TinyTalk

1.0.0

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# **Chapter 1**

# **TT Language**

# 1.1 Introduction

TT Technical Details

2 TT Language

# **Chapter 2**

# **TT Technical Details**

### 2.1 Main Features

#### 2.2 Details

Chapter 1: Memory Management

**Syntax** 

Chapter 3: Implementation

## 2.3 Chapter 1: Memory Management

# 2.4 Syntax

```
object_ident ::= IDENT.
object_ident ::= IDENT IDENT.
unary_pattern ::= IDENT.
binary_pattern ::= BINOP IDENT.
\verb"keyword_pattern ::= \verb"KEYWORD IDENT."
keyword_pattern ::= keyword_pattern KEYWORD IDENT.
all ::= object_defs.
object_defs ::=.
object_defs ::= object_defs object_ident LBRACK var_list method_defs RBRACK.
object_defs ::= object_defs object_ident LARROW IDENT LBRACK var_list method_defs RBRACK.
var_list ::=.
var_list ::= BAR idents BAR.
idents ::= IDENT.
idents ::= idents IDENT.
method_defs ::=.
method_defs ::= method_defs msg_pattern LBRACK var_list statements RBRACK.
method_defs ::= method_defs msg_pattern VERBATIM.
msg\_pattern ::= unary\_pattern.
msg_pattern ::= binary_pattern.
msg_pattern ::= keyword_pattern.
statements ::= return_statement.
statements ::= return_statement DOT.
statements ::= expression DOT statements.
statements ::= expression.
statements ::= expression DOT.
```

4 TT Technical Details

```
return_statement ::= UARROW expression.
expression ::= IDENT LARROW expr.
expression ::= basic_expression.
basic_expression ::= primary.
\verb|basic_expression|::= \verb|primary| messages| cascaded_messages.
basic_expression ::= primary cascaded_messages.
basic_expression ::= primary messages.
primary ::= IDENT.
primary ::= STRING.
primary ::= LBRACK block_body RBRACK.
primary ::= LBRACE expression RBRACE.
block_body ::= block_arguments BAR var_list statements.
block_body ::= var_list statements.
block_body ::= var_list.
block_arguments ::= COLON IDENT.
block_arguments ::= block_arguments COLON IDENT.
messages ::= unary_messages.
messages ::= unary_messages keyword_message.
messages ::= unary_messages binary_messages.
messages ::= unary_messages binary_messages keyword_message.
messages ::= binary_messages.
messages ::= binary_messages keyword_message.
messages ::= keyword_message.
unary_messages ::= IDENT.
binary_messages ::= binary_message.
binary_messages ::= binary_message binary_messages.
binary_message ::= BINOP binary_argument.
binary_argument ::= primary unary_messages.
binary_argument ::= primary.
keyword_message ::= KEYWORD keyword_argument.
keyword_message ::= keyword_message KEYWORD keyword_argument.
keyword\_argument ::= primary.
keyword_argument ::= primary unary_messages.
keyword_argument ::= primary unary_messages binary_messages.
cascaded_messages ::= SEMICOLON messages.
cascaded_messages ::= cascaded_messages SEMICOLON messages.
atom ::= IDENT.
atom ::= STRING.
unary_call ::= unary_call IDENT.
binary_call ::= binary_call BINOP unary_call.
unary_call ::= atom.
binary_call ::= unary_call.
expr ::= binary_call.
```

## 2.5 Chapter 3: Implementation

# **Chapter 3**

# **Module Index**

## 3.1 Modules

Here is a list of all modules:

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# **Data Structure Index**

## 4.1 Data Structures

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# **Chapter 5**

# **Module Documentation**

#### 5.1 ITab

#### **Data Structures**

```
    struct itab_entry
        structure of an entry in the itab.
```

struct itab

structure of itab

· struct itab iter

iterator over elements of an itab.

#### **Functions**

```
struct itab * itab_new ()
```

create a new itab with default parameters.

