

Μεταγλωττιστές 2019

Προγραμματιστική Εργασία #2

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- Κανόνες γραμματικής:

```
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 →       parenthesis1 Expr parenthesis2
           | id
           | number .
```

- Αποτέλεσμα ελέγχου για LL(1) συμβατότητα:

### Grammar

```

Stmnt_list → Stmnt Stmnt_list
            | .
Stmnt → 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 → parenthesis1 Expr parenthesis2
      | id
      | number .

```

Some sentences generated by this grammar (e, print id, id equal id, print number, print id and id, id equal number, id equal id and id, print id and number, print number and id, id equal number and id, id equal id and number, print number and number, id equal id and id and id, id equal number and number, id equal id and id and number, id equal id and number and id, id equal number and id and id, id equal id and number and number, id equal number and id and number, id equal number and number and id)

- All nonterminals are reachable and realizable
- The nullable nonterminals are: Stmnt\_list Term\_tail Factor\_tail Atom\_tail
- The endable nonterminals are: Atom\_tail Atom Factor\_tail Factor Term\_tail Term Expr Stmnt\_list Stmnt
- No cycles

nonterminal	first set	follow set	nullable	endable
Stmnt_list	id print	ε	yes	yes
Stmnt	id print	id print	no	yes
Term_tail	xor	parenthesis2 id print	yes	yes
Term	parenthesis1 id number	parenthesis2 xor id print	no	yes
Factor_tail	or	parenthesis2 xor id print	yes	yes
Factor	parenthesis1 id number	parenthesis2 or xor id print	no	yes
Atom_tail	and	parenthesis2 or xor id print	yes	yes
Atom	parenthesis1 id number	parenthesis2 and or xor id print	no	yes
Expr	parenthesis1 id number	parenthesis2 id print	no	yes

The grammar is LL(1)

- attempt to **transform** the grammar (to LL(1))
- generate **LL(1)** parsing table
- generate **LR(0)/SLR(1)** automaton
- generate **LALR(1)** automaton
- generate **LR(1)** automaton

[Return home to enter a new grammar.](#)

- Πίνακες με τα FIRST και FOLLOW sets:

nonterminal	first set	follow set	nullable	endable
Stmnt_list	id print	ε	yes	yes
Stmnt	id print	id print	no	yes
Term_tail	xor	parenthesis2 id print	yes	yes
Term	parenthesis1 id number	parenthesis2 xor id print	no	yes
Factor_tail	or	parenthesis2 xor id print	yes	yes
Factor	parenthesis1 id number	parenthesis2 or xor id print	no	yes
Atom_tail	and	parenthesis2 or xor id print	yes	yes
Atom	parenthesis1 id number	parenthesis2 and or xor id print	no	yes
Expr	parenthesis1 id number	parenthesis2 id print	no	yes

- Αποτελέσματα:

Για εισοδο :

```
1 a = 101001
2 b = 101011
3 print (b ^ a)
```

Εξοδος:

```
Run Run Config Name Command: python/compilers/assignment2.py

Your code is running at https://programming-lazaros54.c9users.io.
Important: use os.geten(PORT, 8080) as the port and os.geten(IP, 0.0.0.0) as the host in your scripts!

xor : 101011 ^ 101001
= 11010

Process edited with code: 0
```

Εισοδος:

```
1 a = 101001
2 b = 000001
3 print (b & a)
```

Εξοδος:

```
Your code is running at https://programming-lazaros54.c9users.io.
Important: use os.geten(PORT, 8080) as the port and os.geten(IP, 0.0.0.0) as the host in your scripts!

and : 1 & 101001
= 1

Process edited with code: 0
```

Λαθος εισοδοι:

```
1 a = 1998
2
```

python/compilers/Parser.py

Run Run Config Name Command: python/compilers/Parser.py

Your code is running at <https://programming-lazaros51.c9users.io>.  
Important: use `os.geten(PORT, 8080)` as the port and `os.geten(IP, 0.0.0.0)` as the host in your scripts!

Traceback (most recent call last):  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 153, in <module>  
 parser.parse(fp)  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 54, in parse  
 self.stat\_list()  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 58, in stat\_list  
 self.stat()  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 78, in stat  
 e = self.expr()  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 88, in expr  
 self.term()  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 99, in term  
 self.factor()  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 116, in factor  
 self.atom()  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 145, in atom  
 self.match('BINARY\_NUM')  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 48, in match  
 self.la, self.text = self.next\_token()  
File "/home/ubuntu/workspace/python/compilers/Parser.py", line 44, in next\_token  
 return self.scanner.read()  
File "/usr/local/lib/python2.7/dist-packages/plex-2.0.0dev-py2.7.egg/plex/scanners.py", line 94, in read  
 self.text, action = self.scan\_a\_token()  
File "/usr/local/lib/python2.7/dist-packages/plex-2.0.0dev-py2.7.egg/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 ''

Process edited with code: 0

```
1 a = 1001
2 b = 1001
3 c = a + b
4 print c
```

python/compilers/Parser.py python/compilers/runner.py

Run Run Config Name Command: python/compilers/runner.py

Your code is running at <https://programming-lazaros51.c9users.io>.  
Important: use `os.geten(PORT, 8080)` as the port and `os.geten(IP, 0.0.0.0)` as the host in your scripts!

Traceback (most recent call last):  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 146, in <module>  
 parser.parse(fp)  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 54, in parse  
 self.stat\_list()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 59, in stat\_list  
 self.stat\_list()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 59, in stat\_list  
 self.stat\_list()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 58, in stat\_list  
 self.stat()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 78, in stat  
 e = self.expr()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 84, in expr  
 t = self.term()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 98, in term  
 f = self.factor()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 112, in factor  
 a = self.atom()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 132, in atom  
 self.match('ID\_TOKEN')  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 47, in match  
 self.la, self.text = self.next\_token()  
File "/home/ubuntu/workspace/python/compilers/runner.py", line 42, in next\_token  
 return self.scanner.read()  
File "/usr/local/lib/python2.7/dist-packages/plex-2.0.0dev-py2.7.egg/plex/scanners.py", line 94, in read  
 self.text, action = self.scan\_a\_token()  
File "/usr/local/lib/python2.7/dist-packages/plex-2.0.0dev-py2.7.egg/plex/scanners.py", line 138, in scan\_a\_token  
 raise errors.UnrecognizedInput(self, self.state\_name)  
plex.errors.UnrecognizedInput: '', line 3, char 6: Token not recognised in state ''

Process edited with code: 0



Πηγές και σχόλια:

Χρησιμοποίησα τον κώδικα που δημιουργήσαμε κατά την διάρκεια του εξαμήνου στα εργαστήρια σαν βοήθημα όπου στη συνέχεια τον επέκτεινα σύμφωνα με την γραμματική που δημιούργησα έχοντας γνώμονα την εκφώνηση της εργασίας. Άλλες πηγές που χρησιμοποιήθηκαν ήταν κάποια link που είχε η εκφώνηση της εργασίας καθώς και το Google. Επίσης για την αναπτυξη και το τρέξιμο του κώδικα χρησιμοποίησα το cloud9.

Πηγές:

- <https://c9.io/login>
- <http://mixstef.github.io/courses/compilers/assignment2.pdf>
- <http://mixstef.github.io/courses/compilers/lecturedoc/unit5/module2.html#id1>
- <https://gist.github.com/mixstef/946fce67f49f147991719bfa4d0101fa>
- <http://smlweb.cpsc.ucalgary.ca/start.html>