# Program:

import java.io.BufferedReader; import java.io.FileReader; import java.io.FileWriter; import java.io.IOException; import java.util.Iterator;

import java.util.LinkedHashMap; public class MacroPass1 {

public static void main(String[] args) throws IOException{ BufferedReader br=new BufferedReader(new

FileReader("macro\_input.asm"));

FileWriter mnt=new FileWriter("mnt.txt"); FileWriter mdt=new FileWriter("mdt.txt"); FileWriter kpdt=new FileWriter("kpdt.txt"); FileWriter pnt=new FileWriter("pntab.txt"); FileWriter ir=new FileWriter("intermediate.txt");

LinkedHashMap<String, Integer> pntab=new LinkedHashMap<>(); String line;

String Macroname = null;

int mdtp=1,kpdtp=0,paramNo=1,pp=0,kp=0,flag=0; while((line=br.readLine())!=null)

{

String parts[]=line.split("\\s+"); if(parts[0].equalsIgnoreCase("MACRO"))

{

flag=1; line=br.readLine(); parts=line.split("\\s+"); Macroname=parts[0]; if(parts.length<=1)

{

mnt.write(parts[0]+"\t"+pp+"\t"+kp+"\t"+mdtp+"\t"+(kp==0?kpdtp:(kpdtp+1))+"\n");

continue;

}

for(int i=1;i<parts.length;i++) //processing of parameters

{

parts[i]=parts[i].replaceAll("[&,]", "");

//System.out.println(parts[i]); if(parts[i].contains("="))

{

++kp;

String keywordParam[]=parts[i].split("="); pntab.put(keywordParam[0], paramNo++); if(keywordParam.length==2)

{

kpdt.write(keywordParam[0]+"\t"+keywordParam[1]+"\n");

}

}

else

{

else

{

}

kpdt.write(keywordParam[0]+"\t-\n");

pntab.put(parts[i], paramNo++); pp++;

}

}

mnt.write(parts[0]+"\t"+pp+"\t"+kp+"\t"+mdtp+"\t"+(kp==0?kpdtp:(kpdtp+1))+"\n"); kpdtp=kpdtp+kp;

//System.out.println("KP="+kp);

}

else if(parts[0].equalsIgnoreCase("MEND"))

{

mdt.write(line+"\n"); flag=kp=pp=0; mdtp++; paramNo=1;

pnt.write(Macroname+":\t");

Iterator<String> itr=pntab.keySet().iterator(); while(itr.hasNext())

{

pnt.write(itr.next()+"\t");

}

pnt.write("\n"); pntab.clear();

}

else if(flag==1)

{

for(int i=0;i<parts.length;i++)

{

if(parts[i].contains("&"))

{

}

else

{

}

}

parts[i]=parts[i].replaceAll("[&,]", "");

mdt.write("(P,"+pntab.get(parts[i])+")\t");

mdt.write(parts[i]+"\t");

}

else

{

}

}

mdt.write("\n"); mdtp++;

ir.write(line+"\n");

br.close();

mdt.close();

mnt.close();

ir.close();

pnt.close();

kpdt.close();

System.out.println("Macro Pass1 Processing done. )");

}

}

## Output:

Macro Pass1 Processing done )

## Macro Pass1 file

Macro Input

MACRO

M1 &X, &Y, &A=AREG, &B= MOVER &A, &X

ADD &A, ='1' MOVER &B, &Y ADD &B, ='5' MEND

MACRO

M2 &P, &Q, &U=CREG, &V=DREG MOVER &U, &P

MOVER &V, &Q ADD &U, ='15'

ADD &V, ='10' MEND

START 100

M1 10, 20, &B=CREG

M2 100, 200, &V=AREG, &U=BREG END

Intermediate

START 100

M1 10, 20, &B=CREG

M2 100, 200, &V=AREG, &U=BREG END

|  |  |  |
| --- | --- | --- |
| MDT |  | |
| MOVER | (P,3) | (P,1) |
| ADD (P,3) | ='1' |  |
| MOVER | (P,4) | (P,2) |
| ADD (P,4) | ='5' |  |
| MEND |  |  |
| MOVER | (P,3) | (P,1) |
| MOVER | (P,4) | (P,2) |
| ADD (P,3) | ='15' |  |
| ADD (P,4) | ='10' |  |
| MEND |  |  |

MNT

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| M1 | 2 | 2 | 1 | 1 |
| M2 | 2 | 2 | 6 | 3 |

PNTAB

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| M1: | X | Y | A | B |
| M2: | P | Q | U | V |

## Pass 2:

import java.io.BufferedReader; import java.io.FileReader; import java.io.FileWriter; import java.util.HashMap; import java.util.Vector;

class MNTEntry {

String name;

int pp,kp,mdtp,kpdtp;

public MNTEntry(String name, int pp, int kp, int mdtp, int kpdtp) { super();

this.name = name; this.pp = pp; this.kp = kp; this.mdtp = mdtp; this.kpdtp = kpdtp;

