Министерство науки и высшего образования Российской Федерации

Федеральное государственное бюджетное образовательное учреждение

высшего образования

«Алтайский государственный технический университет им. И. И. Ползунова»

Факультет информационных технологий

Кафедра прикладной математики

Отчет защищен с оценкой \_\_\_\_\_

Преподаватель \_\_\_\_\_\_\_\_\_\_\_\_\_

(подпись)

«\_\_\_» \_\_\_\_\_\_\_\_\_\_\_\_ 2022 г.

Отчет

По лабораторной работе №4

«Программа лексического транслятора»

по дисциплине «Теория алгоритмических языков и трансляторов»

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Преподаватель профессор Крючкова Е.Н.

Барнаул 2022

Задание:

Программа: главная программа языка C++.

Допускается описание массивов любой размерности

Типы данных: int (short и long), bool

Операции: все арифметические бинарные и унарные, сравнения.

Операторы: пустой, составной, присваивания и switch.

Операнды: простые переменные, элементы массивов, константы и именованные константы.

Константы: все целые и символьные.

Таблица 1 Таблица лексем

|  |  |  |
| --- | --- | --- |
| **Лексема** | **Тип лексемы** | **Ограничитель лексемы** |
| Целая константа | type\_int\_const = 1 | Не цифра |
|  |  |  |
| Символьная константа | type\_char\_const = 2 | Не буква, не цифра |
| Идентификатор | type\_ident = 3 | Не буква, не цифра |
|  |  |  |
| **Ключевые слова** | | |
| int | type\_int = 200 | Не буква, не цифра |
| short | type\_short = 201 | Не буква, не цифра |
| long | type\_long = 202 | Не буква, не цифра |
| bool | type\_bool = 203 | Не буква, не цифра |
| void | type\_void = 204 | Не буква, не цифра |
| return | type\_return = 205 | Не буква, не цифра |
| main | type\_main = 206 | Не буква, не цифра |
| true | type\_true = 207 | Не буква, не цифра |
| false | type\_false = 208 | Не буква, не цифра |
| switch | Type\_switch = 209 | Не буква, не цифра |
| const | type\_const = 210 | Не буква, не цифра |
| default | type\_default = 211 | Не буква, не цифра |
| case | type\_case = 212 | Не буква, не цифра |
| break | type\_break = 213 | Не буква, не цифра |
| **Специальные знаки** | | |
| . | type\_dot = 100 | Любой символ |
| , | type\_comma = 101 | Любой символ |
| ; | type\_semicolon = 102 | Любой символ |
| ( | type\_lbracket = 103 | Любой символ |
| ) | type\_rbracket = 104 | Любой символ |
| { | type\_lparenthesis = 105 | Любой символ |
| } | type\_rparenthesis = 106 | Любой символ |
| : | type\_colon = 107 | Любой символ |
| [ | type\_square\_lparenthesis = 108 | Любой символ |
| ] | type\_square\_rparenthesis = 109 | Любой символ |
| ‘ | type\_quote = 110 | Любой символ |
| **Знаки операций** | | |
| + | type\_plus = 300 | Не знак “+”, не знак “=” |
| - | type\_minus = 301 | Не знак “-“, не знак “=” |
| < | type\_lt = 302 | Не знак “=” |
| > | type\_gt = 303 | Не знак “=” |
| <= | type\_le = 304 | Любой символ |
| >= | type\_ge = 305 | Любой символ |
| == | type\_eq = 306 | Любой символ |
| != | type\_ne = 307 | Любой символ |
|  |  |  |
|  |  |  |
| \* | type\_mul = 308 | Не знак “=” |
| / | type\_div = 309 | Не знак “=” |
| % | type\_mod = 310 | Любой символ |
| = | type\_assign = 311 | Не знак “=” |
| ++ | type\_plus\_plus = 312 | Любой символ |
| -- | type\_minus\_minus = 313 | Любой символ |
| += | type\_plus\_assign = 314 | Не знак “=” |
| \*= | type\_mul\_assign = 315 | Не знак “=” |
| /= | type\_div\_assign = 316 | Не знак “=” |
| -= | type\_minus\_assign = 317 | Не знак “=” |
| %= | type\_mod\_assign = 318 | Не знак “=” |
| **Дополнительные знаки** | | |
| Конец | type\_end = 400 | Любой символ |
| Ошибочный тип | type\_error = 401 | Любой символ |

