it would be represented as code.*
- **`virtual bool isCopyNeeded () const`**

Determine whether or not a copy is needed.
- **`virtual bool is_equal (const Tang::integer_t &val) const`**

Check whether or not the computed expression is equal to another value.
- **`virtual bool is_equal (const Tang::float_t &val) const`**

Check whether or not the computed expression is equal to another value.
- **`virtual bool is_equal (const string &val) const`**

Check whether or not the computed expression is equal to another value.
- **`virtual bool is_equal (const Error &val) const`**

Check whether or not the computed expression is equal to another value.
- **`virtual bool is_equal (const std::nullptr_t &val) const`**

Check whether or not the computed expression is equal to another value.
- **`virtual GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value) const`**

Perform an index assignment to the supplied value.
- **`virtual GarbageCollected __add (const GarbageCollected &rhs) const`**

Compute the result of adding this value and the supplied value.
- **`virtual GarbageCollected __subtract (const GarbageCollected &rhs) const`**

Compute the result of subtracting this value and the supplied value.
- **`virtual GarbageCollected __multiply (const GarbageCollected &rhs) const`**

Compute the result of multiplying this value and the supplied value.
- **`virtual GarbageCollected __divide (const GarbageCollected &rhs) const`**

Compute the result of dividing this value and the supplied value.
- **`virtual GarbageCollected __modulo (const GarbageCollected &rhs) const`**

Compute the result of moduloing this value and the supplied value.
- **`virtual GarbageCollected __negative () const`**

Compute the result of negating this value.
- **`virtual GarbageCollected __not () const`**

Compute the logical not of this value.
- **`virtual GarbageCollected __lessThan (const GarbageCollected &rhs) const`**

Compute the "less than" comparison.
- **`virtual GarbageCollected __period (const GarbageCollected &member, std::shared_ptr<TangBase> &tang) const`**

Perform a member access (period) operation.
- **`virtual GarbageCollected __index (const GarbageCollected &index) const`**

Perform an index operation.

- virtual `GarbageCollected __slice` (const `GarbageCollected &begin`, const `GarbageCollected &end`, const `GarbageCollected &skip`) const
Perform a slice operation.
- virtual `GarbageCollected __getIterator` (const `GarbageCollected &collection`) const
Get an iterator for the expression.
- virtual `GarbageCollected __iteratorNext` (size_t index=0) const
Get the next iterative value.
- virtual `GarbageCollected __integer` () const
Perform a type cast to integer.
- virtual `GarbageCollected __float` () const
Perform a type cast to float.
- virtual `GarbageCollected __boolean` () const
Perform a type cast to boolean.
- virtual `GarbageCollected __string` () const
Perform a type cast to string.

Public Attributes

- `std::optional<GarbageCollected> target`
The target object that the function is bound to.

Private Attributes

- `NativeBoundFunction nativeBoundFunction`
The native bound function to be executed.
- `size_t argc`
The count of arguments that this function expects.
- `std::type_index targetTypeIndex`
The type of the value to which the function is bound.

5.39.1 Detailed Description

Represents a NativeBound Function declared in the script.

5.39.2 Constructor & Destructor Documentation

5.39.2.1 ComputedExpressionNativeBoundFunction()

```
ComputedExpressionNativeBoundFunction::ComputedExpressionNativeBoundFunction (
    NativeBoundFunction nativeBoundFunction,
    size_t argc,
    std::type_index targetTypeIndex )
```

Construct an NativeBoundFunction.

The object itself is designed to be safe in that, once it is constructed, the method function pointer, argument count, and target type cannot be changed, but can only be accessible through a getter.

The target value that the function is bound to, however, cannot be set when the object is created, due to the design of the compiler. It is therefore exposed, regardless of being made public or via a setter function.

The current design of the VM will set the correct target, but because the target is exposed, it is possible that some bad actor could modify it. It is therefore necessary to verify that the type of the bound object and the type that was known when this object is created are, in fact, the same. That is why we store the target object type information and protect it behind a getter function.

When the VM executes the bound method, it will perform a type check to verify that the bound object is of the same type as that of the method that is defined in [TangBase::getObjectMethods\(\)](#).

It should be safe, then, to assume that within a NativeBoundFunction, the type is the expected type. No [ComputedExpression](#) type, then, should "steal" a NativeBoundFunction from another [ComputedExpression](#) definition, as it is assumed that the bound target that is provided to any NativeBoundFunction is the same as the type on which it was originally defined.

For example, a NativeBoundFunction declared in [ComputedExpressionString](#) may assume that the bound target is also a [ComputedExpressionString](#). If another class, such as [ComputedExpressionArray](#), were to try to copy the NativeBoundFunction (as a pointer reference), the function will still expect that the bound target is a [ComputedExpressionString](#), and will probably cause a segmentation fault. Just don't do it.

Parameters

<i>nativeBoundFunction</i>	The native bound function to be executed.
<i>argc</i>	The count of arguments that this function expects.
<i>targetTypeIndex</i>	The type of the value to which the function is bound.

5.39.3 Member Function Documentation

5.39.3.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.39.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.39.3.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.39.3.4 __boolean()

```
GarbageCollected ComputedExpression::__boolean ( ) const [virtual], [inherited]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.39.3.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.39.3.6 __equal()

```
GarbageCollected ComputedExpressionNativeBoundFunction::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

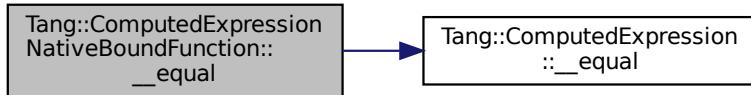
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.39.3.7 __float()

[GarbageCollected](#) `ComputedExpression::__float () const [virtual], [inherited]`

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.39.3.8 __getIterator()

[GarbageCollected](#) `ComputedExpression::__getIterator (`
`const GarbageCollected & collection) const [virtual], [inherited]`

Get an iterator for the expression.

Parameters

<code>collection</code>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.39.3.9 __index()

[GarbageCollected](#) `ComputedExpression::__index (`
`const GarbageCollected & index) const [virtual], [inherited]`

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.39.3.10 `__integer()`

`GarbageCollected ComputedExpression::__integer () const [virtual], [inherited]`

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.39.3.11 `__iteratorNext()`

`GarbageCollected ComputedExpression::__iteratorNext (size_t index = 0) const [virtual], [inherited]`

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.39.3.12 `__lessThan()`

`GarbageCollected ComputedExpression::__lessThan (const GarbageCollected & rhs) const [virtual], [inherited]`

Compute the "less than" comparison.

Parameters

<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.39.3.13 __modulo()

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.39.3.14 __multiply()

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to multiply to this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.39.3.15 `__negative()`

`GarbageCollected` `ComputedExpression::__negative () const [virtual], [inherited]`

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.39.3.16 `__not()`

`GarbageCollected` `ComputedExpression::__not () const [virtual], [inherited]`

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.39.3.17 `__period()`

`GarbageCollected` `ComputedExpression::__period (`
 `const GarbageCollected & member,`
 `std::shared_ptr< TangBase > & tang) const [virtual], [inherited]`

Perform a member access (period) operation.

Parameters

<code>member</code>	The member expression provided by the script.
---------------------	---

Returns

The result of the operation.

5.39.3.18 __slice()

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.39.3.19 __string()

```
GarbageCollected ComputedExpression::__string () const [virtual], [inherited]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionArray](#).

5.39.3.20 __subtract()

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.39.3.21 dump()

```
string ComputedExpressionNativeBoundFunction::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.39.3.22 getArgc()

```
size_t ComputedExpressionNativeBoundFunction::getArgc ( ) const
```

Get the count of arguments that this function expects.

Returns

The count of arguments that this function expects.

5.39.3.23 getFunction()

```
NativeBoundFunction ComputedExpressionNativeBoundFunction::getFunction ( ) const
```

Get the native bound function to be executed.

Returns

The native bound function to be executed.

5.39.3.24 `getTargetTypeIndex()`

```
const type_index & ComputedExpressionNativeBoundFunction::getTargetTypeIndex ( ) const
```

Get the type of the value to which the function is bound.

Returns

The type of the value to which the function is bound.

5.39.3.25 `is_equal()` [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.39.3.26 `is_equal()` [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.39.3.27 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.39.3.28 is_equal() [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.39.3.29 is_equal() [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.39.3.30 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.39.3.31 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.39.3.32 makeCopy()

```
GarbageCollected ComputedExpressionNativeBoundFunction::makeCopy ( ) const [override], [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

The documentation for this class was generated from the following files:

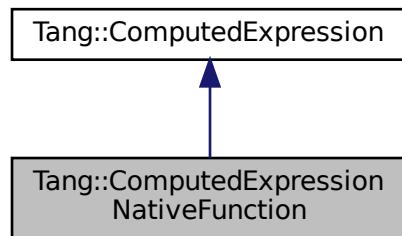
- [include/computedExpressionNativeBoundFunction.hpp](#)
- [src/computedExpressionNativeBoundFunction.cpp](#)

5.40 Tang::ComputedExpressionNativeFunction Class Reference

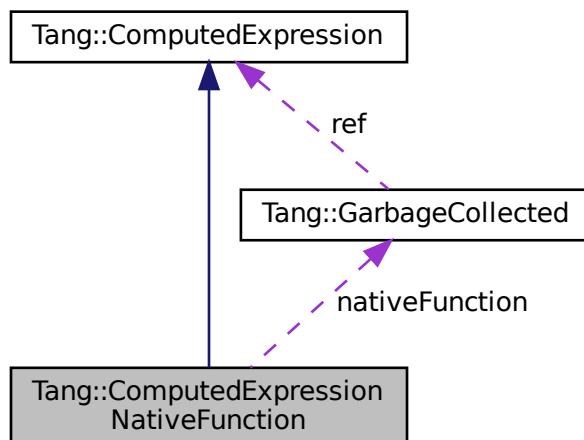
Represents a Native Function provided by compiled C++ code.

```
#include <computedExpressionNativeFunction.hpp>
```

Inheritance diagram for Tang::ComputedExpressionNativeFunction:



Collaboration diagram for Tang::ComputedExpressionNativeFunction:



Public Member Functions

- [ComputedExpressionNativeFunction \(NativeFunction nativeFunction, size_t argc\)](#)
Construct an NativeFunction.
- virtual std::string [dump \(\) const override](#)
Output the contents of the [ComputedExpression](#) as a string.

- `GarbageCollected makeCopy () const override`
Make a copy of the `ComputedExpression` (recursively, if appropriate).
- virtual `GarbageCollected __equal (const GarbageCollected &rhs) const override`
Perform an equality test.
- `NativeFunction getFunction () const`
Get the native bound function to be executed.
- `size_t getArgc () const`
Get the count of arguments that this function expects.
- virtual `std::string __asCode () const`
Output the contents of the `ComputedExpression` as a string similar to how it would be represented as code.
- virtual `bool isCopyNeeded () const`
Determine whether or not a copy is needed.
- virtual `bool is_equal (const Tang::integer_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const Tang::float_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const bool &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const string &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const Error &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `bool is_equal (const std::nullptr_t &val) const`
Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __assign_index (const GarbageCollected &index, const GarbageCollected &value) const`
Perform an index assignment to the supplied value.
- virtual `GarbageCollected __add (const GarbageCollected &rhs) const`
Compute the result of adding this value and the supplied value.
- virtual `GarbageCollected __subtract (const GarbageCollected &rhs) const`
Compute the result of subtracting this value and the supplied value.
- virtual `GarbageCollected __multiply (const GarbageCollected &rhs) const`
Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __divide (const GarbageCollected &rhs) const`
Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __modulo (const GarbageCollected &rhs) const`
Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __negative () const`
Compute the result of negating this value.
- virtual `GarbageCollected __not () const`
Compute the logical not of this value.
- virtual `GarbageCollected __lessThan (const GarbageCollected &rhs) const`
Compute the "less than" comparison.
- virtual `GarbageCollected __period (const GarbageCollected &member, std::shared_ptr< TangBase > &tang) const`
Perform a member access (period) operation.
- virtual `GarbageCollected __index (const GarbageCollected &index) const`
Perform an index operation.
- virtual `GarbageCollected __slice (const GarbageCollected &begin, const GarbageCollected &end, const GarbageCollected &skip) const`
Perform a slice operation.
- virtual `GarbageCollected __getIterator (const GarbageCollected &collection) const`

- `virtual GarbageCollected __iteratorNext (size_t index=0) const`
Get an iterator for the expression.
- `virtual GarbageCollected __integer () const`
Get the next iterative value.
- `virtual GarbageCollected __float () const`
Perform a type cast to float.
- `virtual GarbageCollected __boolean () const`
Perform a type cast to boolean.
- `virtual GarbageCollected __string () const`
Perform a type cast to string.

Private Attributes

- `NativeFunction nativeFunction`
The native bound function to be executed.
- `size_t argc`
The count of arguments that this function expects.

5.40.1 Detailed Description

Represents a Native Function provided by compiled C++ code.

5.40.2 Constructor & Destructor Documentation

5.40.2.1 ComputedExpressionNativeFunction()

```
ComputedExpressionNativeFunction::ComputedExpressionNativeFunction (
    NativeFunction nativeFunction,
    size_t argc )
```

Construct an NativeFunction.

The object itself is designed to be safe in that, once it is constructed, the method function pointer, and argument count cannot be changed, but can only be accessible through a getter.

Parameters

<code>nativeFunction</code>	The native function to be executed.
<code>argc</code>	The count of arguments that this function expects.

5.40.3 Member Function Documentation

5.40.3.1 __add()

```
GarbageCollected ComputedExpression::__add (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of adding this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.40.3.2 __asCode()

```
string ComputedExpression::__asCode ( ) const [virtual], [inherited]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented in [Tang::ComputedExpressionString](#).

5.40.3.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.40.3.4 `__boolean()`

```
GarbageCollected ComputedExpression::__boolean () const [virtual], [inherited]
```

Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.40.3.5 `__divide()`

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.40.3.6 `__equal()`

```
GarbageCollected ComputedExpressionNativeFunction::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

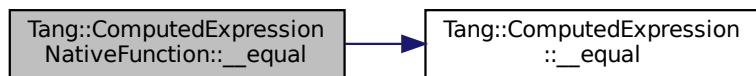
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.40.3.7 __float()**

[GarbageCollected](#) `ComputedExpression::__float () const [virtual], [inherited]`

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.40.3.8 __getIterator()

[GarbageCollected](#) `ComputedExpression::__getIterator (`
`const GarbageCollected & collection) const [virtual], [inherited]`

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.40.3.9 __index()

```
GarbageCollected ComputedExpression::__index (
    const GarbageCollected & index ) const [virtual], [inherited]
```

Perform an index operation.

Parameters

<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.40.3.10 __integer()

```
GarbageCollected ComputedExpression::__integer () const [virtual], [inherited]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.40.3.11 __iteratorNext()

```
GarbageCollected ComputedExpression::__iteratorNext (
    size_t index = 0 ) const [virtual], [inherited]
```

Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIterator](#), and [Tang::ComputedExpressionArray](#).

5.40.3.12 `__lessThan()`

```
GarbageCollected ComputedExpression::__lessThan (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the "less than" comparison.

Parameters

<code>rhs</code>	The GarbageCollected value to compare against.
------------------	--

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.40.3.13 `__modulo()`

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<code>rhs</code>	The GarbageCollected value to modulo this by.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.40.3.14 `__multiply()`

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<code>rhs</code>	The GarbageCollected value to multiply to this.
------------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.40.3.15 `__negative()`

[GarbageCollected](#) `ComputedExpression::__negative () const [virtual], [inherited]`

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.40.3.16 `__not()`

[GarbageCollected](#) `ComputedExpression::__not () const [virtual], [inherited]`

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.40.3.17 `__period()`

[GarbageCollected](#) `ComputedExpression::__period (`
`const GarbageCollected & member,`
`std::shared_ptr< TangBase > & tang) const [virtual], [inherited]`

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.40.3.18 `__slice()`

```
GarbageCollected ComputedExpression::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [virtual], [inherited]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionString](#), and [Tang::ComputedExpressionArray](#).

5.40.3.19 `__string()`

```
GarbageCollected ComputedExpression::__string () const [virtual], [inherited]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionMap](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionArray](#).

5.40.3.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<code>rhs</code>	The <code>GarbageCollected</code> value to subtract from this.
------------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.40.3.21 `dump()`

```
string ComputedExpressionNativeFunction::dump () const [override], [virtual]
```

Output the contents of the `ComputedExpression` as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.40.3.22 `getArgc()`

```
size_t ComputedExpressionNativeFunction::getArgc () const
```

Get the count of arguments that this function expects.

Returns

The count of arguments that this function expects.

5.40.3.23 `getFunction()`

```
NativeFunction ComputedExpressionNativeFunction::getFunction ( ) const
```

Get the native bound function to be executed.

Returns

The native bound function to be executed.

5.40.3.24 `is_equal()` [1/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const bool & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionBoolean](#).

5.40.3.25 is_equal() [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.40.3.26 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

5.40.3.27 `is_equal()` [4/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const string & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionString](#).

5.40.3.28 `is_equal()` [5/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.40.3.29 `is_equal()` [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.40.3.30 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.40.3.31 makeCopy()

```
GarbageCollected ComputedExpressionNativeFunction::makeCopy ( ) const [override], [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

The documentation for this class was generated from the following files:

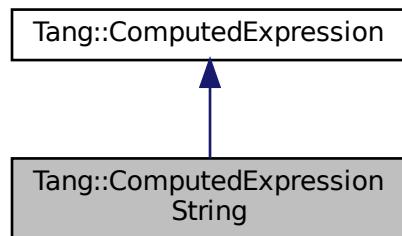
- include/computedExpressionNativeFunction.hpp
- src/computedExpressionNativeFunction.cpp

5.41 Tang::ComputedExpressionString Class Reference

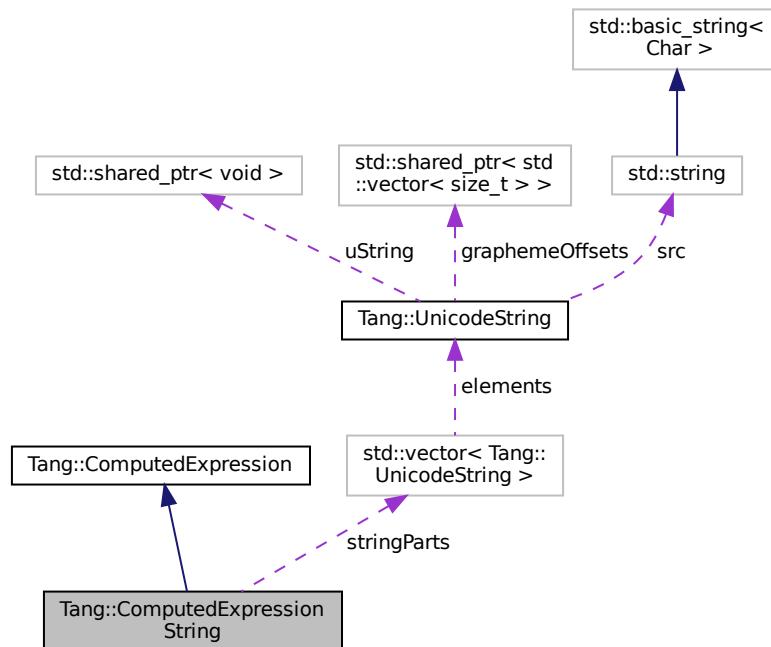
Represents a String that is the result of a computation.

```
#include <computedExpressionString.hpp>
```

Inheritance diagram for Tang::ComputedExpressionString:



Collaboration diagram for Tang::ComputedExpressionString:



Public Member Functions

- `ComputedExpressionString (const std::string &val)`
`Construct a String result.`
- `ComputedExpressionString (const std::vector< UnicodeString > &stringParts)`
`Construct a String result from a vector of UnicodeString objects.`
- `virtual std::string dump () const override`
`Output the contents of the ComputedExpression as a string.`
- `virtual std::string __asCode () const override`
`Output the contents of the ComputedExpression as a string similar to how it would be represented as code.`
- `GarbageCollected makeCopy () const override`
`Make a copy of the ComputedExpression (recursively, if appropriate).`
- `virtual bool is_equal (const bool &val) const override`
`Check whether or not the computed expression is equal to another value.`
- `virtual bool is_equal (const string &val) const override`
`Check whether or not the computed expression is equal to another value.`
- `virtual GarbageCollected __index (const GarbageCollected &index) const override`
`Perform an index operation.`
- `virtual GarbageCollected __slice (const GarbageCollected &begin, const GarbageCollected &end, const GarbageCollected &skip) const override`
`Perform a slice operation.`
- `virtual GarbageCollected __getIterator (const GarbageCollected &collection) const override`
`Get an iterator for the expression.`
- `virtual GarbageCollected __iteratorNext (size_t index) const override`
`Get the next iterative value.`
- `virtual GarbageCollected __add (const GarbageCollected &rhs) const override`
`Compute the result of adding this value and the supplied value.`
- `virtual GarbageCollected __not () const override`
`Compute the logical not of this value.`
- `virtual GarbageCollected __lessThan (const GarbageCollected &rhs) const override`
`Compute the "less than" comparison.`
- `virtual GarbageCollected __equal (const GarbageCollected &rhs) const override`
`Perform an equality test.`
- `virtual GarbageCollected __boolean () const override`
`Perform a type cast to boolean.`
- `virtual GarbageCollected __string () const override`
`Perform a type cast to string.`
- `const std::vector< UnicodeString > & getValue () const`
`Return the collection of string values that are stored in this object.`
- `size_t length () const`
`Return the number of graphemes contained in the string.`
- `size_t bytesLength () const`
`Return the number of bytes required by the string, stored as UTF-8.`
- `ComputedExpressionString & operator+= (const ComputedExpressionString &rhs)`
`Helper function to copy the contents of the rhs string into the current string.`
- `void setUntrusted ()`
`Set all of the string parts to untrusted.`
- `virtual bool isCopyNeeded () const`
`Determine whether or not a copy is needed.`
- `virtual bool is_equal (const Tang::integer_t &val) const`
`Check whether or not the computed expression is equal to another value.`

- virtual bool `is_equal` (const `Tang::float_t` &val) const
Check whether or not the computed expression is equal to another value.
- virtual bool `is_equal` (const `Error` &val) const
Check whether or not the computed expression is equal to another value.
- virtual bool `is_equal` (const `std::nullptr_t` &val) const
Check whether or not the computed expression is equal to another value.
- virtual `GarbageCollected __assign_index` (const `GarbageCollected` &index, const `GarbageCollected` &value)
Perform an index assignment to the supplied value.
- virtual `GarbageCollected __subtract` (const `GarbageCollected` &rhs) const
Compute the result of subtracting this value and the supplied value.
- virtual `GarbageCollected __multiply` (const `GarbageCollected` &rhs) const
Compute the result of multiplying this value and the supplied value.
- virtual `GarbageCollected __divide` (const `GarbageCollected` &rhs) const
Compute the result of dividing this value and the supplied value.
- virtual `GarbageCollected __modulo` (const `GarbageCollected` &rhs) const
Compute the result of moduloing this value and the supplied value.
- virtual `GarbageCollected __negative` () const
Compute the result of negating this value.
- virtual `GarbageCollected __period` (const `GarbageCollected` &member, `std::shared_ptr<TangBase>` &tang) const
Perform a member access (period) operation.
- virtual `GarbageCollected __integer` () const
Perform a type cast to integer.
- virtual `GarbageCollected __float` () const
Perform a type cast to float.

Static Public Member Functions

- static `NativeBoundFunctionMap getMethods` ()
Return the member functions implemented for this particular expression type.

Private Attributes

- `std::vector<UnicodeString> stringParts`
The string value.
- `std::optional<size_t> cachedLength`
Cache of the string length in graphemes.
- `std::optional<size_t> cachedBytesLength`
Cache of the string length in bytes.

5.41.1 Detailed Description

Represents a String that is the result of a computation.

5.41.2 Constructor & Destructor Documentation

5.41.2.1 ComputedExpressionString() [1/2]

```
ComputedExpressionString::ComputedExpressionString (
```

```
    const std::string & val )
```

Construct a String result.

Parameters

<i>val</i>	The string value.
------------	-------------------

5.41.2.2 ComputedExpressionString() [2/2]

```
ComputedExpressionString::ComputedExpressionString (
    const std::vector< UnicodeString > & stringParts )
```

Construct a String result from a vector of [UnicodeString](#) objects.

Parameters

<i>stringParts</i>	The vector of UnicodeString objects.
--------------------	--

5.41.3 Member Function Documentation**5.41.3.1 __add()**

```
GarbageCollected ComputedExpressionString::__add (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the result of adding this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.41.3.2 __asCode()

```
string ComputedExpressionString::__asCode ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string similar to how it would be represented as code.

Returns

A code-string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.41.3.3 __assign_index()

```
GarbageCollected ComputedExpression::__assign_index (
    const GarbageCollected & index,
    const GarbageCollected & value ) [virtual], [inherited]
```

Perform an index assignment to the supplied value.

Parameters

<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.41.3.4 __boolean()

```
GarbageCollected ComputedExpressionString::__boolean ( ) const [override], [virtual]
```

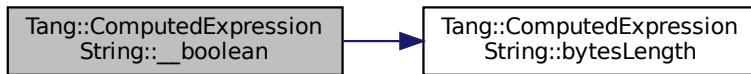
Perform a type cast to boolean.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.41.3.5 __divide()

```
GarbageCollected ComputedExpression::__divide (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of dividing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.41.3.6 __equal()

```
GarbageCollected ComputedExpressionString::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

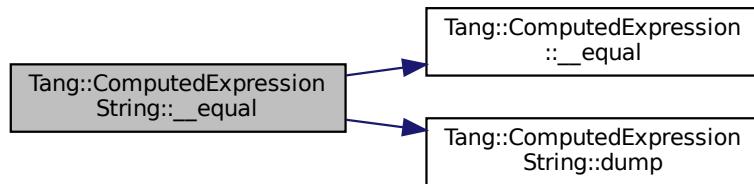
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.41.3.7 __float()**

[GarbageCollected](#) `ComputedExpression::__float () const [virtual], [inherited]`

Perform a type cast to float.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.41.3.8 __getIterator()

[GarbageCollected](#) `ComputedExpressionString::__getIterator (const GarbageCollected & collection) const [override], [virtual]`

Get an iterator for the expression.

Parameters

<i>collection</i>	The GarbageCollected value that will serve as the collection through which to iterate.
-------------------	--

Reimplemented from [Tang::ComputedExpression](#).

5.41.3.9 __index()

```
GarbageCollected ComputedExpressionString::__index (
    const GarbageCollected & index ) const [override], [virtual]
```

Perform an index operation.

Parameters

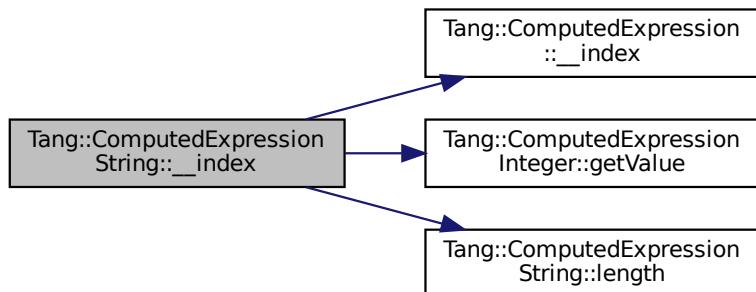
<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.41.3.10 __integer()**

```
GarbageCollected ComputedExpression::__integer () const [virtual], [inherited]
```

Perform a type cast to integer.

Returns

The result of the the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), and [Tang::ComputedExpressionBoolean](#).

5.41.3.11 __iteratorNext()

```
GarbageCollected ComputedExpressionString::__iteratorNext (
    size_t index ) const [override], [virtual]
```

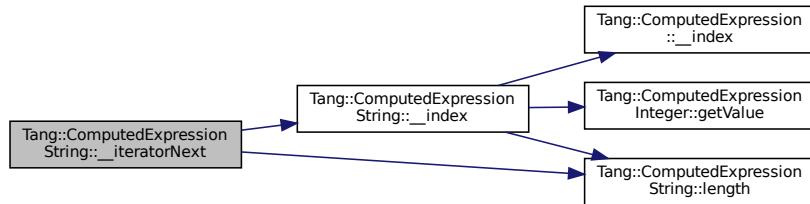
Get the next iterative value.

Parameters

<i>index</i>	The desired index value.
--------------	--------------------------

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.41.3.12 __lessThan()**

```
GarbageCollected ComputedExpressionString::__lessThan (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Compute the "less than" comparison.

Parameters

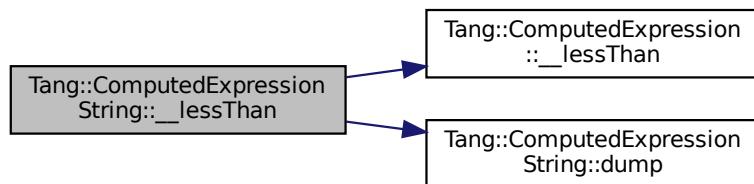
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.41.3.13 __modulo()**

```
GarbageCollected ComputedExpression::__modulo (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of moduloing this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	--

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionError](#).

5.41.3.14 __multiply()

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of multiplying this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to multiply to this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.41.3.15 __negative()

[GarbageCollected](#) `ComputedExpression::__negative () const [virtual], [inherited]`

Compute the result of negating this value.

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.41.3.16 __not()

[GarbageCollected](#) `ComputedExpressionString::__not () const [override], [virtual]`

Compute the logical not of this value.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.41.3.17 __period()**

[GarbageCollected](#) `ComputedExpression::__period (`
`const GarbageCollected & member,`
`std::shared_ptr< TangBase > & tang) const [virtual], [inherited]`

Perform a member access (period) operation.

Parameters

<i>member</i>	The member expression provided by the script.
---------------	---

Returns

The result of the operation.

5.41.3.18 `__slice()`

```
GarbageCollected ComputedExpressionString::__slice (
    const GarbageCollected & begin,
    const GarbageCollected & end,
    const GarbageCollected & skip ) const [override], [virtual]
```

Perform a slice operation.

Convention will follow Python semantics, in which a slice will start at the provided index position, and go up to but not including the end index. The slice will default to an index increment of 1, but can be defined as another integer value.

Parameters

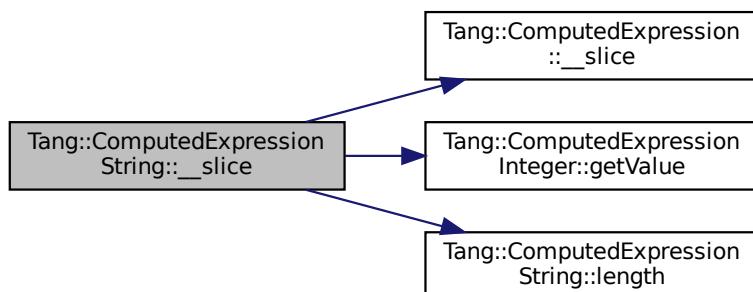
<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:



5.41.3.19 `__string()`

```
GarbageCollected ComputedExpressionString::__string ( ) const [override], [virtual]
```

Perform a type cast to string.

Returns

The result of the the operation.

Reimplemented from [Tang::ComputedExpression](#).

5.41.3.20 `__subtract()`

```
GarbageCollected ComputedExpression::__subtract (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

Compute the result of subtracting this value and the supplied value.

Parameters

<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

Returns

The result of the operation.

Reimplemented in [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), and [Tang::ComputedExpressionError](#).

5.41.3.21 `bytesLength()`

```
size_t ComputedExpressionString::bytesLength ( ) const
```

Return the number of bytes required by the string, stored as UTF-8.

Returns

The number of bytes required by the string, stored as UTF-8.

5.41.3.22 dump()

```
string ComputedExpressionString::dump ( ) const [override], [virtual]
```

Output the contents of the [ComputedExpression](#) as a string.

Returns

A string representation of the computed expression.

Reimplemented from [Tang::ComputedExpression](#).

5.41.3.23 getMethods()

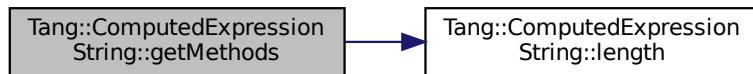
```
NativeBoundFunctionMap ComputedExpressionString::getMethods ( ) [static]
```

Return the member functions implemented for this particular expression type.

Returns

The member functions implemented.

Here is the call graph for this function:



5.41.3.24 getValue()

```
const vector< UnicodeString > & ComputedExpressionString::getValue ( ) const
```

Return the collection of string values that are stored in this object.

Returns

The collection of string values.

5.41.3.25 is_equal() [1/6]

```
bool ComputedExpressionString::is_equal (
    const bool & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

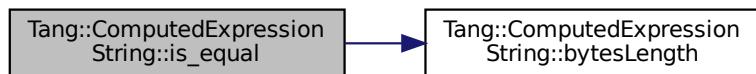
<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.41.3.26 is_equal() [2/6]**

```
virtual bool Tang::ComputedExpression::is_equal (
    const Error & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionError](#).

5.41.3.27 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const std::nullptr_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

5.41.3.28 `is_equal()` [4/6]

```
bool ComputedExpressionString::is_equal (
    const string & val ) const [override], [virtual]
```

Check whether or not the computed expression is equal to another value.

Parameters

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented from [Tang::ComputedExpression](#).

Here is the call graph for this function:

**5.41.3.29 `is_equal()` [5/6]**

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::float_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.41.3.30 is_equal() [6/6]

```
virtual bool Tang::ComputedExpression::is_equal (
    const Tang::integer_t & val ) const [virtual], [inherited]
```

Check whether or not the computed expression is equal to another value.

Parameters

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

Reimplemented in [Tang::ComputedExpressionInteger](#), and [Tang::ComputedExpressionFloat](#).

5.41.3.31 isCopyNeeded()

```
bool ComputedExpression::isCopyNeeded ( ) const [virtual], [inherited]
```

Determine whether or not a copy is needed.

Copying is only required for ComputedExpressions which serve as containers, such as [ComputedExpressionArray](#) and [ComputedExpressionObject](#).

Returns

Whether or not a copy is needed.

Reimplemented in [Tang::ComputedExpressionMap](#), and [Tang::ComputedExpressionArray](#).

5.41.3.32 length()

```
size_t ComputedExpressionString::length ( ) const
```

Return the number of graphemes contained in the string.

Returns

The number of graphemes contained in the string.

5.41.3.33 makeCopy()

```
GarbageCollected ComputedExpressionString::makeCopy ( ) const [override], [virtual]
```

Make a copy of the [ComputedExpression](#) (recursively, if appropriate).

Returns

A [Tang::GarbageCollected](#) value for the new [ComputedExpression](#).

Reimplemented from [Tang::ComputedExpression](#).

5.41.3.34 operator+=()

```
ComputedExpressionString & ComputedExpressionString::operator+= ( const ComputedExpressionString & rhs )
```

Helper function to copy the contents of the rhs string into the current string.

Parameters

<i>rhs</i>	The right hand side of the operation.
------------	---------------------------------------

Returns

The result of the operation.

The documentation for this class was generated from the following files:

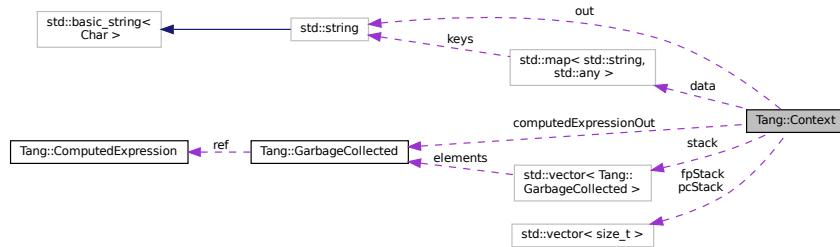
- [include/computedExpressionString.hpp](#)
- [src/computedExpressionString.cpp](#)

5.42 Tang::Context Class Reference

Holds all environment variables specific to the execution of a program.

```
#include <context.hpp>
```

Collaboration diagram for Tang::Context:



Public Member Functions

- [Context \(\)](#)

Default constructor.

Public Attributes

- std::map< std::string, std::any > [data](#)
Holds arbitrary data for use in the program execution.
- std::string [out](#)
The output result from the program execution.
- [GarbageCollected computedExpressionOut](#)
The output result from the program execution, as a ComputedExpressionString.
- std::optional< [GarbageCollected](#) > [result](#)
The result of the Program execution.
- size_t [pc](#) {0}
The program counter of the current instruction.
- size_t [fp](#) {0}
The frame pointer (an index into the stack frame).
- vector< [GarbageCollected](#) > [stack](#)
The execution stack.
- vector< size_t > [pcStack](#) {}
The stack of program counters used to recover the previous pc when returning from a function.
- vector< size_t > [fpStack](#) {}
The stack of frame pointers, used to recover the previous fp when returning from a function.

5.42.1 Detailed Description

Holds all environment variables specific to the execution of a program.

The documentation for this class was generated from the following files:

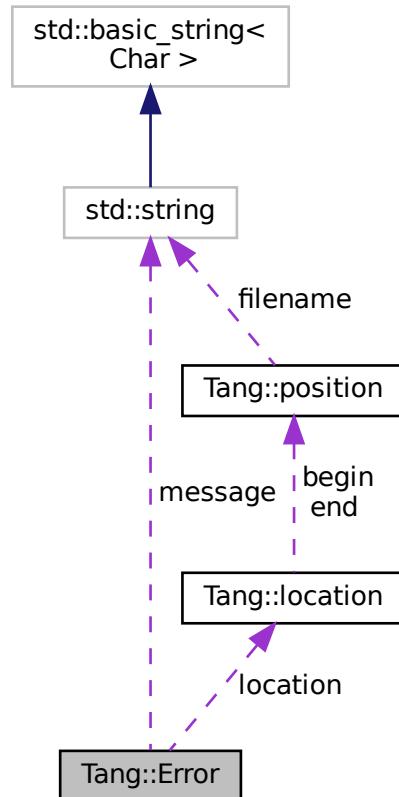
- include/context.hpp
- src/context.cpp

5.43 Tang::Error Class Reference

The [Error](#) class is used to report any error of the system, whether a syntax (parsing) error or a runtime (execution) error.

```
#include <error.hpp>
```

Collaboration diagram for Tang::Error:



Public Member Functions

- `Error ()`
Creates an empty error message.
- `Error (std::string message)`
Creates an error message using the supplied error string and location.
- `Error (std::string message, Tang::location location)`
Creates an error message using the supplied error string and location.

Public Attributes

- `std::string message`
The error message as a string.
- `Tang::location location`
The location of the error.

Friends

- `std::ostream & operator<< (std::ostream &out, const Error &error)`
Add friendly output.

5.43.1 Detailed Description

The `Error` class is used to report any error of the system, whether a syntax (parsing) error or a runtime (execution) error.

5.43.2 Constructor & Destructor Documentation

5.43.2.1 Error() [1/2]

```
Tang::Error::Error (
    std::string message ) [inline]
```

Creates an error message using the supplied error string and location.

Parameters

<code>message</code>	The error message as a string.
----------------------	--------------------------------

5.43.2.2 Error() [2/2]

```
Tang::Error::Error (
```

```
    std::string message,
    Tang::location location ) [inline]
```

Creates an error message using the supplied error string and location.

Parameters

<i>message</i>	The error message as a string.
<i>location</i>	The location of the error.

5.43.3 Friends And Related Function Documentation

5.43.3.1 operator<<

```
std::ostream& operator<< (
    std::ostream & out,
    const Error & error ) [friend]
```

Add friendly output.

Parameters

<i>out</i>	The output stream.
<i>error</i>	The Error object.

Returns

The output stream.

The documentation for this class was generated from the following files:

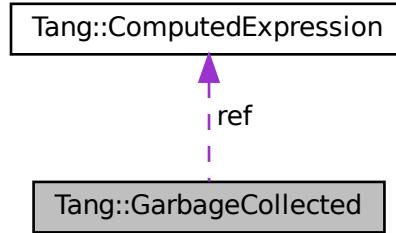
- [include/error.hpp](#)
- [src/error.cpp](#)

5.44 Tang::GarbageCollected Class Reference

A container that acts as a resource-counting garbage collector for the specified type.

```
#include <garbageCollected.hpp>
```

Collaboration diagram for Tang::GarbageCollected:



Public Member Functions

- `GarbageCollected (const GarbageCollected &other)`
Copy Constructor.
- `GarbageCollected (GarbageCollected &&other)`
Move Constructor.
- `GarbageCollected & operator= (const GarbageCollected &other)`
Copy Assignment.
- `GarbageCollected & operator= (GarbageCollected &&other)`
Move Assignment.
- `~GarbageCollected ()`
Destructor.
- `bool isCopyNeeded () const`
Determine whether or not a copy is needed as determined by the referenced `ComputedExpression`.
- `GarbageCollected makeCopy () const`
Create a separate copy of the original `GarbageCollected` value.
- `ComputedExpression * operator-> () const`
Access the tracked object as a pointer.
- `ComputedExpression & operator* () const`
Access the tracked object.
- `bool operator== (const Tang::integer_t &val) const`
Compare the `GarbageCollected` tracked object with a supplied value.
- `bool operator== (const Tang::float_t &val) const`
Compare the `GarbageCollected` tracked object with a supplied value.
- `bool operator== (const bool &val) const`
Compare the `GarbageCollected` tracked object with a supplied value.
- `bool operator== (const std::string &val) const`
Compare the `GarbageCollected` tracked object with a supplied value.
- `bool operator== (const char *const &val) const`
Compare the `GarbageCollected` tracked object with a supplied value.
- `bool operator== (const Error &val) const`
Compare the `GarbageCollected` tracked object with a supplied value.
- `bool operator== (const std::nullptr_t &null) const`
Compare the `GarbageCollected` tracked object with a supplied value.