- int itab\_entry\_cmp (const void \*aptr, const void \*bptr)
  - compares the keys of two entries
- void itab\_append (struct itab \*itab, const char \*key, void \*value)
- void \* itab\_read (struct itab \*itab, const char \*key)
- void itab\_dump (struct itab \*itab)
- struct itab\_iter \* itab\_foreach (struct itab \*tab)
- struct itab\_iter \* itab\_next (struct itab\_iter \*iter)
- void \* itab\_value (struct itab\_iter \*iter)
- const char \* itab\_key (struct itab\_iter \*iter)

#### 5.1.1 Detailed Description

sorted list of structures -> tables with primary index

#### 5.1.2 Function Documentation

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#### 5.1.2.1 itab\_entry\_cmp()

compares the keys of two entries

#### Returns

- < 0, when first key is lower
- == 0, when both keys are equal
- ullet > 0, when second key is lower

```
00180
00181     const struct itab_entry *a = aptr;
00182     const struct itab_entry *b = bptr;
00183     return strcmp( a->key, b->key );
00184 }
```

#### 5.1.2.2 itab\_new()

```
struct itab* itab_new ( )
```

create a new itab with default parameters.

#### Returns

reference to an itab structure.

#### Detailed description follows here.

#### 5.2 Runtime Context

#### **Functions**

- struct context \* context\_new (struct context \*super)
- struct contextdef \* context\_lookup (struct context \*ctx, const char \*name)

#### **Variables**

- struct contextdef context\_global\_def = {.global = true}
- struct contextdef context\_class\_def = {.instance = true }

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### 5.2.1 Detailed Description

#### 5.3 Tokenizer

#### **Functions**

```
    bool is_ident_char (int c)
    check if character is part of an identifier.
```

- bool is\_binary\_char (int c)
- bool readLine ()

read one line from stdin stores the result into {gd.line}.

bool readChar (char \*t)

read one character from input and store it somewhere.

bool readStringToken (void)

read string token.

bool nextToken (void)

read next token.

### 5.3.1 Detailed Description

convert stdin into tokens. each token is returned by the call to

See also

nextToken.

#### 5.3.2 Function Documentation

#### 5.3.2.1 is\_ident\_char()

```
bool is_ident_char ( \quad \text{int } c \ )
```

check if character is part of an identifier.

#### **Parameters**

```
in c character to classify.
```

#### Returns

true if if c is an identifier character.

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Referenced by nextToken().

#### 5.3.2.2 nextToken()

```
bool nextToken ( )
```

read next token.

This is a more detailed description.

#### Returns

#### true if successful

```
00403
00404
           char c;
           bool result = false;
00405
00406
           while(true) {
00407
                while( readChar( &c ) && isspace( c ) );
00408
                if( c == '"' ) {
                     while( readChar( &c ) && c != '"' );
00409
00410
00411
                else
00412
                    break;
00413
00414
           if( gd.state == 1 ) {
00415
                if( isalpha( c ) ) {
00416
                     int idx = 0;
                     for(;;) {
00417
                         gd.buf[idx++] = c;
00418
00419
                          readChar( &c );
00420
                         if( !is_ident_char( c ) )
00421
00422
                     if( c == ':' ) {
00423
                         gd.buf[idx++] = c;
00424
                          gd.token = TK_KEYWORD;
00425
00426
00427
                     else {
00428
                          gd.pos--;
                          gd.token = TK_IDENT;
00429
00430
00431
                     gd.buf[idx] = 0;
00432
                     result = true;
00433
                gelse if( is_binary_char( c ) ) {
    for( int idx = 0; is_binary_char( c ); idx++ ) {
        gd.buf[idx] = c;
        gd.buf[idx + 1] = 0;
00434
00435
00436
00437
00438
                         readChar( &c );
00439
00440
                     gd.pos--;
                     gd.token = 0;
gd.token = TK_BINOP;
result = true;
00441
00442
00443
                     if( strcmp( "<-", qd.buf ) == 0 ) {
00444
                         gd.token = TK_LARROW;
00446
                          result = true;
00447
                     else if( strcmp( "|", gd.buf ) == 0 ) {
   gd.token = TK_BAR;
   result = true;
00448
00449
00450
00451
00452
                     else if( 0 == strcmp( "<", gd.buf ) ) {</pre>
00453
                         gd.token = TK_LT;
00454
                          result = true;
00455
                     else if( 0 == strcmp( ">", gd.buf ) ) {
00456
                         gd.token = TK_GT;
00458
                          result = true;
00459
00460
                else if( isdigit( c ) ) {
   int idx = 1;
   while( isdigit( c ) ) {
00461
00462
00463
00464
                         gd.buf[idx - 1] = c;
```