**Тест 1**

**Тестируемый код:**

void main() {

const int a=0;

int b=99;

bool isEqual = a >= b;

isEqual = a != b;

isEqual = !isEqual;

a++;

--b;

//olloffoofofofofoofofo

int i[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};

short a1 = 5;

long a2 = 5000000000;

isEqual = true;

isEqual = false;

const long someVar = 100000000;

const short someVar2 = 10;

b = someVar - someVar2;

a = b++;

a += 100;

a -= 100;

//commented...........

{

int c = 100;

};

a = (a \* 2) / 2 + (10 \* a++) - (--a + true);

a < 1;

(a>100);

a /= 10;

a %= 2;

b = b / a;

b = 100 % 10;

/\* jdfslkflisdjfisldjfidsjfisjdif jsdijf jjsdfjsdjf sdjf u2903ur0923 2jfwm ;fmwef wef we68f6 8\wefw \*/

int num = 999;

switch (num) {

case (num > 1000):

a \*= 100;

break;

case (num == 1000):

a / 10;

break;

case (num < 1000):

a += 10;

break;

default:

a %= 2;

break;

}

isEqual = false >= 1;

isEqual true <= 1;

1 == 10;

1 == true;

1 < 4;

//aha[[fa[[af[[

'a' < 100;

400 > 40;

a -= 1;

a++;

a += 10;

isEqual = true != false;

isEqual = true != 0;

isEqual = 1 != 1;

isEqual = 'a' > 'b';

return 0;

//the end of programmmmmmmmmmmmmmmmmmmmmmmmmmmmmm...

a=100;

switch (a) {

case 1:

a \*= 100;

break;

case 10:

a \*= 10;

break;

default:

a = 0;

break;

