```java
package sakshi50;

import java.io.BufferedReader;

import java.io.FileInputStream;

import java.io.FileWriter;

import java.io.InputStreamReader;

import java.io.PrintWriter;

import java.util.ArrayList;

import java.util.LinkedHashMap;

import java.util.List;

import java.util.Map;

import java.util.StringTokenizer;


public class macroprocessorpasstwo {

	static List<String> MDT;

	static Map<String, String> MNT;

	static int mntPtr, mdtPtr;

	static List<String> formalParams, actualParams;


	public static void main(String[] args) {

		try{

			initiallizeTables();

			pass2();

		}catch(Exception ex){

			ex.printStackTrace();

		}

	}


	static void pass2() throws Exception {
```

```
            BufferedReader input = new BufferedReader(new InputStreamReader(new
FileInputStream("C:\\Users\\student\\Desktop\\OUTPUT1.txt")));

            PrintWriter out_pass2 = new PrintWriter(new
FileWriter("C:\\Users\\student\\Desktop\\PASSTWOOUTPUT.txt"), true);


            System.out.println("============= Pass 2 Output ==============");

            System.out.println("Sakshi Malusare TACO22150");

            //Read from input file one line at a time

            String s;

            while((s = input.readLine()) != null) {

                  String s_arr[] = tokenizeString(s, " ");

                  //First token will either be a mnemonic or a macro call

                  if(MNT.containsKey(s_arr[0])){

                        //It is a macro call

                        //Create an array list of formal parameters

                        String actual_params[] = tokenizeString(s_arr[1], ",");

                        String param;

                        actualParams.clear();

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

