

Iter 3

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## **Chapter 1**

# **3081W Group Archaeopteryx Project**



## Chapter 2

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# Class Index

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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 [Decl](#)
- class [DeclStmt](#)
- class [DivideExpr](#)
- class [EmptyStmts](#)
- class [Expr](#)
- class [FalseExpr](#)
- class [FloatConstExpr](#)
- class [FuncExpr](#)
- class [IfElseExpr](#)
- class [IfElseStmt](#)
- class [IfStmt](#)
- class [IntConstExpr](#)
- class [LetExpr](#)
- class [MatrixAssignStmt](#)
- class [MatrixDecl](#)
- class [MatrixExpr](#)
- class [MatrixIndexDecl](#)
- class [MinusExpr](#)
- class [Node](#)
- class [NotExpr](#)
- class [ParenExpr](#)
- class [PlusExpr](#)

- class [PrintStmt](#)
- class [Program](#)
- class [RelationalExpr](#)
- class [RepeatStmt](#)
- class [SCStmt](#)
- class [SeqStmts](#)
- class [Stmt](#)
- class [Stmts](#)
- class [StmtsStmt](#)
- class [StringConstExpr](#)
- class [TimesExpr](#)
- class [TrueExpr](#)
- class [VarDecl](#)
- class [VariableExpr](#)
- class [varName](#)
- class [WhileStmt](#)

## 6.3 `fcval::parser` Namespace Reference

### Classes

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

## 6.4 `fcval::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](#),  
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    [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*

### 6.4.3 Function Documentation

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

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

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.

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.

#### 6.4.4 Variable Documentation

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



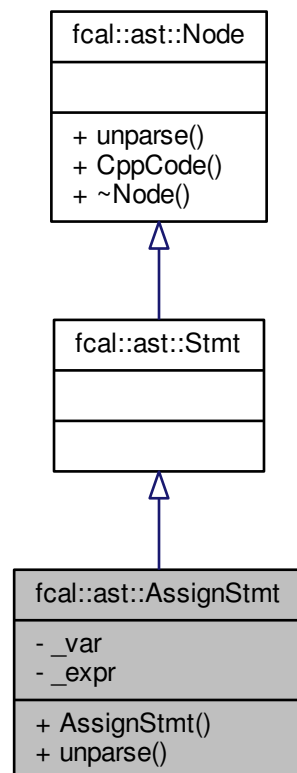
## Chapter 7

# Class Documentation

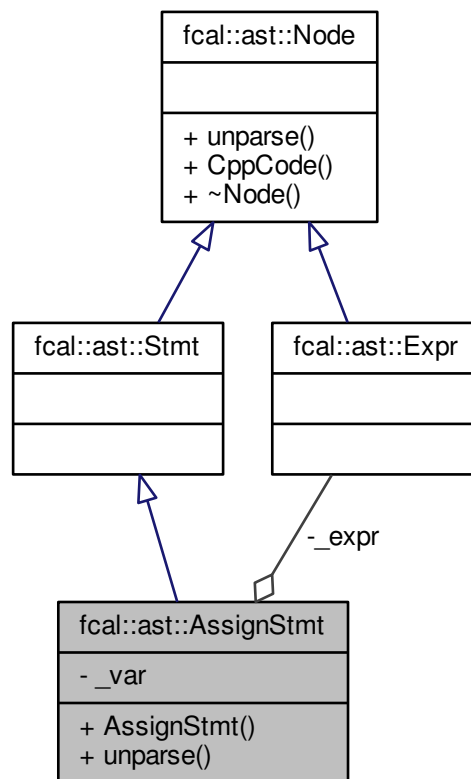
### 7.1 fcal::ast::AssignStmt Class Reference

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

Inheritance diagram for fcal::ast::AssignStmt:



Collaboration diagram for `fcgal::ast::AssignStmt`:



## Public Member Functions

- [AssignStmt](#) (std::string var, [Expr](#) \*expr)
- std::string [unparse](#) ()

## Private Attributes

- std::string [\\_var](#)
- [Expr](#) \* [\\_expr](#)

### 7.1.1 Constructor & Destructor Documentation

7.1.1.1 `fcgal::ast::AssignStmt::AssignStmt ( std::string var, Expr * expr )` `[inline]`

### 7.1.2 Member Function Documentation

7.1.2.1 `std::string fcgal::ast::AssignStmt::unparse ( void )` `[inline], [virtual]`

Reimplemented from [fcgal::ast::Node](#).

### 7.1.3 Member Data Documentation

7.1.3.1 `Expr* fcal::ast::AssignStmt::_expr` [private]

7.1.3.2 `std::string fcal::ast::AssignStmt::_var` [private]

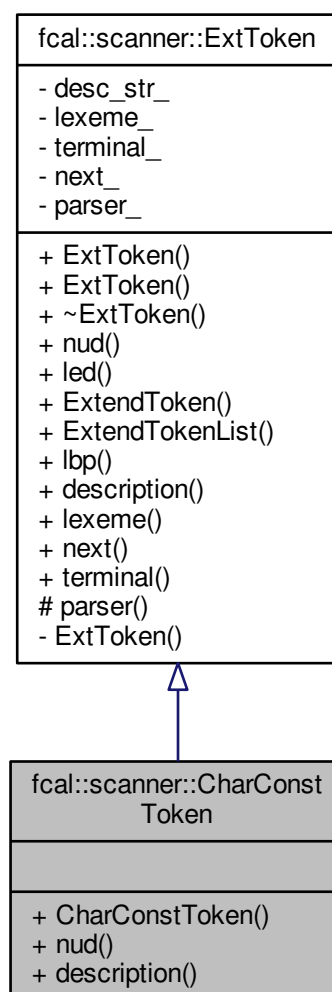
The documentation for this class was generated from the following file:

- [include/ast.h](#)

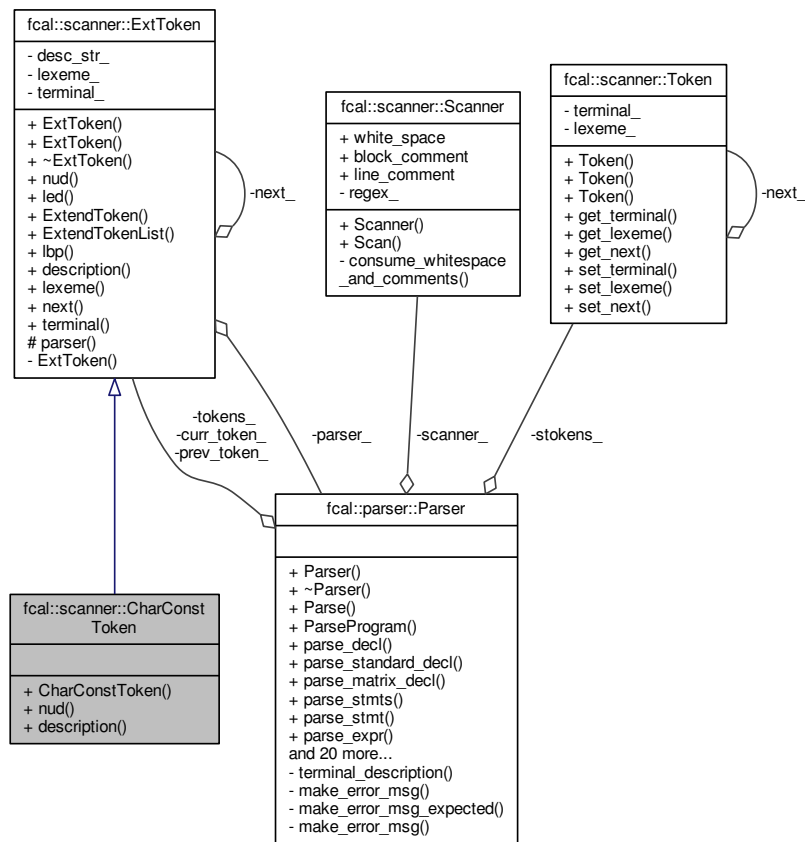
## 7.2 fcal::scanner::CharConstToken Class Reference

```
#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

### 7.2.1 Constructor & Destructor Documentation

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

### 7.2.2 Member Function Documentation

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

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



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

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

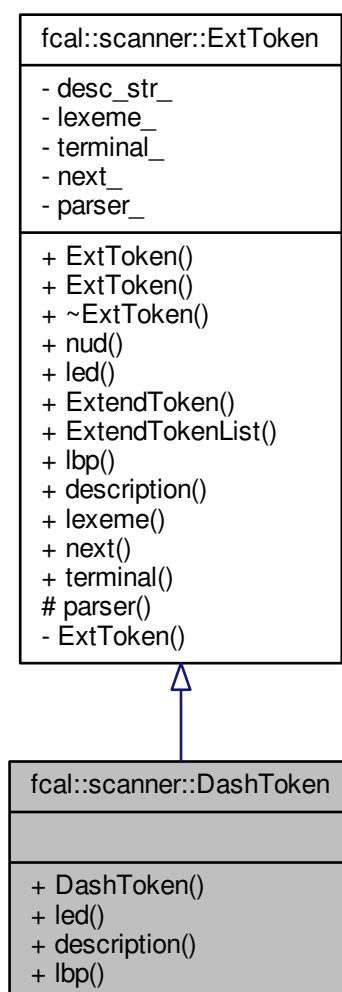
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

## 7.3 fcal::scanner::DashToken Class Reference

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

Inheritance diagram for fcal::scanner::DashToken:





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

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

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

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

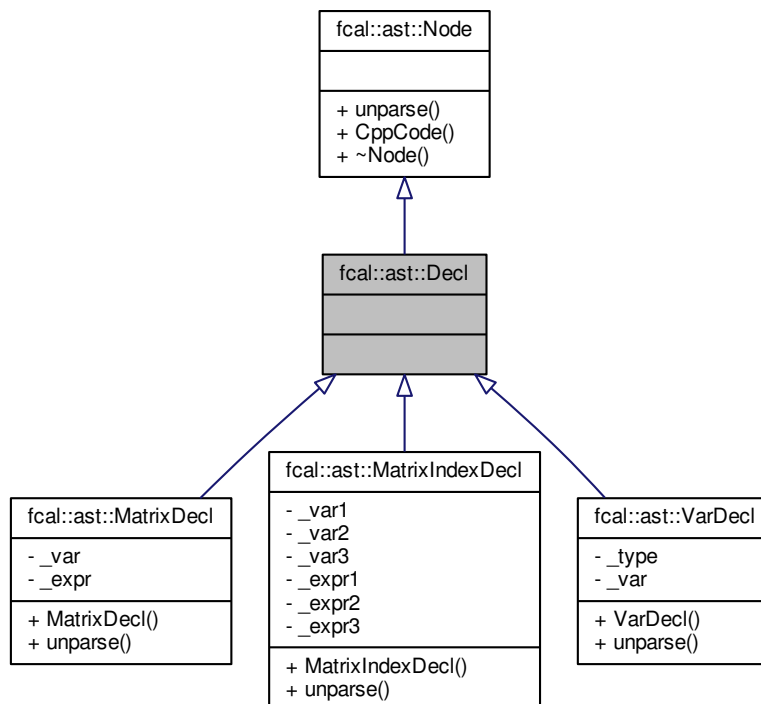
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

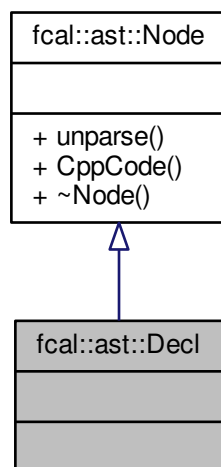
## 7.4 fcal::ast::Decl Class Reference

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

Inheritance diagram for fcal::ast::Decl:



Collaboration diagram for `fcsl::ast::Decl`:



### Additional Inherited Members

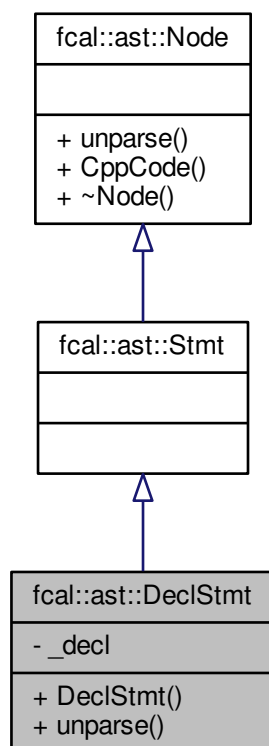
The documentation for this class was generated from the following file:

- [include/ast.h](#)

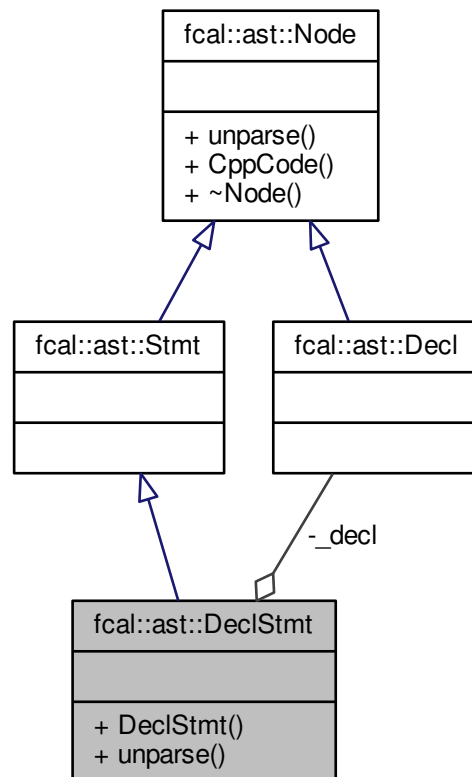
## 7.5 `fcsl::ast::DeclStmt` Class Reference

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

Inheritance diagram for fcal::ast::DeclStmt:



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



## Public Member Functions

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

## Private Attributes

- [Decl](#) \*`_decl`

## 7.5.1 Constructor & Destructor Documentation

7.5.1.1 `fcal::ast::DeclStmt::DeclStmt ( Decl * decl )` `[inline]`

## 7.5.2 Member Function Documentation

7.5.2.1 `std::string fcal::ast::DeclStmt::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.5.3 Member Data Documentation

#### 7.5.3.1 Decl\* fcal::ast::DeclStmt::\_decl [private]

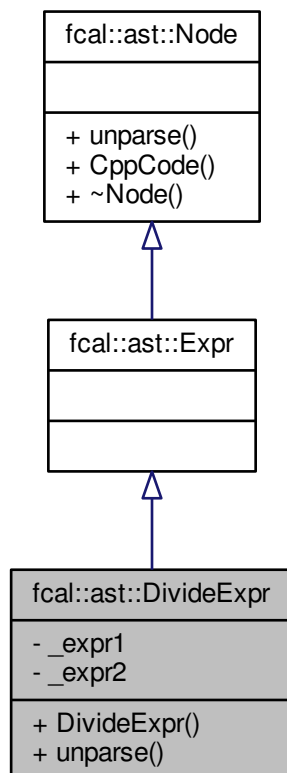
The documentation for this class was generated from the following file:

- [include/ast.h](#)

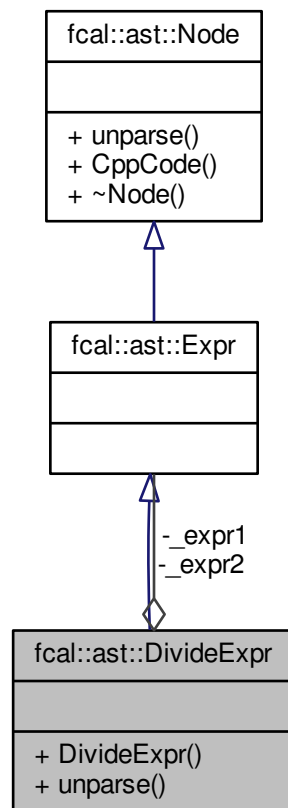
## 7.6 fcal::ast::DivideExpr Class Reference

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

Inheritance diagram for fcal::ast::DivideExpr:



Collaboration diagram for `fcgal::ast::DivideExpr`:



## Public Member Functions

- [DivideExpr](#) ([Expr](#) \*expr1, [Expr](#) \*expr2)
- `std::string` [unparse](#) ()

## Private Attributes

- [Expr](#) \* [\\_expr1](#)
- [Expr](#) \* [\\_expr2](#)

## 7.6.1 Constructor & Destructor Documentation

7.6.1.1 `fcgal::ast::DivideExpr::DivideExpr ( Expr * expr1, Expr * expr2 )` `[inline]`

## 7.6.2 Member Function Documentation

7.6.2.1 `std::string fcgal::ast::DivideExpr::unparse ( void )` `[inline]`, `[virtual]`

Reimplemented from [fcgal::ast::Node](#).



### 7.6.3 Member Data Documentation

7.6.3.1 `Expr* fcal::ast::DivideExpr::_expr1` [private]

7.6.3.2 `Expr* fcal::ast::DivideExpr::_expr2` [private]

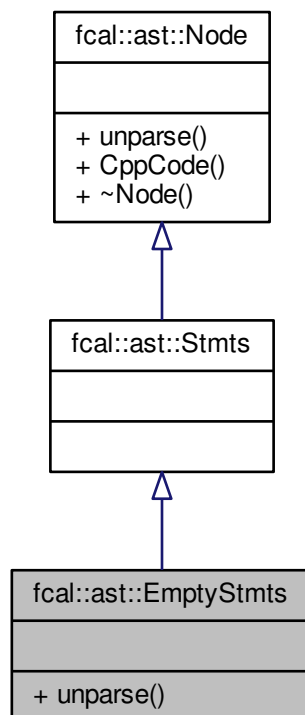
The documentation for this class was generated from the following file:

- `include/ast.h`

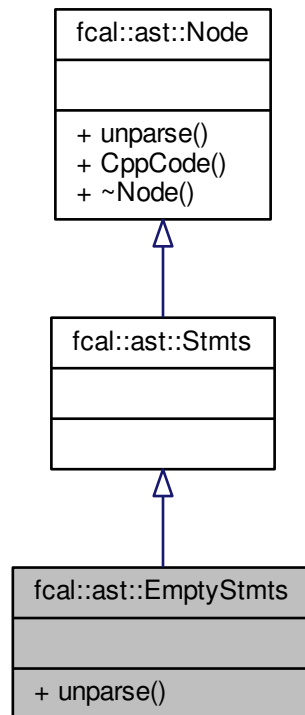
## 7.7 fcal::ast::EmptyStmts Class Reference

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

Inheritance diagram for fcal::ast::EmptyStmts:



Collaboration diagram for `fcab::ast::EmptyStmts`:



## Public Member Functions

- `std::string unparse ()`

### 7.7.1 Member Function Documentation

**7.7.1.1** `std::string fcab::ast::EmptyStmts::unparse ( void )` `[inline], [virtual]`

Reimplemented from `fcab::ast::Node`.

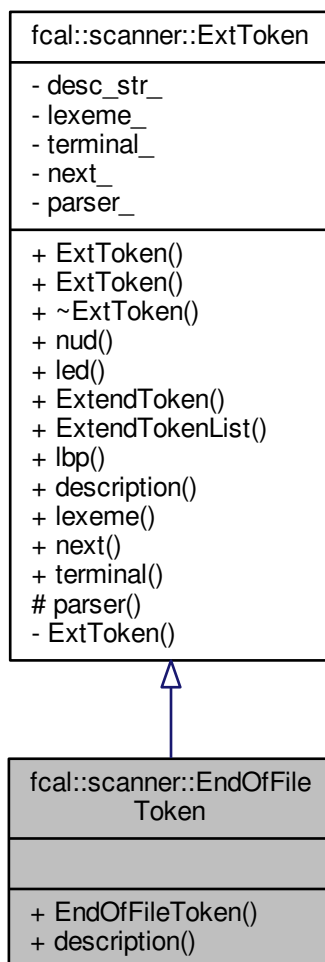
The documentation for this class was generated from the following file:

- `include/ast.h`

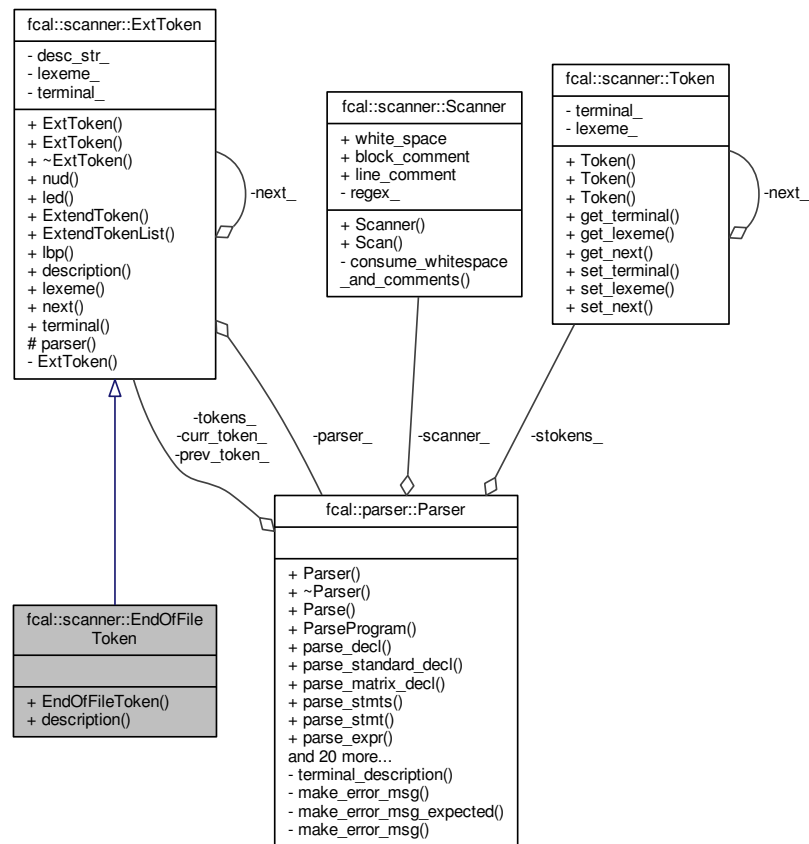
## 7.8 fcal::scanner::EndOfFileToken Class Reference

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

Inheritance diagram for fcal::scanner::EndOfFileToken:



Collaboration diagram for `fcal::scanner::EndOfFileToken`:



## Public Member Functions

- [EndOfFileToken](#) ([parser::Parser](#) \*p, [Token](#) \*t)
- `std::string description ()`

## Additional Inherited Members

### 7.8.1 Constructor & Destructor Documentation

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

### 7.8.2 Member Function Documentation

7.8.2.1 `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`

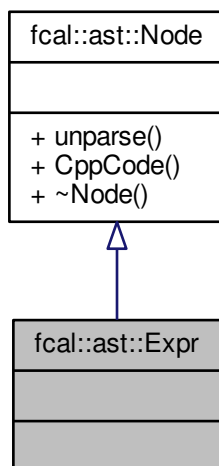
## 7.9 fcal::ast::Expr Class Reference

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

Inheritance diagram for `fcal::ast::Expr`:



Collaboration diagram for fcal::ast::Expr:



### Additional Inherited Members

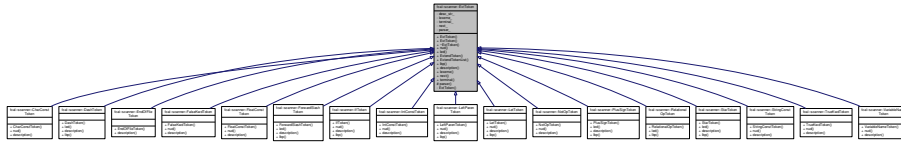
The documentation for this class was generated from the following file:

- `include/ast.h`

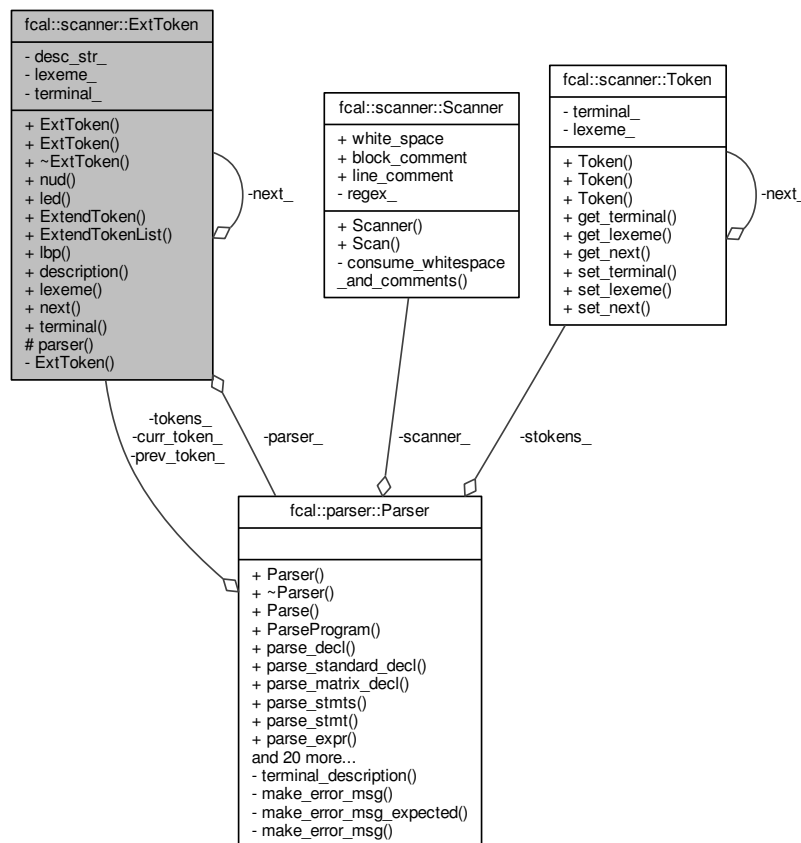
## 7.10 fcal::scanner::ExtToken Class Reference

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

Inheritance diagram for `fcgal::scanner::ExtToken`:



Collaboration diagram for `fcgal::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)

## Private Member Functions

- [ExtToken](#) (void)

## Private Attributes

- [std::string desc\\_str\\_](#)
- [std::string lexeme\\_](#)
- [scanner::TokenType terminal\\_](#)
- [ExtToken \\* next\\_](#)
- [parser::Parser \\* parser\\_](#)

### 7.10.1 Detailed Description

Extends a [Token](#) object by adding properties useful for parsing and describing the [Token](#).

### 7.10.2 Constructor & Destructor Documentation

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

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

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

7.10.2.4 `fcal::scanner::ExtToken::ExtToken ( void )` [inline],[private]

### 7.10.3 Member Function Documentation

7.10.3.1 `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](#).

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

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

7.10.3.4 `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](#).

7.10.3.5 `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](#).

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

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

7.10.3.8 `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](#).

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

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

## 7.10.4 Member Data Documentation

7.10.4.1 `std::string fcal::scanner::ExtToken::desc_str_ [private]`

7.10.4.2 `std::string fcal::scanner::ExtToken::lexeme_ [private]`

7.10.4.3 `ExtToken* fcal::scanner::ExtToken::next_ [private]`

7.10.4.4 `parser::Parser* fcal::scanner::ExtToken::parser_ [private]`

7.10.4.5 `scanner::TokenType fcal::scanner::ExtToken::terminal_ [private]`

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

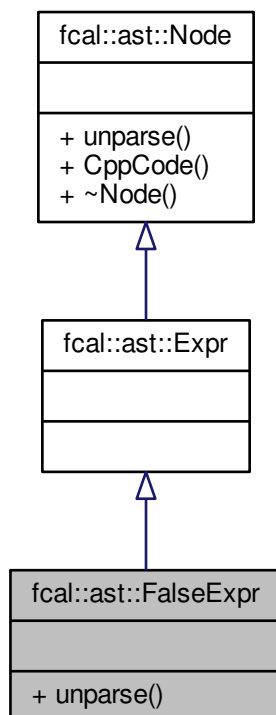
- [include/ext\\_token.h](#)
- [src/ext\\_token.cc](#)



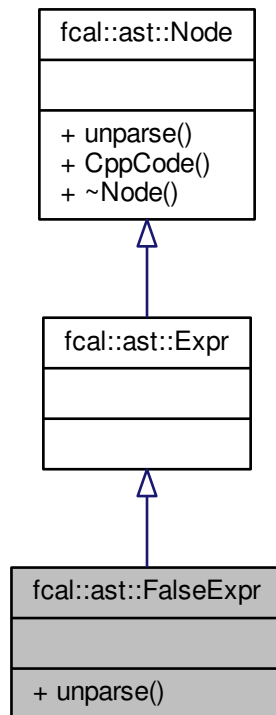
## 7.11 fcal::ast::FalseExpr Class Reference

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

Inheritance diagram for fcal::ast::FalseExpr:



Collaboration diagram for `fcal::ast::FalseExpr`:



## Public Member Functions

- `std::string unparse ()`

### 7.11.1 Member Function Documentation

7.11.1.1 `std::string fcal::ast::FalseExpr::unparse ( void ) [inline],[virtual]`

Reimplemented from `fcal::ast::Node`.

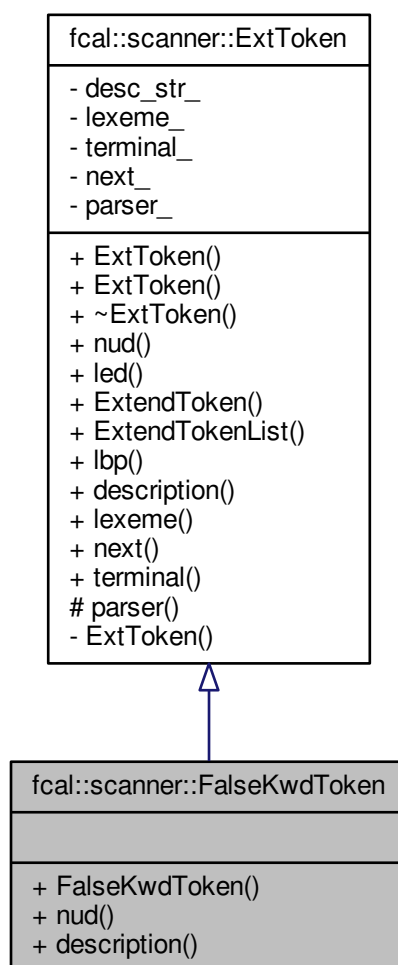
The documentation for this class was generated from the following file:

- `include/ast.h`

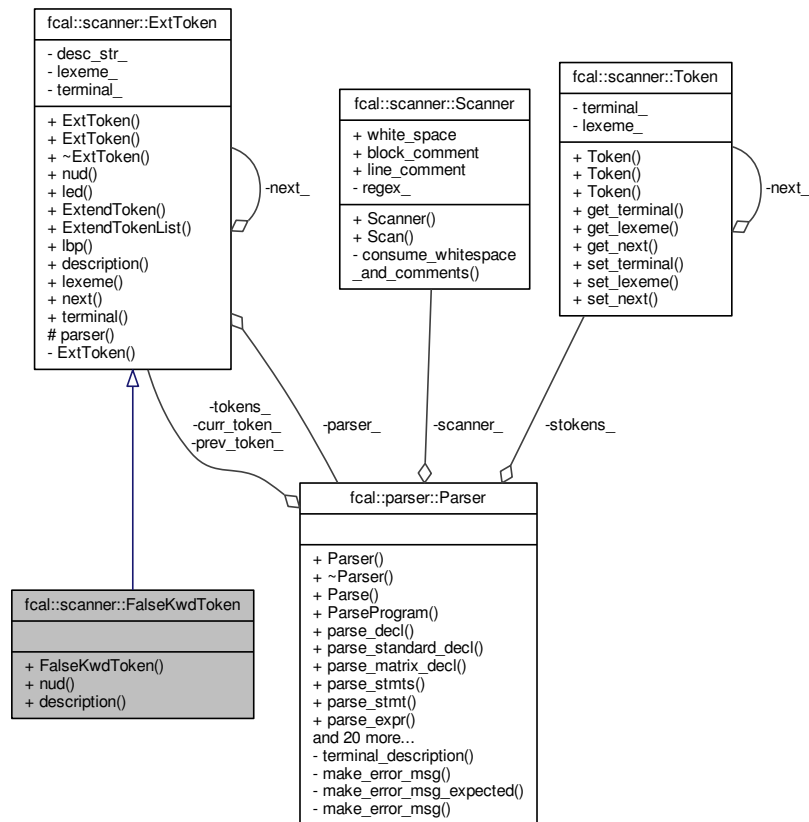
## 7.12 fcal::scanner::FalseKwdToken Class Reference

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

Inheritance diagram for fcal::scanner::FalseKwdToken:



Collaboration diagram for `fcal::scanner::FalseKwdToken`:



## Public Member Functions

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

## Additional Inherited Members

### 7.12.1 Constructor & Destructor Documentation

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

### 7.12.2 Member Function Documentation

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

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

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

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

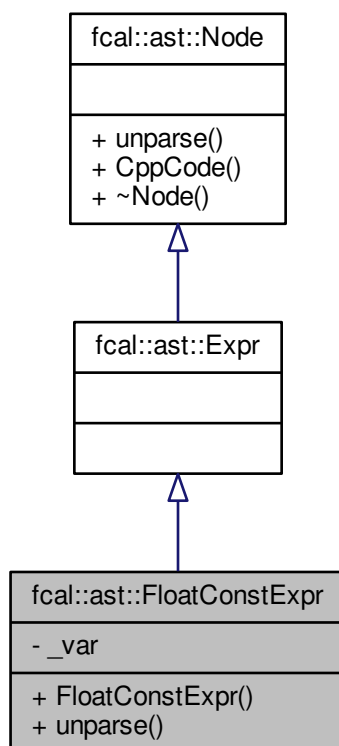
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

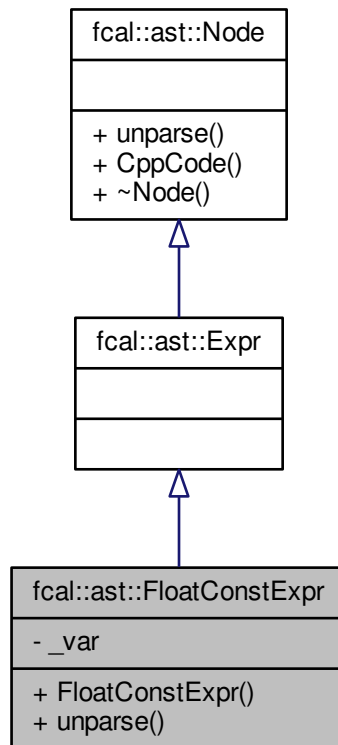
## 7.13 fcal::ast::FloatConstExpr Class Reference

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

Inheritance diagram for fcal::ast::FloatConstExpr:



Collaboration diagram for `fcal::ast::FloatConstExpr`:



## Public Member Functions

- [FloatConstExpr](#) (`std::string var`)
- `std::string` [unparse](#) ()

## Private Attributes

- `std::string` [\\_var](#)

## 7.13.1 Constructor & Destructor Documentation

7.13.1.1 `fcal::ast::FloatConstExpr::FloatConstExpr ( std::string var )` `[inline]`

## 7.13.2 Member Function Documentation

7.13.2.1 `std::string fcal::ast::FloatConstExpr::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.13.3 Member Data Documentation

#### 7.13.3.1 std::string fcal::ast::FloatConstExpr::\_var [private]

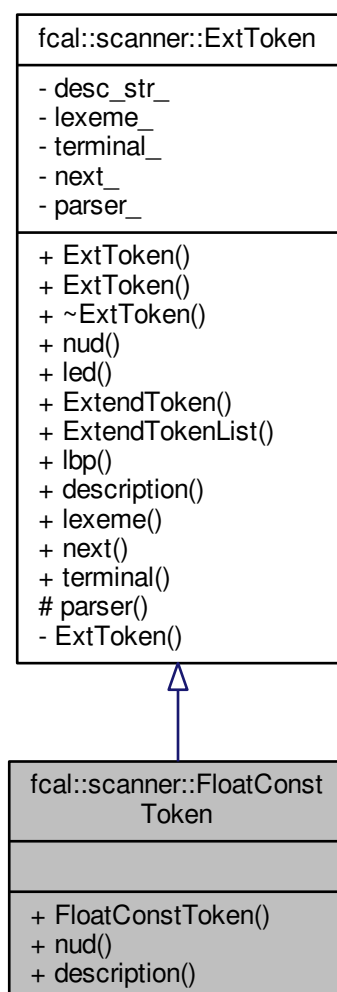
The documentation for this class was generated from the following file:

- [include/ast.h](#)

## 7.14 fcal::scanner::FloatConstToken Class Reference

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

Inheritance diagram for fcal::scanner::FloatConstToken:







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

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

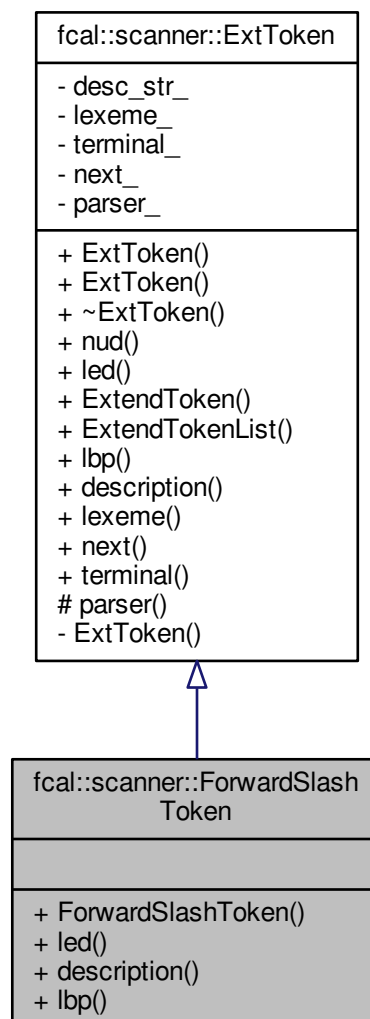
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

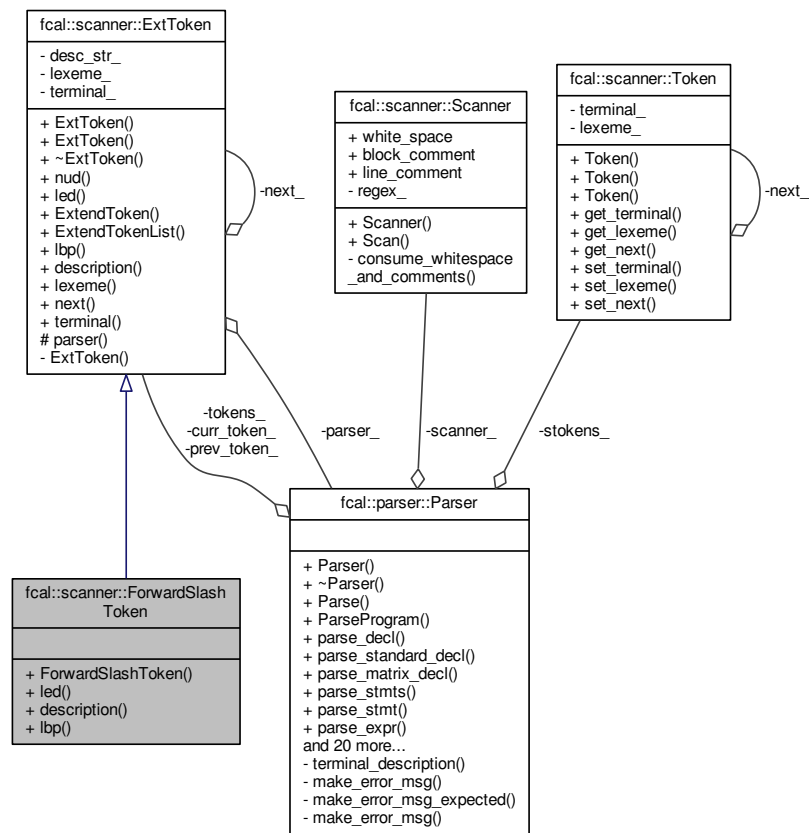
## 7.15 fcal::scanner::ForwardSlashToken Class Reference

