

Tang

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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()	123
5.25.4 Member Function Documentation	124
5.25.4.1 compile()	124
5.25.4.2 compileLiteral()	124
5.25.4.3 compilePreprocess()	125
5.25.4.4 dump()	125
5.26 Tang::AstNodeTernary Class Reference	126
5.26.1 Detailed Description	128
5.26.2 Member Enumeration Documentation	128
5.26.2.1 PreprocessState	128
5.26.3 Constructor & Destructor Documentation	128
5.26.3.1 AstNodeTernary()	129
5.26.4 Member Function Documentation	129
5.26.4.1 compile()	129
5.26.4.2 compilePreprocess()	130
5.26.4.3 dump()	130
5.27 Tang::AstNodeUnary Class Reference	130
5.27.1 Detailed Description	132
5.27.2 Member Enumeration Documentation	132
5.27.2.1 Operator	132
5.27.2.2 PreprocessState	133
5.27.3 Constructor & Destructor Documentation	133
5.27.3.1 AstNodeUnary()	133
5.27.4 Member Function Documentation	133
5.27.4.1 compile()	133
5.27.4.2 compilePreprocess()	135
5.27.4.3 dump()	135
5.28 Tang::AstNodeWhile Class Reference	136
5.28.1 Detailed Description	138
5.28.2 Member Enumeration Documentation	138

5.28.2.1 PreprocessState	138
5.28.3 Constructor & Destructor Documentation	138
5.28.3.1 AstNodeWhile()	138
5.28.4 Member Function Documentation	139
5.28.4.1 compile()	139
5.28.4.2 compilePreprocess()	140
5.28.4.3 dump()	140
5.29 Tang::ComputedExpression Class Reference	140
5.29.1 Detailed Description	143
5.29.2 Member Function Documentation	143
5.29.2.1 __add()	143
5.29.2.2 __asCode()	143
5.29.2.3 __assign_index()	143
5.29.2.4 __boolean()	144
5.29.2.5 __divide()	144
5.29.2.6 __equal()	145
5.29.2.7 __float()	145
5.29.2.8 __getIterator()	145
5.29.2.9 __index()	146
5.29.2.10 __integer()	146
5.29.2.11 __iteratorNext()	146
5.29.2.12 __lessThan()	147
5.29.2.13 __modulo()	147
5.29.2.14 __multiply()	147
5.29.2.15 __negative()	148
5.29.2.16 __not()	148
5.29.2.17 __period()	148
5.29.2.18 __slice()	149
5.29.2.19 __string()	149
5.29.2.20 __subtract()	149
5.29.2.21 dump()	150
5.29.2.22 is_equal() [1/6]	150
5.29.2.23 is_equal() [2/6]	151
5.29.2.24 is_equal() [3/6]	151
5.29.2.25 is_equal() [4/6]	151
5.29.2.26 is_equal() [5/6]	152
5.29.2.27 is_equal() [6/6]	152
5.29.2.28 isCopyNeeded()	152
5.29.2.29 makeCopy()	153
5.30 Tang::ComputedExpressionArray Class Reference	153
5.30.1 Detailed Description	156
5.30.2 Constructor & Destructor Documentation	156

5.30.2.1 <code>ComputedExpressionArray()</code>	156
5.30.3 Member Function Documentation	156
5.30.3.1 <code>__add()</code>	156
5.30.3.2 <code>__asCode()</code>	157
5.30.3.3 <code>__assign_index()</code>	157
5.30.3.4 <code>__boolean()</code>	158
5.30.3.5 <code>__divide()</code>	158
5.30.3.6 <code>__equal()</code>	158
5.30.3.7 <code>__float()</code>	159
5.30.3.8 <code>__getIterator()</code>	159
5.30.3.9 <code>__index()</code>	159
5.30.3.10 <code>__integer()</code>	160
5.30.3.11 <code>__iteratorNext()</code>	160
5.30.3.12 <code>__lessThan()</code>	161
5.30.3.13 <code>__modulo()</code>	161
5.30.3.14 <code>__multiply()</code>	161
5.30.3.15 <code>__negative()</code>	162
5.30.3.16 <code>__not()</code>	162
5.30.3.17 <code>__period()</code>	162
5.30.3.18 <code>__slice()</code>	163
5.30.3.19 <code>__string()</code>	163
5.30.3.20 <code>__subtract()</code>	164
5.30.3.21 <code>append()</code>	164
5.30.3.22 <code>dump()</code>	165
5.30.3.23 <code>getContents()</code>	165
5.30.3.24 <code>getMethods()</code>	165
5.30.3.25 <code>is_equal() [1/6]</code>	165
5.30.3.26 <code>is_equal() [2/6]</code>	166
5.30.3.27 <code>is_equal() [3/6]</code>	166
5.30.3.28 <code>is_equal() [4/6]</code>	167
5.30.3.29 <code>is_equal() [5/6]</code>	167
5.30.3.30 <code>is_equal() [6/6]</code>	167
5.30.3.31 <code>isCopyNeeded()</code>	168
5.30.3.32 <code>makeCopy()</code>	168
5.31 <code>Tang::ComputedExpressionBoolean Class Reference</code>	169
5.31.1 Detailed Description	171
5.31.2 Constructor & Destructor Documentation	171
5.31.2.1 <code>ComputedExpressionBoolean()</code>	171
5.31.3 Member Function Documentation	171
5.31.3.1 <code>__add()</code>	171
5.31.3.2 <code>__asCode()</code>	172
5.31.3.3 <code>__assign_index()</code>	172

5.31.3.4 __boolean()	172
5.31.3.5 __divide()	172
5.31.3.6 __equal()	173
5.31.3.7 __float()	173
5.31.3.8 __getIterator()	174
5.31.3.9 __index()	174
5.31.3.10 __integer()	174
5.31.3.11 __iteratorNext()	174
5.31.3.12 __lessThan()	175
5.31.3.13 __modulo()	175
5.31.3.14 __multiply()	176
5.31.3.15 __negative()	176
5.31.3.16 __not()	176
5.31.3.17 __period()	176
5.31.3.18 __slice()	177
5.31.3.19 __string()	177
5.31.3.20 __subtract()	178
5.31.3.21 dump()	178
5.31.3.22 is_equal() [1/6]	178
5.31.3.23 is_equal() [2/6]	179
5.31.3.24 is_equal() [3/6]	179
5.31.3.25 is_equal() [4/6]	179
5.31.3.26 is_equal() [5/6]	180
5.31.3.27 is_equal() [6/6]	180
5.31.3.28 isCopyNeeded()	180
5.31.3.29 makeCopy()	181
5.32 Tang::ComputedExpressionCompiledFunction Class Reference	181
5.32.1 Detailed Description	183
5.32.2 Constructor & Destructor Documentation	183
5.32.2.1 ComputedExpressionCompiledFunction()	184
5.32.3 Member Function Documentation	184
5.32.3.1 __add()	184
5.32.3.2 __asCode()	184
5.32.3.3 __assign_index()	185
5.32.3.4 __boolean()	185
5.32.3.5 __divide()	185
5.32.3.6 __equal()	186
5.32.3.7 __float()	186
5.32.3.8 __getIterator()	187
5.32.3.9 __index()	187
5.32.3.10 __integer()	187
5.32.3.11 __iteratorNext()	187

5.32.3.12 __lessThan()	188
5.32.3.13 __modulo()	188
5.32.3.14 __multiply()	189
5.32.3.15 __negative()	189
5.32.3.16 __not()	189
5.32.3.17 __period()	189
5.32.3.18 __slice()	190
5.32.3.19 __string()	190
5.32.3.20 __subtract()	191
5.32.3.21 dump()	191
5.32.3.22 is_equal() [1/6]	191
5.32.3.23 is_equal() [2/6]	192
5.32.3.24 is_equal() [3/6]	192
5.32.3.25 is_equal() [4/6]	192
5.32.3.26 is_equal() [5/6]	193
5.32.3.27 is_equal() [6/6]	193
5.32.3.28 isCopyNeeded()	193
5.32.3.29 makeCopy()	194
5.33 Tang::ComputedExpressionError Class Reference	194
5.33.1 Detailed Description	197
5.33.2 Constructor & Destructor Documentation	197
5.33.2.1 ComputedExpressionError()	197
5.33.3 Member Function Documentation	197
5.33.3.1 __add()	197
5.33.3.2 __asCode()	198
5.33.3.3 __assign_index()	198
5.33.3.4 __boolean()	198
5.33.3.5 __divide()	198
5.33.3.6 __equal()	199
5.33.3.7 __float()	199
5.33.3.8 __getIterator()	199
5.33.3.9 __index()	200
5.33.3.10 __integer()	200
5.33.3.11 __iteratorNext()	200
5.33.3.12 __lessThan()	201
5.33.3.13 __modulo()	201
5.33.3.14 __multiply()	202
5.33.3.15 __negative()	202
5.33.3.16 __not()	202
5.33.3.17 __period()	202
5.33.3.18 __slice()	203
5.33.3.19 __string()	203

5.33.3.20 __subtract()	204
5.33.3.21 dump()	205
5.33.3.22 is_equal() [1/6]	205
5.33.3.23 is_equal() [2/6]	206
5.33.3.24 is_equal() [3/6]	207
5.33.3.25 is_equal() [4/6]	207
5.33.3.26 is_equal() [5/6]	208
5.33.3.27 is_equal() [6/6]	208
5.33.3.28 isCopyNeeded()	208
5.33.3.29 makeCopy()	209
5.34 Tang::ComputedExpressionFloat Class Reference	209
5.34.1 Detailed Description	211
5.34.2 Constructor & Destructor Documentation	211
5.34.2.1 ComputedExpressionFloat()	211
5.34.3 Member Function Documentation	211
5.34.3.1 __add()	212
5.34.3.2 __asCode()	212
5.34.3.3 __assign_index()	212
5.34.3.4 __boolean()	213
5.34.3.5 __divide()	213
5.34.3.6 __equal()	214
5.34.3.7 __float()	214
5.34.3.8 __getIterator()	215
5.34.3.9 __index()	215
5.34.3.10 __integer()	215
5.34.3.11 __iteratorNext()	215
5.34.3.12 __lessThan()	216
5.34.3.13 __modulo()	216
5.34.3.14 __multiply()	217
5.34.3.15 __negative()	217
5.34.3.16 __not()	218
5.34.3.17 __period()	218
5.34.3.18 __slice()	218
5.34.3.19 __string()	219
5.34.3.20 __subtract()	219
5.34.3.21 dump()	220
5.34.3.22 getValue()	220
5.34.3.23 is_equal() [1/6]	220
5.34.3.24 is_equal() [2/6]	221
5.34.3.25 is_equal() [3/6]	221
5.34.3.26 is_equal() [4/6]	221
5.34.3.27 is_equal() [5/6]	222

5.34.3.28 <code>is_equal()</code> [6/6]	222
5.34.3.29 <code>isCopyNeeded()</code>	223
5.34.3.30 <code>makeCopy()</code>	223
5.35 <code>Tang::ComputedExpressionInteger</code> Class Reference	223
5.35.1 Detailed Description	225
5.35.2 Constructor & Destructor Documentation	225
5.35.2.1 <code>ComputedExpressionInteger()</code>	225
5.35.3 Member Function Documentation	226
5.35.3.1 <code>__add()</code>	226
5.35.3.2 <code>__asCode()</code>	226
5.35.3.3 <code>__assign_index()</code>	227
5.35.3.4 <code>__boolean()</code>	227
5.35.3.5 <code>__divide()</code>	227
5.35.3.6 <code>__equal()</code>	228
5.35.3.7 <code>__float()</code>	228
5.35.3.8 <code>__getIterator()</code>	229
5.35.3.9 <code>__index()</code>	229
5.35.3.10 <code>__integer()</code>	229
5.35.3.11 <code>__iteratorNext()</code>	230
5.35.3.12 <code>__lessThan()</code>	230
5.35.3.13 <code>__modulo()</code>	230
5.35.3.14 <code>__multiply()</code>	231
5.35.3.15 <code>__negative()</code>	232
5.35.3.16 <code>__not()</code>	232
5.35.3.17 <code>__period()</code>	232
5.35.3.18 <code>__slice()</code>	232
5.35.3.19 <code>__string()</code>	233
5.35.3.20 <code>__subtract()</code>	233
5.35.3.21 <code>dump()</code>	234
5.35.3.22 <code>getValue()</code>	234
5.35.3.23 <code>is_equal()</code> [1/6]	234
5.35.3.24 <code>is_equal()</code> [2/6]	235
5.35.3.25 <code>is_equal()</code> [3/6]	235
5.35.3.26 <code>is_equal()</code> [4/6]	236
5.35.3.27 <code>is_equal()</code> [5/6]	236
5.35.3.28 <code>is_equal()</code> [6/6]	236
5.35.3.29 <code>isCopyNeeded()</code>	237
5.35.3.30 <code>makeCopy()</code>	237
5.36 <code>Tang::ComputedExpressionIterator</code> Class Reference	238
5.36.1 Detailed Description	240
5.36.2 Constructor & Destructor Documentation	240
5.36.2.1 <code>ComputedExpressionIterator()</code>	240

5.36.3 Member Function Documentation	240
5.36.3.1 __add()	240
5.36.3.2 __asCode()	241
5.36.3.3 __assign_index()	241
5.36.3.4 __boolean()	242
5.36.3.5 __divide()	242
5.36.3.6 __equal()	242
5.36.3.7 __float()	243
5.36.3.8 __getIterator()	243
5.36.3.9 __index()	243
5.36.3.10 __integer()	244
5.36.3.11 __iteratorNext()	244
5.36.3.12 __lessThan()	245
5.36.3.13 __modulo()	245
5.36.3.14 __multiply()	245
5.36.3.15 __negative()	246
5.36.3.16 __not()	246
5.36.3.17 __period()	246
5.36.3.18 __slice()	247
5.36.3.19 __string()	247
5.36.3.20 __subtract()	247
5.36.3.21 dump()	248
5.36.3.22 is_equal() [1/6]	248
5.36.3.23 is_equal() [2/6]	249
5.36.3.24 is_equal() [3/6]	250
5.36.3.25 is_equal() [4/6]	250
5.36.3.26 is_equal() [5/6]	251
5.36.3.27 is_equal() [6/6]	251
5.36.3.28 isCopyNeeded()	251
5.36.3.29 makeCopy()	252
5.37 Tang::ComputedExpressionIteratorEnd Class Reference	252
5.37.1 Detailed Description	254
5.37.2 Member Function Documentation	254
5.37.2.1 __add()	254
5.37.2.2 __asCode()	254
5.37.2.3 __assign_index()	255
5.37.2.4 __boolean()	255
5.37.2.5 __divide()	255
5.37.2.6 __equal()	256
5.37.2.7 __float()	256
5.37.2.8 __getIterator()	256
5.37.2.9 __index()	257

5.37.2.10 __integer()	257
5.37.2.11 __iteratorNext()	257
5.37.2.12 __lessThan()	258
5.37.2.13 __modulo()	258
5.37.2.14 __multiply()	259
5.37.2.15 __negative()	259
5.37.2.16 __not()	259
5.37.2.17 __period()	259
5.37.2.18 __slice()	260
5.37.2.19 __string()	260
5.37.2.20 __subtract()	261
5.37.2.21 dump()	262
5.37.2.22 is_equal() [1/6]	262
5.37.2.23 is_equal() [2/6]	263
5.37.2.24 is_equal() [3/6]	264
5.37.2.25 is_equal() [4/6]	264
5.37.2.26 is_equal() [5/6]	265
5.37.2.27 is_equal() [6/6]	265
5.37.2.28 isCopyNeeded()	265
5.37.2.29 makeCopy()	266
5.38 Tang::ComputedExpressionMap Class Reference	266
5.38.1 Detailed Description	268
5.38.2 Constructor & Destructor Documentation	269
5.38.2.1 ComputedExpressionMap()	269
5.38.3 Member Function Documentation	269
5.38.3.1 __add()	269
5.38.3.2 __asCode()	269
5.38.3.3 __assign_index()	270
5.38.3.4 __boolean()	270
5.38.3.5 __divide()	270
5.38.3.6 __equal()	271
5.38.3.7 __float()	271
5.38.3.8 __getIterator()	271
5.38.3.9 __index()	272
5.38.3.10 __integer()	272
5.38.3.11 __iteratorNext()	273
5.38.3.12 __lessThan()	273
5.38.3.13 __modulo()	273
5.38.3.14 __multiply()	274
5.38.3.15 __negative()	274
5.38.3.16 __not()	274
5.38.3.17 __period()	274

5.38.3.18 __slice()	275
5.38.3.19 __string()	275
5.38.3.20 __subtract()	276
5.38.3.21 dump()	276
5.38.3.22 is_equal() [1/6]	277
5.38.3.23 is_equal() [2/6]	277
5.38.3.24 is_equal() [3/6]	277
5.38.3.25 is_equal() [4/6]	278
5.38.3.26 is_equal() [5/6]	278
5.38.3.27 is_equal() [6/6]	278
5.38.3.28 isCopyNeeded()	279
5.38.3.29 makeCopy()	279
5.39 Tang::ComputedExpressionNativeBoundFunction Class Reference	280
5.39.1 Detailed Description	282
5.39.2 Constructor & Destructor Documentation	282
5.39.2.1 ComputedExpressionNativeBoundFunction()	283
5.39.3 Member Function Documentation	283
5.39.3.1 __add()	283
5.39.3.2 __asCode()	284
5.39.3.3 __assign_index()	284
5.39.3.4 __boolean()	285
5.39.3.5 __divide()	285
5.39.3.6 __equal()	285
5.39.3.7 __float()	286
5.39.3.8 __getIterator()	286
5.39.3.9 __index()	286
5.39.3.10 __integer()	287
5.39.3.11 __iteratorNext()	287
5.39.3.12 __lessThan()	287
5.39.3.13 __modulo()	289
5.39.3.14 __multiply()	289
5.39.3.15 __negative()	290
5.39.3.16 __not()	290
5.39.3.17 __period()	290
5.39.3.18 __slice()	291
5.39.3.19 __string()	291
5.39.3.20 __subtract()	291
5.39.3.21 dump()	292
5.39.3.22 getArgc()	292
5.39.3.23 getFunction()	292
5.39.3.24 getTargetTypeIndex()	293
5.39.3.25 is_equal() [1/6]	293

5.39.3.26 <code>is_equal()</code> [2/6]	293
5.39.3.27 <code>is_equal()</code> [3/6]	294
5.39.3.28 <code>is_equal()</code> [4/6]	294
5.39.3.29 <code>is_equal()</code> [5/6]	294
5.39.3.30 <code>is_equal()</code> [6/6]	295
5.39.3.31 <code>isCopyNeeded()</code>	295
5.39.3.32 <code>makeCopy()</code>	295
5.40 <code>Tang::ComputedExpressionString</code> Class Reference	296
5.40.1 Detailed Description	298
5.40.2 Constructor & Destructor Documentation	298
5.40.2.1 <code>ComputedExpressionString()</code>	298
5.40.3 Member Function Documentation	298
5.40.3.1 <code>__add()</code>	299
5.40.3.2 <code>__asCode()</code>	299
5.40.3.3 <code>__assign_index()</code>	300
5.40.3.4 <code>__boolean()</code>	300
5.40.3.5 <code>__divide()</code>	300
5.40.3.6 <code>__equal()</code>	301
5.40.3.7 <code>__float()</code>	301
5.40.3.8 <code>__getIterator()</code>	302
5.40.3.9 <code>__index()</code>	302
5.40.3.10 <code>__integer()</code>	303
5.40.3.11 <code>__iteratorNext()</code>	303
5.40.3.12 <code>__lessThan()</code>	303
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>	307
5.40.3.20 <code>__subtract()</code>	307
5.40.3.21 <code>dump()</code>	307
5.40.3.22 <code>getMethods()</code>	308
5.40.3.23 <code>getValue()</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 <code>isCopyNeeded()</code>	311

5.40.3.31 makeCopy()	311
5.41 Tang::Error Class Reference	312
5.41.1 Detailed Description	313
5.41.2 Constructor & Destructor Documentation	313
5.41.2.1 Error() [1/2]	313
5.41.2.2 Error() [2/2]	313
5.41.3 Friends And Related Function Documentation	313
5.41.3.1 operator<<	314
5.42 Tang::GarbageCollected Class Reference	314
5.42.1 Detailed Description	316
5.42.2 Constructor & Destructor Documentation	316
5.42.2.1 GarbageCollected() [1/3]	316
5.42.2.2 GarbageCollected() [2/3]	317
5.42.2.3 ~GarbageCollected()	317
5.42.2.4 GarbageCollected() [3/3]	317
5.42.3 Member Function Documentation	317
5.42.3.1 isCopyNeeded()	317
5.42.3.2 make()	318
5.42.3.3 makeCopy()	318
5.42.3.4 operator"!"()	319
5.42.3.5 operator"!="()	319
5.42.3.6 operator%()	320
5.42.3.7 operator*() [1/2]	321
5.42.3.8 operator*() [2/2]	321
5.42.3.9 operator+()	321
5.42.3.10 operator-() [1/2]	322
5.42.3.11 operator-() [2/2]	322
5.42.3.12 operator->()	323
5.42.3.13 operator/()	323
5.42.3.14 operator<()	324
5.42.3.15 operator<=()	324
5.42.3.16 operator>() [1/2]	325
5.42.3.17 operator>() [2/2]	325
5.42.3.18 operator==() [1/8]	325
5.42.3.19 operator==() [2/8]	326
5.42.3.20 operator==() [3/8]	326
5.42.3.21 operator==() [4/8]	326
5.42.3.22 operator==() [5/8]	327
5.42.3.23 operator==() [6/8]	327
5.42.3.24 operator==() [7/8]	328
5.42.3.25 operator==() [8/8]	328
5.42.3.26 operator>()	329

5.42.3.27 operator>=()	329
5.42.4 Friends And Related Function Documentation	329
5.42.4.1 operator<<	330
5.43 Tang::HtmlEscape Class Reference	330
5.43.1 Detailed Description	331
5.43.2 Constructor & Destructor Documentation	331
5.43.2.1 HtmlEscape()	331
5.43.3 Member Function Documentation	332
5.43.3.1 get_next_token()	332
5.44 Tang::HtmlEscapeAscii Class Reference	332
5.44.1 Detailed Description	333
5.44.2 Constructor & Destructor Documentation	333
5.44.2.1 HtmlEscapeAscii()	333
5.44.3 Member Function Documentation	334
5.44.3.1 get_next_token()	334
5.45 Tang::location Class Reference	334
5.45.1 Detailed Description	335
5.46 Tang::position Class Reference	336
5.46.1 Detailed Description	337
5.47 Tang::Program Class Reference	337
5.47.1 Detailed Description	339
5.47.2 Member Enumeration Documentation	340
5.47.2.1 CodeType	340
5.47.3 Constructor & Destructor Documentation	340
5.47.3.1 Program()	340
5.47.4 Member Function Documentation	340
5.47.4.1 addBreak()	340
5.47.4.2 addBytecode()	341
5.47.4.3 addContinue()	341
5.47.4.4 addIdentifier()	341
5.47.4.5 addIdentifierAssigned()	342
5.47.4.6 addString()	342
5.47.4.7 dumpBytecode()	342
5.47.4.8 execute()	342
5.47.4.9 getAst()	343
5.47.4.10 getBytecode()	343
5.47.4.11 getCode()	343
5.47.4.12 getIdentifiers()	344
5.47.4.13 getIdentifiersAssigned()	344
5.47.4.14 getResult()	344
5.47.4.15 getStrings()	344
5.47.4.16 popBreakStack()	344

5.47.4.17 popContinueStack()	345
5.47.4.18 pushEnvironment()	345
5.47.4.19 setFunctionStackDeclaration()	346
5.47.4.20 setJumpTarget()	346
5.47.5 Member Data Documentation	347
5.47.5.1 functionsDeclared	347
5.48 Tang::SingletonObjectPool< T > Class Template Reference	347
5.48.1 Detailed Description	348
5.48.2 Member Function Documentation	349
5.48.2.1 get()	349
5.48.2.2 getInstance()	349
5.48.2.3 recycle()	349
5.48.3 Member Data Documentation	349
5.48.3.1 currentIndex	350
5.48.3.2 currentRecycledIndex	350
5.49 Tang::TangBase Class Reference	350
5.49.1 Detailed Description	351
5.49.2 Constructor & Destructor Documentation	351
5.49.2.1 TangBase()	351
5.49.3 Member Function Documentation	352
5.49.3.1 compileScript()	352
5.49.3.2 make_shared()	352
5.50 Tang::TangScanner Class Reference	352
5.50.1 Detailed Description	354
5.50.2 Constructor & Destructor Documentation	354
5.50.2.1 TangScanner()	354
5.50.3 Member Function Documentation	354
5.50.3.1 get_next_token()	355
5.51 Tang::Unescape Class Reference	355
5.51.1 Detailed Description	356
5.51.2 Constructor & Destructor Documentation	356
5.51.2.1 Unescape()	356
5.51.3 Member Function Documentation	356
5.51.3.1 get_next_token()	356
5.52 Tang::UnicodeString Class Reference	357
5.52.1 Detailed Description	358
5.52.2 Constructor & Destructor Documentation	358
5.52.2.1 UnicodeString()	358
5.52.3 Member Function Documentation	358
5.52.3.1 bytesLength()	358
5.52.3.2 length()	359
5.52.3.3 operator std::string()	359

5.52.3.4 operator+()	359
5.52.3.5 operator<()	360
5.52.3.6 operator==()	360
5.52.3.7 substr()	360
6 File Documentation	363
6.1 build/generated/location.hh File Reference	363
6.1.1 Detailed Description	364
6.1.2 Function Documentation	364
6.1.2.1 operator<<() [1/2]	364
6.1.2.2 operator<<() [2/2]	365
6.2 include/astNode.hpp File Reference	365
6.2.1 Detailed Description	366
6.3 include/astNodeArray.hpp File Reference	366
6.3.1 Detailed Description	367
6.4 include/astNodeAssign.hpp File Reference	367
6.4.1 Detailed Description	368
6.5 include/astNodeBinary.hpp File Reference	368
6.5.1 Detailed Description	369
6.6 include/astNodeBlock.hpp File Reference	369
6.6.1 Detailed Description	370
6.7 include/astNodeBoolean.hpp File Reference	370
6.7.1 Detailed Description	371
6.8 include/astNodeBreak.hpp File Reference	371
6.8.1 Detailed Description	372
6.9 include/astNodeCast.hpp File Reference	372
6.9.1 Detailed Description	373
6.10 include/astNodeContinue.hpp File Reference	373
6.10.1 Detailed Description	374
6.11 include/astNodeDoWhile.hpp File Reference	374
6.11.1 Detailed Description	375
6.12 include/astNodeFloat.hpp File Reference	375
6.12.1 Detailed Description	376
6.13 include/astNodeFor.hpp File Reference	376
6.13.1 Detailed Description	377
6.14 include/astNodeFunctionCall.hpp File Reference	377
6.14.1 Detailed Description	378
6.15 include/astNodeFunctionDeclaration.hpp File Reference	378
6.15.1 Detailed Description	379
6.16 include/astNodeIdentifier.hpp File Reference	379
6.16.1 Detailed Description	380
6.17 include/astNodeIfElse.hpp File Reference	380

6.17.1 Detailed Description	381
6.18 include/astNodeIndex.hpp File Reference	381
6.18.1 Detailed Description	382
6.19 include/astNodeInteger.hpp File Reference	382
6.19.1 Detailed Description	383
6.20 include/astNodeMap.hpp File Reference	383
6.20.1 Detailed Description	384
6.21 include/astNodePeriod.hpp File Reference	384
6.21.1 Detailed Description	385
6.22 include/astNodePrint.hpp File Reference	385
6.22.1 Detailed Description	386
6.23 include/astNodeRangedFor.hpp File Reference	386
6.23.1 Detailed Description	387
6.24 include/astNodeReturn.hpp File Reference	387
6.24.1 Detailed Description	388
6.25 include/astNodeSlice.hpp File Reference	388
6.25.1 Detailed Description	389
6.26 include/astNodeString.hpp File Reference	389
6.26.1 Detailed Description	389
6.27 include/astNodeTernary.hpp File Reference	390
6.27.1 Detailed Description	390
6.28 include/astNodeUnary.hpp File Reference	391
6.28.1 Detailed Description	391
6.29 include/astNodeWhile.hpp File Reference	392
6.29.1 Detailed Description	392
6.30 include/computedExpression.hpp File Reference	393
6.30.1 Detailed Description	393
6.31 include/computedExpressionArray.hpp File Reference	394
6.31.1 Detailed Description	394
6.32 include/computedExpressionBoolean.hpp File Reference	395
6.32.1 Detailed Description	395
6.33 include/computedExpressionCompiledFunction.hpp File Reference	395
6.33.1 Detailed Description	396
6.34 include/computedExpressionError.hpp File Reference	396
6.34.1 Detailed Description	397
6.35 include/computedExpressionFloat.hpp File Reference	397
6.35.1 Detailed Description	398
6.36 include/computedExpressionInteger.hpp File Reference	398
6.36.1 Detailed Description	399
6.37 include/computedExpressionIterator.hpp File Reference	399
6.37.1 Detailed Description	400
6.38 include/computedExpressionIteratorEnd.hpp File Reference	400

6.38.1 Detailed Description	401
6.39 include/computedExpressionMap.hpp File Reference	401
6.39.1 Detailed Description	402
6.40 include/computedExpressionNativeBoundFunction.hpp File Reference	402
6.40.1 Detailed Description	403
6.41 include/computedExpressionString.hpp File Reference	403
6.41.1 Detailed Description	404
6.42 include/error.hpp File Reference	404
6.42.1 Detailed Description	405
6.43 include/garbageCollected.hpp File Reference	405
6.43.1 Detailed Description	406
6.44 include/htmlEscape.hpp File Reference	406
6.44.1 Detailed Description	407
6.45 include/htmlEscapeAscii.hpp File Reference	407
6.45.1 Detailed Description	408
6.46 include/macros.hpp File Reference	408
6.46.1 Detailed Description	409
6.47 include/opcode.hpp File Reference	409
6.47.1 Detailed Description	410
6.47.2 Enumeration Type Documentation	410
6.47.2.1 Opcode	410
6.48 include/program.hpp File Reference	411
6.48.1 Detailed Description	412
6.49 include/singleObjectPool.hpp File Reference	412
6.49.1 Detailed Description	413
6.50 include/tang.hpp File Reference	413
6.50.1 Detailed Description	414
6.51 include/tangBase.hpp File Reference	414
6.51.1 Detailed Description	414
6.52 include/tangScanner.hpp File Reference	415
6.52.1 Detailed Description	416
6.53 include/unescape.hpp File Reference	416
6.53.1 Detailed Description	417
6.54 include/unicodeString.hpp File Reference	417
6.54.1 Detailed Description	418
6.54.2 Function Documentation	418
6.54.2.1 htmlEscape()	418
6.54.2.2 htmlEscapeAscii()	418
6.54.2.3 unescape()	419
6.55 src/astNode.cpp File Reference	420
6.55.1 Detailed Description	420
6.56 src/astNodeArray.cpp File Reference	420

6.56.1 Detailed Description	421
6.57 src/astNodeAssign.cpp File Reference	421
6.57.1 Detailed Description	421
6.58 src/astNodeBinary.cpp File Reference	421
6.58.1 Detailed Description	422
6.59 src/astNodeBlock.cpp File Reference	422
6.59.1 Detailed Description	422
6.60 src/astNodeBoolean.cpp File Reference	423
6.60.1 Detailed Description	423
6.61 src/astNodeBreak.cpp File Reference	423
6.61.1 Detailed Description	424
6.62 src/astNodeCast.cpp File Reference	424
6.62.1 Detailed Description	425
6.63 src/astNodeContinue.cpp File Reference	425
6.63.1 Detailed Description	425
6.64 src/astNodeDoWhile.cpp File Reference	425
6.64.1 Detailed Description	426
6.65 src/astNodeFloat.cpp File Reference	426
6.65.1 Detailed Description	426
6.66 src/astNodeFor.cpp File Reference	427
6.66.1 Detailed Description	427
6.67 src/astNodeFunctionCall.cpp File Reference	427
6.67.1 Detailed Description	428
6.68 src/astNodeFunctionDeclaration.cpp File Reference	428
6.68.1 Detailed Description	428
6.69 src/astNodeIdentifier.cpp File Reference	428
6.69.1 Detailed Description	429
6.70 src/astNodeIfElse.cpp File Reference	429
6.70.1 Detailed Description	429
6.71 src/astNodeIndex.cpp File Reference	430
6.71.1 Detailed Description	430
6.72 src/astNodeInteger.cpp File Reference	430
6.72.1 Detailed Description	431
6.73 src/astNodeMap.cpp File Reference	431
6.73.1 Detailed Description	431
6.74 src/astNodePeriod.cpp File Reference	431
6.74.1 Detailed Description	432
6.75 src/astNodePrint.cpp File Reference	432
6.75.1 Detailed Description	432
6.76 src/astNodeRangedFor.cpp File Reference	433
6.76.1 Detailed Description	433
6.77 src/astNodeReturn.cpp File Reference	433

6.77.1 Detailed Description	434
6.78 src/astNodeSlice.cpp File Reference	434
6.78.1 Detailed Description	434
6.79 src/astNodeString.cpp File Reference	434
6.79.1 Detailed Description	435
6.80 src/astNodeTernary.cpp File Reference	435
6.80.1 Detailed Description	436
6.81 src/astNodeUnary.cpp File Reference	436
6.81.1 Detailed Description	436
6.82 src/astNodeWhile.cpp File Reference	436
6.82.1 Detailed Description	437
6.83 src/computedExpression.cpp File Reference	437
6.83.1 Detailed Description	437
6.84 src/computedExpressionArray.cpp File Reference	438
6.84.1 Detailed Description	438
6.85 src/computedExpressionBoolean.cpp File Reference	438
6.85.1 Detailed Description	439
6.86 src/computedExpressionCompiledFunction.cpp File Reference	439
6.86.1 Detailed Description	439
6.87 src/computedExpressionError.cpp File Reference	439
6.87.1 Detailed Description	440
6.88 src/computedExpressionFloat.cpp File Reference	440
6.88.1 Detailed Description	441
6.89 src/computedExpressionInteger.cpp File Reference	441
6.89.1 Detailed Description	441
6.90 src/computedExpressionIterator.cpp File Reference	441
6.90.1 Detailed Description	442
6.91 src/computedExpressionIteratorEnd.cpp File Reference	442
6.91.1 Detailed Description	443
6.92 src/computedExpressionMap.cpp File Reference	443
6.92.1 Detailed Description	443
6.93 src/computedExpressionNativeBoundFunction.cpp File Reference	443
6.93.1 Detailed Description	444
6.94 src/computedExpressionString.cpp File Reference	444
6.94.1 Detailed Description	444
6.95 src/error.cpp File Reference	445
6.95.1 Detailed Description	445
6.95.2 Function Documentation	445
6.95.2.1 operator<<()	445
6.96 src/garbageCollected.cpp File Reference	446
6.96.1 Function Documentation	446
6.96.1.1 operator<<()	446

6.97 src/program-dumpBytecode.cpp File Reference	447
6.97.1 Detailed Description	447
6.97.2 Macro Definition Documentation	447
6.97.2.1 DUMPPROGRAMCHECK	447
6.98 src/program-execute.cpp File Reference	448
6.98.1 Detailed Description	448
6.98.2 Macro Definition Documentation	448
6.98.2.1 EXECUTEPROGRAMCHECK	449
6.98.2.2 STACKCHECK	449
6.99 src/program.cpp File Reference	449
6.99.1 Detailed Description	450
6.100 src/tangBase.cpp File Reference	450
6.100.1 Detailed Description	450
6.101 src/unicodeString.cpp File Reference	451
6.101.1 Detailed Description	451
6.102 test/test.cpp File Reference	451
6.102.1 Detailed Description	452
6.103 test/testGarbageCollected.cpp File Reference	453
6.103.1 Detailed Description	453
6.104 test/testSingletonObjectPool.cpp File Reference	453
6.104.1 Detailed Description	454
6.105 test/testUnicodeString.cpp File Reference	454
6.105.1 Detailed Description	455
Index	457

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

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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	130
Tang::AstNodeWhile	136
Tang::ComputedExpression	140
Tang::ComputedExpressionArray	153
Tang::ComputedExpressionBoolean	169
Tang::ComputedExpressionCompiledFunction	181
Tang::ComputedExpressionError	194
Tang::ComputedExpressionFloat	209
Tang::ComputedExpressionInteger	223

Tang::ComputedExpressionIterator	238
Tang::ComputedExpressionIteratorEnd	252
Tang::ComputedExpressionMap	266
Tang::ComputedExpressionNativeBoundFunction	280
Tang::ComputedExpressionString	296
std::enable_shared_from_this	
Tang::TangBase	350
Tang::Error	312
Tang::GarbageCollected	314
Tang::location	334
Tang::position	336
Tang::Program	337
Tang::SingletonObjectPool< T >	347
TangHtmlEscapeAsciiFlexLexer	
Tang::HtmlEscapeAscii	332
TangHtmlEscapeFlexLexer	
Tang::HtmlEscape	330
TangTangFlexLexer	
Tang::TangScanner	352
TangUnescapeFlexLexer	
Tang::Unescape	355
Tang::UnicodeString	357

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 return 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	130
Tang::AstNodeWhile	An <code>AstNode</code> that represents a while statement	136
Tang::ComputedExpression	Represents the result of a computation that has been executed	140
Tang::ComputedExpressionArray	Represents an Array that is the result of a computation	153
Tang::ComputedExpressionBoolean	Represents an Boolean that is the result of a computation	169
Tang::ComputedExpressionCompiledFunction	Represents a Compiled Function declared in the script	181
Tang::ComputedExpressionError	Represents a Runtime Error	194
Tang::ComputedExpressionFloat	Represents a Float that is the result of a computation	209
Tang::ComputedExpressionInteger	Represents an Integer that is the result of a computation	223
Tang::ComputedExpressionIterator	Represents an Iterator that is the result of a computation	238
Tang::ComputedExpressionIteratorEnd	Represents that a collection has no more values through which to iterate	252
Tang::ComputedExpressionMap	Represents an Map that is the result of a computation	266
Tang::ComputedExpressionNativeBoundFunction	Represents a NativeBound Function declared in the script	280
Tang::ComputedExpressionString	Represents a String that is the result of a computation	296
Tang::Error	Used to report any error of the system, whether a syntax (parsing) error or a runtime (execution) error	312
Tang::GarbageCollected	A container that acts as a resource-counting garbage collector for the specified type	314
Tang::HtmlEscape	The Flex lexer class for the main Tang language	330
Tang::HtmlEscapeAscii	The Flex lexer class for the main Tang language	332
Tang::location	Two points in a source file	334
Tang::position	A point in a source file	336

Tang::Program	Represents a compiled script or template that may be executed	337
Tang::SingletonObjectPool< T >	A thread-safe, singleton object pool of the designated type	347
Tang::TangBase	The base class for the Tang programming language	350
Tang::TangScanner	The Flex lexer class for the main Tang language	352
Tang::Unescape	The Flex lexer class for the main Tang language	355
Tang::UnicodeString	Represents a UTF-8 encoded string that is Unicode-aware	357

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	363
include/ astNode.hpp	Declare the Tang::AstNode base class	365
include/ astNodeArray.hpp	Declare the Tang::AstNodeArray class	366
include/ astNodeAssign.hpp	Declare the Tang::AstNodeAssign class	367
include/ astNodeBinary.hpp	Declare the Tang::AstNodeBinary class	368
include/ astNodeBlock.hpp	Declare the Tang::AstNodeBlock class	369
include/ astNodeBoolean.hpp	Declare the Tang::AstNodeBoolean class	370
include/ astNodeBreak.hpp	Declare the Tang::AstNodeBreak class	371
include/ astNodeCast.hpp	Declare the Tang::AstNodeCast class	372
include/ astNodeContinue.hpp	Declare the Tang::AstNodeContinue class	373
include/ astNodeDoWhile.hpp	Declare the Tang::AstNodeDoWhile class	374
include/ astNodeFloat.hpp	Declare the Tang::AstNodeFloat class	375
include/ astNodeFor.hpp	Declare the Tang::AstNodeFor class	376
include/ astNodeFunctionCall.hpp	Declare the Tang::AstNodeFunctionCall class	377
include/ astNodeFunctionDeclaration.hpp	Declare the Tang::AstNodeFunctionDeclaration class	378
include/ astNodeIdentifier.hpp	Declare the Tang::AstNodeIdentifier class	379
include/ astNodeIfElse.hpp	Declare the Tang::AstNodeIfElse class	380
include/ astNodeIndex.hpp	Declare the Tang::AstNodeIndex class	381

include/astNodeInteger.hpp	Declare the Tang::AstNodeInteger class	382
include/astNodeMap.hpp	Declare the Tang::AstNodeMap class	383
include/astNodePeriod.hpp	Declare the Tang::AstNodePeriod class	384
include/astNodePrint.hpp	Declare the Tang::AstNodePrint class	385
include/astNodeRangedFor.hpp	Declare the Tang::AstNodeRangedFor class	386
include/astNodeReturn.hpp	Declare the Tang::AstNodeReturn class	387
include/astNodeSlice.hpp	Declare the Tang::AstNodeSlice class	388
include/astNodeString.hpp	Declare the Tang::AstNodeString class	389
include/astNodeTernary.hpp	Declare the Tang::AstNodeTernary class	390
include/astNodeUnary.hpp	Declare the Tang::AstNodeUnary class	391
include/astNodeWhile.hpp	Declare the Tang::AstNodeWhile class	392
include/computedExpression.hpp	Declare the Tang::ComputedExpression base class	393
include/computedExpressionArray.hpp	Declare the Tang::ComputedExpressionArray class	394
include/computedExpressionBoolean.hpp	Declare the Tang::ComputedExpressionBoolean class	395
include/computedExpressionCompiledFunction.hpp	Declare the Tang::ComputedExpressionCompiledFunction class	395
include/computedExpressionError.hpp	Declare the Tang::ComputedExpressionError class	396
include/computedExpressionFloat.hpp	Declare the Tang::ComputedExpressionFloat class	397
include/computedExpressionInteger.hpp	Declare the Tang::ComputedExpressionInteger class	398
include/computedExpressionIterator.hpp	Declare the Tang::ComputedExpressionIterator class	399
include/computedExpressionIteratorEnd.hpp	Declare the Tang::ComputedExpressionIteratorEnd class	400
include/computedExpressionMap.hpp	Declare the Tang::ComputedExpressionMap class	401
include/computedExpressionNativeBoundFunction.hpp	Declare the Tang::ComputedExpressionNativeBoundFunction class	402
include/computedExpressionString.hpp	Declare the Tang::ComputedExpressionString class	403
include/error.hpp	Declare the Tang::Error class used to describe syntax and runtime errors	404
include/garbageCollected.hpp	Declare the Tang::GarbageCollected class	405
include/htmlEscape.hpp	Declare the Tang::HtmlEscape used to tokenize a Tang script	406
include/htmlEscapeAscii.hpp	Declare the Tang::HtmlEscapeAscii used to tokenize a Tang script	407
include/macros.hpp	Contains generic macros	408
include/opcode.hpp	Declare the Opcodes used in the Bytecode representation of a program	409

include/program.hpp	Declare the <code>Tang::Program</code> class used to compile and execute source code	411
include/singletonObjectPool.hpp	Declare the <code>Tang::SingletonObjectPool</code> class	412
include/tang.hpp	Header file supplied for use by 3rd party code so that they can easily include all necessary headers	413
include/tangBase.hpp	Declare the <code>Tang::TangBase</code> class used to interact with Tang	414
include/tangScanner.hpp	Declare the <code>Tang::TangScanner</code> used to tokenize a Tang script	415
include/unescape.hpp	Declare the <code>Tang::Unescape</code> used to tokenize a Tang script	416
include/unicodeString.hpp	Contains the code to interface with the ICU library	417
src/astNode.cpp	Define the <code>Tang::AstNode</code> class	420
src/astNodeArray.cpp	Define the <code>Tang::AstNodeArray</code> class	420
src/astNodeAssign.cpp	Define the <code>Tang::AstNodeAssign</code> class	421
src/astNodeBinary.cpp	Define the <code>Tang::AstNodeBinary</code> class	421
src/astNodeBlock.cpp	Define the <code>Tang::AstNodeBlock</code> class	422
src/astNodeBoolean.cpp	Define the <code>Tang::AstNodeBoolean</code> class	423
src/astNodeBreak.cpp	Define the <code>Tang::AstNodeBreak</code> class	423
src/astNodeCast.cpp	Define the <code>Tang::AstNodeCast</code> class	424
src/astNodeContinue.cpp	Define the <code>Tang::AstNodeContinue</code> class	425
src/astNodeDoWhile.cpp	Define the <code>Tang::AstNodeDoWhile</code> class	425
src/astNodeFloat.cpp	Define the <code>Tang::AstNodeFloat</code> class	426
src/astNodeFor.cpp	Define the <code>Tang::AstNodeFor</code> class	427
src/astNodeFunctionCall.cpp	Define the <code>Tang::AstNodeFunctionCall</code> class	427
src/astNodeFunctionDeclaration.cpp	Define the <code>Tang::AstNodeFunctionDeclaration</code> class	428
src/astNodeIdentifier.cpp	Define the <code>Tang::AstNodeIdentifier</code> class	428
src/astNodeIfElse.cpp	Define the <code>Tang::AstNodeIfElse</code> class	429
src/astNodeIndex.cpp	Define the <code>Tang::AstNodeIndex</code> class	430
src/astNodeInteger.cpp	Define the <code>Tang::AstNodeInteger</code> class	430
src/astNodeMap.cpp	Define the <code>Tang::AstNodeMap</code> class	431
src/astNodePeriod.cpp	Define the <code>Tang::AstNodePeriod</code> class	431
src/astNodePrint.cpp	Define the <code>Tang::AstNodePrint</code> class	432

src/astNodeRangedFor.cpp	Define the Tang::AstNodeRangedFor class	433
src/astNodeReturn.cpp	Define the Tang::AstNodeReturn class	433
src/astNodeSlice.cpp	Define the Tang::AstNodeSlice class	434
src/astNodeString.cpp	Define the Tang::AstNodeString class	434
src/astNodeTernary.cpp	Define the Tang::AstNodeTernary class	435
src/astNodeUnary.cpp	Define the Tang::AstNodeUnary class	436
src/astNodeWhile.cpp	Define the Tang::AstNodeWhile class	436
src/computedExpression.cpp	Define the Tang::ComputedExpression class	437
src/computedExpressionArray.cpp	Define the Tang::ComputedExpressionArray class	438
src/computedExpressionBoolean.cpp	Define the Tang::ComputedExpressionBoolean class	438
src/computedExpressionCompiledFunction.cpp	Define the Tang::ComputedExpressionCompiledFunction class	439
src/computedExpressionError.cpp	Define the Tang::ComputedExpressionError class	439
src/computedExpressionFloat.cpp	Define the Tang::ComputedExpressionFloat class	440
src/computedExpressionInteger.cpp	Define the Tang::ComputedExpressionInteger class	441
src/computedExpressionIterator.cpp	Define the Tang::ComputedExpressionIterator class	441
src/computedExpressionIteratorEnd.cpp	Define the Tang::ComputedExpressionIteratorEnd class	442
src/computedExpressionMap.cpp	Define the Tang::ComputedExpressionMap class	443
src/computedExpressionNativeBoundFunction.cpp	Define the Tang::ComputedExpressionNativeBoundFunction class	443
src/computedExpressionString.cpp	Define the Tang::ComputedExpressionString class	444
src/error.cpp	Define the Tang::Error class	445
src/garbageCollected.cpp	446
src/program-dumpBytecode.cpp	Define the Tang::Program::dumpBytecode method	447
src/program-execute.cpp	Define the Tang::Program::execute method	448
src/program.cpp	Define the Tang::Program class	449
src/tangBase.cpp	Define the Tang::TangBase class	450
src/unicodeString.cpp	Contains the function declarations for the Tang::UnicodeString class and the interface to ICU	451
test/test.cpp	Test the general language behaviors	451
test/testGarbageCollected.cpp	Test the generic behavior of the Tang::GarbageCollected class	453
test/testSingletonObjectPool.cpp	Test the generic behavior of the Tang::SingletonObjectPool class	453

test/testUnicodeString.cpp Contains tests for the Tang::UnicodeString class	454
--	-----

Chapter 5

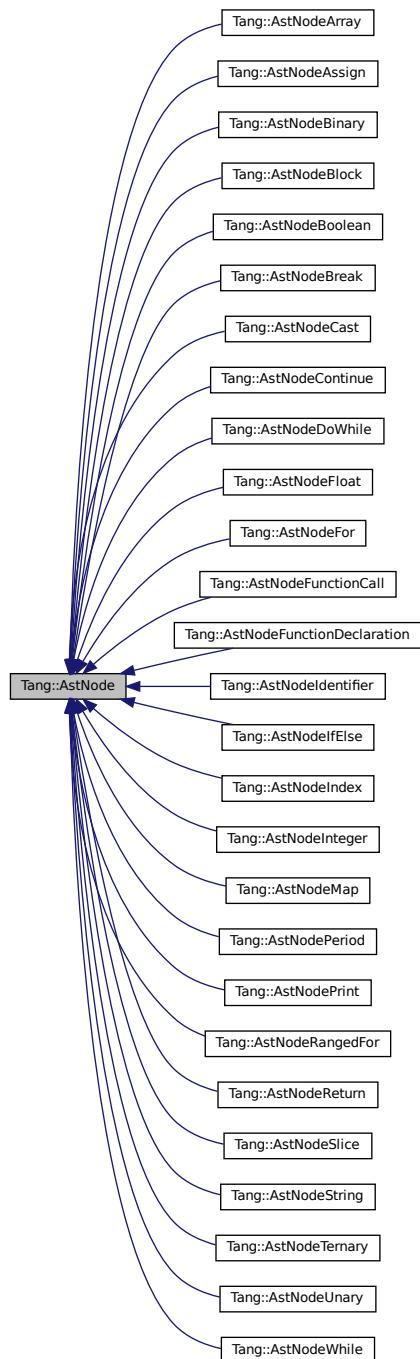
Class Documentation

5.1 Tang::AstNode Class Reference

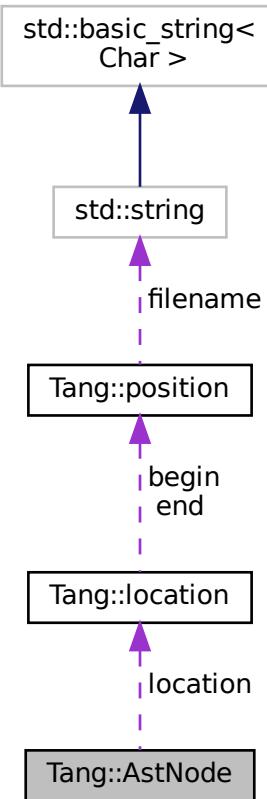
Base class for representing nodes of an Abstract Syntax Tree (AST).

```
#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:

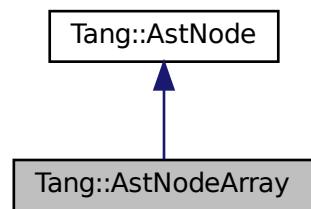
- `include/astNode.hpp`
- `src/astNode.cpp`

5.2 `Tang::AstNodeArray` Class Reference

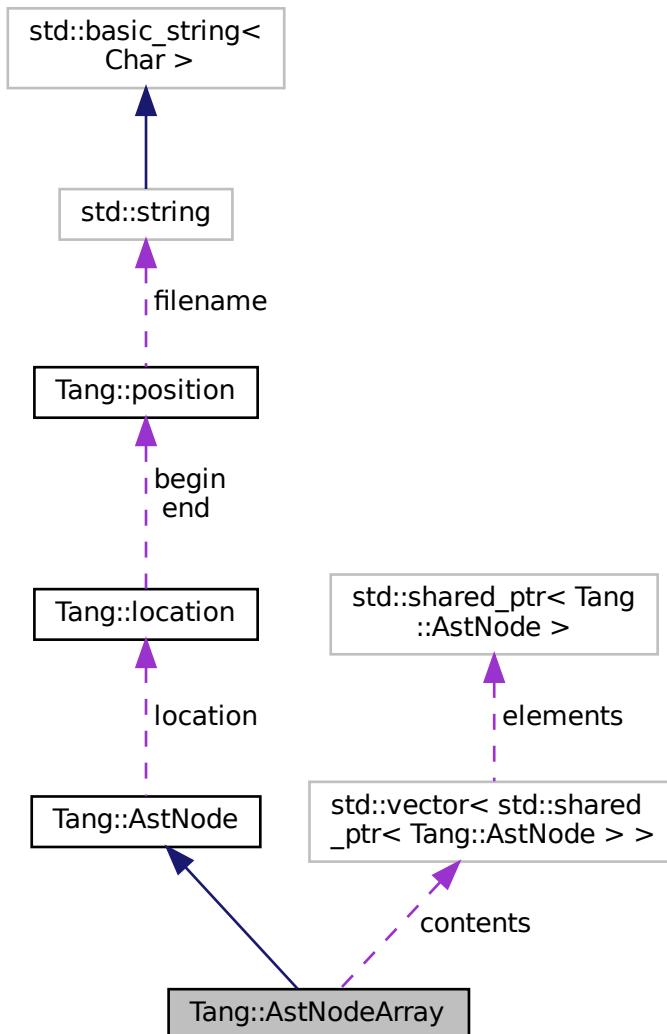
An `AstNode` that represents an array literal.

```
#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]
```

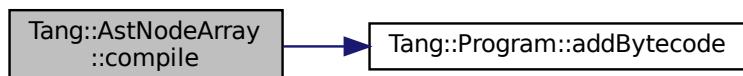
Compile the ast of the provided [Tang::Program](#).

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:

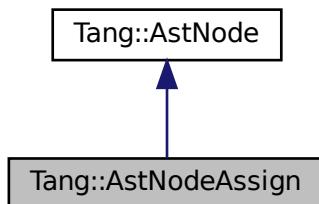
- [include/astNodeArray.hpp](#)
- [src/astNodeArray.cpp](#)

5.3 Tang::AstNodeAssign Class Reference

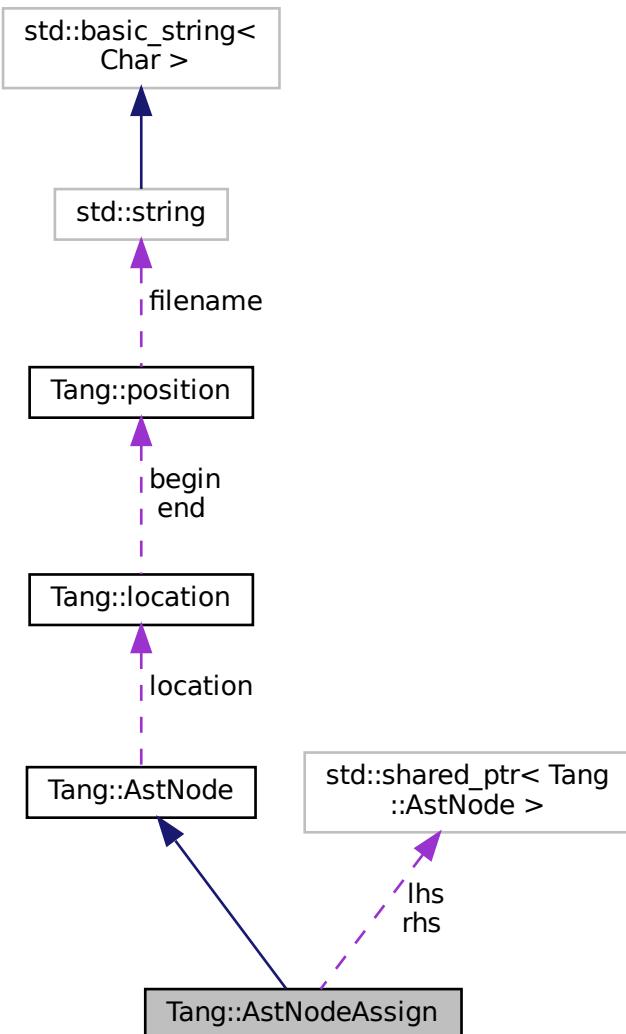
An [AstNode](#) that represents a binary expression.

```
#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]
```

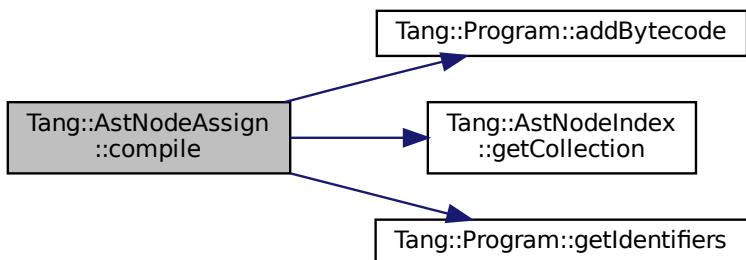
Compile the ast of the provided [Tang::Program](#).

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:

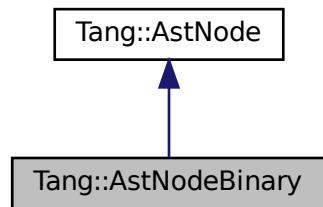
- [include/astNodeAssign.hpp](#)
- [src/astNodeAssign.cpp](#)

5.4 Tang::AstNodeBinary Class Reference

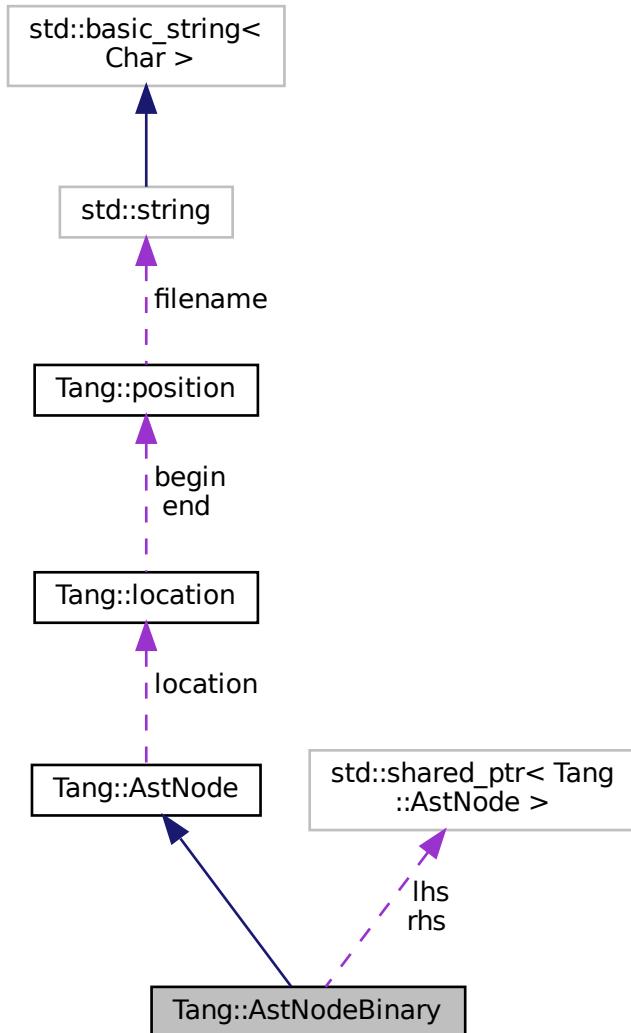
An [AstNode](#) that represents a binary expression.

```
#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]
```

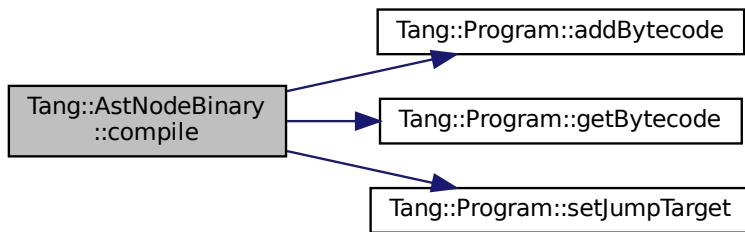
Compile the ast of the provided [Tang::Program](#).

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:

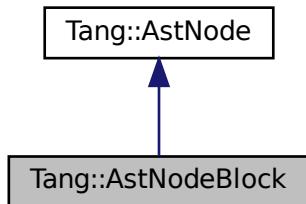
- [include/astNodeBinary.hpp](#)
- [src/astNodeBinary.cpp](#)

5.5 Tang::AstNodeBlock Class Reference

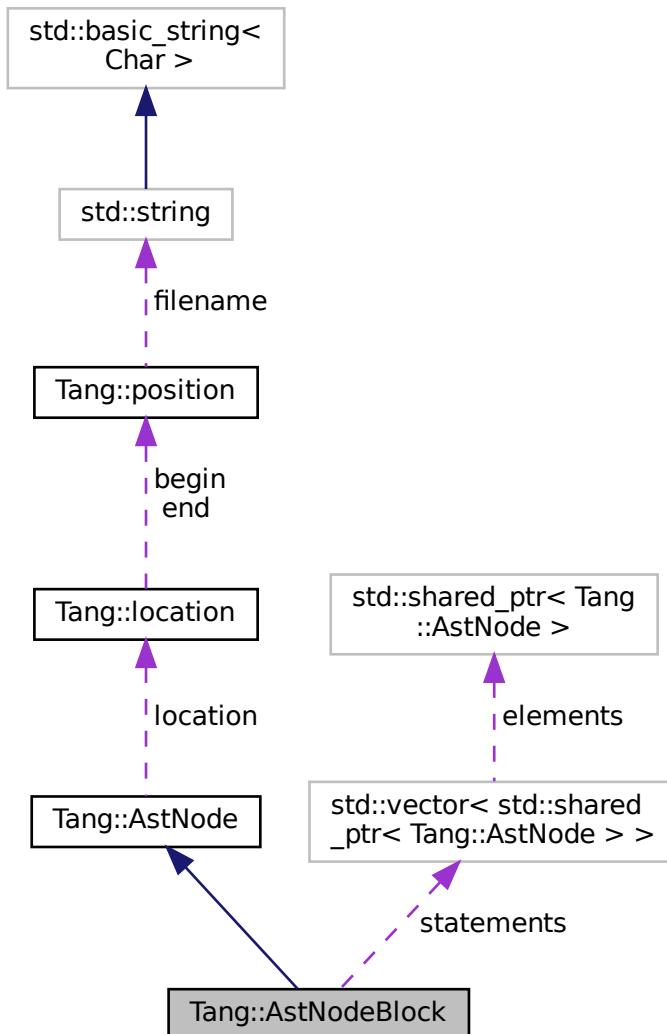
An [AstNode](#) that represents a code block.

```
#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]
```

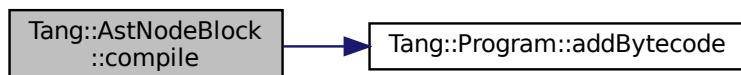
Compile the ast of the provided [Tang::Program](#).

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:

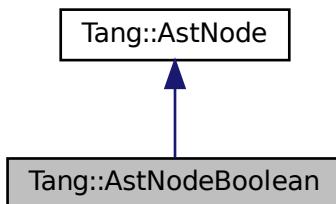
- [include/astNodeBlock.hpp](#)
- [src/astNodeBlock.cpp](#)

5.6 Tang::AstNodeBoolean Class Reference

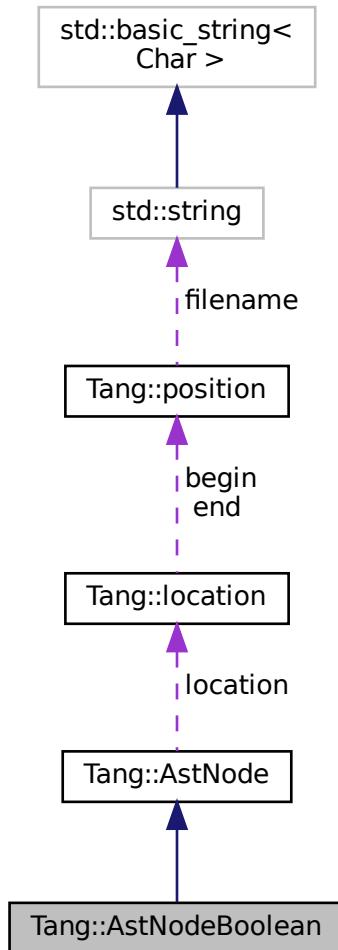
An [AstNode](#) that represents a boolean literal.

```
#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]
```

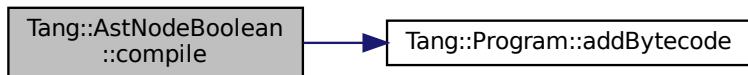
Compile the ast of the provided [Tang::Program](#).

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:

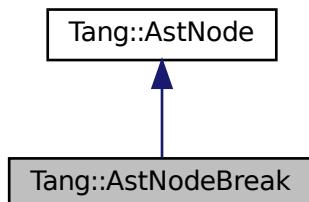
- [include/astNodeBoolean.hpp](#)
- [src/astNodeBoolean.cpp](#)

5.7 Tang::AstNodeBreak Class Reference

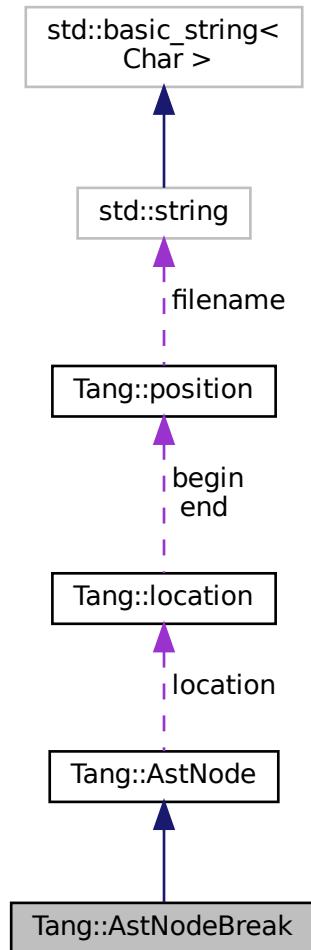
An [AstNode](#) that represents a `break` statement.

```
#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]
```

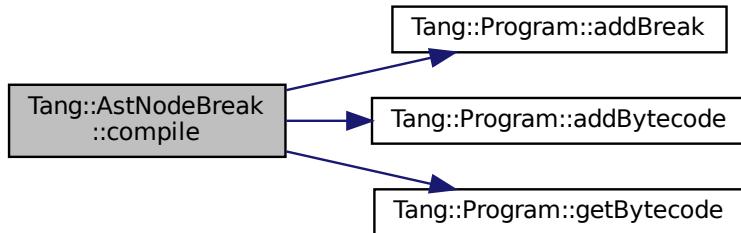
Compile the ast of the provided [Tang::Program](#).

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:

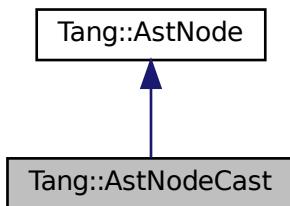
- [include/astNodeBreak.hpp](#)
- [src/astNodeBreak.cpp](#)

5.8 Tang::AstNodeCast Class Reference

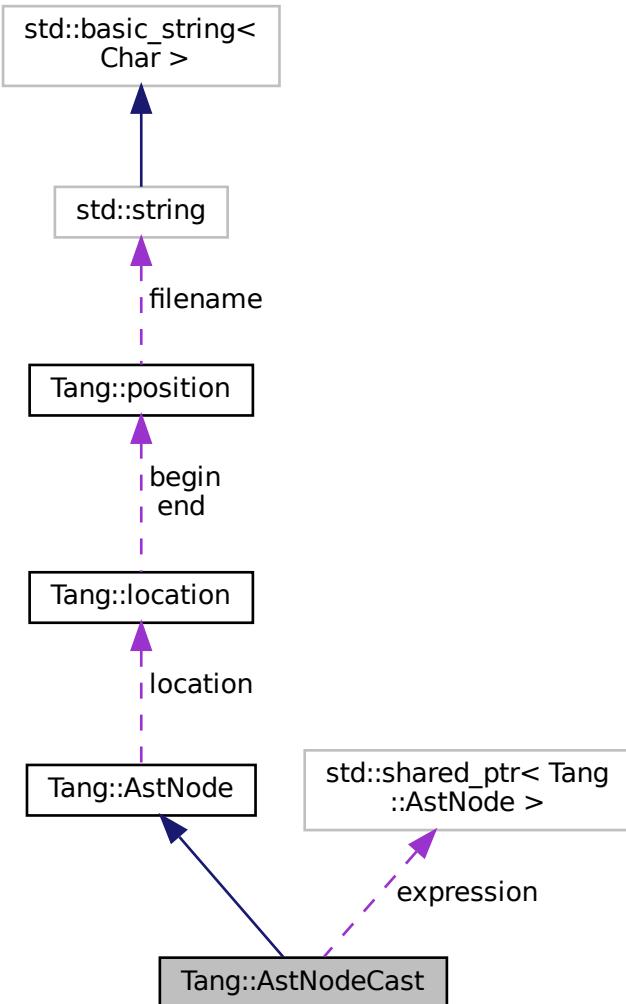
An [AstNode](#) that represents a typecast of an expression.

```
#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]
```

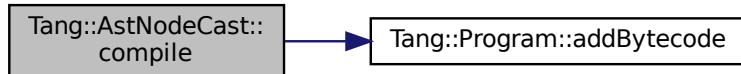
Compile the ast of the provided [Tang::Program](#).

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:

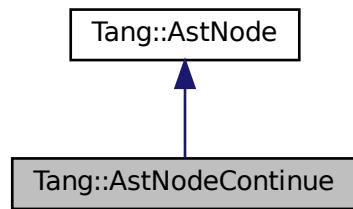
- [include/astNodeCast.hpp](#)
- [src/astNodeCast.cpp](#)

5.9 Tang::AstNodeContinue Class Reference

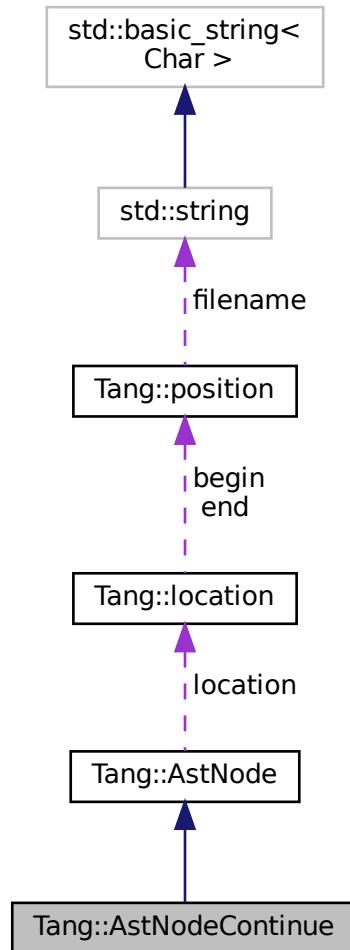
An [AstNode](#) that represents a `continue` statement.

```
#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]
```

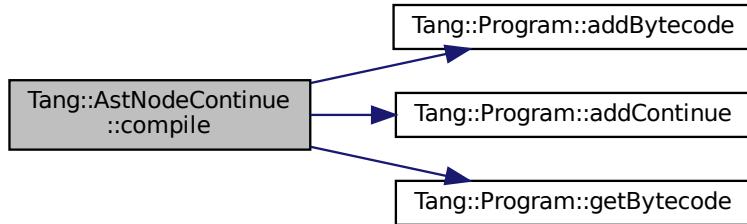
Compile the ast of the provided [Tang::Program](#).

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:

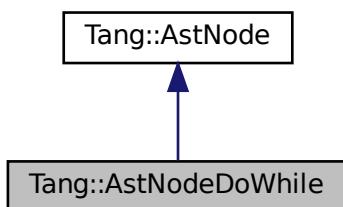
- [include/astNodeContinue.hpp](#)
- [src/astNodeContinue.cpp](#)

5.10 Tang::AstNodeDoWhile Class Reference

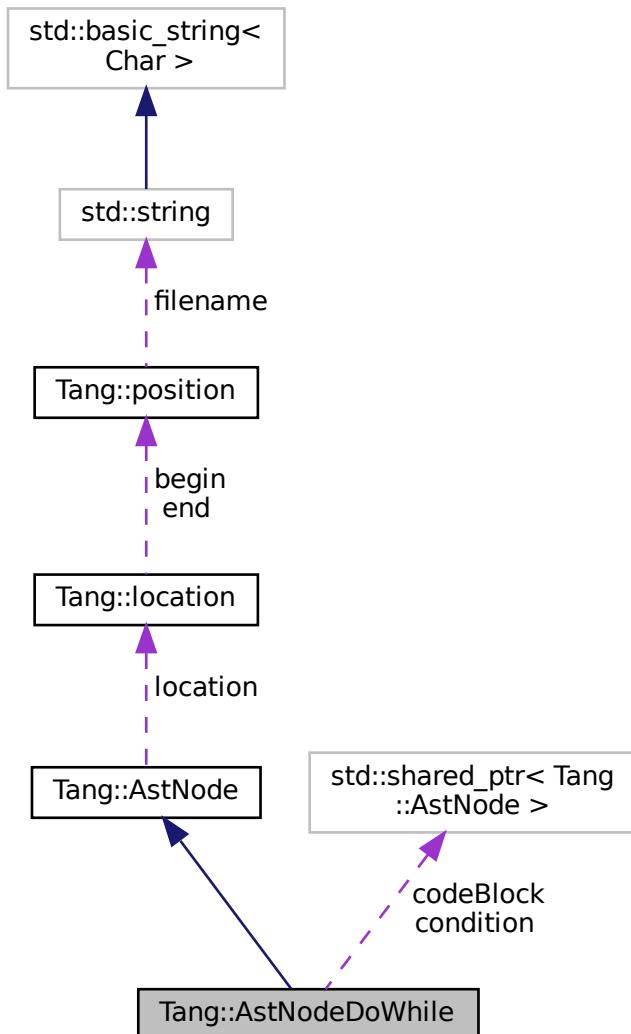
An [AstNode](#) that represents a do..while statement.

```
#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]
```

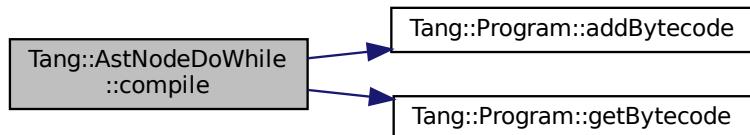
Compile the ast of the provided [Tang::Program](#).

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:

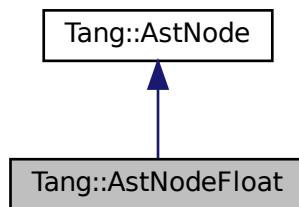
- include/astNodeDoWhile.hpp
- src/astNodeDoWhile.cpp

5.11 Tang::AstNodeFloat Class Reference

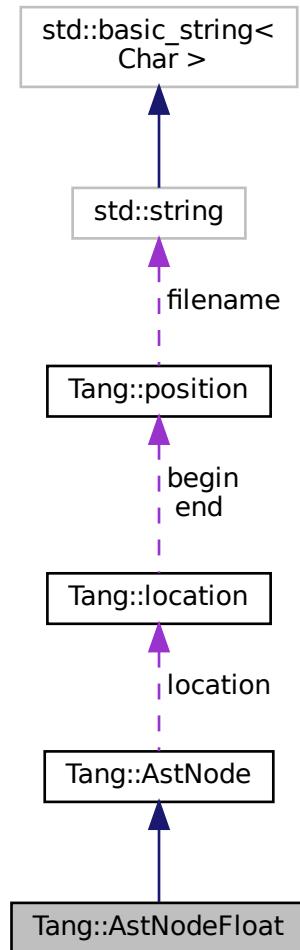
An [AstNode](#) that represents an float literal.

```
#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]
```

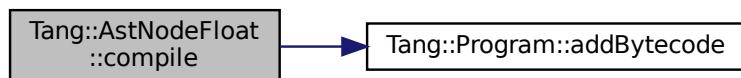
Compile the ast of the provided [Tang::Program](#).

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:

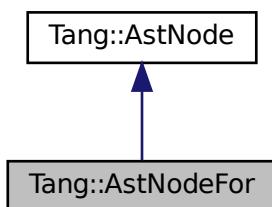
- [include/astNodeFloat.hpp](#)
- [src/astNodeFloat.cpp](#)

5.12 Tang::AstNodeFor Class Reference

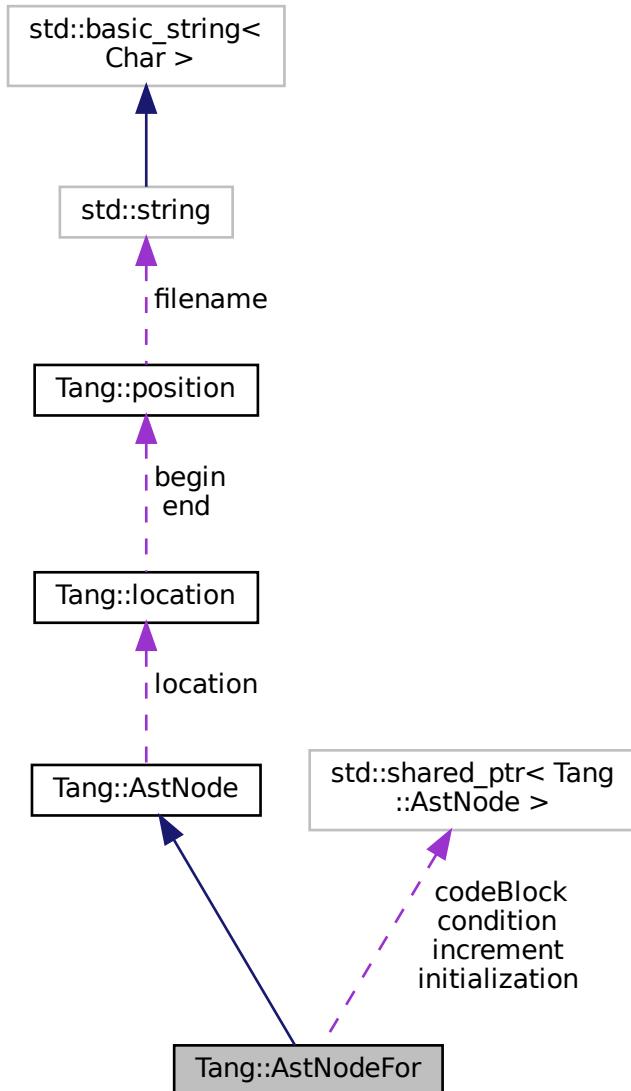
An [AstNode](#) that represents an if() statement.

```
#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]
```

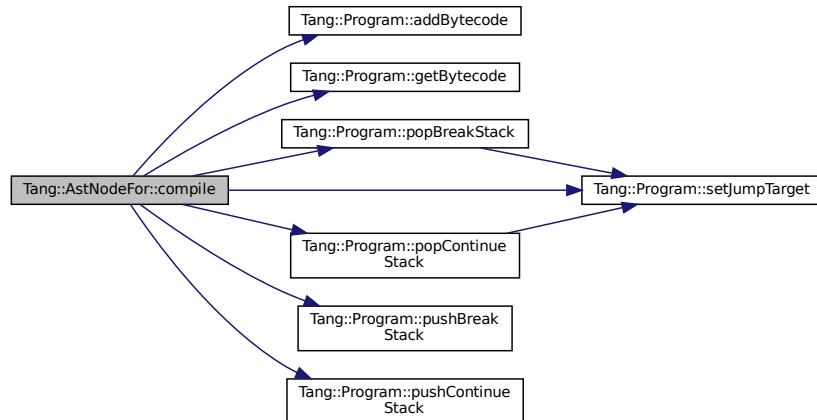
Compile the ast of the provided [Tang::Program](#).

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:

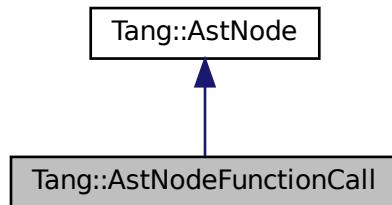
- [include/astNodeFor.hpp](#)
- [src/astNodeFor.cpp](#)

5.13 Tang::AstNodeFunctionCall Class Reference

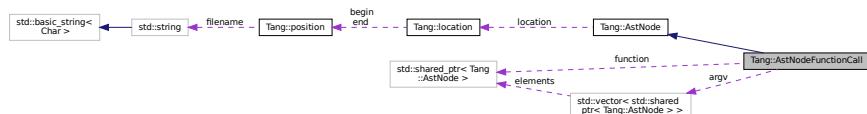
An [AstNode](#) that represents a function call.

```
#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:

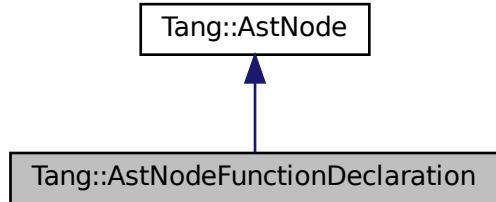
- [include/astNodeFunctionCall.hpp](#)
- [src/astNodeFunctionCall.cpp](#)

5.14 Tang::AstNodeFunctionDeclaration Class Reference

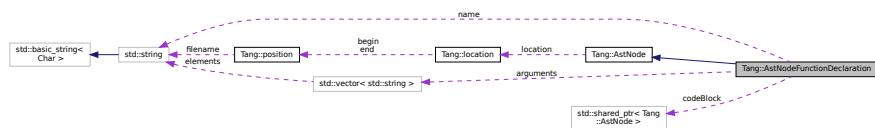
An [AstNode](#) that represents a function declaration.

```
#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]
```

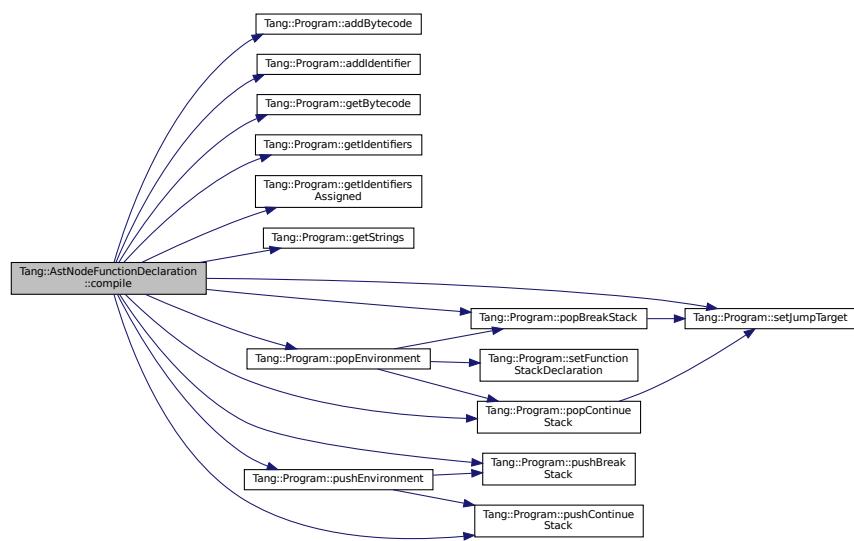
Compile the ast of the provided [Tang::Program](#).

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:

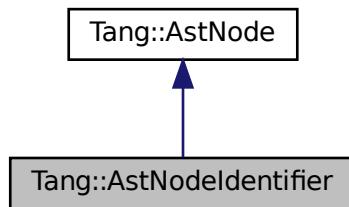
- include/astNodeFunctionDeclaration.hpp
- src/astNodeFunctionDeclaration.cpp

5.15 Tang::AstNodeIdentifier Class Reference

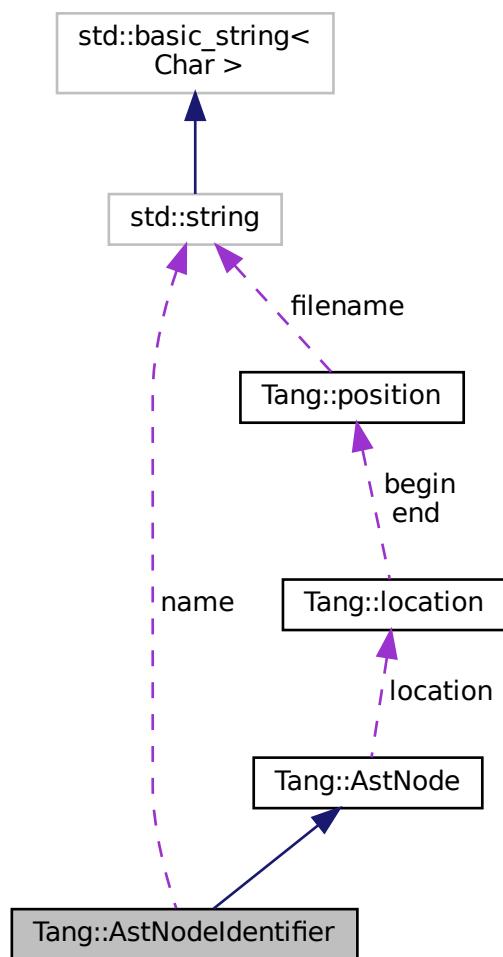
An [AstNode](#) that represents an identifier.

```
#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]
```

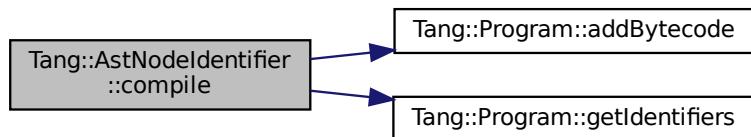
Compile the ast of the provided [Tang::Program](#).

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]
```

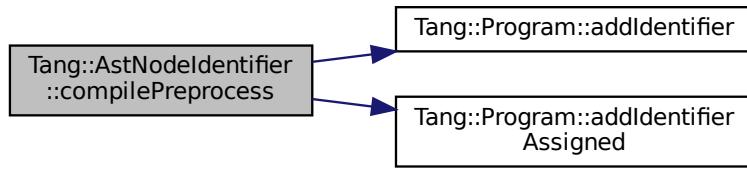
Run any preprocess analysis needed before compilation.

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:

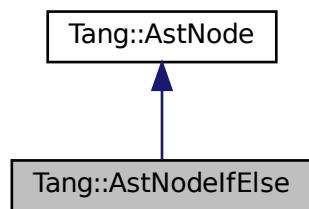
- [include/astNodeIdentifier.hpp](#)
- [src/astNodeIdentifier.cpp](#)

5.16 Tang::AstNodeIfElse Class Reference

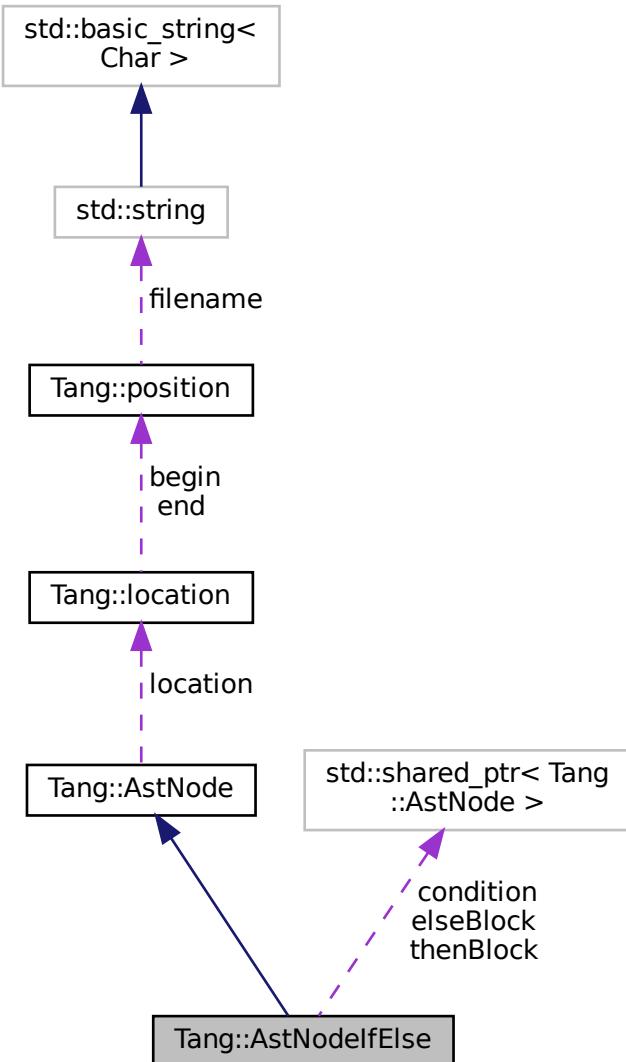
An [AstNode](#) that represents an if..else statement.

