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Contents

1	My persnoal index page	1
1.1	Introduction	1
1.2	Installation	1
2	Namespace Index	3
2.1	Namespace List	3
3	Hierarchical Index	5
3.1	Class Hierarchy	5
4	Class Index	7
4.1	Class List	7
5	File Index	9
5.1	File List	9
6	Namespace Documentation	11
6.1	fcsl Namespace Reference	11
6.2	fcsl::ast Namespace Reference	11
6.3	fcsl::parser Namespace Reference	12
6.4	fcsl::scanner Namespace Reference	12
6.4.1	Typedef Documentation	14
6.4.1.1	TokenType	14
6.4.2	Enumeration Type Documentation	14
6.4.2.1	kTokenEnumType [1/2]	14
6.4.2.2	kTokenEnumType [2/2]	16
6.4.3	Function Documentation	18
6.4.3.1	consume_whitespace_and_comments()	18
6.4.3.2	make_regex()	19
6.4.3.3	match_regex()	20
6.4.3.4	ReadInput()	21
6.4.3.5	ReadInputFromFile()	21
6.4.4	Variable Documentation	22
6.4.4.1	kRegexNSub	22

7	Class Documentation	23
7.1	<code>fcal::ast::assignStmt1</code> Class Reference	23
7.1.1	Detailed Description	24
7.1.2	Constructor & Destructor Documentation	24
7.1.2.1	<code>assignStmt1()</code>	25
7.1.2.2	<code>~assignStmt1()</code>	25
7.1.3	Member Function Documentation	25
7.1.3.1	<code>CppCode()</code>	25
7.1.3.2	<code>Unparse()</code>	25
7.2	<code>fcal::ast::assignStmt2</code> Class Reference	26
7.2.1	Detailed Description	27
7.2.2	Constructor & Destructor Documentation	27
7.2.2.1	<code>assignStmt2()</code>	28
7.2.2.2	<code>~assignStmt2()</code>	28
7.2.3	Member Function Documentation	28
7.2.3.1	<code>CppCode()</code>	28
7.2.3.2	<code>Unparse()</code>	28
7.3	<code>fcal::ast::boolDecl</code> Class Reference	29
7.3.1	Detailed Description	31
7.3.2	Constructor & Destructor Documentation	31
7.3.2.1	<code>boolDecl()</code>	32
7.3.2.2	<code>~boolDecl()</code>	32
7.3.3	Member Function Documentation	32
7.3.3.1	<code>CppCode()</code>	32
7.3.3.2	<code>Unparse()</code>	32
7.4	<code>fcal::scanner::CharConstToken</code> Class Reference	33
7.4.1	Detailed Description	35
7.4.2	Constructor & Destructor Documentation	35
7.4.2.1	<code>CharConstToken()</code>	35
7.4.3	Member Function Documentation	35

7.4.3.1	description()	35
7.4.3.2	ExtendToken()	35
7.4.3.3	ExtendTokenList()	36
7.4.3.4	lbp()	37
7.4.3.5	led()	38
7.4.3.6	lexeme()	39
7.4.3.7	next()	39
7.4.3.8	nud()	40
7.4.3.9	parser()	41
7.4.3.10	terminal()	42
7.5	fcal::ast::Decl Class Reference	42
7.5.1	Detailed Description	43
7.5.2	Member Function Documentation	43
7.5.2.1	CppCode()	43
7.5.2.2	Unparse()	44
7.6	fcal::ast::declStmt Class Reference	45
7.6.1	Detailed Description	47
7.6.2	Constructor & Destructor Documentation	47
7.6.2.1	declStmt()	48
7.6.2.2	~declStmt()	48
7.6.3	Member Function Documentation	48
7.6.3.1	CppCode()	48
7.6.3.2	Unparse()	48
7.7	fcal::ast::emptyStmts Class Reference	49
7.7.1	Detailed Description	50
7.7.2	Constructor & Destructor Documentation	50
7.7.2.1	emptyStmts()	50
7.7.3	Member Function Documentation	51
7.7.3.1	CppCode()	51
7.7.3.2	Unparse()	51

7.8	fcal::scanner::EndOfFileToken Class Reference	51
7.8.1	Detailed Description	54
7.8.2	Constructor & Destructor Documentation	54
7.8.2.1	EndOfFileToken()	54
7.8.3	Member Function Documentation	54
7.8.3.1	description()	54
7.8.3.2	ExtendToken()	54
7.8.3.3	ExtendTokenList()	55
7.8.3.4	lbp()	56
7.8.3.5	led()	57
7.8.3.6	lexeme()	58
7.8.3.7	next()	58
7.8.3.8	nud()	59
7.8.3.9	parser()	60
7.8.3.10	terminal()	61
7.9	fcal::ast::Expr Class Reference	61
7.9.1	Detailed Description	62
7.9.2	Member Function Documentation	62
7.9.2.1	CppCode()	62
7.9.2.2	Unparse()	63
7.10	fcal::scanner::ExtToken Class Reference	64
7.10.1	Detailed Description	66
7.10.2	Constructor & Destructor Documentation	66
7.10.2.1	ExtToken() [1/2]	66
7.10.2.2	ExtToken() [2/2]	66
7.10.2.3	~ExtToken()	66
7.10.3	Member Function Documentation	66
7.10.3.1	description()	67
7.10.3.2	ExtendToken()	67
7.10.3.3	ExtendTokenList()	68

7.10.3.4	lbp()	69
7.10.3.5	led()	70
7.10.3.6	lexeme()	71
7.10.3.7	next()	71
7.10.3.8	nud()	72
7.10.3.9	parser()	73
7.10.3.10	terminal()	74
7.11	fcal::ast::falseExpr Class Reference	74
7.11.1	Detailed Description	76
7.11.2	Constructor & Destructor Documentation	76
7.11.2.1	falseExpr()	77
7.11.2.2	~falseExpr()	77
7.11.3	Member Function Documentation	77
7.11.3.1	CppCode()	77
7.11.3.2	Unparse()	77
7.12	fcal::scanner::FalseKwdToken Class Reference	78
7.12.1	Detailed Description	80
7.12.2	Constructor & Destructor Documentation	80
7.12.2.1	FalseKwdToken()	80
7.12.3	Member Function Documentation	80
7.12.3.1	description()	80
7.12.3.2	ExtendToken()	80
7.12.3.3	ExtendTokenList()	81
7.12.3.4	lbp()	82
7.12.3.5	led()	83
7.12.3.6	lexeme()	84
7.12.3.7	next()	84
7.12.3.8	nud()	85
7.12.3.9	parser()	86
7.12.3.10	terminal()	87

7.13 fcal::scanner::FloatConstToken Class Reference	87
7.13.1 Detailed Description	90
7.13.2 Constructor & Destructor Documentation	90
7.13.2.1 FloatConstToken()	90
7.13.3 Member Function Documentation	90
7.13.3.1 description()	90
7.13.3.2 ExtendToken()	90
7.13.3.3 ExtendTokenList()	91
7.13.3.4 lbp()	92
7.13.3.5 led()	93
7.13.3.6 lexeme()	94
7.13.3.7 next()	94
7.13.3.8 nud()	95
7.13.3.9 parser()	96
7.13.3.10 terminal()	97
7.14 fcal::ast::floatDecl Class Reference	97
7.14.1 Detailed Description	99
7.14.2 Constructor & Destructor Documentation	99
7.14.2.1 floatDecl()	100
7.14.2.2 ~floatDecl()	100
7.14.3 Member Function Documentation	100
7.14.3.1 CppCode()	100
7.14.3.2 Unparse()	100
7.15 fcal::ast::floatExpr Class Reference	101
7.15.1 Detailed Description	102
7.15.2 Constructor & Destructor Documentation	102
7.15.2.1 floatExpr()	103
7.15.2.2 ~floatExpr()	103
7.15.3 Member Function Documentation	103
7.15.3.1 CppCode()	103

7.15.3.2	Unparse()	103
7.16	<code>fcval::ast::ifElseStmt</code> Class Reference	104
7.16.1	Detailed Description	105
7.16.2	Constructor & Destructor Documentation	105
7.16.2.1	<code>ifElseStmt()</code>	106
7.16.2.2	<code>~ifElseStmt()</code>	106
7.16.3	Member Function Documentation	106
7.16.3.1	<code>CppCode()</code>	106
7.16.3.2	<code>Unparse()</code>	106
7.17	<code>fcval::ast::ifExpr</code> Class Reference	107
7.17.1	Detailed Description	108
7.17.2	Constructor & Destructor Documentation	108
7.17.2.1	<code>ifExpr()</code>	109
7.17.2.2	<code>~ifExpr()</code>	109
7.17.3	Member Function Documentation	109
7.17.3.1	<code>CppCode()</code>	109
7.17.3.2	<code>Unparse()</code>	109
7.18	<code>fcval::ast::ifStmt</code> Class Reference	110
7.18.1	Detailed Description	111
7.18.2	Constructor & Destructor Documentation	111
7.18.2.1	<code>ifStmt()</code>	112
7.18.2.2	<code>~ifStmt()</code>	112
7.18.3	Member Function Documentation	112
7.18.3.1	<code>CppCode()</code>	112
7.18.3.2	<code>Unparse()</code>	112
7.19	<code>fcval::scanner::IfToken</code> Class Reference	113
7.19.1	Detailed Description	115
7.19.2	Constructor & Destructor Documentation	115
7.19.2.1	<code>IfToken()</code>	115
7.19.3	Member Function Documentation	115

7.19.3.1	description()	115
7.19.3.2	ExtendToken()	115
7.19.3.3	ExtendTokenList()	116
7.19.3.4	lbp()	117
7.19.3.5	led()	118
7.19.3.6	lexeme()	118
7.19.3.7	next()	119
7.19.3.8	nud()	120
7.19.3.9	parser()	120
7.19.3.10	terminal()	121
7.20	fcal::scanner::IntConstToken Class Reference	122
7.20.1	Detailed Description	125
7.20.2	Constructor & Destructor Documentation	125
7.20.2.1	IntConstToken()	125
7.20.3	Member Function Documentation	125
7.20.3.1	description()	125
7.20.3.2	ExtendToken()	125
7.20.3.3	ExtendTokenList()	126
7.20.3.4	lbp()	127
7.20.3.5	led()	128
7.20.3.6	lexeme()	129
7.20.3.7	next()	129
7.20.3.8	nud()	130
7.20.3.9	parser()	131
7.20.3.10	terminal()	132
7.21	fcal::ast::intDecl Class Reference	132
7.21.1	Detailed Description	134
7.21.2	Constructor & Destructor Documentation	134
7.21.2.1	intDecl()	135
7.21.2.2	~intDecl()	135

7.21.3	Member Function Documentation	135
7.21.3.1	CppCode()	135
7.21.3.2	Unparse()	135
7.22	fcal::ast::intExpr Class Reference	136
7.22.1	Detailed Description	137
7.22.2	Constructor & Destructor Documentation	137
7.22.2.1	intExpr()	138
7.22.2.2	~intExpr()	138
7.22.3	Member Function Documentation	138
7.22.3.1	CppCode()	138
7.22.3.2	Unparse()	138
7.23	fcal::scanner::LeftParenToken Class Reference	139
7.23.1	Detailed Description	141
7.23.2	Constructor & Destructor Documentation	141
7.23.2.1	LeftParenToken()	141
7.23.3	Member Function Documentation	141
7.23.3.1	description()	141
7.23.3.2	ExtendToken()	141
7.23.3.3	ExtendTokenList()	142
7.23.3.4	lbp()	143
7.23.3.5	led()	144
7.23.3.6	lexeme()	144
7.23.3.7	next()	145
7.23.3.8	nud()	146
7.23.3.9	parser()	146
7.23.3.10	terminal()	147
7.24	fcal::ast::letExpr Class Reference	148
7.24.1	Detailed Description	150
7.24.2	Constructor & Destructor Documentation	150
7.24.2.1	letExpr()	151

7.24.2.2	~letExpr()	151
7.24.3	Member Function Documentation	151
7.24.3.1	CppCode()	151
7.24.3.2	Unparse()	151
7.25	fcal::scanner::LetToken Class Reference	152
7.25.1	Detailed Description	154
7.25.2	Constructor & Destructor Documentation	154
7.25.2.1	LetToken()	154
7.25.3	Member Function Documentation	154
7.25.3.1	description()	154
7.25.3.2	ExtendToken()	154
7.25.3.3	ExtendTokenList()	155
7.25.3.4	lbp()	156
7.25.3.5	led()	157
7.25.3.6	lexeme()	157
7.25.3.7	next()	158
7.25.3.8	nud()	159
7.25.3.9	parser()	159
7.25.3.10	terminal()	160
7.26	fcal::scanner::match_result Struct Reference	161
7.26.1	Detailed Description	162
7.26.2	Member Data Documentation	162
7.26.2.1	num_matched	162
7.26.2.2	type	162
7.27	fcal::ast::matrixDecl Class Reference	162
7.27.1	Detailed Description	164
7.27.2	Constructor & Destructor Documentation	164
7.27.2.1	matrixDecl()	165
7.27.2.2	~matrixDecl()	165
7.27.3	Member Function Documentation	165

7.27.3.1	CppCode()	165
7.27.3.2	Unparse()	166
7.28	fcal::ast::matrixDecl2 Class Reference	166
7.28.1	Detailed Description	168
7.28.2	Constructor & Destructor Documentation	168
7.28.2.1	matrixDecl2()	169
7.28.2.2	~matrixDecl2()	169
7.28.3	Member Function Documentation	169
7.28.3.1	CppCode()	169
7.28.3.2	Unparse()	169
7.29	fcal::ast::matrixExpr Class Reference	170
7.29.1	Detailed Description	171
7.29.2	Constructor & Destructor Documentation	171
7.29.2.1	matrixExpr()	172
7.29.2.2	~matrixExpr()	172
7.29.3	Member Function Documentation	172
7.29.3.1	CppCode()	172
7.29.3.2	Unparse()	172
7.30	fcal::ast::multipleStmts Class Reference	173
7.30.1	Detailed Description	175
7.30.2	Constructor & Destructor Documentation	175
7.30.2.1	multipleStmts()	176
7.30.2.2	~multipleStmts()	176
7.30.3	Member Function Documentation	176
7.30.3.1	CppCode()	176
7.30.3.2	Unparse()	176
7.31	MySequence< T, N > Class Template Reference	177
7.31.1	Detailed Description	177
7.31.2	Constructor & Destructor Documentation	177
7.31.2.1	MySequence()	177

7.31.3	Member Function Documentation	177
7.31.3.1	get_member()	178
7.31.3.2	set_member()	178
7.32	fcal::ast::nestedExpr Class Reference	179
7.32.1	Detailed Description	180
7.32.2	Constructor & Destructor Documentation	180
7.32.2.1	nestedExpr()	181
7.32.2.2	~nestedExpr()	181
7.32.3	Member Function Documentation	181
7.32.3.1	CppCode()	181
7.32.3.2	Unparse()	181
7.33	fcal::ast::Node Class Reference	182
7.33.1	Detailed Description	183
7.33.2	Constructor & Destructor Documentation	183
7.33.2.1	~Node()	183
7.33.3	Member Function Documentation	183
7.33.3.1	CppCode()	183
7.33.3.2	Unparse()	183
7.34	fcal::ast::notExpr Class Reference	184
7.34.1	Detailed Description	186
7.34.2	Constructor & Destructor Documentation	186
7.34.2.1	notExpr()	187
7.34.2.2	~notExpr()	187
7.34.3	Member Function Documentation	187
7.34.3.1	CppCode()	187
7.34.3.2	Unparse()	187
7.35	fcal::scanner::NotOpToken Class Reference	188
7.35.1	Detailed Description	190
7.35.2	Constructor & Destructor Documentation	190
7.35.2.1	NotOpToken()	190

7.35.3	Member Function Documentation	190
7.35.3.1	description()	190
7.35.3.2	ExtendToken()	190
7.35.3.3	ExtendTokenList()	191
7.35.3.4	lbp()	192
7.35.3.5	led()	193
7.35.3.6	lexeme()	194
7.35.3.7	next()	194
7.35.3.8	nud()	195
7.35.3.9	parser()	196
7.35.3.10	terminal()	197
7.36	fcal::ast::parenExpr Class Reference	197
7.36.1	Detailed Description	199
7.36.2	Constructor & Destructor Documentation	199
7.36.2.1	parenExpr()	200
7.36.2.2	~parenExpr()	200
7.36.3	Member Function Documentation	200
7.36.3.1	CppCode()	200
7.36.3.2	Unparse()	200
7.37	fcal::parser::Parser Class Reference	201
7.37.1	Detailed Description	202
7.37.2	Constructor & Destructor Documentation	202
7.37.2.1	Parser()	202
7.37.2.2	~Parser()	202
7.37.3	Member Function Documentation	203
7.37.3.1	attempt_match()	203
7.37.3.2	match()	204
7.37.3.3	next_is()	205
7.37.3.4	next_token()	205
7.37.3.5	Parse()	206

7.37.3.6	parse_addition()	207
7.37.3.7	parse_char_const()	207
7.37.3.8	parse_decl()	208
7.37.3.9	parse_division()	208
7.37.3.10	parse_expr()	209
7.37.3.11	parse_false_kwd()	209
7.37.3.12	parse_float_const()	210
7.37.3.13	parse_if_expr()	211
7.37.3.14	parse_int_const()	212
7.37.3.15	parse_let_expr()	212
7.37.3.16	parse_matrix_decl()	213
7.37.3.17	parse_multiplication()	214
7.37.3.18	parse_nested_expr()	214
7.37.3.19	parse_not_expr()	215
7.37.3.20	parse_relational_expr()	215
7.37.3.21	parse_standard_decl()	216
7.37.3.22	parse_stmt()	217
7.37.3.23	parse_stmts()	218
7.37.3.24	parse_string_const()	218
7.37.3.25	parse_subtraction()	219
7.37.3.26	parse_true_kwd()	219
7.37.3.27	parse_variable_name()	220
7.37.3.28	ParseProgram()	221
7.38	fcal::parser::ParseResult Class Reference	222
7.38.1	Detailed Description	222
7.38.2	Constructor & Destructor Documentation	222
7.38.2.1	ParseResult()	223
7.38.3	Member Function Documentation	223
7.38.3.1	ast() [1/2]	223
7.38.3.2	ast() [2/2]	224

7.38.3.3	errors() [1/2]	224
7.38.3.4	errors() [2/2]	224
7.38.3.5	ok() [1/2]	225
7.38.3.6	ok() [2/2]	225
7.39	fcal::ast::printStmt Class Reference	225
7.39.1	Detailed Description	227
7.39.2	Constructor & Destructor Documentation	227
7.39.2.1	printStmt()	228
7.39.2.2	~printStmt()	228
7.39.3	Member Function Documentation	228
7.39.3.1	CppCode()	228
7.39.3.2	Unparse()	228
7.40	fcal::ast::Program Class Reference	229
7.40.1	Detailed Description	230
7.40.2	Member Function Documentation	230
7.40.2.1	CppCode()	230
7.40.2.2	Unparse()	231
7.41	fcal::ast::relationalExpr Class Reference	232
7.41.1	Detailed Description	234
7.41.2	Constructor & Destructor Documentation	234
7.41.2.1	relationalExpr()	235
7.41.2.2	~relationalExpr()	235
7.41.3	Member Function Documentation	235
7.41.3.1	cpp_code()	235
7.41.3.2	CppCode()	236
7.41.3.3	Unparse()	236
7.42	fcal::scanner::RelationalOpToken Class Reference	236
7.42.1	Detailed Description	239
7.42.2	Constructor & Destructor Documentation	239
7.42.2.1	RelationalOpToken()	239

7.42.3	Member Function Documentation	239
7.42.3.1	description()	239
7.42.3.2	ExtendToken()	240
7.42.3.3	ExtendTokenList()	241
7.42.3.4	lbp()	242
7.42.3.5	led()	242
7.42.3.6	lexeme()	243
7.42.3.7	next()	243
7.42.3.8	nud()	244
7.42.3.9	parser()	244
7.42.3.10	terminal()	245
7.43	fcal::ast::repeatStmt Class Reference	246
7.43.1	Detailed Description	248
7.43.2	Constructor & Destructor Documentation	248
7.43.2.1	repeatStmt()	249
7.43.2.2	~repeatStmt()	249
7.43.3	Member Function Documentation	249
7.43.3.1	CppCode()	249
7.43.3.2	Unparse()	249
7.44	fcal::ast::Root Class Reference	250
7.44.1	Detailed Description	252
7.44.2	Constructor & Destructor Documentation	252
7.44.2.1	Root()	253
7.44.2.2	~Root()	253
7.44.3	Member Function Documentation	253
7.44.3.1	CppCode()	253
7.44.3.2	Unparse()	253
7.45	fcal::scanner::Scanner Class Reference	254
7.45.1	Detailed Description	255
7.45.2	Constructor & Destructor Documentation	255

7.45.2.1	Scanner()	255
7.45.3	Member Function Documentation	255
7.45.3.1	find_match()	255
7.45.3.2	Scan()	256
7.45.3.3	try_match()	257
7.45.4	Member Data Documentation	258
7.45.4.1	dictionary	258
7.46	fcal::ast::semiColonStmt Class Reference	258
7.46.1	Detailed Description	260
7.46.2	Constructor & Destructor Documentation	260
7.46.2.1	semiColonStmt()	260
7.46.3	Member Function Documentation	261
7.46.3.1	CppCode()	261
7.46.3.2	Unparse()	261
7.47	fcal::ast::Stmt Class Reference	261
7.47.1	Detailed Description	262
7.47.2	Member Function Documentation	262
7.47.2.1	CppCode()	262
7.47.2.2	Unparse()	263
7.48	fcal::ast::Stmts Class Reference	264
7.48.1	Detailed Description	266
7.48.2	Member Function Documentation	266
7.48.2.1	CppCode()	266
7.48.2.2	Unparse()	267
7.49	fcal::ast::stmtsStmt Class Reference	268
7.49.1	Detailed Description	270
7.49.2	Constructor & Destructor Documentation	270
7.49.2.1	stmtsStmt()	271
7.49.2.2	~stmtsStmt()	271
7.49.3	Member Function Documentation	271

7.49.3.1	CppCode()	271
7.49.3.2	Unparse()	271
7.50	fcal::scanner::StringConstToken Class Reference	272
7.50.1	Detailed Description	274
7.50.2	Constructor & Destructor Documentation	274
7.50.2.1	StringConstToken()	274
7.50.3	Member Function Documentation	274
7.50.3.1	description()	274
7.50.3.2	ExtendToken()	274
7.50.3.3	ExtendTokenList()	275
7.50.3.4	lbp()	276
7.50.3.5	led()	277
7.50.3.6	lexeme()	278
7.50.3.7	next()	278
7.50.3.8	nud()	279
7.50.3.9	parser()	280
7.50.3.10	terminal()	281
7.51	fcal::ast::stringDecl Class Reference	281
7.51.1	Detailed Description	283
7.51.2	Constructor & Destructor Documentation	283
7.51.2.1	stringDecl()	284
7.51.2.2	~stringDecl()	284
7.51.3	Member Function Documentation	284
7.51.3.1	CppCode()	284
7.51.3.2	Unparse()	284
7.52	fcal::ast::stringExpr Class Reference	285
7.52.1	Detailed Description	286
7.52.2	Constructor & Destructor Documentation	286
7.52.2.1	stringExpr()	287
7.52.2.2	~stringExpr()	287

7.52.3	Member Function Documentation	287
7.52.3.1	CppCode()	287
7.52.3.2	Unparse()	287
7.53	fcal::scanner::Token Class Reference	288
7.53.1	Detailed Description	288
7.53.2	Constructor & Destructor Documentation	288
7.53.2.1	Token() [1/3]	289
7.53.2.2	Token() [2/3]	289
7.53.2.3	Token() [3/3]	289
7.53.3	Member Function Documentation	289
7.53.3.1	getlexemelength()	290
7.53.3.2	lexeme()	290
7.53.3.3	next()	290
7.53.3.4	setLexeme()	291
7.53.3.5	setlexemeLength()	291
7.53.3.6	setNextToken()	291
7.53.3.7	setTokenType()	292
7.53.3.8	terminal()	292
7.54	fcal::ast::trueExpr Class Reference	292
7.54.1	Detailed Description	294
7.54.2	Constructor & Destructor Documentation	294
7.54.2.1	trueExpr()	295
7.54.2.2	~trueExpr()	295
7.54.3	Member Function Documentation	295
7.54.3.1	CppCode()	295
7.54.3.2	Unparse()	295
7.55	fcal::scanner::TrueKwdToken Class Reference	296
7.55.1	Detailed Description	298
7.55.2	Constructor & Destructor Documentation	298
7.55.2.1	TrueKwdToken()	298

7.55.3	Member Function Documentation	298
7.55.3.1	description()	298
7.55.3.2	ExtendToken()	298
7.55.3.3	ExtendTokenList()	299
7.55.3.4	lbp()	300
7.55.3.5	led()	301
7.55.3.6	lexeme()	302
7.55.3.7	next()	302
7.55.3.8	nud()	303
7.55.3.9	parser()	304
7.55.3.10	terminal()	305
7.56	fcal::scanner::VariableNameToken Class Reference	305
7.56.1	Detailed Description	308
7.56.2	Constructor & Destructor Documentation	308
7.56.2.1	VariableNameToken()	308
7.56.3	Member Function Documentation	308
7.56.3.1	description()	308
7.56.3.2	ExtendToken()	308
7.56.3.3	ExtendTokenList()	309
7.56.3.4	lbp()	310
7.56.3.5	led()	311
7.56.3.6	lexeme()	312
7.56.3.7	next()	312
7.56.3.8	nud()	313
7.56.3.9	parser()	314
7.56.3.10	terminal()	315
7.57	fcal::ast::varName Class Reference	315
7.57.1	Detailed Description	317
7.57.2	Constructor & Destructor Documentation	317
7.57.2.1	varName()	317

7.57.3	Member Function Documentation	317
7.57.3.1	CppCode()	317
7.57.3.2	Unparse()	317
7.58	fcal::ast::varNameExpr Class Reference	319
7.58.1	Detailed Description	320
7.58.2	Constructor & Destructor Documentation	320
7.58.2.1	varNameExpr()	321
7.58.2.2	~varNameExpr()	321
7.58.3	Member Function Documentation	321
7.58.3.1	CppCode()	321
7.58.3.2	Unparse()	321
7.59	fcal::ast::whileStmt Class Reference	322
7.59.1	Detailed Description	323
7.59.2	Constructor & Destructor Documentation	323
7.59.2.1	whileStmt()	324
7.59.2.2	~whileStmt()	324
7.59.3	Member Function Documentation	324
7.59.3.1	CppCode()	324
7.59.3.2	Unparse()	324
8	File Documentation	325
8.1	docs_in/mainpage.h File Reference	325
8.2	include/ast.h File Reference	325
8.3	include/ext_token.h File Reference	327
8.4	include/iter2scanner.h File Reference	329
8.5	include/parse_result.h File Reference	330
8.6	include/parser.h File Reference	331
8.7	include/read_input.h File Reference	333
8.8	include/regex.h File Reference	333
8.9	include/scanner.h File Reference	334
8.10	src/ast.cc File Reference	336
8.11	src/ext_token.cc File Reference	337
8.12	src/parser.cc File Reference	338
8.13	src/read_input.cc File Reference	339
8.14	src/regex.cc File Reference	340
8.15	src/scanner.cc File Reference	341
8.15.1	Macro Definition Documentation	341
8.15.1.1	DEBUG	341
8.16	src/templates.cc File Reference	342
8.16.1	Function Documentation	342
8.16.1.1	main()	342
	Index	343

Chapter 1

My persnoal index page

1.1 Introduction

This is the documentation for our FCAL parser

1.2 Installation

To install this software clone it from <https://github.com/umn-csci-3081S17/repo-group-Agamemnon> and use the makefile in project

Chapter 2

Namespace Index

2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

fcal	11
fcal::ast	11
fcal::parser	12
fcal::scanner	12

Chapter 3

Hierarchical Index

3.1 Class Hierarchy

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

fcal::scanner::ExtToken	64
fcal::scanner::CharConstToken	33
fcal::scanner::EndOfFileToken	51
fcal::scanner::FalseKwdToken	78
fcal::scanner::FloatConstToken	87
fcal::scanner::LfToken	113
fcal::scanner::IntConstToken	122
fcal::scanner::LeftParenToken	139
fcal::scanner::LetToken	152
fcal::scanner::NotOpToken	188
fcal::scanner::RelationalOpToken	236
fcal::scanner::StringConstToken	272
fcal::scanner::TrueKwdToken	296
fcal::scanner::VariableNameToken	305
fcal::scanner::match_result	161
MySequence< T, N >	177
fcal::ast::Node	182
fcal::ast::Decl	42
fcal::ast::boolDecl	29
fcal::ast::floatDecl	97
fcal::ast::intDecl	132
fcal::ast::matrixDecl	162
fcal::ast::matrixDecl2	166
fcal::ast::stringDecl	281
fcal::ast::Expr	61
fcal::ast::falseExpr	74
fcal::ast::floatExpr	101
fcal::ast::ifExpr	107
fcal::ast::intExpr	136
fcal::ast::letExpr	148
fcal::ast::matrixExpr	170
fcal::ast::nestedExpr	179
fcal::ast::notExpr	184
fcal::ast::parenExpr	197
fcal::ast::relationalExpr	232

fcal::ast::stringExpr	285
fcal::ast::trueExpr	292
fcal::ast::varNameExpr	319
fcal::ast::Program	229
fcal::ast::Root	250
fcal::ast::Stmt	261
fcal::ast::assignStmt1	23
fcal::ast::assignStmt2	26
fcal::ast::declStmt	45
fcal::ast::ifElseStmt	104
fcal::ast::ifStmt	110
fcal::ast::printStmt	225
fcal::ast::repeatStmt	246
fcal::ast::semiColonStmt	258
fcal::ast::stmtsStmt	268
fcal::ast::whileStmt	322
fcal::ast::Stmts	264
fcal::ast::emptyStmts	49
fcal::ast::multipleStmts	173
fcal::ast::varName	315
fcal::parser::Parser	201
fcal::parser::ParseResult	222
fcal::scanner::Scanner	254
fcal::scanner::Token	288

Chapter 4

Class Index

4.1 Class List

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

fcal::ast::assignStmt1	23
fcal::ast::assignStmt2	26
fcal::ast::boolDecl	29
fcal::scanner::CharConstToken	33
fcal::ast::Decl	42
fcal::ast::declStmt	45
fcal::ast::emptyStmts	49
fcal::scanner::EndOfFileToken	51
fcal::ast::Expr	61
fcal::scanner::ExtToken	64
fcal::ast::falseExpr	74
fcal::scanner::FalseKwdToken	78
fcal::scanner::FloatConstToken	87
fcal::ast::floatDecl	97
fcal::ast::floatExpr	101
fcal::ast::ifElseStmt	104
fcal::ast::ifExpr	107
fcal::ast::ifStmt	110
fcal::scanner::IfToken	113
fcal::scanner::IntConstToken	122
fcal::ast::intDecl	132
fcal::ast::intExpr	136
fcal::scanner::LeftParenToken	139
fcal::ast::letExpr	148
fcal::scanner::LetToken	152
fcal::scanner::match_result	161
fcal::ast::matrixDecl	162
fcal::ast::matrixDecl2	166
fcal::ast::matrixExpr	170
fcal::ast::multipleStmts	173
MySequence< T, N >	177
fcal::ast::nestedExpr	179
fcal::ast::Node	182
fcal::ast::notExpr	184
fcal::scanner::NotOpToken	188

fcal::ast::parenExpr	197
fcal::parser::Parser	201
fcal::parser::ParseResult	222
fcal::ast::printStmt	225
fcal::ast::Program	229
fcal::ast::relationalExpr	232
fcal::scanner::RelationalOpToken	236
fcal::ast::repeatStmt	246
fcal::ast::Root	250
fcal::scanner::Scanner	254
fcal::ast::semiColonStmt	258
fcal::ast::Stmt	261
fcal::ast::Stmts	264
fcal::ast::stmtsStmt	268
fcal::scanner::StringConstToken	272
fcal::ast::stringDecl	281
fcal::ast::stringExpr	285
fcal::scanner::Token	288
fcal::ast::trueExpr	292
fcal::scanner::TrueKwdToken	296
fcal::scanner::VariableNameToken	305
fcal::ast::varName	315
fcal::ast::varNameExpr	319
fcal::ast::whileStmt	322

Chapter 5

File Index

5.1 File List

Here is a list of all files with brief descriptions:

docs_in/mainpage.h	325
include/ast.h	325
include/ext_token.h	327
include/iter2scanner.h	329
include/parse_result.h	330
include/parser.h	331
include/read_input.h	333
include/regex.h	333
include/scanner.h	334
src/ast.cc	336
src/ext_token.cc	337
src/parser.cc	338
src/read_input.cc	339
src/regex.cc	340
src/scanner.cc	341
src/templates.cc	342

Chapter 6

Namespace Documentation

6.1 fcal Namespace Reference

Namespaces

- [ast](#)
- [parser](#)
- [scanner](#)

6.2 fcal::ast Namespace Reference

Classes

- class [assignStmt1](#)
- class [assignStmt2](#)
- class [boolDecl](#)
- class [Decl](#)
- class [declStmt](#)
- class [emptyStmts](#)
- class [Expr](#)
- class [falseExpr](#)
- class [floatDecl](#)
- class [floatExpr](#)
- class [ifElseStmt](#)
- class [ifExpr](#)
- class [ifStmt](#)
- class [intDecl](#)
- class [intExpr](#)
- class [letExpr](#)
- class [matrixDecl](#)
- class [matrixDecl2](#)
- class [matrixExpr](#)
- class [multipleStmts](#)
- class [nestedExpr](#)
- class [Node](#)
- class [notExpr](#)

- class [parenExpr](#)
- class [printStmt](#)
- class [Program](#)
- class [relationalExpr](#)
- class [repeatStmt](#)
- class [Root](#)
- class [semiColonStmt](#)
- class [Stmt](#)
- class [Stmts](#)
- class [stmtsStmt](#)
- class [stringDecl](#)
- class [stringExpr](#)
- class [trueExpr](#)
- class [varName](#)
- class [varNameExpr](#)
- class [whileStmt](#)

6.3 `fcnl::parser` Namespace Reference

Classes

- class [Parser](#)
- class [ParseResult](#)

6.4 `fcnl::scanner` Namespace Reference

Classes

- class [CharConstToken](#)
- class [EndOfFileToken](#)
- class [ExtToken](#)
- class [FalseKwdToken](#)
- class [FloatConstToken](#)
- class [IfToken](#)
- class [IntConstToken](#)
- class [LeftParenToken](#)
- class [LetToken](#)
- struct [match_result](#)
- class [NotOpToken](#)
- class [RelationalOpToken](#)
- class [Scanner](#)
- class [StringConstToken](#)
- class [Token](#)
- class [TrueKwdToken](#)
- class [VariableNameToken](#)

Typedefs

- typedef enum [kTokenEnumType](#) [TokenType](#)

Enumerations

- enum [kTokenEnumType](#) {
[kIntKwd](#), [kFloatKwd](#), [kBoolKwd](#), [kTrueKwd](#),
[kFalseKwd](#), [kStringKwd](#), [kMatrixKwd](#), [kLetKwd](#),
[kInKwd](#), [kEndKwd](#), [kIfKwd](#), [kThenKwd](#),
[kElseKwd](#), [kRepeatKwd](#), [kWhileKwd](#), [kPrintKwd](#),
[kToKwd](#), [kIntConst](#), [kFloatConst](#), [kStringConst](#),
[kVariableName](#), [kLeftParen](#), [kRightParen](#), [kLeftCurly](#),
[kRightCurly](#), [kLeftSquare](#), [kRightSquare](#), [kSemiColon](#),
[kColon](#), [kAssign](#), [kPlusSign](#), [kStar](#),
[kDash](#), [kForwardSlash](#), [kLessThan](#), [kLessThanEqual](#),
[kGreaterThan](#), [kGreaterThanEqual](#), [kEqualsEquals](#), [kNotEquals](#),
[kAndOp](#), [kOrOp](#), [kNotOp](#), [kEndOfFile](#),
[kLexicalError](#), [kIntKwd](#), [kFloatKwd](#), [kBoolKwd](#),
[kTrueKwd](#), [kFalseKwd](#), [kStringKwd](#), [kMatrixKwd](#),
[kLetKwd](#), [kInKwd](#), [kEndKwd](#), [kIfKwd](#),
[kThenKwd](#), [kElseKwd](#), [kRepeatKwd](#), [kWhileKwd](#),
[kPrintKwd](#), [kToKwd](#), [kIntConst](#), [kFloatConst](#),
[kStringConst](#), [kVariableName](#), [kLeftParen](#), [kRightParen](#),
[kLeftCurly](#), [kRightCurly](#), [kLeftSquare](#), [kRightSquare](#),
[kSemiColon](#), [kColon](#), [kAssign](#), [kPlusSign](#),
[kStar](#), [kDash](#), [kForwardSlash](#), [kLessThan](#),
[kLessThanEqual](#), [kGreaterThan](#), [kGreaterThanEqual](#), [kEqualsEquals](#),
[kNotEquals](#), [kAndOp](#), [kOrOp](#), [kNotOp](#),
[kEndOfFile](#), [kLexicalError](#) }
- enum [kTokenEnumType](#) {
[kIntKwd](#), [kFloatKwd](#), [kBoolKwd](#), [kTrueKwd](#),
[kFalseKwd](#), [kStringKwd](#), [kMatrixKwd](#), [kLetKwd](#),
[kInKwd](#), [kEndKwd](#), [kIfKwd](#), [kThenKwd](#),
[kElseKwd](#), [kRepeatKwd](#), [kWhileKwd](#), [kPrintKwd](#),
[kToKwd](#), [kIntConst](#), [kFloatConst](#), [kStringConst](#),
[kVariableName](#), [kLeftParen](#), [kRightParen](#), [kLeftCurly](#),
[kRightCurly](#), [kLeftSquare](#), [kRightSquare](#), [kSemiColon](#),
[kColon](#), [kAssign](#), [kPlusSign](#), [kStar](#),
[kDash](#), [kForwardSlash](#), [kLessThan](#), [kLessThanEqual](#),
[kGreaterThan](#), [kGreaterThanEqual](#), [kEqualsEquals](#), [kNotEquals](#),
[kAndOp](#), [kOrOp](#), [kNotOp](#), [kEndOfFile](#),
[kLexicalError](#), [kIntKwd](#), [kFloatKwd](#), [kBoolKwd](#),
[kTrueKwd](#), [kFalseKwd](#), [kStringKwd](#), [kMatrixKwd](#),
[kLetKwd](#), [kInKwd](#), [kEndKwd](#), [kIfKwd](#),
[kThenKwd](#), [kElseKwd](#), [kRepeatKwd](#), [kWhileKwd](#),
[kPrintKwd](#), [kToKwd](#), [kIntConst](#), [kFloatConst](#),
[kStringConst](#), [kVariableName](#), [kLeftParen](#), [kRightParen](#),
[kLeftCurly](#), [kRightCurly](#), [kLeftSquare](#), [kRightSquare](#),
[kSemiColon](#), [kColon](#), [kAssign](#), [kPlusSign](#),
[kStar](#), [kDash](#), [kForwardSlash](#), [kLessThan](#),
[kLessThanEqual](#), [kGreaterThan](#), [kGreaterThanEqual](#), [kEqualsEquals](#),
[kNotEquals](#), [kAndOp](#), [kOrOp](#), [kNotOp](#),
[kEndOfFile](#), [kLexicalError](#) }

Functions

- char * [ReadInputFromFile](#) (const char *filename)
- char * [ReadInput](#) (int argc, char **argv)
- regex_t * [make_regex](#) (const char *pattern)
- int [match_regex](#) (regex_t *re, const char *text)
- int [consume_whitespace_and_comments](#) (regex_t *whiteSpace, regex_t *block_comment, regex_t *line_↵
comment, const char *text)

Variables

- const int `kRegexNSub` = 1

6.4.1 Typedef Documentation

6.4.1.1 TokenType

```
typedef enum kTokenEnumType fcal::scanner::TokenType
```

Definition at line 88 of file iter2scanner.h.

6.4.2 Enumeration Type Documentation

6.4.2.1 kTokenEnumType [1/2]

```
enum fcal::scanner::kTokenEnumType
```

Enumerator

kIntKwd	
kFloatKwd	
kBoolKwd	
kTrueKwd	
kFalseKwd	
kStringKwd	
kMatrixKwd	
kLetKwd	
kInKwd	
kEndKwd	
kIfKwd	
kThenKwd	
kElseKwd	
kRepeatKwd	
kWhileKwd	
kPrintKwd	
kToKwd	
kIntConst	
kFloatConst	
kStringConst	
kVariableName	
kLeftParen	
kRightParen	
kLeftCurly	

Enumerator

kRightCurly	
kLeftSquare	
kRightSquare	
kSemiColon	
kColon	
kAssign	
kPlusSign	
kStar	
kDash	
kForwardSlash	
kLessThan	
kLessThanEqual	
kGreaterThan	
kGreaterThanEqual	
kEqualsEquals	
kNotEquals	
kAndOp	
kOrOp	
kNotOp	
kEndOfFile	
kLexicalError	
kIntKwd	
kFloatKwd	
kBoolKwd	
kTrueKwd	
kFalseKwd	
kStringKwd	
kMatrixKwd	
kLetKwd	
kInKwd	
kEndKwd	
kIfKwd	
kThenKwd	
kElseKwd	
kRepeatKwd	
kWhileKwd	
kPrintKwd	
kToKwd	
kIntConst	
kFloatConst	
kStringConst	
kVariableName	
kLeftParen	
kRightParen	
kLeftCurly	
kRightCurly	
kLeftSquare	
kRightSquare	
kSemiColon	

Enumerator

kColon	
kAssign	
kPlusSign	
kStar	
kDash	
kForwardSlash	
kLessThan	
kLessThanEqual	
kGreaterThan	
kGreaterThanEqual	
kEqualsEquals	
kNotEquals	
kAndOp	
kOrOp	
kNotOp	
kEndOfFile	
kLexicalError	

Definition at line 29 of file scanner.h.

6.4.2.2 kTokenEnumType [2/2]

```
enum fcal::scanner::kTokenEnumType
```

Enumerator

kIntKwd	
kFloatKwd	
kBoolKwd	
kTrueKwd	
kFalseKwd	
kStringKwd	
kMatrixKwd	
kLetKwd	
kInKwd	
kEndKwd	
kIfKwd	
kThenKwd	
kElseKwd	
kRepeatKwd	
kWhileKwd	
kPrintKwd	
kToKwd	
kIntConst	
kFloatConst	
kStringConst	
kVariableName	

Enumerator

kLeftParen	
kRightParen	
kLeftCurly	
kRightCurly	
kLeftSquare	
kRightSquare	
kSemiColon	
kColon	
kAssign	
kPlusSign	
kStar	
kDash	
kForwardSlash	
kLessThan	
kLessThanEqual	
kGreaterThan	
kGreaterThanEqual	
kEqualsEquals	
kNotEquals	
kAndOp	
kOrOp	
kNotOp	
kEndOfFile	
kLexicalError	
kIntKwd	
kFloatKwd	
kBoolKwd	
kTrueKwd	
kFalseKwd	
kStringKwd	
kMatrixKwd	
kLetKwd	
kInKwd	
kEndKwd	
kIfKwd	
kThenKwd	
kElseKwd	
kRepeatKwd	
kWhileKwd	
kPrintKwd	
kToKwd	
kIntConst	
kFloatConst	
kStringConst	
kVariableName	
kLeftParen	
kRightParen	
kLeftCurly	
kRightCurly	

Enumerator

kLeftSquare	
kRightSquare	
kSemiColon	
kColon	
kAssign	
kPlusSign	
kStar	
kDash	
kForwardSlash	
kLessThan	
kLessThanEqual	
kGreaterThan	
kGreaterThanEqual	
kEqualsEquals	
kNotEquals	
kAndOp	
kOrOp	
kNotOp	
kEndOfFile	
kLexicalError	

Definition at line 31 of file iter2scanner.h.

6.4.3 Function Documentation

6.4.3.1 consume_whitespace_and_comments()

```
int fcal::scanner::consume_whitespace_and_comments (
    regex_t * white_space,
    regex_t * block_comment,
    regex_t * line_comment,
    const char * text )
```

Consumes whitespace, block comment, and line comments given their regexes

Parameters

<i>whiteSpace</i>	whitespace regex
<i>block_comment</i>	block comment regex
<i>line_comment</i>	line comment regex
<i>text</i>	text ta match

Definition at line 319 of file scanner.cc.

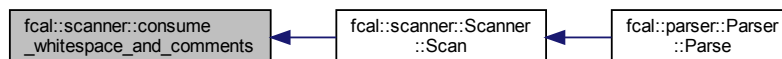
References `match_regex()`.

Referenced by fcal::scanner::Scanner::Scan().

Here is the call graph for this function:



Here is the caller graph for this function:



6.4.3.2 make_regex()

```
regex_t * fcal::scanner::make_regex (
    const char * pattern )
```

Returns a regex pointer given a pattern

Parameters

<i>pattern</i>	Pattern to build regex for
----------------	----------------------------

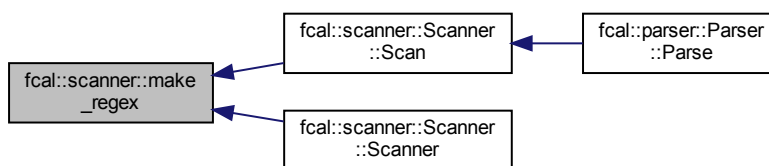
Returns

Regex if able to construct, else nullptr

Definition at line 35 of file regex.cc.

Referenced by fcal::scanner::Scanner::Scan(), and fcal::scanner::Scanner::Scanner().

Here is the caller graph for this function:



6.4.3.3 match_regex()

```
int fcal::scanner::match_regex (
    regex_t * re,
    const char * text )
```

Matches regex

Parameters

<i>re</i>	Regex to match
<i>text</i>	Text to match

Returns

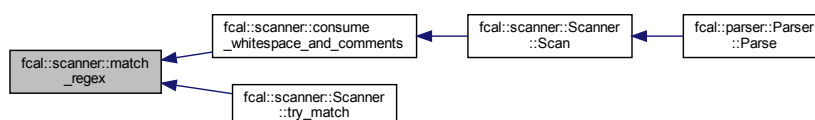
0 if unable to match, else length of match

Definition at line 64 of file `regex.cc`.

References `kRegexNSub`.

Referenced by `consume_whitespace_and_comments()`, and `fcal::scanner::Scanner::try_match()`.

Here is the caller graph for this function:



6.4.3.4 ReadInput()

```
char * fcal::scanner::ReadInput (
    int argc,
    char ** argv )
```

[ReadInput\(\)](#) - Read a file into a char buffer. The calling function is responsible for disposing of the return memory.

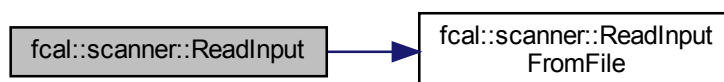
Returns

char* - The buffer, or nullptr if an error occurred.

Definition at line 73 of file read_input.cc.

References [ReadInputFromFile\(\)](#).

Here is the call graph for this function:



6.4.3.5 ReadInputFromFile()

```
char * fcal::scanner::ReadInputFromFile (
    const char * filename )
```

Definition at line 34 of file read_input.cc.

Referenced by [ReadInput\(\)](#).

Here is the caller graph for this function:



6.4.4 Variable Documentation

6.4.4.1 kRegexNSub

```
const int fcal::scanner::kRegexNSub = 1
```

Definition at line 28 of file regex.h.

Referenced by `match_regex()`.

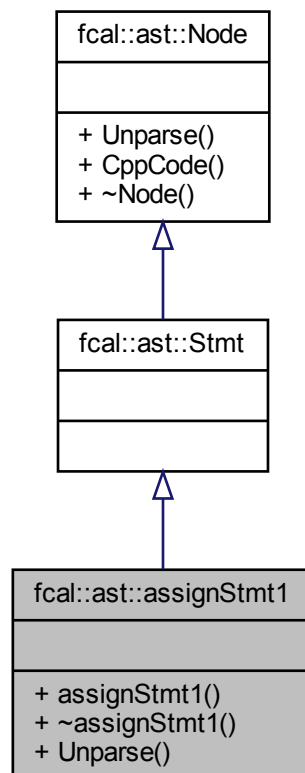
Chapter 7

Class Documentation

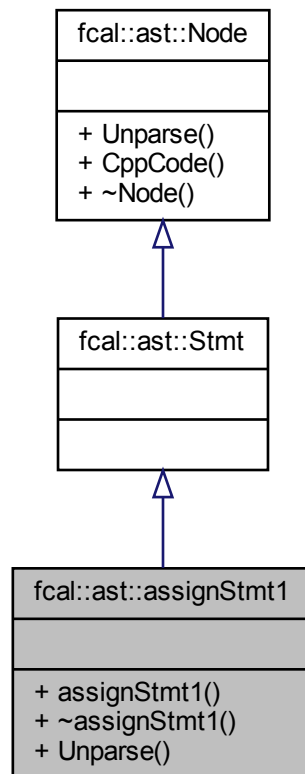
7.1 fcal::ast::assignStmt1 Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::assignStmt1:



Collaboration diagram for `fcgal::ast::assignStmt1`:



Public Member Functions

- `assignStmt1` (`varName *`, `Expr *`)
- `~assignStmt1` ()
- `std::string Unparse` (void)
- virtual `std::string CppCode` (void)

7.1.1 Detailed Description

Definition at line 140 of file `ast.h`.

7.1.2 Constructor & Destructor Documentation

7.1.2.1 assignStmt1()

```
fcal::ast::assignStmt1::assignStmt1 (
    varName * v1,
    Expr * e1 )
```

Definition at line 186 of file ast.cc.

7.1.2.2 ~assignStmt1()

```
fcal::ast::assignStmt1::~~assignStmt1 ( )
```

assignStmt Destructor

Definition at line 194 of file ast.cc.

7.1.3 Member Function Documentation

7.1.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.1.3.2 Unparse()

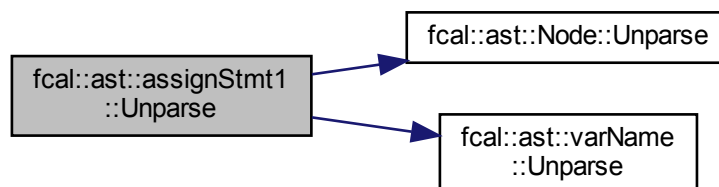
```
std::string fcal::ast::assignStmt1::Unparse (
    void ) [virtual]
```

Implements [fcal::ast::Node](#).

Definition at line 199 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#), and [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



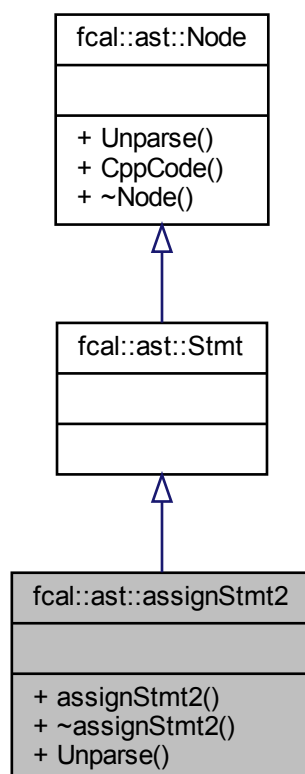
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

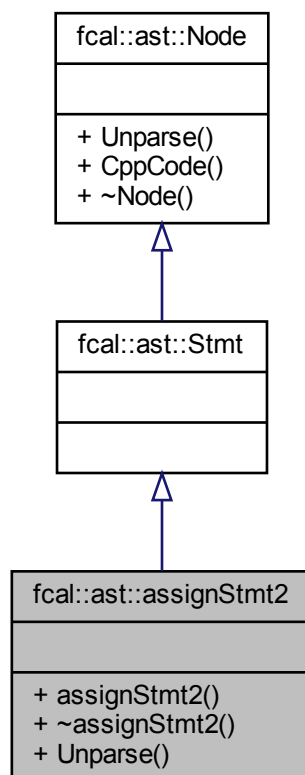
7.2 fcal::ast::assignStmt2 Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::assignStmt2:



Collaboration diagram for fcal::ast::assignStmt2:



Public Member Functions

- [assignStmt2](#) (varName *, Expr *, Expr *, Expr *)
- [~assignStmt2](#) ()
- std::string [Unparse](#) (void)
- virtual std::string [CppCode](#) (void)

7.2.1 Detailed Description

Definition at line 151 of file ast.h.

7.2.2 Constructor & Destructor Documentation

7.2.2.1 assignStmt2()

```
fcal::ast::assignStmt2::assignStmt2 (
    varName * v1,
    Expr * e1,
    Expr * e2,
    Expr * e3 )
```

Definition at line 204 of file ast.cc.

7.2.2.2 ~assignStmt2()

```
fcal::ast::assignStmt2::~~assignStmt2 ( )
```

assignStmt Destructor

Definition at line 214 of file ast.cc.

7.2.3 Member Function Documentation

7.2.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.2.3.2 Unparse()

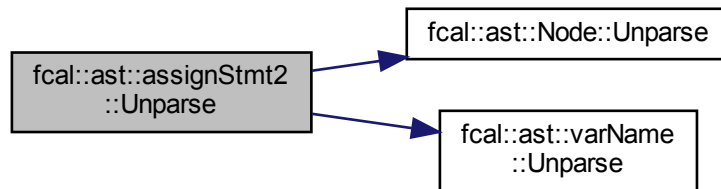
```
std::string fcal::ast::assignStmt2::Unparse (
    void ) [virtual]
```

Implements [fcal::ast::Node](#).

Definition at line 221 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#), and [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



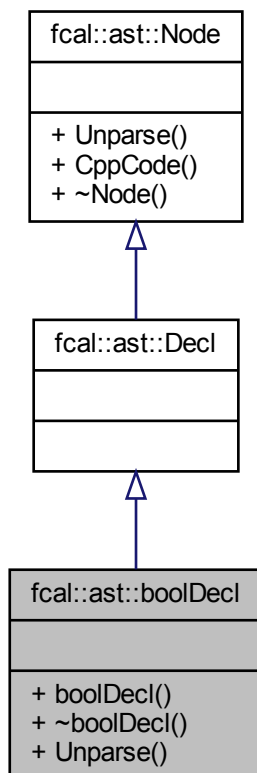
The documentation for this class was generated from the following files:

- include/[ast.h](#)
- src/[ast.cc](#)

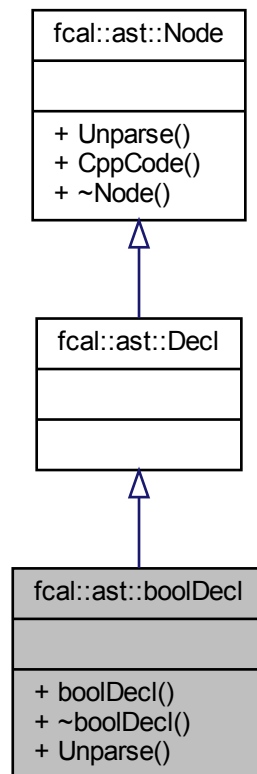
7.3 fcal::ast::boolDecl Class Reference

```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::boolDecl`:



Collaboration diagram for fcal::ast::boolDecl:



Public Member Functions

- [boolDecl](#) ([varName](#) *)
- [~boolDecl](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.3.1 Detailed Description

Definition at line 243 of file ast.h.

7.3.2 Constructor & Destructor Documentation

7.3.2.1 boolDecl()

```
fcal::ast::boolDecl::boolDecl (
    varName * v1 ) [explicit]
```

[boolDecl](#) Constructor

Definition at line 368 of file ast.cc.

7.3.2.2 ~boolDecl()

```
fcal::ast::boolDecl::~~boolDecl ( )
```

[boolDecl](#) Destructor

Definition at line 373 of file ast.cc.

7.3.3 Member Function Documentation

7.3.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.3.3.2 Unparse()

```
std::string fcal::ast::boolDecl::Unparse (
    void ) [virtual]
```

[boolDecl](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 378 of file ast.cc.

References [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



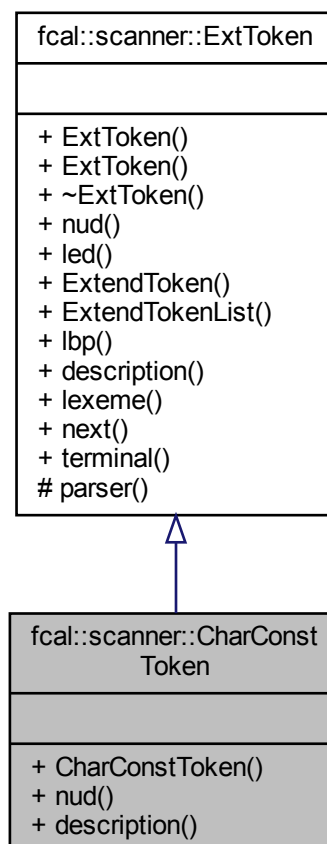
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

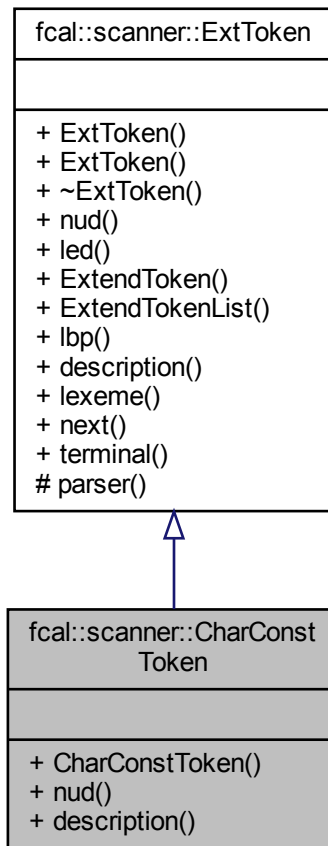
7.4 fcal::scanner::CharConstToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::CharConstToken:



Collaboration diagram for `fcsl::scanner::CharConstToken`:



Public Member Functions

- `CharConstToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `virtual int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.4.1 Detailed Description

Definition at line 127 of file ext_token.h.

7.4.2 Constructor & Destructor Documentation

7.4.2.1 CharConstToken()

```
fcal::scanner::CharConstToken::CharConstToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 129 of file ext_token.h.

7.4.3 Member Function Documentation

7.4.3.1 description()

```
std::string fcal::scanner::CharConstToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 131 of file ext_token.h.

7.4.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

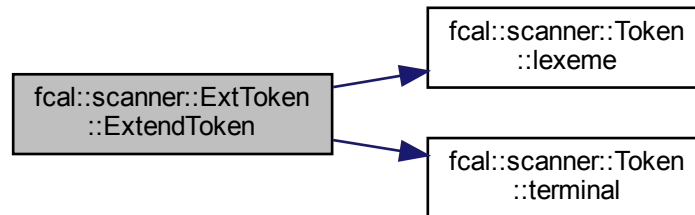
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

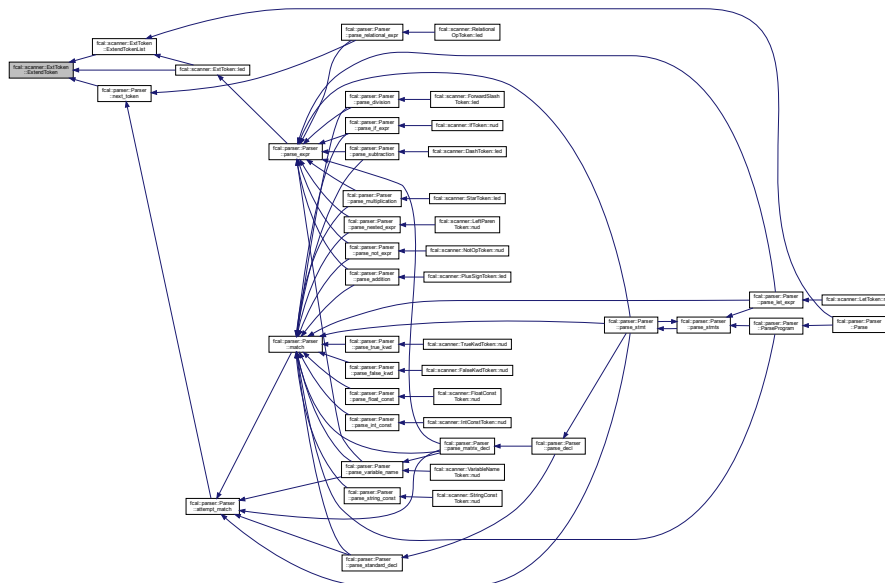
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:



7.4.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```

Definition at line 136 of file ext_token.cc.

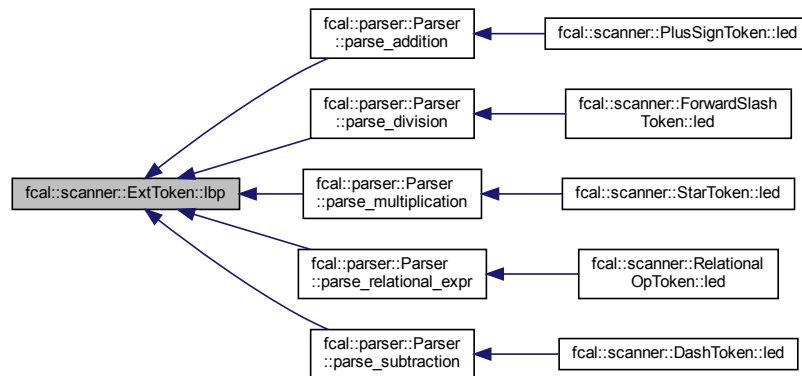
Referenced by `fcsl::scanner::ExtToken::led()`, and `fcsl::parser::Parser::Parse()`.

