Háskóli Íslands

Þýðendur

Parser-NanoMorpho

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Github

Parser

Parser.java

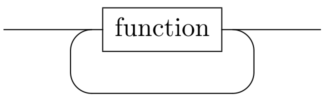
```java
import java.io.FileReader;
import java.io.IOException;

public class Parser {
  private static NanoMorpho lexer;
  private static int token;

  private static boolean should_advance = true;

  public static void main(String[] args) throws Exception {
    lexer = new NanoMorpho(new FileReader(args[0]));
    token = advance();

    while (token != 0) {
      func();
      token = lexer.yylex();
    }
    System.out.println("Accepted!");
  }

  private static void debug(int line) {
    System.out.println("DEBUG: line-" + line + ", token-" + token + ", lexeme-" +
    ↪  lexer.getLexeme());
  }

  // Print error message
  private static void error(String s) {
    throw new Error(
        "Line " + lexer.getLineNumber() +
        ": Expected " + s + " but found " + lexer.getLexeme()
    );
  }

  private static String errorMsg(int expected) {
    switch (expected) {
      case NanoMorpho.NAME: return "name";
      default: return "unknown";
    }
  }

  private static int asciiValue(char c) {
    return (int) c;
  }

  // Check if token is valid
  private static void check(int expected) {
    if (token != expected) error(errorMsg(expected));
  }
```

```java
// Check if token is valid
private static void check(char expected) {
  if (token != (asciiValue(expected))) error(""+expected);
}

// Optional check for token
private static boolean optionalCheck(int opt) {
  if (token != opt) return false;
  return true;
}

// Optional check for token
private static boolean optionalCheck(char opt) {
  if (token != asciiValue(opt)) return false;
  return true;
}

private static int advance() throws Exception {
  if (should_advance) {
    token = lexer.yylex();
    if (token == 0) {
      throw new Error("Ending is invalid");
    }
  }
  should_advance = true;
  return token;
}

/*
  we look at the next token without "using" it,
  meaning that the next time advance is called,
  the same token is used
*/
private static int lookahead() throws Exception {
  advance();
  should_advance = false;
  return token;
}

public static void func() throws Exception {
  // *** NAME(... , ...) *** //
  check(NanoMorpho.NAME);

  // Read next token
  advance();
  check('(');

  // Read next token
  advance();


  if (! optionalCheck(')')) {

    check(NanoMorpho.NAME);

    // Read next token
    advance();
    // Reading function parameters
    while (optionalCheck(',')) {

      // Read next token
      advance();
      check(NanoMorpho.NAME);

      // Read next token
      advance();
    }

  }

  // Closing function paranthesis
  check(')');

  // Read next token
  advance();
  check('{');

  // *** { decl;* expr;*} *** //
  decl();

  /*
    we check for expressions until we reach },
    or we reach an invalid ending.
    We also want to make sure the function contains
    at least one expression.
  */
  boolean contains_expr = false;

  while (! optionalCheck('}')) {
    expr();

    // Read next token
    advance();
    check(';');

    // Read next token
    advance();
    contains_expr = true;
  }
  if (!contains_expr) error("expression");
}

// *** var NAME,NAME..... *** //
public static void decl() throws Exception {

  // just in case it's set to false before the call
  should_advance = true;

  // Lookahead next token
  lookahead();

  while (optionalCheck(NanoMorpho.VAR)) {
```