```
#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

### 7.15.1 Constructor & Destructor Documentation

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

### 7.15.2 Member Function Documentation

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

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

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

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

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

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

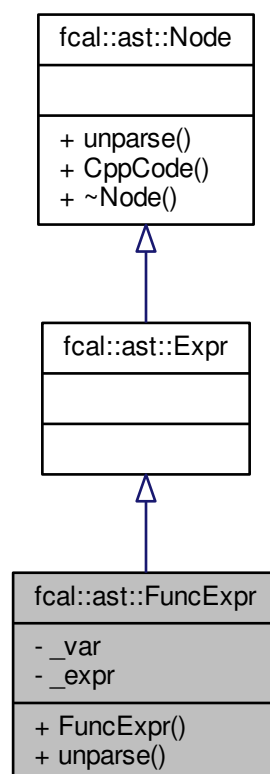
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

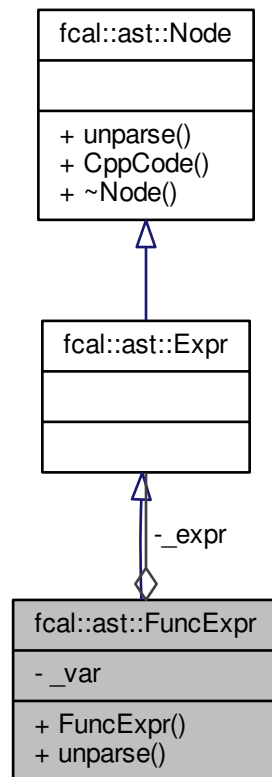
## 7.16 fcal::ast::FuncExpr Class Reference

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

Inheritance diagram for fcal::ast::FuncExpr:



Collaboration diagram for `fcgal::ast::FuncExpr`:



## Public Member Functions

- `FuncExpr` (`std::string var`, `Expr *expr`)
- `std::string unparse ()`

## Private Attributes

- `std::string _var`
- `Expr * _expr`

## 7.16.1 Constructor & Destructor Documentation

7.16.1.1 `fcgal::ast::FuncExpr::FuncExpr ( std::string var, Expr * expr )` `[inline]`

## 7.16.2 Member Function Documentation

7.16.2.1 `std::string fcgal::ast::FuncExpr::unparse ( void )` `[inline]`, `[virtual]`

Reimplemented from `fcgal::ast::Node`.

### 7.16.3 Member Data Documentation

7.16.3.1 `Expr* fcal::ast::FuncExpr::_expr` `[private]`

7.16.3.2 `std::string fcal::ast::FuncExpr::_var` `[private]`

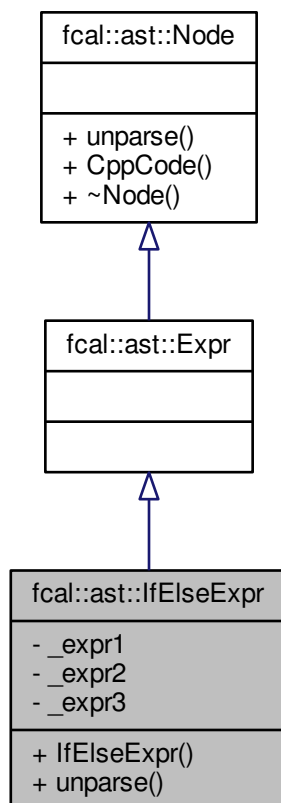
The documentation for this class was generated from the following file:

- [include/ast.h](#)

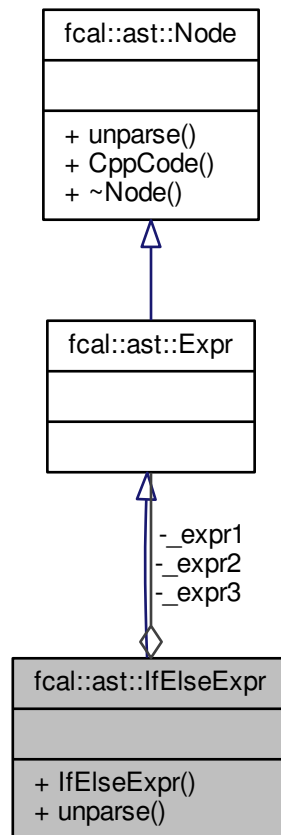
## 7.17 fcal::ast::IfElseExpr Class Reference

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

Inheritance diagram for fcal::ast::IfElseExpr:



Collaboration diagram for `fcgal::ast::IfElseExpr`:



## Public Member Functions

- `IfElseExpr (Expr *expr1, Expr *expr2, Expr *expr3)`
- `std::string unparsed ()`

## Private Attributes

- `Expr * _expr1`
- `Expr * _expr2`
- `Expr * _expr3`

## 7.17.1 Constructor & Destructor Documentation

7.17.1.1 `fcgal::ast::IfElseExpr::IfElseExpr ( Expr * expr1, Expr * expr2, Expr * expr3 )` `[inline]`

## 7.17.2 Member Function Documentation

7.17.2.1 `std::string fcgal::ast::IfElseExpr::unparsed ( void )` `[inline],[virtual]`

Reimplemented from `fcgal::ast::Node`.

### 7.17.3 Member Data Documentation

7.17.3.1 **Expr\*** fcal::ast::IfElseExpr::\_expr1 [private]

7.17.3.2 **Expr\*** fcal::ast::IfElseExpr::\_expr2 [private]

7.17.3.3 **Expr\*** fcal::ast::IfElseExpr::\_expr3 [private]

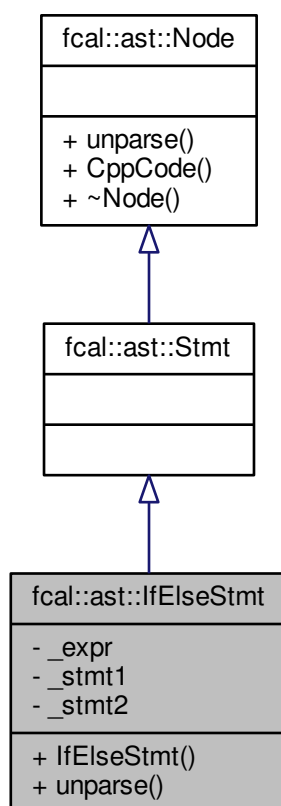
The documentation for this class was generated from the following file:

- include/[ast.h](#)

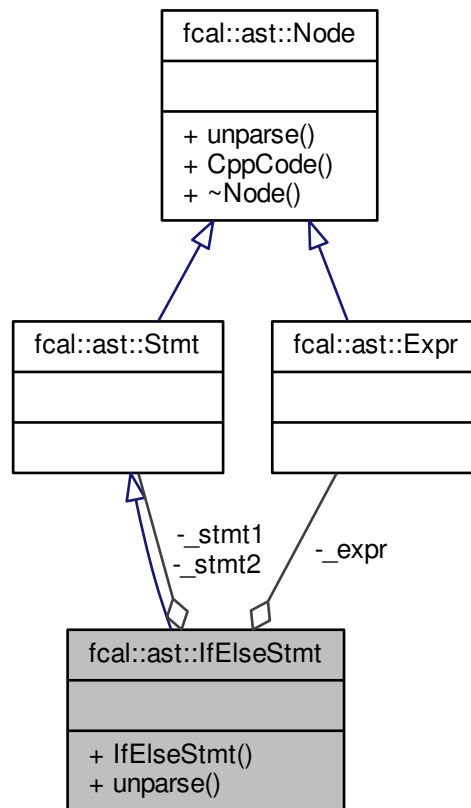
## 7.18 fcal::ast::IfElseStmt Class Reference

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

Inheritance diagram for fcal::ast::IfElseStmt:



Collaboration diagram for `fcal::ast::IfElseStmt`:



## Public Member Functions

- `IfElseStmt (Expr *expr, Stmt *stmt1, Stmt *stmt2)`
- `std::string unparsed ()`

## Private Attributes

- `Expr * _expr`
- `Stmt * _stmt1`
- `Stmt * _stmt2`

## 7.18.1 Constructor & Destructor Documentation

7.18.1.1 `fcal::ast::IfElseStmt::IfElseStmt ( Expr * expr, Stmt * stmt1, Stmt * stmt2 )` `[inline]`

## 7.18.2 Member Function Documentation

7.18.2.1 `std::string fcal::ast::IfElseStmt::unparsed ( void )` `[inline], [virtual]`

Reimplemented from `fcal::ast::Node`.



