

Group Faraday Project

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Chapter 1

My Personal Index Page

1.1 Introduction

Group-Faraday Language Translator Project

CSCI4211 Spring 2017

1.2 ===

1.2.1 Group Members

Alish Akhmetzyanov Cyrus Chen

1.2.2 Language

C++ based project

Chapter 2

Namespace Index

2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

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Chapter 4

Class Index

4.1 Class List

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fcal::ast::IfElseStmt	60
fcal::ast::IfStmt	62
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fcal::scanner::IntConstToken	68
fcal::scanner::LeftParenToken	70
fcal::ast::LetExpr	72
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Chapter 5

File Index

5.1 File List

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include/regex.h	141
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include/token.h	143
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src/regex.cc	148
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Chapter 6

Namespace Documentation

6.1 fcal Namespace Reference

Namespaces

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

6.2 fcal::ast Namespace Reference

Classes

- class [AssignStmt](#)
- class [BasicOp](#)
- class [BinaryOperators](#)
- class [BodyStmt](#)
- class [Decl](#)
- class [Decls](#)
- class [DeclStmt](#)
- class [EmptyStmts](#)
- class [Expr](#)
- class [FalseExpr](#)
- class [FloatConstExpr](#)
- class [FuncExpr](#)
- class [IfElseExpr](#)
- class [IfElseStmt](#)
- class [IfStmt](#)
- class [IntConstExpr](#)
- class [LetExpr](#)
- class [MatrixBodyDecl](#)
- class [MatrixDecl](#)
- class [MatrixRefExpr](#)
- class [MatrixStmt](#)
- class [Node](#)
- class [NotExpr](#)

- class [ParenExpr](#)
- class [PrintStmt](#)
- class [Program](#)
- class [RepeatStmt](#)
- class [SemiColonStmt](#)
- class [Stmt](#)
- class [Stmts](#)
- class [StmtStmts](#)
- class [StringConstExpr](#)
- class [TrueExpr](#)
- class [VarExpr](#)
- class [WhileStmt](#)

6.3 fcal::parser Namespace Reference

Classes

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

6.4 fcal::scanner Namespace Reference

Classes

- class [CharConstToken](#)
- class [DashToken](#)
- class [EndOfFileToken](#)
- class [ExtToken](#)
- class [FalseKwdToken](#)
- class [FloatConstToken](#)
- class [ForwardSlashToken](#)
- class [IfToken](#)
- class [IntConstToken](#)
- class [LeftParenToken](#)
- class [LetToken](#)
- class [NotOpToken](#)
- class [PlusSignToken](#)
- class [RelationalOpToken](#)
- class [Scanner](#)
- class [StarToken](#)
- 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)

Variables

- const int [kRegexNSub](#) = 1

6.4.1 Typedef Documentation

6.4.1.1 typedef enum kTokenEnumType fcal::scanner::TokenType

6.4.2 Enumeration Type Documentation

6.4.2.1 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
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

6.4.2.2 enum `fcsl::scanner::kTokenEnumType`

All the [Token](#) type needed for this language.

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
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

6.4.3 Function Documentation

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

Function that make a new regular expression with specific target

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

Function that match target regex

6.4.3.3 `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.

RETURN: char* - The buffer, or NULL if an error occurred.

Function reads input

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

[ReadInputFromFile\(\)](#) - Do the actual reading of the file into the buffer

RETURN: char* - The buffer, or NULL if an error occurred.

Function reads input from the target file

6.4.4 Variable Documentation

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

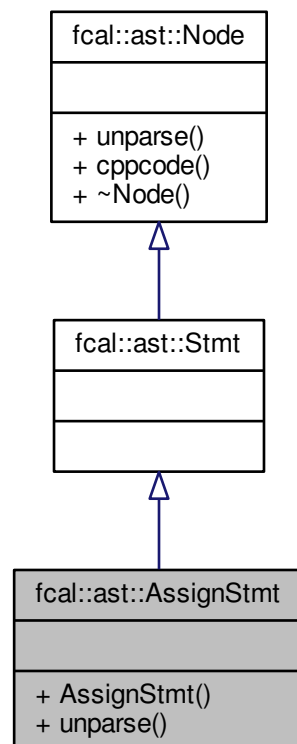
Chapter 7

Class Documentation

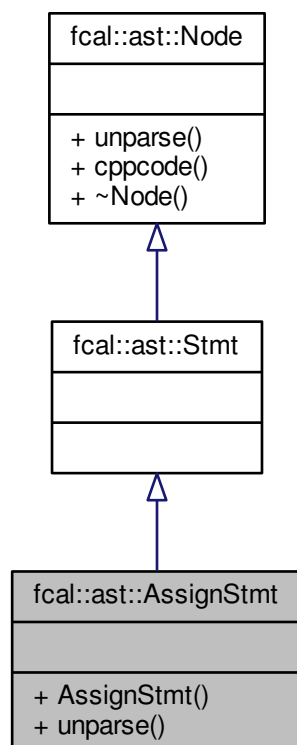
7.1 fcal::ast::AssignStmt Class Reference

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

Inheritance diagram for fcal::ast::AssignStmt:



Collaboration diagram for `fcal::ast::AssignStmt`:



Public Member Functions

- [AssignStmt](#) (Token *id, [Expr](#) *expr)
- `std::string unparse ()`

7.1.1 Detailed Description

class [AssignStmt](#) brief abstract class for [AssignStmt](#) in AST

7.1.2 Constructor & Destructor Documentation

7.1.2.1 `fcal::ast::AssignStmt::AssignStmt (Token * id, Expr * expr)`

Assignment [Stmt](#)

7.1.3 Member Function Documentation

7.1.3.1 std::string fcal::ast::AssignStmt::unparse (void) [virtual]

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

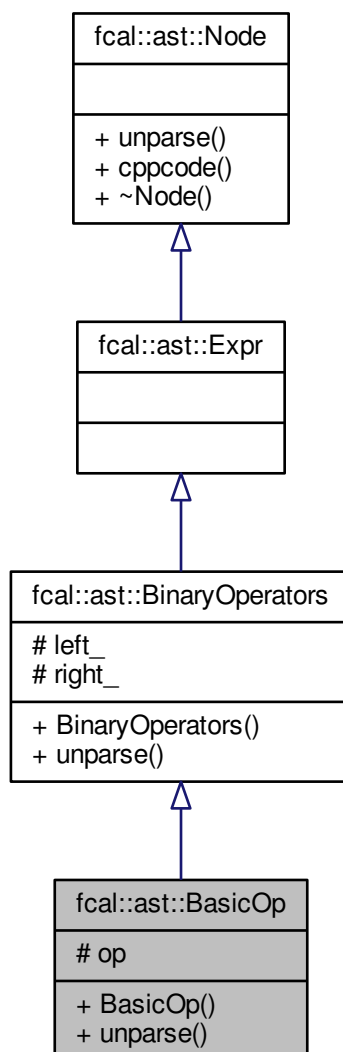
The documentation for this class was generated from the following files:

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

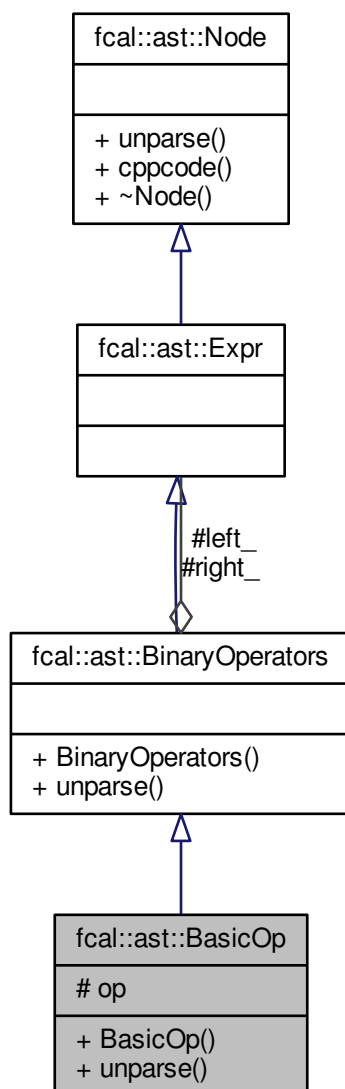
7.2 fcal::ast::BasicOp Class Reference

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

Inheritance diagram for fcal::ast::BasicOp:



Collaboration diagram for `fcal::ast::BasicOp`:



Public Member Functions

- `BasicOp` (`Expr` *left, `Expr` *right, `TokenType` op)
- `std::string unparse ()`

Protected Attributes

- `TokenType op`

7.2.1 Detailed Description

class [BinaryOperators](#) brief abstract class for [BinaryOperators](#) in AST

7.2.2 Constructor & Destructor Documentation

7.2.2.1 `fcal::ast::BasicOp::BasicOp (Expr * left, Expr * right, TokenType op)`

7.2.3 Member Function Documentation

7.2.3.1 `std::string fcal::ast::BasicOp::unparse (void)` `[virtual]`

All the basic binary operators

Reimplemented from [fcal::ast::BinaryOperators](#).

7.2.4 Member Data Documentation

7.2.4.1 `TokenType fcal::ast::BasicOp::op` `[protected]`

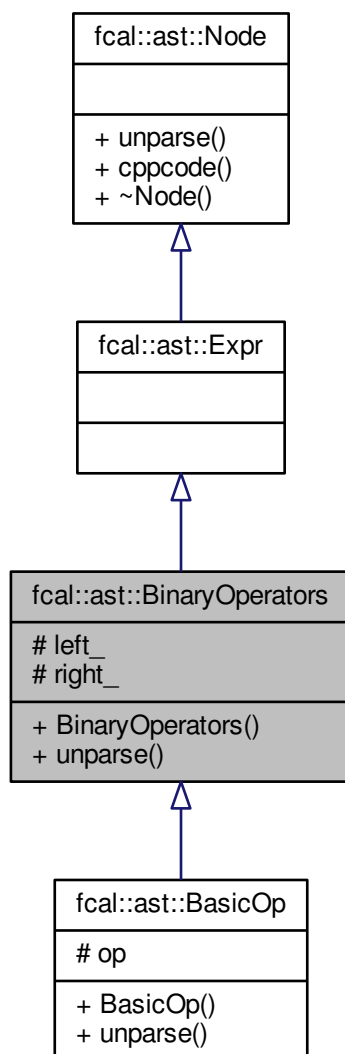
The documentation for this class was generated from the following files:

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

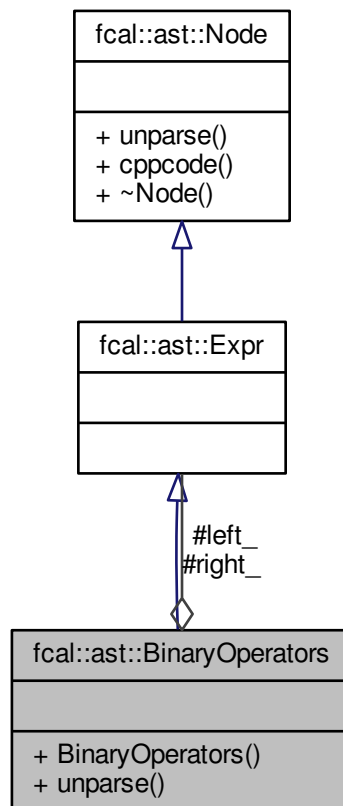
7.3 fcal::ast::BinaryOperators Class Reference

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

Inheritance diagram for `fcal::ast::BinaryOperators`:



Collaboration diagram for fcal::ast::BinaryOperators:



Public Member Functions

- [BinaryOperators](#) ([Expr](#) *left, [Expr](#) *right)
- [std::string unparse](#) ()

Protected Attributes

- [Expr](#) * left_
- [Expr](#) * right_

7.3.1 Detailed Description

class [BinaryOperators](#) brief abstract class for [BinaryOperators](#) in AST

7.3.2 Constructor & Destructor Documentation

7.3.2.1 `fcgal::ast::BinaryOperators::BinaryOperators (Expr * left, Expr * right)`

7.3.3 Member Function Documentation

7.3.3.1 `std::string fcal::ast::BinaryOperators::unparse () [virtual]`

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

Reimplemented in [fcgal::ast::BasicOp](#).

7.3.4 Member Data Documentation

7.3.4.1 `Expr* fcal::ast::BinaryOperators::left_ [protected]`

7.3.4.2 `Expr* fcal::ast::BinaryOperators::right_ [protected]`

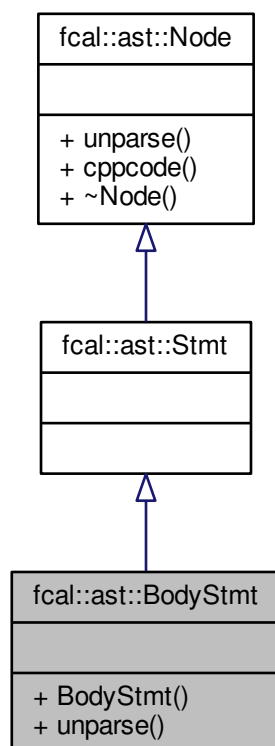
The documentation for this class was generated from the following files:

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

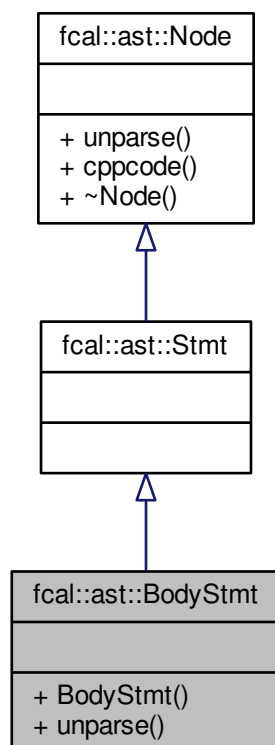
7.4 fcal::ast::BodyStmt Class Reference

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

Inheritance diagram for fcal::ast::BodyStmt:



Collaboration diagram for `fcgal::ast::BodyStmt`:



Public Member Functions

- [BodyStmt](#) ([Stmts](#) *stmts)
- `std::string unparse ()`

7.4.1 Detailed Description

class [BodyStmt](#) brief abstract class for [BodyStmt](#) in AST

7.4.2 Constructor & Destructor Documentation

7.4.2.1 `fcgal::ast::BodyStmt::BodyStmt (Stmts * stmts)` `[explicit]`

Statements in {}

7.4.3 Member Function Documentation

7.4.3.1 std::string fcal::ast::BodyStmt::unparse (void) [virtual]

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

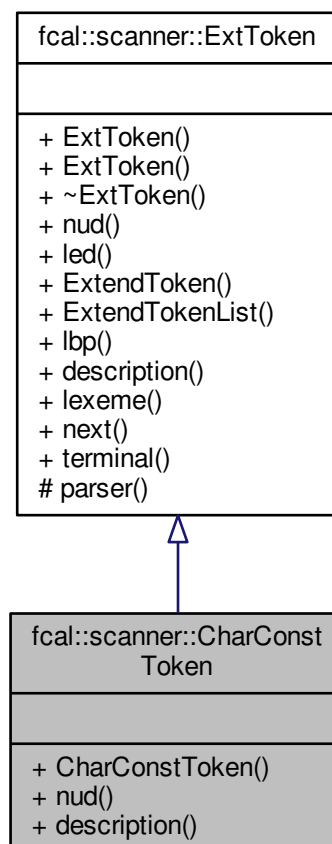
The documentation for this class was generated from the following files:

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

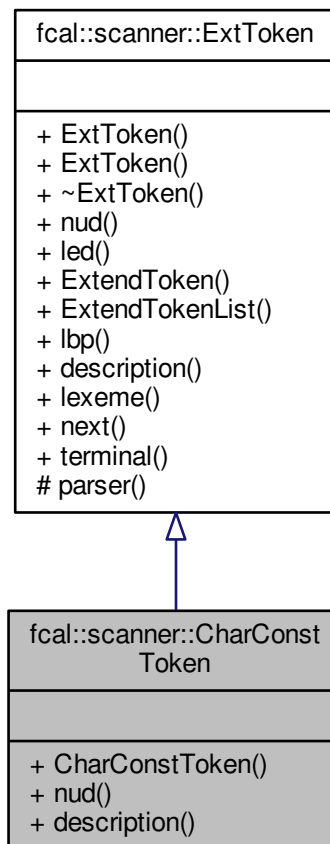
7.5 fcal::scanner::CharConstToken Class Reference

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

Inheritance diagram for fcal::scanner::CharConstToken:



Collaboration diagram for `fcal::scanner::CharConstToken`:



Public Member Functions

- [CharConstToken](#) ([parser::Parser](#) **p*, [Token](#) **t*)
- [parser::ParseResult nud](#) ()
- [std::string description](#) ()

Additional Inherited Members

7.5.1 Constructor & Destructor Documentation

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

7.5.2 Member Function Documentation

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

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

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

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

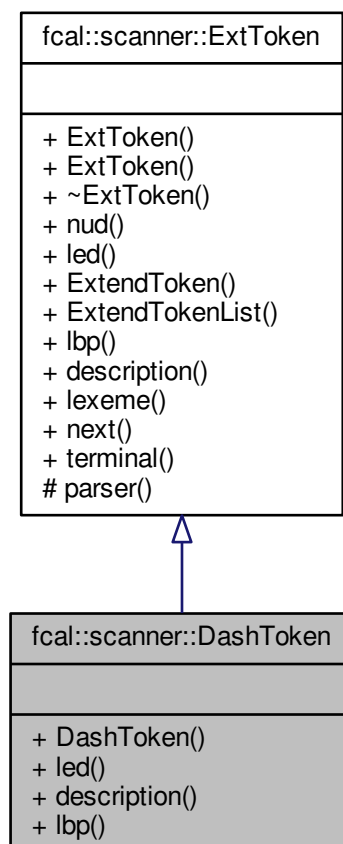
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

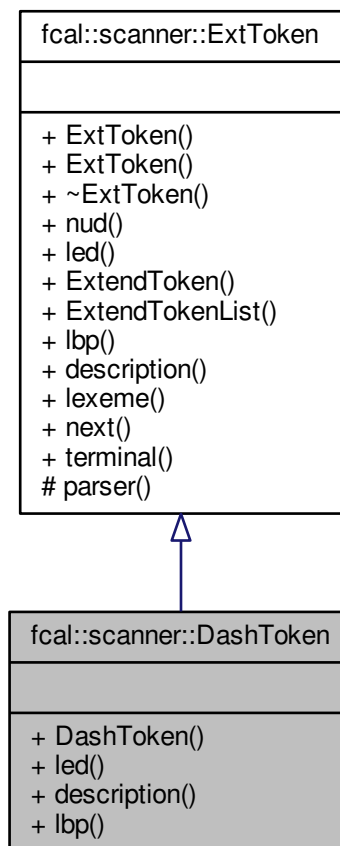
7.6 fcal::scanner::DashToken Class Reference

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

Inheritance diagram for fcal::scanner::DashToken:



Collaboration diagram for `fcal::scanner::DashToken`:



Public Member Functions

- [DashToken](#) ([parser::Parser](#) *p, [Token](#) *t)
- [parser::ParseResult](#) led ([parser::ParseResult](#) left)
- `std::string` [description](#) ()
- `int` [lbp](#) ()