- `GarbageCollected operator+ (const GarbageCollected &rhs) const`
Perform an addition between two `GarbageCollected` values.
- `GarbageCollected operator- (const GarbageCollected &rhs) const`
Perform a subtraction between two `GarbageCollected` values.
- `GarbageCollected operator* (const GarbageCollected &rhs) const`
Perform a multiplication between two `GarbageCollected` values.
- `GarbageCollected operator/ (const GarbageCollected &rhs) const`
Perform a division between two `GarbageCollected` values.
- `GarbageCollected operator% (const GarbageCollected &rhs) const`
Perform a modulo between two `GarbageCollected` values.
- `GarbageCollected operator- () const`
Perform a negation on the `GarbageCollected` value.
- `GarbageCollected operator! () const`
Perform a logical not on the `GarbageCollected` value.
- `GarbageCollected operator< (const GarbageCollected &rhs) const`
Perform a < between two `GarbageCollected` values.
- `GarbageCollected operator<= (const GarbageCollected &rhs) const`
Perform a <= between two `GarbageCollected` values.
- `GarbageCollected operator> (const GarbageCollected &rhs) const`
Perform a > between two `GarbageCollected` values.
- `GarbageCollected operator>= (const GarbageCollected &rhs) const`
Perform a >= between two `GarbageCollected` values.
- `GarbageCollected operator== (const GarbageCollected &rhs) const`
Perform a == between two `GarbageCollected` values.
- `GarbageCollected operator!= (const GarbageCollected &rhs) const`
Perform a != between two `GarbageCollected` values.

Static Public Member Functions

- `template<class T , typename... Args>`
`static GarbageCollected make (Args... args)`
Creates a garbage-collected object of the specified type.

Protected Member Functions

- `GarbageCollected ()`
Constructs a garbage-collected object of the specified type.

Protected Attributes

- `size_t * count`
The count of references to the tracked object.
- `ComputedExpression * ref`
A reference to the tracked object.
- `std::function< void(void)> recycle`
A cleanup function to recycle the object.

Friends

- std::ostream & `operator<<` (std::ostream &out, const `GarbageCollected` &gc)
Add friendly output.

5.44.1 Detailed Description

A container that acts as a resource-counting garbage collector for the specified type.

Uses the `SingletonObjectPool` to created and recycle object memory. The container is not thread-safe.

5.44.2 Constructor & Destructor Documentation

5.44.2.1 GarbageCollected() [1/3]

```
GarbageCollected::GarbageCollected (
    const GarbageCollected & other )
```

Copy Constructor.

Parameters

<i>The</i>	other <code>GarbageCollected</code> object to copy.
------------	---

5.44.2.2 GarbageCollected() [2/3]

```
GarbageCollected::GarbageCollected (
    GarbageCollected && other )
```

Move Constructor.

Parameters

<i>The</i>	other <code>GarbageCollected</code> object to move.
------------	---

5.44.2.3 ~GarbageCollected()

```
GarbageCollected::~GarbageCollected ( )
```

Destructor.

Clean up the tracked object, if appropriate.

5.44.2.4 GarbageCollected() [3/3]

```
Tang::GarbageCollected::GarbageCollected ( ) [inline], [protected]
```

Constructs a garbage-collected object of the specified type.

It is private so that a [GarbageCollected](#) object can only be created using the [GarbageCollected::make\(\)](#) function.

Parameters

<i>variable</i>	The arguments to pass to the constructor of the specified type.
-----------------	---

5.44.3 Member Function Documentation

5.44.3.1 isCopyNeeded()

```
bool GarbageCollected::isCopyNeeded ( ) const
```

Determine whether or not a copy is needed as determined by the referenced [ComputedExpression](#).

Returns

Whether or not a copy is needed.

5.44.3.2 make()

```
template<class T , typename... Args>
static GarbageCollected Tang::GarbageCollected::make (
    Args... args ) [inline], [static]
```

Creates a garbage-collected object of the specified type.

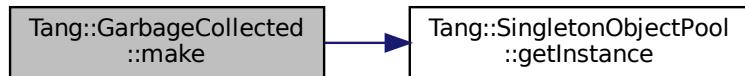
Parameters

<i>variable</i>	The arguments to pass to the constructor of the specified type.
-----------------	---

Returns

A [GarbageCollected](#) object.

Here is the call graph for this function:



5.44.3.3 makeCopy()

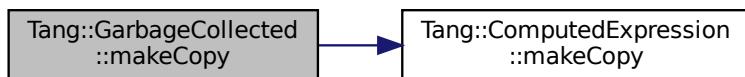
```
GarbageCollected GarbageCollected::makeCopy() const
```

Create a separate copy of the original [GarbageCollected](#) value.

Returns

A [GarbageCollected](#) copy of the original value.

Here is the call graph for this function:



5.44.3.4 operator"!"()

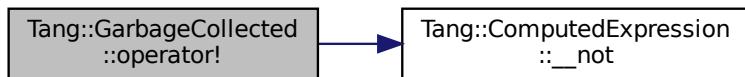
```
GarbageCollected GarbageCollected::operator!() const
```

Perform a logical not on the [GarbageCollected](#) value.

Returns

The result of the operation.

Here is the call graph for this function:

**5.44.3.5 operator"!=()**

```
GarbageCollected GarbageCollected::operator!= (
    const GarbageCollected & rhs ) const
```

Perform a != between two [GarbageCollected](#) values.

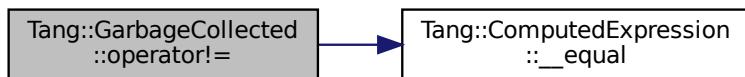
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.44.3.6 operator%()**

```
GarbageCollected GarbageCollected::operator% (
    const GarbageCollected & rhs ) const
```

Perform a modulo between two [GarbageCollected](#) values.

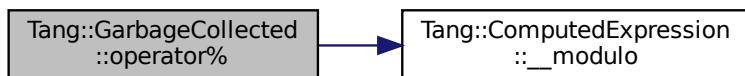
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.44.3.7 operator*() [1/2]**

```
ComputedExpression & GarbageCollected::operator* ( ) const
```

Access the tracked object.

Returns

A reference to the tracked object.

5.44.3.8 operator*() [2/2]

```
GarbageCollected GarbageCollected::operator* (
    const GarbageCollected & rhs ) const
```

Perform a multiplication between two `GarbageCollected` values.

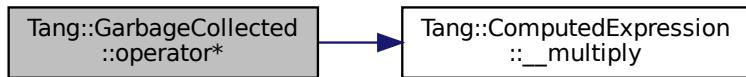
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.44.3.9 operator+()

```
GarbageCollected GarbageCollected::operator+ (
    const GarbageCollected & rhs ) const
```

Perform an addition between two `GarbageCollected` values.

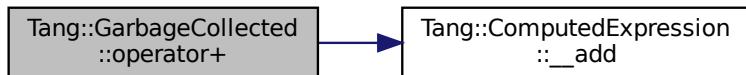
Parameters

<code>rhs</code>	The right hand side operand.
------------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.44.3.10 operator-() [1/2]

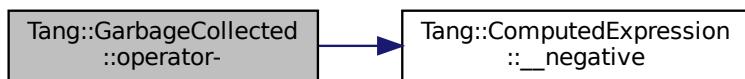
```
GarbageCollected GarbageCollected::operator- ( ) const
```

Perform a negation on the `GarbageCollected` value.

Returns

The result of the operation.

Here is the call graph for this function:

**5.44.3.11 operator-() [2/2]**

```
GarbageCollected GarbageCollected::operator- (
    const GarbageCollected & rhs ) const
```

Perform a subtraction between two `GarbageCollected` values.

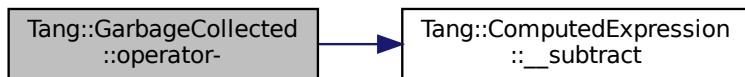
Parameters

<code>rhs</code>	The right hand side operand.
------------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.44.3.12 operator->()**

```
ComputedExpression * GarbageCollected::operator-> ( ) const
```

Access the tracked object as a pointer.

Returns

A pointer to the tracked object.

5.44.3.13 operator/()

```
GarbageCollected GarbageCollected::operator/ (
    const GarbageCollected & rhs ) const
```

Perform a division between two **GarbageCollected** values.

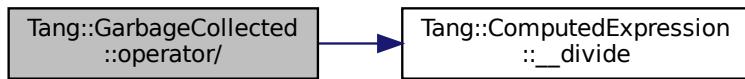
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.44.3.14 operator<()**

```
GarbageCollected GarbageCollected::operator< (
    const GarbageCollected & rhs ) const
```

Perform a < between two **GarbageCollected** values.

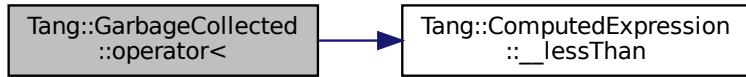
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.44.3.15 operator<=()

```
GarbageCollected GarbageCollected::operator<= (
    const GarbageCollected & rhs ) const
```

Perform a \leq between two `GarbageCollected` values.

Parameters

<code>rhs</code>	The right hand side operand.
------------------	------------------------------

Returns

The result of the operation.

5.44.3.16 operator=() [1/2]

```
GarbageCollected & GarbageCollected::operator= (
    const GarbageCollected & other )
```

Copy Assignment.

Parameters

<code>The</code>	other <code>GarbageCollected</code> object.
------------------	---

5.44.3.17 operator=() [2/2]

```
GarbageCollected & GarbageCollected::operator= (
    GarbageCollected && other )
```

Move Assignment.

Parameters

<i>The</i>	other GarbageCollected object.
------------	--

5.44.3.18 operator==(1/8)

```
bool GarbageCollected::operator== (
    const bool & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<i>val</i>	The value to compare the tracked object against.
------------	--

Returns

True if they are equal, false otherwise.

5.44.3.19 operator==(2/8)

```
bool GarbageCollected::operator== (
    const char *const & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<i>val</i>	The value to compare the tracked object against.
------------	--

Returns

True if they are equal, false otherwise.

5.44.3.20 operator==(3/8)

```
bool GarbageCollected::operator== (
    const Error & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<i>val</i>	The value to compare the tracked object against.
------------	--

Returns

True if they are equal, false otherwise.

5.44.3.21 operator==() [4/8]

```
GarbageCollected GarbageCollected::operator== (
    const GarbageCollected & rhs ) const
```

Perform a == between two [GarbageCollected](#) values.

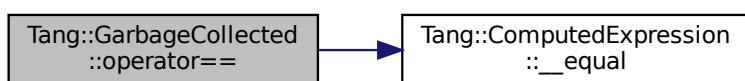
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.44.3.22 operator==() [5/8]**

```
bool GarbageCollected::operator== (
    const std::nullptr_t & null ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<i>val</i>	The value to compare the tracked object against.
------------	--

Returns

True if they are equal, false otherwise.

5.44.3.23 operator==() [6/8]

```
bool GarbageCollected::operator== (
    const std::string & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<i>val</i>	The value to compare the tracked object against.
------------	--

Returns

True if they are equal, false otherwise.

5.44.3.24 operator==() [7/8]

```
bool GarbageCollected::operator== (
    const Tang::float_t & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<i>val</i>	The value to compare the tracked object against.
------------	--

Returns

True if they are equal, false otherwise.

5.44.3.25 operator==() [8/8]

```
bool GarbageCollected::operator== (
    const Tang::integer_t & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

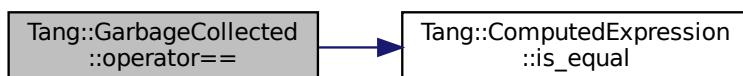
Parameters

<i>val</i>	The value to compare the tracked object against.
------------	--

Returns

True if they are equal, false otherwise.

Here is the call graph for this function:

**5.44.3.26 operator>()**

```
GarbageCollected GarbageCollected::operator> (
    const GarbageCollected & rhs ) const
```

Perform a $>$ between two `GarbageCollected` values.

Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

5.44.3.27 operator>=()

```
GarbageCollected GarbageCollected::operator>= (
    const GarbageCollected & rhs ) const
```

Perform a \geq between two `GarbageCollected` values.

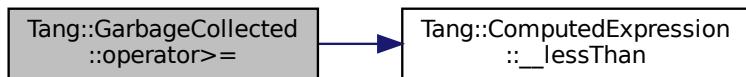
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.44.4 Friends And Related Function Documentation

5.44.4.1 operator<<

```
std::ostream& operator<< (
    std::ostream & out,
    const GarbageCollected & gc ) [friend]
```

Add friendly output.

Parameters

<i>out</i>	The output stream.
<i>gc</i>	The GarbageCollected value.

Returns

The output stream.

The documentation for this class was generated from the following files:

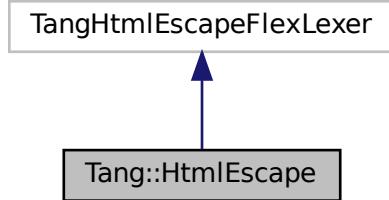
- [include/garbageCollected.hpp](#)
- [src/garbageCollected.cpp](#)

5.45 Tang::HtmlEscape Class Reference

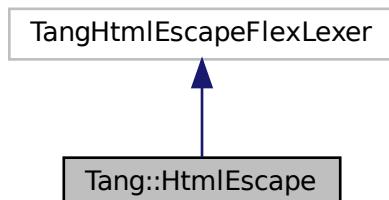
The Flex lexer class for the main Tang language.

```
#include <htmlEscape.hpp>
```

Inheritance diagram for Tang::HtmlEscape:



Collaboration diagram for Tang::HtmlEscape:



Public Member Functions

- [HtmlEscape](#) (std::istream &arg_yyin, std::ostream &arg_yyout)
The constructor for the Scanner.
- virtual std::string [get_next_token](#) ()
Extract the next token from the input string.

5.45.1 Detailed Description

The Flex lexer class for the main Tang language.

Flex requires that our lexer class inherit from yyFlexLexer, an "intermediate" class whose real name is "TangTangFlexLexer". We are subclassing it so that we can override the return type of [get_next_token\(\)](#), for compatibility with Bison 3 tokens.

5.45.2 Constructor & Destructor Documentation

5.45.2.1 HtmlEscape()

```
Tang::HtmlEscape::HtmlEscape (
    std::istream & arg_yyin,
    std::ostream & arg_yyout ) [inline]
```

The constructor for the Scanner.

The design of the Flex lexer is to tokenize the contents of an input stream, and to write any error messages to an output stream. In our implementation, however, errors are returned differently, so the output stream is never used. Its presence is retained, however, in case it is needed in the future.

For now, the general approach should be to supply the input as a string stream, and to use `std::cout` as the output.

Parameters

<i>arg_yyin</i>	The input stream to be tokenized
<i>arg_yyout</i>	The output stream (not currently used)

5.45.3 Member Function Documentation

5.45.3.1 get_next_token()

```
virtual std::string Tang::HtmlEscape::get_next_token ( ) [virtual]
```

Extract the next token from the input string.

Returns

The next unescaped character.

The documentation for this class was generated from the following file:

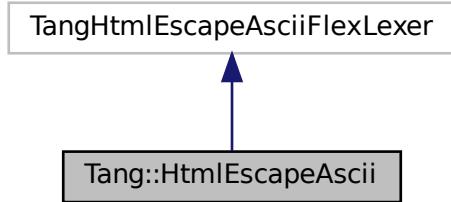
- [include/htmlEscape.hpp](#)

5.46 Tang::HtmlEscapeAscii Class Reference

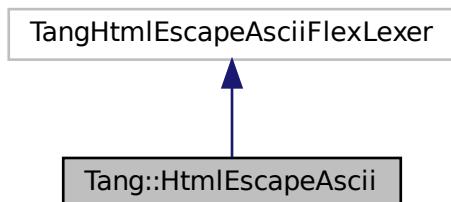
The Flex lexer class for the main Tang language.

```
#include <htmlEscapeAscii.hpp>
```

Inheritance diagram for Tang::HtmlEscapeAscii:



Collaboration diagram for Tang::HtmlEscapeAscii:



Public Member Functions

- [HtmlEscapeAscii](#) (std::istream &arg_yyin, std::ostream &arg_yyout, [UnicodeString::Type](#) type)
The constructor for the Scanner.
- virtual std::string [get_next_token](#) ()
Extract the next token from the input string.

Private Attributes

- [UnicodeString::Type](#) type
The type of string that is being escaped.

5.46.1 Detailed Description

The Flex lexer class for the main Tang language.

Flex requires that our lexer class inherit from yyFlexLexer, an "intermediate" class whose real name is "TangTang←FlexLexer". We are subclassing it so that we can override the return type of [get_next_token\(\)](#), for compatibility with Bison 3 tokens.

5.46.2 Constructor & Destructor Documentation

5.46.2.1 HtmlEscapeAscii()

```
Tang::HtmlEscapeAscii::HtmlEscapeAscii (
    std::istream & arg_yyin,
    std::ostream & arg_yyout,
    UnicodeString::Type type ) [inline]
```

The constructor for the Scanner.

The design of the Flex lexer is to tokenize the contents of an input stream, and to write any error messages to an output stream. In our implementation, however, errors are returned differently, so the output stream is never used. Its presence is retained, however, in case it is needed in the future.

For now, the general approach should be to supply the input as a string stream, and to use `std::cout` as the output.

Parameters

<code>arg_yyin</code>	The input stream to be tokenized
<code>arg_yyout</code>	The output stream (not currently used)

5.46.3 Member Function Documentation

5.46.3.1 get_next_token()

```
virtual std::string Tang::HtmlEscapeAscii::get_next_token () [virtual]
```

Extract the next token from the input string.

Returns

The next unescaped character.

The documentation for this class was generated from the following file:

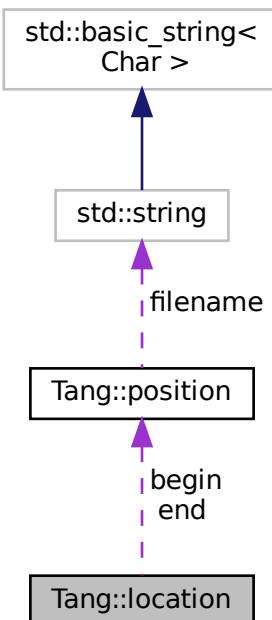
- [include/htmlEscapeAscii.hpp](#)

5.47 Tang::location Class Reference

Two points in a source file.

```
#include <location.hh>
```

Collaboration diagram for Tang::location:



Public Types

- **typedef position::filename_type filename_type**
Type for file name.
- **typedef position::counter_type counter_type**
Type for line and column numbers.

Public Member Functions

- **location (const position &b, const position &e)**
Construct a location from b to e.
- **location (const position &p=position())**
Construct a 0-width location in p.
- **location (filename_type *f, counter_type l=1, counter_type c=1)**
Construct a 0-width location in f, l, c.
- **void initialize (filename_type *f=((void *) 0), counter_type l=1, counter_type c=1)**
Initialization.

Line and Column related manipulators

- void [step \(\)](#)
Reset initial location to final location.
- void [columns \(counter_type count=1\)](#)
Extend the current location to the COUNT next columns.
- void [lines \(counter_type count=1\)](#)
Extend the current location to the COUNT next lines.

Public Attributes

- [position begin](#)
Beginning of the located region.
- [position end](#)
End of the located region.

5.47.1 Detailed Description

Two points in a source file.

The documentation for this class was generated from the following file:

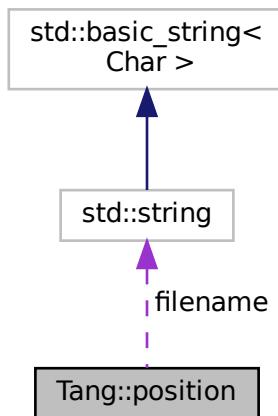
- build/generated/[location.hh](#)

5.48 Tang::position Class Reference

A point in a source file.

```
#include <location.hh>
```

Collaboration diagram for Tang::position:



Public Types

- `typedef const std::string filename_type`
Type for file name.
- `typedef int counter_type`
Type for line and column numbers.

Public Member Functions

- `position (filename_type *f=((void *) 0), counter_type l=1, counter_type c=1)`
Construct a position.
- `void initialize (filename_type *fn=((void *) 0), counter_type l=1, counter_type c=1)`
Initialization.

Line and Column related manipulators

- `void lines (counter_type count=1)`
(line related) Advance to the COUNT next lines.
- `void columns (counter_type count=1)`
(column related) Advance to the COUNT next columns.

Public Attributes

- `filename_type * filename`
File name to which this position refers.
- `counter_type line`
Current line number.
- `counter_type column`
Current column number.

Static Private Member Functions

- `static counter_type add_ (counter_type lhs, counter_type rhs, counter_type min)`
Compute max (min, lhs+rhs).

5.48.1 Detailed Description

A point in a source file.

The documentation for this class was generated from the following file:

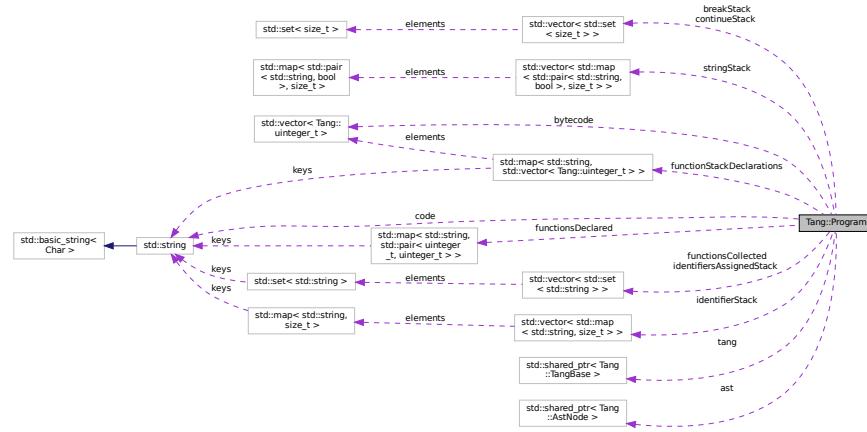
- build/generated/location.hh

5.49 Tang::Program Class Reference

Represents a compiled script or template that may be executed.

```
#include <program.hpp>
```

Collaboration diagram for Tang::Program:



Public Types

- enum [CodeType](#) { [Script](#) , [Template](#) }
- Indicate the type of code that was supplied to the [Program](#).*

Public Member Functions

- [Program](#) ([std::string](#) [code](#), [CodeType](#) [codeType](#), [std::shared_ptr< Tang::LangBase >](#) [tang](#))
Create a compiled program using the provided code.
- [std::string](#) [getCode](#) () const
Get the code that was provided when the [Program](#) was created.
- [std::optional< const std::shared_ptr< AstNode > >](#) [getAst](#) () const
Get the AST that was generated by the parser.
- [std::string](#) [dumpBytecode](#) () const
Get the OpCodes of the compiled program, formatted like Assembly.
- [std::optional< const GarbageCollected >](#) [getResult](#) () const
Get the result of the [Program](#) execution, if it exists.
- [size_t](#) [addBytecode](#) ([Tang::uinteger_t](#))
Add a [Tang::uinteger_t](#) to the Bytecode.
- const [Bytecode](#) & [getBytecode](#) ()
Get the Bytecode vector.
- [Context](#) [execute](#) ()
Execute the program's Bytecode, and return the execution [Context](#).
- bool [setJumpTarget](#) ([size_t](#) [opcodeAddress](#), [Tang::uinteger_t](#) [jumpTarget](#))
Set the target address of a Jump opcode.
- bool [setFunctionStackDeclaration](#) ([size_t](#) [opcodeAddress](#), [uinteger_t](#) [argc](#), [uinteger_t](#) [targetPC](#))

- Set the stack details of a function declaration.*
- void **pushEnvironment** (const std::shared_ptr< AstNode > &**ast**)
Create a new compile/execute environment stack entry.
 - void **popEnvironment** ()
Remove a compile/execute environment stack entry.
 - void **addIdentifier** (const std::string &**name**, std::optional< size_t > **position**={})
Add an identifier to the environment.
 - const std::map< std::string, size_t > & **getIdentifiers** () const
Get the identifier map of the current environment.
 - void **addIdentifierAssigned** (const std::string &**name**)
Indicate that an identifier will be altered within the associated scope.
 - const std::set< std::string > & **getIdentifiersAssigned** () const
Get the set of identifiers that will be assigned in the current scope.
 - void **addString** (const std::string &**name**, bool **isTrusted**)
Add a string to the environment.
 - const std::map< std::pair< std::string, bool >, size_t > & **getStrings** () const
Get the string map of the current environment.
 - void **pushBreakStack** ()
Increase the break environment stack, so that we can handle nested break-supporting structures.
 - void **addBreak** (size_t **location**)
Add the Bytecode location of a break statement, to be set when the final target is known at a later time.
 - void **popBreakStack** (size_t **target**)
For all continue bytecode locations collected by Tang::addContinue, set the target pc to target.
 - void **pushContinueStack** ()
Increase the continue environment stack, so that we can handle nested continue-supporting structures.
 - void **addContinue** (size_t **location**)
Add the Bytecode location of a continue statement, to be set when the final target is known at a later time.
 - void **popContinueStack** (size_t **target**)
For all continue bytecode locations collected by Tang::addContinue, set the target pc to target.

Public Attributes

- std::vector< std::set< std::string > > **functionsCollected**
Names of the functions that are declared in a previous or the current scope.
- std::map< std::string, std::pair< uinteger_t, uinteger_t > > **functionsDeclared**
Key/value pair of the function declaration information.
- std::map< std::string, std::vector< Tang::uinteger_t > > **functionStackDeclarations**
For each function name, a list of Bytecode addresses that need to be replaced by a function definition.

Private Member Functions

- void **parse** ()
Parse the code into an AST.
- void **compile** ()
Compile the AST into Bytecode.

Private Attributes

- std::shared_ptr< [Tang::TangBase](#) > **tang**
A pointer to the base Tang class.
- std::vector< std::map< std::string, size_t > > **identifierStack**
Stack of mappings of identifiers to their stack locations.
- std::vector< std::set< std::string > > **identifiersAssignedStack**
Stack of sets of identifiers that are the target of an assignment statement within the associated scope.
- std::vector< std::map< std::pair< std::string, bool >, size_t > > **stringStack**
Stack of mappings of strings to their stack locations.
- std::vector< std::set< size_t > > **breakStack**
Stack of a collection of break statement locations.
- std::vector< std::set< size_t > > **continueStack**
Stack of a collection of continue statement locations.
- std::string **code**
The code supplied when the [Program](#) was instantiated.
- [CodeType](#) **codeType**
The type of code that was supplied when the [Program](#) was instantiated.
- shared_ptr< [AstNode](#) > **ast**
A pointer to the AST, if parsing was successful.
- [Bytecode](#) **bytecode**
The Bytecode of the compiled program.
- std::optional< [GarbageCollected](#) > **result**
The result of the [Program](#) compilation.

5.49.1 Detailed Description

Represents a compiled script or template that may be executed.

5.49.2 Member Enumeration Documentation

5.49.2.1 [CodeType](#)

```
enum Tang::Program::CodeType
```

Indicate the type of code that was supplied to the [Program](#).

Enumerator

Script	The code is pure Tang script, without any templating.
Template	The code is a template.

5.49.3 Constructor & Destructor Documentation

5.49.3.1 Program()

```
Program::Program (
    std::string code,
    Program::CodeType codeType,
    std::shared_ptr< Tang::TangBase > tang )
```

Create a compiled program using the provided code.

Parameters

<i>code</i>	The code to be compiled.
<i>codeType</i>	Whether the code is a Script or Template.
<i>tang</i>	A pointer to the base Tang class.

5.49.4 Member Function Documentation

5.49.4.1 addBreak()

```
void Program::addBreak (
    size_t location )
```

Add the Bytecode location of a `break` statement, to be set when the final target is known at a later time.

Parameters

<i>location</i>	The offset location of the <code>break</code> bytecode.
-----------------	---

5.49.4.2 addBytecode()

```
size_t Program::addBytecode (
    Tang::uinteger_t op )
```

Add a `Tang::uinteger_t` to the Bytecode.

Parameters

<i>op</i>	The value to add to the Bytecode.
-----------	-----------------------------------

Returns

The size of the bytecode structure.

5.49.4.3 addContinue()

```
void Program::addContinue (
    size_t location )
```

Add the Bytecode location of a `continue` statement, to be set when the final target is known at a later time.

Parameters

<i>location</i>	The offset location of the <code>continue</code> bytecode.
-----------------	--

5.49.4.4 addIdentifier()

```
void Program::addIdentifier (
    const std::string & name,
    std::optional< size_t > position = {} )
```

Add an identifier to the environment.

Parameters

<i>name</i>	The variable to add to the environment.
<i>position</i>	If provided, the desired position to place the identifier.

5.49.4.5 addIdentifierAssigned()

```
void Program::addIdentifierAssigned (
    const std::string & name )
```

Indicate that an identifier will be altered within the associated scope.

Parameters

<i>name</i>	The identifier name.
-------------	----------------------

5.49.4.6 addString()

```
void Program::addString (
    const std::string & name,
    bool isTrusted )
```

Add a string to the environment.

Parameters

<i>name</i>	The variable to add to the environment.
<i>isTrusted</i>	Whether or not the string is a trusted literal.

5.49.4.7 dumpBytecode()

```
string Program::dumpBytecode ( ) const
```

Get the Opcodes of the compiled program, formatted like Assembly.

Returns

A string containing the Opcode representation.

5.49.4.8 execute()

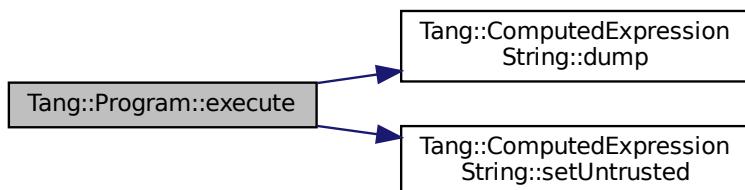
```
Context Program::execute ( )
```

Execute the program's Bytecode, and return the execution [Context](#).

Returns

The execution [Context](#).

Here is the call graph for this function:



5.49.4.9 `getAst()`

```
optional< const shared_ptr< AstNode > > Program::getAst ( ) const
```

Get the AST that was generated by the parser.

The parser may have failed, so the return is an `optional<>` type. If the compilation failed, check `Program::error`.

Returns

A pointer to the AST, if it exists.

5.49.4.10 `getBytecode()`

```
const Bytecode & Program::getBytecode ( )
```

Get the Bytecode vector.

Returns

The Bytecode vector.

5.49.4.11 `getCode()`

```
string Program::getCode ( ) const
```

Get the code that was provided when the `Program` was created.

Returns

The source code from which the `Program` was created.

5.49.4.12 `getIdentifiers()`

```
const map< string, size_t > & Program::getIdentifiers ( ) const
```

Get the identifier map of the current environment.

Returns

A map of each identifier name to its stack position within the current environment.

5.49.4.13 `getIdentifiersAssigned()`

```
const set< string > & Program::getIdentifiersAssigned ( ) const
```

Get the set of identifiers that will be assigned in the current scope.

Returns

A set of identifier names that have been identified as the target of an assignment operator within the current scope.

5.49.4.14 `getResult()`

```
optional< const GarbageCollected > Program::getResult ( ) const
```

Get the result of the [Program](#) execution, if it exists.

Returns

The result of the [Program](#) execution, if it exists.

5.49.4.15 `getStrings()`

```
const map< pair< string, bool >, size_t > & Program::getStrings ( ) const
```

Get the string map of the current environment.

Returns

A map of each identifier name to its stack position within the current environment.

5.49.4.16 `popBreakStack()`

```
void Program::popBreakStack (
    size_t target )
```

For all `continue` bytecode locations collected by `Tang::addContinue`, set the target pc to `target`.

Parameters

<code>target</code>	The target bytecode offset that the <code>continue</code> should jump to.
---------------------	---

Here is the call graph for this function:



5.49.4.17 popContinueStack()

```
void Program::popContinueStack (
    size_t target )
```

For all continue bytecode locations collected by Tang::addContinue, set the target pc to target.

Parameters

<i>target</i>	The target bytecode offset that the continue should jump to.
---------------	--

Here is the call graph for this function:



5.49.4.18 pushEnvironment()

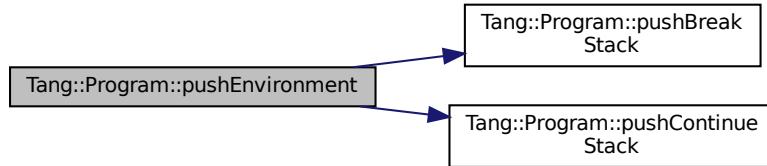
```
void Program::pushEnvironment (
    const std::shared_ptr< AstNode > & ast )
```

Create a new compile/execute environment stack entry.

Parameters

<i>ast</i>	The ast node from which this new environment will be formed.
------------	--

Here is the call graph for this function:



5.49.4.19 setFunctionStackDeclaration()

```
bool Program::setFunctionStackDeclaration (
    size_t opcodeAddress,
    uinteger_t argc,
    uinteger_t targetPC )
```

Set the stack details of a function declaration.

Parameters

<i>opcodeAddress</i>	The location of the FUNCTION opcode.
<i>argc</i>	The argument count to set.
<i>targetPC</i>	The bytecode address of the start of the function.

5.49.4.20 setJumpTarget()

```
bool Program::setJumpTarget (
    size_t opcodeAddress,
    Tang::uinteger_t jumpTarget )
```

Set the target address of a Jump opcode.

Parameters

<i>opcodeAddress</i>	The location of the jump statement.
<i>jumpTarget</i>	The address to jump to.

Returns

Whether or not the jumpTarget was set.

5.49.5 Member Data Documentation

5.49.5.1 functionsDeclared

```
std::map<std::string, std::pair<uinteger_t, uinteger_t> > Tang::Program::functionsDeclared
```

Key/value pair of the function declaration information.

The key is the name of the function. The value is a pair of the `argc` value and the `targetPC` value.

The documentation for this class was generated from the following files:

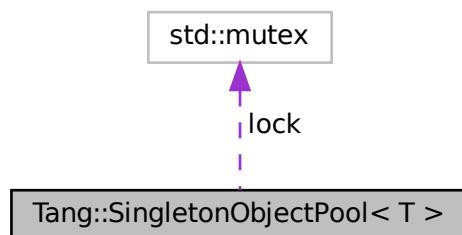
- [include/program.hpp](#)
- [src/program-dumpBytecode.cpp](#)
- [src/program-execute.cpp](#)
- [src/program.cpp](#)

5.50 Tang::SingletonObjectPool< T > Class Template Reference

A thread-safe, singleton object pool of the designated type.

```
#include <singletonObjectPool.hpp>
```

Collaboration diagram for Tang::SingletonObjectPool< T >:



Public Member Functions

- `T * get ()`
Request an uninitialized memory location from the pool for an object T.
- `void recycle (T *obj)`
Recycle a memory location for an object T.
- `~SingletonObjectPool ()`
Destructor.

Static Public Member Functions

- static `SingletonObjectPool< T > & getInstance ()`
Get the singleton instance of the object pool.

Private Member Functions

- `SingletonObjectPool ()`
The constructor, hidden from being directly called.
- `SingletonObjectPool (const SingletonObjectPool &other)`
The copy constructor, hidden from being called.

Private Attributes

- `T ** allocations`
C-array of allocated blocks, each block contains `GROW` objects.
- `int currentAllocation`
Index into `allocations`, representing the current block supplying non-recycled memory addresses.
- `size_t currentIndex`
Current location (within the most recently allocated block) of an available `T`.*
- `int currentRecycledAllocation`
Index into `allocations`, representing the current block tracking the recycled memory addresses.
- `int currentRecycledIndex`
Current location (within the `currentRecycledAllocation` block) of the last available `T`.*

Static Private Attributes

- static `std::mutex lock`
A mutex for thread-safety.

5.50.1 Detailed Description

```
template<class T>
class Tang::SingletonObjectPool< T >
```

A thread-safe, singleton object pool of the designated type.

5.50.2 Member Function Documentation

5.50.2.1 get()

```
template<class T >
T* Tang::SingletonObjectPool< T >::get ( ) [inline]
```

Request an uninitialized memory location from the pool for an object T.

Returns

An uninitialized memory location for an object T.

5.50.2.2 getInstance()

```
template<class T >
static SingletonObjectPool<T>& Tang::SingletonObjectPool< T >::getInstance ( ) [inline],
[static]
```

Get the singleton instance of the object pool.

Returns

The singleton instance of the object pool.

5.50.2.3 recycle()

```
template<class T >
void Tang::SingletonObjectPool< T >::recycle (
    T * obj ) [inline]
```

Recycle a memory location for an object T.

Parameters

<i>obj</i>	The memory location to recycle.
------------	---------------------------------

5.50.3 Member Data Documentation

5.50.3.1 currentIndex

```
template<class T >
size_t Tang::SingletonObjectPool< T >::currentIndex [private]
```

Current location (within the most recently allocated block) of an available T*.

If currentIndex == GROW, then a new block needs to be allocated.

5.50.3.2 currentRecycledIndex

```
template<class T >
int Tang::SingletonObjectPool< T >::currentRecycledIndex [private]
```

Current location (within the currentRecycledAllocation block) of the last available T*.

If currentRecycledIndex == GROW, then we must move to the next currentRecycledAllocation.

The documentation for this class was generated from the following file:

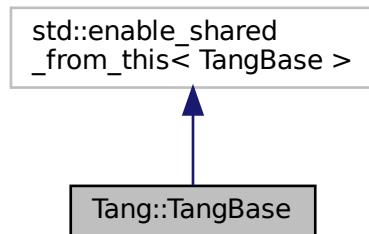
- [include/singletonObjectPool.hpp](#)

5.51 Tang::TangBase Class Reference

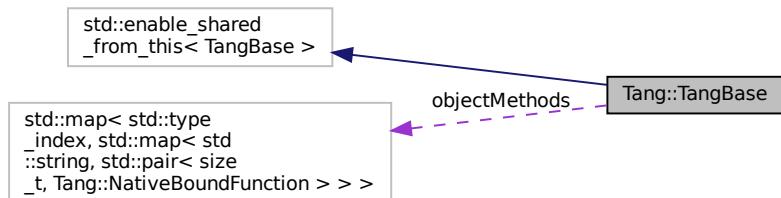
The base class for the Tang programming language.

```
#include <tangBase.hpp>
```

Inheritance diagram for Tang::TangBase:



Collaboration diagram for Tang::TangBase:



Public Member Functions

- **Program compileScript (std::string script)**
Compile the provided source code as a script and return a [Program](#).
- **TangBase ()**
The constructor.
- **std::map< std::type_index, std::map< std::string, std::pair< size_t, Tang::NativeBoundFunction > > > & getObjectMethods ()**
Get the object methods available to this instance of the base language object.

Static Public Member Functions

- **static std::shared_ptr< TangBase > make_shared ()**
Create an instance of Tang and return a reference to it as a shared pointer.

Private Attributes

- **std::map< std::type_index, std::map< std::string, std::pair< size_t, Tang::NativeBoundFunction > > > > objectMethods**
Store the available object methods.

5.51.1 Detailed Description

The base class for the Tang programming language.

This class is the fundamental starting point to compile and execute a Tang program. It may be considered in three parts:

1. It acts as an extendable interface through which additional "library" functions can be added to the language.
 It is intentionally designed that each instance of [TangBase](#) will have its own library functions.
2. It provides methods to compile scripts and templates, resulting in a [Program](#) object.
3. The [Program](#) object may then be executed, providing instance-specific context information (*i.e.*, state).

5.51.2 Constructor & Destructor Documentation

5.51.2.1 TangBase()

```
TangBase::TangBase ( )
```

The constructor.

This function should never be called directly. Rather, always use the [Tang::TangBase\(\)](#) static method, which supplies the shared pointer necessary for creation of [Program](#) objects. Here is the call graph for this function:



5.51.3 Member Function Documentation

5.51.3.1 compileScript()

```
Program TangBase::compileScript (
    std::string script )
```

Compile the provided source code as a script and return a [Program](#).

Parameters

<i>script</i>	The Tang script to be compiled.
---------------	---------------------------------

Returns

The [Program](#) object representing the compiled script.

5.51.3.2 make_shared()

```
shared_ptr< TangBase > TangBase::make_shared ( ) [static]
```

Create an instance of Tang and return a reference to it as a shared pointer.

Returns

A shared pointer to the base Tang object.

The documentation for this class was generated from the following files:

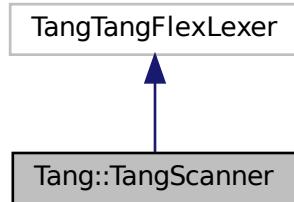
- [include/tangBase.hpp](#)
- [src/tangBase.cpp](#)

5.52 Tang::TangScanner Class Reference

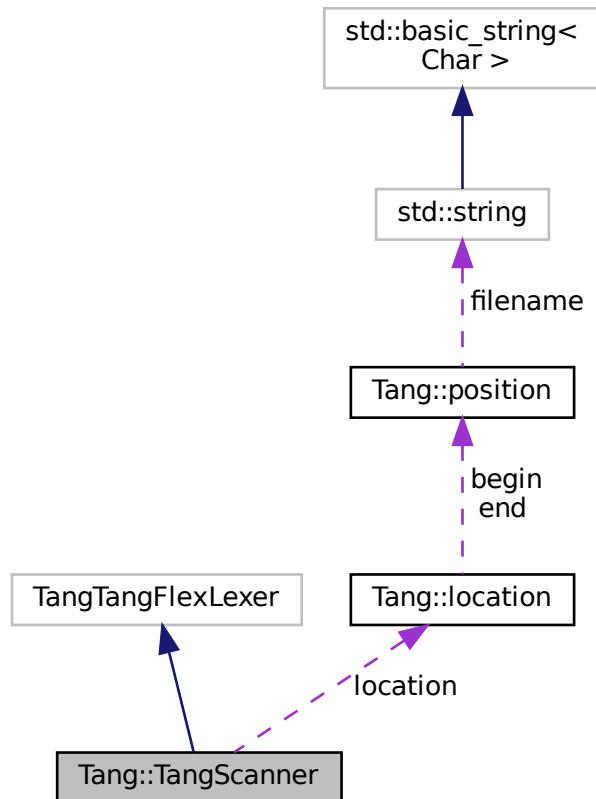
The Flex lexer class for the main Tang language.

```
#include <tangScanner.hpp>
```

Inheritance diagram for Tang::TangScanner:



Collaboration diagram for Tang::TangScanner:



Public Member Functions

- [TangScanner](#) (std::istream &arg_yyin, std::ostream &arg_yyout)

The constructor for the Scanner.

- virtual Tang::TangParser::symbol_type [get_next_token\(\)](#)

A pass-through function that we supply so that we can provide a Bison 3 token return type instead of the int that is returned by the default class configuration.

Private Attributes

- [Tang::location location](#)

The location information of the token that is identified.

5.52.1 Detailed Description

The Flex lexer class for the main Tang language.

Flex requires that our lexer class inherit from yyFlexLexer, an "intermediate" class whose real name is "TangTang ← FlexLexer". We are subclassing it so that we can override the return type of [get_next_token\(\)](#), for compatibility with Bison 3 tokens.

5.52.2 Constructor & Destructor Documentation

5.52.2.1 [TangScanner\(\)](#)

```
Tang::TangScanner::TangScanner (
    std::istream & arg_yyin,
    std::ostream & arg_yyout ) [inline]
```

The constructor for the Scanner.

The design of the Flex lexer is to tokenize the contents of an input stream, and to write any error messages to an output stream. In our implementation, however, errors are returned differently, so the output stream is never used. Its presence is retained, however, in case it is needed in the future.

For now, the general approach should be to supply the input as a string stream, and to use std::cout as the output.

Parameters

<code>arg_yyin</code>	The input stream to be tokenized
<code>arg_yyout</code>	The output stream (not currently used)

5.52.3 Member Function Documentation

5.52.3.1 get_next_token()

```
virtual Tang::TangParser::symbol_type Tang::TangScanner::get_next_token ( ) [virtual]
```

A pass-through function that we supply so that we can provide a Bison 3 token return type instead of the `int` that is returned by the default class configuration.

Returns

A Bison 3 token representing the lexeme that was recognized.

The documentation for this class was generated from the following file:

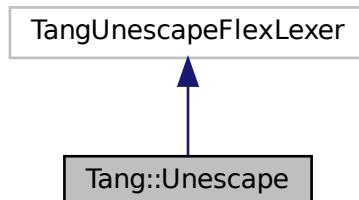
- [include/tangScanner.hpp](#)

5.53 Tang::Unescape Class Reference

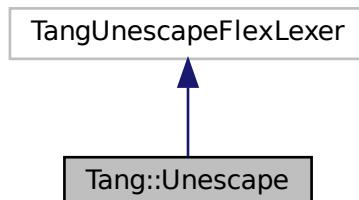
The Flex lexer class for the main Tang language.

```
#include <unescape.hpp>
```

Inheritance diagram for Tang::Unescape:



Collaboration diagram for Tang::Unescape:



Public Member Functions

- [Unescape](#) (std::istream &arg_yyin, std::ostream &arg_yyout)
The constructor for the Scanner.
- virtual std::string [get_next_token](#) ()
Extract the next token from the input string.

5.53.1 Detailed Description

The Flex lexer class for the main Tang language.

Flex requires that our lexer class inherit from yyFlexLexer, an "intermediate" class whose real name is "TangTang←FlexLexer". We are subclassing it so that we can override the return type of [get_next_token\(\)](#), for compatibility with Bison 3 tokens.

5.53.2 Constructor & Destructor Documentation

5.53.2.1 Unescape()

```
Tang::Unescape::Unescape (
    std::istream & arg_yyin,
    std::ostream & arg_yyout ) [inline]
```

The constructor for the Scanner.

The design of the Flex lexer is to tokenize the contents of an input stream, and to write any error messages to an output stream. In our implementation, however, errors are returned differently, so the output stream is never used. Its presence is retained, however, in case it is needed in the future.

For now, the general approach should be to supply the input as a string stream, and to use std::cout as the output.

Parameters

<i>arg_yyin</i>	The input stream to be tokenized
<i>arg_yyout</i>	The output stream (not currently used)

5.53.3 Member Function Documentation

5.53.3.1 get_next_token()

```
virtual std::string Tang::Unescape::get_next_token ( ) [virtual]
```

Extract the next token from the input string.

Returns

The next unescaped character.

The documentation for this class was generated from the following file:

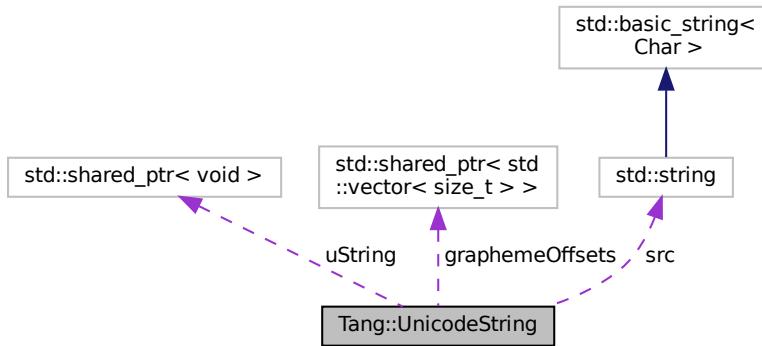
- [include/unescape.hpp](#)

5.54 Tang::UnicodeString Class Reference

Represents a UTF-8 encoded string that is Unicode-aware.

```
#include <unicodeString.hpp>
```

Collaboration diagram for Tang::UnicodeString:



Public Types

- enum `Type` { [Trusted](#) , [Untrusted](#) }

The types of string being created.

Public Member Functions

- `UnicodeString()`
Construct an empty `Tang::UnicodeString` object, which acts as the interface to the ICU library.
- `UnicodeString(const UnicodeString &source)`
Construct a `Tang::UnicodeString` object, from an existing `Tang::UnicodeString`.
- `UnicodeString(const std::string &source)`
Construct a `Tang::UnicodeString` object, from an existing `std::string`.
- `std::string substr(size_t position, size_t length) const`
Return a Unicode grapheme-aware substring.
- `bool operator==(const UnicodeString &rhs) const`
Compare two `UnicodeString`s.

- bool `operator<` (const `UnicodeString` &rhs) const
Compare two `UnicodeString`s.
- `UnicodeString operator+` (const `UnicodeString` &rhs) const
Create a new `UnicodeString` that is the concatenation of two `UnicodeString`s.
- `UnicodeString & operator+=` (const `UnicodeString` &rhs)
Concatenate the `rhs` `UnicodeString` to the current `UnicodeString`.
- `operator std::string ()` const
Cast the current `UnicodeString` object to a `std::string`, UTF-8 encoded.
- `size_t length ()` const
Return the length of the `UnicodeString` in graphemes.
- `size_t bytesLength ()` const
Return the length of the `UnicodeString` in bytes.
- `std::string render ()` const
Render the string in with dangerous characters HTML encoded, if the string is `UnicodeString::Type::Untrusted`.
- `std::string renderAscii ()` const
Render the string in with all characters converted to an ASCII representation.
- void `setUntrusted ()`
Set the string as `UnicodeString::Type::Untrusted`.

Private Member Functions

- void `generateCachedValues ()` const
Calculate cachable values for the object.

Private Attributes

- `std::string src`
The UTF-8 encoded string.
- `UnicodeString::Type type`
The type of string being stored.
- `std::shared_ptr< std::vector< size_t > > graphemeOffsets`
Cache of the grapheme offsets, if they happen to be calculated.
- `std::shared_ptr< void > uString`
Cache of the ICU Unicode string.

5.54.1 Detailed Description

Represents a UTF-8 encoded string that is Unicode-aware.

This class serves as the interface between the Tang language and the ICU library.

5.54.2 Member Enumeration Documentation

5.54.2.1 Type

```
enum Tang::UnicodeString::Type
```

The types of string being created.

Enumerator

Trusted	String is from a trusted source.
Untrusted	String is not from a trusted source.

5.54.3 Member Function Documentation

5.54.3.1 bytesLength()

```
size_t UnicodeString::bytesLength ( ) const
```

Return the length of the [UnicodeString](#) in bytes.

Note: this is *not* the number of codepoints or graphemes, but is the acutal number of bytes in memory.

Returns

Returns the length of the [UnicodeString](#) in bytes.

5.54.3.2 length()

```
size_t UnicodeString::length ( ) const
```

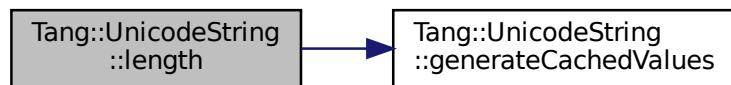
Return the length of the [UnicodeString](#) in graphemes.

Note: this is *not* the number of bytes, chars, or codepoints, but is the length in graphemes, as defined by ICU.

Returns

Returns the length of the [UnicodeString](#) in graphemes.

Here is the call graph for this function:



5.54.3.3 operator std::string()

```
UnicodeString::operator std::string ( ) const
```

Cast the current [UnicodeString](#) object to a std::string, UTF-8 encoded.

Returns

Returns the std::string version of the [UnicodeString](#).

5.54.3.4 operator+()

```
UnicodeString UnicodeString::operator+ (
    const UnicodeString & rhs ) const
```

Create a new [UnicodeString](#) that is the concatenation of two UnicodeStrings.

Parameters

<i>rhs</i>	The string to append to the current object string.
------------	--

Returns

Returns the result of the concatenation.

5.54.3.5 operator+=()

```
UnicodeString & UnicodeString::operator+= (
    const UnicodeString & rhs )
```

Concatenate the *rhs* [UnicodeString](#) to the current [UnicodeString](#).

Parameters

<i>rhs</i>	The string to append to the current object string.
------------	--

Returns

Returns the result of the concatenation.

5.54.3.6 operator<()

```
bool UnicodeString::operator< (
    const UnicodeString & rhs ) const
```

Compare two UnicodeStrings.

Parameters

<i>rhs</i>	The string to compare against.
------------	--------------------------------

Returns

Returns true if the rhs string is greater than or equal to the object string.

5.54.3.7 operator==()

```
bool UnicodeString::operator== (
    const UnicodeString & rhs ) const
```

Compare two UnicodeStrings.

Parameters

<i>rhs</i>	The string to compare against.
------------	--------------------------------

Returns

Returns true if the two strings are equal.

5.54.3.8 render()

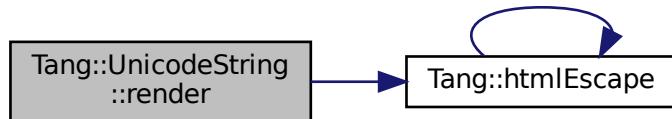
```
string UnicodeString::render ( ) const
```

Render the string in with dangerous characters HTML encoded, if the string is UnicodeString::Type::Untrusted.

Returns

The rendered string, according to its type.

Here is the call graph for this function:

**5.54.3.9 renderAscii()**

```
string UnicodeString::renderAscii ( ) const
```

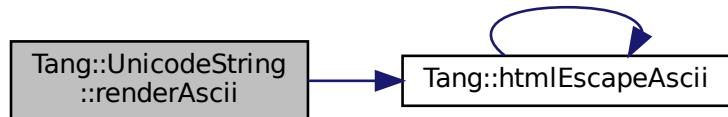
Render the string in with all characters converted to an ASCII representation.

The dangerous characters will not be HTML encoded, if the string is `UnicodeString::Type::Trusted`.

Returns

The rendered string, according to its type.

Here is the call graph for this function:

**5.54.3.10 substr()**

```
std::string UnicodeString::substr ( size_t position, size_t length ) const
```

Return a Unicode grapheme-aware substring.

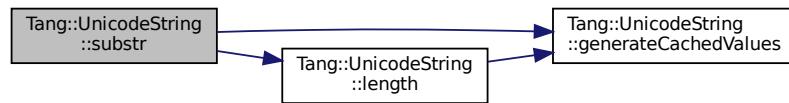
Parameters

<i>position</i>	The 0-based position of the first grapheme.
<i>length</i>	The maximum number of graphemes to return.

Returns

The requested substring.

Here is the call graph for this function:



The documentation for this class was generated from the following files:

- include/unicodeString.hpp
- src/unicodeString.cpp

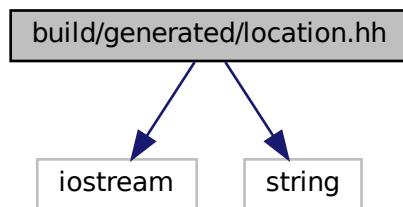
Chapter 6

File Documentation

6.1 build/generated/location.hh File Reference

Define the Tang ::location class.

```
#include <iostream>
#include <string>
Include dependency graph for location.hh:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::position](#)
A point in a source file.
- class [Tang::location](#)
Two points in a source file.

Macros

- `#define YY_NULLPTR ((void*)0)`

Functions

- `position & Tang::operator+= (position &res, position::counter_type width)`
Add width columns, in place.
- `position Tang::operator+ (position res, position::counter_type width)`
Add width columns.
- `position & Tang::operator-= (position &res, position::counter_type width)`
Subtract width columns, in place.
- `position Tang::operator- (position res, position::counter_type width)`
Subtract width columns.
- `template<typename YYChar >`
`std::basic_ostream< YYChar > & Tang::operator<< (std::basic_ostream< YYChar > &ostr, const position &pos)`
Intercept output stream redirection.
- `location & Tang::operator+= (location &res, const location &end)`
Join two locations, in place.
- `location Tang::operator+ (location res, const location &end)`
Join two locations.
- `location & Tang::operator+= (location &res, location::counter_type width)`
Add width columns to the end position, in place.
- `location Tang::operator+ (location res, location::counter_type width)`
Add width columns to the end position.
- `location & Tang::operator-= (location &res, location::counter_type width)`
Subtract width columns to the end position, in place.
- `location Tang::operator- (location res, location::counter_type width)`
Subtract width columns to the end position.
- `template<typename YYChar >`
`std::basic_ostream< YYChar > & Tang::operator<< (std::basic_ostream< YYChar > &ostr, const location &loc)`
Intercept output stream redirection.

6.1.1 Detailed Description

Define the Tang ::location class.

6.1.2 Function Documentation

6.1.2.1 operator<<() [1/2]

```
template<typename YYChar >
std::basic_ostream<YYChar>& Tang::operator<< (
    std::basic_ostream< YYChar > & ostr,
    const location & loc )
```

Intercept output stream redirection.

Parameters

<i>ostr</i>	the destination output stream
<i>loc</i>	a reference to the location to redirect

Avoid duplicate information.

6.1.2.2 operator<<() [2/2]

```
template<typename YYChar >
std::basic_ostream<YYChar>& Tang::operator<< (
    std::basic_ostream< YYChar > & ostr,
    const position & pos )
```

Intercept output stream redirection.

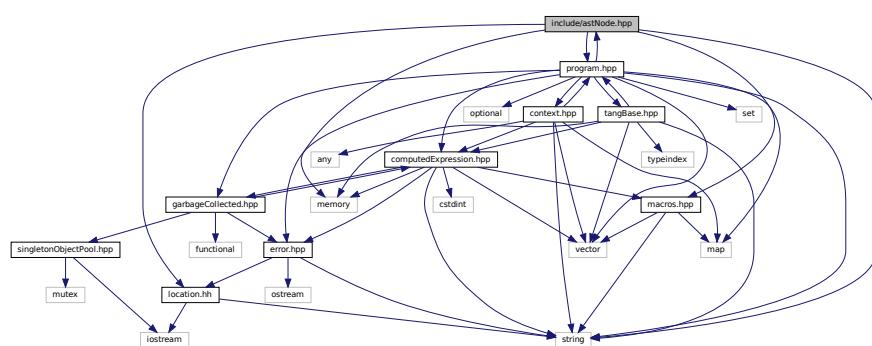
Parameters

<i>ostr</i>	the destination output stream
<i>pos</i>	a reference to the position to redirect

6.2 include/astNode.hpp File Reference

Declare the [Tang::AstNode](#) base class.

```
#include <memory>
#include <string>
#include "location.hpp"
#include "macros.hpp"
#include "program.hpp"
Include dependency graph for astNode.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNode](#)

Base class for representing nodes of an Abstract Syntax Tree (AST).

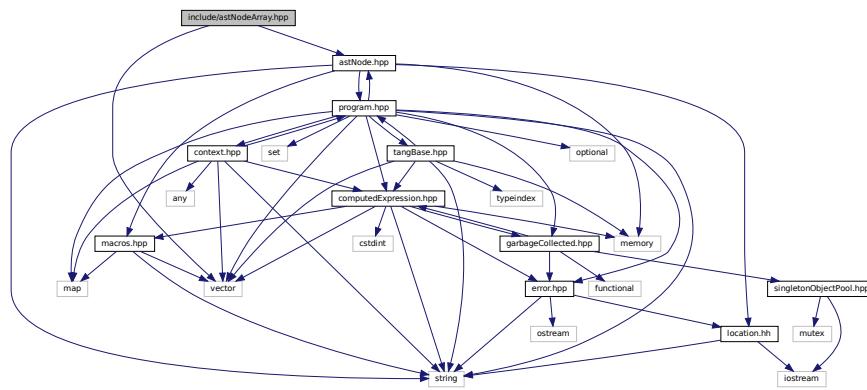
6.2.1 Detailed Description

Declare the [Tang::AstNode](#) base class.

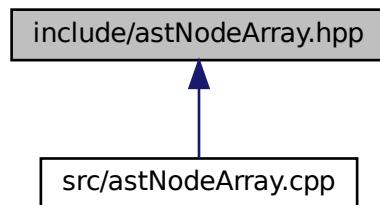
6.3 include/astNodeArray.hpp File Reference

Declare the [Tang::AstNodeArray](#) class.

```
#include <vector>
#include "astNode.hpp"
Include dependency graph for astNodeArray.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class `Tang::AstNodeArray`
An `AstNode` that represents an array literal.

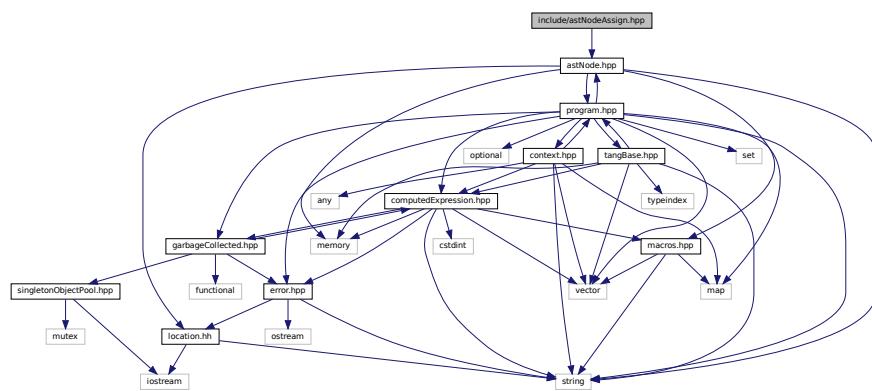
6.3.1 Detailed Description

Declare the `Tang::AstNodeArray` class.

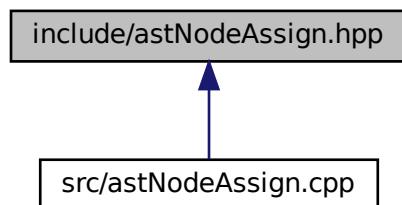
6.4 include/astNodeAssign.hpp File Reference

Declare the `Tang::AstNodeAssign` class.

```
#include "astNode.hpp"
Include dependency graph for astNodeAssign.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class `Tang::AstNodeAssign`
An AstNode that represents a binary expression.

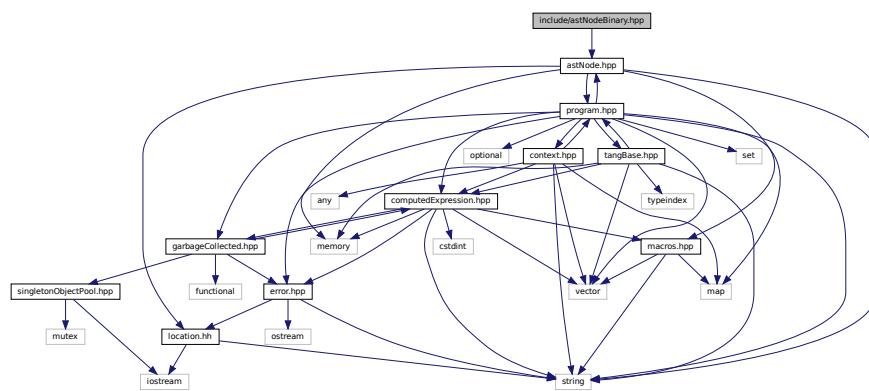
6.4.1 Detailed Description

Declare the [Tang::AstNodeAssign](#) class.

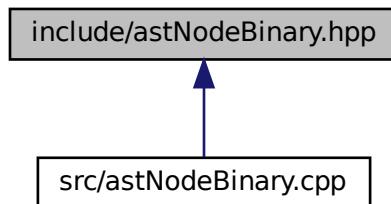
6.5 include/astNodeBinary.hpp File Reference

Declare the [Tang::AstNodeBinary](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeBinary.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeBinary](#)
An `AstNode` that represents a binary expression.

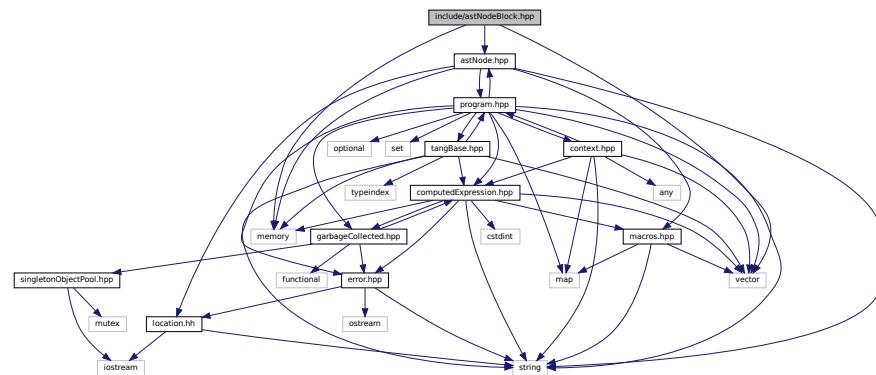
6.5.1 Detailed Description

Declare the [Tang::AstNodeBinary](#) class.

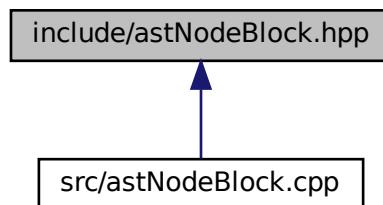
6.6 include/astNodeBlock.hpp File Reference

Declare the [Tang::AstNodeBlock](#) class.

```
#include <vector>
#include <memory>
#include "astNode.hpp"
Include dependency graph for astNodeBlock.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeBlock](#)
An [AstNode](#) that represents a code block.

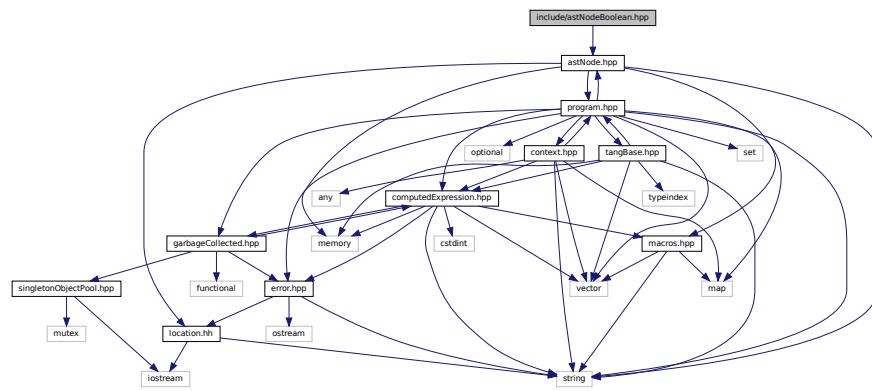
6.6.1 Detailed Description

Declare the [Tang::AstNodeBlock](#) class.

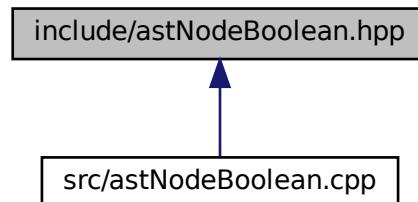
6.7 include/astNodeBoolean.hpp File Reference

Declare the [Tang::AstNodeBoolean](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeBoolean.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeBoolean](#)
An [AstNode](#) that represents a boolean literal.

6.7.1 Detailed Description

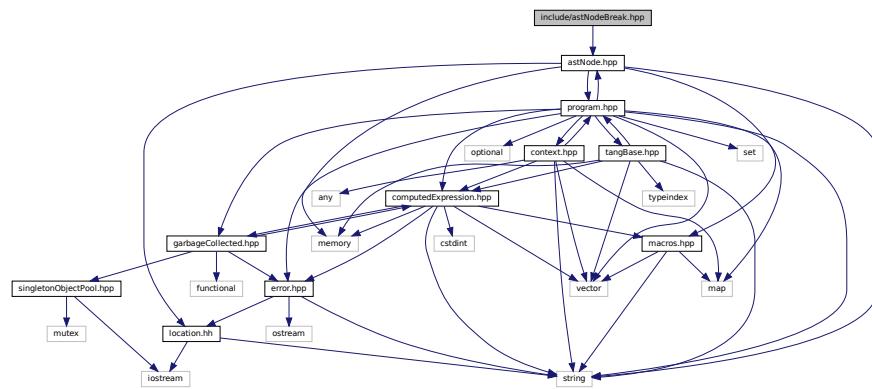
Declare the [Tang::AstNodeBoolean](#) class.

6.8 include/astNodeBreak.hpp File Reference

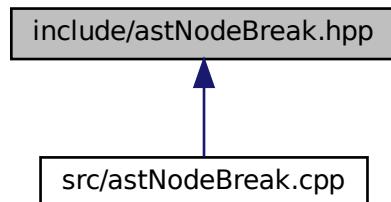
Declare the [Tang::AstNodeBreak](#) class.

```
#include "astNode.hpp"
```

Include dependency graph for astNodeBreak.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeBreak](#)
An [AstNode](#) that represents a break statement.

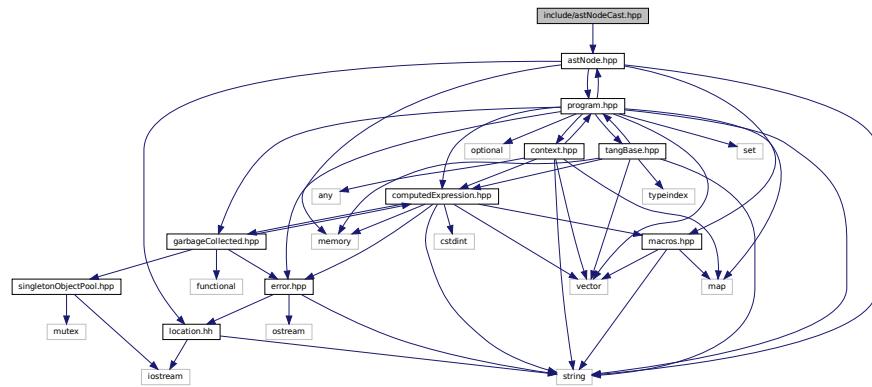
6.8.1 Detailed Description

Declare the [Tang::AstNodeBreak](#) class.

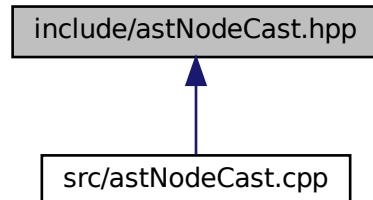
6.9 include/astNodeCast.hpp File Reference

Declare the `Tang::AstNodeCast` class.

```
#include "astNode.hpp"
Include dependency graph for astNodeCast.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class `Tang::AstNodeCast`
An `AstNode` that represents a typecast of an expression.

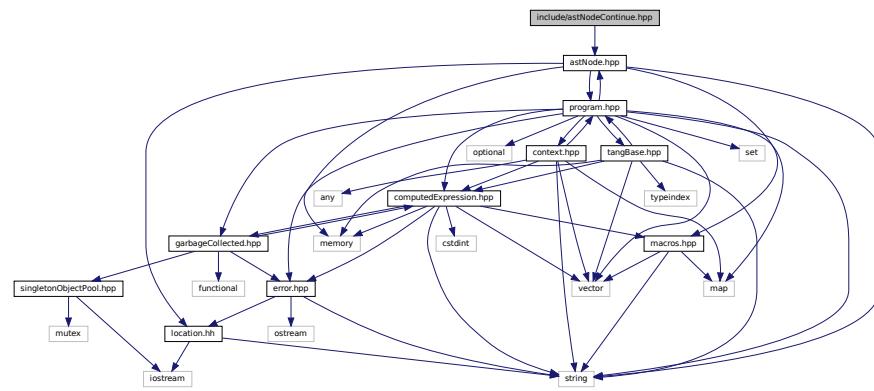
6.9.1 Detailed Description

Declare the `Tang::AstNodeCast` class.

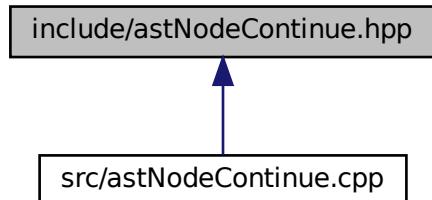
6.10 include/astNodeContinue.hpp File Reference

Declare the [Tang::AstNodeContinue](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeContinue.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeContinue](#)
An [AstNode](#) that represents a `continue` statement.

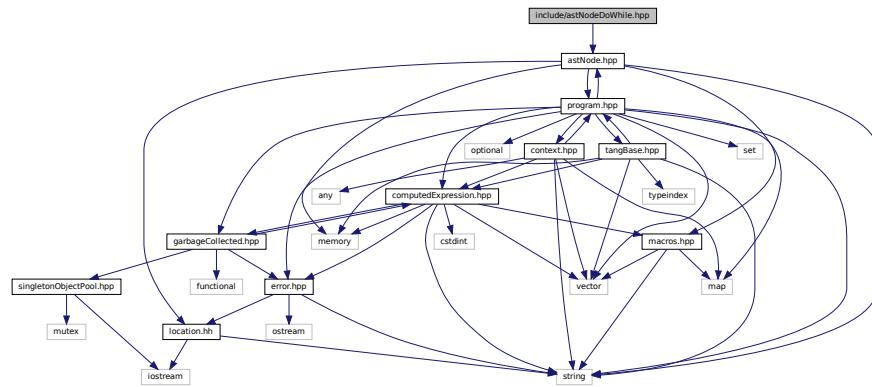
6.10.1 Detailed Description

Declare the [Tang::AstNodeContinue](#) class.

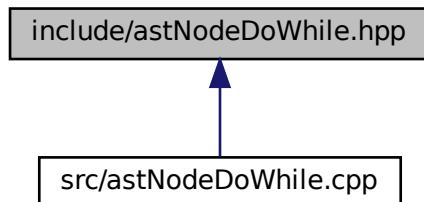
6.11 include/astNodeDoWhile.hpp File Reference

Declare the [Tang::AstNodeDoWhile](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeDoWhile.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeDoWhile](#)
An [AstNode](#) that represents a do..while statement.

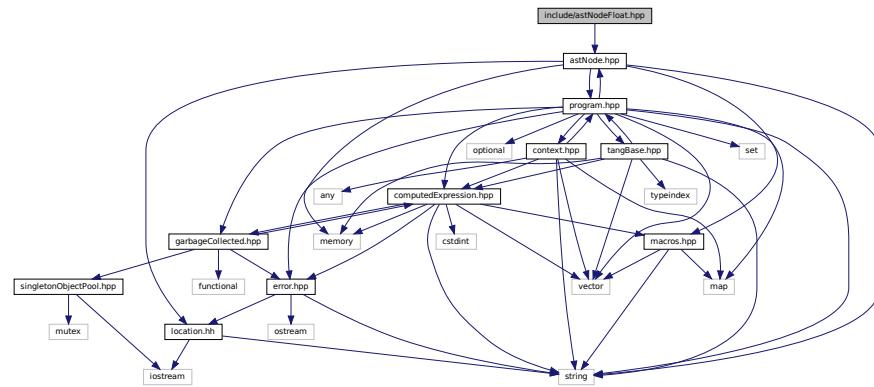
6.11.1 Detailed Description

Declare the [Tang::AstNodeDoWhile](#) class.

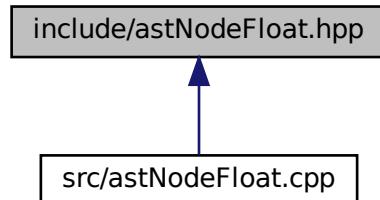
6.12 include/astNodeFloat.hpp File Reference

Declare the [Tang::AstNodeFloat](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeFloat.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeFloat](#)
An [AstNode](#) that represents an float literal.

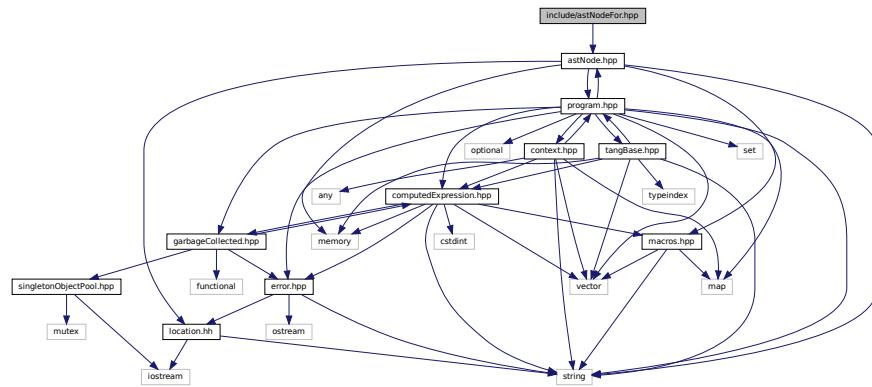
6.12.1 Detailed Description

Declare the [Tang::AstNodeFloat](#) class.

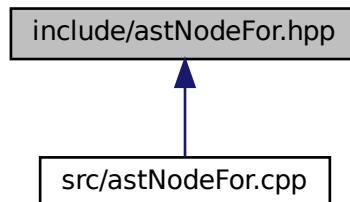
6.13 include/astNodeFor.hpp File Reference

Declare the `Tang::AstNodeFor` class.

```
#include "astNode.hpp"
Include dependency graph for astNodeFor.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class `Tang::AstNodeFor`
An AstNode that represents an if() statement.

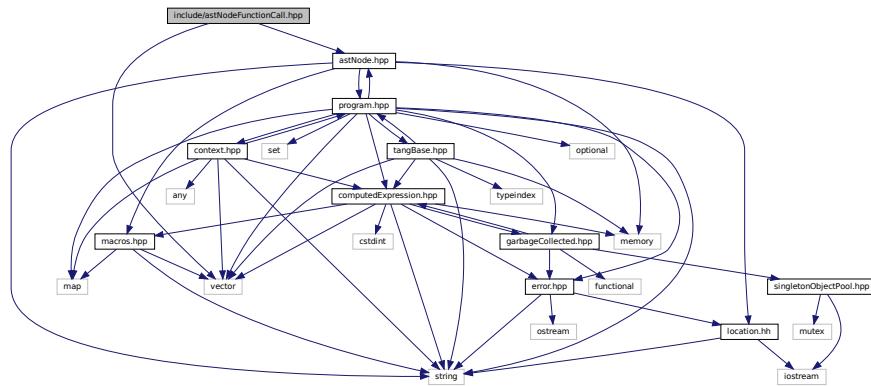
6.13.1 Detailed Description

Declare the `Tang::AstNodeFor` class.

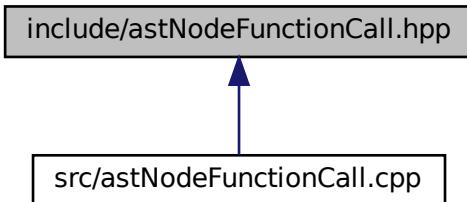
6.14 include/astNodeFunctionCall.hpp File Reference

Declare the [Tang::AstNodeFunctionCall](#) class.

```
#include <vector>
#include "astNode.hpp"
Include dependency graph for astNodeFunctionCall.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeFunctionCall](#)
An [AstNode](#) that represents a function call.

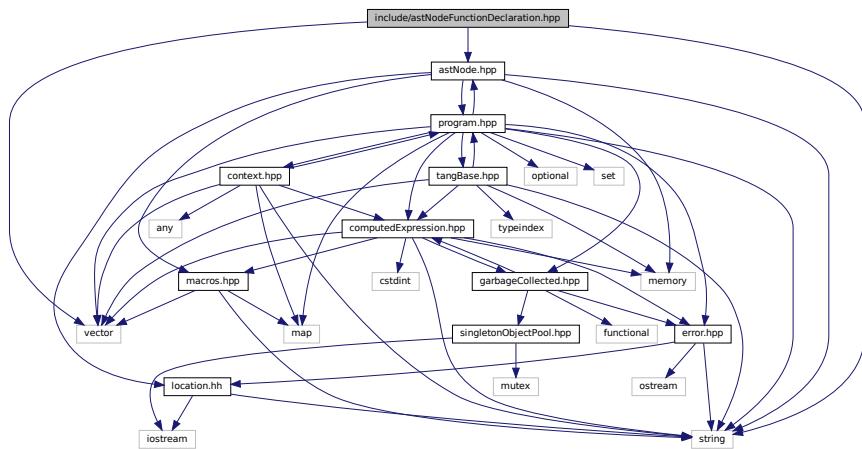
6.14.1 Detailed Description

Declare the [Tang::AstNodeFunctionCall](#) class.

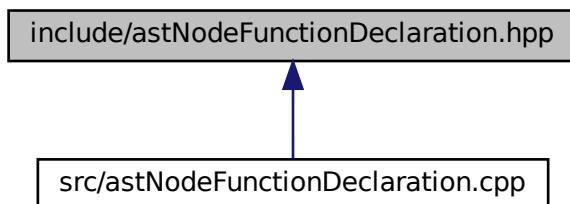
6.15 include/astNodeFunctionDeclaration.hpp File Reference

Declare the [Tang::AstNodeFunctionDeclaration](#) class.

```
#include <string>
#include <vector>
#include "astNode.hpp"
Include dependency graph for astNodeFunctionDeclaration.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeFunctionDeclaration](#)
An `AstNode` that represents a function declaration.

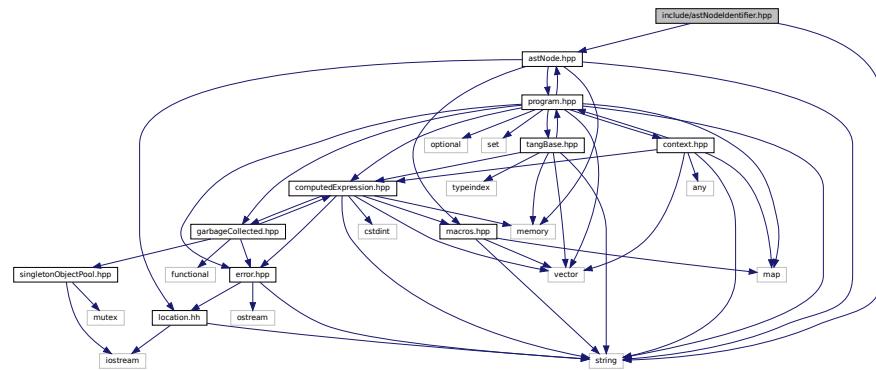
6.15.1 Detailed Description

Declare the [Tang::AstNodeFunctionDeclaration](#) class.