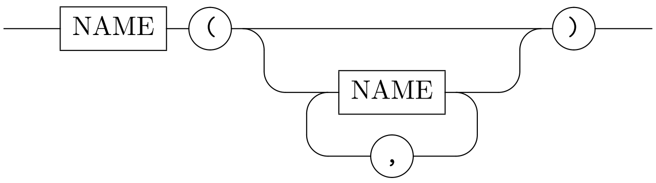
```java
      // Use token
      advance();

      // Read next token
      advance();
      check(NanoMorpho.NAME);

      // Additional variables, seperate by commas
      advance();
      while (optionalCheck(',')) {

        // Read next token
        advance();
        check(NanoMorpho.NAME);

        advance();
      }
      check(';');

      // Lookahead next token
      lookahead();
    }
  }

  public static void expr() throws Exception {

    // just in case it's set to false before the call
    should_advance = true;

    boolean is_empty = true;

    // *** NAME | NAME = expr | NAME = (expr,....) *** //
    if (optionalCheck(NanoMorpho.NAME)) {

      // assigning to a variable => NAME = expr

      // Lookahead next token
      lookahead();

      if (optionalCheck('=')) {

        // Read next token
        advance();
        advance();

        expr();
      }

      // Lookahead next token
      lookahead();

      if (optionalCheck('(')) {

        // Read next token
        advance();
        // Lookahead next token
        lookahead();
        if (! optionalCheck(')')) {

          // First parameter
          advance();
          expr();

          // Additional parameters
          advance();
          while (optionalCheck(',')) {
            // n parameter
            advance();
            expr();
          }

          // Read next token
          advance();
          check(')');

        }
        else advance();

      }
      is_empty = false;
    }

    // *** return expr | OPNAME expr *** //
    else if (optionalCheck(NanoMorpho.RETURN) || optionalCheck(NanoMorpho.OPNAME)) {

      // Read next token
      advance();
      expr();
      is_empty = false;
    }

    // *** LITERAL *** //
    else if (optionalCheck(NanoMorpho.LITERAL)) is_empty = false;


    else if (optionalCheck('(')) {

      // Read next token
      advance();
      expr();

      // Read next token
      advance();
      check(')');

      is_empty = false;
    }

    else if (optionalCheck(NanoMorpho.WHILE)) {

      // Read next token
      advance();
      check('(');
      // Read next token
      advance();
      expr();

      // Read next token
      advance();
      check(')');

      body();
      is_empty = false;
    }
    else is_empty = ifexpr();

    // Empty expressions result in an error
    if (is_empty) error("expression");

    // Lookahead and check if next token is an operator, if so
    // we need to follow up with an expression
    lookahead();

    if (optionalCheck(NanoMorpho.OPNAME)) {

      advance();

      // Read next token
      advance();
      expr();
    }
  }

  // Returns true if the ifexpr is empty
  public static boolean ifexpr() throws Exception {

    // just in case it's set to false before the call
    should_advance = true;

    if (optionalCheck(NanoMorpho.IF)) {

      // Read next token
      advance();
      check('(');

      // Read next token
      advance();
      expr();

      // Read next token
      advance();
      check(')');

      body();

      // Lookahead next token
      lookahead();
      if (optionalCheck(NanoMorpho.ELSIF)) {
        // Use token
        advance();

        // Read next token
        advance();
        check('(');

        // Read next token
        advance();
        expr();

        // Read next token
        advance();
        check(')');

        body();
      }

      // Lookahead next token
      lookahead();
      if (optionalCheck(NanoMorpho.ELSE)) {

        // Use token
        advance();
        body();
      }
      return false;
    }
    return true;
  }

  public static void body() throws Exception {

    // just in case it's set to false before the call
    should_advance = true;

    // Read next token
    advance();
    check('{');

    while (! optionalCheck(';')) {

      advance();
      expr();
      advance();
    }

    // Read next token
    advance();
    check('}');
  }

}
```

