

# Bison Quick Reference

## Starting Bison

To use Bison, type: `bison filename`

Options can be used as: `bison options filename`

## Command Line Options

Display usage information.	-h
Display version information.	-V
Generate token and YYSTYPE definitions.	-d
Prepend a prefix to external symbols.	-p <i>prefix</i>
Don't put <code>#line</code> directives in the parser.	-l
Specify the output file.	-o <i>filename</i>
Debug or <i>trace</i> mode.	-t
Verbose description of the parser.	-v
Emulate yacc (generate <code>y.tab.*</code> files).	-y

**Note:** The token and YYSTYPE definitions are generated to a file called `y.tab.h` if the `-y` option is used, otherwise it will have the format `name.tab.h`, where *name* is the leading part of the parser definition filename.

## Definitions

Declare a terminal symbol.	<code>%token &lt;t&gt; n</code>
Declare a terminal symbol, and define its association.	<code>association &lt;t&gt; n</code>
Generate a reentrant (pure) parser.	<code>%pure_parser</code>
Define the union of all data types used in the parser.	<code>%union{field list}</code>
Tell bison where to start parsing.	<code>%start m</code>
Tell bison the data type of symbols.	<code>%type &lt;t&gt; s1...sn</code>

In the above, *t* is a *type* defined in the `%union` definition, *n* is a *terminal* symbol name, *m* is a *non-terminal* symbol name, and *association* can be one of `%left`, `%right`, or `%nonassoc`.

The `<t>` after `%token`, `%left`, `%right` and `%nonassoc` is optional. Additionally, precedence may be overridden in the rules with `%prec` commands.

## Parser Definition Files

The general form for a parser definition is:

```
{%
  /* Initial C code. */
}%
  Token and type definitions
%%
  Rule definition 1
      :
  Rule definition n
%%
  /* Other C code. */
```

## Rule definitions

Rules take the form:

```
non-terminal : statement 1
              | statement 2
              :
              | statement n
              ;
```

Where *statements* can be either empty, or contain a mixture of C code (enclosed in {...}), and the symbols that make up the non-terminal. For example:

```
expression : number '+' number { $$ = $1 + $3 }
            | number '-' number { $$ = $1 - $3 }
            | number '/' number { $$ = $1 / $3 }
            | number '*' number { $$ = $1 * $3 }
            ;
```

For altering the precedence of a symbol use:

```
%prec name
```

For example:

```
foo : gnu bar gnu      %prec bar
    ;
```

## Grammar Variables and Symbols

Recognize an error & continue parsing.	<code>error</code>
Access data associated with a symbol.	<code>\$\$, \$0...\$<i>n</i></code>
Access a field of the data union.	<code>\$\$.<i>t</i>, \$0.<i>t</i>...\$<i>n</i>.<i>t</i></code>
Access symbol's location.	<code>@\$, @0...@<i>n</i></code>
Access data's line location.	<code>@<i>x</i>.line_spec</code>
Access data's column location.	<code>@<i>x</i>.column_spec</code>

Where *t* is a type defined in the %union, *n* is a number, *x* is a number or \$, *line\_spec* one of `first_line` and `last_line`, and *column\_spec* is specified as either `first_column` or `last_column`.

## Variables and Types

Current look ahead token.	<code>yychar</code>
Debug mode flag.	<code>yydebug</code>
Data associated with the current token.	<code>yylval</code>
Source position of current token.	<code>yylloc</code>
Number of errors encountered.	<code> yynerrs</code>
Position information type.	<code>YYLTYPE</code>
Data type associated with symbols.	<code>YYSTYPE</code>

## Functions

User defined error handler.	<code>int yyerror(char *)</code>
User defined lexical analyzer.	<code>int yylex()</code>
The grammar parser.	<code>int yyparse()</code>

## Macros

Quit parsing immediately. Return 1.	<code>YYABORT</code>
Quit parsing immediately. Return 0.	<code>YYACCEPT</code>
Pretend a syntax error occurred.	<code>YYERROR</code>
Value in <code>yychar</code> if no look-ahead token.	<code>YYEMPTY</code>
Clear previous look ahead token.	<code>yyclearin</code>
Recover normally from an error.	<code>yyerrok</code>

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