### 7.18.3 Member Data Documentation

7.18.3.1 **Expr\*** fcal::ast::IfElseStmt::\_expr [private]

7.18.3.2 **Stmt\*** fcal::ast::IfElseStmt::\_stmt1 [private]

7.18.3.3 **Stmt\*** fcal::ast::IfElseStmt::\_stmt2 [private]

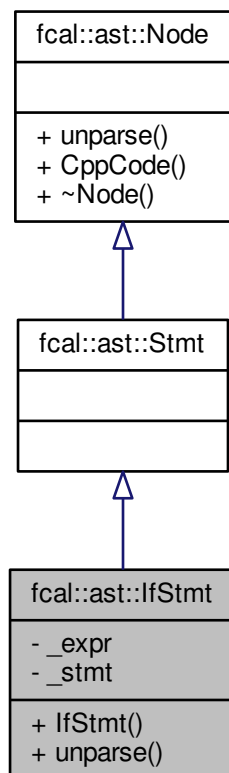
The documentation for this class was generated from the following file:

- include/[ast.h](#)

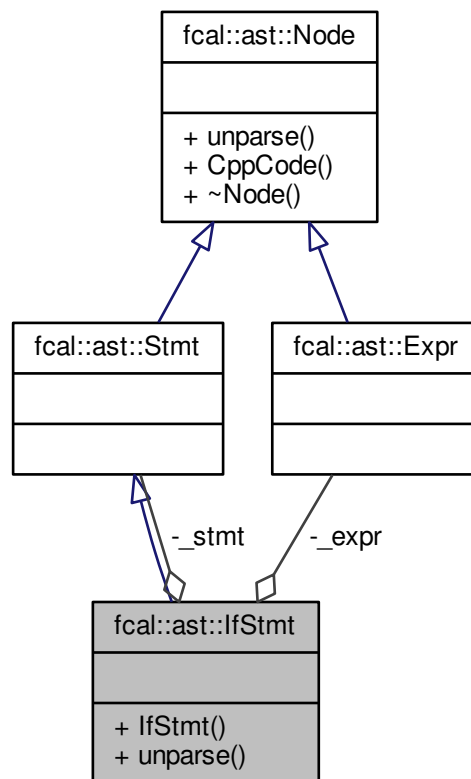
## 7.19 fcal::ast::IfStmt Class Reference

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

Inheritance diagram for fcal::ast::IfStmt:



Collaboration diagram for `fcal::ast::IfStmt`:



## Public Member Functions

- `IfStmt (Expr *expr, Stmt *stmt)`
- `std::string unparse ()`

## Private Attributes

- `Expr * _expr`
- `Stmt * _stmt`

## 7.19.1 Constructor & Destructor Documentation

7.19.1.1 `fcal::ast::IfStmt::IfStmt ( Expr * expr, Stmt * stmt )` `[inline]`

## 7.19.2 Member Function Documentation

7.19.2.1 `std::string fcal::ast::IfStmt::unparse ( void )` `[inline]`, `[virtual]`

Reimplemented from `fcal::ast::Node`.

### 7.19.3 Member Data Documentation

7.19.3.1 **Expr\*** fcal::ast::IfStmt::\_expr [private]

7.19.3.2 **Stmt\*** fcal::ast::IfStmt::\_stmt [private]

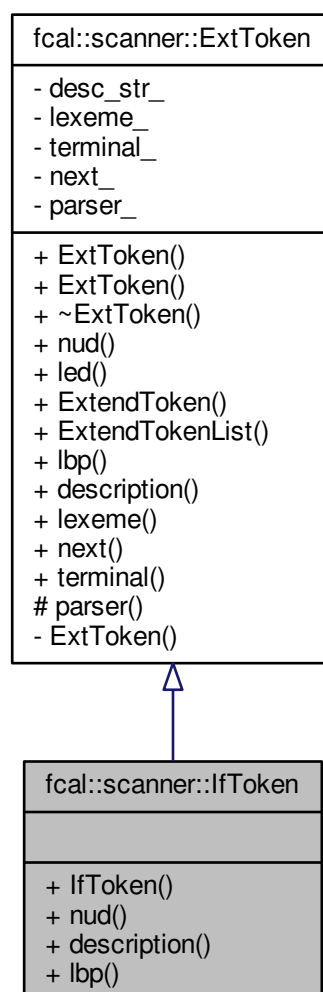
The documentation for this class was generated from the following file:

- include/[ast.h](#)

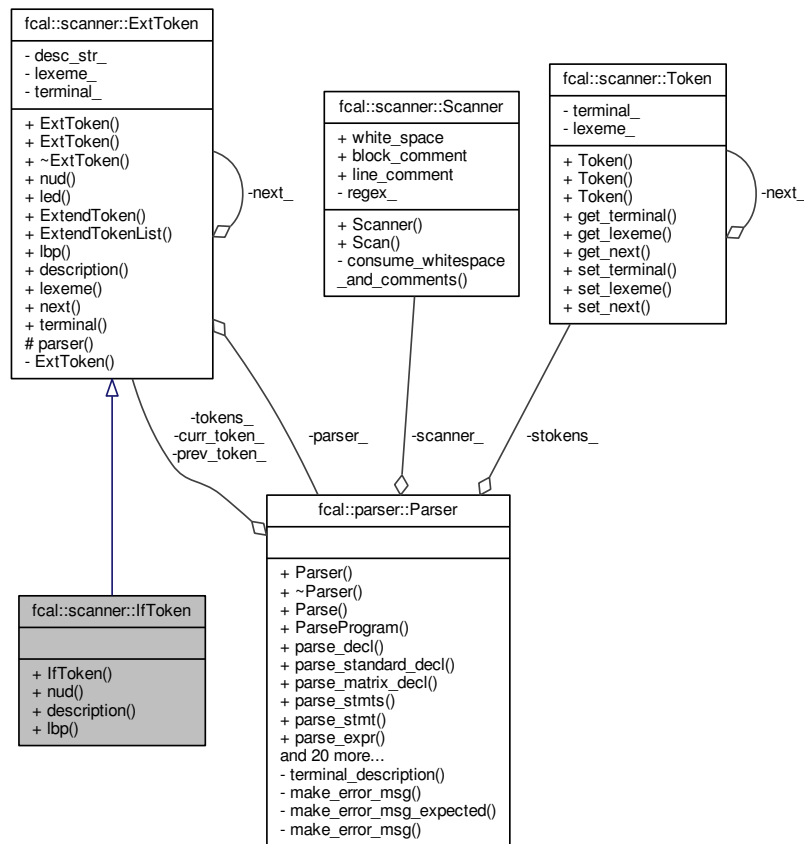
## 7.20 fcal::scanner::IfToken Class Reference

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

Inheritance diagram for fcal::scanner::IfToken:



Collaboration diagram for `fcval::scanner::IfToken`:



## Public Member Functions

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

## Additional Inherited Members

### 7.20.1 Constructor & Destructor Documentation

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

### 7.20.2 Member Function Documentation

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

Reimplemented from `fcval::scanner::ExtToken`.

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

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

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

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

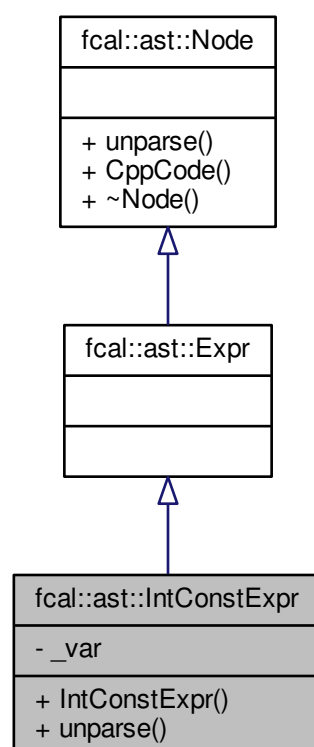
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

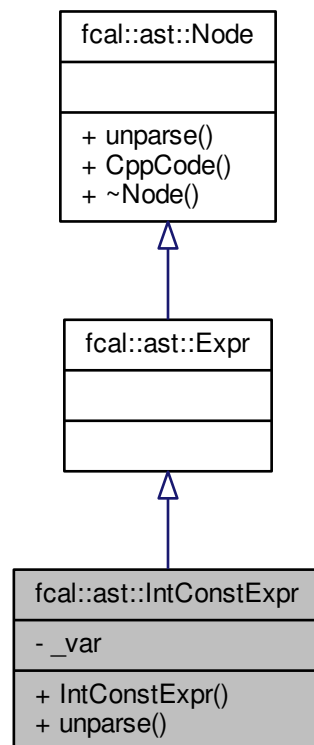
## 7.21 fcal::ast::IntConstExpr Class Reference

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

Inheritance diagram for fcal::ast::IntConstExpr:



Collaboration diagram for `fcal::ast::IntConstExpr`:



## Public Member Functions

- [IntConstExpr](#) (`std::string var`)
- `std::string unparse ()`

## Private Attributes

- `std::string _var`

## 7.21.1 Constructor & Destructor Documentation

7.21.1.1 `fcal::ast::IntConstExpr::IntConstExpr ( std::string var )` `[inline]`

## 7.21.2 Member Function Documentation

7.21.2.1 `std::string fcal::ast::IntConstExpr::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.21.3 Member Data Documentation

#### 7.21.3.1 `std::string fcal::ast::IntConstExpr::_var` `[private]`

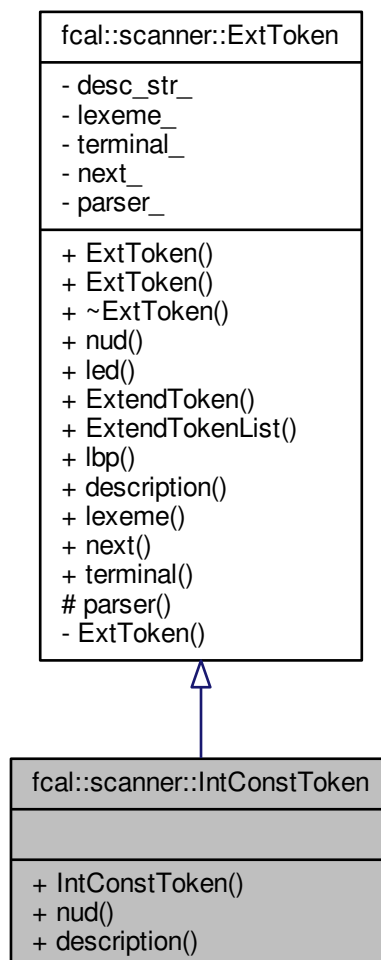
The documentation for this class was generated from the following file:

- include/[ast.h](#)

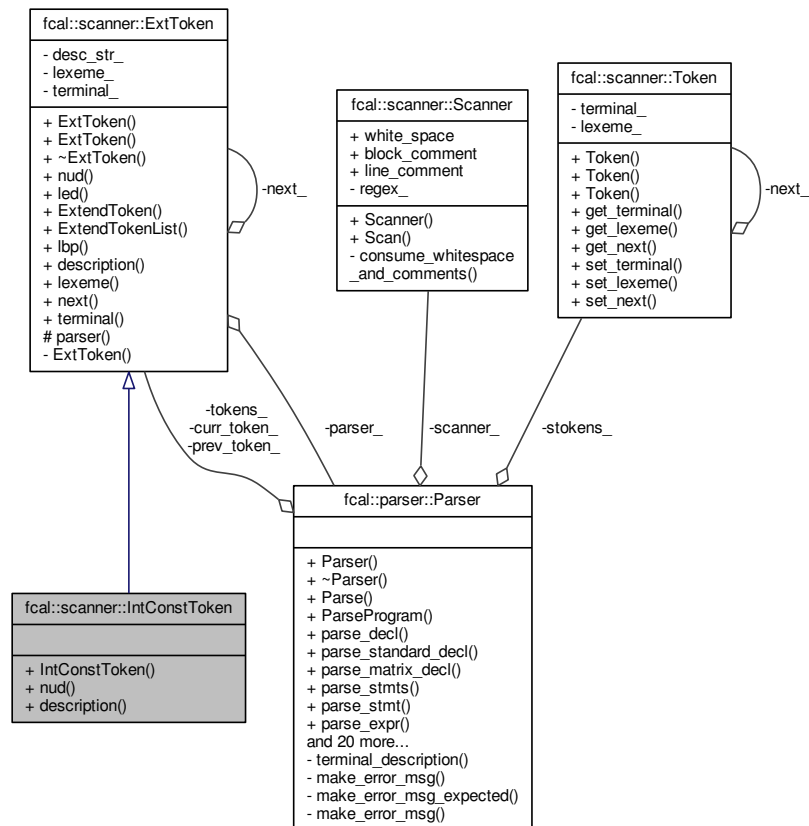
## 7.22 fcal::scanner::IntConstToken Class Reference

```
#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

### 7.22.1 Constructor & Destructor Documentation

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

### 7.22.2 Member Function Documentation

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

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



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

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

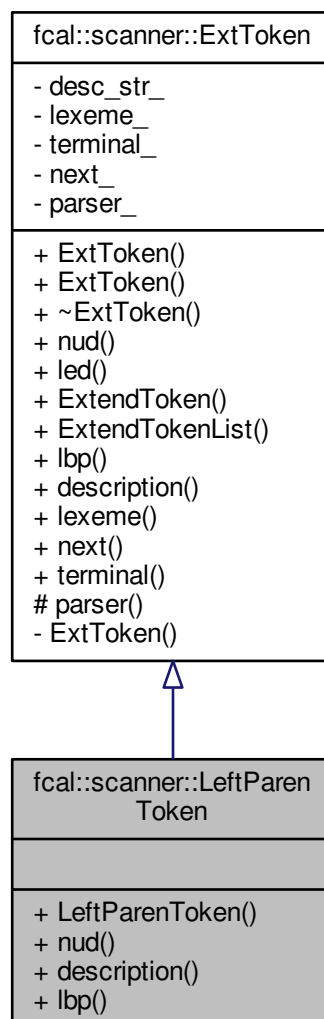
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

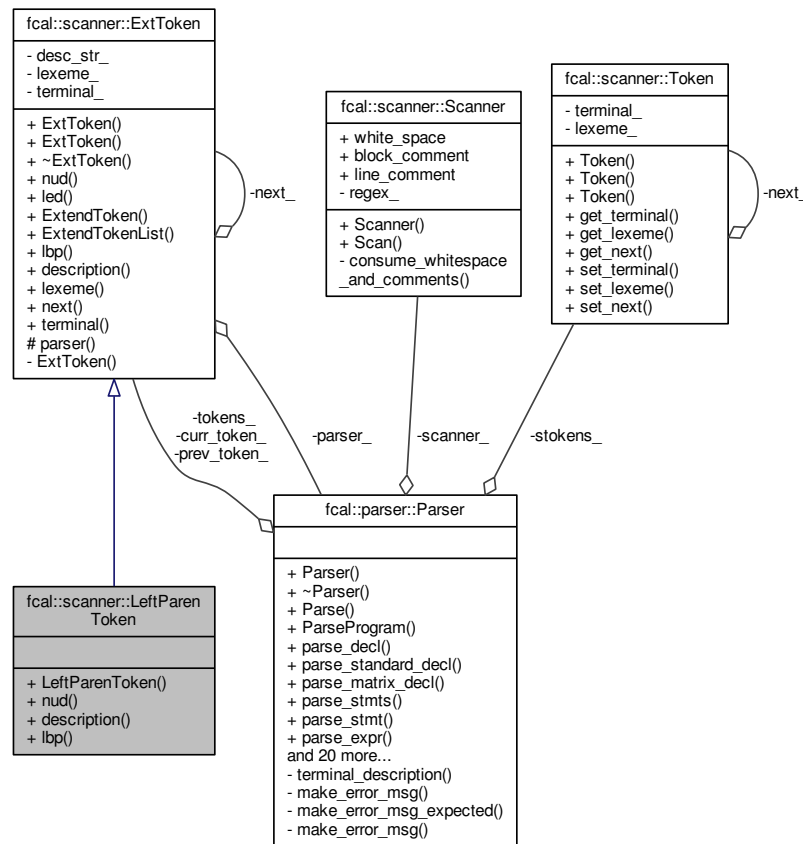
## 7.23 fcal::scanner::LeftParenToken Class Reference

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

Inheritance diagram for `fcal::scanner::LeftParenToken`:



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



## Public Member Functions

- [LeftParenToken](#) ([parser::Parser](#) \*p, [Token](#) \*t)
- [parser::ParseResult nud](#) ()
- [std::string description](#) ()
- [int lbp](#) ()

## Additional Inherited Members

### 7.23.1 Constructor & Destructor Documentation

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

### 7.23.2 Member Function Documentation

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

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

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

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

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

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

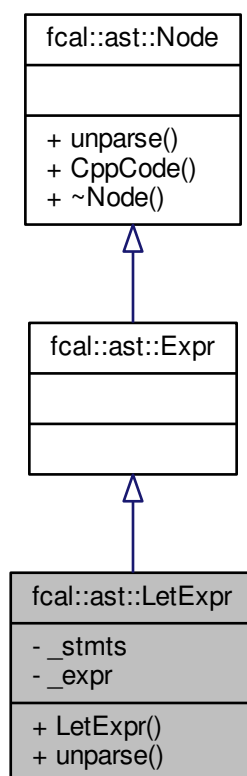
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

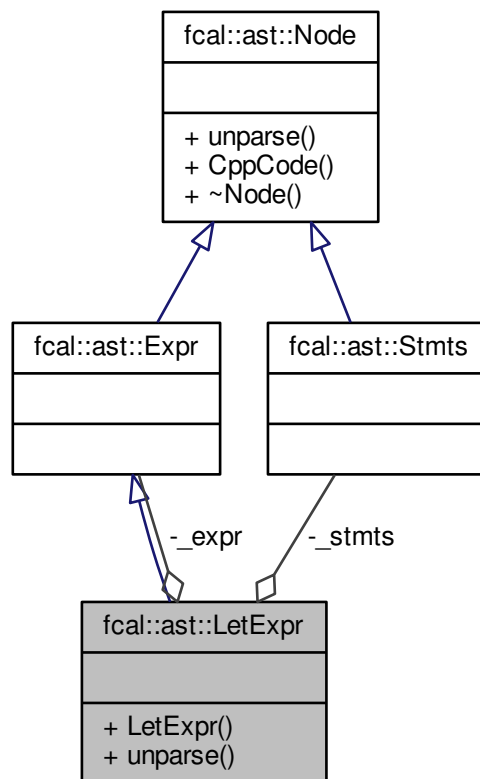
## 7.24 fcal::ast::LetExpr Class Reference

```
#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 unparsed ()`

## Private Attributes

- `Stmts * _stmts`
- `Expr * _expr`

## 7.24.1 Constructor & Destructor Documentation

7.24.1.1 `fcal::ast::LetExpr::LetExpr ( Stmt * stmts, Expr * expr )` `[inline]`

## 7.24.2 Member Function Documentation

7.24.2.1 `std::string fcal::ast::LetExpr::unparsed ( void )` `[inline]`, `[virtual]`

Reimplemented from `fcal::ast::Node`.

### 7.24.3 Member Data Documentation

7.24.3.1 `Expr* fcal::ast::LetExpr::_expr` [private]

7.24.3.2 `Stmts* fcal::ast::LetExpr::_stmts` [private]

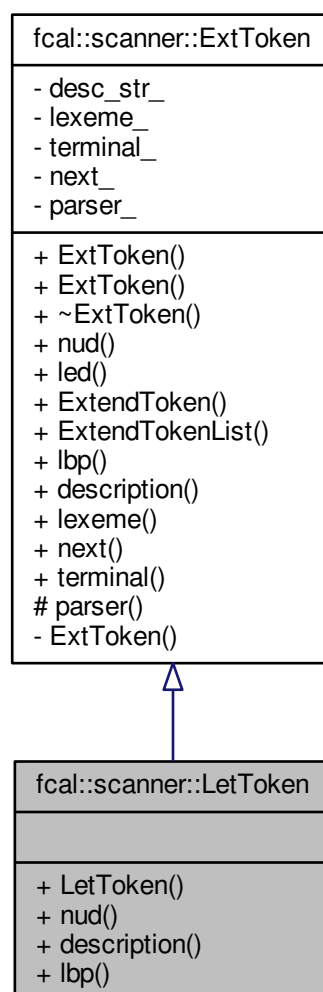
The documentation for this class was generated from the following file:

- [include/ast.h](#)

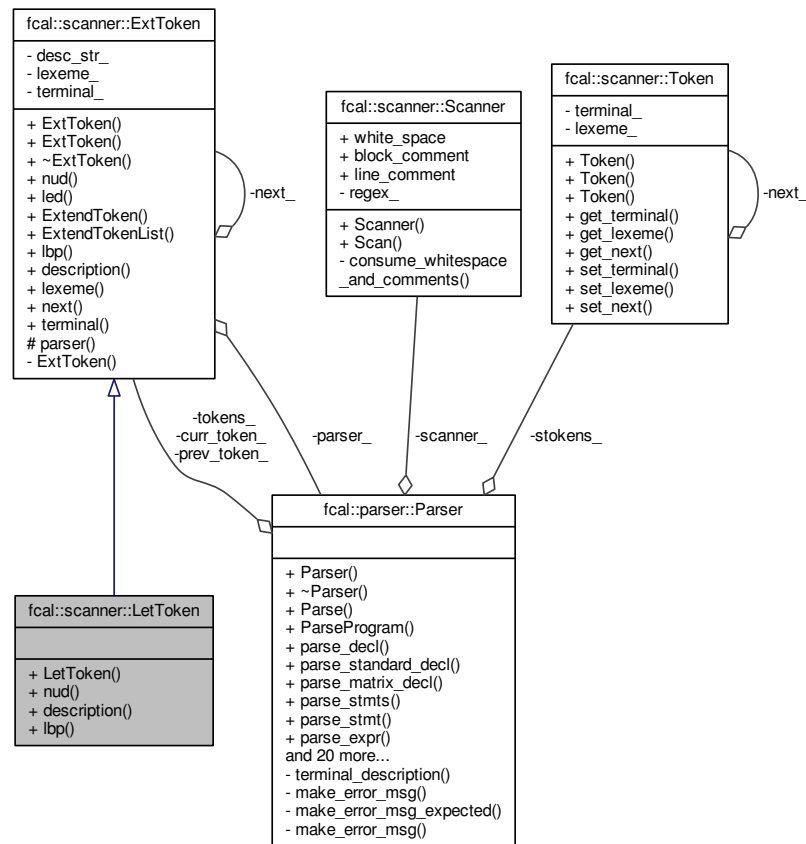
## 7.25 fcal::scanner::LetToken Class Reference

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

Inheritance diagram for fcal::scanner::LetToken:



Collaboration diagram for `fcsl::scanner::LetToken`:



## Public Member Functions

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

## Additional Inherited Members

### 7.25.1 Constructor & Destructor Documentation

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

### 7.25.2 Member Function Documentation

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

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

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

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

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

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

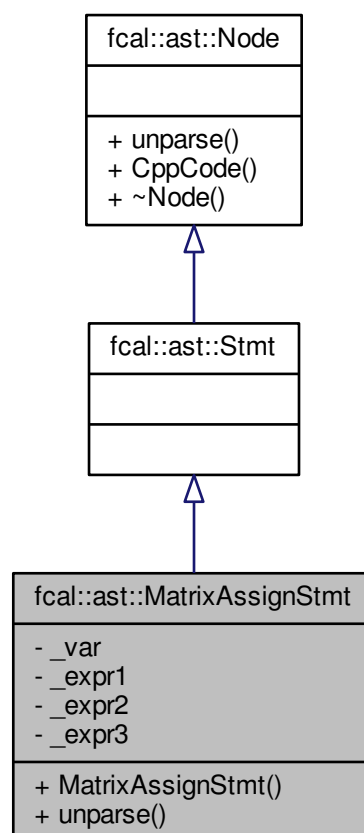
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

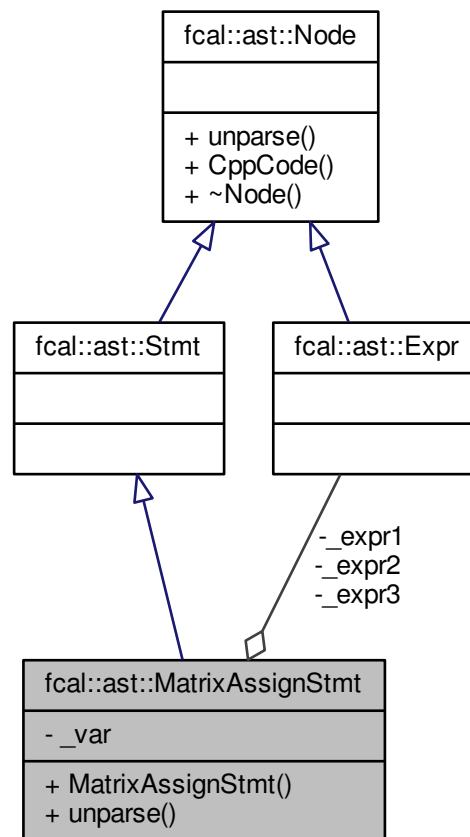
## 7.26 fcal::ast::MatrixAssignStmt Class Reference

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

Inheritance diagram for `fcal::ast::MatrixAssignStmt`:



Collaboration diagram for `fcal::ast::MatrixAssignStmt`:



## Public Member Functions

- `MatrixAssignStmt` (`std::string var`, `Expr *expr1`, `Expr *expr2`, `Expr *expr3`)
- `std::string unparse ()`