Additional Inherited Members

7.6.1 Constructor & Destructor Documentation

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

7.6.2 Member Function Documentation

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

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

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

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

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

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

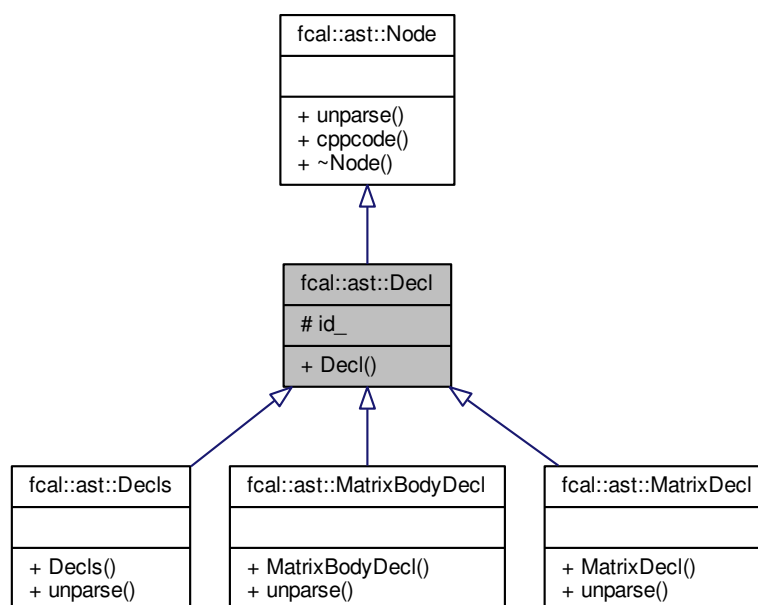
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

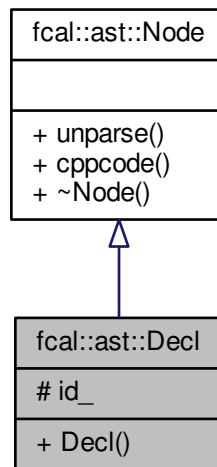
7.7 fcal::ast::Decl Class Reference

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

Inheritance diagram for fcal::ast::Decl:



Collaboration diagram for `fcgal::ast::Decl`:



Public Member Functions

- [Decl](#) (Token *id)

Protected Attributes

- Token * [id_](#)

7.7.1 Detailed Description

class [Decl](#) brief abstract class for [Decl](#) in AST

7.7.2 Constructor & Destructor Documentation

7.7.2.1 `fcgal::ast::Decl::Decl (Token * id)` `[explicit]`

7.7.3 Member Data Documentation

7.7.3.1 `Token* fcgal::ast::Decl::id_` `[protected]`

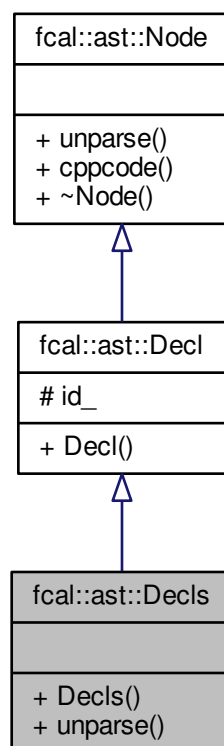
The documentation for this class was generated from the following files:

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

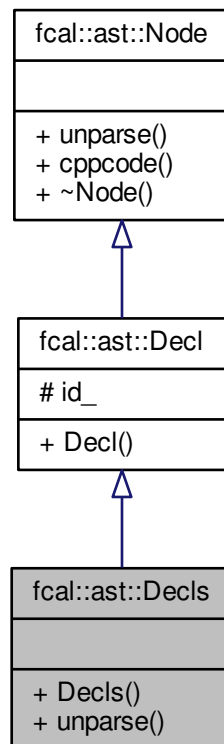
7.8 fcal::ast::Decls Class Reference

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

Inheritance diagram for fcal::ast::Decls:



Collaboration diagram for `fcgal::ast::Decls`:



Public Member Functions

- [Decls](#) (Token *id)
- `std::string unparse ()`

Additional Inherited Members

7.8.1 Detailed Description

class [Decls](#) brief abstract class for [Decls](#) in AST

7.8.2 Constructor & Destructor Documentation

7.8.2.1 `fcgal::ast::Decls::Decls (Token * id)` `[explicit]`

7.8.3 Member Function Documentation

7.8.3.1 `std::string fcal::ast::Decls::unparse (void)` `[virtual]`

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

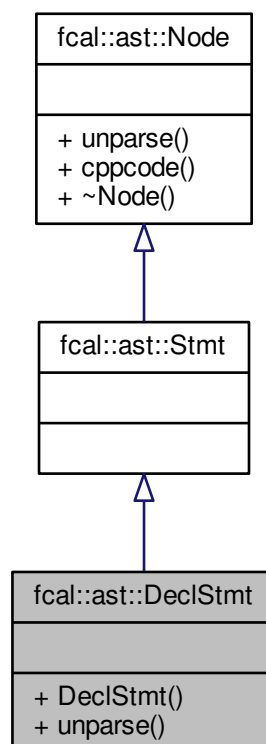
The documentation for this class was generated from the following files:

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

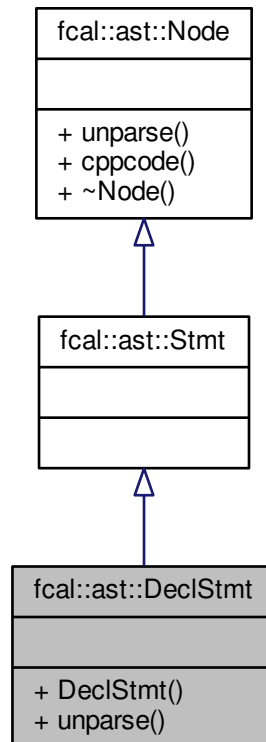
7.9 fcal::ast::DeclStmt Class Reference

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

Inheritance diagram for fcal::ast::DeclStmt:



Collaboration diagram for `fcal::ast::DeclStmt`:



Public Member Functions

- [DeclStmt](#) ([Decl](#) *decl)
- `std::string unparse ()`

7.9.1 Detailed Description

class [DeclStmt](#) brief abstract class for [DeclStmt](#) in AST

7.9.2 Constructor & Destructor Documentation

7.9.2.1 `fcal::ast::DeclStmt::DeclStmt (Decl * decl) [explicit]`

[Decl](#) Statement

7.9.3 Member Function Documentation

7.9.3.1 std::string fcal::ast::DeclStmt::unparse (void) [virtual]

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

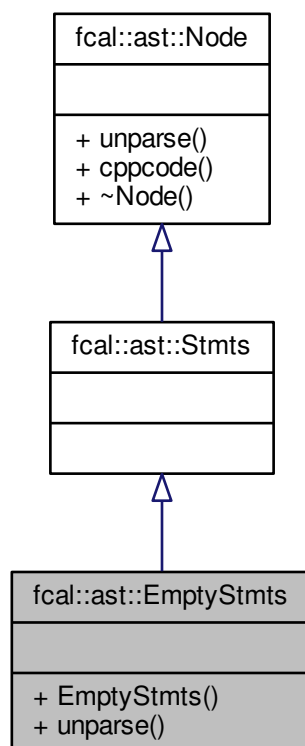
The documentation for this class was generated from the following files:

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

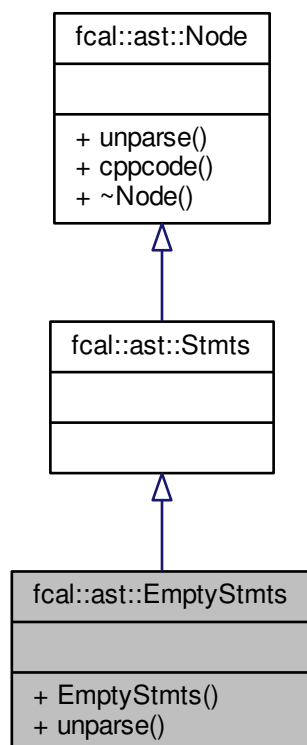
7.10 fcal::ast::EmptyStmts Class Reference

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

Inheritance diagram for fcal::ast::EmptyStmts:



Collaboration diagram for `fcal::ast::EmptyStmts`:



Public Member Functions

- [EmptyStmts](#) ()
- `std::string` [unparse](#) ()

7.10.1 Detailed Description

class [EmptyStmts](#) brief abstract class for [EmptyStmts](#) in AST

7.10.2 Constructor & Destructor Documentation

7.10.2.1 `fcal::ast::EmptyStmts::EmptyStmts ()`

Empty Statements

7.10.3 Member Function Documentation

7.10.3.1 std::string fcal::ast::EmptyStmts::unparse (void) [virtual]

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

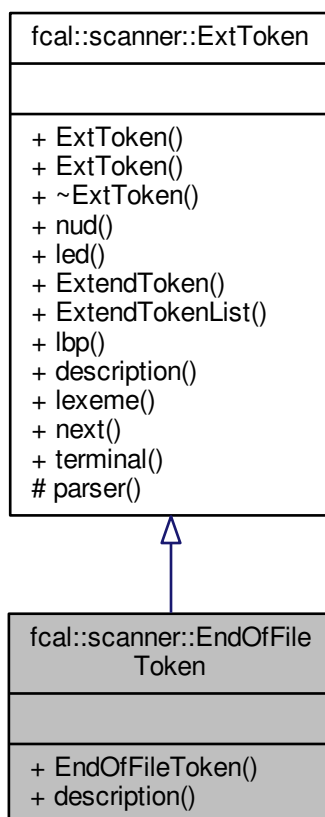
The documentation for this class was generated from the following files:

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

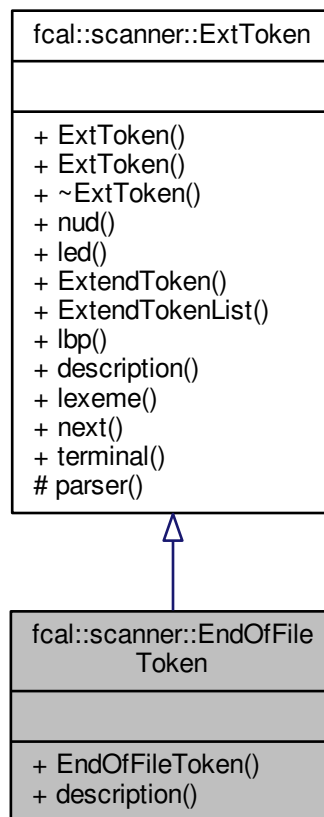
7.11 fcal::scanner::EndOfFileToken Class Reference

```
#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](#) ()

Additional Inherited Members

7.11.1 Constructor & Destructor Documentation

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

7.11.2 Member Function Documentation

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

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

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

- `include/ext_token.h`

7.13 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)

7.13.1 Constructor & Destructor Documentation

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

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

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

7.13.2 Member Function Documentation

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

Reimplemented in [fcal::scanner::EndOfFileToken](#), [fcal::scanner::ForwardSlashToken](#), [fcal::scanner::DashToken](#), [fcal::scanner::StarToken](#), [fcal::scanner::PlusSignToken](#), [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](#).

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

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

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

Reimplemented in [fcal::scanner::RelationalOpToken](#), [fcal::scanner::ForwardSlashToken](#), [fcal::scanner::DashToken](#), [fcal::scanner::StarToken](#), [fcal::scanner::PlusSignToken](#), [fcal::scanner::LeftParenToken](#), [fcal::scanner::LetToken](#), and [fcal::scanner::IfToken](#).

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

Reimplemented in [fcal::scanner::RelationalOpToken](#), [fcal::scanner::ForwardSlashToken](#), [fcal::scanner::DashToken](#), [fcal::scanner::StarToken](#), and [fcal::scanner::PlusSignToken](#).

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

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

7.13.2.8 `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](#).

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

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

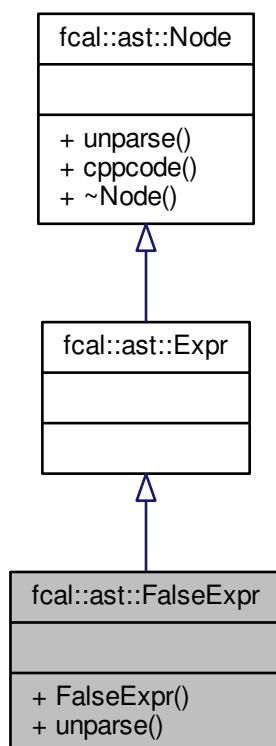
The documentation for this class was generated from the following files:

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

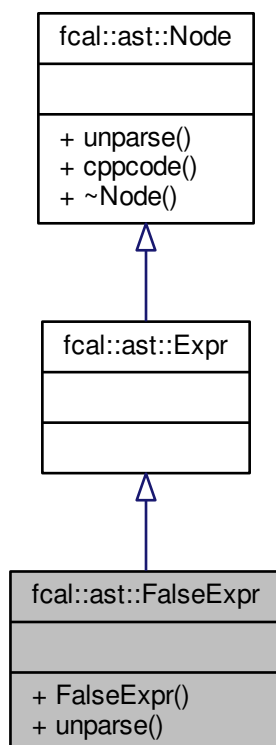
7.14 fcal::ast::FalseExpr Class Reference

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

Inheritance diagram for fcal::ast::FalseExpr:



Collaboration diagram for fcal::ast::FalseExpr:



Public Member Functions

- [FalseExpr](#) ()
- `std::string` [unparse](#) ()

7.14.1 Detailed Description

class [FalseExpr](#) brief abstract class for [FalseExpr](#) in AST

7.14.2 Constructor & Destructor Documentation

7.14.2.1 fcal::ast::FalseExpr::FalseExpr ()

[FalseExpr](#)

7.14.3 Member Function Documentation

7.14.3.1 `std::string fcal::ast::FalseExpr::unparse (void)` [virtual]

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

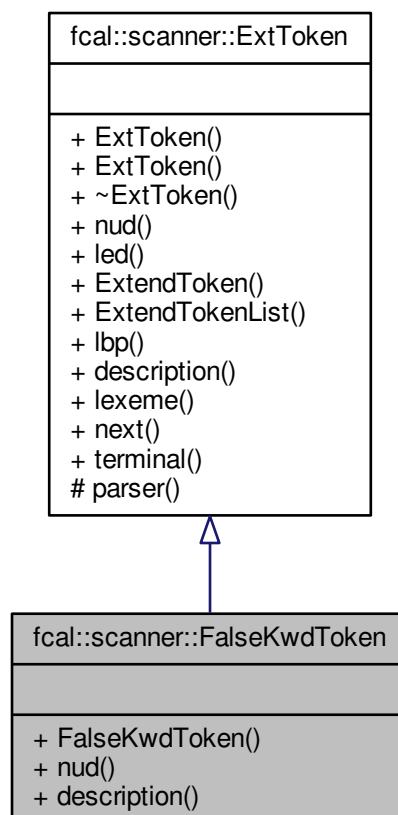
The documentation for this class was generated from the following files:

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

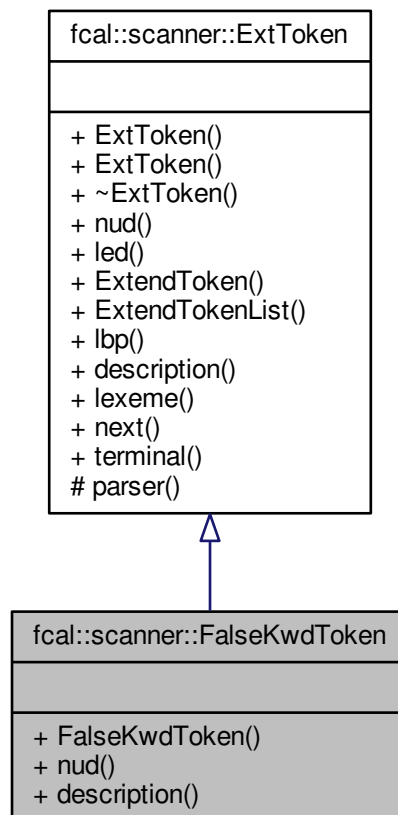
7.15 `fcal::scanner::FalseKwdToken` Class Reference

```
#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](#) ()

Additional Inherited Members

7.15.1 Constructor & Destructor Documentation

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

7.15.2 Member Function Documentation

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

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

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

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

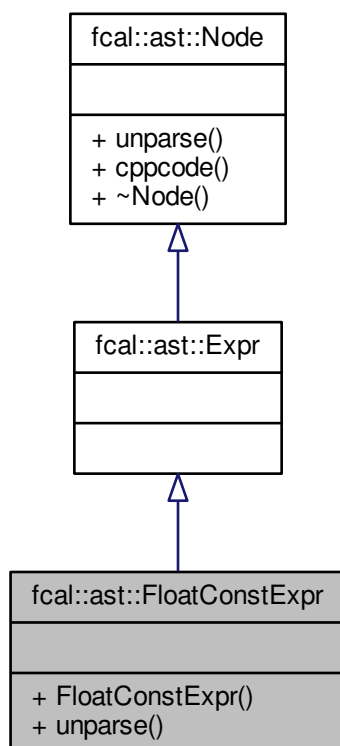
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

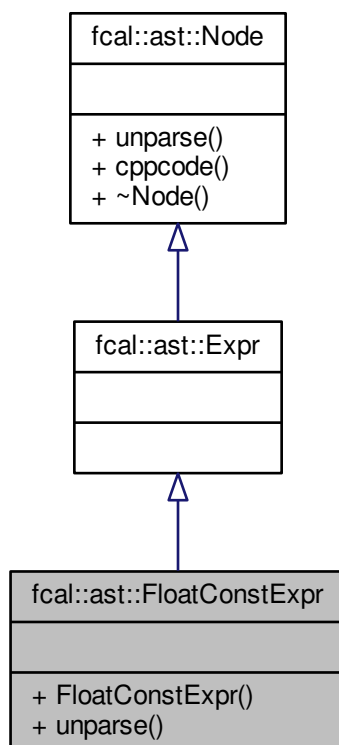
7.16 fcal::ast::FloatConstExpr Class Reference

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

Inheritance diagram for `fcal::ast::FloatConstExpr`:



Collaboration diagram for fcal::ast::FloatConstExpr:



Public Member Functions

- [FloatConstExpr](#) (Token *id)
- std::string [unparse](#) ()

7.16.1 Detailed Description

class [FloatConstExpr](#) brief abstract class for [FloatConstExpr](#) in AST

7.16.2 Constructor & Destructor Documentation

7.16.2.1 `fcal::ast::FloatConstExpr::FloatConstExpr (Token * id)` `[explicit]`

[FloatConstExpr](#)

7.16.3 Member Function Documentation

7.16.3.1 `std::string fcal::ast::FloatConstExpr::unparse (void)` [virtual]

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

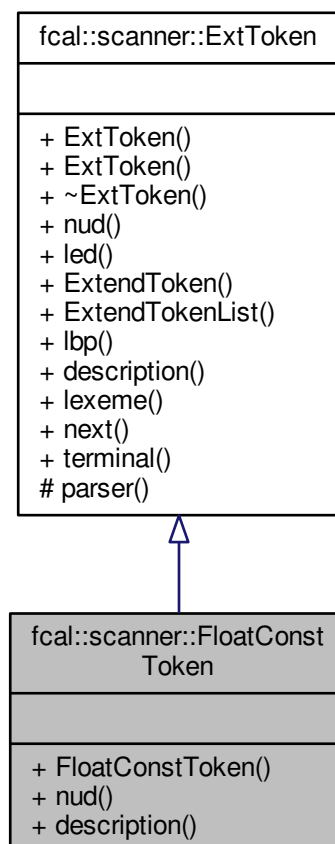
The documentation for this class was generated from the following files:

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

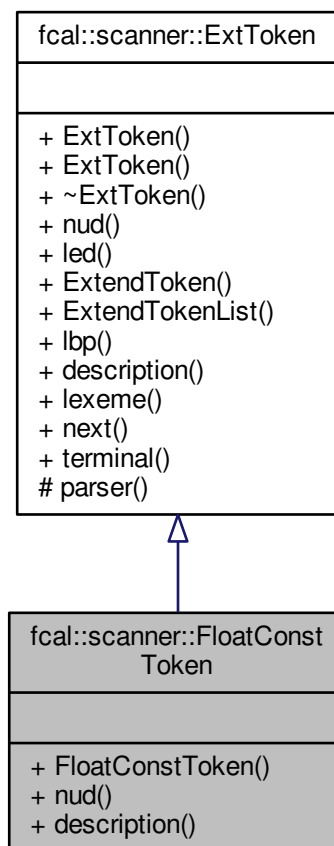
7.17 `fcal::scanner::FloatConstToken` Class Reference

```
#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](#) ()

Additional Inherited Members

7.17.1 Constructor & Destructor Documentation

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

7.17.2 Member Function Documentation

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

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

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

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

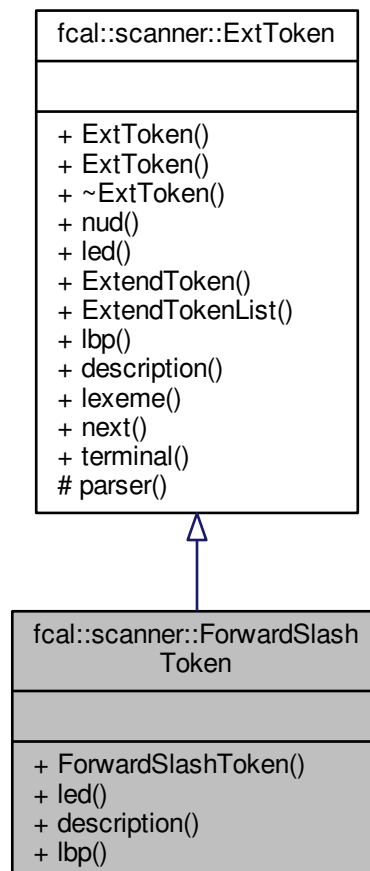
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

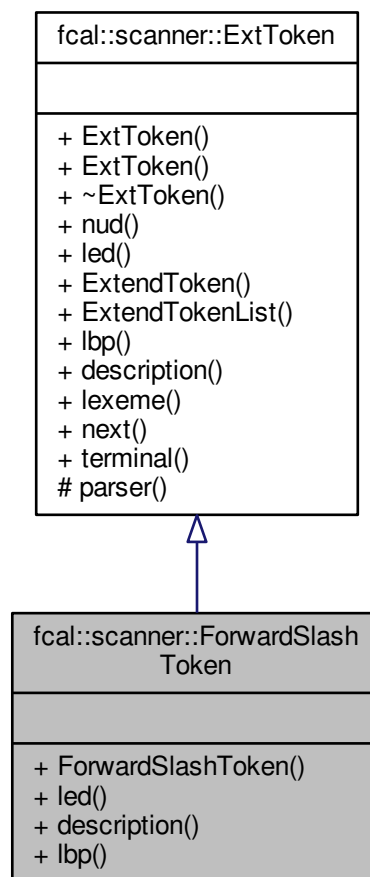
7.18 fcal::scanner::ForwardSlashToken Class Reference

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

Inheritance diagram for `fcal::scanner::ForwardSlashToken`:



Collaboration diagram for fcal::scanner::ForwardSlashToken:



Public Member Functions

- [ForwardSlashToken](#) ([parser::Parser *p](#), [Token *t](#))
- [parser::ParseResult led](#) ([parser::ParseResult left](#))
- [std::string description](#) ()
- [int lbp](#) ()

Additional Inherited Members

7.18.1 Constructor & Destructor Documentation

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

7.18.2 Member Function Documentation

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

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

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

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

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

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

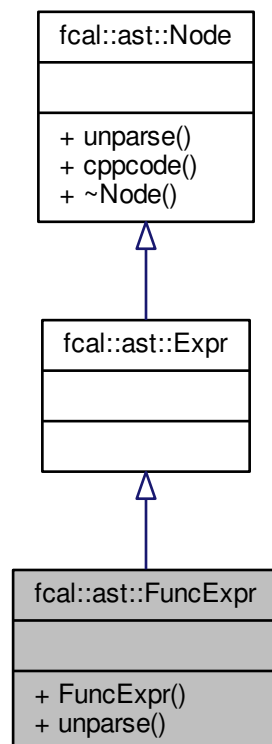
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

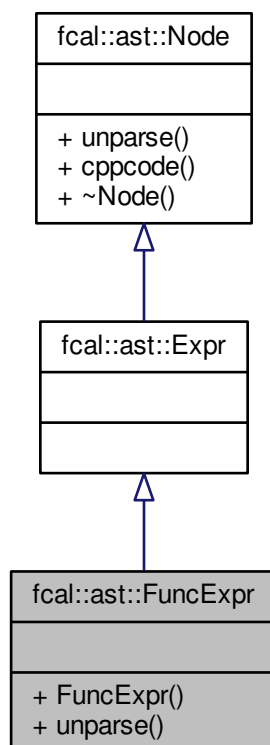
7.19 fcal::ast::FuncExpr Class Reference

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

Inheritance diagram for fcal::ast::FuncExpr:



Collaboration diagram for fcal::ast::FuncExpr:



Public Member Functions

- [FuncExpr](#) (Token *name, [Expr](#) *body)
- `std::string unparse ()`

7.19.1 Detailed Description

class funcExpr brief abstract class for [BinaryOperators](#) in AST

7.19.2 Constructor & Destructor Documentation

7.19.2.1 fcal::ast::FuncExpr::FuncExpr (Token * name, Expr * expr)

Function [Expr](#)

7.19.3 Member Function Documentation

7.19.3.1 `std::string fcal::ast::FuncExpr::unparse (void)` [virtual]

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

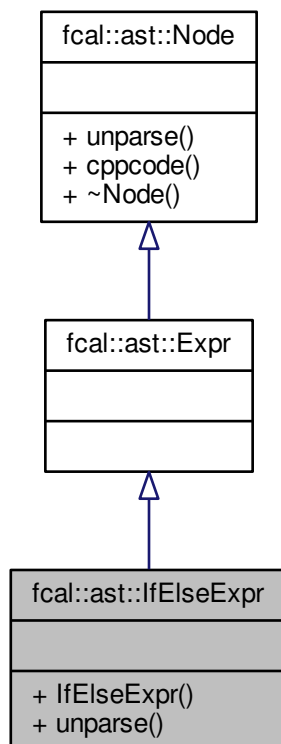
The documentation for this class was generated from the following files:

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

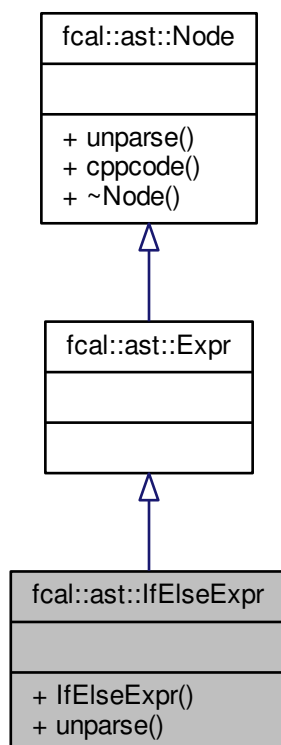
7.20 `fcal::ast::IfElseExpr` Class Reference

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

Inheritance diagram for `fcal::ast::IfElseExpr`:



Collaboration diagram for fcal::ast::IfElseExpr:



Public Member Functions

- `IfElseExpr` (`Expr` *predicate, `Expr` *then_stmt, `Expr` *else_stmt)
- `std::string unparse ()`

7.20.1 Detailed Description

class `IfElseExpr` brief abstract class for `IfElseExpr` in AST

7.20.2 Constructor & Destructor Documentation

7.20.2.1 `fcal::ast::IfElseExpr::IfElseExpr (Expr * predicate, Expr * then_stmt, Expr * else_stmt)`

If Else `Expr`

7.20.3 Member Function Documentation

7.20.3.1 `std::string fcal::ast::IfElseExpr::unparse (void)` [virtual]

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

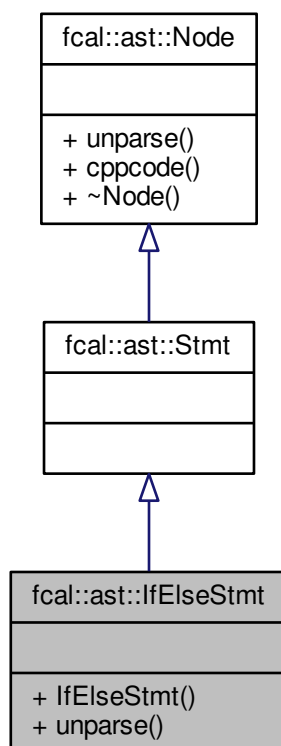
The documentation for this class was generated from the following files:

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

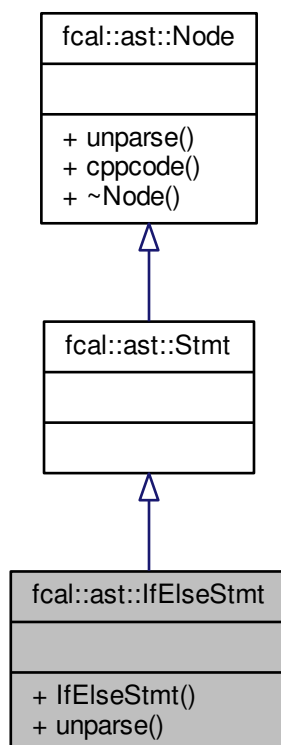
7.21 `fcal::ast::IfElseStmt` Class Reference

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

Inheritance diagram for `fcal::ast::IfElseStmt`:



Collaboration diagram for fcal::ast::IfElseStmt:



Public Member Functions

- `IfElseStmt` (`Expr` *predicate, `Stmt` *then_stmt, `Stmt` *else_stmt)
- `std::string unparse ()`

7.21.1 Detailed Description

class `IfStmt` brief abstract class for BlockStmt in AST

7.21.2 Constructor & Destructor Documentation

7.21.2.1 `fcal::ast::IfElseStmt::IfElseStmt (Expr * predicate, Stmt * then_stmt, Stmt * else_stmt)`

If Else Statement

7.21.3 Member Function Documentation

7.21.3.1 `std::string fcal::ast::IfElseStmt::unparse (void)` [virtual]

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

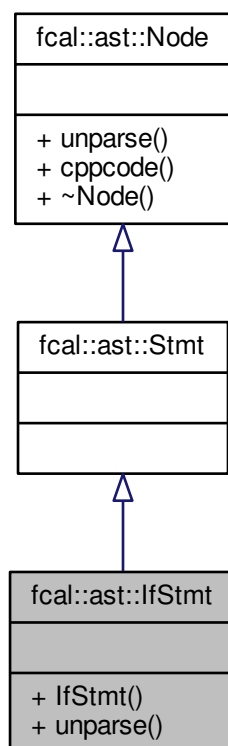
The documentation for this class was generated from the following files:

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

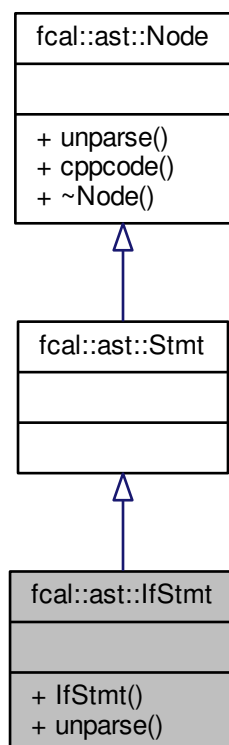
7.22 fcal::ast::IfStmt Class Reference

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

Inheritance diagram for `fcal::ast::IfStmt`:



Collaboration diagram for fcal::ast::IfStmt:



Public Member Functions

- `IfStmt` (`Expr` *predicate, `Stmt` *then_stmt)
- `std::string unparse ()`

7.22.1 Detailed Description

class `IfStmt` brief abstract class for BlockStmt in AST

7.22.2 Constructor & Destructor Documentation

7.22.2.1 `fcal::ast::IfStmt::IfStmt (Expr * predicate, Stmt * then_stmt)`

If Statement

7.22.3 Member Function Documentation

7.22.3.1 `std::string fcal::ast::IfStmt::unparse (void)` [virtual]

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

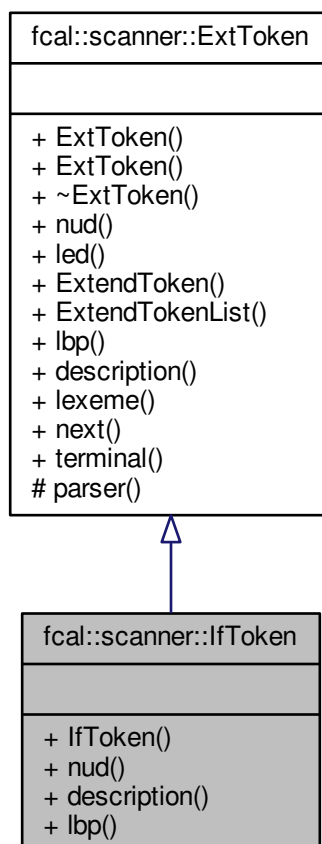
The documentation for this class was generated from the following files:

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

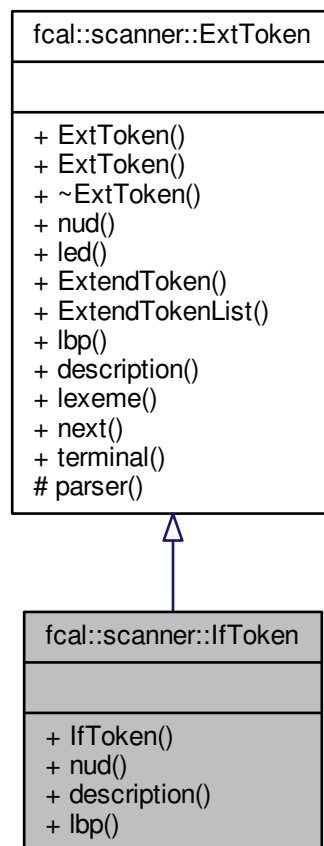
7.23 `fcal::scanner::IfToken` Class Reference

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

Inheritance diagram for `fcal::scanner::IfToken`:



Collaboration diagram for fcal::scanner::IfToken:



Public Member Functions

- `IfToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`
- `int lbp ()`

Additional Inherited Members

7.23.1 Constructor & Destructor Documentation

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

7.23.2 Member Function Documentation

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

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

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

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

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

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

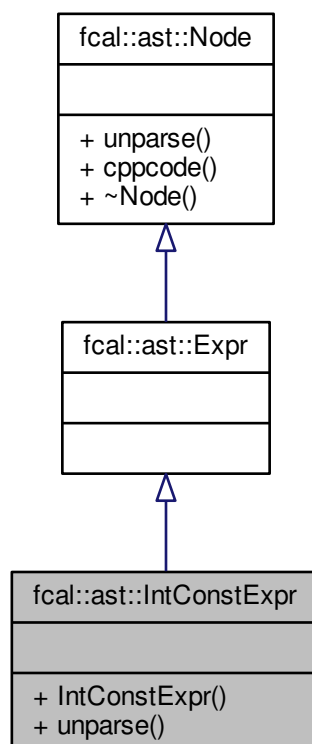
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

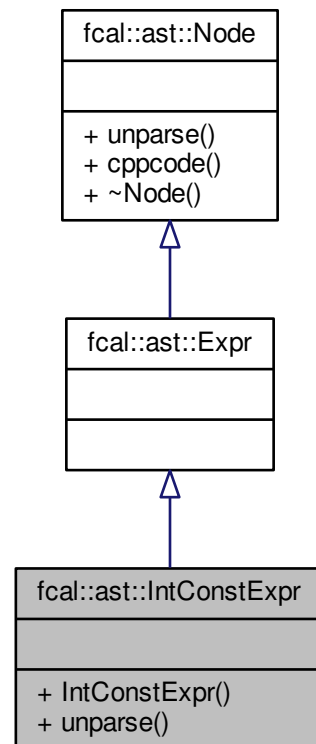
7.24 fcal::ast::IntConstExpr Class Reference

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

Inheritance diagram for `fcal::ast::IntConstExpr`:



Collaboration diagram for fcal::ast::IntConstExpr:



Public Member Functions

- [IntConstExpr](#) (Token *id)
- std::string [unparse](#) ()

7.24.1 Detailed Description

class [IntConstExpr](#) brief abstract class for IntConst Expressions in AST

7.24.2 Constructor & Destructor Documentation

7.24.2.1 `fcal::ast::IntConstExpr::IntConstExpr (Token * id)` `[explicit]`

[IntConstExpr](#)

7.24.3 Member Function Documentation

7.24.3.1 `std::string fcal::ast::IntConstExpr::unparse(void)` `[virtual]`

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

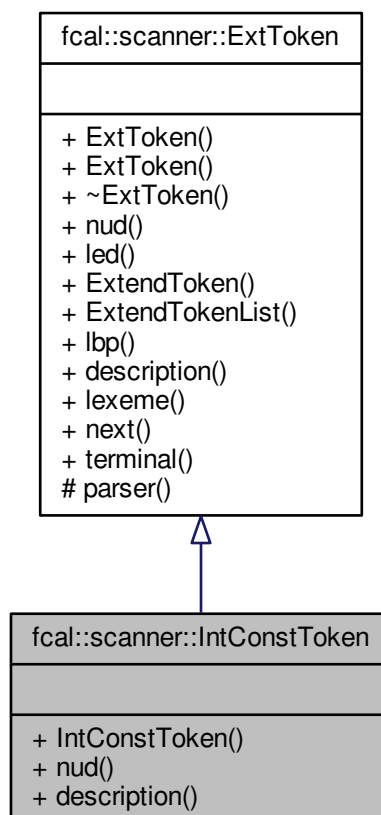
The documentation for this class was generated from the following files:

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

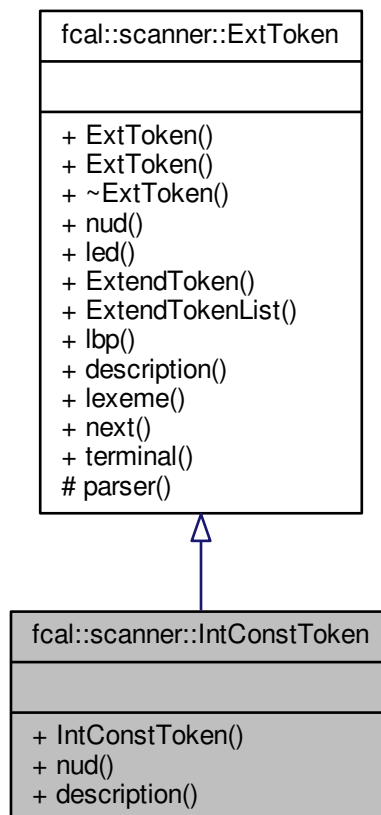
7.25 fcal::scanner::IntConstToken Class Reference

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

Inheritance diagram for `fcal::scanner::IntConstToken`:



Collaboration diagram for fcal::scanner::IntConstToken:



Public Member Functions

- [IntConstToken](#) ([parser::Parser](#) *p, [Token](#) *t)
- [parser::ParseResult nud](#) ()
- `std::string` [description](#) ()

Additional Inherited Members

7.25.1 Constructor & Destructor Documentation

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

7.25.2 Member Function Documentation

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

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

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

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

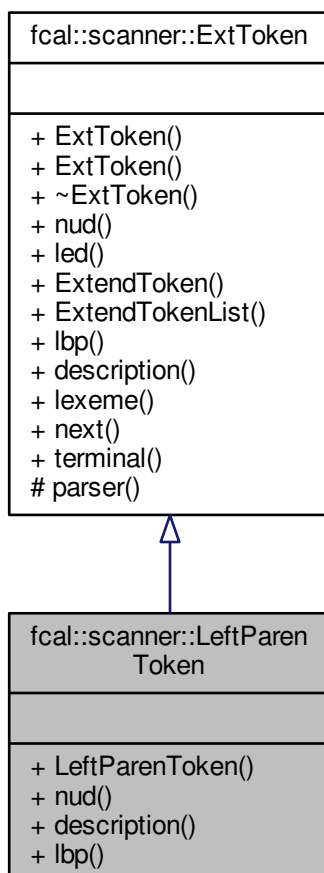
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

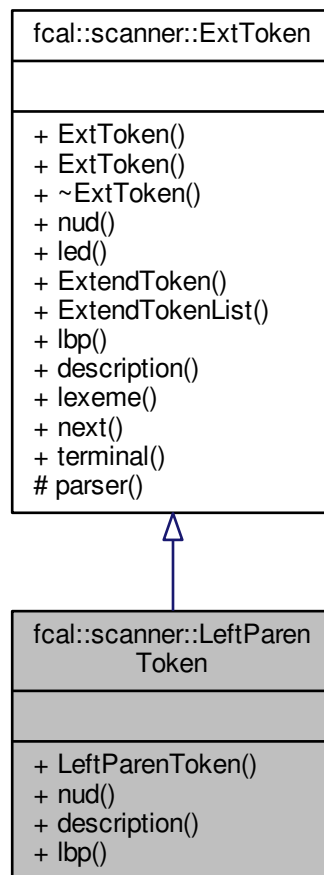
7.26 fcal::scanner::LeftParenToken Class Reference