```

graph LR
    A[fcal::scanner::ExtToken ::ExtendTokenList] --> B[fcal::scanner::ExtToken ::ExtendToken]
    B --> C[fcal::scanner::Token ::lexeme]
    B --> D[fcal::scanner::Token ::terminal]
    B --> E[fcal::scanner::Token ::next]
  
```

Generated by Doxygen

Here is the caller graph for this function:



7.4.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

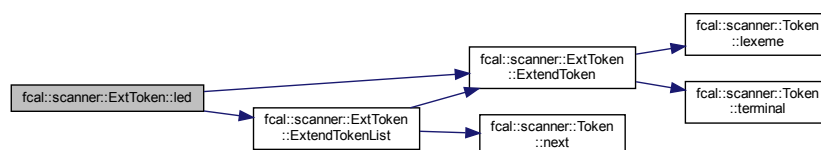
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

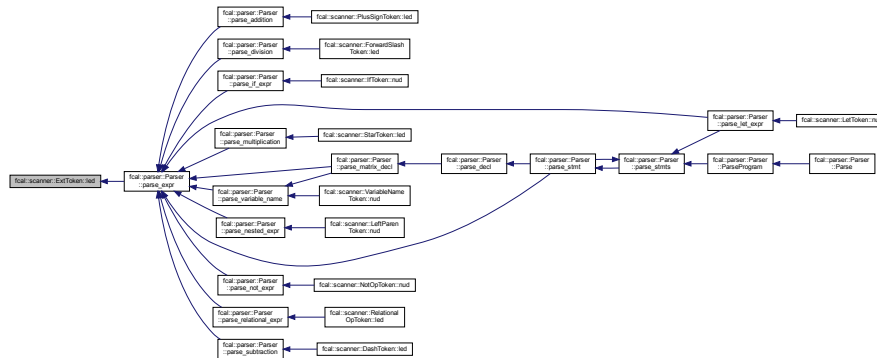
References `fcal::scanner::ExtToken::ExtendToken()`, and `fcal::scanner::ExtToken::ExtendTokenList()`.

Referenced by `fcal::parser::Parser::parse_expr()`.

Here is the call graph for this function:



Here is the caller graph for this function:



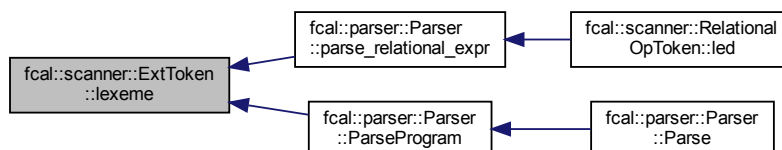
7.4.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file ext_token.h.

Referenced by fcal::parser::Parser::parse_float_const(), fcal::parser::Parser::parse_int_const(), fcal::parser::Parser::parse_matrix_decl(), fcal::parser::Parser::parse_relational_expr(), fcal::parser::Parser::parse_standard_decl(), fcal::parser::Parser::parse_stmt(), fcal::parser::Parser::parse_string_const(), fcal::parser::Parser::parse_variable_name(), and fcal::parser::Parser::ParseProgram().

Here is the caller graph for this function:



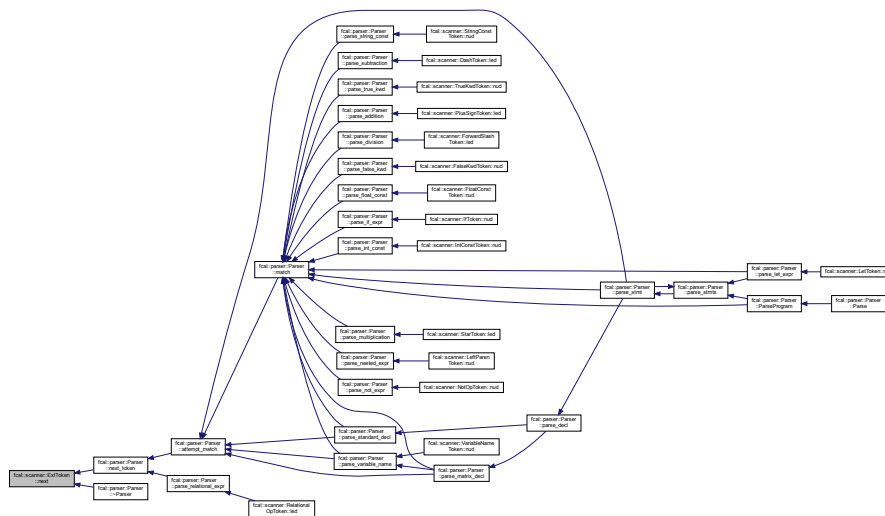
7.4.3.7 next()

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Definition at line 58 of file ext_token.h.

Referenced by `fcgal::parser::Parser::next_token()`, and `fcgal::parser::Parser::~~Parser()`.

Here is the caller graph for this function:



7.4.3.8 nud()

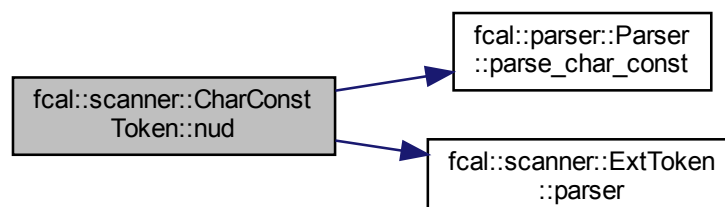
```
parser::ParseResult fcgal::scanner::CharConstToken::nud (
    void ) [inline], [virtual]
```

Reimplemented from [fcgal::scanner::ExtToken](#).

Definition at line 130 of file `ext_token.h`.

References `fcgal::parser::Parser::parse_char_const()`, and `fcgal::scanner::ExtToken::parser()`.

Here is the call graph for this function:



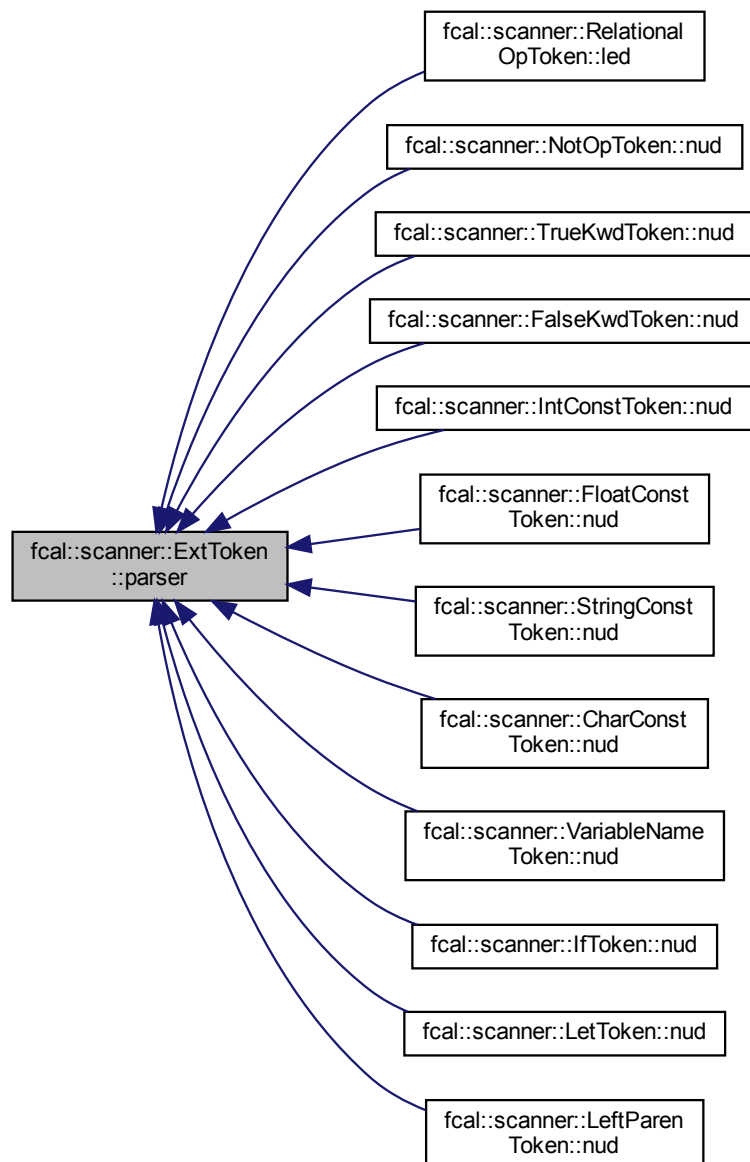
7.4.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

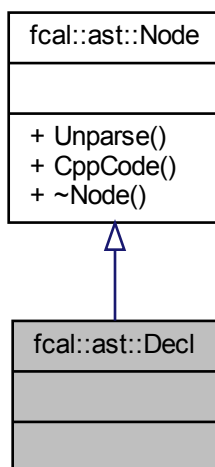
Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:



Collaboration diagram for fcal::ast::Decl:



Public Member Functions

- virtual std::string [Unparse](#) (void)=0
- virtual std::string [CppCode](#) (void)

7.5.1 Detailed Description

Definition at line 48 of file ast.h.

7.5.2 Member Function Documentation

7.5.2.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

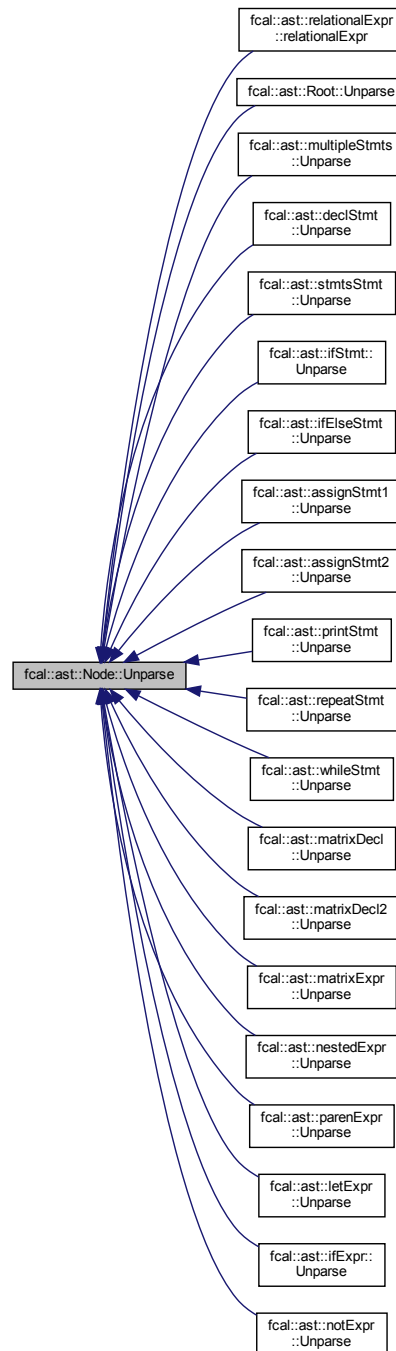
7.5.2.2 Unparse()

```
virtual std::string fcal::ast::Node::Unparse (
    void ) [pure virtual], [inherited]
```

Implemented in [fcal::ast::notExpr](#), [fcal::ast::ifExpr](#), [fcal::ast::letExpr](#), [fcal::ast::parenExpr](#), [fcal::ast::nestedExpr](#), [fcal::ast::matrixExpr](#), [fcal::ast::relationalExpr](#), [fcal::ast::falseExpr](#), [fcal::ast::trueExpr](#), [fcal::ast::stringExpr](#), [fcal::ast::floatExpr](#), [fcal::ast::intExpr](#), [fcal::ast::varNameExpr](#), [fcal::ast::matrixDecl2](#), [fcal::ast::matrixDecl](#), [fcal::ast::boolDecl](#), [fcal::ast::stringDecl](#), [fcal::ast::floatDecl](#), [fcal::ast::intDecl](#), [fcal::ast::semiColonStmt](#), [fcal::ast::whileStmt](#), [fcal::ast::repeatStmt](#), [fcal::ast::printStmt](#), [fcal::ast::assignStmt2](#), [fcal::ast::assignStmt1](#), [fcal::ast::ifElseStmt](#), [fcal::ast::ifStmt](#), [fcal::ast::stmtsStmt](#), [fcal::ast::declStmt](#), [fcal::ast::multipleStmts](#), [fcal::ast::emptyStmts](#), [fcal::ast::Root](#), and [fcal::ast::varName](#).

Referenced by [fcal::ast::relationalExpr::relationalExpr\(\)](#), [fcal::ast::Root::Unparse\(\)](#), [fcal::ast::multipleStmts::Unparse\(\)](#), [fcal::ast::declStmt::Unparse\(\)](#), [fcal::ast::stmtsStmt::Unparse\(\)](#), [fcal::ast::ifStmt::Unparse\(\)](#), [fcal::ast::ifElseStmt::Unparse\(\)](#), [fcal::ast::assignStmt1::Unparse\(\)](#), [fcal::ast::assignStmt2::Unparse\(\)](#), [fcal::ast::printStmt::Unparse\(\)](#), [fcal::ast::repeatStmt::Unparse\(\)](#), [fcal::ast::whileStmt::Unparse\(\)](#), [fcal::ast::matrixDecl::Unparse\(\)](#), [fcal::ast::matrixDecl2::Unparse\(\)](#), [fcal::ast::matrixExpr::Unparse\(\)](#), [fcal::ast::nestedExpr::Unparse\(\)](#), [fcal::ast::parenExpr::Unparse\(\)](#), [fcal::ast::letExpr::Unparse\(\)](#), [fcal::ast::ifExpr::Unparse\(\)](#), and [fcal::ast::notExpr::Unparse\(\)](#).

Here is the caller graph for this function:



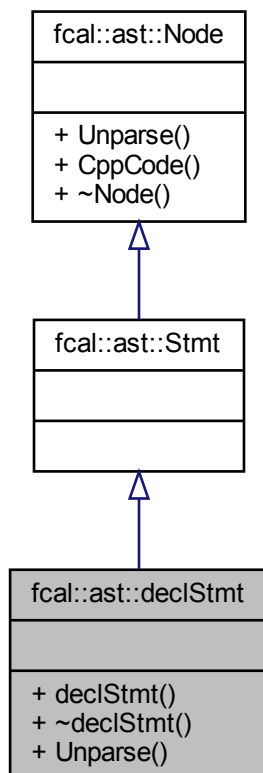
The documentation for this class was generated from the following file:

- [include/ast.h](#)

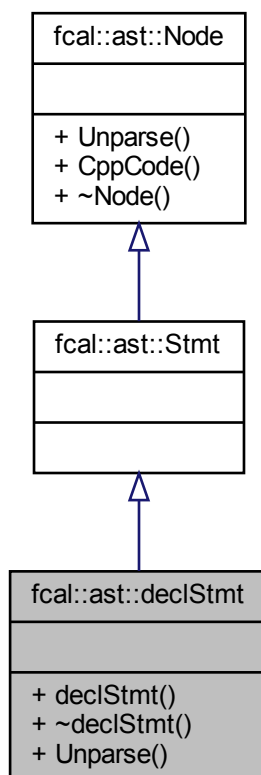
7.6 fcal::ast::declStmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for `fcab::ast::declStmt`:



Collaboration diagram for fcal::ast::declStmt:



Public Member Functions

- [declStmt](#) ([Decl](#) *)
- [~declStmt](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.6.1 Detailed Description

Definition at line 92 of file `ast.h`.

7.6.2 Constructor & Destructor Documentation

7.6.2.1 declStmt()

```
fcal::ast::declStmt::declStmt (
    Decl * d1 ) [explicit]
```

[declStmt](#) Constructor

Definition at line 106 of file ast.cc.

7.6.2.2 ~declStmt()

```
fcal::ast::declStmt::~~declStmt ( )
```

[declStmt](#) Destructor

Definition at line 111 of file ast.cc.

7.6.3 Member Function Documentation

7.6.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.6.3.2 Unparse()

```
std::string fcal::ast::declStmt::Unparse (
    void ) [virtual]
```

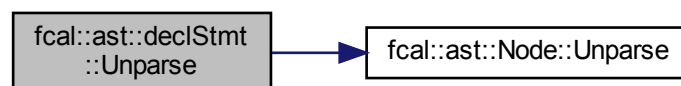
[declStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 116 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



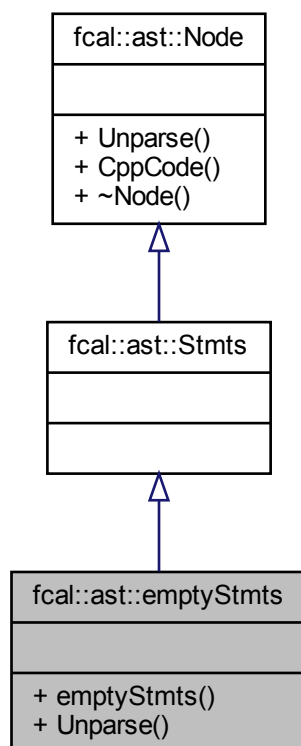
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

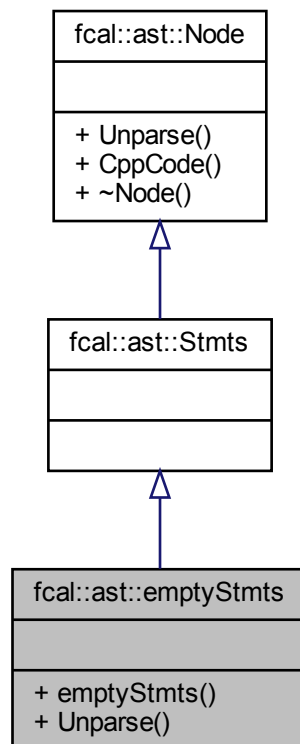
7.7 fcal::ast::emptyStmts Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::emptyStmts:



Collaboration diagram for `fcal::ast::emptyStmts`:



Public Member Functions

- [emptyStmts](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.7.1 Detailed Description

Definition at line 71 of file `ast.h`.

7.7.2 Constructor & Destructor Documentation

7.7.2.1 emptyStmts()

```
fcal::ast::emptyStmts::emptyStmts ( )
```

[emptyStmts](#) Constructor

Definition at line 71 of file `ast.cc`.

7.7.3 Member Function Documentation

7.7.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.7.3.2 Unparse()

```
std::string fcal::ast::emptyStmts::Unparse (
    void ) [virtual]
```

[emptyStmts](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 75 of file ast.cc.

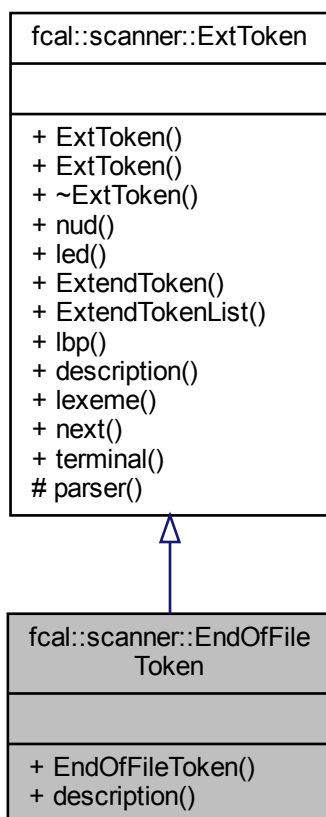
The documentation for this class was generated from the following files:

- include/[ast.h](#)
- src/[ast.cc](#)

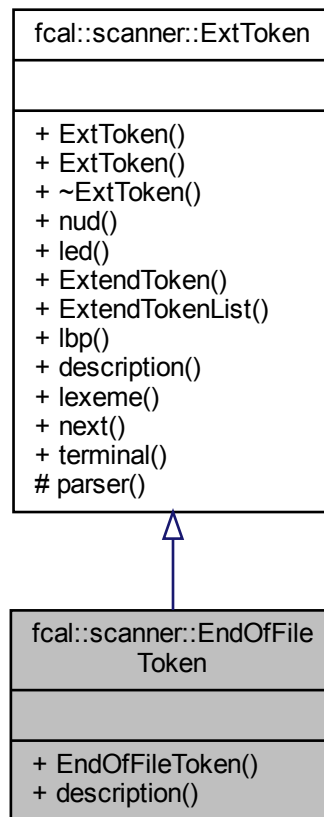
7.8 fcal::scanner::EndOfFileToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::EndOfFileToken:



Collaboration diagram for fcal::scanner::EndOfFileToken:



Public Member Functions

- `EndOfFileToken (parser::Parser *p, Token *t)`
- `std::string description ()`
- `virtual parser::ParseResult nud (void)`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `virtual int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.8.1 Detailed Description

Definition at line 222 of file ext_token.h.

7.8.2 Constructor & Destructor Documentation

7.8.2.1 EndOfFileToken()

```
fcal::scanner::EndOfFileToken::EndOfFileToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 224 of file ext_token.h.

7.8.3 Member Function Documentation

7.8.3.1 description()

```
std::string fcal::scanner::EndOfFileToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 225 of file ext_token.h.

7.8.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

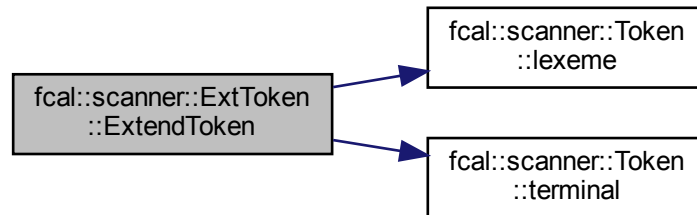
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

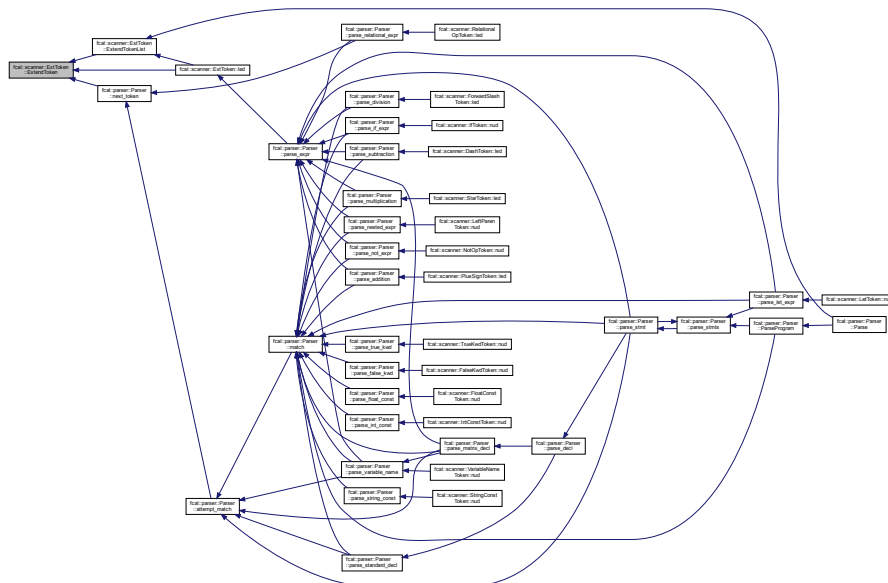
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:



7.8.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```

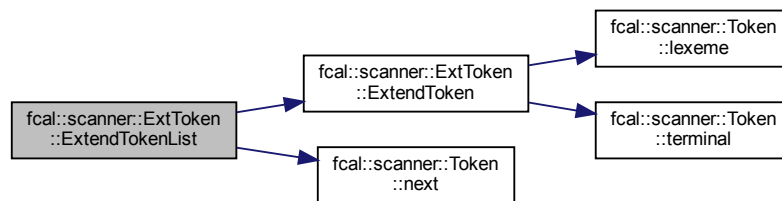
Create Extended token list from tokens

Definition at line 136 of file ext_token.cc.

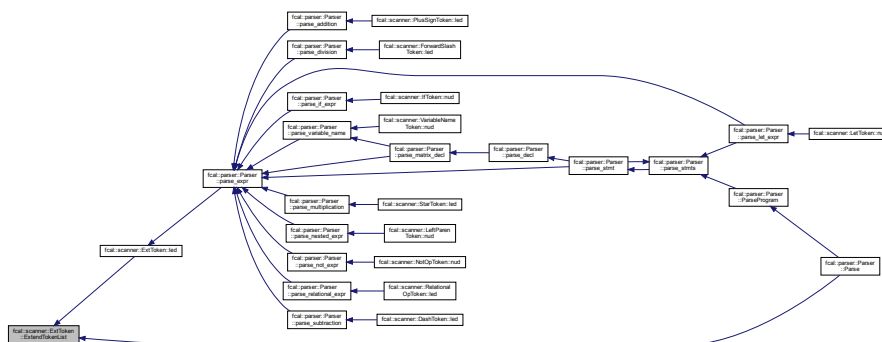
References `fcal::scanner::ExtToken::ExtendToken()`, and `fcal::scanner::Token::next()`.

Referenced by `fcal::scanner::ExtToken::led()`, and `fcal::parser::Parser::Parse()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.8.3.4 lbp()

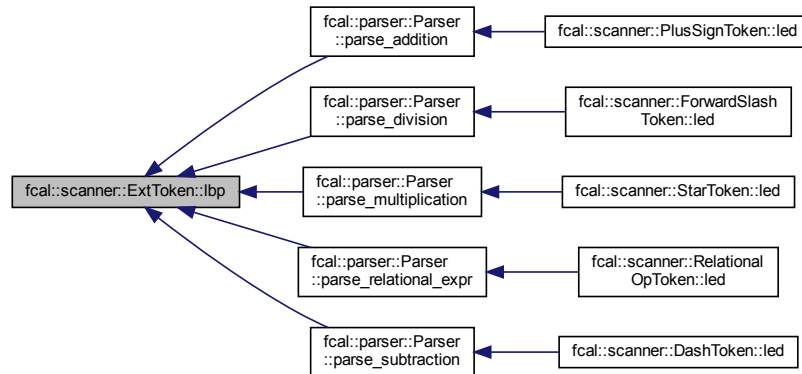
```
virtual int fcal::scanner::ExtToken::lbp ( ) [inline], [virtual], [inherited]
```

Reimplemented in `fcal::scanner::RelationalOpToken`, `fcal::scanner::LeftParenToken`, `fcal::scanner::LetToken`, and `fcal::scanner::IfToken`.

Definition at line 55 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_relational_expr()`.

Here is the caller graph for this function:



7.8.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

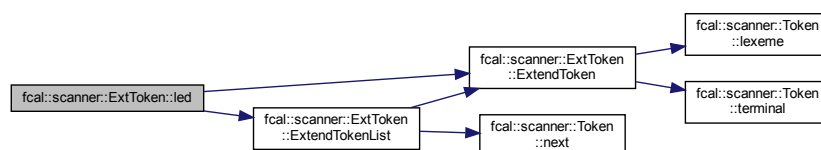
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

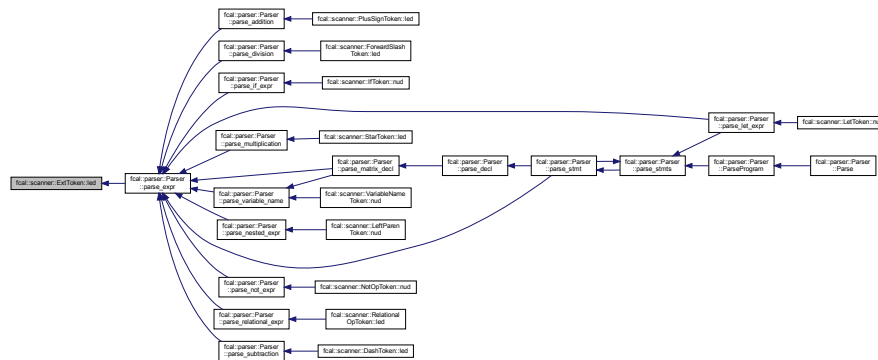
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



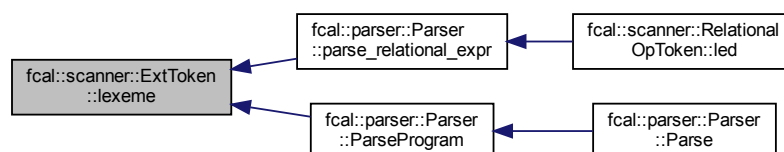
7.8.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_float_const()`, `fcal::parser::Parser::parse_int_const()`, `fcal::parser::Parser::parse_matrix_decl()`, `fcal::parser::Parser::parse_relational_expr()`, `fcal::parser::Parser::parse_standard_decl()`, `fcal::parser::Parser::parse_stmt()`, `fcal::parser::Parser::parse_string_const()`, `fcal::parser::Parser::parse_variable_name()`, and `fcal::parser::Parser::ParseProgram()`.

Here is the caller graph for this function:

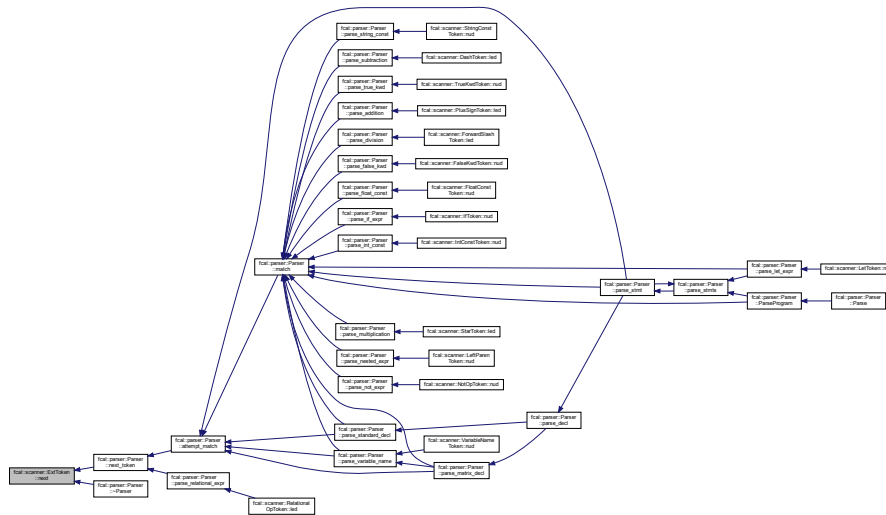


7.8.3.7 next()

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Definition at line 58 of file ext_token.h.

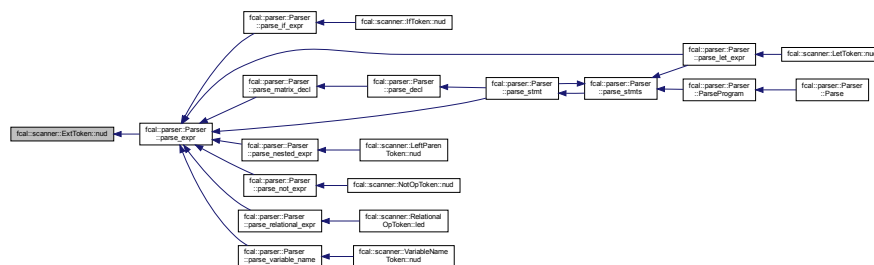
Here is the caller graph for this function:



```
virtual parser::ParseResult fcal::scanner::ExtToken::nud (
    void ) [inline], [virtual], [inherited]
```

Definition at line 49 of file ext_token.h.

Here is the caller graph for this function:



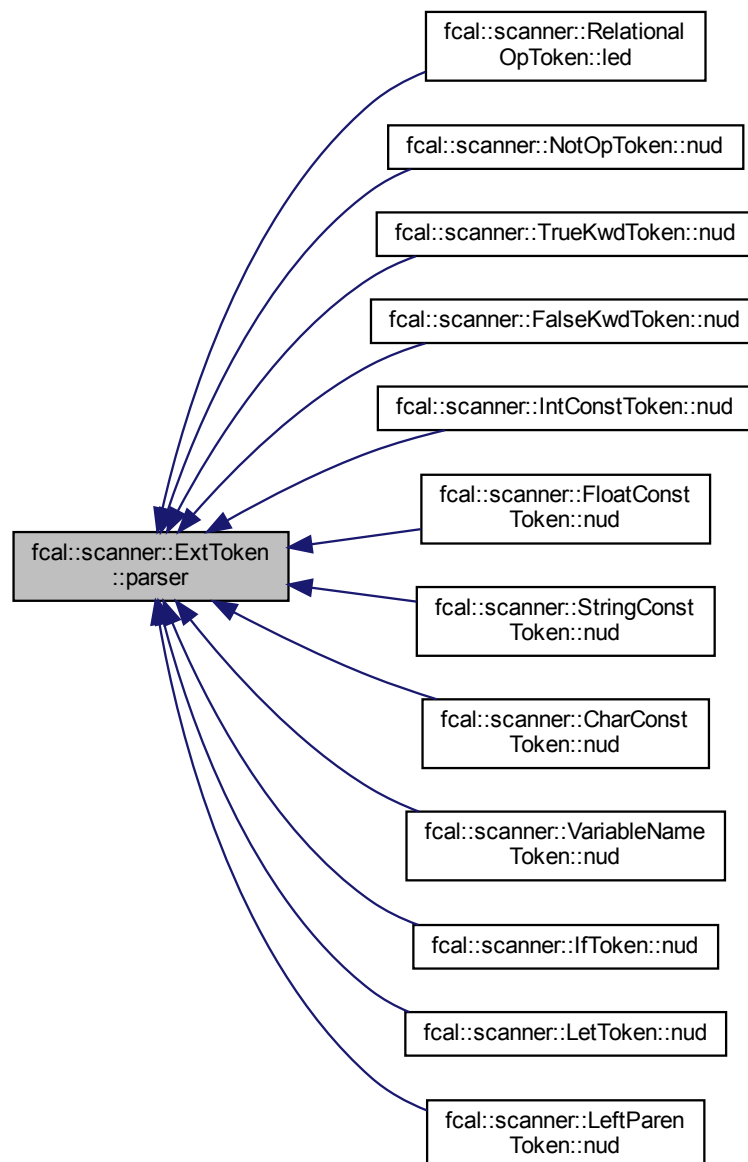
7.8.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:



```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]
```

Referenced by `fcall::parser::Parser::attempt_match()`, `fcall::parser::Parser::next_is()`, `fcall::parser::Parser::next_↵
token()`, and `fcall::parser::Parser::parse_stmt()`.

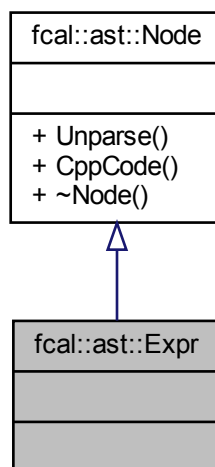
[illegible]

- `include/ext_token.h`

```
#include <ast.h>
```

[illegible]

Collaboration diagram for `fcgal::ast::Expr`:



Public Member Functions

- virtual `std::string` [Unparse](#) (void)=0
- virtual `std::string` [CppCode](#) (void)

7.9.1 Detailed Description

Definition at line 51 of file `ast.h`.

7.9.2 Member Function Documentation

7.9.2.1 CppCode()

```
virtual std::string fcgal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file `ast.h`.

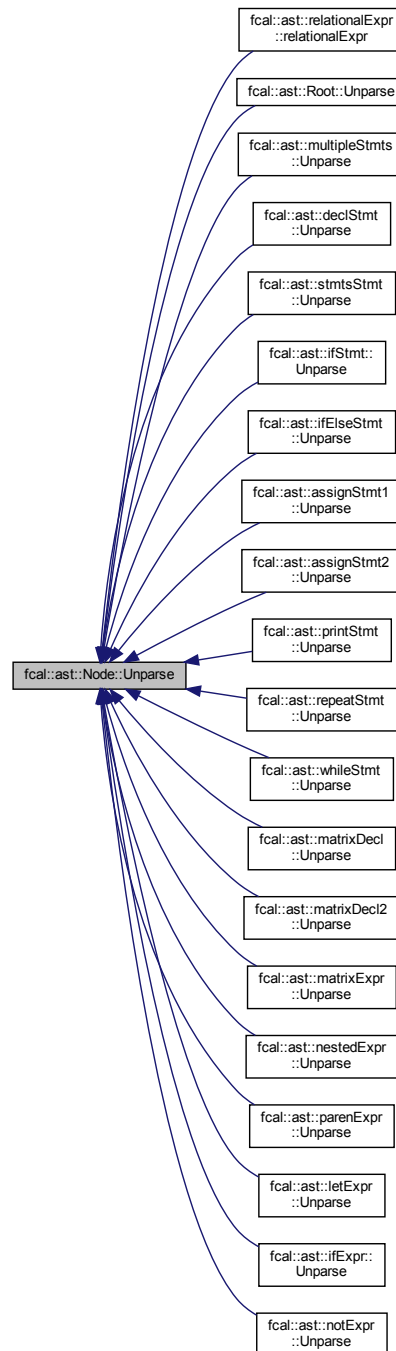
7.9.2.2 Unparse()

```
virtual std::string fcal::ast::Node::Unparse (
    void ) [pure virtual], [inherited]
```

Implemented in [fcal::ast::notExpr](#), [fcal::ast::ifExpr](#), [fcal::ast::letExpr](#), [fcal::ast::parenExpr](#), [fcal::ast::nestedExpr](#), [fcal::ast::matrixExpr](#), [fcal::ast::relationalExpr](#), [fcal::ast::falseExpr](#), [fcal::ast::trueExpr](#), [fcal::ast::stringExpr](#), [fcal::ast::floatExpr](#), [fcal::ast::intExpr](#), [fcal::ast::varNameExpr](#), [fcal::ast::matrixDecl2](#), [fcal::ast::matrixDecl](#), [fcal::ast::boolDecl](#), [fcal::ast::stringDecl](#), [fcal::ast::floatDecl](#), [fcal::ast::intDecl](#), [fcal::ast::semiColonStmt](#), [fcal::ast::whileStmt](#), [fcal::ast::repeatStmt](#), [fcal::ast::printStmt](#), [fcal::ast::assignStmt2](#), [fcal::ast::assignStmt1](#), [fcal::ast::ifElseStmt](#), [fcal::ast::ifStmt](#), [fcal::ast::stmtsStmt](#), [fcal::ast::declStmt](#), [fcal::ast::multipleStmts](#), [fcal::ast::emptyStmts](#), [fcal::ast::Root](#), and [fcal::ast::varName](#).

Referenced by [fcal::ast::relationalExpr::relationalExpr\(\)](#), [fcal::ast::Root::Unparse\(\)](#), [fcal::ast::multipleStmts::Unparse\(\)](#), [fcal::ast::declStmt::Unparse\(\)](#), [fcal::ast::stmtsStmt::Unparse\(\)](#), [fcal::ast::ifStmt::Unparse\(\)](#), [fcal::ast::ifElseStmt::Unparse\(\)](#), [fcal::ast::assignStmt1::Unparse\(\)](#), [fcal::ast::assignStmt2::Unparse\(\)](#), [fcal::ast::printStmt::Unparse\(\)](#), [fcal::ast::repeatStmt::Unparse\(\)](#), [fcal::ast::whileStmt::Unparse\(\)](#), [fcal::ast::matrixDecl::Unparse\(\)](#), [fcal::ast::matrixDecl2::Unparse\(\)](#), [fcal::ast::matrixExpr::Unparse\(\)](#), [fcal::ast::nestedExpr::Unparse\(\)](#), [fcal::ast::parenExpr::Unparse\(\)](#), [fcal::ast::letExpr::Unparse\(\)](#), [fcal::ast::ifExpr::Unparse\(\)](#), and [fcal::ast::notExpr::Unparse\(\)](#).

Here is the caller graph for this function:



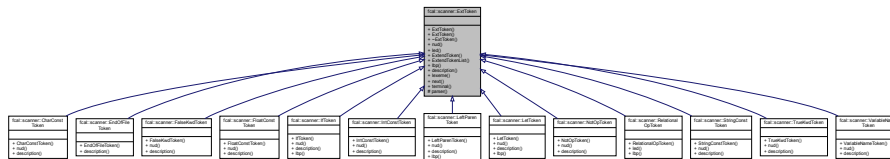
The documentation for this class was generated from the following file:

- [include/ast.h](#)

7.10 fcal::scanner::ExtToken Class Reference

```
#include <ext_token.h>
```


Inheritance diagram for fcal::scanner::ExtToken:



Collaboration diagram for fcal::scanner::ExtToken:



Public Member Functions

- [ExtToken](#) ([parser::Parser](#) *p, [Token](#) *t)
- [ExtToken](#) ([parser::Parser](#) *p, [Token](#) *t, [std::string](#) d)
- virtual [~ExtToken](#) ()
- virtual [parser::ParseResult](#) nud (void)
- virtual [parser::ParseResult](#) led ([parser::ParseResult](#) left)
- [ExtToken](#) * [ExtendToken](#) ([parser::Parser](#) *p, [Token](#) *tokens)
- [ExtToken](#) * [ExtendTokenList](#) ([parser::Parser](#) *p, [Token](#) *tokens)
- virtual int [lbp](#) ()
- virtual [std::string](#) [description](#) ()
- [std::string](#) [lexeme](#) (void) const
- [ExtToken](#) * [next](#) (void) const
- [scanner::TokenType](#) [terminal](#) (void) const

Protected Member Functions

- [parser::Parser](#) * [parser](#) (void)

7.10.1 Detailed Description

Definition at line 34 of file ext_token.h.

7.10.2 Constructor & Destructor Documentation

7.10.2.1 ExtToken() [1/2]

```
fcsl::scanner::ExtToken::ExtToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 36 of file ext_token.h.

7.10.2.2 ExtToken() [2/2]

```
fcsl::scanner::ExtToken::ExtToken (
    parser::Parser * p,
    Token * t,
    std::string d ) [inline]
```

Definition at line 42 of file ext_token.h.

7.10.2.3 ~ExtToken()

```
virtual fcsl::scanner::ExtToken::~~ExtToken ( ) [inline], [virtual]
```

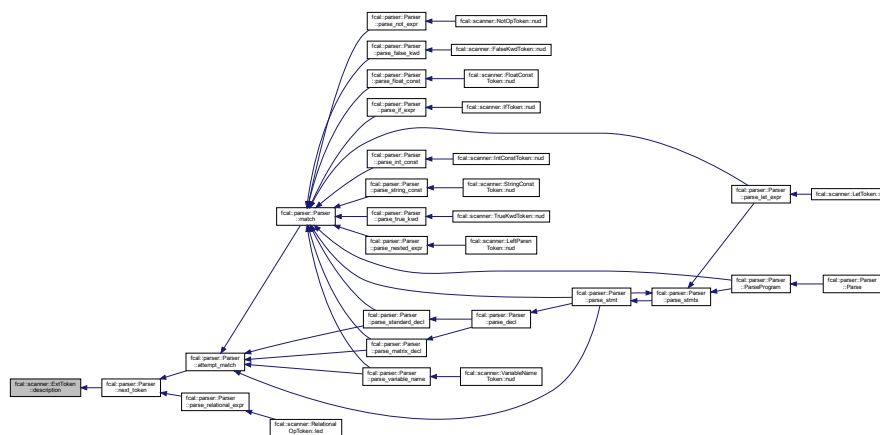
Definition at line 48 of file ext_token.h.

7.10.3 Member Function Documentation

```
virtual std::string fcal::scanner::ExtToken::description ( ) [inline], [virtual]
```

Definition at line 56 of file ext_token.h.

Here is the caller graph for this function:



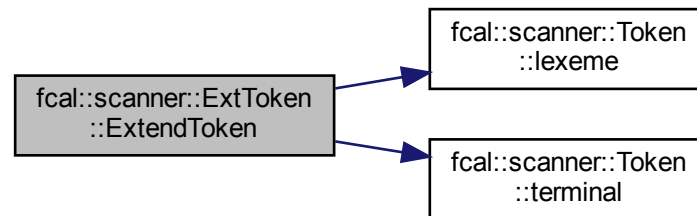
```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens )
```

Definition at line 31 of file ext_token.cc.

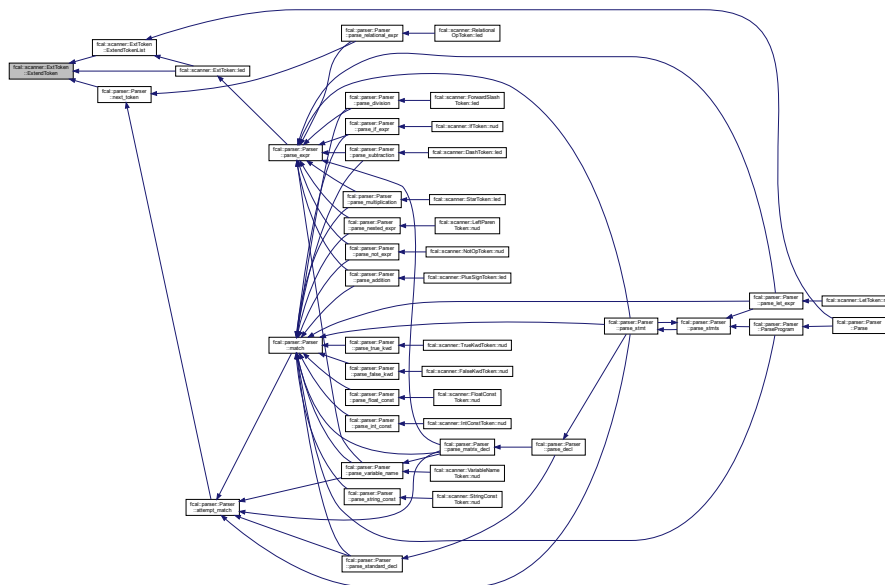
Generated by Doxygen

Referenced by `ExtendTokenList()`, `led()`, and `fcfcal::parser::Parser::next_token()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.10.3.3 ExtendTokenList()

```

ExtToken * fcfcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens )
  
```

Create Extended token list from tokens

Definition at line 136 of file `ext_token.cc`.

Referenced by `led()`, and `fcal::parser::Parser::Parse()`.

```
graph LR; A["fcal::scanner::ExtToken  
::ExtendTokenList"] --> B["fcal::scanner::ExtToken  
::ExtendToken"]; A --> C["fcal::scanner::Token  
::next"]; B --> D["fcal::scanner::Token  
::lexeme"]; B --> E["fcal::scanner::Token  
::terminal"];
```

The diagram illustrates the structure of the `fcal::scanner::ExtToken` and its relationships with other scanner components. It shows a central node `fcal::scanner::ExtToken::ExtendToken` which is pointed to by `fcal::scanner::ExtToken::ExtendTokenList`. This central node then points to two other nodes: `fcal::scanner::Token::lexeme` and `fcal::scanner::Token::terminal`. Additionally, `fcal::scanner::ExtToken::ExtendTokenList` points to `fcal::scanner::Token::next`.

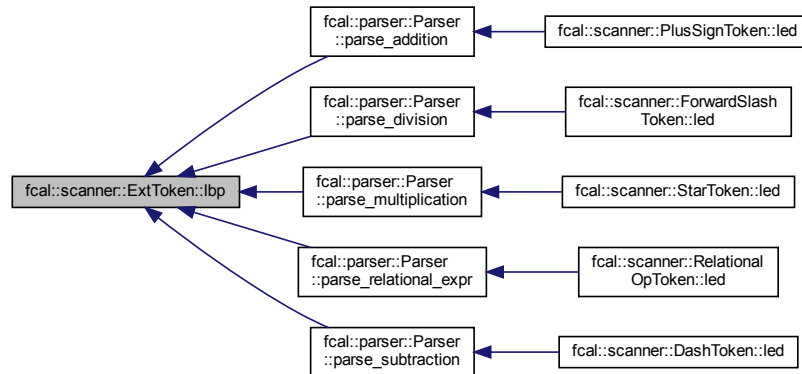
[illegible]

```
virtual int fcal::scanner::ExtToken::lbp ( ) [inline], [virtual]
```

Definition at line 55 of file ext_token.h.

Generated by Doxygen

Here is the caller graph for this function:



7.10.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual]
```

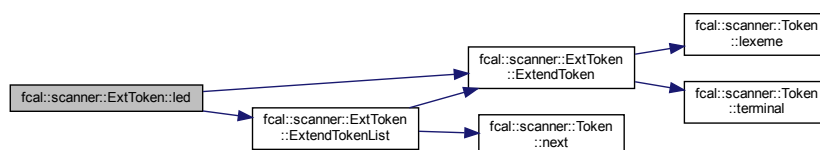
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

References `ExtendToken()`, and `ExtendTokenList()`.

Referenced by `fcal::parser::Parser::parse_expr()`.

Here is the call graph for this function:



[illegible]

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline]
```

Referenced by `fcsl::parser::Parser::parse_float_const()`, `fcsl::parser::Parser::parse_int_const()`, `fcsl::parser::Parser::parse_matrix_decl()`, `fcsl::parser::Parser::parse_relational_expr()`, `fcsl::parser::Parser::parse_standard_decl()`, `fcsl::parser::Parser::parse_stmt()`, `fcsl::parser::Parser::parse_string_const()`, `fcsl::parser::Parser::parse_variable_name()`, and `fcsl::parser::Parser::ParseProgram()`.

```

graph LR
    A["fcal::scanner::ExtToken  
::lexeme"]
    B["fcal::parser::Parser  
::parse_relational_expr"]
    C["fcal::scanner::Relational  
OpToken::led"]
    D["fcal::parser::Parser  
::ParseProgram"]
    E["fcal::parser::Parser  
::Parse"]

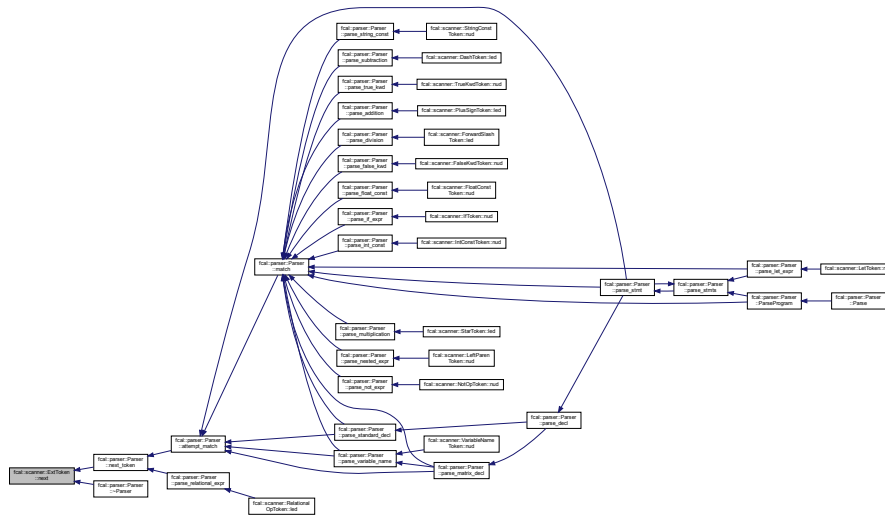
    C --> B
    E --> D
    D --> A
    B --> A
  
```

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline]
```

Generated by Doxygen

Referenced by `fcal::parser::Parser::next_token()`, and `fcal::parser::Parser::~~Parser()`.

Here is the caller graph for this function:



7.10.3.8 nud()

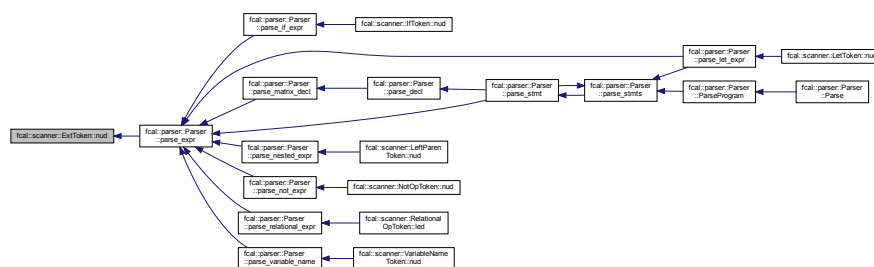
```
virtual parser::ParseResult fcal::scanner::ExtToken::nud (
    void ) [inline], [virtual]
```

Reimplemented in `fcal::scanner::LeftParenToken`, `fcal::scanner::LetToken`, `fcal::scanner::IfToken`, `fcal::scanner::VariableNameToken`, `fcal::scanner::CharConstToken`, `fcal::scanner::StringConstToken`, `fcal::scanner::FloatConstToken`, `fcal::scanner::IntConstToken`, `fcal::scanner::FalseKwdToken`, `fcal::scanner::TrueKwdToken`, and `fcal::scanner::NotOpToken`.

Definition at line 49 of file `ext_token.h`.

Referenced by `fcal::parser::Parser::parse_expr()`.

Here is the caller graph for this function:



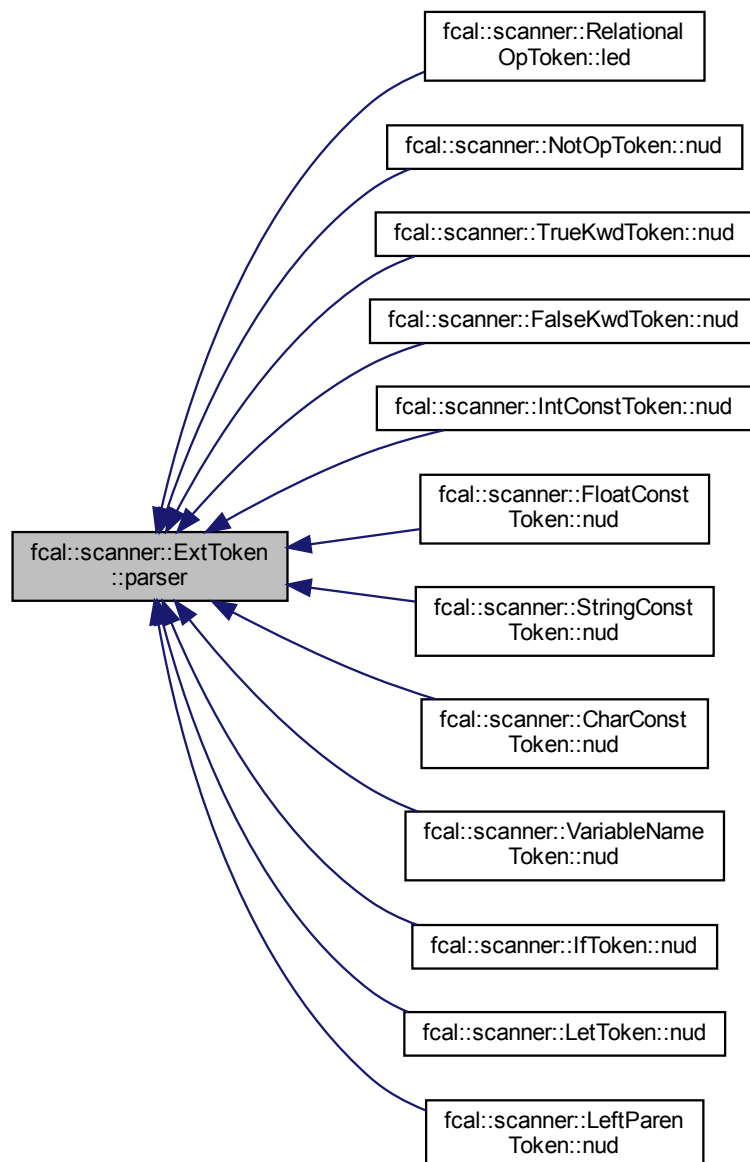
7.10.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected]
```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:



```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline]
```

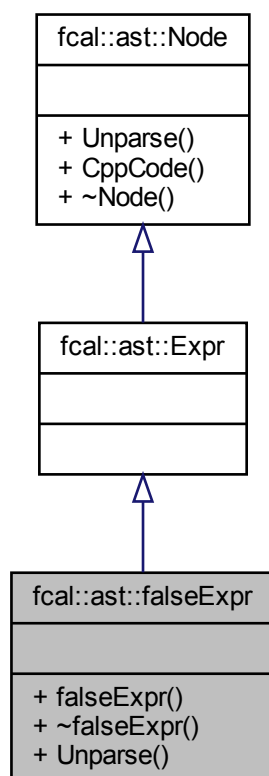
Referenced by `fcall::parser::Parser::attempt_match()`, `fcall::parser::Parser::next_is()`, `fcall::parser::Parser::next_token()`, and `fcall::parser::Parser::parse_stmt()`.

[illegible]

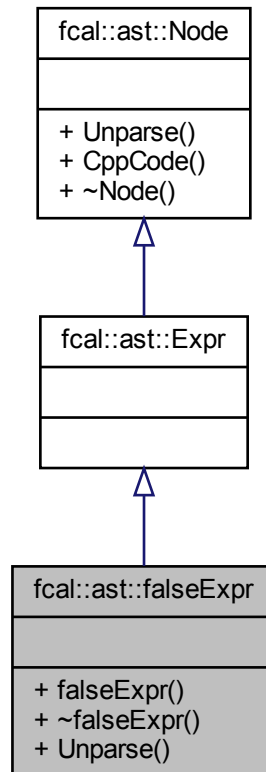
- `include/ext_token.h`
- `src/ext_token.cc`

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::falseExpr:



Collaboration diagram for `fcgal::ast::falseExpr`:



Public Member Functions

- [falseExpr](#) ()
- [~falseExpr](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.11.1 Detailed Description

Definition at line 334 of file `ast.h`.

7.11.2 Constructor & Destructor Documentation

7.11.2.1 falseExpr()

```
fcal::ast::falseExpr::falseExpr ( )
```

[falseExpr](#) Constructor

Definition at line 519 of file ast.cc.

7.11.2.2 ~falseExpr()

```
fcal::ast::falseExpr::~~falseExpr ( )
```

[falseExpr](#) Destructor

Definition at line 524 of file ast.cc.

7.11.3 Member Function Documentation

7.11.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.11.3.2 Unparse()

```
std::string fcal::ast::falseExpr::Unparse (
    void ) [virtual]
```

[falseExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 529 of file ast.cc.

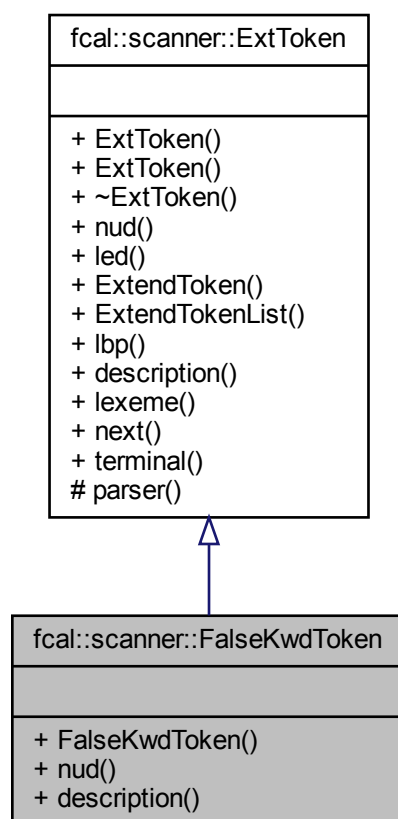
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

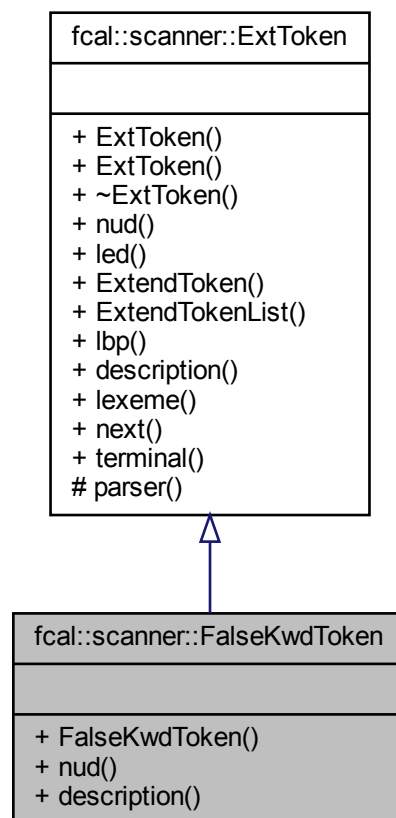
7.12 fcal::scanner::FalseKwdToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::FalseKwdToken:



Collaboration diagram for fcal::scanner::FalseKwdToken:



Public Member Functions

- `FalseKwdToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `virtual int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.12.1 Detailed Description

Definition at line 95 of file ext_token.h.

7.12.2 Constructor & Destructor Documentation

7.12.2.1 FalseKwdToken()

```
fcal::scanner::FalseKwdToken::FalseKwdToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 97 of file ext_token.h.