## Private Attributes

- `std::string _var`
- `Expr * _expr1`
- `Expr * _expr2`
- `Expr * _expr3`

## 7.26.1 Constructor & Destructor Documentation

7.26.1.1 `fcal::ast::MatrixAssignStmt::MatrixAssignStmt ( std::string var, Expr * expr1, Expr * expr2, Expr * expr3 )`  
`[inline]`



## 7.26.2 Member Function Documentation

7.26.2.1 `std::string fcal::ast::MatrixAssignStmt::unparse ( void )` `[inline]`, `[virtual]`

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

## 7.26.3 Member Data Documentation

7.26.3.1 `Expr* fcal::ast::MatrixAssignStmt::_expr1` `[private]`

7.26.3.2 `Expr* fcal::ast::MatrixAssignStmt::_expr2` `[private]`

7.26.3.3 `Expr* fcal::ast::MatrixAssignStmt::_expr3` `[private]`

7.26.3.4 `std::string fcal::ast::MatrixAssignStmt::_var` `[private]`

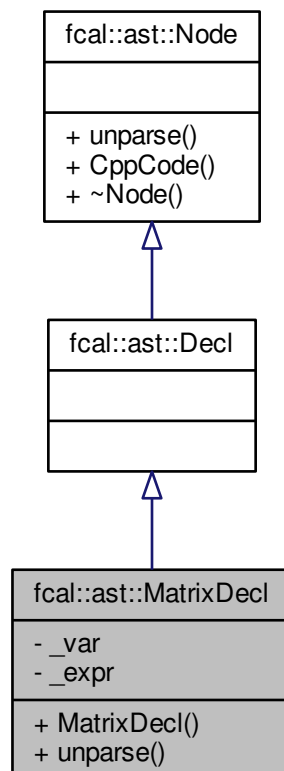
The documentation for this class was generated from the following file:

- [include/ast.h](#)

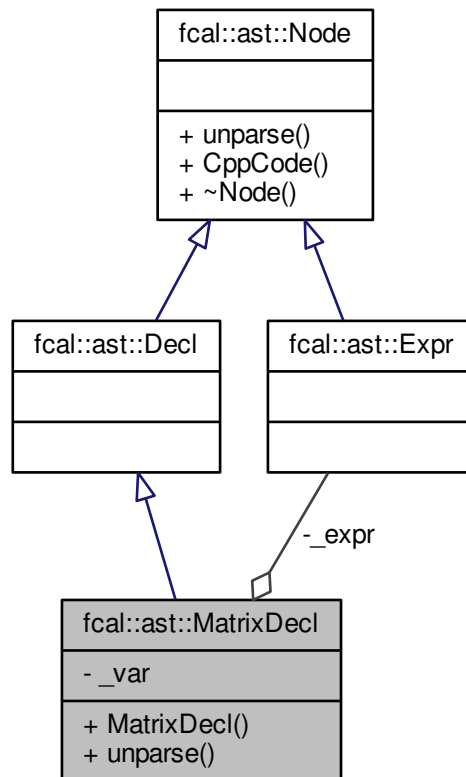
## 7.27 fcal::ast::MatrixDecl Class Reference

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

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



Collaboration diagram for `fcal::ast::MatrixDecl`:



## Public Member Functions

- [MatrixDecl](#) (`std::string var`, [Expr](#) \*`expr`)
- `std::string unparsed ()`

## Private Attributes

- `std::string _var`
- [Expr](#) \* `_expr`

## 7.27.1 Constructor & Destructor Documentation

7.27.1.1 `fcal::ast::MatrixDecl::MatrixDecl ( std::string var, Expr * expr )` `[inline]`

## 7.27.2 Member Function Documentation

7.27.2.1 `std::string fcal::ast::MatrixDecl::unparsed ( void )` `[inline]`, `[virtual]`

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

### 7.27.3 Member Data Documentation

7.27.3.1 `Expr* fcal::ast::MatrixDecl::_expr` [private]

7.27.3.2 `std::string fcal::ast::MatrixDecl::_var` [private]

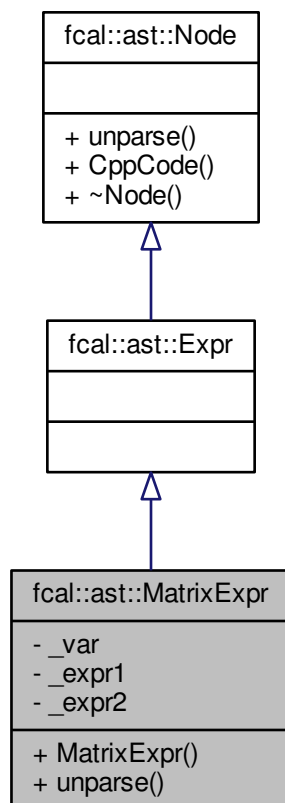
The documentation for this class was generated from the following file:

- [include/ast.h](#)

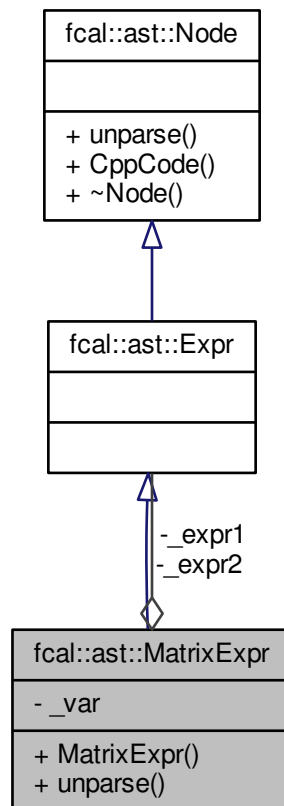
## 7.28 fcal::ast::MatrixExpr Class Reference

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

Inheritance diagram for fcal::ast::MatrixExpr:



Collaboration diagram for `fcgal::ast::MatrixExpr`:



## Public Member Functions

- [MatrixExpr](#) (`std::string var`, [Expr](#) \**expr1*, [Expr](#) \**expr2*)
- `std::string unparsed ()`

## Private Attributes

- `std::string _var`
- [Expr](#) \* *\_expr1*
- [Expr](#) \* *\_expr2*

### 7.28.1 Constructor & Destructor Documentation

7.28.1.1 `fcgal::ast::MatrixExpr::MatrixExpr ( std::string var, Expr * expr1, Expr * expr2 )` `[inline]`

### 7.28.2 Member Function Documentation

7.28.2.1 `std::string fcgal::ast::MatrixExpr::unparsed ( void )` `[inline]`, `[virtual]`

Reimplemented from [fcgal::ast::Node](#).

### 7.28.3 Member Data Documentation

7.28.3.1 **Expr\*** fcal::ast::MatrixExpr::\_expr1 [private]

7.28.3.2 **Expr\*** fcal::ast::MatrixExpr::\_expr2 [private]

7.28.3.3 **std::string** fcal::ast::MatrixExpr::\_var [private]

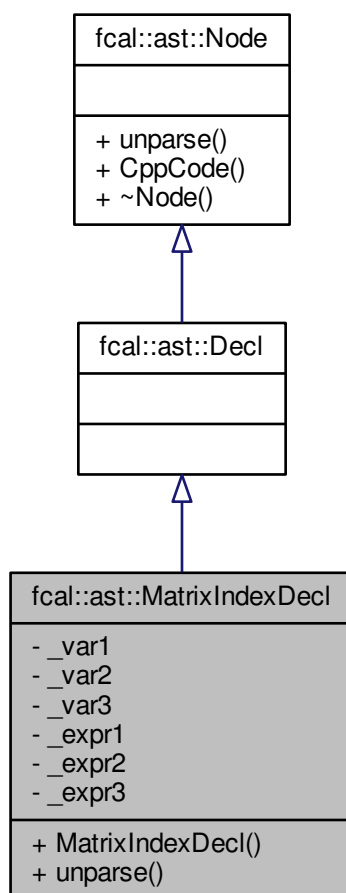
The documentation for this class was generated from the following file:

- include/[ast.h](#)

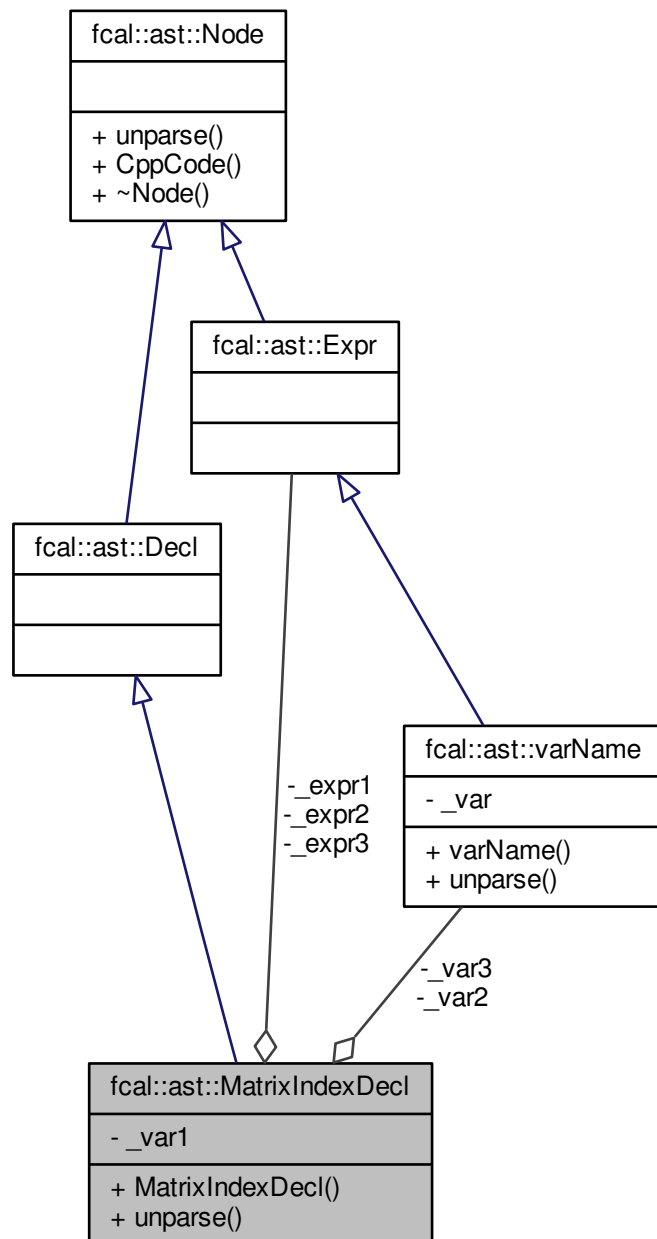
## 7.29 fcal::ast::MatrixIndexDecl Class Reference

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

Inheritance diagram for fcal::ast::MatrixIndexDecl:



Collaboration diagram for `fcgal::ast::MatrixIndexDecl`:



### Public Member Functions

- `MatrixIndexDecl` (`std::string var1`, `Expr *expr1`, `Expr *expr2`, `varName *var2`, `varName *var3`, `Expr *expr3`)
- `std::string unparse ()`

### Private Attributes

- `std::string _var1`

- [varName \\* \\_var2](#)
- [varName \\* \\_var3](#)
- [Expr \\* \\_expr1](#)
- [Expr \\* \\_expr2](#)
- [Expr \\* \\_expr3](#)

## 7.29.1 Constructor & Destructor Documentation

7.29.1.1 `fcal::ast::MatrixIndexDecl::MatrixIndexDecl ( std::string var1, Expr * expr1, Expr * expr2, varName * var2, varName * var3, Expr * expr3 )` `[inline]`

## 7.29.2 Member Function Documentation

7.29.2.1 `std::string fcal::ast::MatrixIndexDecl::unparse ( void )` `[inline]`, `[virtual]`

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

## 7.29.3 Member Data Documentation

7.29.3.1 `Expr* fcal::ast::MatrixIndexDecl::_expr1` `[private]`

7.29.3.2 `Expr* fcal::ast::MatrixIndexDecl::_expr2` `[private]`

7.29.3.3 `Expr* fcal::ast::MatrixIndexDecl::_expr3` `[private]`

7.29.3.4 `std::string fcal::ast::MatrixIndexDecl::_var1` `[private]`

7.29.3.5 `varName* fcal::ast::MatrixIndexDecl::_var2` `[private]`

7.29.3.6 `varName* fcal::ast::MatrixIndexDecl::_var3` `[private]`

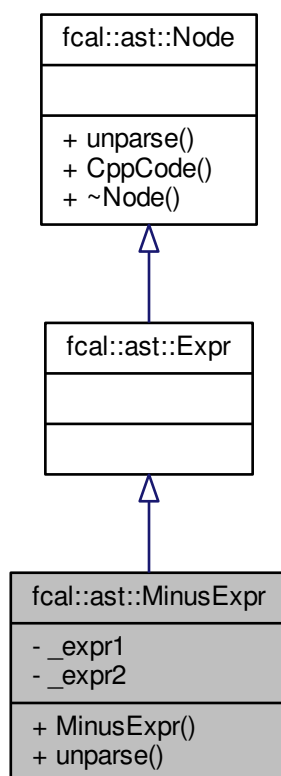
The documentation for this class was generated from the following file:

- [include/ast.h](#)

### 7.30 fcal::ast::MinusExpr Class Reference

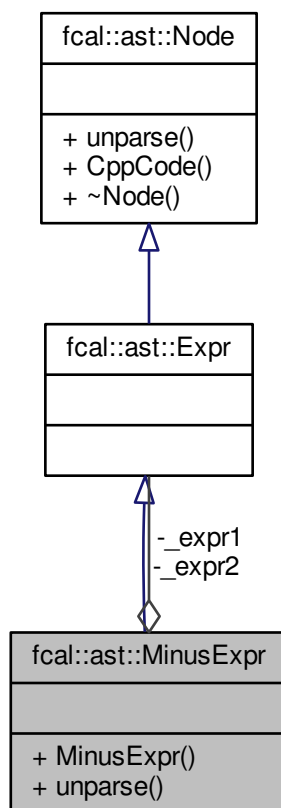
```
#include <ast.h>
```

Inheritance diagram for fcal::ast::MinusExpr:





Collaboration diagram for fcal::ast::MinusExpr:



## Public Member Functions

- [MinusExpr](#) ([Expr](#) \*expr1, [Expr](#) \*expr2)
- [std::string unparse](#) ()

## Private Attributes

- [Expr](#) \* [\\_expr1](#)
- [Expr](#) \* [\\_expr2](#)

### 7.30.1 Constructor & Destructor Documentation

7.30.1.1 `fcal::ast::MinusExpr::MinusExpr ( Expr * expr1, Expr * expr2 )` `[inline]`

### 7.30.2 Member Function Documentation

7.30.2.1 `std::string fcal::ast::MinusExpr::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.30.3 Member Data Documentation

7.30.3.1 `Expr* fcal::ast::MinusExpr::_expr1` `[private]`

7.30.3.2 `Expr* fcal::ast::MinusExpr::_expr2` `[private]`

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

- [include/ast.h](#)

## 7.31 MySequence< T, N > Class Template Reference

Collaboration diagram for MySequence< T, N >:

MySequence< T, N >
- memblock_
+ MySequence() + set_member() + get_member()

### Public Member Functions

- [MySequence](#) (void)
- void [set\\_member](#) (int x, T value)
- T [get\\_member](#) (int x)

### Private Attributes

- T [memblock\\_](#) [N]

### 7.31.1 Constructor & Destructor Documentation

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

### 7.31.2 Member Function Documentation

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

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

### 7.31.3 Member Data Documentation

7.31.3.1 `template<class T, int N> T MySequence< T, N >::memblock_ [N]` `[private]`

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

- [src/templates.cc](#)

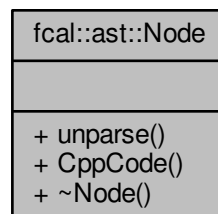
## 7.32 fcal::ast::Node Class Reference

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

Inheritance diagram for fcal::ast::Node:



Collaboration diagram for fcal::ast::Node:



### Public Member Functions

- virtual std::string [unparse](#) (void)
- virtual std::string [CppCode](#) (void)
- virtual [~Node](#) (void)

### 7.32.1 Detailed Description

Abstract class used as the parent of all of the AST classes to be used by the parser to generate and AST and unparse a parsed program

### 7.32.2 Constructor & Destructor Documentation

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

### 7.32.3 Member Function Documentation

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

### 7.32.3.2 `virtual std::string fcal::ast::Node::unparse ( void ) [inline],[virtual]`

Reimplemented in `fcal::ast::NotExpr`, `fcal::ast::IfElseExpr`, `fcal::ast::LetExpr`, `fcal::ast::ParenExpr`, `fcal::ast::FuncExpr`, `fcal::ast::MatrixExpr`, `fcal::ast::RelationalExpr`, `fcal::ast::MinusExpr`, `fcal::ast::PlusExpr`, `fcal::ast::DivideExpr`, `fcal::ast::TimesExpr`, `fcal::ast::FalseExpr`, `fcal::ast::TrueExpr`, `fcal::ast::FloatConstExpr`, `fcal::ast::IntConstExpr`, `fcal::ast::StringConstExpr`, `fcal::ast::VariableExpr`, `fcal::ast::MatrixDecl`, `fcal::ast::MatrixIndexDecl`, `fcal::ast::VarDecl`, `fcal::ast::SCStmt`, `fcal::ast::WhileStmt`, `fcal::ast::RepeatStmt`, `fcal::ast::PrintStmt`, `fcal::ast::MatrixAssignStmt`, `fcal::ast::AssignStmt`, `fcal::ast::IfElseStmt`, `fcal::ast::IfStmt`, `fcal::ast::StmtsStmt`, `fcal::ast::DeclStmt`, `fcal::ast::SeqStmts`, `fcal::ast::EmptyStmts`, `fcal::ast::Program`, and `fcal::ast::varName`.

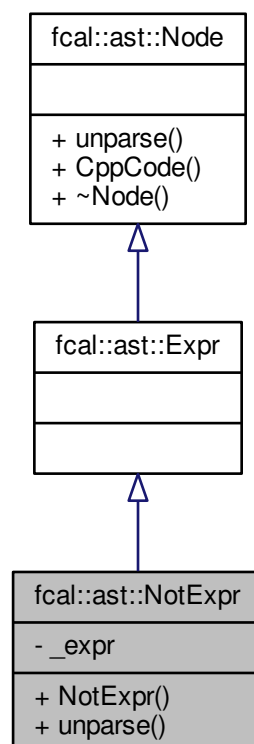
The documentation for this class was generated from the following file:

- `include/ast.h`

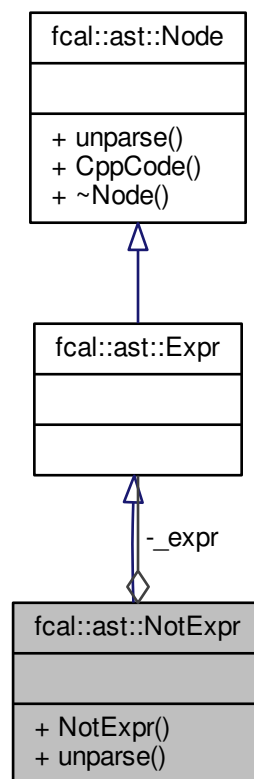
## 7.33 `fcal::ast::NotExpr` Class Reference

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

Inheritance diagram for `fcal::ast::NotExpr`:



Collaboration diagram for fcal::ast::NotExpr:



## Public Member Functions

- [NotExpr](#) ([Expr](#) \*expr)
- std::string [unparse](#) ()

## Private Attributes

- [Expr](#) \* [\\_expr](#)

### 7.33.1 Constructor & Destructor Documentation

7.33.1.1 `fcal::ast::NotExpr::NotExpr ( Expr * expr )` `[inline]`

### 7.33.2 Member Function Documentation

7.33.2.1 `std::string fcal::ast::NotExpr::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.33.3 Member Data Documentation

#### 7.33.3.1 Expr\* fcal::ast::NotExpr::\_expr [private]

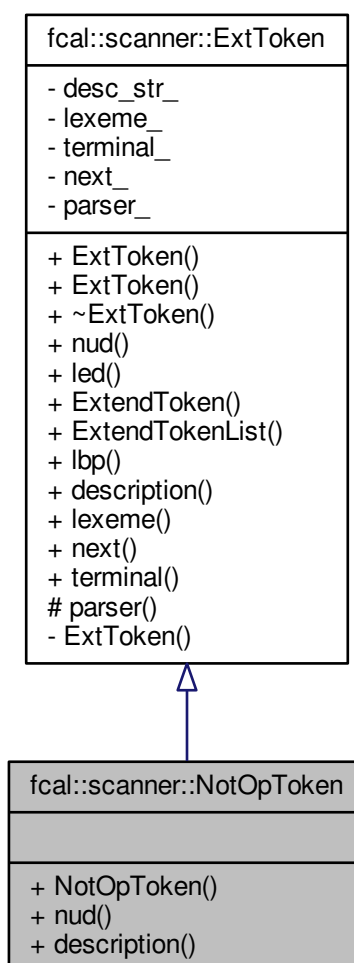
The documentation for this class was generated from the following file:

- include/[ast.h](#)

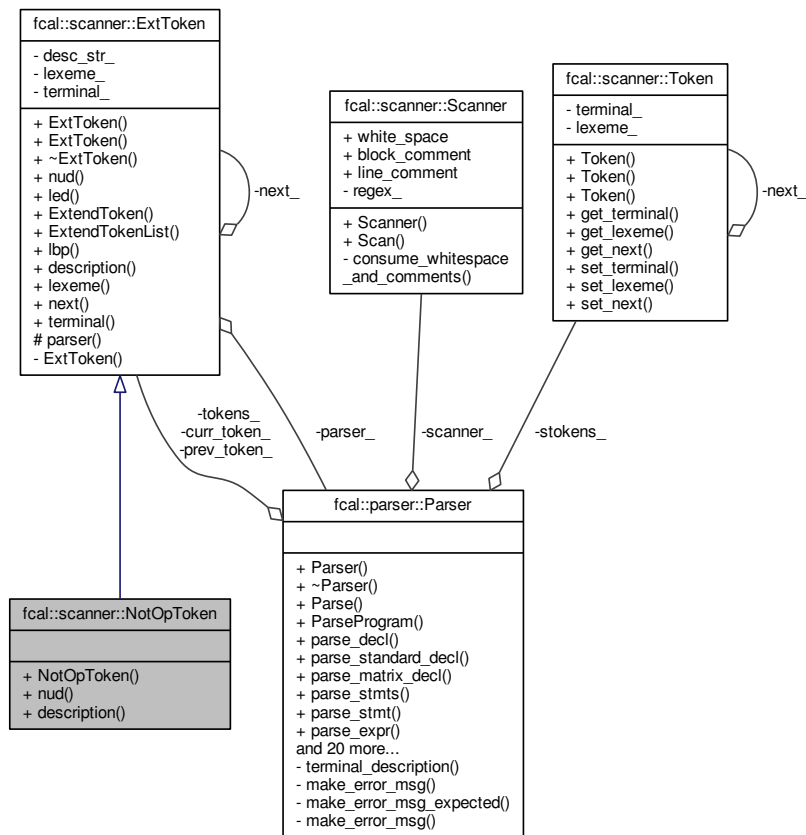
### 7.34 fcal::scanner::NotOpToken Class Reference

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

Inheritance diagram for fcal::scanner::NotOpToken:



Collaboration diagram for fcal::scanner::NotOpToken:



## Public Member Functions

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

## Additional Inherited Members

### 7.34.1 Constructor & Destructor Documentation

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

### 7.34.2 Member Function Documentation

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

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

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

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

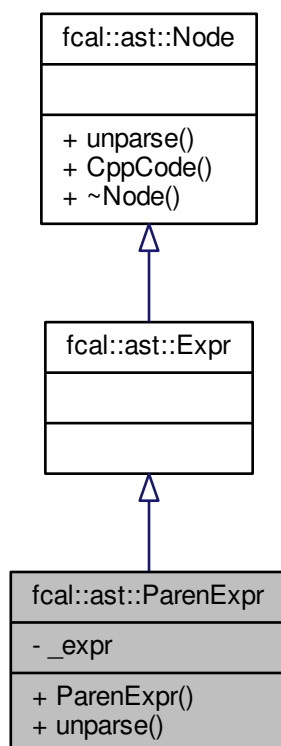
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

