Assignment 3: Write a program to implement a two pass macro processor.

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Code:

import java.util.\*;

import java.io.\*;

/\*\*

\* macroprocessor

\*/

public class macroprocessor {

public static *void* main(*String*[] *args*) throws *IOException* {

*FileReader* fr = new FileReader("input.c");

*Scanner* sc = new Scanner(fr);

*HashMap*<*String*, *List*<*Object*>> MNT = new *HashMap*<*String*, *List*<*Object*>>();

*HashMap*<*String*, *List*<*Object*>> MDT = new *HashMap*<*String*, *List*<*Object*>>();

*HashMap*<*String*, *List*<*Object*>> ALA = new *HashMap*<*String*, *List*<*Object*>>();

*List*<*Object*> MNTIndexList = new *ArrayList*<*Object*>();

*List*<*Object*> MacroNameList = new *ArrayList*<*Object*>();

*List*<*Object*> MNTMDTIndexList = new *ArrayList*<*Object*>();

*List*<*Object*> FormalArgsList = new *ArrayList*<*Object*>();

*List*<*Object*> PositionalArgsList = new *ArrayList*<*Object*>();

*List*<*Object*> ActualArgsList = new *ArrayList*<*Object*>();

*List*<*Object*> MDTIndexList = new *ArrayList*<*Object*>();

*List*<*Object*> MDTCardList = new *ArrayList*<*Object*>();

*int* MNTindex = 1;

*int* MDTindex = 1;

// First Pass of Macroprocessor

while (sc.hasNextLine()) {

*String* line = sc.nextLine();

*String*[] words = line.split(" ");

if (line.startsWith("MACRO")) {

*int* position = 1;

// Initialising MNT,MDT

for (*String* word : words) {

if (word.equals("MACRO")) {

MNTIndexList.add(MNTindex);

MNTMDTIndexList.add(MDTindex);

MNTindex++;

MacroNameList.add(words[2]);

} else if (word.startsWith("&")) {

FormalArgsList.add(word);

PositionalArgsList.add("#" + position);

ActualArgsList.add("");

position++;

}

}

// Initialising MDTCardList

while (!line.startsWith("MEND")) {

line = sc.nextLine();

*String*[] linesplit = line.split(" ");

*int* wordindex = 0;

for (*String* word : linesplit) {

if (word.contains("&")) {

wordindex = FormalArgsList.indexOf(word);

*Object* posarg = PositionalArgsList.get(wordindex);

MDTCardList.add(posarg);

} else {

MDTCardList.add(word);

}

}

MDTIndexList.add(MDTindex);

MDTindex++;

}

}

} // End of First Pass

System.out.println("\nAfter 1st Pass:");

MNT.put("Index", MNTIndexList);

MNT.put("Macro Name", MacroNameList);

MNT.put("MDT Index", MNTMDTIndexList);

ALA.put("Macro Name", MacroNameList);

ALA.put("Formal Args", FormalArgsList);

ALA.put("Positional Args", PositionalArgsList);

ALA.put("Actual Args", ActualArgsList);

MDT.put("Index", MDTIndexList);

MDT.put("Card", MDTCardList);

System.out.println("MNT:\n" + MNT);

System.out.println("ALA:\n" + ALA);

System.out.println("MDT:\n" + MDT);

// 2nd Pass of Macroprocessor

*FileReader* fr2 = new FileReader("input.c");

*Scanner* sc2 = new Scanner(fr2);

MDTCardList.clear();

while (sc2.hasNextLine()) {

*String* line = sc2.nextLine();

*String*[] words = line.split(" ");

*int* word = 0;

// Initialising Actual Args

if (MacroNameList.contains(words[word])) {

*int* startindex = words[word].length() + 2;

*String* Actualargs = line.substring(startindex);

*String*[] ActualArgs = Actualargs.split(" ");

*int* ActualArgsIndex = MacroNameList.indexOf(words[word]);

for (*String* i : ActualArgs) {

ActualArgsList.set(ActualArgsIndex, i);

ActualArgsIndex++;

}

}

}

*FileReader* fr3 = new FileReader("input.c");

*Scanner* sc3 = new Scanner(fr3);

while (sc3.hasNextLine()) {

// Replacing Positional Args with Actual Args in CardList

*String* line = sc3.nextLine();

if (line.startsWith("MACRO")) {

while (!line.startsWith("MEND")) {

line = sc3.nextLine();

*String*[] linesplit = line.split(" ");

*int* wordindex = 0;

for (*String* word2 : linesplit) {

if (word2.contains("&")) {

wordindex = FormalArgsList.indexOf(word2);

*Object* actualarg = ActualArgsList.get(wordindex);

// System.out.println(actualarg);

MDTCardList.add(actualarg);

} else {

MDTCardList.add(word2);

}

}

}

}

} // End of Pass 2

System.out.println("\nAfter 2nd Pass:");

MNT.put("Index", MNTIndexList);

MNT.put("Macro Name", MacroNameList);

MNT.put("MDT Index", MNTMDTIndexList);

ALA.put("Macro Name", MacroNameList);

ALA.put("Formal Args", FormalArgsList);

ALA.put("Positional Args", PositionalArgsList);

ALA.put("Actual Args", ActualArgsList);

MDT.put("Index", MDTIndexList);

MDT.put("Card", MDTCardList);

System.out.println("MNT:\n" + MNT);

System.out.println("ALA:\n" + ALA);

System.out.println("MDT:\n" + MDT);

// Expanded Code

System.out.println("\n\nExpanded Code:");

*FileReader* frnew = new FileReader("input.c");

*Scanner* scnew = new Scanner(frnew);

*int* count = 0;

while (scnew.hasNextLine()) {

*String* line = scnew.nextLine();

if (line.startsWith("MACRO")) {

while (!line.startsWith("MEND")) {

line = scnew.nextLine();

*String*[] linesplit = line.split(" ");

for (*int* i = 0; i < linesplit.length; i++) {

if (linesplit[i].equals("MEND")) {

count += 1;

continue;

}

System.out.print(MDTCardList.get(count) + " ");

count += 1;

}

System.out.println();

}

}

}

}

}

Output:

