Année 2023-2024

AI PROJECT RAPPORT

Subject:
Application : d'un système expert d'aide au diagnostic des pannes d'un PC. Ouazzine Yasmine diagnostic

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ACKNOWLEDGMENTS

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The practical sessions, led by Professor Benhaddou, were particularly enriching. Her ability to explain complex concepts clearly and concisely facilitated my understanding of fundamental AI principles. Her ongoing support, readiness to answer our questions, and encouragement created a conducive and motivating learning environment.

Furthermore, I sincerely thank her for entrusting me with the project topic "Implementation of an Expert System for PC Troubleshooting Diagnosis." This stimulating and relevant project provided me with the opportunity to apply classroom knowledge and develop practical skills in AI system design tailored to diagnosing PC malfunctions.

In conclusion, I am grateful to Professor Siham Benhaddou for her exceptional dedication to teaching and for significantly contributing to my academic journey. These learning moments will remain unforgettable and serve as a solid foundation for my future projects and accomplishments.

INTRODUCTION

Application: The development of an expert system to aid in diagnosing PC malfunctions presented an intriguing and engaging endeavour, allocated within the framework of our academic curriculum. The project was meticulously planned and executed according to a predefined schedule, striking a careful balance between the aspiration to delve into new facets of Java programming and the necessity to adhere to time constraints.

The deliberate selection of Java Application over Java EE (JEE) for this project was a strategic one. Having previously engaged in an e-commerce project utilizing Java EE, we recognized an opportunity to deepen our Java proficiency within a distinct context. Opting for Java Application was driven by our aspiration to broaden our knowledge and expertise, exploring a dimension of Java that had received comparatively less attention within our academic curriculum.

The decision to concentrate on Java Application was founded on the belief that this project offers a unique avenue for enhancing our comprehension of Java within specific domains while contributing to the development of a robust and functional PC malfunction diagnosis application. This approach underscores our dedication to expanding our skill set and maximizing the educational value provided by this project.

Chapitre I : Project

1- Project's Subject:

Title: Application: The development of an expert system to aid in diagnosing PC malfunctions

Objectif: The objective is to design and implement an expert system to assist in diagnosing computer malfunctions.

-The expert system to be developed is one that diagnoses computer malfunctions and detects which component is faulty based on observed symptoms.

-The user must input the observed symptoms, in other words, the facts. The user then responds to a questionnaire generated by the system for further precision in identifying the faulty hardware. Once the questionnaire is completed, the system displays the malfunctioning component, as well as others that may be affected by the symptom.

User Session:

- The system should provide an interface that allows the user to access the application.
- The system should be capable of:

1. Inserting facts (symptoms) via a user-friendly form and manipulating them later if necessary.
2. Deducting malfunctions related to the inserted facts.

Expert Session:

- The system should provide an interface for the expert to access the application.
- The system should recognize the expert through their login credentials to allow them to manipulate the rule base.
- The system should allow the expert to:

1. Add a rule.
2. Modify a rule.
3. Delete a rule.

Tasks to be completed:

1. Choose the presentation method of knowledge.
2. Determine the type of reasoning and the strategy used (forward chaining or backward chaining).
3. Design the user interface.
4. The prototype must be tested and refined by the knowledge engineer and the domain expert simultaneously.
5. The prototype can be progressively enhanced by adding new elements to the knowledge base.
6. Represent detailed computer breakdowns.
7. Develop a usage scenario for the expert system.

SE definition:

An "expert system" is a computer program designed to emulate the decision-making ability of a human expert in a specific domain or field. It leverages a knowledge base, which contains information and rules acquired from human experts, and inference engines to provide reasoning capabilities. Expert systems are used to solve complex problems, offer advice, make predictions, or assist in decision-making within their designated area of expertise.

The user interface: serves to simplify communication, it can use question-answer format, menu, natural language, etc.

The knowledge base: contains knowledge regarding problem resolution and has the following two bases:

The Fact Base (FB): is one of the inputs to an inference engine. It contains knowledge representing states considered proven. It is the working memory of the ES. It varies during execution and is emptied when execution is completed. Facts can take more or less complex forms. I did it in my project as problems meaning symptoms.

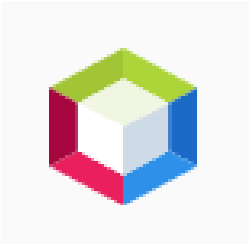
The Rule Base (RB): The rule base contains expert knowledge, representing the reasoning performed by an expert. They are called one after the other in order to create sequences of reasoning. All these reasonings can be represented in the form of production rules of the type "If condition then action." However, this representation can vary depending on the context of the application.

The explanation module: allows the expert system to explain its reasoning.

2- Used Environment:

In the context of our project "Implementation of a Patient Record Management System," we have established a cohesive technological environment, integrating multiple tools to effectively meet our development needs. Here is an overview of the main components of this environment:

JAVA: Java is a versatile, object-oriented programming language known for its portability and platform independence. Developed by Sun Microsystems, it provides a robust framework for building scalable applications. Java's key features include its simplicity, security, and the ability to run on various platforms without recompilation, making it a popular choice for diverse software development projects.



NetBeans IDE 19: NetBeans is an Integrated Development Environment (IDE) that simplifies and accelerates the software development process. Equipped with comprehensive tools and supporting multiple programming languages, it streamlines coding, debugging, and project management. With its user-friendly interface, NetBeans IDE is a powerful tool for constructing diverse applications.

Système de Gestion de Base de Données (SGBD) - MySQL via PHPMyAdmin : For managing data related to patient records, we integrated MySQL using the user-friendly interface of PhpMyAdmin. This combination allows us to design and administer our database efficiently.

Environnement de Développement Local - XAMPP : XAMPP is an open-source, cross-platform software stack that simplifies setting up a local server environment for web development. It includes Apache (web server), MySQL (database server), PHP, and Perl, providing a convenient package for creating and testing dynamic web applications on a personal computer.

Chapter II : Project Requirements Document:

1-Introduction:

The project aims to develop a Java application of of an expert system to aid in diagnosing PC malfunctions. The system includes three tables in the MySQL database (prblm,rules,user). The application will provide specific functionalities for user and expert.

2. General Features:

- Creation of user.
- User adding symptoms in a form for not found symptoms.
- User accessing different suggestion created by expert to diagnosis its pc malfunctions.
- User reading all symptom list created by expert.
- Creating the expert in the database to just have one expert.
-Expert reading the list of added new symptoms by user (not found symptoms).
- Expert adding Rules for different symptoms and for the new added symptoms by the User .

3. User Access:

- **User:**
  - Create a not found symptom list.
  - View Different Symptoms added by expert.
  - Create a user (user).
  - view all the 5 symptoms suggestion created by expert .

- **Expert:**
  - View Different Symptoms added by this expert.
  - View all added new symptom list the content is by the user.
  - View the button, Rules.
  - created rules for different symptoms.(add , update , delete)

4. User Interfaces:

- **Home Page:**
  - Authentication (User/expert).
  - Access to role-specific functionalities.

- **User:**
  - Battery Issues.
  - Performance Problems.
  - Hardware Malfunctions.
  - Software Glitches.
  - Networking Problems.
  - add not found symptom.
  - View Different Symptoms.

- **Expert:**
  - Battery Issues.
  - Performance Problems.
  - Hardware Malfunctions.
  - Software Glitches.
  - Networking Problems.
  - View all added new sym List.
  - Rules.

5. Database Management:

- Design of tables (‘prblm’, ‘rules’,’user’).
- Establishment of appropriate foreign key relationships.

6. Security:

- Secure authentication and authorization.
- Encryption of sensitive data.

7. Languages and Tools:

- Use Java for application development.
- MySQL with PhpMyAdmin for database management.
- User-friendly UI design.

8. Time Constraints:

- Delivery of the final product within one month.(29/02-31/03)

9. Testing:

- Detailed test plan for each functionality.
- Integration and system testing.

10. Documentation:

- Comprehensive code documentation.
- User and administrator manuals.

11. Maintenance:

- Ensure system maintenance after deployment.
- Address potential issues and update features as needed.

12. Deliverables:

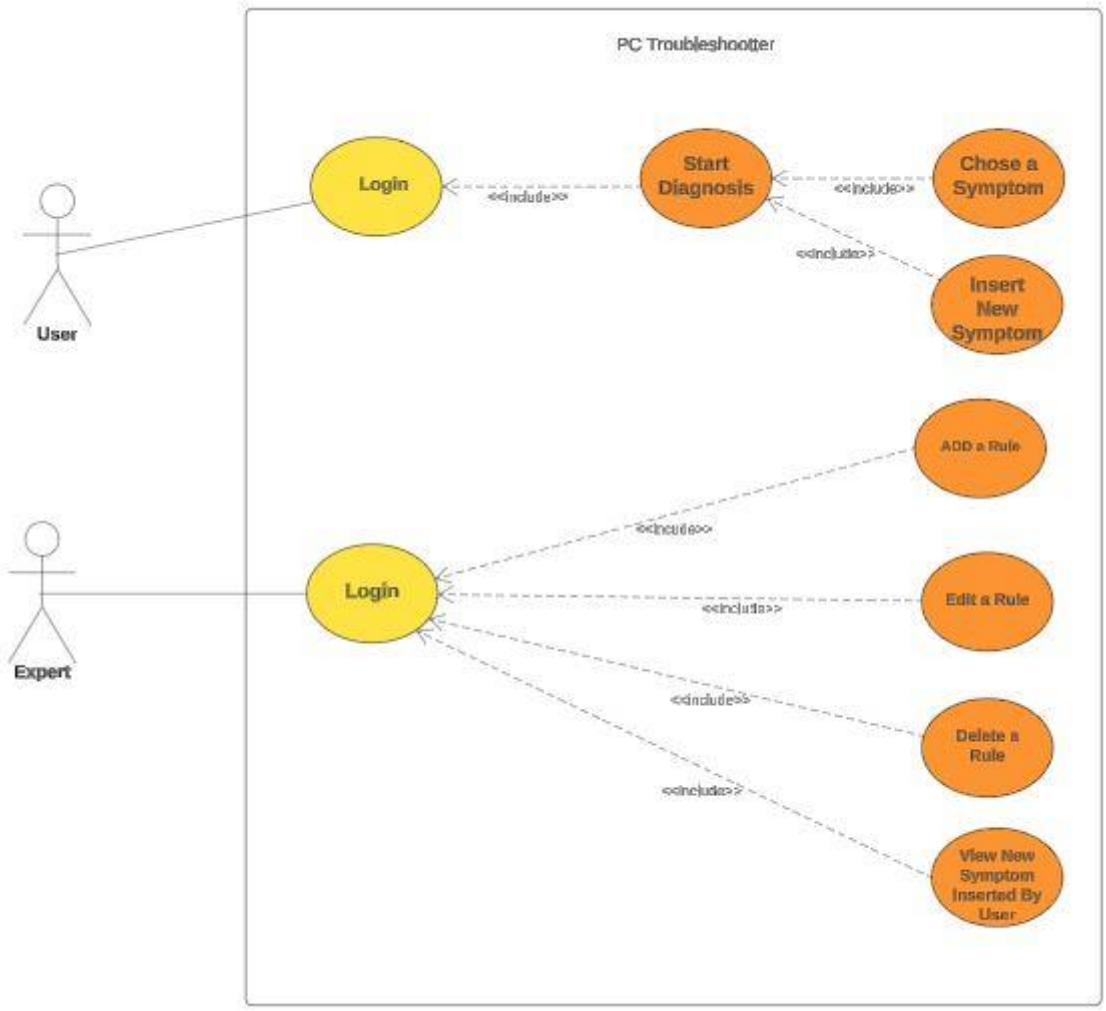
- Complete source code.
- Technical documentation and user manuals.
- MySQL database ready for use.

Chapter III : Unified Modeling Langage :

1-Use Case Diagram:

a-Use Case :

a.1-Diagram:

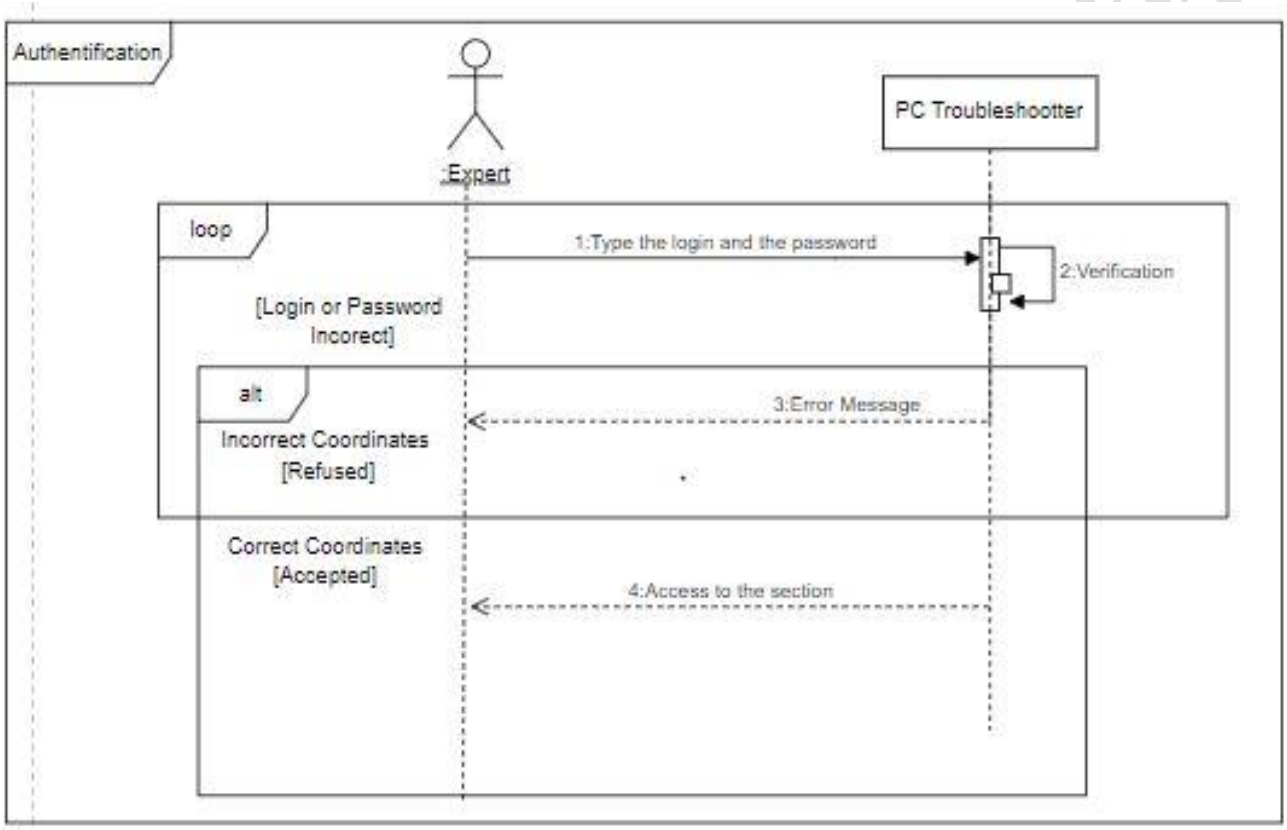


2-Sequence diagram:

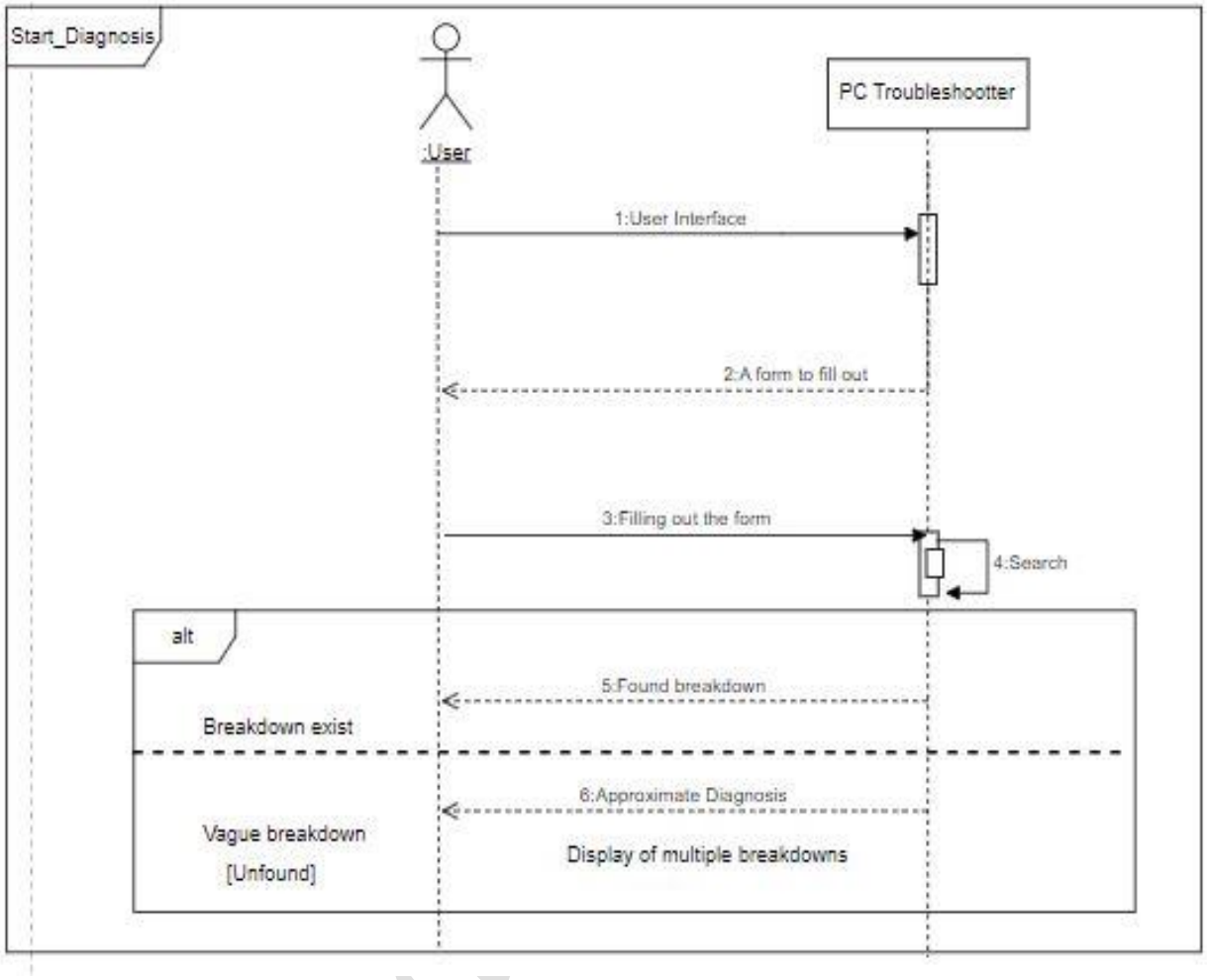
a-Sequence :

we will study the details of the authentification , and adding rules by expert, and the diagnosis that the user is processing

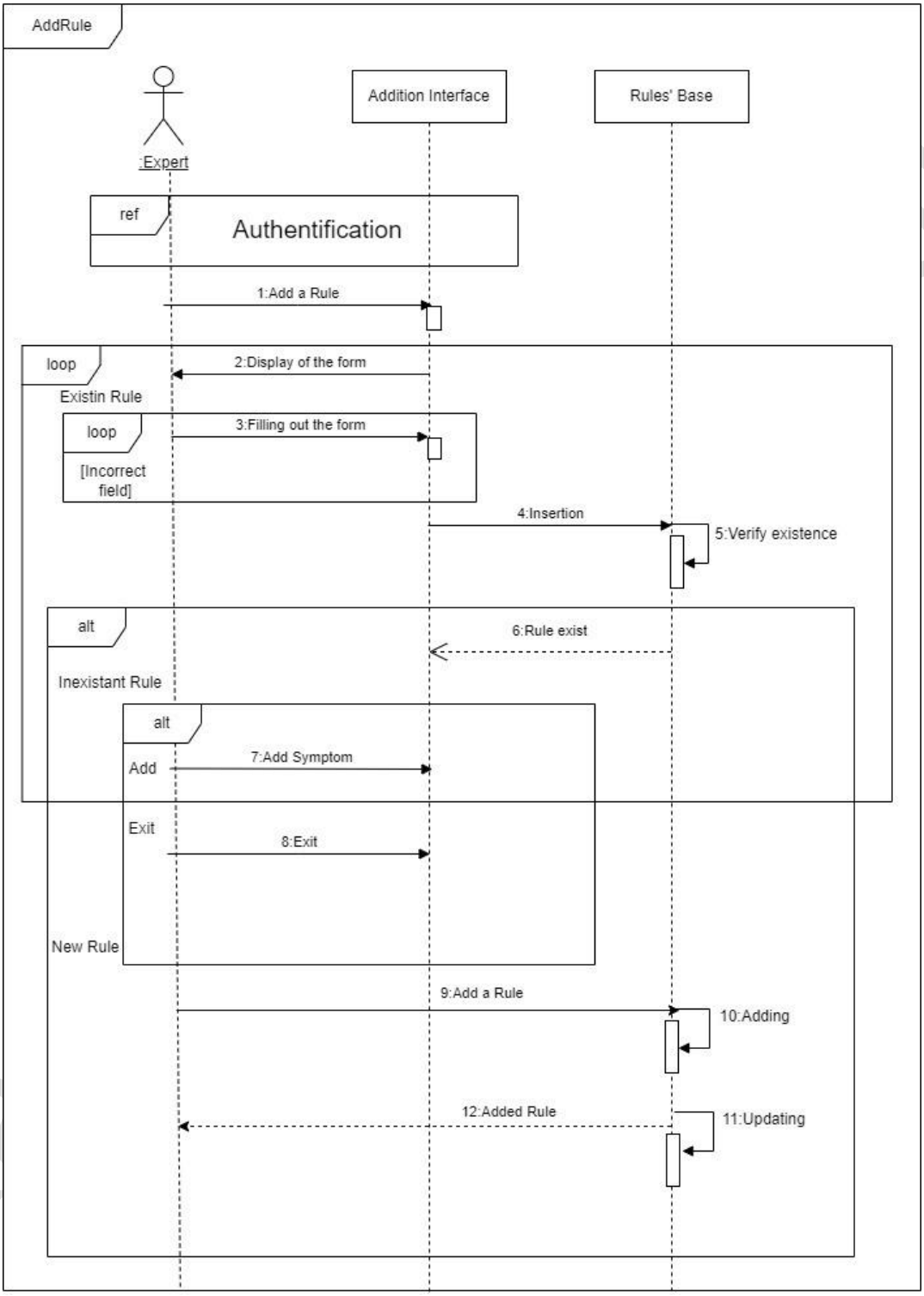
a.1- Authentification Diagram:



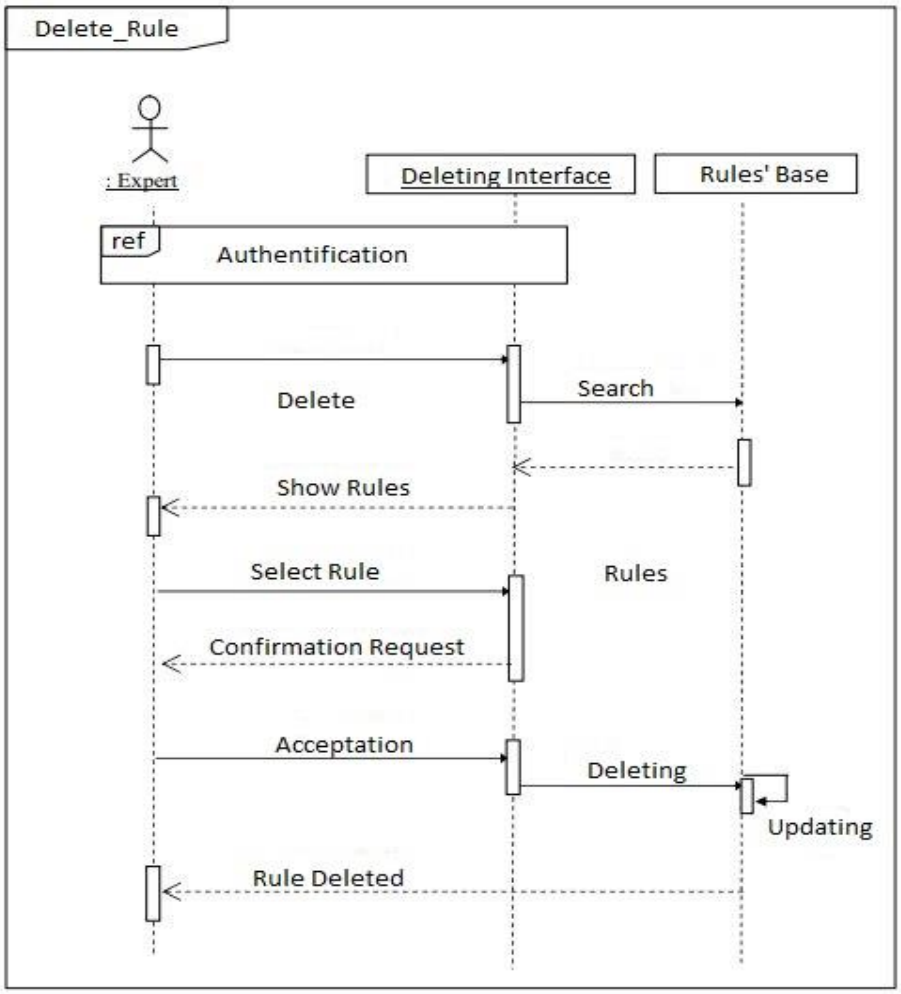
a.2- Start diagnosis Diagram:



a.3- AddRule Diagram:

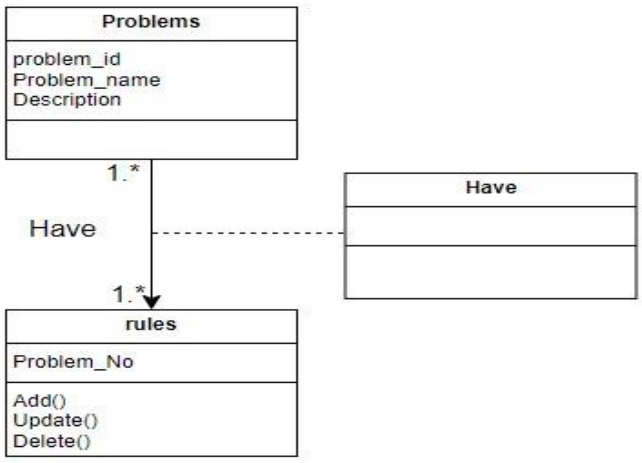


a.4- Delete_Rule Diagram:



3-Class diagram:

a.1- Class Case:



Chapter IV : Project Implementation:

1- Creation of Database in phpMyAdmin:

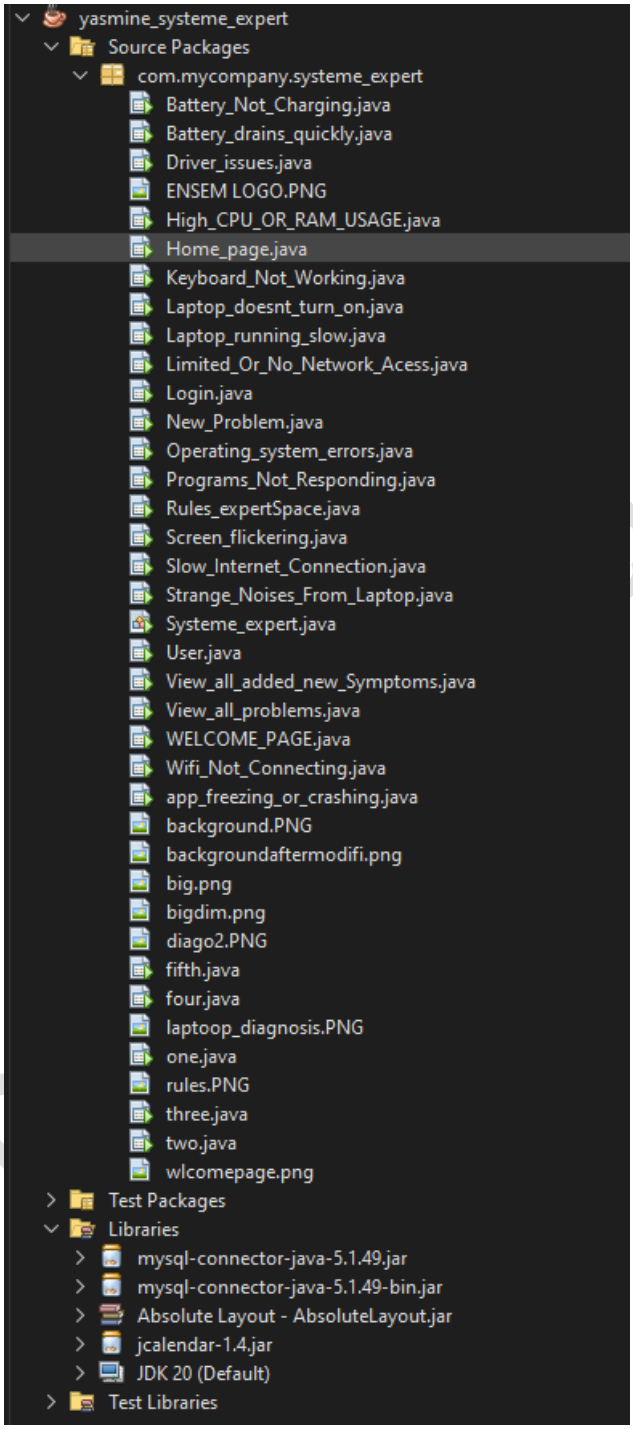
Database: yasminediagnostic.

Tables Created: prblm , rules , user

2-Creation in NetBeans the project:

Project name: laptop diagnostic app

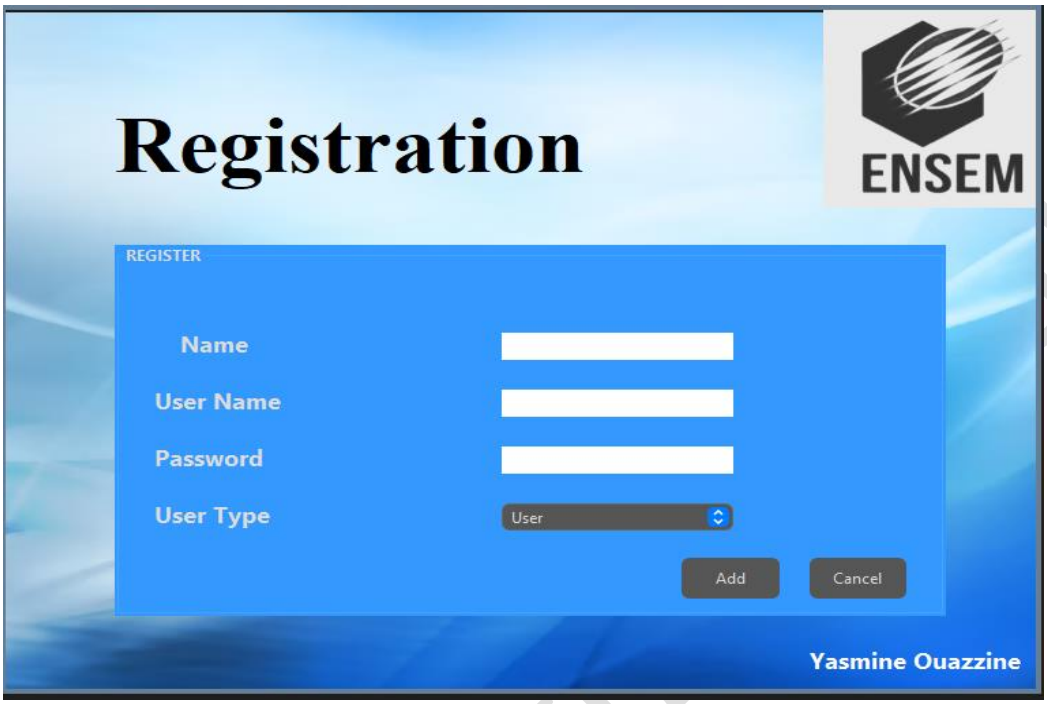
Jframes created: Battery_Not_Charging.java , Battery_drains_quickly.java ,Driver_issues.java , High_CPU_OR_RAM_USAGE.java , Home_page.java , Keyboard_Not_Working.java , Laptop_doesn't_turn_on.java , Laptop_running_slow.java , Limited_or_no_network_access.java , Login.java, New_Problem.java , Operating_system_errors.java, Programs_Not_Responding , Rules_expertSpace.java , Screen_flickering.java , Slow_internet_connection.java, Strange_Noises_From_Laptop.java , User.java , View_all_added_new_Symptoms.java , View_all_problems.java, WELCOME_PAGE.java , Wifi_Not_Connecting.java , app_freezing_or_crushing.java , fifth.java , four.java , one.java , three.java , two.java



Project's Files

User.java :

To create new user (User), there is only one expert added in the database directly



User table :

←T→	id	name	username	password	utype
Éditer Copier Supprimer	1	yasmine	ouazzine	yassmine 2003	Expert
Éditer Copier Supprimer	2	hiba	darkaoui	hiba 2003	User
Éditer Copier Supprimer	3	kaoutar	nechaan	kaoutar1998	User
Éditer Copier Supprimer	4	lego	mycat	kayahi123	User
Éditer Copier Supprimer	5	ouazzine	mohamed	1000	User
Éditer Copier Supprimer	6	fatima	moutawakil	kassba2	User

we create and visualize here new users that we can use to login

Login.java

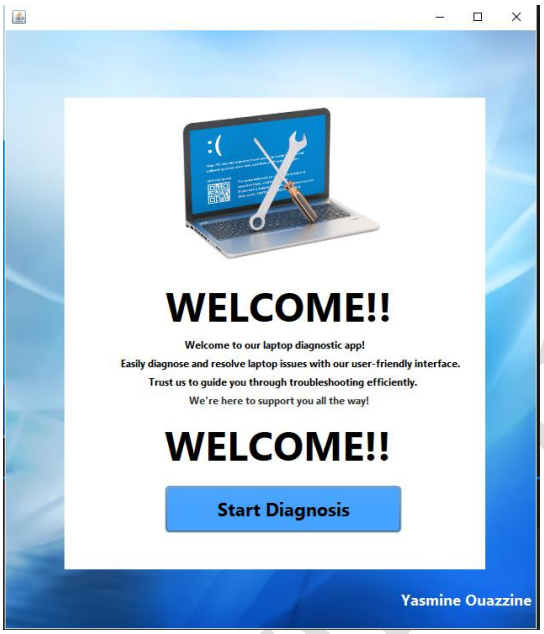
To reach the home page we need to login as a expert or user

The home page button depends on the user type to visualize certain button

After login as User

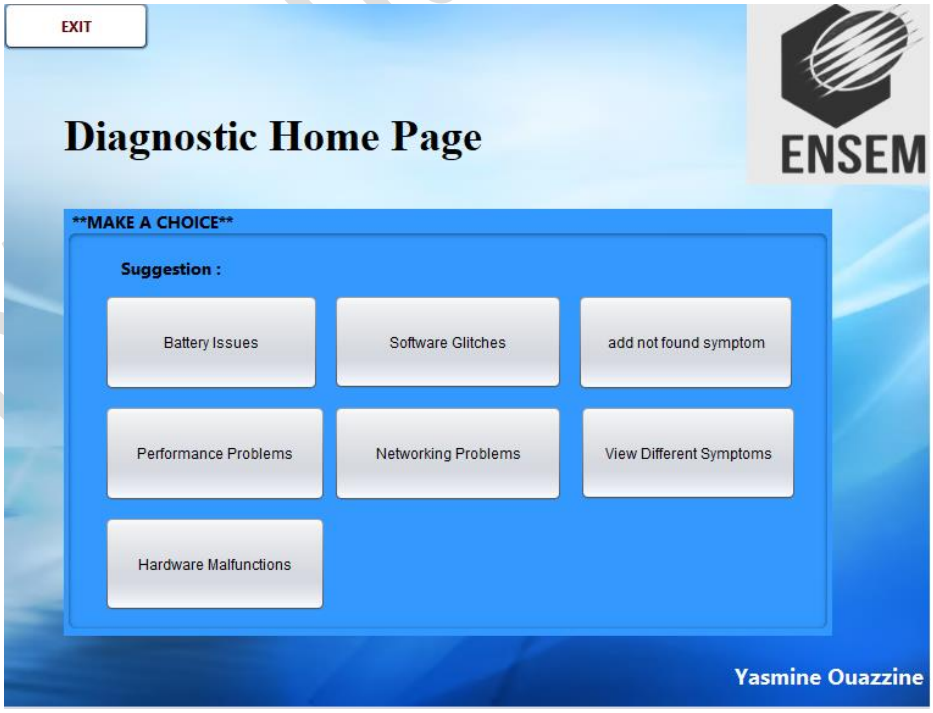
WELCOME_PAGE.java:

The user will access this page first:



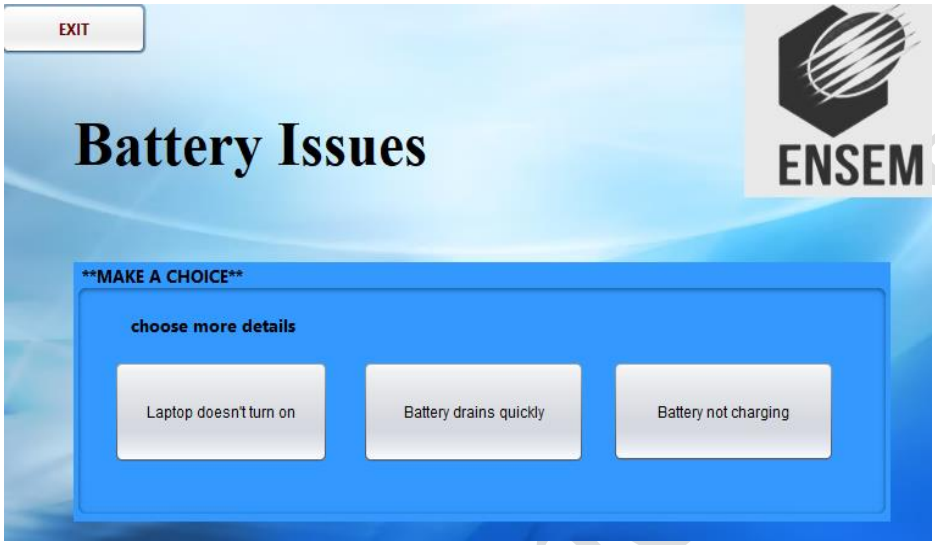
After clicking on Start Diagnosis he will access the home page

Home_page.java :