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```
gd.buf[idx] = 0;
00466
                        readChar( &c );
00467
00468
                   gd.pos--;
                   gd.token = TK_NUMBER;
result = true;
00469
00470
00472
                   switch ( c ) {
    case '\":
00473
00474
                           result = readStringToken( );
00475
00476
                            break;
                        case '.':
00477
00478
                          result = true;
00479
                            gd.token = TK_DOT;
                        break;
case ';':
00480
00481
00482
                           result = true;
                            gd.token = TK_SEMICOLON;
00483
00484
                            break;
00485
                        case '(':
00486
                           result = true;
                            gd.token = TK_LBRACE;
00487
00488
                           break;
00489
                        case ')':
00490
                          result = true;
00491
                            gd.token = TK_RBRACE;
                        break; case '[':
00492
00493
                           result = true;
00494
00495
                            gd.token = TK_LBRACK;
00496
                            break;
00497
00498
                           result = true;
00499
                            gd.token = TK_RBRACK;
00500
                            break;
                        case '{':
00501
                            {
00503
                                 int i = 0;
00504
                                gd.buf[i] = 0;
                                readChar( &c );
while( c != '}' ) {
00505
00506
                                    gd.buf[i++] = c;
gd.buf[i] = 0;
00507
00508
00509
                                     readChar( &c );
00510
00511
                                gd.token = TK_VERBATIM;
00512
00513
                            result = true;
00514
                            break:
                        case '#':
00515
00516
                           readChar( &c );
00517
                            for( int idx = 0; is_ident_char( c ) || c == ':'; idx++ ) {
                              gd.buf[idx] = c;
gd.buf[idx + 1] = 0;
00518
00519
00520
                                readChar( &c );
00522
                            gd.pos--;
                            gd.token = TK_SYMBOL;
00523
00524
                            result = true;
00525
                        break;
case '^':
00526
                           result = true;
00528
                            gd.token = TK_UARROW;
00529
                        case ':':
00530
                           result = true;
00531
                            gd.token = TK_COLON;
00532
00533
                            break:
                        case '$':
00535
                           result = true;
00536
                            gd.token = TK_CHAR;
                            readChar( &c );
gd.buf[0] = c;
00537
00538
00539
                            gd.buf[1] = 0;
00540
                            break;
00541
                        default:
00542
                           gd.pos--;
00543
                            break;
00544
                   }
00545
              }
00547
          return result;
00548 }
```

References is\_ident\_char(), and readChar().

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#### 5.3.2.3 readChar()

```
bool readChar ( {\tt char} \ * \ t \ )
```

read one character from input and store it somewhere.

#### **Parameters**

```
in t c-string of some sort.
```

#### Returns

#### true if successful

```
00367
00368
          bool result = true;
          if( gd.state == 0 ) {
00369
00370
              result = readLine( );
00371
00372
          if( result ) {
              *t = gd.line[gd.pos++];
while( *t == 0 ) {
00373
00374
                  if( readLine( ) ) {
00375
00376
                       *t = gd.line[gd.pos++];
00377
00378
                   else {
                       result = false;
00379
00380
                       break;
00381
00382
              }
00383
00384
           return result;
00385 }
```

References readLine().

Referenced by nextToken(), and readStringToken().

#### 5.3.2.4 readLine()

```
bool readLine ( )
```

read one line from stdin stores the result into {gd.line}.

### trailing blanks are removed.

```
00345
           static int line_count = 0;
00347
00348
           char *line = fgets( gd.line, sizeof( gd.line ), stdin );
00349
           line_count++;
           printf( "%2d:%s", line_count, line );
00350
           if(line) {
00351
               size_t len = strlen(line);
while(len >= 0 && line[len] <= 32)</pre>
00352
00353
00354
                   line[len--] = 0;
               gd.pos = 0;
gd.state = 1;
00355
00356
00357
               return true;
00358
00359
           else {
00360
               gd.line[0] = 0;
00361
               gd.state = 2;
               return false;
00362
           }
00363
00364 }
```

Referenced by readChar().

#### 5.3.2.5 readStringToken()

read string token.

Returns

true if successful

References readChar().

## 5.4 Internal Representation

Collaboration diagram for Internal Representation:



#### **Modules**

C Code Generator

#### **Data Structures**

- struct s\_names
- struct s\_pattern

## **Typedefs**

- typedef struct s\_names \* t\_names
- typedef struct s\_pattern \* t\_pattern

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#### **Functions**

- void **method\_def** (t\_pattern pattern, void \*locals, void \*directive, void \*statements)
- void method\_def\_verb (t\_pattern pattern, void \*coding)

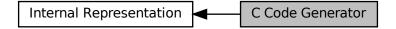
#### **Variables**

- · bool classinfo::meta
- char \* classinfo::name
- char \* classinfo::super
- · int classinfo::num
- char \* methodinfo::classname
- char \* methodinfo::name
- char \* varinfo::classname
- char \* varinfo::name
- · int stringinfo::num
- char \* \_Assign::name
- char \* \_Assign::value
- Assign \_Assigns::assign
- Assigns \_Assigns::next
- const char \* itab entry::key
- void \* itab\_entry::value
- · int itab::total
- · int itab::used
- struct itab\_entry \* itab::rows
- struct itab \* itab\_iter::tab
- int itab\_iter::pos
- · char \* meth::name
- struct meth \* meth::next

### 5.4.1 Detailed Description

#### 5.5 C Code Generator

Collaboration diagram for C Code Generator:



#### **Functions**

• void c\_generate (FILE \*out)

generate the C-Code into the file stream.

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### 5.5.1 Detailed Description

|}

#### 5.5.2 Function Documentation

#### 5.5.2.1 c\_generate()

generate the C-Code into the file stream.

#### **Parameters**