7.12.3 Member Function Documentation

7.12.3.1 description()

```
std::string fcal::scanner::FalseKwdToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 99 of file ext_token.h.

7.12.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

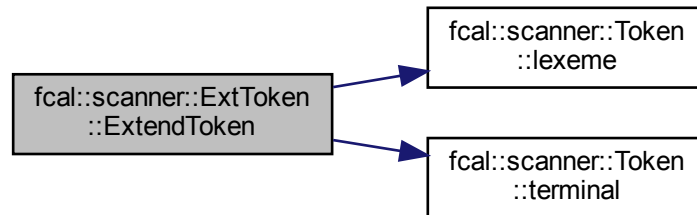
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

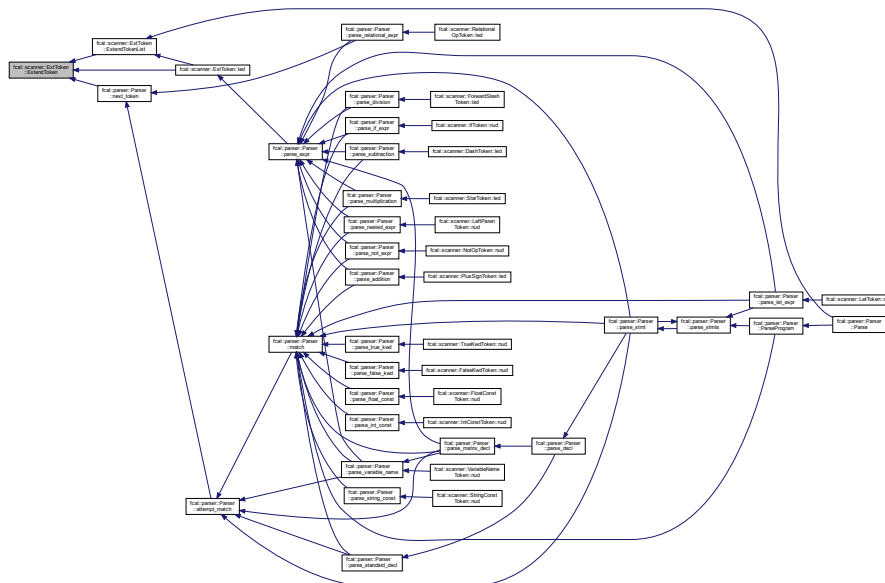
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:

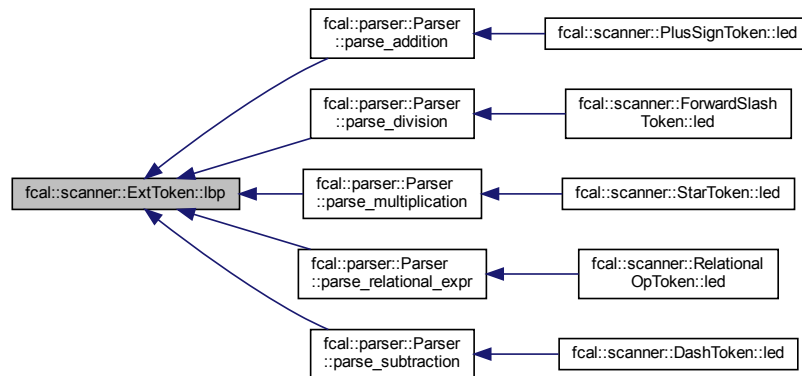


7.12.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```


Here is the caller graph for this function:



7.12.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

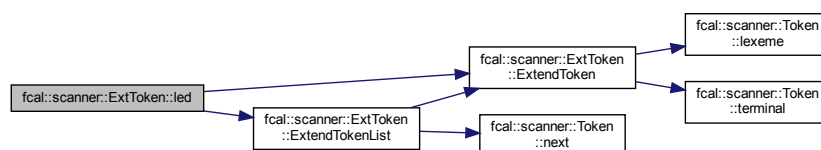
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

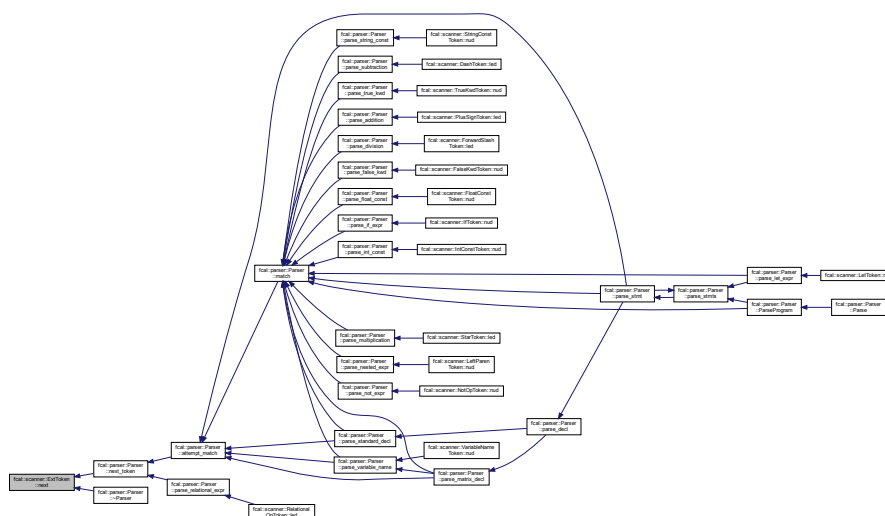
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



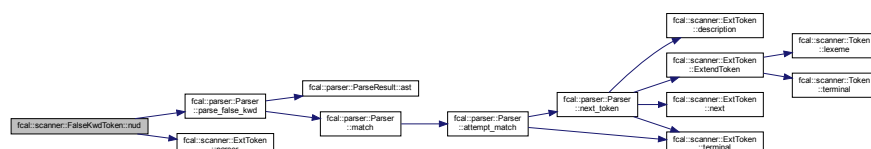
Here is the caller graph for this function:



```
parser::ParseResult fcal::scanner::FalseKwdToken::nud (
    void ) [inline], [virtual]
```

Definition at line 98 of file ext_token.h.

Here is the call graph for this function:



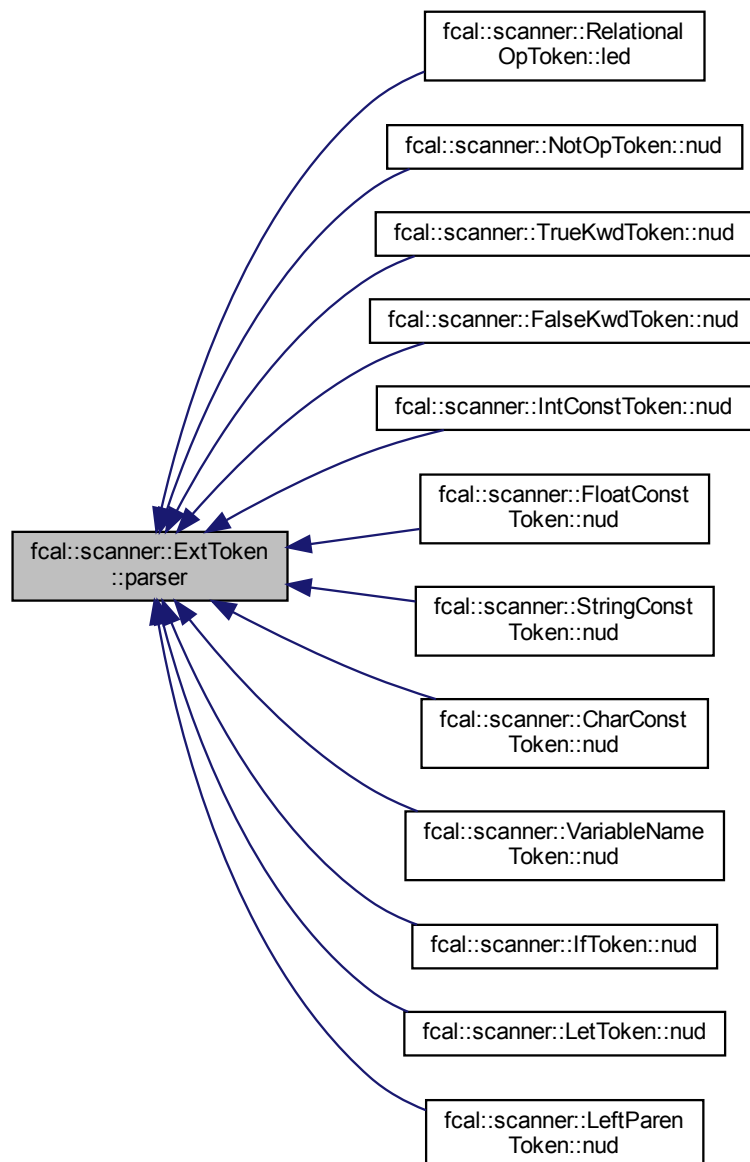
7.12.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:



```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]
```

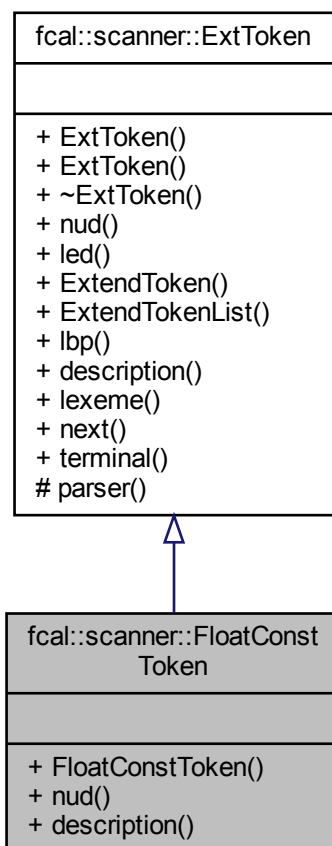
Referenced by `fcall::parser::Parser::attempt_match()`, `fcall::parser::Parser::next_is()`, `fcall::parser::Parser::next_token()`, and `fcall::parser::Parser::parse_stmt()`.

[illegible]

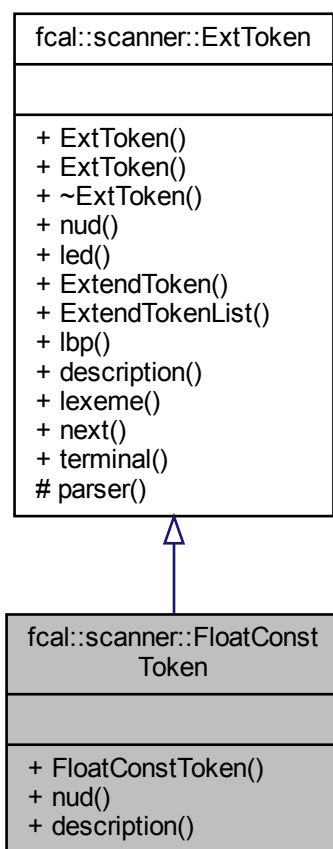
- `include/ext token.h`

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::FloatConstToken:



Collaboration diagram for fcal::scanner::FloatConstToken:



Public Member Functions

- `FloatConstToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `virtual int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.13.1 Detailed Description

Definition at line 111 of file ext_token.h.

7.13.2 Constructor & Destructor Documentation

7.13.2.1 FloatConstToken()

```
fcal::scanner::FloatConstToken::FloatConstToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 113 of file ext_token.h.

7.13.3 Member Function Documentation

7.13.3.1 description()

```
std::string fcal::scanner::FloatConstToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 115 of file ext_token.h.

7.13.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

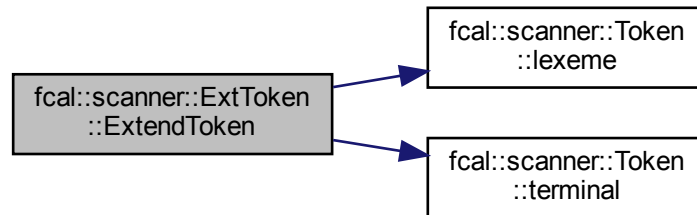
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

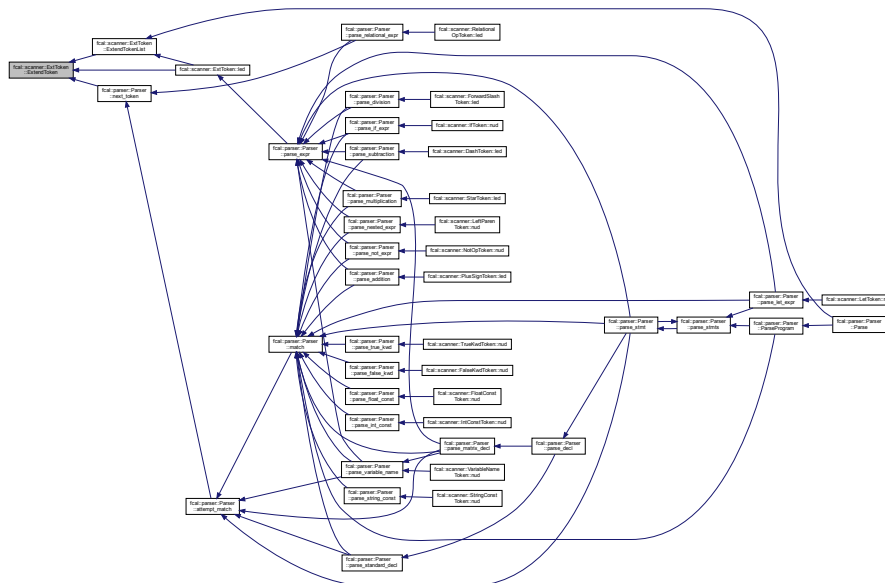
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:

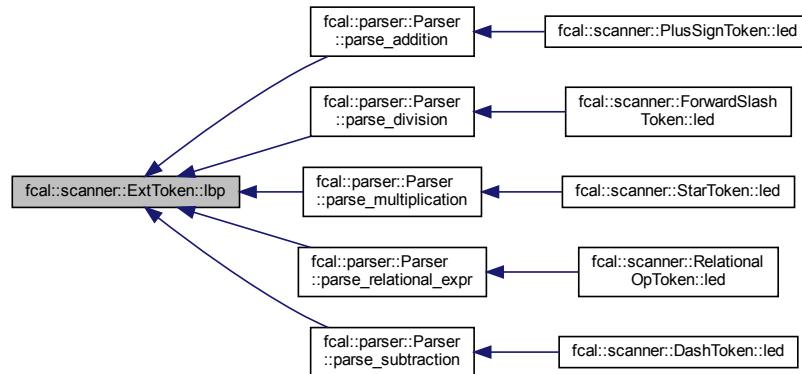


7.13.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```


Here is the caller graph for this function:



7.13.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

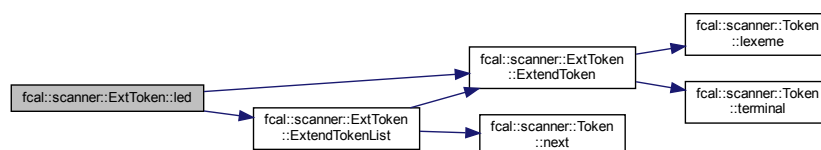
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

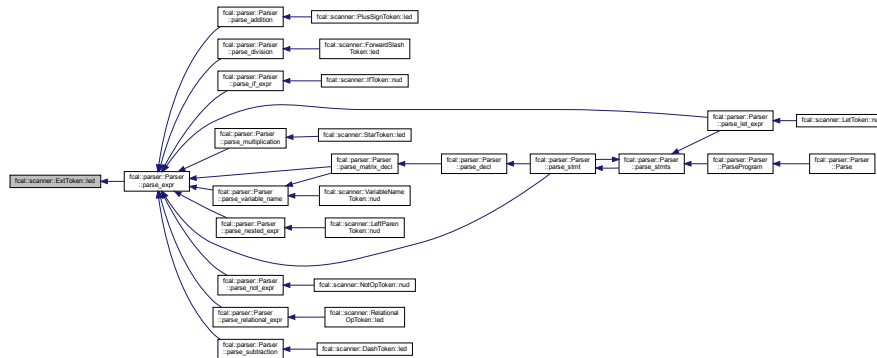
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



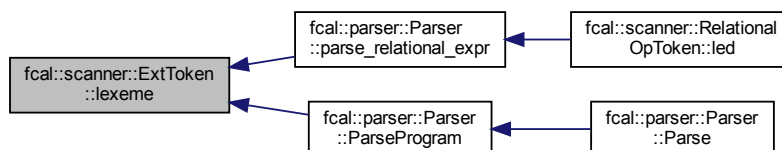
7.13.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_float_const()`, `fcal::parser::Parser::parse_int_const()`, `fcal::parser::Parser::parse_matrix_decl()`, `fcal::parser::Parser::parse_relational_expr()`, `fcal::parser::Parser::parse_standard_decl()`, `fcal::parser::Parser::parse_stmt()`, `fcal::parser::Parser::parse_string_const()`, `fcal::parser::Parser::parse_variable_name()`, and `fcal::parser::Parser::ParseProgram()`.

Here is the caller graph for this function:

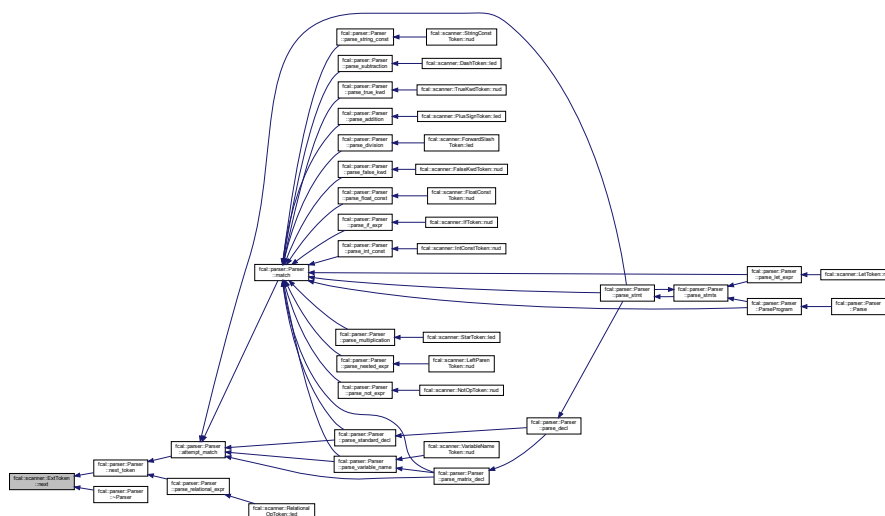


7.13.3.7 next()

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Definition at line 58 of file ext_token.h.

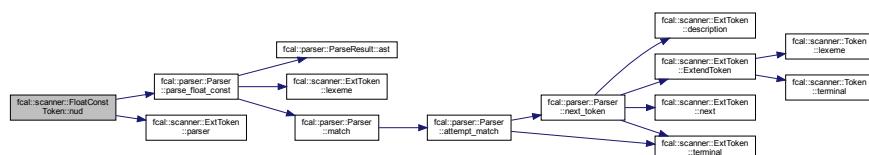
Here is the caller graph for this function:



```
parser::ParseResult fcal::scanner::FloatConstToken::nud (
    void ) [inline], [virtual]
```

Definition at line 114 of file ext_token.h.

Here is the call graph for this function:



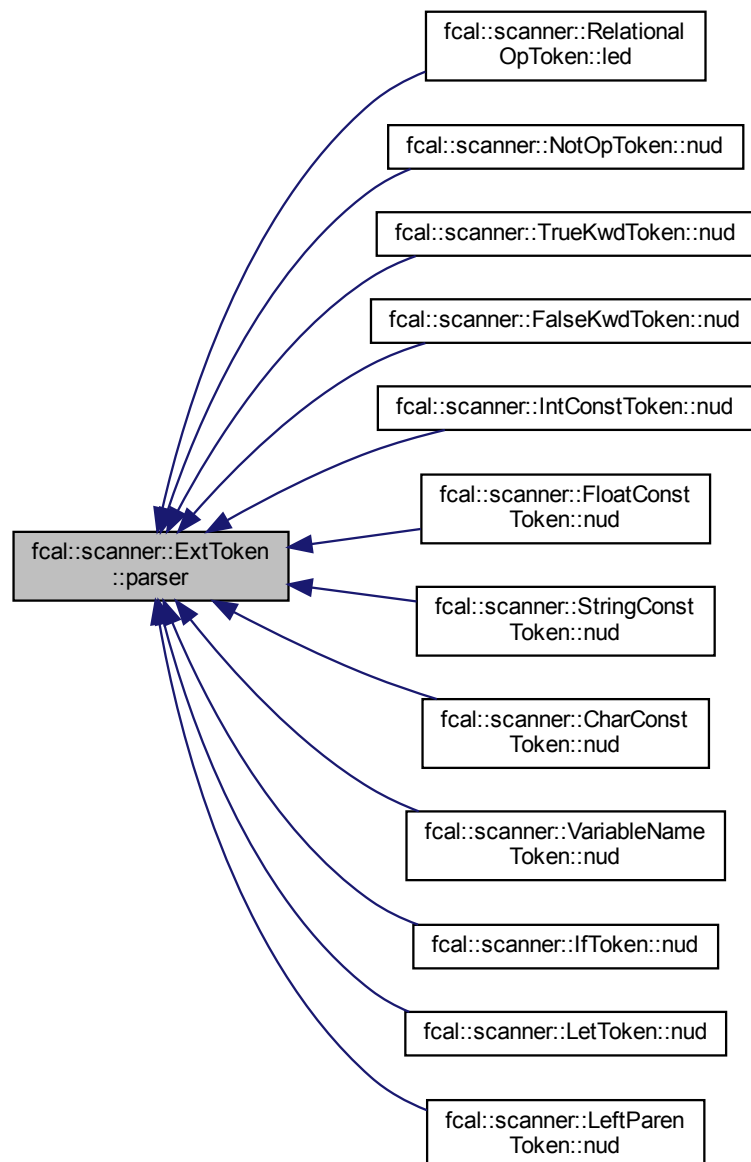
7.13.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:




```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]
```

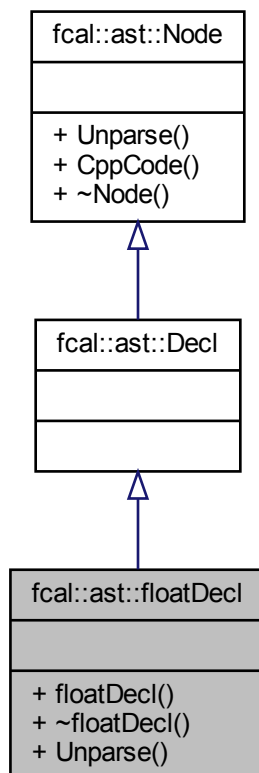
Referenced by `fcall::parser::Parser::attempt_match()`, `fcall::parser::Parser::next_is()`, `fcall::parser::Parser::next_token()`, and `fcall::parser::Parser::parse_stmt()`.

[illegible]

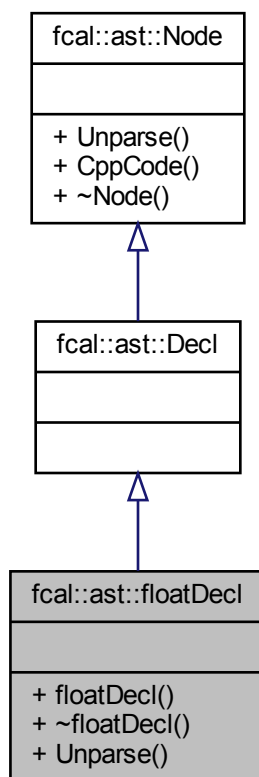
- `include/ext token.h`

```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::floatDecl`:



Collaboration diagram for fcal::ast::floatDecl:



Public Member Functions

- `floatDecl (varName *)`
- `~floatDecl ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.14.1 Detailed Description

Definition at line 221 of file `ast.h`.

7.14.2 Constructor & Destructor Documentation

7.14.2.1 floatDecl()

```
fcal::ast::floatDecl::floatDecl (
    varName * v1 ) [explicit]
```

[floatDecl](#) Constructor

Definition at line 330 of file ast.cc.

7.14.2.2 ~floatDecl()

```
fcal::ast::floatDecl::~~floatDecl ( )
```

[floatDecl](#) Destructor

Definition at line 335 of file ast.cc.

7.14.3 Member Function Documentation

7.14.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.14.3.2 Unparse()

```
std::string fcal::ast::floatDecl::Unparse (
    void ) [virtual]
```

[floatDecl](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 340 of file ast.cc.

References [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



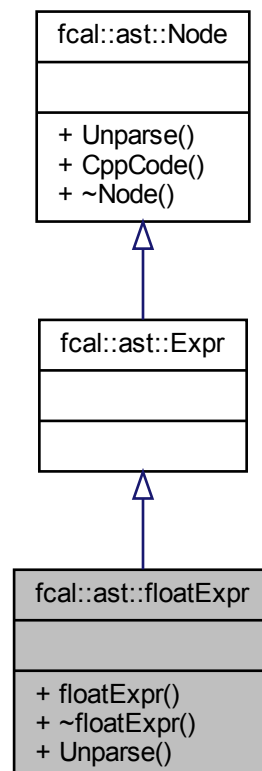
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

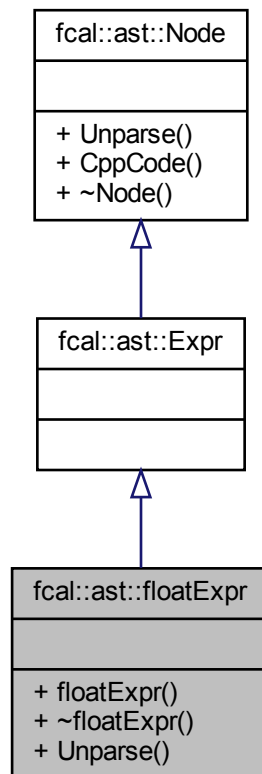
7.15 fcal::ast::floatExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::floatExpr:



Collaboration diagram for `fcgal::ast::floatExpr`:



Public Member Functions

- [floatExpr](#) (`std::string`)
- [~floatExpr](#) ()
- `std::string` [Unparse](#) (`void`)
- virtual `std::string` [CppCode](#) (`void`)

7.15.1 Detailed Description

Definition at line 305 of file `ast.h`.

7.15.2 Constructor & Destructor Documentation

7.15.2.1 floatExpr()

```
fcal::ast::floatExpr::floatExpr (
    std::string fl ) [explicit]
```

[floatExpr](#) Constructor

Definition at line 474 of file ast.cc.

7.15.2.2 ~floatExpr()

```
fcal::ast::floatExpr::~floatExpr ( )
```

[floatExpr](#) Destructor

Definition at line 479 of file ast.cc.

7.15.3 Member Function Documentation

7.15.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.15.3.2 Unparse()

```
std::string fcal::ast::floatExpr::Unparse (
    void ) [virtual]
```

[floatExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 484 of file ast.cc.

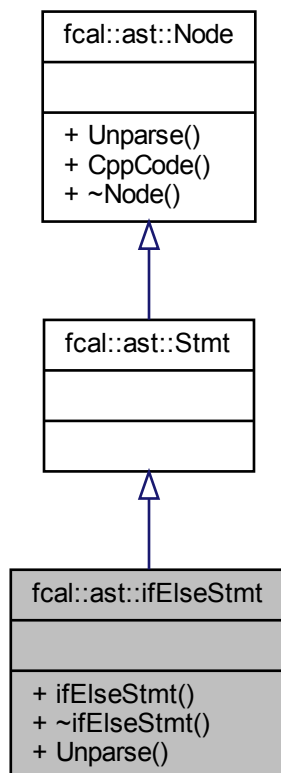
The documentation for this class was generated from the following files:

- include/[ast.h](#)
- src/[ast.cc](#)

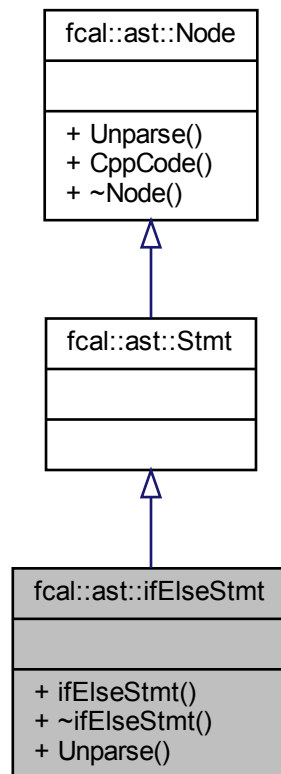
7.16 fcal::ast::ifElseStmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::ifElseStmt:



Collaboration diagram for fcal::ast::ifElseStmt:



Public Member Functions

- `ifElseStmt (Expr *, Stmt *, Stmt *)`
- `~ifElseStmt ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.16.1 Detailed Description

Definition at line 127 of file `ast.h`.

7.16.2 Constructor & Destructor Documentation

7.16.2.1 ifElseStmt()

```
fcal::ast::ifElseStmt::ifElseStmt (
    Expr * e1,
    Stmt * s1,
    Stmt * s2 )
```

[ifElseStmt](#) Constructor

Definition at line 162 of file ast.cc.

7.16.2.2 ~ifElseStmt()

```
fcal::ast::ifElseStmt::~~ifElseStmt ( )
```

[ifElseStmt](#) Destructor

Definition at line 171 of file ast.cc.

7.16.3 Member Function Documentation

7.16.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.16.3.2 Unparse()

```
std::string fcal::ast::ifElseStmt::Unparse (
    void ) [virtual]
```

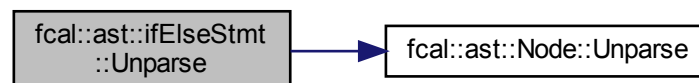
[ifElseStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 180 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



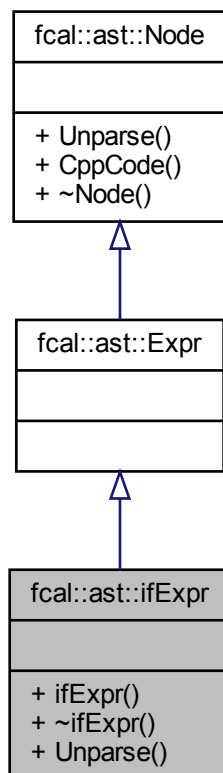
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

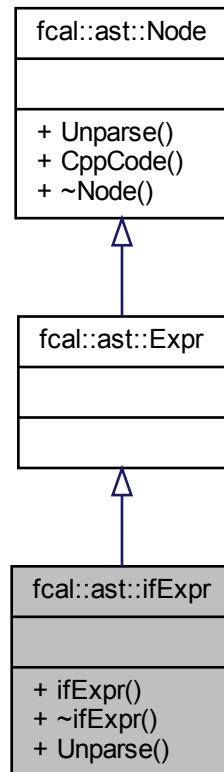
7.17 fcal::ast::ifExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::ifExpr:



Collaboration diagram for `fcgal::ast::ifExpr`:



Public Member Functions

- `ifExpr (Expr *, Expr *, Expr *)`
- `~ifExpr ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.17.1 Detailed Description

Definition at line 556 of file `ast.h`.

7.17.2 Constructor & Destructor Documentation

7.17.2.1 ifExpr()

```
fcal::ast::ifExpr::ifExpr (
    Expr * e1,
    Expr * e2,
    Expr * e3 )
```

[ifExpr](#) Constructor

Definition at line 645 of file ast.cc.

7.17.2.2 ~ifExpr()

```
fcal::ast::ifExpr::~ifExpr ( )
```

[ifExpr](#) Destructor

Definition at line 654 of file ast.cc.

7.17.3 Member Function Documentation

7.17.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.17.3.2 Unparse()

```
std::string fcal::ast::ifExpr::Unparse (
    void ) [virtual]
```

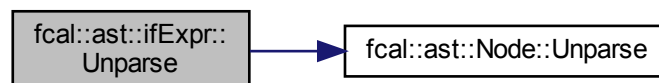
[ifExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 663 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



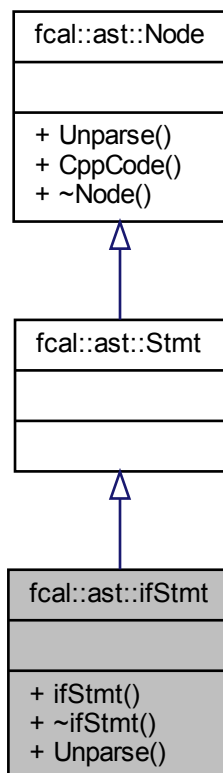
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

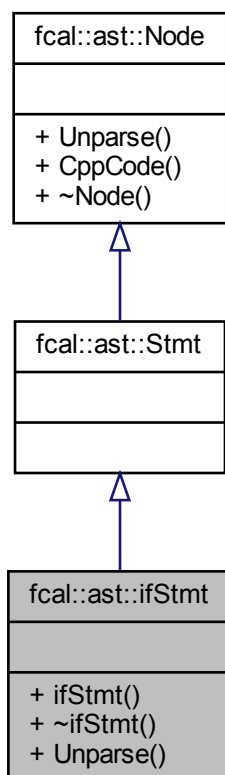
7.18 fcal::ast::ifStmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::ifStmt:



Collaboration diagram for fcal::ast::ifStmt:



Public Member Functions

- [ifStmt](#) ([Expr](#) *, [Stmt](#) *)
- [~ifStmt](#) ()
- [std::string Unparse](#) (void)
- [virtual std::string CppCode](#) (void)

7.18.1 Detailed Description

Definition at line 115 of file ast.h.

7.18.2 Constructor & Destructor Documentation

7.18.2.1 ifStmt()

```
fcal::ast::ifStmt::ifStmt (
    Expr * e1,
    Stmt * s1 )
```

[ifStmt](#) Constructor

Definition at line 138 of file ast.cc.

7.18.2.2 ~ifStmt()

```
fcal::ast::ifStmt::~ifStmt ( )
```

[ifStmt](#) Destructor

Definition at line 146 of file ast.cc.

7.18.3 Member Function Documentation

7.18.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.18.3.2 Unparse()

```
std::string fcal::ast::ifStmt::Unparse (
    void ) [virtual]
```

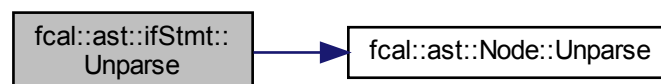
[ifStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 154 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



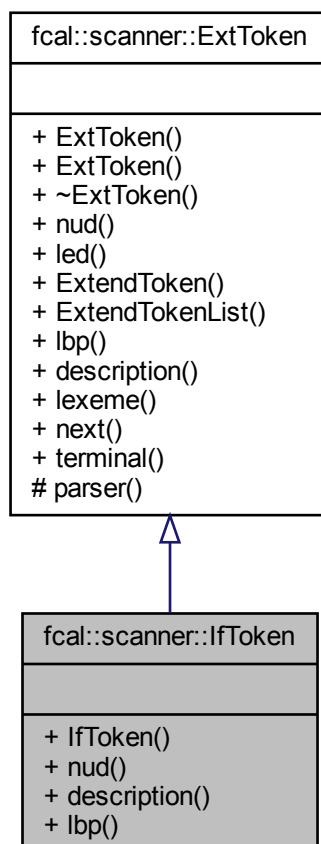
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

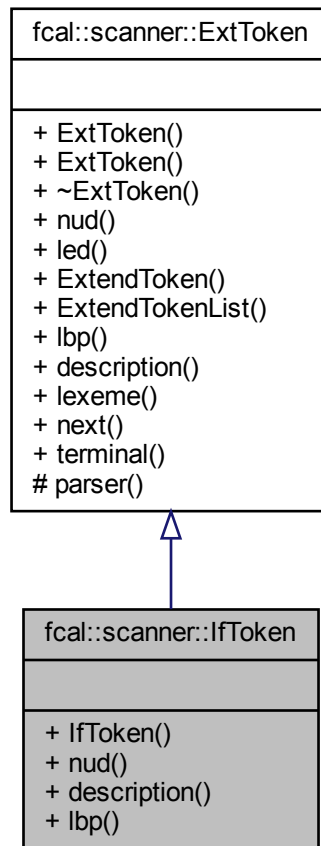
7.19 fcal::scanner::IfToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::IfToken:



Collaboration diagram for `fcsl::scanner::IfToken`:



Public Member Functions

- `IfToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `int lbp ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.19.1 Detailed Description

Definition at line 142 of file ext_token.h.

7.19.2 Constructor & Destructor Documentation

7.19.2.1 IfToken()

```
fcal::scanner::IfToken::IfToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 144 of file ext_token.h.

7.19.3 Member Function Documentation

7.19.3.1 description()

```
std::string fcal::scanner::IfToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 146 of file ext_token.h.

7.19.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

Definition at line 136 of file ext_token.cc.

Referenced by `fcal::scanner::ExtToken::led()`, and `fcal::parser::Parser::Parse()`.

```

graph LR
    A[fcal::scanner::ExtTokenList] --> B[fcal::scanner::ExtToken::ExtendToken]
    A --> C[fcal::scanner::Token::next]
    B --> D[fcal::scanner::Token::lexeme]
    B --> E[fcal::scanner::Token::terminal]
  
```

```
int fcal::scanner::IfToken::lbp ( ) [inline], [virtual]
```

Definition at line 147 of file ext_token.h.

7.19.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

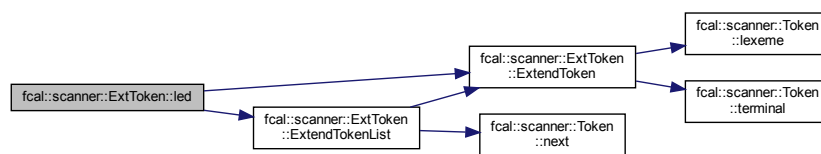
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

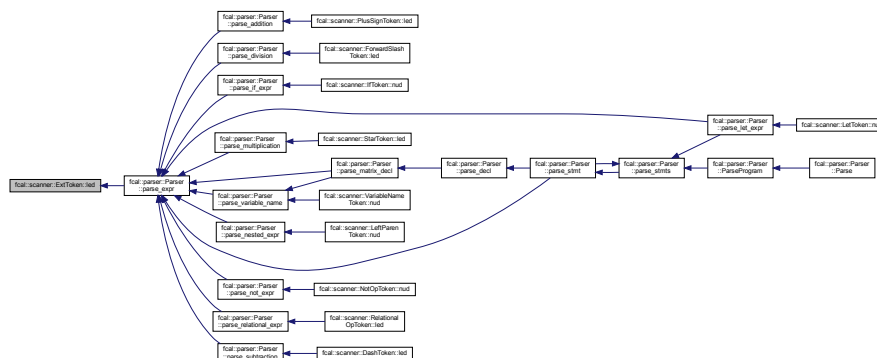
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



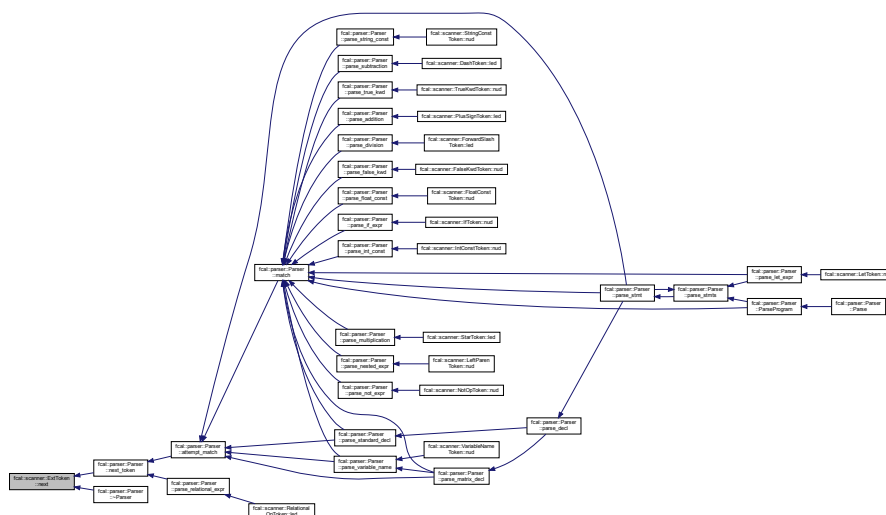
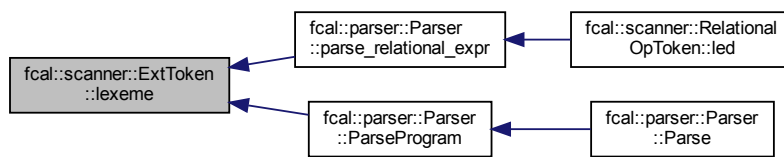
7.19.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file `ext_token.h`.

Referenced by [fcal::parser::Parser::parse_float_const\(\)](#), [fcal::parser::Parser::parse_int_const\(\)](#), [fcal::parser::Parser::parse_matrix_decl\(\)](#), [fcal::parser::Parser::parse_relational_expr\(\)](#), [fcal::parser::Parser::parse_standard_decl\(\)](#), [fcal::parser::Parser::parse_stmt\(\)](#), [fcal::parser::Parser::parse_string_const\(\)](#), [fcal::parser::Parser::parse_variable_name\(\)](#), and [fcal::parser::Parser::ParseProgram\(\)](#).

```
graph RL; A[fcal::scanner::Relational OpToken::led] --> B[fcal::parser::Parser::parse_relational_expr]; B --> C[fcal::scanner::ExtToken::lexeme]; D[fcal::parser::Parser::ParseProgram] --> C;
```



7.19.3.8 nud()

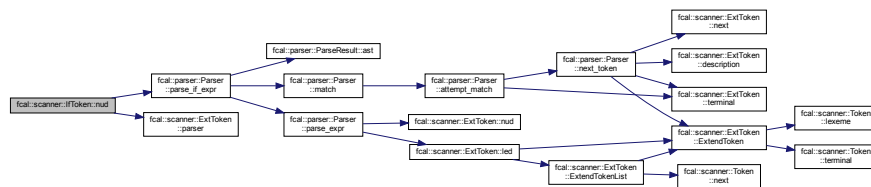
```
parser::ParseResult fcal::scanner::IfToken::nud (
    void ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 145 of file ext_token.h.

References [fcal::parser::Parser::parse_if_expr\(\)](#), and [fcal::scanner::ExtToken::parser\(\)](#).

Here is the call graph for this function:



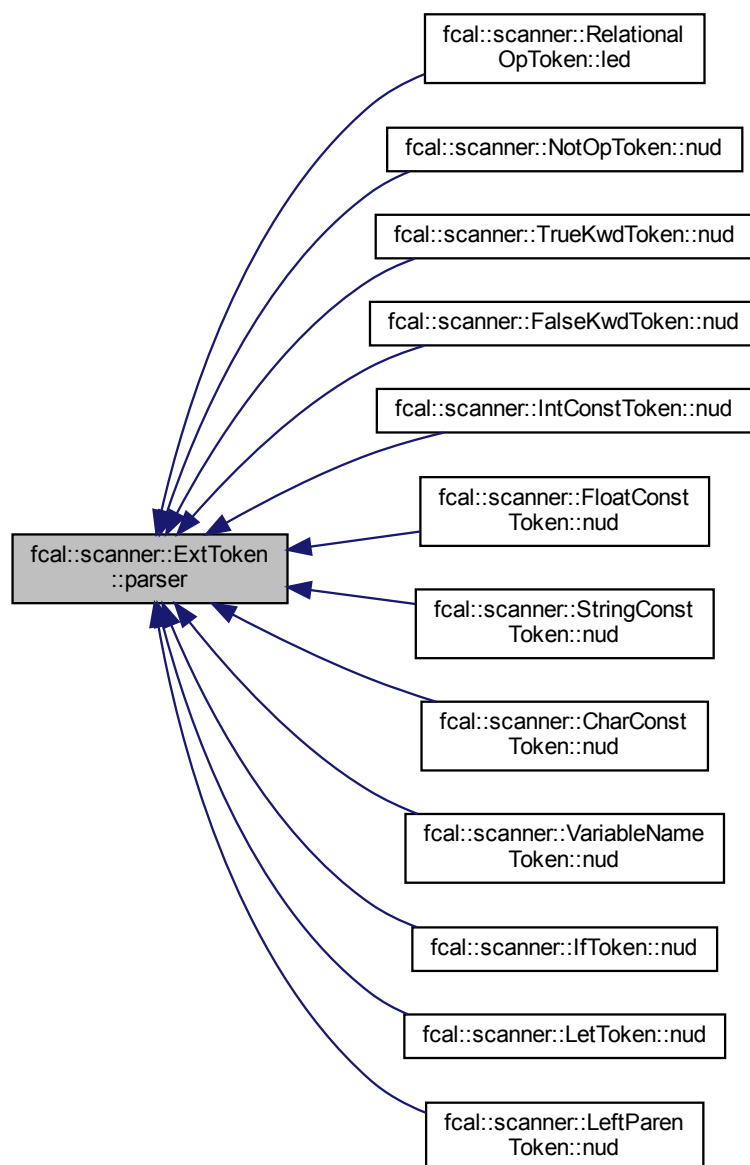
7.19.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file ext_token.h.

Referenced by [fcal::scanner::RelationalOpToken::led\(\)](#), [fcal::scanner::NotOpToken::nud\(\)](#), [fcal::scanner::TrueKwdToken::nud\(\)](#), [fcal::scanner::FalseKwdToken::nud\(\)](#), [fcal::scanner::IntConstToken::nud\(\)](#), [fcal::scanner::FloatConstToken::nud\(\)](#), [fcal::scanner::StringConstToken::nud\(\)](#), [fcal::scanner::CharConstToken::nud\(\)](#), [fcal::scanner::VariableNameToken::nud\(\)](#), [nud\(\)](#), [fcal::scanner::LetToken::nud\(\)](#), and [fcal::scanner::LeftParenToken::nud\(\)](#).

Here is the caller graph for this function:

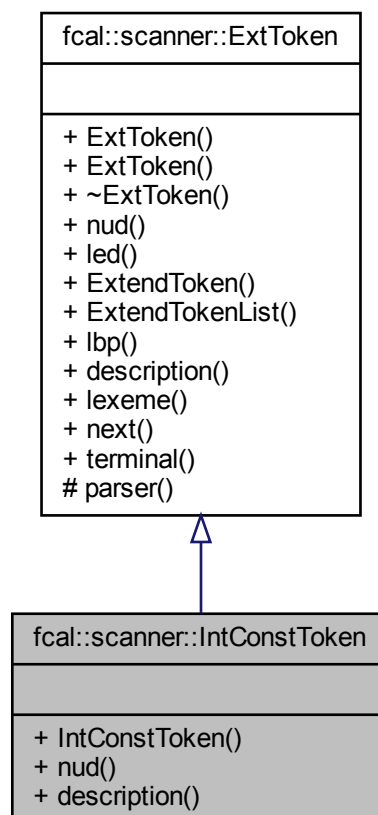


7.19.3.10 terminal()

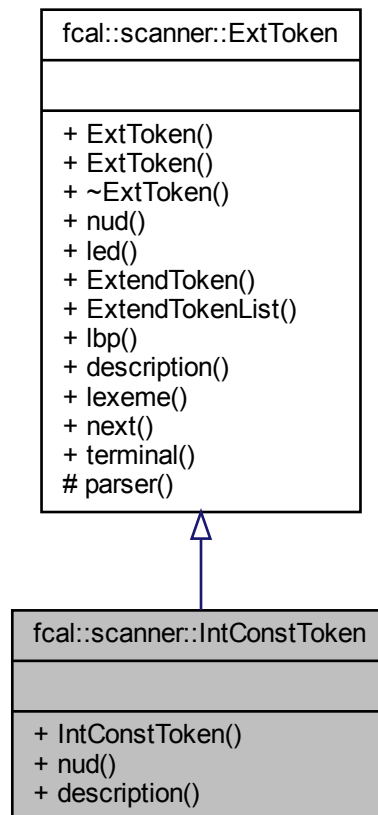
```
scanner::TokenType fcal::scanner::ExtToken::terminal (  
    void ) const [inline], [inherited]
```

Definition at line 59 of file `ext_token.h`.

Inheritance diagram for fcal::scanner::IntConstToken:



Collaboration diagram for `fcsl::scanner::IntConstToken`:



Public Member Functions

- `IntConstToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `virtual int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.20.1 Detailed Description

Definition at line 103 of file ext_token.h.

7.20.2 Constructor & Destructor Documentation

7.20.2.1 IntConstToken()

```
fcal::scanner::IntConstToken::IntConstToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 105 of file ext_token.h.

7.20.3 Member Function Documentation

7.20.3.1 description()

```
std::string fcal::scanner::IntConstToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 107 of file ext_token.h.

7.20.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

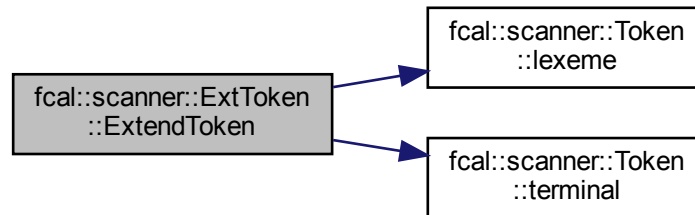
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

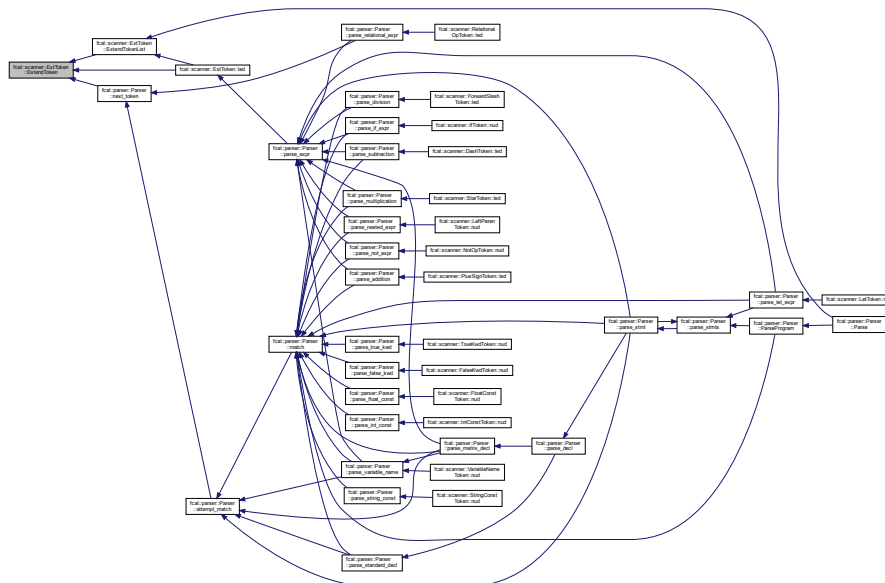
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:



7.20.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```

Definition at line 136 of file ext_token.cc.

Referenced by `fcsl::scanner::ExtToken::led()`, and `fcsl::parser::Parser::Parse()`.

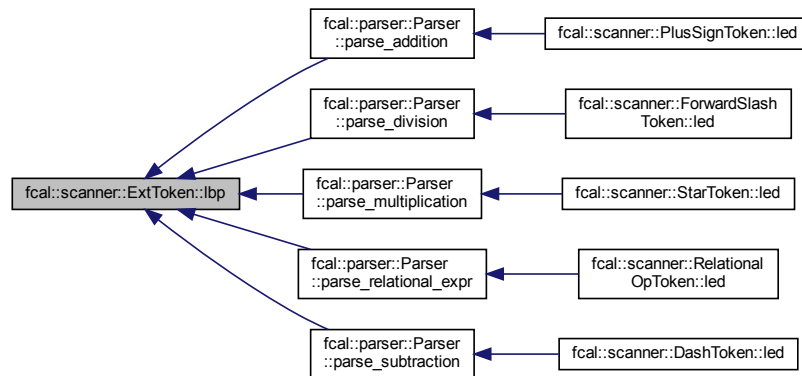
```
graph LR; ExtTokenList[fcal::scanner::ExtToken::ExtendTokenList] --> ExtToken[fcal::scanner::ExtToken::ExtendToken]; ExtTokenList --> TokenNext[fcal::scanner::Token::next]; ExtToken --> TokenLexeme[fcal::scanner::Token::lexeme]; ExtToken --> TokenTerminal[fcal::scanner::Token::terminal];
```

The diagram illustrates the structure of the `fcal::scanner::ExtToken` class and its relationships. It shows a central `fcal::scanner::ExtToken::ExtendToken` box, which is pointed to by a `fcal::scanner::ExtToken::ExtendTokenList` box (shaded gray). The `ExtendToken` box has two outgoing arrows: one pointing to a `fcal::scanner::Token::lexeme` box and another pointing to a `fcal::scanner::Token::terminal` box. Additionally, the `ExtendTokenList` box has an arrow pointing to a `fcal::scanner::Token::next` box.

[illegible]

Generated by Doxygen

Here is the caller graph for this function:



7.20.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

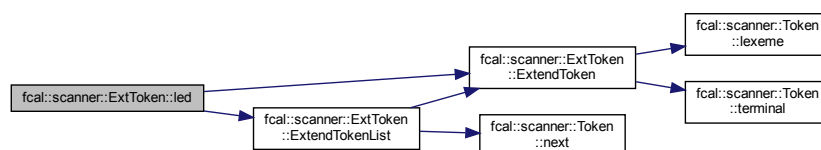
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

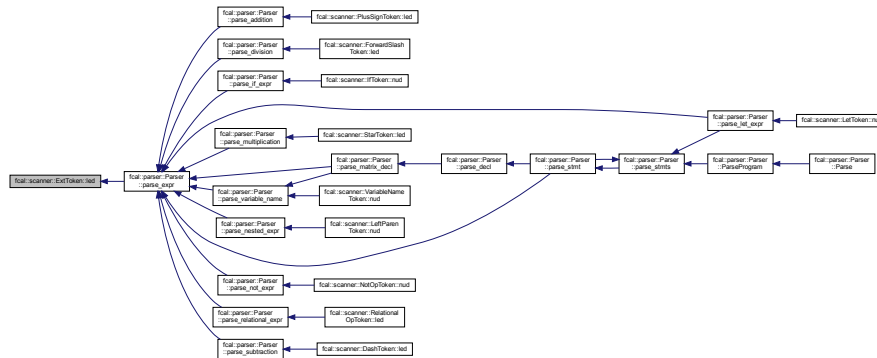
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



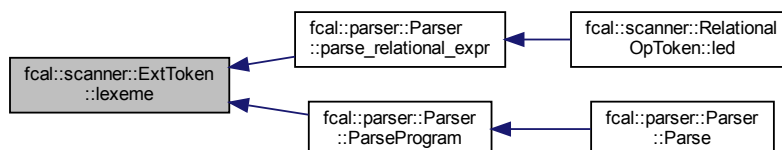
7.20.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_float_const()`, `fcal::parser::Parser::parse_int_const()`, `fcal::parser::Parser::parse_matrix_decl()`, `fcal::parser::Parser::parse_relational_expr()`, `fcal::parser::Parser::parse_standard_expr()`, `fcal::parser::Parser::parse_stmt()`, `fcal::parser::Parser::parse_string_const()`, `fcal::parser::Parser::parse_variable_name()`, and `fcal::parser::Parser::ParseProgram()`.

Here is the caller graph for this function:



7.20.3.7 next()

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Definition at line 58 of file ext_token.h.

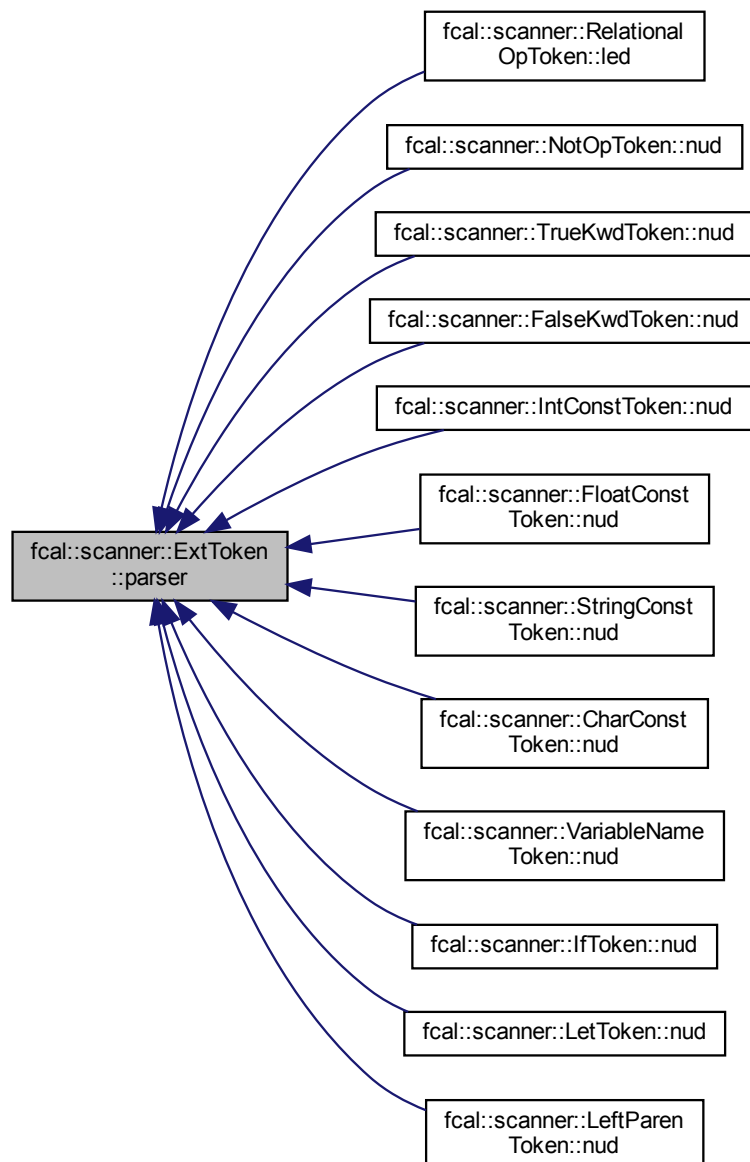
7.20.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

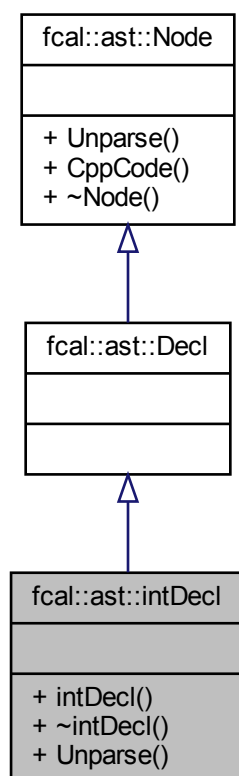
Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

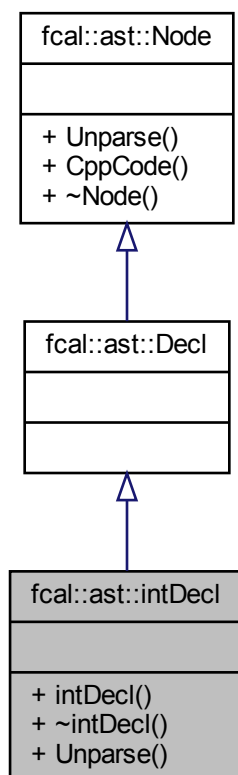
Here is the caller graph for this function:



Inheritance diagram for fcal::ast::intDecl:



Collaboration diagram for `fcal::ast::intDecl`:



Public Member Functions

- `intDecl` (`varName *`)
- `~intDecl` ()
- `std::string Unparse` (void)
- virtual `std::string CppCode` (void)

7.21.1 Detailed Description

Definition at line 210 of file `ast.h`.

7.21.2 Constructor & Destructor Documentation

7.21.2.1 intDecl()

```
fcal::ast::intDecl::intDecl (
    varName * v1 ) [explicit]
```

[intDecl](#) Constructor

Definition at line 313 of file ast.cc.

7.21.2.2 ~intDecl()

```
fcal::ast::intDecl::~~intDecl ( )
```

[intDecl](#) Destructor

Definition at line 318 of file ast.cc.

7.21.3 Member Function Documentation

7.21.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.21.3.2 Unparse()

```
std::string fcal::ast::intDecl::Unparse (
    void ) [virtual]
```

[intDecl](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 323 of file ast.cc.

References [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



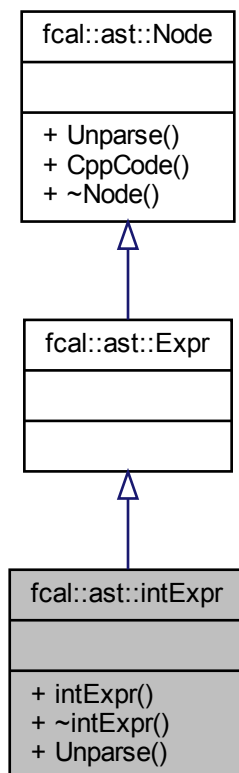
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

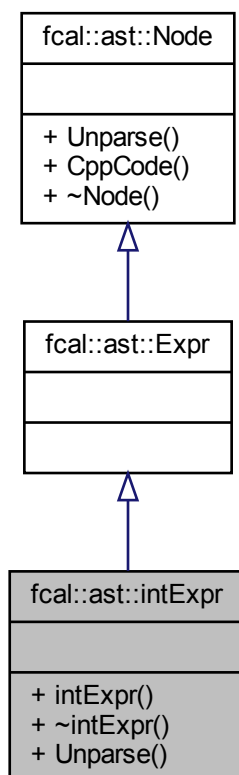
7.22 fcal::ast::intExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::intExpr:



Collaboration diagram for fcal::ast::intExpr:



Public Member Functions

- [intExpr](#) (std::string)
- [~intExpr](#) ()
- std::string [Unparse](#) (void)
- virtual std::string [CppCode](#) (void)

7.22.1 Detailed Description

Definition at line 295 of file ast.h.

7.22.2 Constructor & Destructor Documentation

7.22.2.1 intExpr()

```
fcal::ast::intExpr::intExpr (
    std::string il ) [explicit]
```

[intExpr](#) Constructor

Definition at line 459 of file ast.cc.

7.22.2.2 ~intExpr()

```
fcal::ast::intExpr::~intExpr ( )
```

[intExpr](#) Destructor

Definition at line 464 of file ast.cc.

7.22.3 Member Function Documentation

7.22.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.22.3.2 Unparse()

```
std::string fcal::ast::intExpr::Unparse (
    void ) [virtual]
```

[intExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 469 of file ast.cc.

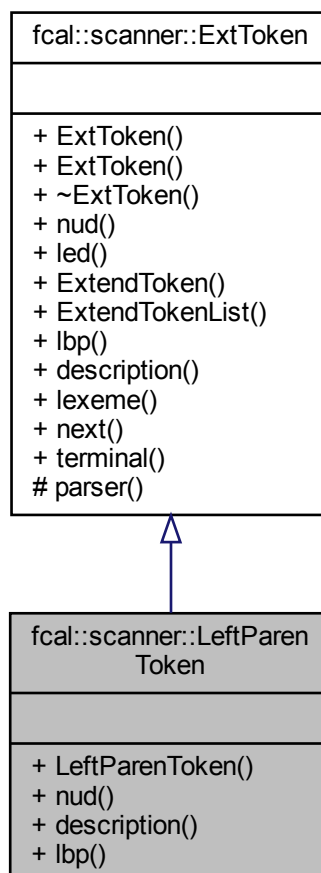
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

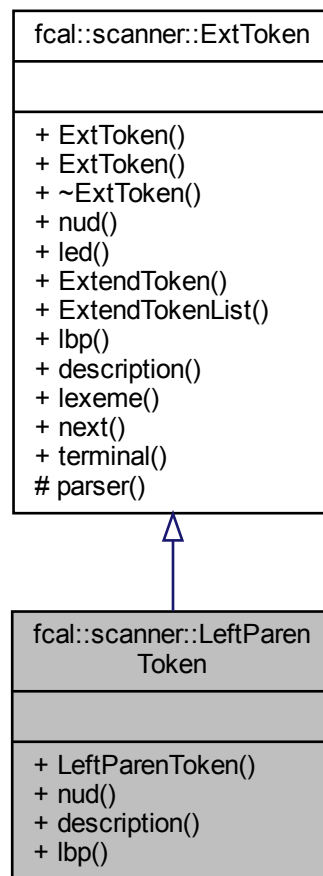
7.23 fcal::scanner::LeftParenToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::LeftParenToken:



Collaboration diagram for `fcal::scanner::LeftParenToken`:



Public Member Functions

- `LeftParenToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `int lbp ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.23.1 Detailed Description

Definition at line 158 of file ext_token.h.

7.23.2 Constructor & Destructor Documentation

7.23.2.1 LeftParenToken()

```
fcal::scanner::LeftParenToken::LeftParenToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 160 of file ext_token.h.