We click on Battery issue

Battery_Not_Charging.java



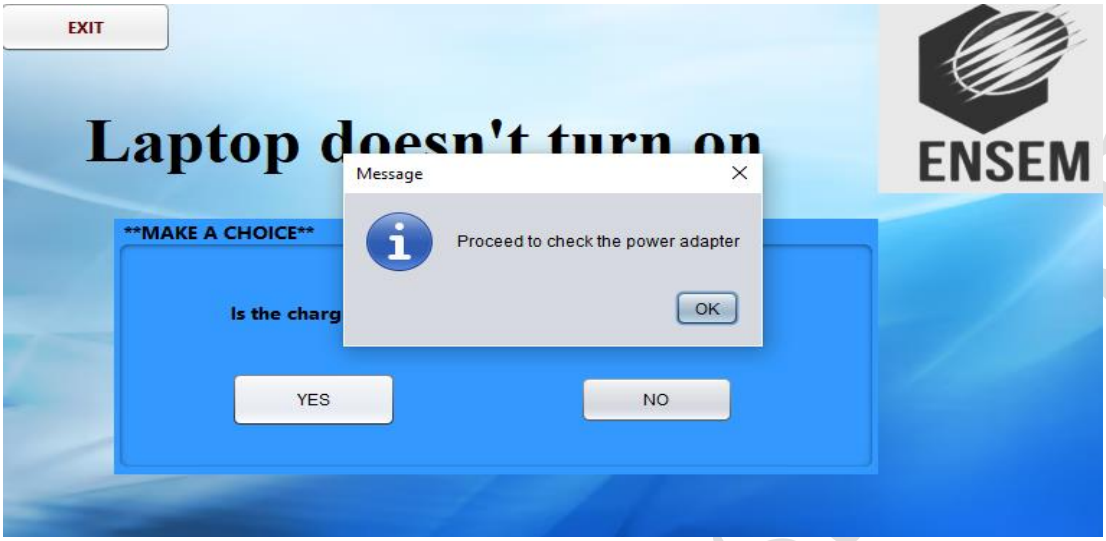
We click on one of the details

I choose Laptop doesn't turn on

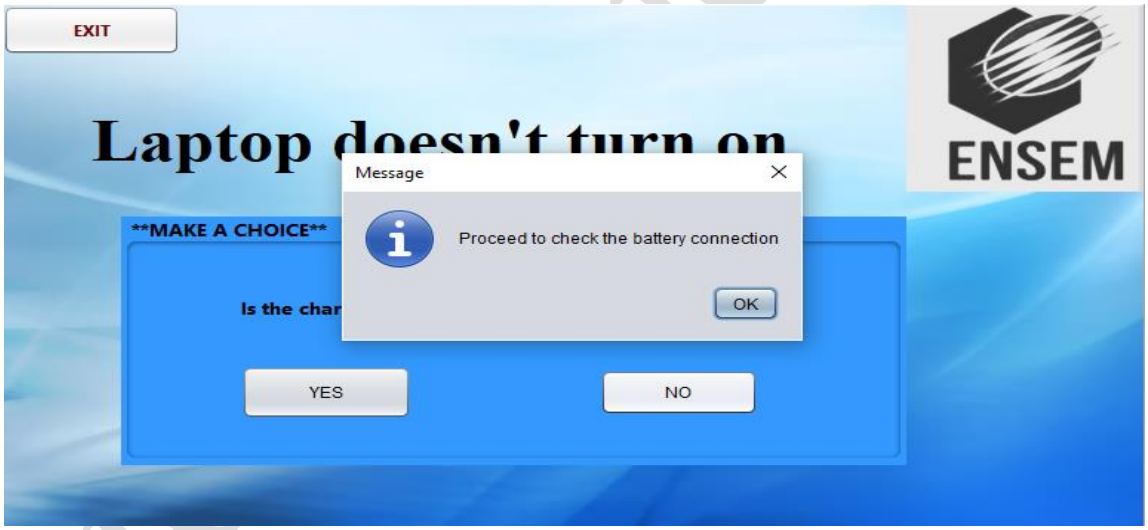
Laptop_doesn't_turn_on.java:

If we click on yes or no, we will get messages:

For yes:



For no:

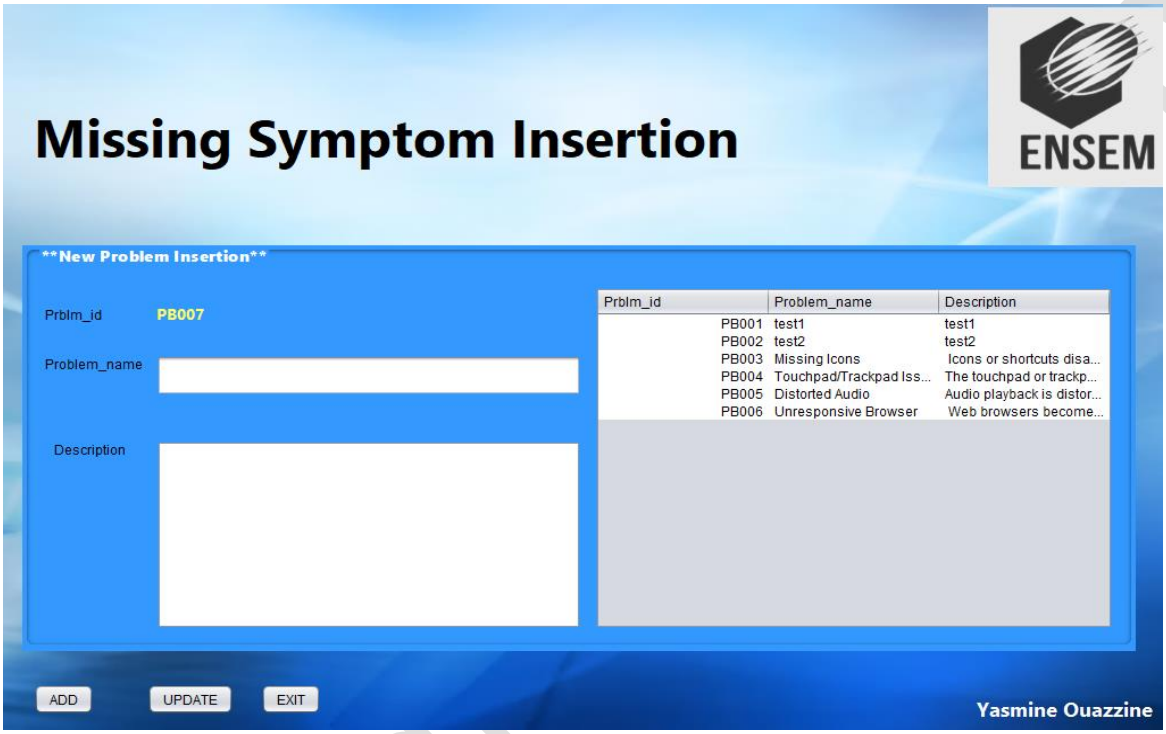


i did the same for all of the button :

Battery_Not_Charging.java , Battery_drains_quickly.java ,Driver_issues.java , High_CPU_OR_RAM_USAGE.java , Keyboard_Not_Working.java , Laptop_doesn't_turn_on.java , Laptop_running_slow.java , Limited_or_no_network_access.java , Operating_system_errors.java, Programs_Not_Responding , Screen_flickering.java , Slow_internet_connection.java, Strange_Noises_From_Laptop.java , Wifi_Not_Connecting.java , app_freezing_or_crushing.java , fifth.java , four.java , one.java , three.java , two.java

We click now on the button add not found symptom so the user can insert new symptoms of his laptop not found in the app or in the list of expert's rules

New_Problem.java:

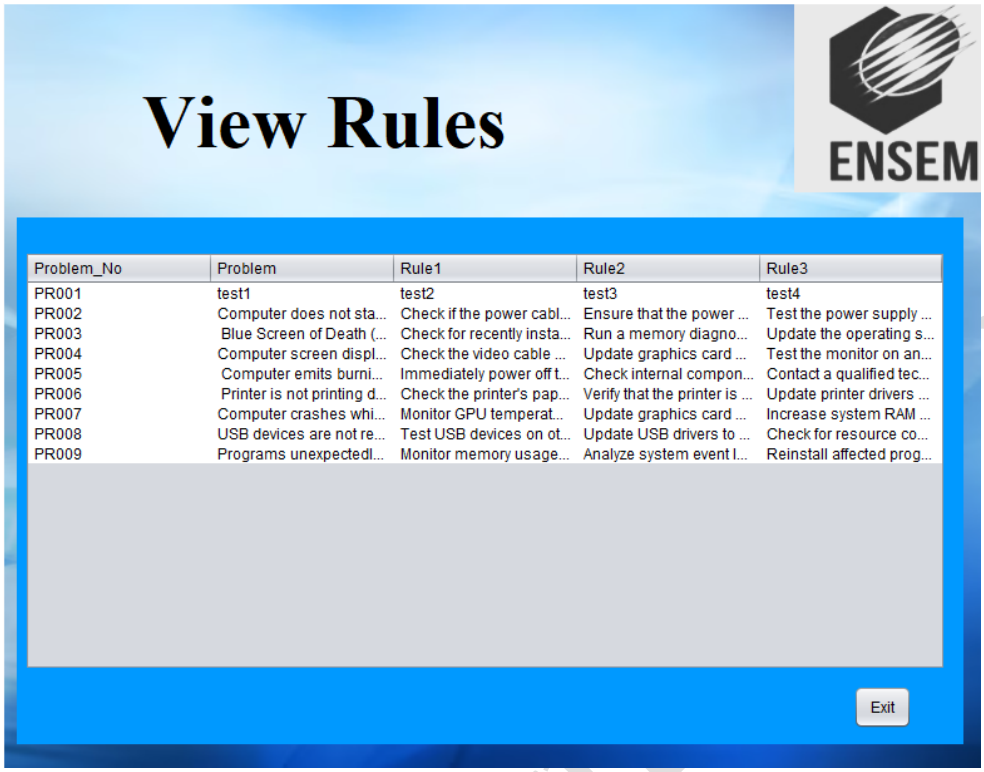


Prblm table :

	Prblm_id	Problem_name	Description
Éditer Copier Supprimer	PB001	test1	test1
Éditer Copier Supprimer	PB002	test2	test2
Éditer Copier Supprimer	PB003	Missing Icons	Icons or shortcuts disappear from the desktop or ...
Éditer Copier Supprimer	PB004	Touchpad/Trackpad Issues	The touchpad or trackpad stops working or behaves ...
Éditer Copier Supprimer	PB005	Distorted Audio	Audio playback is distorted, crackling, or cutting...
Éditer Copier Supprimer	PB006	Unresponsive Browser	Web browsers become unresponsive or crash frequen...

We click on View different Symptoms so the user can see the list of symptoms and rules inserted by expert

View_all_problems.java :



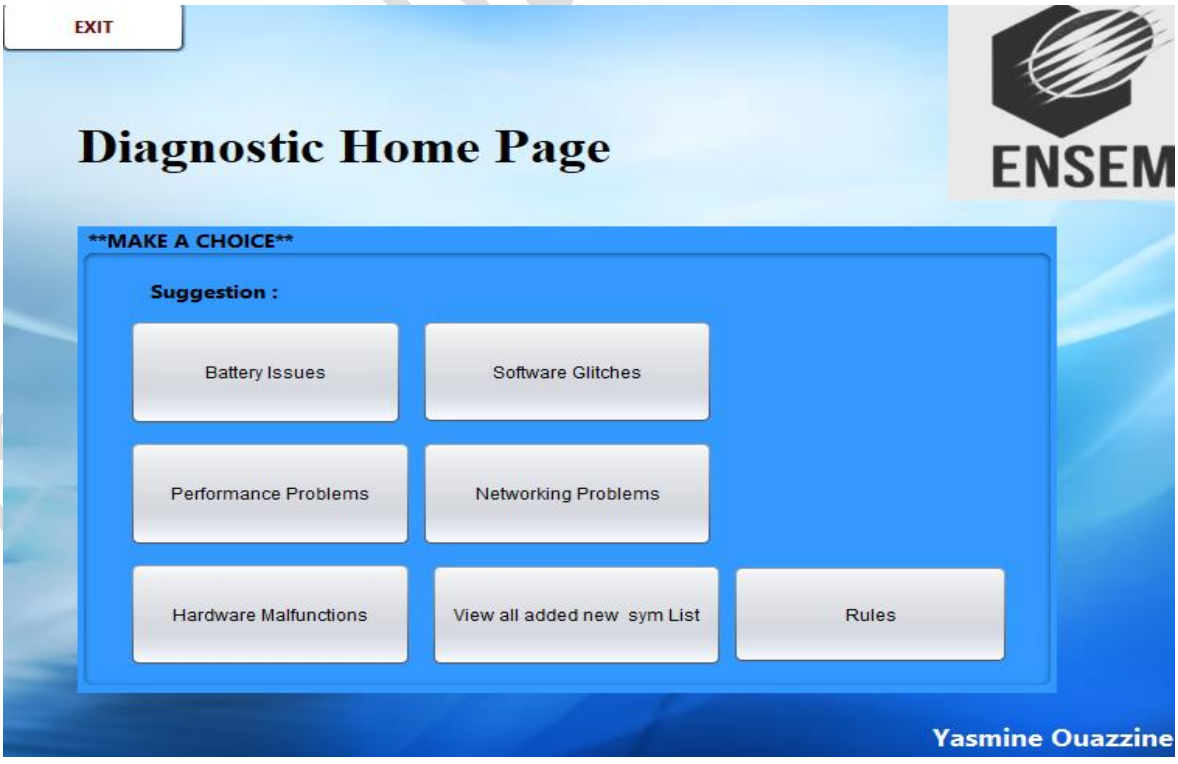
Rules table:

	Problem_No	Problem	Rule_1	Rule_2	Rule_3
Éditer Copier Supprimer	PR001	test1	test2	test3	test4
Éditer Copier Supprimer	PR002	Computer does not start up.	Check if the power cable is properly plugged into ...	Ensure that the power switch of the computer is tu...	Test the power supply using another power cable or...
Éditer Copier Supprimer	PR003	Blue Screen of Death (BSOD) appears frequently.	Check for recently installed hardware or software ...	Run a memory diagnostic test to identify potential...	Update the operating system and drivers to the lat...
Éditer Copier Supprimer	PR004	Computer screen displays distorted or garbled imag...	Check the video cable connections between the comp...	Update graphics card drivers to the latest version...	Test the monitor on another computer to determine ...
Éditer Copier Supprimer	PR005	Computer emits burning smells or unusual odors.	Immediately power off the computer and unplug it f...	Check internal components for signs of overheating...	Contact a qualified technician to inspect the comp...
Éditer Copier Supprimer	PR006	Printer is not printing documents.	Check the printer's paper tray for jams or paper f...	Verify that the printer is connected to the comput...	Update printer drivers and software to resolve pri...
Éditer Copier Supprimer	PR007	Computer crashes while playing games or running in...	Monitor GPU temperature and consider upgrading coo...	Update graphics card drivers to the latest version...	Increase system RAM or upgrade the graphics card t...
Éditer Copier Supprimer	PR008	USB devices are not recognized.	Test USB devices on other ports to determine if th...	Update USB drivers to resolve compatibility issues...	Check for resource conflicts with other connected ...
Éditer Copier Supprimer	PR009	Programs unexpectedly close.	Monitor memory usage and CPU consumption to detect...	Analyze system event logs for specific errors or w...	Reinstall affected programs to address potential f...

