

CS 340 Fall 2015

Assignment 2

Due 09/27/15

Assignment 2

- Modify the infix evaluation program so it processes assignment statements where the expressions can contain variables. A variable will be a string of 1 to 6 alphabetic characters.
- The values of variables must be stored in a symbol table that is stored in a binary file. The symbol table should be stored as a sorted (based on the variable) sequence. To find the value of variable the program must search the symbol table using a binary search. I will review binary search in class and give an example using an ArrayList

Assignment 2

- All accesses (looking up the current value, giving a variable a new value, etc) to the symbol table must use the binary file. That is you cannot just read in the contents of the file into memory (e.g. into an ArrayList) and then access this information from the ArrayList.
- Uninitialized variables are assumed to have the value 0.

Assignment 2

- The program expects two command line arguments. The first argument is the name of a text file that contains one assignment statement per line. The second command line argument is the name of the binary file that will be used to store the symbol table
- As in assignment one the tokens in the assignment statements will be separated by whitespace.
- You can assume the input is syntactically correct

Assignment 2

- After all the lines in the input file have been evaluated the program should print the contents of the symbol table

Assignment 2

Example Input File

$$X = 10$$

$$xsqr = X ^ 2$$

$$w = y + 3 * z$$

$$y = 2$$

$$z = 2 * (X + y) ^ (X - 8)$$

Example Output

Id	Value
X	10
w	0
xsqr	100
y	2
z	288

Symbol Table

```
public class SymbolTable {  
    //we will learn better ways (such as a hash table) to do this  
    //but for now we will store values in a sorted sequence
```

```
    private class Item {  
        String id;  
        int value;  
  
        Item(String i, int v) {  
            id = i;  
            value = v;  
        }  
  
        String getId() {  
            return id;  
        }  
    }
```


Symbol Table

```
int getValue() {  
    return value;  
}  
  
void setId(String i) {  
    id = i;  
}  
  
void setValue(int v) {  
    value = v;  
}  
}
```

Symbol Table

```
ArrayList<Item> table;  
int place;
```

```
public SymbolTable() {  
    table = new ArrayList<>();  
}
```

```
public void insert(String id, int v) {  
    if (find(id))  
        table.get(place).setValue(v);  
    else  
        table.add(place, new Item(id,v));  
}
```

Symbol Table

```
public boolean find(String id) {
    int high = table.size()-1;
    int low = 0;
    int mid;
    while ( low <= high ) {
        mid = (high-low)/2 + low;    //why not (low+high)/2
        int cmp = table.get(mid).getId().compareTo(id);
        if (cmp < 0)
            low = mid+1;
        else if (cmp > 0)
            high = mid - 1;
        else {
            place = mid;
            return true;
        }
    }
    place = low;
    return false;
}
```

Symbol Table

```
public int getValue() {  
    return table.get(place).getValue();  
}
```

```
public void setValue(int v) {  
    table.get(place).setValue(v);  
  
}
```

```
public void printTable() {  
    System.out.println("Id\tValue");  
    for (int i = 0; i < table.size(); i++)  
        System.out.println(table.get(i).getId()+"\t"+table.get(i).getValue());  
}
```

Symbol Table

- My implementation of SymbolTable is just an example so you can see the basic operations and how binary search can be used to find the value of a variable. You can choose different methods if you want but your implementation must have the characteristics shown on the next slide

Symbol Table

- Data must be stored and accessed in a binary file.
- Only the most recently accessed item can be stored in memory
- Items must be stored sorted in ascending order based on the variable id
- A binary search must be used to find items

Assignment Submission

- Send me only 2 Java files. The files should be called InfixEval.java and SymbolTable.java
- The first line in the file should be a comment with your name in the comment
- In the subject field of the email put the value CS340 A2