                              param = actual_params[i];

                              if(param.contains("=")){

                                    //If parameter specified a default value,
the value will go in the list instead of param name

                                    param =
param.substring(param.indexOf("=")+1, param.length());

                              }

                              actualParams.add(param);

                        }

                        //Expand the macro call

                        mdtPtr = Integer.parseInt(MNT.get(s_arr[0]));
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                        //Read macro definitaion starting from mdtPtr till MEND
                        String macroDef;
                        boolean createParamArray = true;
                        String def_tokens[] = {}, paramStr = "", printStr;
                        while(true){
                              //First line of macro definition is name and
arglist
                              macroDef = MDT.get(mdtPtr);
                              if(createParamArray == true){
                                    createFormalParamList(macroDef);
                                    createParamArray = false;
                              }
                              else{
                                    //Tokenize line of macro definition
                                    def_tokens = tokenizeString(macroDef, " ");
                                    //If the line is MEND, exit loop

      if(def_tokens[0].equalsIgnoreCase("MEND")){
                                          break;
                                    }
                                    else{
                                          //Replace formal parameters with
actual parameters
                                          paramStr =
replaceFormalParams(def_tokens[1]);
                                    }
                                    printStr = "+" + def_tokens[0] + " " +
paramStr;
                                    System.out.println(printStr);
                                    out_pass2.println(printStr);
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                        }
                        mdtPtr++;
                    }
                }
                else{
                    //It is a line of normal assembly code
                    //Print the line as it is in the output file
                    System.out.println(s);
                    out_pass2.println(s);
                }
            }
            input.close();
            out_pass2.close();
        }

        static String replaceFormalParams(String formalParamList){
            String returnStr = "";
            //Replace # by blank string
            formalParamList = formalParamList.replace("#", "");
            //Separate formal params
            String param_array[] = tokenizeString(formalParamList, ",");
            int index;
            String actualParam;
            //For every parameter in the formal parameter list
            for(int i = 0; i < param_array.length; i++){
                index = Integer.parseInt(param_array[i]);
                if(index <= actualParams.size()){
                    actualParam = actualParams.get(index-1);
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                }
                else{
                        actualParam = formalParams.get(index-1);
                }
                returnStr += actualParam + ",";
        }

        //Strip last comma
        returnStr = returnStr.substring(0,returnStr.length() -1);