```
#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](#) ()

Additional Inherited Members

7.26.1 Constructor & Destructor Documentation

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

7.26.2 Member Function Documentation

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

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

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

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

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

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

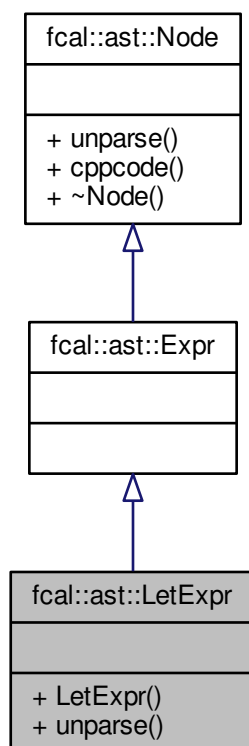
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

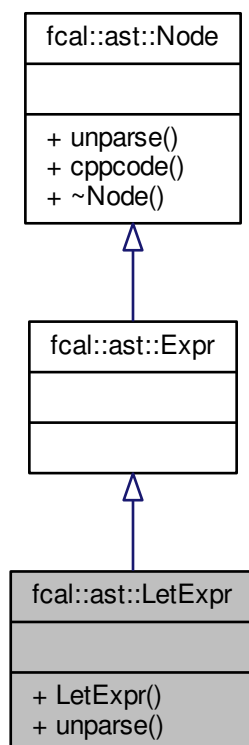
7.27 fcal::ast::LetExpr Class Reference

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

Inheritance diagram for `fcal::ast::LetExpr`:



Collaboration diagram for fcal::ast::LetExpr:



Public Member Functions

- `LetExpr (Stmts *stmts, Expr *expr)`
- `std::string unparse ()`

7.27.1 Detailed Description

class `LetExpr` brief abstract class for `LetExpr` in AST

7.27.2 Constructor & Destructor Documentation

7.27.2.1 `fcal::ast::LetExpr::LetExpr (Stmts * stmts, Expr * expr)`

Let `Expr`

7.27.3 Member Function Documentation

7.27.3.1 `std::string fcal::ast::LetExpr::unparse (void) [virtual]`

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

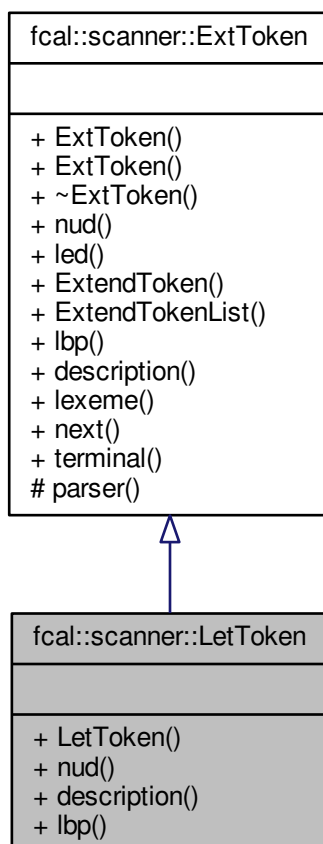
The documentation for this class was generated from the following files:

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

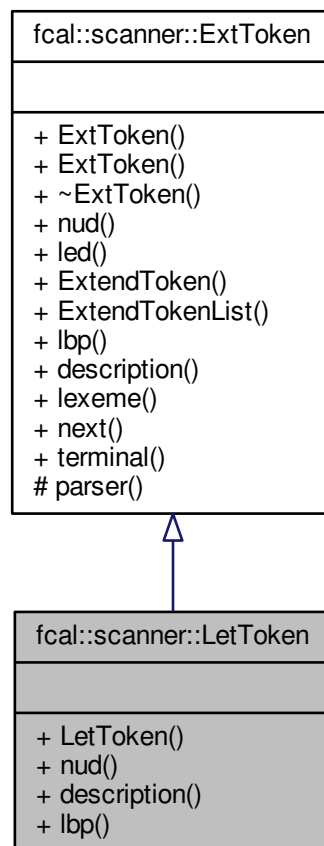
7.28 fcal::scanner::LetToken Class Reference

```
#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 ()`

Additional Inherited Members

7.28.1 Constructor & Destructor Documentation

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

7.28.2 Member Function Documentation

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

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

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

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

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

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

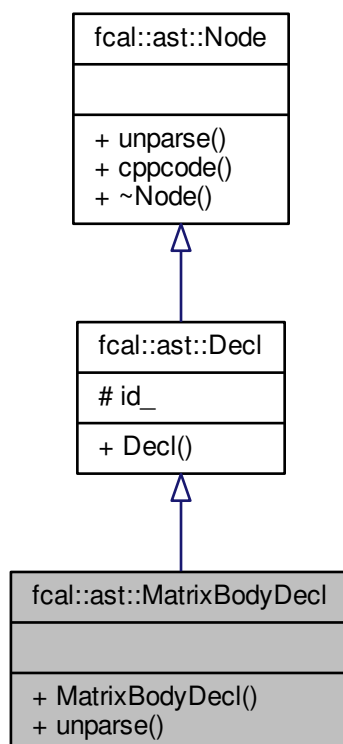
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

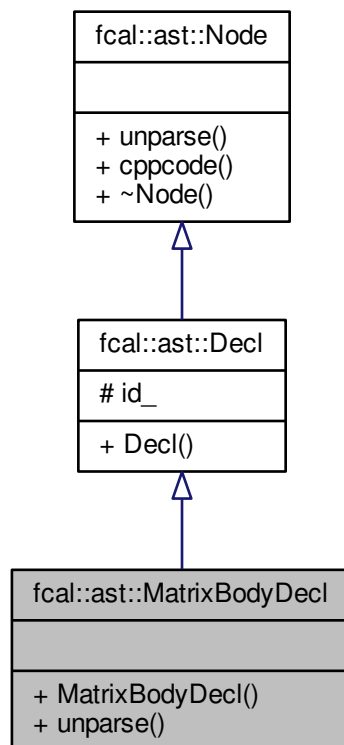
7.29 fcal::ast::MatrixBodyDecl Class Reference

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

Inheritance diagram for `fcal::ast::MatrixBodyDecl`:



Collaboration diagram for fcal::ast::MatrixBodyDecl:



Public Member Functions

- [MatrixBodyDecl](#) (Token *name, [Expr](#) *column, [Expr](#) *row, [Expr](#) *row_iter, [Expr](#) *col_iter, [Expr](#) *expr)
- std::string [unparse](#) ()

Additional Inherited Members

7.29.1 Detailed Description

class [MatrixBodyDecl](#) brief abstract class for [MatrixBodyDecl](#) in AST

7.29.2 Constructor & Destructor Documentation

7.29.2.1 [fcal::ast::MatrixBodyDecl::MatrixBodyDecl](#) (Token * name, [Expr](#) * column, [Expr](#) * row, [Expr](#) * row_iter, [Expr](#) * col_iter, [Expr](#) * expr)

7.29.3 Member Function Documentation

7.29.3.1 `std::string fcal::ast::MatrixBodyDecl::unparse ()` [virtual]

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

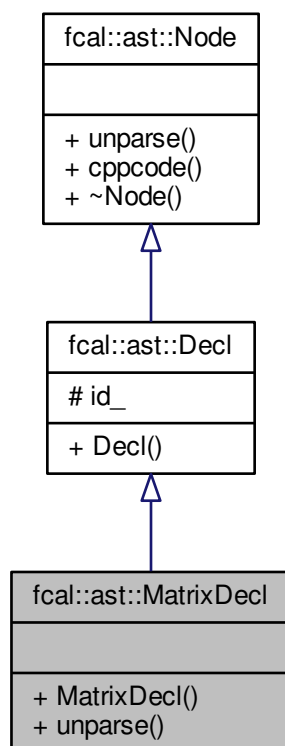
The documentation for this class was generated from the following file:

- [include/ast.h](#)

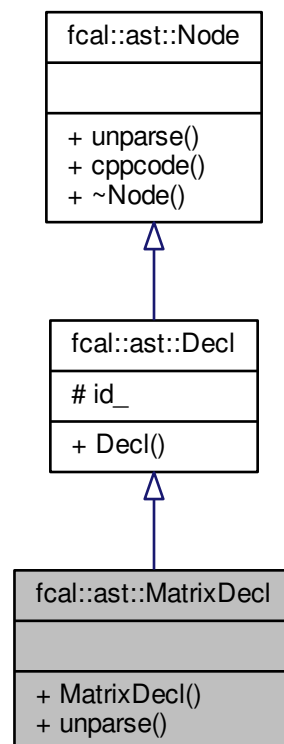
7.30 fcal::ast::MatrixDecl Class Reference

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

Inheritance diagram for `fcal::ast::MatrixDecl`:



Collaboration diagram for fcal::ast::MatrixDecl:



Public Member Functions

- [MatrixDecl](#) (Token *name, [Expr](#) *matrix_expr)
- `std::string unparse ()`

Additional Inherited Members

7.30.1 Constructor & Destructor Documentation

7.30.1.1 `fcal::ast::MatrixDecl::MatrixDecl (Token * name, Expr * matrix_expr)`

7.30.2 Member Function Documentation

7.30.2.1 `std::string fcal::ast::MatrixDecl::unparse ()` [virtual]

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

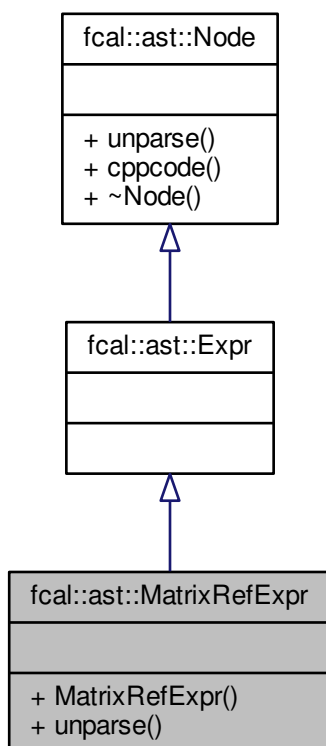
The documentation for this class was generated from the following file:

- `include/ast.h`

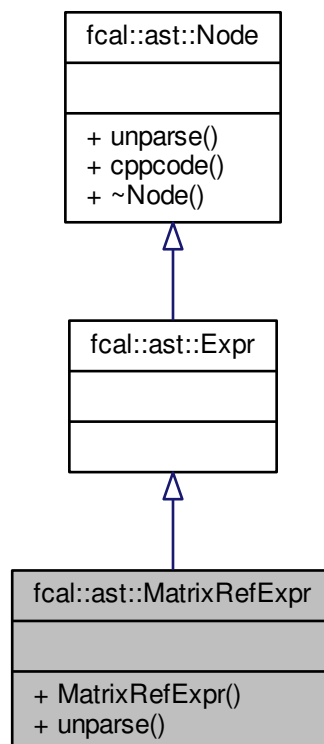
7.31 fcal::ast::MatrixRefExpr Class Reference

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

Inheritance diagram for fcal::ast::MatrixRefExpr:



Collaboration diagram for fcal::ast::MatrixRefExpr:



Public Member Functions

- `MatrixRefExpr` (Token *name, Expr *row, Expr *column)
- `std::string unparse ()`

7.31.1 Detailed Description

class `MatrixStmt` brief abstract class for `MatrixStmt` in AST

7.31.2 Constructor & Destructor Documentation

7.31.2.1 `fcal::ast::MatrixRefExpr::MatrixRefExpr (Token * name, Expr * row, Expr * column)`

7.31.3 Member Function Documentation

7.31.3.1 `std::string fcal::ast::MatrixRefExpr::unparse ()` [virtual]

Implements `fcal::ast::Node`.

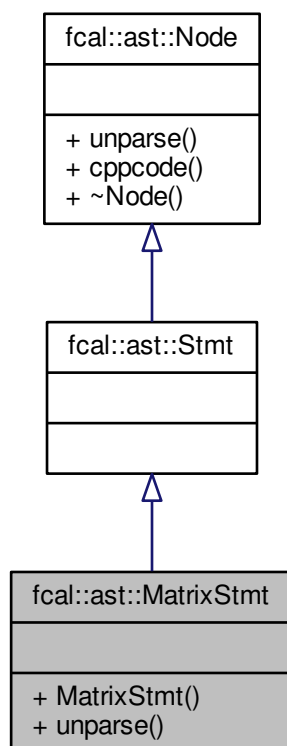
The documentation for this class was generated from the following file:

- `include/ast.h`

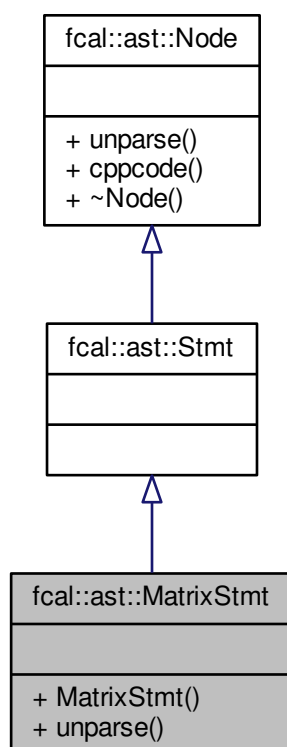
7.32 fcal::ast::MatrixStmt Class Reference

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

Inheritance diagram for fcal::ast::MatrixStmt:



Collaboration diagram for fcal::ast::MatrixStmt:



Public Member Functions

- [MatrixStmt](#) (Token *name, [Expr](#) *column, [Expr](#) *row, [Expr](#) *expr)
- std::string [unparse](#) ()

7.32.1 Detailed Description

class [MatrixStmt](#) brief abstract class for [MatrixStmt](#) in AST

7.32.2 Constructor & Destructor Documentation

7.32.2.1 `fcal::ast::MatrixStmt::MatrixStmt (Token * name, Expr * column, Expr * row, Expr * expr)`

7.32.3 Member Function Documentation

7.32.3.1 `std::string fcal::ast::MatrixStmt::unparse () [virtual]`

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

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

- include/[ast.h](#)

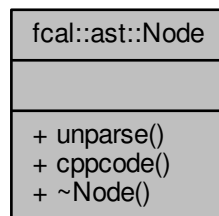
7.33 fcal::ast::Node Class Reference

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

Inheritance diagram for fcal::ast::Node:



Collaboration diagram for fcal::ast::Node:



Public Member Functions

- virtual std::string [unparsed](#) (void)=0
- virtual std::string [cppcode](#) (void)=0
- virtual [~Node](#) (void)

7.33.1 Constructor & Destructor Documentation

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

7.33.2 Member Function Documentation

7.33.2.1 virtual std::string fcal::ast::Node::cppcode (void) [pure virtual]

7.33.2.2 virtual std::string fcal::ast::Node::unparsed (void) [pure virtual]

Implemented in [fcal::ast::MatrixRefExpr](#), [fcal::ast::MatrixStmt](#), [fcal::ast::MatrixBodyDecl](#), [fcal::ast::MatrixDecl](#), [fcal::ast::NotExpr](#), [fcal::ast::IfElseExpr](#), [fcal::ast::LetExpr](#), [fcal::ast::ParenExpr](#), [fcal::ast::FuncExpr](#), [fcal::ast::BasicOp](#), [fcal::ast::BinaryOperators](#), [fcal::ast::FalseExpr](#), [fcal::ast::TrueExpr](#), [fcal::ast::StringConstExpr](#), [fcal::ast::FloatConstExpr](#), [fcal::ast::IntConstExpr](#), [fcal::ast::VarExpr](#), [fcal::ast::SemiColonStmt](#), [fcal::ast::WhileStmt](#), [fcal::ast::RepeatStmt](#), [fcal::ast::PrintStmt](#), [fcal::ast::DeclStmt](#), [fcal::ast::IfElseStmt](#), [fcal::ast::IfStmt](#), [fcal::ast::BodyStmt](#), [fcal::ast::AssignStmt](#), [fcal::ast::StmtStmts](#), [fcal::ast::EmptyStmts](#), [fcal::ast::Decls](#), and [fcal::ast::Program](#).

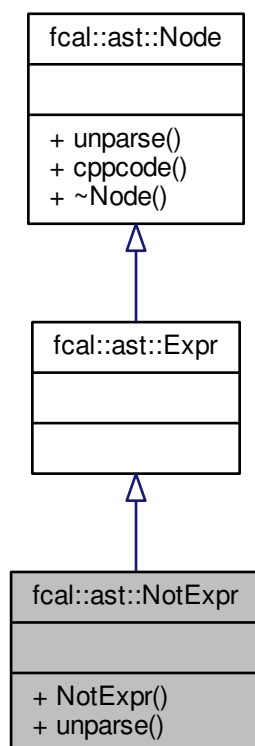
The documentation for this class was generated from the following file:

- include/[ast.h](#)

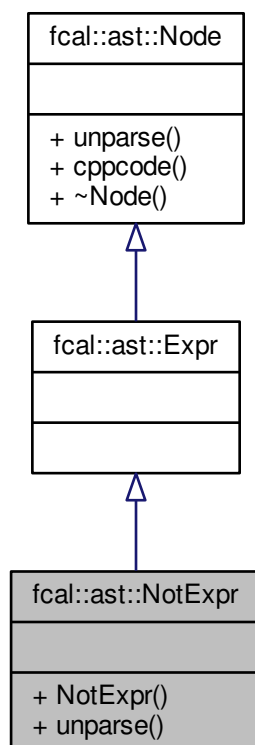
7.34 fcal::ast::NotExpr Class Reference

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

Inheritance diagram for fcal::ast::NotExpr:



Collaboration diagram for `fcal::ast::NotExpr`:



Public Member Functions

- [NotExpr](#) ([Expr](#) *not_expr)
- `std::string` [unparse](#) ()

7.34.1 Detailed Description

class [NotExpr](#) brief abstract class for [LetExpr](#) in AST

7.34.2 Constructor & Destructor Documentation

7.34.2.1 `fcal::ast::NotExpr::NotExpr (Expr * expr)` `[explicit]`

Not [Expr](#)

7.34.3 Member Function Documentation

7.34.3.1 std::string fcal::ast::NotExpr::unparse (void) [virtual]

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

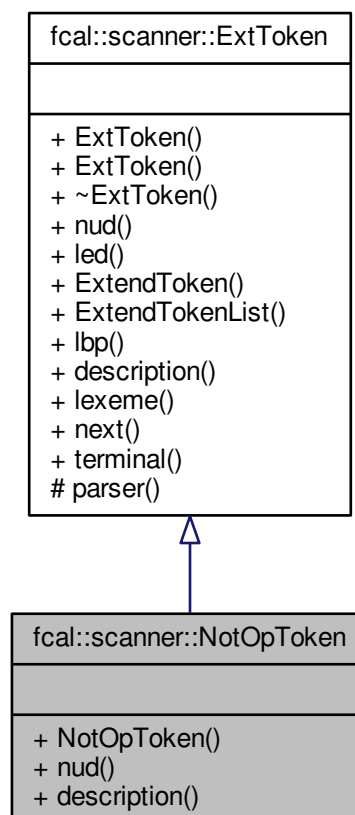
The documentation for this class was generated from the following files:

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

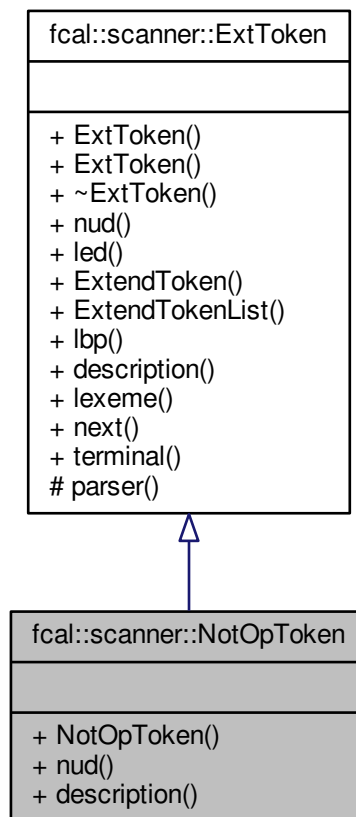
7.35 fcal::scanner::NotOpToken Class Reference

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

Inheritance diagram for fcal::scanner::NotOpToken:



Collaboration diagram for `fcsl::scanner::NotOpToken`:



Public Member Functions

- `NotOpToken (parser::Parser *p, Token *t)`
- `parser::ParseResult nud ()`
- `std::string description ()`

Additional Inherited Members

7.35.1 Constructor & Destructor Documentation

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

7.35.2 Member Function Documentation

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

Reimplemented from `fcsl::scanner::ExtToken`.

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

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

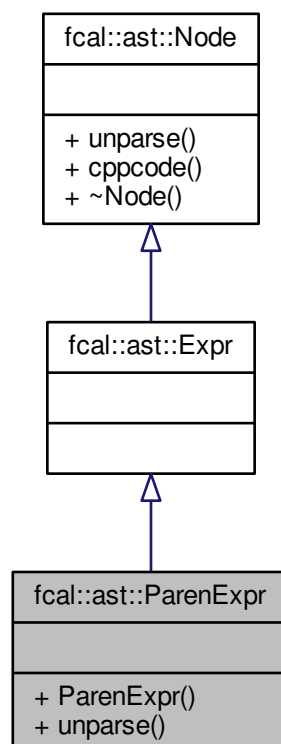
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

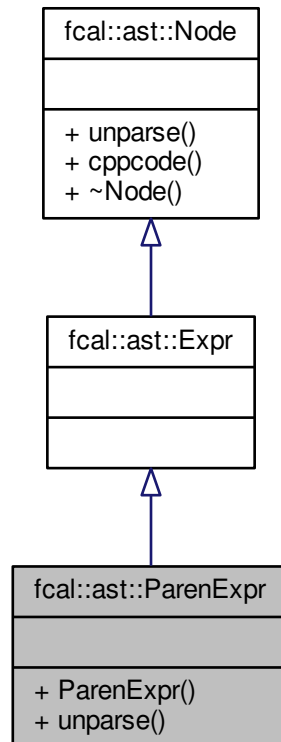
7.36 fcal::ast::ParenExpr Class Reference

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

Inheritance diagram for fcal::ast::ParenExpr:



Collaboration diagram for `fcgal::ast::ParenExpr`:



Public Member Functions

- [ParenExpr](#) ([Expr](#) *expr)
- `std::string unparse ()`

7.36.1 Detailed Description

class [ParenExpr](#) brief abstract class for [ParenExpr](#) in AST

7.36.2 Constructor & Destructor Documentation

7.36.2.1 `fcgal::ast::ParenExpr::ParenExpr (Expr * expr)` `[explicit]`

Parenthesis [Expr](#)

7.36.3 Member Function Documentation

7.36.3.1 std::string fcal::ast::ParenExpr::unparse (void) [virtual]

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

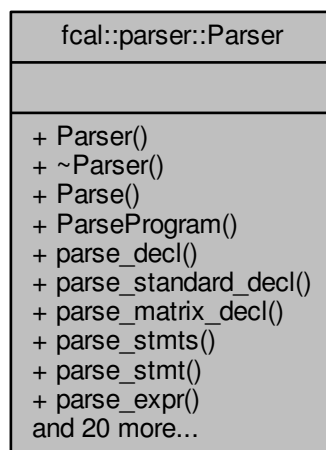
The documentation for this class was generated from the following files:

- 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

[Parser](#) Class built with token type and scanner, including methods which are operated by nonterminals, expressions and 4 helper functions which match the input and tokens

7.37.2 Constructor & Destructor Documentation

7.37.2.1 `fcsl::parser::Parser::Parser (void)` `[inline]`

7.37.2.2 `fcsl::parser::Parser::~~Parser (void)`

7.37.3 Member Function Documentation

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

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

Helper function used by the parser.

- 7.37.3.3 `bool fcal::parser::Parser::next_is (const scanner::TokenType & tt)`
- 7.37.3.4 `void fcal::parser::Parser::next_token (void)`
- 7.37.3.5 `ParseResult fcal::parser::Parser::Parse (const char * text)`
- 7.37.3.6 `ParseResult fcal::parser::Parser::parse_addition (ParseResult left)`
- 7.37.3.7 `ParseResult fcal::parser::Parser::parse_char_const ()`
- 7.37.3.8 `ParseResult fcal::parser::Parser::parse_decl ()`
- 7.37.3.9 `ParseResult fcal::parser::Parser::parse_division (ParseResult left)`
- 7.37.3.10 `ParseResult fcal::parser::Parser::parse_expr (int rbp)`
- 7.37.3.11 `ParseResult fcal::parser::Parser::parse_false_kwd ()`
- 7.37.3.12 `ParseResult fcal::parser::Parser::parse_float_const ()`
- 7.37.3.13 `ParseResult fcal::parser::Parser::parse_if_expr ()`
- 7.37.3.14 `ParseResult fcal::parser::Parser::parse_int_const ()`
- 7.37.3.15 `ParseResult fcal::parser::Parser::parse_let_expr ()`
- 7.37.3.16 `ParseResult fcal::parser::Parser::parse_matrix_decl ()`
- 7.37.3.17 `ParseResult fcal::parser::Parser::parse_multiplication (ParseResult left)`
- 7.37.3.18 `ParseResult fcal::parser::Parser::parse_nested_expr ()`
- 7.37.3.19 `ParseResult fcal::parser::Parser::parse_not_expr ()`
- 7.37.3.20 `ParseResult fcal::parser::Parser::parse_relational_expr (ParseResult left)`
- 7.37.3.21 `ParseResult fcal::parser::Parser::parse_standard_decl ()`
- 7.37.3.22 `ParseResult fcal::parser::Parser::parse_stmt ()`
- 7.37.3.23 `ParseResult fcal::parser::Parser::parse_stmts ()`
- 7.37.3.24 `ParseResult fcal::parser::Parser::parse_string_const ()`
- 7.37.3.25 `ParseResult fcal::parser::Parser::parse_subtraction (ParseResult left)`
- 7.37.3.26 `ParseResult fcal::parser::Parser::parse_true_kwd ()`

methods for parsing productions for Expr

7.37.3.27 **ParseResult** fcal::parser::Parser::parse_variable_name ()

7.37.3.28 **ParseResult** fcal::parser::Parser::ParseProgram ()

[Parser](#) methods for the nonterminals: add Program to our ast

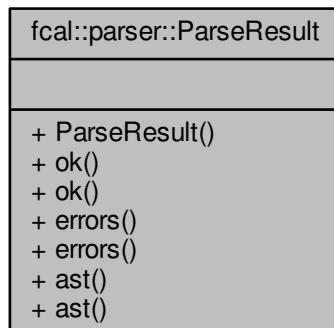
The documentation for this class was generated from the following files:

- [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 Constructor & Destructor Documentation

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

7.38.2 Member Function Documentation

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

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

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

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

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

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

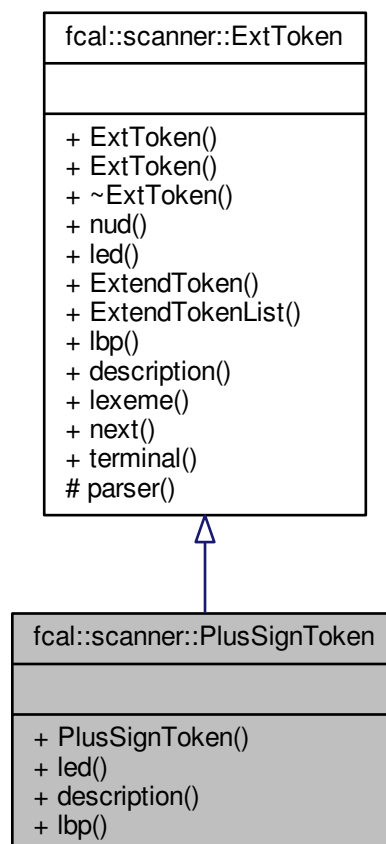
The documentation for this class was generated from the following file:

- [include/parse_result.h](#)

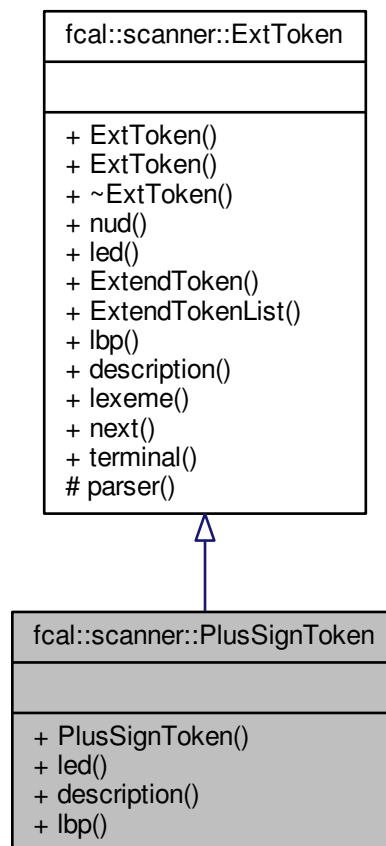
7.39 fcal::scanner::PlusSignToken Class Reference

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

Inheritance diagram for fcal::scanner::PlusSignToken:



Collaboration diagram for fcal::scanner::PlusSignToken:



Public Member Functions

- [PlusSignToken](#) ([parser::Parser](#) *p, [Token](#) *t)
- [parser::ParseResult](#) led ([parser::ParseResult](#) left)
- [std::string](#) description ()
- [int](#) lbp ()

Additional Inherited Members

7.39.1 Constructor & Destructor Documentation

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

7.39.2 Member Function Documentation

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

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

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

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

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

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

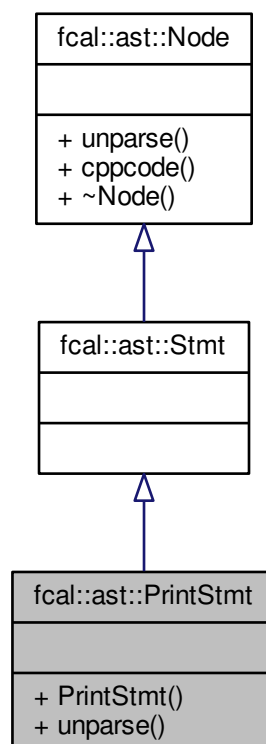
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

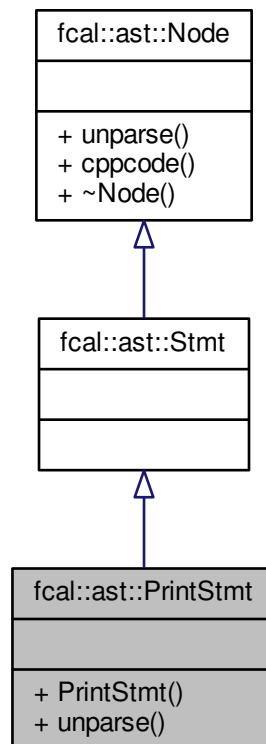
7.40 fcal::ast::PrintStmt Class Reference

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

Inheritance diagram for `fcal::ast::PrintStmt`:



Collaboration diagram for fcal::ast::PrintStmt:



Public Member Functions

- [PrintStmt](#) ([Expr](#) *expr)
- `std::string` [unparse](#) ()

7.40.1 Detailed Description

class [PrintStmt](#) brief abstract class for [PrintStmt](#) in AST

7.40.2 Constructor & Destructor Documentation

7.40.2.1 `fcal::ast::PrintStmt::PrintStmt (Expr * expr)` [explicit]

Print Statement

7.40.3 Member Function Documentation

7.40.3.1 `std::string fcal::ast::PrintStmt::unparse (void)` [virtual]

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

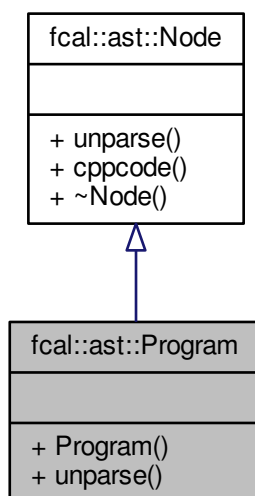
The documentation for this class was generated from the following files:

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

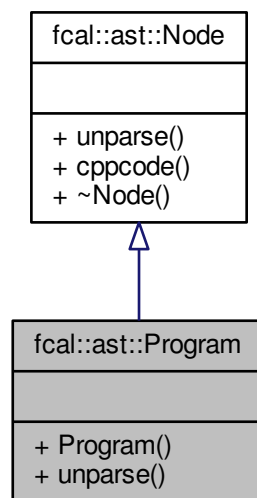
7.41 `fcal::ast::Program` Class Reference

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

Inheritance diagram for `fcal::ast::Program`:



Collaboration diagram for fcal::ast::Program:



Public Member Functions

- [Program](#) (std::string var_name, [Stmts](#) *stmts)
- std::string [unparse](#) ()

7.41.1 Detailed Description

class [Program](#) brief abstract class for [Program](#) in AST

7.41.2 Constructor & Destructor Documentation

7.41.2.1 `fcal::ast::Program::Program (std::string var_name, Stmts * stmts)`

7.41.3 Member Function Documentation

7.41.3.1 `std::string fcal::ast::Program::unparse (void)` `[virtual]`

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

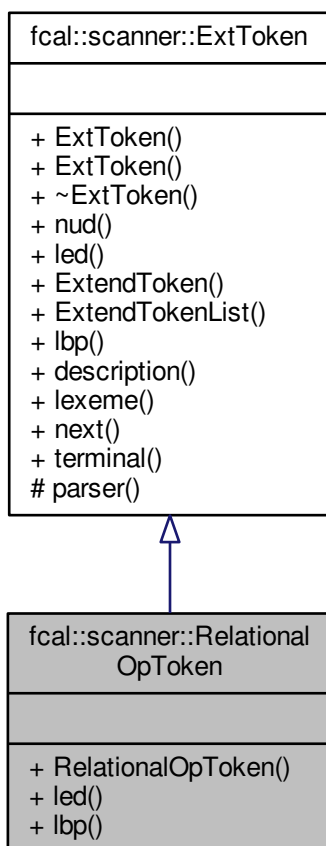
The documentation for this class was generated from the following files:

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

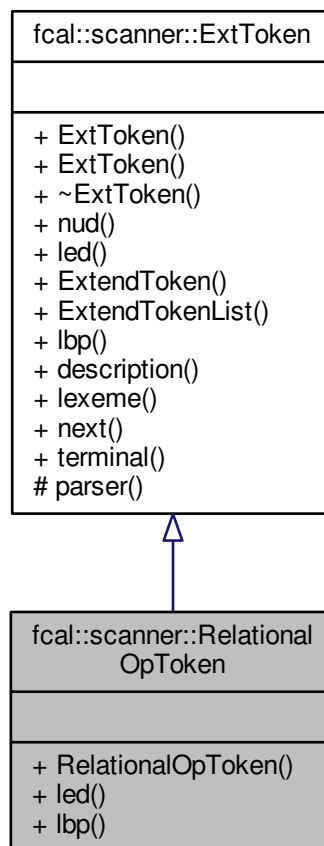
7.42 fcal::scanner::RelationalOpToken Class Reference

```
#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` ()

Additional Inherited Members

7.42.1 Constructor & Destructor Documentation

7.42.1.1 `fcal::scanner::RelationalOpToken::RelationalOpToken (parser::Parser * p, Token * t, std::string d)`
`[inline]`

7.42.2 Member Function Documentation

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

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

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

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

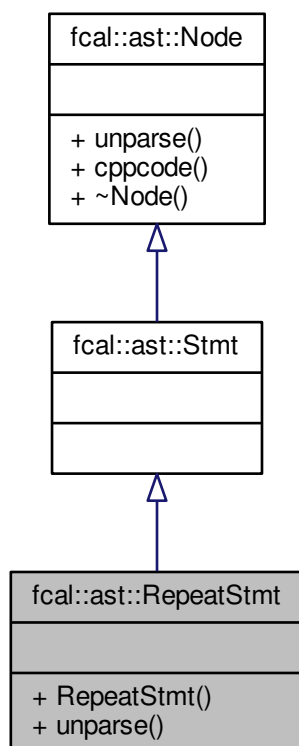
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

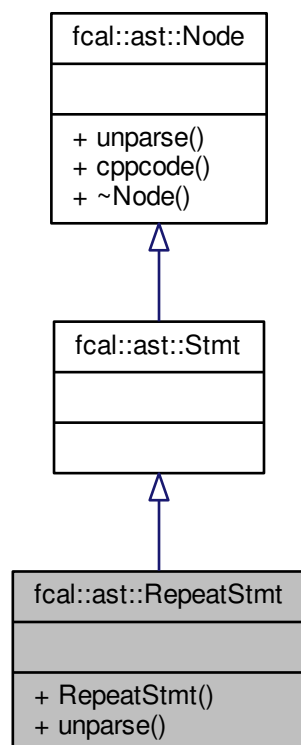
7.43 fcal::ast::RepeatStmt Class Reference

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

Inheritance diagram for `fcal::ast::RepeatStmt`:



Collaboration diagram for fcal::ast::RepeatStmt:



Public Member Functions

- [RepeatStmt](#) (Token *id, [Expr](#) *begin, [Expr](#) *end, [Stmt](#) *stmt)
- `std::string unparse ()`

7.43.1 Detailed Description

class [RepeatStmt](#) brief abstract class for [RepeatStmt](#) in AST

7.43.2 Constructor & Destructor Documentation

7.43.2.1 `fcal::ast::RepeatStmt::RepeatStmt (Token * id, Expr * begin, Expr * end, Stmt * stmt)`

Repeat Statement

7.43.3 Member Function Documentation

7.43.3.1 `std::string fcal::ast::RepeatStmt::unparse (void) [virtual]`

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

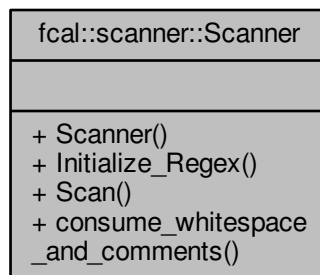
The documentation for this class was generated from the following files:

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

7.44 fcal::scanner::Scanner Class Reference

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

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



Public Member Functions

- [Scanner](#) ()
- void [Initialize_Regex](#) ()
- [Token](#) * [Scan](#) (const char *)
- int [consume_whitespace_and_comments](#) (regex_t *white_space, regex_t *block_comment, regex_t *line_comment, const char *text)

7.44.1 Constructor & Destructor Documentation

7.44.1.1 `fcal::scanner::Scanner::Scanner ()`

7.44.2 Member Function Documentation

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

clean up the input so it doesn't contain whitespace and comment Try to match white space

Try to match block comments

7.44.2.2 void fcal::scanner::Scanner::Initialize_Regex ()

initialize scanner that all regular expressions are putted in an array.