```
#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]
```

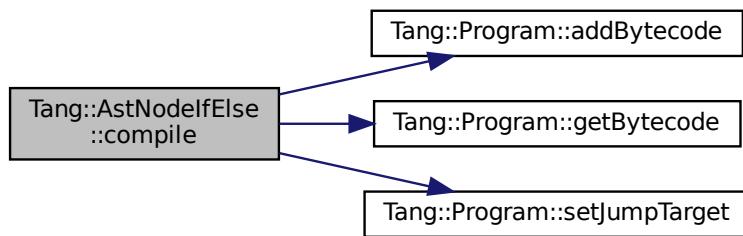
Compile the ast of the provided [Tang::Program](#).

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:

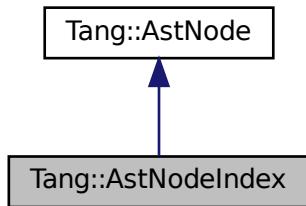
- [include/astNodeIfElse.hpp](#)
- [src/astNodeIfElse.cpp](#)

5.17 Tang::AstNodeIndex Class Reference

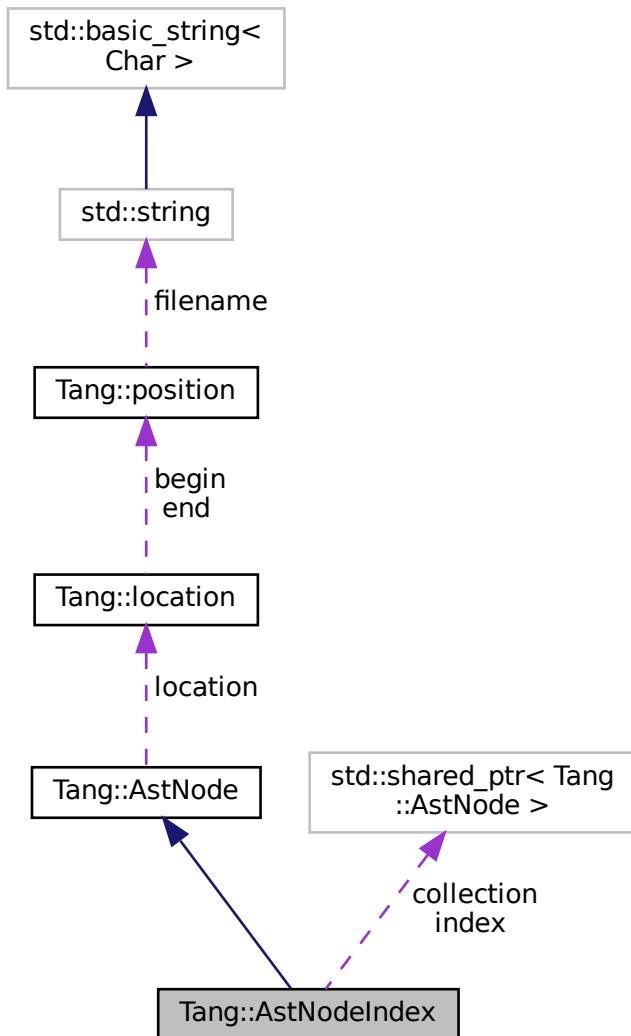
An [AstNode](#) that represents an index into a collection.

```
#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]
```

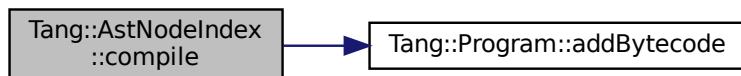
Compile the ast of the provided [Tang::Program](#).

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:

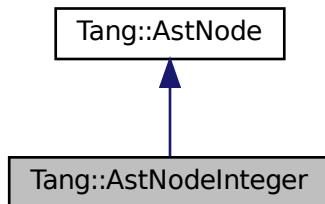
- [include/astNodeIndex.hpp](#)
- [src/astNodeIndex.cpp](#)

5.18 Tang::AstNodeInteger Class Reference

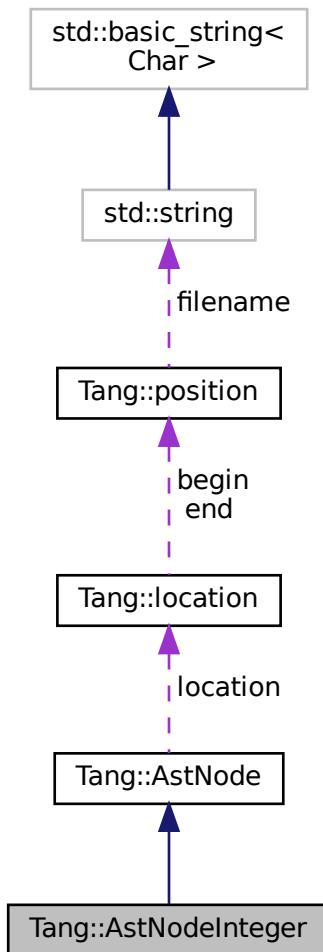
An [AstNode](#) that represents an integer literal.

```
#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]
```

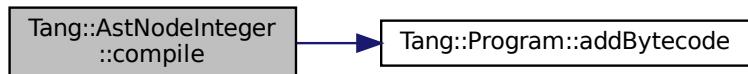
Compile the ast of the provided [Tang::Program](#).

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:

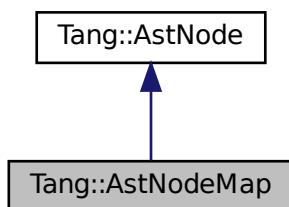
- [include/astNodeInteger.hpp](#)
- [src/astNodeInteger.cpp](#)

5.19 Tang::AstNodeMap Class Reference

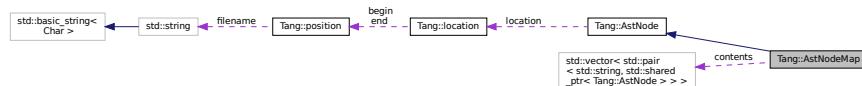
An [AstNode](#) that represents a map literal.

```
#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]
```

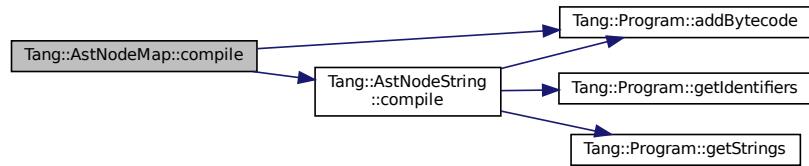
Compile the ast of the provided [Tang::Program](#).

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:

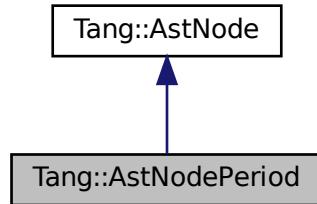
- [include/astNodeMap.hpp](#)
- [src/astNodeMap.cpp](#)

5.20 Tang::AstNodePeriod Class Reference

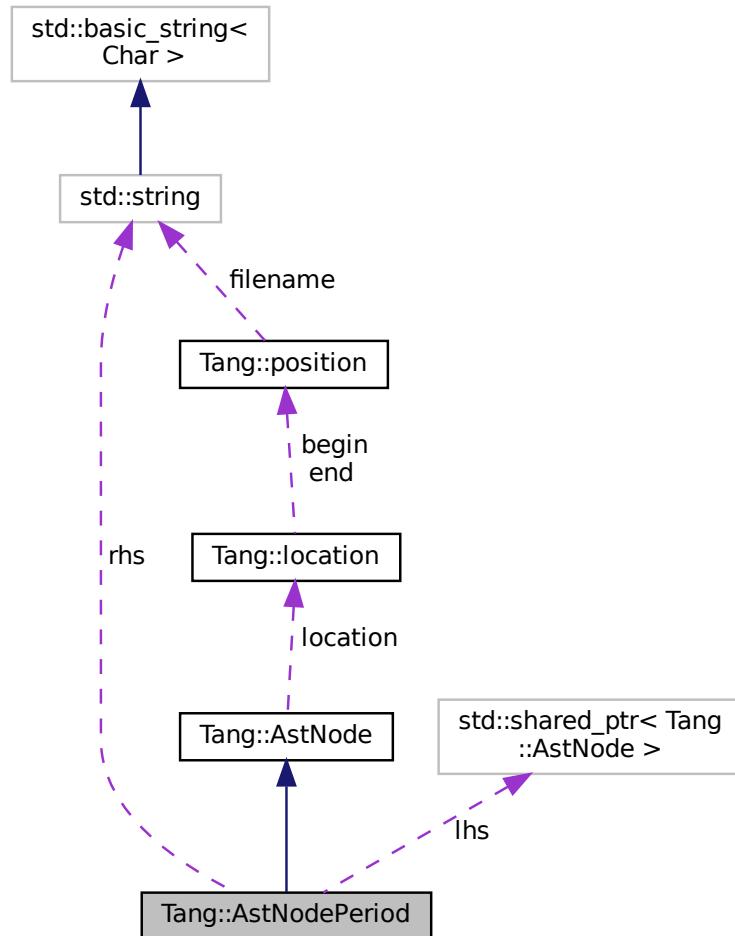
An [AstNode](#) that represents a member access (period) into an object.

```
#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]
```

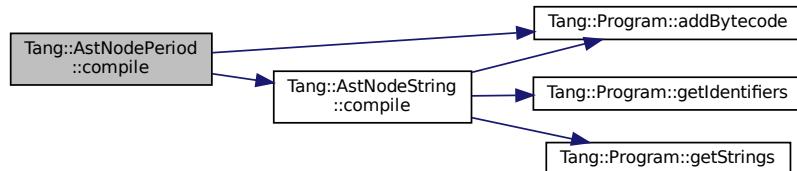
Compile the ast of the provided [Tang::Program](#).

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]
```

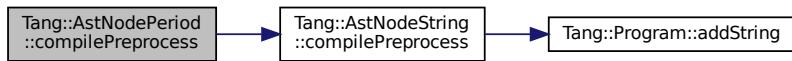
Run any preprocess analysis needed before compilation.

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:

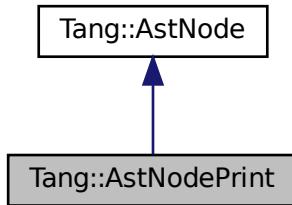
- include/astNodePeriod.hpp
- src/astNodePeriod.cpp

5.21 Tang::AstNodePrint Class Reference

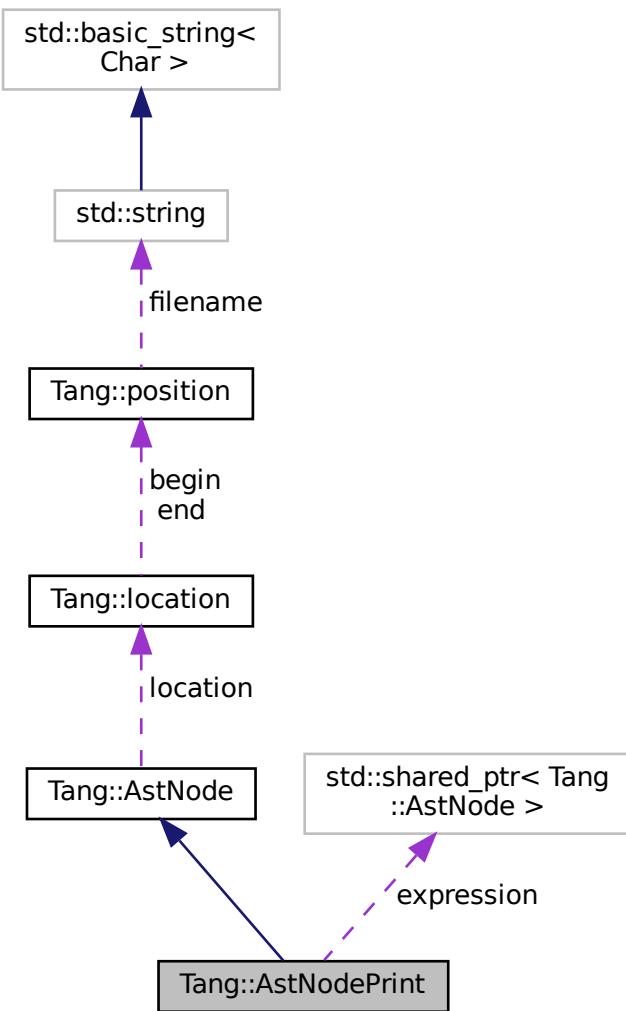
An [AstNode](#) that represents a print typeeration.

```
#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]
```

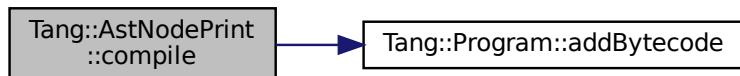
Compile the ast of the provided [Tang::Program](#).

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:

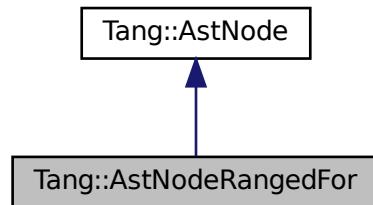
- [include/astNodePrint.hpp](#)
- [src/astNodePrint.cpp](#)

5.22 Tang::AstNodeRangedFor Class Reference

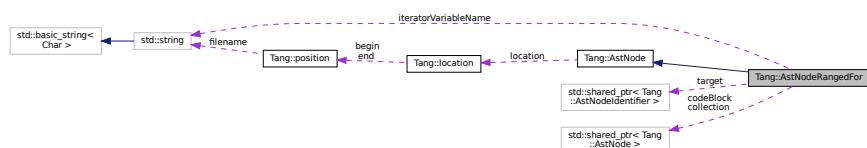
An [AstNode](#) that represents a ranged for() statement.

```
#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]
```

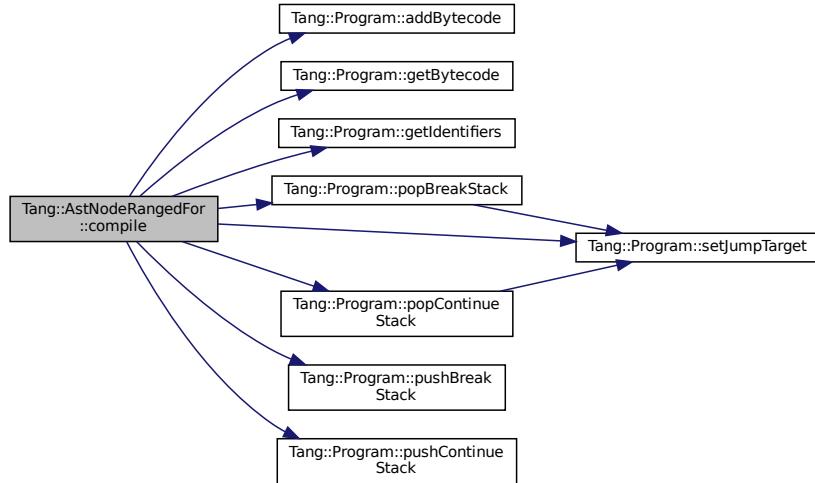
Compile the ast of the provided [Tang::Program](#).

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]
```

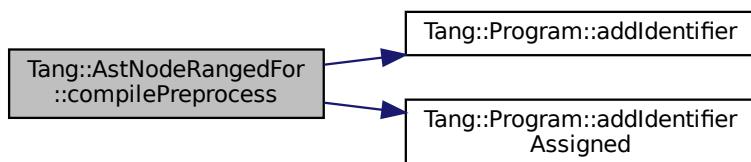
Run any preprocess analysis needed before compilation.

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:

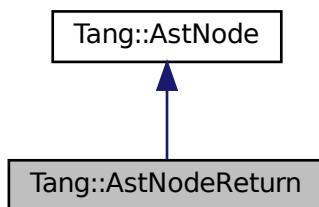
- [include/astNodeRangedFor.hpp](#)
- [src/astNodeRangedFor.cpp](#)

5.23 Tang::AstNodeReturn Class Reference

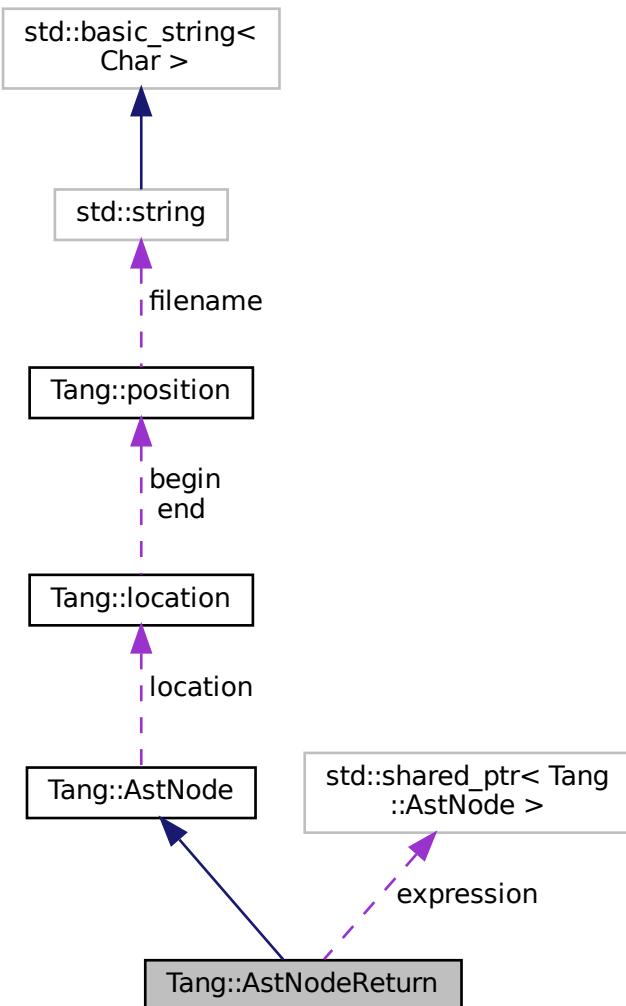
An [AstNode](#) that represents a `return` statement.

```
#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]
```

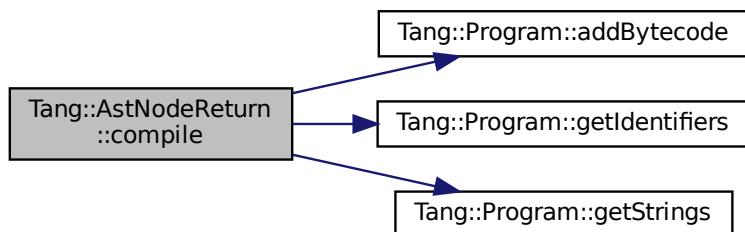
Compile the ast of the provided [Tang::Program](#).

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:

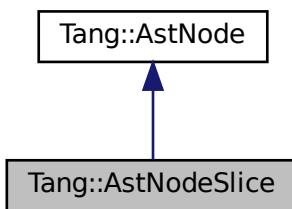
- [include/astNodeReturn.hpp](#)
- [src/astNodeReturn.cpp](#)

5.24 Tang::AstNodeSlice Class Reference

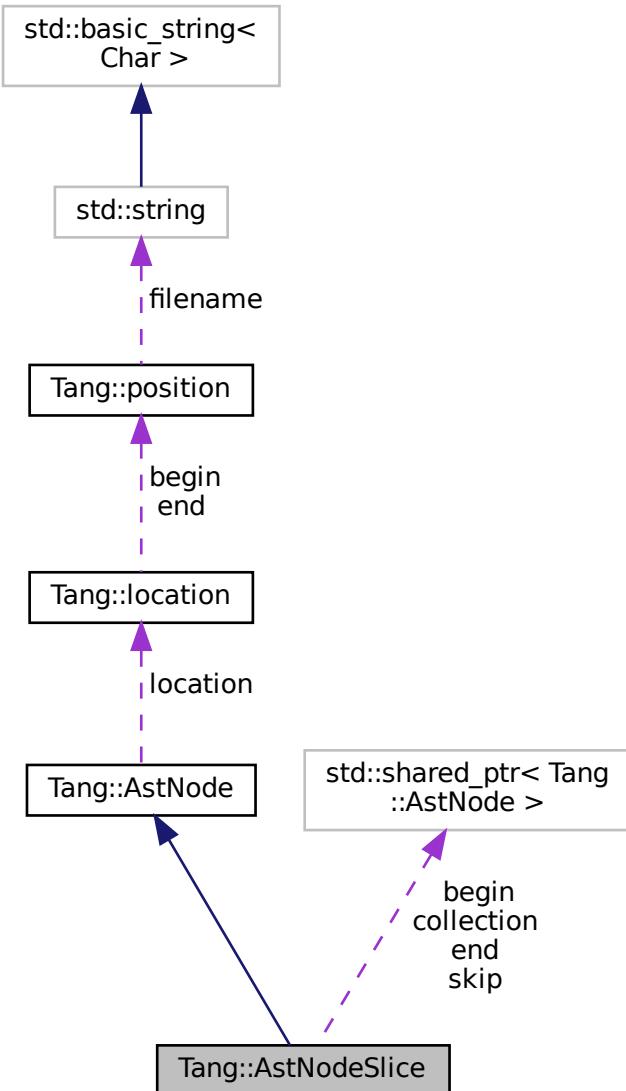
An [AstNode](#) that represents a ternary expression.

```
#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]
```

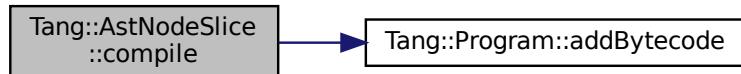
Compile the ast of the provided [Tang::Program](#).

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:

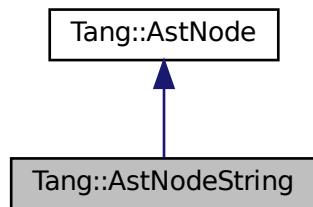
- [include/astNodeSlice.hpp](#)
- [src/astNodeSlice.cpp](#)

5.25 Tang::AstNodeString Class Reference

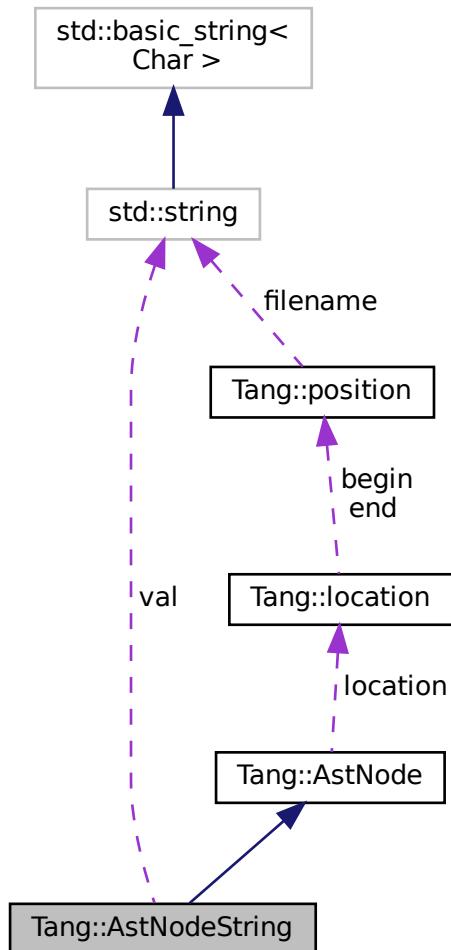
An [AstNode](#) that represents a string literal.

```
#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)`
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.
- `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.

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	AstNode is part of an assignment expression.

5.25.3 Constructor & Destructor Documentation

5.25.3.1 AstNodeString()

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

The constructor.

Parameters

<i>text</i>	The string to represent.
<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]
```

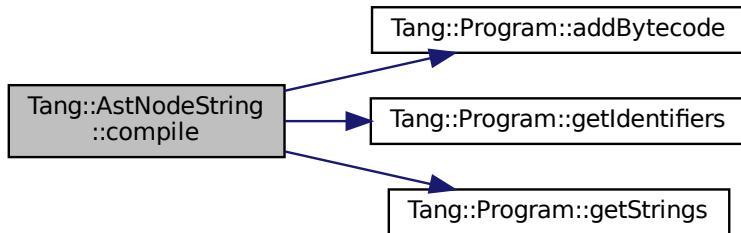
Compile the ast of the provided [Tang::Program](#).

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()

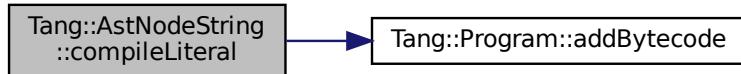
```
void AstNodeString::compileLiteral (
    Tang::Program & program ) const
```

Compile the string and push it onto the stack.

Parameters

<i>program</i>	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]
```

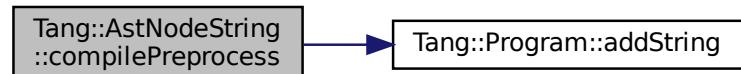
Run any preprocess analysis needed before compilation.

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:

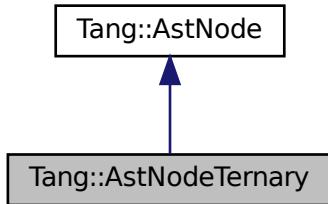
- [include/astNodeString.hpp](#)
- [src/astNodeString.cpp](#)

5.26 Tang::AstNodeTernary Class Reference

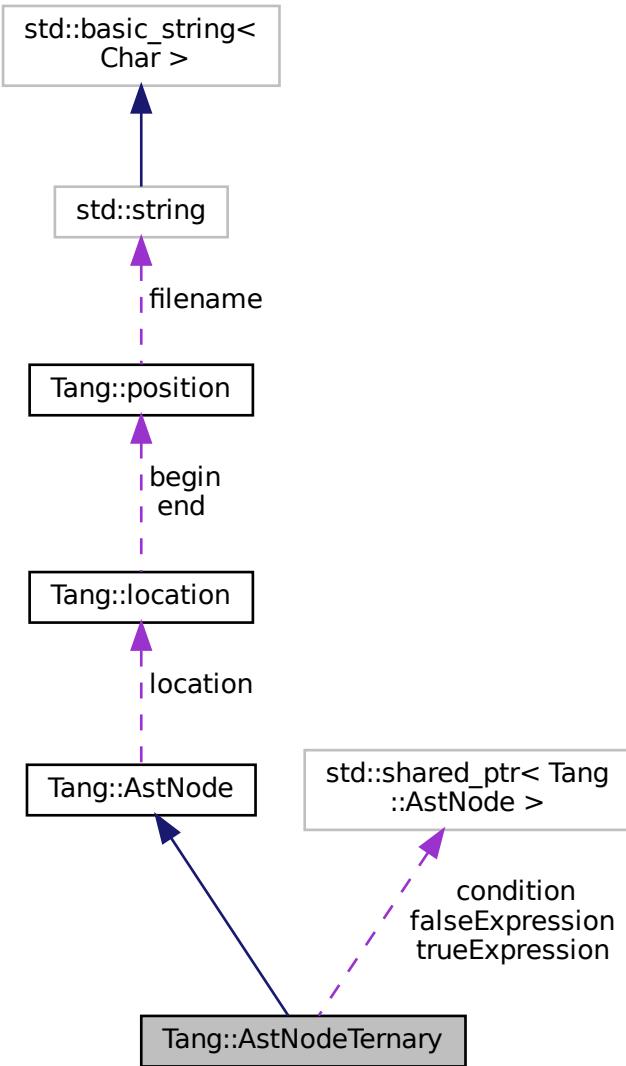
An [AstNode](#) that represents a ternary expression.

```
#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	<code>AstNode</code> 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]
```

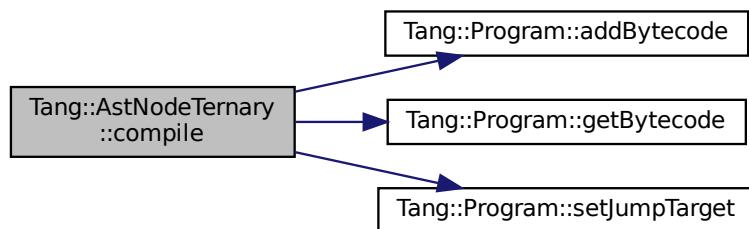
Compile the ast of the provided [Tang::Program](#).

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:

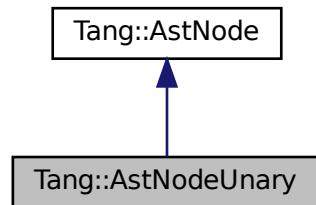
- [include/astNodeTernary.hpp](#)
- [src/astNodeTernary.cpp](#)

5.27 Tang::AstNodeUnary Class Reference

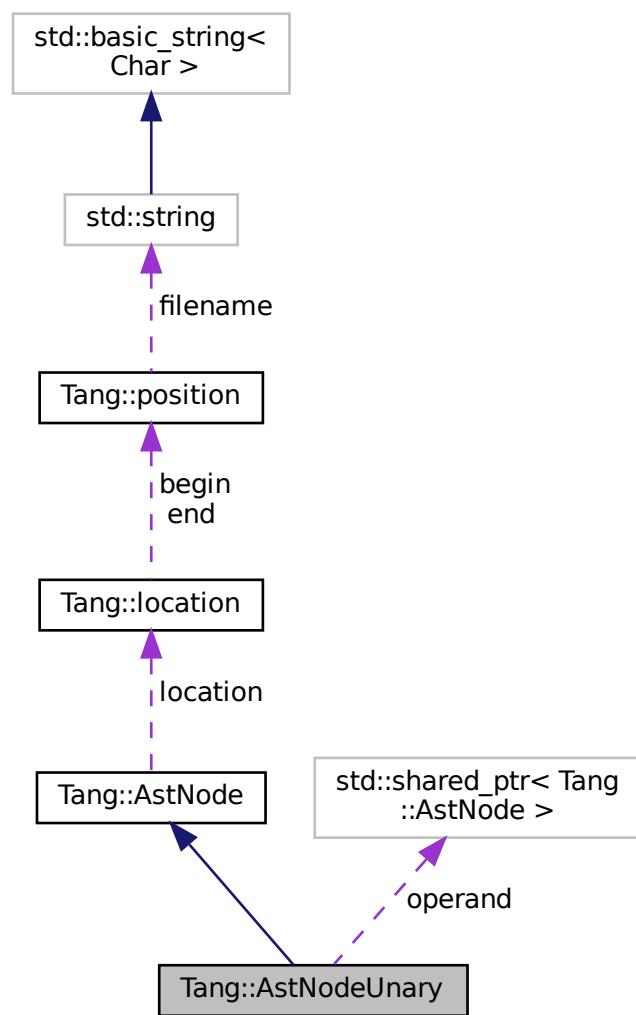
An [AstNode](#) that represents a unary negation.

```
#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]
```

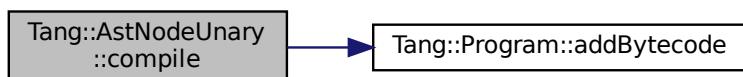
Compile the ast of the provided [Tang::Program](#).

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:

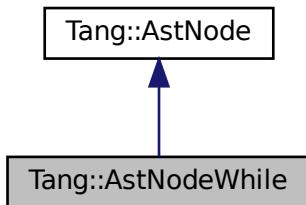
- [include/astNodeUnary.hpp](#)
- [src/astNodeUnary.cpp](#)

5.28 Tang::AstNodeWhile Class Reference

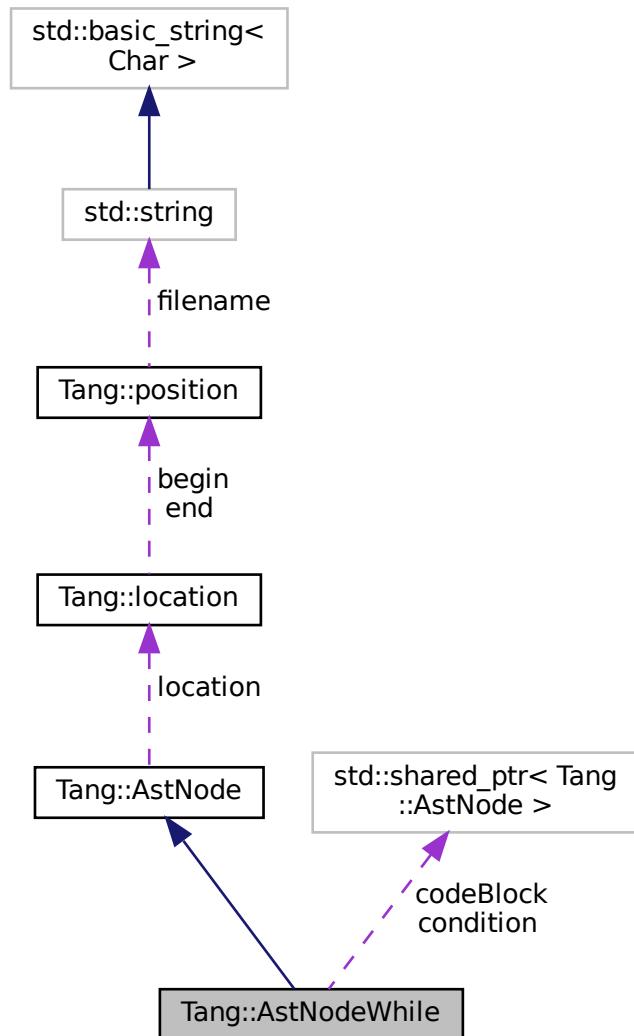
An [AstNode](#) that represents a while statement.

```
#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]
```

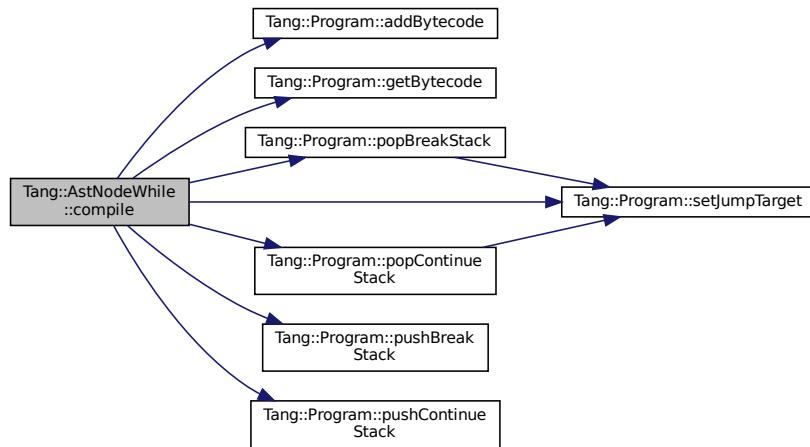
Compile the ast of the provided [Tang::Program](#).

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:

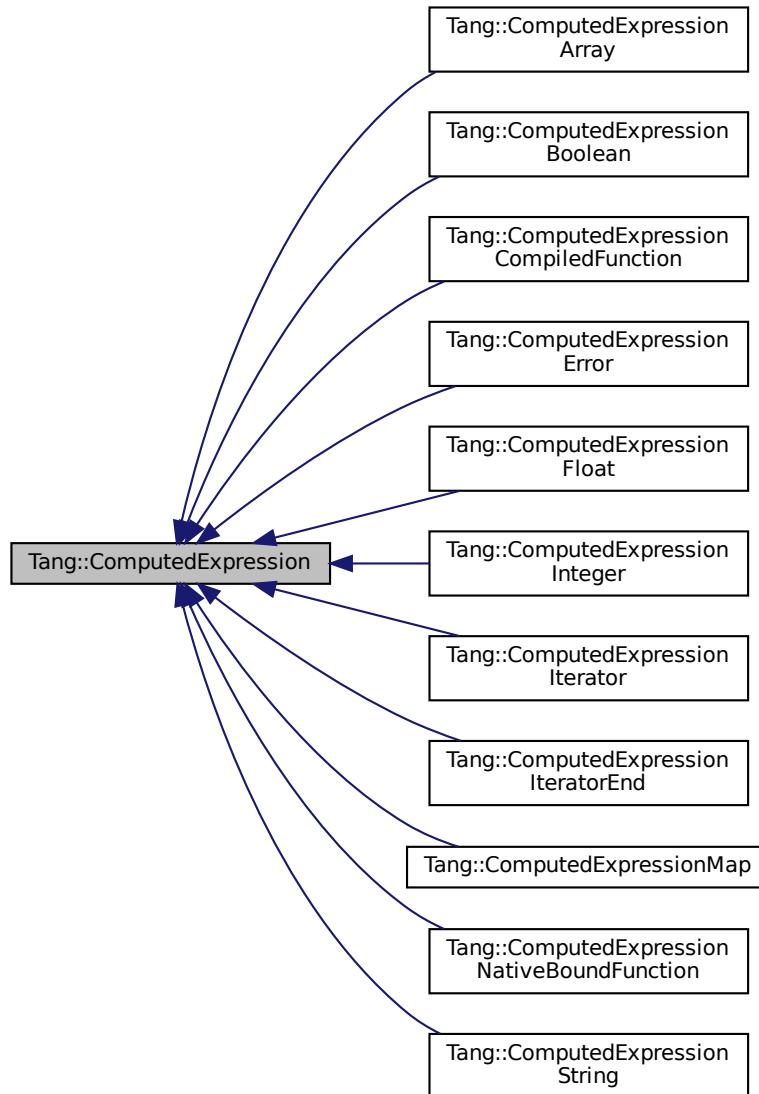
- [include/astNodeWhile.hpp](#)
- [src/astNodeWhile.cpp](#)

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

<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](#).

5.29.2.2 __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::ComputedExpressionNativeBoundFunction](#), [Tang::ComputedExpression](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionCompiledFunction](#), 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

<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](#).

5.29.2.15 __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 GarbageCollected 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::ComputedExpressionNativeBoundFunction](#), [Tang::ComputedExpression](#), [Tang::ComputedExpressionIteratorEnd](#), [Tang::ComputedExpressionIterator](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionCompiledFunction](#), [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

<code>val</code>	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

<code>val</code>	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

<code>val</code>	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

<code>val</code>	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

<code>val</code>	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::ComputedExpressionNativeBoundFunction](#), [Tang::ComputedExpression](#), [Tang::ComputedExpressionInteger](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionBoolean](#), and [Tang::ComputedExpressionArray](#).

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

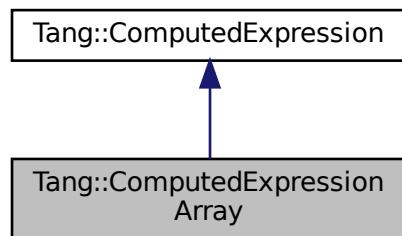
- include/computedExpression.hpp
- src/computedExpression.cpp

5.30 Tang::ComputedExpressionArray Class Reference

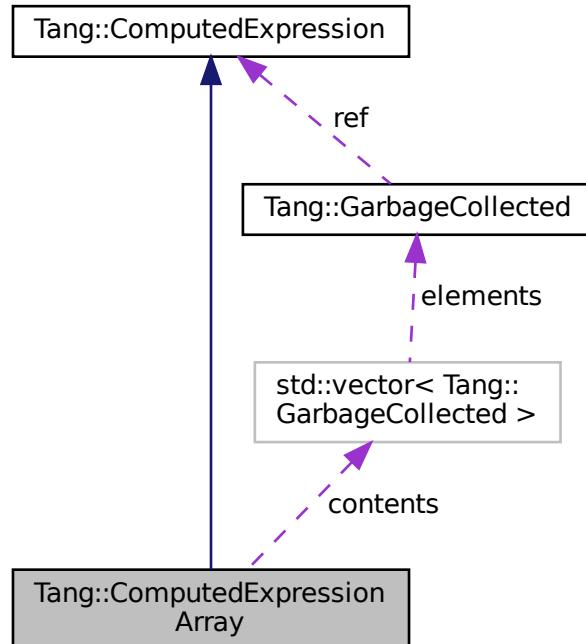
Represents an Array that is the result of a computation.

```
#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) override**
Perform an index assignment to the supplied value.
- virtual **GarbageCollected __string () const override**

- `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

<code>rhs</code>	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

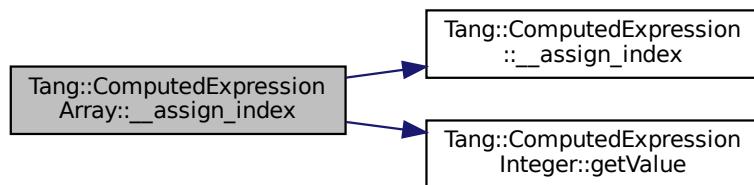
<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

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

<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](#).

5.30.3.6 __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::ComputedExpressionNativeBoundFunction](#), [Tang::ComputedExpressionInt](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionCompiledFunction](#), and [Tang::ComputedExpressionBoolean](#).

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

<code>collection</code>	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

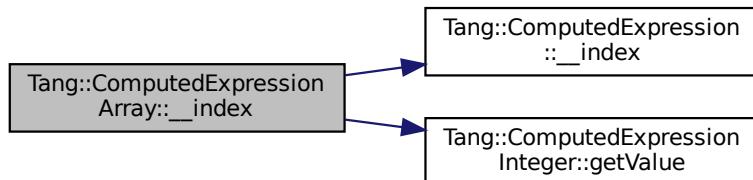
<code>index</code>	The index expression provided by the script.
--------------------	--

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

<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](#).

5.30.3.15 __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

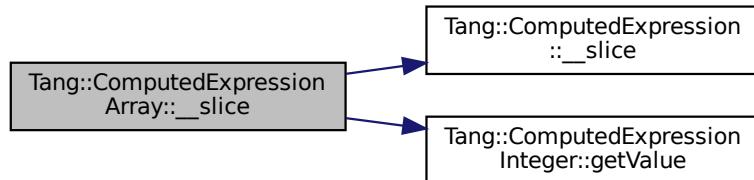
<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

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]
```

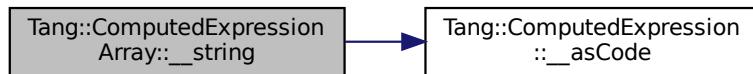
Perform a type cast to string.

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

<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](#).

5.30.3.21 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()

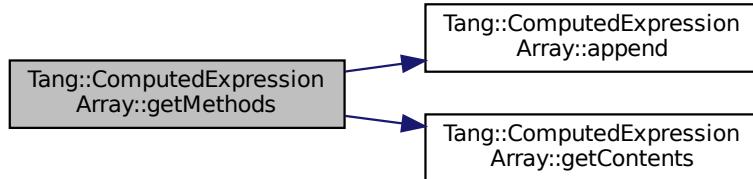
```
NativeBoundFunctionMap ComputedExpressionArray::getMethods ( ) [static]
```

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

<i>val</i>	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

<i>val</i>	The value to compare against.
------------	-------------------------------

Returns

True if equal, false if not.

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

5.30.3.30 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:

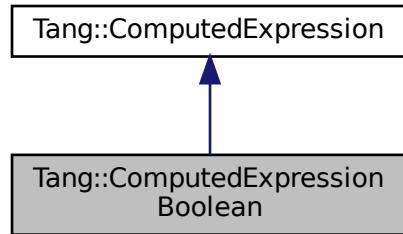
- include/computedExpressionArray.hpp
- src/computedExpressionArray.cpp

5.31 Tang::ComputedExpressionBoolean Class Reference

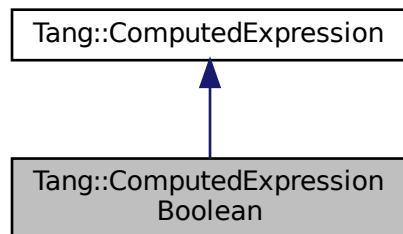
Represents an Boolean that is the result of a computation.

```
#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.

Returns

<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:

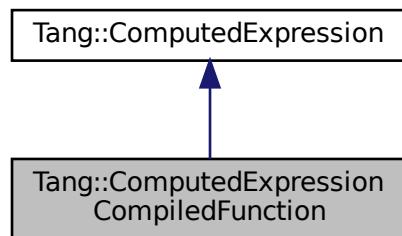
- [include/computedExpressionBoolean.hpp](#)
- [src/computedExpressionBoolean.cpp](#)

5.32 Tang::ComputedExpressionCompiledFunction Class Reference

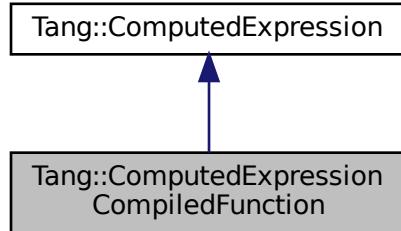
Represents a Compiled Function declared in the script.

```
#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

<code>val</code>	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

<code>val</code>	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

<code>val</code>	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

<i>val</i>	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

<i>val</i>	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:

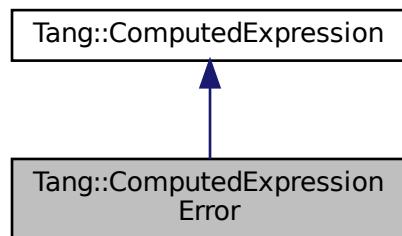
- include/computedExpressionCompiledFunction.hpp
- src/computedExpressionCompiledFunction.cpp

5.33 Tang::ComputedExpressionError Class Reference

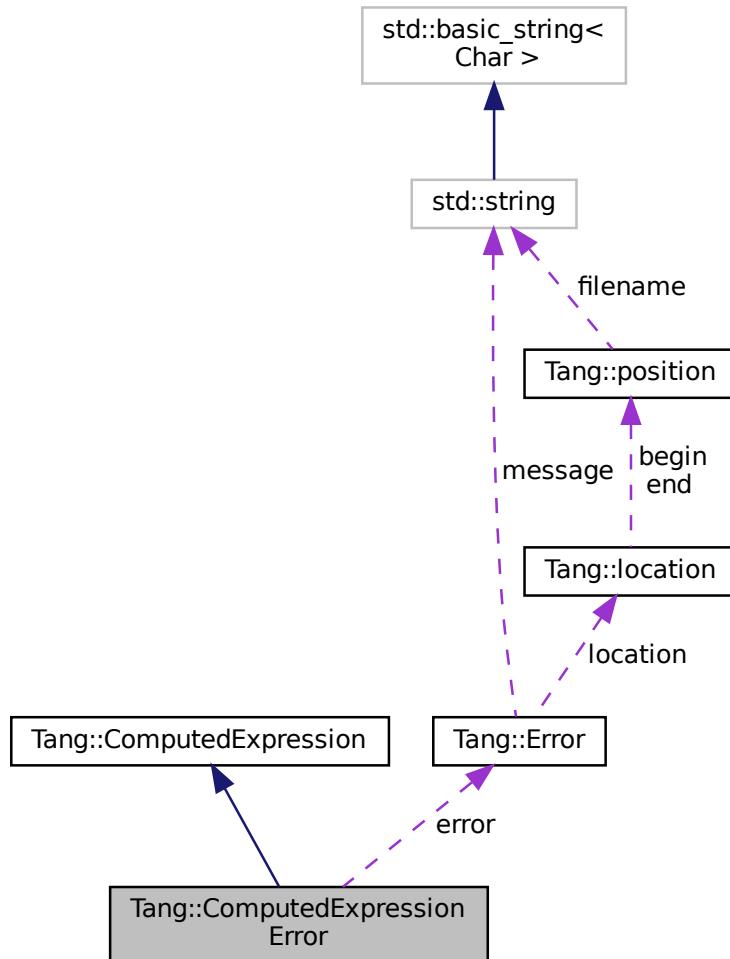
Represents a Runtime `Error`.

```
#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 result of negating 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

<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](#).

5.33.3.9 __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](#).

5.33.3.10 __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

<code>val</code>	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

<code>val</code>	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:

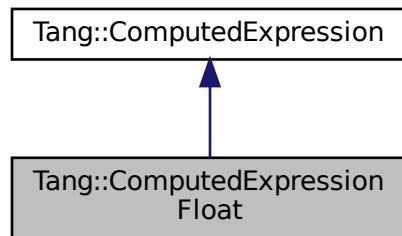
- `include/computedExpressionError.hpp`
- `src/computedExpressionError.cpp`

5.34 Tang::ComputedExpressionFloat Class Reference

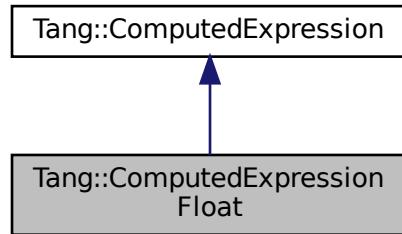
Represents a Float that is the result of a computation.

