

Μεταγλωτιστές 2019

Προγραμματιστική Εργασία #2

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1. Κανόνες γραμματικής:

```
Stmt_list -> Stmt Stmt_list | ε .  
Stmt -> id equal Expr | print Expr .  
Expr -> Term Term_tail .  
Term_tail -> xor Term Term_tail | ε .  
Term -> Factor Factor_tail .  
Factor_tail -> or Factor Factor_tail | ε .  
Factor -> Atom Atom_tail .  
Atom_tail -> and Atom Atom_tail | ε .  
Atom -> parethesis1 Expr parethesis1 | id | number .
```

2. Έλεγχος συμβατότητας LL(1):

Grammar	
Stmt_list	→ Stmt Stmt_list .
Stmt	→ id equal Expr print Expr .
Expr	→ Term Term_tail .
Term_tail	→ xor Term Term_tail .
Term	→ Factor Factor_tail .
Factor_tail	→ or Factor Factor_tail .
Factor	→ Atom Atom_tail .
Atom_tail	→ and Atom Atom_tail .
Atom	→ parethesis1 Expr parethesis1 id number.

Some sentences generated by this grammar: {
number and number, id equal id and id and id,
and number, id equal number and number and

- All nonterminals are reachable and realizable.
- The nullable nonterminals are: Stmt_list Term_tail Factor_tail Atom_tail.
- The endable nonterminals are: Atom_tail Atom Factor_tail Factor Term_tail Term Expr Stmt_list Stmt.
- No cycles.

3. Πίνακας με τα FIRST και FOLLOW sets:

nonterminal	first set	follow set	nullable	endable
Stmt_list	id print	∅	yes	yes
Stmt	id print	id print	no	yes
Term_tail	xor	parethesis1 id print	yes	yes
Term	parethesis1 id number	parethesis1 xor id print	no	yes
Factor_tail	or	parethesis1 xor id print	yes	yes
Factor	parethesis1 id number	parethesis1 or xor id print	no	yes
Atom_tail	and	parethesis1 or xor id print	yes	yes
Atom	parethesis1 id number	parethesis1 and or xor id print	no	yes
Expr	parethesis1 id number	parethesis1 id print	no	yes

The grammar is LL(1).

4. Αποτελέσματα εισόδου/εξόδου για έγκυρες και άκυρες μορφές:

A. Έγκυρα αποτελέσματα:

Είσοδος

```
a = 10111010
b = 11111111
c = 10101110
print a or (b and c)
d = a and c
print a and ((b or a) xor c) xor d
```

Έξοδος

```
lefospap21:~/workspace/Compilers/Ergasia2 $ python3 runner.py
11111111 and 10101110
10111010 or 10101110
= 10111110
10111010 and 10101110
11111111 or 10111010
11111111 xor 10101110
10111010 and 1010001
10000 xor 10101010
= 10111010
```

B. Άκυρα αποτελέσματα:

Είσοδος

```
a = 125
print a xor and b
print b
```

Έξοδος

a

```
lefospap21:~/workspace/Compilers/Ergasia2 $ python3 runner.py
Traceback (most recent call last):
  File "runner.py", line 169, in <module>
    parser.parse(fp)
  File "runner.py", line 77, in parse
    self.stmt_list()
  File "runner.py", line 81, in stmt_list
    self.stmt()
  File "runner.py", line 93, in stmt
    e = self.expr()
  File "runner.py", line 107, in expr
    t = self.term()
  File "runner.py", line 121, in term
    f = self.factor()
  File "runner.py", line 135, in factor
    a = self.atom()
  File "runner.py", line 161, in atom
    self.match('BIN_NUM')
  File "runner.py", line 70, in match
    self.la,self.text=self.next_token()
  File "runner.py", line 64, in next_token
    return self.scanner.read()
  File "/home/ubuntu/.local/lib/python3.4/site-packages/plex/scanners.py", line 94, in read
    self.text, action = self.scan_a_token()
  File "/home/ubuntu/.local/lib/python3.4/site-packages/plex/scanners.py", line 138, in scan_a_token
    raise errors.UnrecognizedInput(self, self.state_name)
plex.errors.UnrecognizedInput: '', line 1, char 5: Token not recognised in state ''
```

b

```
lefospap21:~/workspace/Compilers/Ergasia2 $ python3 runner.py
Traceback (most recent call last):
  File "runner.py", line 169, in <module>
    parser.parse(fp)
  File "runner.py", line 77, in parse
    self.stmt_list()
  File "runner.py", line 81, in stmt_list
    self.stmt()
  File "runner.py", line 99, in stmt
    e = self.expr()
  File "runner.py", line 107, in expr
    t = self.term()
  File "runner.py", line 121, in term
    f = self.factor()
  File "runner.py", line 135, in factor
    a = self.atom()
  File "runner.py", line 158, in atom
    raise RunError("no variable name")
__main__.RunError: no variable name
```

C

```
lefospap21:~/workspace/Compilers/Ergasia2 $ python3 runner.py
Traceback (most recent call last):
  File "runner.py", line 169, in <module>
    parser.parse(fp)
  File "runner.py", line 77, in parse
    self.stmt_list()
  File "runner.py", line 81, in stmt_list
    self.stmt()
  File "runner.py", line 99, in stmt
    e = self.expr()
  File "runner.py", line 107, in expr
    t = self.term()
  File "runner.py", line 121, in term
    f = self.factor()
  File "runner.py", line 135, in factor
    a = self.atom()
  File "runner.py", line 158, in atom
    raise RunError("no variable name")
__main__.RunError: no variable name
```

5. Πηγές που χρησιμοποίησα:

1. [Recursive descent parsing](#)
2. [Εργαλείο ελέγχου γραμματικής](#)

Επίσης χρησιμοποιήθηκε ο κώδικας που αναπτύχθηκε στα εργαστήρια με κατάλληλες τροποποιήσεις βάση την γραμματική που ζητούσε η άσκηση .