## 7.35 fcal::ast::ParenExpr Class Reference

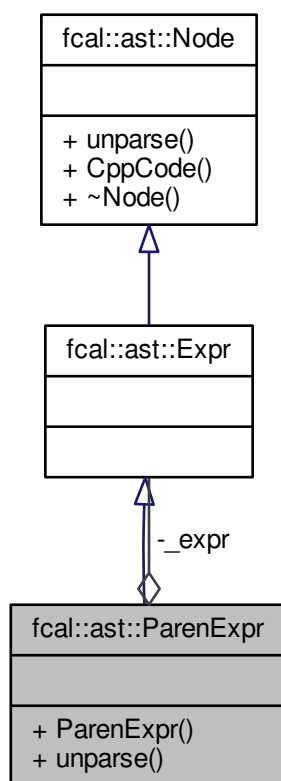
```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::ParenExpr`:





Collaboration diagram for fcal::ast::ParenExpr:



## Public Member Functions

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

## Private Attributes

- [Expr](#) \* [\\_expr](#)

### 7.35.1 Constructor & Destructor Documentation

7.35.1.1 `fcal::ast::ParenExpr::ParenExpr ( Expr * expr )` `[inline]`

### 7.35.2 Member Function Documentation

7.35.2.1 `std::string fcal::ast::ParenExpr::unparse ( void )` `[inline], [virtual]`

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

### 7.35.3 Member Data Documentation

7.35.3.1 `Expr* fcal::ast::ParenExpr::_expr` `[private]`

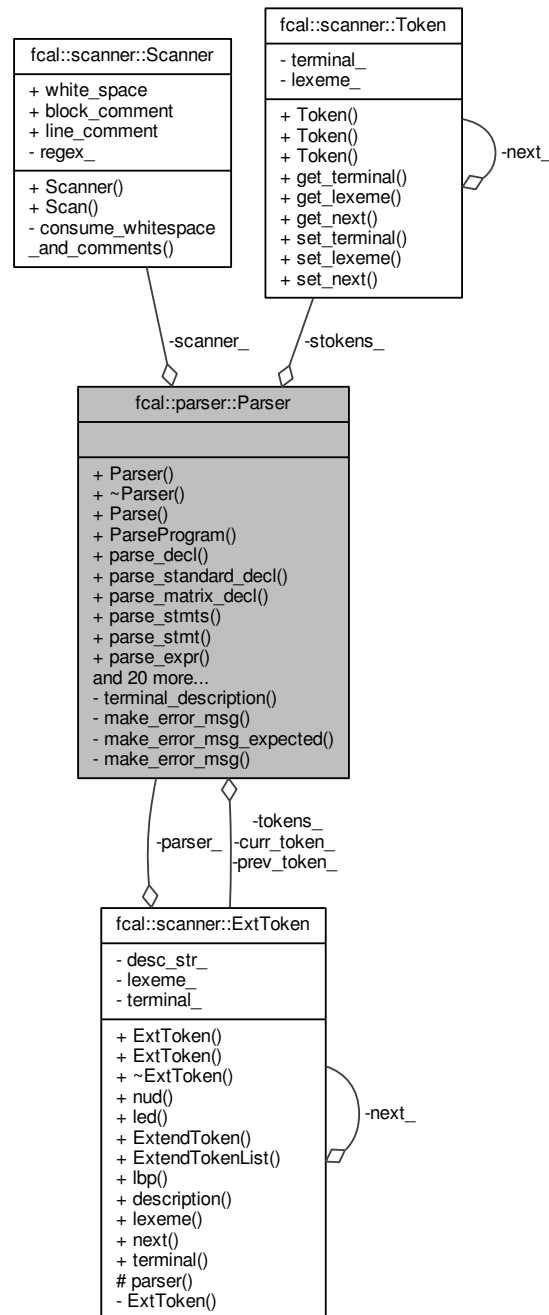
The documentation for this class was generated from the following file:

- `include/ast.h`

## 7.36 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 \(void\)](#)

### Private Member Functions

- [std::string terminal\\_description \(const scanner::TokenType &terminal\)](#)
- [std::string make\\_error\\_msg \(const scanner::TokenType &terminal\)](#)
- [std::string make\\_error\\_msg\\_expected \(const scanner::TokenType &terminal\)](#)
- [std::string make\\_error\\_msg \(const char \\*msg\)](#)

### Private Attributes

- [scanner::ExtToken \\* tokens\\_](#)
- [scanner::ExtToken \\* curr\\_token\\_](#)
- [scanner::ExtToken \\* prev\\_token\\_](#)
- [scanner::Token \\* stokens\\_](#)
- [scanner::Scanner \\* scanner\\_](#)

### 7.36.1 Detailed Description

Recursively parses a linked list of Token objects as a tree of [Parser](#) Results and creates an Abstract Syntax Tree to be used for unparsing using the classes in [ast.h](#)

## 7.36.2 Constructor & Destructor Documentation

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

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

## 7.36.3 Member Function Documentation

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

7.36.3.2 `std::string fcal::parser::Parser::make_error_msg ( const scanner::TokenType & terminal )` `[private]`

7.36.3.3 `std::string fcal::parser::Parser::make_error_msg ( const char * msg )` `[private]`

7.36.3.4 `std::string fcal::parser::Parser::make_error_msg_expected ( const scanner::TokenType & terminal )`  
`[private]`

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

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

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

7.36.3.8 `ParseResult fcal::parser::Parser::Parse ( const char * text )`

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

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

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

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

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

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

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

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

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

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

- 7.36.3.19 **ParseResult** fcal::parser::Parser::parse\_matrix\_decl ( )
- 7.36.3.20 **ParseResult** fcal::parser::Parser::parse\_multiplication ( **ParseResult** *left* )
- 7.36.3.21 **ParseResult** fcal::parser::Parser::parse\_nested\_expr ( )
- 7.36.3.22 **ParseResult** fcal::parser::Parser::parse\_not\_expr ( )
- 7.36.3.23 **ParseResult** fcal::parser::Parser::parse\_relational\_expr ( **ParseResult** *left* )
- 7.36.3.24 **ParseResult** fcal::parser::Parser::parse\_standard\_decl ( )
- 7.36.3.25 **ParseResult** fcal::parser::Parser::parse\_stmt ( )
- 7.36.3.26 **ParseResult** fcal::parser::Parser::parse\_stmts ( )
- 7.36.3.27 **ParseResult** fcal::parser::Parser::parse\_string\_const ( )
- 7.36.3.28 **ParseResult** fcal::parser::Parser::parse\_subtraction ( **ParseResult** *left* )
- 7.36.3.29 **ParseResult** fcal::parser::Parser::parse\_true\_kwd ( )
- 7.36.3.30 **ParseResult** fcal::parser::Parser::parse\_variable\_name ( )
- 7.36.3.31 **ParseResult** fcal::parser::Parser::ParseProgram ( )
- 7.36.3.32 **std::string** fcal::parser::Parser::terminal\_description ( **const scanner::TokenType &** *terminal* ) [private]

## 7.36.4 Member Data Documentation

- 7.36.4.1 **scanner::ExtToken\*** fcal::parser::Parser::curr\_token\_ [private]
- 7.36.4.2 **scanner::ExtToken\*** fcal::parser::Parser::prev\_token\_ [private]
- 7.36.4.3 **scanner::Scanner\*** fcal::parser::Parser::scanner\_ [private]
- 7.36.4.4 **scanner::Token\*** fcal::parser::Parser::tokens\_ [private]
- 7.36.4.5 **scanner::ExtToken\*** fcal::parser::Parser::tokens\_ [private]

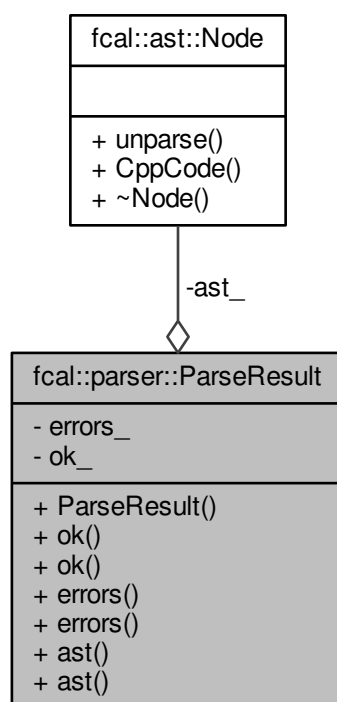
The documentation for this class was generated from the following files:

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

## 7.37 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)

### Private Attributes

- std::string [errors\\_](#)
- [ast::Node](#) \* [ast\\_](#)
- bool [ok\\_](#)

### 7.37.1 Detailed Description

Creates a [ParseResult](#) that can store the nodes of an AST, and be used to create the Abstract Syntax Tree.

### 7.37.2 Constructor & Destructor Documentation

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

### 7.37.3 Member Function Documentation

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

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

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

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

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

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

### 7.37.4 Member Data Documentation

7.37.4.1 `ast::Node* fcsl::parser::ParseResult::ast_ [private]`

7.37.4.2 `std::string fcsl::parser::ParseResult::errors_ [private]`

7.37.4.3 `bool fcsl::parser::ParseResult::ok_ [private]`

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

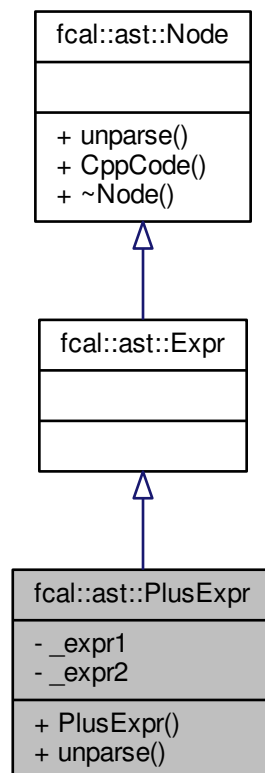
- [include/parse\\_result.h](#)



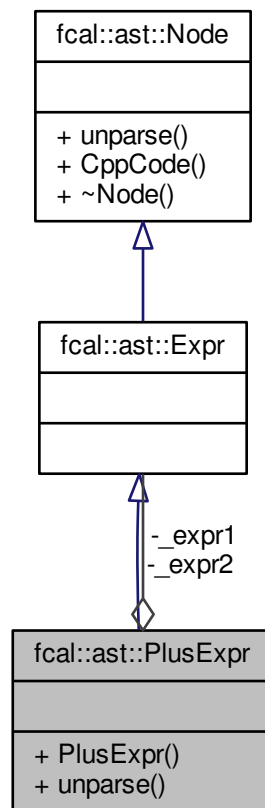
## 7.38 fcal::ast::PlusExpr Class Reference

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

Inheritance diagram for fcal::ast::PlusExpr:



Collaboration diagram for `fcal::ast::PlusExpr`:



## Public Member Functions

- `PlusExpr (Expr *expr1, Expr *expr2)`
- `std::string unparse ()`

## Private Attributes

- `Expr * _expr1`
- `Expr * _expr2`

## 7.38.1 Constructor & Destructor Documentation

7.38.1.1 `fcal::ast::PlusExpr::PlusExpr ( Expr * expr1, Expr * expr2 )` `[inline]`

## 7.38.2 Member Function Documentation

7.38.2.1 `std::string fcal::ast::PlusExpr::unparse ( void )` `[inline]`, `[virtual]`

Reimplemented from `fcal::ast::Node`.

### 7.38.3 Member Data Documentation

7.38.3.1 `Expr* fcal::ast::PlusExpr::_expr1` `[private]`

7.38.3.2 `Expr* fcal::ast::PlusExpr::_expr2` `[private]`

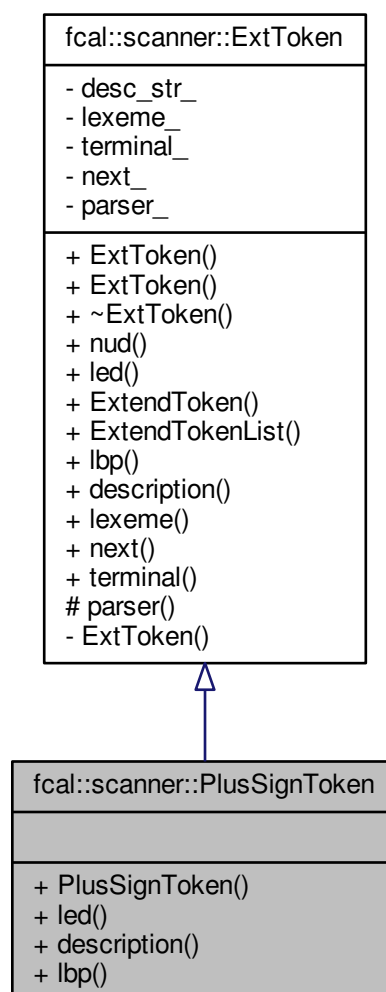
The documentation for this class was generated from the following file:

- `include/ast.h`

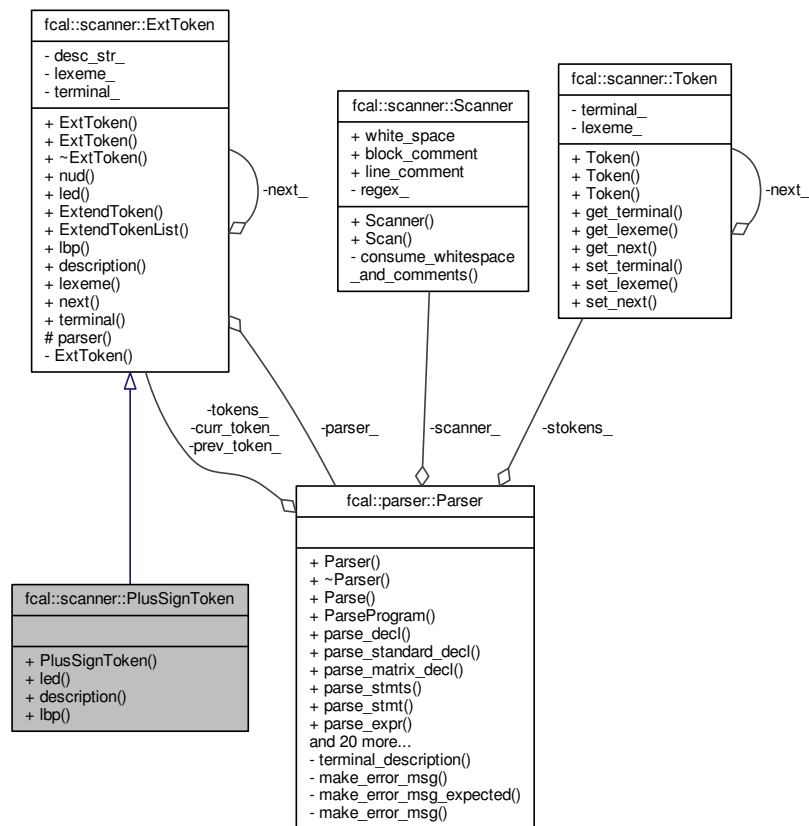
## 7.39 fcal::scanner::PlusSignToken Class Reference

```
#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](#).

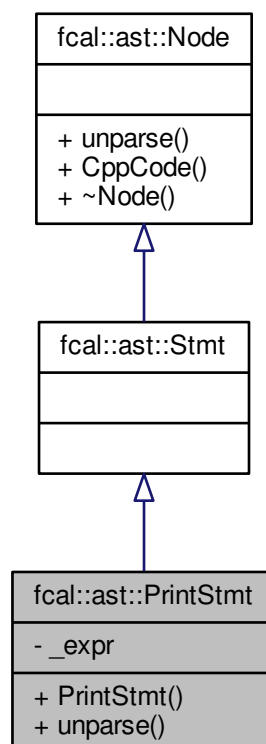
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

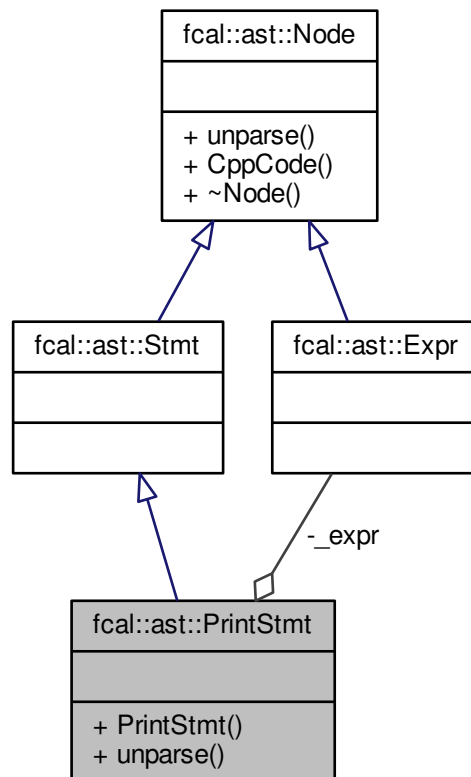
## 7.40 fcal::ast::PrintStmt Class Reference

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

Inheritance diagram for fcal::ast::PrintStmt:



Collaboration diagram for `fcal::ast::PrintStmt`:



## Public Member Functions

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

## Private Attributes

- [Expr](#) \* [\\_expr](#)

### 7.40.1 Constructor & Destructor Documentation

7.40.1.1 `fcal::ast::PrintStmt::PrintStmt ( Expr * expr )` `[inline]`

### 7.40.2 Member Function Documentation

7.40.2.1 `std::string fcal::ast::PrintStmt::unparsed ( void )` `[inline],[virtual]`

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

### 7.40.3 Member Data Documentation

#### 7.40.3.1 Expr\* fcal::ast::PrintStmt::\_expr [private]

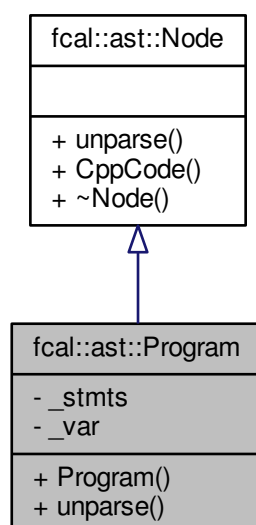
The documentation for this class was generated from the following file:

- include/[ast.h](#)

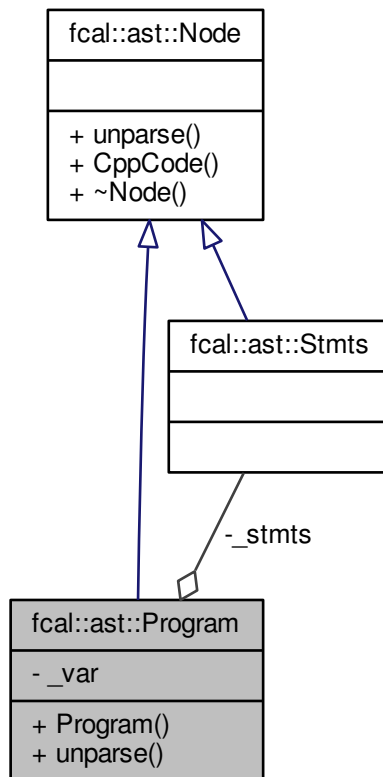
## 7.41 fcal::ast::Program Class Reference

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

Inheritance diagram for fcal::ast::Program:



Collaboration diagram for `fcal::ast::Program`:



## Public Member Functions

- [Program](#) (`std::string var`, [Stmts](#) \*stmts)
- `std::string unparse ()`

## Private Attributes

- [Stmts](#) \*`_stmts`
- `std::string _var`

## 7.41.1 Constructor & Destructor Documentation

7.41.1.1 `fcal::ast::Program::Program ( std::string var, Stmts * stmts )` `[inline]`

## 7.41.2 Member Function Documentation

7.41.2.1 `std::string fcal::ast::Program::unparse ( void )` `[inline]`, `[virtual]`

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



### 7.41.3 Member Data Documentation

7.41.3.1 `Stmts* fcal::ast::Program::_stmts` [private]

7.41.3.2 `std::string fcal::ast::Program::_var` [private]

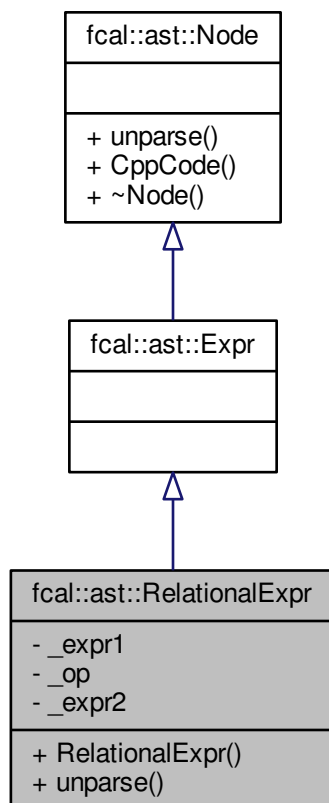
The documentation for this class was generated from the following file:

- [include/ast.h](#)

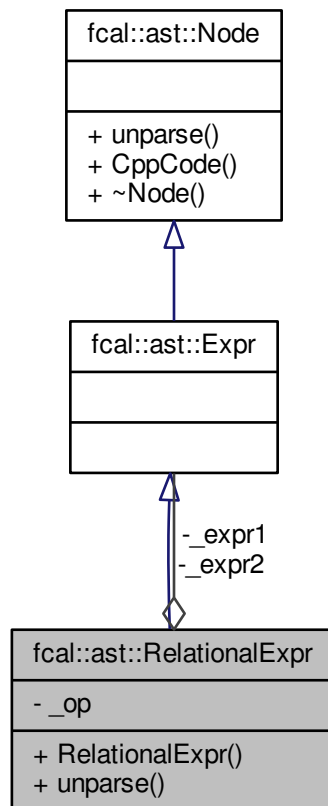
## 7.42 fcal::ast::RelationalExpr Class Reference

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

Inheritance diagram for fcal::ast::RelationalExpr:



Collaboration diagram for `fcgal::ast::RelationalExpr`:



## Public Member Functions

- [RelationalExpr](#) ([Expr](#) \**expr1*, `std::string` *op*, [Expr](#) \**expr2*)
- `std::string` [unparse](#) ()

## Private Attributes

- [Expr](#) \* [\\_expr1](#)
- `std::string` [\\_op](#)
- [Expr](#) \* [\\_expr2](#)

## 7.42.1 Constructor & Destructor Documentation

7.42.1.1 `fcgal::ast::RelationalExpr::RelationalExpr ( Expr * expr1, std::string op, Expr * expr2 )` `[inline]`

## 7.42.2 Member Function Documentation

7.42.2.1 `std::string fcgal::ast::RelationalExpr::unparse ( void )` `[inline]`, `[virtual]`

Reimplemented from [fcgal::ast::Node](#).