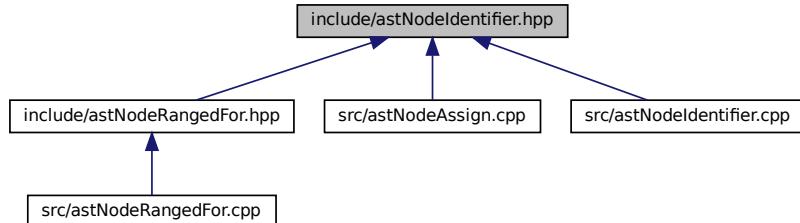
6.16 include/astNodelentifier.hpp File Reference

Declare the [Tang::AstNodelentifier](#) class.

```
#include <string>
#include "astNode.hpp"
Include dependency graph for astNodelentifier.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodelentifier](#)
An AstNode that represents an identifier.

6.16.1 Detailed Description

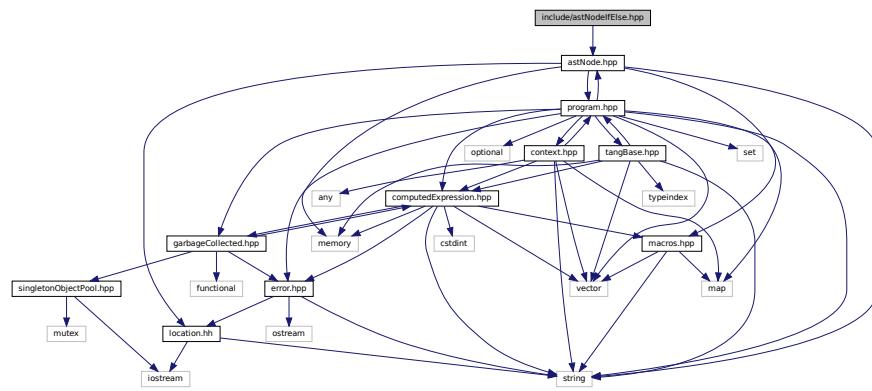
Declare the [Tang::AstNodelentifier](#) class.

6.17 include/astNodeIfElse.hpp File Reference

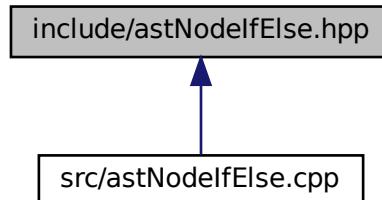
Declare the [Tang::AstNodeIfElse](#) class.

```
#include "astNode.hpp"
```

Include dependency graph for astNodeIfElse.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeIfElse](#)
An `AstNode` that represents an if..else statement.

6.17.1 Detailed Description

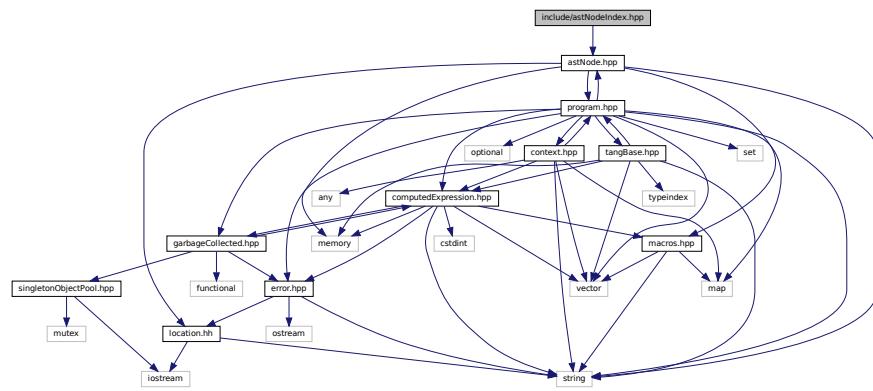
Declare the [Tang::AstNodeIfElse](#) class.

6.18 include/astNodeIndex.hpp File Reference

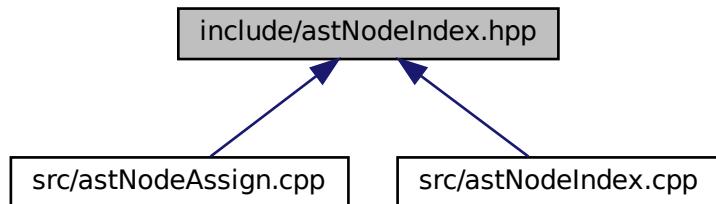
Declare the [Tang::AstNodeIndex](#) class.

```
#include "astNode.hpp"
```

Include dependency graph for astNodeIndex.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeIndex](#)
An [AstNode](#) that represents an index into a collection.

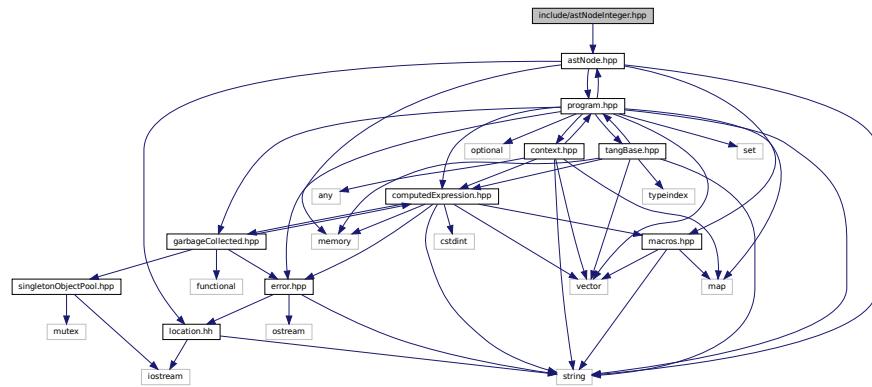
6.18.1 Detailed Description

Declare the [Tang::AstNodeIndex](#) class.

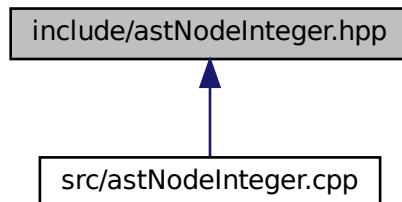
6.19 include/astNodeInteger.hpp File Reference

Declare the [Tang::AstNodeInteger](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeInteger.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeInteger](#)
An [AstNode](#) that represents an integer literal.

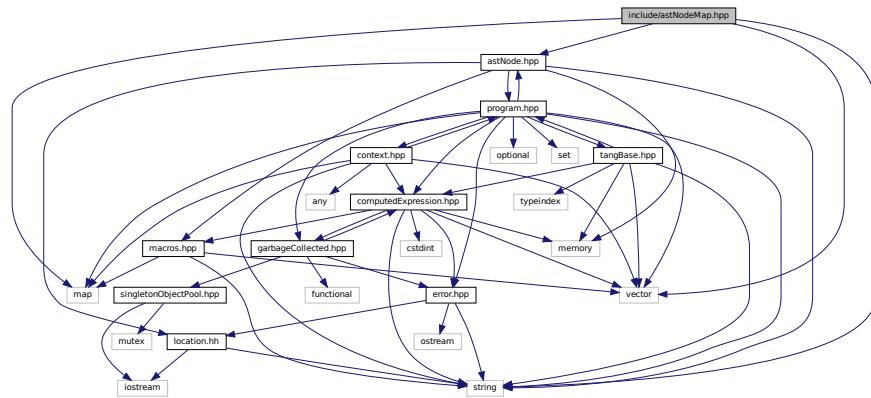
6.19.1 Detailed Description

Declare the [Tang::AstNodeInteger](#) class.

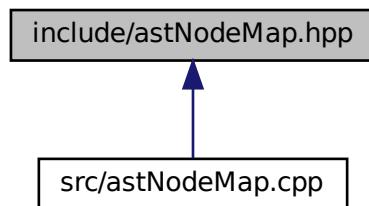
6.20 include/astNodeMap.hpp File Reference

Declare the [Tang::AstNodeMap](#) class.

```
#include <vector>
#include <map>
#include <string>
#include "astNode.hpp"
Include dependency graph for astNodeMap.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeMap](#)
An [AstNode](#) that represents a map literal.

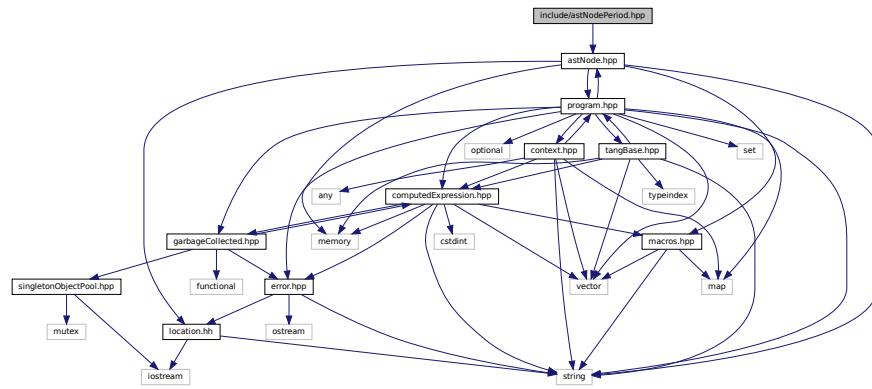
6.20.1 Detailed Description

Declare the [Tang::AstNodeMap](#) class.

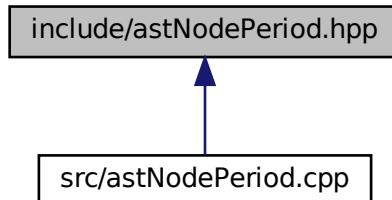
6.21 include/astNodePeriod.hpp File Reference

Declare the [Tang::AstNodePeriod](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodePeriod.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodePeriod](#)

An [AstNode](#) that represents a member access (period) into an object.

6.21.1 Detailed Description

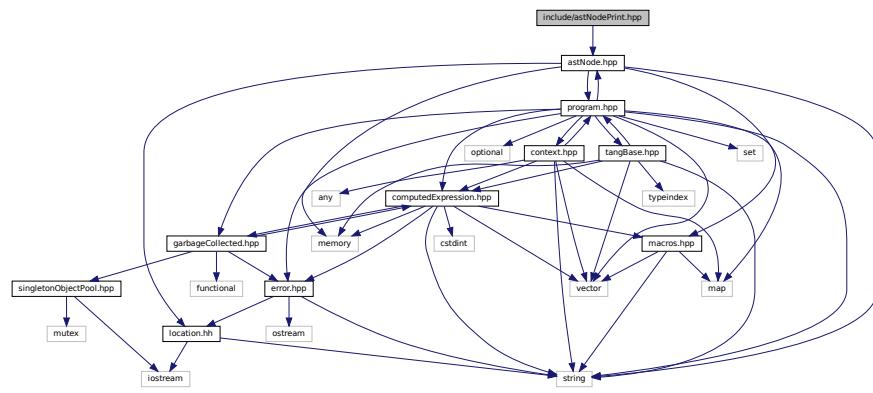
Declare the [Tang::AstNodePeriod](#) class.

6.22 include/astNodePrint.hpp File Reference

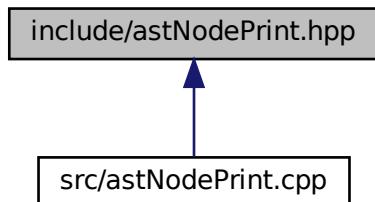
Declare the [Tang::AstNodePrint](#) class.

```
#include "astNode.hpp"
```

Include dependency graph for astNodePrint.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodePrint](#)
An [AstNode](#) that represents a print typeeration.

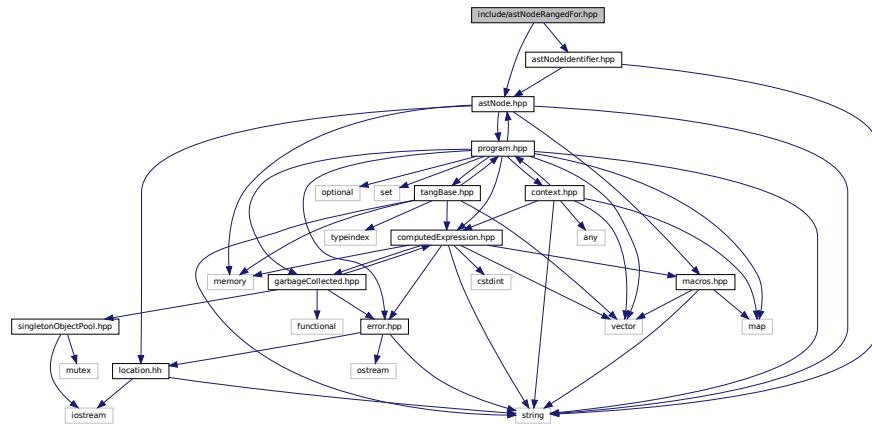
6.22.1 Detailed Description

Declare the [Tang::AstNodePrint](#) class.

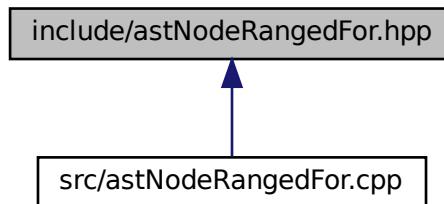
6.23 include/astNodeRangedFor.hpp File Reference

Declare the [Tang::AstNodeRangedFor](#) class.

```
#include "astNode.hpp"
#include "astNodeIdentifier.hpp"
Include dependency graph for astNodeRangedFor.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeRangedFor](#)
An `AstNode` that represents a ranged for() statement.

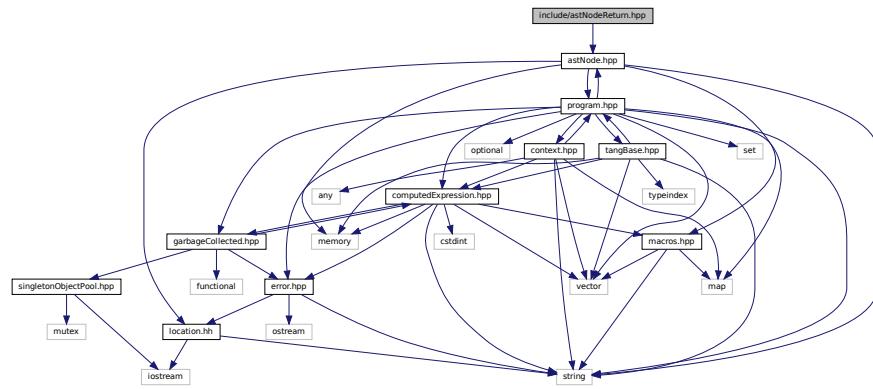
6.23.1 Detailed Description

Declare the [Tang::AstNodeRangedFor](#) class.

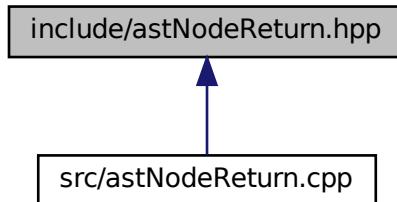
6.24 include/astNodeReturn.hpp File Reference

Declare the [Tang::AstNodeReturn](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeReturn.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeReturn](#)
An [AstNode](#) that represents a return statement.

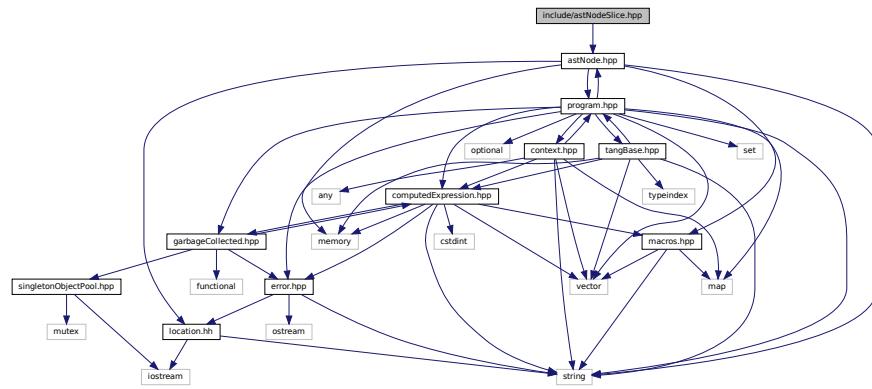
6.24.1 Detailed Description

Declare the [Tang::AstNodeReturn](#) class.

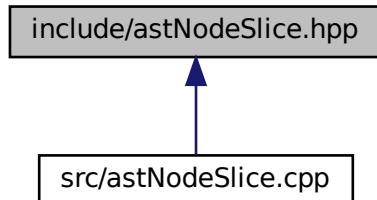
6.25 include/astNodeSlice.hpp File Reference

Declare the [Tang::AstNodeSlice](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeSlice.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeSlice](#)
An `AstNode` that represents a ternary expression.

6.25.1 Detailed Description

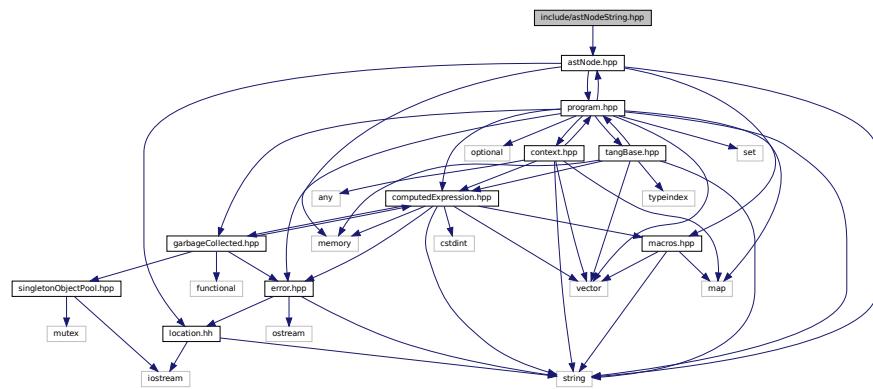
Declare the [Tang::AstNodeSlice](#) class.

6.26 include/astNodeString.hpp File Reference

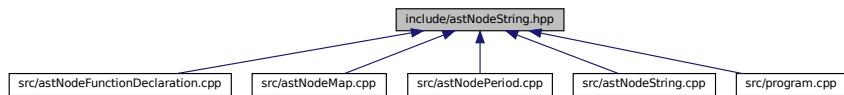
Declare the [Tang::AstNodeString](#) class.

```
#include "astNode.hpp"
```

Include dependency graph for astNodeString.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeString](#)
An [AstNode](#) that represents a string literal.

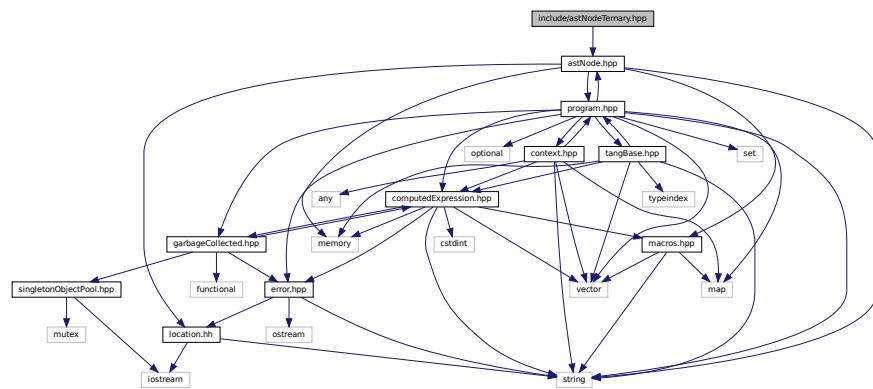
6.26.1 Detailed Description

Declare the [Tang::AstNodeString](#) class.

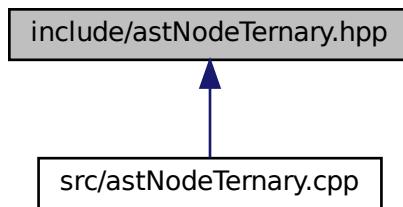
6.27 include/astNodeTernary.hpp File Reference

Declare the [Tang::AstNodeTernary](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeTernary.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeTernary](#)
An `AstNode` that represents a ternary expression.

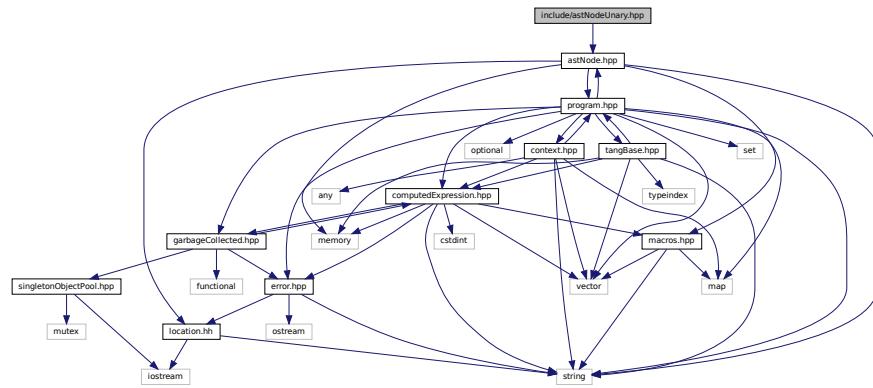
6.27.1 Detailed Description

Declare the [Tang::AstNodeTernary](#) class.

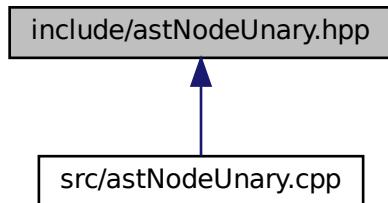
6.28 include/astNodeUnary.hpp File Reference

Declare the [Tang::AstNodeUnary](#) class.

```
#include "astNode.hpp"
Include dependency graph for astNodeUnary.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class Tang::AstNodeUnary
An AstNode that represents a unary negation.

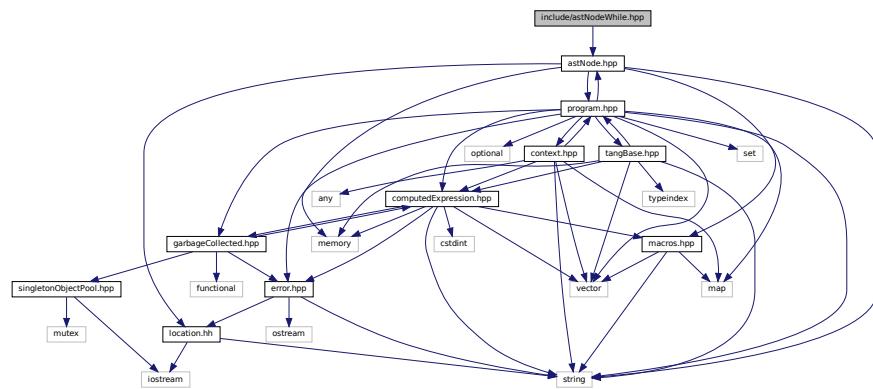
6.28.1 Detailed Description

Declare the `Tang::AstNodeUnary` class.

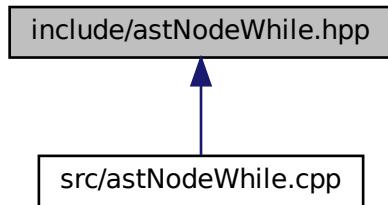
6.29 include/astNodeWhile.hpp File Reference

Declare the `Tang::AstNodeWhile` class.

```
#include "astNode.hpp"
Include dependency graph for astNodeWhile.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::AstNodeWhile](#)
An [AstNode](#) that represents a while statement.

6.29.1 Detailed Description

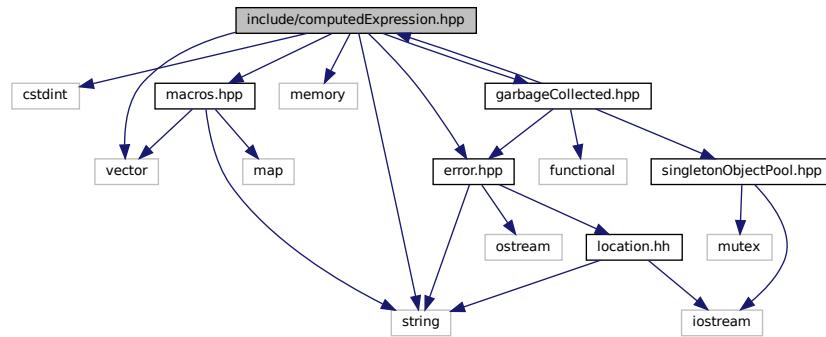
Declare the [Tang::AstNodeWhile](#) class.

6.30 include/computedExpression.hpp File Reference

Declare the [Tang::ComputedExpression](#) base class.

```
#include <cstdint>
#include <string>
```

```
#include <vector>
#include <memory>
#include "macros.hpp"
#include "garbageCollected.hpp"
#include "error.hpp"
Include dependency graph for computedExpression.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpression](#)
Represents the result of a computation that has been executed.

6.30.1 Detailed Description

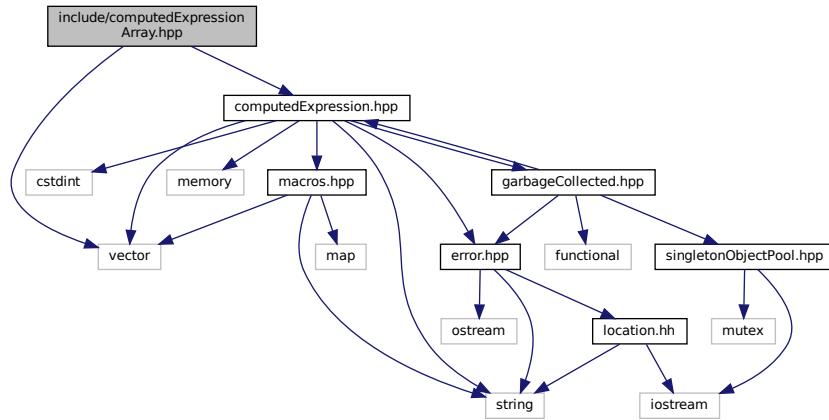
Declare the [Tang::ComputedExpression](#) base class.

6.31 include/computedExpressionArray.hpp File Reference

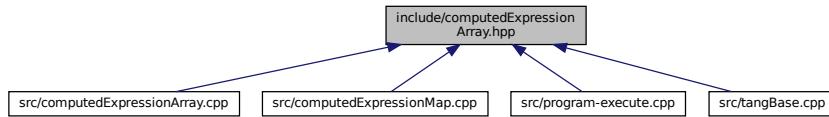
Declare the [Tang::ComputedExpressionArray](#) class.

```
#include <vector>
#include "computedExpression.hpp"
```

Include dependency graph for computedExpressionArray.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionArray](#)
Represents an Array that is the result of a computation.

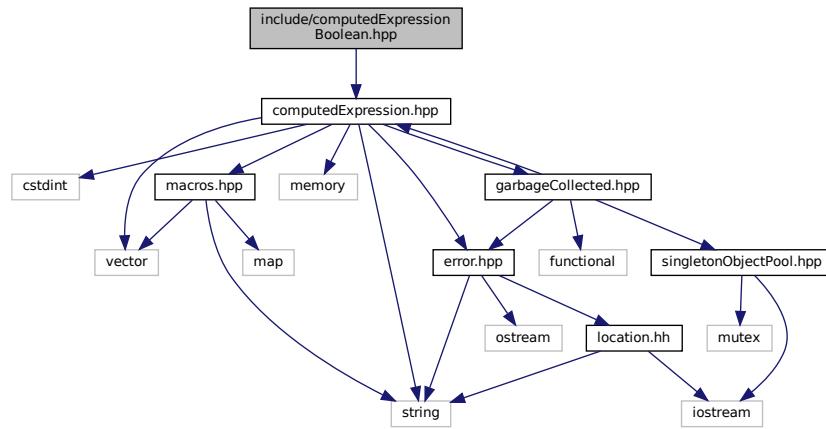
6.31.1 Detailed Description

Declare the [Tang::ComputedExpressionArray](#) class.

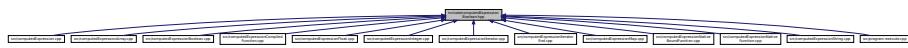
6.32 include/computedExpressionBoolean.hpp File Reference

Declare the [Tang::ComputedExpressionBoolean](#) class.

```
#include "computedExpression.hpp"
Include dependency graph for computedExpressionBoolean.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionBoolean](#)
Represents an Boolean that is the result of a computation.

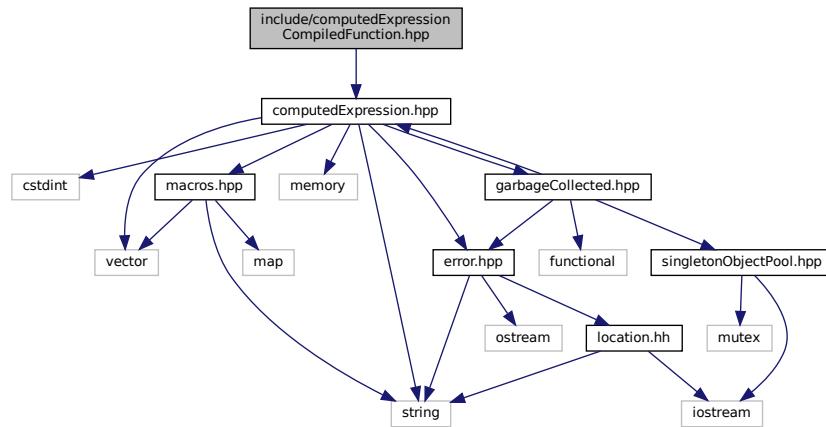
6.32.1 Detailed Description

Declare the [Tang::ComputedExpressionBoolean](#) class.

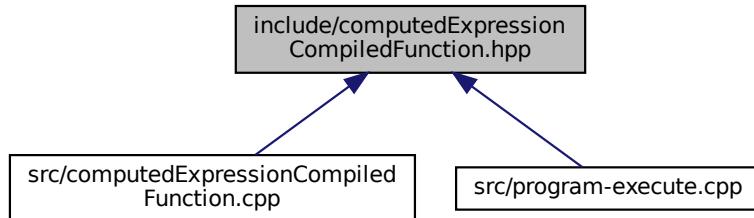
6.33 include/computedExpressionCompiledFunction.hpp File Reference

Declare the [Tang::ComputedExpressionCompiledFunction](#) class.

```
#include "computedExpression.hpp"
Include dependency graph for computedExpressionCompiledFunction.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionCompiledFunction](#)
Represents a Compiled Function declared in the script.

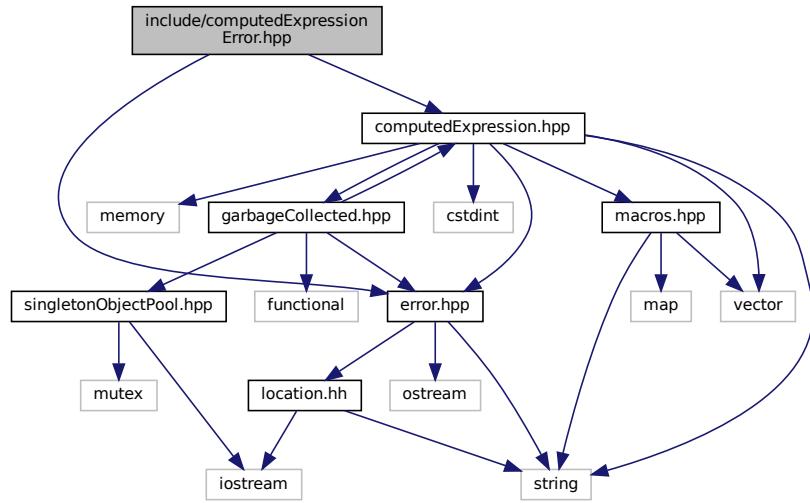
6.33.1 Detailed Description

Declare the [Tang::ComputedExpressionCompiledFunction](#) class.

6.34 include/computedExpressionError.hpp File Reference

Declare the [Tang::ComputedExpressionError](#) class.

```
#include "computedExpression.hpp"
#include "error.hpp"
Include dependency graph for computedExpressionError.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionError](#)
Represents a Runtime Error.

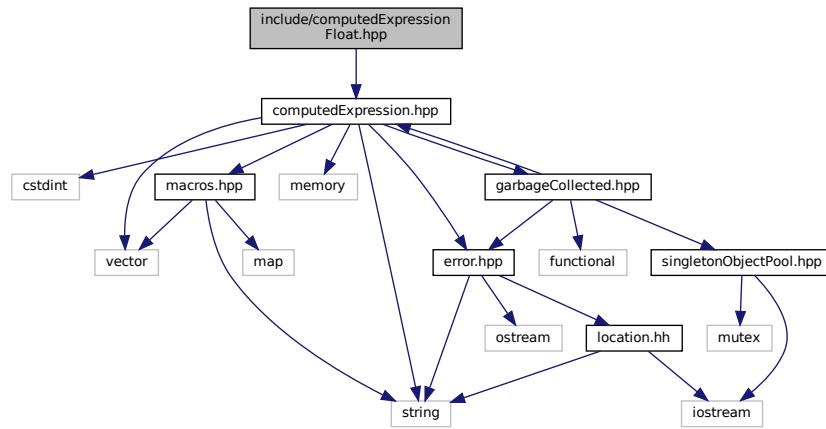
6.34.1 Detailed Description

Declare the [Tang::ComputedExpressionError](#) class.

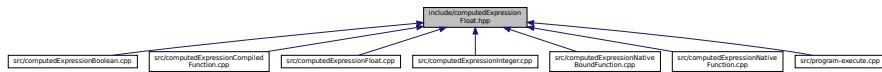
6.35 include/computedExpressionFloat.hpp File Reference

Declare the [Tang::ComputedExpressionFloat](#) class.

```
#include "computedExpression.hpp"
Include dependency graph for computedExpressionFloat.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionFloat](#)
Represents a Float that is the result of a computation.

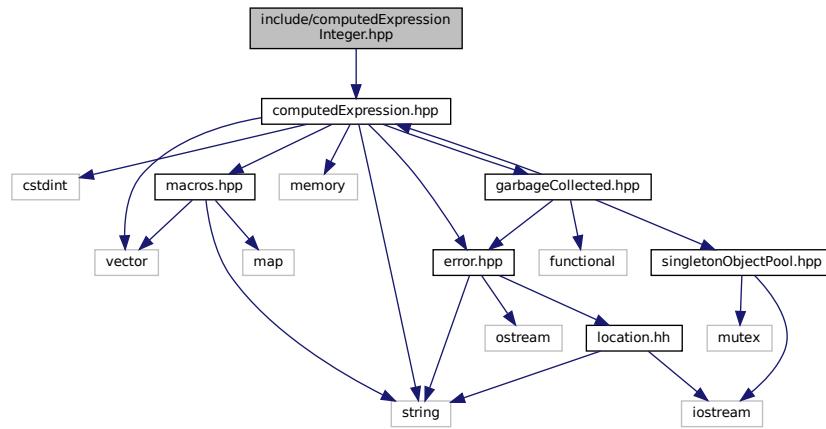
6.35.1 Detailed Description

Declare the [Tang::ComputedExpressionFloat](#) class.

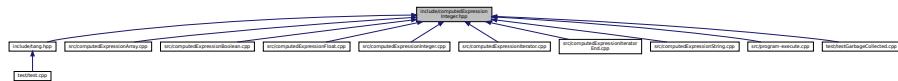
6.36 include/computedExpressionInteger.hpp File Reference

Declare the [Tang::ComputedExpressionInteger](#) class.

```
#include "computedExpression.hpp"
Include dependency graph for computedExpressionInteger.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionInteger](#)
Represents an Integer that is the result of a computation.

6.36.1 Detailed Description

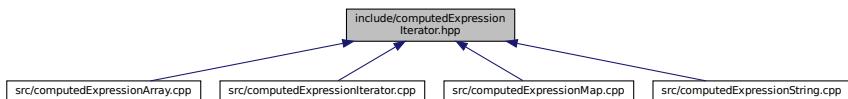
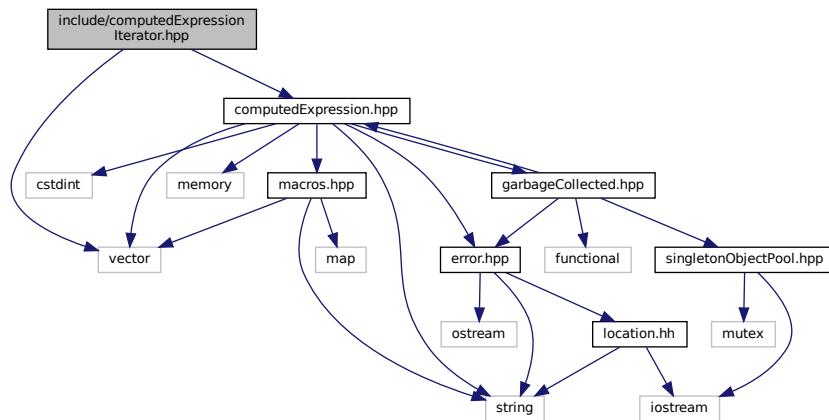
Declare the [Tang::ComputedExpressionInteger](#) class.

6.37 include/computedExpressionIterator.hpp File Reference

Declare the [Tang::ComputedExpressionIterator](#) class.

```
#include <vector>
#include "computedExpression.hpp"
```

Include dependency graph for `computedExpressionIterator.hpp`:



Classes

- class [Tang::ComputedExpressionIterator](#)
Represents an Iterator that is the result of a computation.

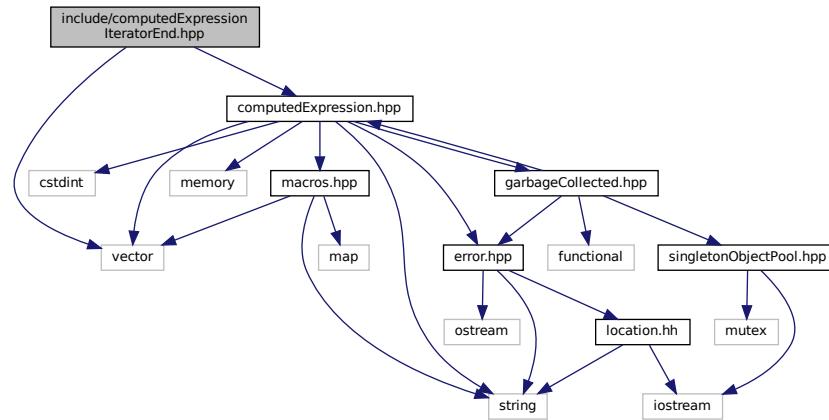
6.37.1 Detailed Description

Declare the [Tang::ComputedExpressionIterator](#) class.

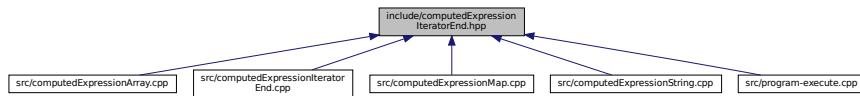
6.38 include/computedExpressionIteratorEnd.hpp File Reference

Declare the [Tang::ComputedExpressionIteratorEnd](#) class.

```
#include <vector>
#include "computedExpression.hpp"
Include dependency graph for computedExpressionIteratorEnd.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionIteratorEnd](#)
Represents that a collection has no more values through which to iterate.

6.38.1 Detailed Description

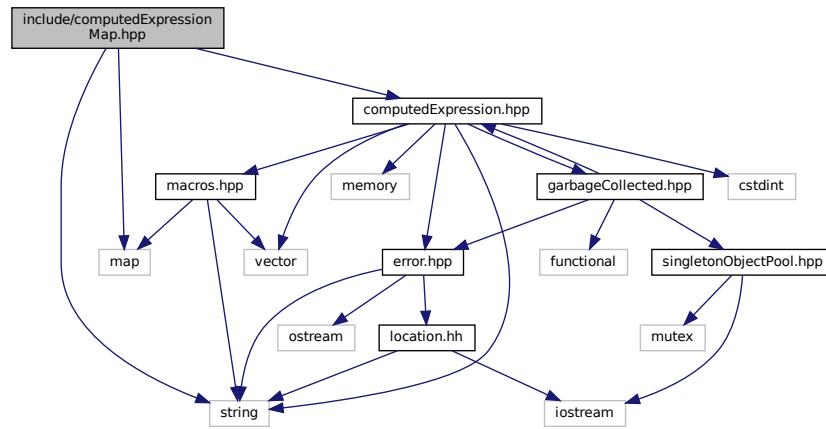
Declare the [Tang::ComputedExpressionIteratorEnd](#) class.