```
#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

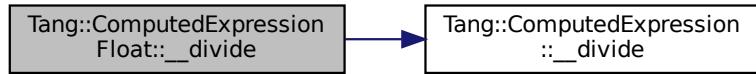
<i>rhs</i>	The GarbageCollected value to divide this by.
------------	---

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 (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

<i>rhs</i>	The <code>GarbageCollected</code> 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

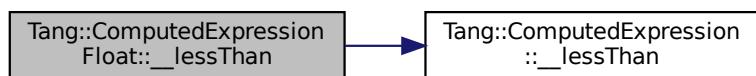
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

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]
```

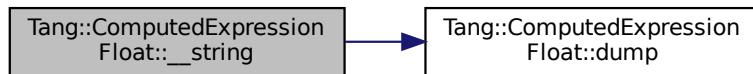
Perform a type cast to string.

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 ( \n    const GarbageCollected & rhs ) const [override], [virtual]
```

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

Parameters

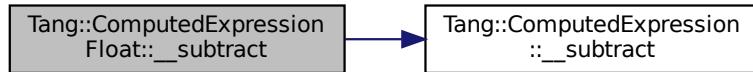
<i>rhs</i>	The GarbageCollected value to subtract from this.
------------	---

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(
    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](#).

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:

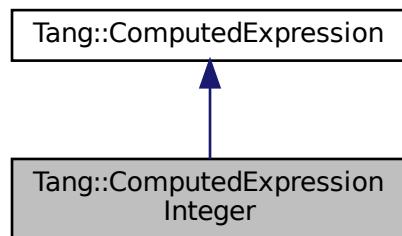
- [include/computedExpressionFloat.hpp](#)
- [src/computedExpressionFloat.cpp](#)

5.35 Tang::ComputedExpressionInteger Class Reference

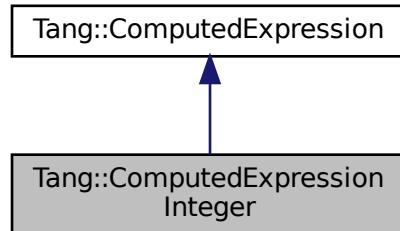
Represents an Integer that is the result of a computation.

```
#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

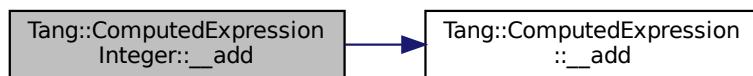
<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

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

<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](#).

5.35.3.4 __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

<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:



5.35.3.6 __equal()

```
GarbageCollected ComputedExpressionInteger::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

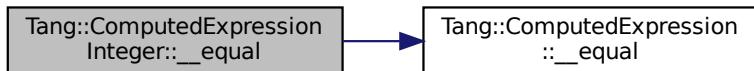
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

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

<code>index</code>	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

<code>rhs</code>	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

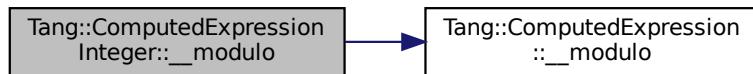
<i>rhs</i>	The GarbageCollected value to modulo this by.
------------	---

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

<code>val</code>	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

<code>val</code>	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

<code>val</code>	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:

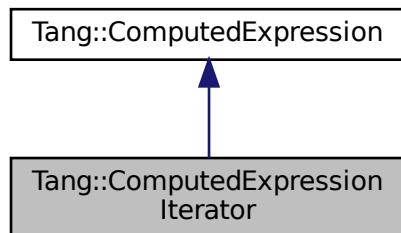
- include/computedExpressionInteger.hpp
- src/computedExpressionInteger.cpp

5.36 Tang::ComputedExpressionIterator Class Reference

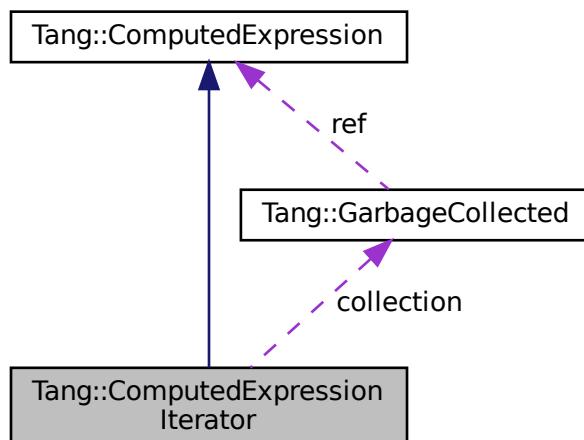
Represents an iterator that is the result of a computation.

```
#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`

- 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::ComputedExpressionNativeBoundFunction](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionCompiledFunction](#), 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

<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](#).

5.36.3.9 `__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](#).

5.36.3.10 `__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]`

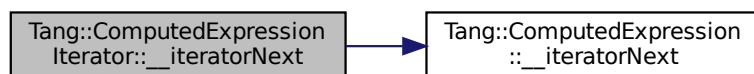
Get the next iterative value.

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::ComputedExpressionNativeBoundFunction`, `Tang::ComputedExpressionTang::ComputedExpressionInteger`, `Tang::ComputedExpressionFloat`, `Tang::ComputedExpressionError`, `Tang::ComputedExpressionTang::ComputedExpressionBoolean`, and `Tang::ComputedExpressionArray`.

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

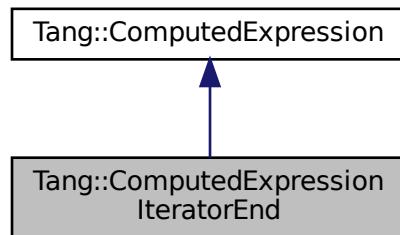
- `include/computedExpressionIterator.hpp`
- `src/computedExpressionIterator.cpp`

5.37 Tang::ComputedExpressionIteratorEnd Class Reference

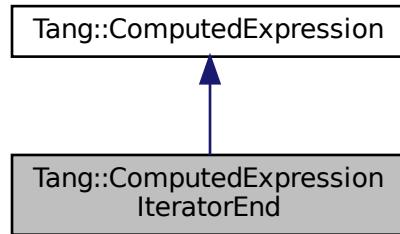
Represents that a collection has no more values through which to iterate.

`#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

<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](#).

5.37.2.6 __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::ComputedExpressionNativeBoundFunction](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionCompiledFunction](#), 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::ComputedExpressionNativeBoundFunction`, `Tang::ComputedExpressionTang::ComputedExpressionInteger`, `Tang::ComputedExpressionFloat`, `Tang::ComputedExpressionError`, `Tang::ComputedExpressionTang::ComputedExpressionBoolean`, and `Tang::ComputedExpressionArray`.

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

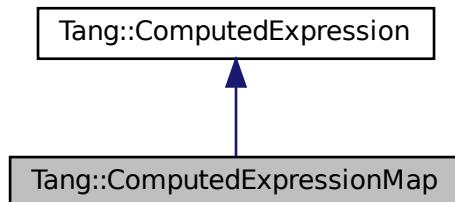
- `include/computedExpressionIteratorEnd.hpp`
- `src/computedExpressionIteratorEnd.cpp`

5.38 Tang::ComputedExpressionMap Class Reference

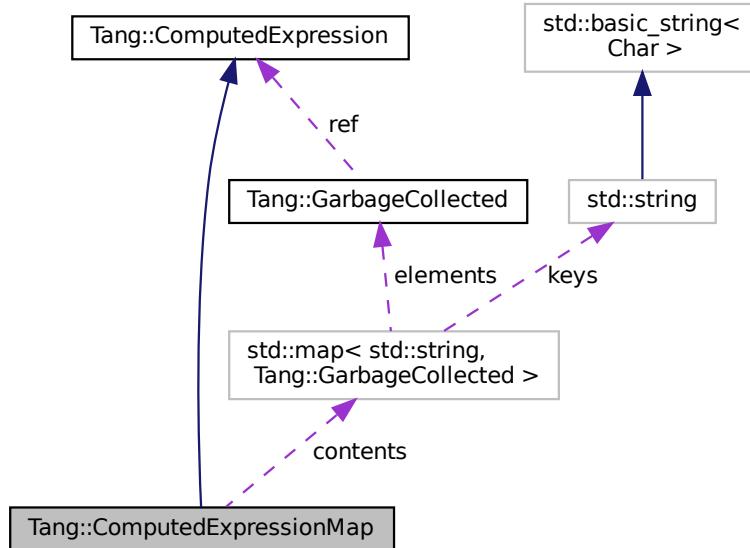
Represents an Map that is the result of a computation.

```
#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

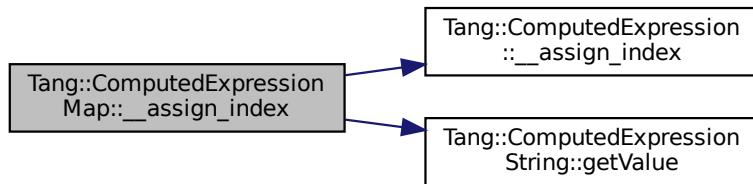
<i>index</i>	The index to which the value should be applied.
<i>value</i>	The value to store.

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

<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](#).

5.38.3.6 `__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::ComputedExpressionNativeBoundFunction](#), [Tang::ComputedExpressionNativeFunction](#), [Tang::ComputedExpressionFloat](#), [Tang::ComputedExpressionError](#), [Tang::ComputedExpressionCompiledFunction](#), 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

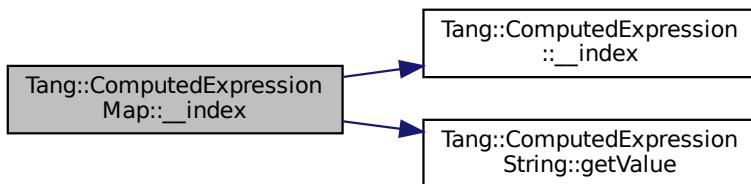
<i>index</i>	The index expression provided by the script.
--------------	--

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]
```

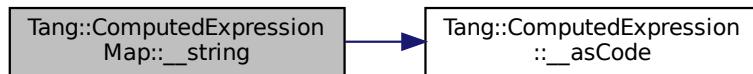
Perform a type cast to string.

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

<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](#).

5.38.3.23 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

<i>val</i>	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

<i>val</i>	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:

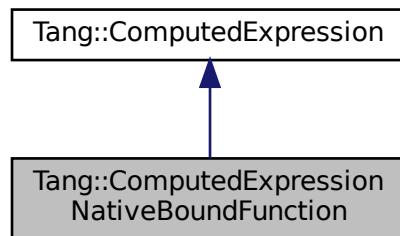
- [include/computedExpressionMap.hpp](#)
- [src/computedExpressionMap.cpp](#)

5.39 Tang::ComputedExpressionNativeBoundFunction Class Reference

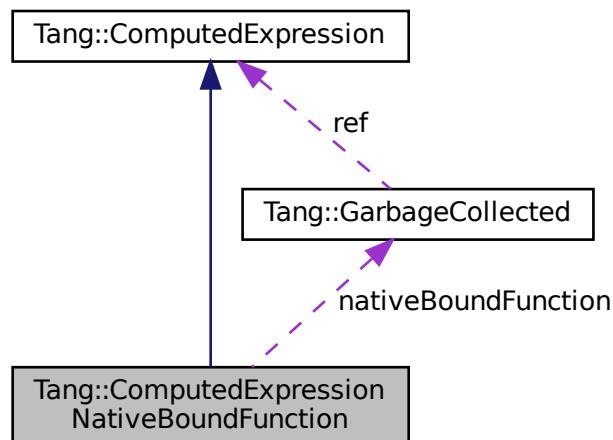
Represents a NativeBound Function declared in the script.

```
#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 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
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

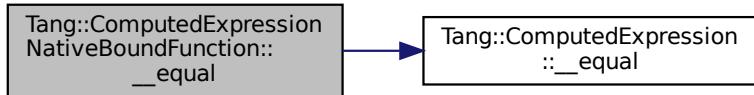
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

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 <code>GarbageCollected</code> 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

<code>val</code>	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

<code>val</code>	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

<code>val</code>	The value to compare against.
------------------	-------------------------------

Returns

True if equal, false if not.

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

5.39.3.30 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:

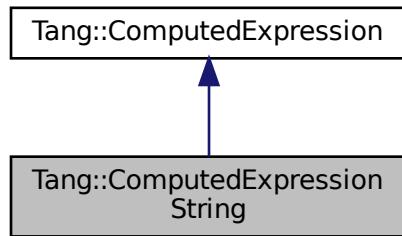
- include/computedExpressionNativeBoundFunction.hpp
- src/computedExpressionNativeBoundFunction.cpp

5.40 Tang::ComputedExpressionString Class Reference

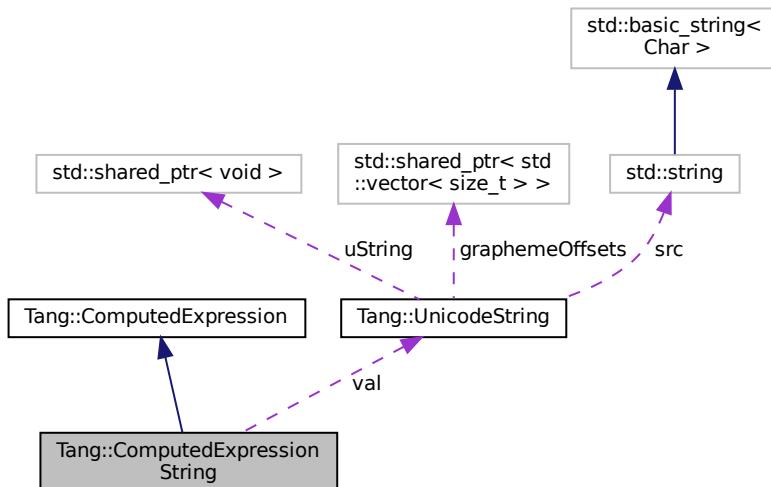
Represents a String that is the result of a computation.

```
#include <computedExpressionString.hpp>
```

Inheritance diagram for Tang::ComputedExpressionString:



Collaboration diagram for Tang::ComputedExpressionString:



Public Member Functions

- [ComputedExpressionString \(std::string val\)](#)
Construct a String result.
- 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.
- `UnicodeString getValue () const`
Return the string value that is stored in this object.
- 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) const`
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

- `UnicodeString val`
The string value.

5.40.1 Detailed Description

Represents a String that is the result of a computation.

5.40.2 Constructor & Destructor Documentation

5.40.2.1 ComputedExpressionString()

```
ComputedExpressionString::ComputedExpressionString ( std::string val )
```

Construct a String result.

Parameters

<code>val</code>	The string value.
------------------	-------------------

5.40.3 Member Function Documentation

5.40.3.1 __add()

```
GarbageCollected ComputedExpressionString::__add (
    const GarbageCollected & rhs ) const [override], [virtual]
```

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

Parameters

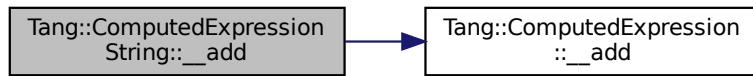
<i>rhs</i>	The GarbageCollected value to add to this.
------------	--

Returns

The result of the operation.

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

Here is the call graph for this function:



5.40.3.2 __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:



5.40.3.3 __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 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:



5.40.3.5 __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 ComputedExpressionString::__equal (
    const GarbageCollected & rhs ) const [override], [virtual]
```

Perform an equality test.

Parameters

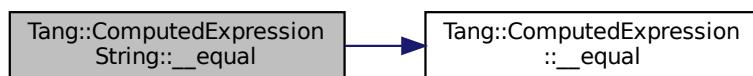
<i>rhs</i>	The GarbageCollected value to compare against.
------------	--

Returns

The result of the the operation.

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

Here is the call graph for this function:

**5.40.3.7 __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 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](#).

5.40.3.9 __index()

```
GarbageCollected ComputedExpressionString::__index (
    const GarbageCollected & index ) const [override], [virtual]
```

Perform an index operation.

Parameters

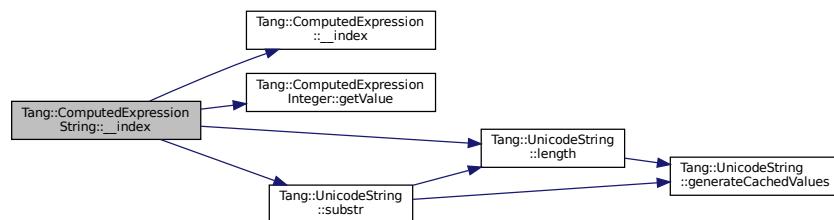
<i>index</i>	The index expression provided by the script.
--------------	--

Returns

The result of the operation.

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

Here is the call graph for this function:



5.40.3.10 __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` `ComputedExpressionString::__iteratorNext (size_t index) const [override], [virtual]`

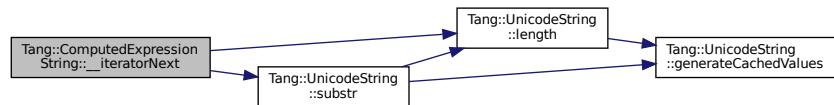
Get the next iterative value.

Parameters

<code>index</code>	The desired index value.
--------------------	--------------------------

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

Here is the call graph for this function:



5.40.3.12 __lessThan()

`GarbageCollected` `ComputedExpressionString::__lessThan (const GarbageCollected & rhs) const [override], [virtual]`

Compute the "less than" comparison.

Parameters

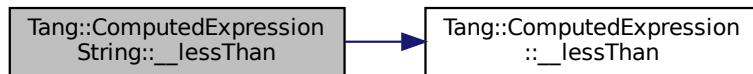
<code>rhs</code>	The <code>GarbageCollected</code> value to compare against.
------------------	---

Returns

The result of the the operation.

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

Here is the call graph for this function:

**5.40.3.13 __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](#).

5.40.3.14 __multiply()

```
GarbageCollected ComputedExpression::__multiply (
    const GarbageCollected & rhs ) const [virtual], [inherited]
```

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

Parameters

<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](#).

5.40.3.15 `__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 ComputedExpressionString::__not () const [override], [virtual]`

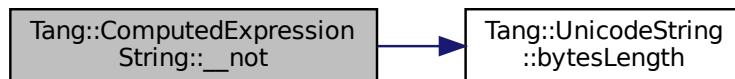
Compute the logical not of this value.

Returns

The result of the operation.

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

Here is the call graph for this function:



5.40.3.17 `__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 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

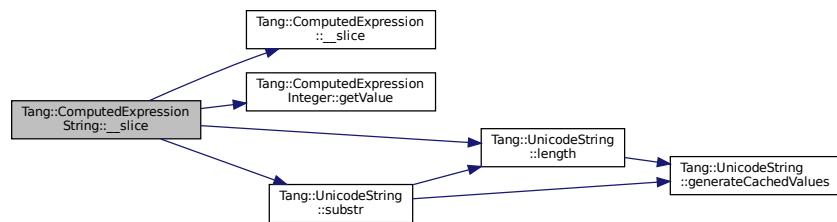
<i>begin</i>	The begin index expression provided by the script.
<i>end</i>	The end index expression provided by the script.
<i>skip</i>	The skip index expression provided by the script.

Returns

The result of the operation.

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

Here is the call graph for this function:



5.40.3.19 `__string()`

```
GarbageCollected ComputedExpressionString::__string ( ) const [override], [virtual]
```

Perform a type cast to string.

Returns

The result of the the operation.

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

5.40.3.20 `__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 GarbageCollected 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 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](#).

5.40.3.22 `getMethods()`

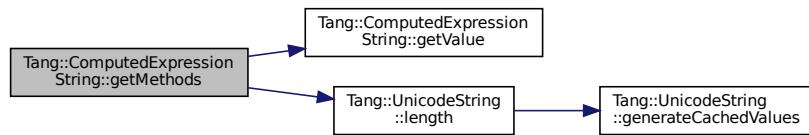
```
NativeBoundFunctionMap ComputedExpressionString::getMethods ( ) [static]
```

Return the member functions implemented for this particular expression type.

Returns

The member functions implemented.

Here is the call graph for this function:



5.40.3.23 `getValue()`

```
UnicodeString ComputedExpressionString::getValue ( ) const
```

Return the string value that is stored in this object.

Returns

The string value.

5.40.3.24 `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:



5.40.3.25 is_equal() [2/6]

```
virtual bool Tang::ComputedExpression::is_equal (\n    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](#).

5.40.3.26 is_equal() [3/6]

```
virtual bool Tang::ComputedExpression::is_equal (\n    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.

5.40.3.27 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](#).

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

<i>val</i>	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 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](#).

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

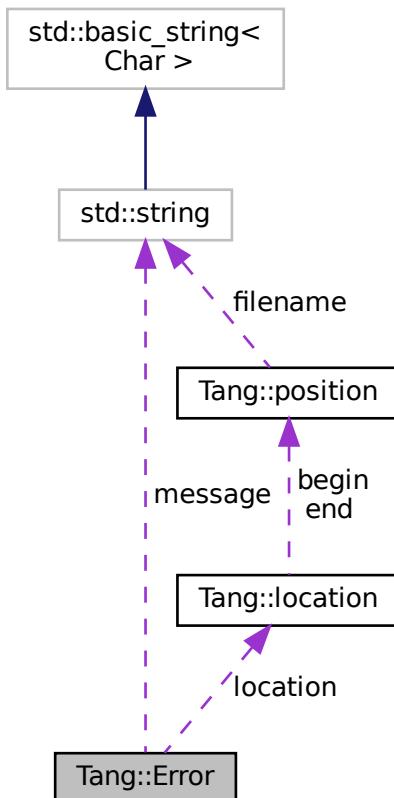
- [include/computedExpressionString.hpp](#)
- [src/computedExpressionString.cpp](#)

5.41 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.

5.41.1 Detailed Description

The `Error` class is used to report any error of the system, whether a syntax (parsing) error or a runtime (execution) error.

5.41.2 Constructor & Destructor Documentation

5.41.2.1 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.
----------------------	--------------------------------

5.41.2.2 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

<code>message</code>	The error message as a string.
<code>location</code>	The location of the error.

5.41.3 Friends And Related Function Documentation

5.41.3.1 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:

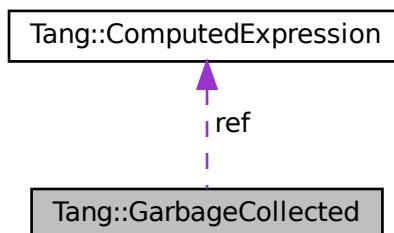
- [include/error.hpp](#)
- [src/error.cpp](#)

5.42 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.

5.42.1 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.

5.42.2 Constructor & Destructor Documentation

5.42.2.1 `GarbageCollected()` [1/3]

```
GarbageCollected::GarbageCollected (
    const GarbageCollected & other )
```

Copy Constructor.

Parameters

<i>The</i>	other GarbageCollected object to copy.
------------	--

5.42.2.2 GarbageCollected() [2/3]

```
GarbageCollected::GarbageCollected (
    GarbageCollected && other )
```

Move Constructor.

Parameters

<i>The</i>	other GarbageCollected object to move.
------------	--

5.42.2.3 ~GarbageCollected()

```
GarbageCollected::~GarbageCollected ( )
```

Destructor.

Clean up the tracked object, if appropriate.

5.42.2.4 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.
-----------------	---

5.42.3 Member Function Documentation**5.42.3.1 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.

5.42.3.2 make()

```
template<class T , typename... Args>
static GarbageCollected Tang::GarbageCollected::make (
    Args... args ) [inline], [static]
```

Creates a garbage-collected object of the specified type.

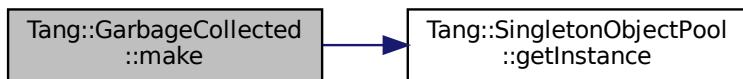
Parameters

<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:



5.42.3.3 makeCopy()

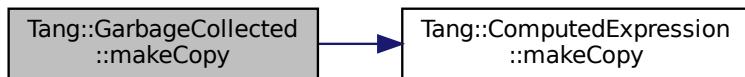
```
GarbageCollected GarbageCollected::makeCopy () const
```

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:



5.42.3.4 operator"!"()

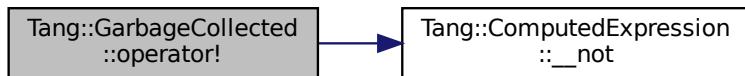
```
GarbageCollected GarbageCollected::operator! ( ) const
```

Perform a logical not on the [GarbageCollected](#) value.

Returns

The result of the operation.

Here is the call graph for this function:



5.42.3.5 operator"!=()

```
GarbageCollected GarbageCollected::operator!= (
    const GarbageCollected & rhs ) const
```

Perform a != between two [GarbageCollected](#) values.

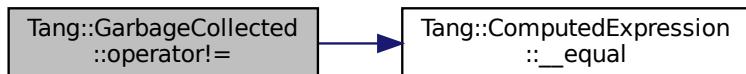
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.42.3.6 operator%()**

```
GarbageCollected GarbageCollected::operator% (
    const GarbageCollected & rhs ) const
```

Perform a modulo between two `GarbageCollected` values.

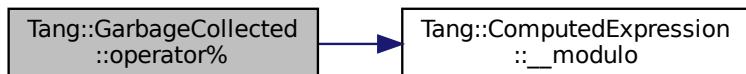
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.42.3.7 operator*() [1/2]

```
ComputedExpression & GarbageCollected::operator* ( ) const
```

Access the tracked object.

Returns

A reference to the tracked object.

5.42.3.8 operator*() [2/2]

```
GarbageCollected GarbageCollected::operator* (
    const GarbageCollected & rhs ) const
```

Perform a multiplication between two **GarbageCollected** values.

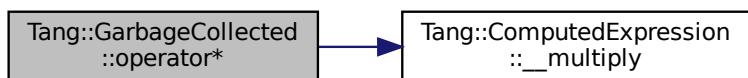
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.42.3.9 operator+()

```
GarbageCollected GarbageCollected::operator+ (
    const GarbageCollected & rhs ) const
```

Perform an addition between two **GarbageCollected** values.

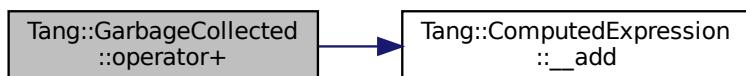
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.42.3.10 operator-() [1/2]**

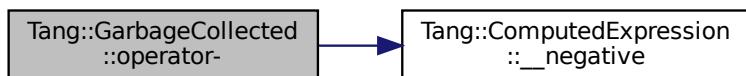
```
GarbageCollected GarbageCollected::operator- () const
```

Perform a negation on the [GarbageCollected](#) value.

Returns

The result of the operation.

Here is the call graph for this function:

**5.42.3.11 operator-() [2/2]**

```
GarbageCollected GarbageCollected::operator- (
    const GarbageCollected & rhs ) const
```

Perform a subtraction between two [GarbageCollected](#) values.

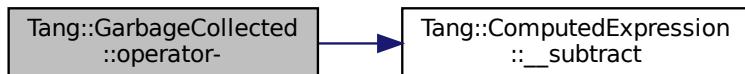
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.42.3.12 operator->()

```
ComputedExpression * GarbageCollected::operator-> ( ) const
```

Access the tracked object as a pointer.

Returns

A pointer to the tracked object.

5.42.3.13 operator/()

```
GarbageCollected GarbageCollected::operator/ (
    const GarbageCollected & rhs ) const
```

Perform a division between two [GarbageCollected](#) values.

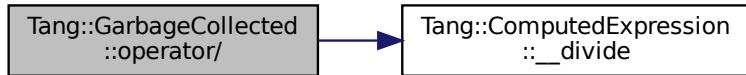
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.42.3.14 operator<()

```
GarbageCollected GarbageCollected::operator< (
    const GarbageCollected & rhs ) const
```

Perform a $<$ between two [GarbageCollected](#) values.

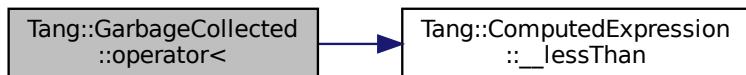
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.42.3.15 operator<=()

```
GarbageCollected GarbageCollected::operator<= (
    const GarbageCollected & rhs ) const
```

Perform a \leq between two [GarbageCollected](#) values.

Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

5.42.3.16 operator=() [1/2]

```
GarbageCollected & GarbageCollected::operator= (
    const GarbageCollected & other )
```

Copy Assignment.

Parameters

<i>The</i>	other GarbageCollected object.
------------	--------------------------------

5.42.3.17 operator=() [2/2]

```
GarbageCollected & GarbageCollected::operator= (
    GarbageCollected && other )
```

Move Assignment.

Parameters

<i>The</i>	other GarbageCollected object.
------------	--------------------------------

5.42.3.18 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.

5.42.3.19 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.

5.42.3.20 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.

5.42.3.21 operator==() [4/8]

```
GarbageCollected GarbageCollected::operator== (
    const GarbageCollected & rhs ) const
```

Perform a == between two [GarbageCollected](#) values.

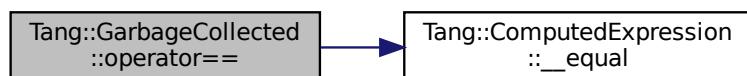
Parameters

<i>rhs</i>	The right hand side operand.
------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:

**5.42.3.22 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.

5.42.3.23 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.

5.42.3.24 operator==(7/8)

```
bool GarbageCollected::operator== (
    const Tang::float_t & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<code>val</code>	The value to compare the tracked object against.
------------------	--

Returns

True if they are equal, false otherwise.

5.42.3.25 operator==(8/8)

```
bool GarbageCollected::operator== (
    const Tang::integer_t & val ) const
```

Compare the [GarbageCollected](#) tracked object with a supplied value.

Parameters

<code>val</code>	The value to compare the tracked object against.
------------------	--

Returns

True if they are equal, false otherwise.

Here is the call graph for this function:



5.42.3.26 operator>()

```
GarbageCollected GarbageCollected::operator> (
    const GarbageCollected & rhs ) const
```

Perform a `>` between two `GarbageCollected` values.

Parameters

<code>rhs</code>	The right hand side operand.
------------------	------------------------------

Returns

The result of the operation.

5.42.3.27 operator>=()

```
GarbageCollected GarbageCollected::operator>= (
    const GarbageCollected & rhs ) const
```

Perform a `>=` between two `GarbageCollected` values.

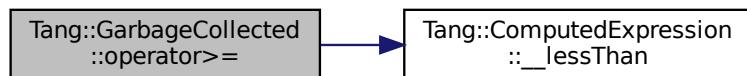
Parameters

<code>rhs</code>	The right hand side operand.
------------------	------------------------------

Returns

The result of the operation.

Here is the call graph for this function:



5.42.4 Friends And Related Function Documentation

5.42.4.1 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:

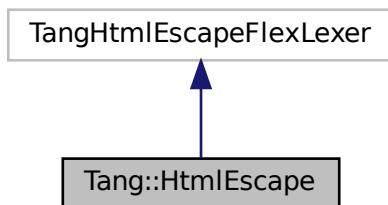
- [include/garbageCollected.hpp](#)
- [src/garbageCollected.cpp](#)

5.43 Tang::HtmlEscape Class Reference

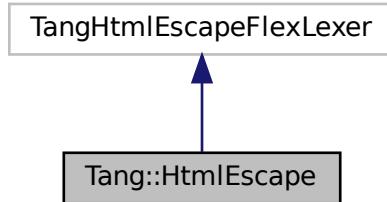
The Flex lexer class for the main Tang language.

```
#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.

5.43.1 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.

5.43.2 Constructor & Destructor Documentation

5.43.2.1 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)

5.43.3 Member Function Documentation**5.43.3.1 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:

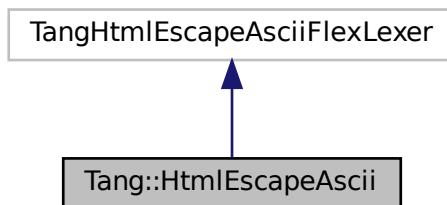
- [include/htmlEscape.hpp](#)

5.44 Tang::HtmlEscapeAscii Class Reference

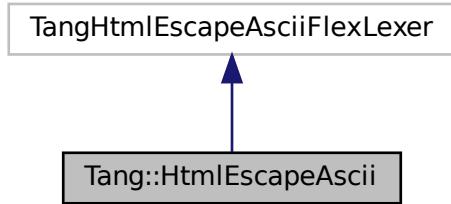
The Flex lexer class for the main Tang language.

```
#include <htmlEscapeAscii.hpp>
```

Inheritance diagram for Tang::HtmlEscapeAscii:



Collaboration diagram for Tang::HtmlEscapeAscii:



Public Member Functions

- [HtmlEscapeAscii \(std::istream &arg_yyin, std::ostream &arg_yyout\)](#)
The constructor for the Scanner.
- virtual std::string [get_next_token \(\)](#)
Extract the next token from the input string.

5.44.1 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.

5.44.2 Constructor & Destructor Documentation

5.44.2.1 HtmlEscapeAscii()

```
Tang::HtmlEscapeAscii::HtmlEscapeAscii (
    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)

5.44.3 Member Function Documentation**5.44.3.1 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:

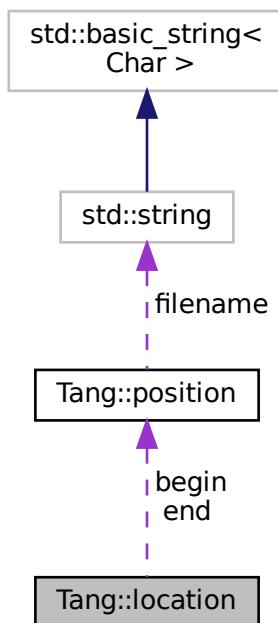
- [include/htmlEscapeAscii.hpp](#)

5.45 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.

5.45.1 Detailed Description

Two points in a source file.

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

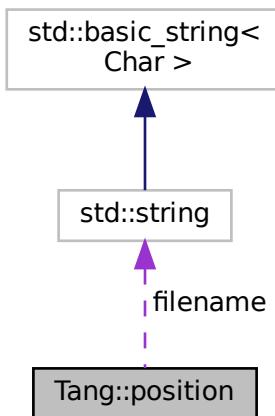
- build/generated/location.hh

5.46 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).

5.46.1 Detailed Description

A point in a source file.

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

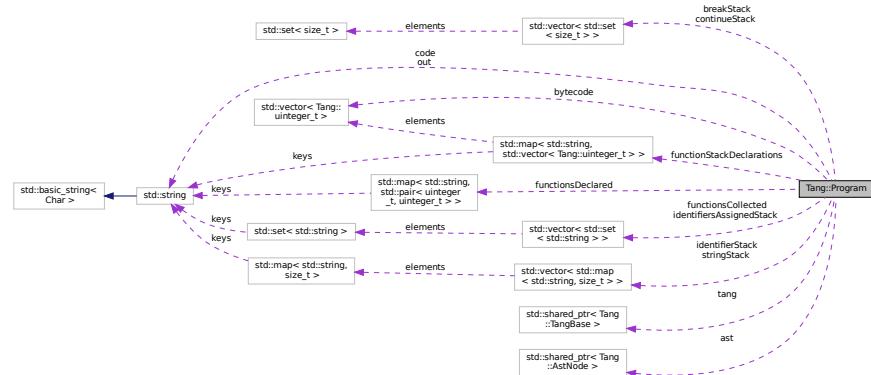
- build/generated/location.hh

5.47 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::TangBase > 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.
- `Program & execute ()`
Execute the program's Bytecode, and return the current `Program` object.
- `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)`
Add a string to the environment.
- `const std::map< std::string, 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::string **out**
The output of the program, resulting from the program execution.
- 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::string, 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](#) execution.

5.47.1 Detailed Description

Represents a compiled script or template that may be executed.

5.47.2 Member Enumeration Documentation

5.47.2.1 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.

5.47.3 Constructor & Destructor Documentation

5.47.3.1 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.

5.47.4 Member Function Documentation

5.47.4.1 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 break bytecode.
-----------------	--

5.47.4.2 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.

5.47.4.3 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 continue bytecode.
-----------------	---

5.47.4.4 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.

5.47.4.5 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.
-------------	----------------------

5.47.4.6 addString()

```
void Program::addString (
    const std::string & name )
```

Add a string 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.

5.47.4.7 dumpBytecode()

```
string Program::dumpBytecode ( ) const
```

Get the Opcodes of the compiled program, formatted like Assembly.

Returns

A string containing the Opcode representation.

5.47.4.8 execute()

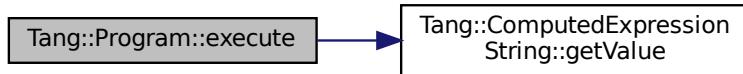
```
Program & Program::execute ( )
```

Execute the program's Bytecode, and return the current [Program](#) object.

Returns

The current [Program](#) object.

Here is the call graph for this function:



5.47.4.9 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.

5.47.4.10 getBytecode()

```
const Bytecode & Program::getBytecode ( )
```

Get the Bytecode vector.

Returns

The Bytecode vector.

5.47.4.11 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.

5.47.4.12 `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.

5.47.4.13 `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.

5.47.4.14 `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.

5.47.4.15 `getStrings()`

```
const map< string, 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.

5.47.4.16 `popBreakStack()`

```
void Program::popBreakStack ( size_t target )
```

For all `continue` bytecode locations collected by `Tang::addContinue`, set the target pc to `target`.

Parameters

<i>target</i>	The target bytecode offset that the <code>continue</code> should jump to.
---------------	---

Here is the call graph for this function:

**5.47.4.17 popContinueStack()**

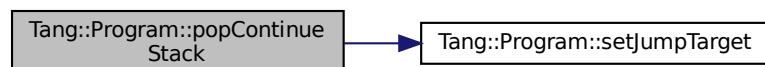
```
void Program::popContinueStack ( size_t target )
```

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 <code>continue</code> should jump to.
---------------	---

Here is the call graph for this function:

**5.47.4.18 pushEnvironment()**

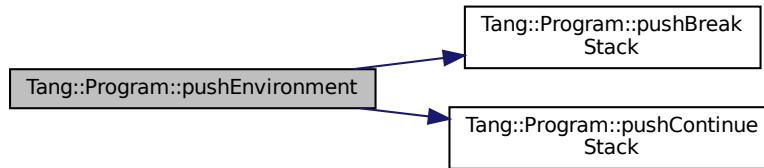
```
void Program::pushEnvironment ( const std::shared_ptr< AstNode > & ast )
```

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:

**5.47.4.19 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.

5.47.4.20 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.

5.47.5 Member Data Documentation

5.47.5.1 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:

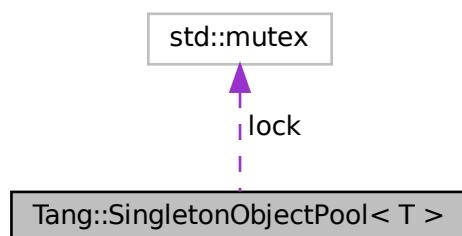
- [include/program.hpp](#)
- [src/program-dumpBytecode.cpp](#)
- [src/program-execute.cpp](#)
- [src/program.cpp](#)

5.48 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.

5.48.1 Detailed Description

```
template<class T>
class Tang::SingletonObjectPool< T >
```

A thread-safe, singleton object pool of the designated type.

5.48.2 Member Function Documentation

5.48.2.1 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.

5.48.2.2 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.

5.48.2.3 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.
------------	---------------------------------

5.48.3 Member Data Documentation

5.48.3.1 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.

5.48.3.2 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:

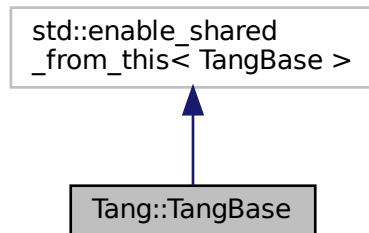
- [include/singletonObjectPool.hpp](#)

5.49 Tang::TangBase Class Reference

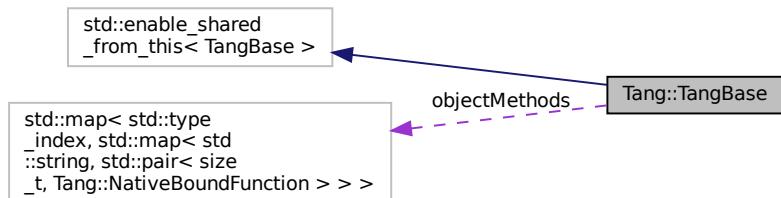
The base class for the Tang programming language.

```
#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.

5.49.1 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).

5.49.2 Constructor & Destructor Documentation

5.49.2.1 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:



5.49.3 Member Function Documentation

5.49.3.1 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.

5.49.3.2 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:

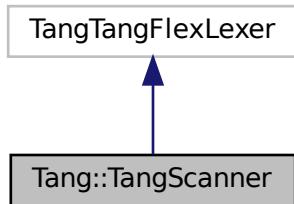
- [include/tangBase.hpp](#)
- [src/tangBase.cpp](#)

5.50 Tang::TangScanner Class Reference

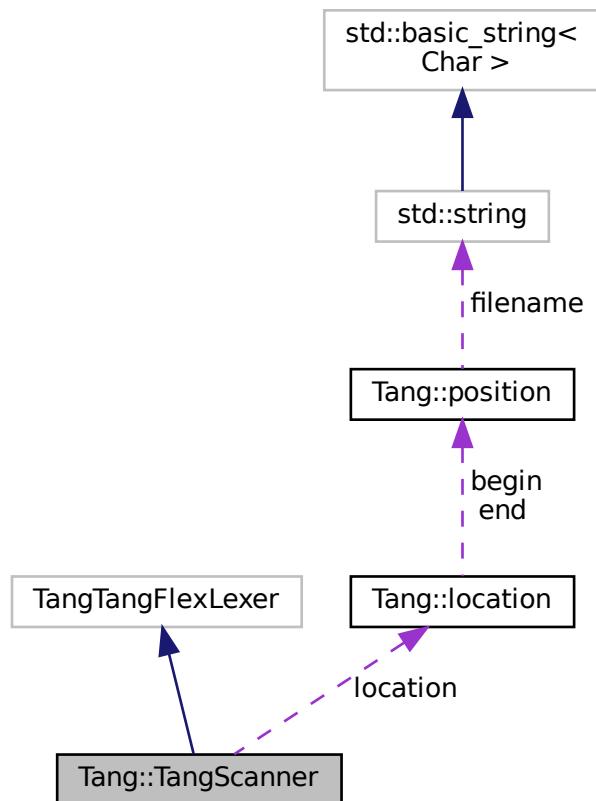
The Flex lexer class for the main Tang language.

```
#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.

5.50.1 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.

5.50.2 Constructor & Destructor Documentation

5.50.2.1 `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)

5.50.3 Member Function Documentation

5.50.3.1 `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:

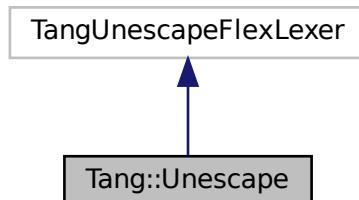
- [include/tangScanner.hpp](#)

5.51 Tang::Unescape Class Reference

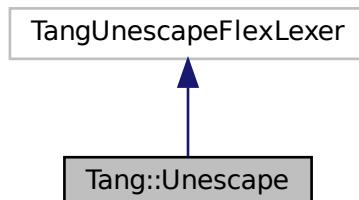
The Flex lexer class for the main Tang language.

```
#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.

5.51.1 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.