### 7.42.3 Member Data Documentation

7.42.3.1 **Expr\*** fcal::ast::RelationalExpr::\_expr1 [private]

7.42.3.2 **Expr\*** fcal::ast::RelationalExpr::\_expr2 [private]

7.42.3.3 **std::string** fcal::ast::RelationalExpr::\_op [private]

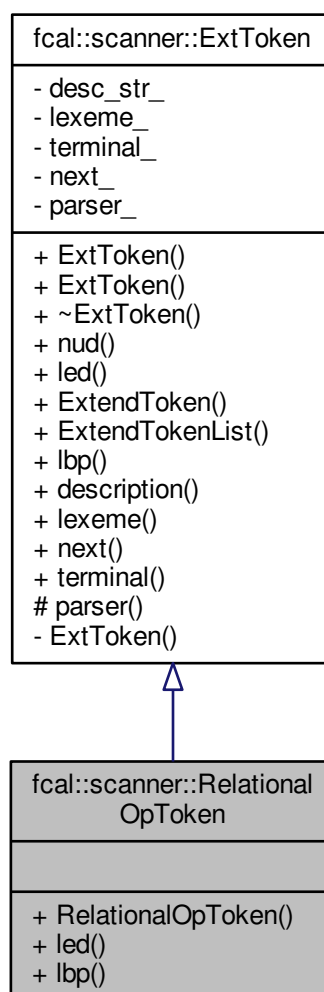
The documentation for this class was generated from the following file:

- include/[ast.h](#)

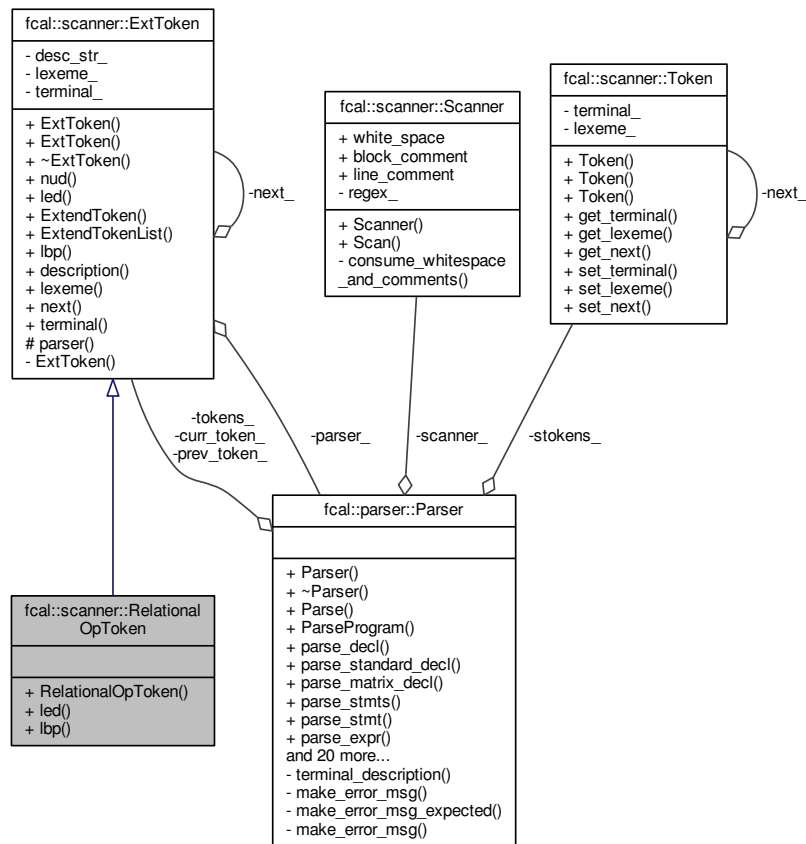
## 7.43 fcal::scanner::RelationalOpToken Class Reference

```
#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

### 7.43.1 Constructor & Destructor Documentation

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

### 7.43.2 Member Function Documentation

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

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

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

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

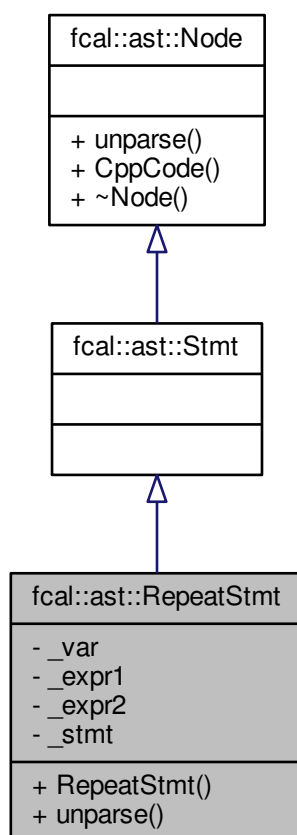
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

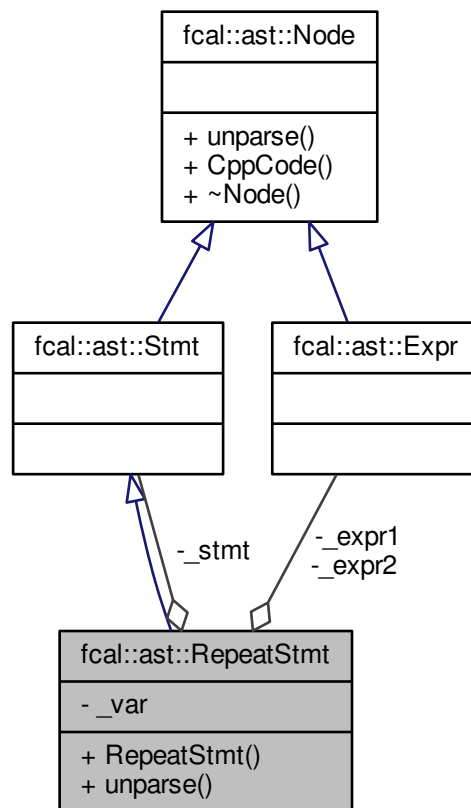
## 7.44 fcal::ast::RepeatStmt Class Reference

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

Inheritance diagram for fcal::ast::RepeatStmt:



Collaboration diagram for `fcal::ast::RepeatStmt`:



## Public Member Functions

- [RepeatStmt](#) (`std::string var`, [Expr](#) \*`expr1`, [Expr](#) \*`expr2`, [Stmt](#) \*`stmt`)
- `std::string` [unparse](#) ()

## Private Attributes

- `std::string` [\\_var](#)
- [Expr](#) \* [\\_expr1](#)
- [Expr](#) \* [\\_expr2](#)
- [Stmt](#) \* [\\_stmt](#)

## 7.44.1 Constructor & Destructor Documentation

7.44.1.1 `fcal::ast::RepeatStmt::RepeatStmt ( std::string var, Expr * expr1, Expr * expr2, Stmt * stmt )` `[inline]`

## 7.44.2 Member Function Documentation

7.44.2.1 `std::string fcal::ast::RepeatStmt::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.44.3 Member Data Documentation

7.44.3.1 `Expr* fcal::ast::RepeatStmt::_expr1` [private]

7.44.3.2 `Expr* fcal::ast::RepeatStmt::_expr2` [private]

7.44.3.3 `Stmt* fcal::ast::RepeatStmt::_stmt` [private]

7.44.3.4 `std::string fcal::ast::RepeatStmt::_var` [private]

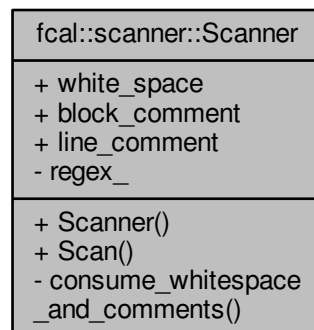
The documentation for this class was generated from the following file:

- [include/ast.h](#)

## 7.45 fcal::scanner::Scanner Class Reference

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

Collaboration diagram for fcal::scanner::Scanner:



### Public Member Functions

- [Scanner](#) ()
- [Token](#) \* [Scan](#) (const char \*)

### Public Attributes

- `regex_t` \* [white\\_space](#) = [make\\_regex](#)("^[\\n\\t\\r ]+")
- `regex_t` \* [block\\_comment](#) = [make\\_regex](#)("^\\\[\\\*([\\^\\\[\\\*]|\\\\\\\*+[^\\[\\\*\\/])\\\\\\\*+/"
- `regex_t` \* [line\\_comment](#) = [make\\_regex](#)("^[^\\n]\*\\n")

## Private Member Functions

- `int consume_whitespace_and_comments (regex_t *white_space, regex_t *block_comment, regex_t *line←_comment, const char *text)`

## Private Attributes

- `regex_t * regex_ [kNotOp+1]`

### 7.45.1 Detailed Description

Scans an array of chars and converts it into a linked list of `Token` objects Example: `Scanner scanner = new Scanner(); Token token = scanner.Scan(*text) delete scanner;`

### 7.45.2 Constructor & Destructor Documentation

7.45.2.1 `fcsl::scanner::Scanner::Scanner ( )`

### 7.45.3 Member Function Documentation

7.45.3.1 `int fcsl::scanner::Scanner::consume_whitespace_and_comments ( regex_t * white_space, regex_t * block_comment, regex_t * line_comment, const char * text ) [private]`

Takes a character array and removes the leading white space and comments

#### Parameters

<i>white_space</i>	A regular expression to match all white space
<i>block_comment</i>	A regular expression to match block comments
<i>line_comment</i>	A regular expression to match line comments
<i>text</i>	The character array to remove the leading whitespace and comments from

7.45.3.2 `fcsl::scanner::Token * fcsl::scanner::Scanner::Scan ( const char * text )`

Takes in an array of characters and returns a linked list of Tokens

#### Parameters

<i>text</i>	The character array to be scanned.
-------------	------------------------------------

### 7.45.4 Member Data Documentation

7.45.4.1 `regex_t * fcsl::scanner::Scanner::block_comment = make_regex("^\\*([\\^\\*]|\\*+[^\\*\\*])\\*\\*+/")`



7.45.4.2 `regex_t* fcal::scanner::Scanner::line_comment = make_regex("^[^\\n]*\\n")`

7.45.4.3 `regex_t* fcal::scanner::Scanner::regex_[kNotOp+1] [private]`

7.45.4.4 `regex_t* fcal::scanner::Scanner::white_space = make_regex("[\\n\\t\\r ]+")`

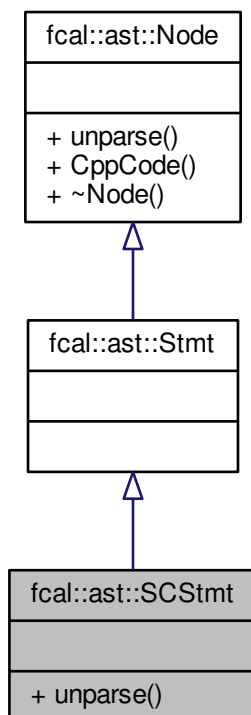
The documentation for this class was generated from the following files:

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

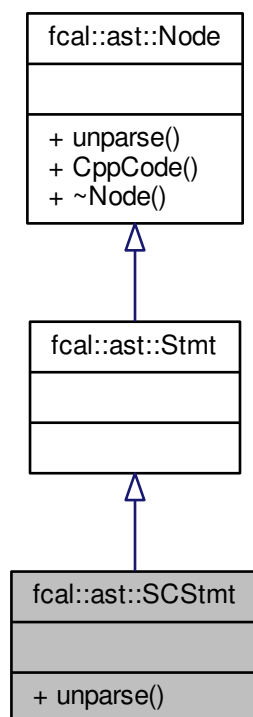
## 7.46 fcal::ast::SCStmt Class Reference

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

Inheritance diagram for fcal::ast::SCStmt:



Collaboration diagram for `fcal::ast::SCStmt`:



## Public Member Functions

- `std::string unparse ()`

## 7.46.1 Member Function Documentation

**7.46.1.1** `std::string fcal::ast::SCStmt::unparse ( void )` `[inline],[virtual]`

Reimplemented from `fcal::ast::Node`.

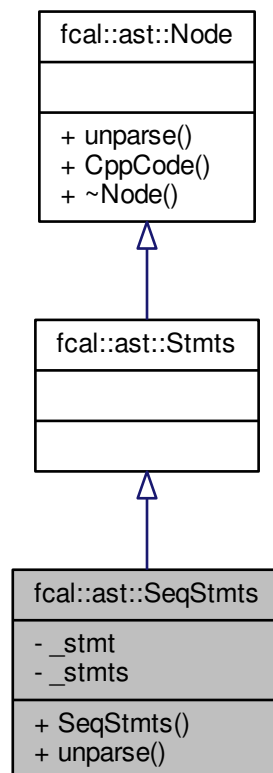
The documentation for this class was generated from the following file:

- `include/ast.h`

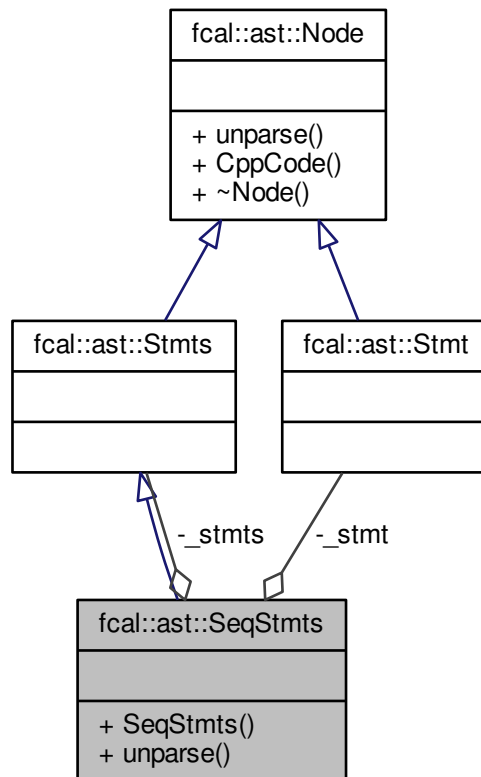
## 7.47 fcal::ast::SeqStmts Class Reference

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

Inheritance diagram for fcal::ast::SeqStmts:



Collaboration diagram for `fcal::ast::SeqStmts`:



## Public Member Functions

- [SeqStmts](#) ([Stmt](#) \*stmt, [Stmts](#) \*stmts)
- `std::string unparse ()`

## Private Attributes

- [Stmt](#) \* [\\_stmt](#)
- [Stmts](#) \* [\\_stmts](#)

## 7.47.1 Constructor & Destructor Documentation

7.47.1.1 `fcal::ast::SeqStmts::SeqStmts ( Stmt * stmt, Stmts * stmts )` `[inline]`

## 7.47.2 Member Function Documentation

7.47.2.1 `std::string fcal::ast::SeqStmts::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.47.3 Member Data Documentation

7.47.3.1 Stmt\* fcal::ast::SeqStmts::\_stmt [private]

7.47.3.2 Stmt\* fcal::ast::SeqStmts::\_stmts [private]

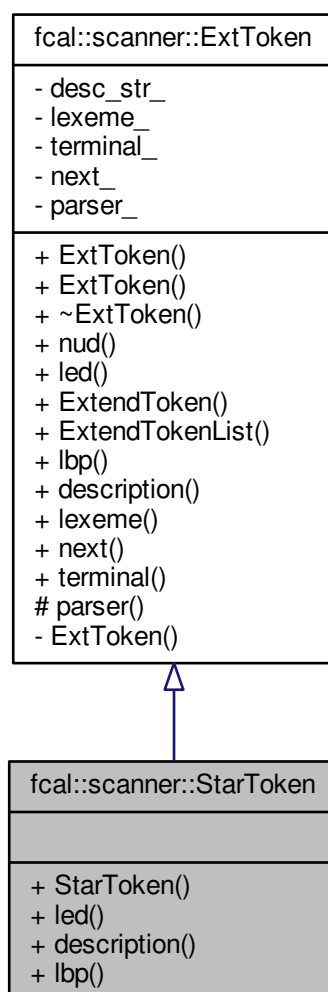
The documentation for this class was generated from the following file:

- include/[ast.h](#)

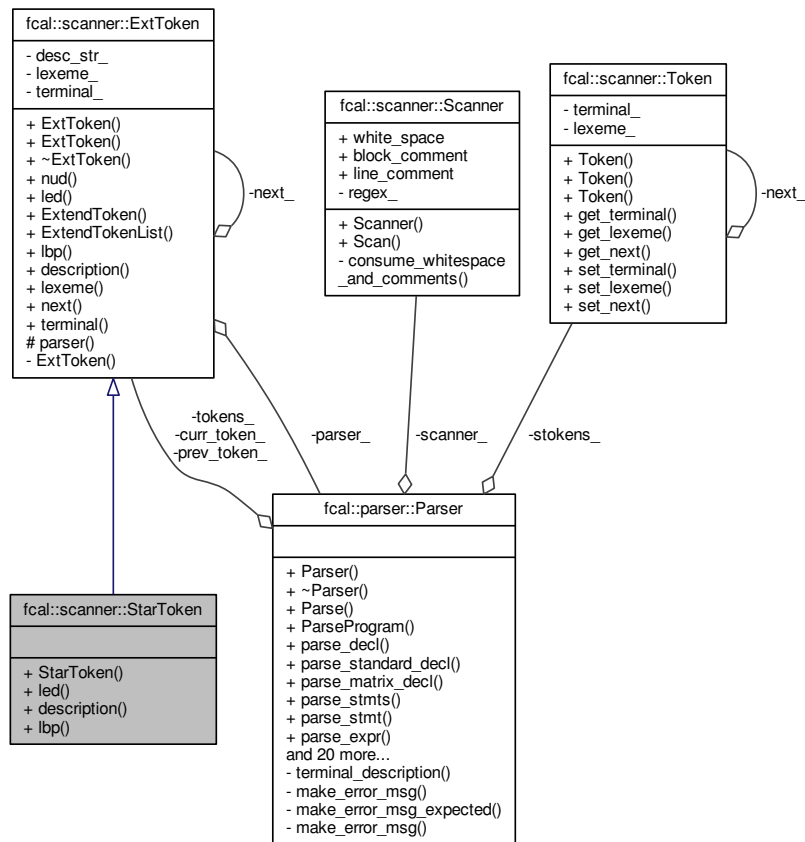
## 7.48 fcal::scanner::StarToken Class Reference

```
#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

### 7.48.1 Constructor & Destructor Documentation

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

### 7.48.2 Member Function Documentation

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

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

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

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

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

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

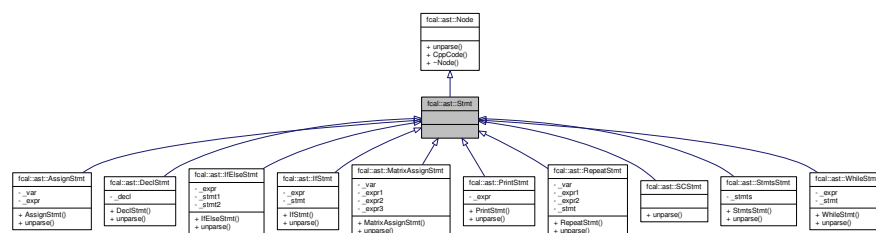
The documentation for this class was generated from the following file:

- `include/ext_token.h`

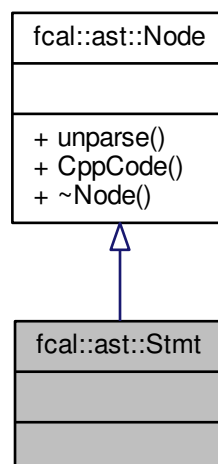
## 7.49 fcal::ast::Stmt Class Reference

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

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



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



## Additional Inherited Members

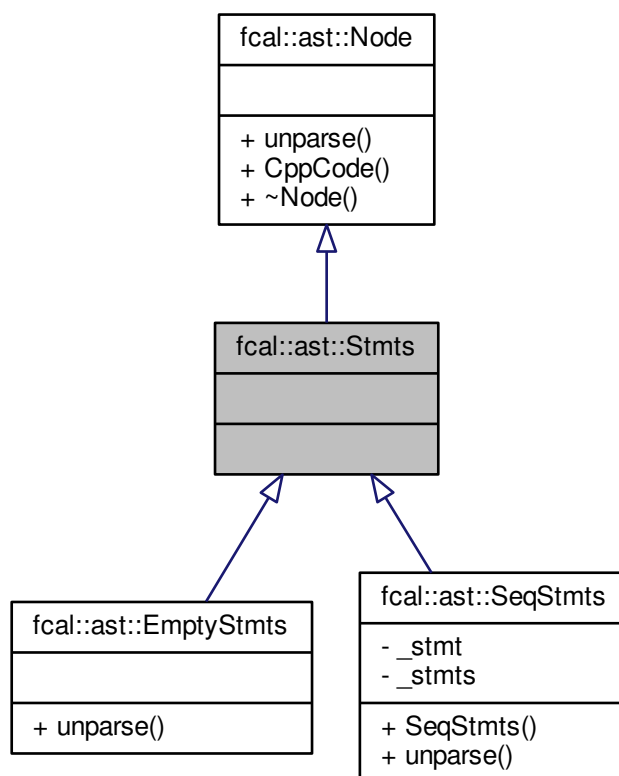
The documentation for this class was generated from the following file:

- include/[ast.h](#)

## 7.50 fcal::ast::Stmts Class Reference

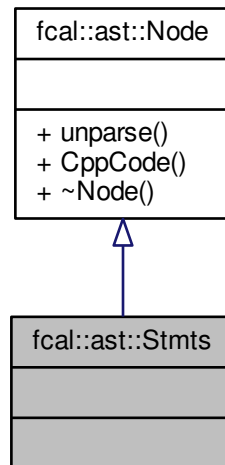
```
#include <ast.h>
```

Inheritance diagram for fcal::ast::Stmts:





Collaboration diagram for fcal::ast::Stmts:



### Additional Inherited Members

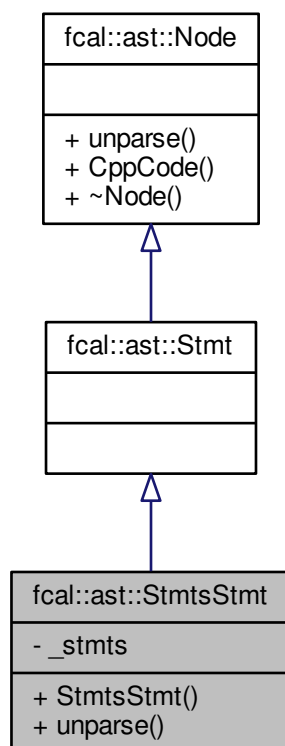
The documentation for this class was generated from the following file:

- `include/ast.h`

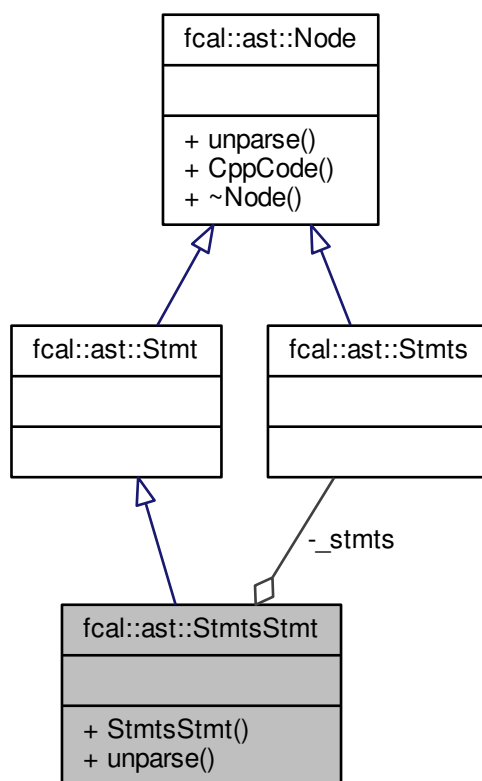
## 7.51 fcal::ast::StmtsStmt Class Reference

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

Inheritance diagram for `fcal::ast::StmtsStmt`:



Collaboration diagram for fcal::ast::StmtsStmt:



## Public Member Functions

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

## Private Attributes

- [Stmts](#) \* [\\_stmts](#)

### 7.51.1 Constructor & Destructor Documentation

7.51.1.1 `fcal::ast::StmtsStmt::StmtsStmt ( Stmts * stmts )` `[inline]`

### 7.51.2 Member Function Documentation

7.51.2.1 `std::string` `fcal::ast::StmtsStmt::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.51.3 Member Data Documentation

#### 7.51.3.1 `Stmts* fcal::ast::StmtsStmt::_stmts` [private]

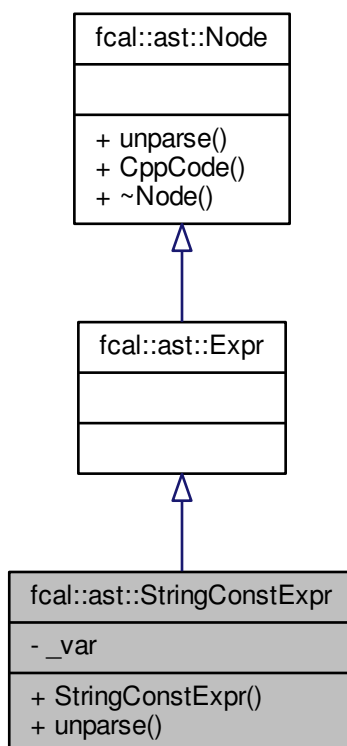
The documentation for this class was generated from the following file:

- [include/ast.h](#)

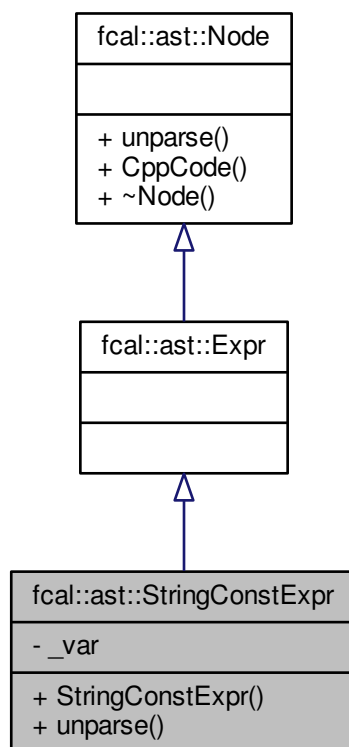
## 7.52 `fcal::ast::StringConstExpr` Class Reference

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

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



Collaboration diagram for fcal::ast::StringConstExpr:



### Public Member Functions

- [StringConstExpr](#) (std::string var)
- std::string [unparse](#) ()

### Private Attributes

- std::string [\\_var](#)

### 7.52.1 Constructor & Destructor Documentation

7.52.1.1 `fcal::ast::StringConstExpr::StringConstExpr ( std::string var )` `[inline]`

### 7.52.2 Member Function Documentation

7.52.2.1 `std::string fcal::ast::StringConstExpr::unparse ( void )` `[inline],[virtual]`