        return returnStr;
    }

    static void createFormalParamList(String macroDef){
        //By processing macro call generate array of actual parameters
        String argList, arg_array[];
        String s_arr[] = tokenizeString(macroDef, " ");
        //First array element will be macro name and second will be argument
list
        argList = s_arr[1];
        //Separate the arguments in the list
        arg_array = tokenizeString(argList, ",");
        String param;
        formalParams.clear();
        for(int i=0; i <arg_array.length; i++){
                param = arg_array[i];
                if(param.contains("=")){
                        //If parameter specified a default value, the value will
go in the list instead of param name
                        param = param.substring(param.indexOf("=")+1,
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param.length());
                    }
                    formalParams.add(param);
              }
        }

        static void initiallizeTables() throws Exception{
              MDT = new ArrayList<String>();
              MNT = new LinkedHashMap<String, String>();
              formalParams = new ArrayList<String>();
              actualParams = new ArrayList<String>();

              //Read contents of MNT.txt and create internal data structure
              BufferedReader br;
              String s;
              br = new BufferedReader(new InputStreamReader(new
FileInputStream("C:\\Users\\student\\Desktop\\MNT.txt")));
              while((s = br.readLine()) != null) {
                    StringTokenizer st = new StringTokenizer(s, " ", false);
                    MNT.put(st.nextToken(), st.nextToken());
              }
              br.close();