5.51.2 Constructor & Destructor Documentation

5.51.2.1 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

<code>arg_yyin</code>	The input stream to be tokenized
<code>arg_yyout</code>	The output stream (not currently used)

5.51.3 Member Function Documentation

5.51.3.1 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:

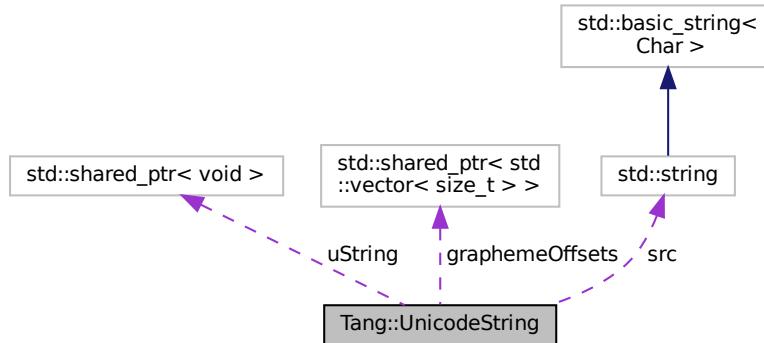
- [include/unescape.hpp](#)

5.52 Tang::UnicodeString Class Reference

Represents a UTF-8 encoded string that is Unicode-aware.

```
#include <unicodeString.hpp>
```

Collaboration diagram for Tang::UnicodeString:



Public Member Functions

- **UnicodeString** (const std::string &**src**)
Construct a [Tang::UnicodeString](#) object, which acts as the interface to the ICU library.
- 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.
- **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.

Private Member Functions

- void `generateCachedValues () const`
Calculate cachable values for the object.

Private Attributes

- std::string `src`
The UTF-8 encoded string.
- 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.

5.52.1 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.

5.52.2 Constructor & Destructor Documentation

5.52.2.1 `UnicodeString()`

```
UnicodeString::UnicodeString (
    const std::string & src )
```

Construct a `Tang::UnicodeString` object, which acts as the interface to the ICU library.

Parameters

<code>src</code>	A UTF-8 encoded string.
------------------	-------------------------

5.52.3 Member Function Documentation

5.52.3.1 `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 actual number of bytes in memory.

Returns

Returns the length of the [UnicodeString](#) in bytes.

5.52.3.2 length()

```
size_t UnicodeString::length ( ) const
```

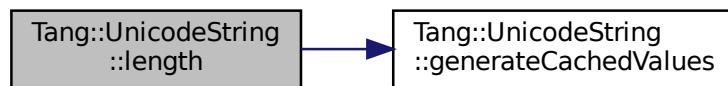
Return the length of the [UnicodeString](#) in graphemes.

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:



5.52.3.3 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](#).

5.52.3.4 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.

5.52.3.5 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.

5.52.3.6 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 two strings are equal.

5.52.3.7 substr()

```
std::string UnicodeString::substr (
    size_t position,
    size_t length ) const
```

Return a Unicode grapheme-aware substring.

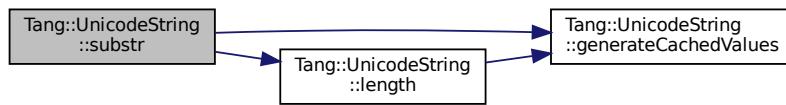
Parameters

<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

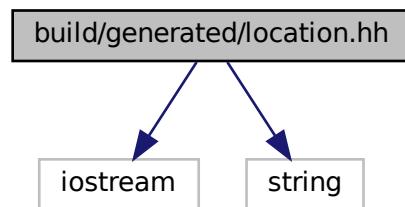
Chapter 6

File Documentation

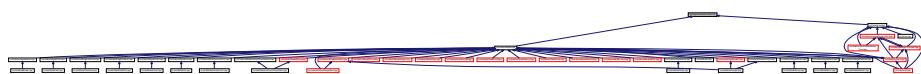
6.1 build/generated/location.hh File Reference

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.

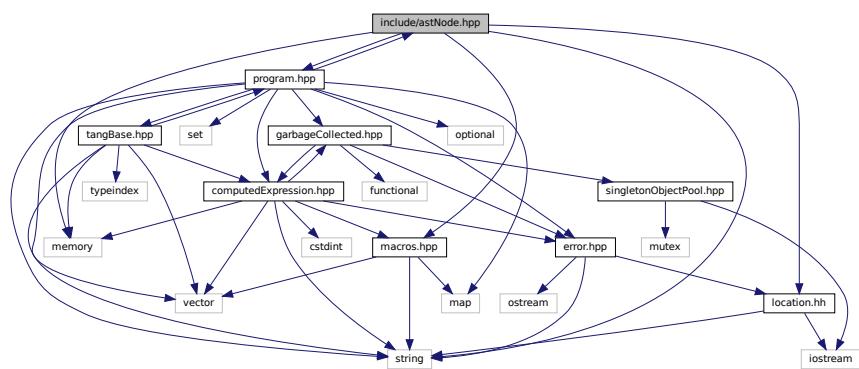
Parameters

<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.hh"
#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).

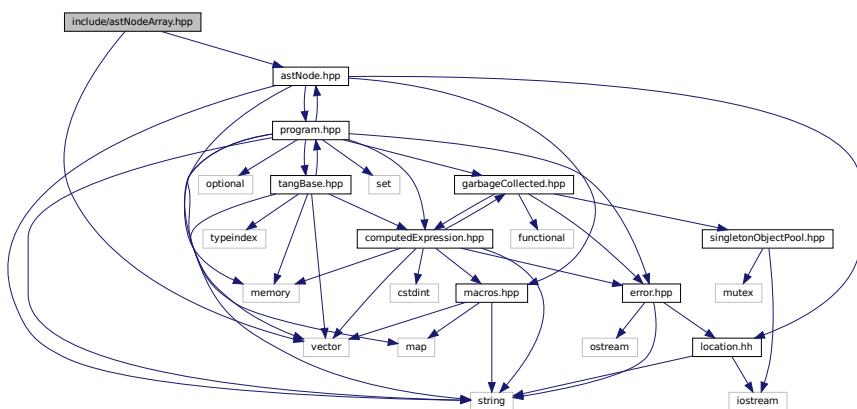
6.2.1 Detailed Description

Declare the `Tang::AstNode` base class.

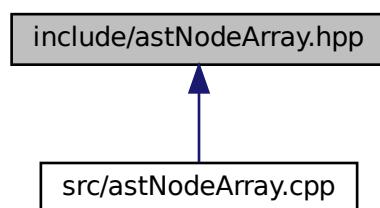
6.3 include/astNodeArray.hpp File Reference

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

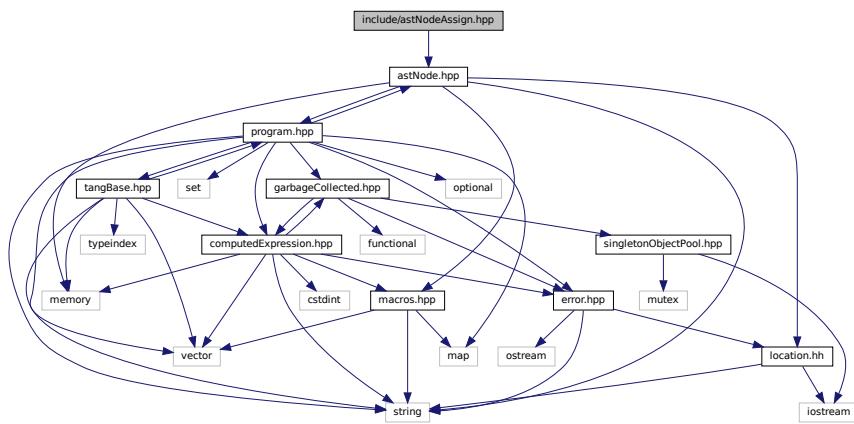
Declare the [Tang::AstNodeArray](#) class.

6.4 include/astNodeAssign.hpp File Reference

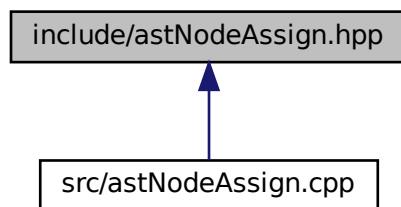
Declare the [Tang::AstNodeAssign](#) class.

```
#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

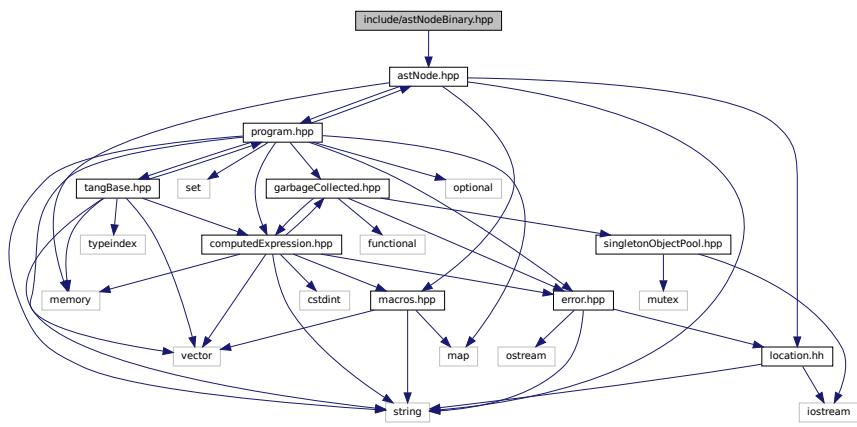
Declare the [Tang::AstNodeAssign](#) class.

6.5 include/astNodeBinary.hpp File Reference

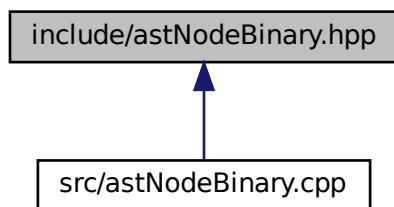
Declare the [Tang::AstNodeBinary](#) class.

```
#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.

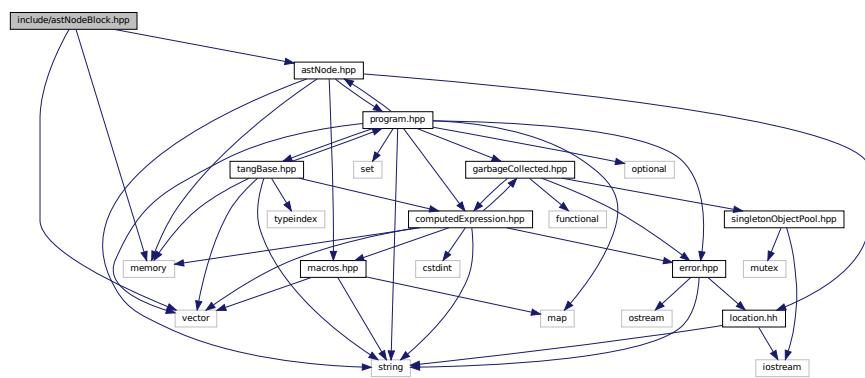
6.5.1 Detailed Description

Declare the [Tang::AstNodeBinary](#) class.

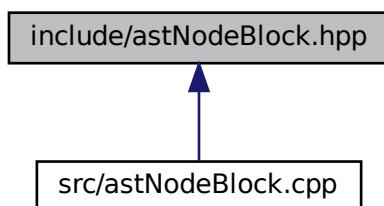
6.6 include/astNodeBlock.hpp File Reference

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

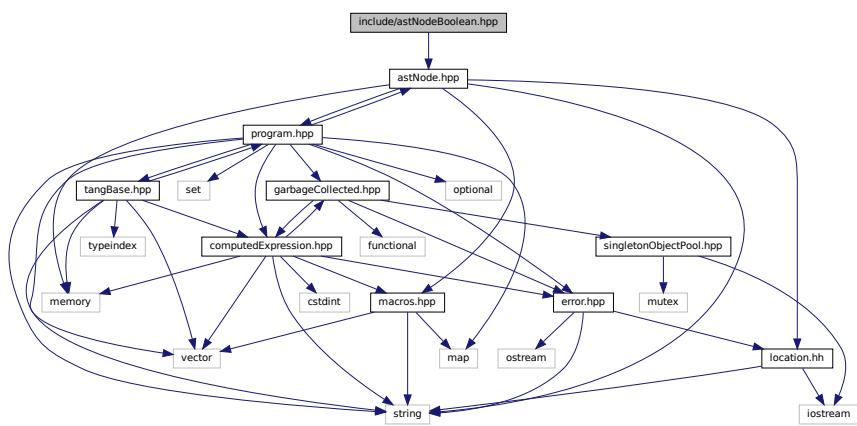
Declare the [Tang::AstNodeBlock](#) class.

6.7 include/astNodeBoolean.hpp File Reference

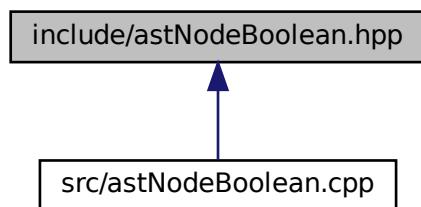
Declare the [Tang::AstNodeBoolean](#) class.

```
#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.

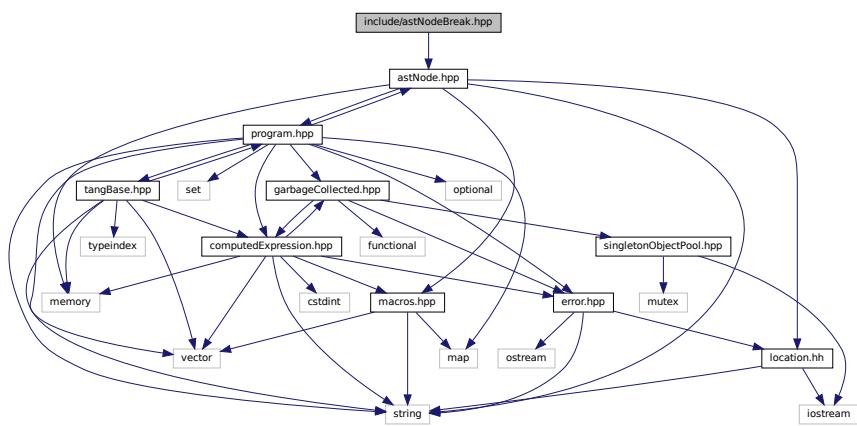
6.7.1 Detailed Description

Declare the [Tang::AstNodeBoolean](#) class.

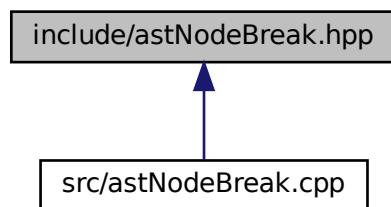
6.8 include/astNodeBreak.hpp File Reference

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

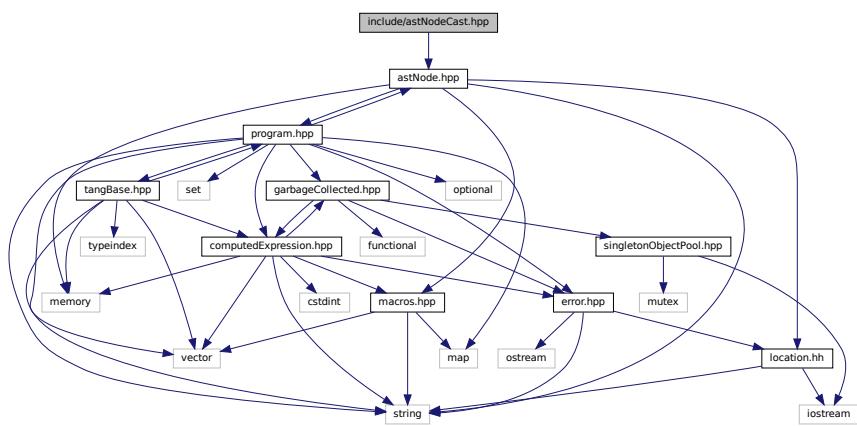
Declare the [Tang::AstNodeBreak](#) class.

6.9 include/astNodeCast.hpp File Reference

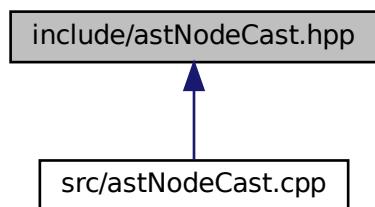
Declare the [Tang::AstNodeCast](#) class.

```
#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.

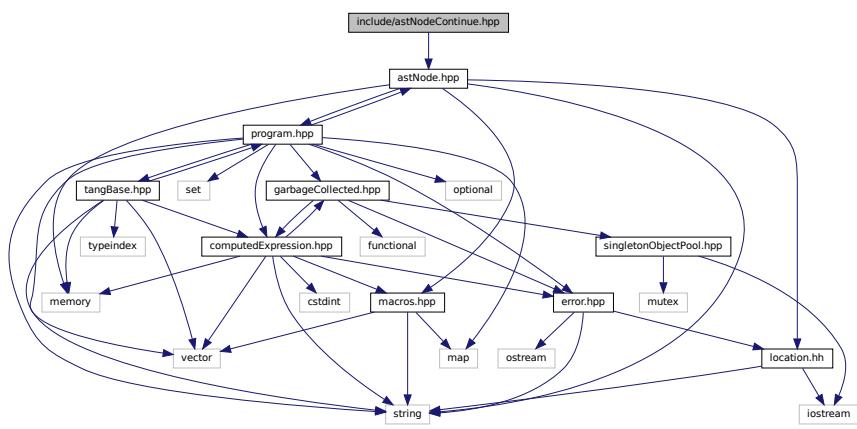
6.9.1 Detailed Description

Declare the `Tang::AstNodeCast` class.

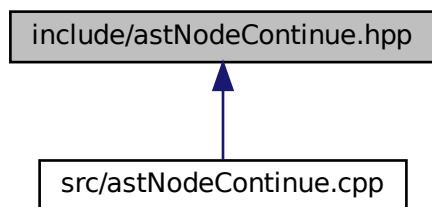
6.10 include/astNodeContinue.hpp File Reference

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

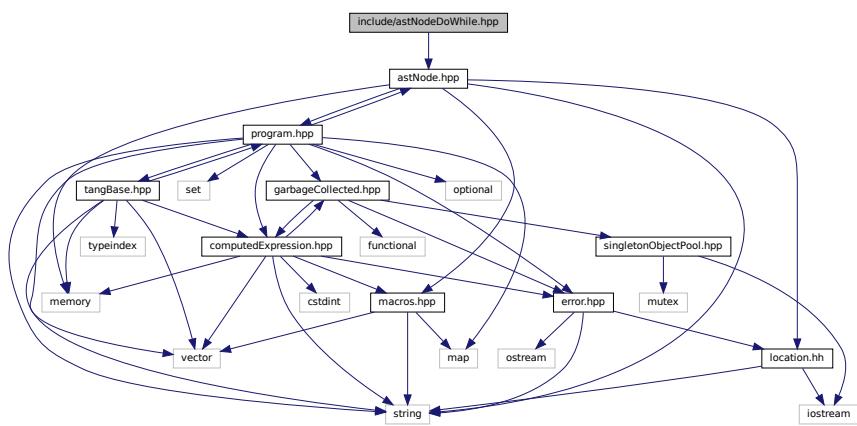
Declare the [Tang::AstNodeContinue](#) class.

6.11 include/astNodeDoWhile.hpp File Reference

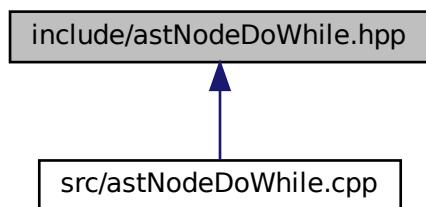
Declare the [Tang::AstNodeDoWhile](#) class.

```
#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.

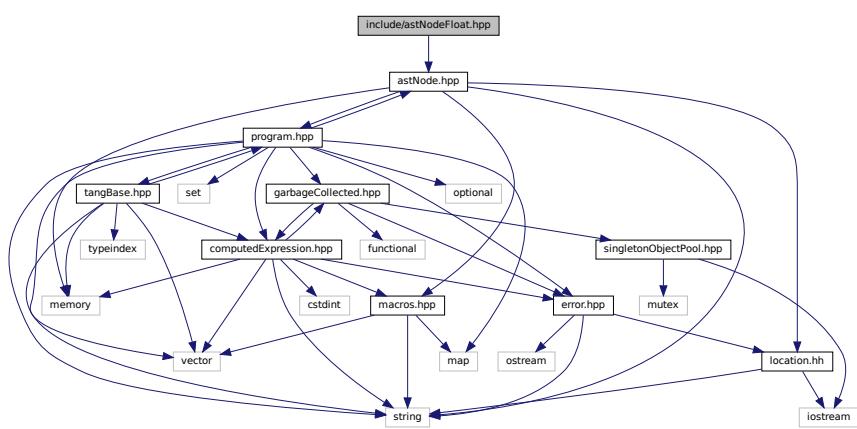
6.11.1 Detailed Description

Declare the `Tang::AstNodeDoWhile` class.

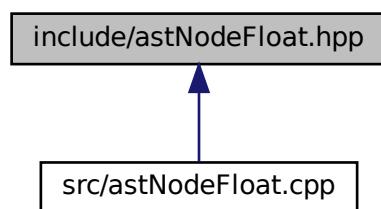
6.12 include/astNodeFloat.hpp File Reference

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.

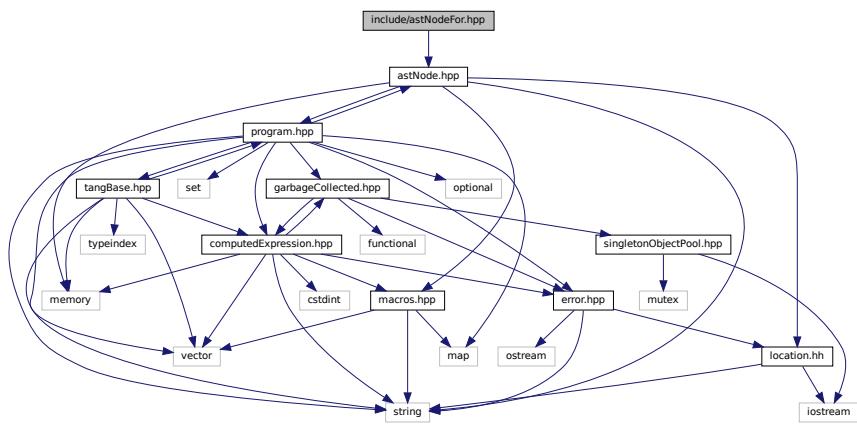
6.12.1 Detailed Description

Declare the [Tang::AstNodeFloat](#) class.

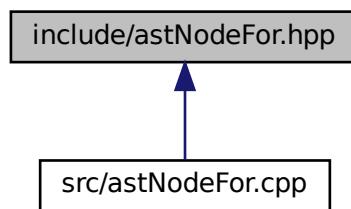
6.13 include/astNodeFor.hpp File Reference

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.

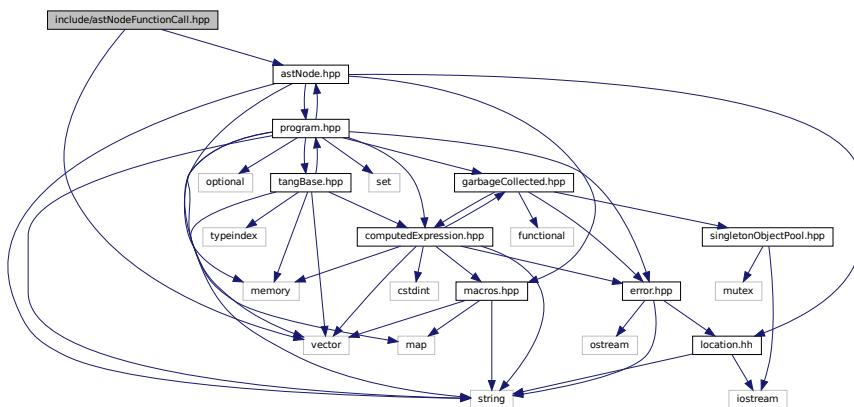
6.13.1 Detailed Description

Declare the [Tang::AstNodeFor](#) class.

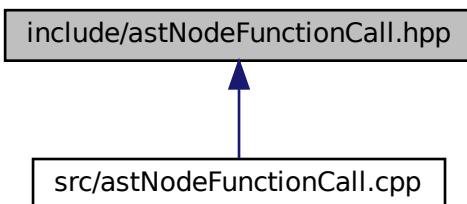
6.14 include/astNodeFunctionCall.hpp File Reference

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.

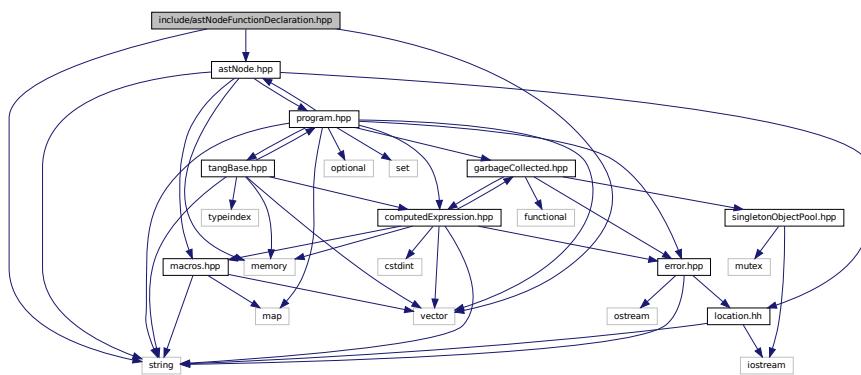
6.14.1 Detailed Description

Declare the [Tang::AstNodeFunctionCall](#) class.

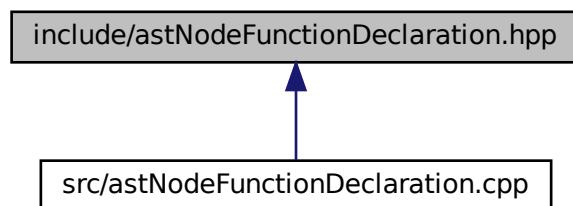
6.15 include/astNodeFunctionDeclaration.hpp File Reference

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.

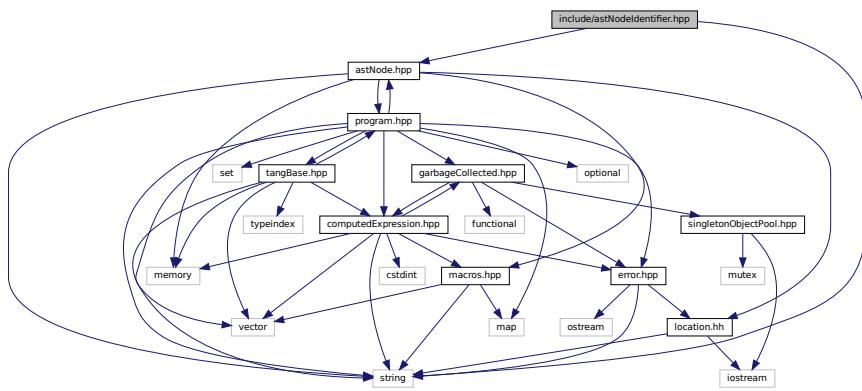
6.15.1 Detailed Description

Declare the [Tang::AstNodeFunctionDeclaration](#) class.

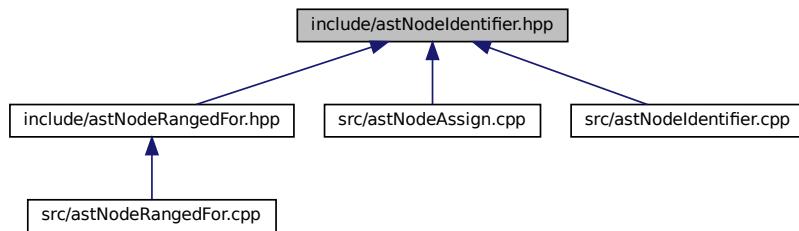
6.16 include/astNodelentifier.hpp File Reference

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.

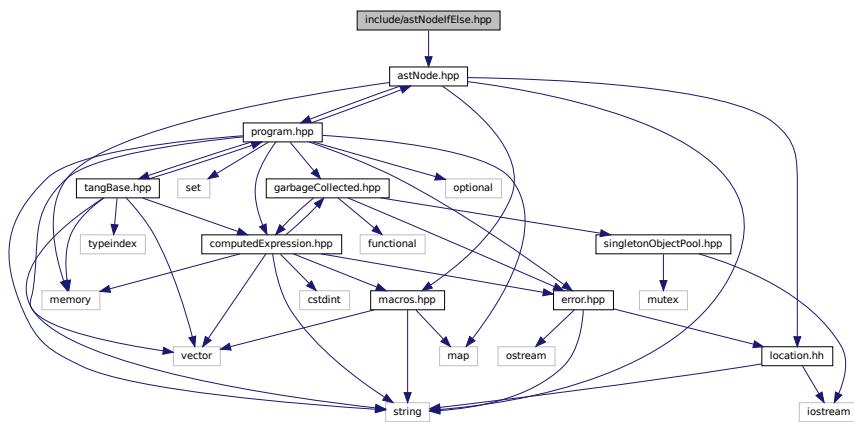
6.16.1 Detailed Description

Declare the [Tang::AstNodeIdentifier](#) class.

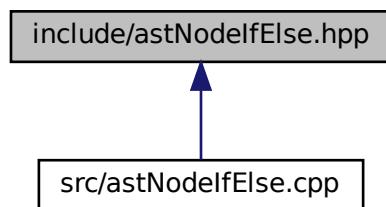
6.17 include/astNodeIfElse.hpp File Reference

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

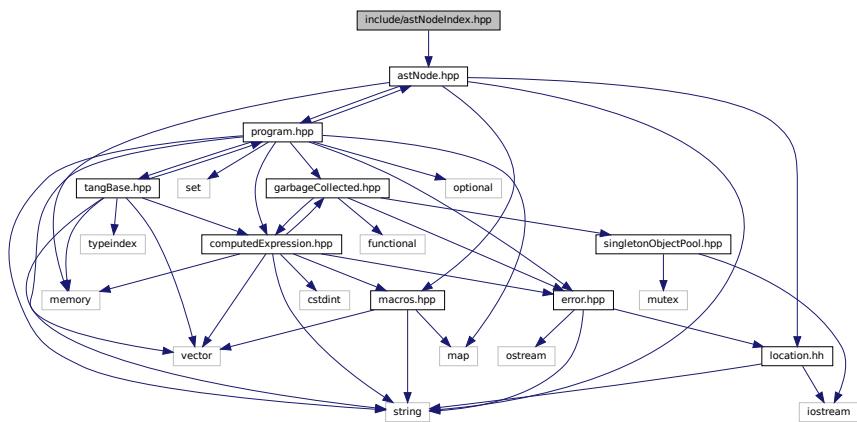
Declare the [Tang::AstNodeIfElse](#) class.

6.18 include/astNodeIndex.hpp File Reference

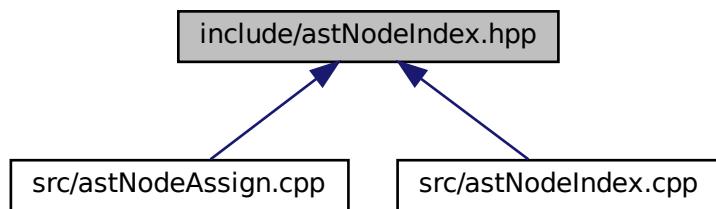
Declare the [Tang::AstNodeIndex](#) class.

```
#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.

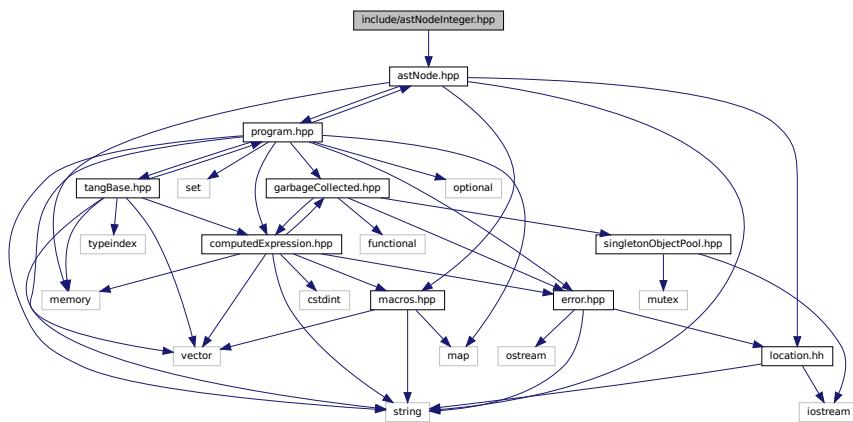
6.18.1 Detailed Description

Declare the [Tang::AstNodeIndex](#) class.

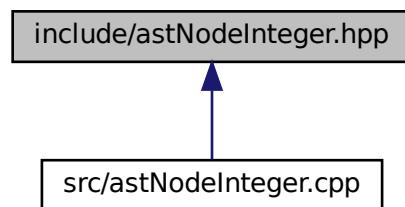
6.19 include/astNodeInteger.hpp File Reference

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.

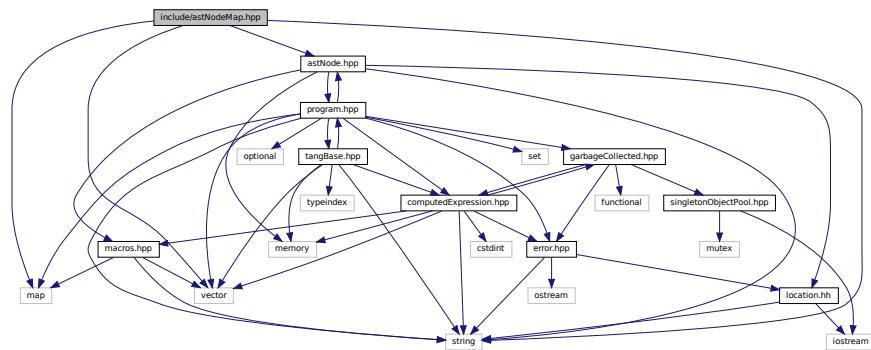
6.19.1 Detailed Description

Declare the `Tang::AstNodeInteger` class.

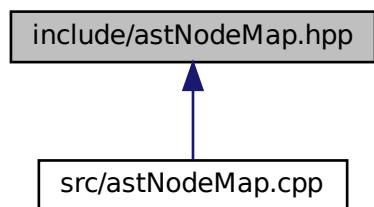
6.20 include/astNodeMap.hpp File Reference

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.

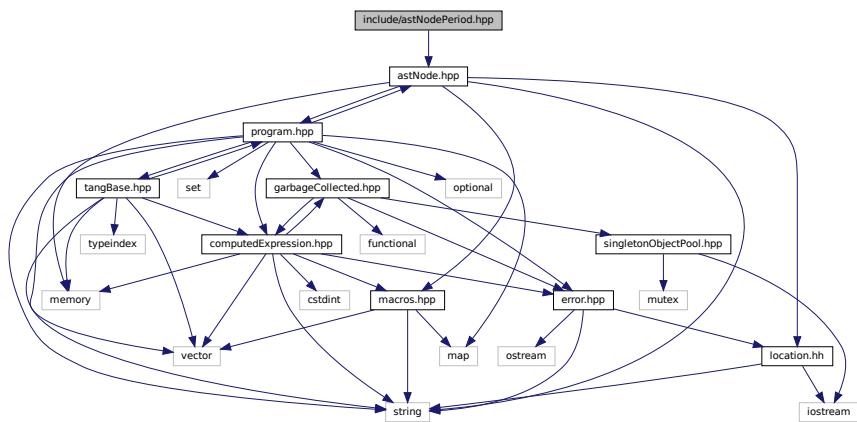
6.20.1 Detailed Description

Declare the [Tang::AstNodeMap](#) class.

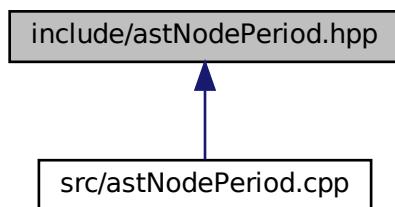
6.21 include/astNodePeriod.hpp File Reference

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

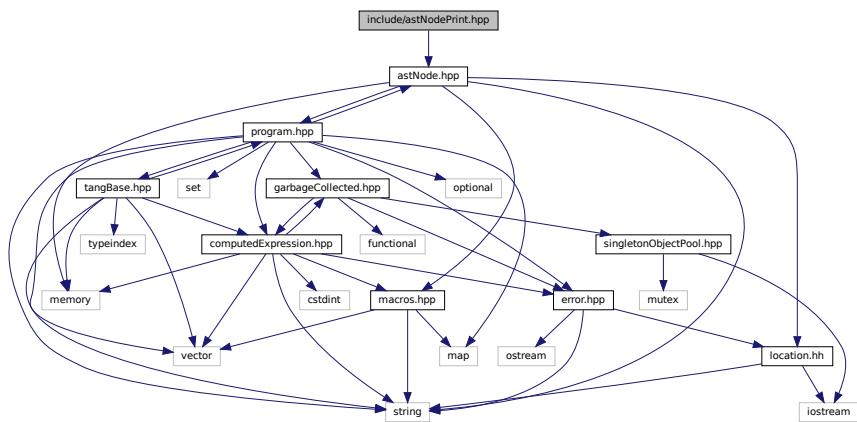
Declare the [Tang::AstNodePeriod](#) class.

6.22 include/astNodePrint.hpp File Reference

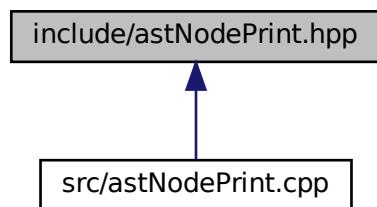
Declare the [Tang::AstNodePrint](#) class.

```
#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.

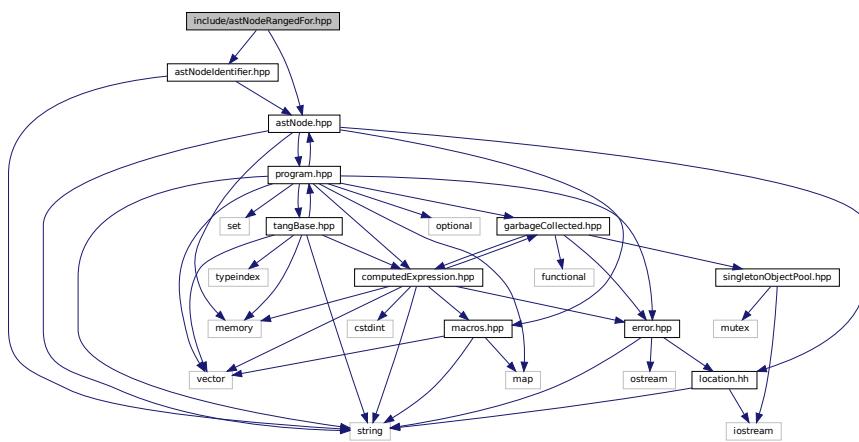
6.22.1 Detailed Description

Declare the [Tang::AstNodePrint](#) class.

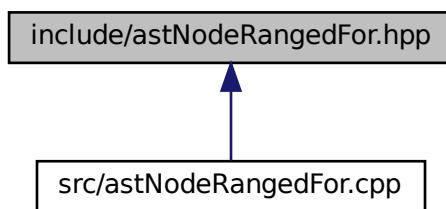
6.23 include/astNodeRangedFor.hpp File Reference

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.

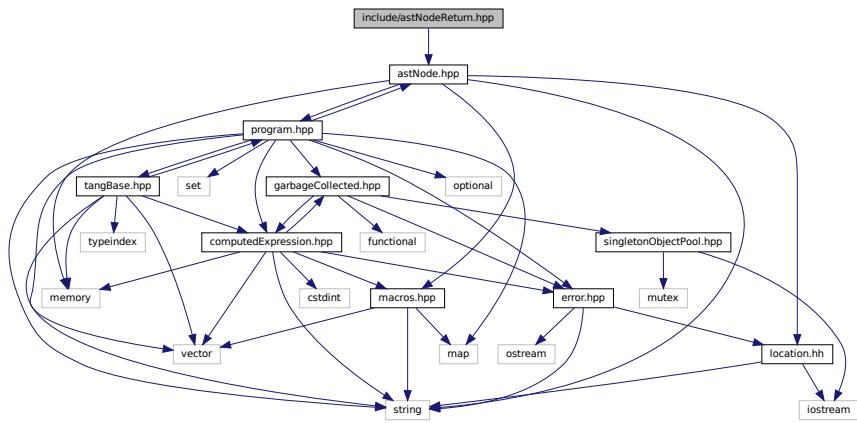
6.23.1 Detailed Description

Declare the [Tang::AstNodeRangedFor](#) class.

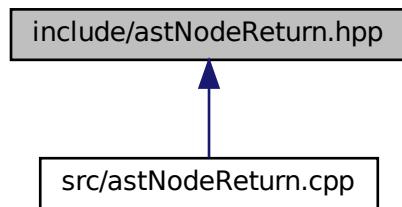
6.24 include/astNodeReturn.hpp File Reference

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.

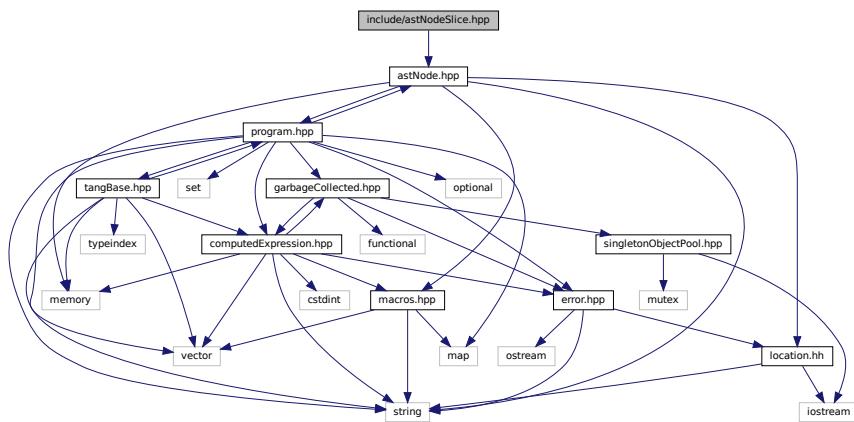
6.24.1 Detailed Description

Declare the [Tang::AstNodeReturn](#) class.

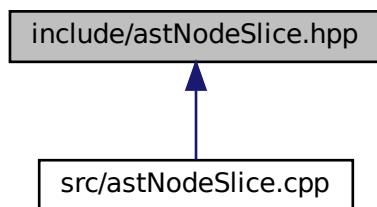
6.25 include/astNodeSlice.hpp File Reference

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.

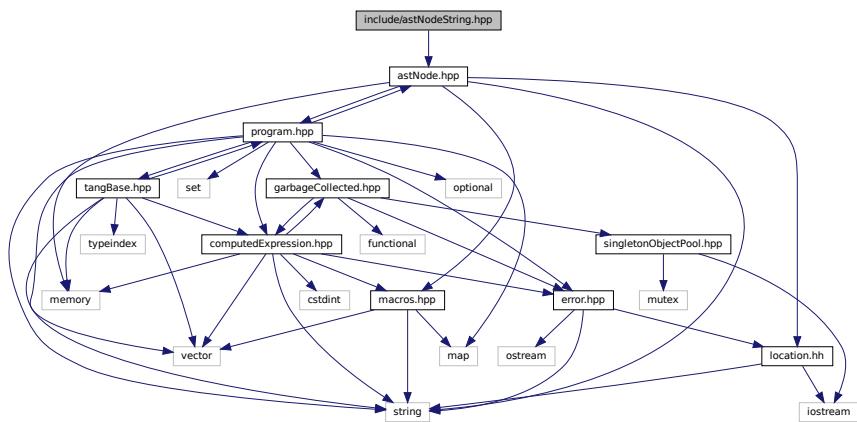
6.25.1 Detailed Description

Declare the [Tang::AstNodeSlice](#) class.

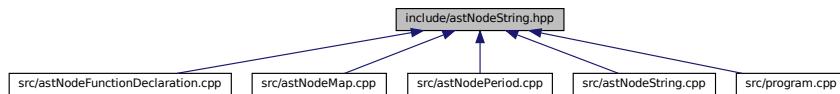
6.26 include/astNodeString.hpp File Reference

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.

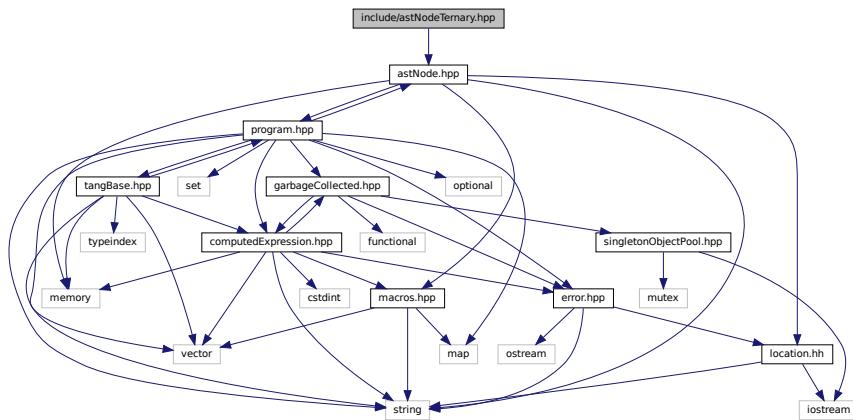
6.26.1 Detailed Description

Declare the [Tang::AstNodeString](#) class.

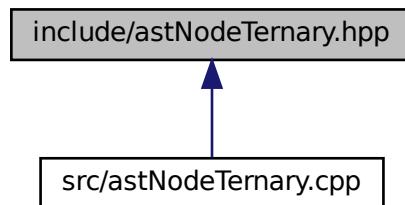
6.27 include/astNodeTernary.hpp File Reference

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.

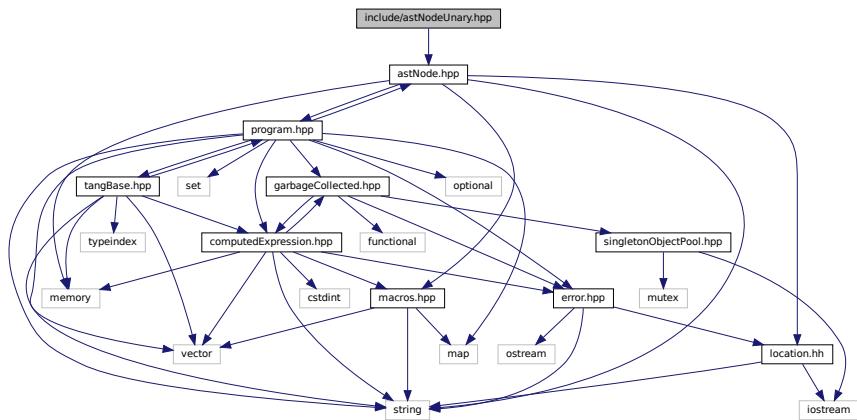
6.27.1 Detailed Description

Declare the [Tang::AstNodeTernary](#) class.

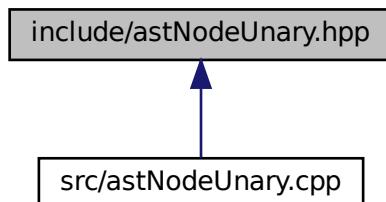
6.28 include/astNodeUnary.hpp File Reference

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

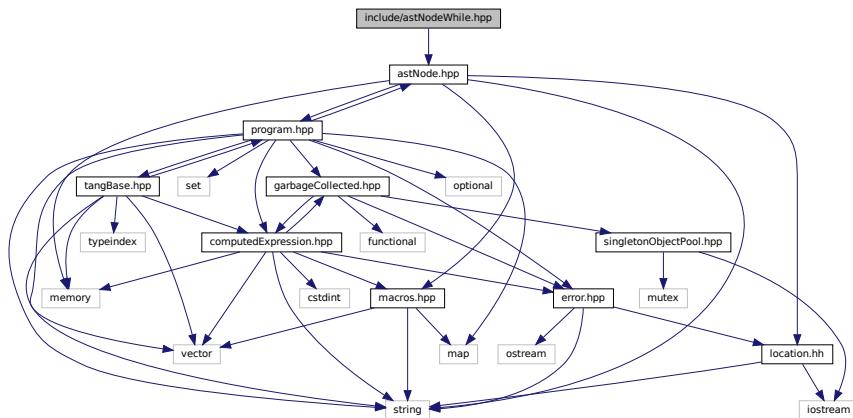
Declare the [Tang::AstNodeUnary](#) class.

6.29 include/astNodeWhile.hpp File Reference

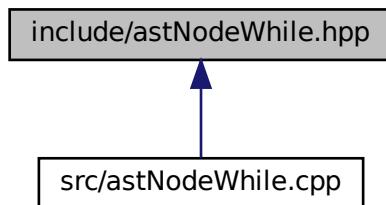
Declare the [Tang::AstNodeWhile](#) class.