7.23.3 Member Function Documentation

7.23.3.1 description()

```
std::string fcal::scanner::LeftParenToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 162 of file ext_token.h.

7.23.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

Definition at line 136 of file ext_token.cc.

Referenced by `fcal::scanner::ExtToken::led()`, and `fcal::parser::Parser::Parse()`.

```

graph LR
    A[fcal::scanner::ExtToken::ExtendTokenList] --> B[fcal::scanner::ExtToken::ExtendToken]
    B --> C[fcal::scanner::Token::lexeme]
    B --> D[fcal::scanner::Token::terminal]
    B --> E[fcal::scanner::Token::next]

```

[illegible]

```
int fcal::scanner::LeftParenToken::lbp ( ) [inline], [virtual]
```

Definition at line 163 of file ext_token.h.

7.23.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

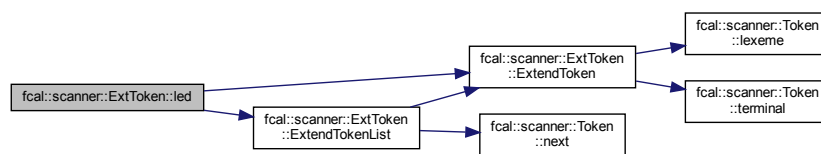
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

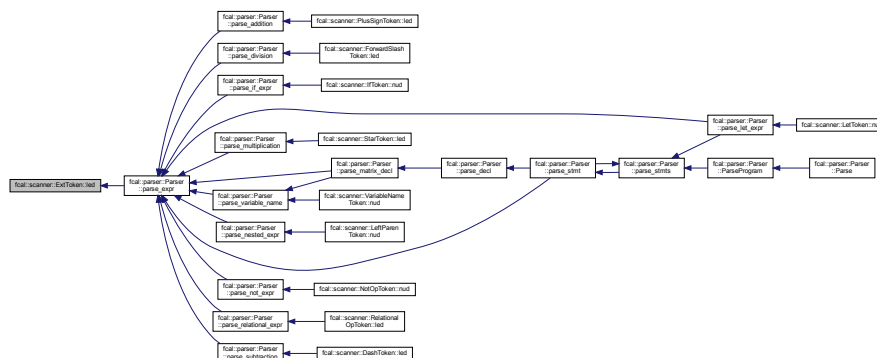
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:

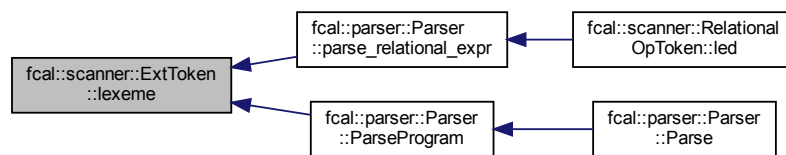


7.23.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

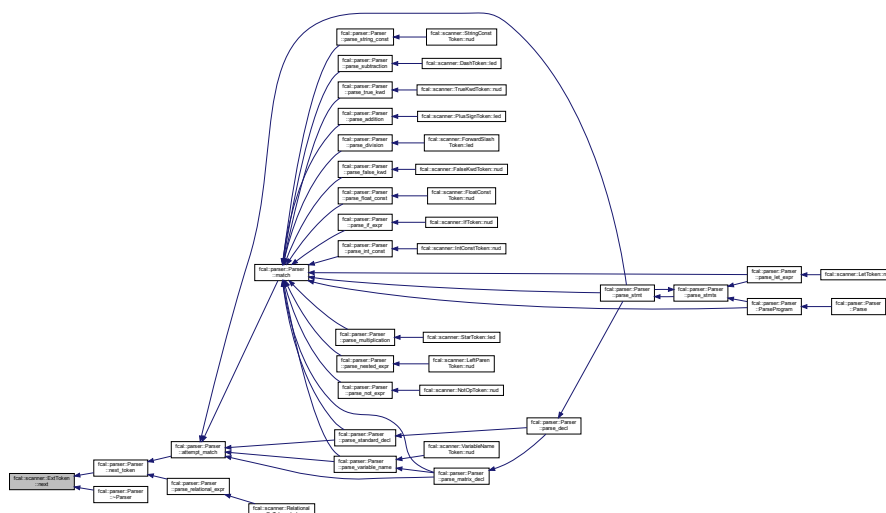
Definition at line 57 of file `ext_token.h`.

Referenced by [fcal::parser::Parser::parse_float_const\(\)](#), [fcal::parser::Parser::parse_int_const\(\)](#), [fcal::parser::Parser::parse_matrix_decl\(\)](#), [fcal::parser::Parser::parse_relational_expr\(\)](#), [fcal::parser::Parser::parse_standard_decl\(\)](#), [fcal::parser::Parser::parse_stmt\(\)](#), [fcal::parser::Parser::parse_string_const\(\)](#), [fcal::parser::Parser::parse_variable_name\(\)](#), and [fcal::parser::Parser::ParseProgram\(\)](#).



```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Referenced by `fcsl::parser::Parser::next_token()`, and `fcsl::parser::Parser::~~Parser()`.



7.23.3.8 nud()

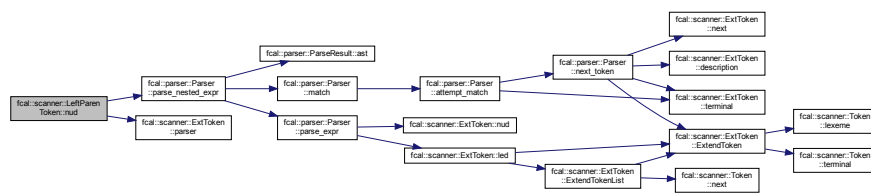
```
parser::ParseResult fcal::scanner::LeftParenToken::nud (
    void ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 161 of file `ext_token.h`.

References [fcal::parser::Parser::parse_nested_expr\(\)](#), and [fcal::scanner::ExtToken::parser\(\)](#).

Here is the call graph for this function:



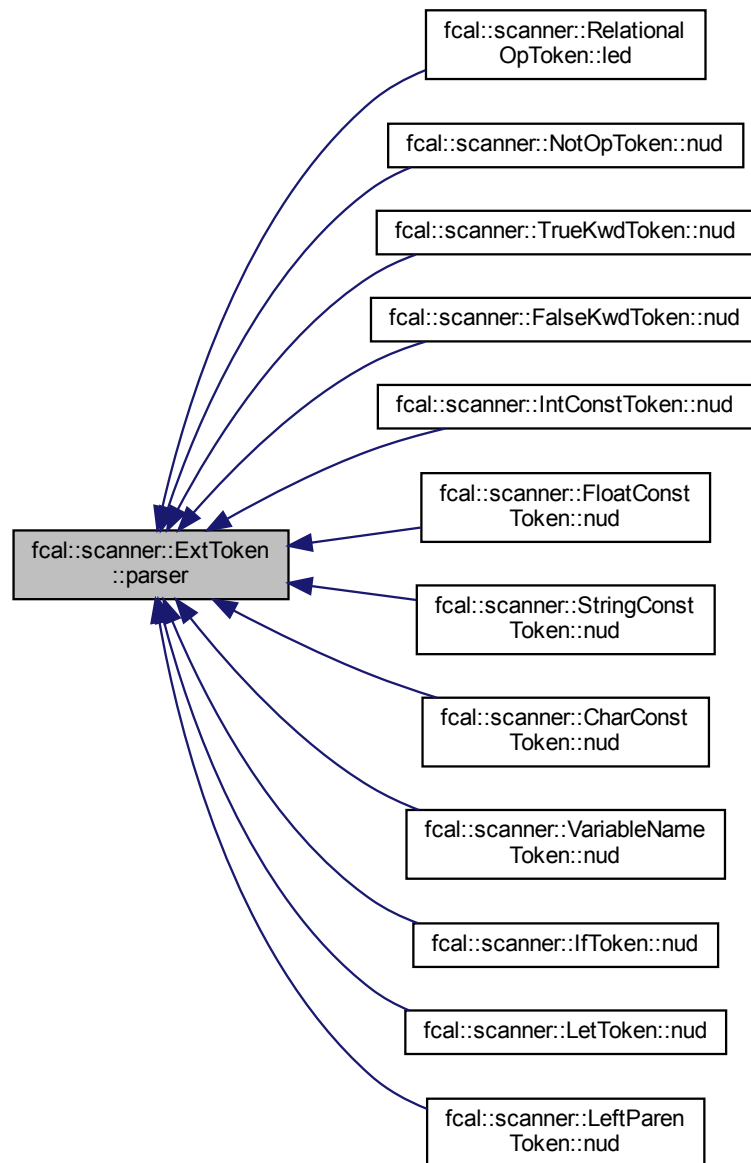
7.23.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file `ext_token.h`.

Referenced by [fcal::scanner::RelationalOpToken::led\(\)](#), [fcal::scanner::NotOpToken::nud\(\)](#), [fcal::scanner::TrueKwdToken::nud\(\)](#), [fcal::scanner::FalseKwdToken::nud\(\)](#), [fcal::scanner::IntConstToken::nud\(\)](#), [fcal::scanner::FloatConstToken::nud\(\)](#), [fcal::scanner::StringConstToken::nud\(\)](#), [fcal::scanner::CharConstToken::nud\(\)](#), [fcal::scanner::VariableNameToken::nud\(\)](#), [fcal::scanner::IfToken::nud\(\)](#), [fcal::scanner::LetToken::nud\(\)](#), and [nud\(\)](#).

Here is the caller graph for this function:



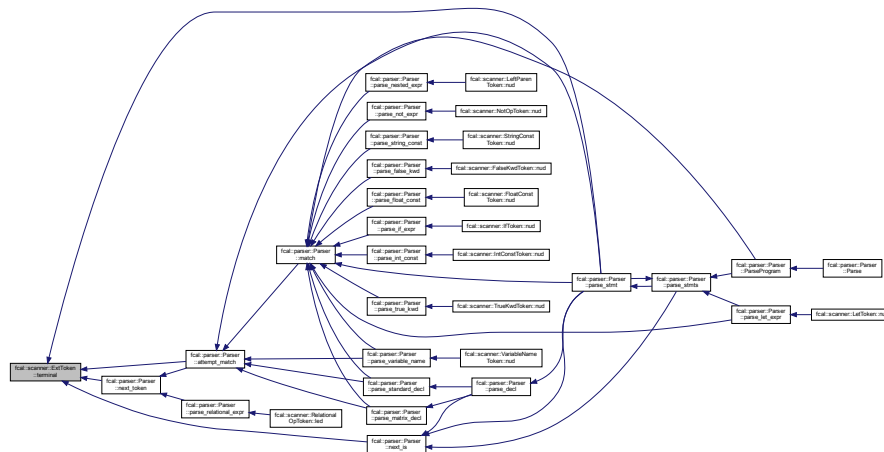
7.23.3.10 terminal()

```
scanner::TokenType fcal::scanner::ExtToken::terminal (  
    void ) const [inline], [inherited]
```

Definition at line 59 of file `ext_token.h`.

Referenced by `fcgal::parser::Parser::attempt_match()`, `fcgal::parser::Parser::next_is()`, `fcgal::parser::Parser::next_token()`, and `fcgal::parser::Parser::parse_stmt()`.

Here is the caller graph for this function:



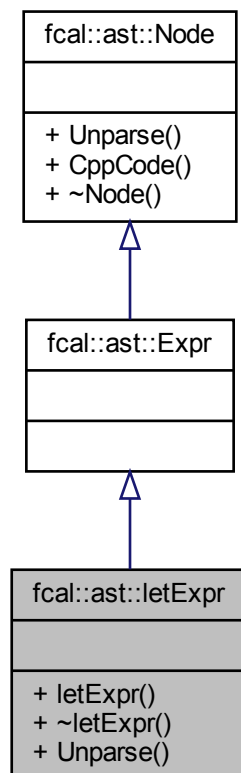
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

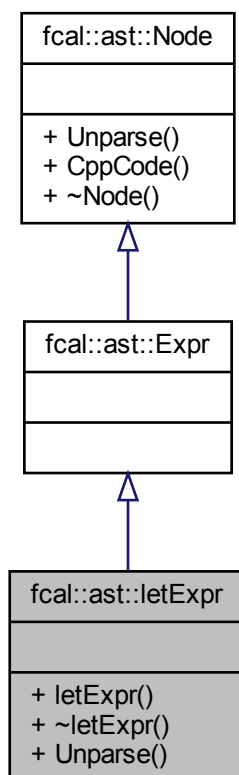
7.24 fcgal::ast::letExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::letExpr:



Collaboration diagram for `fcgal::ast::letExpr`:



Public Member Functions

- `letExpr` (`Stmts *`, `Expr *`)
- `~letExpr` ()
- `std::string Unparse` (void)
- `virtual std::string CppCode` (void)

7.24.1 Detailed Description

Definition at line 544 of file `ast.h`.

7.24.2 Constructor & Destructor Documentation

7.24.2.1 letExpr()

```
fcal::ast::letExpr::letExpr (
    Stmt * s1,
    Expr * e1 )
```

[letExpr](#) Constructor

Definition at line 620 of file ast.cc.

7.24.2.2 ~letExpr()

```
fcal::ast::letExpr::~letExpr ( )
```

[letExpr](#) Destructor

Definition at line 628 of file ast.cc.

7.24.3 Member Function Documentation

7.24.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.24.3.2 Unparse()

```
std::string fcal::ast::letExpr::Unparse (
    void ) [virtual]
```

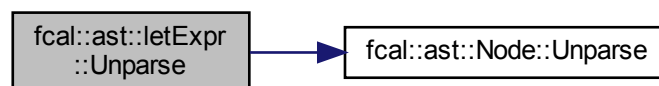
[letExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 636 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



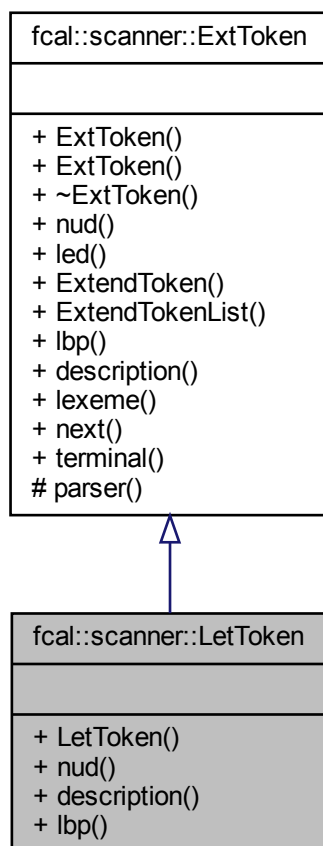
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

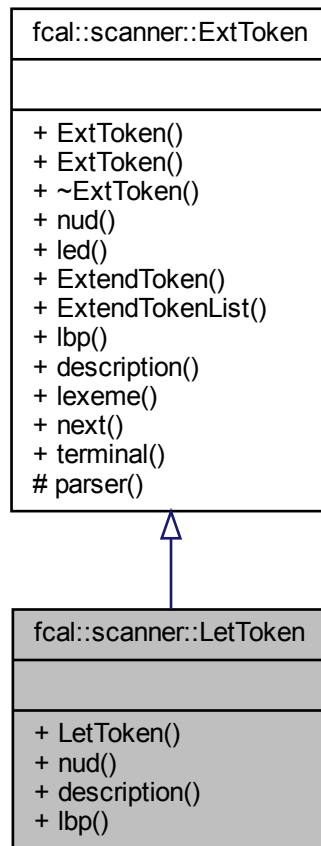
7.25 fcal::scanner::LetToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::LetToken:



Collaboration diagram for fcal::scanner::LetToken:



Public Member Functions

- `LetToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `int lbp ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.25.1 Detailed Description

Definition at line 149 of file ext_token.h.

7.25.2 Constructor & Destructor Documentation

7.25.2.1 LetToken()

```
fcal::scanner::LetToken::LetToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 151 of file ext_token.h.

7.25.3 Member Function Documentation

7.25.3.1 description()

```
std::string fcal::scanner::LetToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 153 of file ext_token.h.

7.25.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

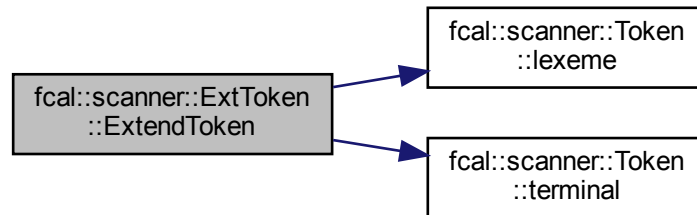
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

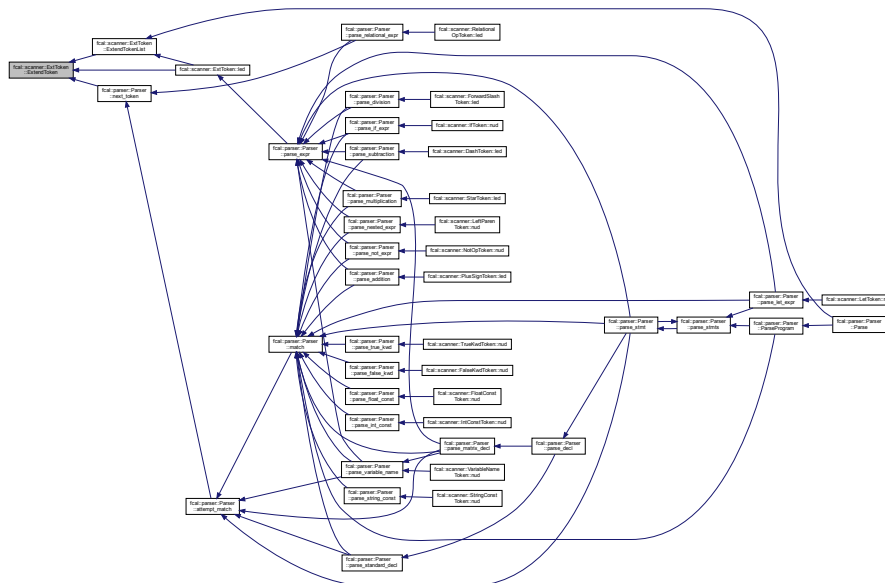
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:



7.25.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```

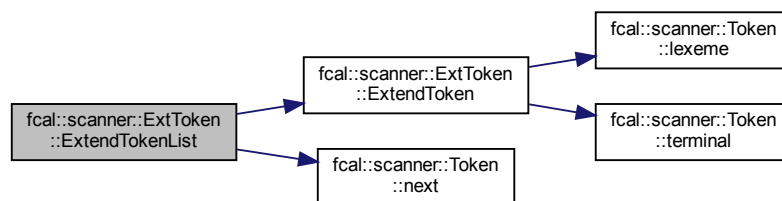
Create Extended token list from tokens

Definition at line 136 of file ext_token.cc.

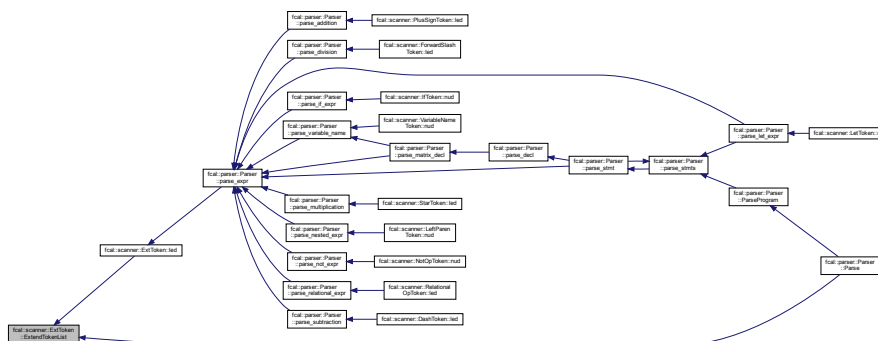
References `fcal::scanner::ExtToken::ExtendToken()`, and `fcal::scanner::Token::next()`.

Referenced by `fcal::scanner::ExtToken::led()`, and `fcal::parser::Parser::Parse()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.25.3.4 lbp()

```
int fcal::scanner::LetToken::lbp ( ) [inline], [virtual]
```

Reimplemented from `fcal::scanner::ExtToken`.

Definition at line 154 of file ext_token.h.

7.25.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

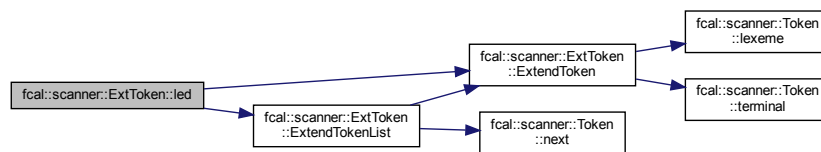
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

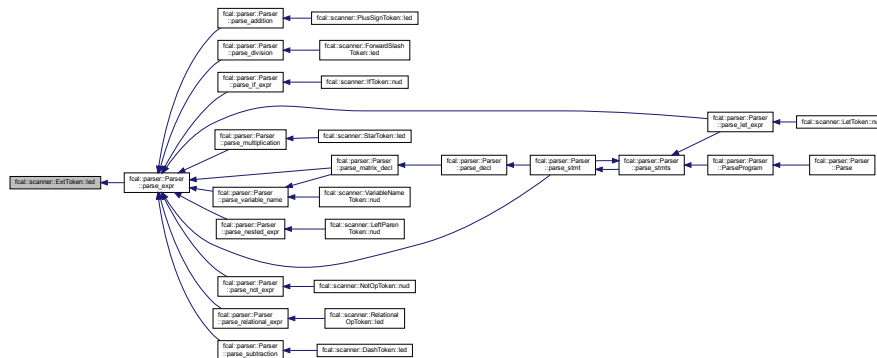
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



7.25.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file `ext_token.h`.

Referenced by [fcal::parser::Parser::parse_float_const\(\)](#), [fcal::parser::Parser::parse_int_const\(\)](#), [fcal::parser::Parser::parse_matrix_decl\(\)](#), [fcal::parser::Parser::parse_relational_expr\(\)](#), [fcal::parser::Parser::parse_standard_decl\(\)](#), [fcal::parser::Parser::parse_stmt\(\)](#), [fcal::parser::Parser::parse_string_const\(\)](#), [fcal::parser::Parser::parse_variable_name\(\)](#), and [fcal::parser::Parser::ParseProgram\(\)](#).

7.25.3.8 nud()

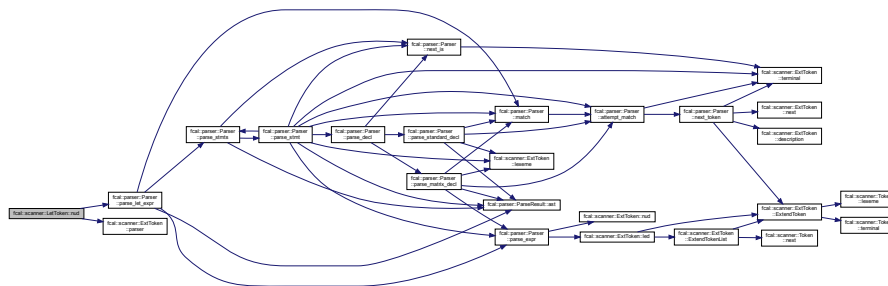
```
parser::ParseResult fcal::scanner::LetToken::nud (
    void ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 152 of file `ext_token.h`.

References [fcal::parser::Parser::parse_let_expr\(\)](#), and [fcal::scanner::ExtToken::parser\(\)](#).

Here is the call graph for this function:



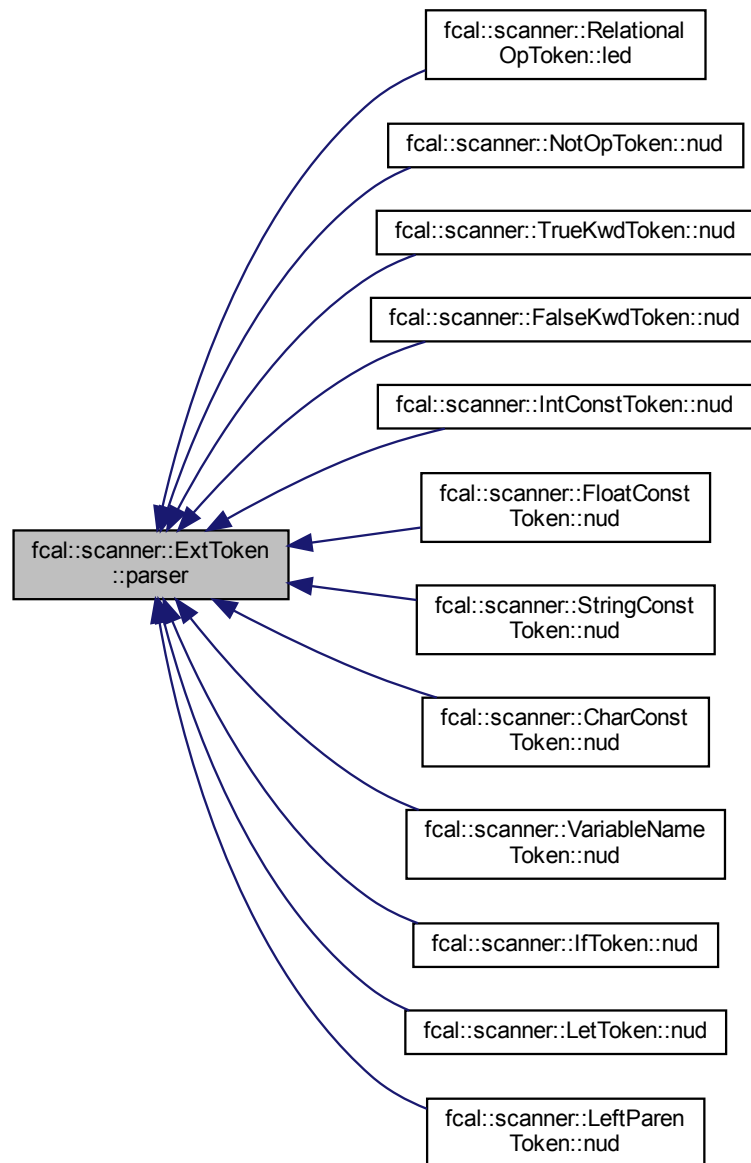
7.25.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file `ext_token.h`.

Referenced by [fcal::scanner::RelationalOpToken::led\(\)](#), [fcal::scanner::NotOpToken::nud\(\)](#), [fcal::scanner::TrueKwdToken::nud\(\)](#), [fcal::scanner::FalseKwdToken::nud\(\)](#), [fcal::scanner::IntConstToken::nud\(\)](#), [fcal::scanner::FloatConstToken::nud\(\)](#), [fcal::scanner::StringConstToken::nud\(\)](#), [fcal::scanner::CharConstToken::nud\(\)](#), [fcal::scanner::VariableNameToken::nud\(\)](#), [fcal::scanner::IfToken::nud\(\)](#), [nud\(\)](#), and [fcal::scanner::LeftParenToken::nud\(\)](#).

Here is the caller graph for this function:



7.25.3.10 terminal()

```

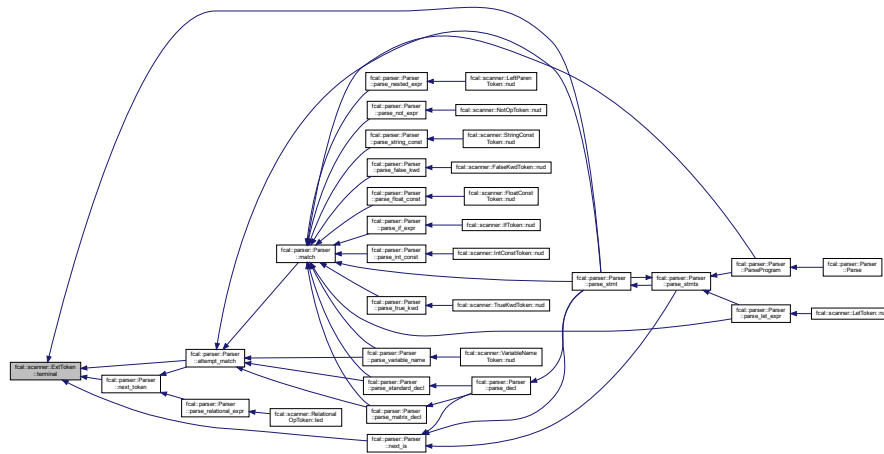
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]

```

Definition at line 59 of file ext_token.h.

Referenced by `fcal::parser::Parser::attempt_match()`, `fcal::parser::Parser::next_is()`, `fcal::parser::Parser::next_token()`, and `fcal::parser::Parser::parse_stmt()`.

Here is the caller graph for this function:



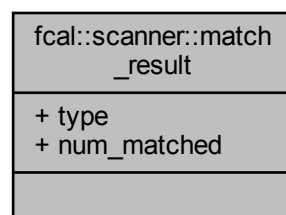
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

7.26 fcal::scanner::match_result Struct Reference

```
#include <scanner.h>
```

Collaboration diagram for `fcal::scanner::match_result`:



Public Attributes

- [TokenType](#) type
- int [num_matched](#)

7.26.1 Detailed Description

Definition at line 90 of file scanner.h.

7.26.2 Member Data Documentation

7.26.2.1 num_matched

```
int fcal::scanner::match_result::num_matched
```

Definition at line 92 of file scanner.h.

Referenced by `fcal::scanner::Scanner::find_match()`, `fcal::scanner::Scanner::Scan()`, and `fcal::scanner::Scanner::try_match()`.

7.26.2.2 type

```
TokenType fcal::scanner::match_result::type
```

Definition at line 91 of file scanner.h.

Referenced by `fcal::scanner::Scanner::find_match()`, `fcal::scanner::Scanner::Scan()`, and `fcal::scanner::Scanner::try_match()`.

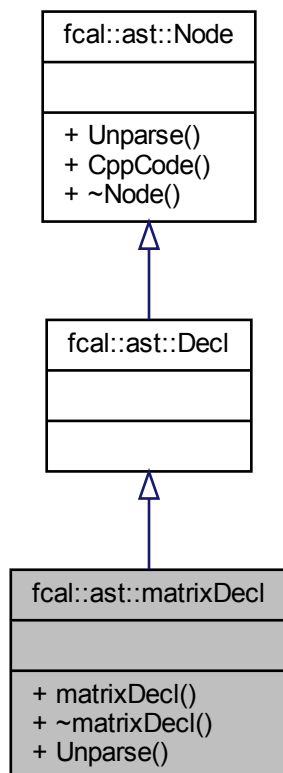
The documentation for this struct was generated from the following file:

- `include/scanner.h`

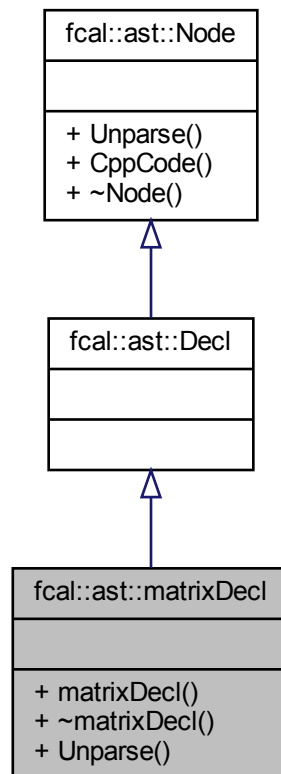
7.27 fcal::ast::matrixDecl Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::matrixDecl:



Collaboration diagram for `fcgal::ast::matrixDecl`:



Public Member Functions

- `matrixDecl` (`varName *`, `varName *`, `varName *`, `Expr *`, `Expr *`, `Expr *`)
- `~matrixDecl` ()
- `std::string Unparse` (void)
- `virtual std::string CppCode` (void)

7.27.1 Detailed Description

Definition at line 255 of file `ast.h`.

7.27.2 Constructor & Destructor Documentation

7.27.2.1 matrixDecl()

```
fcal::ast::matrixDecl::matrixDecl (
    varName * v1,
    varName * v2,
    varName * v3,
    Expr * e1,
    Expr * e2,
    Expr * e3 )
```

[matrixDecl](#) Constructor

Definition at line 387 of file ast.cc.

7.27.2.2 ~matrixDecl()

```
fcal::ast::matrixDecl::~~matrixDecl ( )
```

[matrixDecl](#) Destructor

Definition at line 401 of file ast.cc.

7.27.3 Member Function Documentation

7.27.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.27.3.2 Unparse()

```
std::string fcal::ast::matrixDecl::Unparse (  
    void ) [virtual]
```

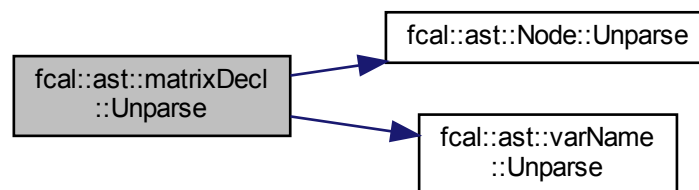
[matrixDecl](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 413 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#), and [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



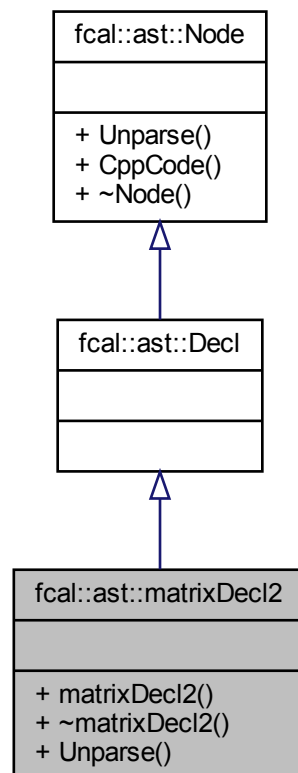
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

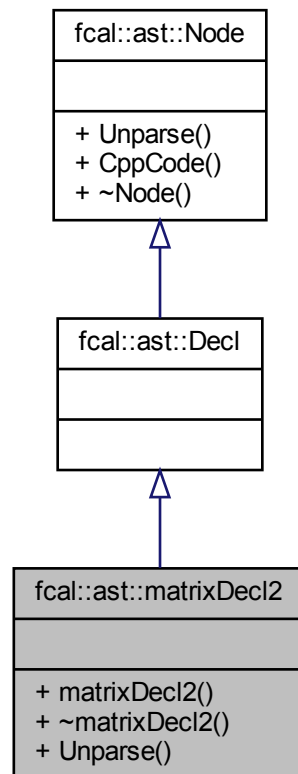
7.28 fcal::ast::matrixDecl2 Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::matrixDecl2:



Collaboration diagram for `fcal::ast::matrixDecl2`:



Public Member Functions

- [matrixDecl2](#) ([varName](#) *, [Expr](#) *)
- [~matrixDecl2](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.28.1 Detailed Description

Definition at line 271 of file `ast.h`.

7.28.2 Constructor & Destructor Documentation

7.28.2.1 matrixDecl2()

```
fcal::ast::matrixDecl2::matrixDecl2 (
    varName * v1,
    Expr * e1 )
```

Definition at line 421 of file ast.cc.

7.28.2.2 ~matrixDecl2()

```
fcal::ast::matrixDecl2::~~matrixDecl2 ( )
```

[matrixDecl](#) Destructor

Definition at line 429 of file ast.cc.

7.28.3 Member Function Documentation

7.28.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.28.3.2 Unparse()

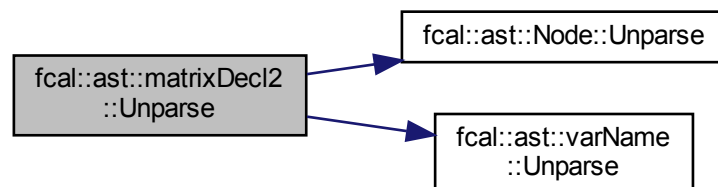
```
std::string fcal::ast::matrixDecl2::Unparse (
    void ) [virtual]
```

Implements [fcal::ast::Node](#).

Definition at line 434 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#), and [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



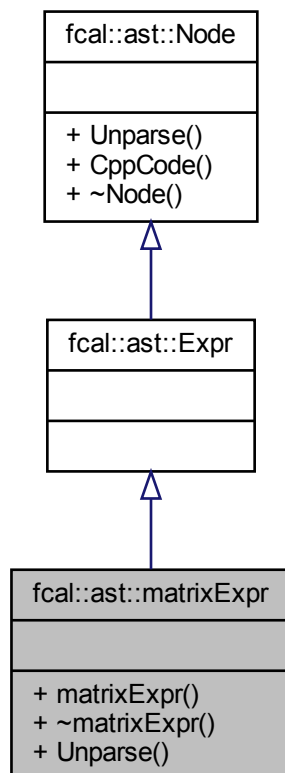
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

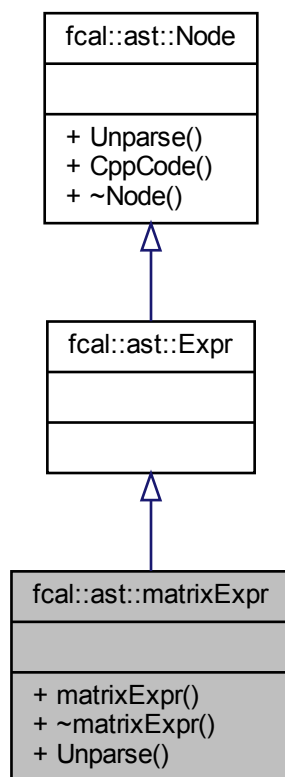
7.29 fcal::ast::matrixExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::matrixExpr:



Collaboration diagram for fcal::ast::matrixExpr:



Public Member Functions

- `matrixExpr (Expr *, Expr *, varName *)`
- `~matrixExpr ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.29.1 Detailed Description

Definition at line 505 of file `ast.h`.

7.29.2 Constructor & Destructor Documentation

7.29.2.1 matrixExpr()

```
fcgal::ast::matrixExpr::matrixExpr (
    Expr * e1,
    Expr * e2,
    varName * v1 )
```

[matrixExpr](#) Constructor

Definition at line 551 of file ast.cc.

7.29.2.2 ~matrixExpr()

```
fcgal::ast::matrixExpr::~matrixExpr ( )
```

[matrixExpr](#) Destructor

Definition at line 560 of file ast.cc.

7.29.3 Member Function Documentation

7.29.3.1 CppCode()

```
virtual std::string fcgal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.29.3.2 Unparse()

```
std::string fcgal::ast::matrixExpr::Unparse (
    void ) [virtual]
```

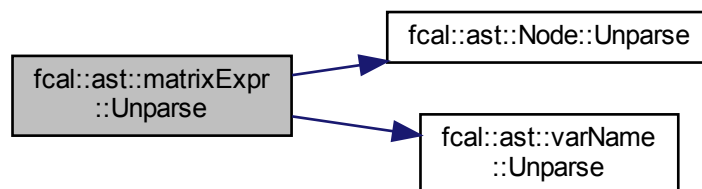
[matrixExpr](#) Unparser

Implements [fcgal::ast::Node](#).

Definition at line 569 of file ast.cc.

References [fcgal::ast::Node::Unparse\(\)](#), and [fcgal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



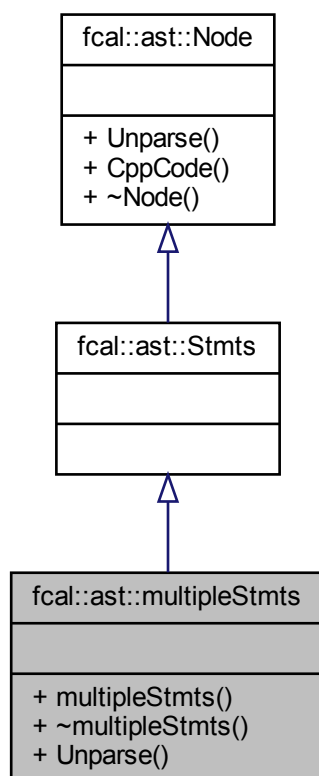
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

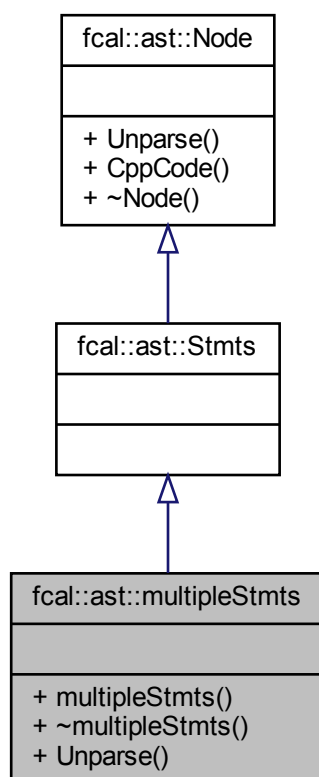
7.30 fcal::ast::multipleStmts Class Reference

```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::multipleStmts`:



Collaboration diagram for fcal::ast::multipleStmts:



Public Member Functions

- `multipleStmts (Stmt *, Stmts *)`
- `~multipleStmts ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.30.1 Detailed Description

Definition at line 78 of file `ast.h`.

7.30.2 Constructor & Destructor Documentation

7.30.2.1 multipleStmts()

```
fcal::ast::multipleStmts::multipleStmts (
    Stmt * s1,
    Stmt * s2 )
```

[multipleStmts](#) Constructor

Definition at line 82 of file ast.cc.

7.30.2.2 ~multipleStmts()

```
fcal::ast::multipleStmts::~~multipleStmts ( )
```

[multipleStmts](#) Destructor

Definition at line 90 of file ast.cc.

7.30.3 Member Function Documentation

7.30.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.30.3.2 Unparse()

```
std::string fcal::ast::multipleStmts::Unparse (
    void ) [virtual]
```

[multipleStmts](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 98 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:

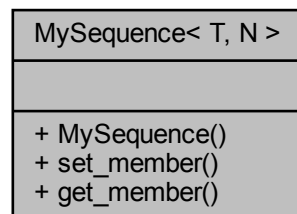


The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

7.31 MySequence< T, N > Class Template Reference

Collaboration diagram for MySequence< T, N >:



Public Member Functions

- [MySequence](#) (void)
- void [set_member](#) (int x, T value)
- T [get_member](#) (int x)

7.31.1 Detailed Description

```
template<class T, int N>
class MySequence< T, N >
```

Definition at line 27 of file templates.cc.

7.31.2 Constructor & Destructor Documentation

7.31.2.1 MySequence()

```
template<class T, int N>
MySequence< T, N >::MySequence (
    void ) [inline]
```

Definition at line 29 of file templates.cc.

7.31.3 Member Function Documentation

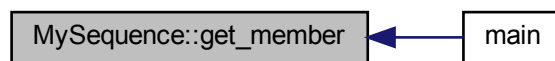
7.31.3.1 `get_member()`

```
template<class T, int N>
T MySequence< T, N >::get_member (
    int x ) [inline]
```

Definition at line 33 of file templates.cc.

Referenced by `main()`.

Here is the caller graph for this function:



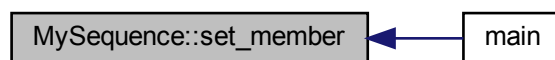
7.31.3.2 `set_member()`

```
template<class T, int N>
void MySequence< T, N >::set_member (
    int x,
    T value ) [inline]
```

Definition at line 31 of file templates.cc.

Referenced by `main()`.

Here is the caller graph for this function:



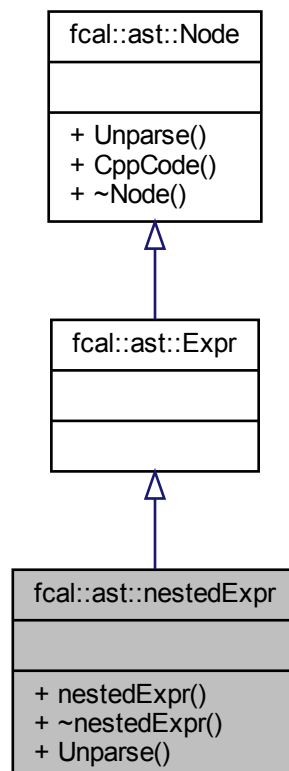
The documentation for this class was generated from the following file:

- [src/templates.cc](#)

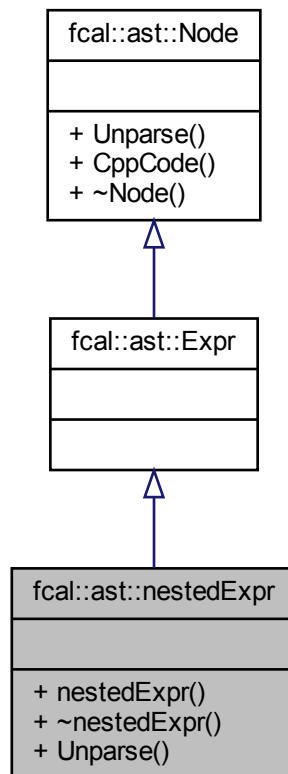
7.32 fcal::ast::nestedExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::nestedExpr:



Collaboration diagram for `fcgal::ast::nestedExpr`:



Public Member Functions

- `nestedExpr` (`Expr *`, `varName *`)
- `~nestedExpr` ()
- `std::string Unparse` (void)
- `virtual std::string CppCode` (void)

7.32.1 Detailed Description

Definition at line 519 of file `ast.h`.

7.32.2 Constructor & Destructor Documentation

7.32.2.1 nestedExpr()

```
fcal::ast::nestedExpr::nestedExpr (
    Expr * el,
    varName * vl )
```

[nestedExpr](#) Constructor

Definition at line 579 of file ast.cc.

7.32.2.2 ~nestedExpr()

```
fcal::ast::nestedExpr::~~nestedExpr ( )
```

[nestedExpr](#) Destructor

Definition at line 587 of file ast.cc.

7.32.3 Member Function Documentation

7.32.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.32.3.2 Unparse()

```
std::string fcal::ast::nestedExpr::Unparse (
    void ) [virtual]
```

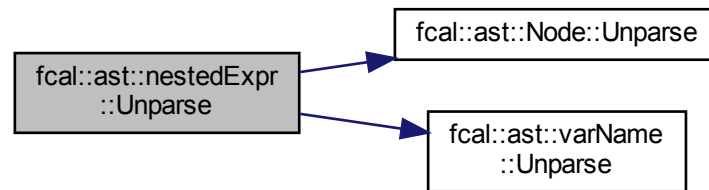
[nestedExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 595 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#), and [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



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

- [include/ast.h](#)
- [src/ast.cc](#)

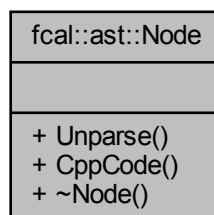
7.33 fcal::ast::Node Class Reference

```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::Node`:



Collaboration diagram for `fcal::ast::Node`:



Public Member Functions

- virtual `std::string Unparse` (void)=0
- virtual `std::string CppCode` (void)
- virtual `~Node` (void)

7.33.1 Detailed Description

Definition at line 31 of file ast.h.

7.33.2 Constructor & Destructor Documentation

7.33.2.1 ~Node()

```
virtual fcal::ast::Node::~~Node (
    void ) [inline], [virtual]
```

Definition at line 35 of file ast.h.

7.33.3 Member Function Documentation

7.33.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual]
```

Definition at line 34 of file ast.h.

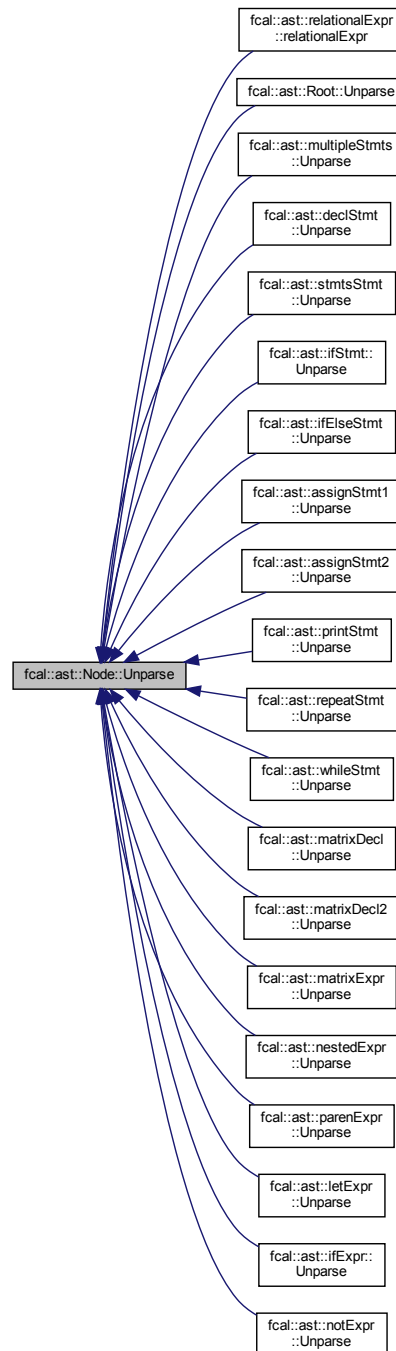
7.33.3.2 Unparse()

```
virtual std::string fcal::ast::Node::Unparse (
    void ) [pure virtual]
```

Implemented in [fcal::ast::notExpr](#), [fcal::ast::ifExpr](#), [fcal::ast::letExpr](#), [fcal::ast::parenExpr](#), [fcal::ast::nestedExpr](#), [fcal::ast::matrixExpr](#), [fcal::ast::relationalExpr](#), [fcal::ast::falseExpr](#), [fcal::ast::trueExpr](#), [fcal::ast::stringExpr](#), [fcal::ast::floatExpr](#), [fcal::ast::intExpr](#), [fcal::ast::varNameExpr](#), [fcal::ast::matrixDecl2](#), [fcal::ast::matrixDecl](#), [fcal::ast::boolDecl](#), [fcal::ast::stringDecl](#), [fcal::ast::floatDecl](#), [fcal::ast::intDecl](#), [fcal::ast::semiColonStmt](#), [fcal::ast::whileStmt](#), [fcal::ast::repeatStmt](#), [fcal::ast::printStmt](#), [fcal::ast::assignStmt2](#), [fcal::ast::assignStmt1](#), [fcal::ast::ifElseStmt](#), [fcal::ast::ifStmt](#), [fcal::ast::stmtsStmt](#), [fcal::ast::declStmt](#), [fcal::ast::multipleStmts](#), [fcal::ast::emptyStmts](#), [fcal::ast::Root](#), and [fcal::ast::varName](#).

Referenced by [fcal::ast::relationalExpr::relationalExpr\(\)](#), [fcal::ast::Root::Unparse\(\)](#), [fcal::ast::multipleStmts::Unparse\(\)](#), [fcal::ast::declStmt::Unparse\(\)](#), [fcal::ast::stmtsStmt::Unparse\(\)](#), [fcal::ast::ifStmt::Unparse\(\)](#), [fcal::ast::ifElseStmt::Unparse\(\)](#), [fcal::ast::assignStmt1::Unparse\(\)](#), [fcal::ast::assignStmt2::Unparse\(\)](#), [fcal::ast::printStmt::Unparse\(\)](#), [fcal::ast::repeatStmt::Unparse\(\)](#), [fcal::ast::whileStmt::Unparse\(\)](#), [fcal::ast::matrixDecl::Unparse\(\)](#), [fcal::ast::matrixDecl2::Unparse\(\)](#), [fcal::ast::matrixExpr::Unparse\(\)](#), [fcal::ast::nestedExpr::Unparse\(\)](#), [fcal::ast::parenExpr::Unparse\(\)](#), [fcal::ast::letExpr::Unparse\(\)](#), [fcal::ast::ifExpr::Unparse\(\)](#), and [fcal::ast::notExpr::Unparse\(\)](#).

Here is the caller graph for this function:



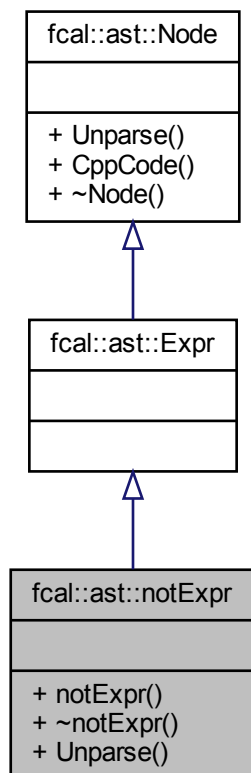
The documentation for this class was generated from the following file:

- [include/ast.h](#)

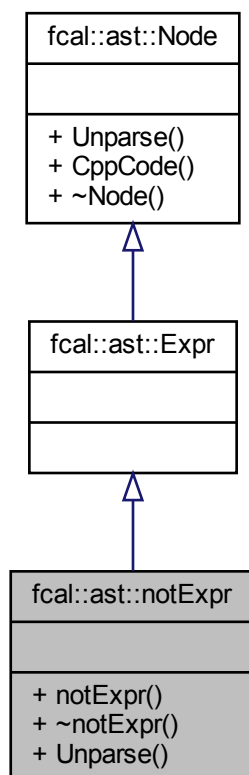
7.34 fcal::ast::notExpr Class Reference

```
#include <ast.h>
```


Inheritance diagram for fcal::ast::notExpr:



Collaboration diagram for `fcgal::ast::notExpr`:



Public Member Functions

- `notExpr (Expr *)`
- `~notExpr ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.34.1 Detailed Description

Definition at line 568 of file `ast.h`.

7.34.2 Constructor & Destructor Documentation

7.34.2.1 notExpr()

```
fcal::ast::notExpr::notExpr (
    Expr * e1 ) [explicit]
```

[notExpr](#) Constructor

Definition at line 672 of file ast.cc.

7.34.2.2 ~notExpr()

```
fcal::ast::notExpr::~notExpr ( )
```

[notExpr](#) Destructor

Definition at line 677 of file ast.cc.

7.34.3 Member Function Documentation

7.34.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.34.3.2 Unparse()

```
std::string fcal::ast::notExpr::Unparse (
    void ) [virtual]
```

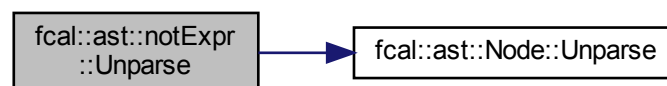
[notExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 682 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



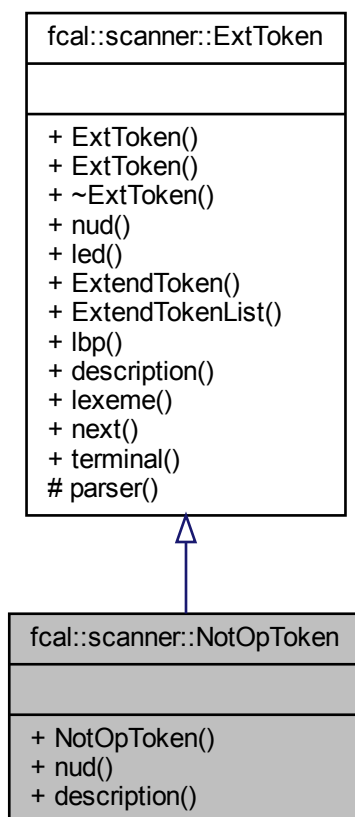
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

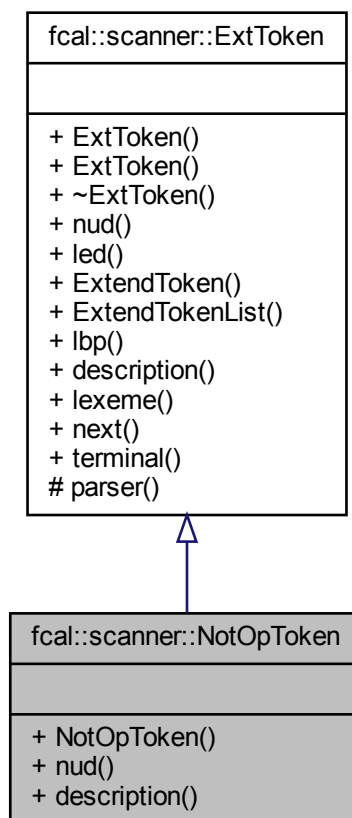
7.35 fcal::scanner::NotOpToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::NotOpToken:



Collaboration diagram for fcal::scanner::NotOpToken:



Public Member Functions

- `NotOpToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `virtual int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.35.1 Detailed Description

Definition at line 78 of file `ext_token.h`.

7.35.2 Constructor & Destructor Documentation

7.35.2.1 NotOpToken()

```
fcal::scanner::NotOpToken::NotOpToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 80 of file `ext_token.h`.

7.35.3 Member Function Documentation

7.35.3.1 description()

```
std::string fcal::scanner::NotOpToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 83 of file `ext_token.h`.