```
FILE*
   in
                    out
01003
01004
01005
           itab_dump( variables );
           c_generate_structs( out );
c_generate_protos( out );
01006
01008
           c_generate_strings( out );
01009
           c_generate_blocks( out );
01010
           c_generate_dispatchers( out );
01011
01012 }
```

## 5.6 Assign

#### **Functions**

- Assign Assign new (char \*name, char \*value)
- Assigns Assigns\_new (Assign assign, Assigns next)
- void Assign\_add (char \*name, char \*value)
- Assign Assign\_find (char \*name)
- char \* Assign\_value (Assign a)
- char \* Assign\_name (Assign a)
- void Assigns\_dump (Assigns as)

### 5.6.1 Detailed Description

#### 5.6.2 Function Documentation

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#### 5.6.2.1 Assign\_add()

add an assignment pair to the global list. No additional checks are done.

References Assign new(), and Assigns new().

#### 5.6.2.2 Assign\_find()

find a pair in the global assignment list with the given name

```
00114
00115
    for( Assigns as = global_assigns; as; as = as->next ) {
        if( strcmp( name, as->assign->name ) == 0 ) {
            return as->assign;
        }
        00119
        }
        return NULL;
        00121 }
```

#### 5.6.2.3 Assign\_name()

return the name of the assignment pair

#### 5.6.2.4 Assign\_new()

Referenced by Assign\_add().

00088 }

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#### 5.6.2.5 Assign\_value()

```
char* Assign_value (
              Assign a )
return the value of the assignment pair
00091
00092
          return a->value;
00093 }
```

#### 5.6.2.6 Assigns\_dump()

```
void Assigns_dump (
           Assigns as )
```

```
for(; as; as = as->next ) {
    printf( "%s <- %s\n", as->assign->name, as->assign->value );
}
00127
00128 }
```

#### 5.6.2.7 Assigns\_new()

```
Assigns Assigns_new (
                Assign assign,
                 Assigns next )
create a new assignment list
00100
           Assigns result = malloc( sizeof( *result ) );
result->assign = assign;
result->next = next;
00101
00102
00103
           return result;
00104
00105 }
```

Referenced by Assign\_add().

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# **Chapter 6**

# **Data Structure Documentation**

## 6.1 \_Assign Struct Reference

#### **Data Fields**

- char \* name
- char \* value

### 6.1.1 Detailed Description

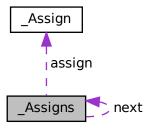
single assignment of a value to string

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

· lib.c

# 6.2 \_Assigns Struct Reference

 $Collaboration\ diagram\ for\ \_Assigns:$ 



#### **Data Fields**

- Assign assign
- · Assigns next

### 6.2.1 Detailed Description

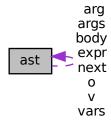
list of assignment of a value to string

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

· lib.c

### 6.3 ast Struct Reference

Collaboration diagram for ast:



#### **Data Fields**

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```
method target
     char * sel
        selector
     struct ast * arg
        list of arguments
  } unary
        unary method call node
  struct {
     struct ast * v
        argument value node
     struct \; \underset{}{\textbf{ast}} * \underset{}{\textbf{next}}
        next argument
  } arg
  struct argdef {
     const char * key
     const\ char * \textcolor{red}{name}
        parameter name
     struct ast * next
        next keyword in the list
  } argdef
  struct {
     struct ast * v
     struct ast * next
  } stmt
  struct {
     \text{char} * \textbf{var}
     struct ast * expr
  } asgn
  struct {
     \text{char} * \textbf{name}
     \text{char} * \textbf{super}
     int num
     struct ast * vars
     struct ast * next
  } cls
  struct {
     char * v
     struct ast * next
  } names
  struct {
     const char * name
     struct ast * args
     \text{char} * \textbf{classname}
     \text{char} * \textbf{src}
     struct ast * body
     struct ast * next
  } methods
} u
```