6.39 include/computedExpressionMap.hpp File Reference

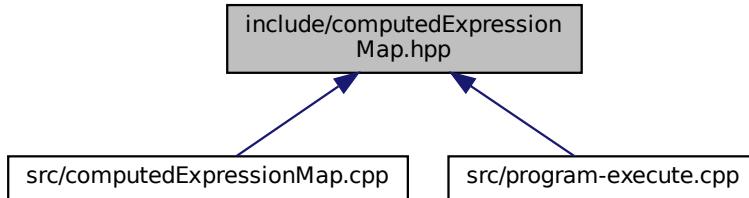
Declare the [Tang::ComputedExpressionMap](#) class.

```
#include <map>
#include <string>
```

```
#include "computedExpression.hpp"
Include dependency graph for computedExpressionMap.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionMap](#)
Represents an Map that is the result of a computation.

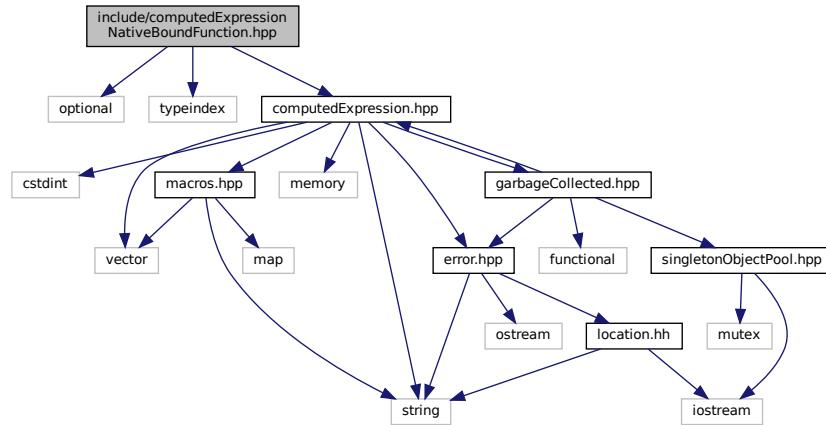
6.39.1 Detailed Description

Declare the [Tang::ComputedExpressionMap](#) class.

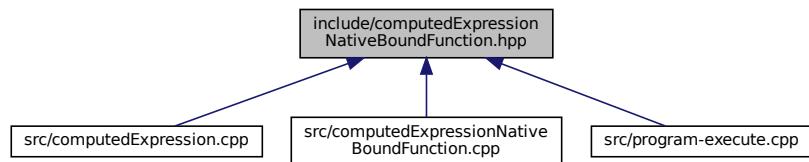
6.40 include/computedExpressionNativeBoundFunction.hpp File Reference

Declare the [Tang::ComputedExpressionNativeBoundFunction](#) class.

```
#include <optional>
#include <typeindex>
#include "computedExpression.hpp"
Include dependency graph for computedExpressionNativeBoundFunction.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionNativeBoundFunction](#)
Represents a NativeBound Function declared in the script.

6.40.1 Detailed Description

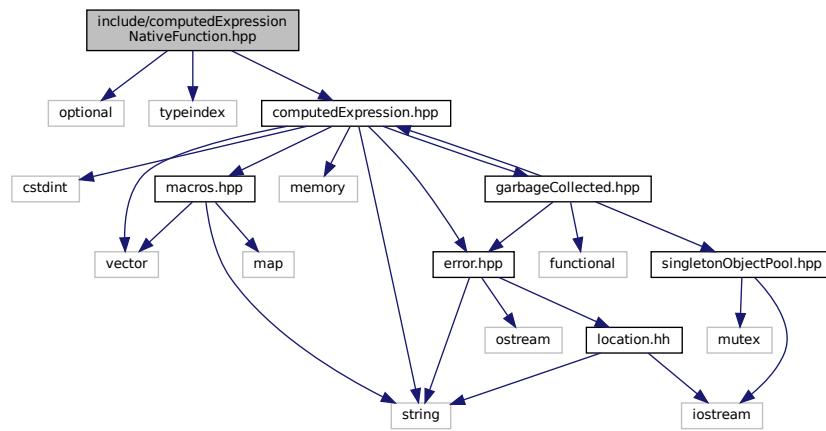
Declare the [Tang::ComputedExpressionNativeBoundFunction](#) class.

6.41 include/computedExpressionNativeFunction.hpp File Reference

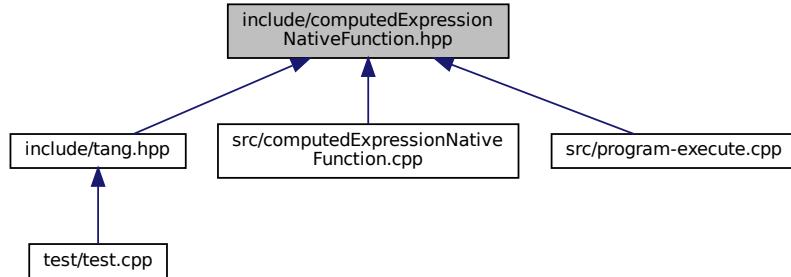
Declare the [Tang::ComputedExpressionNativeFunction](#) class.

```
#include <optional>
#include <typeindex>
```

```
#include "computedExpression.hpp"
Include dependency graph for computedExpressionNativeFunction.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionNativeFunction](#)
Represents a Native Function provided by compiled C++ code.

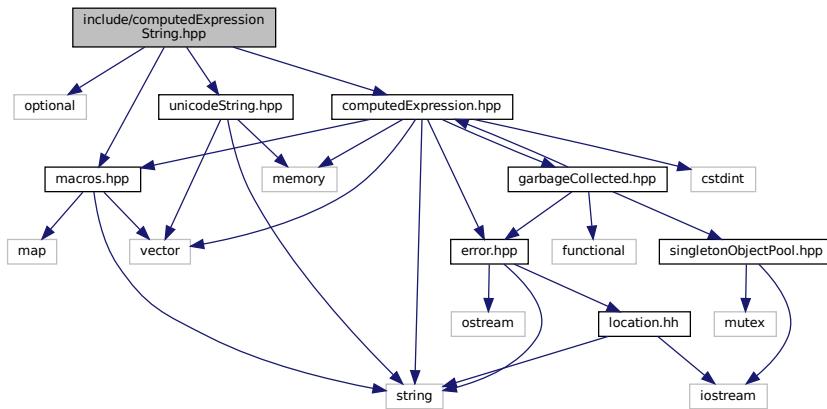
6.41.1 Detailed Description

Declare the [Tang::ComputedExpressionNativeFunction](#) class.

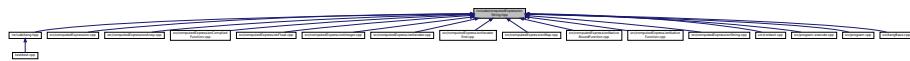
6.42 include/computedExpressionString.hpp File Reference

Declare the [Tang::ComputedExpressionString](#) class.

```
#include <optional>
#include "macros.hpp"
#include "computedExpression.hpp"
#include "unicodeString.hpp"
Include dependency graph for computedExpressionString.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::ComputedExpressionString](#)
Represents a String that is the result of a computation.

6.42.1 Detailed Description

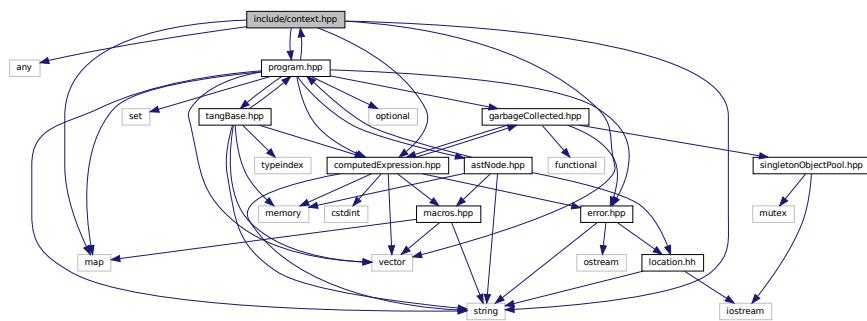
Declare the [Tang::ComputedExpressionString](#) class.

6.43 include/context.hpp File Reference

Declare the [Tang::Context](#) class.

```
#include <any>
#include <map>
#include <string>
```

```
#include <vector>
#include "program.hpp"
#include "computedExpression.hpp"
Include dependency graph for context.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::Context](#)
Holds all environment variables specific to the execution of a program.

6.43.1 Detailed Description

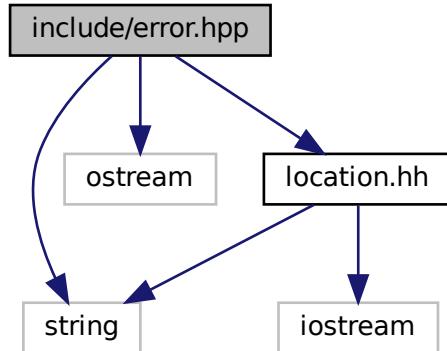
Declare the [Tang::Context](#) class.

6.44 include/error.hpp File Reference

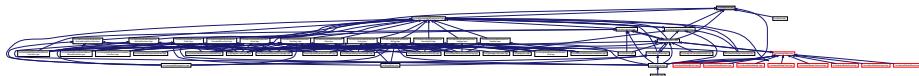
Declare the [Tang::Error](#) class used to describe syntax and runtime errors.

```
#include <string>
#include <iostream>
```

```
#include "location.hh"
Include dependency graph for error.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::Error](#)

The [Error](#) class is used to report any error of the system, whether a syntax (parsing) error or a runtime (execution) error.

6.44.1 Detailed Description

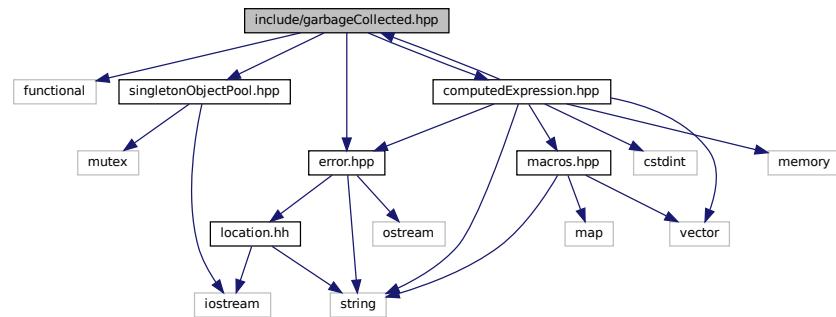
Declare the [Tang::Error](#) class used to describe syntax and runtime errors.

6.45 include/garbageCollected.hpp File Reference

Declare the [Tang::GarbageCollected](#) class.

```
#include <functional>
#include "singletonObjectPool.hpp"
#include "computedExpression.hpp"
```

```
#include "error.hpp"
Include dependency graph for garbageCollected.hpp:
```



This graph shows which files directly or indirectly include this file:

Classes

- class [Tang::GarbageCollected](#)
A container that acts as a resource-counting garbage collector for the specified type.

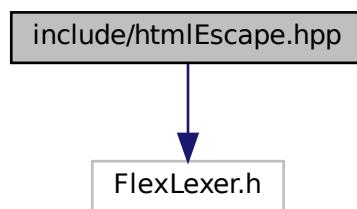
6.45.1 Detailed Description

Declare the [Tang::GarbageCollected](#) class.

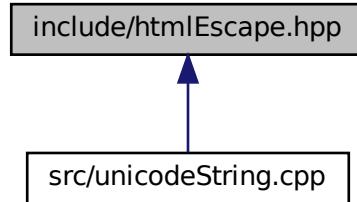
6.46 include/htmlEscape.hpp File Reference

Declare the [Tang::HtmlEscape](#) used to tokenize a Tang script.

```
#include <FlexLexer.h>
Include dependency graph for htmlEscape.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::HtmlEscape](#)
The Flex lexer class for the main Tang language.

Macros

- #define **yyFlexLexer** TangHtmlEscapeFlexLexer
- #define **YY_DECL** std::string [Tang::HtmlEscape::get_next_token\(\)](#)

6.46.1 Detailed Description

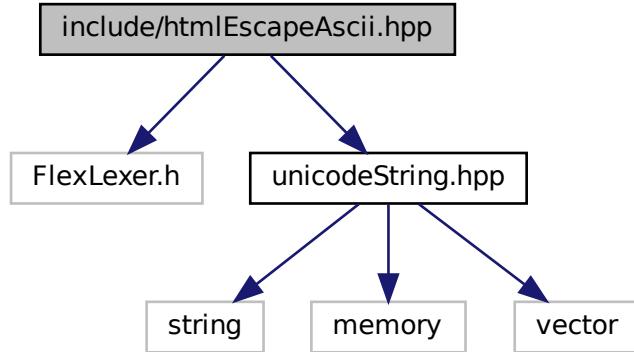
Declare the [Tang::HtmlEscape](#) used to tokenize a Tang script.

6.47 include/htmlEscapeAscii.hpp File Reference

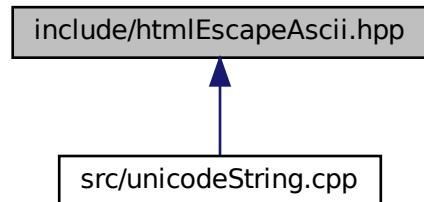
Declare the [Tang::HtmlEscapeAscii](#) used to tokenize a Tang script.

```
#include <FlexLexer.h>
#include "unicodeString.hpp"
```

Include dependency graph for htmlEscapeAscii.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::HtmlEscapeAscii](#)
The Flex lexer class for the main Tang language.

Macros

- `#define yyFlexLexer TangHtmlEscapeAsciiFlexLexer`
- `#define YY_DECL std::string Tang::HtmlEscapeAscii::get_next_token()`

6.47.1 Detailed Description

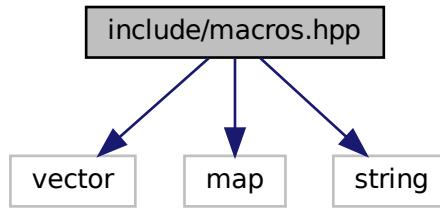
Declare the [Tang::HtmlEscapeAscii](#) used to tokenize a Tang script.

6.48 include/macros.hpp File Reference

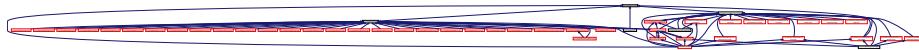
Contains generic macros.

```
#include <vector>
#include <map>
#include <string>
```

Include dependency graph for macros.hpp:



This graph shows which files directly or indirectly include this file:



Typedefs

- using `Tang::integer_t` = `int32_t`
Define the size of signed integers used by Tang.
- using `Tang::uinteger_t` = `int32_t`
Define the size of integers used by Tang.
- using `Tang::float_t` = `float`
Define the size of floats used by Tang.
- using `Tang::NativeFunction` = `GarbageCollected(*)(std::vector< GarbageCollected > &, Context &)`
A function pointer that will be executed.
- using `Tang::NativeBoundFunction` = `GarbageCollected(*)(GarbageCollected &, std::vector< GarbageCollected > &)`
A function pointer that will be executed as bound to an object.
- using `Tang::NativeBoundFunctionMap` = `std::map< std::string, std::pair< size_t, NativeBoundFunction > >`
A map of method names to NativeBoundFunction objects.

6.48.1 Detailed Description

Contains generic macros.

6.49 include/opcode.hpp File Reference

Declare the Opcodes used in the Bytecode representation of a program.

This graph shows which files directly or indirectly include this file:



Enumerations

- enum class Tang::Opcode {
 POP , PEEK , POKE , COPY ,
 JMP , JMPF , JMPF_POP , JMPT ,
 JMPT_POP , NULLVAL , INTEGER , FLOAT ,
 BOOLEAN , STRING , ARRAY , MAP ,
 FUNCTION , ASSIGNINDEX , ADD , SUBTRACT ,
 MULTIPLY , DIVIDE , MODULO , NEGATIVE ,
 NOT , LT , LTE , GT ,
 GTE , EQ , NEQ , PERIOD ,
 INDEX , SLICE , GETITERATOR , ITERATORNEXT ,
 ISITERATOREND , CASTINTEGER , CASTFLOAT , CASTBOOLEAN ,
 CASTSTRING , CALLFUNC , RETURN , PRINT }

6.49.1 Detailed Description

Declare the Opcodes used in the Bytecode representation of a program.

6.49.2 Enumeration Type Documentation

6.49.2.1 Opcode

```
enum Tang::Opcode [ strong ]
```

Enumerator

POP	Pop a val.
PEEK	Stack # (from fp): push val from stack #.
POKE	Stack # (from fp): Copy a val, store @ stack #.
COPY	Stack # (from fp): Deep copy val @ stack #, store @ stack #.
JMP	PC #: set pc to PC #.
JMPF	PC #: read val, if false, set pc to PC #.
JMPF_POP	PC #: pop val, if false, set pc to PC #.
JMPT	PC #: read val, if true, set pc to PC #.
JMPT_POP	PC #: pop val, if true, set pc to PC #.
NULLVAL	Push a null onto the stack.

Enumerator

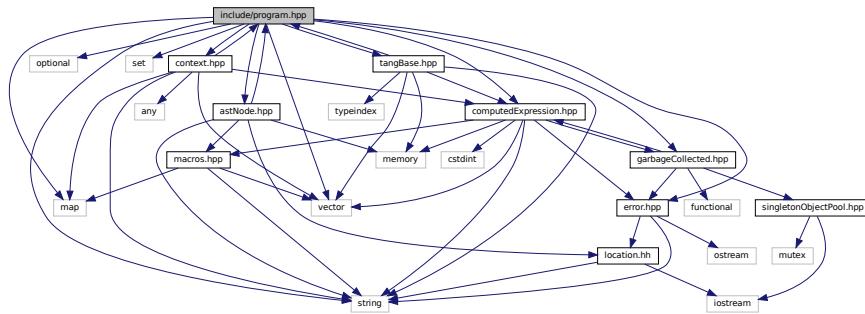
INTEGER	Push an integer onto the stack.
FLOAT	Push a floating point number onto the stack.
BOOLEAN	Push a boolean onto the stack.
STRING	Get len, char string: push string.
ARRAY	Get len, pop len items, putting them into an array with the last array item popped first.
MAP	Get len, pop len value then key pairs, putting them into a map.
FUNCTION	Get argc, PC#: push function(argc, PC #)
ASSIGNINDEX	Pop index, pop collection, pop value, push (collection[index] = value)
ADD	Pop rhs, pop lhs, push lhs + rhs.
SUBTRACT	Pop rhs, pop lhs, push lhs - rhs.
MULTIPLY	Pop rhs, pop lhs, push lhs * rhs.
DIVIDE	Pop rhs, pop lhs, push lhs / rhs.
MODULO	Pop rhs, pop lhs, push lhs % rhs.
NEGATIVE	Pop val, push negative val.
NOT	Pop val, push logical not of val.
LT	Pop rhs, pop lhs, push lhs < rhs.
LTE	Pop rhs, pop lhs, push lhs <= rhs.
GT	Pop rhs, pop lhs, push lhs > rhs.
GTE	Pop rhs, pop lhs, push lhs >= rhs.
EQ	Pop rhs, pop lhs, push lhs == rhs.
NEQ	Pop rhs, pop lhs, push lhs != rhs.
PERIOD	Pop rhs, pop lhs, push lhs.rhs.
INDEX	Pop index, pop collection, push collection[index].
SLICE	Pop skip, pop end, pop begin, pop collection, push collection[begin:end:skip].
GETITERATOR	Pop a collection, push the collection iterator.
ITERATORNEXT	Pop an iterator, push the next iterator value.
ISITERATOREND	Pop a val, push bool(is val == iterator end)
CASTINTEGER	Pop a val, typecast to int, push.
CASTFLOAT	Pop a val, typecast to float, push.
CASTBOOLEAN	Pop a val, typecast to boolean, push.
CASTSTRING	Pop a val, typecast to string, push.
CALLFUNC	Get argc, Pop a function, execute function if argc matches.
RETURN	Get stack #, pop return val, pop (stack #) times, push val, restore fp, restore pc.
PRINT	Pop val, print(val), push error or NULL.

6.50 include/program.hpp File Reference

Declare the [Tang::Program](#) class used to compile and execute source code.

```
#include <string>
#include <optional>
#include <vector>
#include <set>
#include <map>
#include "astNode.hpp"
```

```
#include "error.hpp"
#include "tangBase.hpp"
#include "computedExpression.hpp"
#include "garbageCollected.hpp"
#include "context.hpp"
Include dependency graph for program.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::Program](#)
Represents a compiled script or template that may be executed.

TypeDefs

- using [Tang::Bytecode](#) = std::vector< [Tang::uinteger_t](#) >
Contains the Opcodes of a compiled program.

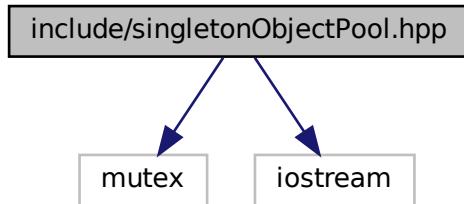
6.50.1 Detailed Description

Declare the [Tang::Program](#) class used to compile and execute source code.

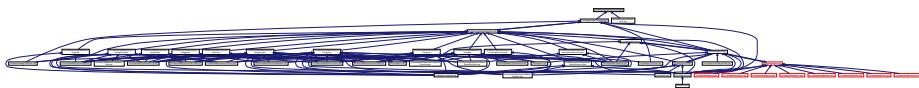
6.51 include/singletonObjectPool.hpp File Reference

Declare the [Tang::SingletonObjectPool](#) class.

```
#include <mutex>
#include <iostream>
Include dependency graph for singletonObjectPool.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::SingletonObjectPool< T >](#)
A thread-safe, singleton object pool of the designated type.

Macros

- [#define GROW 1024](#)
The threshold size to use when allocating blocks of data, measured in the number of instances of the object type.

6.51.1 Detailed Description

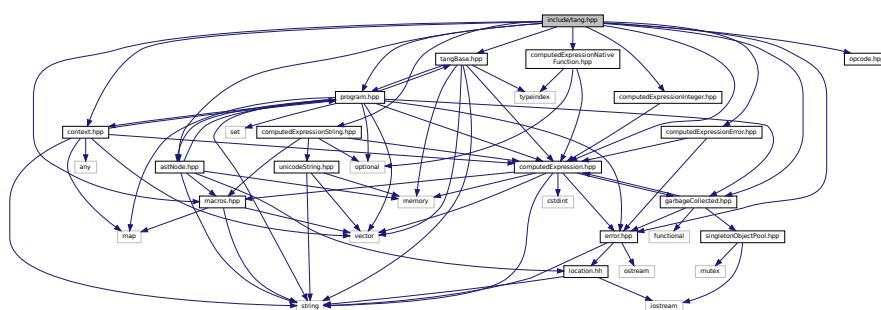
Declare the [Tang::SingletonObjectPool](#) class.

6.52 include/tang.hpp File Reference

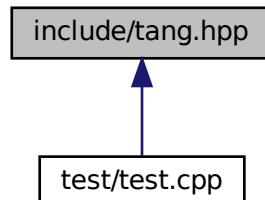
Header file supplied for use by 3rd party code so that they can easily include all necessary headers.

```
#include "macros.hpp"
#include "tangBase.hpp"
#include "astNode.hpp"
#include "error.hpp"
#include "garbageCollected.hpp"
#include "program.hpp"
```

```
#include "context.hpp"
#include "opcode.hpp"
#include "computedExpression.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionNativeFunction.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionError.hpp"
Include dependency graph for tang.hpp:
```



This graph shows which files directly or indirectly include this file:



6.52.1 Detailed Description

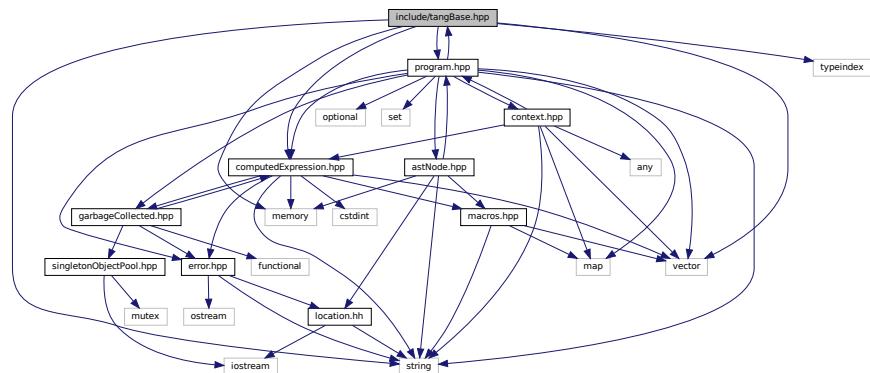
Header file supplied for use by 3rd party code so that they can easily include all necessary headers.

6.53 include/tangBase.hpp File Reference

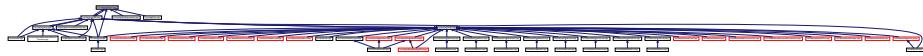
Declare the [Tang::TangBase](#) class used to interact with Tang.

```
#include <memory>
#include <string>
#include <typeindex>
#include <vector>
#include "program.hpp"
```

```
#include "computedExpression.hpp"
Include dependency graph for tangBase.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::TangBase](#)
The base class for the Tang programming language.

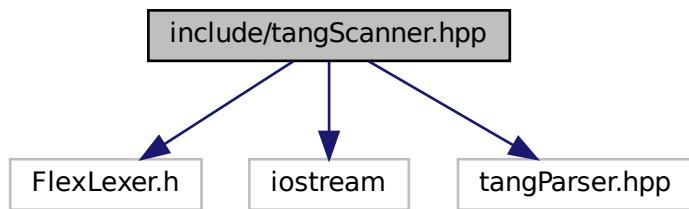
6.53.1 Detailed Description

Declare the [Tang::TangBase](#) class used to interact with Tang.

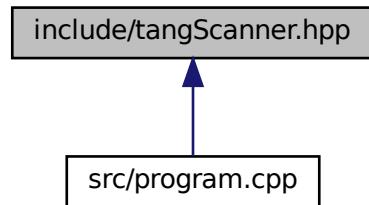
6.54 include/tangScanner.hpp File Reference

Declare the [Tang::TangScanner](#) used to tokenize a Tang script.

```
#include <FlexLexer.h>
#include <iostream>
#include "tangParser.hpp"
Include dependency graph for tangScanner.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::TangScanner](#)
The Flex lexer class for the main Tang language.

Macros

- #define **yyFlexLexer** TangTangFlexLexer
- #define **YY_DECL** Tang::TangParser::symbol_type [Tang::TangScanner::get_next_token\(\)](#)

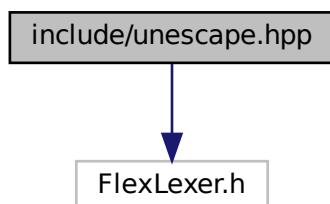
6.54.1 Detailed Description

Declare the [Tang::TangScanner](#) used to tokenize a Tang script.

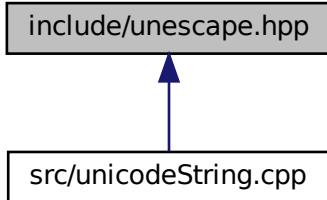
6.55 include/unescape.hpp File Reference

Declare the [Tang::Unescape](#) used to tokenize a Tang script.

```
#include <FlexLexer.h>
Include dependency graph for unescape.hpp:
```



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::Unescape](#)
The Flex lexer class for the main Tang language.

Macros

- #define `yyFlexLexer` TangUnescapeFlexLexer
- #define `YY_DECL` std::string [Tang::Unescape::get_next_token\(\)](#)

6.55.1 Detailed Description

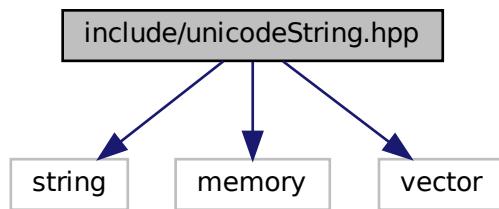
Declare the [Tang::Unescape](#) used to tokenize a Tang script.

6.56 include/unicodeString.hpp File Reference

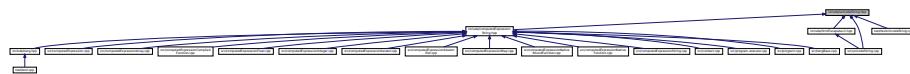
Contains the code to interface with the ICU library.

```
#include <string>
#include <memory>
#include <vector>
```

Include dependency graph for unicodeString.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class [Tang::UnicodeString](#)
Represents a UTF-8 encoded string that is Unicode-aware.

Functions

- std::string [Tang::unescape](#) (const std::string &str)
Return an "unescaped" version of the provided string, which, when interpreted by Tang, should result in a representation equivalent to the original source string.
- std::string [Tang::htmlEscape](#) (const std::string &str)
Return an "html escaped" version of the provided string.
- std::string [Tang::htmlEscapeAscii](#) (const std::string &str, [UnicodeString::Type](#) type=[UnicodeString::Type::Untrusted](#))
Return an Ascii-only, "html escaped" version of the provided string.

6.56.1 Detailed Description

Contains the code to interface with the ICU library.

6.56.2 Function Documentation

6.56.2.1 htmlEscape()

```
string Tang::htmlEscape (
    const std::string & str )
```

Return an "html escaped" version of the provided string.

Only "critical" characters <, >, &, ", and `` will be escaped. All other characters will be allowed through unaltered. The result is a UTF-8 encoded string that is safe for inclusion in an HTML template without disturbing the HTML structure.

Parameters

<code>str</code>	The string to be escaped.
------------------	---------------------------

Returns

An "escaped" version of the provided string.

Here is the call graph for this function:



6.56.2.2 htmlEscapeAscii()

```
string Tang::htmlEscapeAscii (
    const std::string & str,
    UnicodeString::Type type = UnicodeString::Type::Untrusted )
```

Return an Ascii-only, "html escaped" version of the provided string.

This function will convert all characters into an Ascii-only representation of the provided UTF-8 encoded string. Visible, standard Ascii characters will pass through unaltered, but all others will be replaced by their HTML escape sequence (if it exists), or the appropriate hexadecimal escape code.

Parameters

<code>str</code>	The string to be escaped.
------------------	---------------------------

Returns

An "escaped" version of the provided string.

Here is the call graph for this function:



6.56.2.3 unescape()

```
string Tang::unescape (
    const std::string & str )
```

Return an "unescaped" version of the provided string, which, when interpreted by Tang, should result in a representation equivalent to the original source string.

Parameters

<code>str</code>	The string to be unescaped.
------------------	-----------------------------

Returns

An "unescaped" version of the provided string.

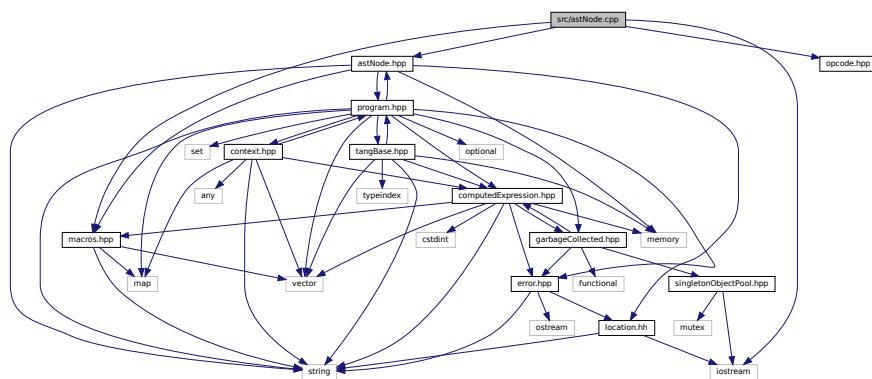
Here is the call graph for this function:



6.57 src/astNode.cpp File Reference

Define the [Tang::AstNode](#) class.

```
#include <iostream>
#include "macros.hpp"
#include "astNode.hpp"
#include "opcode.hpp"
Include dependency graph for astNode.cpp:
```



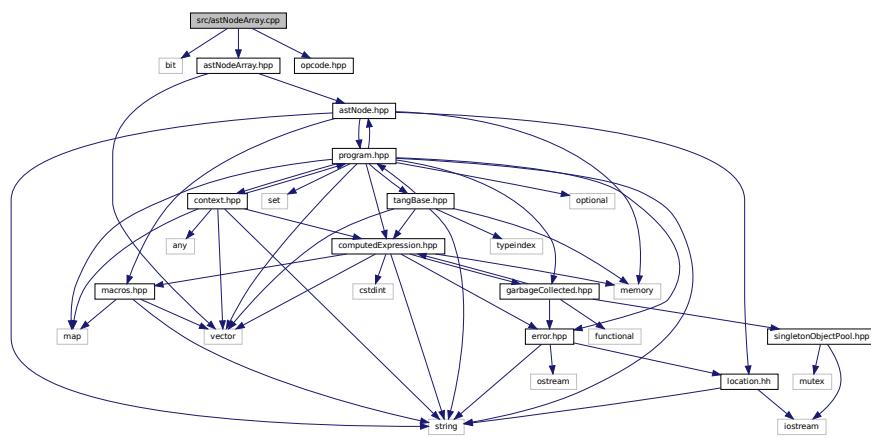
6.57.1 Detailed Description

Define the [Tang::AstNode](#) class.

6.58 src/astNodeArray.cpp File Reference

Define the [Tang::AstNodeArray](#) class.

```
#include <bit>
#include "astNodeArray.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeArray.cpp:
```



6.58.1 Detailed Description

Define the [Tang::AstNodeArray](#) class.

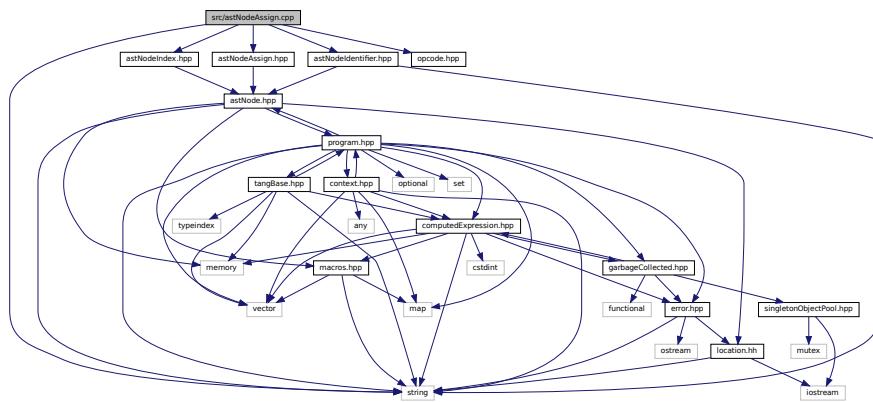
6.59 src/astNodeAssign.cpp File Reference

Define the [Tang::AstNodeAssign](#) class.

```
#include <string>
#include "astNodeAssign.hpp"
#include "astNodeIdentifier.hpp"
#include "astNodeIndex.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for `astNodeAssign.cpp`:



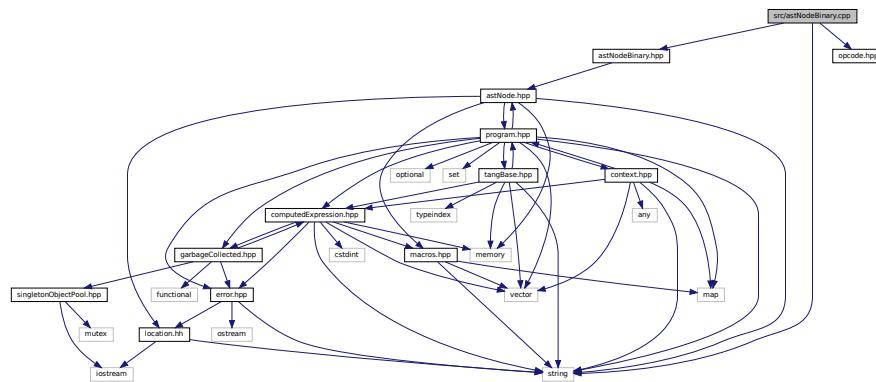
6.59.1 Detailed Description

Define the [Tang::AstNodeAssign](#) class.

6.60 src/astNodeBinary.cpp File Reference

Define the [Tang::AstNodeBinary](#) class.

```
#include <string>
#include "astNodeBinary.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeBinary.cpp:
```



6.60.1 Detailed Description

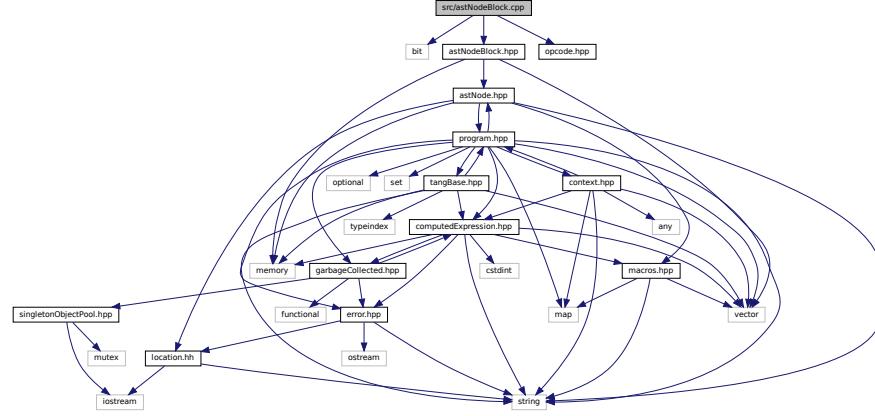
Define the [Tang::AstNodeBinary](#) class.

6.61 src/astNodeBlock.cpp File Reference

Define the [Tang::AstNodeBlock](#) class.

```
#include <bit>
#include "astNodeBlock.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeBlock.cpp:



6.61.1 Detailed Description

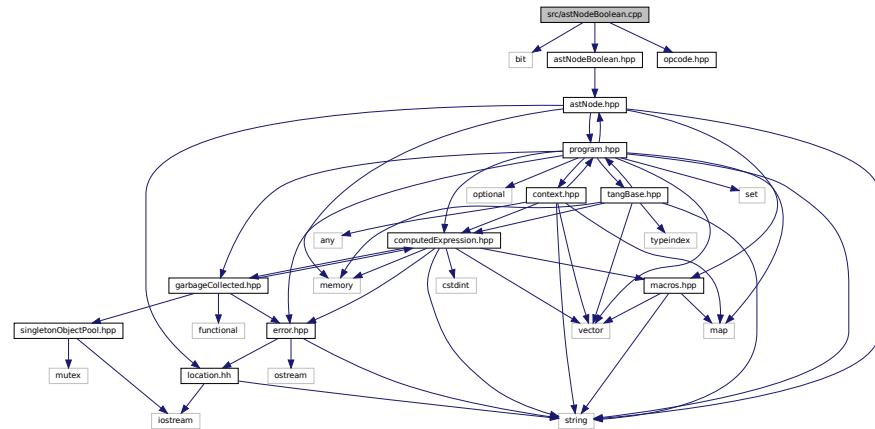
Define the [Tang::AstNodeBlock](#) class.

6.62 src/astNodeBoolean.cpp File Reference

Define the [Tang::AstNodeBoolean](#) class.

```
#include <bit>
#include "astNodeBoolean.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeBoolean.cpp:



6.62.1 Detailed Description

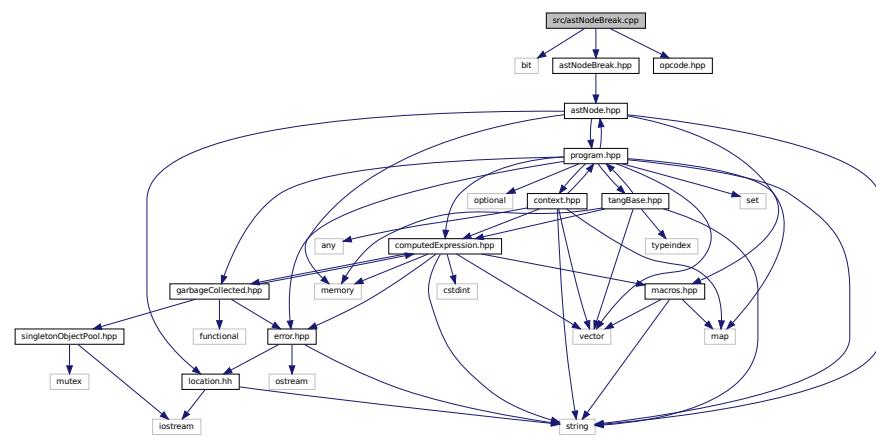
Define the [Tang::AstNodeBoolean](#) class.

6.63 src/astNodeBreak.cpp File Reference

Define the [Tang::AstNodeBreak](#) class.

```
#include <bit>
#include "astNodeBreak.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeBreak.cpp:



6.63.1 Detailed Description

Define the [Tang::AstNodeBreak](#) class.

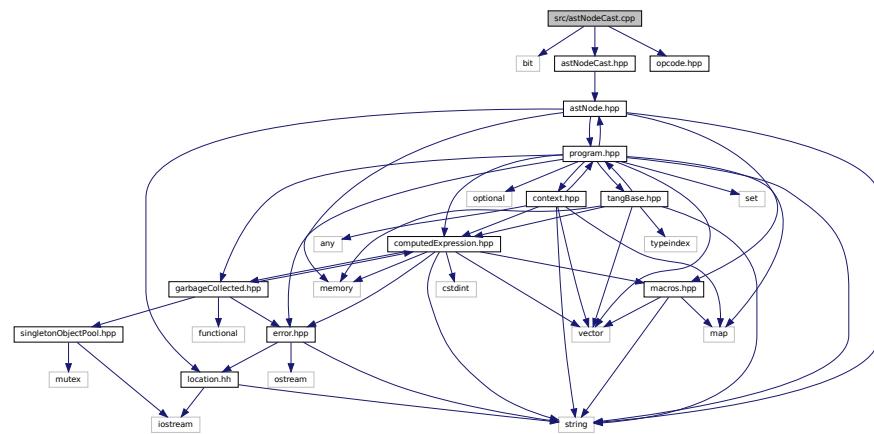
6.64 src/astNodeCast.cpp File Reference

Define the [Tang::AstNodeCast](#) class.