7.35.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

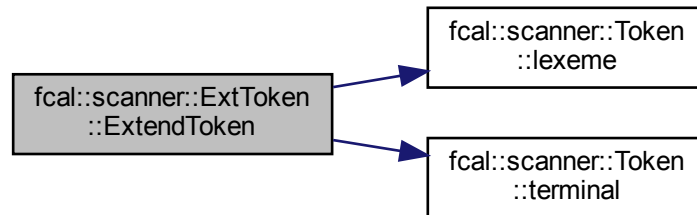
Definition at line 31 of file `ext_token.cc`.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

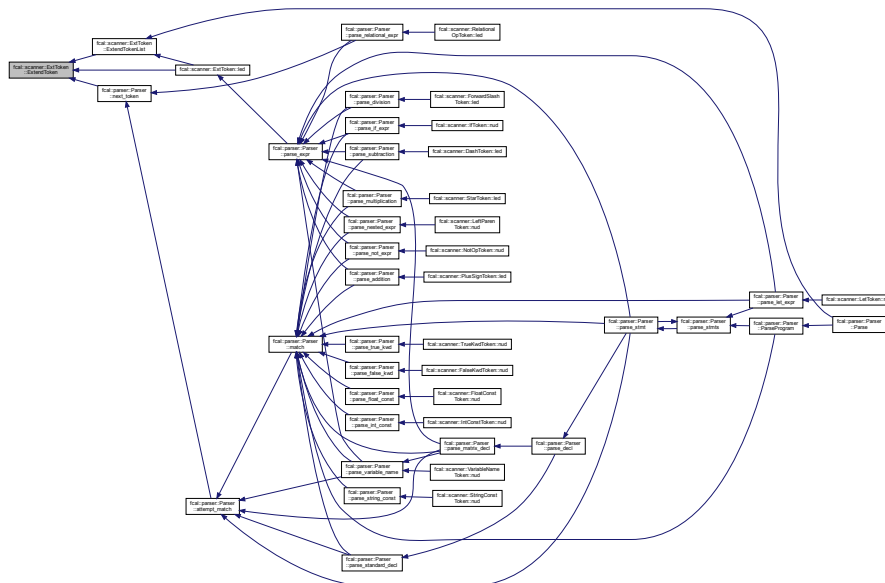
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:

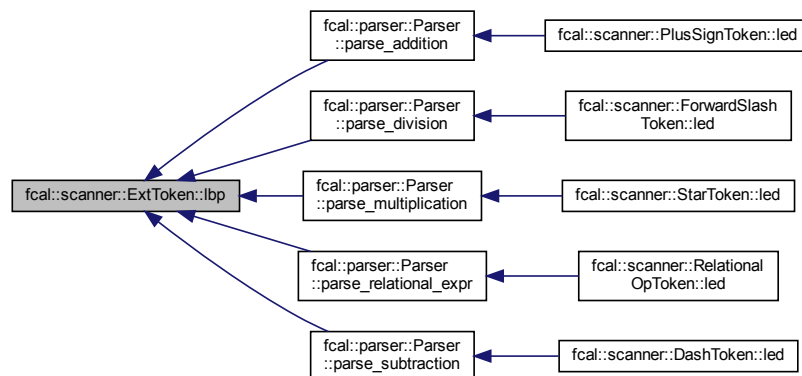


7.35.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```


Here is the caller graph for this function:



7.35.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

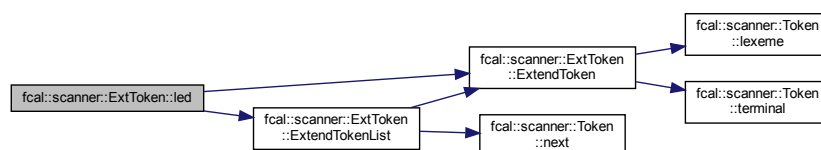
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

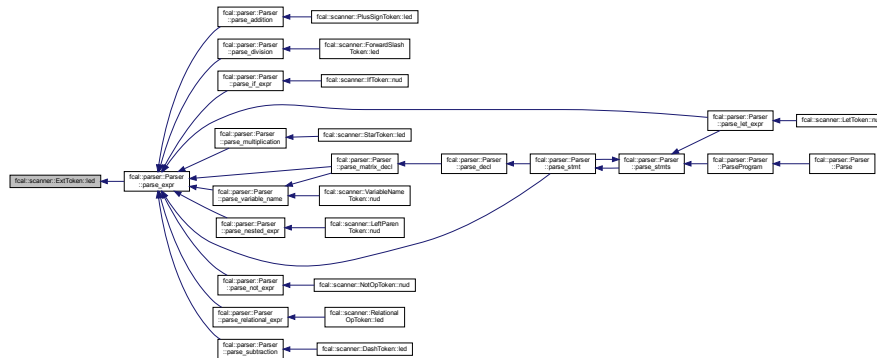
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



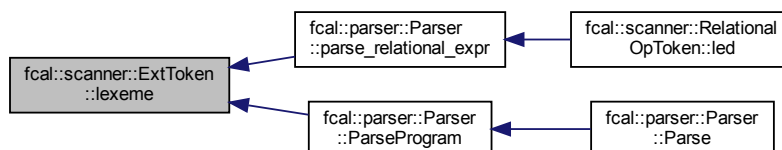
7.35.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_float_const()`, `fcal::parser::Parser::parse_int_const()`, `fcal::parser::Parser::parse_matrix_decl()`, `fcal::parser::Parser::parse_relational_expr()`, `fcal::parser::Parser::parse_standard_decl()`, `fcal::parser::Parser::parse_stmt()`, `fcal::parser::Parser::parse_string_const()`, `fcal::parser::Parser::parse_variable_name()`, and `fcal::parser::Parser::ParseProgram()`.

Here is the caller graph for this function:

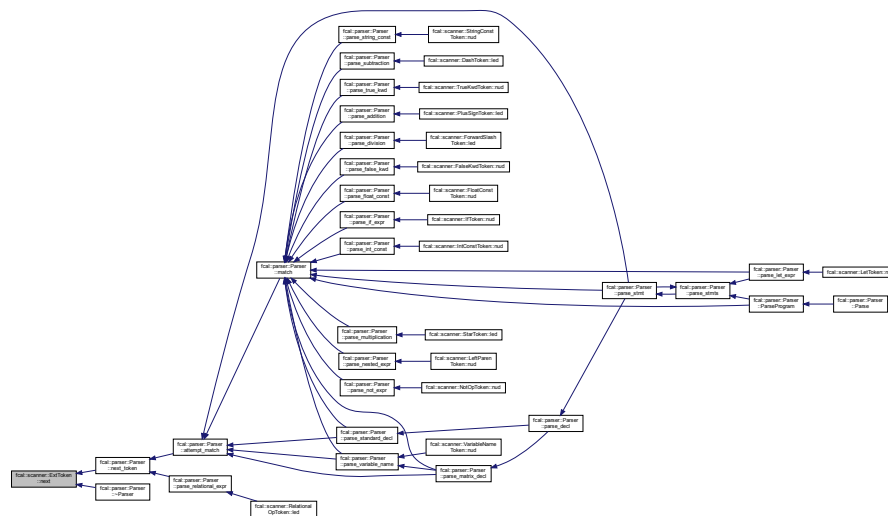


7.35.3.7 next()

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Definition at line 58 of file ext_token.h.

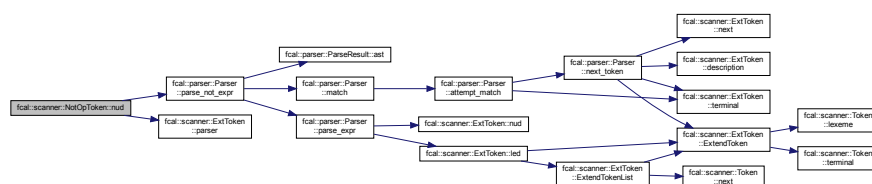
Here is the caller graph for this function:



```
parser::ParseResult fcal::scanner::NotOpToken::nud (
    void ) [inline], [virtual]
```

Definition at line 82 of file ext_token.h.

Here is the call graph for this function:



7.35.3.9 parser()

```

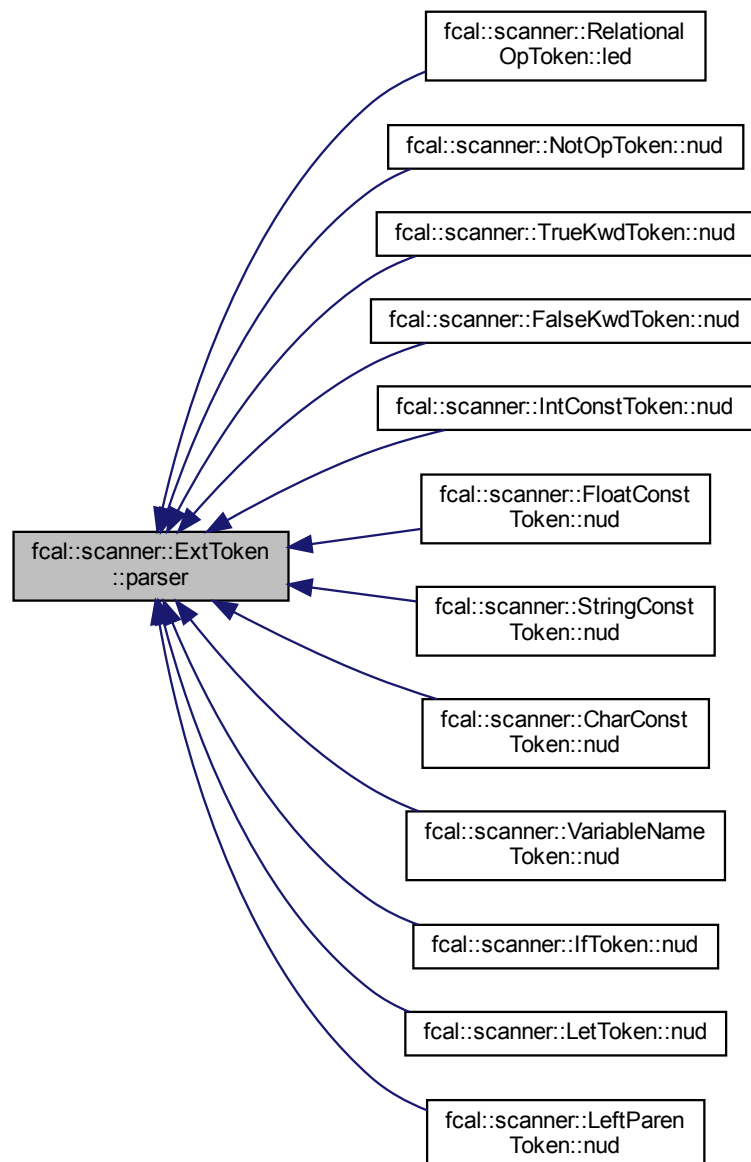
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]

```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:



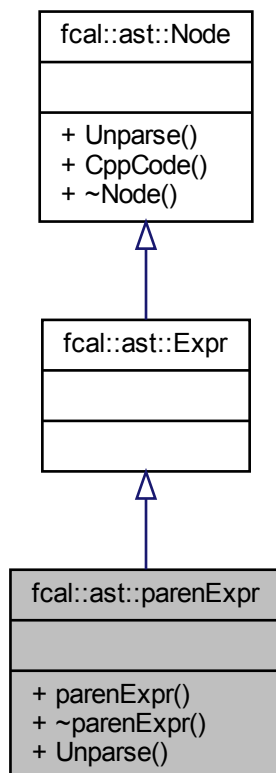
```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]
```

Referenced by `fcgal::parser::Parser::attempt_match()`, `fcgal::parser::Parser::next_is()`, `fcgal::parser::Parser::next_token()`, and `fcgal::parser::Parser::parse_stmt()`.

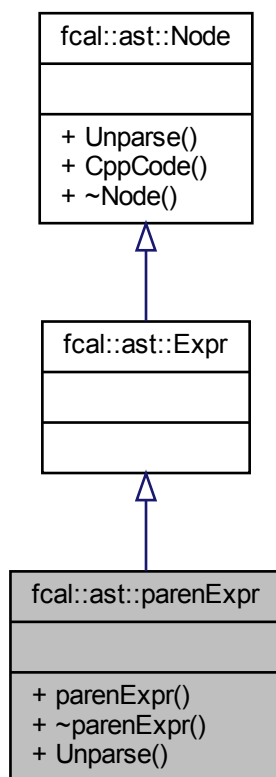
- `include/ext_token.h`

```
#include <ast.h>
```

Inheritance diagram for `fcab::ast::parenExpr`:



Collaboration diagram for fcal::ast::parenExpr:



Public Member Functions

- `parenExpr (Expr *)`
- `~parenExpr ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.36.1 Detailed Description

Definition at line 532 of file `ast.h`.

7.36.2 Constructor & Destructor Documentation

7.36.2.1 parenExpr()

```
fcgal::ast::parenExpr::parenExpr (
    Expr * e1 ) [explicit]
```

[parenExpr](#) Constructor

Definition at line 604 of file ast.cc.

7.36.2.2 ~parenExpr()

```
fcgal::ast::parenExpr::~~parenExpr ( )
```

[parenExpr](#) Destructor

Definition at line 609 of file ast.cc.

7.36.3 Member Function Documentation

7.36.3.1 CppCode()

```
virtual std::string fcgal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.36.3.2 Unparse()

```
std::string fcgal::ast::parenExpr::Unparse (
    void ) [virtual]
```

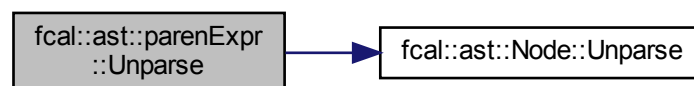
[parenExpr](#) Unparser

Implements [fcgal::ast::Node](#).

Definition at line 614 of file ast.cc.

References [fcgal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



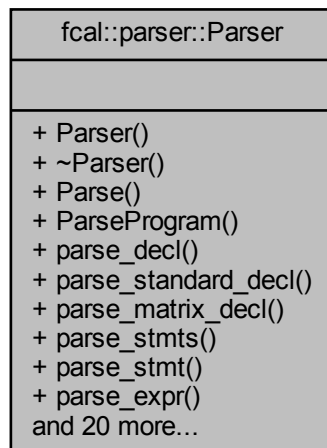
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

7.37 fcal::parser::Parser Class Reference

```
#include <parser.h>
```

Collaboration diagram for fcal::parser::Parser:



Public Member Functions

- [Parser](#) (void)
- [~Parser](#) (void)
- [ParseResult Parse](#) (const char *text)
- [ParseResult ParseProgram](#) ()
- [ParseResult parse_decl](#) ()
- [ParseResult parse_standard_decl](#) ()
- [ParseResult parse_matrix_decl](#) ()
- [ParseResult parse_stmts](#) ()
- [ParseResult parse_stmt](#) ()
- [ParseResult parse_expr](#) (int rbp)
- [ParseResult parse_true_kwd](#) ()
- [ParseResult parse_false_kwd](#) ()
- [ParseResult parse_int_const](#) ()
- [ParseResult parse_float_const](#) ()
- [ParseResult parse_string_const](#) ()
- [ParseResult parse_char_const](#) ()
- [ParseResult parse_variable_name](#) ()
- [ParseResult parse_nested_expr](#) ()
- [ParseResult parse_not_expr](#) ()
- [ParseResult parse_let_expr](#) ()
- [ParseResult parse_if_expr](#) ()
- [ParseResult parse_addition](#) (ParseResult left)
- [ParseResult parse_multiplication](#) (ParseResult left)
- [ParseResult parse_subtraction](#) (ParseResult left)

- [ParseResult parse_division](#) ([ParseResult](#) left)
- [ParseResult parse_relational_expr](#) ([ParseResult](#) left)
- void [match](#) (const [scanner::TokenType](#) &tt)
- bool [attempt_match](#) (const [scanner::TokenType](#) &tt)
- bool [next_is](#) (const [scanner::TokenType](#) &tt)
- void [next_token](#) (void)

7.37.1 Detailed Description

Definition at line 51 of file parser.h.

7.37.2 Constructor & Destructor Documentation

7.37.2.1 Parser()

```
fcal::parser::Parser::Parser (
    void ) [inline]
```

Definition at line 53 of file parser.h.

7.37.2.2 ~Parser()

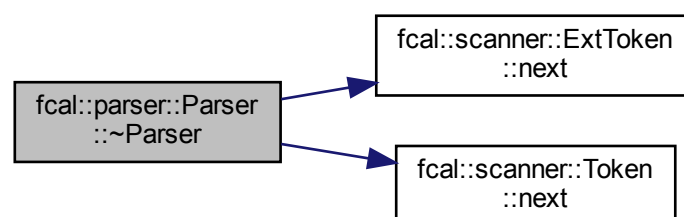
```
fcal::parser::Parser::~~Parser (
    void )
```

[Parser](#) Destructor

Definition at line 33 of file parser.cc.

References [fcal::scanner::ExtToken::next\(\)](#), and [fcal::scanner::Token::next\(\)](#).

Here is the call graph for this function:



7.37.3 Member Function Documentation

7.37.3.1 attempt_match()

```
bool fcal::parser::Parser::attempt_match (
    const scanner::TokenType & tt )
```

Tries to match a token

Parameters

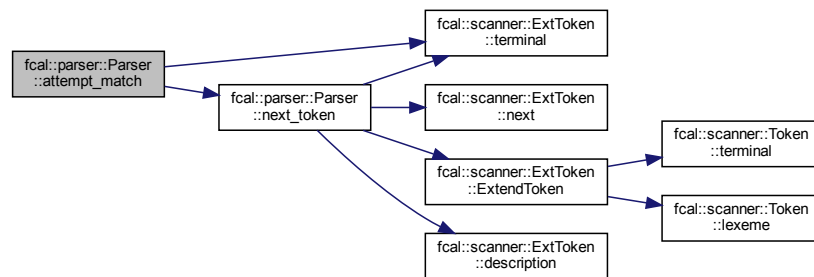
<i>tt</i>	TokenType to match
-----------	--------------------

Definition at line 698 of file parser.cc.

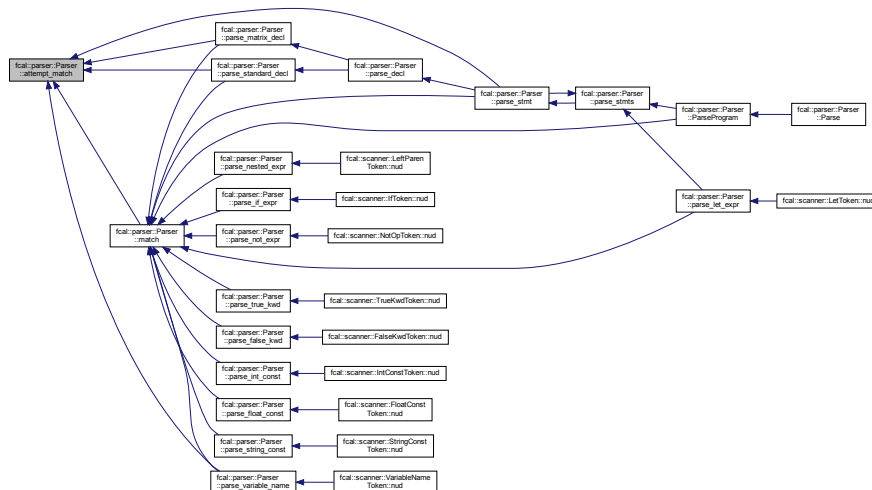
References `next_token()`, and `fcal::scanner::ExtToken::terminal()`.

Referenced by `match()`, `parse_matrix_decl()`, `parse_standard_decl()`, `parse_stmt()`, and `parse_variable_name()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.2 match()

```
void fcal::parser::Parser::match (
    const scanner::TokenType & tt )
```

Matches a token

Parameters

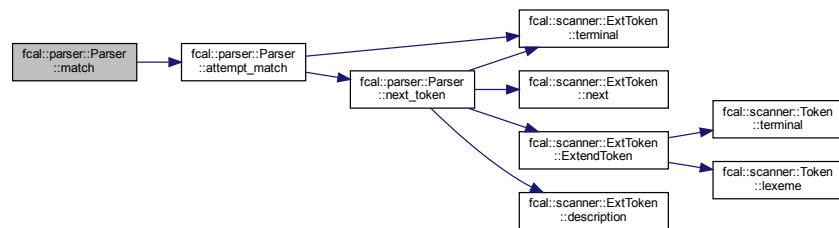
<i>tt</i>	TokenType to match
-----------	--------------------

Definition at line 688 of file parser.cc.

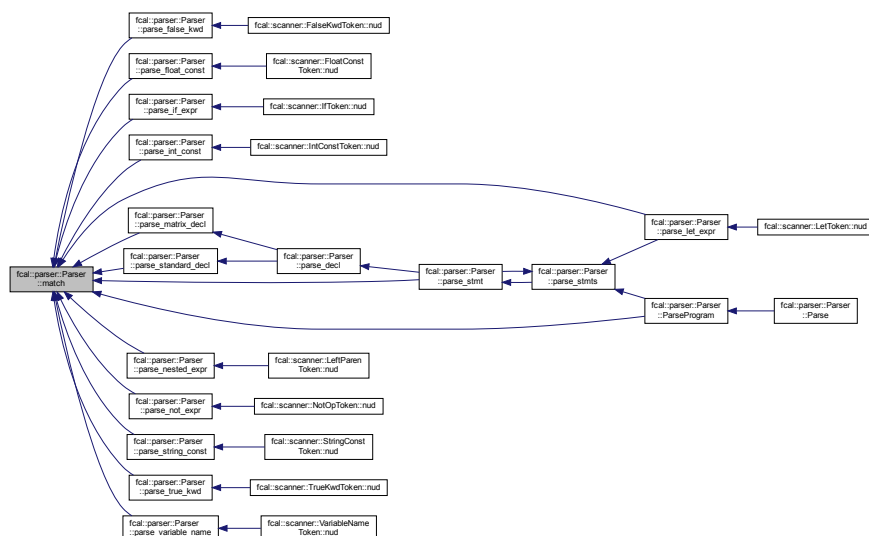
References `attempt_match()`.

Referenced by `parse_false_kwd()`, `parse_float_const()`, `parse_if_expr()`, `parse_int_const()`, `parse_let_expr()`, `parse_matrix_decl()`, `parse_nested_expr()`, `parse_not_expr()`, `parse_standard_decl()`, `parse_stmt()`, `parse_string_const()`, `parse_true_kwd()`, `parse_variable_name()`, and `ParseProgram()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.3 next_is()

```
bool fcal::parser::Parser::next_is (
    const scanner::TokenType & tt )
```

Returns true if current token terminal is tt

Parameters

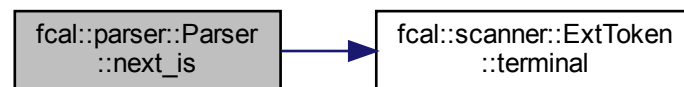
<i>tt</i>	TokenType to check
-----------	--------------------

Definition at line 710 of file parser.cc.

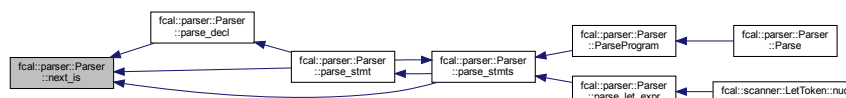
References `fcal::scanner::ExtToken::terminal()`.

Referenced by `parse_decl()`, `parse_stmt()`, and `parse_stmts()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.4 next_token()

```
void fcal::parser::Parser::next_token (
    void )
```

Returns next token

Definition at line 717 of file parser.cc.

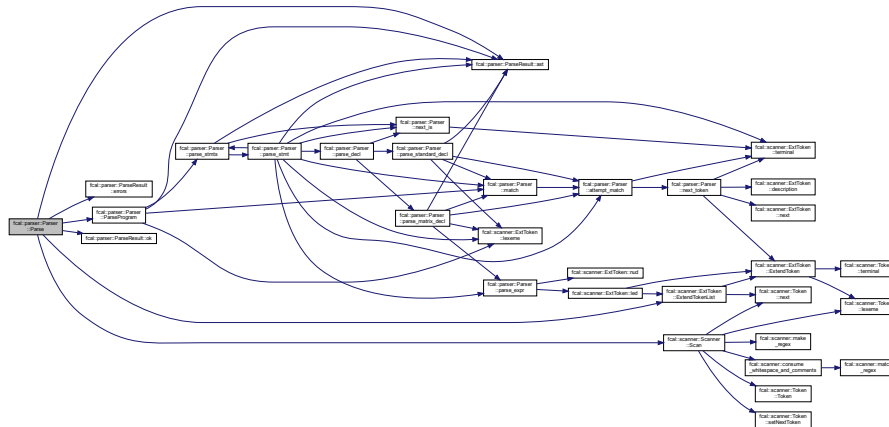
Parameters

in	text	c_string text to parse
----	------	------------------------

Definition at line 57 of file parser.cc.

References `fcal::parser::ParseResult::ast()`, `fcal::parser::ParseResult::errors()`, `fcal::scanner::ExtToken::ExtendTokenList()`, `fcal::parser::ParseResult::ok()`, `ParseProgram()`, and `fcal::scanner::Scanner::Scan()`.

Here is the call graph for this function:



7.37.3.6 parse_addition()

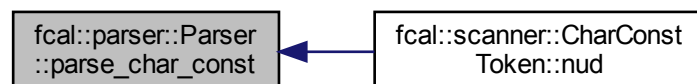
```
ParseResult fcal::parser::Parser::parse_addition (
    ParseResult left )
```

7.37.3.7 parse_char_const()

```
ParseResult fcal::parser::Parser::parse_char_const ( )
```

Referenced by `fcal::scanner::CharConstToken::nud()`.

Here is the caller graph for this function:



7.37.3.8 parse_decl()

```
ParseResult fcal::parser::Parser::parse_decl ( )
```

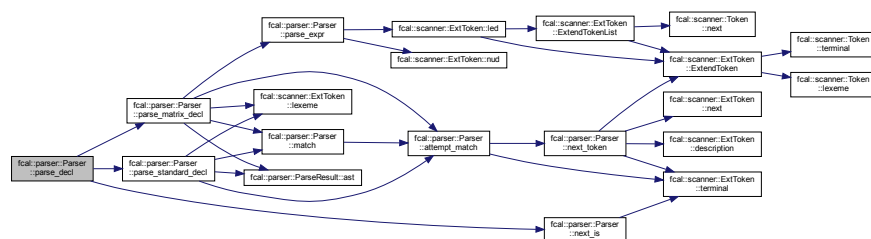
Parses decl

Definition at line 221 of file parser.cc.

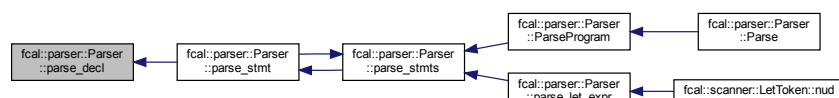
References `fcal::scanner::kMatrixKwd`, `next_is()`, `parse_matrix_decl()`, and `parse_standard_decl()`.

Referenced by `parse_stmt()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.9 parse_division()

```
ParseResult fcal::parser::Parser::parse_division (
    ParseResult left )
```


7.37.3.10 parse_expr()

```
ParseResult fcal::parser::Parser::parse_expr (
    int rbp )
```

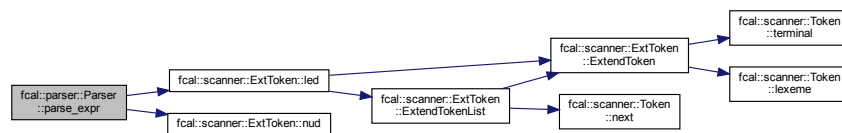
Parses expr

Definition at line 436 of file parser.cc.

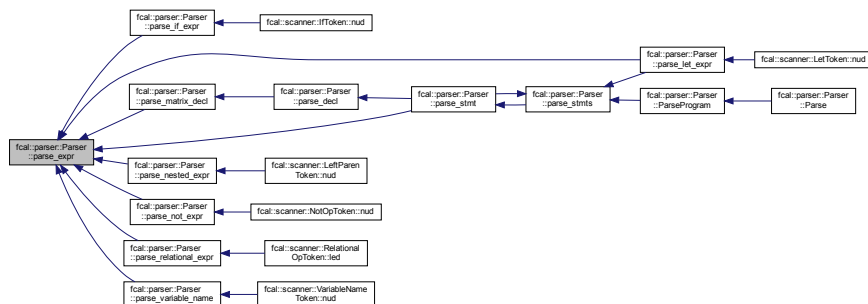
References `fcal::scanner::ExtToken::led()`, and `fcal::scanner::ExtToken::nud()`.

Referenced by `parse_if_expr()`, `parse_let_expr()`, `parse_matrix_decl()`, `parse_nested_expr()`, `parse_not_expr()`, `parse_relational_expr()`, `parse_stmt()`, and `parse_variable_name()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.11 parse_false_kwd()

```
ParseResult fcal::parser::Parser::parse_false_kwd ( )
```

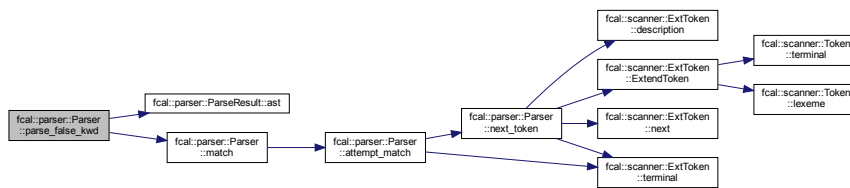
Parses false keyword

Definition at line 470 of file parser.cc.

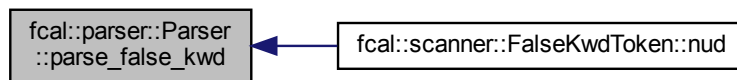
References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kFalseKwd`, and `match()`.

Referenced by `fcal::scanner::FalseKwdToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.12 parse_float_const()

```
ParseResult fcal::parser::Parser::parse_float_const ( )
```

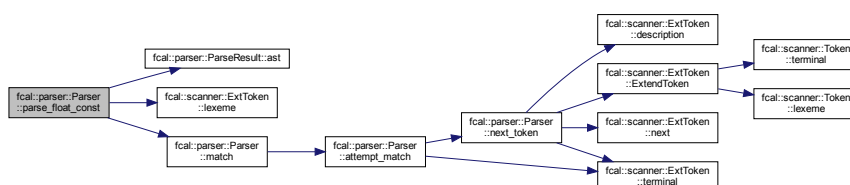
Parses float const

Definition at line 493 of file parser.cc.

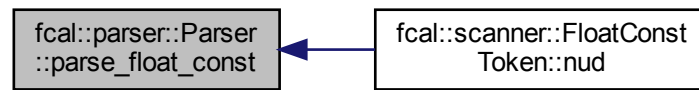
References `fcal::parser::ParserResult::ast()`, `fcal::scanner::kFloatConst`, `fcal::scanner::ExtToken::lexeme()`, and `match()`.

Referenced by `fcal::scanner::FloatConstToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.13 parse_if_expr()

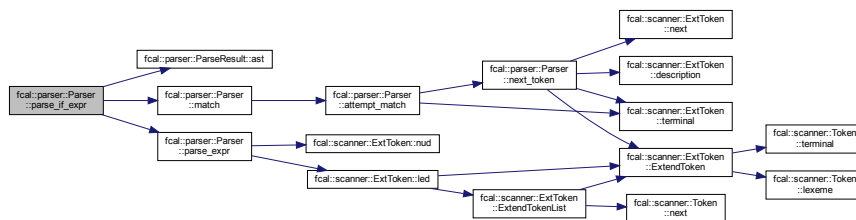
```
ParseResult fcal::parser::Parser::parse_if_expr ( )
```

Definition at line 575 of file parser.cc.

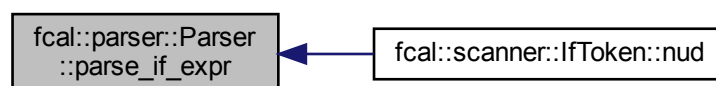
References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kElseKwd`, `fcal::scanner::kIfKwd`, `fcal::scanner::kThenKwd`, `match()`, and `parse_expr()`.

Referenced by `fcal::scanner::IfToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.14 parse_int_const()

```
ParseResult fcal::parser::Parser::parse_int_const ( )
```

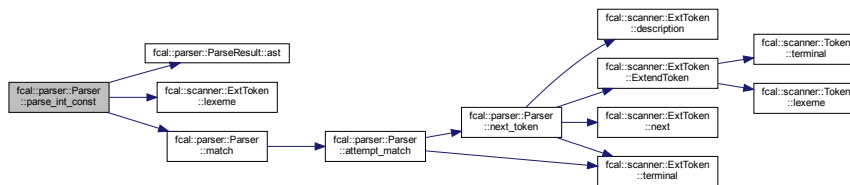
Parses int const

Definition at line 481 of file parser.cc.

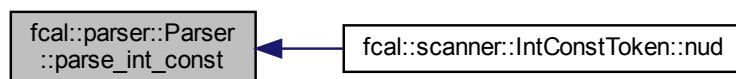
References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kIntConst`, `fcal::scanner::ExtToken::lexeme()`, and `match()`.

Referenced by `fcal::scanner::IntConstToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.15 parse_let_expr()

```
ParseResult fcal::parser::Parser::parse_let_expr ( )
```

Definition at line 605 of file parser.cc.

References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kEndKwd`, `fcal::scanner::kInKwd`, `fcal::scanner::kLetKwd`, `match()`, `parse_expr()`, and `parse_stmts()`.

Referenced by `fcal::scanner::LetToken::nud()`.

[illegible]

```
graph LR
    A["fcal::scanner::LetToken::nud"] --> B["fcal::parser::Parser::parse_let_expr"]
```

```
ParseResult fcal::parser::Parser::parse_matrix_decl ( )
```

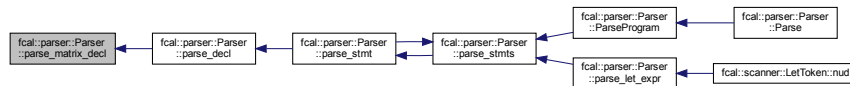
Definition at line 117 of file parser.cc.

Referenced by `parse_decl()`.

```

graph LR
    Entry[foal::parser::Parser::parse_mainx_dec] --> Match[foal::parser::Parser::match]
    Entry --> ParseExpr[foal::parser::Parser::parse_expr]
    Entry --> Lexeme[foal::scanner::ExtToken::lexeme]
    
    Match --> AttemptMatch[foal::parser::Parser::attempt_match]
    AttemptMatch --> NextToken[foal::parser::Parser::next_token]
    
    ParseExpr --> Nud[foal::scanner::ExtToken::nud]
    ParseExpr --> Led[foal::scanner::ExtToken::led]
    
    Lexeme --> Next[foal::scanner::ExtToken::next]
    
    NextToken --> Next2[foal::scanner::ExtToken::next]
    NextToken --> Description[foal::scanner::ExtToken::description]
    NextToken --> Terminal1[foal::scanner::ExtToken::terminal]
    
    Nud --> ExtendToken[foal::scanner::ExtToken::ExtendToken]
    Led --> ExtendToken
    
    ExtendToken --> Terminal2[foal::scanner::Token::terminal]
    ExtendToken --> Lexeme2[foal::scanner::Token::lexeme]
    
    Next2 --> Next3[foal::scanner::Token::next]
  
```

Here is the caller graph for this function:



7.37.3.17 parse_multiplication()

```

ParseResult fcal::parser::Parser::parse_multiplication (
    ParseResult left )
  
```

7.37.3.18 parse_nested_expr()

```

ParseResult fcal::parser::Parser::parse_nested_expr ( )
  
```

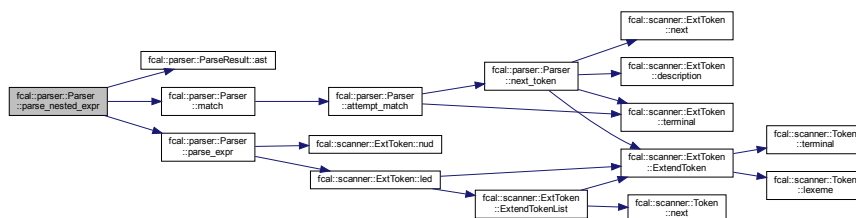
Parses nested expression

Definition at line 559 of file parser.cc.

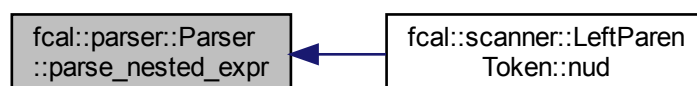
References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kLeftParen`, `fcal::scanner::kRightParen`, `match()`, and `parse_expr()`.

Referenced by `fcal::scanner::LeftParenToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.19 parse_not_expr()

```
ParseResult fcal::parser::Parser::parse_not_expr ( )
```

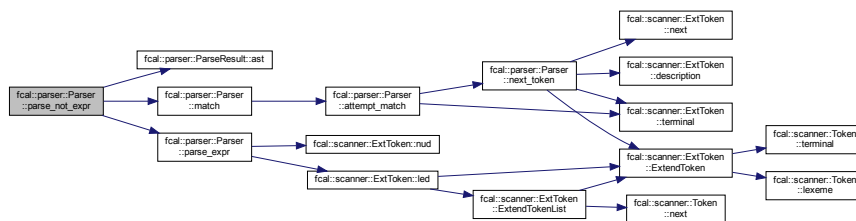
Parses not expression

Definition at line 631 of file parser.cc.

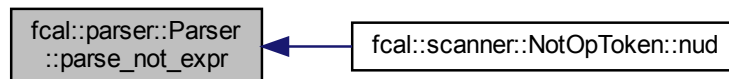
References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kNotOp`, `match()`, and `parse_expr()`.

Referenced by `fcal::scanner::NotOpToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.20 parse_relational_expr()

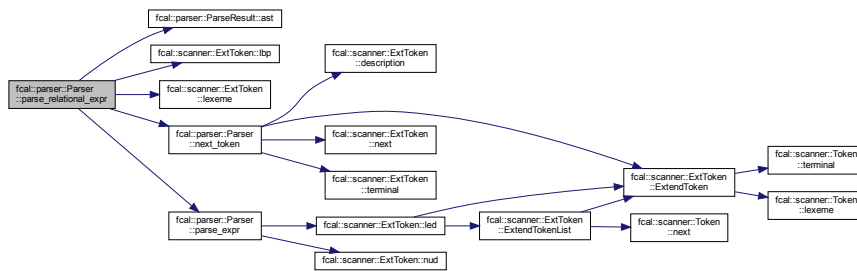
```
ParseResult fcal::parser::Parser::parse_relational_expr (
    ParseResult left )
```

Definition at line 658 of file parser.cc.

References `fcal::parser::ParseResult::ast()`, `fcal::scanner::ExtToken::lbp()`, `fcal::scanner::ExtToken::lexeme()`, `next_token()`, and `parse_expr()`.

Referenced by `fcal::scanner::RelationalOpToken::led()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.21 parse_standard_decl()

```
ParseResult fcal::parser::Parser::parse_standard_decl ( )
```

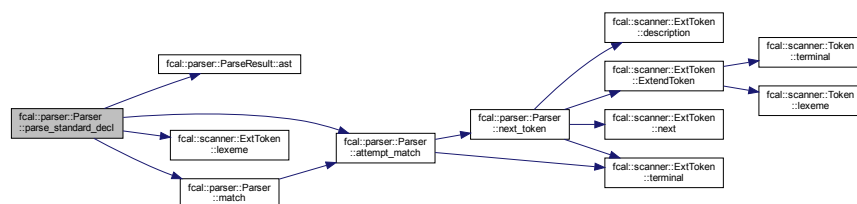
Parses standardDecl

Definition at line 179 of file parser.cc.

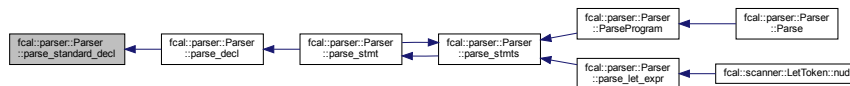
References `fcal::parser::ParseResult::ast()`, `attempt_match()`, `fcal::scanner::kBoolKwd`, `fcal::scanner::kFloatKwd`, `fcal::scanner::kIntKwd`, `fcal::scanner::kSemiColon`, `fcal::scanner::kStringKwd`, `fcal::scanner::kVariableName`, `fcal::scanner::ExtToken::lexeme()`, and `match()`.

Referenced by `parse_decl()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.22 parse_stmt()

```
ParseResult fcal::parser::Parser::parse_stmt ( )
```

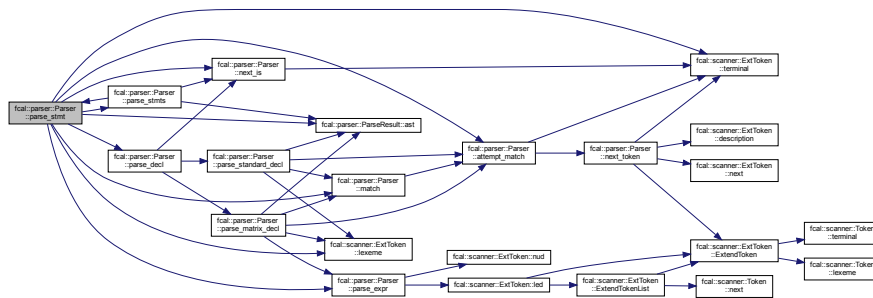
Parses stmt

Definition at line 268 of file parser.cc.

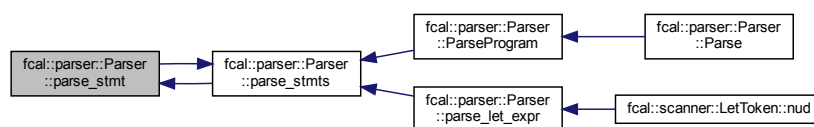
References `fcal::parser::ParseResult::ast()`, `attempt_match()`, `fcal::scanner::kAssign`, `fcal::scanner::kBoolKwd`, `fcal::scanner::kColon`, `fcal::scanner::kElseKwd`, `fcal::scanner::kFloatKwd`, `fcal::scanner::kIfKwd`, `fcal::scanner::kIntKwd`, `fcal::scanner::kLeftCurly`, `fcal::scanner::kLeftParen`, `fcal::scanner::kLeftSquare`, `fcal::scanner::kMatrixKwd`, `fcal::scanner::kPrintKwd`, `fcal::scanner::kRepeatKwd`, `fcal::scanner::kRightCurly`, `fcal::scanner::kRightParen`, `fcal::scanner::kRightSquare`, `fcal::scanner::kSemiColon`, `fcal::scanner::kStringKwd`, `fcal::scanner::kToKwd`, `fcal::scanner::kVariableName`, `fcal::scanner::kWhileKwd`, `fcal::scanner::ExtToken::lexeme()`, `match()`, `next_is()`, `parse_decl()`, `parse_expr()`, `parse_stmts()`, and `fcal::scanner::ExtToken::terminal()`.

Referenced by `parse_stmts()`.

Here is the call graph for this function:



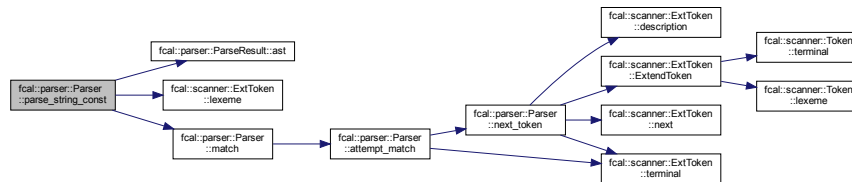
Here is the caller graph for this function:



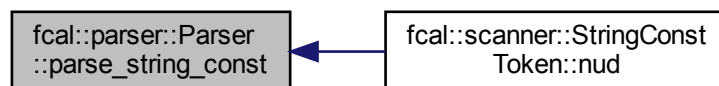
References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kStringConst`, `fcal::scanner::ExtToken::lexeme()`, and `match()`.

Referenced by `fcal::scanner::StringConstToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.25 parse_subtraction()

```
ParseResult fcal::parser::Parser::parse_subtraction (
    ParseResult left )
```

7.37.3.26 parse_true_kwd()

```
ParseResult fcal::parser::Parser::parse_true_kwd ( )
```

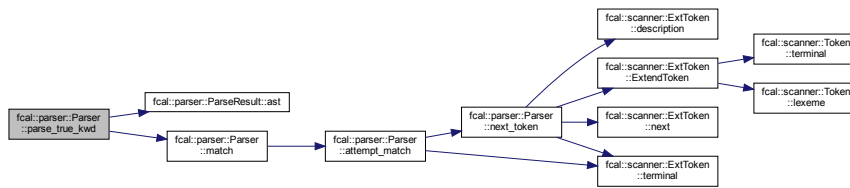
Parses true keyword

Definition at line 459 of file `parser.cc`.

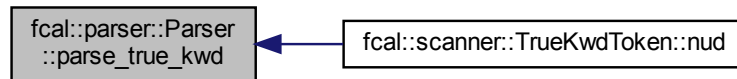
References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kTrueKwd`, and `match()`.

Referenced by `fcal::scanner::TrueKwdToken::nud()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.37.3.27 parse_variable_name()

```
ParseResult fcal::parser::Parser::parse_variable_name ( )
```

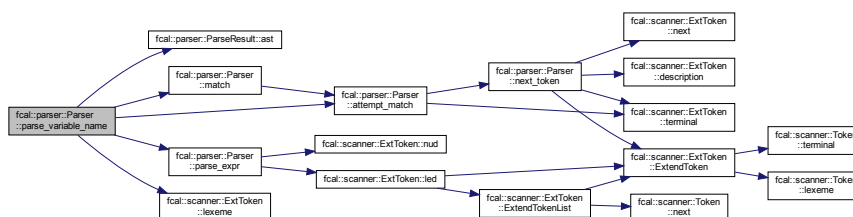
Parses variable name

Definition at line 517 of file parser.cc.

References `fcal::parser::ParserResult::ast()`, `attempt_match()`, `fcal::scanner::kColon`, `fcal::scanner::kLeftParen`, `fcal::scanner::kLeftSquare`, `fcal::scanner::kRightParen`, `fcal::scanner::kRightSquare`, `fcal::scanner::kVariableName`, `fcal::scanner::ExtToken::lexeme()`, `match()`, and `parse_expr()`.

Referenced by `fcal::scanner::VariableNameToken::nud()`.

Here is the call graph for this function:



```
graph LR; A["fcal::scanner::VariableName  
Token::nud"] --> B["fcal::parser::Parser  
::parse_variable_name"]
```

The diagram illustrates a function call. On the right, a box represents the caller: `fcal::scanner::VariableName` with the argument `Token::nud`. A blue arrow points from this box to a box on the left, which represents the callee: `fcal::parser::Parser` with the method `::parse_variable_name`.



Parses the program

References `fcal::parser::ParseResult::ast()`, `fcal::scanner::kEndOfFile`, `fcal::scanner::kLeftCurly`, `fcal::scanner::kLeftParen`, `fcal::scanner::kRightCurly`, `fcal::scanner::kRightParen`, `fcal::scanner::kVariableName`, `fcal::scanner::kExtToken::lexeme()`, `match()`, and `parse_stmts()`.

Here is the call graph for this function:

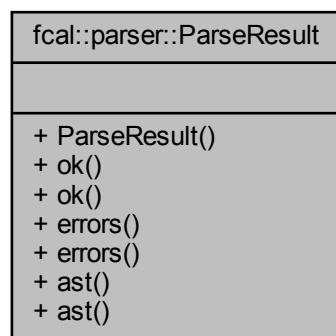


- [include/parser.h](#)
- [src/parser.cc](#)

7.38 fcal::parser::ParseResult Class Reference

```
#include <parse_result.h>
```

Collaboration diagram for fcal::parser::ParseResult:



Public Member Functions

- [ParseResult](#) (void)
- bool [ok](#) (void) const
- void [ok](#) (bool result_in)
- std::string [errors](#) (void) const
- void [errors](#) (const std::string str_in)
- [ast::Node](#) * [ast](#) (void)
- void [ast](#) ([ast::Node](#) *Node_ptr)

7.38.1 Detailed Description

Definition at line 30 of file `parse_result.h`.

7.38.2 Constructor & Destructor Documentation

7.38.2.1 ParseResult()

```
fcal::parser::ParseResult::ParseResult (
    void ) [inline]
```

Definition at line 32 of file parse_result.h.

7.38.3 Member Function Documentation

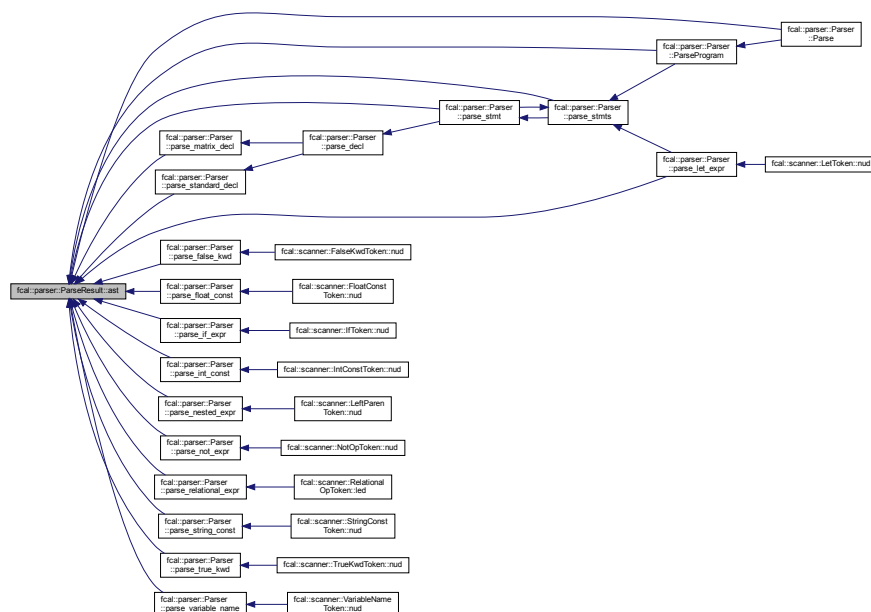
7.38.3.1 ast() [1/2]

```
ast::Node* fcal::parser::ParseResult::ast (
    void ) [inline]
```

Definition at line 38 of file parse_result.h.

Referenced by fcal::parser::Parser::Parse(), fcal::parser::Parser::parse_false_kwd(), fcal::parser::Parser::parse_float_const(), fcal::parser::Parser::parse_if_expr(), fcal::parser::Parser::parse_int_const(), fcal::parser::Parser::parse_let_expr(), fcal::parser::Parser::parse_matrix_decl(), fcal::parser::Parser::parse_nested_expr(), fcal::parser::Parser::parse_not_expr(), fcal::parser::Parser::parse_relational_expr(), fcal::parser::Parser::parse_standard_decl(), fcal::parser::Parser::parse_stmt(), fcal::parser::Parser::parse_stmts(), fcal::parser::Parser::parse_string_const(), fcal::parser::Parser::parse_true_kwd(), fcal::parser::Parser::parse_variable_name(), and fcal::parser::Parser::ParseProgram().

Here is the caller graph for this function:



7.38.3.2 ast() [2/2]

```
void fcal::parser::ParseResult::ast (
    ast::Node * Node_ptr ) [inline]
```

Definition at line 39 of file parse_result.h.

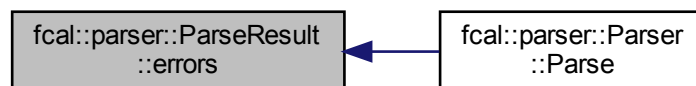
7.38.3.3 errors() [1/2]

```
std::string fcal::parser::ParseResult::errors (
    void ) const [inline]
```

Definition at line 36 of file parse_result.h.

Referenced by fcal::parser::Parser::Parse().

Here is the caller graph for this function:



7.38.3.4 errors() [2/2]

```
void fcal::parser::ParseResult::errors (
    const std::string str_in ) [inline]
```

Definition at line 37 of file parse_result.h.

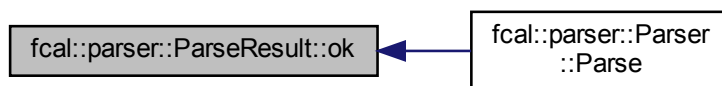
7.38.3.5 ok() [1/2]

```
bool fcal::parser::ParseResult::ok (  
    void ) const [inline]
```

Definition at line 34 of file parse_result.h.

Referenced by fcal::parser::Parser::Parse().

Here is the caller graph for this function:



7.38.3.6 ok() [2/2]

```
void fcal::parser::ParseResult::ok (  
    bool result_in ) [inline]
```

Definition at line 35 of file parse_result.h.

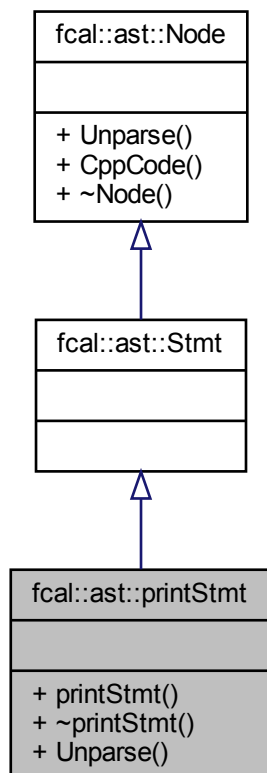
The documentation for this class was generated from the following file:

- [include/parse_result.h](#)

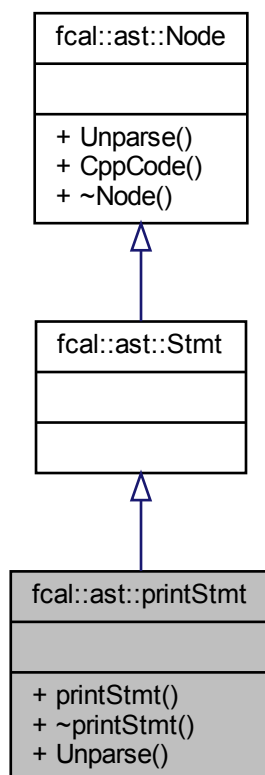
7.39 fcal::ast::printStmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::printStmt`:



Collaboration diagram for fcal::ast::printStmt:



Public Member Functions

- [printStmt](#) ([Expr](#) *)
- [~printStmt](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.39.1 Detailed Description

Definition at line 166 of file `ast.h`.

7.39.2 Constructor & Destructor Documentation

7.39.2.1 printStmt()

```
fcal::ast::printStmt::printStmt (
    Expr * e1 ) [explicit]
```

[printStmt](#) Constructor

Definition at line 230 of file ast.cc.

7.39.2.2 ~printStmt()

```
fcal::ast::printStmt::~~printStmt ( )
```

[printStmt](#) Destructor

Definition at line 235 of file ast.cc.

7.39.3 Member Function Documentation

7.39.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.39.3.2 Unparse()

```
std::string fcal::ast::printStmt::Unparse (
    void ) [virtual]
```

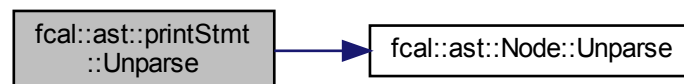
[printStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 240 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



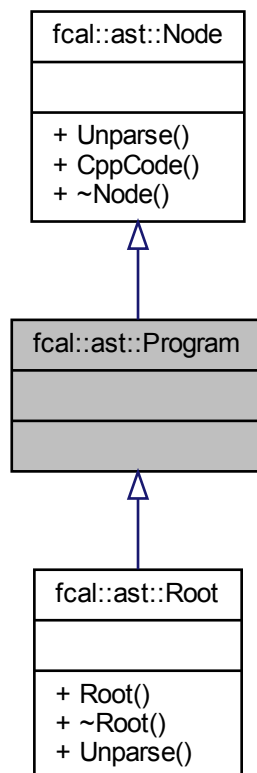
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

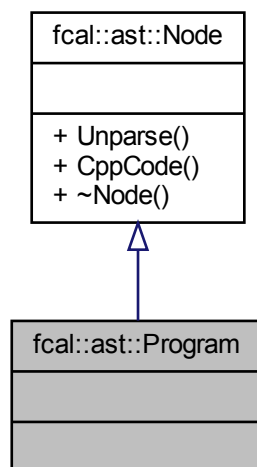
7.40 fcal::ast::Program Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::Program:



Collaboration diagram for `fcgal::ast::Program`:



Public Member Functions

- virtual `std::string` `Unparse` (void)=0
- virtual `std::string` `CppCode` (void)

7.40.1 Detailed Description

Definition at line 54 of file `ast.h`.

7.40.2 Member Function Documentation

7.40.2.1 `CppCode()`

```
virtual std::string fcgal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file `ast.h`.

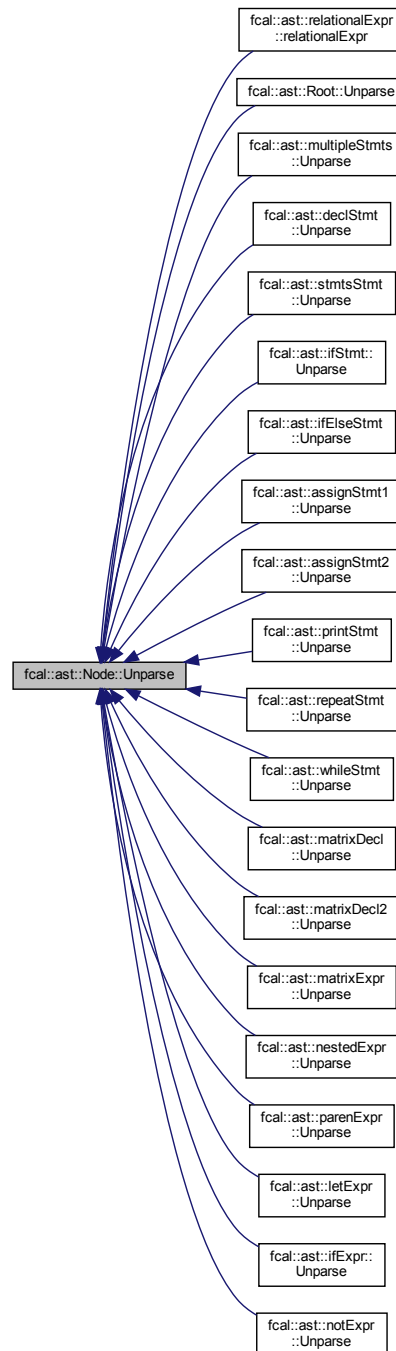
7.40.2.2 Unparse()

```
virtual std::string fcal::ast::Node::Unparse (
    void ) [pure virtual], [inherited]
```

Implemented in [fcal::ast::notExpr](#), [fcal::ast::ifExpr](#), [fcal::ast::letExpr](#), [fcal::ast::parenExpr](#), [fcal::ast::nestedExpr](#), [fcal::ast::matrixExpr](#), [fcal::ast::relationalExpr](#), [fcal::ast::falseExpr](#), [fcal::ast::trueExpr](#), [fcal::ast::stringExpr](#), [fcal::ast::floatExpr](#), [fcal::ast::intExpr](#), [fcal::ast::varNameExpr](#), [fcal::ast::matrixDecl2](#), [fcal::ast::matrixDecl](#), [fcal::ast::boolDecl](#), [fcal::ast::stringDecl](#), [fcal::ast::floatDecl](#), [fcal::ast::intDecl](#), [fcal::ast::semiColonStmt](#), [fcal::ast::whileStmt](#), [fcal::ast::repeatStmt](#), [fcal::ast::printStmt](#), [fcal::ast::assignStmt2](#), [fcal::ast::assignStmt1](#), [fcal::ast::ifElseStmt](#), [fcal::ast::ifStmt](#), [fcal::ast::stmtsStmt](#), [fcal::ast::declStmt](#), [fcal::ast::multipleStmts](#), [fcal::ast::emptyStmts](#), [fcal::ast::Root](#), and [fcal::ast::varName](#).

Referenced by [fcal::ast::relationalExpr::relationalExpr\(\)](#), [fcal::ast::Root::Unparse\(\)](#), [fcal::ast::multipleStmts::Unparse\(\)](#), [fcal::ast::declStmt::Unparse\(\)](#), [fcal::ast::stmtsStmt::Unparse\(\)](#), [fcal::ast::ifStmt::Unparse\(\)](#), [fcal::ast::ifElseStmt::Unparse\(\)](#), [fcal::ast::assignStmt1::Unparse\(\)](#), [fcal::ast::assignStmt2::Unparse\(\)](#), [fcal::ast::printStmt::Unparse\(\)](#), [fcal::ast::repeatStmt::Unparse\(\)](#), [fcal::ast::whileStmt::Unparse\(\)](#), [fcal::ast::matrixDecl::Unparse\(\)](#), [fcal::ast::matrixDecl2::Unparse\(\)](#), [fcal::ast::matrixExpr::Unparse\(\)](#), [fcal::ast::nestedExpr::Unparse\(\)](#), [fcal::ast::parenExpr::Unparse\(\)](#), [fcal::ast::letExpr::Unparse\(\)](#), [fcal::ast::ifExpr::Unparse\(\)](#), and [fcal::ast::notExpr::Unparse\(\)](#).

Here is the caller graph for this function:



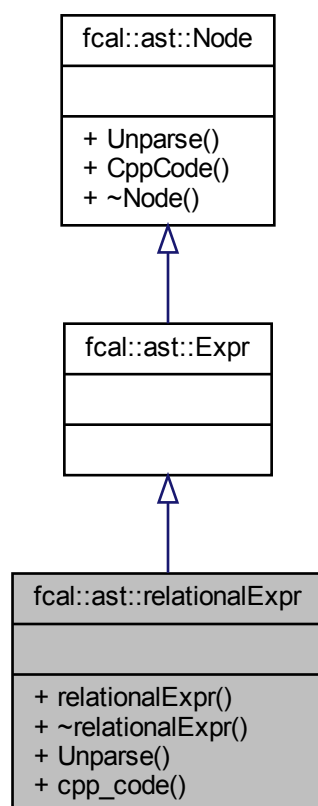
The documentation for this class was generated from the following file:

- [include/ast.h](#)

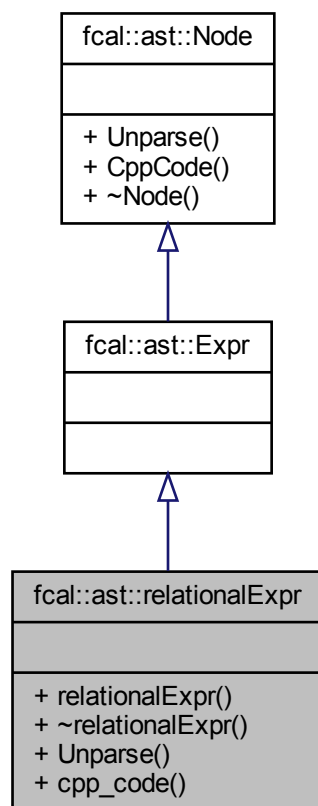
7.41 fcal::ast::relationalExpr Class Reference

```
#include <ast.h>
```


Inheritance diagram for fcal::ast::relationalExpr:



Collaboration diagram for `fcgal::ast::relationalExpr`:



Public Member Functions

- `relationalExpr` (`Expr *l`, `Expr *r`, `std::string op`)
- `~relationalExpr` ()
- `std::string Unparse` (void)
- `std::string cpp_code` (void)
- virtual `std::string CppCode` (void)

7.41.1 Detailed Description

Definition at line 392 of file `ast.h`.