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

### 7.52.3 Member Data Documentation

#### 7.52.3.1 `std::string fcal::ast::StringConstExpr::_var` `[private]`

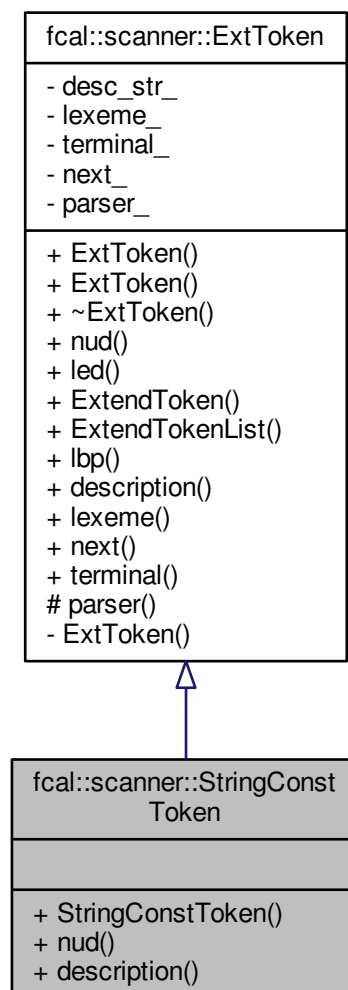
The documentation for this class was generated from the following file:

- [include/ast.h](#)

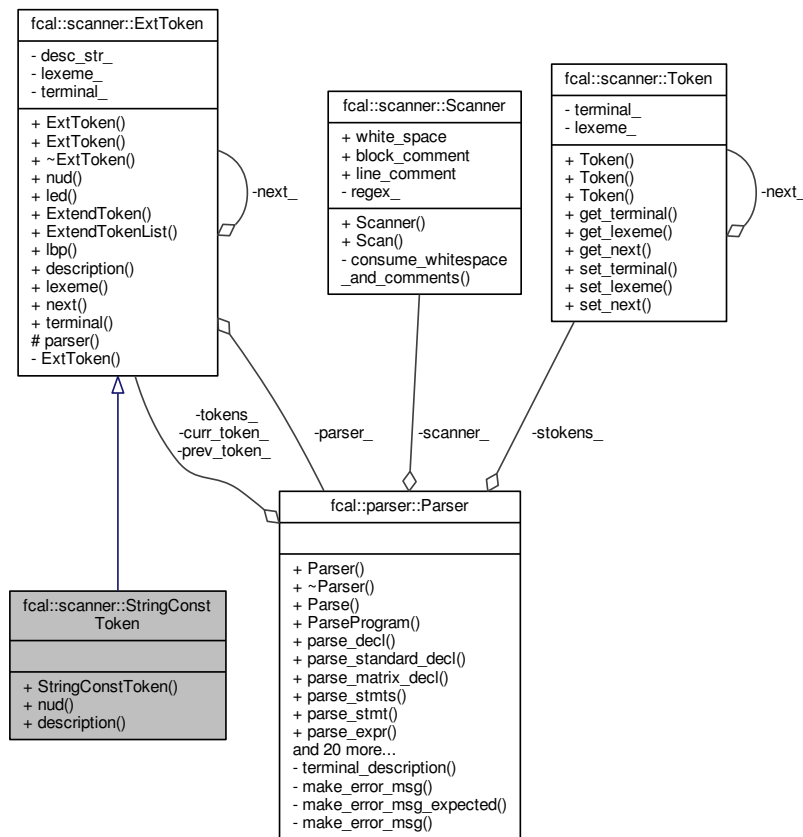
### 7.53 `fcal::scanner::StringConstToken` Class Reference

```
#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

### 7.53.1 Constructor & Destructor Documentation

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

### 7.53.2 Member Function Documentation

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

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

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

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

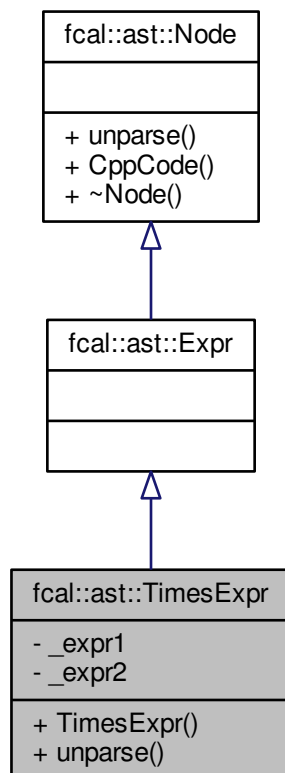
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

## 7.54 fcal::ast::TimesExpr Class Reference

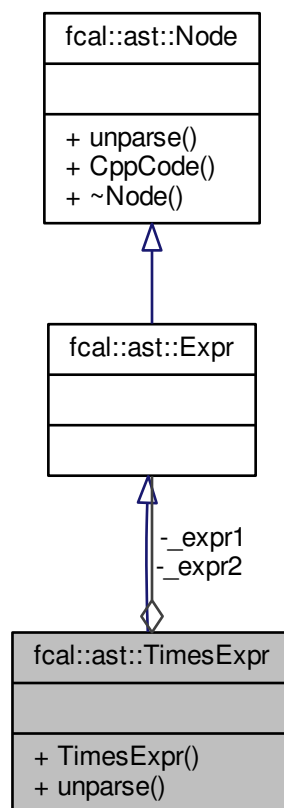
```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::TimesExpr`:





Collaboration diagram for fcal::ast::TimesExpr:



### Public Member Functions

- [TimesExpr](#) ([Expr](#) \*expr1, [Expr](#) \*expr2)
- `std::string unparse ()`

### Private Attributes

- [Expr](#) \* [\\_expr1](#)
- [Expr](#) \* [\\_expr2](#)

#### 7.54.1 Constructor & Destructor Documentation

7.54.1.1 `fcal::ast::TimesExpr::TimesExpr ( Expr * expr1, Expr * expr2 )` `[inline]`

#### 7.54.2 Member Function Documentation

7.54.2.1 `std::string fcal::ast::TimesExpr::unparse ( void )` `[inline], [virtual]`

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

### 7.54.3 Member Data Documentation

7.54.3.1 `Expr* fcal::ast::TimesExpr::_expr1` `[private]`

7.54.3.2 `Expr* fcal::ast::TimesExpr::_expr2` `[private]`

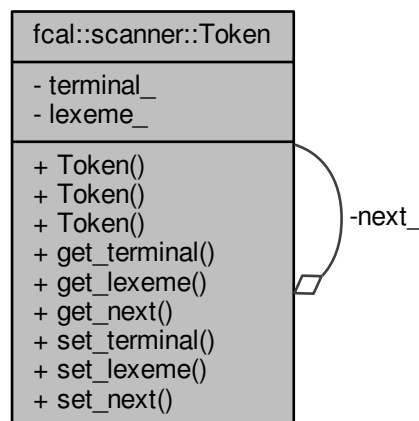
The documentation for this class was generated from the following file:

- `include/ast.h`

## 7.55 fcal::scanner::Token Class Reference

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

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



### Public Member Functions

- `Token ()`
- `Token (std::string lexeme, TokenType terminal, Token *next)`
- `Token (const char *lexeme, TokenType terminal, Token *next)`
- `TokenType get_terminal ()`
- `std::string get_lexeme ()`
- `Token * get_next ()`
- `void set_terminal (TokenType new_terminal)`
- `void set_lexeme (std::string new_lexeme)`
- `void set_next (Token *new_next)`

## Private Attributes

- [TokenType](#) `terminal_`
- `std::string` `lexeme_`
- [Token](#) \* `next_`

### 7.55.1 Detailed Description

Creates an token node that stores a type and a lexeme. Can be used to create a linked list of tokens

### 7.55.2 Constructor & Destructor Documentation

7.55.2.1 `fcal::scanner::Token::Token ( )` `[inline]`

7.55.2.2 `fcal::scanner::Token::Token ( std::string lexeme, TokenType terminal, Token * next )` `[inline]`

The [Token](#) constructor requires three parameters: terminal, lexeme, and a pointer to the next token

#### Parameters

<i>lexeme</i>	The token's lexeme as a string
<i>terminal</i>	The token's type as a <a href="#">TokenType</a> object
<i>next</i>	A pointer to the next <a href="#">Token</a> object in the linked list

7.55.2.3 `fcal::scanner::Token::Token ( const char * lexeme, TokenType terminal, Token * next )` `[inline]`

### 7.55.3 Member Function Documentation

7.55.3.1 `std::string fcal::scanner::Token::get_lexeme ( )` `[inline]`

7.55.3.2 `Token* fcal::scanner::Token::get_next ( )` `[inline]`

7.55.3.3 `TokenType fcal::scanner::Token::get_terminal ( )` `[inline]`

7.55.3.4 `void fcal::scanner::Token::set_lexeme ( std::string new_lexeme )` `[inline]`

7.55.3.5 `void fcal::scanner::Token::set_next ( Token * new_next )` `[inline]`

7.55.3.6 `void fcal::scanner::Token::set_terminal ( TokenType new_terminal )` `[inline]`

### 7.55.4 Member Data Documentation

7.55.4.1 `std::string fcal::scanner::Token::lexeme_` `[private]`

7.55.4.2 `Token* fcal::scanner::Token::next_` `[private]`

7.55.4.3 `TokenType fcal::scanner::Token::terminal_` `[private]`

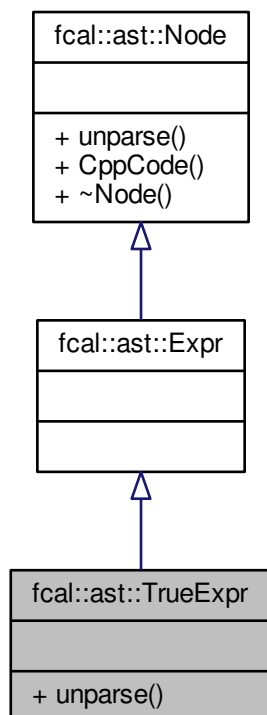
The documentation for this class was generated from the following file:

- [include/scanner.h](#)

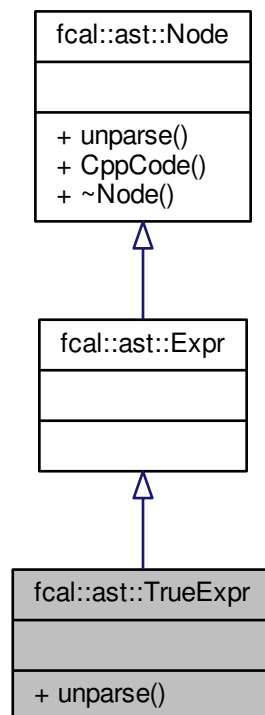
## 7.56 fcal::ast::TrueExpr Class Reference

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

Inheritance diagram for fcal::ast::TrueExpr:



Collaboration diagram for fcal::ast::TrueExpr:



## Public Member Functions

- `std::string unparse ()`

## 7.56.1 Member Function Documentation

**7.56.1.1** `std::string fcal::ast::TrueExpr::unparse ( void )` `[inline]`, `[virtual]`

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

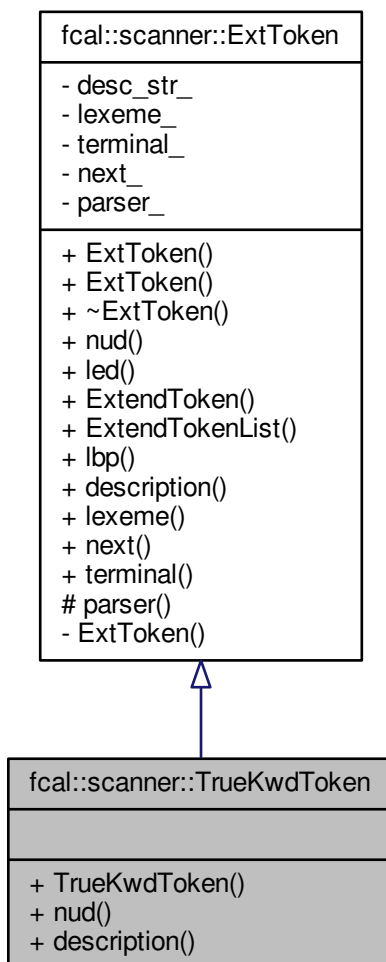
The documentation for this class was generated from the following file:

- `include/ast.h`

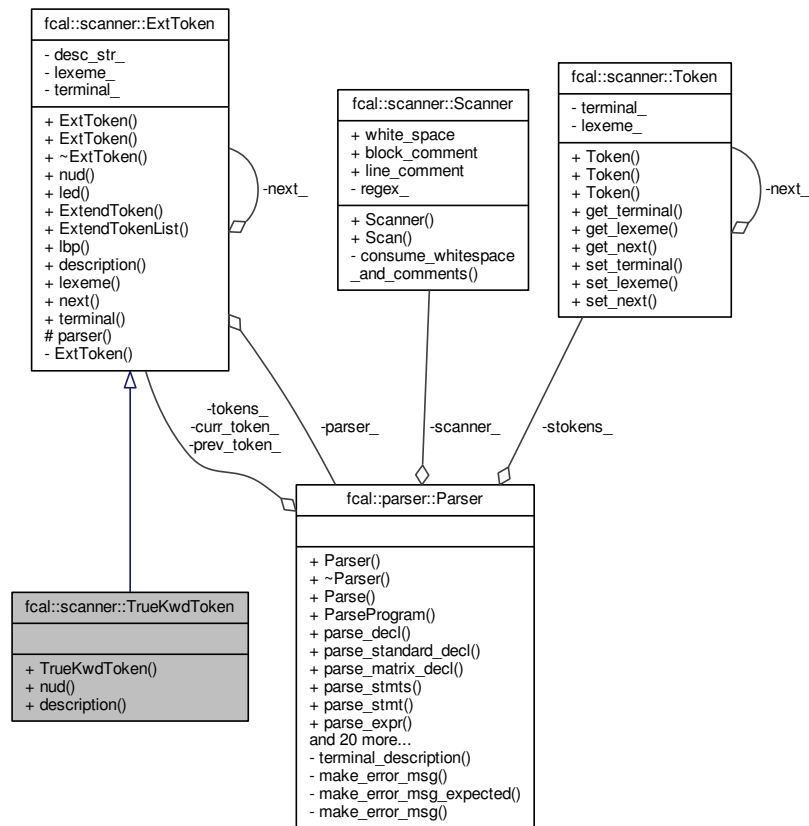
## 7.57 fcal::scanner::TrueKwdToken Class Reference

```
#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

### 7.57.1 Constructor & Destructor Documentation

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

### 7.57.2 Member Function Documentation

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

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

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

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

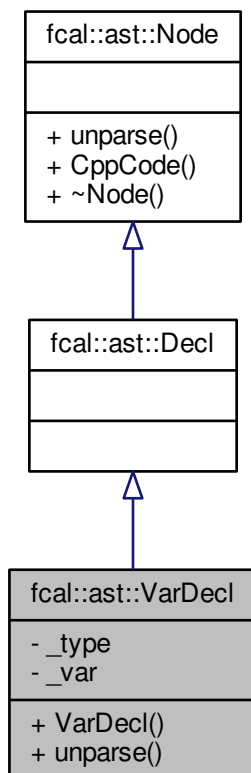
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

## 7.58 fcal::ast::VarDecl Class Reference

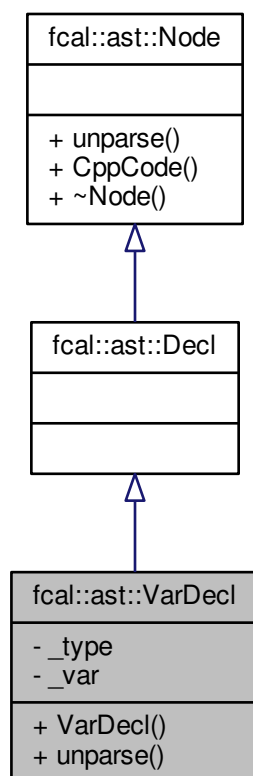
```
#include <ast.h>
```

Inheritance diagram for `fcal::ast::VarDecl`:





Collaboration diagram for fcal::ast::VarDecl:



## Public Member Functions

- [VarDecl](#) (std::string type, std::string var)
- std::string [unparse](#) ()

## Private Attributes

- std::string [\\_type](#)
- std::string [\\_var](#)

## 7.58.1 Constructor & Destructor Documentation

7.58.1.1 `fcal::ast::VarDecl::VarDecl ( std::string type, std::string var )` `[inline]`

## 7.58.2 Member Function Documentation

7.58.2.1 `std::string fcal::ast::VarDecl::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.58.3 Member Data Documentation

7.58.3.1 `std::string fcal::ast::VarDecl::_type` [private]

7.58.3.2 `std::string fcal::ast::VarDecl::_var` [private]

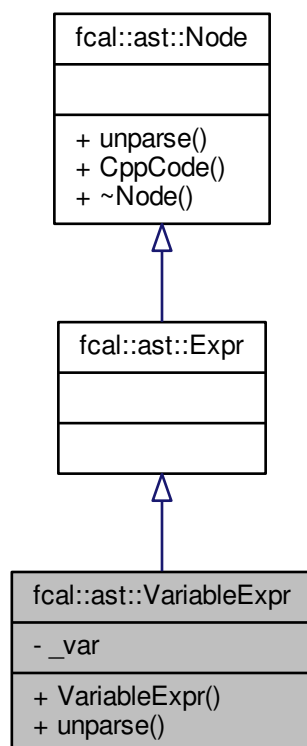
The documentation for this class was generated from the following file:

- [include/ast.h](#)

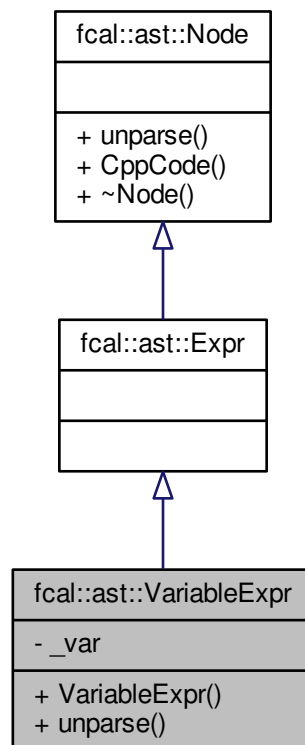
## 7.59 fcal::ast::VariableExpr Class Reference

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

Inheritance diagram for fcal::ast::VariableExpr:



Collaboration diagram for fcal::ast::VariableExpr:



### Public Member Functions

- [VariableExpr](#) (std::string var)
- std::string [unparse](#) ()

### Private Attributes

- std::string [\\_var](#)

## 7.59.1 Constructor & Destructor Documentation

7.59.1.1 `fcal::ast::VariableExpr::VariableExpr ( std::string var )` `[inline]`

## 7.59.2 Member Function Documentation

7.59.2.1 `std::string fcal::ast::VariableExpr::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.59.3 Member Data Documentation

#### 7.59.3.1 `std::string fcal::ast::VariableExpr::_var` `[private]`

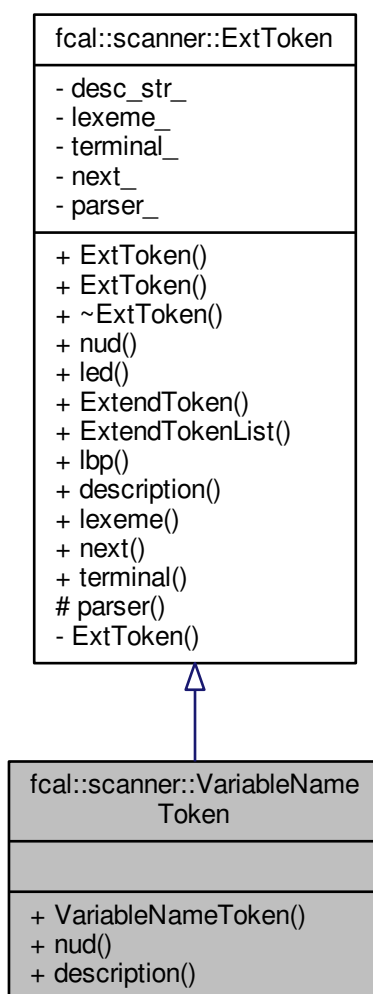
The documentation for this class was generated from the following file:

- [include/ast.h](#)

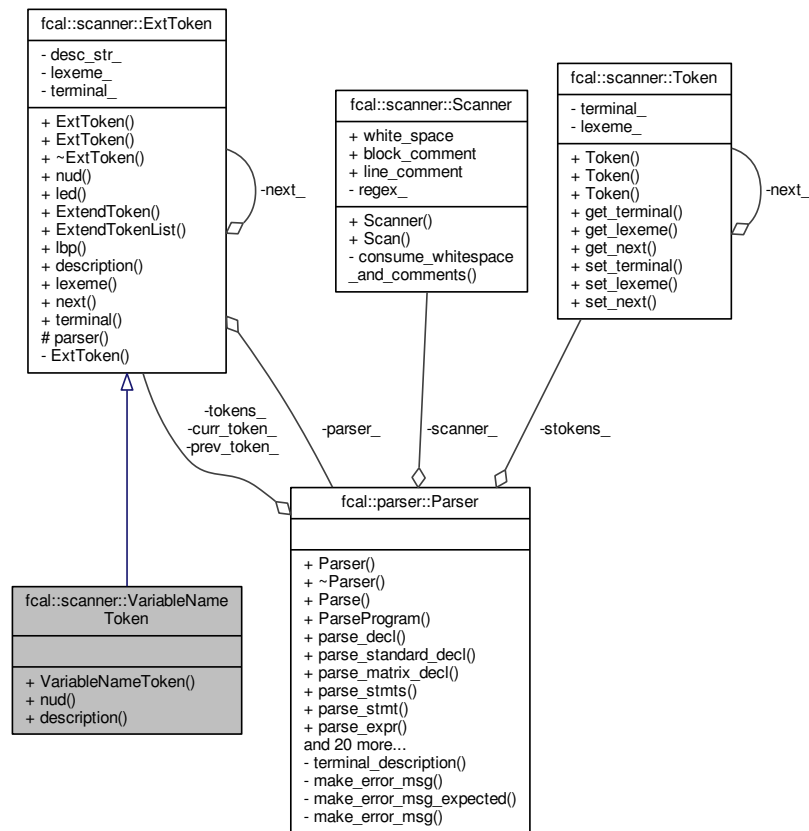
## 7.60 `fcal::scanner::VariableNameToken` Class Reference

```
#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

### 7.60.1 Constructor & Destructor Documentation

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

### 7.60.2 Member Function Documentation

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

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

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

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

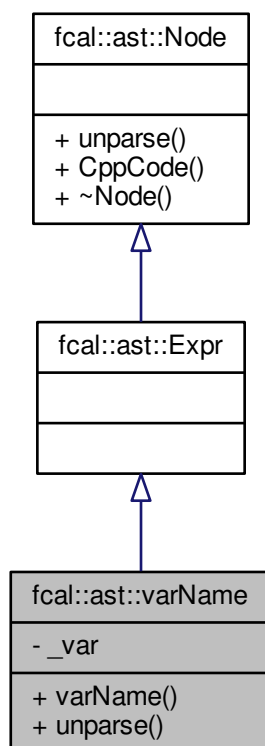
The documentation for this class was generated from the following file:

- [include/ext\\_token.h](#)

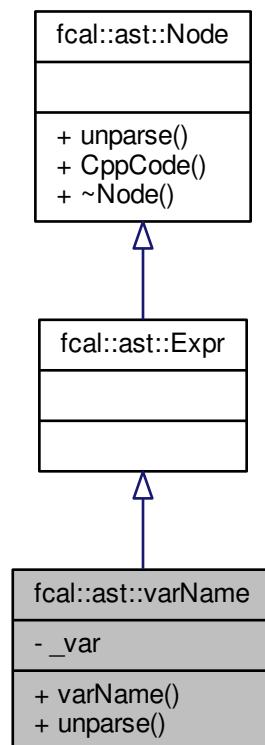
## 7.61 fcal::ast::varName Class Reference

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

Inheritance diagram for `fcal::ast::varName`:



Collaboration diagram for fcal::ast::varName:



## Public Member Functions

- [varName](#) (std::string var)
- std::string [unparse](#) ()

## Private Attributes

- std::string [\\_var](#)

## 7.61.1 Constructor & Destructor Documentation

7.61.1.1 `fcal::ast::varName::varName ( std::string var )` `[inline]`

## 7.61.2 Member Function Documentation

7.61.2.1 `std::string fcal::ast::varName::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.61.3 Member Data Documentation

