CS 442/542 Homework 4

“Due” Friday November 4
Homework 4 Grammar

Prog -> StmtSeq
StmtSeq -> Stmt StmtSeq
StmtSeq -> ε
Stmt -> Id = Expr ;
Expr -> Expr + Term
Expr -> Term
Term -> Term * Factor
Term -> Factor
Factor -> ( Expr )
Factor -> Id
Factor -> SetLit
Id -> Ident
Homework 4

• Build an interpreter for the set grammar shown on the previous slide.
• The + operator means union and the * operator means intersection.
• As in the boolean expression grammar (yacc1 lecture) use the symbol table to remember the values of variables. In this case the value of a variable is a set. Store the value of a variable (i.e. a set) in a symbol table. For example the values of a variable x (i.e. the elements of the set x) will be stored in a symbol table associated with x.
• When the program is finished, print the values of the variables to standard output
Homework 4 Example Input

```c
x = {a,b,c} + {d,e,f};
y = {};
z = {x};
w = x + z;
a = x + y + z + w;
b = ( x + y + z + w) * y;
```
w: \{f,x,a,b,c,d,e\}
x: \{f,a,b,c,d,e\}
y: \{

z: \{x\}
a: \{f,x,a,b,c,d,e\}
b: \{

Homework 4 a Few Hints

Prog -> StmtSeq
StmtSeq -> Stmt StmtSeq
StmtSeq -> ε
Stmt -> Id = Expr ;
Expr -> Expr + Term
Expr -> Term
Term -> Term * Factor
Term -> Factor
Factor -> ( Expr )
Factor -> Id
Factor -> SetLit
Id -> Ident

The data type of Id should be a char *
The data type of Expr, Term and Factor should be a SymTab *

If a variable is used before it is initialized assume its value is the empty set
Make a new set (i.e. a new symbol table from the set literal)
Make a copy of yytext since in lex yytext is a statically allocated array
Homework 4 a Few Hints

Prog -> StmtSeq

When this production is used call the function to print the values of the variables

StmtSeq -> Stmt StmtSeq
StmtSeq -> ε
Stmt -> Id = Expr ;

The symbol table that stores the elements of one set is the attribute associate with the variable

Expr -> Expr + Term
Expr -> Term
Term -> Term * Factor
Term -> Factor
Factor -> ( Expr )
Factor -> Id
Factor -> SetLit

A SetLit is either {}, the empty set, or a {comma delimited list of letters}

Id -> Ident
A Ident is a letter followed by one or more letters or digits
Homework 4 Submission

• You will demo homework 4 to me online sometime.
• After you demo you will upload your homework to Canvas (see next slide)
• The homework is worth 30 points.
Homework 4 Submission

• Upload one zip file to Canvas
• The file must contain some test programs on which your h4 program works and the following files: h4.l, h4.y, SymTab.h, SymTab.c, IOMngr.h, IOMngr.c, semantics.h, semantics.c, main.c
• Please use the exact file names shown above