```
#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.

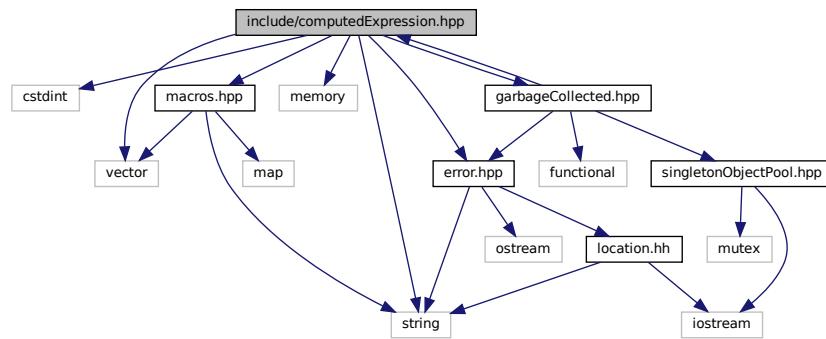
6.29.1 Detailed Description

Declare the [Tang::AstNodeWhile](#) class.

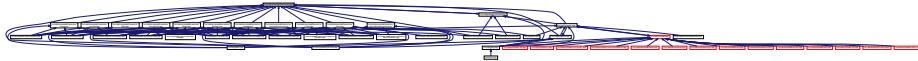
6.30 include/computedExpression.hpp File Reference

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.

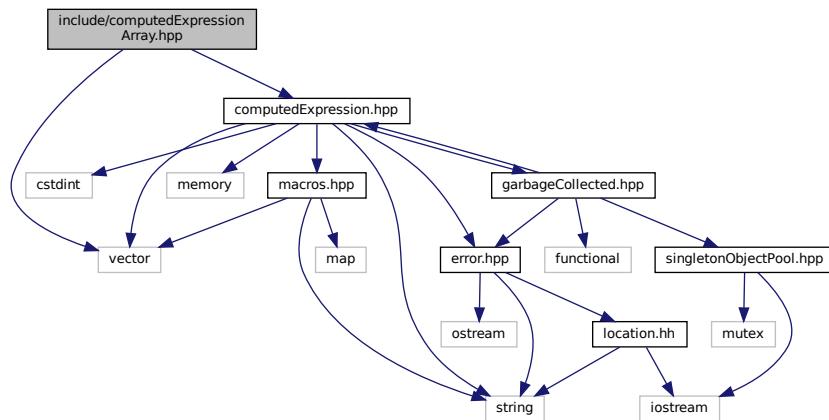
6.30.1 Detailed Description

Declare the [Tang::ComputedExpression](#) base class.

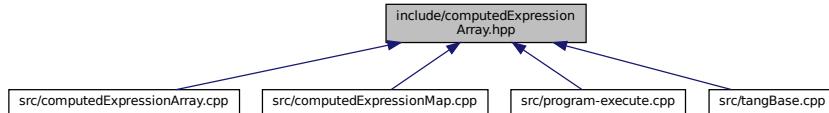
6.31 include/computedExpressionArray.hpp File Reference

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.

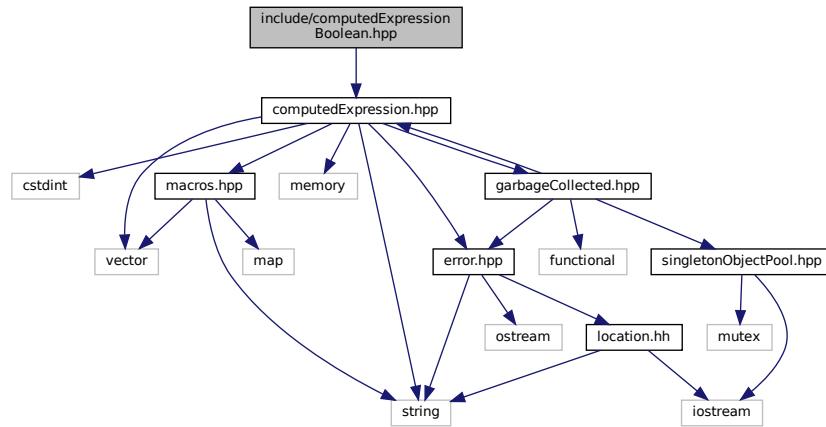
6.31.1 Detailed Description

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.

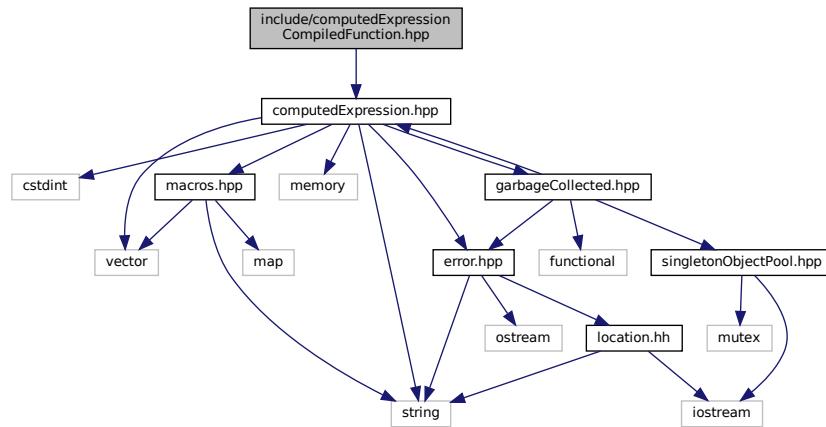
6.32.1 Detailed Description

Declare the [Tang::ComputedExpressionBoolean](#) class.

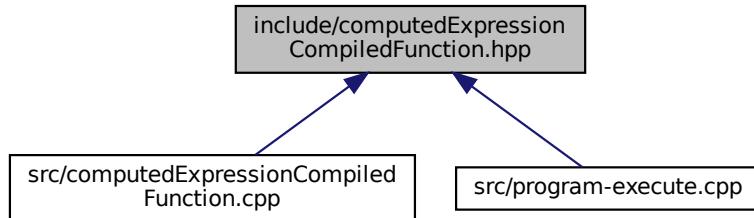
6.33 include/computedExpressionCompiledFunction.hpp File Reference

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.

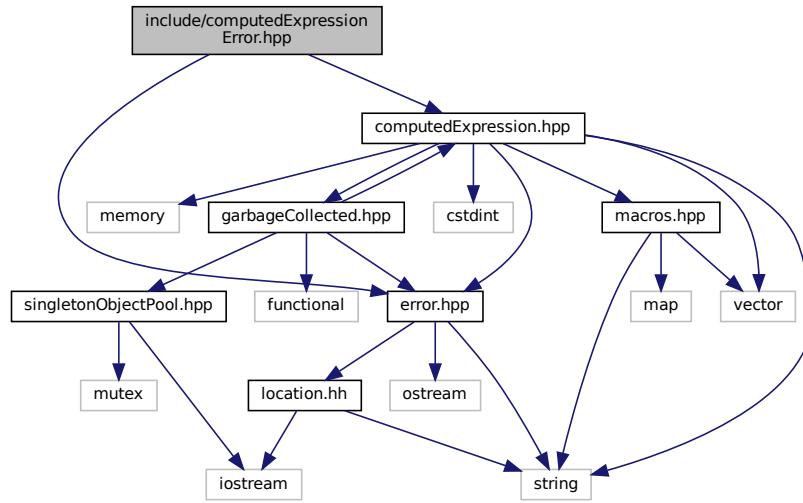
6.33.1 Detailed Description

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.

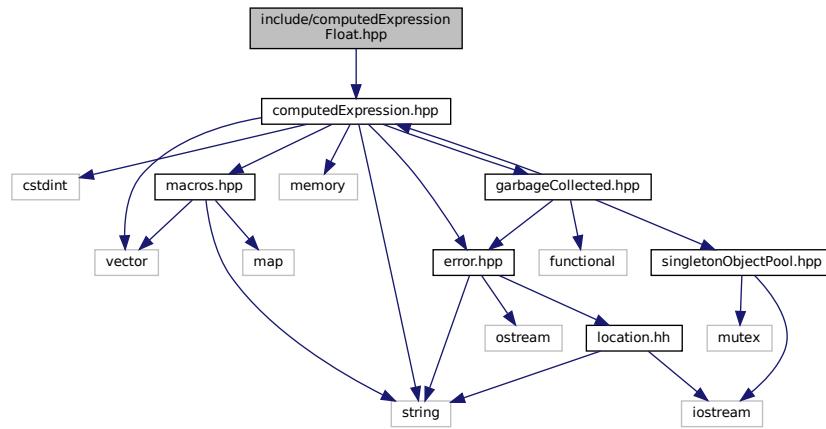
6.34.1 Detailed Description

Declare the [Tang::ComputedExpressionError](#) class.

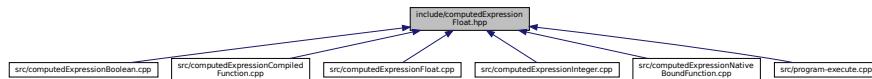
6.35 include/computedExpressionFloat.hpp File Reference

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.

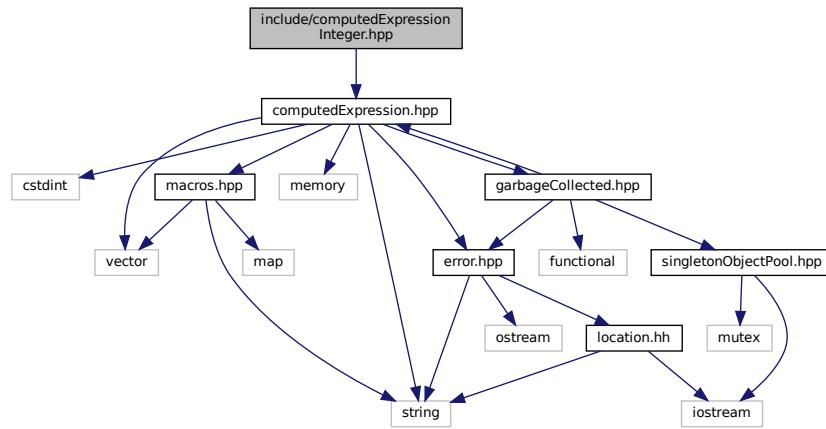
6.35.1 Detailed Description

Declare the [Tang::ComputedExpressionFloat](#) class.

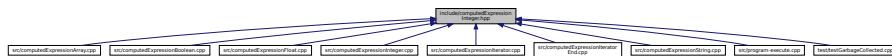
6.36 include/computedExpressionInteger.hpp File Reference

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

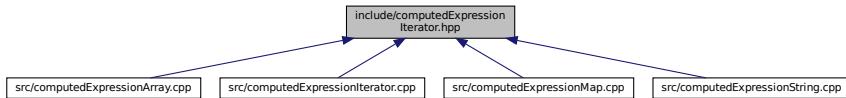
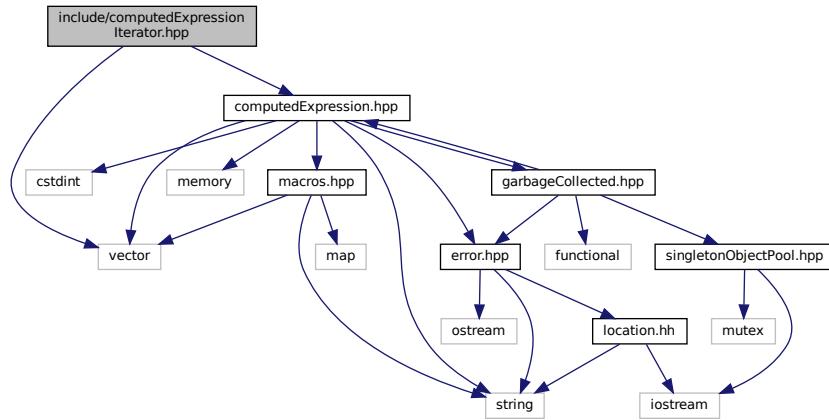
Declare the [Tang::ComputedExpressionInteger](#) class.

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.

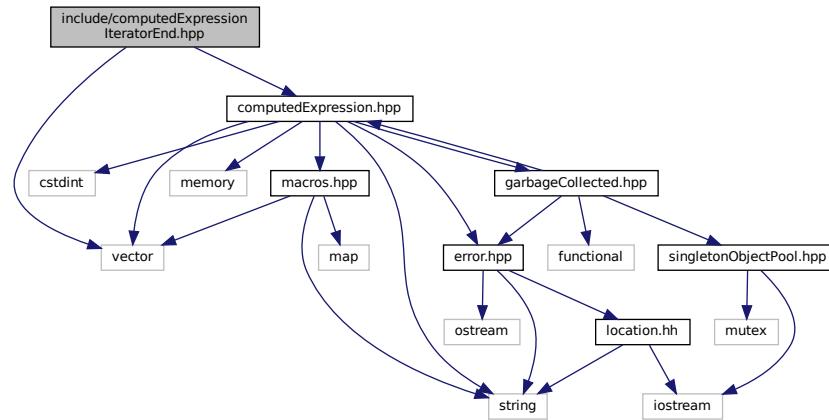
6.37.1 Detailed Description

Declare the [Tang::ComputedExpressionIterator](#) class.

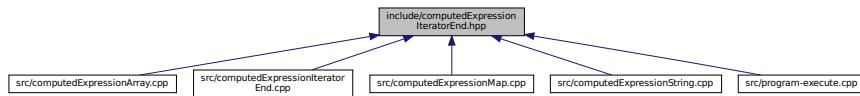
6.38 include/computedExpressionIteratorEnd.hpp File Reference

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

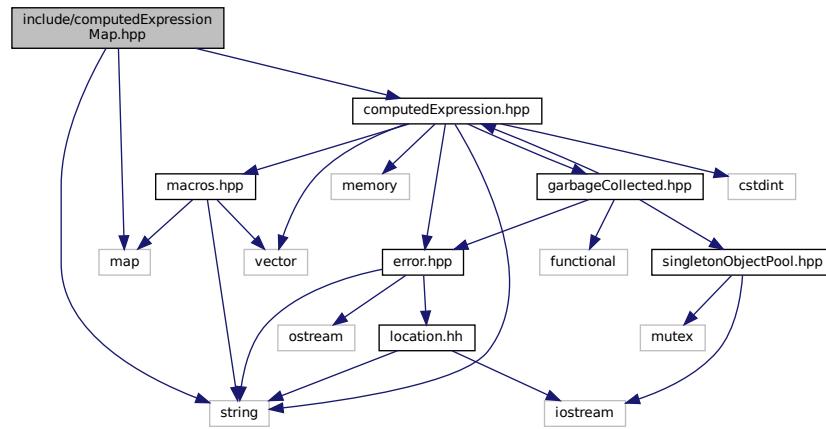
Declare the [Tang::ComputedExpressionIteratorEnd](#) class.

6.39 include/computedExpressionMap.hpp File Reference

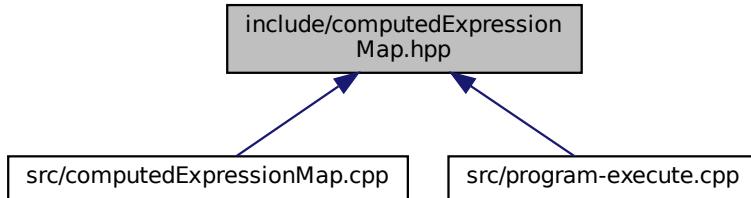
Declare the [Tang::ComputedExpressionMap](#) class.

```
#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.

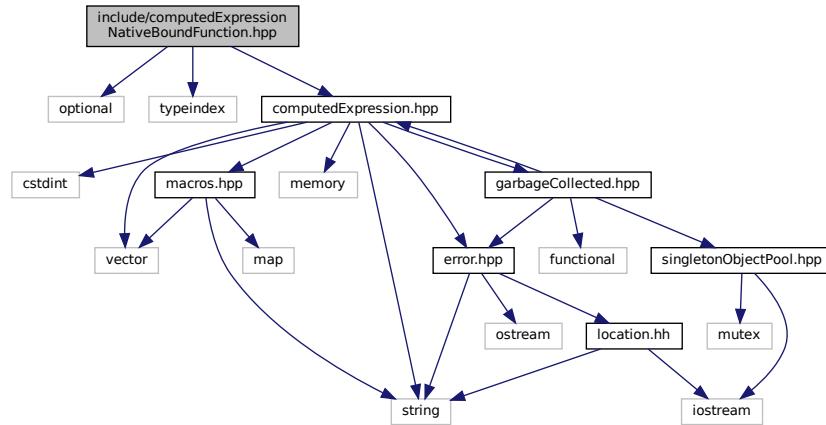
6.39.1 Detailed Description

Declare the [Tang::ComputedExpressionMap](#) class.

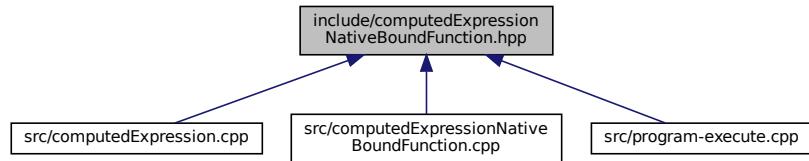
6.40 include/computedExpressionNativeBoundFunction.hpp File Reference

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

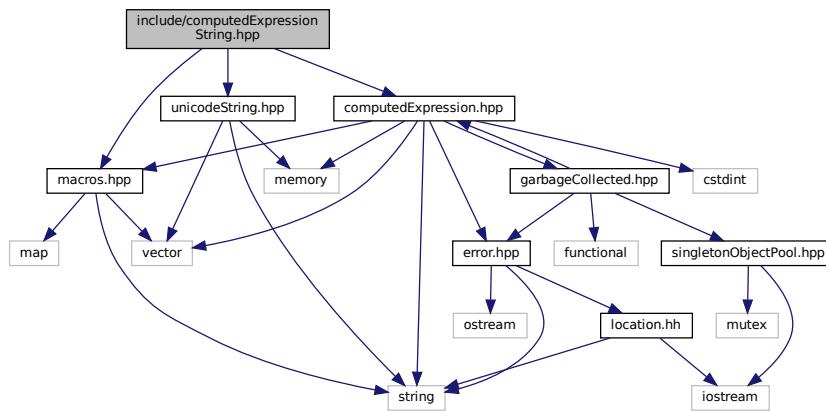
Declare the [Tang::ComputedExpressionNativeBoundFunction](#) class.

6.41 include/computedExpressionString.hpp File Reference

Declare the [Tang::ComputedExpressionString](#) class.

```
#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.

6.41.1 Detailed Description

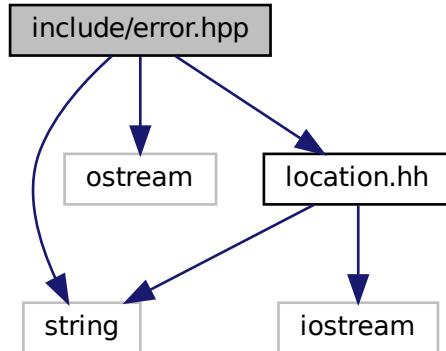
Declare the [Tang::ComputedExpressionString](#) class.

6.42 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.

6.42.1 Detailed Description

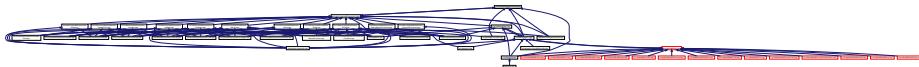
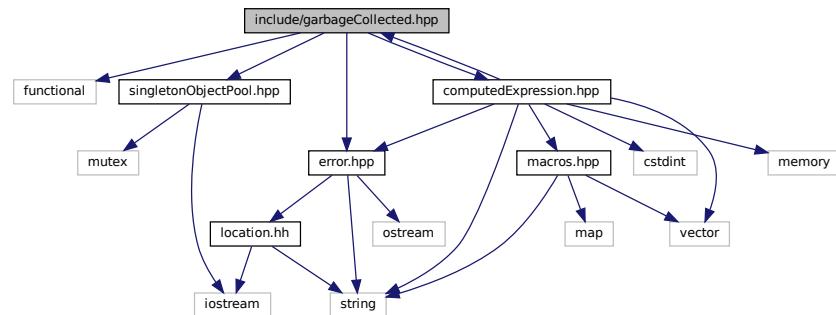
Declare the [Tang::Error](#) class used to describe syntax and runtime errors.

6.43 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:
```



Classes

- class [Tang::GarbageCollected](#)
A container that acts as a resource-counting garbage collector for the specified type.

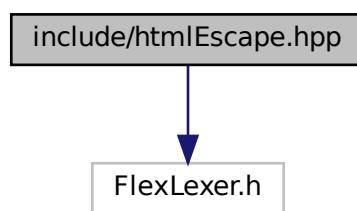
6.43.1 Detailed Description

Declare the [Tang::GarbageCollected](#) class.

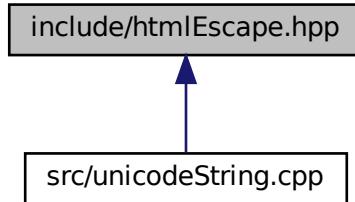
6.44 include/htmlEscape.hpp File Reference

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\(\)](#)

6.44.1 Detailed Description

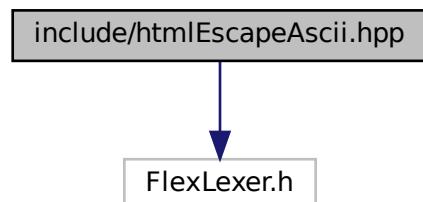
Declare the [Tang::HtmlEscape](#) used to tokenize a Tang script.

6.45 include/htmlEscapeAscii.hpp File Reference

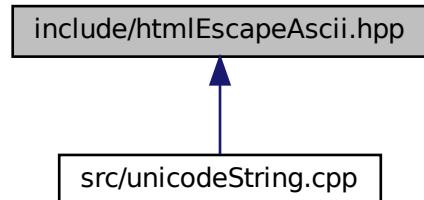
Declare the [Tang::HtmlEscapeAscii](#) used to tokenize a Tang script.

```
#include <FlexLexer.h>
```

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\(\)](#)

6.45.1 Detailed Description

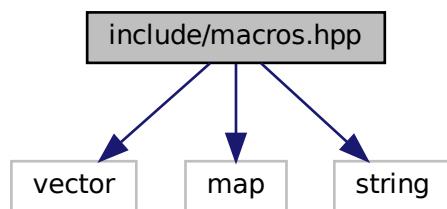
Declare the [Tang::HtmlEscapeAscii](#) used to tokenize a Tang script.

6.46 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::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.

6.46.1 Detailed Description

Contains generic macros.

6.47 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` }

6.47.1 Detailed Description

Declare the Opcodes used in the Bytecode representation of a program.

6.47.2 Enumeration Type Documentation

6.47.2.1 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.
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].

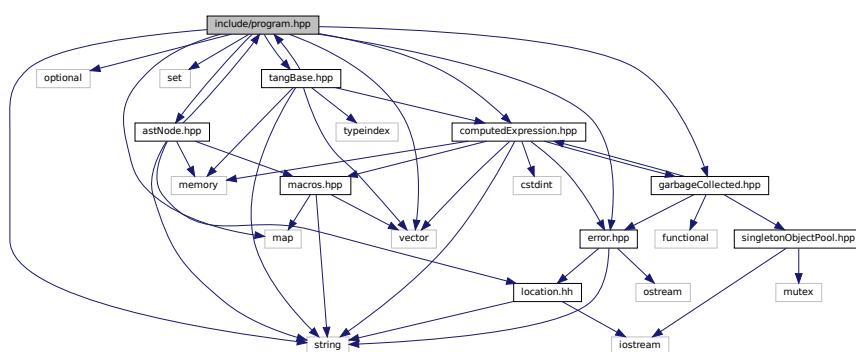
Enumerator

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.

6.48 include/program.hpp File Reference

Declare the [Tang::Program](#) class used to compile and execute source code.

```
#include <string>
#include <optional>
#include <set>
#include <map>
#include "astNode.hpp"
#include "error.hpp"
#include "tangBase.hpp"
#include "computedExpression.hpp"
#include "garbageCollected.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.

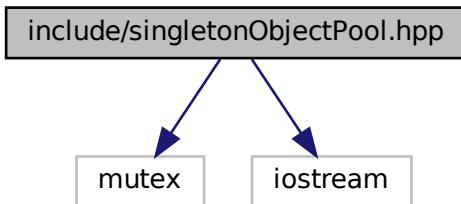
6.48.1 Detailed Description

Declare the [Tang::Program](#) class used to compile and execute source code.

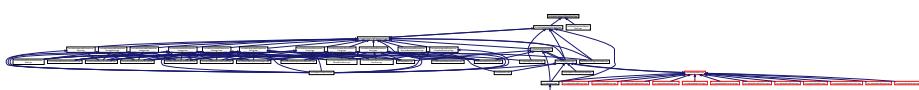
6.49 include/singletonObjectPool.hpp File Reference

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.

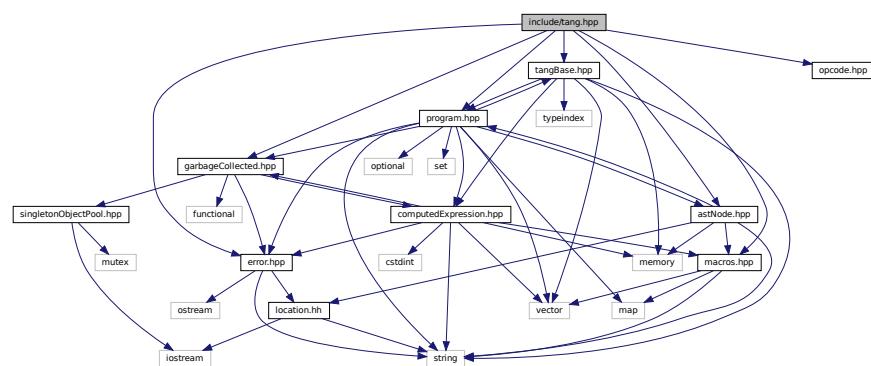
6.49.1 Detailed Description

Declare the `Tang::SingletonObjectPool` class.

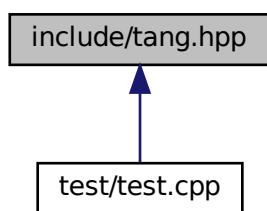
6.50 include/tang.hpp File Reference

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 "opcode.hpp"
Include dependency graph for tang.hpp:
```



This graph shows which files directly or indirectly include this file:



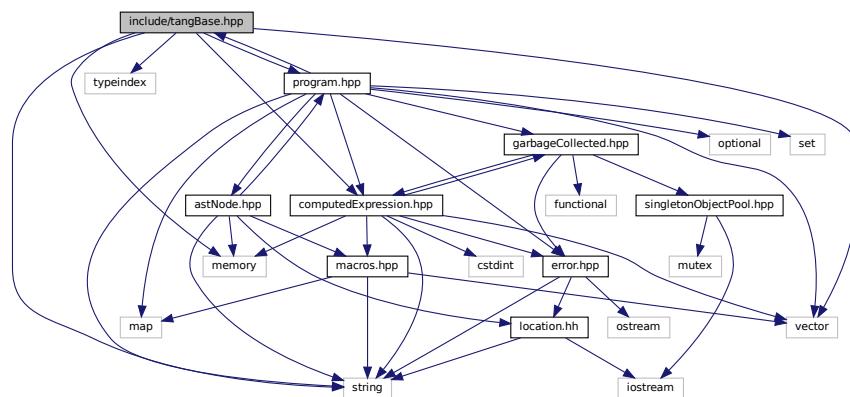
6.50.1 Detailed Description

Header file supplied for use by 3rd party code so that they can easily include all necessary headers.

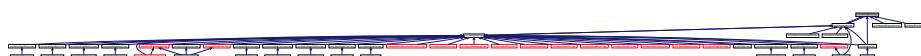
6.51 include/tangBase.hpp File Reference

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.

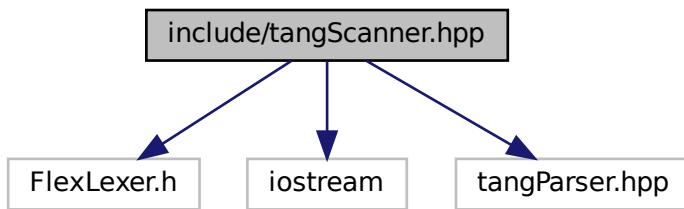
6.51.1 Detailed Description

Declare the [Tang::TangBase](#) class used to interact with Tang.

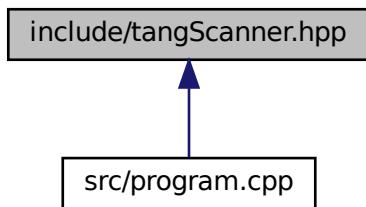
6.52 include/tangScanner.hpp File Reference

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()`

6.52.1 Detailed Description

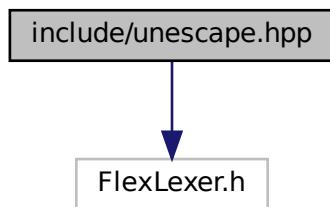
Declare the [Tang::TangScanner](#) used to tokenize a Tang script.

6.53 include/unescape.hpp File Reference

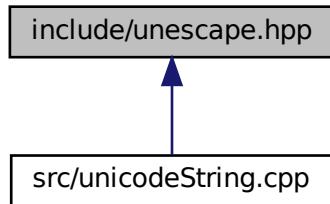
Declare the [Tang::Unescape](#) used to tokenize a Tang script.

```
#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()`

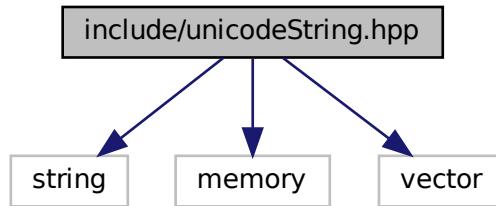
6.53.1 Detailed Description

Declare the [Tang::Unescape](#) used to tokenize a Tang script.

6.54 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)
Return an Ascii-only, "html escaped" version of the provided string.

6.54.1 Detailed Description

Contains the code to interface with the ICU library.

6.54.2 Function Documentation

6.54.2.1 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

<i>str</i>	The string to be escaped.
------------	---------------------------

Returns

An "escaped" version of the provided string.

Here is the call graph for this function:



6.54.2.2 htmlEscapeAscii()

```
string Tang::htmlEscapeAscii (
    const std::string & str )
```

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.

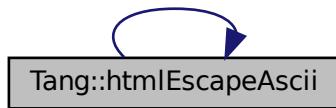
Parameters

<code>str</code>	The string to be escaped.
------------------	---------------------------

Returns

An "escaped" version of the provided string.

Here is the call graph for this function:



6.54.2.3 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.

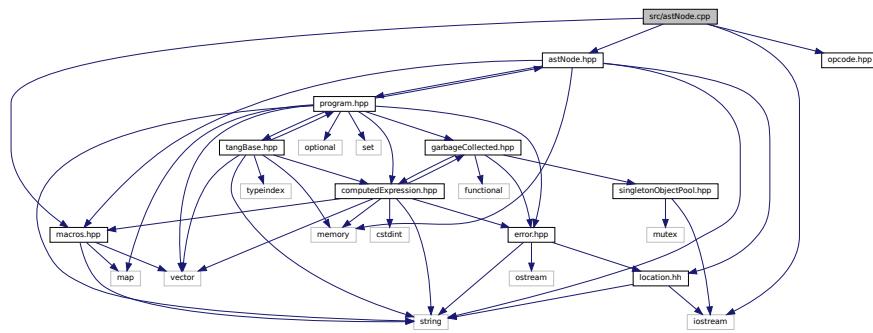
Here is the call graph for this function:



6.55 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:
```



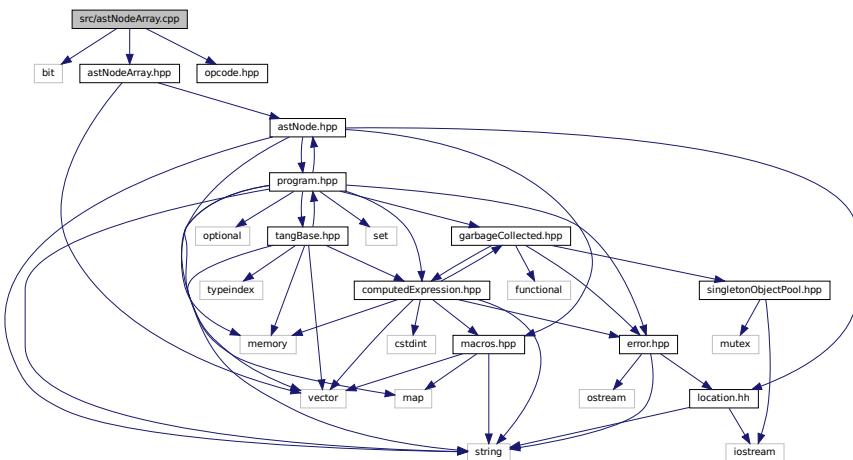
6.55.1 Detailed Description

Define the [Tang::AstNode](#) class.

6.56 src/astNodeArray.cpp File Reference

Define the [Tang::AstNodeArray](#) class.

```
#include <bit>
#include "astNodeArray.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeArray.cpp:
```



6.56.1 Detailed Description

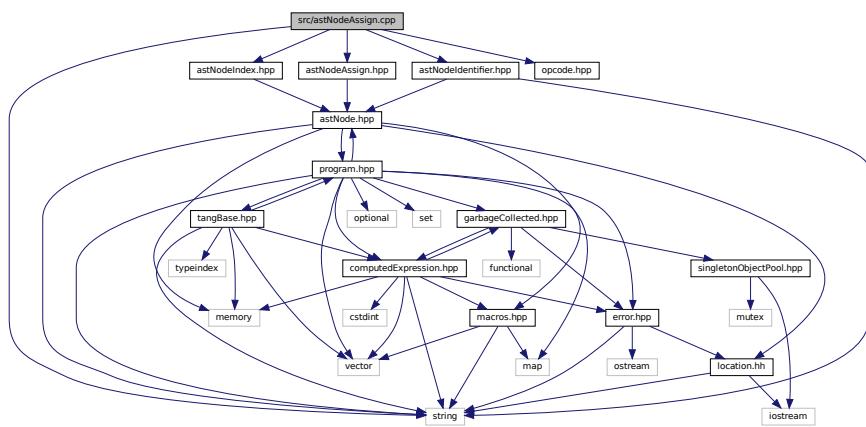
Define the [Tang::AstNodeArray](#) class.

6.57 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:
```



6.57.1 Detailed Description

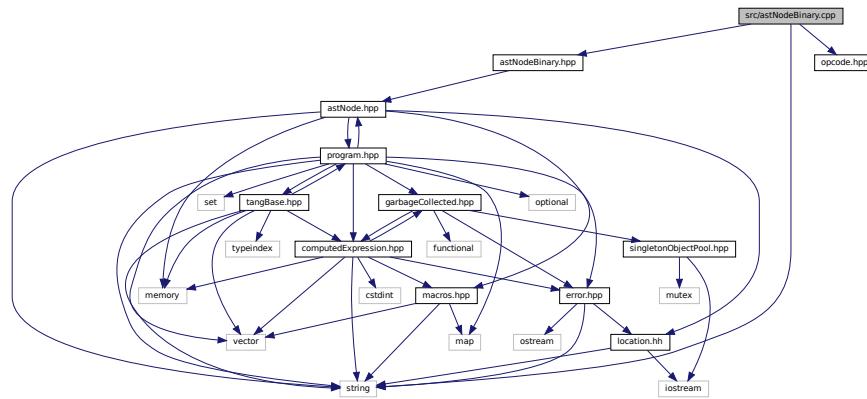
Define the [Tang::AstNodeAssign](#) class.

6.58 src/astNodeBinary.cpp File Reference

Define the [Tang::AstNodeBinary](#) class.

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

```
#include "opcode.hpp"
Include dependency graph for astNodeBinary.cpp:
```



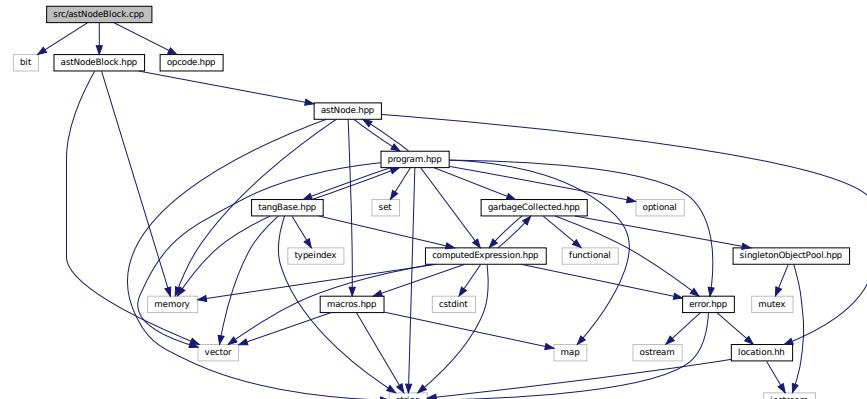
6.58.1 Detailed Description

Define the [Tang::AstNodeBinary](#) class.

6.59 src/astNodeBlock.cpp File Reference

Define the [Tang::AstNodeBlock](#) class.

```
#include <bit>
#include "astNodeBlock.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeBlock.cpp:
```



6.59.1 Detailed Description

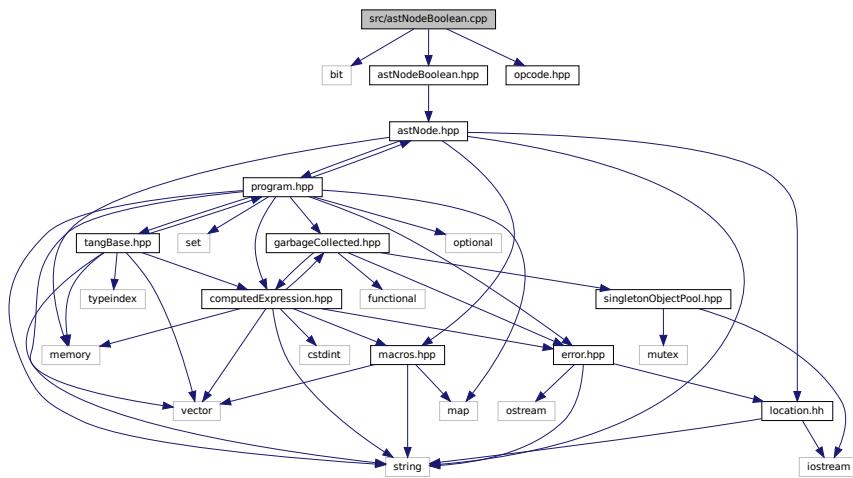
Define the [Tang::AstNodeBlock](#) class.

6.60 src/astNodeBoolean.cpp File Reference

Define the [Tang::AstNodeBoolean](#) class.

```
#include <bit>
#include "astNodeBoolean.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeBoolean.cpp:



6.60.1 Detailed Description

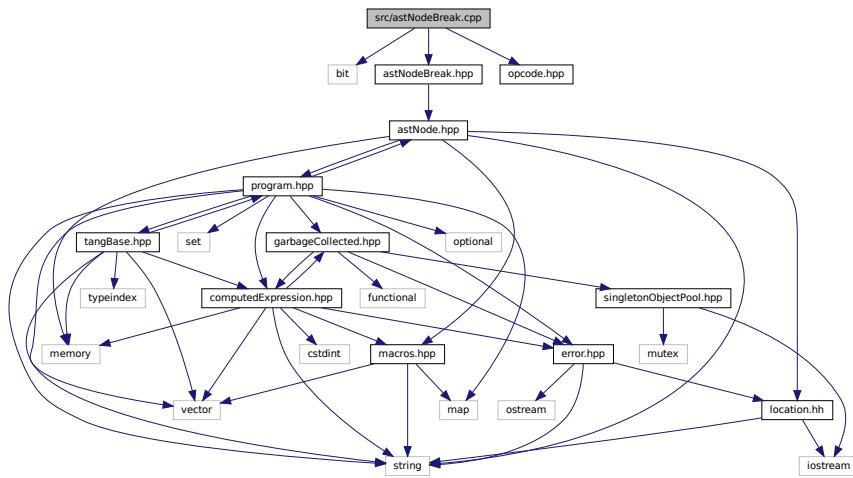
Define the [Tang::AstNodeBoolean](#) class.

6.61 src/astNodeBreak.cpp File Reference

Define the [Tang::AstNodeBreak](#) class.

```
#include <bit>
#include "astNodeBreak.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeBreak.cpp:



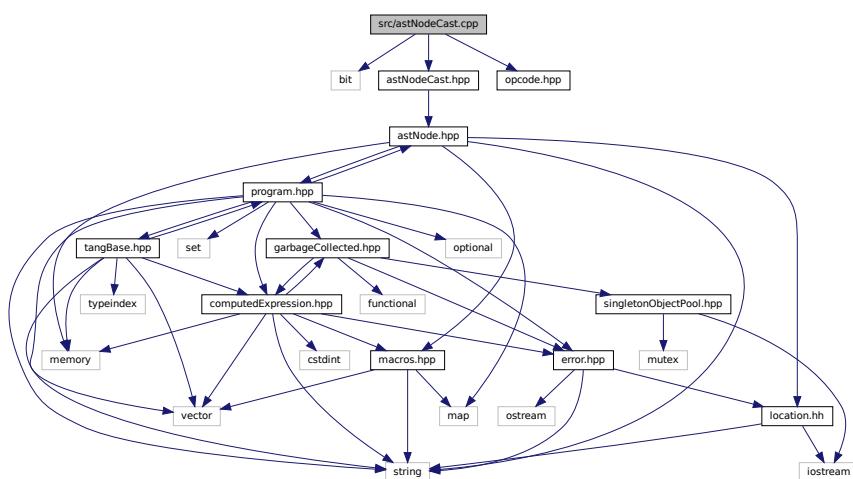
6.61.1 Detailed Description

Define the [Tang::AstNodeBreak](#) class.

6.62 src/astNodeCast.cpp File Reference

Define the [Tang::AstNodeCast](#) class.

```
#include <bit>
#include "astNodeCast.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeCast.cpp:
```



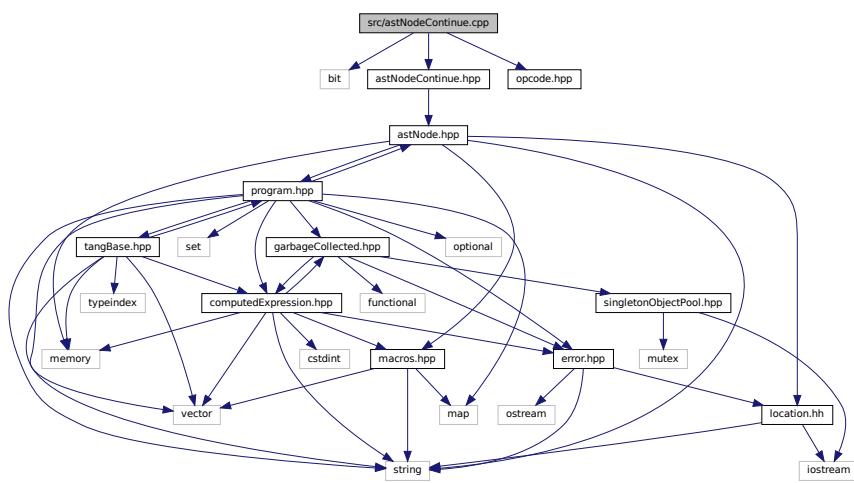
6.62.1 Detailed Description

Define the [Tang::AstNodeCast](#) class.

6.63 src/astNodeContinue.cpp File Reference

Define the [Tang::AstNodeContinue](#) class.

```
#include <bit>
#include "astNodeContinue.hpp"
#include "opcode.hpp"
Include dependency graph for astNodeContinue.cpp:
```



6.63.1 Detailed Description

Define the [Tang::AstNodeContinue](#) class.

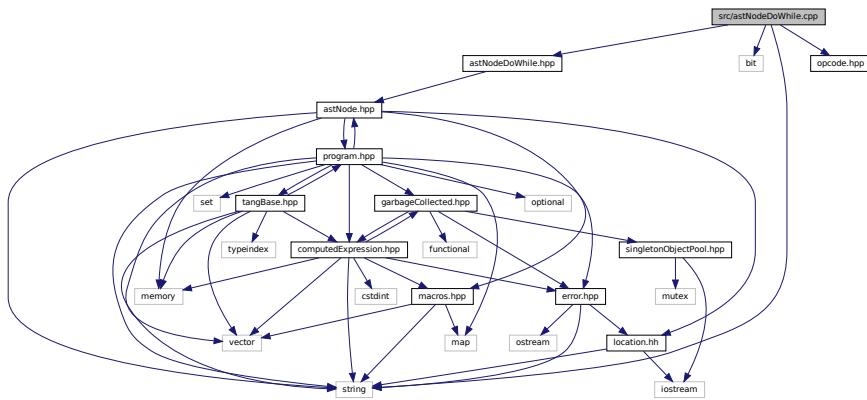
6.64 src/astNodeDoWhile.cpp File Reference

Define the [Tang::AstNodeDoWhile](#) class.

```
#include <string>
#include <bit>
#include "astNodeDoWhile.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodeDoWhile.cpp:



6.64.1 Detailed Description

Define the [Tang::AstNodeDoWhile](#) class.

6.65 src/astNodeFloat.cpp File Reference

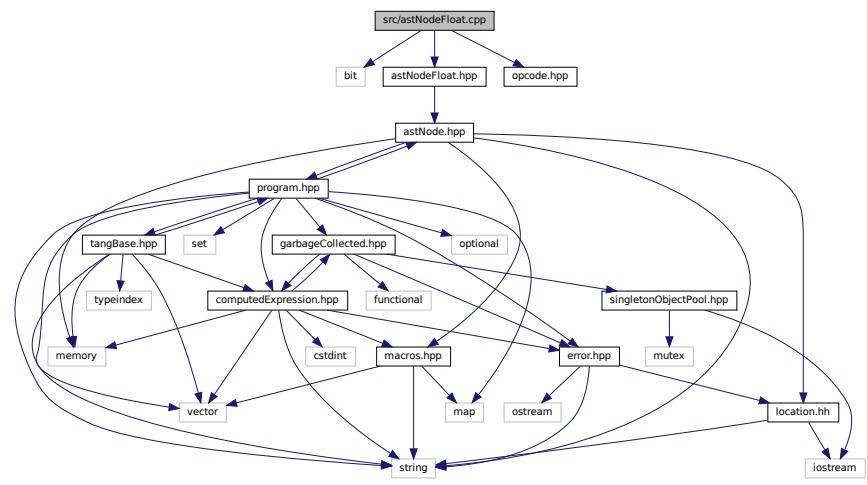
Define the [Tang::AstNodeFloat](#) class.

```
#include <bit>
```

```
#include "astNodeFloat.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for `astNodeFloat.cpp`:



6.65.1 Detailed Description

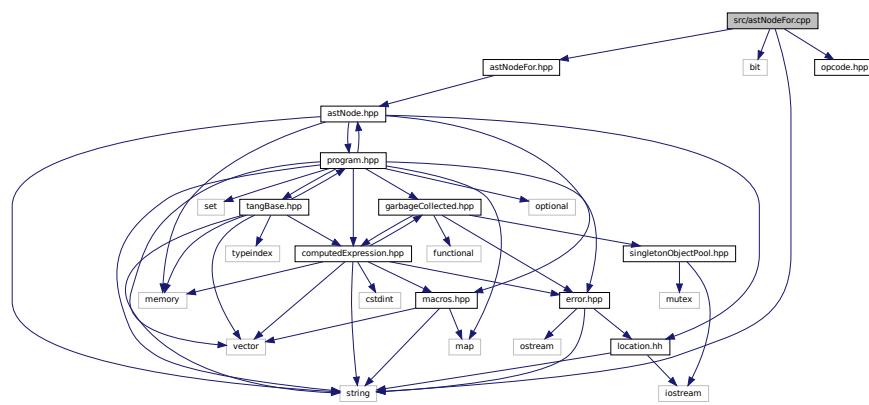
Define the [Tang::AstNodeFloat](#) class.

6.66 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:



6.66.1 Detailed Description

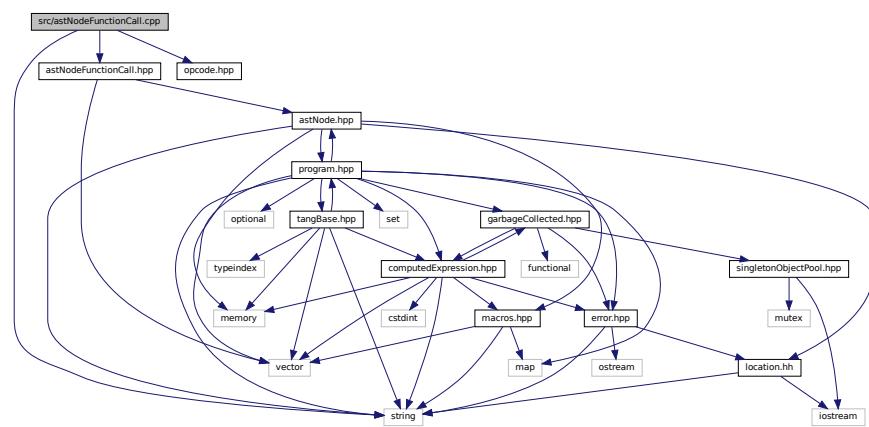
Define the [Tang::AstNodeFor](#) class.

6.67 src/astNodeFunctionCall.cpp File Reference

Define the [Tang::AstNodeFunctionCall](#) class.

```
#include <string>
#include "astNodeFunctionCall.hpp"
#include "opcode.hpp"
```

Include dependency graph for astNodeFunctionCall.cpp:



6.67.1 Detailed Description

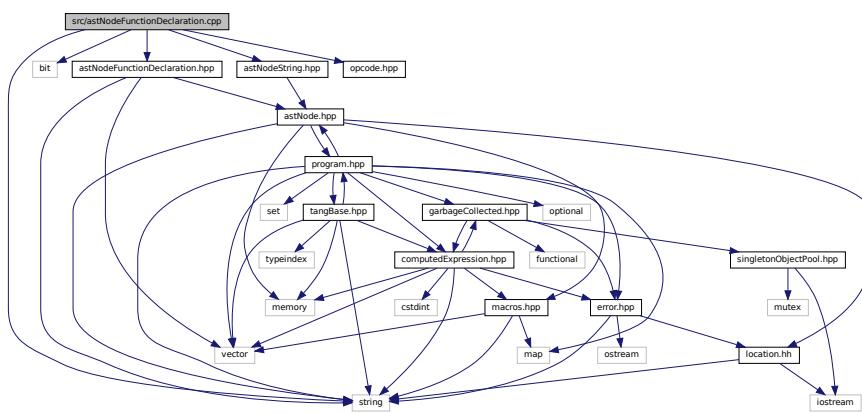
Define the [Tang::AstNodeFunctionCall](#) class.

6.68 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:
```



6.68.1 Detailed Description

Define the [Tang::AstNodeFunctionDeclaration](#) class.

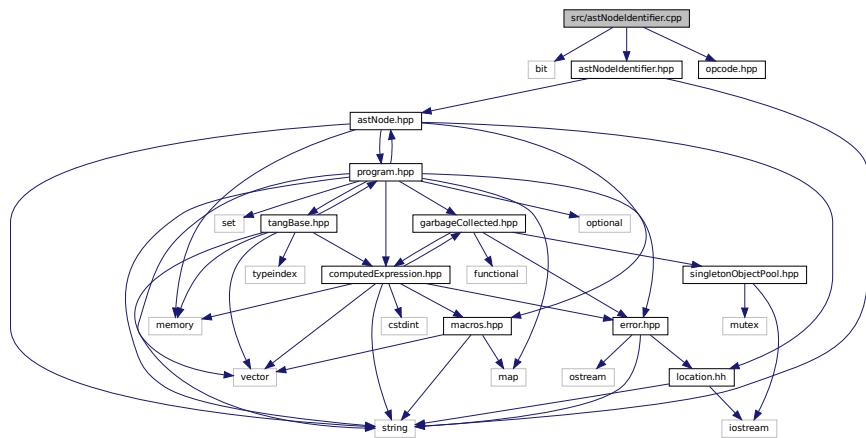
6.69 src/astNodIdentifier.cpp File Reference

Define the [Tang::AstNodIdentifier](#) class.

```
#include <bit>
#include "astNodIdentifier.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodeIdentifier.cpp:



6.69.1 Detailed Description

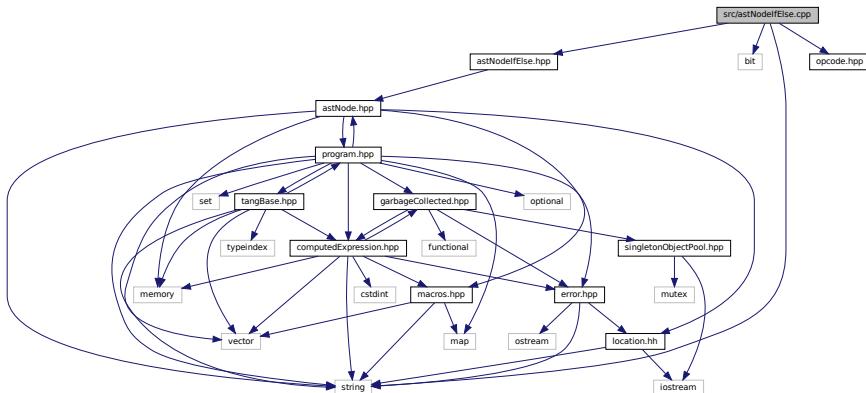
Define the [Tang::AstNodeIdentifier](#) class.

6.70 src/astNodeIfElse.cpp File Reference

Define the [Tang::AstNodeIfElse](#) class.

```
#include <string>
#include <bit>
#include "astNodeIfElse.hpp"
#include "opcode.hpp"
```

Include dependency graph for `astNodeIfElse.cpp`:



6.70.1 Detailed Description

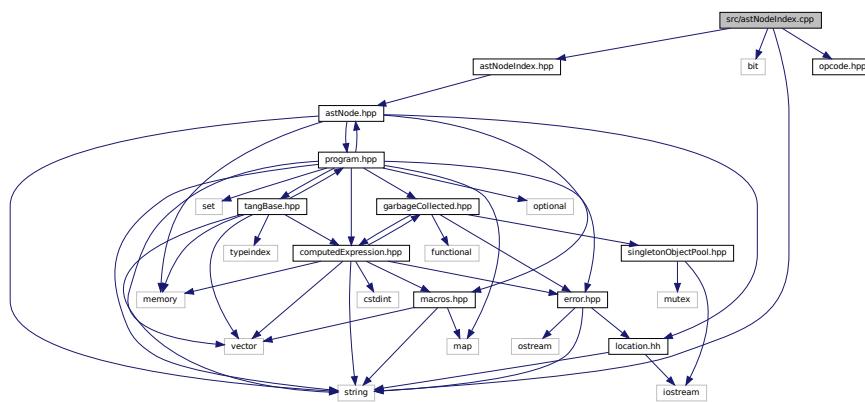
Define the [Tang::AstNodeIfElse](#) class.

6.71 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`:



6.71.1 Detailed Description

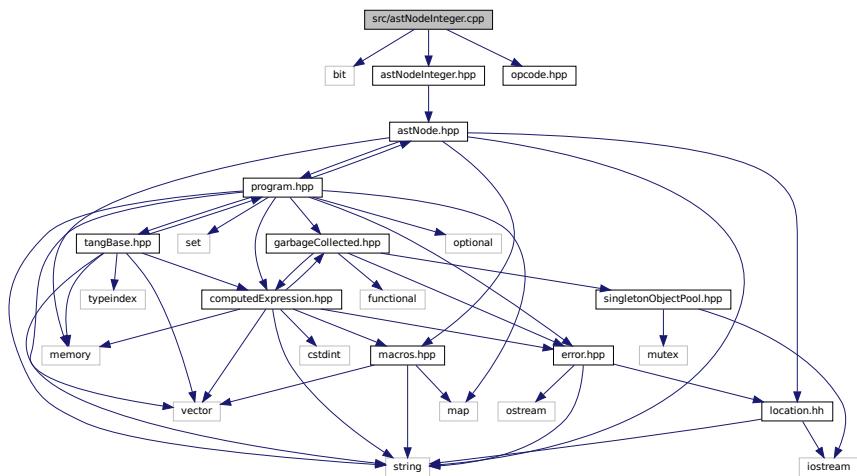
Define the `Tang::AstNodeIndex` class.

6.72 src/astNodeInteger.cpp File Reference

Define the `Tang::AstNodeInteger` class.

```
#include <bit>
#include "astNodeInteger.hpp"
#include "opcode.hpp"
```

Include dependency graph for `astNodeInteger.cpp`:



6.72.1 Detailed Description

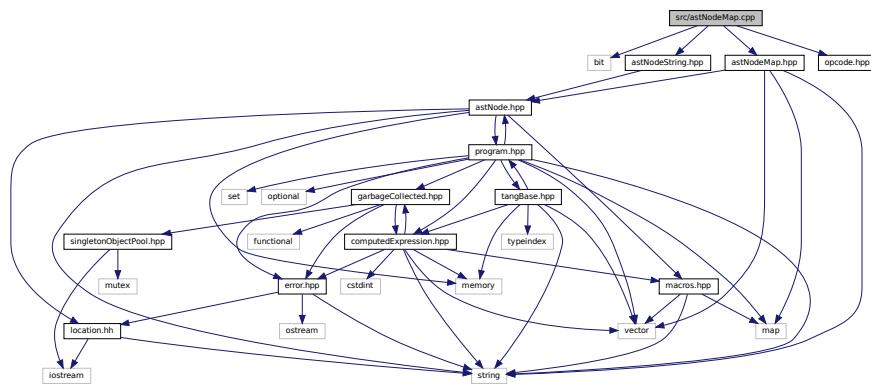
Define the [Tang::AstNodeInteger](#) class.

6.73 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:



6.73.1 Detailed Description

Define the [Tang::AstNodeMap](#) class.

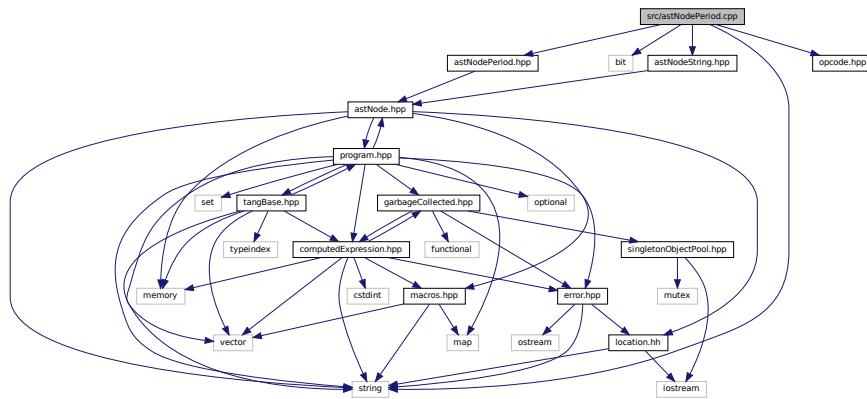
6.74 src/astNodePeriod.cpp File Reference

Define the [Tang::AstNodePeriod](#) class.

```
#include <string>
#include <bit>
#include "astNodePeriod.hpp"
#include "astNodeString.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodePeriod.cpp:



6.74.1 Detailed Description

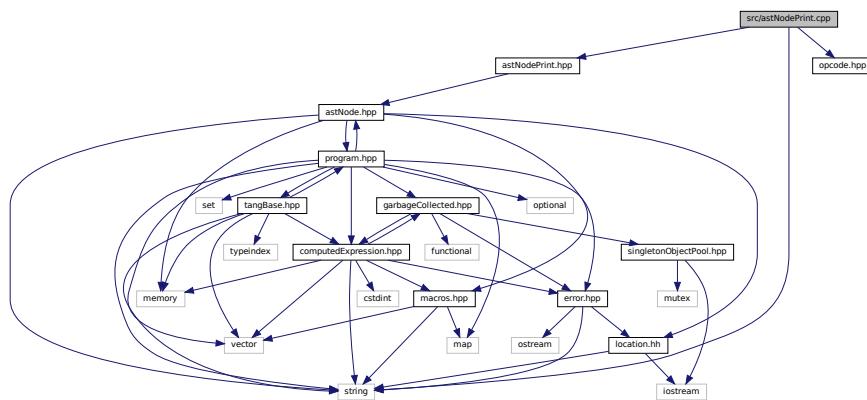
Define the [Tang::AstNodePeriod](#) class.

6.75 src/astNodePrint.cpp File Reference

Define the [Tang::AstNodePrint](#) class.

```
#include <string>
#include "astNodePrint.hpp"
#include "opcode.hpp"
```

Include dependency graph for `astNodePrint.cpp`:



6.75.1 Detailed Description

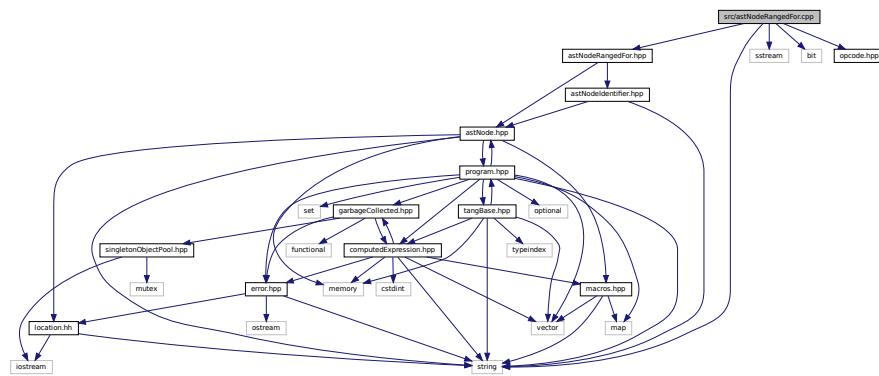
Define the [Tang::AstNodePrint](#) class.

6.76 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:



6.76.1 Detailed Description

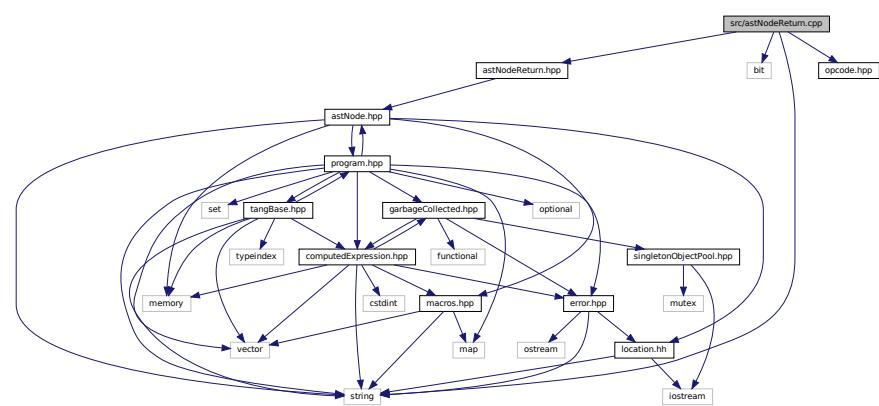
Define the [Tang::AstNodeRangedFor](#) class.

6.77 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:



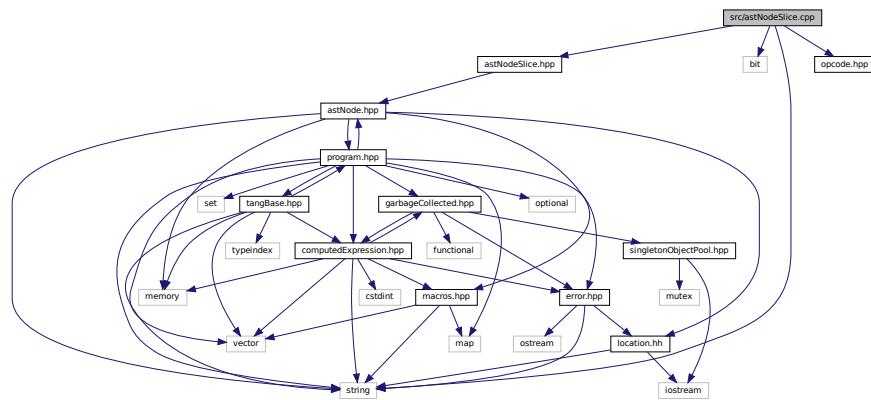
6.77.1 Detailed Description

Define the [Tang::AstNodeReturn](#) class.

6.78 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:
```



6.78.1 Detailed Description

Define the [Tang::AstNodeSlice](#) class.

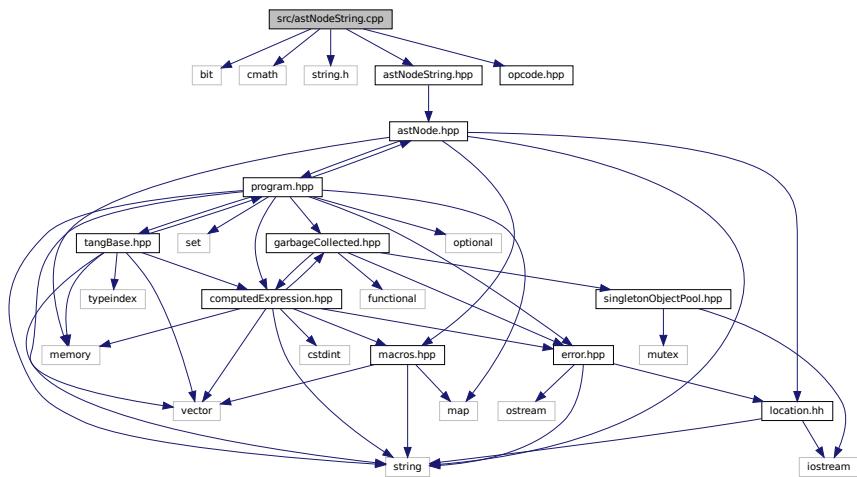
6.79 src/astNodeString.cpp File Reference

Define the [Tang::AstNodeString](#) class.

```
#include <bit>
#include <cmath>
#include <string.h>
#include "astNodeString.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodeString.cpp:



6.79.1 Detailed Description

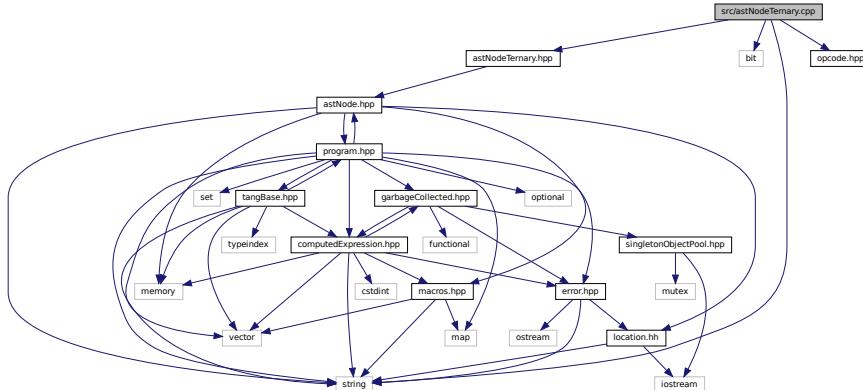
Define the [Tang::AstNodeString](#) class.

6.80 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`:



6.80.1 Detailed Description

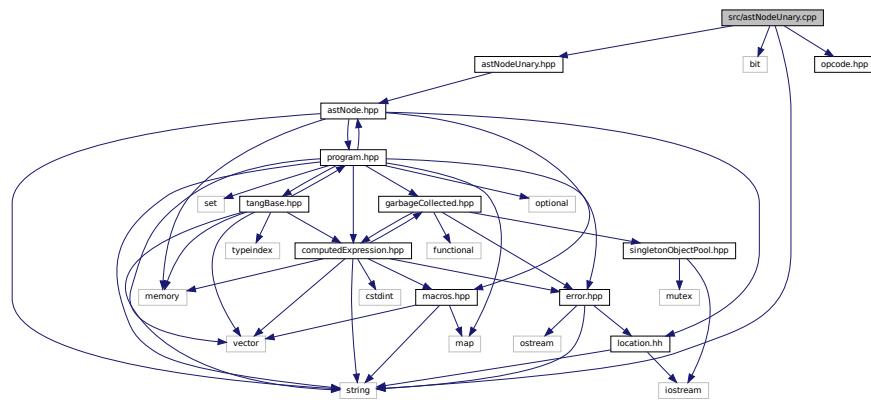
Define the [Tang::AstNodeTernary](#) class.

6.81 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:
```



6.81.1 Detailed Description

Define the [Tang::AstNodeUnary](#) class.

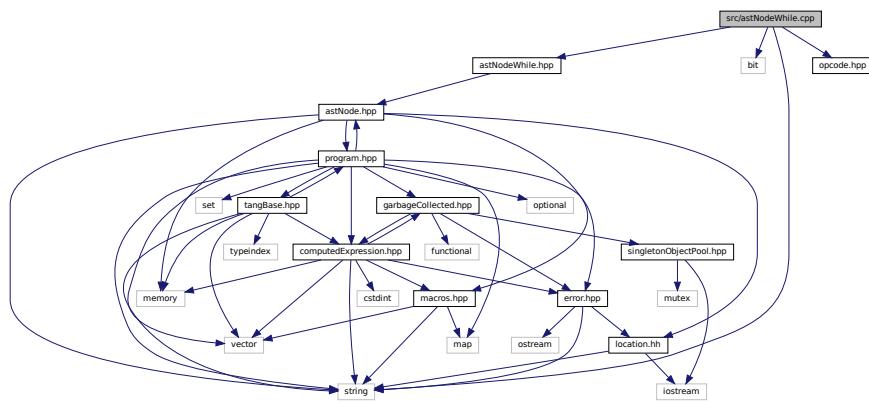
6.82 src/astNodeWhile.cpp File Reference

Define the [Tang::AstNodeWhile](#) class.

```
#include <string>
#include <bit>
#include "astNodeWhile.hpp"
```

```
#include "opcode.hpp"
```

Include dependency graph for astNodeWhile.cpp:



6.82.1 Detailed Description

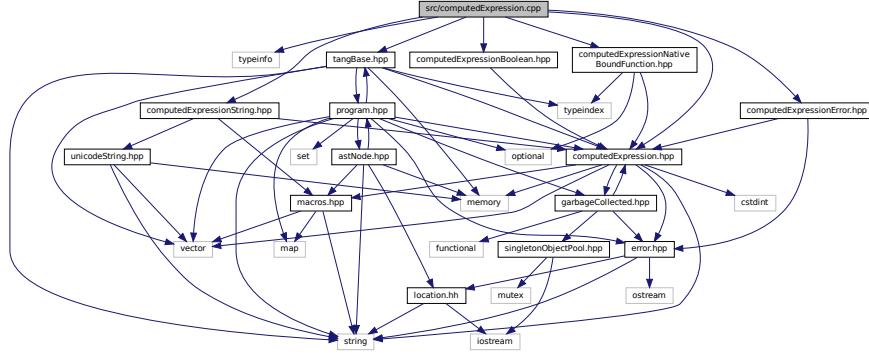
Define the [Tang::AstNodeWhile](#) class.

6.83 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`:



6.83.1 Detailed Description

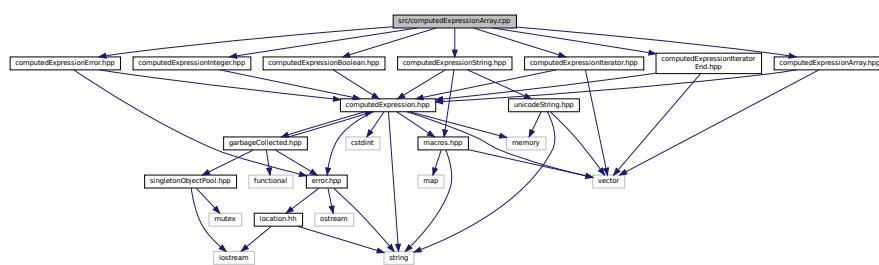
Define the [Tang::ComputedExpression](#) class.

6.84 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:
```



6.84.1 Detailed Description

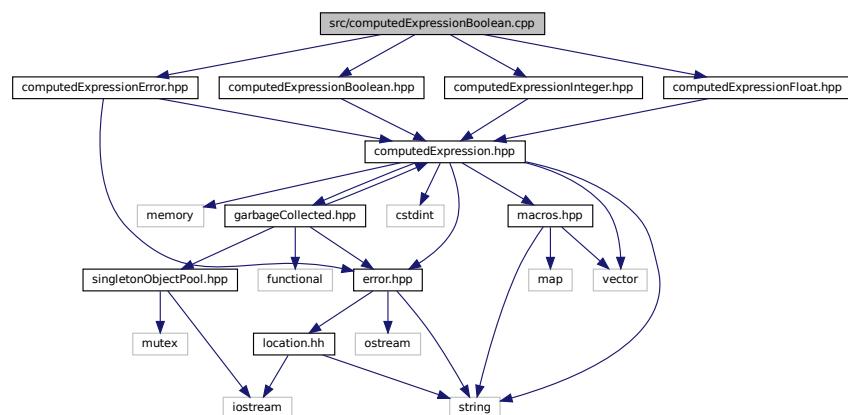
Define the [Tang::ComputedExpressionArray](#) class.

6.85 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:
```



6.85.1 Detailed Description

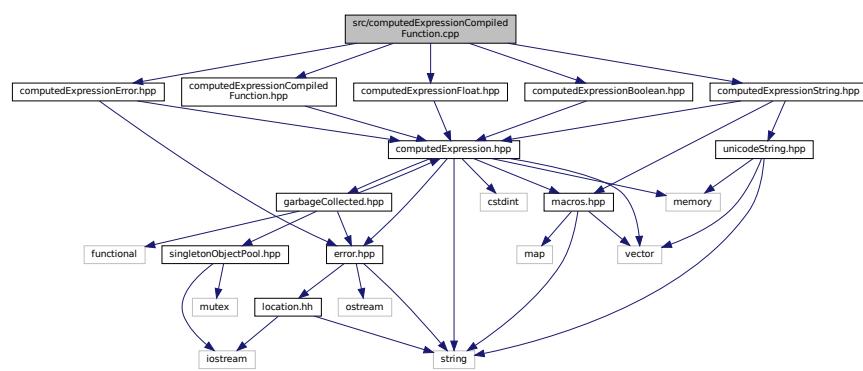
Define the [Tang::ComputedExpressionBoolean](#) class.

6.86 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:
```



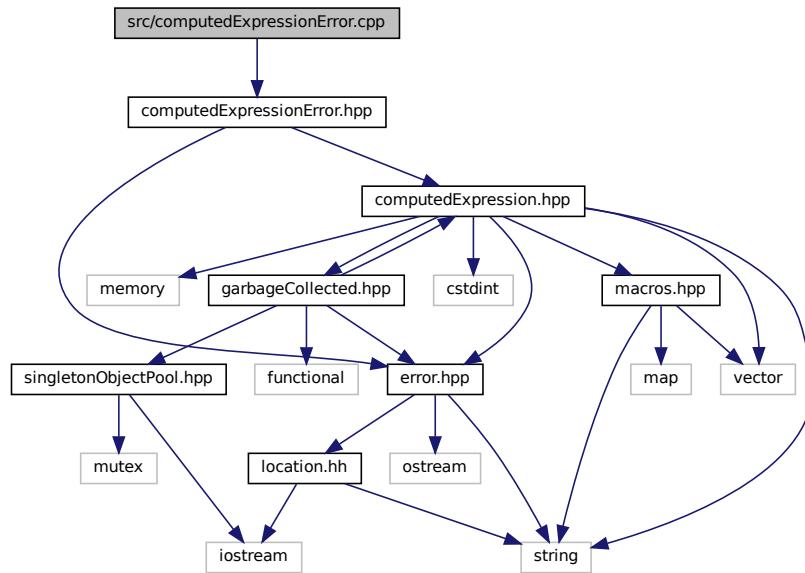
6.86.1 Detailed Description

Define the [Tang::ComputedExpressionCompiledFunction](#) class.

6.87 src/computedExpressionError.cpp File Reference

Define the [Tang::ComputedExpressionError](#) class.

```
#include "computedExpressionError.hpp"
Include dependency graph for computedExpressionError.cpp:
```



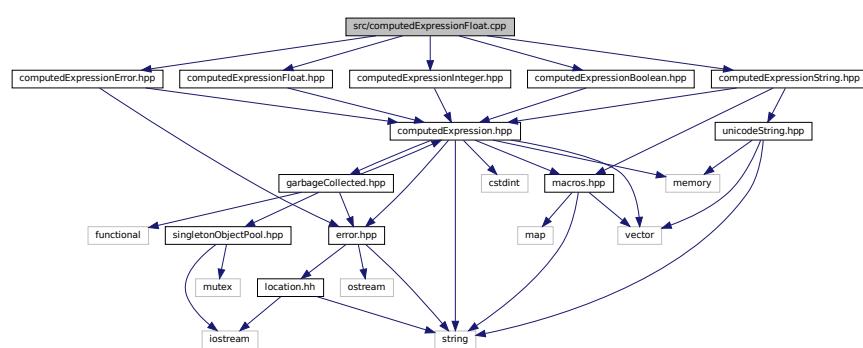
6.87.1 Detailed Description

Define the [Tang::ComputedExpressionError](#) class.

6.88 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:
```



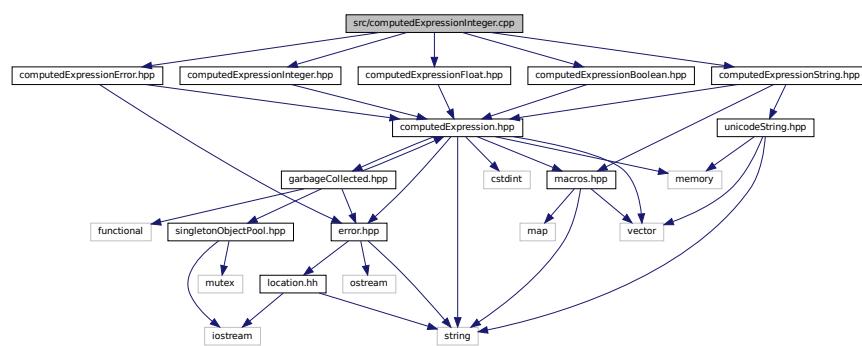
6.88.1 Detailed Description

Define the [Tang::ComputedExpressionFloat](#) class.

6.89 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:
```



6.89.1 Detailed Description

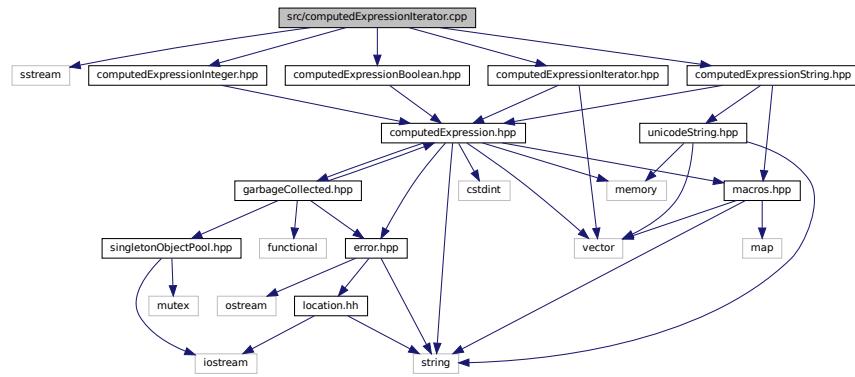
Define the [Tang::ComputedExpressionInteger](#) class.

6.90 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:
```



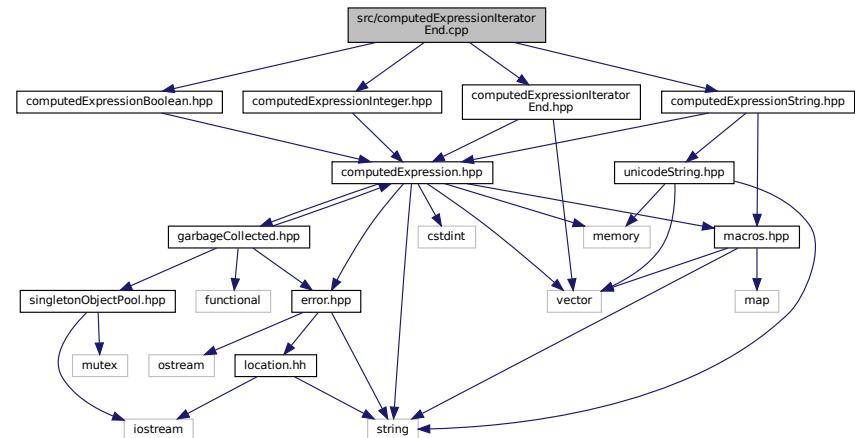
6.90.1 Detailed Description

Define the [Tang::ComputedExpressionIterator](#) class.

6.91 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:
```



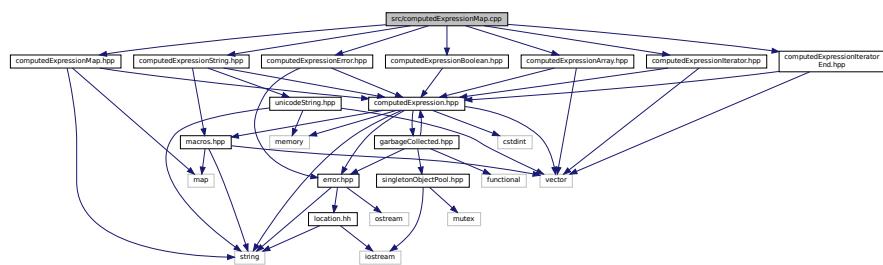
6.91.1 Detailed Description

Define the `Tang::ComputedExpressionIteratorEnd` class.

6.92 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:
```



6.92.1 Detailed Description

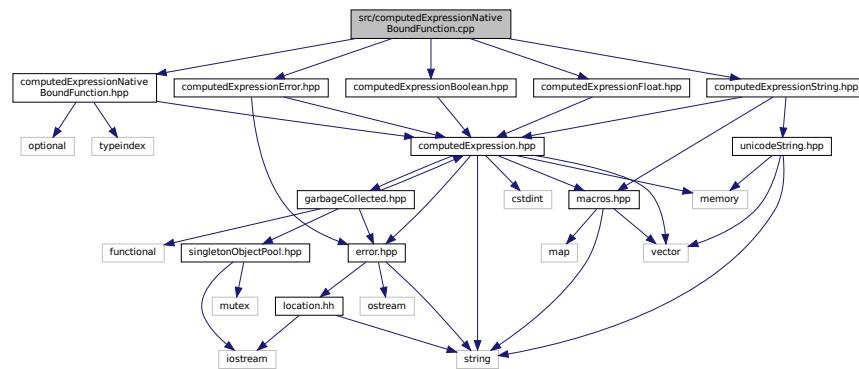
Define the `Tang::ComputedExpressionMap` class.

6.93 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:
```



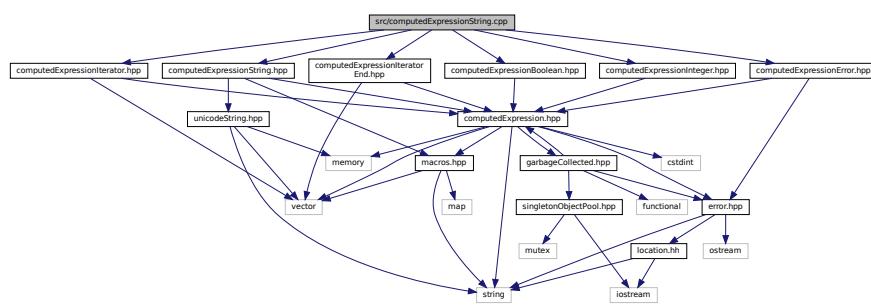
6.93.1 Detailed Description

Define the [Tang::ComputedExpressionNativeBoundFunction](#) class.

6.94 src/computedExpressionString.cpp File Reference

Define the [Tang::ComputedExpressionString](#) class.