              //Read contents of MDT.txt and create internal data structure
              br = new BufferedReader(new InputStreamReader(new
FileInputStream("C:\\Users\\student\\Desktop\\MDT.txt")));
              while((s = br.readLine()) != null) {
                    //For each line, separate out the tokens
                    String s_arr[] = tokenizeString(s," ");
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                if(s_arr.length == 0){
                        continue;
                }
                int index = Integer.parseInt(s_arr[0]);

                if(s_arr.length == 2){
                        MDT.add(index, s_arr[1]);
                }
                else if(s_arr.length == 3){
                        MDT.add(index, s_arr[1] + " " + s_arr[2]);
                }

        }
        br.close();
    }

    static String[] tokenizeString(String str, String separator){
        StringTokenizer st = new StringTokenizer(str, separator, false);
        //Construct an array of the separated tokens
        String s_arr[] = new String[st.countTokens()];
        for(int i=0 ; i < s_arr.length ; i++) {
                s_arr[i] = st.nextToken();
        }
        return s_arr;
    }
}
```
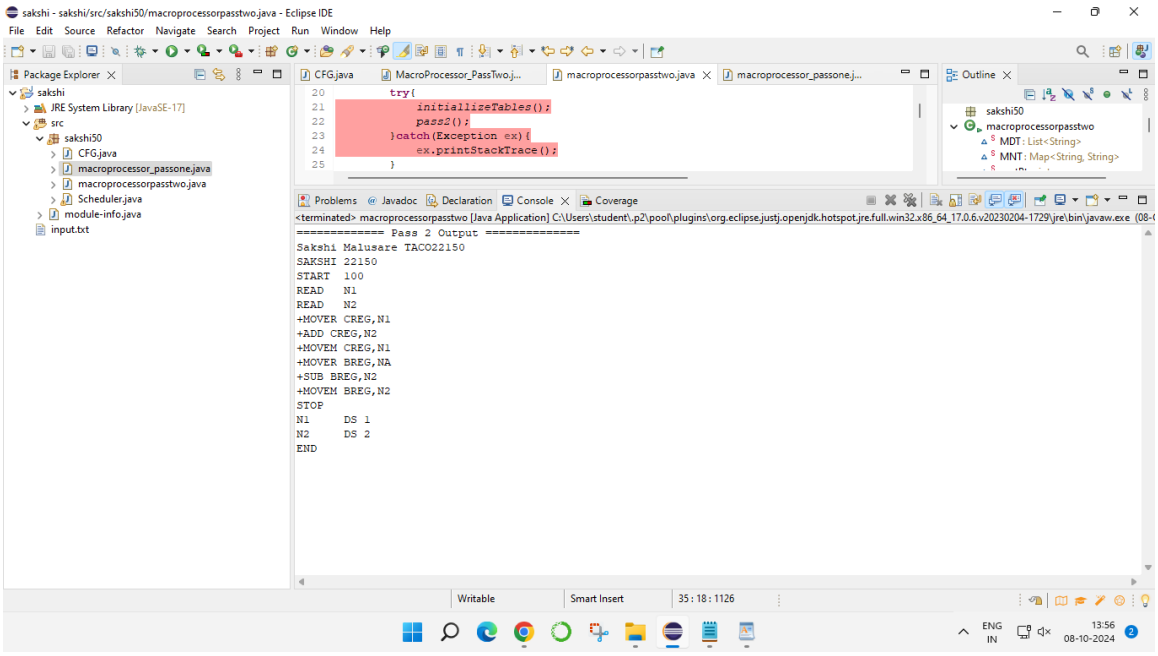
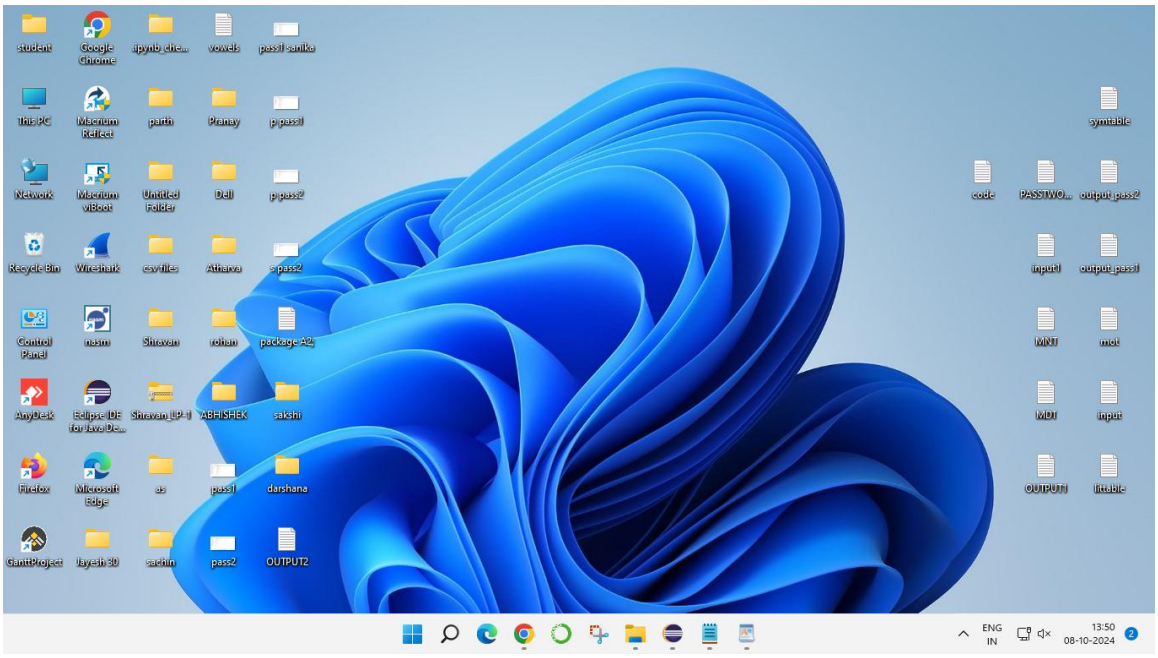
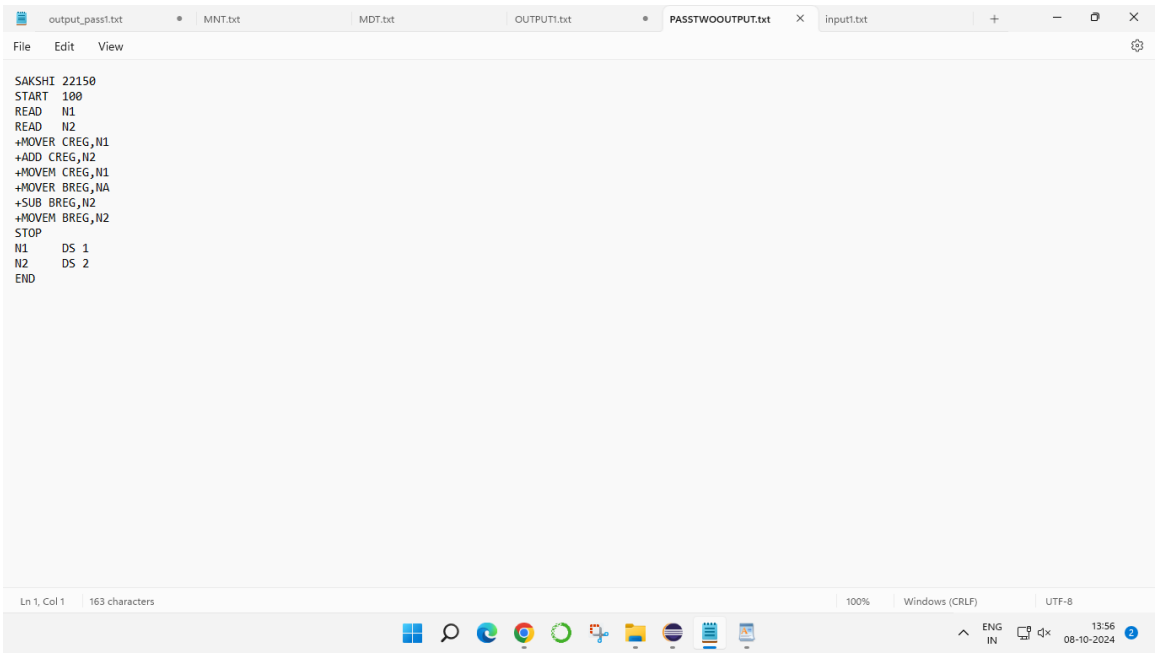
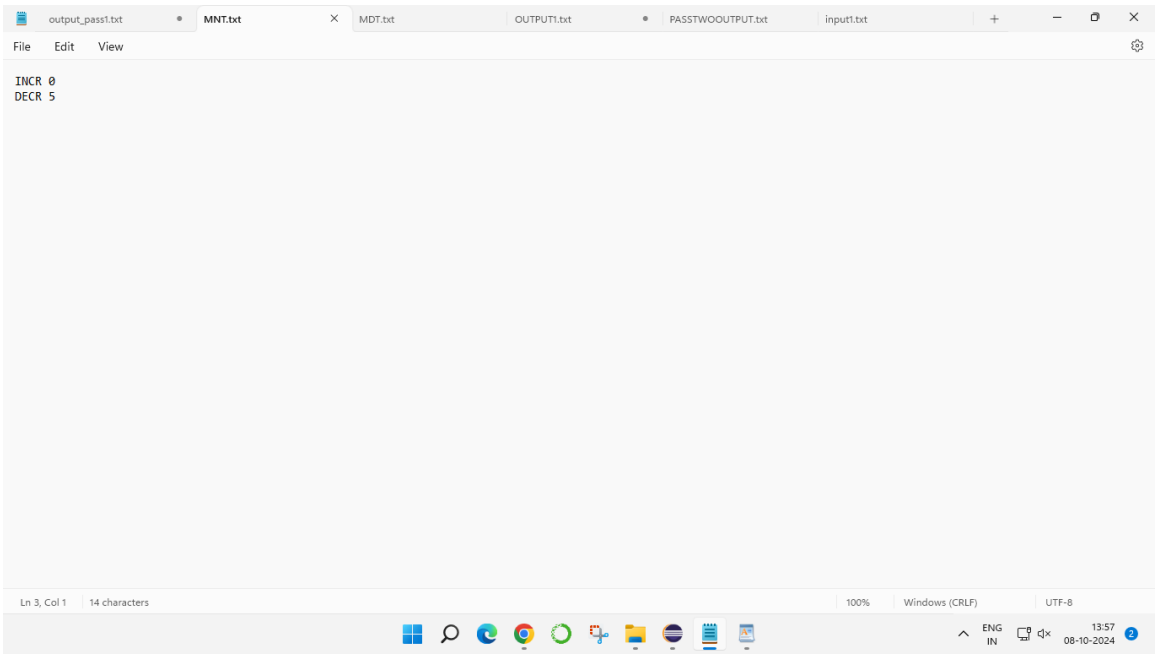
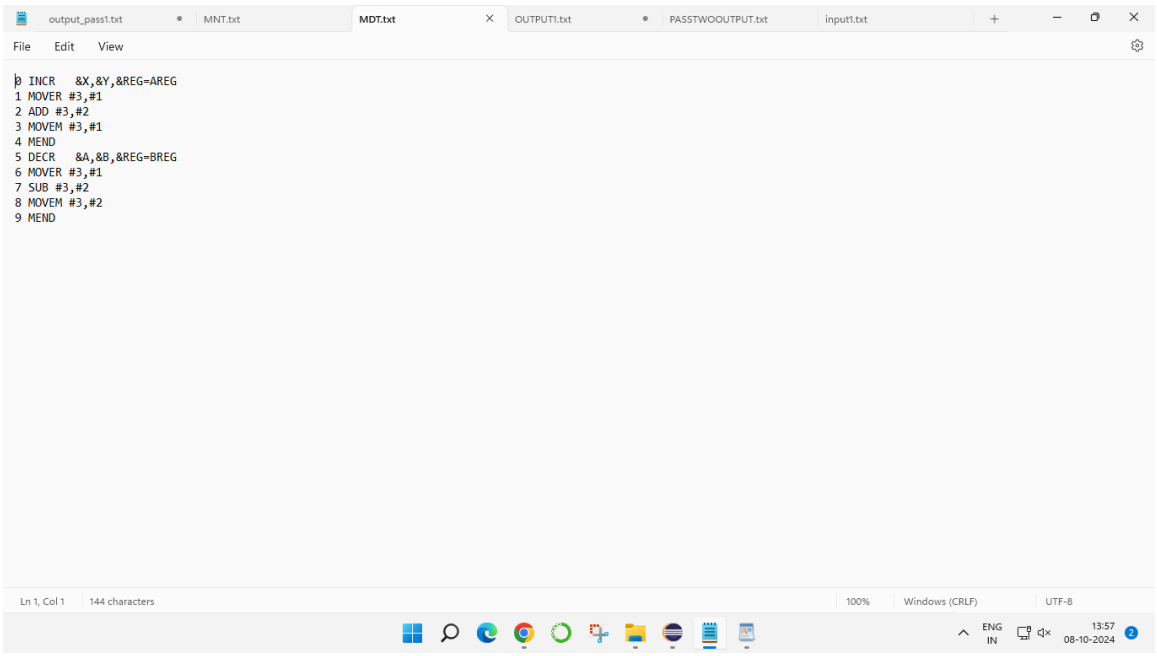

OUTPUT:

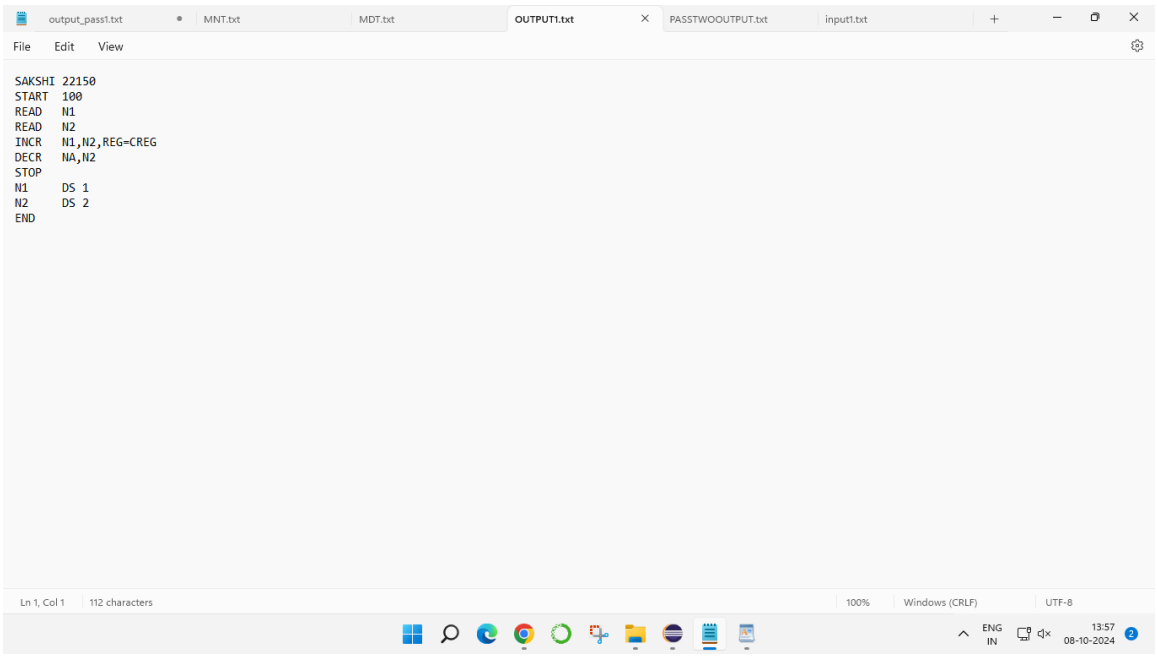

sakshi - sakshi/src/sakshi50/macroprocessorpasstwo.java - Eclipse IDE
File Edit Source Refactor Navigate Search Project Run Window Help
Package Explorer
sakshi
JRE System Library [JavaSE-17]
src
sakshi50
CFG.java
macroprocessor_passone.java
macroprocessorpasstwo.java
Scheduler.java
module-info.java
input.txt
CFG.java
MacroProcessor_PassTwo.j...