}

public String getName() { return name;

}

public void setName(String name) { this.name = name;

}

public int getPp() {

return pp;

}

public void setPp(int pp) { this.pp = pp;

}

public int getKp() {

return kp;

}

public void setKp(int kp) { this.kp = kp;

}

public int getMdtp() {

return mdtp;

}

public void setMdtp(int mdtp) { this.mdtp = mdtp;

}

public int getKpdtp() {

return kpdtp;

}

public void setKpdtp(int kpdtp) { this.kpdtp = kpdtp;

}

}

public class MacroPass2 {

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

BufferedReader irb=new BufferedReader(new FileReader("intermediate.txt")); BufferedReader mdtb=new BufferedReader(new FileReader("mdt.txt")); BufferedReader kpdtb=new BufferedReader(new FileReader("kpdt.txt")); BufferedReader mntb=new BufferedReader(new FileReader("mnt.txt"));

FileWriter fr=new FileWriter("pass2.txt");

HashMap<String, MNTEntry> mnt=new HashMap<>(); HashMap<Integer, String> aptab=new HashMap<>(); HashMap<String,Integer> aptabInverse=new HashMap<>();

Vector<String>mdt=new Vector<String>(); Vector<String>kpdt=new Vector<String>();

int pp,kp,mdtp,kpdtp,paramNo; String line; while((line=mdtb.readLine())!=null)

{

mdt.addElement(line);

}

while((line=kpdtb.readLine())!=null)

{

kpdt.addElement(line);

}

while((line=mntb.readLine())!=null)

{

String parts[]=line.split("\\s+");

mnt.put(parts[0], new MNTEntry(parts[0], Integer.parseInt(parts[1]), Integer.parseInt(parts[2]), Integer.parseInt(parts[3]), Integer.parseInt(parts[4])));

}

while((line=irb.readLine())!=null)

{

String []parts=line.split("\\s+"); if(mnt.containsKey(parts[0]))

{

pp=mnt.get(parts[0]).getPp();

kp=mnt.get(parts[0]).getKp(); kpdtp=mnt.get(parts[0]).getKpdtp(); mdtp=mnt.get(parts[0]).getMdtp(); paramNo=1;

for(int i=0;i<pp;i++)

{

parts[paramNo]=parts[paramNo].replace(",", ""); aptab.put(paramNo, parts[paramNo]); aptabInverse.put(parts[paramNo], paramNo); paramNo++;

}

int j=kpdtp-1; for(int i=0;i<kp;i++)

{

String temp[]=kpdt.get(j).split("\t");

aptab.put(paramNo,temp[1]); aptabInverse.put(temp[0],paramNo); j++;

paramNo++;

}

for(int i=pp+1;i<parts.length;i++)

{

parts[i]=parts[i].replace(",", ""); String splits[]=parts[i].split("=");

String name=splits[0].replaceAll("&", ""); aptab.put(aptabInverse.get(name),splits[1]);

}

int i=mdtp-1; while(!mdt.get(i).equalsIgnoreCase("MEND"))

{

String splits[]=mdt.get(i).split("\\s+"); fr.write("+");

for(int k=0;k<splits.length;k++)

{

if(splits[k].contains("(P,"))

{

"");//not containing number value=aptab.get(Integer.parseInt(splits[k]));

}

}

else

{

}

splits[k]=splits[k].replaceAll("[^0-9]",

String fr.write(value+"\t");

fr.write(splits[k]+"\t");

fr.write("\n"); i++;

}

}

else

{

}

aptab.clear(); aptabInverse.clear();

fr.write(line+"\n");

}

fr.close();

mntb.close();

mdtb.close(); kpdtb.close(); irb.close();

System.out.println("Macro Pass2 Processing done. )");

} }

## Output:

Macro Pass2 Processing done )

## Macro Pass2 file-

Macro Input

MACRO

M1 &X, &Y, &A=AREG, &B= MOVER &A, &X

ADD &A, ='1' MOVER &B, &Y ADD &B, ='5' MEND

MACRO

M2 &P, &Q, &U=CREG, &V=DREG MOVER &U, &P

MOVER &V, &Q ADD &U, ='15'

ADD &V, ='10' MEND

START 100

M1 10, 20, &B=CREG

M2 100, 200, &V=AREG, &U=BREG END

Intermediate

START 100

M1 10, 20, &B=CREG

M2 100, 200, &V=AREG, &U=BREG END

[Pass2](#_TOC_250000)

START 100

+MOVER AREG 10

+ADD AREG ='1'

+MOVER CREG 20

+ADD CREG ='5'

+MOVER BREG 100

+MOVER AREG 200

+ADD BREG ='15'

+ADD AREG ='10' END