7.41.2 Constructor & Destructor Documentation

7.41.2.1 relationalExpr()

```
fcal::ast::relationalExpr::relationalExpr (
    Expr * l,
    Expr * r,
    std::string op ) [inline]
```

Definition at line 394 of file ast.h.

References `fcal::ast::Node::Unparse()`.

Here is the call graph for this function:



7.41.2.2 ~relationalExpr()

```
fcal::ast::relationalExpr::~~relationalExpr ( )
```

Relational expression Destructor

Definition at line 534 of file ast.cc.

7.41.3 Member Function Documentation

7.41.3.1 cpp_code()

```
std::string fcal::ast::relationalExpr::cpp_code (
    void ) [inline]
```

Definition at line 398 of file ast.h.

7.41.3.2 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.41.3.3 Unparse()

```
std::string fcal::ast::relationalExpr::Unparse (
    void ) [virtual]
```

Relational Expression Unparser

Implements [fcal::ast::Node](#).

Definition at line 541 of file ast.cc.

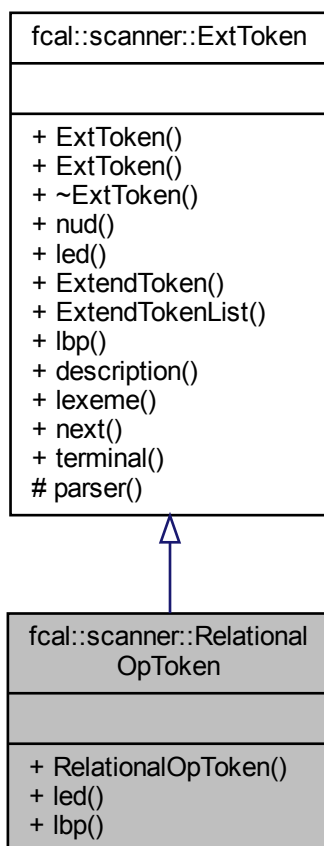
The documentation for this class was generated from the following files:

- include/[ast.h](#)
- src/[ast.cc](#)

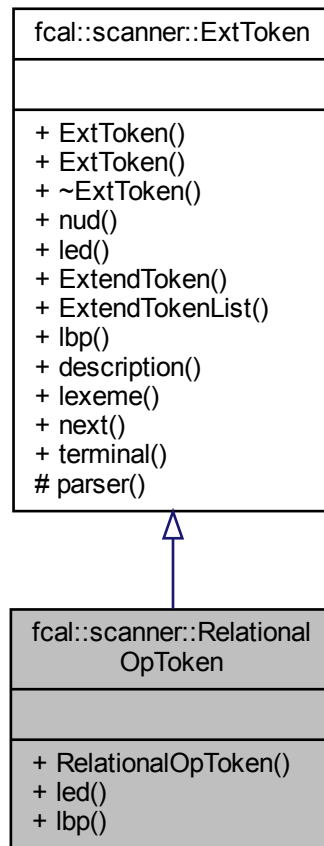
7.42 fcal::scanner::RelationalOpToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::RelationalOpToken:



Collaboration diagram for `fcal::scanner::RelationalOpToken`:



Public Member Functions

- `RelationalOpToken` (`parser::Parser *p`, `Token *t`, `std::string d`)
- `parser::ParseResult led` (`parser::ParseResult left`)
- `int lbp` ()
- virtual `parser::ParseResult nud` (void)
- `ExtToken * ExtendToken` (`parser::Parser *p`, `Token *tokens`)
- `ExtToken * ExtendTokenList` (`parser::Parser *p`, `Token *tokens`)
- virtual `std::string description` ()
- `std::string lexeme` (void) const
- `ExtToken * next` (void) const
- `scanner::TokenType terminal` (void) const

Protected Member Functions

- `parser::Parser * parser` (void)

7.42.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

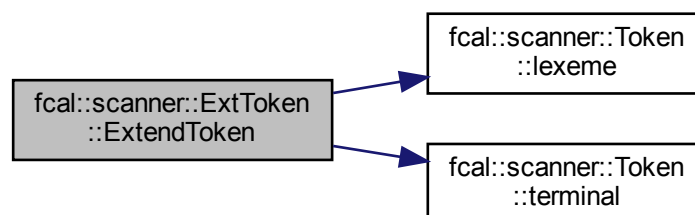
Create Extended token from tokens

Definition at line 31 of file ext_token.cc.

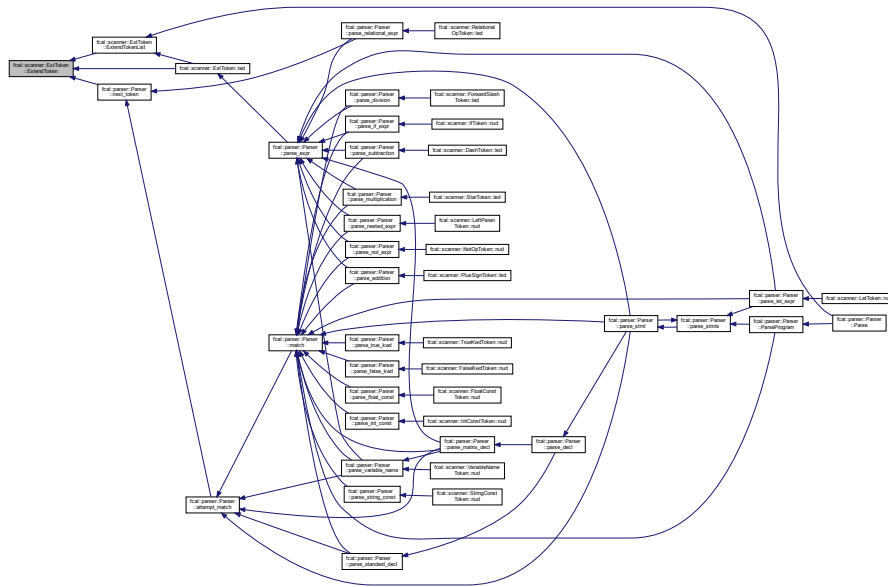
References `fcal::scanner::kAssign`, `fcal::scanner::kBoolKwd`, `fcal::scanner::kColon`, `fcal::scanner::kDash`, `fcal::scanner::kElseKwd`, `fcal::scanner::kEndKwd`, `fcal::scanner::kEndOfFile`, `fcal::scanner::kEqualsEquals`, `fcal::scanner::kFalseKwd`, `fcal::scanner::kFloatConst`, `fcal::scanner::kFloatKwd`, `fcal::scanner::kForwardSlash`, `fcal::scanner::kGreaterThan`, `fcal::scanner::kGreaterThanEqual`, `fcal::scanner::kIfKwd`, `fcal::scanner::kInKwd`, `fcal::scanner::kIntConst`, `fcal::scanner::kIntKwd`, `fcal::scanner::kLeftCurly`, `fcal::scanner::kLeftParen`, `fcal::scanner::kLeftSquare`, `fcal::scanner::kLessThan`, `fcal::scanner::kLessThanEqual`, `fcal::scanner::kLetKwd`, `fcal::scanner::kLexicalError`, `fcal::scanner::kMatrixKwd`, `fcal::scanner::kNotEquals`, `fcal::scanner::kNotOp`, `fcal::scanner::kPlusSign`, `fcal::scanner::kPrintKwd`, `fcal::scanner::kRepeatKwd`, `fcal::scanner::kRightCurly`, `fcal::scanner::kRightParen`, `fcal::scanner::kRightSquare`, `fcal::scanner::kSemiColon`, `fcal::scanner::kStar`, `fcal::scanner::kStringConst`, `fcal::scanner::kStringKwd`, `fcal::scanner::kThenKwd`, `fcal::scanner::kToKwd`, `fcal::scanner::kTrueKwd`, `fcal::scanner::kVariableName`, `fcal::scanner::kWhileKwd`, `fcal::scanner::Token::lexeme()`, and `fcal::scanner::Token::terminal()`.

Referenced by `fcal::scanner::ExtToken::ExtendTokenList()`, `fcal::scanner::ExtToken::led()`, and `fcal::parser::Parser::next_token()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.42.3.3 ExtendTokenList()

```
ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

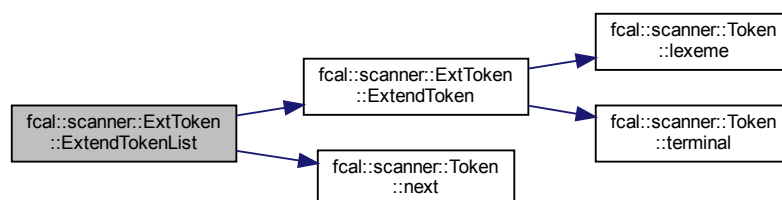
Create Extended token list from tokens

Definition at line 136 of file ext_token.cc.

References `fcal::scanner::ExtToken::ExtendToken()`, and `fcal::scanner::Token::next()`.

Referenced by `fcal::scanner::ExtToken::led()`, and `fcal::parser::Parser::Parse()`.

Here is the call graph for this function:




```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Referenced by `fcsl::parser::Parser::parse_float_const()`, `fcsl::parser::Parser::parse_int_const()`, `fcsl::parser::Parser::parse_matrix_decl()`, `fcsl::parser::Parser::parse_relational_expr()`, `fcsl::parser::Parser::parse_standard_decl()`, `fcsl::parser::Parser::parse_stmt()`, `fcsl::parser::Parser::parse_string_const()`, `fcsl::parser::Parser::parse_variable_name()`, and `fcsl::parser::Parser::ParseProgram()`.

```

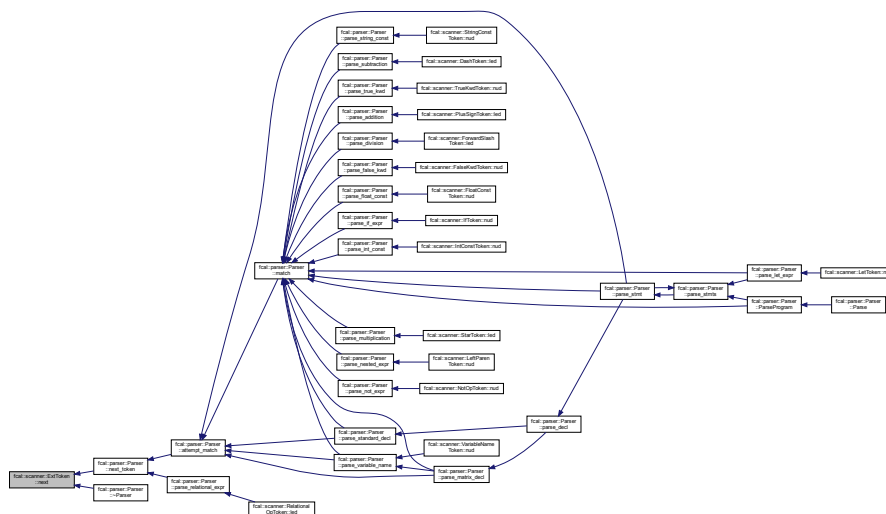
graph LR
    A["fcal::scanner::ExtToken  
::lexeme"]
    B["fcal::parser::Parser  
::parse_relational_expr"]
    C["fcal::scanner::Relational  
OpToken::led"]
    D["fcal::parser::Parser  
::ParseProgram"]
    E["fcal::parser::Parser  
::Parse"]

    C --> B
    E --> D
    D --> B
    B --> A

```

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Here is the caller graph for this function:



7.42.3.8 nud()

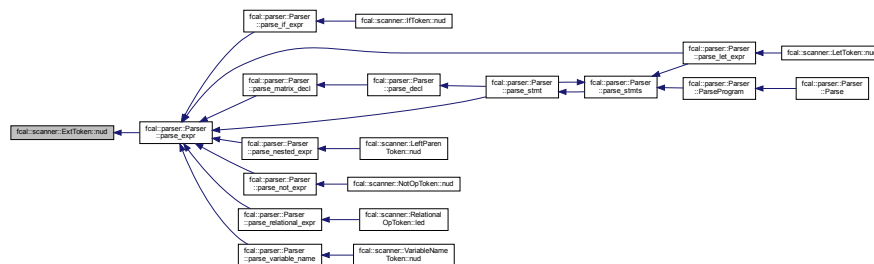
```
virtual parser::ParseResult fcal::scanner::ExtToken::nud (
    void ) [inline], [virtual], [inherited]
```

Reimplemented in [fcal::scanner::LeftParenToken](#), [fcal::scanner::LetToken](#), [fcal::scanner::IfToken](#), [fcal::scanner::VariableNameToken](#), [fcal::scanner::CharConstToken](#), [fcal::scanner::StringConstToken](#), [fcal::scanner::FloatConstToken](#), [fcal::scanner::IntConstToken](#), [fcal::scanner::FalseKwdToken](#), [fcal::scanner::TrueKwdToken](#), and [fcal::scanner::NotOpToken](#).

Definition at line 49 of file [ext_token.h](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the caller graph for this function:



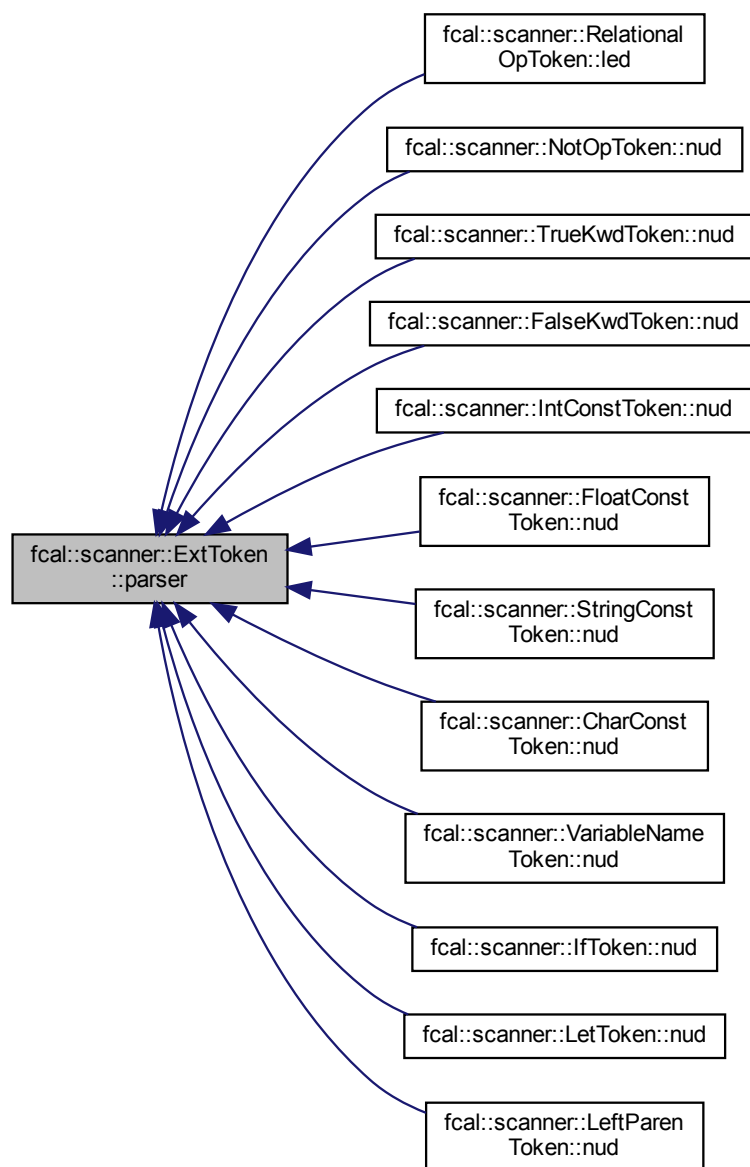
7.42.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file [ext_token.h](#).

Referenced by [led\(\)](#), [fcal::scanner::NotOpToken::nud\(\)](#), [fcal::scanner::TrueKwdToken::nud\(\)](#), [fcal::scanner::FalseKwdToken::nud\(\)](#), [fcal::scanner::IntConstToken::nud\(\)](#), [fcal::scanner::FloatConstToken::nud\(\)](#), [fcal::scanner::StringConstToken::nud\(\)](#), [fcal::scanner::CharConstToken::nud\(\)](#), [fcal::scanner::VariableNameToken::nud\(\)](#), [fcal::scanner::IfToken::nud\(\)](#), [fcal::scanner::LetToken::nud\(\)](#), and [fcal::scanner::LeftParenToken::nud\(\)](#).

Here is the caller graph for this function:

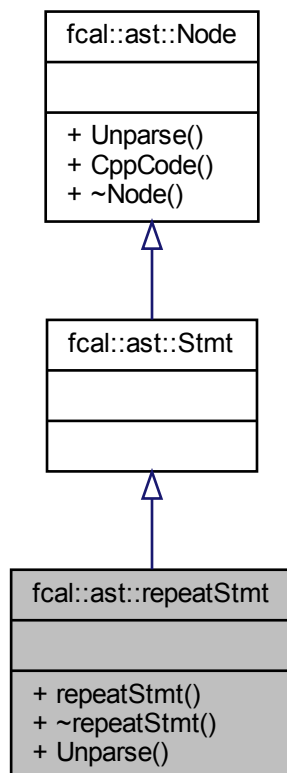


7.42.3.10 terminal()

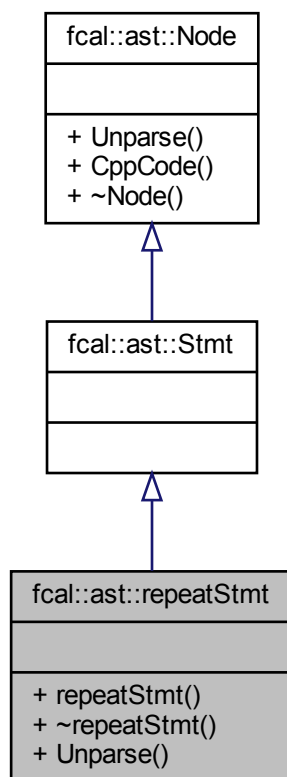
```
scanner::TokenType fcal::scanner::ExtToken::terminal (  
    void ) const [inline], [inherited]
```

Definition at line 59 of file `ext_token.h`.

Inheritance diagram for fcal::ast::repeatStmt:



Collaboration diagram for `fcgal::ast::repeatStmt`:



Public Member Functions

- `repeatStmt (varName *, Expr *, Expr *, Stmt *)`
- `~repeatStmt ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.43.1 Detailed Description

Definition at line 177 of file `ast.h`.

7.43.2 Constructor & Destructor Documentation

7.43.2.1 repeatStmt()

```
fcal::ast::repeatStmt::repeatStmt (
    varName * v1,
    Expr * e1,
    Expr * e2,
    Stmt * s1 )
```

[repeatStmt](#) Constructor

Definition at line 248 of file ast.cc.

7.43.2.2 ~repeatStmt()

```
fcal::ast::repeatStmt::~~repeatStmt ( )
```

[repeatStmt](#) Destructor

Definition at line 258 of file ast.cc.

7.43.3 Member Function Documentation

7.43.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.43.3.2 Unparse()

```
std::string fcal::ast::repeatStmt::Unparse (
    void ) [virtual]
```

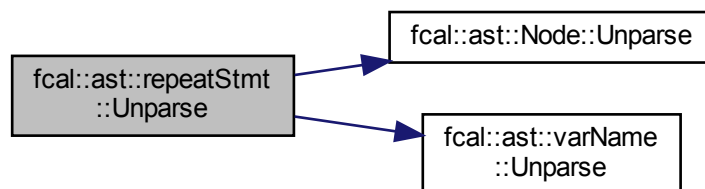
[repeatStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 268 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#), and [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



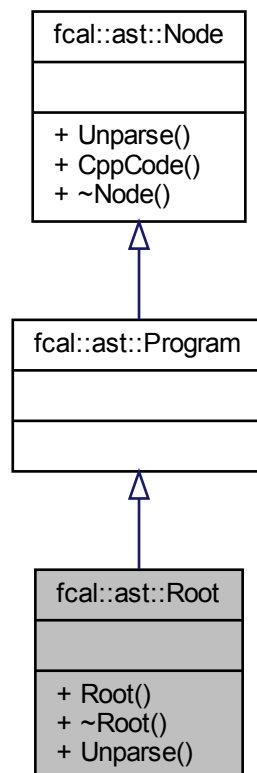
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

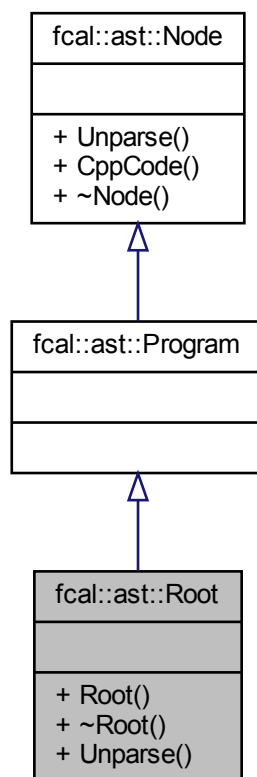
7.44 fcal::ast::Root Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::Root:



Collaboration diagram for `fcgal::ast::Root`:



Public Member Functions

- [Root](#) ([varName](#) *, [Stmts](#) *)
- [~Root](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.44.1 Detailed Description

Definition at line 56 of file `ast.h`.

7.44.2 Constructor & Destructor Documentation

7.44.2.1 Root()

```
fcal::ast::Root::Root (
    varName * v1,
    Stmts * s1 )
```

Root Constructor

Definition at line 36 of file ast.cc.

7.44.2.2 ~Root()

```
fcal::ast::Root::~~Root ( )
```

Root Destructor

Definition at line 44 of file ast.cc.

7.44.3 Member Function Documentation

7.44.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.44.3.2 Unparse()

```
std::string fcal::ast::Root::Unparse (
    void ) [virtual]
```

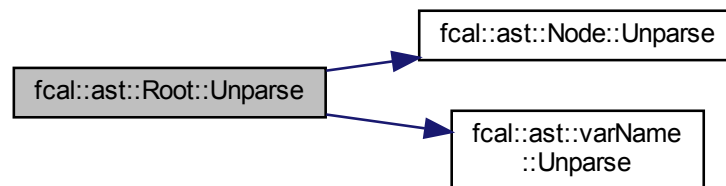
Root Unparser

Implements [fcal::ast::Node](#).

Definition at line 52 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#), and [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



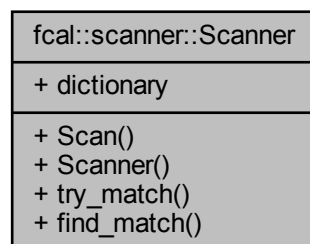
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

7.45 fcal::scanner::Scanner Class Reference

```
#include <scanner.h>
```

Collaboration diagram for `fcal::scanner::Scanner`:



Public Member Functions

- `Token * Scan (const char *)`
- `Scanner ()`
- `void try_match (regex_t *re, const char *text, int *max_num_matched_chars, match_result *res, TokenType type)`
- `void find_match (const char *text, int *max_num_matched_chars, match_result *res)`

Public Attributes

- `std::map< TokenType, regex_t * >` `dictionary`

7.45.1 Detailed Description

Definition at line 130 of file scanner.h.

7.45.2 Constructor & Destructor Documentation

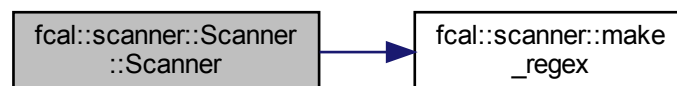
7.45.2.1 Scanner()

```
fcal::scanner::Scanner::Scanner ( )
```

Definition at line 109 of file scanner.cc.

References `fcal::scanner::kAndOp`, `fcal::scanner::kAssign`, `fcal::scanner::kBoolKwd`, `fcal::scanner::kColon`, `fcal::scanner::kDash`, `fcal::scanner::kElseKwd`, `fcal::scanner::kEndKwd`, `fcal::scanner::kEqualsEquals`, `fcal::scanner::kFalseKwd`, `fcal::scanner::kFloatConst`, `fcal::scanner::kFloatKwd`, `fcal::scanner::kForwardSlash`, `fcal::scanner::kGreaterThan`, `fcal::scanner::kGreaterThanEqual`, `fcal::scanner::kIfKwd`, `fcal::scanner::kInKwd`, `fcal::scanner::kIntConst`, `fcal::scanner::kIntKwd`, `fcal::scanner::kLeftCurly`, `fcal::scanner::kLeftParen`, `fcal::scanner::kLeftSquare`, `fcal::scanner::kLessThan`, `fcal::scanner::kLessThanEqual`, `fcal::scanner::kLetKwd`, `fcal::scanner::kMatrixKwd`, `fcal::scanner::kNotEquals`, `fcal::scanner::kNotOp`, `fcal::scanner::kOrOp`, `fcal::scanner::kPlusSign`, `fcal::scanner::kPrintKwd`, `fcal::scanner::kRepeatKwd`, `fcal::scanner::kRightCurly`, `fcal::scanner::kRightParen`, `fcal::scanner::kRightSquare`, `fcal::scanner::kSemiColon`, `fcal::scanner::kStar`, `fcal::scanner::kStringConst`, `fcal::scanner::kStringKwd`, `fcal::scanner::kThenKwd`, `fcal::scanner::kToKwd`, `fcal::scanner::kTrueKwd`, `fcal::scanner::kVariableName`, `fcal::scanner::kWhileKwd`, and `fcal::scanner::make_regex()`.

Here is the call graph for this function:



7.45.3 Member Function Documentation

7.45.3.1 find_match()

```
void fcal::scanner::Scanner::find_match (
    const char * text,
    int * max_num_matched_chars,
    match_result * res )
```

Tries to match all regexes in dictionary

Parameters

<i>text</i>	text to match
<i>max_num_matched_chars</i>	max number of matched chars
<i>res</i>	Result

Definition at line 293 of file scanner.cc.

References `fcal::scanner::kLexicalError`, `fcal::scanner::match_result::num_matched`, and `fcal::scanner::match_result::type`.

7.45.3.2 Scan()

```
Token * fcal::scanner::Scanner::Scan (
    const char * text )
```

Scan text for regexs, returns a token chain

Parameters

<i>text</i>	Text to scan
-------------	--------------

Returns

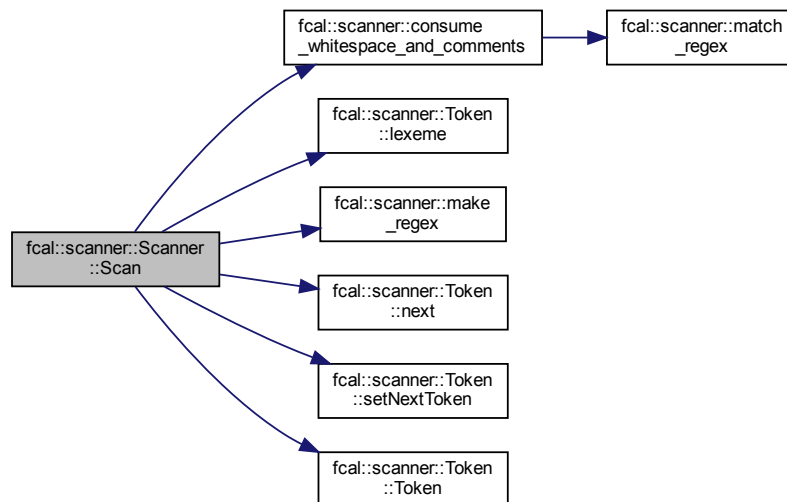
Head of token chain

Definition at line 192 of file scanner.cc.

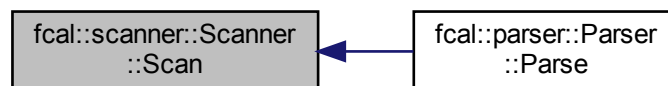
References `fcal::scanner::consume_whitespace_and_comments()`, `fcal::scanner::kEndOfFile`, `fcal::scanner::kLexicalError`, `fcal::scanner::Token::lexeme()`, `fcal::scanner::make_regex()`, `fcal::scanner::Token::next()`, `fcal::scanner::match_result::num_matched`, `fcal::scanner::Token::setNextToken()`, `fcal::scanner::Token::Token()`, and `fcal::scanner::match_result::type`.

Referenced by `fcal::parser::Parser::Parse()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.45.3.3 try_match()

```

void fcal::scanner::Scanner::try_match (
    regex_t * re,
    const char * text,
    int * max_num_matched_chars,
    match_result * res,
    TokenType type )
  
```

Attempts to match regex

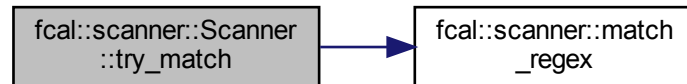
Parameters

	<i>re</i>	regex to match
	<i>text</i>	text to match
out	<i>max_num_matched_chars</i>	Max number of matched chars
out	<i>res</i>	Result
out	<i>type</i>	TokenType

Definition at line 274 of file scanner.cc.

References `fcalf::scanner::match_regex()`, `fcalf::scanner::match_result::num_matched`, and `fcalf::scanner::match_result::type`.

Here is the call graph for this function:



7.45.4 Member Data Documentation

7.45.4.1 dictionary

```
std::map<TokenType, regex_t *> fcalf::scanner::Scanner::dictionary
```

Definition at line 133 of file scanner.h.

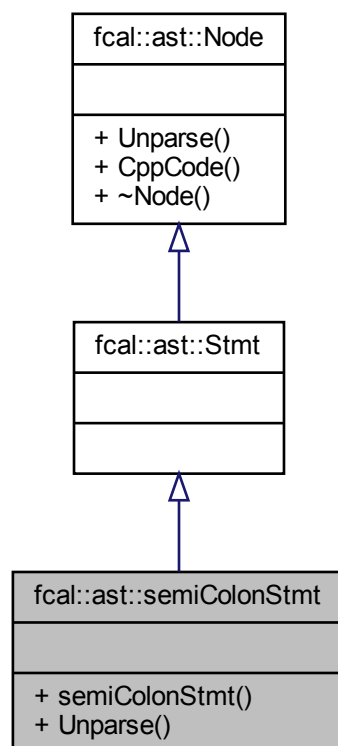
The documentation for this class was generated from the following files:

- [include/scanner.h](#)
- [src/scanner.cc](#)

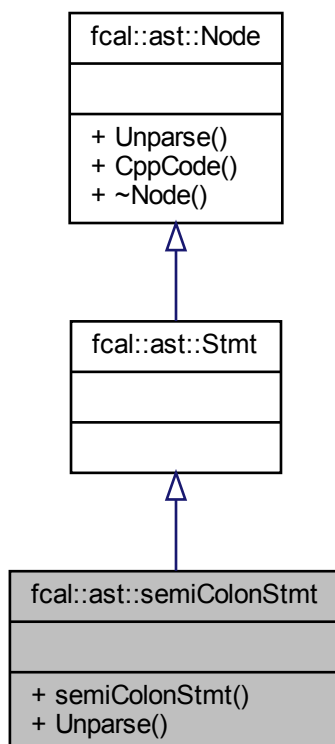
7.46 fcalf::ast::semiColonStmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::semiColonStmt:



Collaboration diagram for `fcal::ast::semiColonStmt`:



Public Member Functions

- [semiColonStmt](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.46.1 Detailed Description

Definition at line 203 of file `ast.h`.

7.46.2 Constructor & Destructor Documentation

7.46.2.1 semiColonStmt()

```
fcal::ast::semiColonStmt::semiColonStmt ( )
```

[semiColonStmt](#) Constructor

Definition at line 302 of file `ast.cc`.

7.46.3 Member Function Documentation

7.46.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.46.3.2 Unparse()

```
std::string fcal::ast::semiColonStmt::Unparse (
    void ) [virtual]
```

[semiColonStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 306 of file ast.cc.

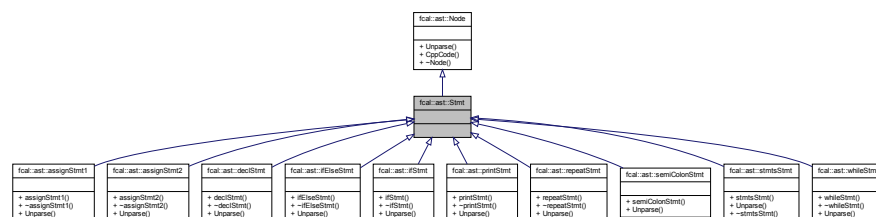
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

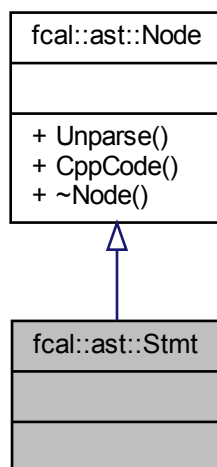
7.47 fcal::ast::Stmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::Stmt:



Collaboration diagram for `fcal::ast::Stmt`:



Public Member Functions

- virtual `std::string` `Unparse` (void)=0
- virtual `std::string` `CppCode` (void)

7.47.1 Detailed Description

Definition at line 49 of file `ast.h`.

7.47.2 Member Function Documentation

7.47.2.1 `CppCode()`

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file `ast.h`.

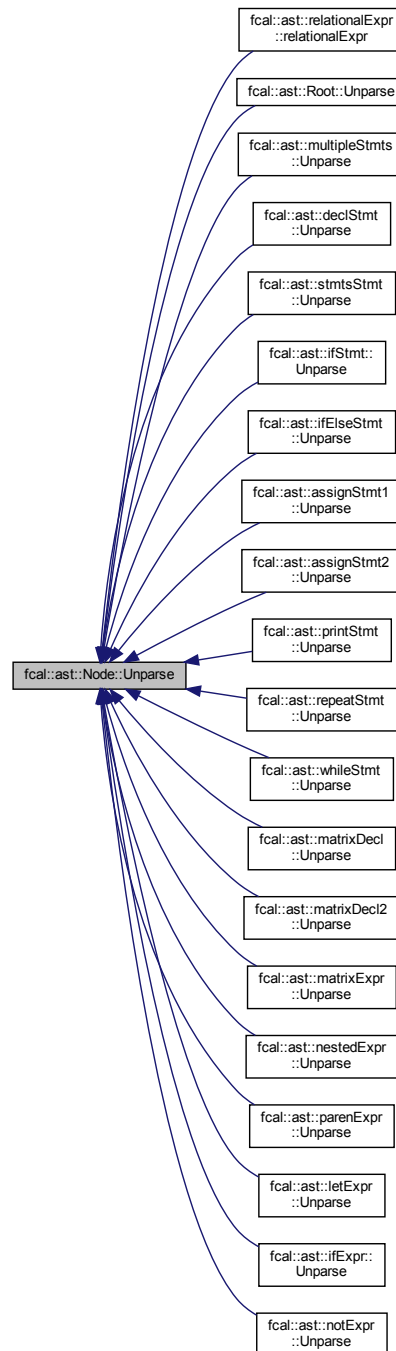
7.47.2.2 Unparse()

```
virtual std::string fcal::ast::Node::Unparse (
    void ) [pure virtual], [inherited]
```

Implemented in [fcal::ast::notExpr](#), [fcal::ast::ifExpr](#), [fcal::ast::letExpr](#), [fcal::ast::parenExpr](#), [fcal::ast::nestedExpr](#), [fcal::ast::matrixExpr](#), [fcal::ast::relationalExpr](#), [fcal::ast::falseExpr](#), [fcal::ast::trueExpr](#), [fcal::ast::stringExpr](#), [fcal::ast::floatExpr](#), [fcal::ast::intExpr](#), [fcal::ast::varNameExpr](#), [fcal::ast::matrixDecl2](#), [fcal::ast::matrixDecl](#), [fcal::ast::boolDecl](#), [fcal::ast::stringDecl](#), [fcal::ast::floatDecl](#), [fcal::ast::intDecl](#), [fcal::ast::semiColonStmt](#), [fcal::ast::whileStmt](#), [fcal::ast::repeatStmt](#), [fcal::ast::printStmt](#), [fcal::ast::assignStmt2](#), [fcal::ast::assignStmt1](#), [fcal::ast::ifElseStmt](#), [fcal::ast::ifStmt](#), [fcal::ast::stmtsStmt](#), [fcal::ast::declStmt](#), [fcal::ast::multipleStmts](#), [fcal::ast::emptyStmts](#), [fcal::ast::Root](#), and [fcal::ast::varName](#).

Referenced by [fcal::ast::relationalExpr::relationalExpr\(\)](#), [fcal::ast::Root::Unparse\(\)](#), [fcal::ast::multipleStmts::Unparse\(\)](#), [fcal::ast::declStmt::Unparse\(\)](#), [fcal::ast::stmtsStmt::Unparse\(\)](#), [fcal::ast::ifStmt::Unparse\(\)](#), [fcal::ast::ifElseStmt::Unparse\(\)](#), [fcal::ast::assignStmt1::Unparse\(\)](#), [fcal::ast::assignStmt2::Unparse\(\)](#), [fcal::ast::printStmt::Unparse\(\)](#), [fcal::ast::repeatStmt::Unparse\(\)](#), [fcal::ast::whileStmt::Unparse\(\)](#), [fcal::ast::matrixDecl::Unparse\(\)](#), [fcal::ast::matrixDecl2::Unparse\(\)](#), [fcal::ast::matrixExpr::Unparse\(\)](#), [fcal::ast::nestedExpr::Unparse\(\)](#), [fcal::ast::parenExpr::Unparse\(\)](#), [fcal::ast::letExpr::Unparse\(\)](#), [fcal::ast::ifExpr::Unparse\(\)](#), and [fcal::ast::notExpr::Unparse\(\)](#).

Here is the caller graph for this function:



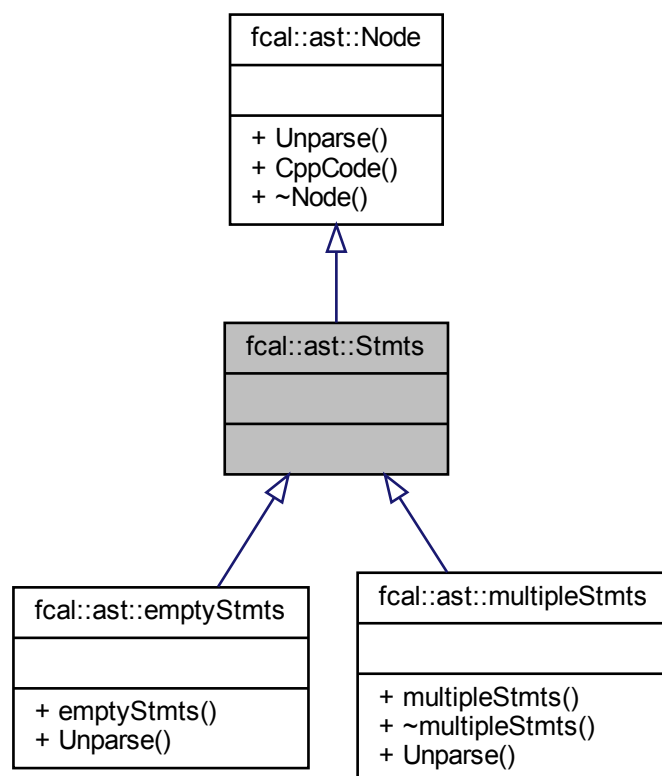
The documentation for this class was generated from the following file:

- [include/ast.h](#)

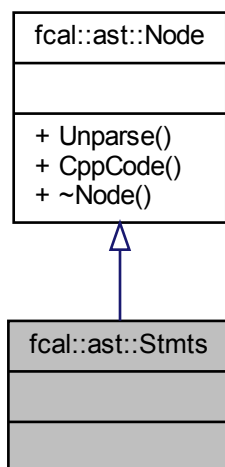
7.48 fcal::ast::Stmts Class Reference

```
#include <ast.h>
```


Inheritance diagram for fcal::ast::Stmts:



Collaboration diagram for `fcgal::ast::Stmts`:



Public Member Functions

- virtual `std::string` `Unparse` (void)=0
- virtual `std::string` `CppCode` (void)

7.48.1 Detailed Description

Definition at line 50 of file `ast.h`.

7.48.2 Member Function Documentation

7.48.2.1 `CppCode()`

```
virtual std::string fcgal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file `ast.h`.

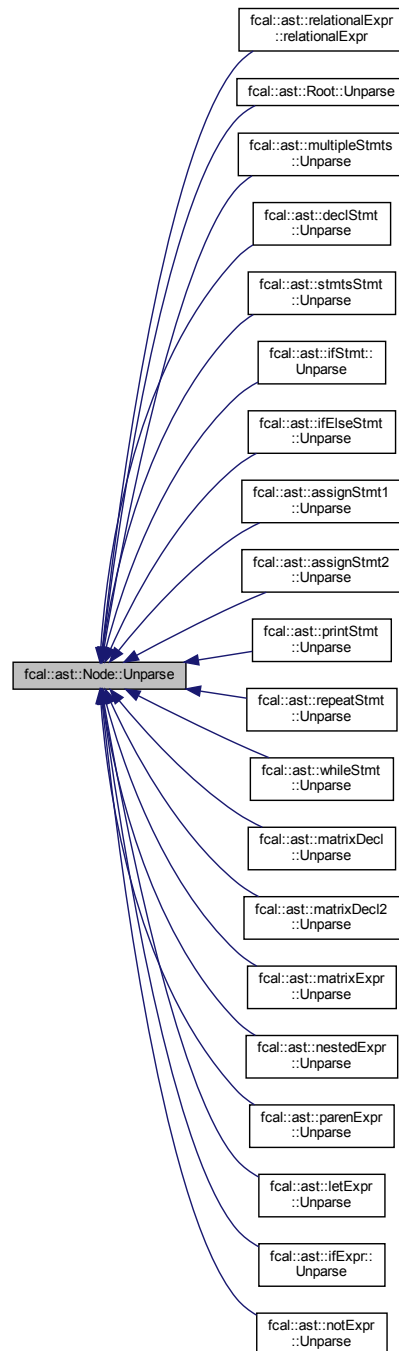
7.48.2.2 Unparse()

```
virtual std::string fcal::ast::Node::Unparse (
    void ) [pure virtual], [inherited]
```

Implemented in [fcal::ast::notExpr](#), [fcal::ast::ifExpr](#), [fcal::ast::letExpr](#), [fcal::ast::parenExpr](#), [fcal::ast::nestedExpr](#), [fcal::ast::matrixExpr](#), [fcal::ast::relationalExpr](#), [fcal::ast::falseExpr](#), [fcal::ast::trueExpr](#), [fcal::ast::stringExpr](#), [fcal::ast::floatExpr](#), [fcal::ast::intExpr](#), [fcal::ast::varNameExpr](#), [fcal::ast::matrixDecl2](#), [fcal::ast::matrixDecl](#), [fcal::ast::boolDecl](#), [fcal::ast::stringDecl](#), [fcal::ast::floatDecl](#), [fcal::ast::intDecl](#), [fcal::ast::semiColonStmt](#), [fcal::ast::whileStmt](#), [fcal::ast::repeatStmt](#), [fcal::ast::printStmt](#), [fcal::ast::assignStmt2](#), [fcal::ast::assignStmt1](#), [fcal::ast::ifElseStmt](#), [fcal::ast::ifStmt](#), [fcal::ast::stmtsStmt](#), [fcal::ast::declStmt](#), [fcal::ast::multipleStmts](#), [fcal::ast::emptyStmts](#), [fcal::ast::Root](#), and [fcal::ast::varName](#).

Referenced by [fcal::ast::relationalExpr::relationalExpr\(\)](#), [fcal::ast::Root::Unparse\(\)](#), [fcal::ast::multipleStmts::Unparse\(\)](#), [fcal::ast::declStmt::Unparse\(\)](#), [fcal::ast::stmtsStmt::Unparse\(\)](#), [fcal::ast::ifStmt::Unparse\(\)](#), [fcal::ast::ifElseStmt::Unparse\(\)](#), [fcal::ast::assignStmt1::Unparse\(\)](#), [fcal::ast::assignStmt2::Unparse\(\)](#), [fcal::ast::printStmt::Unparse\(\)](#), [fcal::ast::repeatStmt::Unparse\(\)](#), [fcal::ast::whileStmt::Unparse\(\)](#), [fcal::ast::matrixDecl::Unparse\(\)](#), [fcal::ast::matrixDecl2::Unparse\(\)](#), [fcal::ast::matrixExpr::Unparse\(\)](#), [fcal::ast::nestedExpr::Unparse\(\)](#), [fcal::ast::parenExpr::Unparse\(\)](#), [fcal::ast::letExpr::Unparse\(\)](#), [fcal::ast::ifExpr::Unparse\(\)](#), and [fcal::ast::notExpr::Unparse\(\)](#).

Here is the caller graph for this function:



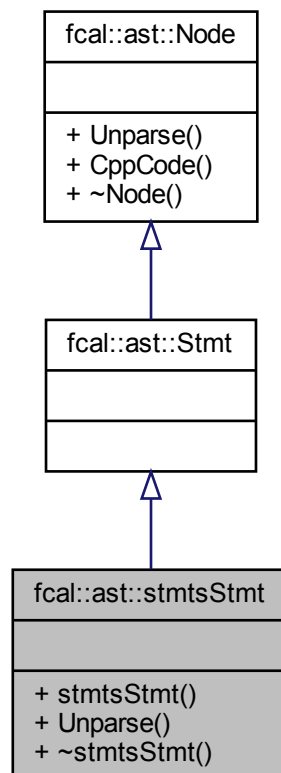
The documentation for this class was generated from the following file:

- [include/ast.h](#)

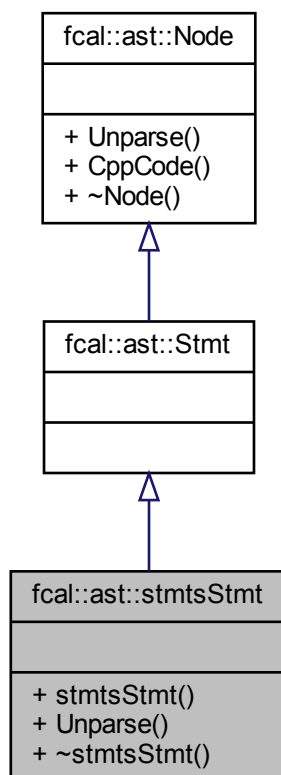
7.49 fcal::ast::stmtsStmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::stmtsStmt:



Collaboration diagram for `fcgal::ast::stmtsStmt`:



Public Member Functions

- [stmtsStmt](#) ([Stmts](#) *)
- `std::string` [Unparse](#) (void)
- [~stmtsStmt](#) ()
- virtual `std::string` [CppCode](#) (void)

7.49.1 Detailed Description

Definition at line 104 of file `ast.h`.

7.49.2 Constructor & Destructor Documentation

7.49.2.1 stmtsStmt()

```
fcal::ast::stmtsStmt::stmtsStmt (
    Stmt * s1 ) [explicit]
```

[stmtsStmt](#) Constructor

Definition at line 122 of file ast.cc.

7.49.2.2 ~stmtsStmt()

```
fcal::ast::stmtsStmt::~~stmtsStmt ( )
```

[stmtsStmt](#) Destructor

Definition at line 127 of file ast.cc.

7.49.3 Member Function Documentation

7.49.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.49.3.2 Unparse()

```
std::string fcal::ast::stmtsStmt::Unparse (
    void ) [virtual]
```

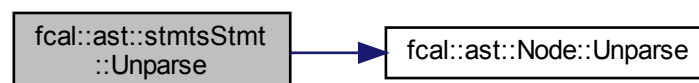
[stmtsStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 132 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



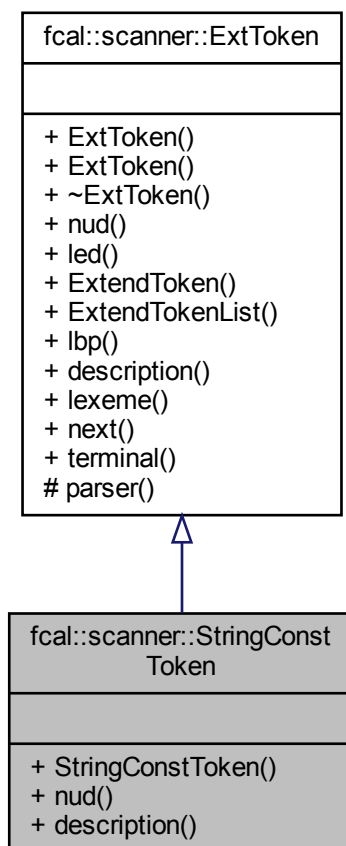
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

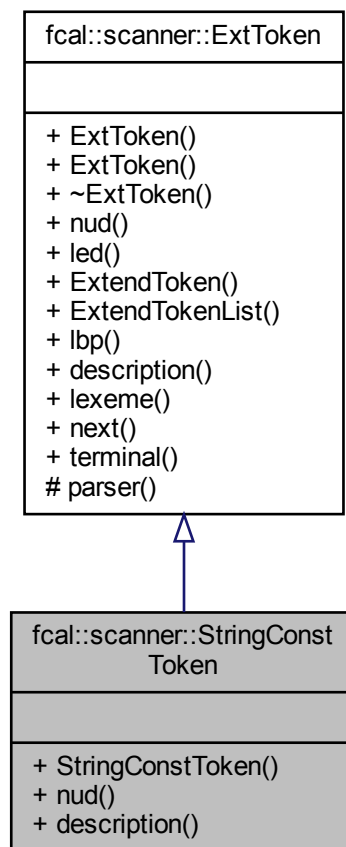
7.50 fcal::scanner::StringConstToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::StringConstToken:



Collaboration diagram for fcal::scanner::StringConstToken:



Public Member Functions

- [StringConstToken](#) ([parser::Parser](#) *p, [Token](#) *t)
- [parser::ParseResult](#) nud ()
- std::string [description](#) ()
- virtual [parser::ParseResult](#) led ([parser::ParseResult](#) left)
- [ExtToken](#) * [ExtendToken](#) ([parser::Parser](#) *p, [Token](#) *tokens)
- [ExtToken](#) * [ExtendTokenList](#) ([parser::Parser](#) *p, [Token](#) *tokens)
- virtual int [lbp](#) ()
- std::string [lexeme](#) (void) const
- [ExtToken](#) * [next](#) (void) const
- [scanner::TokenType](#) [terminal](#) (void) const

Protected Member Functions

- [parser::Parser](#) * [parser](#) (void)

7.50.1 Detailed Description

Definition at line 119 of file ext_token.h.

7.50.2 Constructor & Destructor Documentation

7.50.2.1 StringConstToken()

```
fcal::scanner::StringConstToken::StringConstToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 121 of file ext_token.h.

7.50.3 Member Function Documentation

7.50.3.1 description()

```
std::string fcal::scanner::StringConstToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 123 of file ext_token.h.

7.50.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

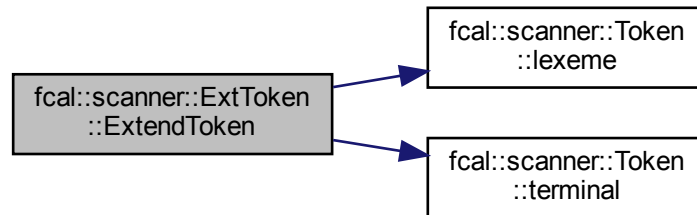
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

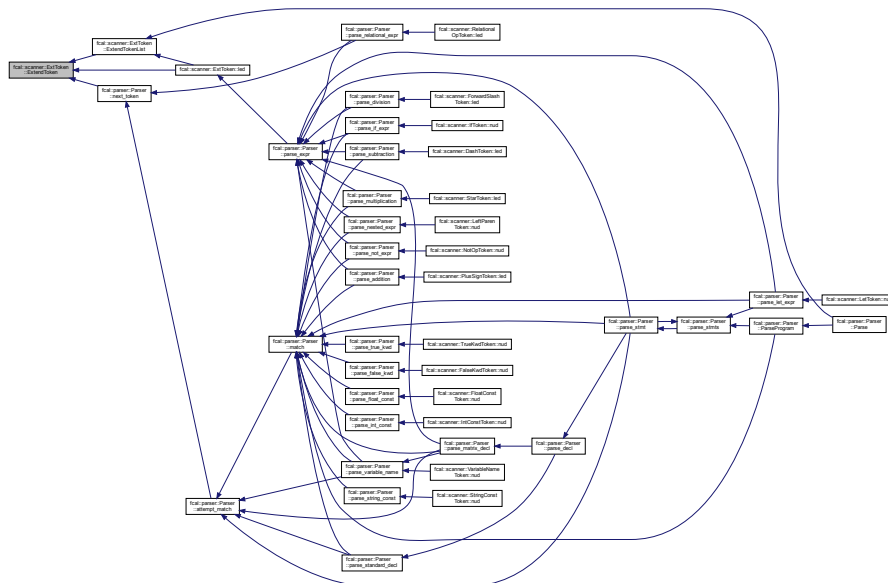
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:

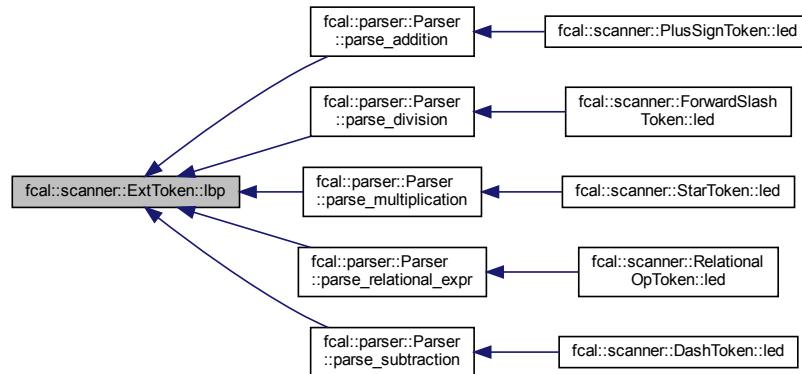


7.50.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```


Here is the caller graph for this function:



7.50.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

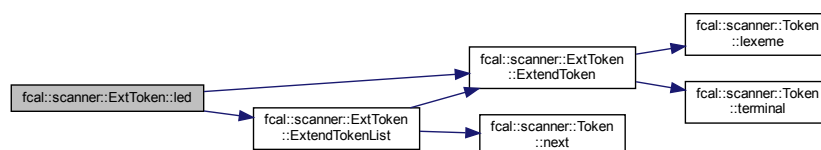
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

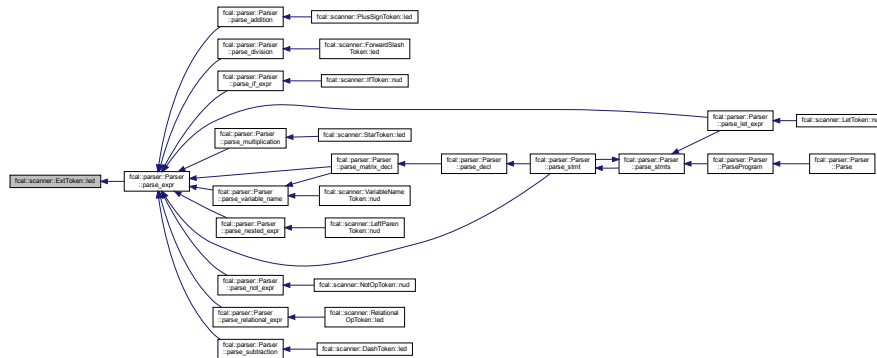
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



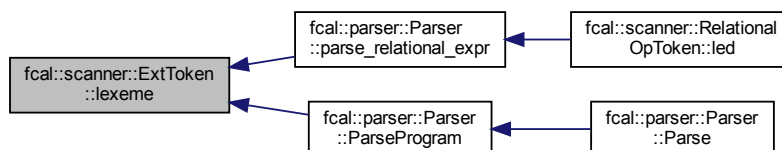
7.50.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_float_const()`, `fcal::parser::Parser::parse_int_const()`, `fcal::parser::Parser::parse_matrix_decl()`, `fcal::parser::Parser::parse_relational_expr()`, `fcal::parser::Parser::parse_standard_decl()`, `fcal::parser::Parser::parse_stmt()`, `fcal::parser::Parser::parse_string_const()`, `fcal::parser::Parser::parse_variable_name()`, and `fcal::parser::Parser::ParseProgram()`.

Here is the caller graph for this function:



7.50.3.7 next()

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Definition at line 58 of file ext_token.h.

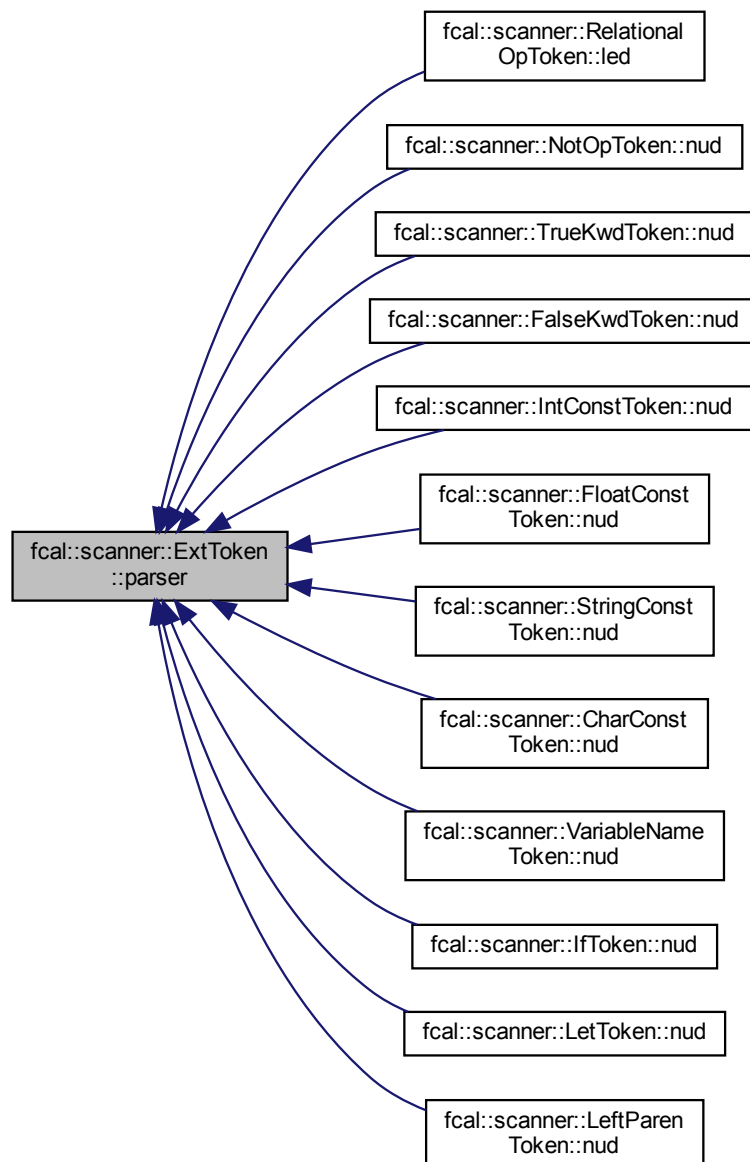
7.50.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:



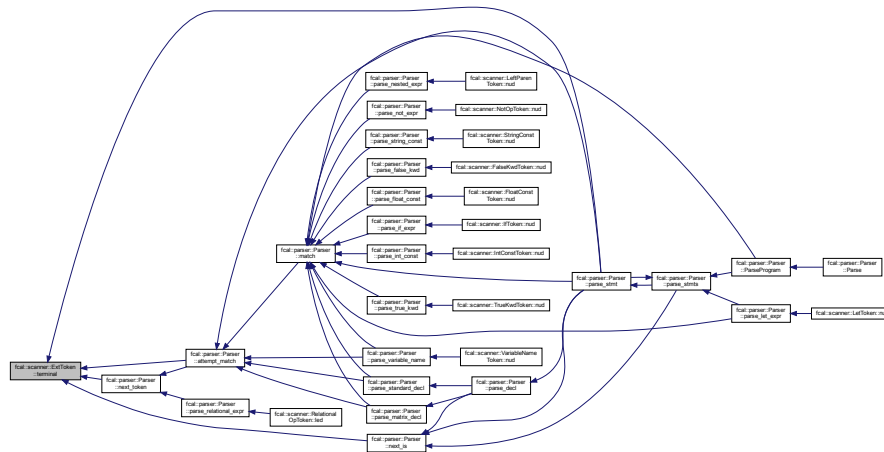
7.50.3.10 terminal()

```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]
```

Definition at line 59 of file ext_token.h.

Referenced by `fcal::parser::Parser::attempt_match()`, `fcal::parser::Parser::next_is()`, `fcal::parser::Parser::next_token()`, and `fcal::parser::Parser::parse_stmt()`.

Here is the caller graph for this function:



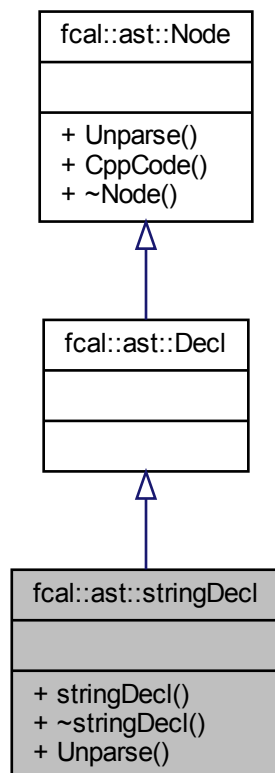
The documentation for this class was generated from the following file:

- include/ext_token.h

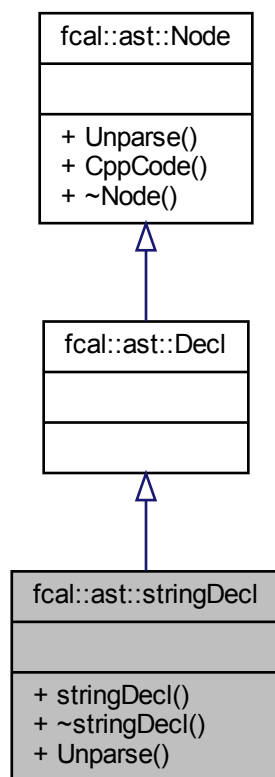
7.51 fcal::ast::stringDecl Class Reference

```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::stringDecl`:



Collaboration diagram for fcal::ast::stringDecl:



Public Member Functions

- `stringDecl` (`varName *`)
- `~stringDecl` ()
- `std::string Unparse` (void)
- virtual `std::string CppCode` (void)

7.51.1 Detailed Description

Definition at line 232 of file `ast.h`.

