

Compiler Construction

Programming Assignment 2

Syntactic and Semantic Definitions for μGo

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What to do in this Assignment?

- Write an LALR(1) parser for μGO using Lex and Yacc.
- The parser supports print IO, arithmetic operations and some programming language basic concepts.
- The spec of μGO is available for your reference.

- You need to design grammar for your own parser.
- You also need to check semantic correctness.



Basic Requirements for this Assignment

- **Design the grammar for Variable Declarations (15pt)**
- **Implement the essential functionalities for the symbol table (20pt)**
  - Implement the following four functions:
    - create_symbol()
    - insert_symbol()
    - lookup_symbol()
    - dump_symbol()
- **Handle the assignment operators (15pt)**
  - I.e., implement =, +=, -=, *=, /=, and %= operators.



Basic Requirements for this Assignment

- **Handle arithmetic operations and consider brackets and precedence (20pt)**
  - The modulo (%) operation does not involve any floating-points.
  - Type checking needs to be implemented.
- **Design grammar for *print* and *println* functions and display the contents for their arguments. (15pt)**
- **Detect semantic error and display the error message. The parser should display at least the error type and the line number. (15pt)**
  - Once the semantic error is detected, the correctness of variable value is not important. (E.g., you can do nothing or still assign the value when you detect the error)



Advanced Features of this Assignment

- **Design the grammar for "*if … else if … else*". (15pt)**
- **Implement scoping check function in your parser. (15pt)**
- **Provide a README explaining WHAT and HOW advanced functions you implemented if you attempt to implement these features.**



Scoping

- What will this program print?

```
var x int = 10
{
    var x int = 5
    x++
    println(x)
}
println(x)
{
    x++
    println(x)
}
println(x)
```

- Output

```
6
10
11
11
```



More about Scoping

- A scope block is a set of statements enclosed within left and right braces ({ and }).
- A variable declared in a block is accessible in the block and all the inner blocks of that block, but not accessible outside the block.
- Different inner scope block in same scope block can't see each other.
- You can declare variable with same name in different scope.



More about Scoping (Cont'd)

```
var x int = 10
{
    var x int = 5
    x++
    println(x)
}
println(x)
{
    x++
    println(x)
    {
        x++
        println(x)
        var x int = 20
        x++
        println(x)
    }
}
println(x)
```

Scope Block A

Scope Block B

Scope Block C

Scope Block D



Requirements for Uploading Your Codes

- Upload your homework to Moodle.

The expected arrangement of your codes:

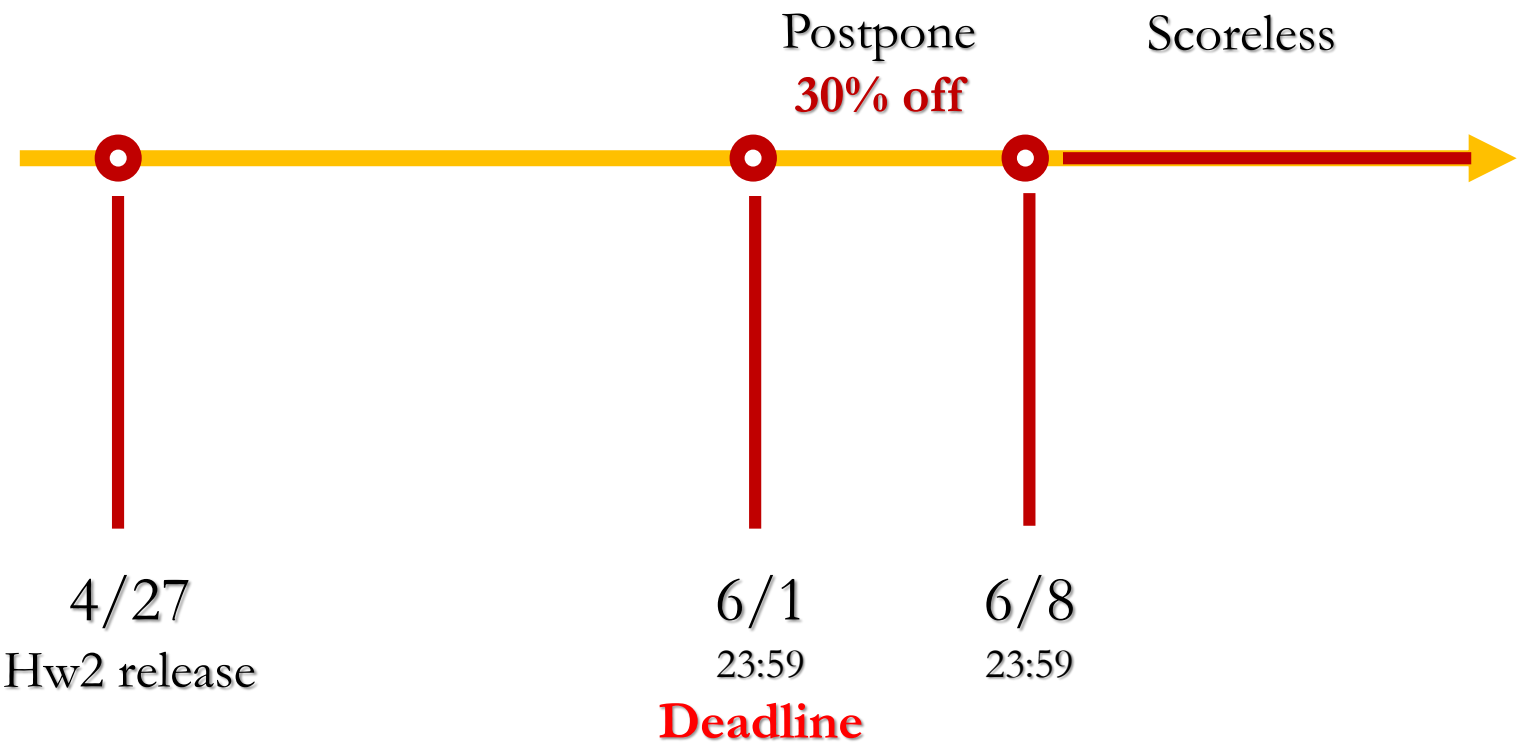
- Only .zip and .rar types of compression are allowed.
- The directory should be organize as:

```
Compiler_StudentID_HW2.zip
  ↳ Compiler_StudentID_HW2/
      ↳ input/
        Makefile
        compiler_hw2.l
        compiler_hw2.y
        README ( if required )
        xxx.h ( header file if required )
```

- **You will get 10% discount if your programs were uploaded in incorrect format!!!**



Deadline


Postpone
30% off
Scoreless
4/27
Hw2 release
6/1
23:59
Deadline
6/8
23:59



Questions ?



Information of the Quiz

- 請依座位表到考試教室
- 並依座位入座
- 考試時間一個小時
- 寫完即可交卷