NanoMorpho-Málrit

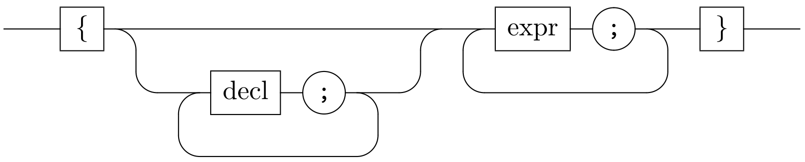
program



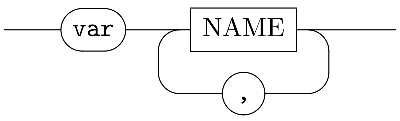
function



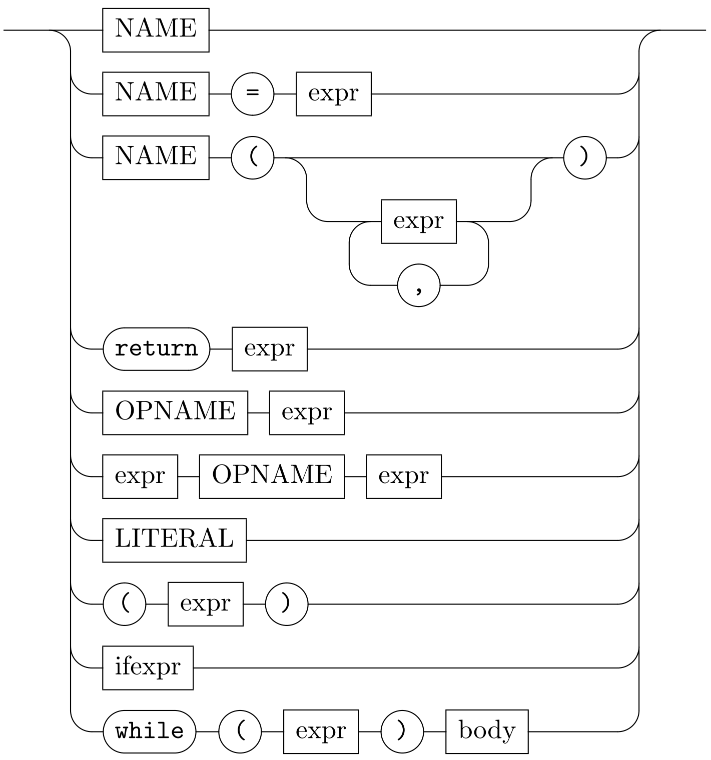
->



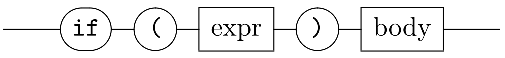
decl



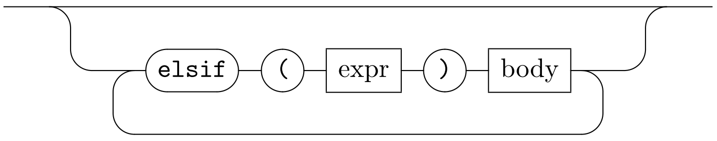
expr



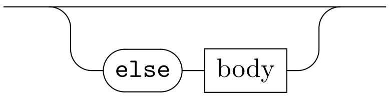
ifexpr



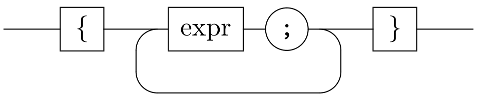
->



->



body



Test output

Test Invalid 1

```
main(asd {

error -> paranthesis left open
```

Test Invalid 2

```
main() {
  var z;
}

error -> no expression in function
```

Test Invalid 3

```
main() {
  var x, y, z, asd, qwe;
  x = y = z = 123;
  asd =;
  error -> no variable assignment
}
```

Test Invalid 4

```
main() {
  var x;
  x = x + x + x +;
  error -> end of line operator
}
```

Test Invalid 5

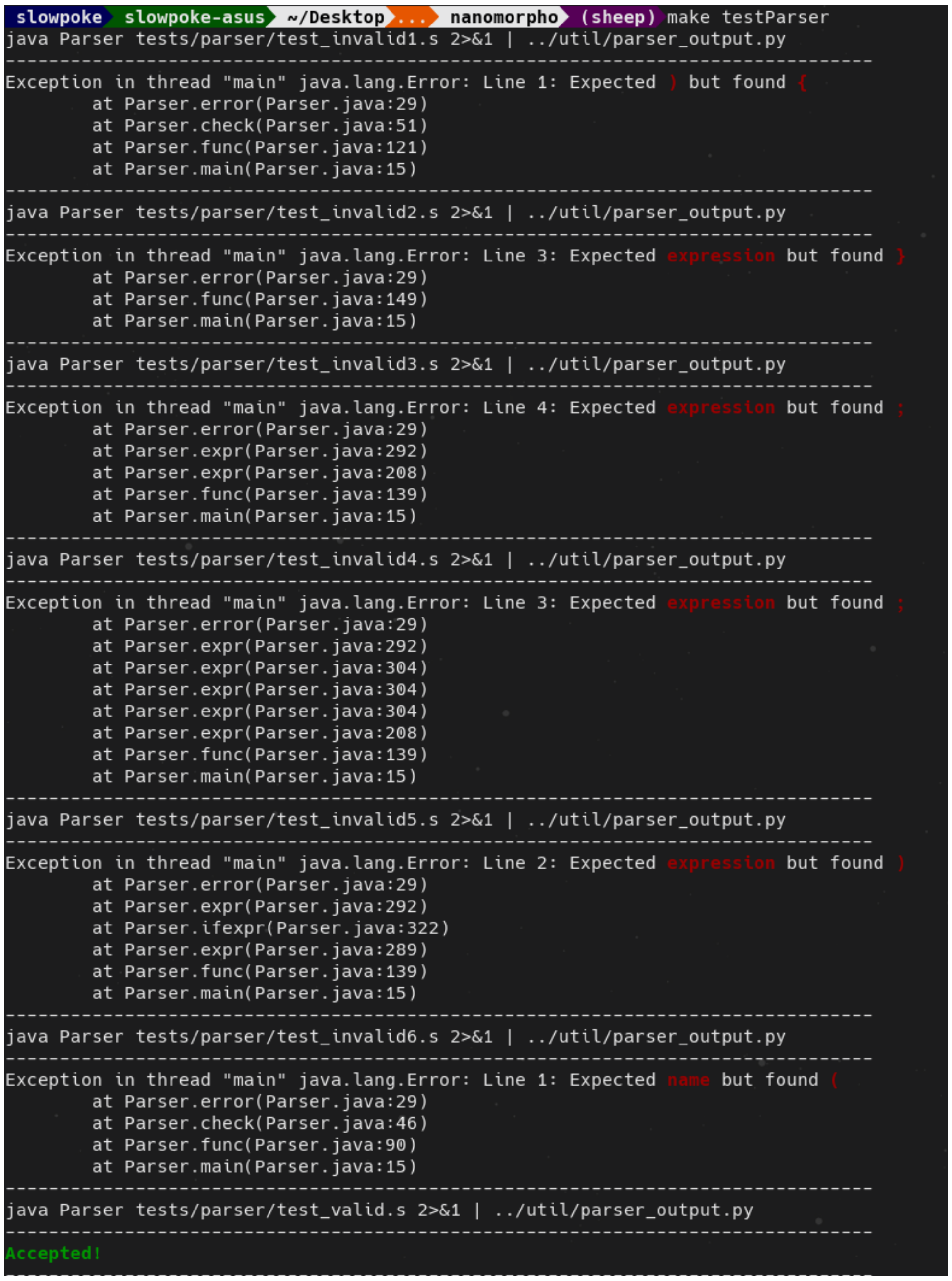
```
main(asd, qwe, sdf) {
  if () {
    error -> not if statement expression
  };
}
```

Test Invalid 6

```
(asd) {
  var hallo = 1;
}
error -> No function name
```

Test Valid

```
main(asd, sdf) {
  var krabbi;
  var bubbi;
  bubbi();
  while(x == 5) {
    bubbi();
  };
  if (krabbi != 123 != asd < bvc) {
    if (x) {
      while (z > asdfghjkl) {
        return 5;
      };
    };
  };
  return 0;
}

epli(lol) {
  var epli;
  epli = (567 - 123) + (999 && 345);
  mango;
  if (5 > 6) {
    1 + 2;
  } elsif (6 > 7) {
    2 + 3;
  } else {
    1 + 2 * 3;
  };
}
```



```
 slowpoke  slowpoke-asus  ~/Desktop ...  nanomorpho  (sheep) make testParser
java Parser tests/parser/test_invalid1.s 2>&1 | ../util/parser_output.py
--------------------------------------------------------------------------------
Exception in thread "main" java.lang.Error: Line 1: Expected ) but found {
        at Parser.error(Parser.java:29)
        at Parser.check(Parser.java:51)
        at Parser.func(Parser.java:121)
        at Parser.main(Parser.java:15)
--------------------------------------------------------------------------------
java Parser tests/parser/test_invalid2.s 2>&1 | ../util/parser_output.py
--------------------------------------------------------------------------------
Exception in thread "main" java.lang.Error: Line 3: Expected expression but found }
        at Parser.error(Parser.java:29)
        at Parser.func(Parser.java:149)
        at Parser.main(Parser.java:15)
--------------------------------------------------------------------------------
java Parser tests/parser/test_invalid3.s 2>&1 | ../util/parser_output.py
--------------------------------------------------------------------------------
Exception in thread "main" java.lang.Error: Line 4: Expected expression but found ;
        at Parser.error(Parser.java:29)
        at Parser.expr(Parser.java:292)
        at Parser.expr(Parser.java:208)
        at Parser.func(Parser.java:139)
        at Parser.main(Parser.java:15)
--------------------------------------------------------------------------------
java Parser tests/parser/test_invalid4.s 2>&1 | ../util/parser_output.py
--------------------------------------------------------------------------------
Exception in thread "main" java.lang.Error: Line 3: Expected expression but found ;
        at Parser.error(Parser.java:29)
        at Parser.expr(Parser.java:292)
        at Parser.expr(Parser.java:304)
        at Parser.expr(Parser.java:304)
        at Parser.expr(Parser.java:304)
        at Parser.expr(Parser.java:208)
        at Parser.func(Parser.java:139)
        at Parser.main(Parser.java:15)
--------------------------------------------------------------------------------
java Parser tests/parser/test_invalid5.s 2>&1 | ../util/parser_output.py
--------------------------------------------------------------------------------
Exception in thread "main" java.lang.Error: Line 2: Expected expression but found )
        at Parser.error(Parser.java:29)
        at Parser.expr(Parser.java:292)
        at Parser.ifexpr(Parser.java:322)
        at Parser.expr(Parser.java:289)
        at Parser.func(Parser.java:139)
        at Parser.main(Parser.java:15)
--------------------------------------------------------------------------------
java Parser tests/parser/test_invalid6.s 2>&1 | ../util/parser_output.py
--------------------------------------------------------------------------------
Exception in thread "main" java.lang.Error: Line 1: Expected name but found (
        at Parser.error(Parser.java:29)
        at Parser.check(Parser.java:46)
        at Parser.func(Parser.java:90)
        at Parser.main(Parser.java:15)
--------------------------------------------------------------------------------
java Parser tests/parser/test_valid.s 2>&1 | ../util/parser_output.py
--------------------------------------------------------------------------------
Accepted!
--------------------------------------------------------------------------------
```