```
#include <bit>
#include "astNodeCast.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodeCast.cpp:



6.64.1 Detailed Description

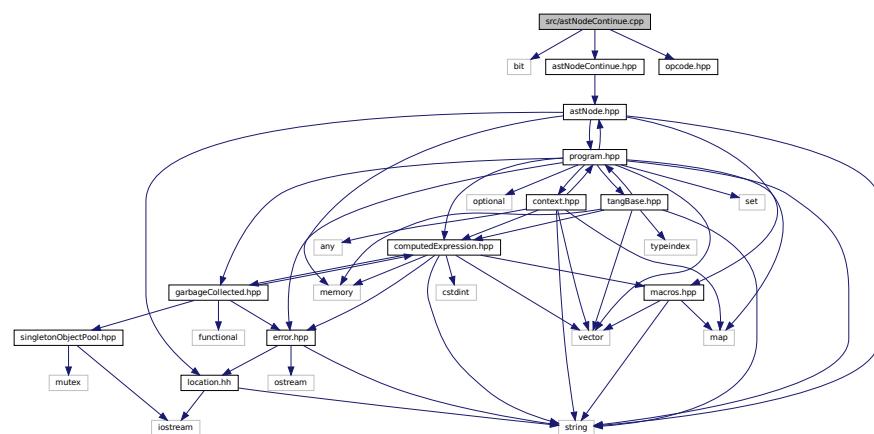
Define the [Tang::AstNodeCast](#) class.

6.65 src/astNodeContinue.cpp File Reference

Define the [Tang::AstNodeContinue](#) class.

```
#include <bit>
#include "astNodeContinue.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeContinue.cpp:



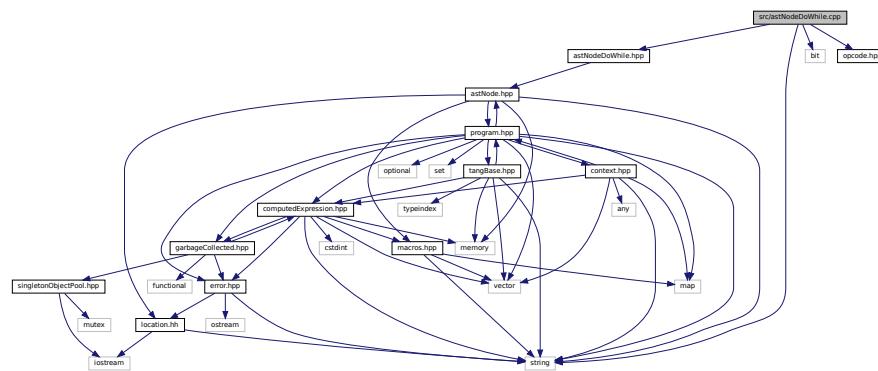
6.65.1 Detailed Description

Define the [Tang::AstNodeContinue](#) class.

6.66 src/astNodeDoWhile.cpp File Reference

Define the [Tang::AstNodeDoWhile](#) class.

```
#include <string>
#include <bit>
#include "astNodeDoWhile.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeDoWhile.cpp:
```



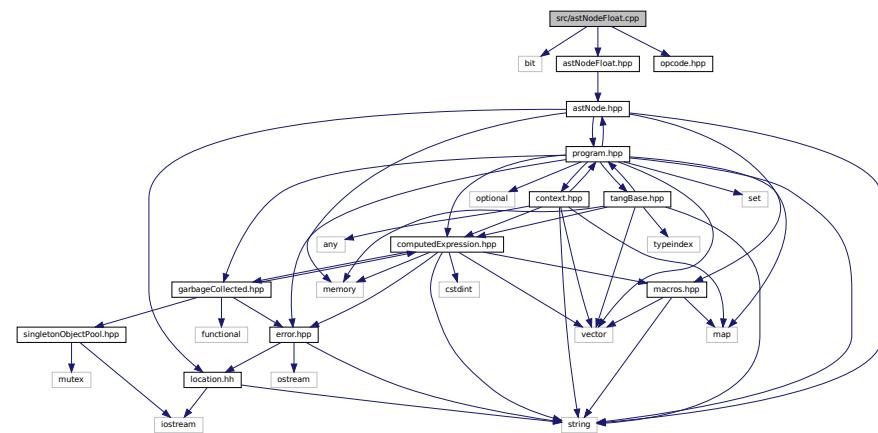
6.66.1 Detailed Description

Define the [Tang::AstNodeDoWhile](#) class.

6.67 src/astNodeFloat.cpp File Reference

Define the [Tang::AstNodeFloat](#) class.

```
#include <bit>
#include "astNodeFloat.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeFloat.cpp:
```



6.67.1 Detailed Description

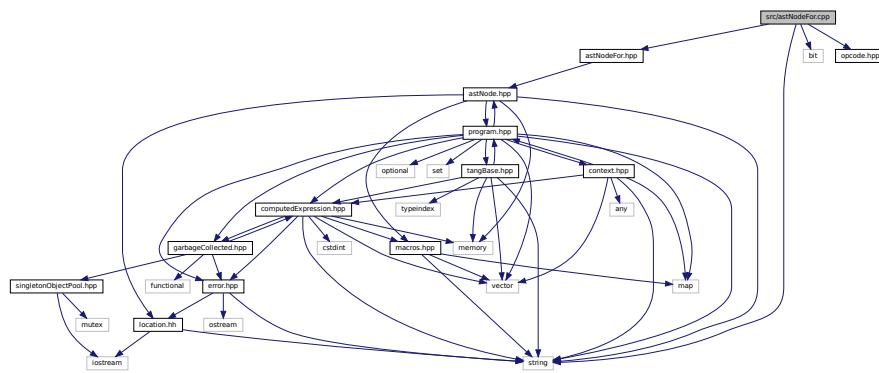
Define the [Tang::AstNodeFloat](#) class.

6.68 src/astNodeFor.cpp File Reference

Define the [Tang::AstNodeFor](#) class.

```
#include <string>
#include <bit>
#include "astNodeFor.hpp"
#include "opcode.hpp"

Include dependency graph for astNodeFor.cpp:
```



6.68.1 Detailed Description

Define the [Tang::AstNodeFor](#) class.

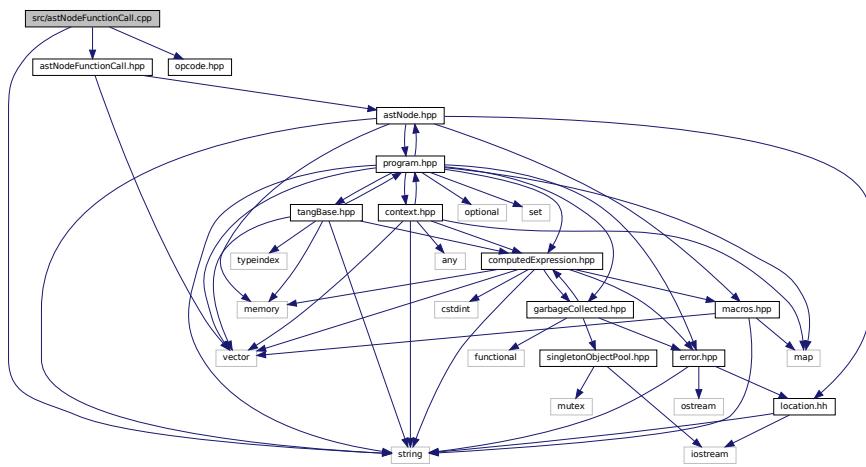
6.69 src/astNodeFunctionCall.cpp File Reference

Define the [Tang::AstNodeFunctionCall](#) class.

```
#include <string>
#include "astNodeFunctionCall.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for `astNodeFunctionCall.cpp`:



6.69.1 Detailed Description

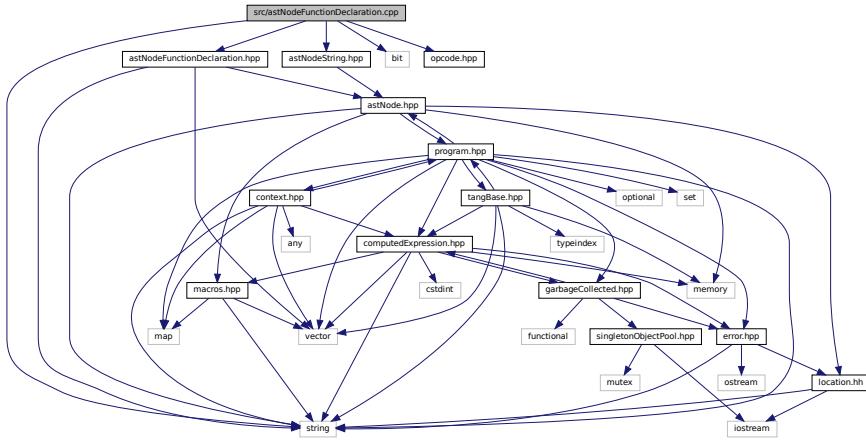
Define the [Tang::AstNodeFunctionCall](#) class.

6.70 src/astNodeFunctionDeclaration.cpp File Reference

Define the [Tang::AstNodeFunctionDeclaration](#) class.

```
#include <string>
#include <bit>
#include "astNodeFunctionDeclaration.hpp"
#include "astNodeString.hpp"
#include "opcode.hpp"
```

Include dependency graph for `astNodeFunctionDeclaration.cpp`:



6.70.1 Detailed Description

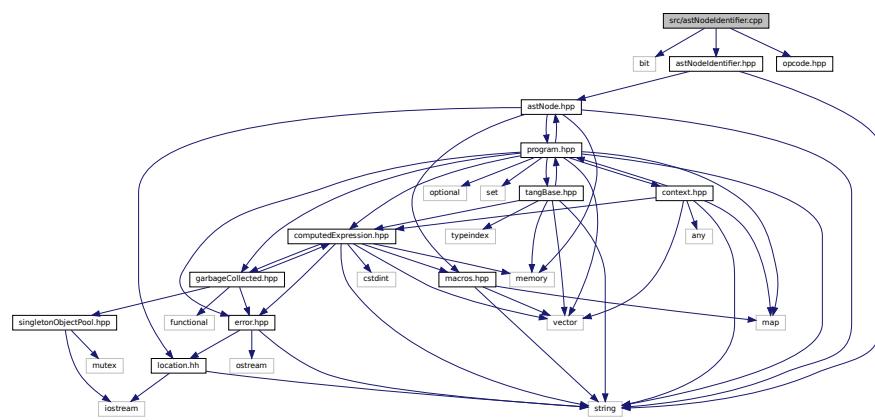
Define the [Tang::AstNodeFunctionDeclaration](#) class.

6.71 src/astNodelentifier.cpp File Reference

Define the [Tang::AstNodelentifier](#) class.

```
#include <bit>
#include "astNodelentifier.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodelentifier.cpp:



6.71.1 Detailed Description

Define the [Tang::AstNodelentifier](#) class.

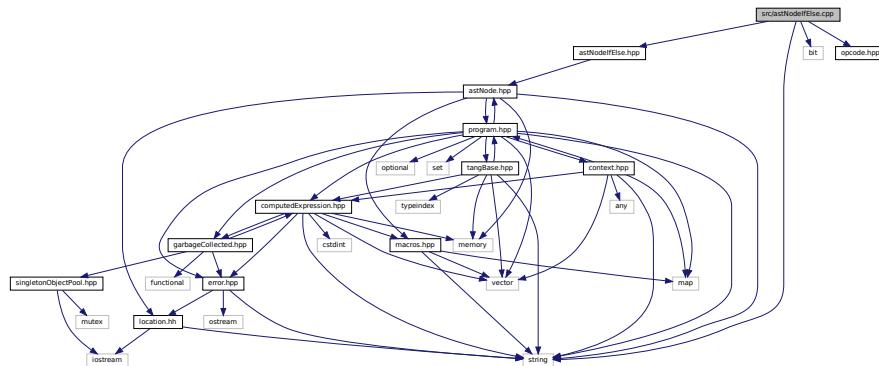
6.72 src/astNodelfElse.cpp File Reference

Define the [Tang::AstNodelfElse](#) class.

```
#include <string>
#include <bit>
#include "astNodelfElse.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for `astNodeIfElse.cpp`:



6.72.1 Detailed Description

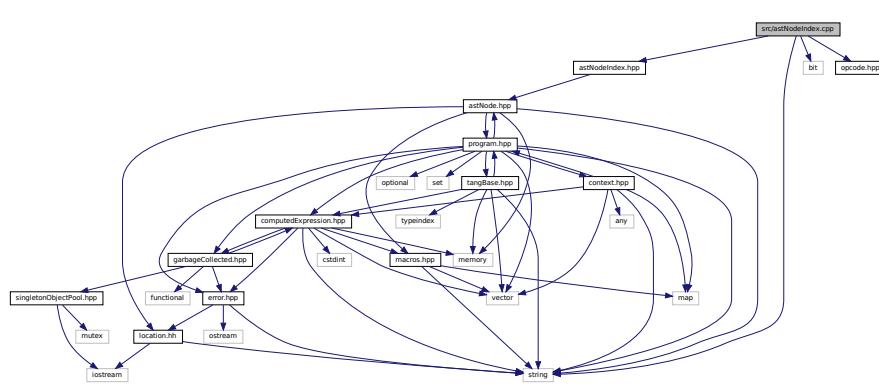
Define the [Tang::AstNodeIfElse](#) class.

6.73 src/astNodeIndex.cpp File Reference

Define the [Tang::AstNodeIndex](#) class.

```
#include <string>
#include <bit>
#include "astNodeIndex.hpp"
#include "opcode.hpp"
```

Include dependency graph for `astNodeIndex.cpp`:



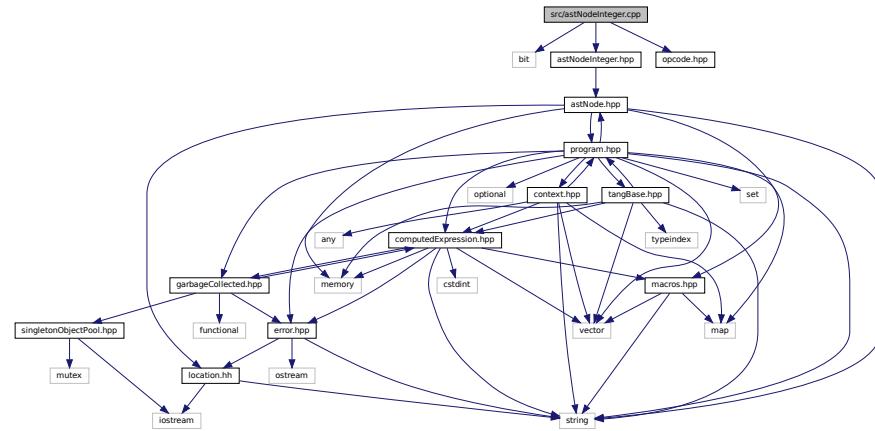
6.73.1 Detailed Description

Define the [Tang::AstNodeIndex](#) class.

6.74 src/astNodeInteger.cpp File Reference

Define the [Tang::AstNodeInteger](#) class.

```
#include <bit>
#include "astNodeInteger.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeInteger.cpp:
```



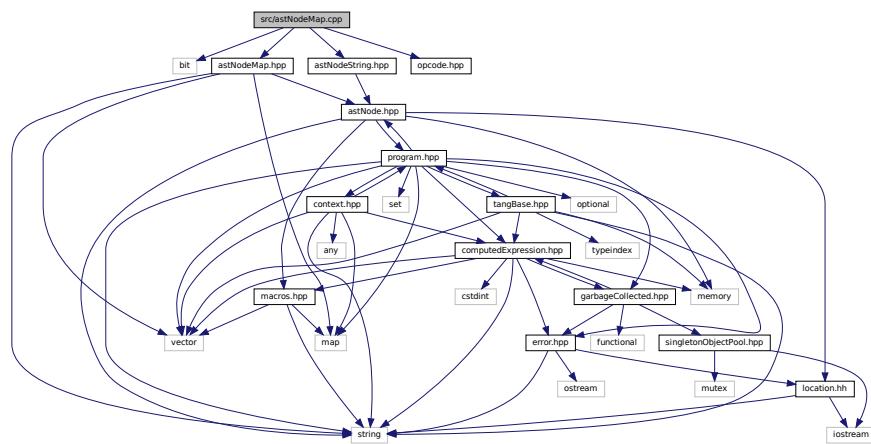
6.74.1 Detailed Description

Define the [Tang::AstNodeInteger](#) class.

6.75 src/astNodeMap.cpp File Reference

Define the [Tang::AstNodeMap](#) class.

```
#include <bit>
#include "astNodeMap.hpp"
#include "astNodeString.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeMap.cpp:
```



6.75.1 Detailed Description

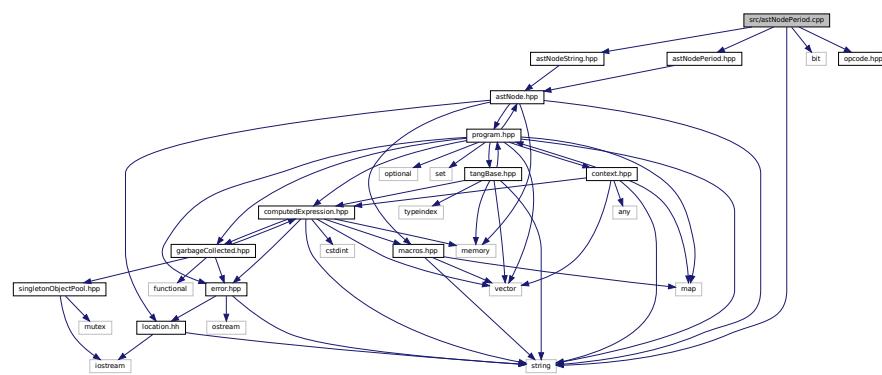
Define the [Tang::AstNodeMap](#) class.

6.76 src/astNodePeriod.cpp File Reference

Define the [Tang::AstNodePeriod](#) class.

```
#include <string>
#include <bit>
#include "astNodePeriod.hpp"
#include "astNodeString.hpp"
#include "opcode.hpp"

Include dependency graph for astNodePeriod.cpp:
```



6.76.1 Detailed Description

Define the [Tang::AstNodePeriod](#) class.

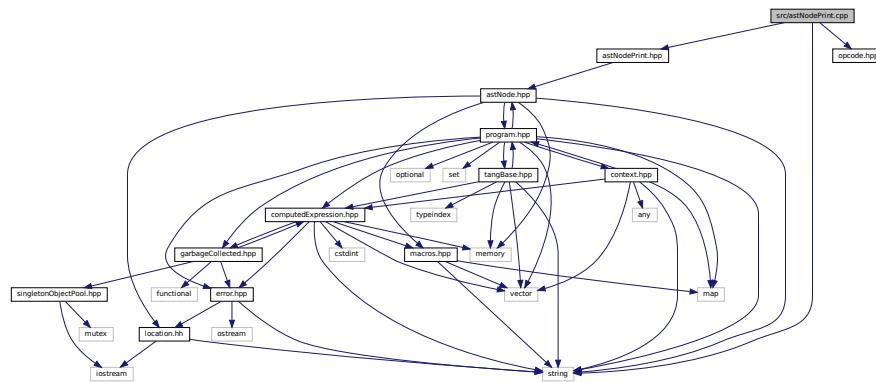
6.77 src/astNodePrint.cpp File Reference

Define the [Tang::AstNodePrint](#) class.

```
#include <string>
#include "astNodePrint.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodePrint.cpp:



6.77.1 Detailed Description

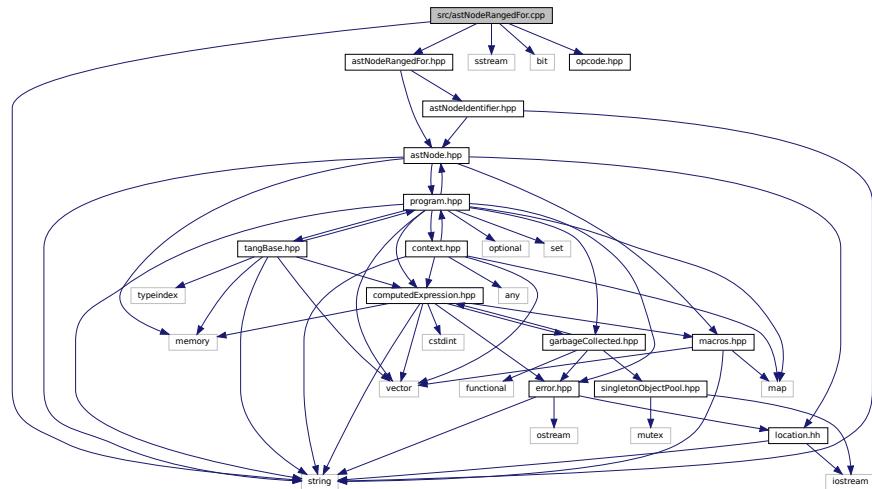
Define the [Tang::AstNodePrint](#) class.

6.78 src/astNodeRangedFor.cpp File Reference

Define the [Tang::AstNodeRangedFor](#) class.

```
#include <string>
#include <sstream>
#include <bit>
#include "astNodeRangedFor.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeRangedFor.cpp:



6.78.1 Detailed Description

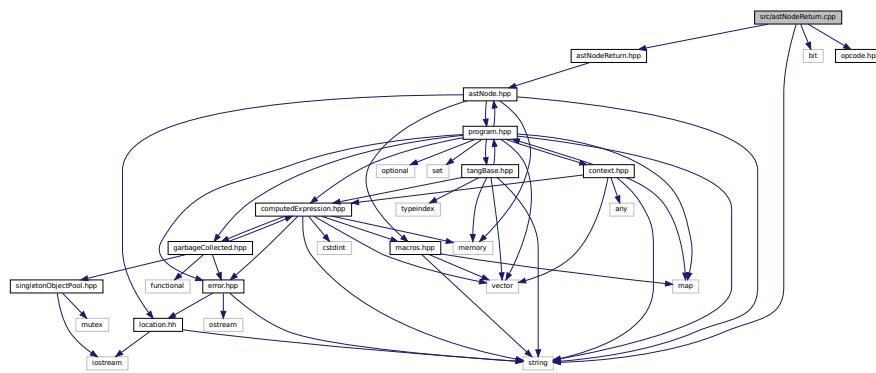
Define the [Tang::AstNodeRangedFor](#) class.

6.79 src/astNodeReturn.cpp File Reference

Define the [Tang::AstNodeReturn](#) class.

```
#include <string>
#include <bit>
#include "astNodeReturn.hpp"
#include "opcode.hpp"

Include dependency graph for astNodeReturn.cpp:
```



6.79.1 Detailed Description

Define the [Tang::AstNodeReturn](#) class.

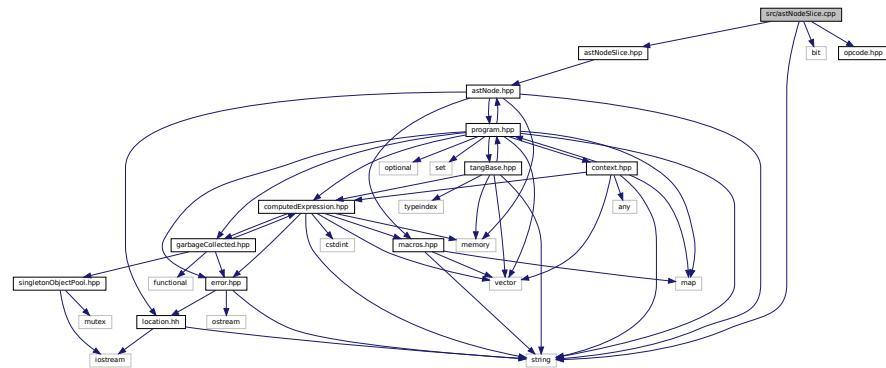
6.80 src/astNodeSlice.cpp File Reference

Define the [Tang::AstNodeSlice](#) class.

```
#include <string>
#include <bit>
#include "astNodeSlice.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodeSlice.cpp:



6.80.1 Detailed Description

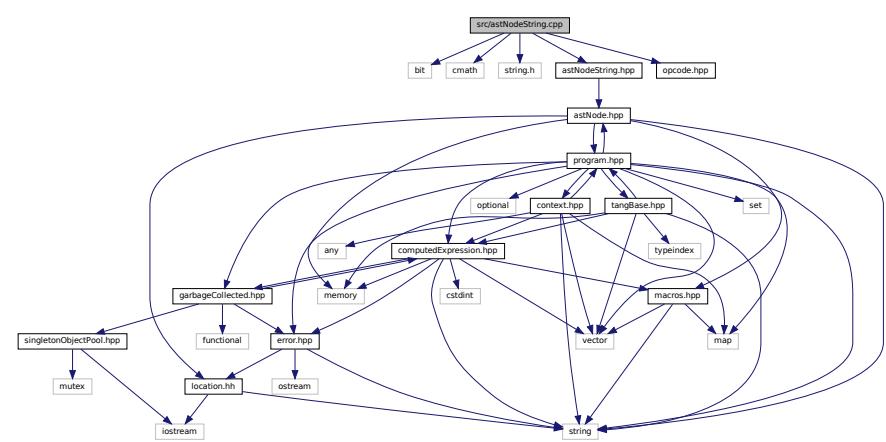
Define the [Tang::AstNodeSlice](#) class.

6.81 src/astNodeString.cpp File Reference

Define the [Tang::AstNodeString](#) class.

```
#include <bit>
#include <cmath>
#include <string.h>
#include "astNodeString.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeString.cpp:



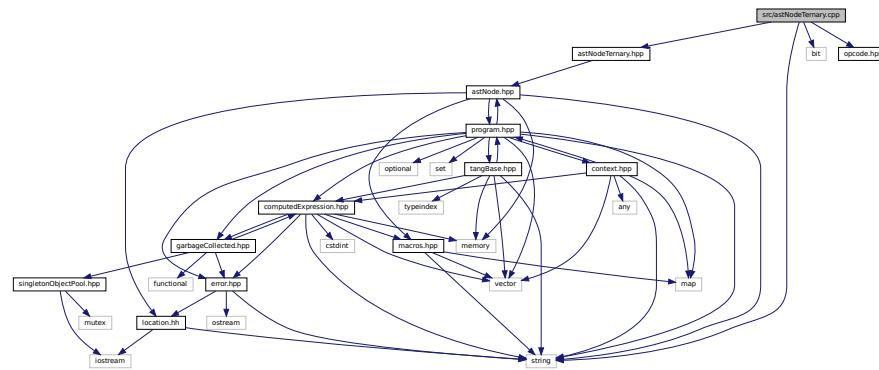
6.81.1 Detailed Description

Define the [Tang::AstNodeString](#) class.

6.82 src/astNodeTernary.cpp File Reference

Define the [Tang::AstNodeTernary](#) class.

```
#include <string>
#include <bit>
#include "astNodeTernary.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeTernary.cpp:
```



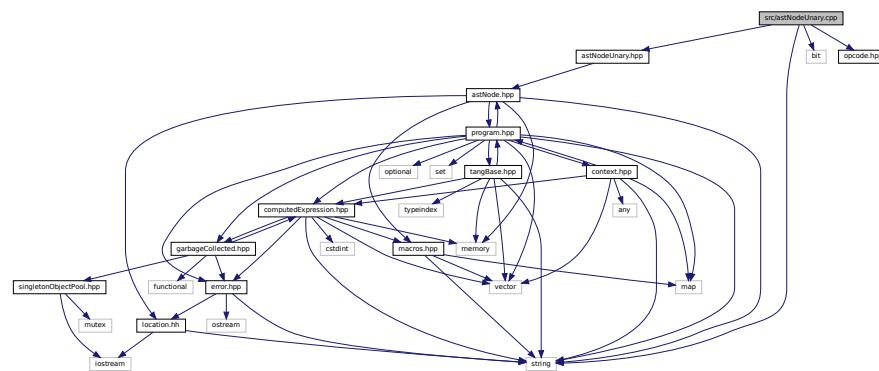
6.82.1 Detailed Description

Define the [Tang::AstNodeTernary](#) class.

6.83 src/astNodeUnary.cpp File Reference

Define the [Tang::AstNodeUnary](#) class.

```
#include <string>
#include <bit>
#include "astNodeUnary.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeUnary.cpp:
```



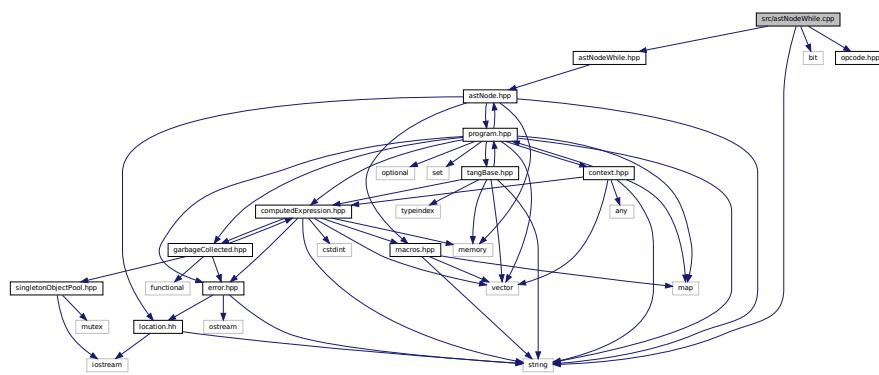
6.83.1 Detailed Description

Define the [Tang::AstNodeUnary](#) class.

6.84 src/astNodeWhile.cpp File Reference

Define the [Tang::AstNodeWhile](#) class.

```
#include <string>
#include <bit>
#include "astNodeWhile.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeWhile.cpp:
```



6.84.1 Detailed Description

Define the [Tang::AstNodeWhile](#) class.

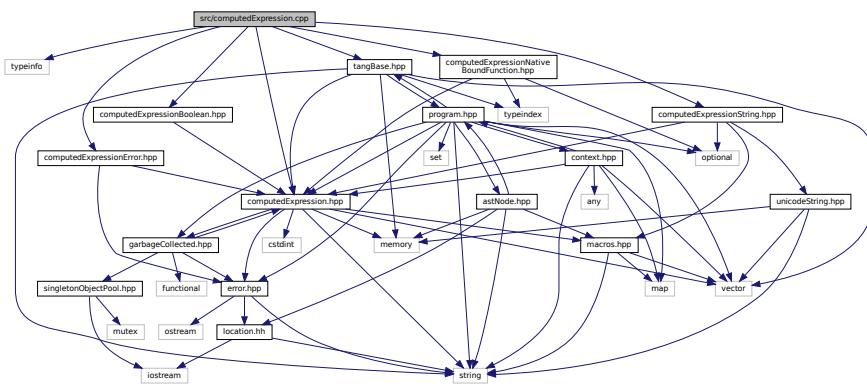
6.85 src/computedExpression.cpp File Reference

Define the [Tang::ComputedExpression](#) class.

```
#include <typeinfo>
#include "computedExpression.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionNativeBoundFunction.hpp"
#include "computedExpressionError.hpp"
```

```
#include "tangBase.hpp"
```

Include dependency graph for computedExpression.cpp:



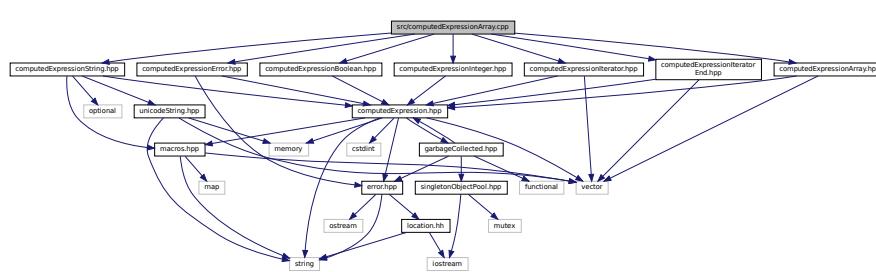
6.85.1 Detailed Description

Define the [Tang::ComputedExpression](#) class.

6.86 src/computedExpressionArray.cpp File Reference

Define the [Tang::ComputedExpressionArray](#) class.

```
#include "computedExpressionArray.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionIterator.hpp"
#include "computedExpressionIteratorEnd.hpp"
#include "computedExpressionError.hpp"
Include dependency graph for computedExpressionArray.cpp:
```



6.86.1 Detailed Description

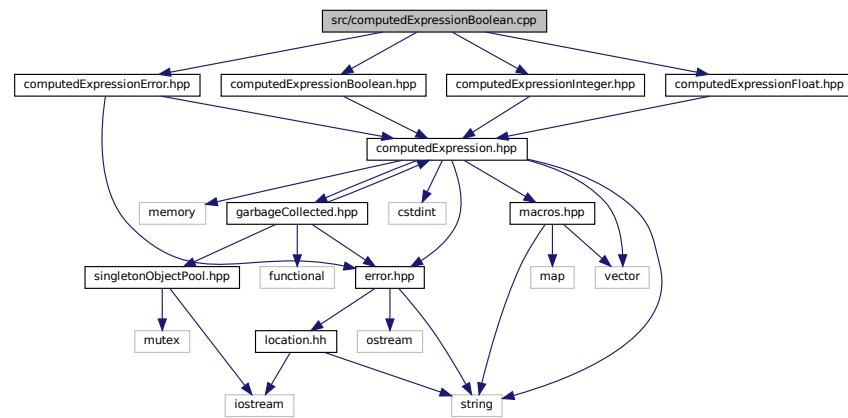
Define the [Tang::ComputedExpressionArray](#) class.

6.87 src/computedExpressionBoolean.cpp File Reference

Define the [Tang::ComputedExpressionBoolean](#) class.

```
#include "computedExpressionBoolean.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionFloat.hpp"
#include "computedExpressionError.hpp"
```

Include dependency graph for `computedExpressionBoolean.cpp`:



6.87.1 Detailed Description

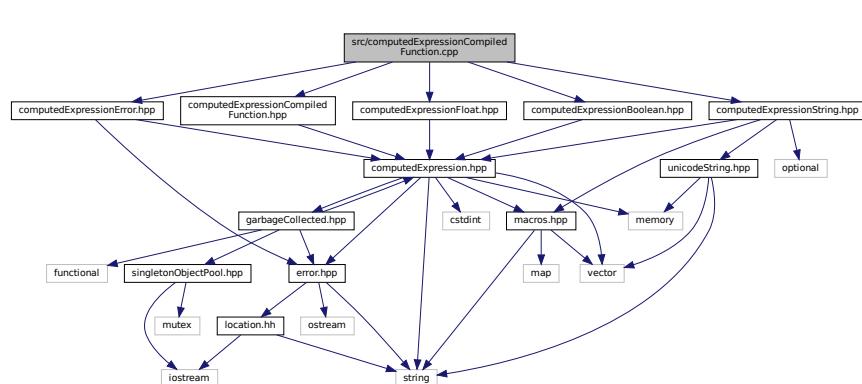
Define the [Tang::ComputedExpressionBoolean](#) class.

6.88 src/computedExpressionCompiledFunction.cpp File Reference

Define the [Tang::ComputedExpressionCompiledFunction](#) class.

```
#include "computedExpressionCompiledFunction.hpp"
#include "computedExpressionFloat.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionError.hpp"
```

Include dependency graph for `computedExpressionCompiledFunction.cpp`:



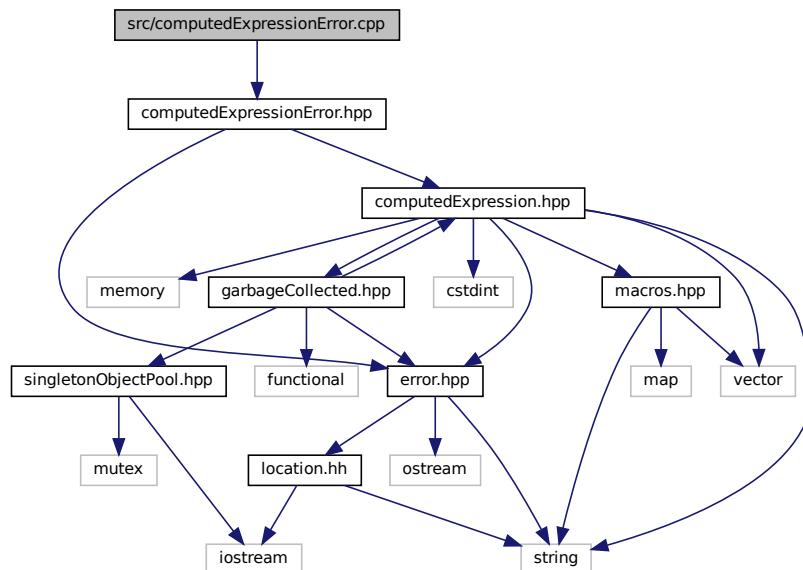
6.88.1 Detailed Description

Define the [Tang::ComputedExpressionCompiledFunction](#) class.

6.89 src/computedExpressionError.cpp File Reference

Define the [Tang::ComputedExpressionError](#) class.

```
#include "computedExpressionError.hpp"
Include dependency graph for computedExpressionError.cpp:
```



6.89.1 Detailed Description

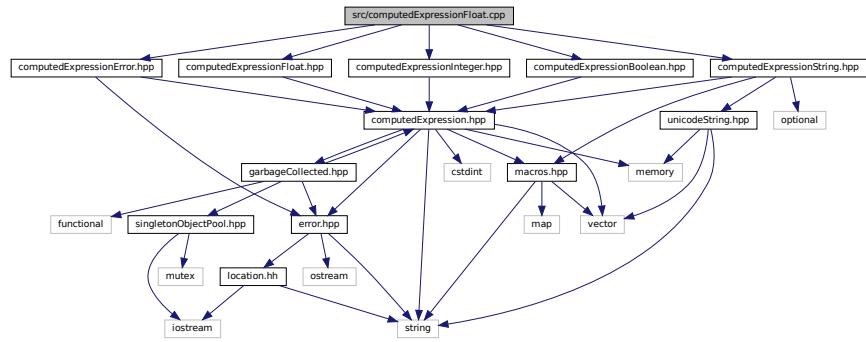
Define the [Tang::ComputedExpressionError](#) class.

6.90 src/computedExpressionFloat.cpp File Reference

Define the [Tang::ComputedExpressionFloat](#) class.

```
#include "computedExpressionFloat.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
```

```
#include "computedExpressionError.hpp"
Include dependency graph for computedExpressionFloat.cpp:
```



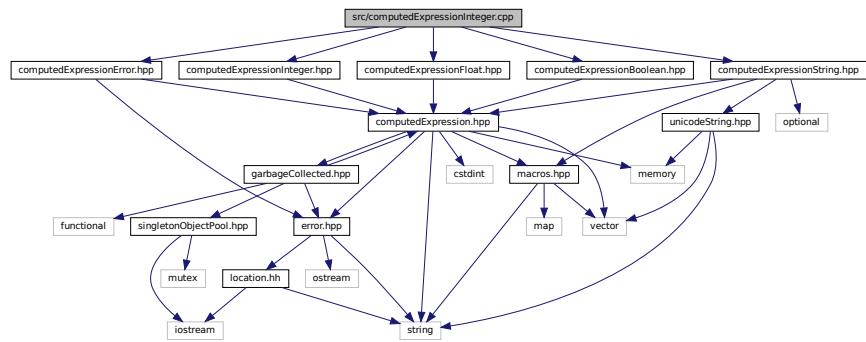
6.90.1 Detailed Description

Define the [Tang::ComputedExpressionFloat](#) class.

6.91 src/computedExpressionInteger.cpp File Reference

Define the [Tang::ComputedExpressionInteger](#) class.

```
#include "computedExpressionInteger.hpp"
#include "computedExpressionFloat.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionError.hpp"
Include dependency graph for computedExpressionInteger.cpp:
```



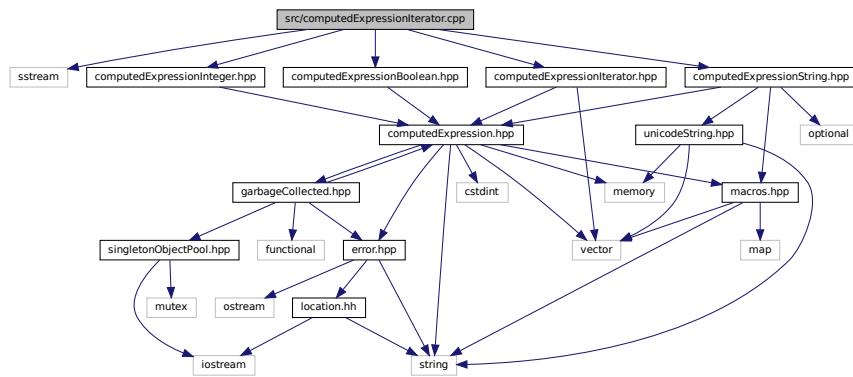
6.91.1 Detailed Description

Define the [Tang::ComputedExpressionInteger](#) class.

6.92 src/computedExpressionIterator.cpp File Reference

Define the `Tang::ComputedExpressionIterator` class.

```
#include <sstream>
#include "computedExpressionIterator.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
Include dependency graph for computedExpressionIterator.cpp:
```



6.92.1 Detailed Description

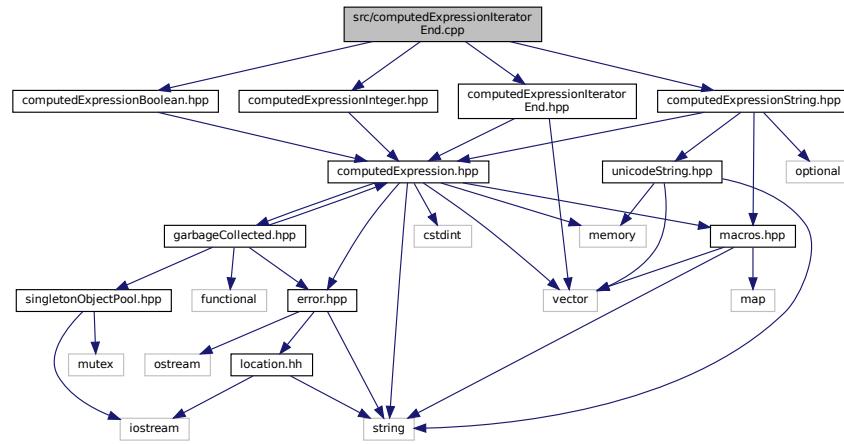
Define the `Tang::ComputedExpressionIterator` class.