7.51.2 Constructor & Destructor Documentation

7.51.2.1 stringDecl()

```
fcal::ast::stringDecl::stringDecl (
    varName * v1 ) [explicit]
```

[stringDecl](#) Constructor

Definition at line 349 of file ast.cc.

7.51.2.2 ~stringDecl()

```
fcal::ast::stringDecl::~~stringDecl ( )
```

[stringDecl](#) Destructor

Definition at line 354 of file ast.cc.

7.51.3 Member Function Documentation

7.51.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.51.3.2 Unparse()

```
std::string fcal::ast::stringDecl::Unparse (
    void ) [virtual]
```

[stringDecl](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 359 of file ast.cc.

References [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



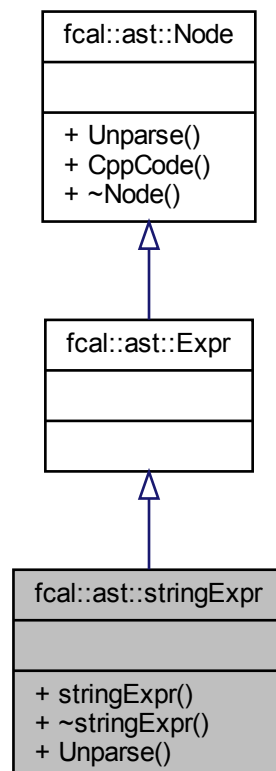
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

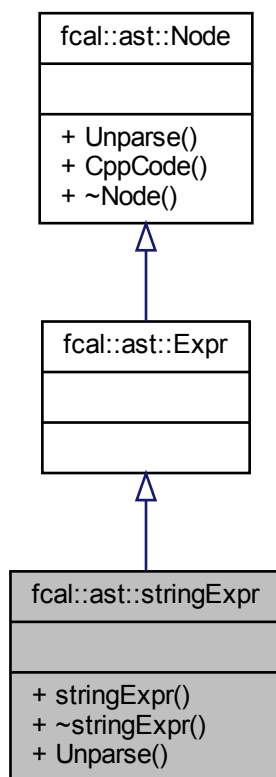
7.52 fcal::ast::stringExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::stringExpr:



Collaboration diagram for `fcgal::ast::stringExpr`:



Public Member Functions

- [stringExpr](#) (`std::string`)
- [~stringExpr](#) ()
- `std::string` [Unparse](#) (`void`)
- virtual `std::string` [CppCode](#) (`void`)

7.52.1 Detailed Description

Definition at line 315 of file `ast.h`.

7.52.2 Constructor & Destructor Documentation

7.52.2.1 stringExpr()

```
fcal::ast::stringExpr::stringExpr (
    std::string s1 ) [explicit]
```

[stringExpr](#) Constructor

Definition at line 489 of file ast.cc.

7.52.2.2 ~stringExpr()

```
fcal::ast::stringExpr::~~stringExpr ( )
```

[stringExpr](#) Destructor

Definition at line 494 of file ast.cc.

7.52.3 Member Function Documentation

7.52.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.52.3.2 Unparse()

```
std::string fcal::ast::stringExpr::Unparse (
    void ) [virtual]
```

[stringExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 499 of file ast.cc.

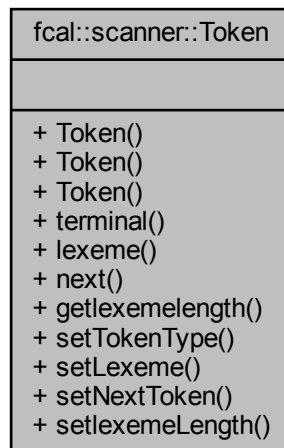
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

7.53 fcal::scanner::Token Class Reference

```
#include <scanner.h>
```

Collaboration diagram for fcal::scanner::Token:



Public Member Functions

- [Token](#) ()
- [Token](#) ([TokenType](#), std::string, [Token](#) *)
- [Token](#) (std::string stringInput, [TokenType](#) term, [Token](#) *nextToken)
- [TokenType](#) terminal ()
- std::string lexeme ()
- [Token](#) * next ()
- int getlexemelength ()
- void setTokenType ([TokenType](#))
- void setLexeme (std::string)
- void setNextToken ([Token](#) *)
- void setlexemeLength ()

7.53.1 Detailed Description

Definition at line 107 of file scanner.h.

7.53.2 Constructor & Destructor Documentation

7.53.2.1 Token() [1/3]

```
fcal::scanner::Token::Token ( )
```

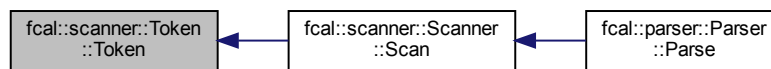
[Token](#) default constructor

Definition at line 65 of file scanner.cc.

References `fcal::scanner::kLexicalError`.

Referenced by `fcal::scanner::Scanner::Scan()`.

Here is the caller graph for this function:



7.53.2.2 Token() [2/3]

```
fcal::scanner::Token::Token (
    TokenType term,
    std::string stringInput,
    Token * nextToken )
```

[Token](#) constructor

Definition at line 74 of file scanner.cc.

7.53.2.3 Token() [3/3]

```
fcal::scanner::Token::Token (
    std::string stringInput,
    TokenType term,
    Token * nextToken )
```

[Token](#) constructor

Definition at line 83 of file scanner.cc.

7.53.3 Member Function Documentation

7.53.3.1 getlexemelength()

```
int fcal::scanner::Token::getlexemelength ( )
```

Definition at line 99 of file scanner.cc.

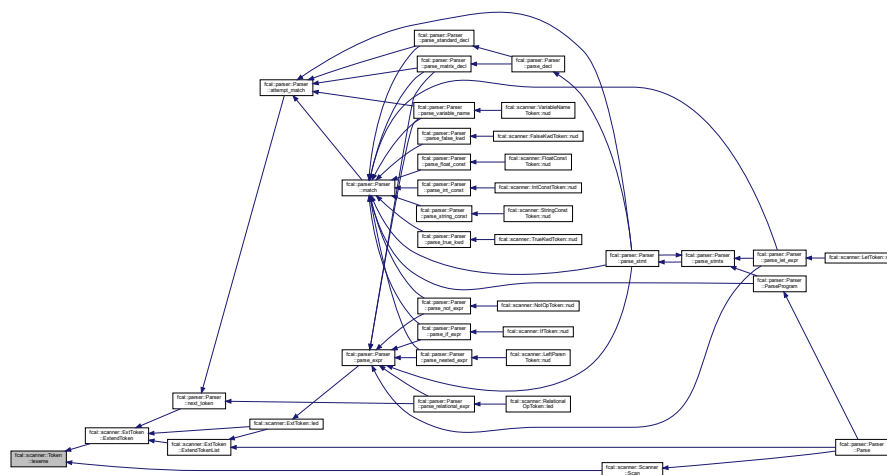
7.53.3.2 lexeme()

```
std::string fcal::scanner::Token::lexeme (
    void )
```

Definition at line 95 of file scanner.cc.

Referenced by fcal::scanner::ExtToken::ExtendToken(), and fcal::scanner::Scanner::Scan().

Here is the caller graph for this function:



7.53.3.3 next()

```
Token * fcal::scanner::Token::next (
    void )
```

Definition at line 97 of file scanner.cc.

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::Scanner::Scan(), and fcal::parser::~Parser::~~Parser().

The diagram shows a network of dependencies between modules in the `fct-scanner` crate. Key nodes include:

- `fct-scanner::Token.mut` (top left)
- `fct-scanner::Parser::parse_lex`, `parse_mixin_def`, `parse_mixin_decl`, `parse_attr`, `parse_attr_mixin`
- `fct-scanner::Lexer::Token.mut`, `NextToken.mut`, `RegisterOpToken.set`, `UnregisterNameToken.mut`
- `fct-scanner::ExtToken.set`
- `fct-scanner::ExtToken::ExtItemFromLex`
- `fct-scanner::Token.mut` (bottom left, highlighted in grey)
- `fct-scanner::Parser` (bottom center)
- `fct-scanner::Scanner::Scan` (bottom right)
- `fct-scanner::Parser::Parse` (far right)

Arrows indicate the direction of dependencies, showing a flow from more specific parsing functions towards the core scanner and parser modules.

```
void fcal::scanner::Token::setLexeme (
    std::string stringInput )
```

7.53.3.5 setlexemeLength()

Definition at line 107 of file scanner.cc.

```
void fcal::scanner::Token::setNextToken (
    Token * nextToken )
```

Referenced by `fcsl::scanner::Scanner::Scan()`.

```
graph RL
    A["fcal::parser::Parser  
::Parse"] --> B["fcal::scanner::Scanner  
::Scan"]
    B --> C["fcal::scanner::Token  
::setNextToken"]
```

7.53.3.7 setTokenType()

```
void fcal::scanner::Token::setTokenType (
    TokenType term )
```

Definition at line 101 of file scanner.cc.

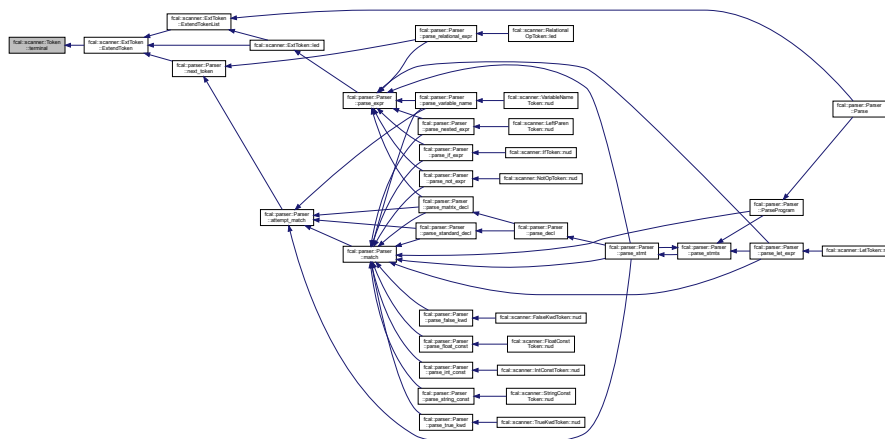
7.53.3.8 terminal()

```
TokenType fcal::scanner::Token::terminal (
    void )
```

Definition at line 93 of file scanner.cc.

Referenced by fcal::scanner::ExtToken::ExtendToken().

Here is the caller graph for this function:



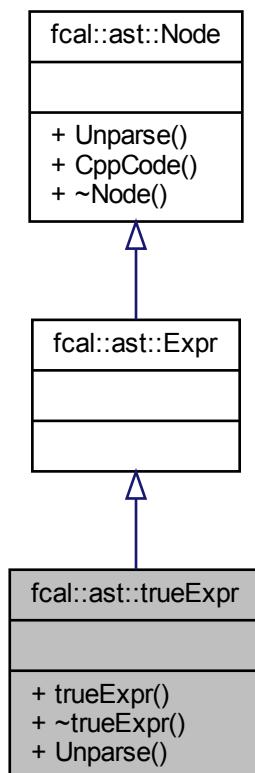
The documentation for this class was generated from the following files:

- include/scanner.h
- src/scanner.cc

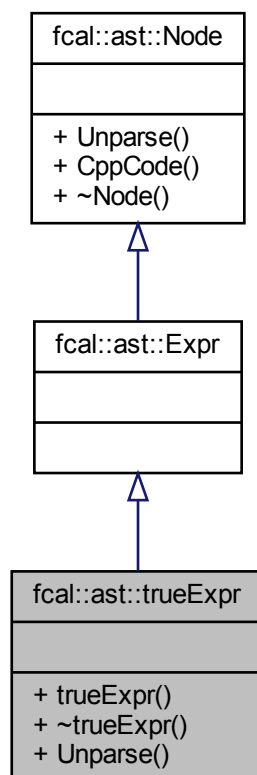
7.54 fcal::ast::trueExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::trueExpr:



Collaboration diagram for `fcgal::ast::trueExpr`:



Public Member Functions

- [trueExpr](#) ()
- [~trueExpr](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.54.1 Detailed Description

Definition at line 327 of file `ast.h`.

7.54.2 Constructor & Destructor Documentation

7.54.2.1 trueExpr()

```
fcal::ast::trueExpr::trueExpr ( )
```

[trueExpr](#) Constructor

Definition at line 505 of file ast.cc.

7.54.2.2 ~trueExpr()

```
fcal::ast::trueExpr::~~trueExpr ( )
```

[trueExpr](#) Destructor

Definition at line 509 of file ast.cc.

7.54.3 Member Function Documentation

7.54.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.54.3.2 Unparse()

```
std::string fcal::ast::trueExpr::Unparse (
    void ) [virtual]
```

[trueExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 514 of file ast.cc.

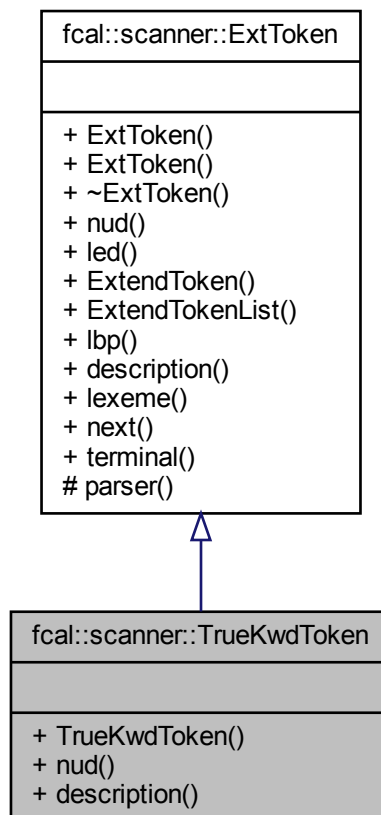
The documentation for this class was generated from the following files:

- include/[ast.h](#)
- src/[ast.cc](#)

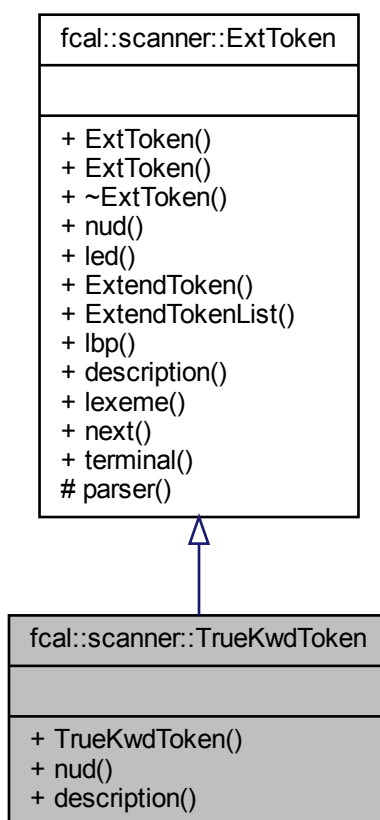
7.55 fcal::scanner::TrueKwdToken Class Reference

```
#include <ext_token.h>
```

Inheritance diagram for fcal::scanner::TrueKwdToken:



Collaboration diagram for fcal::scanner::TrueKwdToken:



Public Member Functions

- `TrueKwdToken` (`parser::Parser *p`, `Token *t`)
- `parser::ParseResult nud ()`
- `std::string description ()`
- virtual `parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- virtual `int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.55.1 Detailed Description

Definition at line 87 of file ext_token.h.

7.55.2 Constructor & Destructor Documentation

7.55.2.1 TrueKwdToken()

```
fcal::scanner::TrueKwdToken::TrueKwdToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 89 of file ext_token.h.

7.55.3 Member Function Documentation

7.55.3.1 description()

```
std::string fcal::scanner::TrueKwdToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 91 of file ext_token.h.

7.55.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

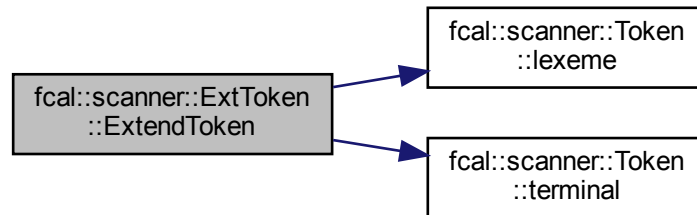
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

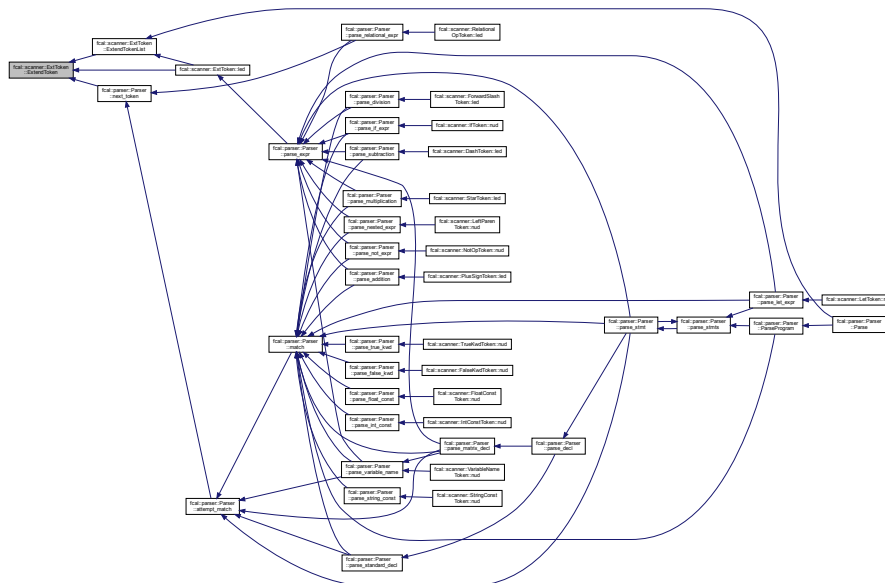
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:



7.55.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```

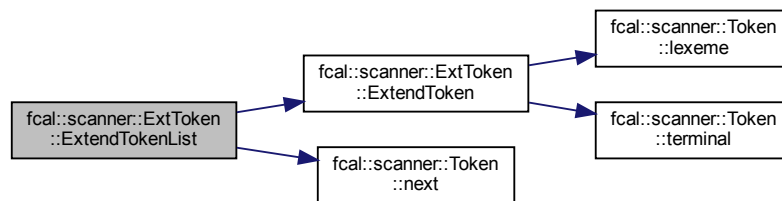
Create Extended token list from tokens

Definition at line 136 of file ext_token.cc.

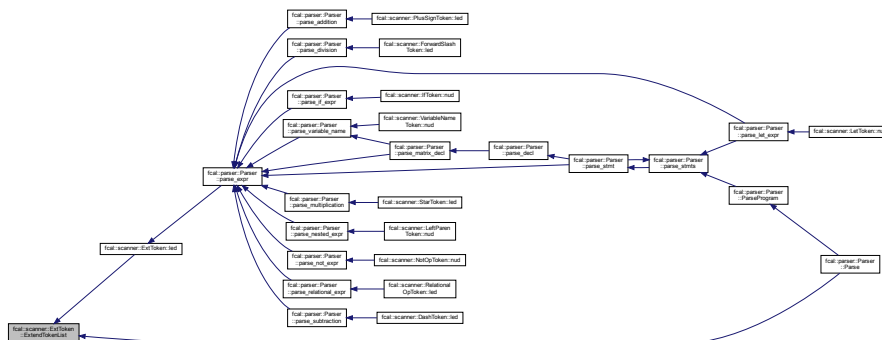
References `fcal::scanner::ExtToken::ExtendToken()`, and `fcal::scanner::Token::next()`.

Referenced by `fcal::scanner::ExtToken::led()`, and `fcal::parser::Parser::Parse()`.

Here is the call graph for this function:



Here is the caller graph for this function:



7.55.3.4 lbp()

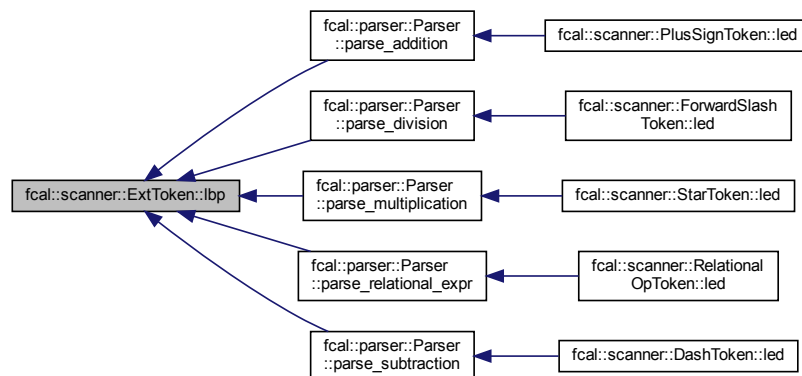
```
virtual int fcal::scanner::ExtToken::lbp ( ) [inline], [virtual], [inherited]
```

Reimplemented in `fcal::scanner::RelationalOpToken`, `fcal::scanner::LeftParenToken`, `fcal::scanner::LetToken`, and `fcal::scanner::IfToken`.

Definition at line 55 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_relational_expr()`.

Here is the caller graph for this function:



7.55.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

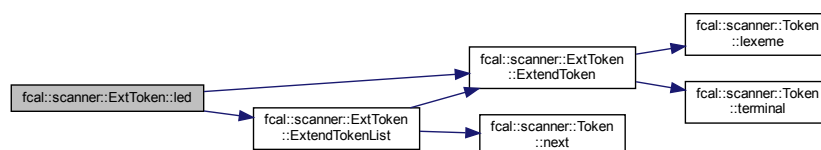
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

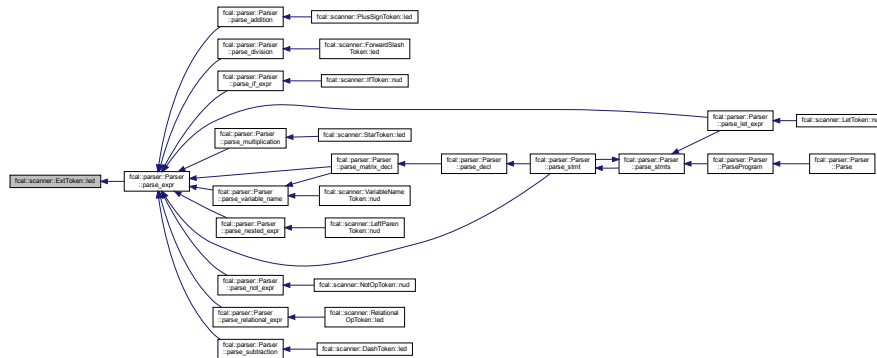
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



Here is the caller graph for this function:



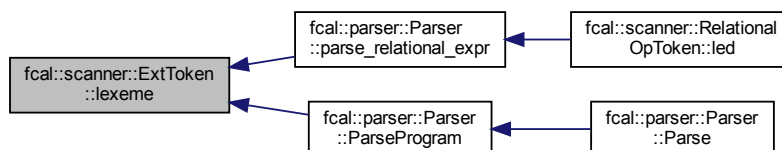
7.55.3.6 lexeme()

```
std::string fcal::scanner::ExtToken::lexeme (
    void ) const [inline], [inherited]
```

Definition at line 57 of file ext_token.h.

Referenced by `fcal::parser::Parser::parse_float_const()`, `fcal::parser::Parser::parse_int_const()`, `fcal::parser::Parser::parse_matrix_decl()`, `fcal::parser::Parser::parse_relational_expr()`, `fcal::parser::Parser::parse_standard_decl()`, `fcal::parser::Parser::parse_stmt()`, `fcal::parser::Parser::parse_string_const()`, `fcal::parser::Parser::parse_variable_name()`, and `fcal::parser::Parser::ParseProgram()`.

Here is the caller graph for this function:

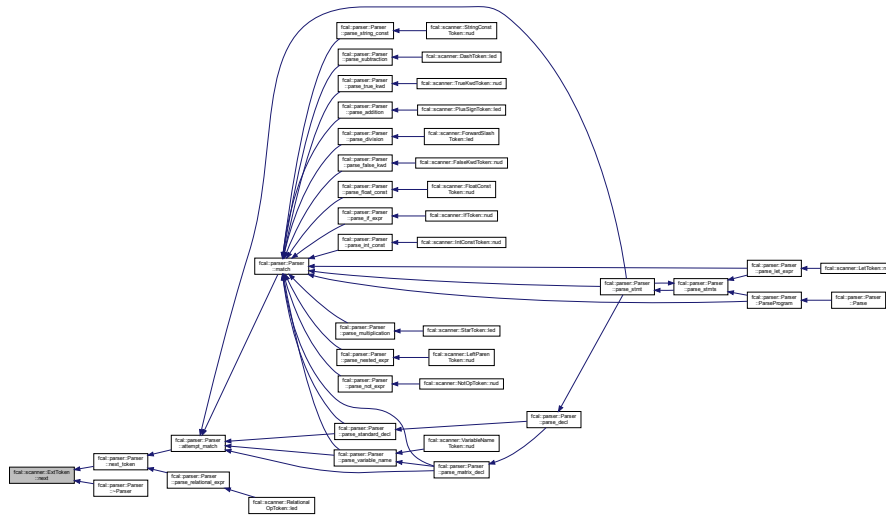


7.55.3.7 next()

```
ExtToken* fcal::scanner::ExtToken::next (
    void ) const [inline], [inherited]
```

Definition at line 58 of file ext_token.h.

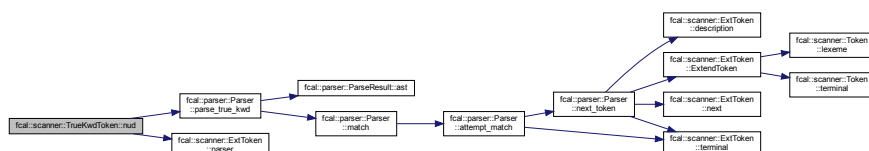
Here is the caller graph for this function:



```
parser::ParseResult fcal::scanner::TrueKwdToken::nud (
    void ) [inline], [virtual]
```

Definition at line 90 of file ext_token.h.

Here is the call graph for this function:



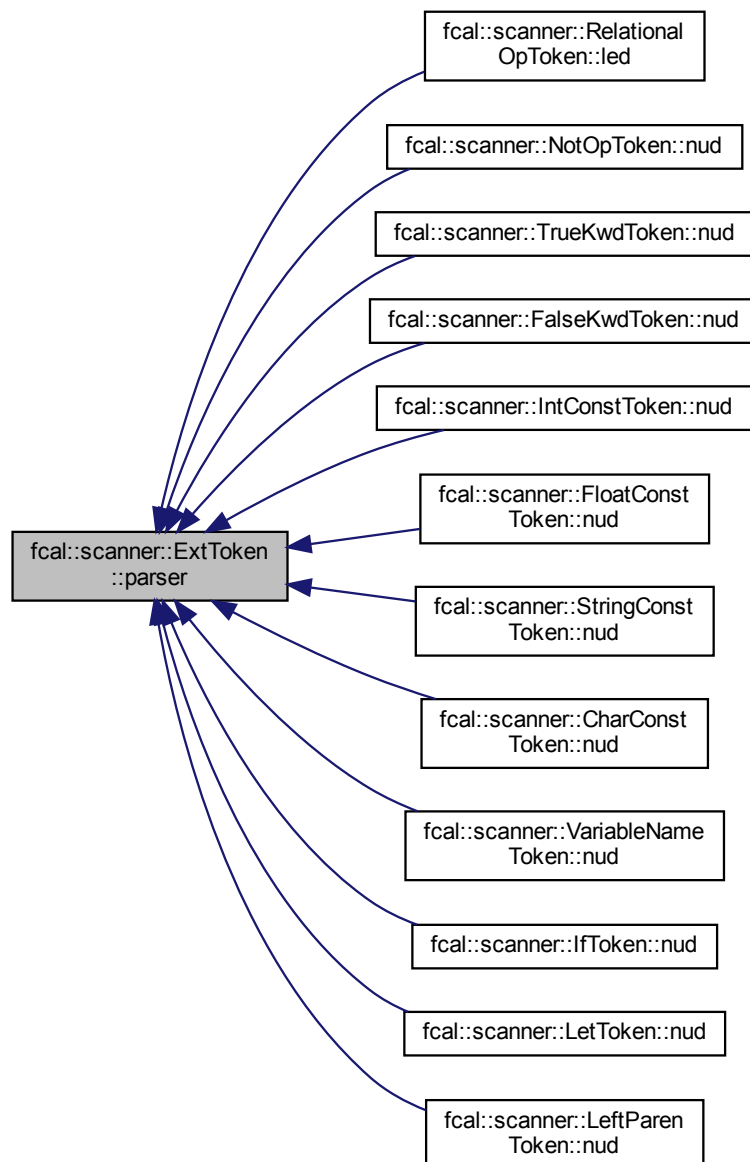
7.55.3.9 parser()

```
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]
```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), fcal::scanner::VariableNameToken::nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:




```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]
```

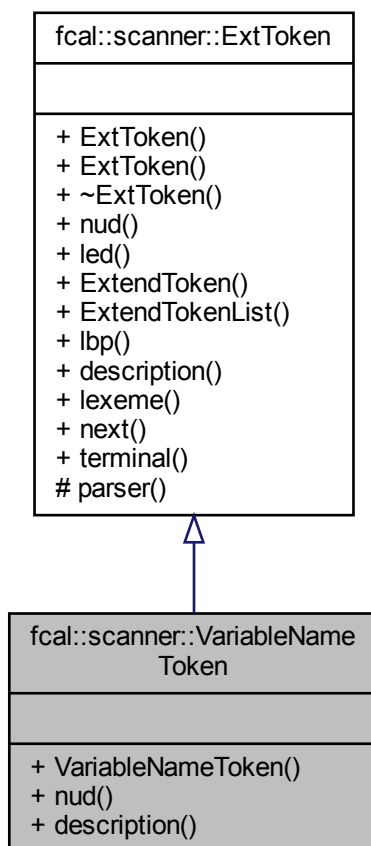
Referenced by `fcall::parser::Parser::attempt_match()`, `fcall::parser::Parser::next_is()`, `fcall::parser::Parser::next_token()`, and `fcall::parser::Parser::parse_stmt()`.

[illegible]

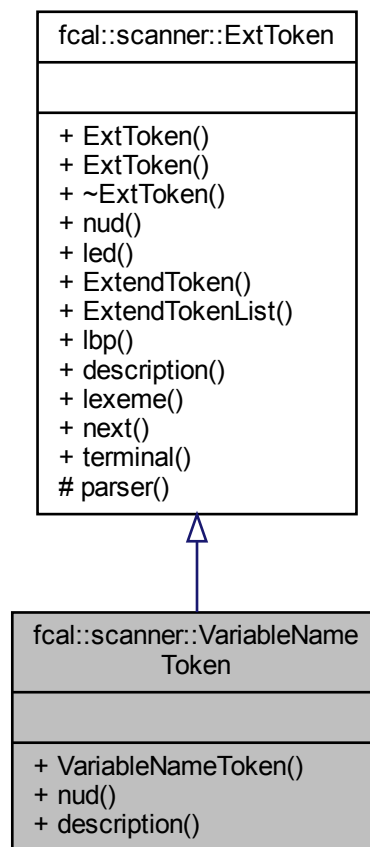
- `include/ext token.h`

```
#include <ext_token.h>
```

Inheritance diagram for `fcal::scanner::VariableNameToken`:



Collaboration diagram for fcal::scanner::VariableNameToken:



Public Member Functions

- `VariableNameToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `virtual parser::ParseResult led (parser::ParseResult left)`
- `ExtToken * ExtendToken (parser::Parser *p, Token *tokens)`
- `ExtToken * ExtendTokenList (parser::Parser *p, Token *tokens)`
- `virtual int lbp ()`
- `std::string lexeme (void) const`
- `ExtToken * next (void) const`
- `scanner::TokenType terminal (void) const`

Protected Member Functions

- `parser::Parser * parser (void)`

7.56.1 Detailed Description

Definition at line 135 of file ext_token.h.

7.56.2 Constructor & Destructor Documentation

7.56.2.1 VariableNameToken()

```
fcal::scanner::VariableNameToken::VariableNameToken (
    parser::Parser * p,
    Token * t ) [inline]
```

Definition at line 137 of file ext_token.h.

7.56.3 Member Function Documentation

7.56.3.1 description()

```
std::string fcal::scanner::VariableNameToken::description ( ) [inline], [virtual]
```

Reimplemented from [fcal::scanner::ExtToken](#).

Definition at line 139 of file ext_token.h.

7.56.3.2 ExtendToken()

```
ExtToken * fcal::scanner::ExtToken::ExtendToken (
    parser::Parser * p,
    Token * tokens ) [inherited]
```

Create Extended token from tokens

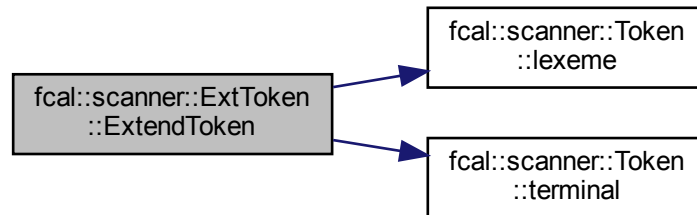
Definition at line 31 of file ext_token.cc.

References [fcal::scanner::kAssign](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kColon](#), [fcal::scanner::kDash](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kEndOfFile](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kLeftCurly](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#), [fcal::scanner::kLetKwd](#), [fcal::scanner::kLexicalError](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kNotEquals](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kPrintKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kRightCurly](#), [fcal::scanner::kRightParen](#),

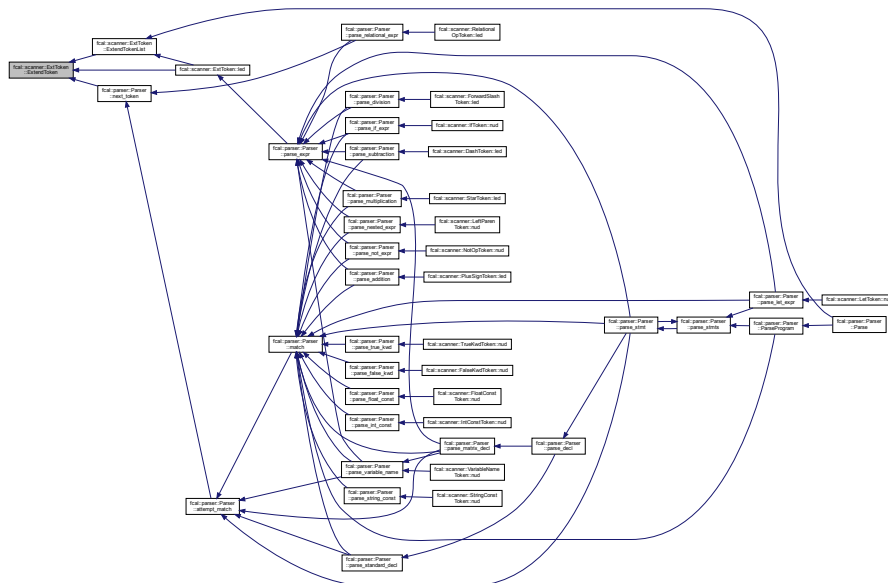
fcal::scanner::kRightSquare, fcal::scanner::kSemiColon, fcal::scanner::kStar, fcal::scanner::kStringConst, fcal::scanner::kStringKwd, fcal::scanner::kThenKwd, fcal::scanner::kToKwd, fcal::scanner::kTrueKwd, fcal::scanner::kVariableName, fcal::scanner::kWhileKwd, fcal::scanner::Token::lexeme(), and fcal::scanner::Token::terminal().

Referenced by fcal::scanner::ExtToken::ExtendTokenList(), fcal::scanner::ExtToken::led(), and fcal::parser::Parser::next_token().

Here is the call graph for this function:



Here is the caller graph for this function:

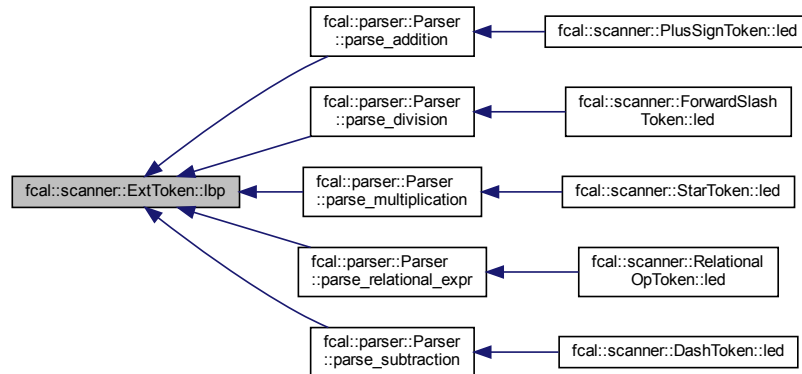


7.56.3.3 ExtendTokenList()

```

ExtToken * fcal::scanner::ExtToken::ExtendTokenList (
    parser::Parser * p,
    Token * tokens ) [inherited]
  
```


Here is the caller graph for this function:



7.56.3.5 led()

```
virtual parser::ParseResult fcal::scanner::ExtToken::led (
    parser::ParseResult left ) [inline], [virtual], [inherited]
```

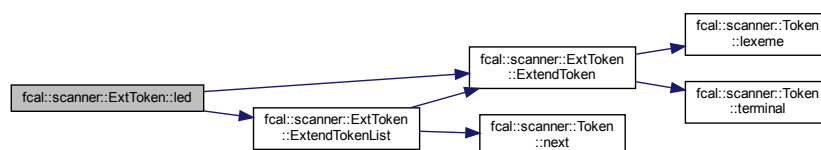
Reimplemented in [fcal::scanner::RelationalOpToken](#).

Definition at line 50 of file `ext_token.h`.

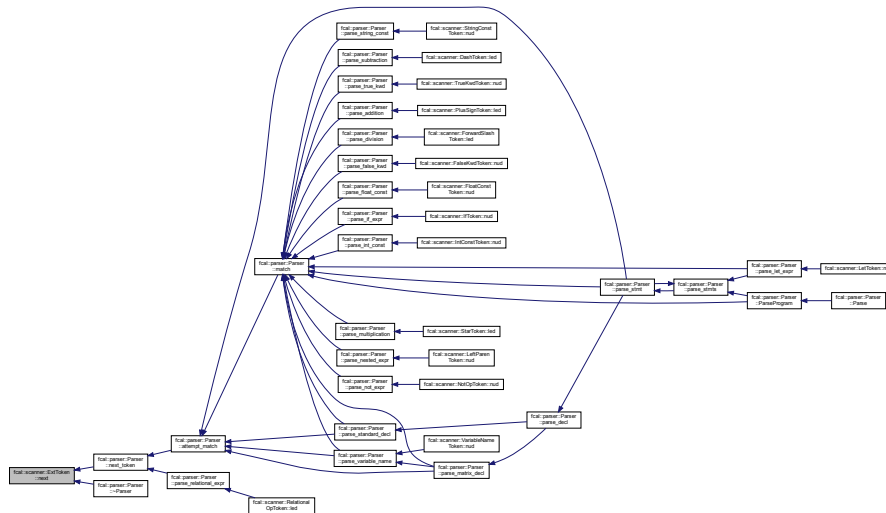
References [fcal::scanner::ExtToken::ExtendToken\(\)](#), and [fcal::scanner::ExtToken::ExtendTokenList\(\)](#).

Referenced by [fcal::parser::Parser::parse_expr\(\)](#).

Here is the call graph for this function:



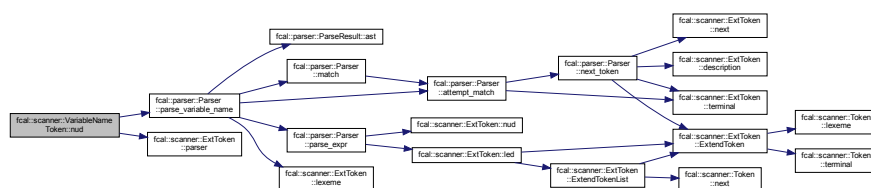
Here is the caller graph for this function:



```
parser::ParseResult fcal::scanner::VariableNameToken::nud (
    void ) [inline], [virtual]
```

Definition at line 138 of file ext token.h.

Here is the call graph for this function:



7.56.3.9 parser()

```

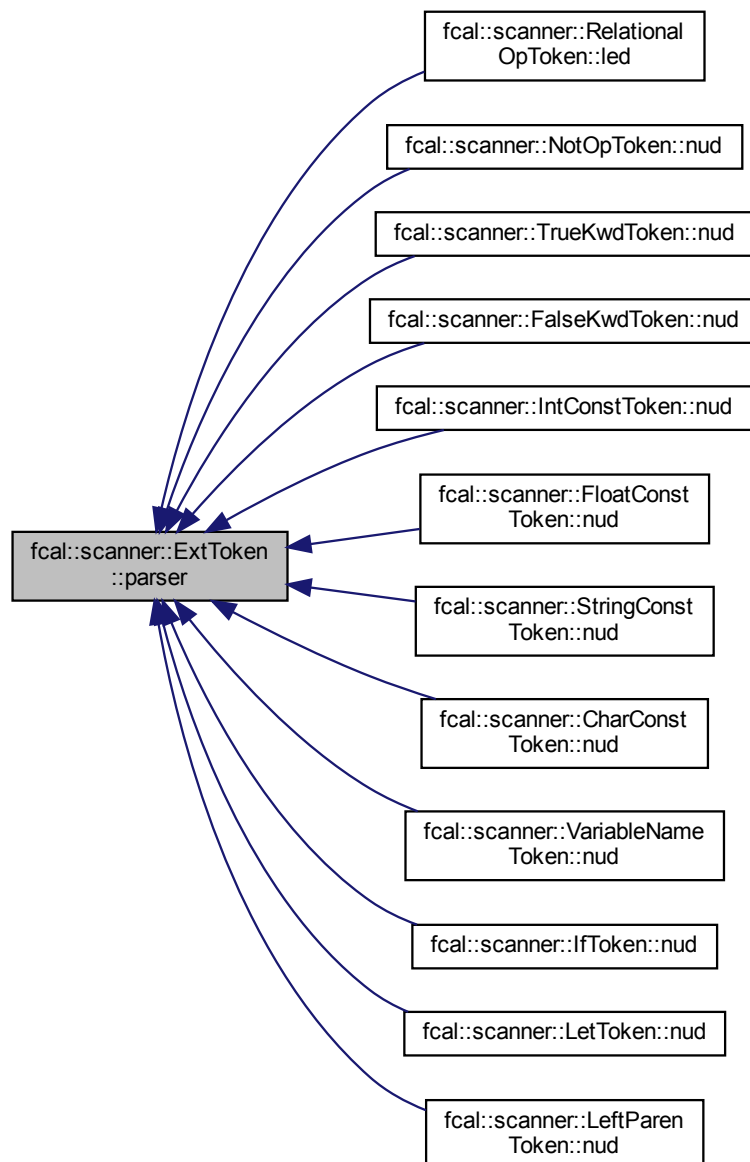
parser::Parser* fcal::scanner::ExtToken::parser (
    void ) [inline], [protected], [inherited]

```

Definition at line 62 of file ext_token.h.

Referenced by fcal::scanner::RelationalOpToken::led(), fcal::scanner::NotOpToken::nud(), fcal::scanner::TrueKwdToken::nud(), fcal::scanner::FalseKwdToken::nud(), fcal::scanner::IntConstToken::nud(), fcal::scanner::FloatConstToken::nud(), fcal::scanner::StringConstToken::nud(), fcal::scanner::CharConstToken::nud(), nud(), fcal::scanner::IfToken::nud(), fcal::scanner::LetToken::nud(), and fcal::scanner::LeftParenToken::nud().

Here is the caller graph for this function:



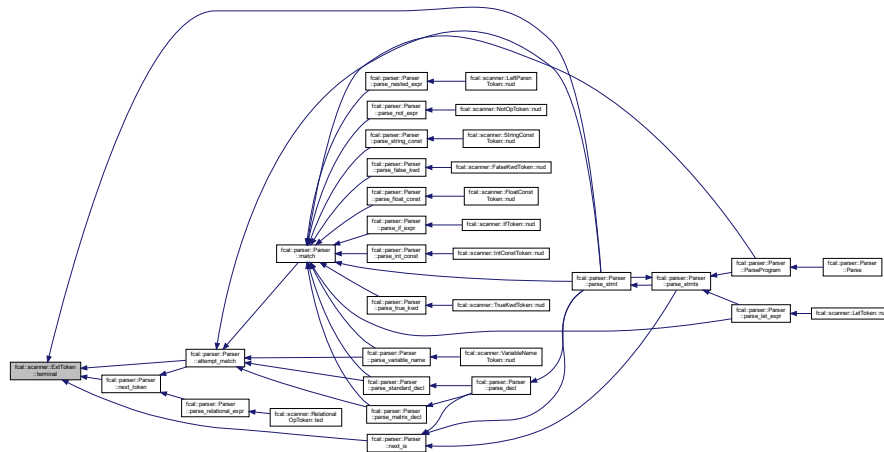
7.56.3.10 terminal()

```
scanner::TokenType fcal::scanner::ExtToken::terminal (
    void ) const [inline], [inherited]
```

Definition at line 59 of file ext_token.h.

Referenced by `fcal::parser::Parser::attempt_match()`, `fcal::parser::Parser::next_is()`, `fcal::parser::Parser::next_token()`, and `fcal::parser::Parser::parse_stmt()`.

Here is the caller graph for this function:



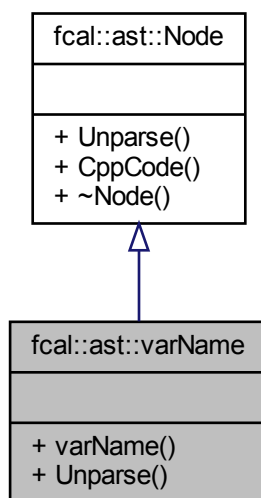
The documentation for this class was generated from the following file:

- `include/ext_token.h`

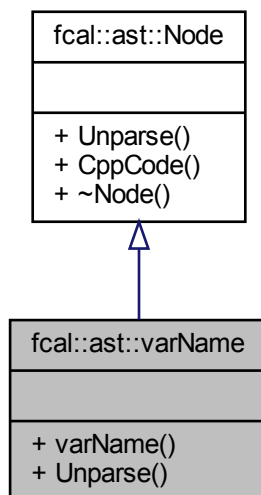
7.57 fcal::ast::varName Class Reference

```
#include <ast.h>
```

Inheritance diagram for `fcgal::ast::varName`:



Collaboration diagram for `fcgal::ast::varName`:



Public Member Functions

- `varName` (`std::string`)
- `std::string Unparse` (`void`)
- `virtual std::string CppCode` (`void`)

7.57.1 Detailed Description

Definition at line 38 of file ast.h.

7.57.2 Constructor & Destructor Documentation

7.57.2.1 varName()

```
fcal::ast::varName::varName (
    std::string s1 ) [explicit]
```

VarName constructor

Definition at line 60 of file ast.cc.

7.57.3 Member Function Documentation

7.57.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.57.3.2 Unparse()

```
std::string fcal::ast::varName::Unparse (
    void ) [virtual]
```

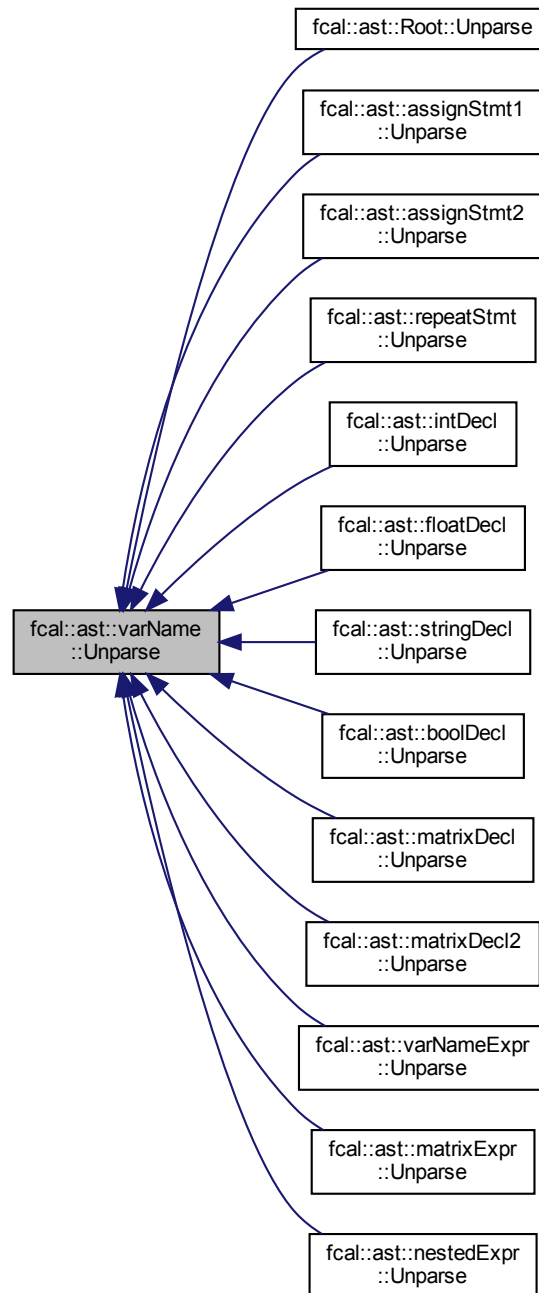
[varName](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 64 of file ast.cc.

Referenced by [fcal::ast::Root::Unparse\(\)](#), [fcal::ast::assignStmt1::Unparse\(\)](#), [fcal::ast::assignStmt2::Unparse\(\)](#), [fcal::ast::repeatStmt::Unparse\(\)](#), [fcal::ast::intDecl::Unparse\(\)](#), [fcal::ast::floatDecl::Unparse\(\)](#), [fcal::ast::stringDecl::Unparse\(\)](#), [fcal::ast::boolDecl::Unparse\(\)](#), [fcal::ast::matrixDecl::Unparse\(\)](#), [fcal::ast::matrixDecl2::Unparse\(\)](#), [fcal::ast::varNameExpr::Unparse\(\)](#), [fcal::ast::matrixExpr::Unparse\(\)](#), and [fcal::ast::nestedExpr::Unparse\(\)](#).

Here is the caller graph for this function:



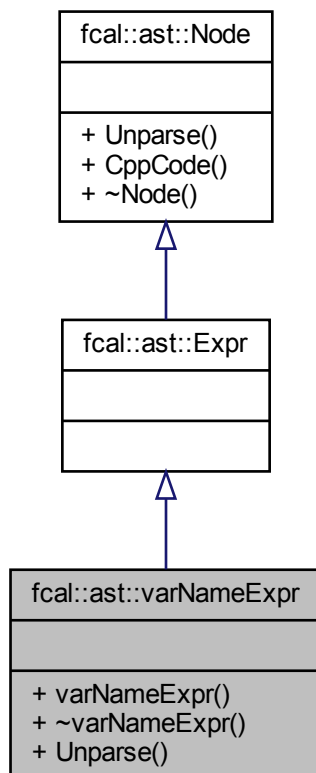
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

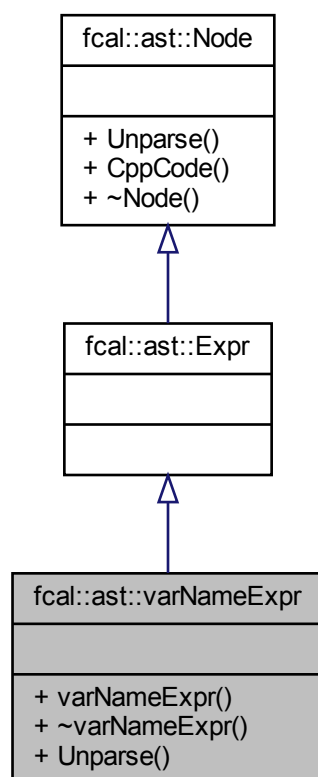
7.58 fcal::ast::varNameExpr Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::varNameExpr:



Collaboration diagram for `fcal::ast::varNameExpr`:



Public Member Functions

- `varNameExpr (varName *)`
- `~varNameExpr ()`
- `std::string Unparse (void)`
- `virtual std::string CppCode (void)`

7.58.1 Detailed Description

Definition at line 283 of file `ast.h`.

7.58.2 Constructor & Destructor Documentation

7.58.2.1 varNameExpr()

```
fcal::ast::varNameExpr::varNameExpr (
    varName * v1 ) [explicit]
```

[varNameExpr](#) Constructor

Definition at line 442 of file ast.cc.

7.58.2.2 ~varNameExpr()

```
fcal::ast::varNameExpr::~varNameExpr ( )
```

[varNameExpr](#) Destructor

Definition at line 447 of file ast.cc.

7.58.3 Member Function Documentation

7.58.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.58.3.2 Unparse()

```
std::string fcal::ast::varNameExpr::Unparse (
    void ) [virtual]
```

[varNameExpr](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 452 of file ast.cc.

References [fcal::ast::varName::Unparse\(\)](#).

Here is the call graph for this function:



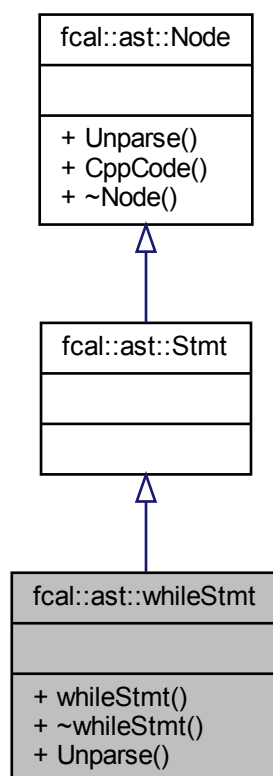
The documentation for this class was generated from the following files:

- [include/ast.h](#)
- [src/ast.cc](#)

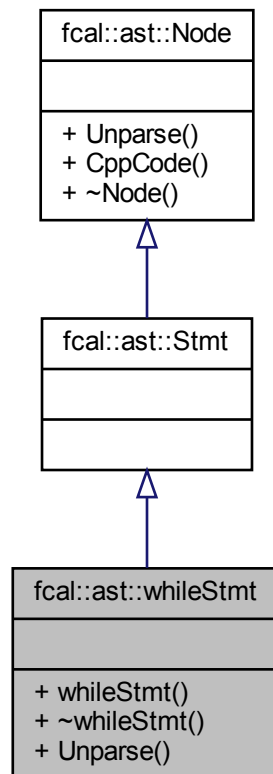
7.59 fcal::ast::whileStmt Class Reference

```
#include <ast.h>
```

Inheritance diagram for fcal::ast::whileStmt:



Collaboration diagram for fcal::ast::whileStmt:



Public Member Functions

- [whileStmt](#) ([Expr](#) *, [Stmt](#) *)
- [~whileStmt](#) ()
- `std::string` [Unparse](#) (void)
- virtual `std::string` [CppCode](#) (void)

7.59.1 Detailed Description

Definition at line 191 of file `ast.h`.

7.59.2 Constructor & Destructor Documentation

7.59.2.1 whileStmt()

```
fcal::ast::whileStmt::whileStmt (
    Expr * e1,
    Stmt * s1 )
```

[whileStmt](#) Constructor

Definition at line 277 of file ast.cc.

7.59.2.2 ~whileStmt()

```
fcal::ast::whileStmt::~~whileStmt ( )
```

[whileStmt](#) Destructor

Definition at line 285 of file ast.cc.

7.59.3 Member Function Documentation

7.59.3.1 CppCode()

```
virtual std::string fcal::ast::Node::CppCode (
    void ) [inline], [virtual], [inherited]
```

Definition at line 34 of file ast.h.

7.59.3.2 Unparse()

```
std::string fcal::ast::whileStmt::Unparse (
    void ) [virtual]
```

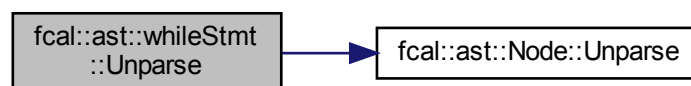
[whileStmt](#) Unparser

Implements [fcal::ast::Node](#).

Definition at line 293 of file ast.cc.

References [fcal::ast::Node::Unparse\(\)](#).