}

//le3r3r3ff

}

**Результат**

C:\Users\Victor\CLionProjects\scanner-lab4\cmake-build-debug\scanner\_lab4.exe

void -> 204

main -> 206

( -> 103

) -> 104

{ -> 105

const -> 210

int -> 200

a -> 3

= -> 311

0 -> 1

; -> 102

int -> 200

b -> 3

= -> 311

99 -> 1

; -> 102

bool -> 203

isEqual -> 3

= -> 311

a -> 3

>= -> 305

b -> 3

; -> 102

isEqual -> 3

= -> 311

a -> 3

!= -> 307

b -> 3

; -> 102

isEqual -> 3

= -> 311

! -> 401

isEqual -> 3

; -> 102

a -> 3

++ -> 312

; -> 102

-- -> 313

b -> 3

; -> 102

int -> 200

i -> 3

[ -> 108

10 -> 1

] -> 109

= -> 311

{ -> 105

1 -> 1

, -> 101

2 -> 1

, -> 101

3 -> 1

, -> 101

4 -> 1

, -> 101

5 -> 1

, -> 101

6 -> 1

, -> 101

7 -> 1

, -> 101

8 -> 1

, -> 101

9 -> 1

, -> 101

10 -> 1

} -> 106

; -> 102

short -> 201

a1 -> 3

= -> 311

5 -> 1

; -> 102

long -> 202

a2 -> 3

= -> 311

5000000000 -> 1

; -> 102

isEqual -> 3

= -> 311

true -> 207

; -> 102

isEqual -> 3

= -> 311

false -> 208

; -> 102

const -> 210

long -> 202

someVar -> 3

= -> 311

100000000 -> 1

; -> 102

const -> 210

short -> 201

someVar2 -> 3

= -> 311

10 -> 1

; -> 102

b -> 3

= -> 311

someVar -> 3

- -> 301

someVar2 -> 3

; -> 102

a -> 3

= -> 311

b -> 3

++ -> 312

; -> 102

a -> 3

+= -> 314

100 -> 1

; -> 102

a -> 3

-= -> 317

100 -> 1

; -> 102

{ -> 105

int -> 200

c -> 3

= -> 311

100 -> 1

; -> 102

} -> 106

; -> 102

a -> 3

= -> 311

( -> 103

a -> 3

\* -> 308

2 -> 1

) -> 104

/ -> 309

2 -> 1

+ -> 300

( -> 103

10 -> 1

\* -> 308

a -> 3

++ -> 312

) -> 104

- -> 301

( -> 103

-- -> 313

a -> 3

+ -> 300

true -> 207

) -> 104

; -> 102

a -> 3

< -> 302

1 -> 1

; -> 102

( -> 103

a -> 3

> -> 303

100 -> 1

) -> 104

; -> 102

a -> 3

/= -> 316

10 -> 1

; -> 102

a -> 3

%= -> 318

2 -> 1

; -> 102

b -> 3

= -> 311

b -> 3

/ -> 309

a -> 3

; -> 102

b -> 3

= -> 311

100 -> 1

% -> 310

10 -> 1

; -> 102

int -> 200

num -> 3

= -> 311

999 -> 1

; -> 102

switch -> 209

( -> 103

num -> 3

) -> 104

{ -> 105

case -> 212

( -> 103

num -> 3

> -> 303

1000 -> 1

) -> 104

: -> 107

a -> 3

\*= -> 315

100 -> 1

; -> 102

break -> 213

; -> 102

case -> 212

( -> 103

num -> 3

== -> 306

1000 -> 1

) -> 104

: -> 107

a -> 3

/ -> 309

10 -> 1

; -> 102

break -> 213

; -> 102

case -> 212

( -> 103

num -> 3

< -> 302

1000 -> 1

) -> 104

: -> 107

a -> 3

+= -> 314

10 -> 1

; -> 102

break -> 213

; -> 102

default -> 211

: -> 107

a -> 3

%= -> 318

2 -> 1

; -> 102

break -> 213

; -> 102

} -> 106

isEqual -> 3

= -> 311

false -> 208

>= -> 305

1 -> 1

; -> 102

isEqual -> 3

true -> 207

<= -> 304

1 -> 1

; -> 102

1 -> 1

== -> 306

10 -> 1

; -> 102

1 -> 1

== -> 306

true -> 207

; -> 102

1 -> 1

< -> 302

4 -> 1

; -> 102

'a' -> 2

< -> 302

100 -> 1

; -> 102

400 -> 1

> -> 303

40 -> 1

; -> 102

a -> 3

-= -> 317

1 -> 1

; -> 102

a -> 3

++ -> 312

; -> 102

a -> 3

+= -> 314

10 -> 1

; -> 102

isEqual -> 3

= -> 311

true -> 207

!= -> 307

false -> 208

; -> 102

isEqual -> 3

= -> 311

true -> 207

!= -> 307

0 -> 1

; -> 102

isEqual -> 3

= -> 311

1 -> 1

!= -> 307

1 -> 1

; -> 102

isEqual -> 3

= -> 311

'a' -> 2

> -> 303

'b' -> 2

; -> 102

return -> 205

0 -> 1

; -> 102

a -> 3

= -> 311

100 -> 1

; -> 102

switch -> 209

( -> 103

a -> 3

) -> 104

{ -> 105

case -> 212

1 -> 1

: -> 107

a -> 3

\*= -> 315

100 -> 1

; -> 102

break -> 213

; -> 102

case -> 212

10 -> 1

: -> 107

a -> 3

\*= -> 315

10 -> 1

; -> 102

break -> 213

; -> 102

default -> 211

: -> 107

a -> 3

= -> 311

0 -> 1

; -> 102

break -> 213

; -> 102

} -> 106

} -> 106

end -> 400

Process finished with exit code 0

**Тест 2:**

**Исходный код с ошибками**

void main() {

int ptr = 01;

ptr=0;

const int a=0;

int b=99;

bool isEqual = a >= b;

isEqual = a != b;

isEqual = !isEqual;

a++;

--b;

if(true){};

for(int i=0; i<10; i++);

true ? 100 : -100;

//olloffoofofofofoofofo

int i[10] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};

short a1 = 5;

long a2 = 5000000000;

isEqual = !true;

isEqual = false;

const long someVar = 100000000;

const short someVar2 = 10;

b = someVar - someVar2;

a = b++;

a += 100;

a & b;

a | c;

a = 0000004;

a = 0x56;

a -= 100;

//commented...........

func(bool a100);

{

int c = 100;

};

a = (a \* 2) / 2 + (10 \* a++) - (--a + true);

a < 1;