6.93 src/computedExpressionIteratorEnd.cpp File Reference

Define the `Tang::ComputedExpressionIteratorEnd` class.

```
#include "computedExpressionIteratorEnd.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
```

Include dependency graph for computedExpressionIteratorEnd.cpp:



6.93.1 Detailed Description

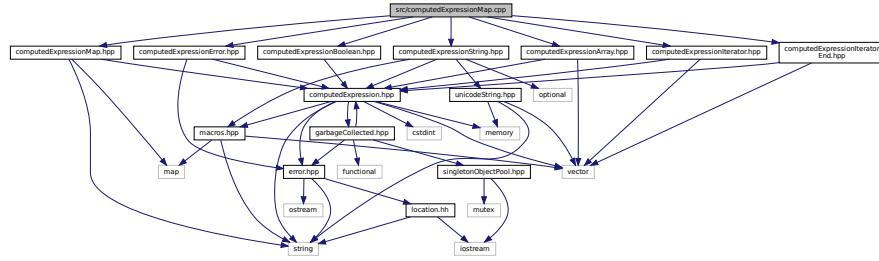
Define the [Tang::ComputedExpressionIteratorEnd](#) class.

6.94 src/computedExpressionMap.cpp File Reference

Define the [Tang::ComputedExpressionMap](#) class.

```
#include "computedExpressionMap.hpp"
#include "computedExpressionArray.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionIterator.hpp"
#include "computedExpressionIteratorEnd.hpp"
#include "computedExpressionError.hpp"
```

Include dependency graph for computedExpressionMap.cpp:



6.94.1 Detailed Description

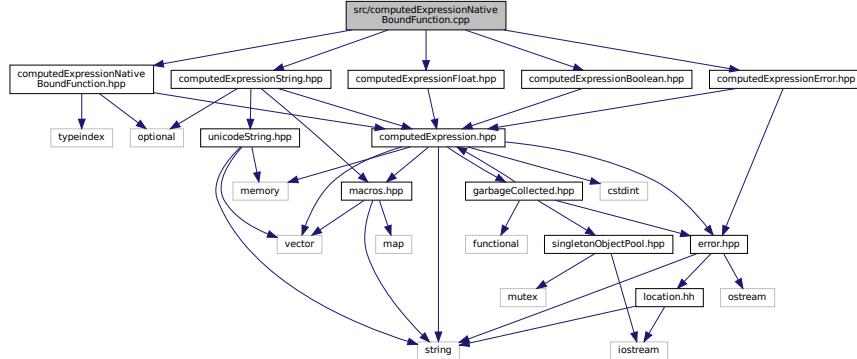
Define the [Tang::ComputedExpressionMap](#) class.

6.95 src/computedExpressionNativeBoundFunction.cpp File Reference

Define the [Tang::ComputedExpressionNativeBoundFunction](#) class.

```
#include "computedExpressionNativeBoundFunction.hpp"
#include "computedExpressionFloat.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionError.hpp"
Include dependency graph for computedExpressionNativeBoundFunction.cpp:
```

Include dependency graph for computedExpressionNativeBoundFunction.cpp:



6.95.1 Detailed Description

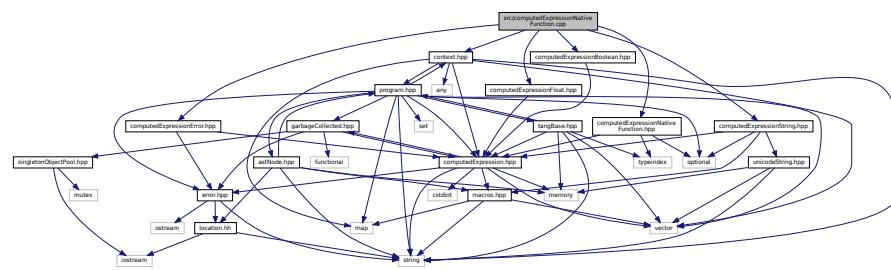
Define the `Tang::ComputedExpressionNativeBoundFunction` class.

6.96 src/computedExpressionNativeFunction.cpp File Reference

Define the `Tang::ComputedExpressionNativeFunction` class.

```
#include "context.hpp"
#include "computedExpressionNativeFunction.hpp"
#include "computedExpressionFloat.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionError.hpp"
```

Include dependency graph for computedExpressionNativeFunction.cpp:



6.96.1 Detailed Description

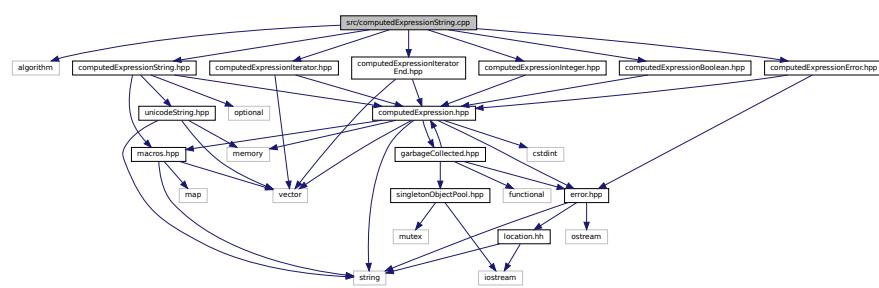
Define the [Tang::ComputedExpressionNativeFunction](#) class.

6.97 src/computedExpressionString.cpp File Reference

Define the [Tang::ComputedExpressionString](#) class.

```
#include <algorithm>
#include "computedExpressionString.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionError.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionIterator.hpp"
#include "computedExpressionIteratorEnd.hpp"
#include "computedExpressionIteratorEnd.hpp"

Include dependency graph for computedExpressionString.cpp:
```



6.97.1 Detailed Description

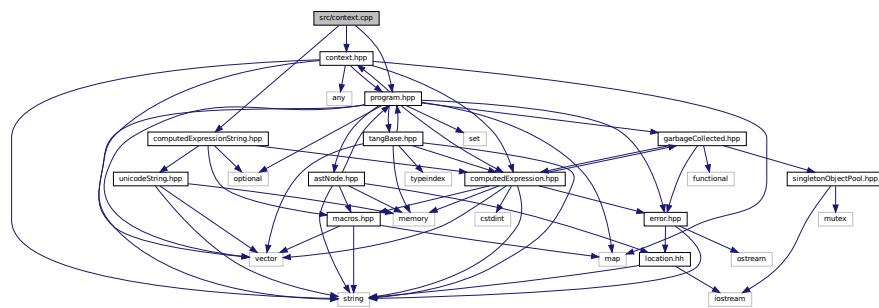
Define the [Tang::ComputedExpressionString](#) class.

6.98 src/context.cpp File Reference

Define the [Tang::Context](#) class.

```
#include "context.hpp"
#include "program.hpp"
#include "computedExpressionString.hpp"

Include dependency graph for context.cpp:
```



6.98.1 Detailed Description

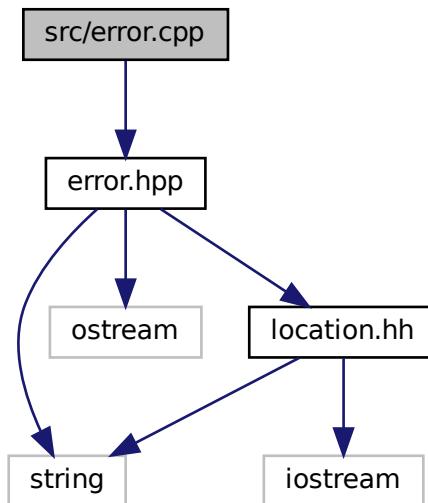
Define the [Tang::Context](#) class.

6.99 src/error.cpp File Reference

Define the [Tang::Error](#) class.

```
#include "error.hpp"
```

Include dependency graph for error.cpp:



Functions

- std::ostream & [Tang::operator<<](#) (std::ostream &out, const Error &error)

6.99.1 Detailed Description

Define the [Tang::Error](#) class.

6.99.2 Function Documentation

6.99.2.1 operator<<()

```
std::ostream& Tang::operator<< (
    std::ostream & out,
    const Error & error )
```

Parameters

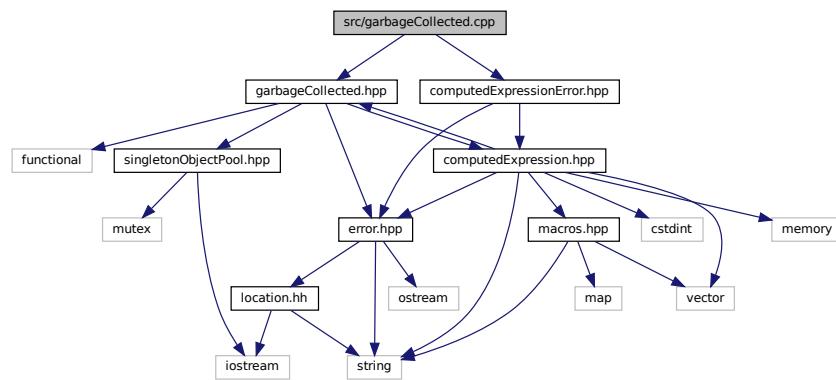
<i>out</i>	The output stream.
<i>error</i>	The Error object.

Returns

The output stream.

6.100 src/garbageCollected.cpp File Reference

```
#include "garbageCollected.hpp"
#include "computedExpressionError.hpp"
Include dependency graph for garbageCollected.cpp:
```



Functions

- std::ostream & [Tang::operator<<](#) (std::ostream &*out*, const GarbageCollected &*gc*)

6.100.1 Function Documentation

6.100.1.1 operator<<()

```
std::ostream& Tang::operator<< (
    std::ostream & out,
    const GarbageCollected & gc )
```

Parameters

<i>out</i>	The output stream.
<i>gc</i>	The GarbageCollected value.

Returns

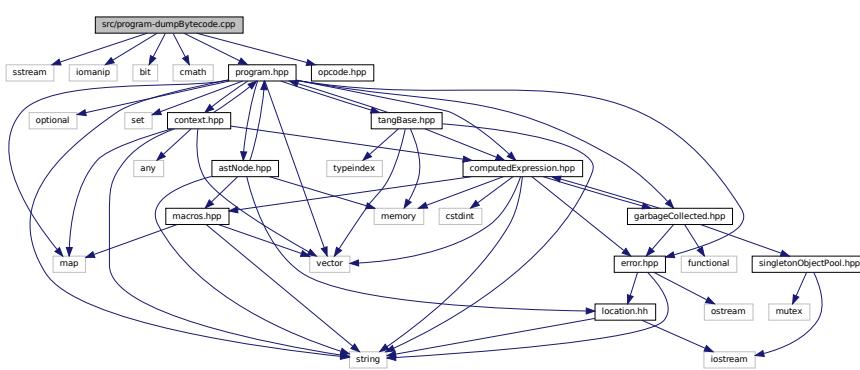
The output stream.

6.101 src/program-dumpBytecode.cpp File Reference

Define the [Tang::Program::dumpBytecode](#) method.

```
#include <iostream>
#include <iomanip>
#include <bit>
#include <cmath>
#include "program.hpp"
#include "opcode.hpp"
```

Include dependency graph for program-dumpBytecode.cpp:



Macros

- `#define DUMPPROGRAMCHECK(x)`

Verify the size of the Bytecode vector so that it may be safely accessed.

6.101.1 Detailed Description

Define the [Tang::Program::dumpBytecode](#) method.

6.101.2 Macro Definition Documentation

6.101.2.1 DUMPPROGRAMCHECK

```
#define DUMPPROGRAMCHECK(
    x )
```

Value:

```
if (this->bytecode.size() < (pc + (x))) \
    return out.str() + "Error: Opcode truncated\n"
```

Verify the size of the Bytecode vector so that it may be safely accessed.

If the vector is not large enough, an error message is appended to the output string and no further opcodes are printed.

Parameters

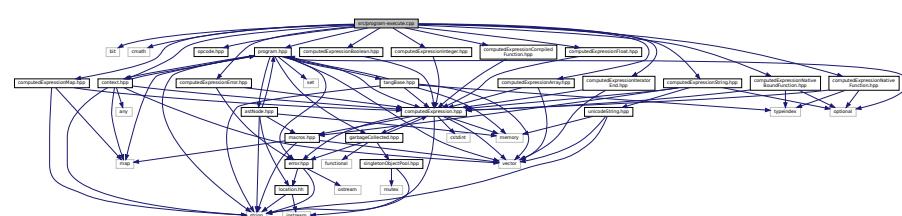
x	The number of additional vector entries that should exist.
---	--

6.102 src/program-execute.cpp File Reference

Define the [Tang::Program::execute](#) method.

```
#include <bit>
#include <cmath>
#include "program.hpp"
#include "context.hpp"
#include "opcode.hpp"
#include "computedExpressionError.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionFloat.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionArray.hpp"
#include "computedExpressionMap.hpp"
#include "computedExpressionCompiledFunction.hpp"
#include "computedExpressionNativeBoundFunction.hpp"
#include "computedExpressionNativeFunction.hpp"
#include "computedExpressionIteratorEnd.hpp"
```

Include dependency graph for program-execute.cpp:



Macros

- `#define EXECUTEPROGRAMCHECK(x)`
Verify the size of the Bytecode vector so that it may be safely accessed.
- `#define STACKCHECK(x)`
Verify the size of the context.stack vector so that it may be safely accessed.

6.102.1 Detailed Description

Define the [Tang::Program::execute](#) method.

6.102.2 Macro Definition Documentation

6.102.2.1 EXECUTEPROGRAMCHECK

```
#define EXECUTEPROGRAMCHECK(
    x )
```

Value:

```
if (this->bytecode.size() < (context.pc + (x))) { \
    context.stack.push_back(GarbageCollected::make<ComputedExpressionError>(Error{"Opcode instruction \
        truncated."})); \
    context.pc = this->bytecode.size(); \
    break; \
}
```

Verify the size of the Bytecode vector so that it may be safely accessed.

Parameters

x	The number of additional vector entries that should exist.
---	--

6.102.2.2 STACKCHECK

```
#define STACKCHECK(
    x )
```

Value:

```
if (context.stack.size() < (context.fp + (x))) { \
    context.stack.push_back(GarbageCollected::make<ComputedExpressionError>(Error{"Insufficient \
        context.stack depth."})); \
    context.pc = this->bytecode.size(); \
    break; \
}
```

Verify the size of the context.stack vector so that it may be safely accessed.

Parameters

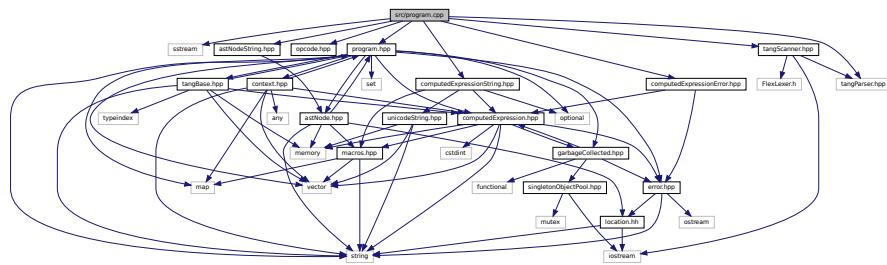
x	The number of entries that should exist in the context.stack.
---	---

6.103 src/program.cpp File Reference

Define the Tang::Program class.

```
#include <sstream>
#include "program.hpp"
#include "opcode.hpp"
#include "tangScanner.hpp"
#include "tangParser.hpp"
#include "astNodeString.hpp"
#include "computedExpressionString.hpp"
```

```
#include "computedExpressionError.hpp"
Include dependency graph for program.cpp:
```



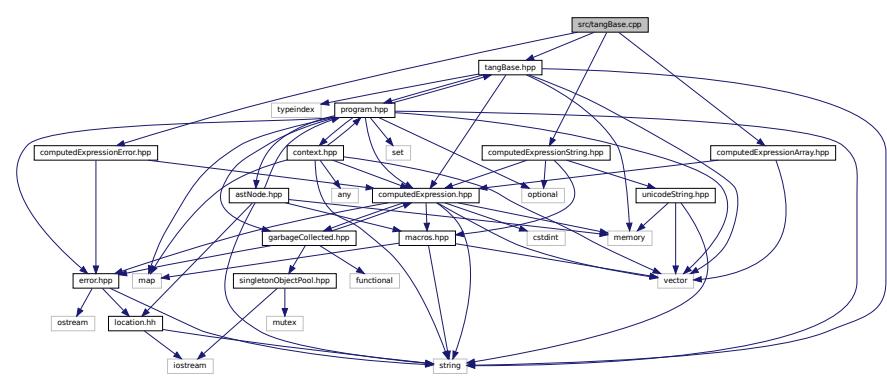
6.103.1 Detailed Description

Define the [Tang::Program](#) class.

6.104 src/tangBase.cpp File Reference

Define the [Tang::TangBase](#) class.

```
#include "tangBase.hpp"
#include "computedExpressionArray.hpp"
#include "computedExpressionString.hpp"
#include "computedExpressionError.hpp"
Include dependency graph for tangBase.cpp:
```



6.104.1 Detailed Description

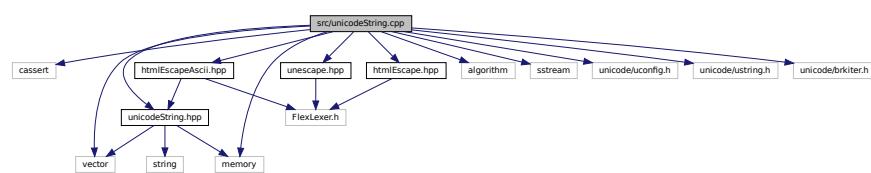
Define the [Tang::TangBase](#) class.

6.105 src/unicodeString.cpp File Reference

Contains the function declarations for the [Tang::UnicodeString](#) class and the interface to ICU.

```
#include <cassert>
#include <vector>
#include <memory>
#include <algorithm>
#include <sstream>
#include <unicode/uconfig.h>
#include <unicode/ustring.h>
#include <unicode/brkiter.h>
#include "unicodeString.hpp"
#include "unescape.hpp"
#include "htmlEscape.hpp"
#include "htmlEscapeAscii.hpp"
```

Include dependency graph for unicodeString.cpp:



6.105.1 Detailed Description

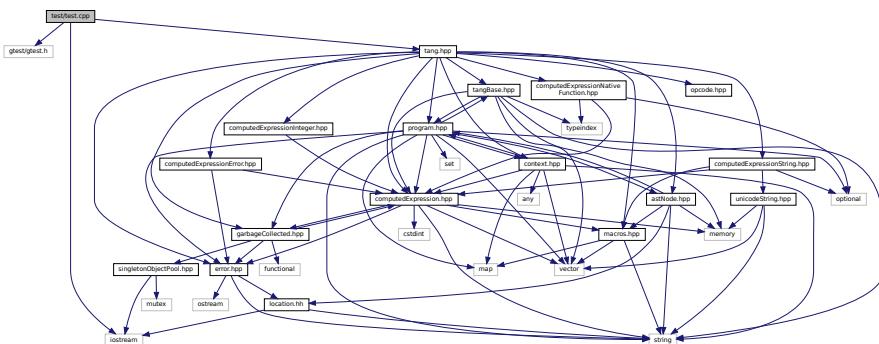
Contains the function declarations for the [Tang::UnicodeString](#) class and the interface to ICU.

6.106 test/test.cpp File Reference

Test the general language behaviors.

```
#include <gtest/gtest.h>
#include <iostream>
#include "tang.hpp"
```

Include dependency graph for test.cpp:



Functions

- **TEST** (Declare, Null)
- **TEST** (Declare, Integer)
- **TEST** (Declare, Float)
- **TEST** (Declare, Boolean)
- **TEST** (Declare, String)
- **TEST** (Expression, Add)
- **TEST** (Expression, Subtract)
- **TEST** (Expression, Multiplication)
- **TEST** (Expression, Division)
- **TEST** (Expression, Modulo)
- **TEST** (Expression, UnaryMinus)
- **TEST** (Expression, Parentheses)
- **TEST** (Expression, TypeCast)
- **TEST** (Expression, Not)
- **TEST** (Expression, LessThan)
- **TEST** (Expression, LessThanEqual)
- **TEST** (Expression, GreaterThan)
- **TEST** (Expression, GreaterThanEqual)
- **TEST** (Expression, Equal)
- **TEST** (Expression, NotEqual)
- **TEST** (Expression, And)
- **TEST** (Expression, Or)
- **TEST** (Expression, Ternary)
- **TEST** (Expression, StringIndex)
- **TEST** (Expression, StringSlice)
- **TEST** (Expression, ArrayIndex)
- **TEST** (Expression, Map)
- **TEST** (CodeBlock, Statements)
- **TEST** (Assign, Identifier)
- **TEST** (Assign, Index)
- **TEST** (Expression, ArraySlice)
- **TEST** (ControlFlow, IfElse)
- **TEST** (ControlFlow, While)
- **TEST** (ControlFlow, Break)
- **TEST** (ControlFlow, Continue)
- **TEST** (ControlFlow, DoWhile)
- **TEST** (ControlFlow, For)
- **TEST** (ControlFlow, RangedFor)
- **TEST** (Print, Default)
- **TEST** (Print, Array)
- **TEST** (Syntax, SingleLineComment)
- **TEST** (Syntax, MultiLineComment)
- **TEST** (Syntax, UntrustedString)
- **TEST** (Syntax, UntrustedStringLiteral)
- **TEST** (NativeFunctions, General)
- int **main** (int argc, char **argv)

Variables

- auto **tang** = TangBase::make_shared()

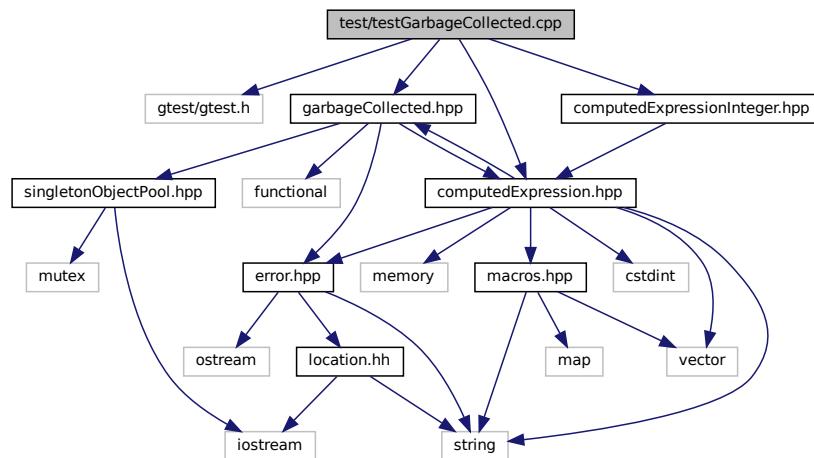
6.106.1 Detailed Description

Test the general language behaviors.

6.107 test/testGarbageCollected.cpp File Reference

Test the generic behavior of the [Tang::GarbageCollected](#) class.

```
#include <gtest/gtest.h>
#include "garbageCollected.hpp"
#include "computedExpression.hpp"
#include "computedExpressionInteger.hpp"
Include dependency graph for testGarbageCollected.cpp:
```



Functions

- `TEST` (Create, Access)
- `TEST` (RuleOfFive, CopyConstructor)
- `TEST` (Recycle, ObjectIsRecycled)
- `TEST` (Recycle, ObjectIsNotRecycled)
- int `main` (int argc, char **argv)

6.107.1 Detailed Description

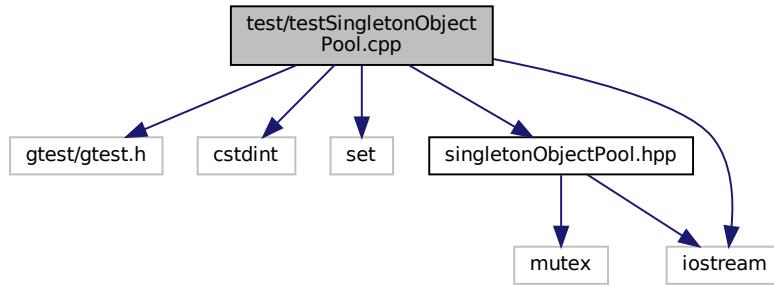
Test the generic behavior of the [Tang::GarbageCollected](#) class.

6.108 test/testSingletonObjectPool.cpp File Reference

Test the generic behavior of the [Tang::SingletonObjectPool](#) class.

```
#include <gtest/gtest.h>
#include <cstdint>
#include <set>
#include "singletonObjectPool.hpp"
#include <iostream>
```

Include dependency graph for testSingletonObjectPool.cpp:



Functions

- [**TEST** \(Singleton, SameForSameType\)](#)
- [**TEST** \(Singleton, DifferentForDifferentTypes\)](#)
- [**TEST** \(Get, SuccessiveCallsProduceDifferentMemoryAddresses\)](#)
- [**TEST** \(Recycle, RecycledObjectIsReused\)](#)
- [**TEST** \(Get, SuccessiveCallsAreSequential\)](#)
- [**TEST** \(Get, KeepsGeneratingDifferentPointers\)](#)
- [**TEST** \(Recycle, WorksAfterLargeNumberOfAllocations\)](#)
- int **main** (int argc, char **argv)

6.108.1 Detailed Description

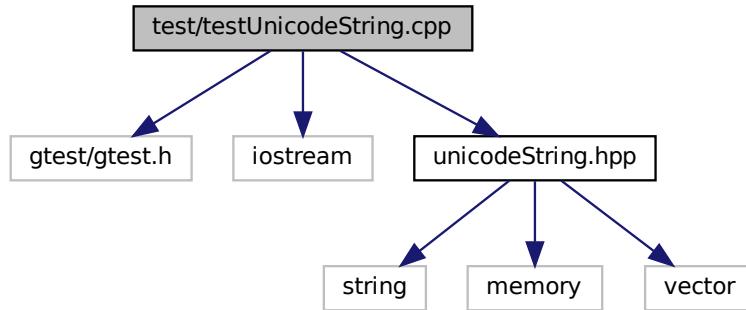
Test the generic behavior of the [Tang::SingletonObjectPool](#) class.

6.109 test/testUnicodeString.cpp File Reference

Contains tests for the [Tang::UnicodeString](#) class.

```
#include <gtest/gtest.h>
#include <iostream>
```

```
#include "unicodeString.hpp"
Include dependency graph for testUnicodeString.cpp:
```



Functions

- [TEST \(Core, Unescape\)](#)
- [TEST \(Core, HtmlEscape\)](#)
- [TEST \(Core, HtmlEscapeAscii\)](#)
- [TEST \(UnicodeString, SubString\)](#)
- [TEST \(UnicodeString, Types\)](#)
- int [main](#) (int argc, char **argv)

6.109.1 Detailed Description

Contains tests for the [Tang::UnicodeString](#) class.

Index

—add
 Tang::ComputedExpression, 144
 Tang::ComputedExpressionArray, 157
 Tang::ComputedExpressionBoolean, 172
 Tang::ComputedExpressionCompiledFunction, 185
 Tang::ComputedExpressionError, 198
 Tang::ComputedExpressionFloat, 212
 Tang::ComputedExpressionInteger, 227
 Tang::ComputedExpressionIterator, 241
 Tang::ComputedExpressionIteratorEnd, 255
 Tang::ComputedExpressionMap, 270
 Tang::ComputedExpressionNativeBoundFunction,
 284
 Tang::ComputedExpressionNativeFunction, 299
 Tang::ComputedExpressionString, 316

—asCode
 Tang::ComputedExpression, 144
 Tang::ComputedExpressionArray, 158
 Tang::ComputedExpressionBoolean, 172
 Tang::ComputedExpressionCompiledFunction, 185
 Tang::ComputedExpressionError, 198
 Tang::ComputedExpressionFloat, 213
 Tang::ComputedExpressionInteger, 227
 Tang::ComputedExpressionIterator, 242
 Tang::ComputedExpressionIteratorEnd, 255
 Tang::ComputedExpressionMap, 270
 Tang::ComputedExpressionNativeBoundFunction,
 285
 Tang::ComputedExpressionNativeFunction, 300
 Tang::ComputedExpressionString, 317

—assign_index
 Tang::ComputedExpression, 144
 Tang::ComputedExpressionArray, 158
 Tang::ComputedExpressionBoolean, 173
 Tang::ComputedExpressionCompiledFunction, 185
 Tang::ComputedExpressionError, 199
 Tang::ComputedExpressionFloat, 213
 Tang::ComputedExpressionInteger, 227
 Tang::ComputedExpressionIterator, 242
 Tang::ComputedExpressionIteratorEnd, 256
 Tang::ComputedExpressionMap, 270
 Tang::ComputedExpressionNativeBoundFunction,
 285
 Tang::ComputedExpressionNativeFunction, 300
 Tang::ComputedExpressionString, 317

—boolean
 Tang::ComputedExpression, 145
 Tang::ComputedExpressionArray, 159
 Tang::ComputedExpressionBoolean, 173

—divide
 Tang::ComputedExpression, 145
 Tang::ComputedExpressionArray, 159
 Tang::ComputedExpressionBoolean, 173
 Tang::ComputedExpressionCompiledFunction, 186
 Tang::ComputedExpressionError, 199
 Tang::ComputedExpressionFloat, 214
 Tang::ComputedExpressionInteger, 228
 Tang::ComputedExpressionIterator, 243
 Tang::ComputedExpressionIteratorEnd, 256
 Tang::ComputedExpressionMap, 271
 Tang::ComputedExpressionNativeBoundFunction,
 285
 Tang::ComputedExpressionNativeFunction, 301
 Tang::ComputedExpressionString, 317

—equal
 Tang::ComputedExpression, 146
 Tang::ComputedExpressionArray, 160
 Tang::ComputedExpressionBoolean, 174
 Tang::ComputedExpressionCompiledFunction, 187
 Tang::ComputedExpressionError, 200
 Tang::ComputedExpressionFloat, 215
 Tang::ComputedExpressionInteger, 229
 Tang::ComputedExpressionIterator, 243
 Tang::ComputedExpressionIteratorEnd, 257
 Tang::ComputedExpressionMap, 272
 Tang::ComputedExpressionNativeBoundFunction,
 286
 Tang::ComputedExpressionNativeFunction, 301
 Tang::ComputedExpressionString, 318

—float
 Tang::ComputedExpression, 146
 Tang::ComputedExpressionArray, 160
 Tang::ComputedExpressionBoolean, 174
 Tang::ComputedExpressionCompiledFunction, 187
 Tang::ComputedExpressionError, 200
 Tang::ComputedExpressionFloat, 215
 Tang::ComputedExpressionInteger, 229

Tang::ComputedExpressionIterator, 244
 Tang::ComputedExpressionIteratorEnd, 257
 Tang::ComputedExpressionMap, 272
 Tang::ComputedExpressionNativeBoundFunction,
 287
 Tang::ComputedExpressionNativeFunction, 302
 Tang::ComputedExpressionString, 319
 __getIterator
 Tang::ComputedExpression, 146
 Tang::ComputedExpressionArray, 160
 Tang::ComputedExpressionBoolean, 174
 Tang::ComputedExpressionCompiledFunction, 187
 Tang::ComputedExpressionError, 200
 Tang::ComputedExpressionFloat, 215
 Tang::ComputedExpressionInteger, 230
 Tang::ComputedExpressionIterator, 244
 Tang::ComputedExpressionIteratorEnd, 257
 Tang::ComputedExpressionMap, 272
 Tang::ComputedExpressionNativeBoundFunction,
 287
 Tang::ComputedExpressionNativeFunction, 302
 Tang::ComputedExpressionString, 319
 __index
 Tang::ComputedExpression, 147
 Tang::ComputedExpressionArray, 161
 Tang::ComputedExpressionBoolean, 175
 Tang::ComputedExpressionCompiledFunction, 188
 Tang::ComputedExpressionError, 201
 Tang::ComputedExpressionFloat, 216
 Tang::ComputedExpressionInteger, 230
 Tang::ComputedExpressionIterator, 244
 Tang::ComputedExpressionIteratorEnd, 258
 Tang::ComputedExpressionMap, 273
 Tang::ComputedExpressionNativeBoundFunction,
 287
 Tang::ComputedExpressionNativeFunction, 303
 Tang::ComputedExpressionString, 320
 __integer
 Tang::ComputedExpression, 147
 Tang::ComputedExpressionArray, 161
 Tang::ComputedExpressionBoolean, 175
 Tang::ComputedExpressionCompiledFunction, 188
 Tang::ComputedExpressionError, 201
 Tang::ComputedExpressionFloat, 216
 Tang::ComputedExpressionInteger, 230
 Tang::ComputedExpressionIterator, 245
 Tang::ComputedExpressionIteratorEnd, 258
 Tang::ComputedExpressionMap, 273
 Tang::ComputedExpressionNativeBoundFunction,
 288
 Tang::ComputedExpressionNativeFunction, 303
 Tang::ComputedExpressionString, 320
 __iteratorNext
 Tang::ComputedExpression, 147
 Tang::ComputedExpressionArray, 161
 Tang::ComputedExpressionBoolean, 175
 Tang::ComputedExpressionCompiledFunction, 188
 Tang::ComputedExpressionError, 201
 Tang::ComputedExpressionFloat, 216
 Tang::ComputedExpressionInteger, 230
 Tang::ComputedExpressionIterator, 245
 Tang::ComputedExpressionIteratorEnd, 258
 Tang::ComputedExpressionMap, 273
 Tang::ComputedExpressionNativeBoundFunction,
 288
 Tang::ComputedExpressionNativeFunction, 303
 Tang::ComputedExpressionString, 319
 __lessThan
 Tang::ComputedExpression, 148
 Tang::ComputedExpressionArray, 162
 Tang::ComputedExpressionBoolean, 176
 Tang::ComputedExpressionCompiledFunction, 189
 Tang::ComputedExpressionError, 202
 Tang::ComputedExpressionFloat, 217
 Tang::ComputedExpressionInteger, 231
 Tang::ComputedExpressionIterator, 245
 Tang::ComputedExpressionIteratorEnd, 259
 Tang::ComputedExpressionMap, 274
 Tang::ComputedExpressionNativeBoundFunction,
 288
 Tang::ComputedExpressionNativeFunction, 304
 Tang::ComputedExpressionString, 321
 __modulo
 Tang::ComputedExpression, 148
 Tang::ComputedExpressionArray, 162
 Tang::ComputedExpressionBoolean, 176
 Tang::ComputedExpressionCompiledFunction, 189
 Tang::ComputedExpressionError, 202
 Tang::ComputedExpressionFloat, 217
 Tang::ComputedExpressionInteger, 231
 Tang::ComputedExpressionIterator, 246
 Tang::ComputedExpressionIteratorEnd, 259
 Tang::ComputedExpressionMap, 274
 Tang::ComputedExpressionNativeBoundFunction,
 290
 Tang::ComputedExpressionNativeFunction, 304
 Tang::ComputedExpressionString, 322
 __multiply
 Tang::ComputedExpression, 148
 Tang::ComputedExpressionArray, 163
 Tang::ComputedExpressionBoolean, 176
 Tang::ComputedExpressionCompiledFunction, 189
 Tang::ComputedExpressionError, 202
 Tang::ComputedExpressionFloat, 218
 Tang::ComputedExpressionInteger, 232
 Tang::ComputedExpressionIterator, 246
 Tang::ComputedExpressionIteratorEnd, 259
 Tang::ComputedExpressionMap, 275
 Tang::ComputedExpressionNativeBoundFunction,
 290
 Tang::ComputedExpressionNativeFunction, 304
 Tang::ComputedExpressionString, 322
 __negative
 Tang::ComputedExpression, 149
 Tang::ComputedExpressionArray, 163
 Tang::ComputedExpressionBoolean, 177

Tang::ComputedExpressionCompiledFunction, 190
Tang::ComputedExpressionError, 203
Tang::ComputedExpressionFloat, 218
Tang::ComputedExpressionInteger, 232
Tang::ComputedExpressionIterator, 247
Tang::ComputedExpressionIteratorEnd, 260
Tang::ComputedExpressionMap, 275
Tang::ComputedExpressionNativeBoundFunction, 290
Tang::ComputedExpressionNativeFunction, 305
Tang::ComputedExpressionString, 323

not
 Tang::ComputedExpression, 149
 Tang::ComputedExpressionArray, 163
 Tang::ComputedExpressionBoolean, 177
 Tang::ComputedExpressionCompiledFunction, 190
 Tang::ComputedExpressionError, 203
 Tang::ComputedExpressionFloat, 218
 Tang::ComputedExpressionInteger, 233
 Tang::ComputedExpressionIterator, 247
 Tang::ComputedExpressionIteratorEnd, 260
 Tang::ComputedExpressionMap, 275
 Tang::ComputedExpressionNativeBoundFunction, 291
 Tang::ComputedExpressionNativeFunction, 305
 Tang::ComputedExpressionString, 323

period
 Tang::ComputedExpression, 149
 Tang::ComputedExpressionArray, 163
 Tang::ComputedExpressionBoolean, 177
 Tang::ComputedExpressionCompiledFunction, 190
 Tang::ComputedExpressionError, 203
 Tang::ComputedExpressionFloat, 219
 Tang::ComputedExpressionInteger, 233
 Tang::ComputedExpressionIterator, 247
 Tang::ComputedExpressionIteratorEnd, 260
 Tang::ComputedExpressionMap, 275
 Tang::ComputedExpressionNativeBoundFunction, 291
 Tang::ComputedExpressionNativeFunction, 305
 Tang::ComputedExpressionString, 323

slice
 Tang::ComputedExpression, 150
 Tang::ComputedExpressionArray, 164
 Tang::ComputedExpressionBoolean, 178
 Tang::ComputedExpressionCompiledFunction, 191
 Tang::ComputedExpressionError, 204
 Tang::ComputedExpressionFloat, 219
 Tang::ComputedExpressionInteger, 233
 Tang::ComputedExpressionIterator, 248
 Tang::ComputedExpressionIteratorEnd, 261
 Tang::ComputedExpressionMap, 276
 Tang::ComputedExpressionNativeBoundFunction, 291
 Tang::ComputedExpressionNativeFunction, 306
 Tang::ComputedExpressionString, 324

string
 Tang::ComputedExpression, 150

Tang::ComputedExpressionArray, 164
Tang::ComputedExpressionBoolean, 178
Tang::ComputedExpressionCompiledFunction, 191
Tang::ComputedExpressionError, 204
Tang::ComputedExpressionFloat, 220
Tang::ComputedExpressionInteger, 234
Tang::ComputedExpressionIterator, 248
Tang::ComputedExpressionIteratorEnd, 261
Tang::ComputedExpressionMap, 276
Tang::ComputedExpressionNativeBoundFunction, 292
Tang::ComputedExpressionNativeFunction, 306
Tang::ComputedExpressionString, 324

subtract
 Tang::ComputedExpression, 150
 Tang::ComputedExpressionArray, 165
 Tang::ComputedExpressionBoolean, 178
 Tang::ComputedExpressionCompiledFunction, 191
 Tang::ComputedExpressionError, 204
 Tang::ComputedExpressionFloat, 220
 Tang::ComputedExpressionInteger, 234
 Tang::ComputedExpressionIterator, 248
 Tang::ComputedExpressionIteratorEnd, 261
 Tang::ComputedExpressionMap, 277
 Tang::ComputedExpressionNativeBoundFunction, 292
 Tang::ComputedExpressionNativeFunction, 306
 Tang::ComputedExpressionString, 325