7.44.2.3 Token * fcal::scanner::Scanner::Scan (const char * *text*)

scan the target text and match with the regular expressions for different token type. Consume leading white space and comments

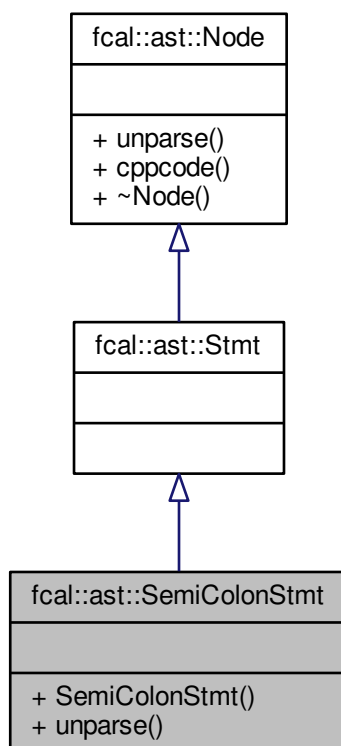
The documentation for this class was generated from the following files:

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

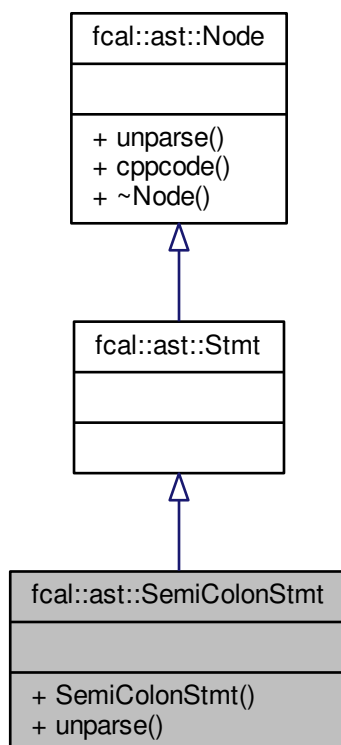
7.45 fcal::ast::SemiColonStmt Class Reference

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

Inheritance diagram for fcal::ast::SemiColonStmt:



Collaboration diagram for `fcgal::ast::SemiColonStmt`:



Public Member Functions

- [SemiColonStmt](#) ()
- `std::string` [unparse](#) ()

7.45.1 Detailed Description

class [SemiColonStmt](#) brief abstract class for [SemiColonStmt](#) in AST

7.45.2 Constructor & Destructor Documentation

7.45.2.1 `fcgal::ast::SemiColonStmt::SemiColonStmt ()`

Semi-Colon Statement

7.45.3 Member Function Documentation

7.45.3.1 `std::string fcal::ast::SemiColonStmt::unparse (void) [virtual]`

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

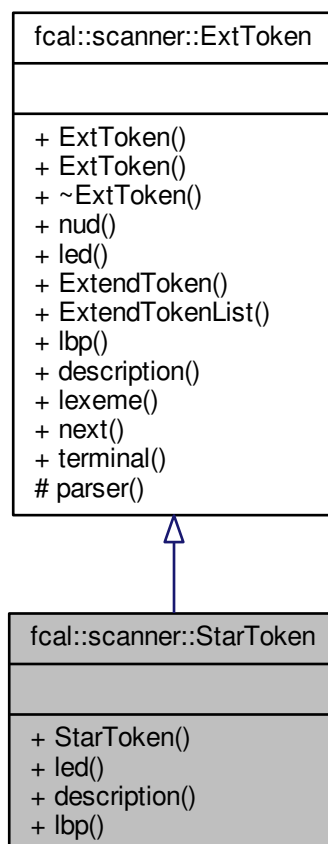
The documentation for this class was generated from the following files:

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

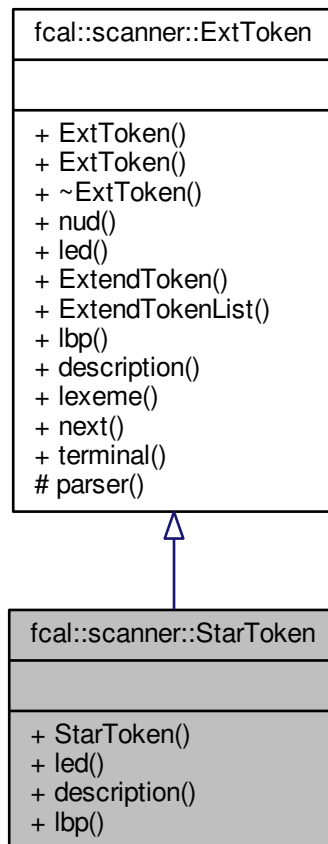
7.46 fcal::scanner::StarToken Class Reference

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

Inheritance diagram for fcal::scanner::StarToken:



Collaboration diagram for `fcal::scanner::StarToken`:



Public Member Functions

- `StarToken (parser::Parser *p, Token *t)`
- `parser::ParseResult led (parser::ParseResult left)`
- `std::string description ()`
- `int lbp ()`

Additional Inherited Members

7.46.1 Constructor & Destructor Documentation

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

7.46.2 Member Function Documentation

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

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

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

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

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

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

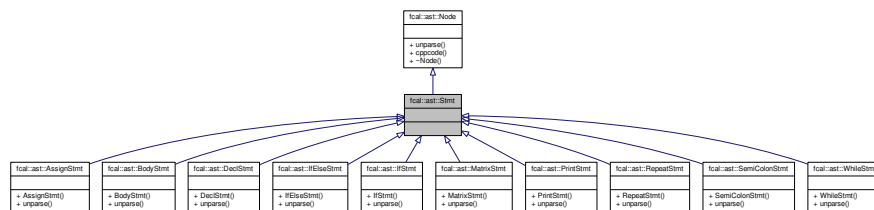
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

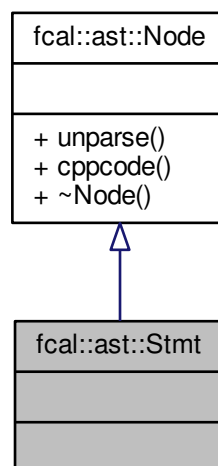
7.47 fcal::ast::Stmt Class Reference

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

Inheritance diagram for `fcal::ast::Stmt`:



Collaboration diagram for `fcal::ast::Stmt`:



Additional Inherited Members

7.47.1 Detailed Description

class [Stmt](#) brief abstract class for [Stmt](#) in AST

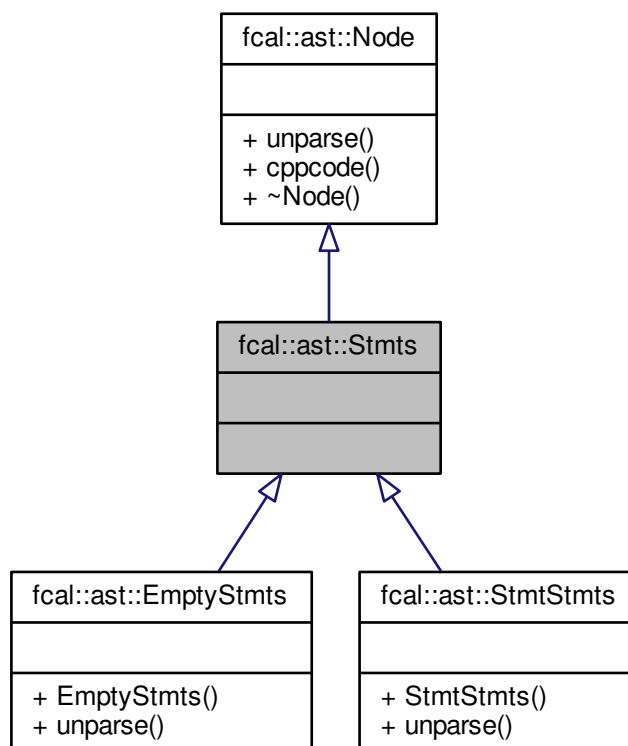
The documentation for this class was generated from the following file:

- [include/ast.h](#)

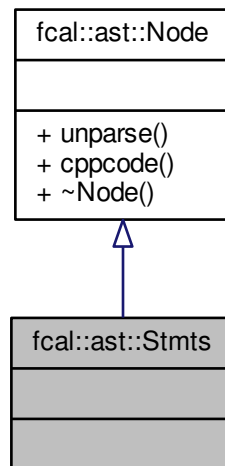
7.48 fcal::ast::Stmts Class Reference

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

Inheritance diagram for fcal::ast::Stmts:



Collaboration diagram for fcal::ast::Stmts:



Additional Inherited Members

7.48.1 Detailed Description

class [Stmts](#) brief abstract class for [Stmts](#) in AST

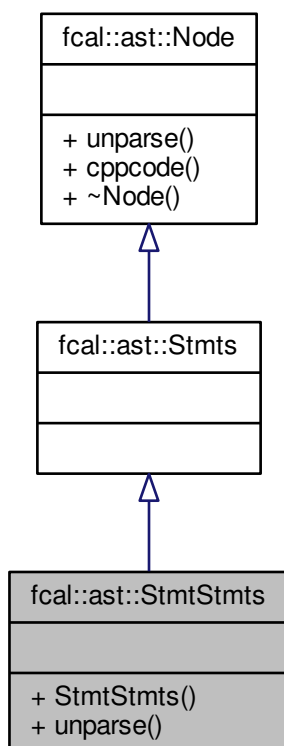
The documentation for this class was generated from the following file:

- [include/ast.h](#)

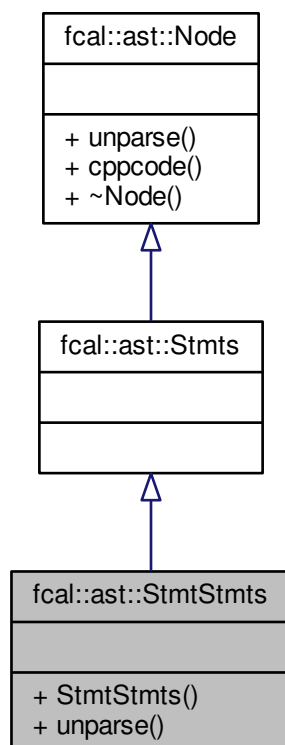
7.49 fcal::ast::StmtStmts Class Reference

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

Inheritance diagram for `fcal::ast::StmtStmts`:



Collaboration diagram for fcal::ast::StmtStmts:



Public Member Functions

- [StmtStmts](#) ([Stmt](#) *stmt_left, [Stmts](#) *stmts_right)
- [std::string unparse](#) ()

7.49.1 Detailed Description

class [StmtStmts](#) brief abstract class for [StmtStmts](#) in AST

7.49.2 Constructor & Destructor Documentation

7.49.2.1 [fcal::ast::StmtStmts::StmtStmts](#) ([Stmt](#) * *stmt_left*, [Stmts](#) * *stmts_right*)

[Stmt](#) + [Stmts](#)

7.49.3 Member Function Documentation

7.49.3.1 `std::string fcal::ast::StmtStmts::unparse (void)` [virtual]

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

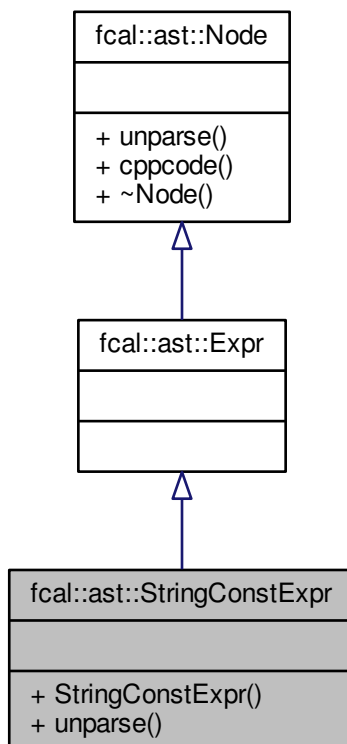
The documentation for this class was generated from the following files:

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

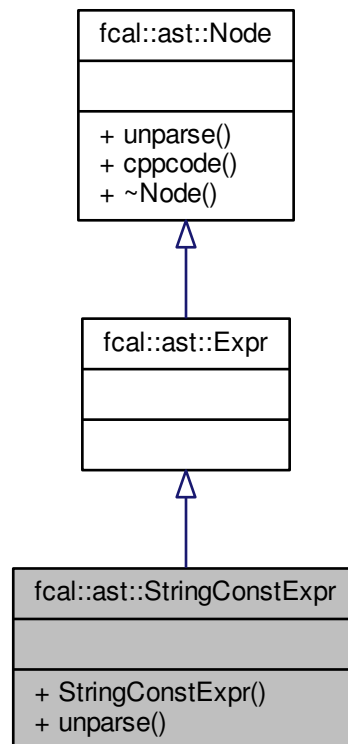
7.50 fcal::ast::StringConstExpr Class Reference

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

Inheritance diagram for `fcal::ast::StringConstExpr`:



Collaboration diagram for fcal::ast::StringConstExpr:



Public Member Functions

- [StringConstExpr](#) (Token *id)
- `std::string unparse ()`

7.50.1 Detailed Description

class stringConstExpr brief abstract class for StringConstExpr in AST

7.50.2 Constructor & Destructor Documentation

7.50.2.1 `fcal::ast::StringConstExpr::StringConstExpr (Token * id)` `[explicit]`

[StringConstExpr](#)

7.50.3 Member Function Documentation

7.50.3.1 `std::string fcal::ast::StringConstExpr::unparse (void) [virtual]`

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

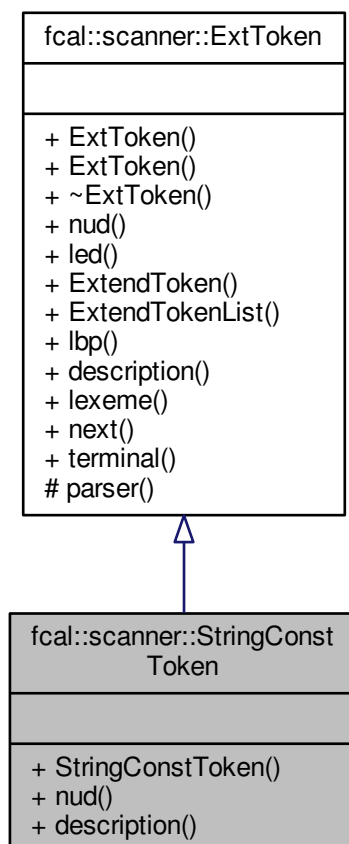
The documentation for this class was generated from the following files:

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

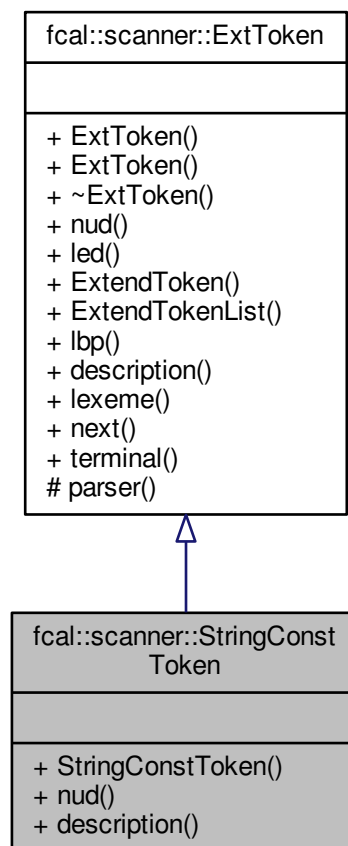
7.51 `fcal::scanner::StringConstToken` Class Reference

```
#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](#) ()

Additional Inherited Members

7.51.1 Constructor & Destructor Documentation

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

7.51.2 Member Function Documentation

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

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

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

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

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

- [include/ext_token.h](#)

7.52 fcal::scanner::Token Class Reference