#### 6.3.1 Field Documentation

### 6.3.1.1 key

```
const char* ast::key
```

Keyword including the colon at the end if it is no keyword then the plain unary or binary name is here.

#### 6.3.1.2 next

```
struct ast* ast::next
```

next argument

next keyword in the list

#### 6.3.1.3 v

```
char* ast::v
```

string value owned by the syntax tree

id value owned by the syntax tree

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

• global.h

### 6.4 classinfo Struct Reference

#### **Data Fields**

- bool meta
- char \* name
- char \* super
- int num

### 6.4.1 Detailed Description

details of a class

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

lib.c

### 6.5 context Struct Reference

Collaboration diagram for context:



#### **Data Fields**

- struct context \* super
- bool ctx\_class
- const char \* name

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

• lib.h

## 6.6 contextdef Struct Reference

#### **Data Fields**

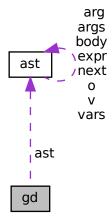
- · bool global
- bool instance
- · bool local

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

• lib.h

## 6.7 gd Struct Reference

Collaboration diagram for gd:



#### **Data Fields**

- · int state
- int paridx
- int token
- int pos
- char **buf** [50]
- char line [2000]
- struct ast \* ast
- · int classnum

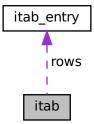
The documentation for this struct was generated from the following file:

global.h

### 6.8 itab Struct Reference

structure of itab

Collaboration diagram for itab:



### **Data Fields**

- int total
- int used
- struct itab\_entry \* rows

## 6.8.1 Detailed Description

structure of itab

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

• lib.c

## 6.9 itab\_entry Struct Reference

structure of an entry in the itab.

#### **Data Fields**

- · const char \* key
- void \* value

### 6.9.1 Detailed Description

structure of an entry in the itab.

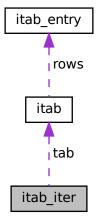
The documentation for this struct was generated from the following file:

· lib.c

## 6.10 itab\_iter Struct Reference

iterator over elements of an itab.

Collaboration diagram for itab\_iter:



#### **Data Fields**

- struct itab \* tab
- int pos

## 6.10.1 Detailed Description

iterator over elements of an itab.

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

· lib.c

### 6.11 meth Struct Reference

Collaboration diagram for meth:



#### **Data Fields**

- char \* name
- struct meth \* next

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

· lib.c

### 6.12 methodinfo Struct Reference

#### **Data Fields**

- char \* classname
- char \* name

### 6.12.1 Detailed Description

details of a method

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

• lib.c

## 6.13 s\_names Struct Reference

Collaboration diagram for s\_names:



#### **Data Fields**

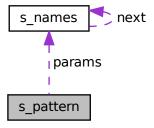
- char \* name
- t\_names next

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

· lib.h

## 6.14 s\_pattern Struct Reference

Collaboration diagram for s\_pattern:



## **Data Fields**

- char \* selector
- t\_names params

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

• lib.h

## 6.15 stringinfo Struct Reference

#### **Data Fields**

• int num

### 6.15.1 Detailed Description

details of a string

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

· lib.c

### 6.16 varinfo Struct Reference

#### **Data Fields**

- char \* classname
- char \* name

## 6.16.1 Detailed Description

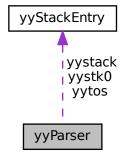
details of a global variable

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

· lib.c

# 6.17 yyParser Struct Reference

Collaboration diagram for yyParser:



#### **Data Fields**

- yyStackEntry \* yytos
- int yyerrcnt
- ParseARG\_SDECL ParseCTX\_SDECL int yystksz
- yyStackEntry \* yystack
- yyStackEntry yystk0

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

· lempar.c

## 6.18 yyStackEntry Struct Reference

#### **Data Fields**

- YYACTIONTYPE stateno
- YYCODETYPE major
- YYMINORTYPE minor

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

• lempar.c