CS 442/542 Homework 3

“Due” Monday October 25
Homework 3 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 3

• 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 (yacc2 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 3 Example Input

\[ x = \{a,b,c\} + \{d,e,f\}; \]
\[ y = \{\}; \]
\[ z = \{x\}; \]
\[ w = x + z; \]
\[ a = x + y + z + w; \]
\[ b = (x + y + z + w) \times y; \]
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 3 a Few Hints

Prog -> StmtSeq
StmtSeq -> Stmt StmtSeq
StmtSeq -> ε
Stmt -> Id = Expr ;                   The data type of Id should be a char *
Expr -> Expr + Term                 The data type of Expr, Term and Factor should be a SymTab *
Expr -> Term                         
Term -> Term * Factor                
Term -> Factor                       
Factor -> ( Expr )                  
Factor -> Id                        If a variable is used before it is initialized assume its value is the empty set
Factor -> SetLit                    Make a new set (i.e. a new symbol table from the set literal)
Id -> Ident                          Make a copy of yytext since in lex yytext is a statically allocated array
Homework 3 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 3 Submission

- You will demo homework 3 to me online sometime.
- After you demo you will upload your homework to Canvas (see next slide)
- The homework (including SymTab and IOMngr, and homework 3) is worth 50 points.
Homework 3 Submission

• Upload one zip file to Canvas
• The file must contain some test programs on which your h3 program works and the following files: h3.l, h3.y, SymTab.h, SymTab.c, IOMngr.h, IOMngr.c, semantics.h, semantics.c, main.c
• Please use the exact file names shown above