CODE:

```
import java.util.*;
import java.io.*;

class M_Pass1
{
	public static void main(String[] args) throws IOException
	{
		File input = new File("m_input.asm");
		input.createNewFile();
		File output = new File("m_intermediate.asm");
		output.createNewFile();
		File tables = new File("m_tables.asm");
		tables.createNewFile();
		FileWriter fw = new FileWriter("m_intermediate.asm");
		BufferedWriter bw = new BufferedWriter(fw);

		List<String> MDT = new ArrayList<String>();
		ArrayList<String[]> MNT = new ArrayList<String[]>();
		ArrayList<String[]> ALA = new ArrayList<String[]>();
		int mdtPtr = 0, mntPtr = 0, alaPtr = 0;

		//Macroprocessor Pass 1
		Scanner fileReader = new Scanner(input);
		byte MacroDefFlag = 0;	//Stores whether in Macro (1) or after Macro Name (2)
		String[] tokens;
		while(fileReader.hasNextLine())
		{
			String i_str = fileReader.nextLine();
			if(i_str.equals("MACRO"))
			{
				MacroDefFlag = 1;
				i_str = fileReader.nextLine();
			}
			if(MacroDefFlag==1) //Processing Macro Name and arguments
			{
				tokens = i_str.split("[ ,//n]");
				for(String str : tokens)
				{
					if(str.equals(""))
						continue;
					else if(str.charAt(0) =='&')
					{
						ALA.add(new String[] {Integer.toString(alaPtr++),str});
					}
					else
					{
						//The pointer to first argument of this macro name is stored in the 3rd value below. This will allow for multiple Macros to use the same ALA table, instead of having a unique table for every macro.
						MNT.add(new String[] {Integer.toString(mntPtr++),str.trim(),Integer.toString(alaPtr),Integer.toString(mdtPtr)});
					}
				}
				MacroDefFlag = 2;
				MDT.add(i_str);
				mdtPtr++;
				i_str = fileReader.nextLine();
			}

			String newstring;
```

```
		if(MacroDefFlag==2) //Processing Macro contents
		{
			tokens = i_str.split("[ ,//n]");
			newstring = "";
			for(String str : tokens)
			{
				if(str == "")
					continue;
				if(str.charAt(0) == '&')  //Replacing Arguments with ALA index
				{
					for(int i = 0; i < ALA.size(); i++)
					{
						if(ALA.get(i)[1].equals(str))
							newstring = newstring + " #" + ALA.get(i)[0];
					}
				}
				else
					newstring = newstring + " " + str;
			}
			if(newstring != "")
			{
				MDT.add(newstring.trim());
				mdtPtr++;
			}
			if(i_str.equals("MEND"))
			{
				MacroDefFlag = 0;
				continue;
			}
		}
		if(MacroDefFlag == 0)	//If not part of Macro
		{
			if(i_str != "")
			{
				bw.write(i_str);
				if(i_str.charAt(i_str.length()-1) != '\n')
					bw.write("\n");
			}
		}
	}

	fileReader.close();
	bw.close();
	fw.close();

	System.out.println("MDT: \n" + MDT);
	System.out.println("\nMNT: ");
	for(String[] arr : MNT)
		System.out.println(Arrays.toString(arr));
	System.out.println("\nALA: ");
	for(String[] arr : ALA)
		System.out.println(Arrays.toString(arr));

	fileReader = new Scanner(output);
	System.out.println("\n\nIntermediate Code");
	while(fileReader.hasNextLine())
	{
		System.out.println(fileReader.nextLine());
	}
	fileReader.close();
```

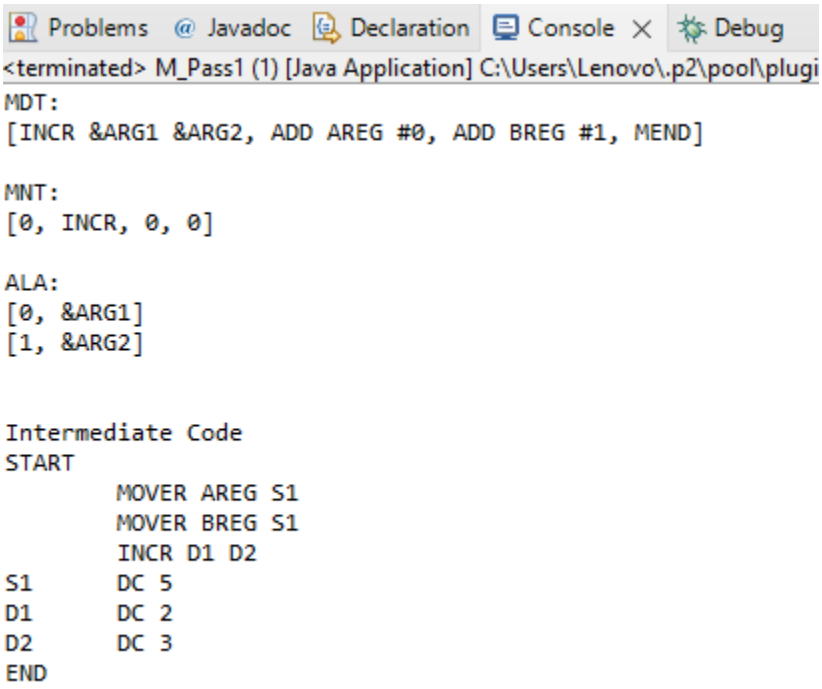
```
            //Writing tables to a file
            fw = new FileWriter("m_tables.asm");
            bw = new BufferedWriter(fw);
            bw.write("[MDT]\n");
            for(String str : MDT)
                  bw.write(str+"\n");
            bw.write("[MNT]\n");
            for(String[] arr : MNT)
            {
                  for(String str : arr)
                        bw.write(str+" ");
                  bw.write("\n");
            }
            bw.write("[ALA]\n");
            for(String[] arr : ALA)
            {
                  for(String str : arr)
                        bw.write(str+" ");
                  bw.write("\n");
            }
            bw.close();
            fw.close();
      }
}
```

INPUT:

m_input.asm

```
      MACRO
      INCR &ARG1 &ARG2
            ADD AREG &ARG1
            ADD BREG &ARG2
      MEND
      START
            MOVER AREG S1
            MOVER BREG S1
            INCR D1 D2
      S1    DC 5
      D1    DC 2
      D2    DC 3
      END
```

OUTPUT:


Problems
Javadoc
Declaration
Console
Debug
<terminated> M_Pass1 (1) [Java Application] C:\Users\Lenovo\.p2\pool\plugi
MDT:
[INCR &ARG1 &ARG2, ADD AREG #0, ADD BREG #1, MEND]
MNT:
[0, INCR, 0, 0]
ALA:
[0, &ARG1]
[1, &ARG2]
Intermediate Code
START
MOVER AREG S1
MOVER BREG S1
INCR D1 D2
S1 DC 5
D1 DC 2
D2 DC 3
END