(a>\*100);

a /= 10;

a %= 2;

b = b / a;

b === 100 % 10;

/\* jdfslkflisdjfisldjfidsjfisjdif jsdijf jjsdfjsdjf sdjf u2903ur0923 2jfwm ;fmwef wef we68f6 8\wefw \*/

int num = 0x999;

switch (num) {

case (num > 1000):

a \*= 100;

break;

case (num == 1000):

a / 10;

break;

case (num < 1000):

a += 10;

break;

default:

a %= 2;

break;

}

isEqual = false >= 1;

isEqual true <= 1;

1 == 10;

1 == true;

1 < 4;

//aha[[fa[[af[[

'a' < 100;

400 > 40;

a -= 1;

int int = 1;

'a';

a++;

a += 10;

isEqual = true != false;

isEqual = true != 0;

isEqual = 1 != 1;

isEqual = 'a' > 'b';

return 0;

//the end of programmmmmmmmmmmmmmmmmmmmmmmmmmmmmm...

a=100;

switch (a) {

case 1:

a \*= 100;

break;

case 10:

a \*= 10;

break;

default:

a = 0;

break;

}

//le3r3r3ff

#comment

'fff';

}

**Результат:**

C:\Users\Victor\CLionProjects\scanner-lab4\cmake-build-debug\scanner\_lab4.exe

void -> 204

main -> 206

( -> 103

) -> 104

{ -> 105

int -> 200

ptr -> 3

= -> 311

Wrong at line 2 Error symbol: 01 ; -> 102

ptr -> 3

= -> 311

0 -> 1

; -> 102

const -> 210

int -> 200

a -> 3

= -> 311

0 -> 1

; -> 102

int -> 200

b -> 3

= -> 311

99 -> 1

; -> 102

bool -> 203

isEqual -> 3

= -> 311

a -> 3

>= -> 305

b -> 3

; -> 102

isEqual -> 3

= -> 311

a -> 3

!= -> 307

b -> 3

; -> 102

isEqual -> 3

= -> 311

Error no '!' operation

! -> 401

isEqual -> 3

; -> 102

a -> 3

++ -> 312

; -> 102

-- -> 313

b -> 3

; -> 102

if -> 3

( -> 103

true -> 207

) -> 104

{ -> 105

} -> 106

; -> 102

for -> 3

( -> 103

int -> 200

i -> 3

= -> 311

0 -> 1

; -> 102

i -> 3

< -> 302

10 -> 1

; -> 102

i -> 3

++ -> 312

) -> 104

; -> 102

true -> 207

Wrong at line 13 Error symbol: ? 100 -> 1

: -> 107

- -> 301

100 -> 1

; -> 102

int -> 200

i -> 3

[ -> 108

10 -> 1

] -> 109

= -> 311

{ -> 105

1 -> 1

, -> 101

2 -> 1

, -> 101

3 -> 1

, -> 101

4 -> 1

, -> 101

5 -> 1

, -> 101

6 -> 1

, -> 101

7 -> 1

, -> 101

8 -> 1

, -> 101

9 -> 1

, -> 101

10 -> 1

} -> 106

; -> 102

short -> 201

a1 -> 3

= -> 311

5 -> 1

; -> 102

long -> 202

a2 -> 3

= -> 311

5000000000 -> 1

; -> 102

isEqual -> 3

= -> 311

Error no '!' operation

! -> 401

true -> 207

; -> 102

isEqual -> 3

= -> 311

false -> 208

; -> 102

const -> 210

long -> 202

someVar -> 3

= -> 311

100000000 -> 1

; -> 102

const -> 210

short -> 201

someVar2 -> 3

= -> 311

10 -> 1

; -> 102

b -> 3

= -> 311

someVar -> 3

- -> 301

someVar2 -> 3

; -> 102

a -> 3

= -> 311

b -> 3

++ -> 312

; -> 102

a -> 3

+= -> 314

100 -> 1

; -> 102

a -> 3

Wrong at line 26 Error symbol: & b -> 3

; -> 102

a -> 3

Wrong at line 27 Error symbol: | c -> 3

; -> 102

a -> 3

= -> 311

Wrong at line 28 Error symbol: 0000004 ; -> 102