```
#include "computedExpressionString.hpp"
#include "computedExpressionBoolean.hpp"
#include "computedExpressionError.hpp"
#include "computedExpressionInteger.hpp"
#include "computedExpressionIterator.hpp"
#include "computedExpressionIteratorEnd.hpp"
Include dependency graph for computedExpressionString.cpp:
```



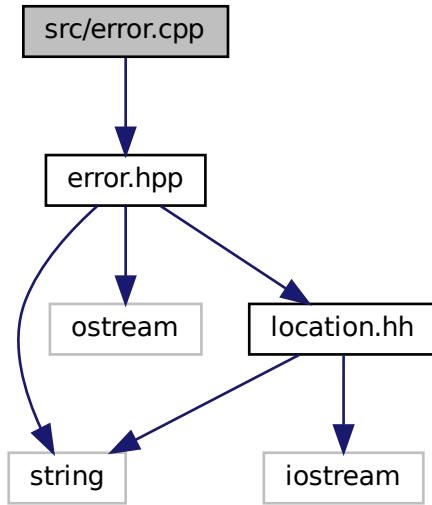
6.94.1 Detailed Description

Define the [Tang::ComputedExpressionString](#) class.

6.95 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)

6.95.1 Detailed Description

Define the [Tang::Error](#) class.

6.95.2 Function Documentation

6.95.2.1 operator<<()

```
std::ostream& Tang::operator<< (
    std::ostream & out,
    const Error & error )
```

Parameters

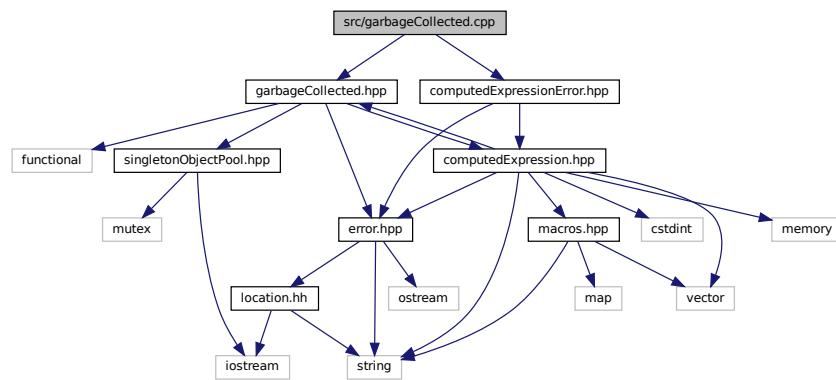
<i>out</i>	The output stream.
<i>error</i>	The Error object.

Returns

The output stream.

6.96 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*)

6.96.1 Function Documentation

6.96.1.1 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

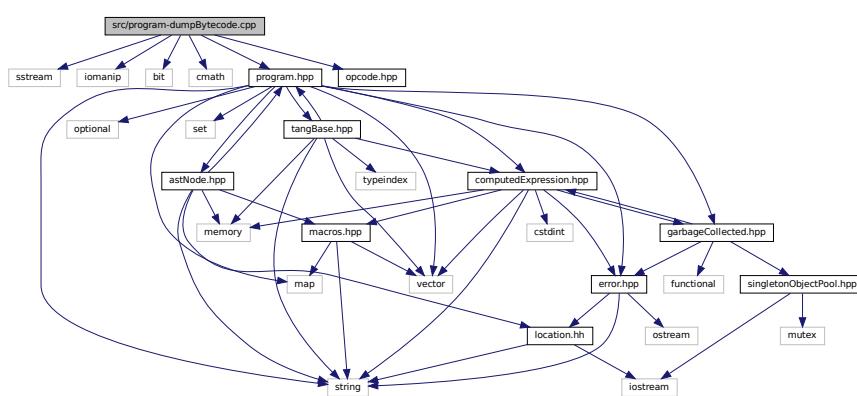
The output stream.

6.97 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.

6.97.1 Detailed Description

Define the [Tang::Program::dumpBytecode](#) method.

6.97.2 Macro Definition Documentation

6.97.2.1 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.

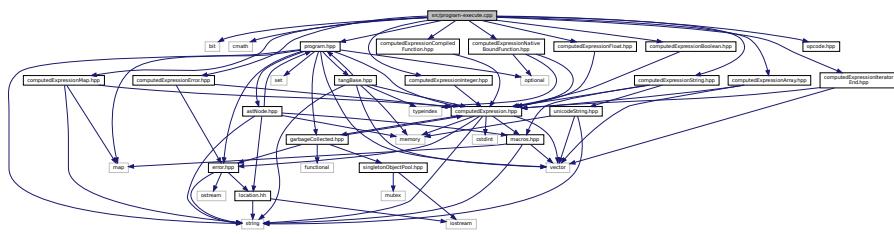
Parameters

x The number of additional vector entries that should exist.

6.98 src/program-execute.cpp File Reference

Define the `Tang::Program::execute` method.

```
#include <bit>
#include <cmath>
#include "program.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 "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 stack vector so that it may be safely accessed.

6.98.1 Detailed Description

Define the Tang::Program::execute method.

6.98.2 Macro Definition Documentation

6.98.2.1 EXECUTEPROGRAMCHECK

```
#define EXECUTEPROGRAMCHECK (
    x )
```

Value:

```
if (this->bytecode.size() < (pc + (x))) { \
    stack.push_back(GarbageCollected::make<ComputedExpressionError>(Error{"Opcode instruction \
        truncated."})); \
    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.
---	--

6.98.2.2 STACKCHECK

```
#define STACKCHECK (
    x )
```

Value:

```
if (stack.size() < (fp + (x))) { \
    stack.push_back(GarbageCollected::make<ComputedExpressionError>(Error{"Insufficient stack depth."})); \
    pc = this->bytecode.size(); \
    break; \
}
```

Verify the size of the stack vector so that it may be safely accessed.

Parameters

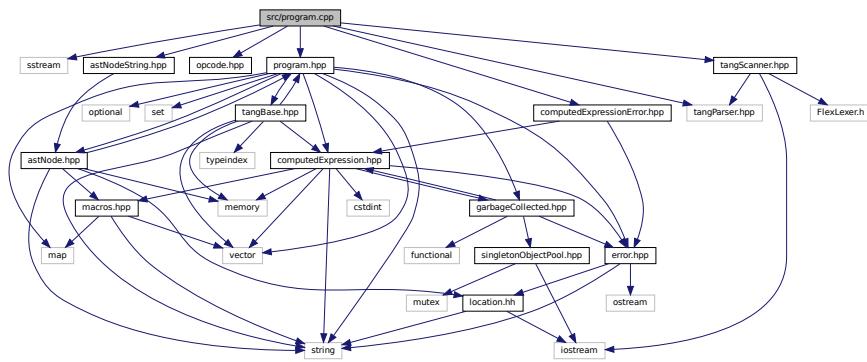
x	The number of entries that should exist in the stack.
---	---

6.99 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 "computedExpressionError.hpp"
```

Include dependency graph for program.cpp:



6.99.1 Detailed Description

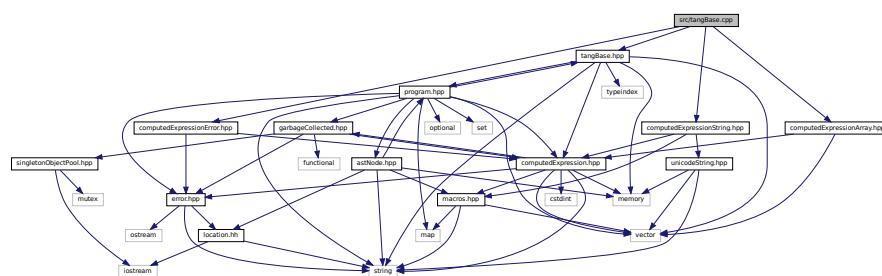
Define the [Tang::Program](#) class.

6.100 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:



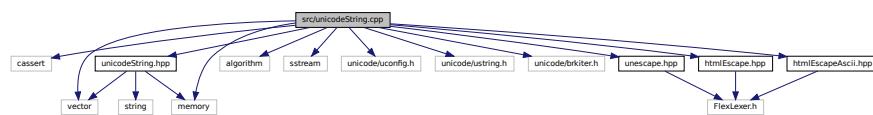
6.100.1 Detailed Description

Define the [Tang::TangBase](#) class.

6.101 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:
```



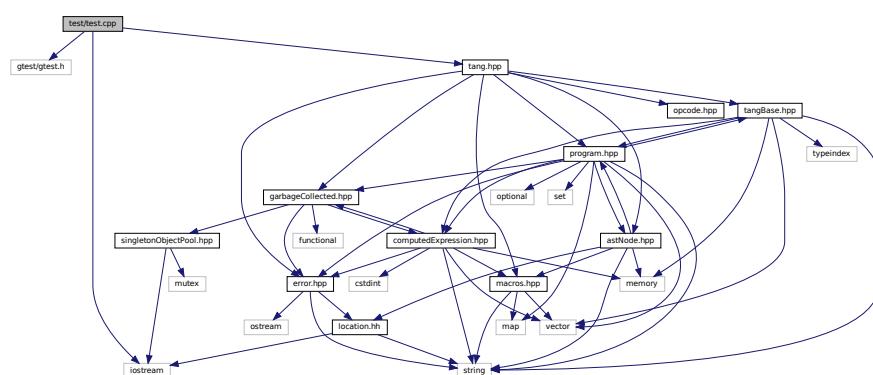
6.101.1 Detailed Description

Contains the function declarations for the [Tang::UnicodeString](#) class and the interface to ICU.

6.102 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)
- int **main** (int argc, char **argv)

Variables

- auto **tang** = TangBase::make_shared()

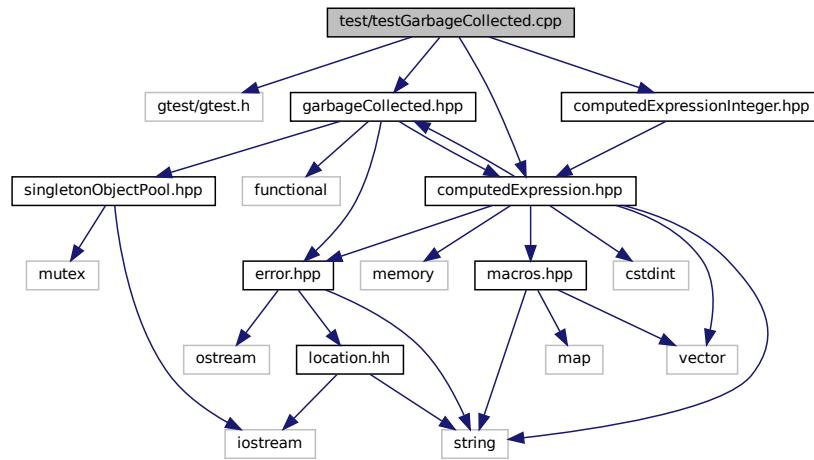
6.102.1 Detailed Description

Test the general language behaviors.

6.103 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)

6.103.1 Detailed Description

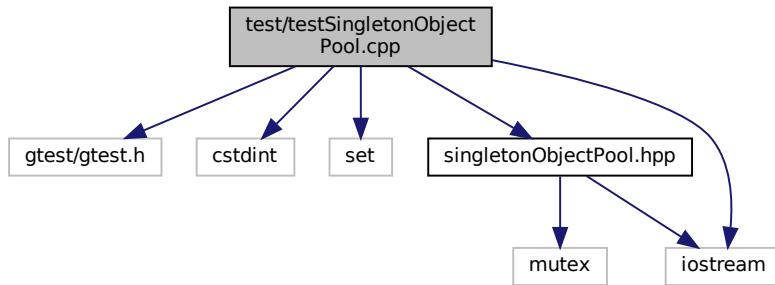
Test the generic behavior of the [Tang::GarbageCollected](#) class.

6.104 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)`

6.104.1 Detailed Description

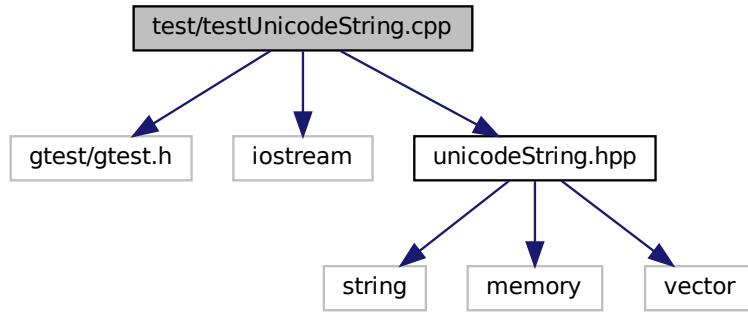
Test the generic behavior of the [Tang::SingletonObjectPool](#) class.

6.105 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)
- int `main` (int argc, char **argv)

6.105.1 Detailed Description

Contains tests for the [Tang::UnicodeString](#) class.

Index

_add
 Tang::ComputedExpression, 143
 Tang::ComputedExpressionArray, 156
 Tang::ComputedExpressionBoolean, 171
 Tang::ComputedExpressionCompiledFunction, 184
 Tang::ComputedExpressionError, 197
 Tang::ComputedExpressionFloat, 211
 Tang::ComputedExpressionInteger, 226
 Tang::ComputedExpressionIterator, 240
 Tang::ComputedExpressionIteratorEnd, 254
 Tang::ComputedExpressionMap, 269
 Tang::ComputedExpressionNativeBoundFunction,
 283
 Tang::ComputedExpressionString, 298

_asCode
 Tang::ComputedExpression, 143
 Tang::ComputedExpressionArray, 156
 Tang::ComputedExpressionBoolean, 171
 Tang::ComputedExpressionCompiledFunction, 184
 Tang::ComputedExpressionError, 197
 Tang::ComputedExpressionFloat, 212
 Tang::ComputedExpressionInteger, 226
 Tang::ComputedExpressionIterator, 241
 Tang::ComputedExpressionIteratorEnd, 254
 Tang::ComputedExpressionMap, 269
 Tang::ComputedExpressionNativeBoundFunction,
 284
 Tang::ComputedExpressionString, 299

_assign_index
 Tang::ComputedExpression, 143
 Tang::ComputedExpressionArray, 157
 Tang::ComputedExpressionBoolean, 172
 Tang::ComputedExpressionCompiledFunction, 184
 Tang::ComputedExpressionError, 198
 Tang::ComputedExpressionFloat, 212
 Tang::ComputedExpressionInteger, 226
 Tang::ComputedExpressionIterator, 241
 Tang::ComputedExpressionIteratorEnd, 255
 Tang::ComputedExpressionMap, 269
 Tang::ComputedExpressionNativeBoundFunction,
 284
 Tang::ComputedExpressionString, 299

_boolean
 Tang::ComputedExpression, 144
 Tang::ComputedExpressionArray, 157
 Tang::ComputedExpressionBoolean, 172
 Tang::ComputedExpressionCompiledFunction, 185
 Tang::ComputedExpressionError, 198
 Tang::ComputedExpressionFloat, 213

_divide
 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,
 284
 Tang::ComputedExpressionString, 300

_equal
 Tang::ComputedExpression, 144
 Tang::ComputedExpressionArray, 158
 Tang::ComputedExpressionBoolean, 173
 Tang::ComputedExpressionCompiledFunction, 186
 Tang::ComputedExpressionError, 199
 Tang::ComputedExpressionFloat, 214
 Tang::ComputedExpressionInteger, 228
 Tang::ComputedExpressionIterator, 242
 Tang::ComputedExpressionIteratorEnd, 256
 Tang::ComputedExpressionMap, 271
 Tang::ComputedExpressionNativeBoundFunction,
 285
 Tang::ComputedExpressionString, 301

_float
 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,
 286
 Tang::ComputedExpressionString, 301

—`getIterator`
 Tang::ComputedExpression, 145
 Tang::ComputedExpressionArray, 159
 Tang::ComputedExpressionBoolean, 173
 Tang::ComputedExpressionCompiledFunction, 186
 Tang::ComputedExpressionError, 199
 Tang::ComputedExpressionFloat, 214
 Tang::ComputedExpressionInteger, 229
 Tang::ComputedExpressionIterator, 243
 Tang::ComputedExpressionIteratorEnd, 256
 Tang::ComputedExpressionMap, 271
 Tang::ComputedExpressionNativeBoundFunction,
 286
 Tang::ComputedExpressionString, 301

—`index`
 Tang::ComputedExpression, 145
 Tang::ComputedExpressionArray, 159
 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::ComputedExpressionString, 302

—`integer`
 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::ComputedExpressionString, 302

—`iteratorNext`
 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::ComputedExpressionString, 303

—`lessThan`
 Tang::ComputedExpression, 146

—`Tang::ComputedExpression`, 160
 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::ComputedExpressionString, 303

—`modulo`
 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,
 289
 Tang::ComputedExpressionString, 304

—`multiply`
 Tang::ComputedExpression, 147
 Tang::ComputedExpressionArray, 161
 Tang::ComputedExpressionBoolean, 175
 Tang::ComputedExpressionCompiledFunction, 188
 Tang::ComputedExpressionError, 201
 Tang::ComputedExpressionFloat, 217
 Tang::ComputedExpressionInteger, 231
 Tang::ComputedExpressionIterator, 245
 Tang::ComputedExpressionIteratorEnd, 258
 Tang::ComputedExpressionMap, 274
 Tang::ComputedExpressionNativeBoundFunction,
 289
 Tang::ComputedExpressionString, 304

—`negative`
 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,
 289
 Tang::ComputedExpressionString, 305

—`not`
 Tang::ComputedExpression, 148
 Tang::ComputedExpressionArray, 162
 Tang::ComputedExpressionBoolean, 176

Tang::ComputedExpressionCompiledFunction, 189
Tang::ComputedExpressionError, 202
Tang::ComputedExpressionFloat, 217
Tang::ComputedExpressionInteger, 232
Tang::ComputedExpressionIterator, 246
Tang::ComputedExpressionIteratorEnd, 259
Tang::ComputedExpressionMap, 274
Tang::ComputedExpressionNativeBoundFunction,
 290
Tang::ComputedExpressionString, 305
—period
 Tang::ComputedExpression, 148
 Tang::ComputedExpressionArray, 162
 Tang::ComputedExpressionBoolean, 176
 Tang::ComputedExpressionCompiledFunction, 189
 Tang::ComputedExpressionError, 202
 Tang::ComputedExpressionFloat, 218
 Tang::ComputedExpressionInteger, 232
 Tang::ComputedExpressionIterator, 246
 Tang::ComputedExpressionIteratorEnd, 259
 Tang::ComputedExpressionMap, 274
 Tang::ComputedExpressionNativeBoundFunction,
 290
 Tang::ComputedExpressionString, 305
—slice
 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::ComputedExpressionString, 306
—string
 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::ComputedExpressionString, 306
—subtract
 Tang::ComputedExpression, 149
 Tang::ComputedExpressionArray, 164
 Tang::ComputedExpressionBoolean, 177
 Tang::ComputedExpressionCompiledFunction, 190
 Tang::ComputedExpressionError, 203
Tang::ComputedExpressionFloat, 219
Tang::ComputedExpressionInteger, 233
Tang::ComputedExpressionIterator, 247
Tang::ComputedExpressionIteratorEnd, 260
Tang::ComputedExpressionMap, 276
Tang::ComputedExpressionNativeBoundFunction,
 291
Tang::ComputedExpressionString, 307
~GarbageCollected
 Tang::GarbageCollected, 317
ADD
 opcode.hpp, 410
Add
 Tang::AstNodeBinary, 32
addBreak
 Tang::Program, 340
addBytecode
 Tang::Program, 341
addContinue
 Tang::Program, 341
addIdentifier
 Tang::Program, 341
addIdentifierAssigned
 Tang::Program, 342
addString
 Tang::Program, 342
And
 Tang::AstNodeBinary, 32
append
 Tang::ComputedExpressionArray, 164
ARRAY
 opcode.hpp, 410
ASSIGNINDEX
 opcode.hpp, 410
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

AstNodeTernary
 Tang::AstNodeTernary, 128

AstNodeUnary
 Tang::AstNodeUnary, 133

AstNodeWhile
 Tang::AstNodeWhile, 138

BOOLEAN
 opcode.hpp, 410

Boolean
 Tang::AstNodeCast, 50

build/generated/location.hh, 363

bytesLength
 Tang::UnicodeString, 358

CALLFUNC
 opcode.hpp, 411

CASTBOOLEAN
 opcode.hpp, 411

CASTFLOAT
 opcode.hpp, 411

CASTINTEGER
 opcode.hpp, 411

CASTSTRING
 opcode.hpp, 411

CodeType
 Tang::Program, 340

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, 129

Tang::AstNodeUnary, 133

Tang::AstNodeWhile, 139

compileLiteral
 Tang::AstNodeString, 124

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, 129
 Tang::AstNodeUnary, 135
 Tang::AstNodeWhile, 139

compileScript
 Tang::TangBase, 352

ComputedExpressionArray
 Tang::ComputedExpressionArray, 156

ComputedExpressionBoolean
 Tang::ComputedExpressionBoolean, 171

ComputedExpressionCompiledFunction
 Tang::ComputedExpressionCompiledFunction, 183

ComputedExpressionError
 Tang::ComputedExpressionError, 197

ComputedExpressionFloat
 Tang::ComputedExpressionFloat, 211

ComputedExpressionInteger
 Tang::ComputedExpressionInteger, 225

ComputedExpressionIterator
 Tang::ComputedExpressionIterator, 240

ComputedExpressionMap
 Tang::ComputedExpressionMap, 269

ComputedExpressionNativeBoundFunction
 Tang::ComputedExpressionNativeBoundFunction, 282

ComputedExpressionString
 Tang::ComputedExpressionString, 298

COPY
 opcode.hpp, 410

currentIndex
 Tang::SingletonObjectPool< T >, 349

currentRecycledIndex
 Tang::SingletonObjectPool< T >, 350

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, 128
 Tang::AstNodeUnary, 133
 Tang::AstNodeWhile, 138

DIVIDE
 opcode.hpp, 410

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, 125
 Tang::AstNodeTernary, 130
 Tang::AstNodeUnary, 135
 Tang::AstNodeWhile, 140
 Tang::ComputedExpression, 150
 Tang::ComputedExpressionArray, 165
 Tang::ComputedExpressionBoolean, 178
 Tang::ComputedExpressionCompiledFunction, 191
 Tang::ComputedExpressionError, 205
 Tang::ComputedExpressionFloat, 220
 Tang::ComputedExpressionInteger, 234
 Tang::ComputedExpressionIterator, 248
 Tang::ComputedExpressionIteratorEnd, 262
 Tang::ComputedExpressionMap, 276
 Tang::ComputedExpressionNativeBoundFunction, 292
 Tang::ComputedExpressionString, 307

dumpBytecode
 Tang::Program, 342

DUMPPROGRAMCHECK
 program-dumpBytecode.cpp, 447

EQ
 opcode.hpp, 410

Equal
 Tang::AstNodeBinary, 32

Error
 Tang::Error, 313

error.cpp
 operator<<, 445

execute
 Tang::Program, 342

EXECUTEPROGRAMCHECK
 program-execute.cpp, 448

FLOAT
 opcode.hpp, 410

Float
 Tang::AstNodeCast, 50

FUNCTION
 opcode.hpp, 410

functionsDeclared
 Tang::Program, 347

GarbageCollected
 Tang::GarbageCollected, 316, 317

garbageCollected.cpp
 operator<<, 446

get
 Tang::SingletonObjectPool< T >, 349

get_next_token
 Tang::HtmlEscape, 332
 Tang::HtmlEscapeAscii, 334
 Tang::TangScanner, 354
 Tang::Unescape, 356

getArgc
 Tang::ComputedExpressionNativeBoundFunction,
 292

getAst
 Tang::Program, 343

getBytecode
 Tang::Program, 343

getCode
 Tang::Program, 343

getCollection
 Tang::AstNodeIndex, 90

getContents
 Tang::ComputedExpressionArray, 165

getFunction
 Tang::ComputedExpressionNativeBoundFunction,
 292

getIdentifiers
 Tang::Program, 343

getIdentifiersAssigned
 Tang::Program, 344

getIndex
 Tang::AstNodeIndex, 90

getInstance
 Tang::SingletonObjectPool< T >, 349

GETITERATOR
 opcode.hpp, 411

getMethods
 Tang::ComputedExpressionArray, 165
 Tang::ComputedExpressionString, 307

getResult
 Tang::Program, 344

getStrings
 Tang::Program, 344

getTargetTypeIndex
 Tang::ComputedExpressionNativeBoundFunction,
 292

getValue
 Tang::ComputedExpressionFloat, 220
 Tang::ComputedExpressionInteger, 234

 Tang::ComputedExpressionString, 308

GreaterThan
 Tang::AstNodeBinary, 32

GreaterThanOrEqual
 Tang::AstNodeBinary, 32

GT
 opcode.hpp, 410

GTE
 opcode.hpp, 410

HtmlEscape
 Tang::HtmlEscape, 331

htmlEscape
 unicodeString.hpp, 418

HtmlEscapeAscii
 Tang::HtmlEscapeAscii, 333

htmlEscapeAscii
 unicodeString.hpp, 418

include/astNode.hpp, 365

include/astNodeArray.hpp, 366

include/astNodeAssign.hpp, 367

include/astNodeBinary.hpp, 368

include/astNodeBlock.hpp, 369

include/astNodeBoolean.hpp, 370

include/astNodeBreak.hpp, 371

include/astNodeCast.hpp, 372

include/astNodeContinue.hpp, 373

include/astNodeDoWhile.hpp, 374

include/astNodeFloat.hpp, 375

include/astNodeFor.hpp, 376

include/astNodeFunctionCall.hpp, 377

include/astNodeFunctionDeclaration.hpp, 378

include/astNodeIdentifier.hpp, 379

include/astNodeIfElse.hpp, 380

include/astNodeIndex.hpp, 381

include/astNodeInteger.hpp, 382

include/astNodeMap.hpp, 383

include/astNodePeriod.hpp, 384

include/astNodePrint.hpp, 385

include/astNodeRangedFor.hpp, 386

include/astNodeReturn.hpp, 387

include/astNodeSlice.hpp, 388

include/astNodeString.hpp, 389

include/astNodeTernary.hpp, 390

include/astNodeUnary.hpp, 391

include/astNodeWhile.hpp, 392

include/computedExpression.hpp, 393

include/computedExpressionArray.hpp, 394

include/computedExpressionBoolean.hpp, 395

include/computedExpressionCompiledFunction.hpp,
 395

include/computedExpressionError.hpp, 396

include/computedExpressionFloat.hpp, 397

include/computedExpressionInteger.hpp, 398

include/computedExpressionIterator.hpp, 399

include/computedExpressionIteratorEnd.hpp, 400

include/computedExpressionMap.hpp, 401

include/computedExpressionNativeBoundFunction.hpp, 402
include/computedExpressionString.hpp, 403
include/error.hpp, 404
include/garbageCollected.hpp, 405
include/htmlEscape.hpp, 406
include/htmlEscapeAscii.hpp, 407
include/macros.hpp, 408
include/opcode.hpp, 409
include/program.hpp, 411
include/singletonObjectPool.hpp, 412
include/tang.hpp, 413
include/tangBase.hpp, 414
include/tangScanner.hpp, 415
include/unescape.hpp, 416
include/unicodeString.hpp, 417
INDEX
 opcode.hpp, 410
INTEGER
 opcode.hpp, 410
Integer
 Tang::AstNodeCast, 50
is_equal
 Tang::ComputedExpression, 150–152
 Tang::ComputedExpressionArray, 165–167
 Tang::ComputedExpressionBoolean, 178–180
 Tang::ComputedExpressionCompiledFunction, 191–193
 Tang::ComputedExpressionError, 205, 207, 208
 Tang::ComputedExpressionFloat, 220–222
 Tang::ComputedExpressionInteger, 234–236
 Tang::ComputedExpressionIterator, 248, 250, 251
 Tang::ComputedExpressionIteratorEnd, 262, 264, 265
 Tang::ComputedExpressionMap, 276–278
 Tang::ComputedExpressionNativeBoundFunction, 293–295
 Tang::ComputedExpressionString, 308–310
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, 128
Tang::AstNodeUnary, 133
Tang::AstNodeWhile, 138
isCopyNeeded
 Tang::ComputedExpression, 152
 Tang::ComputedExpressionArray, 168
 Tang::ComputedExpressionBoolean, 180
 Tang::ComputedExpressionCompiledFunction, 193
 Tang::ComputedExpressionError, 208
 Tang::ComputedExpressionFloat, 222
 Tang::ComputedExpressionInteger, 237
 Tang::ComputedExpressionIterator, 251
 Tang::ComputedExpressionIteratorEnd, 265
 Tang::ComputedExpressionMap, 279
 Tang::ComputedExpressionNativeBoundFunction, 295
 Tang::ComputedExpressionString, 311
 Tang::GarbageCollected, 317
ISITERATOREND
 opcode.hpp, 411
ITERATORNEXT
 opcode.hpp, 411
JMP
 opcode.hpp, 410
JMPF
 opcode.hpp, 410
JMFP_POP
 opcode.hpp, 410
JMPT
 opcode.hpp, 410
JMPT_POP
 opcode.hpp, 410
length
 Tang::UnicodeString, 359
LessThan
 Tang::AstNodeBinary, 32
LessThanEqual
 Tang::AstNodeBinary, 32
location.hh
 operator<<, 364, 365
LT
 opcode.hpp, 410
LTE
 opcode.hpp, 410
make
 Tang::GarbageCollected, 318
make_shared
 Tang::TangBase, 352
makeCopy
 Tang::ComputedExpression, 153

Tang::ComputedExpressionArray, 168
 Tang::ComputedExpressionBoolean, 181
 Tang::ComputedExpressionCompiledFunction, 194
 Tang::ComputedExpressionError, 208
 Tang::ComputedExpressionFloat, 223
 Tang::ComputedExpressionInteger, 237
 Tang::ComputedExpressionIterator, 251
 Tang::ComputedExpressionIteratorEnd, 265
 Tang::ComputedExpressionMap, 279
 Tang::ComputedExpressionNativeBoundFunction, 295
 Tang::ComputedExpressionString, 311
 Tang::GarbageCollected, 318
MAP
 opcode.hpp, 410
MODULO
 opcode.hpp, 410
Modulo
 Tang::AstNodeBinary, 32
MULTIPLY
 opcode.hpp, 410
Multiply
 Tang::AstNodeBinary, 32
NEGATIVE
 opcode.hpp, 410
Negative
 Tang::AstNodeUnary, 133
NEQ
 opcode.hpp, 410
NOT
 opcode.hpp, 410
Not
 Tang::AstNodeUnary, 133
NotEqual
 Tang::AstNodeBinary, 32
NULLVAL
 opcode.hpp, 410
Opcode
 opcode.hpp, 410
opcode.hpp
 ADD, 410
 ARRAY, 410
 ASSIGNINDEX, 410
 BOOLEAN, 410
 CALLFUNC, 411
 CASTBOOLEAN, 411
 CASTFLOAT, 411
 CASTINTEGER, 411
 CASTSTRING, 411
 COPY, 410
 DIVIDE, 410
 EQ, 410
 FLOAT, 410
 FUNCTION, 410
 GETITERATOR, 411
 GT, 410
 GTE, 410
 INDEX, 410
 INTEGER, 410
 ISITERATOREND, 411
 ITERATORNEXT, 411
 JMP, 410
 JMPF, 410
 JMPF_POP, 410
 JMPT, 410
 JMPT_POP, 410
 LT, 410
 LTE, 410
 MAP, 410
 MODULO, 410
 MULTIPLY, 410
 NEGATIVE, 410
 NEQ, 410
 NOT, 410
 NULLVAL, 410
 Opcode, 410
 PEEK, 410
 PERIOD, 410
 POKE, 410
 POP, 410
 PRINT, 411
 RETURN, 411
 SLICE, 411
 STRING, 410
 SUBTRACT, 410
Operation
 Tang::AstNodeBinary, 32
Operator
 Tang::AstNodeUnary, 132
operator std::string
 Tang::UnicodeString, 359
operator!
 Tang::GarbageCollected, 319
operator!=
 Tang::GarbageCollected, 319
operator<
 Tang::GarbageCollected, 324
 Tang::UnicodeString, 360
operator<<
 error.cpp, 445
 garbageCollected.cpp, 446
 location.hh, 364, 365
 Tang::Error, 313
 Tang::GarbageCollected, 329
operator<=
 Tang::GarbageCollected, 324
operator>
 Tang::GarbageCollected, 328
operator>=
 Tang::GarbageCollected, 329
operator*
 Tang::GarbageCollected, 320, 321
operator+
 Tang::GarbageCollected, 321
 Tang::UnicodeString, 359

operator-
 Tang::GarbageCollected, 322
operator->
 Tang::GarbageCollected, 323
operator/
 Tang::GarbageCollected, 323
operator=
 Tang::GarbageCollected, 325
operator==
 Tang::GarbageCollected, 325–328
 Tang::UnicodeString, 360
operator%
 Tang::GarbageCollected, 320
Or
 Tang::AstNodeBinary, 32

PEEK
 opcode.hpp, 410
PERIOD
 opcode.hpp, 410
POKE
 opcode.hpp, 410
POP
 opcode.hpp, 410
popBreakStack
 Tang::Program, 344
popContinueStack
 Tang::Program, 345
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, 128
 Tang::AstNodeUnary, 133
 Tang::AstNodeWhile, 138
PRINT
 opcode.hpp, 411

Program
 Tang::Program, 340
program-dumpBytecode.cpp
 DUMPPROGRAMCHECK, 447
program-execute.cpp
 EXECUTEPROGRAMCHECK, 448
 STACKCHECK, 449
pushEnvironment
 Tang::Program, 345

recycle
 Tang::SingletonObjectPool< T >, 349
RETURN
 opcode.hpp, 411

Script
 Tang::Program, 340
setFunctionStackDeclaration
 Tang::Program, 346
setJumpTarget
 Tang::Program, 346
SLICE
 opcode.hpp, 411
src/astNode.cpp, 420
src/astNodeArray.cpp, 420
src/astNodeAssign.cpp, 421
src/astNodeBinary.cpp, 421
src/astNodeBlock.cpp, 422
src/astNodeBoolean.cpp, 423
src/astNodeBreak.cpp, 423
src/astNodeCast.cpp, 424
src/astNodeContinue.cpp, 425
src/astNodeDoWhile.cpp, 425
src/astNodeFloat.cpp, 426
src/astNodeFor.cpp, 427
src/astNodeFunctionCall.cpp, 427
src/astNodeFunctionDeclaration.cpp, 428
src/astNodeIdentifier.cpp, 428
src/astNodeIfElse.cpp, 429
src/astNodeIndex.cpp, 430
src/astNodeInteger.cpp, 430
src/astNodeMap.cpp, 431
src/astNodePeriod.cpp, 431
src/astNodePrint.cpp, 432
src/astNodeRangedFor.cpp, 433
src/astNodeReturn.cpp, 433
src/astNodeSlice.cpp, 434
src/astNodeString.cpp, 434
src/astNodeTernary.cpp, 435
src/astNodeUnary.cpp, 436
src/astNodeWhile.cpp, 436
src/computedExpression.cpp, 437
src/computedExpressionArray.cpp, 438
src/computedExpressionBoolean.cpp, 438
src/computedExpressionCompiledFunction.cpp, 439
src/computedExpressionError.cpp, 439
src/computedExpressionFloat.cpp, 440
src/computedExpressionInteger.cpp, 441
src/computedExpressionIterator.cpp, 441

src/computedExpressionIteratorEnd.cpp, 442
src/computedExpressionMap.cpp, 443
src/computedExpressionNativeBoundFunction.cpp, 443
src/computedExpressionString.cpp, 444
src/error.cpp, 445
src/garbageCollected.cpp, 446
src/program-dumpBytecode.cpp, 447
src/program-execute.cpp, 448
src/program.cpp, 449
src/tangBase.cpp, 450
src/unicodeString.cpp, 451
STACKCHECK
 program-execute.cpp, 449
STRING
 opcode.hpp, 410
String
 Tang::AstNodeCast, 50
substr
 Tang::UnicodeString, 360
SUBTRACT
 opcode.hpp, 410
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
 GreaterThanOrEqualTo, 32
 IsAssignment, 33
 LessThan, 32
 LessThanOrEqualTo, 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
    compile, 124
    compileLiteral, 124
    compilePreprocess, 125
    Default, 123
    dump, 125
    IsAssignment, 123
    PreprocessState, 123
Tang::AstNodeTernary, 126
    AstNodeTernary, 128
    compile, 129
    compilePreprocess, 129
    Default, 128
    dump, 130
    IsAssignment, 128
    PreprocessState, 128
Tang::AstNodeUnary, 130
    AstNodeUnary, 133
    compile, 133
    compilePreprocess, 135
    Default, 133
    dump, 135
    IsAssignment, 133
    Negative, 133
    Not, 133
    Operator, 132
    PreprocessState, 133
Tang::AstNodeWhile, 136
    AstNodeWhile, 138
    compile, 139
    compilePreprocess, 139
    Default, 138
    dump, 140
    IsAssignment, 138
    PreprocessState, 138
Tang::ComputedExpression, 140
    __add, 143
    __asCode, 143
    __assign_index, 143
    __boolean, 144
    __divide, 144
    __equal, 144
    __float, 145
    __getIterator, 145
    __index, 145
    __integer, 146
    __iteratorNext, 146
    __lessThan, 146
    __modulo, 147
    __multiply, 147
    __negative, 148
    __not, 148
    __period, 148
    __slice, 149
    __string, 149
    __subtract, 149
    dump, 150
    is_equal, 150–152
    isCopyNeeded, 152
    makeCopy, 153
Tang::ComputedExpressionArray, 153
    __add, 156
    __asCode, 156
    __assign_index, 157
    __boolean, 157
    __divide, 158
    __equal, 158
    __float, 159
    __getIterator, 159
    __index, 159
    __integer, 160
    __iteratorNext, 160
    __lessThan, 160
    __modulo, 161
    __multiply, 161
    __negative, 162
    __not, 162
    __period, 162
    __slice, 163
    __string, 163
    __subtract, 164
    append, 164
    ComputedExpressionArray, 156
    dump, 165
    getContents, 165
    getMethods, 165
    is_equal, 165–167
    isCopyNeeded, 168
    makeCopy, 168
Tang::ComputedExpressionBoolean, 169
    __add, 171
    __asCode, 171
    __assign_index, 172
    __boolean, 172
    __divide, 172
    __equal, 173
    __float, 173
    __getIterator, 173
    __index, 174
    __integer, 174
    __iteratorNext, 174
    __lessThan, 175
    __modulo, 175
    __multiply, 175
    __negative, 176
    __not, 176
    __period, 176
    __slice, 177
    __string, 177
    __subtract, 177

```

ComputedExpressionBoolean, 171
dump, 178
is_equal, 178–180
isCopyNeeded, 180
makeCopy, 181
Tang::ComputedExpressionCompiledFunction, 181
 __add, 184
 __asCode, 184
 __assign_index, 184
 __boolean, 185
 __divide, 185
 __equal, 186
 __float, 186
 __getIterator, 186
 __index, 187
 __integer, 187
 __iteratorNext, 187
 __lessThan, 188
 __modulo, 188
 __multiply, 188
 __negative, 189
 __not, 189
 __period, 189
 __slice, 190
 __string, 190
 __subtract, 190
ComputedExpressionCompiledFunction, 183
dump, 191
is_equal, 191–193
isCopyNeeded, 193
makeCopy, 194
Tang::ComputedExpressionError, 194
 __add, 197
 __asCode, 197
 __assign_index, 198
 __boolean, 198
 __divide, 198
 __equal, 199
 __float, 199
 __getIterator, 199
 __index, 200
 __integer, 200
 __iteratorNext, 200
 __lessThan, 201
 __modulo, 201
 __multiply, 201
 __negative, 202
 __not, 202
 __period, 202
 __slice, 203
 __string, 203
 __subtract, 203
ComputedExpressionError, 197
dump, 205
is_equal, 205, 207, 208
isCopyNeeded, 208
makeCopy, 208
Tang::ComputedExpressionFloat, 209
 __add, 211
 __asCode, 212
 __assign_index, 212
 __boolean, 213
 __divide, 213
 __equal, 214
 __float, 214
 __getIterator, 214
 __index, 215
 __integer, 215
 __iteratorNext, 215
 __lessThan, 216
 __modulo, 216
 __multiply, 217
 __negative, 217
 __not, 217
 __period, 218
 __slice, 218
 __string, 219
 __subtract, 219
ComputedExpressionFloat, 211
dump, 220
getValue, 220
is_equal, 220–222
isCopyNeeded, 222
makeCopy, 223
Tang::ComputedExpressionInteger, 223
 __add, 226
 __asCode, 226
 __assign_index, 226
 __boolean, 227
 __divide, 227
 __equal, 228
 __float, 228
 __getIterator, 229
 __index, 229
 __integer, 229
 __iteratorNext, 229
 __lessThan, 230
 __modulo, 230
 __multiply, 231
 __negative, 231
 __not, 232
 __period, 232
 __slice, 232
 __string, 233
 __subtract, 233
ComputedExpressionInteger, 225
dump, 234
getValue, 234
is_equal, 234–236
isCopyNeeded, 237
makeCopy, 237
Tang::ComputedExpressionIterator, 238
 __add, 240
 __asCode, 241
 __assign_index, 241
 __boolean, 241

__divide, 242
 __equal, 242
 __float, 243
 __getIterator, 243
 __index, 243
 __integer, 244
 __iteratorNext, 244
 __lessThan, 244
 __modulo, 245
 __multiply, 245
 __negative, 246
 __not, 246
 __period, 246
 __slice, 247
 __string, 247
 __subtract, 247
 ComputedExpressionIterator, 240
 dump, 248
 is_equal, 248, 250, 251
 isCopyNeeded, 251
 makeCopy, 251
 Tang::ComputedExpressionIteratorEnd, 252
 __add, 254
 __asCode, 254
 __assign_index, 255
 __boolean, 255
 __divide, 255
 __equal, 256
 __float, 256
 __getIterator, 256
 __index, 257
 __integer, 257
 __iteratorNext, 257
 __lessThan, 258
 __modulo, 258
 __multiply, 258
 __negative, 259
 __not, 259
 __period, 259
 __slice, 260
 __string, 260
 __subtract, 260
 dump, 262
 is_equal, 262, 264, 265
 isCopyNeeded, 265
 makeCopy, 265
 Tang::ComputedExpressionMap, 266
 __add, 269
 __asCode, 269
 __assign_index, 269
 __boolean, 270
 __divide, 270
 __equal, 271
 __float, 271
 __getIterator, 271
 __index, 272
 __integer, 272
 __iteratorNext, 272
 __lessThan, 273
 __modulo, 273
 __multiply, 274
 __negative, 274
 __not, 274
 __period, 274
 __slice, 275
 __string, 275
 __subtract, 276
 ComputedExpressionMap, 269
 dump, 276
 is_equal, 276–278
 isCopyNeeded, 279
 makeCopy, 279
 Tang::ComputedExpressionNativeBoundFunction, 280
 __add, 283
 __asCode, 284
 __assign_index, 284
 __boolean, 284
 __divide, 285
 __equal, 285
 __float, 286
 __getIterator, 286
 __index, 286
 __integer, 287
 __iteratorNext, 287
 __lessThan, 287
 __modulo, 289
 __multiply, 289
 __negative, 289
 __not, 290
 __period, 290
 __slice, 290
 __string, 291
 __subtract, 291
 ComputedExpressionNativeBoundFunction, 282
 dump, 292
 getArgc, 292
 getFunction, 292
 getTargetTypeIndex, 292
 is_equal, 293–295
 isCopyNeeded, 295
 makeCopy, 295
 Tang::ComputedExpressionString, 296
 __add, 298
 __asCode, 299
 __assign_index, 299
 __boolean, 300
 __divide, 300
 __equal, 301
 __float, 301
 __getIterator, 301
 __index, 302
 __integer, 302
 __iteratorNext, 303
 __lessThan, 303
 __modulo, 304
 __multiply, 304

__negative, 305
 __not, 305
 __period, 305
 __slice, 306
 __string, 306
 __subtract, 307
 ComputedExpressionString, 298
 dump, 307
 getMethods, 307
 getValue, 308
 is_equal, 308–310
 isCopyNeeded, 311
 makeCopy, 311
Tang::Error, 312
 Error, 313
 operator<<, 313
Tang::GarbageCollected, 314
 ~GarbageCollected, 317
 GarbageCollected, 316, 317
 isCopyNeeded, 317
 make, 318
 makeCopy, 318
 operator!, 319
 operator!=, 319
 operator<, 324
 operator<<, 329
 operator<=, 324
 operator>, 328
 operator>=, 329
 operator*, 320, 321
 operator+, 321
 operator-, 322
 operator->, 323
 operator/, 323
 operator=, 325
 operator==, 325–328
 operator%, 320
Tang::HtmlEscape, 330
 get_next_token, 332
 HtmlEscape, 331
Tang::HtmlEscapeAscii, 332
 get_next_token, 334
 HtmlEscapeAscii, 333
Tang::location, 334
Tang::position, 336
Tang::Program, 337
 addBreak, 340
 addBytecode, 341
 addContinue, 341
 addIdentifier, 341
 addIdentifierAssigned, 342
 addString, 342
 CodeType, 340
 dumpBytecode, 342
 execute, 342
 functionsDeclared, 347
 getAst, 343
 getBytecode, 343
 getCode, 343
 getIdentifiers, 343
 getIdentifiersAssigned, 344
 getResult, 344
 getStrings, 344
 popBreakStack, 344
 popContinueStack, 345
 Program, 340
 pushEnvironment, 345
 Script, 340
 setFunctionStackDeclaration, 346
 setJumpTarget, 346
 Template, 340
Tang::SingletonObjectPool< T >, 347
 currentIndex, 349
 currentRecycledIndex, 350
 get, 349
 getInstance, 349
 recycle, 349
Tang::TangBase, 350
 compileScript, 352
 make_shared, 352
 TangBase, 351
Tang::TangScanner, 352
 get_next_token, 354
 TangScanner, 354
Tang::Unescape, 355
 get_next_token, 356
 Unescape, 356
Tang::UnicodeString, 357
 bytesLength, 358
 length, 359
 operator std::string, 359
 operator<, 360
 operator+, 359
 operator==, 360
 substr, 360
 UnicodeString, 358
TangBase
 Tang::TangBase, 351
TangScanner
 Tang::TangScanner, 354
Template
 Tang::Program, 340
test/test.cpp, 451
test/testGarbageCollected.cpp, 453
test/testSingletonObjectPool.cpp, 453
test/testUnicodeString.cpp, 454
Type
 Tang::AstNodeCast, 49
 Tang::AstNodePrint, 106
Unescape
 Tang::Unescape, 356
unescape
 unicodeString.hpp, 419
UnicodeString
 Tang::UnicodeString, 358
 unicodeString.hpp

[htmlEscape](#), [418](#)
[htmlEscapeAscii](#), [418](#)
[unescape](#), [419](#)