~GarbageCollected
 Tang::GarbageCollected, 337

ADD
 opcode.hpp, 437

Add
 Tang::AstNodeBinary, 32

addBreak
 Tang::Program, 362

addBytecode
 Tang::Program, 362

addContinue
 Tang::Program, 363

addIdentifier
 Tang::Program, 363

addIdentifierAssigned
 Tang::Program, 363

addString
 Tang::Program, 363

And
 Tang::AstNodeBinary, 32

append
 Tang::ComputedExpressionArray, 165

ARRAY
 opcode.hpp, 437

ASSIGNINDEX
 opcode.hpp, 437

AstNode
 Tang::AstNode, 18

AstNodeArray
 Tang::AstNodeArray, 23

AstNodeAssign
 Tang::AstNodeAssign, 27

AstNodeBinary
 Tang::AstNodeBinary, 33

AstNodeBlock
 Tang::AstNodeBlock, 37

AstNodeBoolean
 Tang::AstNodeBoolean, 41

AstNodeBreak
 Tang::AstNodeBreak, 45

AstNodeCast
 Tang::AstNodeCast, 50

AstNodeContinue
 Tang::AstNodeContinue, 54

AstNodeDoWhile
 Tang::AstNodeDoWhile, 58

AstNodeFloat
 Tang::AstNodeFloat, 62

AstNodeFor
 Tang::AstNodeFor, 67

AstNodeFunctionCall
 Tang::AstNodeFunctionCall, 71

AstNodeFunctionDeclaration
 Tang::AstNodeFunctionDeclaration, 74

AstNodeIdentifier
 Tang::AstNodeIdentifier, 79

AstNodeIfElse
 Tang::AstNodeIfElse, 84

AstNodeIndex
 Tang::AstNodeIndex, 88

AstNodeInteger
 Tang::AstNodeInteger, 93

AstNodeMap
 Tang::AstNodeMap, 97

AstNodePeriod
 Tang::AstNodePeriod, 101

AstNodePrint
 Tang::AstNodePrint, 106

AstNodeRangedFor
 Tang::AstNodeRangedFor, 110

AstNodeReturn
 Tang::AstNodeReturn, 114

AstNodeSlice
 Tang::AstNodeSlice, 119

AstNodeString
 Tang::AstNodeString, 123, 124

AstNodeTernary
 Tang::AstNodeTernary, 129

AstNodeUnary
 Tang::AstNodeUnary, 134

AstNodeWhile
 Tang::AstNodeWhile, 139

BOOLEAN
 opcode.hpp, 437

Boolean
 Tang::AstNodeCast, 50

build/generated/location.hh, 387

bytesLength

Tang::ComputedExpressionString, 325

Tang::UnicodeString, 381

CALLFUNC
 opcode.hpp, 437

CASTBOOLEAN
 opcode.hpp, 437

CASTFLOAT
 opcode.hpp, 437

CASTINTEGER
 opcode.hpp, 437

CASTSTRING
 opcode.hpp, 437

CodeType
 Tang::Program, 361

compile
 Tang::AstNode, 19
 Tang::AstNodeArray, 24
 Tang::AstNodeAssign, 28
 Tang::AstNodeBinary, 33
 Tang::AstNodeBlock, 38
 Tang::AstNodeBoolean, 42
 Tang::AstNodeBreak, 45
 Tang::AstNodeCast, 50
 Tang::AstNodeContinue, 54
 Tang::AstNodeDoWhile, 59
 Tang::AstNodeFloat, 63
 Tang::AstNodeFor, 67
 Tang::AstNodeFunctionCall, 71
 Tang::AstNodeFunctionDeclaration, 75
 Tang::AstNodeIdentifier, 79
 Tang::AstNodeIfElse, 84
 Tang::AstNodeIndex, 89
 Tang::AstNodeInteger, 94
 Tang::AstNodeMap, 97
 Tang::AstNodePeriod, 102
 Tang::AstNodePrint, 106
 Tang::AstNodeRangedFor, 110
 Tang::AstNodeReturn, 115
 Tang::AstNodeSlice, 119
 Tang::AstNodeString, 124
 Tang::AstNodeTernary, 130
 Tang::AstNodeUnary, 134
 Tang::AstNodeWhile, 140

compileLiteral
 Tang::AstNodeString, 125

compilePreprocess
 Tang::AstNode, 19
 Tang::AstNodeArray, 24
 Tang::AstNodeAssign, 28
 Tang::AstNodeBinary, 34
 Tang::AstNodeBlock, 38
 Tang::AstNodeBoolean, 42
 Tang::AstNodeBreak, 46
 Tang::AstNodeCast, 51
 Tang::AstNodeContinue, 55
 Tang::AstNodeDoWhile, 59
 Tang::AstNodeFloat, 63
 Tang::AstNodeFor, 68

Tang::AstNodeFunctionCall, 71
Tang::AstNodeFunctionDeclaration, 75
Tang::AstNodeIdentifier, 79
Tang::AstNodeIfElse, 85
Tang::AstNodeIndex, 89
Tang::AstNodeInteger, 94
Tang::AstNodeMap, 98
Tang::AstNodePeriod, 102
Tang::AstNodePrint, 107
Tang::AstNodeRangedFor, 111
Tang::AstNodeReturn, 115
Tang::AstNodeSlice, 120
Tang::AstNodeString, 125
Tang::AstNodeTernary, 130
Tang::AstNodeUnary, 136
Tang::AstNodeWhile, 140
compileScript
 Tang::TangBase, 374
ComputedExpressionArray
 Tang::ComputedExpressionArray, 157
ComputedExpressionBoolean
 Tang::ComputedExpressionBoolean, 172
ComputedExpressionCompiledFunction
 Tang::ComputedExpressionCompiledFunction, 184
ComputedExpressionError
 Tang::ComputedExpressionError, 198
ComputedExpressionFloat
 Tang::ComputedExpressionFloat, 212
ComputedExpressionInteger
 Tang::ComputedExpressionInteger, 226
ComputedExpressionIterator
 Tang::ComputedExpressionIterator, 241
ComputedExpressionMap
 Tang::ComputedExpressionMap, 270
ComputedExpressionNativeBoundFunction
 Tang::ComputedExpressionNativeBoundFunction, 283
ComputedExpressionNativeFunction
 Tang::ComputedExpressionNativeFunction, 299
ComputedExpressionString
 Tang::ComputedExpressionString, 314, 316
COPY
 opcode.hpp, 436
currentIndex
 Tang::SingletonObjectPool< T >, 371
currentRecycledIndex
 Tang::SingletonObjectPool< T >, 372
Default
 Tang::AstNode, 18
 Tang::AstNodeArray, 23
 Tang::AstNodeAssign, 27
 Tang::AstNodeBinary, 33
 Tang::AstNodeBlock, 37
 Tang::AstNodeBoolean, 41
 Tang::AstNodeBreak, 45
 Tang::AstNodeCast, 49
 Tang::AstNodeContinue, 54
 Tang::AstNodeDoWhile, 58
 Tang::AstNodeFloat, 62
 Tang::AstNodeFor, 66
 Tang::AstNodeFunctionCall, 70
 Tang::AstNodeFunctionDeclaration, 74
 Tang::AstNodeIdentifier, 78
 Tang::AstNodeIfElse, 83
 Tang::AstNodeIndex, 88
 Tang::AstNodeInteger, 93
 Tang::AstNodeMap, 97
 Tang::AstNodePeriod, 101
 Tang::AstNodePrint, 106
 Tang::AstNodeRangedFor, 109
 Tang::AstNodeReturn, 114
 Tang::AstNodeSlice, 118
 Tang::AstNodeString, 123
 Tang::AstNodeTernary, 129
 Tang::AstNodeUnary, 134
 Tang::AstNodeWhile, 139
DIVIDE
 opcode.hpp, 437
Divide
 Tang::AstNodeBinary, 32
dump
 Tang::AstNode, 20
 Tang::AstNodeArray, 25
 Tang::AstNodeAssign, 29
 Tang::AstNodeBinary, 34
 Tang::AstNodeBlock, 39
 Tang::AstNodeBoolean, 42
 Tang::AstNodeBreak, 46
 Tang::AstNodeCast, 51
 Tang::AstNodeContinue, 55
 Tang::AstNodeDoWhile, 60
 Tang::AstNodeFloat, 64
 Tang::AstNodeFor, 68
 Tang::AstNodeFunctionCall, 72
 Tang::AstNodeFunctionDeclaration, 76
 Tang::AstNodeIdentifier, 80
 Tang::AstNodeIfElse, 85
 Tang::AstNodeIndex, 90
 Tang::AstNodeInteger, 95
 Tang::AstNodeMap, 98
 Tang::AstNodePeriod, 103
 Tang::AstNodePrint, 107
 Tang::AstNodeRangedFor, 112
 Tang::AstNodeReturn, 116
 Tang::AstNodeSlice, 120
 Tang::AstNodeString, 126
 Tang::AstNodeTernary, 131
 Tang::AstNodeUnary, 136
 Tang::AstNodeWhile, 141
 Tang::ComputedExpression, 151
 Tang::ComputedExpressionArray, 166
 Tang::ComputedExpressionBoolean, 179
 Tang::ComputedExpressionCompiledFunction, 192
 Tang::ComputedExpressionError, 206
 Tang::ComputedExpressionFloat, 221
 Tang::ComputedExpressionInteger, 235

Tang::ComputedExpressionIterator, 249
 Tang::ComputedExpressionIteratorEnd, 263
 Tang::ComputedExpressionMap, 277
 Tang::ComputedExpressionNativeBoundFunction, 293
 Tang::ComputedExpressionNativeFunction, 307
 Tang::ComputedExpressionString, 325
 dumpBytecode
 Tang::Program, 364
 DUMPPROGRAMCHECK
 program-dumpBytecode.cpp, 474

EQ
 opcode.hpp, 437
 Equal
 Tang::AstNodeBinary, 32
 Error
 Tang::Error, 333
 error.cpp
 operator<<, 472
 execute
 Tang::Program, 364
 EXECUTEPROGRAMCHECK
 program-execute.cpp, 475

FLOAT
 opcode.hpp, 437
 Float
 Tang::AstNodeCast, 50
 FUNCTION
 opcode.hpp, 437
 functionsDeclared
 Tang::Program, 369

GarbageCollected
 Tang::GarbageCollected, 337
 garbageCollected.cpp
 operator<<, 473
 get
 Tang::SingletonObjectPool< T >, 370
 get_next_token
 Tang::HtmlEscape, 353
 Tang::HtmlEscapeAscii, 355
 Tang::TangScanner, 376
 Tang::Unescape, 378
 getArgc
 Tang::ComputedExpressionNativeBoundFunction, 293
 Tang::ComputedExpressionNativeFunction, 307
 getAst
 Tang::Program, 364
 getBytocode
 Tang::Program, 365
 getCode
 Tang::Program, 365
 getCollection
 Tang::AstNodeIndex, 90
 getContents
 Tang::ComputedExpressionArray, 166

getFunction
 Tang::ComputedExpressionNativeBoundFunction, 293
 Tang::ComputedExpressionNativeFunction, 307
 getIdentifiers
 Tang::Program, 365
 getIdentifiersAssigned
 Tang::Program, 365
 getIndex
 Tang::AstNodeIndex, 90
 getInstance
 Tang::SingletonObjectPool< T >, 371
 GETITERATOR
 opcode.hpp, 437
 getMethods
 Tang::ComputedExpressionArray, 166
 Tang::ComputedExpressionString, 326
 getResult
 Tang::Program, 366
 getStrings
 Tang::Program, 366
 getTargetTypeIndex
 Tang::ComputedExpressionNativeBoundFunction, 293
 getValue
 Tang::ComputedExpressionFloat, 221
 Tang::ComputedExpressionInteger, 235
 Tang::ComputedExpressionString, 326
 GreaterThan
 Tang::AstNodeBinary, 32
 GreaterThanEqual
 Tang::AstNodeBinary, 32
 GT
 opcode.hpp, 437
 GTE
 opcode.hpp, 437

HtmlEscape
 Tang::HtmlEscape, 352
 htmlEscape
 unicodeString.hpp, 444
 HtmlEscapeAscii
 Tang::HtmlEscapeAscii, 355
 htmlEscapeAscii
 unicodeString.hpp, 445

include/astNode.hpp, 389
 include/astNodeArray.hpp, 390
 include/astNodeAssign.hpp, 391
 include/astNodeBinary.hpp, 392
 include/astNodeBlock.hpp, 393
 include/astNodeBoolean.hpp, 394
 include/astNodeBreak.hpp, 395
 include/astNodeCast.hpp, 396
 include/astNodeContinue.hpp, 397
 include/astNodeDoWhile.hpp, 398
 include/astNodeFloat.hpp, 399
 include/astNodeFor.hpp, 400
 include/astNodeFunctionCall.hpp, 401

include/astNodeFunctionDeclaration.hpp, 402
include/astNodeIdentifier.hpp, 403
include/astNodeIfElse.hpp, 404
include/astNodeIndex.hpp, 405
include/astNodeInteger.hpp, 406
include/astNodeMap.hpp, 407
include/astNodePeriod.hpp, 408
include/astNodePrint.hpp, 409
include/astNodeRangedFor.hpp, 410
include/astNodeReturn.hpp, 411
include/astNodeSlice.hpp, 412
include/astNodeString.hpp, 413
include/astNodeTernary.hpp, 413
include/astNodeUnary.hpp, 414
include/astNodeWhile.hpp, 415
include/computedExpression.hpp, 416
include/computedExpressionArray.hpp, 417
include/computedExpressionBoolean.hpp, 418
include/computedExpressionCompiledFunction.hpp, 419
include/computedExpressionError.hpp, 420
include/computedExpressionFloat.hpp, 421
include/computedExpressionInteger.hpp, 422
include/computedExpressionIterator.hpp, 423
include/computedExpressionIteratorEnd.hpp, 424
include/computedExpressionMap.hpp, 425
include/computedExpressionNativeBoundFunction.hpp, 426
include/computedExpressionNativeFunction.hpp, 427
include/computedExpressionString.hpp, 429
include/context.hpp, 429
include/error.hpp, 430
include/garbageCollected.hpp, 431
include/htmlEscape.hpp, 432
include/htmlEscapeAscii.hpp, 433
include/macros.hpp, 435
include/opcode.hpp, 436
include/program.hpp, 437
include/singleObjectPool.hpp, 438
include/tang.hpp, 439
include/tangBase.hpp, 440
include/tangScanner.hpp, 441
include/unescape.hpp, 442
include/unicodeString.hpp, 443
INDEX
 opcode.hpp, 437
INTEGER
 opcode.hpp, 437
Integer
 Tang::AstNodeCast, 50
is_equal
 Tang::ComputedExpression, 151–153
 Tang::ComputedExpressionArray, 166–168
 Tang::ComputedExpressionBoolean, 179–181
 Tang::ComputedExpressionCompiledFunction, 192–194
 Tang::ComputedExpressionError, 206, 208, 209
 Tang::ComputedExpressionFloat, 221–223
Tang::ComputedExpressionInteger, 235–237
Tang::ComputedExpressionIterator, 249, 251, 252
Tang::ComputedExpressionIteratorEnd, 263, 265, 266
Tang::ComputedExpressionMap, 277–279
Tang::ComputedExpressionNativeBoundFunction, 294–296
Tang::ComputedExpressionNativeFunction, 308–310
Tang::ComputedExpressionString, 326–329
IsAssignment
 Tang::AstNode, 18
 Tang::AstNodeArray, 23
 Tang::AstNodeAssign, 27
 Tang::AstNodeBinary, 33
 Tang::AstNodeBlock, 37
 Tang::AstNodeBoolean, 41
 Tang::AstNodeBreak, 45
 Tang::AstNodeCast, 49
 Tang::AstNodeContinue, 54
 Tang::AstNodeDoWhile, 58
 Tang::AstNodeFloat, 62
 Tang::AstNodeFor, 66
 Tang::AstNodeFunctionCall, 70
 Tang::AstNodeFunctionDeclaration, 74
 Tang::AstNodeIdentifier, 78
 Tang::AstNodeIfElse, 83
 Tang::AstNodeIndex, 88
 Tang::AstNodeInteger, 93
 Tang::AstNodeMap, 97
 Tang::AstNodePeriod, 101
 Tang::AstNodePrint, 106
 Tang::AstNodeRangedFor, 109
 Tang::AstNodeReturn, 114
 Tang::AstNodeSlice, 118
 Tang::AstNodeString, 123
 Tang::AstNodeTernary, 129
 Tang::AstNodeUnary, 134
 Tang::AstNodeWhile, 139
isCopyNeeded
 Tang::ComputedExpression, 153
 Tang::ComputedExpressionArray, 169
 Tang::ComputedExpressionBoolean, 181
 Tang::ComputedExpressionCompiledFunction, 194
 Tang::ComputedExpressionError, 209
 Tang::ComputedExpressionFloat, 223
 Tang::ComputedExpressionInteger, 238
 Tang::ComputedExpressionIterator, 252
 Tang::ComputedExpressionIteratorEnd, 266
 Tang::ComputedExpressionMap, 280
 Tang::ComputedExpressionNativeBoundFunction, 296
 Tang::ComputedExpressionNativeFunction, 311
 Tang::ComputedExpressionString, 329
 Tang::GarbageCollected, 338
ISITERATOREND
 opcode.hpp, 437
ITERATORNEXT

opcode.hpp, 437

JMP
 opcode.hpp, 436

JMPF
 opcode.hpp, 436

JMPF_POP
 opcode.hpp, 436

JMPT
 opcode.hpp, 436

JMPT_POP
 opcode.hpp, 436

length
 Tang::ComputedExpressionString, 329
 Tang::UnicodeString, 381

LessThan
 Tang::AstNodeBinary, 32

LessThanEqual
 Tang::AstNodeBinary, 32

location.hh
 operator<<, 388, 389

LT
 opcode.hpp, 437

LTE
 opcode.hpp, 437

make
 Tang::GarbageCollected, 338

make_shared
 Tang::TangBase, 374

makeCopy
 Tang::ComputedExpression, 154
 Tang::ComputedExpressionArray, 169
 Tang::ComputedExpressionBoolean, 182
 Tang::ComputedExpressionCompiledFunction, 195
 Tang::ComputedExpressionError, 209
 Tang::ComputedExpressionFloat, 224
 Tang::ComputedExpressionInteger, 238
 Tang::ComputedExpressionIterator, 252
 Tang::ComputedExpressionIteratorEnd, 266
 Tang::ComputedExpressionMap, 280
 Tang::ComputedExpressionNativeBoundFunction, 296
 Tang::ComputedExpressionNativeFunction, 311
 Tang::ComputedExpressionString, 330
 Tang::GarbageCollected, 339

MAP
 opcode.hpp, 437

MODULO
 opcode.hpp, 437

Modulo
 Tang::AstNodeBinary, 32

MULTIPLY
 opcode.hpp, 437

Multiply
 Tang::AstNodeBinary, 32

NEGATIVE

Negative
 Tang::AstNodeUnary, 134

NEQ
 opcode.hpp, 437

NOT
 opcode.hpp, 437

Not
 Tang::AstNodeUnary, 134

NotEqual
 Tang::AstNodeBinary, 32

NULLVAL
 opcode.hpp, 436

Opcode
 opcode.hpp, 436

opcode.hpp
 ADD, 437
 ARRAY, 437
 ASSIGNINDEX, 437
 BOOLEAN, 437
 CALLFUNC, 437
 CASTBOOLEAN, 437
 CASTFLOAT, 437
 CASTINTEGER, 437
 CASTSTRING, 437
 COPY, 436
 DIVIDE, 437
 EQ, 437
 FLOAT, 437
 FUNCTION, 437
 GETITERATOR, 437
 GT, 437
 GTE, 437
 INDEX, 437
 INTEGER, 437
 ISITERATOREND, 437
 ITERATORNEXT, 437
 JMP, 436
 JMPF, 436
 JMPF_POP, 436
 JMPT, 436
 JMPT_POP, 436
 LT, 437
 LTE, 437
 MAP, 437
 MODULO, 437
 MULTIPLY, 437
 NEGATIVE, 437
 NEQ, 437
 NOT, 437
 NULLVAL, 436
 Opcode, 436
 PEEK, 436
 PERIOD, 437
 POKE, 436
 POP, 436
 PRINT, 437
 RETURN, 437

SLICE, 437
STRING, 437
SUBTRACT, 437
Operation
 Tang::AstNodeBinary, 32
Operator
 Tang::AstNodeUnary, 133
operator std::string
 Tang::UnicodeString, 381
operator!
 Tang::GarbageCollected, 339
operator!=
 Tang::GarbageCollected, 340
operator<
 Tang::GarbageCollected, 344
 Tang::UnicodeString, 382
operator<<
 error.cpp, 472
 garbageCollected.cpp, 473
 location.hh, 388, 389
 Tang::Error, 334
 Tang::GarbageCollected, 351
operator<=
 Tang::GarbageCollected, 345
operator>
 Tang::GarbageCollected, 350
operator>=
 Tang::GarbageCollected, 350
operator*
 Tang::GarbageCollected, 341
operator+
 Tang::GarbageCollected, 342
 Tang::UnicodeString, 382
operator+=
 Tang::ComputedExpressionString, 330
 Tang::UnicodeString, 382
operator-
 Tang::GarbageCollected, 342, 343
operator->
 Tang::GarbageCollected, 343
operator/
 Tang::GarbageCollected, 344
operator=
 Tang::GarbageCollected, 345
operator==
 Tang::GarbageCollected, 347–349
 Tang::UnicodeString, 383
operator%
 Tang::GarbageCollected, 340
Or
 Tang::AstNodeBinary, 32
PEEK
 opcode.hpp, 436
PERIOD
 opcode.hpp, 437
POKE
 opcode.hpp, 436
POP

opcode.hpp, 436
popBreakStack
 Tang::Program, 366
popContinueStack
 Tang::Program, 367
PreprocessState
 Tang::AstNode, 18
 Tang::AstNodeArray, 23
 Tang::AstNodeAssign, 27
 Tang::AstNodeBinary, 33
 Tang::AstNodeBlock, 37
 Tang::AstNodeBoolean, 41
 Tang::AstNodeBreak, 45
 Tang::AstNodeCast, 49
 Tang::AstNodeContinue, 54
 Tang::AstNodeDoWhile, 58
 Tang::AstNodeFloat, 62
 Tang::AstNodeFor, 66
 Tang::AstNodeFunctionCall, 70
 Tang::AstNodeFunctionDeclaration, 74
 Tang::AstNodeIdentifier, 78
 Tang::AstNodeIfElse, 83
 Tang::AstNodeIndex, 88
 Tang::AstNodeInteger, 93
 Tang::AstNodeMap, 96
 Tang::AstNodePeriod, 101
 Tang::AstNodePrint, 105
 Tang::AstNodeRangedFor, 109
 Tang::AstNodeReturn, 114
 Tang::AstNodeSlice, 118
 Tang::AstNodeString, 123
 Tang::AstNodeTernary, 129
 Tang::AstNodeUnary, 134
 Tang::AstNodeWhile, 139
PRINT
 opcode.hpp, 437
Program
 Tang::Program, 362
program-dumpBytecode.cpp
 DUMPPROGRAMCHECK, 474
program-execute.cpp
 EXECUTEPROGRAMCHECK, 475
 STACKCHECK, 476
pushEnvironment
 Tang::Program, 367
recycle
 Tang::SingletonObjectPool< T >, 371
render
 Tang::UnicodeString, 383
renderAscii
 Tang::UnicodeString, 384
RETURN
 opcode.hpp, 437
Script
 Tang::Program, 361
setFunctionStackDeclaration
 Tang::Program, 368

setJumpTarget
 Tang::Program, 368
SLICE
 opcode.hpp, 437
src/astNode.cpp, 446
src/astNodeArray.cpp, 447
src/astNodeAssign.cpp, 447
src/astNodeBinary.cpp, 448
src/astNodeBlock.cpp, 449
src/astNodeBoolean.cpp, 449
src/astNodeBreak.cpp, 450
src/astNodeCast.cpp, 450
src/astNodeContinue.cpp, 451
src/astNodeDoWhile.cpp, 452
src/astNodeFloat.cpp, 452
src/astNodeFor.cpp, 453
src/astNodeFunctionCall.cpp, 453
src/astNodeFunctionDeclaration.cpp, 454
src/astNodeIdentifier.cpp, 455
src/astNodeIfElse.cpp, 455
src/astNodeIndex.cpp, 456
src/astNodeInteger.cpp, 457
src/astNodeMap.cpp, 457
src/astNodePeriod.cpp, 458
src/astNodePrint.cpp, 458
src/astNodeRangedFor.cpp, 459
src/astNodeReturn.cpp, 460
src/astNodeSlice.cpp, 460
src/astNodeString.cpp, 461
src/astNodeTernary.cpp, 462
src/astNodeUnary.cpp, 462
src/astNodeWhile.cpp, 463
src/computedExpression.cpp, 463
src/computedExpressionArray.cpp, 464
src/computedExpressionBoolean.cpp, 465
src/computedExpressionCompiledFunction.cpp, 465
src/computedExpressionError.cpp, 466
src/computedExpressionFloat.cpp, 466
src/computedExpressionInteger.cpp, 467
src/computedExpressionIterator.cpp, 468
src/computedExpressionIteratorEnd.cpp, 468
src/computedExpressionMap.cpp, 469
src/computedExpressionNativeBoundFunction.cpp, 470
src/computedExpressionNativeFunction.cpp, 470
src/computedExpressionString.cpp, 471
src/context.cpp, 471
src/error.cpp, 472
src/garbageCollected.cpp, 473
src/program-dumpBytecode.cpp, 474
src/program-execute.cpp, 475
src/program.cpp, 476
src/tangBase.cpp, 477
src/unicodeString.cpp, 478
STACKCHECK
 program-execute.cpp, 476
STRING
 opcode.hpp, 437
String

Tang::AstNodeCast, 50
substr
 Tang::UnicodeString, 384
SUBTRACT
 opcode.hpp, 437
Subtract
 Tang::AstNodeBinary, 32
Tang::AstNode, 15
 AstNode, 18
 compile, 19
 compilePreprocess, 19
 Default, 18
 dump, 20
 IsAssignment, 18
 PreprocessState, 18
Tang::AstNodeArray, 20
 AstNodeArray, 23
 compile, 24
 compilePreprocess, 24
 Default, 23
 dump, 25
 IsAssignment, 23
 PreprocessState, 23
Tang::AstNodeAssign, 25
 AstNodeAssign, 27
 compile, 28
 compilePreprocess, 28
 Default, 27
 dump, 29
 IsAssignment, 27
 PreprocessState, 27
Tang::AstNodeBinary, 29
 Add, 32
 And, 32
 AstNodeBinary, 33
 compile, 33
 compilePreprocess, 34
 Default, 33
 Divide, 32
 dump, 34
 Equal, 32
 GreaterThan, 32
 GreaterThanOrEqual, 32
 IsAssignment, 33
 LessThan, 32
 LessThanOrEqual, 32
 Modulo, 32
 Multiply, 32
 NotEqual, 32
 Operation, 32
 Or, 32
 PreprocessState, 33
 Subtract, 32
Tang::AstNodeBlock, 35
 AstNodeBlock, 37
 compile, 38
 compilePreprocess, 38
 Default, 37

dump, 39
IsAssignment, 37
PreprocessState, 37
Tang::AstNodeBoolean, 39
 AstNodeBoolean, 41
 compile, 42
 compilePreprocess, 42
 Default, 41
 dump, 42
 IsAssignment, 41
 PreprocessState, 41
Tang::AstNodeBreak, 43
 AstNodeBreak, 45
 compile, 45
 compilePreprocess, 46
 Default, 45
 dump, 46
 IsAssignment, 45
 PreprocessState, 45
Tang::AstNodeCast, 47
 AstNodeCast, 50
 Boolean, 50
 compile, 50
 compilePreprocess, 51
 Default, 49
 dump, 51
 Float, 50
 Integer, 50
 IsAssignment, 49
 PreprocessState, 49
 String, 50
 Type, 49
Tang::AstNodeContinue, 52
 AstNodeContinue, 54
 compile, 54
 compilePreprocess, 55
 Default, 54
 dump, 55
 IsAssignment, 54
 PreprocessState, 54
Tang::AstNodeDoWhile, 56
 AstNodeDoWhile, 58
 compile, 59
 compilePreprocess, 59
 Default, 58
 dump, 60
 IsAssignment, 58
 PreprocessState, 58
Tang::AstNodeFloat, 60
 AstNodeFloat, 62
 compile, 63
 compilePreprocess, 63
 Default, 62
 dump, 64
 IsAssignment, 62
 PreprocessState, 62
Tang::AstNodeFor, 64
 AstNodeFor, 67
 compile, 67
 compilePreprocess, 68
 Default, 66
 dump, 68
 IsAssignment, 66
 PreprocessState, 66
Tang::AstNodeFunctionCall, 69
 AstNodeFunctionCall, 71
 compile, 71
 compilePreprocess, 71
 Default, 70
 dump, 72
 IsAssignment, 70
 PreprocessState, 70
Tang::AstNodeFunctionDeclaration, 72
 AstNodeFunctionDeclaration, 74
 compile, 75
 compilePreprocess, 75
 Default, 74
 dump, 76
 IsAssignment, 74
 PreprocessState, 74
Tang::AstNodeIdentifier, 76
 AstNodeIdentifier, 79
 compile, 79
 compilePreprocess, 79
 Default, 78
 dump, 80
 IsAssignment, 78
 PreprocessState, 78
Tang::AstNodeIfElse, 81
 AstNodeIfElse, 84
 compile, 84
 compilePreprocess, 85
 Default, 83
 dump, 85
 IsAssignment, 83
 PreprocessState, 83
Tang::AstNodeIndex, 86
 AstNodeIndex, 88
 compile, 89
 compilePreprocess, 89
 Default, 88
 dump, 90
 getCollection, 90
 getIndex, 90
 IsAssignment, 88
 PreprocessState, 88
Tang::AstNodeInteger, 91
 AstNodeInteger, 93
 compile, 94
 compilePreprocess, 94
 Default, 93
 dump, 95
 IsAssignment, 93
 PreprocessState, 93
Tang::AstNodeMap, 95
 AstNodeMap, 97

compile, 97
 compilePreprocess, 98
 Default, 97
 dump, 98
 IsAssignment, 97
 PreprocessState, 96
Tang::AstNodePeriod, 99
 AstNodePeriod, 101
 compile, 102
 compilePreprocess, 102
 Default, 101
 dump, 103
 IsAssignment, 101
 PreprocessState, 101
Tang::AstNodePrint, 103
 AstNodePrint, 106
 compile, 106
 compilePreprocess, 107
 Default, 106
 dump, 107
 IsAssignment, 106
 PreprocessState, 105
 Type, 106
Tang::AstNodeRangedFor, 108
 AstNodeRangedFor, 110
 compile, 110
 compilePreprocess, 111
 Default, 109
 dump, 112
 IsAssignment, 109
 PreprocessState, 109
Tang::AstNodeReturn, 112
 AstNodeReturn, 114
 compile, 115
 compilePreprocess, 115
 Default, 114
 dump, 116
 IsAssignment, 114
 PreprocessState, 114
Tang::AstNodeSlice, 116
 AstNodeSlice, 119
 compile, 119
 compilePreprocess, 120
 Default, 118
 dump, 120
 IsAssignment, 118
 PreprocessState, 118
Tang::AstNodeString, 121
 AstNodeString, 123, 124
 compile, 124
 compileLiteral, 125
 compilePreprocess, 125
 Default, 123
 dump, 126
 IsAssignment, 123
 PreprocessState, 123
Tang::AstNodeTernary, 126
 AstNodeTernary, 129
 compile, 130
 compilePreprocess, 130
 Default, 129
 dump, 131
 IsAssignment, 129
 PreprocessState, 129
Tang::AstNodeUnary, 131
 AstNodeUnary, 134
 compile, 134
 compilePreprocess, 136
 Default, 134
 dump, 136
 IsAssignment, 134
 Negative, 134
 Not, 134
 Operator, 133
 PreprocessState, 134
Tang::AstNodeWhile, 137
 AstNodeWhile, 139
 compile, 140
 compilePreprocess, 140
 Default, 139
 dump, 141
 IsAssignment, 139
 PreprocessState, 139
Tang::ComputedExpression, 141
 __add, 144
 __asCode, 144
 __assign_index, 144
 __boolean, 145
 __divide, 145
 __equal, 146
 __float, 146
 __getIterator, 146
 __index, 147
 __integer, 147
 __iteratorNext, 147
 __lessThan, 148
 __modulo, 148
 __multiply, 148
 __negative, 149
 __not, 149
 __period, 149
 __slice, 150
 __string, 150
 __subtract, 150
 dump, 151
 is_equal, 151–153
 isCopyNeeded, 153
 makeCopy, 154
Tang::ComputedExpressionArray, 154
 __add, 157
 __asCode, 158
 __assign_index, 158
 __boolean, 159
 __divide, 159
 __equal, 160
 __float, 160

__getIterator, 160
 __index, 161
 __integer, 161
 __iteratorNext, 161
 __lessThan, 162
 __modulo, 162
 __multiply, 163
 __negative, 163
 __not, 163
 __period, 163
 __slice, 164
 __string, 164
 __subtract, 165
append, 165
ComputedExpressionArray, 157
dump, 166
getContents, 166
getMethods, 166
is_equal, 166–168
isCopyNeeded, 169
makeCopy, 169
Tang::ComputedExpressionBoolean, 170
 __add, 172
 __asCode, 172
 __assign_index, 173
 __boolean, 173
 __divide, 173
 __equal, 174
 __float, 174
 __getIterator, 174
 __index, 175
 __integer, 175
 __iteratorNext, 175
 __lessThan, 176
 __modulo, 176
 __multiply, 176
 __negative, 177
 __not, 177
 __period, 177
 __slice, 178
 __string, 178
 __subtract, 178
ComputedExpressionBoolean, 172
dump, 179
is_equal, 179–181
isCopyNeeded, 181
makeCopy, 182
Tang::ComputedExpressionCompiledFunction, 182
 __add, 185
 __asCode, 185
 __assign_index, 185
 __boolean, 186
 __divide, 186
 __equal, 187
 __float, 187
 __getIterator, 187
 __index, 188
 __integer, 188
 __iteratorNext, 188
 __lessThan, 189
 __modulo, 189
 __multiply, 189
 __negative, 190
 __not, 190
 __period, 190
 __slice, 191
 __string, 191
 __subtract, 191
ComputedExpressionCompiledFunction, 184
dump, 192
is_equal, 192–194
isCopyNeeded, 194
makeCopy, 195
Tang::ComputedExpressionError, 195
 __add, 198
 __asCode, 198
 __assign_index, 199
 __boolean, 199
 __divide, 199
 __equal, 200
 __float, 200
 __getIterator, 200
 __index, 201
 __integer, 201
 __iteratorNext, 201
 __lessThan, 202
 __modulo, 202
 __multiply, 202
 __negative, 203
 __not, 203
 __period, 203
 __slice, 204
 __string, 204
 __subtract, 204
ComputedExpressionError, 198
dump, 206
is_equal, 206, 208, 209
isCopyNeeded, 209
makeCopy, 209
Tang::ComputedExpressionFloat, 210
 __add, 212
 __asCode, 213
 __assign_index, 213
 __boolean, 214
 __divide, 214
 __equal, 215
 __float, 215
 __getIterator, 215
 __index, 216
 __integer, 216
 __iteratorNext, 216
 __lessThan, 217
 __modulo, 217
 __multiply, 218
 __negative, 218
 __not, 218

```

__period, 219
__slice, 219
__string, 220
__subtract, 220
ComputedExpressionFloat, 212
dump, 221
getValue, 221
is_equal, 221–223
isCopyNeeded, 223
makeCopy, 224
Tang::ComputedExpressionInteger, 224
__add, 227
__asCode, 227
__assign_index, 227
__boolean, 228
__divide, 228
__equal, 229
__float, 229
__getIterator, 230
__index, 230
__integer, 230
__iteratorNext, 230
__lessThan, 231
__modulo, 231
__multiply, 232
__negative, 232
__not, 233
__period, 233
__slice, 233
__string, 234
__subtract, 234
ComputedExpressionInteger, 226
dump, 235
getValue, 235
is_equal, 235–237
isCopyNeeded, 238
makeCopy, 238
Tang::ComputedExpressionIterator, 239
__add, 241
__asCode, 242
__assign_index, 242
__boolean, 242
__divide, 243
__equal, 243
__float, 244
__getIterator, 244
__index, 244
__integer, 245
__iteratorNext, 245
__lessThan, 245
__modulo, 246
__multiply, 246
__negative, 247
__not, 247
__period, 247
__slice, 248
__string, 248
__subtract, 248
ComputedExpressionIterator, 241
dump, 249
is_equal, 249, 251, 252
isCopyNeeded, 252
makeCopy, 252
Tang::ComputedExpressionIteratorEnd, 253
__add, 255
__asCode, 255
__assign_index, 256
__boolean, 256
__divide, 256
__equal, 257
__float, 257
__getIterator, 257
__index, 258
__integer, 258
__iteratorNext, 258
__lessThan, 259
__modulo, 259
__multiply, 259
__negative, 260
__not, 260
__period, 260
__slice, 261
__string, 261
__subtract, 261
dump, 263
is_equal, 263, 265, 266
isCopyNeeded, 266
makeCopy, 266
Tang::ComputedExpressionMap, 267
__add, 270
__asCode, 270
__assign_index, 270
__boolean, 271
__divide, 271
__equal, 272
__float, 272
__getIterator, 272
__index, 273
__integer, 273
__iteratorNext, 273
__lessThan, 274
__modulo, 274
__multiply, 275
__negative, 275
__not, 275
__period, 275
__slice, 276
__string, 276
__subtract, 277
ComputedExpressionMap, 270
dump, 277
is_equal, 277–279
isCopyNeeded, 280
makeCopy, 280
Tang::ComputedExpressionNativeBoundFunction, 281
__add, 284

```

__asCode, 285
 __assign_index, 285
 __boolean, 285
 __divide, 286
 __equal, 286
 __float, 287
 __getIterator, 287
 __index, 287
 __integer, 288
 __iteratorNext, 288
 __lessThan, 288
 __modulo, 290
 __multiply, 290
 __negative, 290
 __not, 291
 __period, 291
 __slice, 291
 __string, 292
 __subtract, 292
ComputedExpressionNativeBoundFunction, 283
dump, 293
getArgc, 293
getFunction, 293
getTargetTypeIndex, 293
is_equal, 294–296
isCopyNeeded, 296
makeCopy, 296
Tang::ComputedExpressionNativeFunction, 297
 __add, 299
 __asCode, 300
 __assign_index, 300
 __boolean, 301
 __divide, 301
 __equal, 301
 __float, 302
 __getIterator, 302
 __index, 303
 __integer, 303
 __iteratorNext, 303
 __lessThan, 304
 __modulo, 304
 __multiply, 304
 __negative, 305
 __not, 305
 __period, 305
 __slice, 306
 __string, 306
 __subtract, 306
ComputedExpressionNativeFunction, 299
dump, 307
getArgc, 307
getFunction, 307
is_equal, 308–310
isCopyNeeded, 311
makeCopy, 311
Tang::ComputedExpressionString, 312
 __add, 316
 __asCode, 317
 __assign_index, 317
 __boolean, 317
 __divide, 318
 __equal, 318
 __float, 319
 __getIterator, 319
 __index, 320
 __integer, 320
 __iteratorNext, 321
 __lessThan, 321
 __modulo, 322
 __multiply, 322
 __negative, 323
 __not, 323
 __period, 323
 __slice, 324
 __string, 324
 __subtract, 325
bytesLength, 325
ComputedExpressionString, 314, 316
dump, 325
getMethods, 326
getValue, 326
is_equal, 326–329
isCopyNeeded, 329
length, 329
makeCopy, 330
operator+=, 330
Tang::Context, 331
Tang::Error, 332
 Error, 333
 operator<<, 334
Tang::GarbageCollected, 334
 ~GarbageCollected, 337
 GarbageCollected, 337
 isCopyNeeded, 338
 make, 338
 makeCopy, 339
 operator!, 339
 operator!=, 340
 operator<, 344
 operator<<, 351
 operator<=, 345
 operator>, 350
 operator>=, 350
 operator*, 341
 operator+, 342
 operator-, 342, 343
 operator->, 343
 operator/, 344
 operator=, 345
 operator==, 347–349
 operator%, 340
Tang::HtmlEscape, 351
 get_next_token, 353
 HtmlEscape, 352
Tang::HtmlEscapeAscii, 353
 get_next_token, 355

HtmlEscapeAscii, 355
 Tang::location, 356
 Tang::position, 357
 Tang::Program, 359
 addBreak, 362
 addBytecode, 362
 addContinue, 363
 addIdentifier, 363
 addIdentifierAssigned, 363
 addString, 363
 CodeType, 361
 dumpBytecode, 364
 execute, 364
 functionsDeclared, 369
 getAst, 364
 getBytecode, 365
 getCode, 365
 getIdentifiers, 365
 getIdentifiersAssigned, 365
 getResult, 366
 getStrings, 366
 popBreakStack, 366
 popContinueStack, 367
 Program, 362
 pushEnvironment, 367
 Script, 361
 setFunctionStackDeclaration, 368
 setJumpTarget, 368
 Template, 361
 Tang::SingletonObjectPool< T >, 369
 currentIndex, 371
 currentRecycledIndex, 372
 get, 370
 getInstance, 371
 recycle, 371
 Tang::TangBase, 372
 compileScript, 374
 make_shared, 374
 TangBase, 373
 Tang::TangScanner, 374
 get_next_token, 376
 TangScanner, 376
 Tang::Unescape, 377
 get_next_token, 378
 Unescape, 378
 Tang::UnicodeString, 379
 bytesLength, 381
 length, 381
 operator std::string, 381
 operator<, 382
 operator+, 382
 operator+=, 382
 operator==, 383
 render, 383
 renderAscii, 384
 substr, 384
 Trusted, 381
 Type, 380
 Untrusted, 381
 TangBase
 Tang::TangBase, 373
 TangScanner
 Tang::TangScanner, 376
 Template
 Tang::Program, 361
 test/test.cpp, 478
 test/testGarbageCollected.cpp, 480
 test/testSingletonObjectPool.cpp, 481
 test/testUnicodeString.cpp, 481
 Trusted
 Tang::UnicodeString, 381
 Type
 Tang::AstNodeCast, 49
 Tang::AstNodePrint, 106
 Tang::UnicodeString, 380
 Unescape
 Tang::Unescape, 378
 unescape
 unicodeString.hpp, 445
 unicodeString.hpp
 htmlEscape, 444
 htmlEscapeAscii, 445
 unescape, 445
 Untrusted
 Tang::UnicodeString, 381