The prolog database is queried for one or more solutions which are redirected to a text file, methods.txt. The format of methods.txt is shown below:

```
method26
method51
method56
method101
method44
method50
method53
method39
method68
```

The query is also generated on the fly based on the command-line arguments and stored in a text file, query.txt. The content of run.bat file is shown below:

```
set path=%path%;C:\Program Files\pl\bin
setclasspath=C:\Program Files\pl\lib\jpl.jar;.;c:\
javac.exe c:\Methods.java
java Methods objective2 m p s t
Pause
```

pl denotes the folder where SWI prolog is installed and bin folder contains the required Windows libraries. jpl.jar file contains the necessary java classes for interfacing with prolog. The structure of java program for executing prolog query is shown below:

```
String t1 = "consult('methodrules.pl')";
                    Query q1 = new Query(t1);
FileOutputStreamfos=new
FileOutputStream("c:\\methods.txt");
FileOutputStream                                fos1=new
FileOutputStream("c:\\query.txt");
byte[] arr=new byte[20];
byte[] q=new byte[100];
                    String str;
                    System.out.println(    t1    +    "    "    +
(q1.hasSolution() ? "succeeded" : "failed") );
                    String str1 = "((objective_for_method(X,"
+ args[0]  + ", a);objective_for_method(X, " + args[0] +
", b)),method_in_class(X,";String str2 = "))";
                    String t2="";
          for (int i=1;i<args.length-1;i++)
          {
          t2=t2+str1+args[i]+str2+";";
          }
          t2=t2+str1+args[args.length-1]+str2;
          Query q2 = new Query(t2);
                    System.out.println( "first solution of " + t2
+ ": X = " + q2.oneSolution().get("X"));
          q=t2.getBytes();
          fos1.write(q);
                    //-------------------------------------------------
                    java.util.Hashtable[]          ss4          =
q2.allSolutions();
                    System.out.println(  "all  solutions  of  "  +
t2);
                    for ( int i=0 ; i<ss4.length ; i++ ) {
                    System.out.println(     "X     =     "     +
ss4[i].get("X"));
          str=ss4[i].get("X").toString()+"\r\n";
                    arr=str.getBytes();
fos.write(arr);

                    }
          fos.close();
          fos1.close();
```

The execution of run.bat file is shown in the Figure 5(a)-(b).

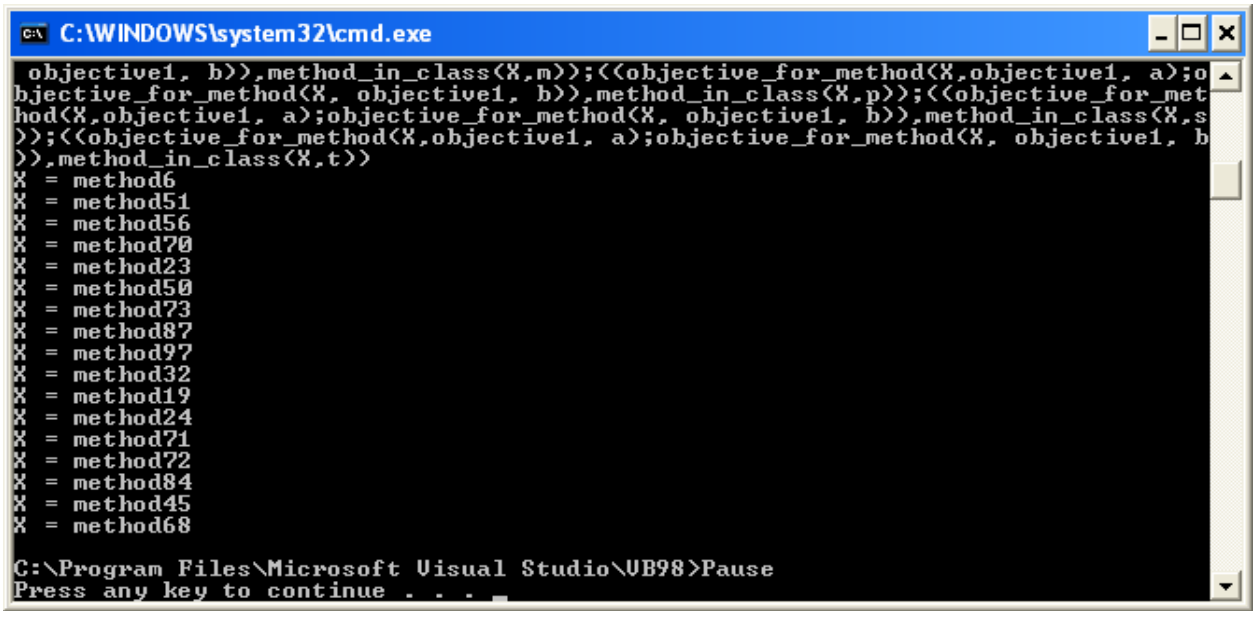

Figure 5 (a)-(b): Execution of run.bat.

The expert system developed in Visual Basic reads the contents of mehods.txt as computed by prolog and presents the results to an end user. The format of the auto generated prolog query generated is shown below:

```
((objective_for_method(X,objective2,
a);objective_for_method(X, objective2,
b)),method_in_class(X,m));((objective_for_method(X,object
ive2, a);objective_for_method(X, objective2,
b)),method_in_class(X,p));((objective_for_method(X,objecti
ve2, a);objective_for_method(X, objective2,
b)),method_in_class(X,s));((objective_for_method(X,objecti
ve2, a);objective_for_method(X, objective2,
b)),method_in_class(X,t))
```

5. Conclusion and Future Work

This paper presents the design of an expert system in Visual Basic (VB) which assists the manager in selection of a manufacturing method based on a single objective. Method and class rules are automatically generated by retrieving the data from the access database which are stored in a prolog database. The expert system shell is implemented in VB which interfaces with SWI Prolog with the help of java application using JPL library. The prolog query is generated on the fly based on the objective and the classes selected by the user in expert system shell which is evaluated using SWI prolog and the solutions are redirected to the text file. The expert system in Visual Basic reads the contents of these text files as computed by SWI prolog and presents the results to an end user. The methodology and application architecture is general and can be applied to similar problems. Our current work focuses on a single objective. It is an idealistic scenario where a single objective defines the section of manufacturing method. In real situations multi objective criteria is required for the purpose. Our future work involves modification of the expert system to take account of multiple objectives and functions.

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