macroprocessorpasstwo.java
macroprocessor_passone.j...
try{
initiallizeTables();
pass2();
}catch(Exception ex){
ex.printStackTrace();
}
Outline
sakshi50
macroprocessorpasstwo
MDT : List<String>
MNT : Map<String, String>
Problems
Javadoc
Declaration
Console
Coverage
<terminated> macroprocessorpasstwo [Java Application] C:\Users\student\.p2\pool\plugins\org.eclipse.justj.openjdk.hotspot.jre.full.win32.x86_64_17.0.6.v20230204-1729\jre\bin\javaw.exe
========== Pass 2 Output ==========
Sakshi Malusare TAC022150
SAKSHI 22150
START 100
READ N1
READ N2
+MOVER CREG,N1
+ADD CREG,N2
+MOVEM CREG,N1
+MOVER BREG,NA
+SUB BREG,N2
+MOVEM BREG,N2
STOP
N1 DS 1
N2 DS 2
END
Writable
Smart Insert
35 : 18 : 1126
ENG
IN
13:56
08-10-2024


student
Google Chrome
ipynb_che...
vowels
pass1 sanika
This PC
Macrium Reflect
parth
Pranay
p pass1
Network
Macrium viBoot
Untitled Folder
Dell
p pass2
Recycle Bin
Wireshark
cavfiles
Athawa
s pass2
Control Panel
nasm
Shravan
rohan
package A2
AnyDesk
Eclipse IDE for Java De...
Shravan_LP-I
ABHISHEK
sakshi
Firefox
Microsoft Edge
as
pass1
darshana
GanttProject
Jayesh 30
sachin
pass2
OUTPUT2
symtable
code
PASSTWO...
output pass2
input1
output pass1
MNT
mot
MDT
input
OUTPUT1
littable
ENG
IN
13:50
08-10-2024


output_pass1.txt
MNT.txt
MDT.txt
OUTPUT1.txt
PASSTWOOUTPUT.txt
input1.txt
File
Edit
View
SAKSHI 22150
START 100
READ N1
READ N2
+MOVER CREG,N1
+ADD CREG,N2
+MOVEM CREG,N1
+MOVER BREG,NA
+SUB BREG,N2
+MOVEM BREG,N2
STOP
N1 DS 1
N2 DS 2
END
Ln 1, Col 1
163 characters
100%
Windows (CRLF)
UTF-8
ENG
IN
13:56
08-10-2024


output_pass1.txt
MNT.txt
MDT.txt
OUTPUT1.txt
PASSTWOOUTPUT.txt
input1.txt
File
Edit
View
INCR 0
DECR 5
Ln 3, Col 1
14 characters
100%
Windows (CRLF)
UTF-8
ENG
IN
13:57
08-10-2024


output_pass1.txt
MNT.txt
MDT.txt
OUTPUT1.txt
PASSTWOOUTPUT.txt
input1.txt
File
Edit
View
0 INCR &X,&Y,&REG=AREG
1 MOVER #3,#1
2 ADD #3,#2
3 MOVEM #3,#1
4 MEND
5 DECR &A,&B,&REG=BREG
6 MOVER #3,#1
7 SUB #3,#2
8 MOVEM #3,#2
9 MEND
Ln 1, Col 1
144 characters
100%
Windows (CRLF)
UTF-8
ENG
IN
13:57
08-10-2024


output_pass1.txt
MNT.txt
MDT.txt
OUTPUT1.txt
PASSTWOOUTPUT.txt
input1.txt
File
Edit
View
SAKSHI 22150
START 100
READ N1
READ N2
INCR N1,N2,REG=CREG
DECR NA,N2
STOP
N1 DS 1
N2 DS 2
END
Ln 1, Col 1
112 characters
100%
Windows (CRLF)
UTF-8
ENG
IN
13:57
08-10-2024