a -> 3

= -> 311

0 -> 1

x56 -> 3

; -> 102

a -> 3

-= -> 317

100 -> 1

; -> 102

func -> 3

( -> 103

bool -> 203

a100 -> 3

) -> 104

; -> 102

{ -> 105

int -> 200

c -> 3

= -> 311

100 -> 1

; -> 102

} -> 106

; -> 102

a -> 3

= -> 311

( -> 103

a -> 3

\* -> 308

2 -> 1

) -> 104

/ -> 309

2 -> 1

+ -> 300

( -> 103

10 -> 1

\* -> 308

a -> 3

++ -> 312

) -> 104

- -> 301

( -> 103

-- -> 313

a -> 3

+ -> 300

true -> 207

) -> 104

; -> 102

a -> 3

< -> 302

1 -> 1

; -> 102

( -> 103

a -> 3

> -> 303

\* -> 308

100 -> 1

) -> 104

; -> 102

a -> 3

/= -> 316

10 -> 1

; -> 102

a -> 3

%= -> 318

2 -> 1

; -> 102

b -> 3

= -> 311

b -> 3

/ -> 309

a -> 3

; -> 102

b -> 3

== -> 306

= -> 311

100 -> 1

% -> 310

10 -> 1

; -> 102

int -> 200

num -> 3

= -> 311

0 -> 1

x999 -> 3

; -> 102

switch -> 209

( -> 103

num -> 3

) -> 104

{ -> 105

case -> 212

( -> 103

num -> 3

> -> 303

1000 -> 1

) -> 104

: -> 107

a -> 3

\*= -> 315

100 -> 1

; -> 102

break -> 213

; -> 102

case -> 212

( -> 103

num -> 3

== -> 306

1000 -> 1

) -> 104

: -> 107

a -> 3

/ -> 309

10 -> 1

; -> 102

break -> 213

; -> 102

case -> 212

( -> 103

num -> 3

< -> 302

1000 -> 1

) -> 104

: -> 107

a -> 3

+= -> 314

10 -> 1

; -> 102

break -> 213

; -> 102

default -> 211

: -> 107

a -> 3

%= -> 318

2 -> 1

; -> 102

break -> 213

; -> 102

} -> 106

isEqual -> 3

= -> 311

false -> 208

>= -> 305

1 -> 1

; -> 102

isEqual -> 3

true -> 207

<= -> 304

1 -> 1

; -> 102

1 -> 1

== -> 306

10 -> 1

; -> 102

1 -> 1

== -> 306

true -> 207

; -> 102

1 -> 1

< -> 302

4 -> 1

; -> 102

'a' -> 2

< -> 302

100 -> 1

; -> 102

400 -> 1

> -> 303

40 -> 1

; -> 102

a -> 3

-= -> 317

1 -> 1

; -> 102

int -> 200

int -> 200

= -> 311

1 -> 1

; -> 102

'a' -> 2

; -> 102

a -> 3

++ -> 312

; -> 102

a -> 3

+= -> 314

10 -> 1

; -> 102

isEqual -> 3

= -> 311

true -> 207

!= -> 307

false -> 208

; -> 102

isEqual -> 3

= -> 311

true -> 207

!= -> 307

0 -> 1

; -> 102

isEqual -> 3

= -> 311

1 -> 1

!= -> 307

1 -> 1

; -> 102

isEqual -> 3

= -> 311

'a' -> 2

> -> 303

'b' -> 2

; -> 102

return -> 205

0 -> 1

; -> 102

a -> 3

= -> 311

100 -> 1

; -> 102

switch -> 209

( -> 103

a -> 3

) -> 104

{ -> 105

case -> 212

1 -> 1

: -> 107

a -> 3

\*= -> 315

100 -> 1

; -> 102

break -> 213

; -> 102

case -> 212

10 -> 1

: -> 107

a -> 3

\*= -> 315

10 -> 1

; -> 102

break -> 213

; -> 102

default -> 211

: -> 107

a -> 3

= -> 311

0 -> 1

; -> 102

break -> 213

; -> 102

} -> 106

Wrong at line 96 Error symbol: # comment -> 3

Error char constant

'f -> 401

ff -> 3

Error char constant

'; -> 401

} -> 106

end -> 400

Process finished with exit code 0