```
#include <token.h>
```

Collaboration diagram for `fcal::scanner::Token`:



Public Member Functions

- [Token](#) (`std::string lexeme`, `TokenType terminal`, `Token *next`)
- [Token](#) ()
- void [SetTerminal](#) (`TokenType terminal_set`)
- void [SetLexeme](#) (`std::string lexeme_set`)
- void [SetNext](#) (`Token *next_set`)
- `TokenType terminal` ()
- `std::string lexeme` ()
- `Token * next` ()

7.52.1 Detailed Description

[Token](#) class, built as an linked list node. Including 2 parts, terminal and lexme

7.52.2 Constructor & Destructor Documentation

7.52.2.1 fcal::scanner::Token::Token (std::string *lexeme*, TokenType *terminal*, Token * *next*)

7.52.2.2 fcal::scanner::Token::Token ()

7.52.3 Member Function Documentation

7.52.3.1 std::string fcal::scanner::Token::lexeme (void)

7.52.3.2 Token * fcal::scanner::Token::next (void)

7.52.3.3 void fcal::scanner::Token::SetLexeme (std::string *lexeme_set*)

7.52.3.4 void fcal::scanner::Token::SetNext (Token * *next_set*)

7.52.3.5 void fcal::scanner::Token::SetTerminal (TokenType *terminal_set*)

7.52.3.6 TokenType fcal::scanner::Token::terminal (void)

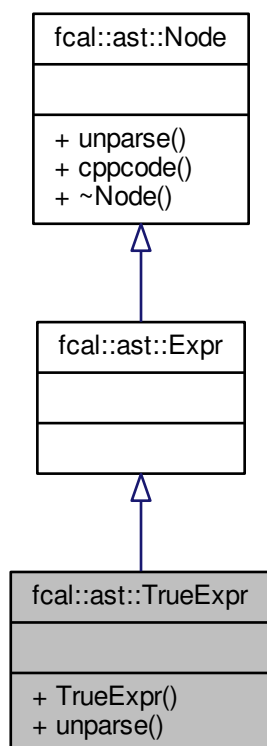
The documentation for this class was generated from the following files:

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

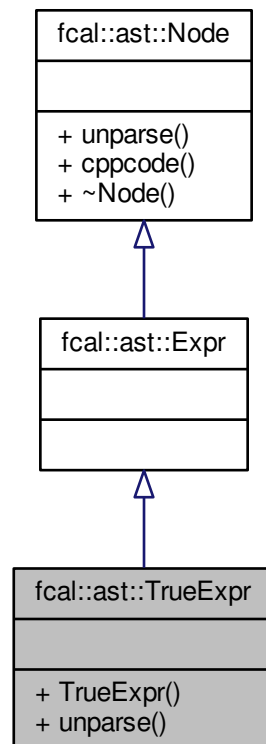
7.53 fcal::ast::TrueExpr Class Reference

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

Inheritance diagram for `fcal::ast::TrueExpr`:



Collaboration diagram for fcal::ast::TrueExpr:



Public Member Functions

- [TrueExpr](#) ()
- `std::string` [unparse](#) ()

7.53.1 Detailed Description

class [TrueExpr](#) brief abstract class for [TrueExpr](#) in AST

7.53.2 Constructor & Destructor Documentation

7.53.2.1 fcal::ast::TrueExpr::TrueExpr ()

[TrueExpr](#)

7.53.3 Member Function Documentation

7.53.3.1 `std::string fcal::ast::TrueExpr::unparse (void)` [virtual]

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

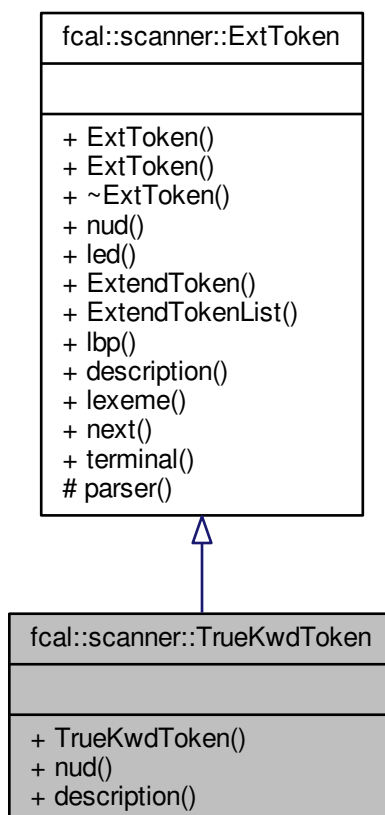
The documentation for this class was generated from the following files:

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

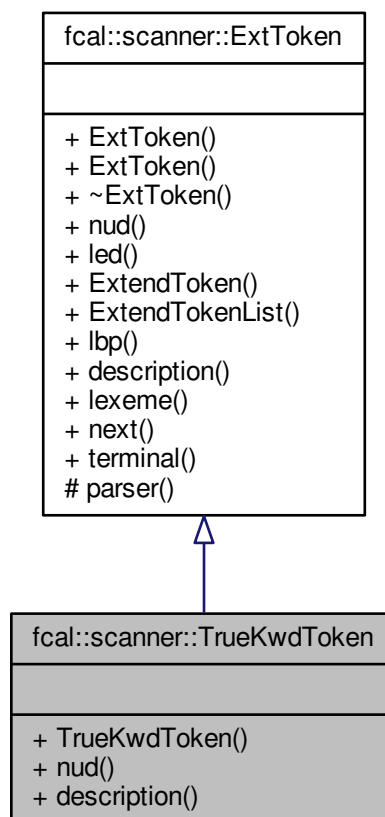
7.54 `fcal::scanner::TrueKwdToken` Class Reference

```
#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](#) ()

Additional Inherited Members

7.54.1 Constructor & Destructor Documentation

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

7.54.2 Member Function Documentation

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

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

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

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

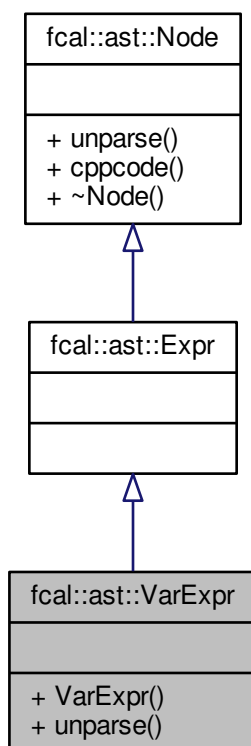
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

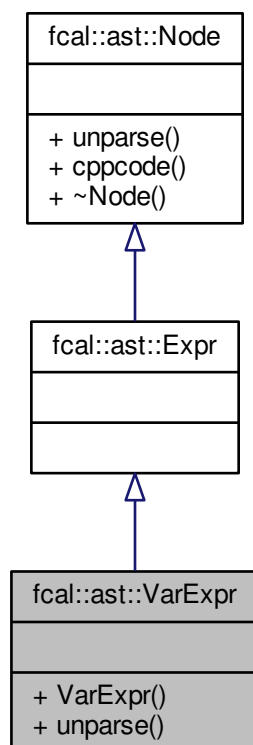
7.55 fcal::ast::VarExpr Class Reference

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

Inheritance diagram for `fcal::ast::VarExpr`:



Collaboration diagram for fcal::ast::VarExpr:



Public Member Functions

- [VarExpr](#) (Token *id)
- `std::string unparse ()`

7.55.1 Detailed Description

class [VarExpr](#) brief abstract class for Simple Expressions in AST

7.55.2 Constructor & Destructor Documentation

7.55.2.1 `fcal::ast::VarExpr::VarExpr (Token * id)` `[explicit]`

Var Expression Handling

7.55.3 Member Function Documentation

7.55.3.1 `std::string fcal::ast::VarExpr::unparse (void) [virtual]`

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

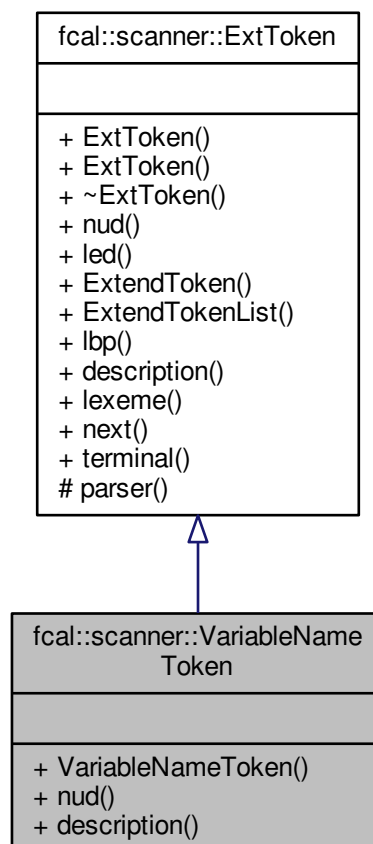
The documentation for this class was generated from the following files:

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

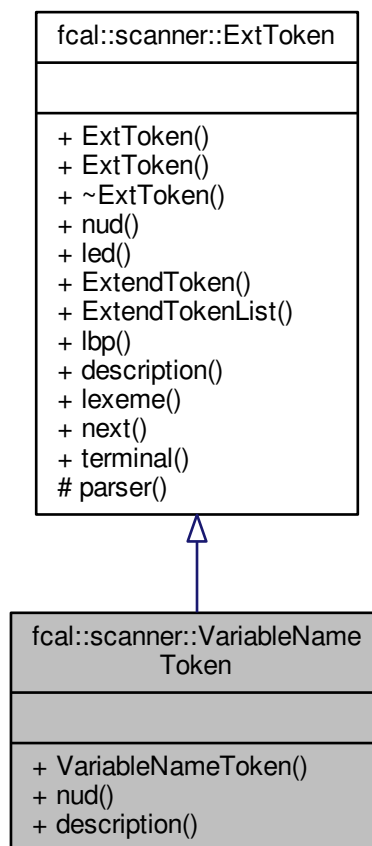
7.56 `fcal::scanner::VariableNameToken` Class Reference

```
#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](#) ()

Additional Inherited Members

7.56.1 Constructor & Destructor Documentation

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

7.56.2 Member Function Documentation

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

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

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

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

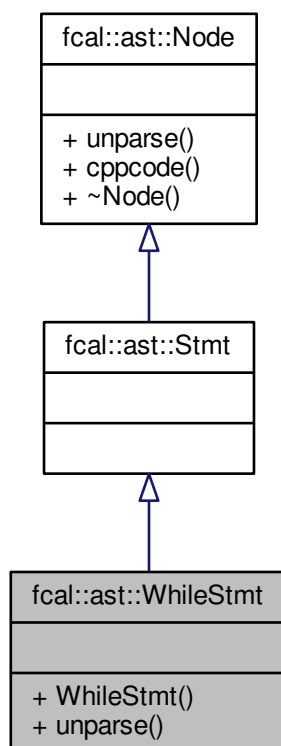
The documentation for this class was generated from the following file:

- [include/ext_token.h](#)

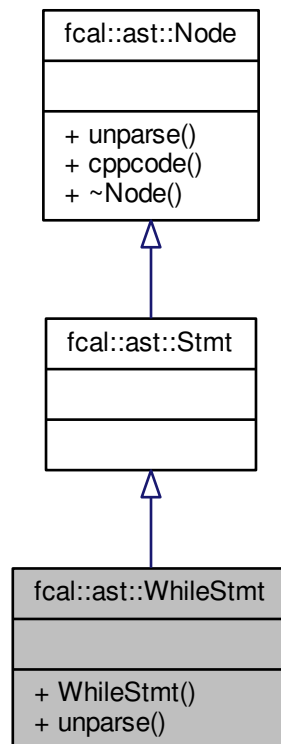
7.57 fcal::ast::WhileStmt Class Reference

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

Inheritance diagram for `fcal::ast::WhileStmt`:



Collaboration diagram for fcal::ast::WhileStmt:



Public Member Functions

- [WhileStmt](#) ([Expr](#) *expr, [Stmt](#) *body)
- `std::string unparse ()`

7.57.1 Detailed Description

class [WhileStmt](#) brief abstract class for [RepeatStmt](#) in AST

7.57.2 Constructor & Destructor Documentation

7.57.2.1 fcal::ast::WhileStmt::WhileStmt (Expr * predicate, Stmt * body)

While Statement

7.57.3 Member Function Documentation

7.57.3.1 `std::string fcal::ast::WhileStmt::unparse (void)` `[virtual]`

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

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

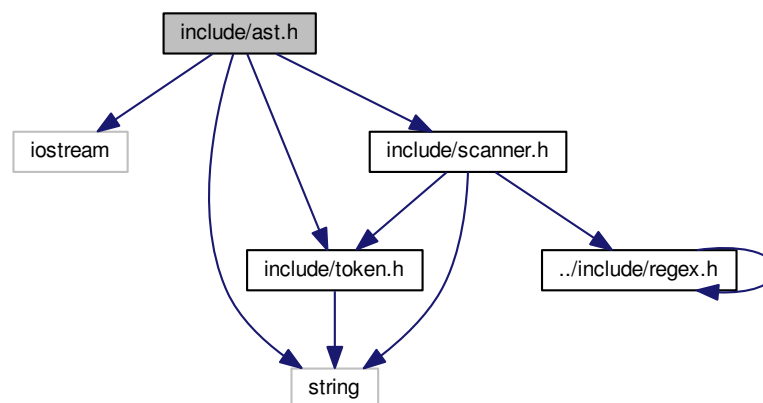
- [include/ast.h](#)
- [src/ast.cc](#)

Chapter 8

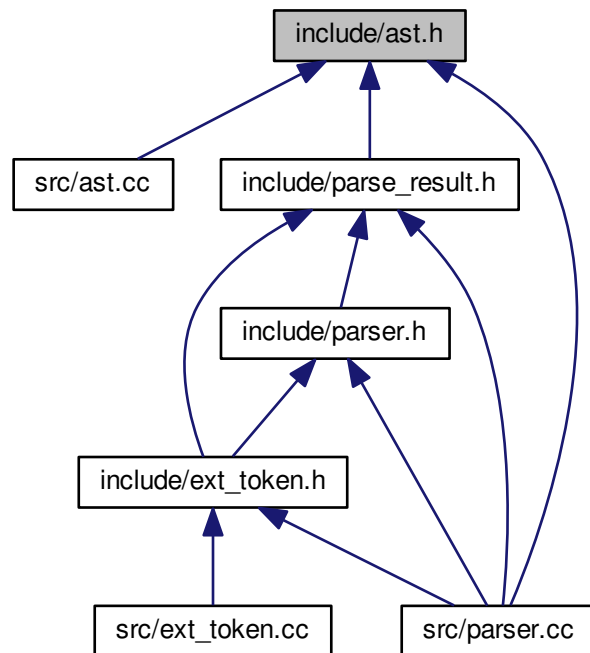
File Documentation

8.1 include/ast.h File Reference

```
#include <iostream>
#include <string>
#include "include/token.h"
#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::Program](#)
- class [fcal::ast::Stmts](#)
- class [fcal::ast::Stmt](#)
- class [fcal::ast::Expr](#)
- class [fcal::ast::Decl](#)
- class [fcal::ast::Decls](#)
- class [fcal::ast::EmptyStmts](#)
- class [fcal::ast::StmtStmts](#)
- class [fcal::ast::AssignStmt](#)
- class [fcal::ast::BodyStmt](#)
- class [fcal::ast::IfStmt](#)
- class [fcal::ast::IfElseStmt](#)
- class [fcal::ast::DeclStmt](#)
- class [fcal::ast::PrintStmt](#)
- class [fcal::ast::RepeatStmt](#)
- class [fcal::ast::WhileStmt](#)
- class [fcal::ast::SemiColonStmt](#)
- class [fcal::ast::VarExpr](#)
- class [fcal::ast::IntConstExpr](#)
- class [fcal::ast::FloatConstExpr](#)
- class [fcal::ast::StringConstExpr](#)

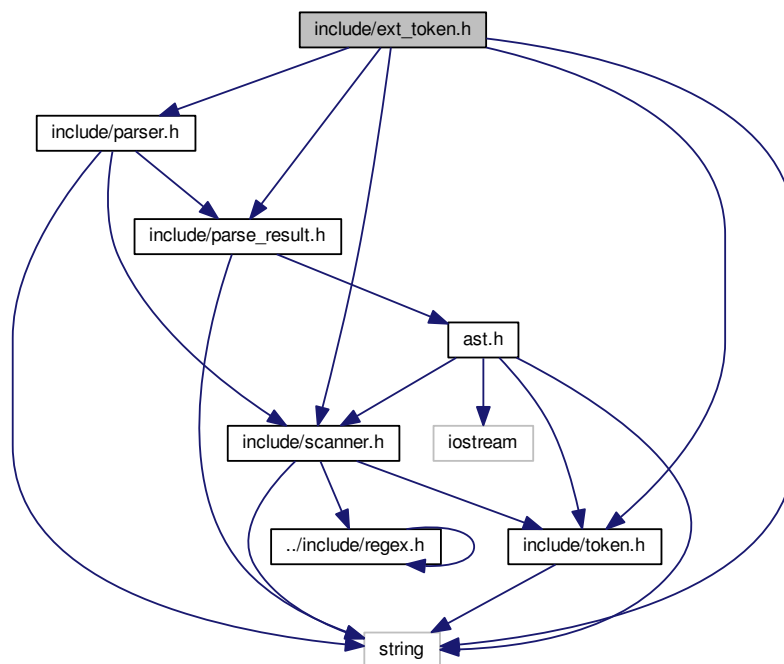
- class `fcal::ast::TrueExpr`
- class `fcal::ast::FalseExpr`
- class `fcal::ast::BinaryOperators`
- class `fcal::ast::BasicOp`
- class `fcal::ast::FuncExpr`
- class `fcal::ast::ParenExpr`
- class `fcal::ast::LetExpr`
- class `fcal::ast::IfElseExpr`
- class `fcal::ast::NotExpr`
- class `fcal::ast::MatrixDecl`
- class `fcal::ast::MatrixBodyDecl`
- class `fcal::ast::MatrixStmt`
- class `fcal::ast::MatrixRefExpr`

Namespaces

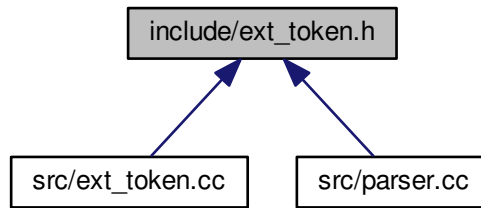
- `fcal`
- `fcal::ast`

8.2 include/ext_token.h File Reference

```
#include <string>
#include "include/parser.h"
#include "include/scanner.h"
#include "include/token.h"
#include "include/parse_result.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::PlusSignToken](#)
- class [fcal::scanner::StarToken](#)
- class [fcal::scanner::DashToken](#)
- class [fcal::scanner::ForwardSlashToken](#)
- class [fcal::scanner::RelationalOpToken](#)
- class [fcal::scanner::EndOfFileToken](#)

Namespaces

- [fcal](#)
- [fcal::scanner](#)

8.3 include/iter2scanner.h File Reference

Namespaces

- [fcal](#)
- [fcal::scanner](#)

Typedefs

- typedef enum kTokenEnumType [fcal::scanner::TokenType](#)

Enumerations

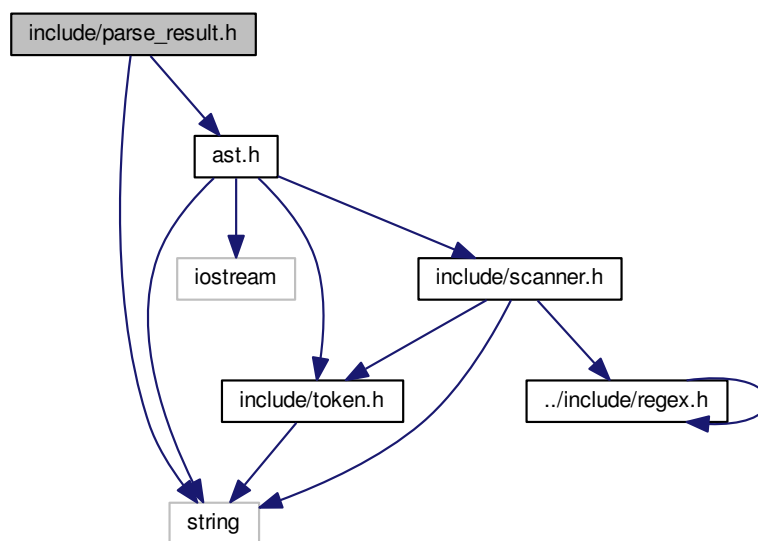
- enum [fcal::scanner::kTokenEnumType](#) {
[fcal::scanner::kIntKwd](#), [fcal::scanner::kFloatKwd](#), [fcal::scanner::kBoolKwd](#), [fcal::scanner::kTrueKwd](#),
[fcal::scanner::kFalseKwd](#), [fcal::scanner::kStringKwd](#), [fcal::scanner::kMatrixKwd](#), [fcal::scanner::kLetKwd](#),
[fcal::scanner::kInKwd](#), [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](#),
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[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](#) }

8.4 include/mainpage.h File Reference

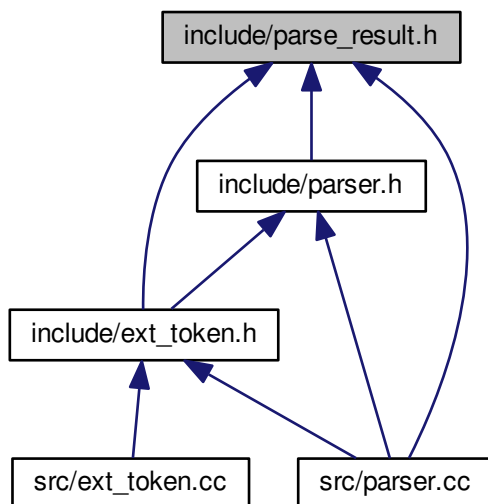
8.5 include/parse_result.h File Reference

