CS 442/542 Homework 3

“Due” Friday March 10
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 (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
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 3 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 * or a type that includes a SymTab *. Consider how to recover space used by temporary results.

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 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 ; Each set is stored in its own symbol table. The main symbol table stores
the variables (i.e. ids) and each variable has an attribute that is a SymTab * that
points to the current value of 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 is worth 40 points. This includes points for IOMngr
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