Here is the call graph for this function:



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

- [include/ast.h](#)
- [src/ast.cc](#)

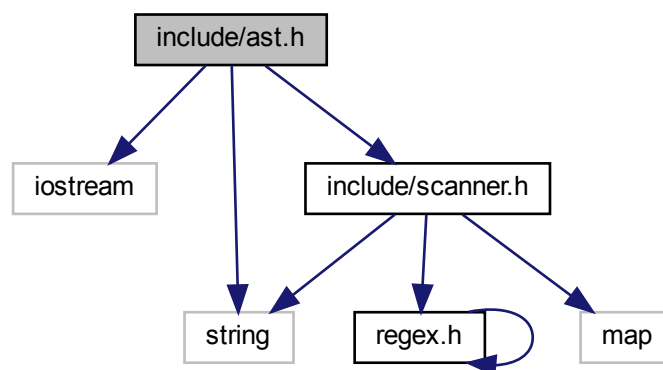
Chapter 8

File Documentation

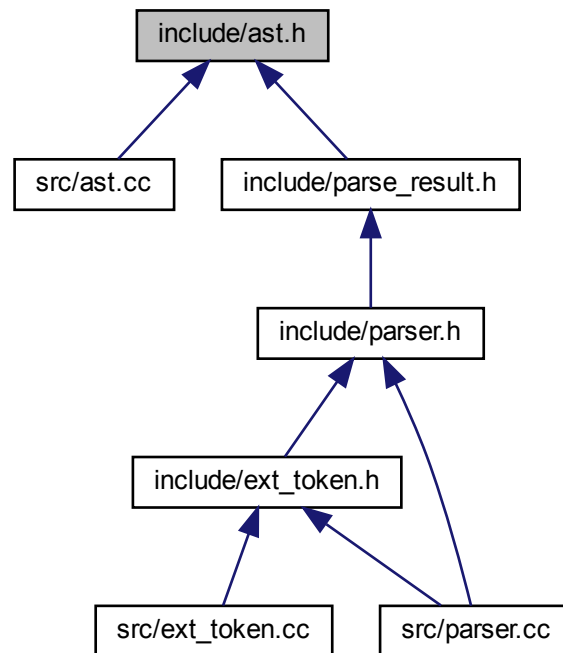
8.1 docs_in/mainpage.h File Reference

8.2 include/ast.h File Reference

```
#include <iostream>
#include <string>
#include "include/scanner.h"
Include dependency graph for ast.h:
```



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



Classes

- class [fcal::ast::Node](#)
- class [fcal::ast::varName](#)
- class [fcal::ast::Decl](#)
- class [fcal::ast::Stmt](#)
- class [fcal::ast::Stmts](#)
- class [fcal::ast::Expr](#)
- class [fcal::ast::Program](#)
- class [fcal::ast::Root](#)
- class [fcal::ast::emptyStmts](#)
- class [fcal::ast::multipleStmts](#)
- class [fcal::ast::declStmt](#)
- class [fcal::ast::stmtsStmt](#)
- class [fcal::ast::ifStmt](#)
- class [fcal::ast::ifElseStmt](#)
- class [fcal::ast::assignStmt1](#)
- class [fcal::ast::assignStmt2](#)
- class [fcal::ast::printStmt](#)
- class [fcal::ast::repeatStmt](#)
- class [fcal::ast::whileStmt](#)
- class [fcal::ast::semiColonStmt](#)
- class [fcal::ast::intDecl](#)
- class [fcal::ast::floatDecl](#)

- class [fcal::ast::stringDecl](#)
- class [fcal::ast::boolDecl](#)
- class [fcal::ast::matrixDecl](#)
- class [fcal::ast::matrixDecl2](#)
- class [fcal::ast::varNameExpr](#)
- class [fcal::ast::intExpr](#)
- class [fcal::ast::floatExpr](#)
- class [fcal::ast::stringExpr](#)
- class [fcal::ast::trueExpr](#)
- class [fcal::ast::falseExpr](#)
- class [fcal::ast::relationalExpr](#)
- class [fcal::ast::matrixExpr](#)
- class [fcal::ast::nestedExpr](#)
- class [fcal::ast::parenExpr](#)
- class [fcal::ast::letExpr](#)
- class [fcal::ast::ifExpr](#)
- class [fcal::ast::notExpr](#)

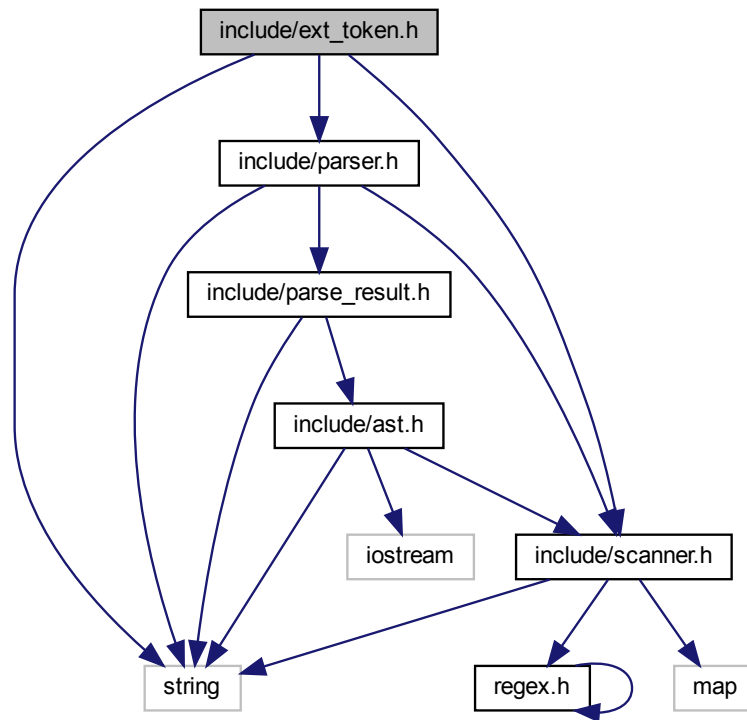
Namespaces

- [fcal](#)
- [fcal::ast](#)

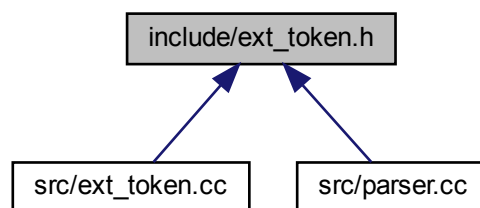
8.3 include/ext_token.h File Reference

```
#include <string>
#include "include/parser.h"
#include "include/scanner.h"
```

Include dependency graph for `ext_token.h`:



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



Classes

- class `fcal::scanner::ExtToken`
- class `fcal::scanner::NotOpToken`
- class `fcal::scanner::TrueKwdToken`
- class `fcal::scanner::FalseKwdToken`
- class `fcal::scanner::IntConstToken`

- class [fcal::scanner::FloatConstToken](#)
- class [fcal::scanner::StringConstToken](#)
- class [fcal::scanner::CharConstToken](#)
- class [fcal::scanner::VariableNameToken](#)
- class [fcal::scanner::IfToken](#)
- class [fcal::scanner::LetToken](#)
- class [fcal::scanner::LeftParenToken](#)
- class [fcal::scanner::RelationalOpToken](#)
- class [fcal::scanner::EndOfFileToken](#)

Namespaces

- [fcal](#)
- [fcal::scanner](#)

8.4 include/iter2scanner.h File Reference

Namespaces

- [fcal](#)
- [fcal::scanner](#)

Typedefs

- typedef enum kTokenEnumType [fcal::scanner::TokenType](#)

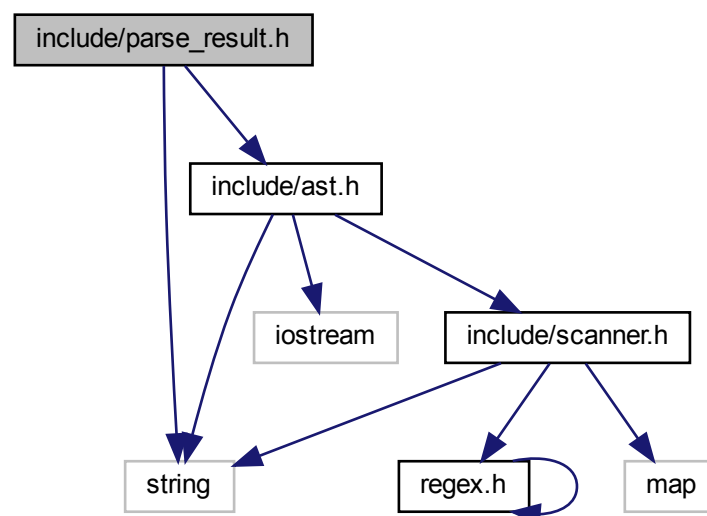
Enumerations

- enum [fcal::scanner::kTokenEnumType](#) {
[fcal::scanner::kIntKwd](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kTrueKwd](#),
[fcal::scanner::kFalseKwd](#), [fcal::scanner::kStringKwd](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kLetKwd](#),
[fcal::scanner::kInKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kIfKwd](#), [fcal::scanner::kThenKwd](#),
[fcal::scanner::kElseKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kWhileKwd](#), [fcal::scanner::kPrintKwd](#),
[fcal::scanner::kToKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kFloatConst](#), [fcal::scanner::kStringConst](#),
[fcal::scanner::kVariableName](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kRightParen](#), [fcal::scanner::kLeftCurly](#),
[fcal::scanner::kRightCurly](#), [fcal::scanner::kLeftSquare](#), [fcal::scanner::kRightSquare](#), [fcal::scanner::kSemiColon](#),
[fcal::scanner::kColon](#), [fcal::scanner::kAssign](#), [fcal::scanner::kPlusSign](#), [fcal::scanner::kStar](#),
[fcal::scanner::kDash](#), [fcal::scanner::kForwardSlash](#), [fcal::scanner::kLessThan](#), [fcal::scanner::kLessThanEqual](#),
[fcal::scanner::kGreaterThan](#), [fcal::scanner::kGreaterThanEqual](#), [fcal::scanner::kEqualsEquals](#), [fcal::scanner::kNotEquals](#),
[fcal::scanner::kAndOp](#), [fcal::scanner::kOrOp](#), [fcal::scanner::kNotOp](#), [fcal::scanner::kEndOfFile](#),
[fcal::scanner::kLexicalError](#), [fcal::scanner::kIntKwd](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kBoolKwd](#),
[fcal::scanner::kTrueKwd](#), [fcal::scanner::kFalseKwd](#), [fcal::scanner::kStringKwd](#), [fcal::scanner::kMatrixKwd](#),
[fcal::scanner::kLetKwd](#), [fcal::scanner::kInKwd](#), [fcal::scanner::kEndKwd](#), [fcal::scanner::kIfKwd](#),
[fcal::scanner::kThenKwd](#), [fcal::scanner::kElseKwd](#), [fcal::scanner::kRepeatKwd](#), [fcal::scanner::kWhileKwd](#),
[fcal::scanner::kPrintKwd](#), [fcal::scanner::kToKwd](#), [fcal::scanner::kIntConst](#), [fcal::scanner::kFloatConst](#),
[fcal::scanner::kStringConst](#), [fcal::scanner::kVariableName](#), [fcal::scanner::kLeftParen](#), [fcal::scanner::kRightParen](#),

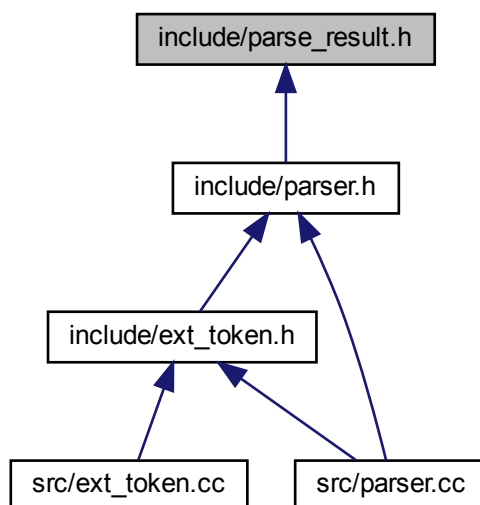
```
fcal::scanner::kLeftCurly, fcal::scanner::kRightCurly, fcal::scanner::kLeftSquare, fcal::scanner::kRightSquare,  
fcal::scanner::kSemiColon, fcal::scanner::kColon, fcal::scanner::kAssign, fcal::scanner::kPlusSign,  
fcal::scanner::kStar, fcal::scanner::kDash, fcal::scanner::kForwardSlash, fcal::scanner::kLessThan,  
fcal::scanner::kLessThanEqual, fcal::scanner::kGreaterThan, fcal::scanner::kGreaterThanEqual, fcal::scanner::kEqualsEquals,  
fcal::scanner::kNotEquals, fcal::scanner::kAndOp, fcal::scanner::kOrOp, fcal::scanner::kNotOp,  
fcal::scanner::kEndOfFile, fcal::scanner::kLexicalError }
```

8.5 include/parse_result.h File Reference

```
#include <string>  
#include "include/ast.h"  
Include dependency graph for parse_result.h:
```



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



Classes

- class `fcal::parser::ParseResult`

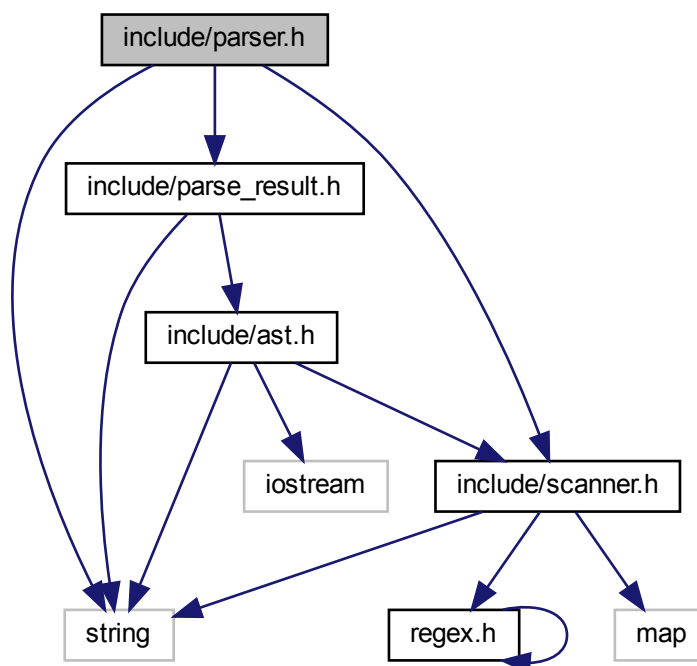
Namespaces

- `fcal`
- `fcal::parser`

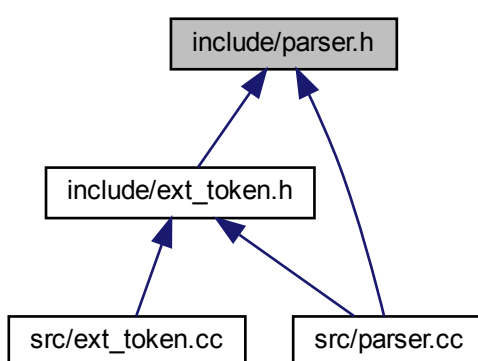
8.6 include/parser.h File Reference

```
#include <string>
#include "include/parse_result.h"
#include "include/scanner.h"
```

Include dependency graph for parser.h:



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



Classes

- class `fcal::parser::Parser`

Namespaces

- [fcal](#)
- [fcal::scanner](#)
- [fcal::parser](#)

8.7 include/read_input.h File Reference

Namespaces

- [fcal](#)
- [fcal::scanner](#)

Functions

- char * [fcal::scanner::ReadInput](#) (int argc, char **argv)
- char * [fcal::scanner::ReadInputFromFile](#) (const char *filename)

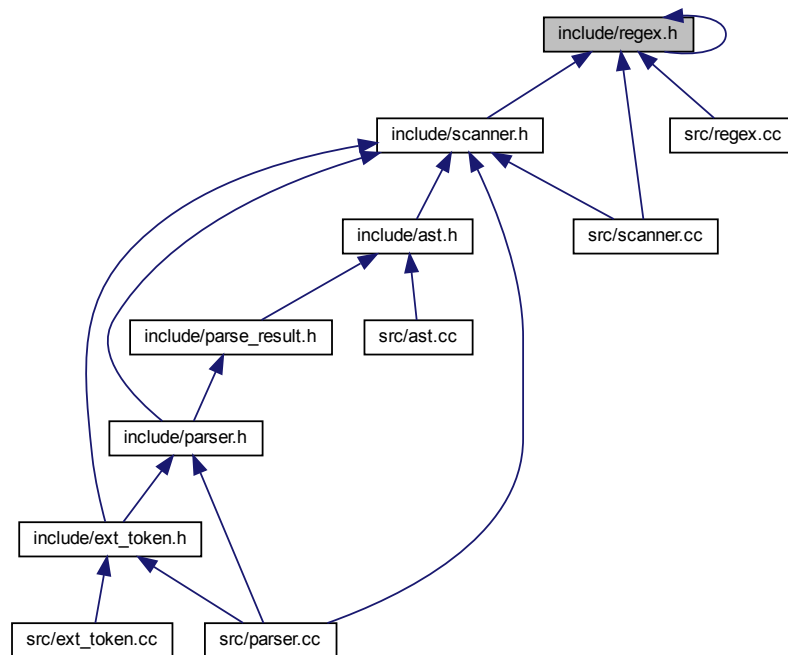
8.8 include/regex.h File Reference

```
#include <regex.h>
```

Include dependency graph for regex.h:



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



Namespaces

- [fcal](#)
- [fcal::scanner](#)

Functions

- [regex_t * fcal::scanner::make_regex](#) (const char *pattern)
- [int fcal::scanner::match_regex](#) (regex_t *re, const char *text)

Variables

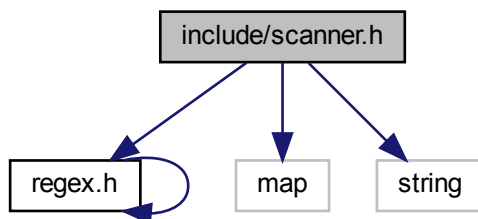
- const int [fcal::scanner::kRegexNSub](#) = 1

8.9 include/scanner.h File Reference

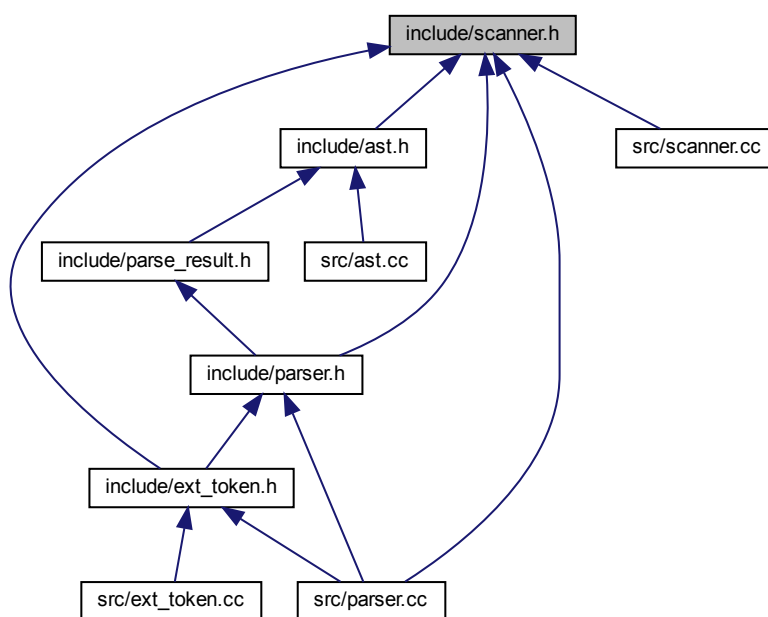
```
#include <regex.h>
#include <map>
```

```
#include <string>
```

Include dependency graph for scanner.h:



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



Classes

- struct `fcal::scanner::match_result`
- class `fcal::scanner::Token`
- class `fcal::scanner::Scanner`

Namespaces

- `fcal`
- `fcal::scanner`

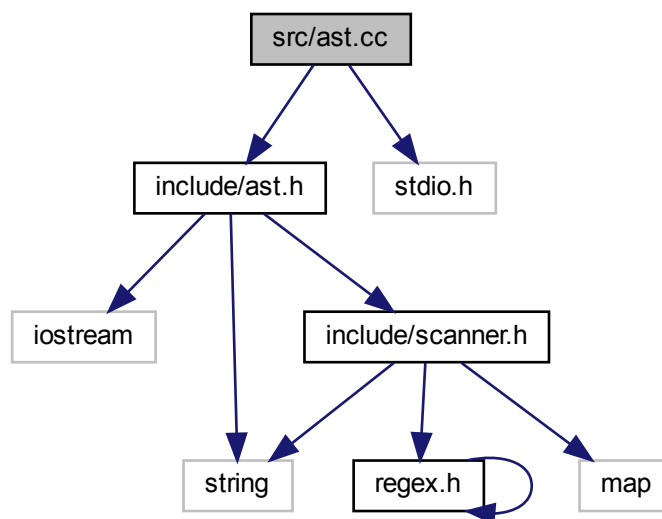
Enumerations

- enum `fcal::scanner::kTokenEnumType` {
`fcal::scanner::kIntKwd`, `fcal::scanner::kFloatKwd`, `fcal::scanner::kBoolKwd`, `fcal::scanner::kTrueKwd`,
`fcal::scanner::kFalseKwd`, `fcal::scanner::kStringKwd`, `fcal::scanner::kMatrixKwd`, `fcal::scanner::kLetKwd`,
`fcal::scanner::kInKwd`, `fcal::scanner::kEndKwd`, `fcal::scanner::kIfKwd`, `fcal::scanner::kThenKwd`,
`fcal::scanner::kElseKwd`, `fcal::scanner::kRepeatKwd`, `fcal::scanner::kWhileKwd`, `fcal::scanner::kPrintKwd`,
`fcal::scanner::kToKwd`, `fcal::scanner::kIntConst`, `fcal::scanner::kFloatConst`, `fcal::scanner::kStringConst`,
`fcal::scanner::kVariableName`, `fcal::scanner::kLeftParen`, `fcal::scanner::kRightParen`, `fcal::scanner::kLeftCurly`,
`fcal::scanner::kRightCurly`, `fcal::scanner::kLeftSquare`, `fcal::scanner::kRightSquare`, `fcal::scanner::kSemiColon`,
`fcal::scanner::kColon`, `fcal::scanner::kAssign`, `fcal::scanner::kPlusSign`, `fcal::scanner::kStar`,
`fcal::scanner::kDash`, `fcal::scanner::kForwardSlash`, `fcal::scanner::kLessThan`, `fcal::scanner::kLessThanEqual`,
`fcal::scanner::kGreaterThan`, `fcal::scanner::kGreaterThanEqual`, `fcal::scanner::kEqualsEquals`, `fcal::scanner::kNotEquals`,
`fcal::scanner::kAndOp`, `fcal::scanner::kOrOp`, `fcal::scanner::kNotOp`, `fcal::scanner::kEndOfFile`,
`fcal::scanner::kLexicalError`, `fcal::scanner::kIntKwd`, `fcal::scanner::kFloatKwd`, `fcal::scanner::kBoolKwd`,
`fcal::scanner::kTrueKwd`, `fcal::scanner::kFalseKwd`, `fcal::scanner::kStringKwd`, `fcal::scanner::kMatrixKwd`,
`fcal::scanner::kLetKwd`, `fcal::scanner::kInKwd`, `fcal::scanner::kEndKwd`, `fcal::scanner::kIfKwd`,
`fcal::scanner::kThenKwd`, `fcal::scanner::kElseKwd`, `fcal::scanner::kRepeatKwd`, `fcal::scanner::kWhileKwd`,
`fcal::scanner::kPrintKwd`, `fcal::scanner::kToKwd`, `fcal::scanner::kIntConst`, `fcal::scanner::kFloatConst`,
`fcal::scanner::kStringConst`, `fcal::scanner::kVariableName`, `fcal::scanner::kLeftParen`, `fcal::scanner::kRightParen`,
`fcal::scanner::kLeftCurly`, `fcal::scanner::kRightCurly`, `fcal::scanner::kLeftSquare`, `fcal::scanner::kRightSquare`,
`fcal::scanner::kSemiColon`, `fcal::scanner::kColon`, `fcal::scanner::kAssign`, `fcal::scanner::kPlusSign`,
`fcal::scanner::kStar`, `fcal::scanner::kDash`, `fcal::scanner::kForwardSlash`, `fcal::scanner::kLessThan`,
`fcal::scanner::kLessThanEqual`, `fcal::scanner::kGreaterThan`, `fcal::scanner::kGreaterThanEqual`, `fcal::scanner::kEqualsEquals`,
`fcal::scanner::kNotEquals`, `fcal::scanner::kAndOp`, `fcal::scanner::kOrOp`, `fcal::scanner::kNotOp`,
`fcal::scanner::kEndOfFile`, `fcal::scanner::kLexicalError` }

8.10 src/ast.cc File Reference

```
#include "include/ast.h"
#include <stdio.h>
```


Include dependency graph for ast.cc:



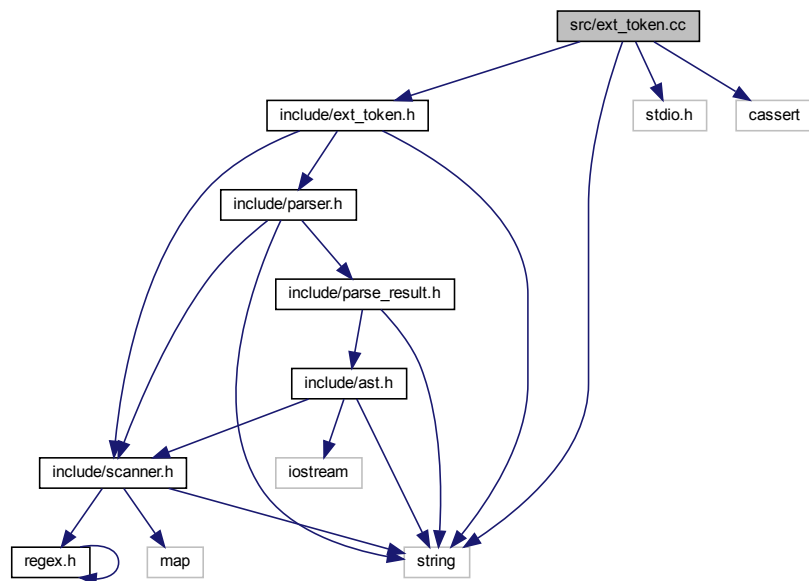
Namespaces

- `fcal`
- `fcal::ast`

8.11 src/ext_token.cc File Reference

```
#include "include/ext_token.h"  
#include <stdio.h>  
#include <string>  
#include <cassert>
```

Include dependency graph for ext_token.cc:



Namespaces

- [fcal](#)
- [fcal::scanner](#)

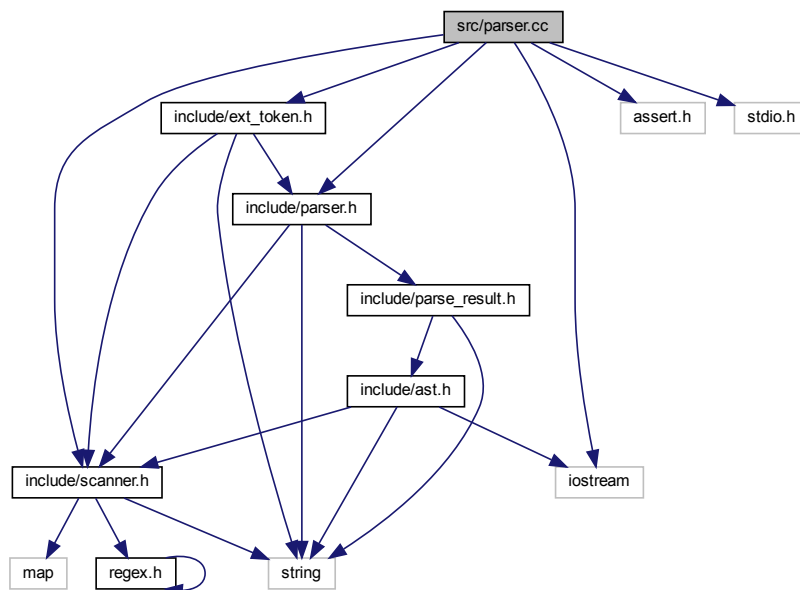
8.12 src/parser.cc File Reference

```

#include "include/parser.h"
#include <assert.h>
#include <stdio.h>
#include <iostream>
#include "include/ext_token.h"
#include "include/scanner.h"

```

Include dependency graph for parser.cc:



Namespaces

- [fcal](#)
- [fcal::parser](#)

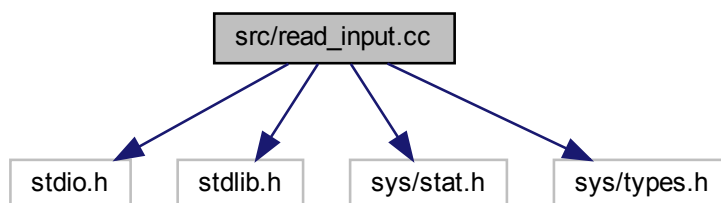
8.13 src/read_input.cc File Reference

```

#include <stdio.h>
#include <stdlib.h>
#include <sys/stat.h>
#include <sys/types.h>

```

Include dependency graph for read_input.cc:



Namespaces

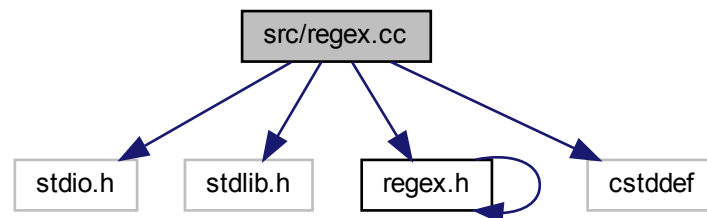
- [fcal](#)
- [fcal::scanner](#)

Functions

- `char * fcal::scanner::ReadInputFromFile (const char *filename)`
- `char * fcal::scanner::ReadInput (int argc, char **argv)`

8.14 src/regex.cc File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <regex.h>
#include <cstdint>
Include dependency graph for regex.cc:
```



Namespaces

- [fcal](#)
- [fcal::scanner](#)

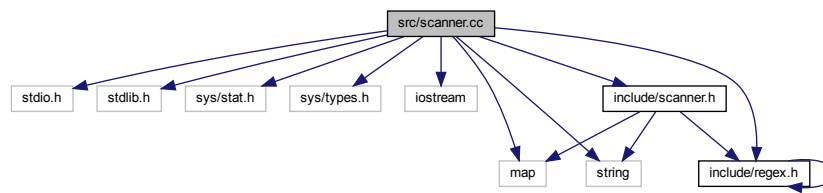
Functions

- `regex_t * fcal::scanner::make_regex (const char *pattern)`
- `int fcal::scanner::match_regex (regex_t *re, const char *text)`

8.15 src/scanner.cc File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <sys/stat.h>
#include <sys/types.h>
#include <iostream>
#include <map>
#include <string>
#include "include/regex.h"
#include "include/scanner.h"
```

Include dependency graph for scanner.cc:



Namespaces

- [fcal](#)
- [fcal::scanner](#)

Macros

- `#define` [DEBUG](#)

Functions

- `int` [fcal::scanner::consume_whitespace_and_comments](#) (`regex_t *whiteSpace`, `regex_t *block_comment`, `regex_t *line_comment`, `const char *text`)
- `regex_t *` [fcal::scanner::make_regex](#) (`const char *pattern`)
- `int` [fcal::scanner::match_regex](#) (`regex_t *re`, `const char *text`)

8.15.1 Macro Definition Documentation

8.15.1.1 DEBUG

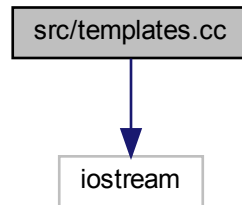
```
#define DEBUG
```

Definition at line 25 of file scanner.cc.

8.16 src/templates.cc File Reference

```
#include <iostream>
```

Include dependency graph for templates.cc:



Classes

- class [MySequence< T, N >](#)

Functions

- int [main](#) ()

8.16.1 Function Documentation

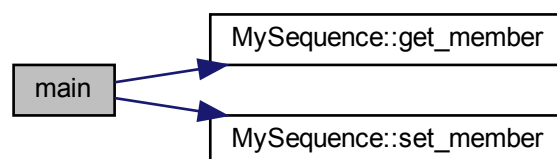
8.16.1.1 main()

```
int main ( )
```

Definition at line 47 of file templates.cc.

References [MySequence< T, N >::get_member\(\)](#), and [MySequence< T, N >::set_member\(\)](#).

Here is the call graph for this function:



Index

- ~ExtToken
 - fcal::scanner::ExtToken, [66](#)
- ~Node
 - fcal::ast::Node, [183](#)
- ~Parser
 - fcal::parser::Parser, [202](#)
- ~Root
 - fcal::ast::Root, [253](#)
- ~assignStmt1
 - fcal::ast::assignStmt1, [25](#)
- ~assignStmt2
 - fcal::ast::assignStmt2, [28](#)
- ~boolDecl
 - fcal::ast::boolDecl, [32](#)
- ~declStmt
 - fcal::ast::declStmt, [48](#)
- ~falseExpr
 - fcal::ast::falseExpr, [77](#)
- ~floatDecl
 - fcal::ast::floatDecl, [100](#)
- ~floatExpr
 - fcal::ast::floatExpr, [103](#)
- ~ifElseStmt
 - fcal::ast::ifElseStmt, [106](#)
- ~ifExpr
 - fcal::ast::ifExpr, [109](#)
- ~ifStmt
 - fcal::ast::ifStmt, [112](#)
- ~intDecl
 - fcal::ast::intDecl, [135](#)
- ~intExpr
 - fcal::ast::intExpr, [138](#)
- ~letExpr
 - fcal::ast::letExpr, [151](#)
- ~matrixDecl
 - fcal::ast::matrixDecl, [165](#)
- ~matrixDecl2
 - fcal::ast::matrixDecl2, [169](#)
- ~matrixExpr
 - fcal::ast::matrixExpr, [172](#)
- ~multipleStmts
 - fcal::ast::multipleStmts, [176](#)
- ~nestedExpr
 - fcal::ast::nestedExpr, [181](#)
- ~notExpr
 - fcal::ast::notExpr, [187](#)
- ~parenExpr
 - fcal::ast::parenExpr, [200](#)
- ~printStmt
 - fcal::ast::printStmt, [228](#)
- ~relationalExpr
 - fcal::ast::relationalExpr, [235](#)
- ~repeatStmt
 - fcal::ast::repeatStmt, [249](#)
- ~stmtsStmt
 - fcal::ast::stmtsStmt, [271](#)
- ~stringDecl
 - fcal::ast::stringDecl, [284](#)
- ~stringExpr
 - fcal::ast::stringExpr, [287](#)
- ~trueExpr
 - fcal::ast::trueExpr, [295](#)
- ~varNameExpr
 - fcal::ast::varNameExpr, [321](#)
- ~whileStmt
 - fcal::ast::whileStmt, [324](#)
- assignStmt1
 - fcal::ast::assignStmt1, [24](#)
- assignStmt2
 - fcal::ast::assignStmt2, [27](#)
- ast
 - fcal::parser::ParseResult, [223](#)
- attempt_match
 - fcal::parser::Parser, [203](#)
- boolDecl
 - fcal::ast::boolDecl, [31](#)
- CharConstToken
 - fcal::scanner::CharConstToken, [35](#)
- consume_whitespace_and_comments
 - fcal::scanner, [18](#)
- cpp_code
 - fcal::ast::relationalExpr, [235](#)
- CppCode
 - fcal::ast::Decl, [43](#)
 - fcal::ast::Expr, [62](#)
 - fcal::ast::Node, [183](#)
 - fcal::ast::Program, [230](#)
 - fcal::ast::Root, [253](#)
 - fcal::ast::Stmt, [262](#)
 - fcal::ast::Stmts, [266](#)
 - fcal::ast::assignStmt1, [25](#)
 - fcal::ast::assignStmt2, [28](#)
 - fcal::ast::boolDecl, [32](#)
 - fcal::ast::declStmt, [48](#)
 - fcal::ast::emptyStmts, [51](#)
 - fcal::ast::falseExpr, [77](#)

- fcgal::ast::floatDecl, [100](#)
- fcgal::ast::floatExpr, [103](#)
- fcgal::ast::ifElseStmt, [106](#)
- fcgal::ast::ifExpr, [109](#)
- fcgal::ast::ifStmt, [112](#)
- fcgal::ast::intDecl, [135](#)
- fcgal::ast::intExpr, [138](#)
- fcgal::ast::letExpr, [151](#)
- fcgal::ast::matrixDecl, [165](#)
- fcgal::ast::matrixDecl2, [169](#)
- fcgal::ast::matrixExpr, [172](#)
- fcgal::ast::multipleStmts, [176](#)
- fcgal::ast::nestedExpr, [181](#)
- fcgal::ast::notExpr, [187](#)
- fcgal::ast::parenExpr, [200](#)
- fcgal::ast::printStmt, [228](#)
- fcgal::ast::relationalExpr, [235](#)
- fcgal::ast::repeatStmt, [249](#)
- fcgal::ast::semiColonStmt, [261](#)
- fcgal::ast::stmtsStmt, [271](#)
- fcgal::ast::stringDecl, [284](#)
- fcgal::ast::stringExpr, [287](#)
- fcgal::ast::trueExpr, [295](#)
- fcgal::ast::varName, [317](#)
- fcgal::ast::varNameExpr, [321](#)
- fcgal::ast::whileStmt, [324](#)
- fcgal::scanner::CharConstToken, [35](#)
- fcgal::scanner::EndOfFileToken, [54](#)
- fcgal::scanner::ExtToken, [67](#)
- fcgal::scanner::FalseKwdToken, [80](#)
- fcgal::scanner::FloatConstToken, [90](#)
- fcgal::scanner::IfToken, [115](#)
- fcgal::scanner::IntConstToken, [125](#)
- fcgal::scanner::LeftParenToken, [141](#)
- fcgal::scanner::LetToken, [154](#)
- fcgal::scanner::NotOpToken, [190](#)
- fcgal::scanner::RelationalOpToken, [239](#)
- fcgal::scanner::StringConstToken, [274](#)
- fcgal::scanner::TrueKwdToken, [298](#)
- fcgal::scanner::VariableNameToken, [308](#)
- ExtendTokenList
 - fcgal::scanner::CharConstToken, [36](#)
 - fcgal::scanner::EndOfFileToken, [55](#)
 - fcgal::scanner::ExtToken, [68](#)
 - fcgal::scanner::FalseKwdToken, [81](#)
 - fcgal::scanner::FloatConstToken, [91](#)
 - fcgal::scanner::IfToken, [116](#)
 - fcgal::scanner::IntConstToken, [126](#)
 - fcgal::scanner::LeftParenToken, [142](#)
 - fcgal::scanner::LetToken, [155](#)
 - fcgal::scanner::NotOpToken, [191](#)
 - fcgal::scanner::RelationalOpToken, [241](#)
 - fcgal::scanner::StringConstToken, [275](#)
 - fcgal::scanner::TrueKwdToken, [299](#)
 - fcgal::scanner::VariableNameToken, [309](#)
- falseExpr
 - fcgal::ast::falseExpr, [76](#)
- FalseKwdToken
 - fcgal::scanner::FalseKwdToken, [80](#)
- fcgal, [11](#)
- fcgal::ast, [11](#)
- fcgal::ast::Decl, [42](#)
 - CppCode, [43](#)
 - Unparse, [43](#)
- fcgal::ast::Expr, [61](#)
 - CppCode, [62](#)
 - Unparse, [62](#)
- fcgal::ast::Node, [182](#)
 - ~Node, [183](#)
 - CppCode, [183](#)
 - Unparse, [183](#)
- fcgal::ast::Program, [229](#)
 - CppCode, [230](#)
 - Unparse, [230](#)
- fcgal::ast::Root, [250](#)
 - ~Root, [253](#)
 - CppCode, [253](#)
 - Root, [252](#)
 - Unparse, [253](#)
- fcgal::ast::Stmt, [261](#)
 - CppCode, [262](#)
 - Unparse, [262](#)
- fcgal::ast::Stmts, [264](#)
 - CppCode, [266](#)
- DEBUG
 - scanner.cc, [341](#)
- declStmt
 - fcgal::ast::declStmt, [47](#)
- description
 - fcgal::scanner::CharConstToken, [35](#)
 - fcgal::scanner::EndOfFileToken, [54](#)
 - fcgal::scanner::ExtToken, [66](#)
 - fcgal::scanner::FalseKwdToken, [80](#)
 - fcgal::scanner::FloatConstToken, [90](#)
 - fcgal::scanner::IfToken, [115](#)
 - fcgal::scanner::IntConstToken, [125](#)
 - fcgal::scanner::LeftParenToken, [141](#)
 - fcgal::scanner::LetToken, [154](#)
 - fcgal::scanner::NotOpToken, [190](#)
 - fcgal::scanner::RelationalOpToken, [239](#)
 - fcgal::scanner::StringConstToken, [274](#)
 - fcgal::scanner::TrueKwdToken, [298](#)
 - fcgal::scanner::VariableNameToken, [308](#)
- dictionary
 - fcgal::scanner::Scanner, [258](#)
- docs_in/mainpage.h, [325](#)
- emptyStmts
 - fcgal::ast::emptyStmts, [50](#)
- EndOfFileToken
 - fcgal::scanner::EndOfFileToken, [54](#)
- errors
 - fcgal::parser::ParseResult, [224](#)
- ExtToken
 - fcgal::scanner::ExtToken, [66](#)
- ExtendToken

- Unparse, 266
- fcsl::ast::assignStmt1, 23
 - ~assignStmt1, 25
 - assignStmt1, 24
 - CppCode, 25
 - Unparse, 25
- fcsl::ast::assignStmt2, 26
 - ~assignStmt2, 28
 - assignStmt2, 27
 - CppCode, 28
 - Unparse, 28
- fcsl::ast::boolDecl, 29
 - ~boolDecl, 32
 - boolDecl, 31
 - CppCode, 32
 - Unparse, 32
- fcsl::ast::declStmt, 45
 - ~declStmt, 48
 - CppCode, 48
 - declStmt, 47
 - Unparse, 48
- fcsl::ast::emptyStmts, 49
 - CppCode, 51
 - emptyStmts, 50
 - Unparse, 51
- fcsl::ast::falseExpr, 74
 - ~falseExpr, 77
 - CppCode, 77
 - falseExpr, 76
 - Unparse, 77
- fcsl::ast::floatDecl, 97
 - ~floatDecl, 100
 - CppCode, 100
 - floatDecl, 99
 - Unparse, 100
- fcsl::ast::floatExpr, 101
 - ~floatExpr, 103
 - CppCode, 103
 - floatExpr, 102
 - Unparse, 103
- fcsl::ast::ifElseStmt, 104
 - ~ifElseStmt, 106
 - CppCode, 106
 - ifElseStmt, 105
 - Unparse, 106
- fcsl::ast::ifExpr, 107
 - ~ifExpr, 109
 - CppCode, 109
 - ifExpr, 108
 - Unparse, 109
- fcsl::ast::ifStmt, 110
 - ~ifStmt, 112
 - CppCode, 112
 - ifStmt, 111
 - Unparse, 112
- fcsl::ast::intDecl, 132
 - ~intDecl, 135
 - CppCode, 135
- intDecl, 134
 - Unparse, 135
- fcsl::ast::intExpr, 136
 - ~intExpr, 138
 - CppCode, 138
 - intExpr, 137
 - Unparse, 138
- fcsl::ast::letExpr, 148
 - ~letExpr, 151
 - CppCode, 151
 - letExpr, 150
 - Unparse, 151
- fcsl::ast::matrixDecl, 162
 - ~matrixDecl, 165
 - CppCode, 165
 - matrixDecl, 164
 - Unparse, 165
- fcsl::ast::matrixDecl2, 166
 - ~matrixDecl2, 169
 - CppCode, 169
 - matrixDecl2, 168
 - Unparse, 169
- fcsl::ast::matrixExpr, 170
 - ~matrixExpr, 172
 - CppCode, 172
 - matrixExpr, 171
 - Unparse, 172
- fcsl::ast::multipleStmts, 173
 - ~multipleStmts, 176
 - CppCode, 176
 - multipleStmts, 175
 - Unparse, 176
- fcsl::ast::nestedExpr, 179
 - ~nestedExpr, 181
 - CppCode, 181
 - nestedExpr, 180
 - Unparse, 181
- fcsl::ast::notExpr, 184
 - ~notExpr, 187
 - CppCode, 187
 - notExpr, 186
 - Unparse, 187
- fcsl::ast::parenExpr, 197
 - ~parenExpr, 200
 - CppCode, 200
 - parenExpr, 199
 - Unparse, 200
- fcsl::ast::printStmt, 225
 - ~printStmt, 228
 - CppCode, 228
 - printStmt, 227
 - Unparse, 228
- fcsl::ast::relationalExpr, 232
 - ~relationalExpr, 235
 - cpp_code, 235
 - CppCode, 235
 - relationalExpr, 234
 - Unparse, 236

- fcsl::ast::repeatStmt, 246
 - ~repeatStmt, 249
 - CppCode, 249
 - repeatStmt, 248
 - Unparse, 249
- fcsl::ast::semiColonStmt, 258
 - CppCode, 261
 - semiColonStmt, 260
 - Unparse, 261
- fcsl::ast::stmtsStmt, 268
 - ~stmtsStmt, 271
 - CppCode, 271
 - stmtsStmt, 270
 - Unparse, 271
- fcsl::ast::stringDecl, 281
 - ~stringDecl, 284
 - CppCode, 284
 - stringDecl, 283
 - Unparse, 284
- fcsl::ast::stringExpr, 285
 - ~stringExpr, 287
 - CppCode, 287
 - stringExpr, 286
 - Unparse, 287
- fcsl::ast::trueExpr, 292
 - ~trueExpr, 295
 - CppCode, 295
 - trueExpr, 294
 - Unparse, 295
- fcsl::ast::varName, 315
 - CppCode, 317
 - Unparse, 317
 - varName, 317
- fcsl::ast::varNameExpr, 319
 - ~varNameExpr, 321
 - CppCode, 321
 - Unparse, 321
 - varNameExpr, 320
- fcsl::ast::whileStmt, 322
 - ~whileStmt, 324
 - CppCode, 324
 - Unparse, 324
 - whileStmt, 323
- fcsl::parser, 12
- fcsl::parser::ParseResult, 222
 - ast, 223
 - errors, 224
 - ok, 224, 225
 - ParseResult, 222
- fcsl::parser::Parser, 201
 - ~Parser, 202
 - attempt_match, 203
 - match, 204
 - next_is, 205
 - next_token, 205
 - Parse, 206
 - parse_addition, 207
 - parse_char_const, 207
 - parse_decl, 207
 - parse_division, 208
 - parse_expr, 208
 - parse_false_kwd, 209
 - parse_float_const, 210
 - parse_if_expr, 211
 - parse_int_const, 211
 - parse_let_expr, 212
 - parse_matrix_decl, 213
 - parse_multiplication, 214
 - parse_nested_expr, 214
 - parse_not_expr, 214
 - parse_relational_expr, 215
 - parse_standard_decl, 216
 - parse_stmt, 217
 - parse_stmts, 217
 - parse_string_const, 218
 - parse_subtraction, 219
 - parse_true_kwd, 219
 - parse_variable_name, 220
 - ParseProgram, 221
 - Parser, 202
- fcsl::scanner, 12
 - consume_whitespace_and_comments, 18
 - kRegexNSub, 22
 - kTokenEnumType, 14, 16
 - make_regex, 19
 - match_regex, 20
 - ReadInput, 20
 - ReadInputFromFile, 21
 - TokenType, 14
- fcsl::scanner::CharConstToken, 33
 - CharConstToken, 35
 - description, 35
 - ExtendToken, 35
 - ExtendTokenList, 36
 - lbp, 37
 - led, 38
 - lexeme, 39
 - next, 39
 - nud, 40
 - parser, 40
 - terminal, 41
- fcsl::scanner::EndOfFileToken, 51
 - description, 54
 - EndOfFileToken, 54
 - ExtendToken, 54
 - ExtendTokenList, 55
 - lbp, 56
 - led, 57
 - lexeme, 58
 - next, 58
 - nud, 59
 - parser, 59
 - terminal, 60
- fcsl::scanner::ExtToken, 64
 - ~ExtToken, 66
 - description, 66

- ExtToken, 66
- ExtendToken, 67
- ExtendTokenList, 68
- lbp, 69
- led, 70
- lexeme, 71
- next, 71
- nud, 72
- parser, 72
- terminal, 73
- fcsl::scanner::FalseKwdToken, 78
 - description, 80
 - ExtendToken, 80
 - ExtendTokenList, 81
 - FalseKwdToken, 80
 - lbp, 82
 - led, 83
 - lexeme, 84
 - next, 84
 - nud, 85
 - parser, 85
 - terminal, 86
- fcsl::scanner::FloatConstToken, 87
 - description, 90
 - ExtendToken, 90
 - ExtendTokenList, 91
 - FloatConstToken, 90
 - lbp, 92
 - led, 93
 - lexeme, 94
 - next, 94
 - nud, 95
 - parser, 95
 - terminal, 96
- fcsl::scanner::IfToken, 113
 - description, 115
 - ExtendToken, 115
 - ExtendTokenList, 116
 - IfToken, 115
 - lbp, 117
 - led, 117
 - lexeme, 118
 - next, 119
 - nud, 119
 - parser, 120
 - terminal, 121
- fcsl::scanner::IntConstToken, 122
 - description, 125
 - ExtendToken, 125
 - ExtendTokenList, 126
 - IntConstToken, 125
 - lbp, 127
 - led, 128
 - lexeme, 129
 - next, 129
 - nud, 130
 - parser, 130
 - terminal, 131
- fcsl::scanner::LeftParenToken, 139
 - description, 141
 - ExtendToken, 141
 - ExtendTokenList, 142
 - lbp, 143
 - led, 143
 - LeftParenToken, 141
 - lexeme, 144
 - next, 145
 - nud, 145
 - parser, 146
 - terminal, 147
- fcsl::scanner::LetToken, 152
 - description, 154
 - ExtendToken, 154
 - ExtendTokenList, 155
 - lbp, 156
 - led, 156
 - LetToken, 154
 - lexeme, 157
 - next, 158
 - nud, 158
 - parser, 159
 - terminal, 160
- fcsl::scanner::NotOpToken, 188
 - description, 190
 - ExtendToken, 190
 - ExtendTokenList, 191
 - lbp, 192
 - led, 193
 - lexeme, 194
 - next, 194
 - NotOpToken, 190
 - nud, 195
 - parser, 195
 - terminal, 196
- fcsl::scanner::RelationalOpToken, 236
 - description, 239
 - ExtendToken, 239
 - ExtendTokenList, 241
 - lbp, 242
 - led, 242
 - lexeme, 242
 - next, 243
 - nud, 243
 - parser, 244
 - RelationalOpToken, 239
 - terminal, 245
- fcsl::scanner::Scanner, 254
 - dictionary, 258
 - find_match, 255
 - Scan, 256
 - Scanner, 255
 - try_match, 257
- fcsl::scanner::StringConstToken, 272
 - description, 274
 - ExtendToken, 274
 - ExtendTokenList, 275

- lbp, 276
- led, 277
- lexeme, 278
- next, 278
- nud, 279
- parser, 279
- StringConstToken, 274
- terminal, 280
- fcgal::scanner::Token, 288
 - getlexemelength, 289
 - lexeme, 290
 - next, 290
 - setLexeme, 291
 - setNextToken, 291
 - setTokenType, 291
 - setlexemeLength, 291
 - terminal, 292
 - Token, 288, 289
- fcgal::scanner::TrueKwdToken, 296
 - description, 298
 - ExtendToken, 298
 - ExtendTokenList, 299
 - lbp, 300
 - led, 301
 - lexeme, 302
 - next, 302
 - nud, 303
 - parser, 303
 - terminal, 304
 - TrueKwdToken, 298
- fcgal::scanner::VariableNameToken, 305
 - description, 308
 - ExtendToken, 308
 - ExtendTokenList, 309
 - lbp, 310
 - led, 311
 - lexeme, 312
 - next, 312
 - nud, 313
 - parser, 313
 - terminal, 314
 - VariableNameToken, 308
- fcgal::scanner::match_result, 161
 - num_matched, 162
 - type, 162
- find_match
 - fcgal::scanner::Scanner, 255
- FloatConstToken
 - fcgal::scanner::FloatConstToken, 90
- floatDecl
 - fcgal::ast::floatDecl, 99
- floatExpr
 - fcgal::ast::floatExpr, 102
- get_member
 - MySequence, 177
- getlexemelength
 - fcgal::scanner::Token, 289
- ifElseStmt
 - fcgal::ast::ifElseStmt, 105
- ifExpr
 - fcgal::ast::ifExpr, 108
- ifStmt
 - fcgal::ast::ifStmt, 111
- IfToken
 - fcgal::scanner::IfToken, 115
- include/ast.h, 325
- include/ext_token.h, 327
- include/iter2scanner.h, 329
- include/parse_result.h, 330
- include/parser.h, 331
- include/read_input.h, 333
- include/regex.h, 333
- include/scanner.h, 334
- IntConstToken
 - fcgal::scanner::IntConstToken, 125
- intDecl
 - fcgal::ast::intDecl, 134
- intExpr
 - fcgal::ast::intExpr, 137
- kRegexNSub
 - fcgal::scanner, 22
- kTokenEnumType
 - fcgal::scanner, 14, 16
- lbp
 - fcgal::scanner::CharConstToken, 37
 - fcgal::scanner::EndOfFileToken, 56
 - fcgal::scanner::ExtToken, 69
 - fcgal::scanner::FalseKwdToken, 82
 - fcgal::scanner::FloatConstToken, 92
 - fcgal::scanner::IfToken, 117
 - fcgal::scanner::IntConstToken, 127
 - fcgal::scanner::LeftParenToken, 143
 - fcgal::scanner::LetToken, 156
 - fcgal::scanner::NotOpToken, 192
 - fcgal::scanner::RelationalOpToken, 242
 - fcgal::scanner::StringConstToken, 276
 - fcgal::scanner::TrueKwdToken, 300
 - fcgal::scanner::VariableNameToken, 310
- led
 - fcgal::scanner::CharConstToken, 38
 - fcgal::scanner::EndOfFileToken, 57
 - fcgal::scanner::ExtToken, 70
 - fcgal::scanner::FalseKwdToken, 83
 - fcgal::scanner::FloatConstToken, 93
 - fcgal::scanner::IfToken, 117
 - fcgal::scanner::IntConstToken, 128
 - fcgal::scanner::LeftParenToken, 143
 - fcgal::scanner::LetToken, 156
 - fcgal::scanner::NotOpToken, 193
 - fcgal::scanner::RelationalOpToken, 242
 - fcgal::scanner::StringConstToken, 277
 - fcgal::scanner::TrueKwdToken, 301
 - fcgal::scanner::VariableNameToken, 311
- LeftParenToken

- fcval::scanner::LeftParenToken, 141
- letExpr
 - fcval::ast::letExpr, 150
- LetToken
 - fcval::scanner::LetToken, 154
- lexeme
 - fcval::scanner::CharConstToken, 39
 - fcval::scanner::EndOfFileToken, 58
 - fcval::scanner::ExtToken, 71
 - fcval::scanner::FalseKwdToken, 84
 - fcval::scanner::FloatConstToken, 94
 - fcval::scanner::IfToken, 118
 - fcval::scanner::IntConstToken, 129
 - fcval::scanner::LeftParenToken, 144
 - fcval::scanner::LetToken, 157
 - fcval::scanner::NotOpToken, 194
 - fcval::scanner::RelationalOpToken, 242
 - fcval::scanner::StringConstToken, 278
 - fcval::scanner::Token, 290
 - fcval::scanner::TrueKwdToken, 302
 - fcval::scanner::VariableNameToken, 312
- main
 - templates.cc, 342
- make_regex
 - fcval::scanner, 19
- match
 - fcval::parser::Parser, 204
- match_regex
 - fcval::scanner, 20
- matrixDecl
 - fcval::ast::matrixDecl, 164
- matrixDecl2
 - fcval::ast::matrixDecl2, 168
- matrixExpr
 - fcval::ast::matrixExpr, 171
- multipleStmts
 - fcval::ast::multipleStmts, 175
- MySequence
 - get_member, 177
 - MySequence, 177
 - set_member, 178
- MySequence< T, N >, 177
- nestedExpr
 - fcval::ast::nestedExpr, 180
- next
 - fcval::scanner::CharConstToken, 39
 - fcval::scanner::EndOfFileToken, 58
 - fcval::scanner::ExtToken, 71
 - fcval::scanner::FalseKwdToken, 84
 - fcval::scanner::FloatConstToken, 94
 - fcval::scanner::IfToken, 119
 - fcval::scanner::IntConstToken, 129
 - fcval::scanner::LeftParenToken, 145
 - fcval::scanner::LetToken, 158
 - fcval::scanner::NotOpToken, 194
 - fcval::scanner::RelationalOpToken, 243
 - fcval::scanner::StringConstToken, 278
 - fcval::scanner::Token, 290
 - fcval::scanner::TrueKwdToken, 302
 - fcval::scanner::VariableNameToken, 312
- next_is
 - fcval::parser::Parser, 205
- next_token
 - fcval::parser::Parser, 205
- notExpr
 - fcval::ast::notExpr, 186
- NotOpToken
 - fcval::scanner::NotOpToken, 190
- nud
 - fcval::scanner::CharConstToken, 40
 - fcval::scanner::EndOfFileToken, 59
 - fcval::scanner::ExtToken, 72
 - fcval::scanner::FalseKwdToken, 85
 - fcval::scanner::FloatConstToken, 95
 - fcval::scanner::IfToken, 119
 - fcval::scanner::IntConstToken, 130
 - fcval::scanner::LeftParenToken, 145
 - fcval::scanner::LetToken, 158
 - fcval::scanner::NotOpToken, 195
 - fcval::scanner::RelationalOpToken, 243
 - fcval::scanner::StringConstToken, 279
 - fcval::scanner::TrueKwdToken, 303
 - fcval::scanner::VariableNameToken, 313
- num_matched
 - fcval::scanner::match_result, 162
- ok
 - fcval::parser::ParseResult, 224, 225
- parenExpr
 - fcval::ast::parenExpr, 199
- Parse
 - fcval::parser::Parser, 206
- parse_addition
 - fcval::parser::Parser, 207
- parse_char_const
 - fcval::parser::Parser, 207
- parse_decl
 - fcval::parser::Parser, 207
- parse_division
 - fcval::parser::Parser, 208
- parse_expr
 - fcval::parser::Parser, 208
- parse_false_kwd
 - fcval::parser::Parser, 209
- parse_float_const
 - fcval::parser::Parser, 210
- parse_if_expr
 - fcval::parser::Parser, 211
- parse_int_const
 - fcval::parser::Parser, 211
- parse_let_expr
 - fcval::parser::Parser, 212
- parse_matrix_decl
 - fcval::parser::Parser, 213
- parse_multiplication

- fcgal::parser::Parser, 214
- parse_nested_expr
 - fcgal::parser::Parser, 214
- parse_not_expr
 - fcgal::parser::Parser, 214
- parse_relational_expr
 - fcgal::parser::Parser, 215
- parse_standard_decl
 - fcgal::parser::Parser, 216
- parse_stmt
 - fcgal::parser::Parser, 217
- parse_stmts
 - fcgal::parser::Parser, 217
- parse_string_const
 - fcgal::parser::Parser, 218
- parse_subtraction
 - fcgal::parser::Parser, 219
- parse_true_kwd
 - fcgal::parser::Parser, 219
- parse_variable_name
 - fcgal::parser::Parser, 220
- ParseProgram
 - fcgal::parser::Parser, 221
- ParseResult
 - fcgal::parser::ParseResult, 222
- Parser
 - fcgal::parser::Parser, 202
- parser
 - fcgal::scanner::CharConstToken, 40
 - fcgal::scanner::EndOfFileToken, 59
 - fcgal::scanner::ExtToken, 72
 - fcgal::scanner::FalseKwdToken, 85
 - fcgal::scanner::FloatConstToken, 95
 - fcgal::scanner::IfToken, 120
 - fcgal::scanner::IntConstToken, 130
 - fcgal::scanner::LeftParenToken, 146
 - fcgal::scanner::LetToken, 159
 - fcgal::scanner::NotOpToken, 195
 - fcgal::scanner::RelationalOpToken, 244
 - fcgal::scanner::StringConstToken, 279
 - fcgal::scanner::TrueKwdToken, 303
 - fcgal::scanner::VariableNameToken, 313
- printStmt
 - fcgal::ast::printStmt, 227
- ReadInput
 - fcgal::scanner, 20
- ReadInputFromFile
 - fcgal::scanner, 21
- relationalExpr
 - fcgal::ast::relationalExpr, 234
- RelationalOpToken
 - fcgal::scanner::RelationalOpToken, 239
- repeatStmt
 - fcgal::ast::repeatStmt, 248
- Root
 - fcgal::ast::Root, 252
- Scan
 - fcgal::scanner::Scanner, 256
- Scanner
 - fcgal::scanner::Scanner, 255
- scanner.cc
 - DEBUG, 341
- semiColonStmt
 - fcgal::ast::semiColonStmt, 260
- set_member
 - MySequence, 178
- setLexeme
 - fcgal::scanner::Token, 291
- setNextToken
 - fcgal::scanner::Token, 291
- setTokenType
 - fcgal::scanner::Token, 291
- setlexemeLength
 - fcgal::scanner::Token, 291
- src/ast.cc, 336
- src/ext_token.cc, 337
- src/parser.cc, 338
- src/read_input.cc, 339
- src/regex.cc, 340
- src/scanner.cc, 341
- src/templates.cc, 342
- stmtsStmt
 - fcgal::ast::stmtsStmt, 270
- StringConstToken
 - fcgal::scanner::StringConstToken, 274
- stringDecl
 - fcgal::ast::stringDecl, 283
- stringExpr
 - fcgal::ast::stringExpr, 286
- templates.cc
 - main, 342
- terminal
 - fcgal::scanner::CharConstToken, 41
 - fcgal::scanner::EndOfFileToken, 60
 - fcgal::scanner::ExtToken, 73
 - fcgal::scanner::FalseKwdToken, 86
 - fcgal::scanner::FloatConstToken, 96
 - fcgal::scanner::IfToken, 121
 - fcgal::scanner::IntConstToken, 131
 - fcgal::scanner::LeftParenToken, 147
 - fcgal::scanner::LetToken, 160
 - fcgal::scanner::NotOpToken, 196
 - fcgal::scanner::RelationalOpToken, 245
 - fcgal::scanner::StringConstToken, 280
 - fcgal::scanner::Token, 292
 - fcgal::scanner::TrueKwdToken, 304
 - fcgal::scanner::VariableNameToken, 314
- Token
 - fcgal::scanner::Token, 288, 289
- TokenType
 - fcgal::scanner, 14
- trueExpr
 - fcgal::ast::trueExpr, 294
- TrueKwdToken
 - fcgal::scanner::TrueKwdToken, 298

try_match

 fcal::scanner::Scanner, 257

type

 fcal::scanner::match_result, 162

Unparse

 fcal::ast::Decl, 43

 fcal::ast::Expr, 62

 fcal::ast::Node, 183

 fcal::ast::Program, 230

 fcal::ast::Root, 253

 fcal::ast::Stmt, 262

 fcal::ast::Stmts, 266

 fcal::ast::assignStmt1, 25

 fcal::ast::assignStmt2, 28

 fcal::ast::boolDecl, 32

 fcal::ast::declStmt, 48

 fcal::ast::emptyStmts, 51

 fcal::ast::falseExpr, 77

 fcal::ast::floatDecl, 100

 fcal::ast::floatExpr, 103

 fcal::ast::ifElseStmt, 106

 fcal::ast::ifExpr, 109

 fcal::ast::ifStmt, 112

 fcal::ast::intDecl, 135

 fcal::ast::intExpr, 138

 fcal::ast::letExpr, 151

 fcal::ast::matrixDecl, 165

 fcal::ast::matrixDecl2, 169

 fcal::ast::matrixExpr, 172

 fcal::ast::multipleStmts, 176

 fcal::ast::nestedExpr, 181

 fcal::ast::notExpr, 187

 fcal::ast::parenExpr, 200

 fcal::ast::printStmt, 228

 fcal::ast::relationalExpr, 236

 fcal::ast::repeatStmt, 249

 fcal::ast::semiColonStmt, 261

 fcal::ast::stmtsStmt, 271

 fcal::ast::stringDecl, 284

 fcal::ast::stringExpr, 287

 fcal::ast::trueExpr, 295

 fcal::ast::varName, 317

 fcal::ast::varNameExpr, 321

 fcal::ast::whileStmt, 324

varName

 fcal::ast::varName, 317

varNameExpr

 fcal::ast::varNameExpr, 320

VariableNameToken

 fcal::scanner::VariableNameToken, 308

whileStmt

 fcal::ast::whileStmt, 323