```
#include <string>
#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`

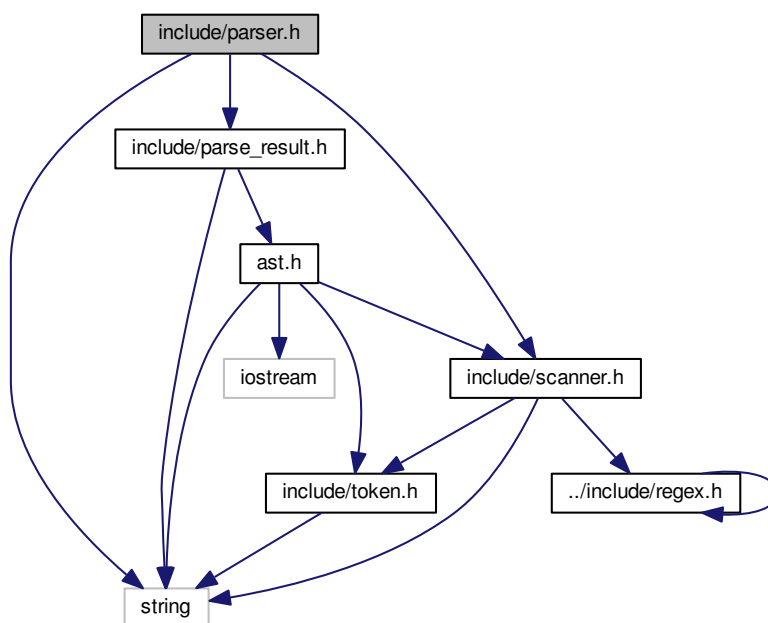
Namespaces

- [fcal](#)
- [fcal::parser](#)

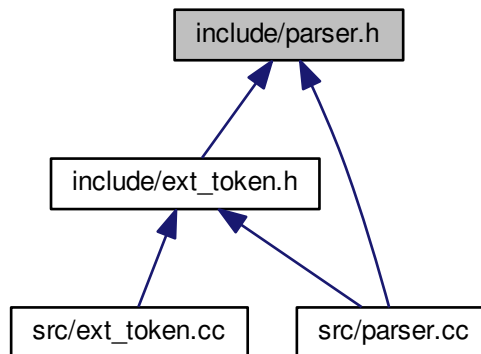
8.6 include/parser.h File Reference

```
#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](#)

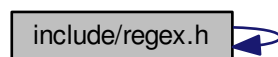
Functions

- char * [fcal::scanner::ReadInput](#) (int argc, char **argv)
- char * [fcal::scanner::ReadInputFromFile](#) (const char *filename)

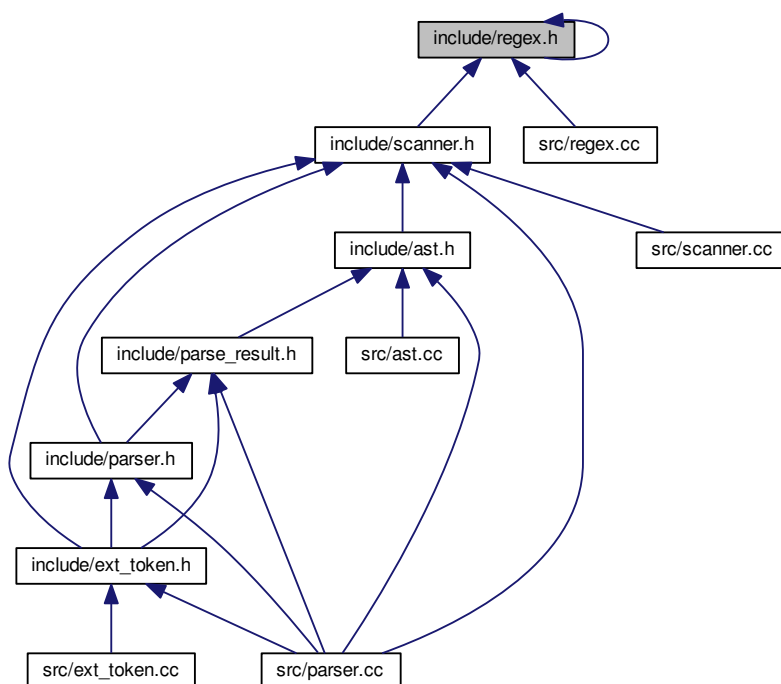
8.8 include/regex.h File Reference

```
#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

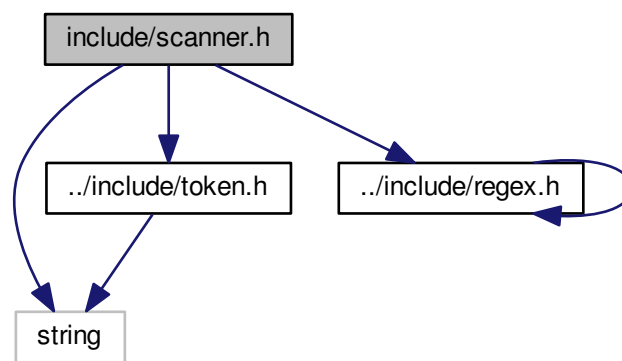
- `regex_t * fcal::scanner::make_regex (const char *pattern)`
- `int fcal::scanner::match_regex (regex_t *re, const char *text)`

Variables

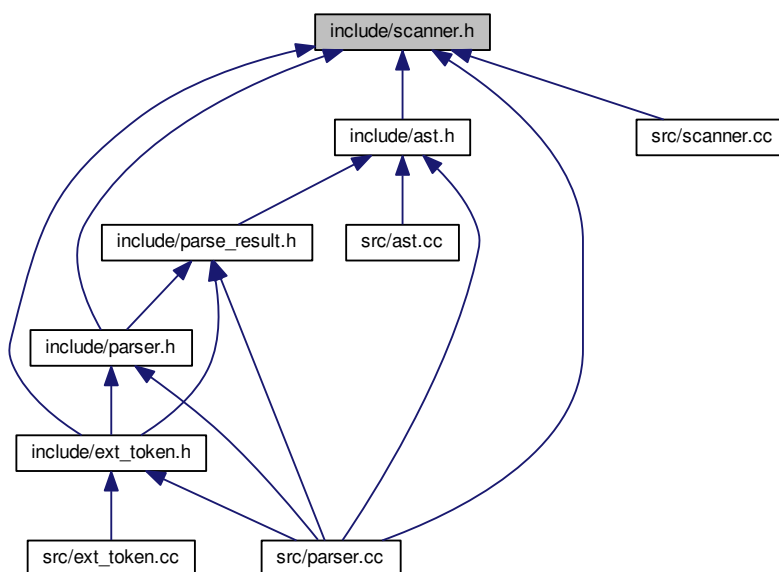
- `const int fcal::scanner::kRegexNSub = 1`

8.9 include/scanner.h File Reference

```
#include <string>
#include "../include/token.h"
#include "../include/regex.h"
Include dependency graph for scanner.h:
```



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



Classes

- class [fcal::scanner::Scanner](#)

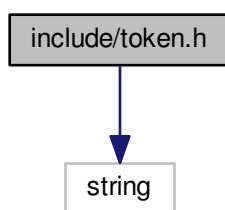
Namespaces

- [fcal](#)
- [fcal::scanner](#)

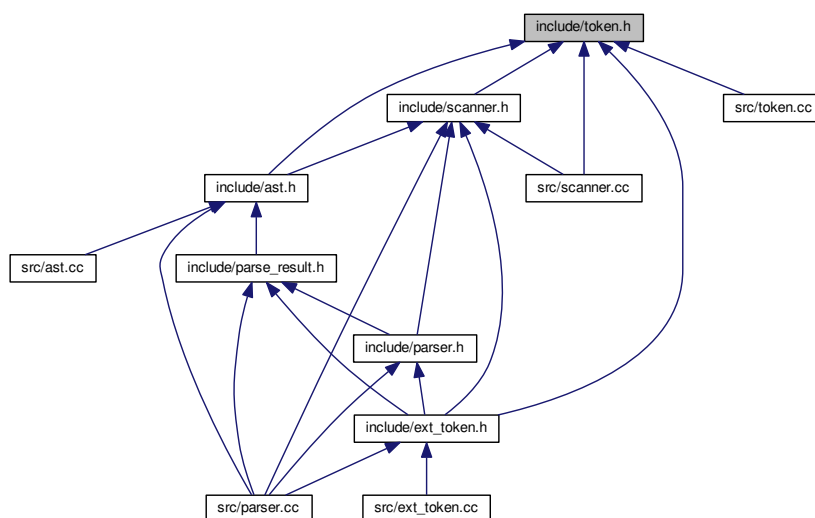
8.10 include/token.h File Reference

```
#include <string>
```

Include dependency graph for token.h:



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



Classes

- class `fcal::scanner::Token`

Namespaces

- `fcal`
- `fcal::scanner`

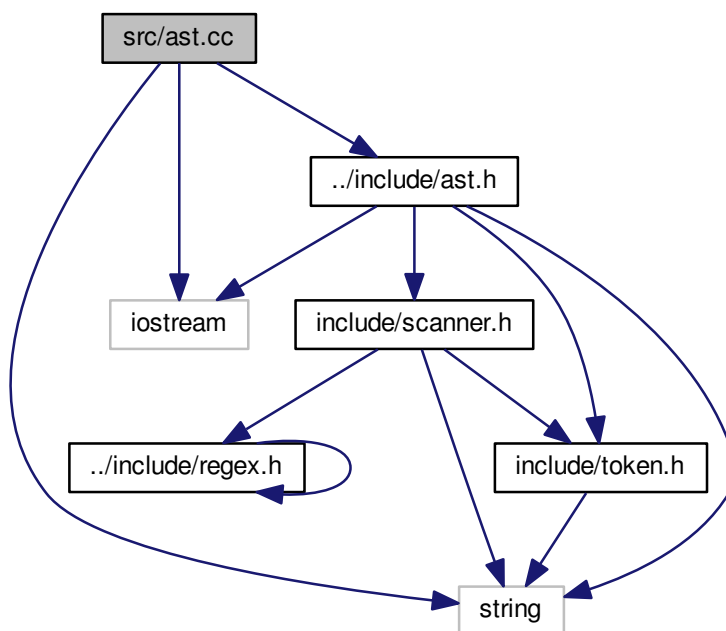
Enumerations

- 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` }

8.11 `src/ast.cc` File Reference

```
#include <iostream>
#include <string>
#include "../include/ast.h"
```

Include dependency graph for ast.cc:



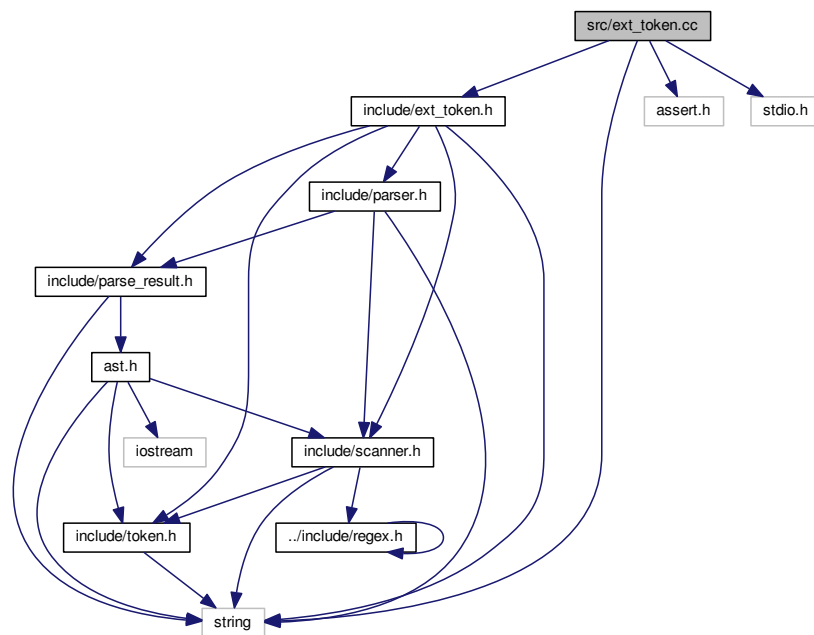
Namespaces

- `fcal`
- `fcal::ast`

8.12 src/ext_token.cc File Reference

```
#include "include/ext_token.h"
#include <assert.h>
#include <stdio.h>
#include <string>
```

Include dependency graph for ext_token.cc:



Namespaces

- `fcal`
- `fcal::scanner`

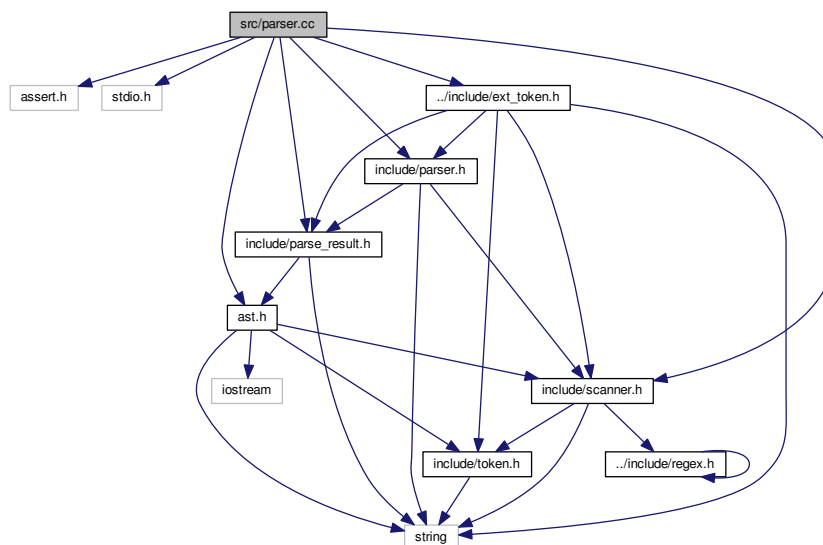
8.13 src/parser.cc File Reference

```

#include <assert.h>
#include <stdio.h>
#include "../include/ext_token.h"
#include "../include/parse_result.h"
#include "../include/parser.h"
#include "../include/scanner.h"
#include "../include/ast.h"

```

Include dependency graph for parser.cc:



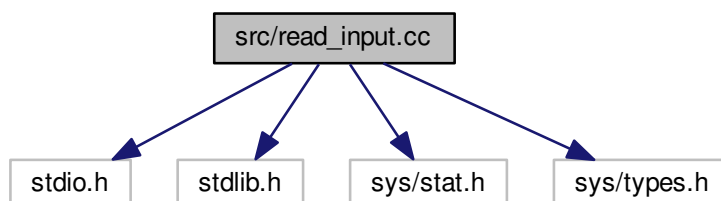
Namespaces

- [fcal](#)
- [fcal::parser](#)

8.14 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

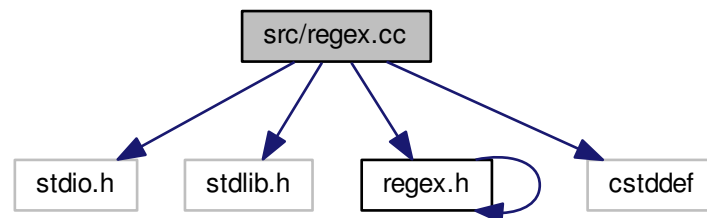
- [fcal](#)
- [fcal::scanner](#)

Functions

- `char * fcal::scanner::ReadInputFromFile (const char *filename)`
- `char * fcal::scanner::ReadInput (int argc, char **argv)`

8.15 src/regex.cc File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <regex.h>
#include <cstdint>
Include dependency graph for regex.cc:
```



Namespaces

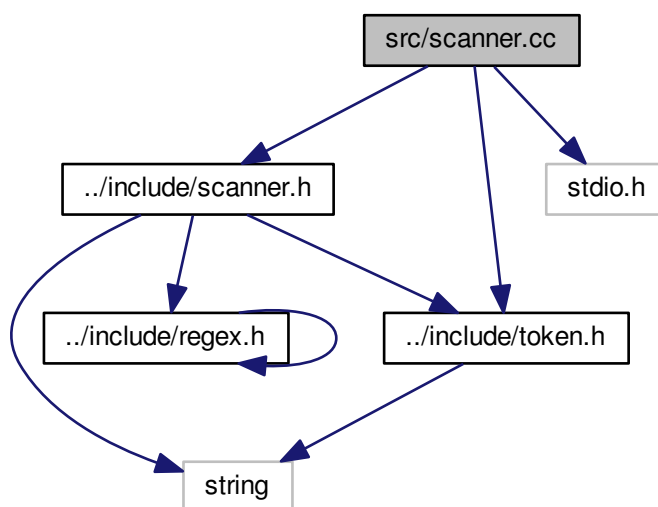
- [fcal](#)
- [fcal::scanner](#)

Functions

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

8.16 src/scanner.cc File Reference

```
#include "../include/scanner.h"  
#include <stdio.h>  
#include "../include/token.h"  
Include dependency graph for scanner.cc:
```



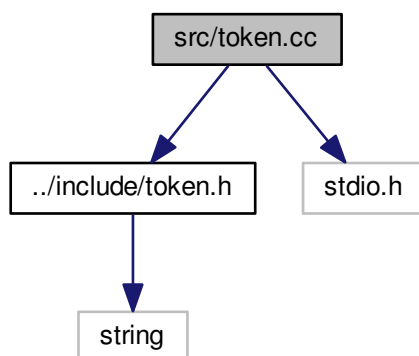
Namespaces

- `fcal`
- `fcal::scanner`

8.17 src/token.cc File Reference

```
#include "../include/token.h"  
#include <stdio.h>
```

Include dependency graph for token.cc:



Namespaces

- [fcal](#)
- [fcal::scanner](#)

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