7.61.3.1 `std::string fcal::ast::varName::_var` `[private]`

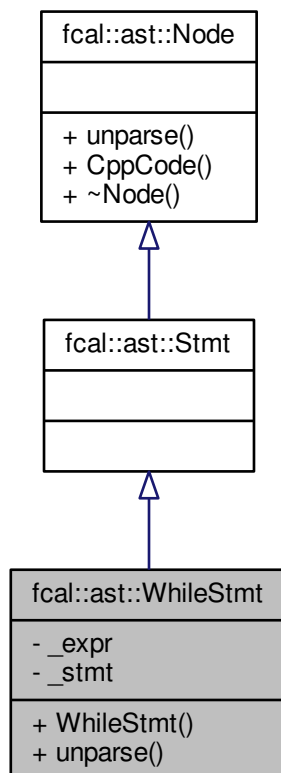
The documentation for this class was generated from the following file:

- [include/ast.h](#)

## 7.62 fcal::ast::WhileStmt Class Reference

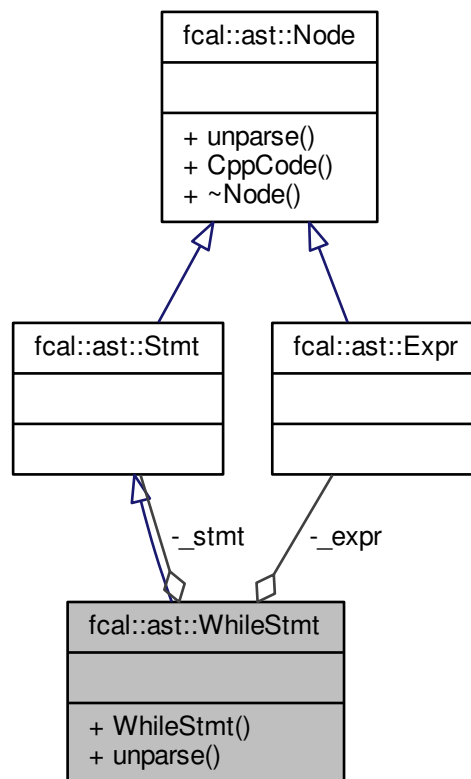
```
#include <ast.h>
```

Inheritance diagram for fcal::ast::WhileStmt:





Collaboration diagram for fcal::ast::WhileStmt:



## Public Member Functions

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

## Private Attributes

- [Expr](#) \* [\\_expr](#)
- [Stmt](#) \* [\\_stmt](#)

## 7.62.1 Constructor & Destructor Documentation

7.62.1.1 `fcal::ast::WhileStmt::WhileStmt ( Expr * expr, Stmt * stmt )` `[inline]`

## 7.62.2 Member Function Documentation

7.62.2.1 `std::string fcal::ast::WhileStmt::unparse ( void )` `[inline]`, `[virtual]`

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

### 7.62.3 Member Data Documentation

7.62.3.1 **Expr\*** `fcal::ast::WhileStmt::_expr` `[private]`

7.62.3.2 **Stmt\*** `fcal::ast::WhileStmt::_stmt` `[private]`

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

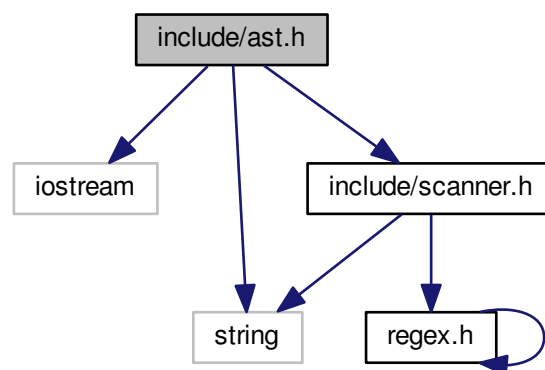
- `include/ast.h`

## Chapter 8

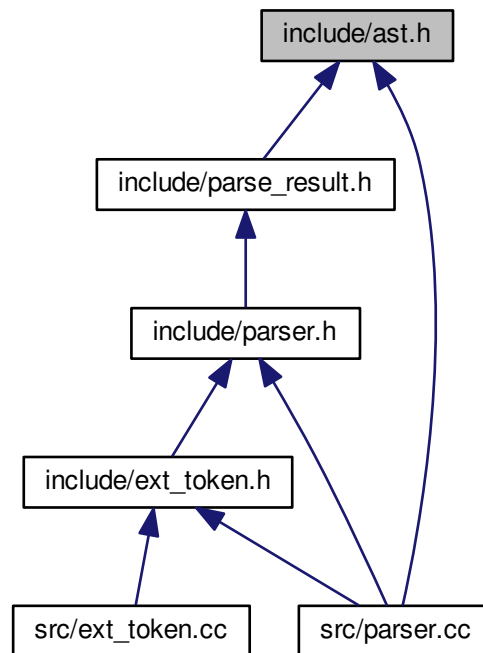
# File Documentation

### 8.1 include/ast.h File Reference

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



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



## Classes

- class [fcal::ast::Node](#)
- class [fcal::ast::Stmts](#)
- class [fcal::ast::Stmt](#)
- class [fcal::ast::Decl](#)
- class [fcal::ast::Expr](#)
- class [fcal::ast::varName](#)
- class [fcal::ast::Program](#)
- class [fcal::ast::EmptyStmts](#)
- class [fcal::ast::SeqStmts](#)
- class [fcal::ast::DeclStmt](#)
- class [fcal::ast::StmtsStmt](#)
- class [fcal::ast::IfStmt](#)
- class [fcal::ast::IfElseStmt](#)
- class [fcal::ast::AssignStmt](#)
- class [fcal::ast::MatrixAssignStmt](#)
- class [fcal::ast::PrintStmt](#)
- class [fcal::ast::RepeatStmt](#)
- class [fcal::ast::WhileStmt](#)
- class [fcal::ast::SCStmt](#)
- class [fcal::ast::VarDecl](#)
- class [fcal::ast::MatrixIndexDecl](#)
- class [fcal::ast::MatrixDecl](#)

- class [fcal::ast::VariableExpr](#)
- class [fcal::ast::StringConstExpr](#)
- class [fcal::ast::IntConstExpr](#)
- class [fcal::ast::FloatConstExpr](#)
- class [fcal::ast::TrueExpr](#)
- class [fcal::ast::FalseExpr](#)
- class [fcal::ast::TimesExpr](#)
- class [fcal::ast::DivideExpr](#)
- class [fcal::ast::PlusExpr](#)
- class [fcal::ast::MinusExpr](#)
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- class [fcal::ast::MatrixExpr](#)
- class [fcal::ast::FuncExpr](#)
- class [fcal::ast::ParenExpr](#)
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- class [fcal::ast::IfElseExpr](#)
- class [fcal::ast::NotExpr](#)

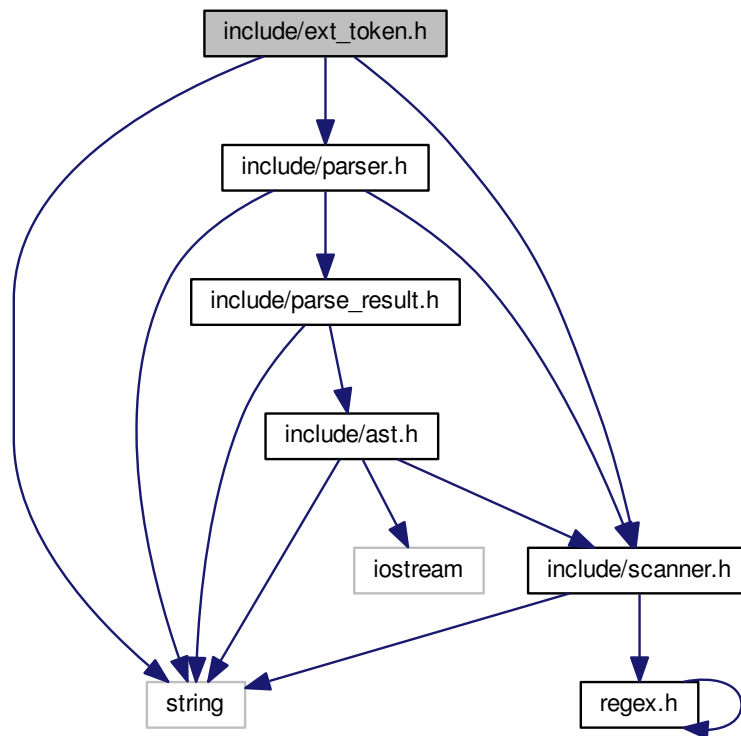
## Namespaces

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

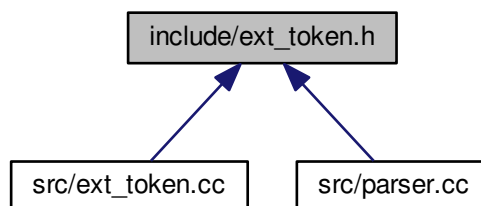
## 8.2 include/ext\_token.h File Reference

```
#include <string>
#include "include/parser.h"
#include "include/scanner.h"
```

Include dependency graph for `ext_token.h`:



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



## Classes

- class `fcal::scanner::ExtToken`
- class `fcal::scanner::NotOpToken`
- class `fcal::scanner::TrueKwdToken`
- class `fcal::scanner::FalseKwdToken`

- class [fcal::scanner::IntConstToken](#)
- class [fcal::scanner::FloatConstToken](#)
- class [fcal::scanner::StringConstToken](#)
- class [fcal::scanner::CharConstToken](#)
- class [fcal::scanner::VariableNameToken](#)
- class [fcal::scanner::IfToken](#)
- class [fcal::scanner::LetToken](#)
- class [fcal::scanner::LeftParenToken](#)
- class [fcal::scanner::PlusSignToken](#)
- class [fcal::scanner::StarToken](#)
- class [fcal::scanner::DashToken](#)
- class [fcal::scanner::ForwardSlashToken](#)
- class [fcal::scanner::RelationalOpToken](#)
- class [fcal::scanner::EndOfFileToken](#)

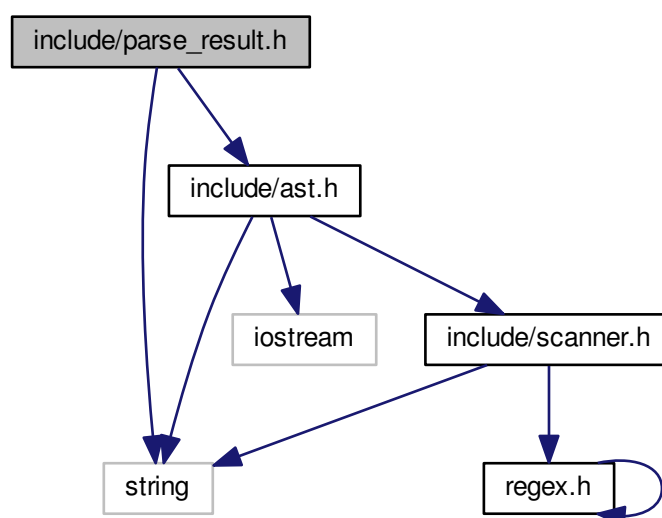
## Namespaces

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

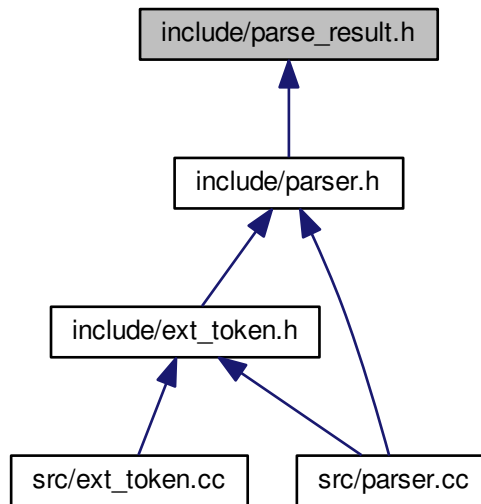
## 8.3 include/mainpage.h File Reference

## 8.4 include/parse\_result.h File Reference

```
#include <string>
#include "include/ast.h"
Include dependency graph for parse_result.h:
```



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



## Classes

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

## Namespaces

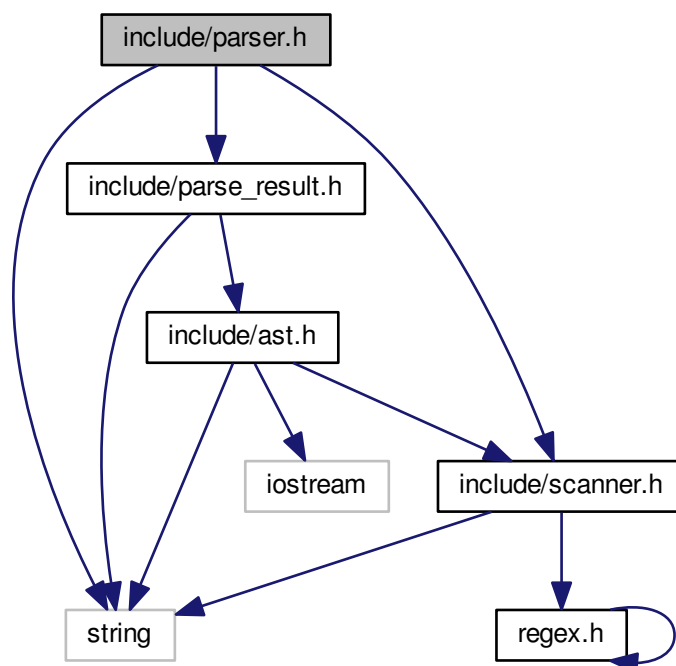
- [fcal](#)
- [fcal::parser](#)

## 8.5 include/parser.h File Reference

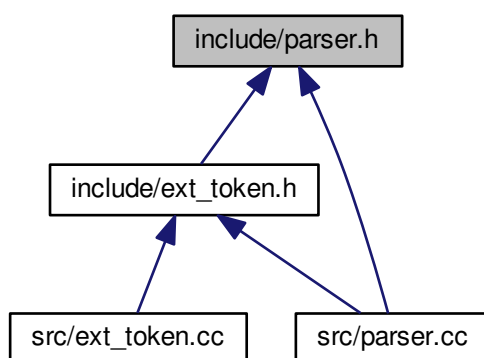
```
#include <string>
#include "include/parse_result.h"
#include "include/scanner.h"
```



Include dependency graph for parser.h:



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



## Classes

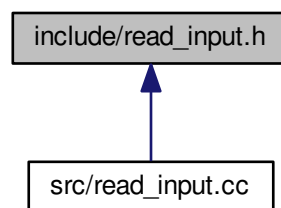
- class `fcal::parser::Parser`

## Namespaces

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

## 8.6 include/read\_input.h File Reference

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



## Namespaces

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

## Functions

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

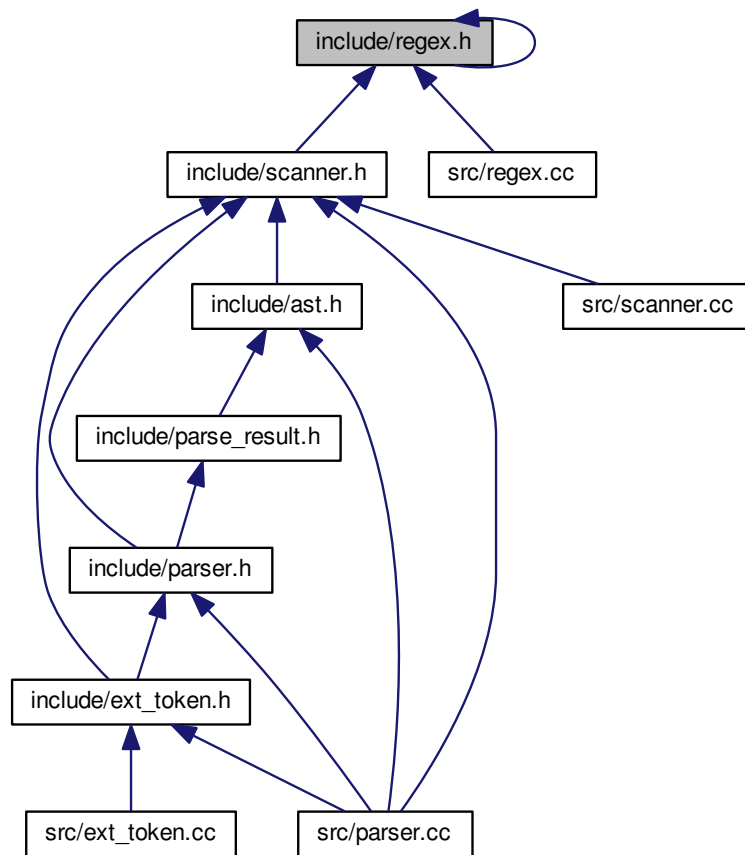
## 8.7 include/regex.h File Reference

```
#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

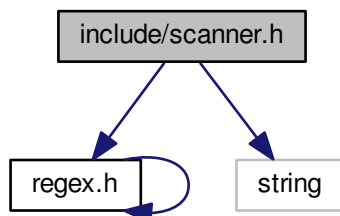
- [regex\\_t \\* fcal::scanner::make\\_regex](#) (const char \*pattern)
- [int fcal::scanner::match\\_regex](#) (regex\_t \*re, const char \*text)

## Variables

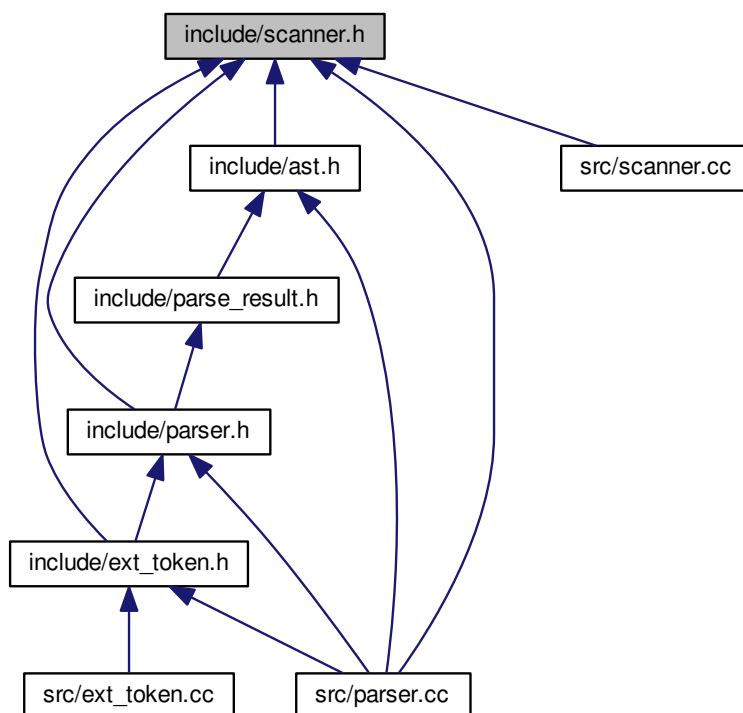
- const int [fcal::scanner::kRegexNSub](#) = 1

## 8.8 include/scanner.h File Reference

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



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



### Classes

- class `fcal::scanner::Token`
- class `fcal::scanner::Scanner`

## Namespaces

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

## Typedefs

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

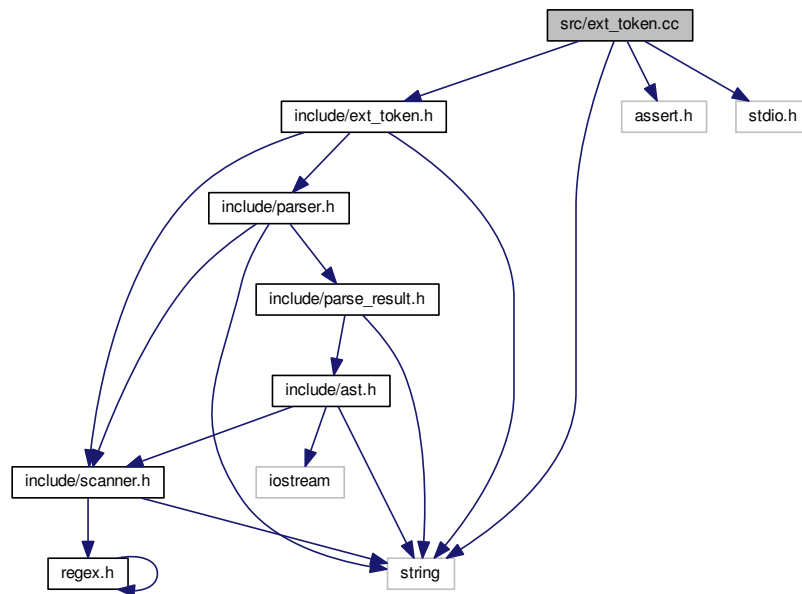
## Enumerations

- 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](#),  
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[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](#) }

## 8.9 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](#)

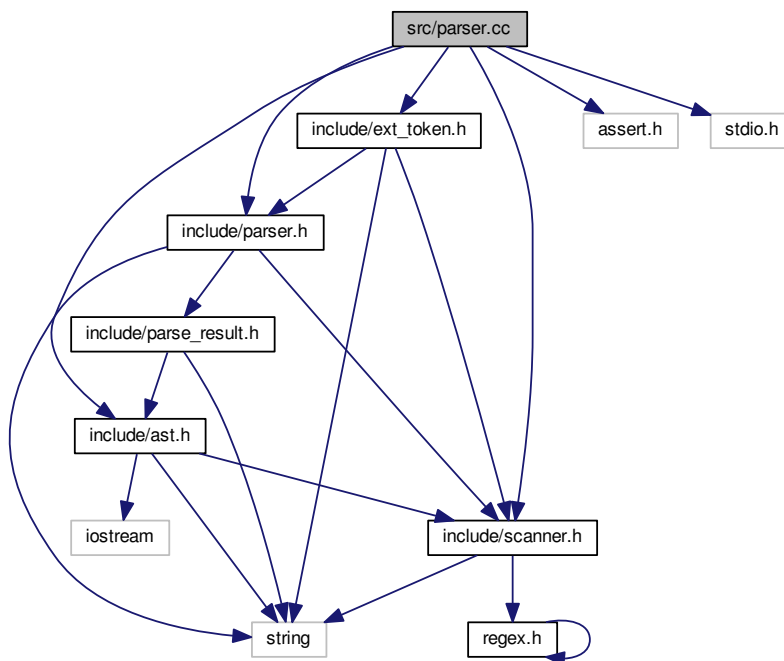
## 8.10 src/parser.cc File Reference

```

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

```

Include dependency graph for parser.cc:



## Namespaces

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

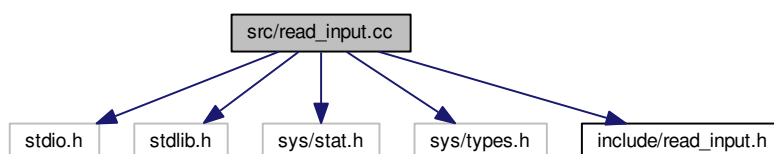
## 8.11 src/read\_input.cc File Reference

```

#include <stdio.h>
#include <stdlib.h>
#include <sys/stat.h>
#include <sys/types.h>
#include "include/read_input.h"

```

Include dependency graph for read\_input.cc:



## Namespaces

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

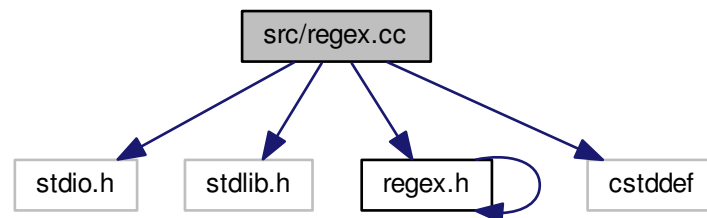
## Functions

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

## 8.12 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](#)

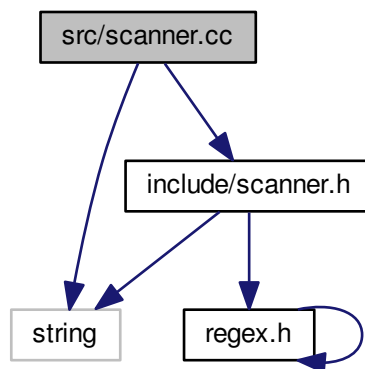
## Functions

- `regex_t * fcal::scanner::make\_regex (const char *pattern)`
- `int fcal::scanner::match\_regex (regex_t *re, const char *text)`



## 8.13 src/scanner.cc File Reference

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



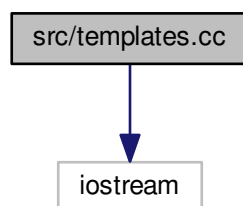
### Namespaces

- `fcal`
- `fcal::scanner`

## 8.14 src/temp.cc File Reference

## 8.15 src/templates.cc File Reference

```
#include <iostream>
Include dependency graph for templates.cc:
```



## Classes

- class `MySequence< T, N >`

## Functions

- int `main ()`

### 8.15.1 Function Documentation

#### 8.15.1.1 int main ( )

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