After login as Expert:

The expert will access directly to homepage not like the user who accessesed the WELCOME_PAGE first:

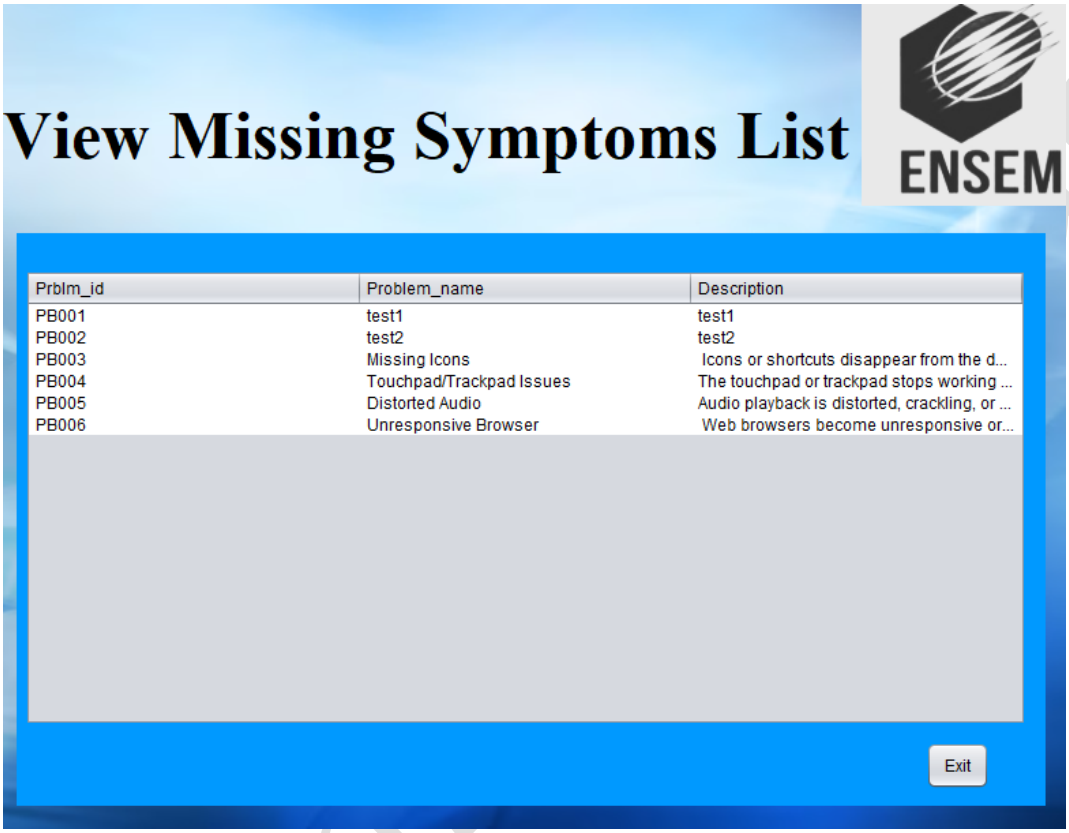
Home_page.java :



The five suggestion symptoms to see the content: see the screen picture its all added in the file .

We click on View all added new sym List which is the symptoms added by the user after not finding their laptop symptoms in the app: the expert visualizes them and assign to each one 3 rules.

View_all_added_new_Symptoms.java :

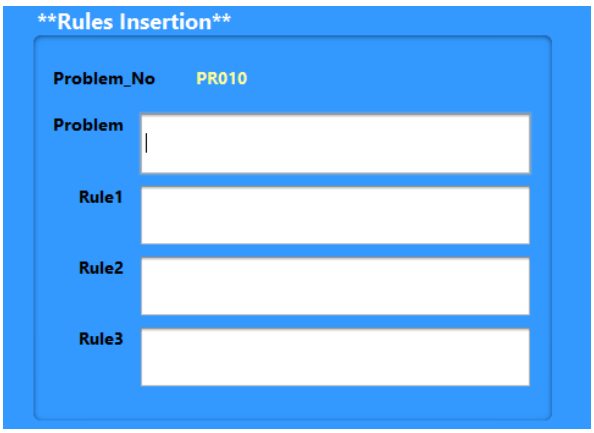


This one has the same prblm_table can we only visualize its content

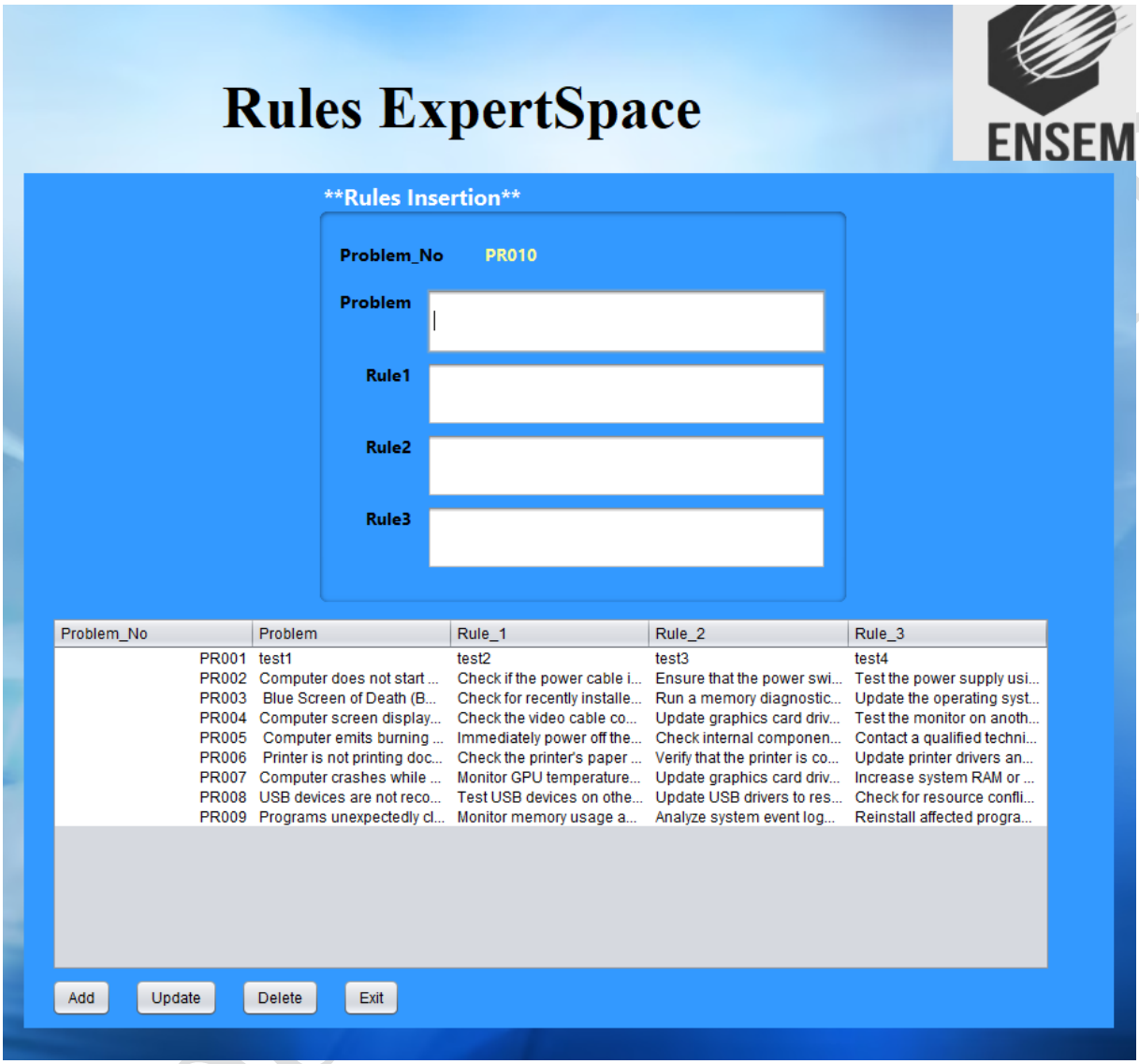
The expert can also click on Rules button where he can add new symptoms and its rules or add symptoms after view missing symptoms list and assign 3 rules to each symptom.

Rules_expertSpace.java:

It has this where he can add, update , delete



Full page :



Rule Table : the same used in view all symptoms cause we update and delete and add in the same database table

I- Connection Code Part:

In all the files.java we created a connection part to connected to the database we can take as an example the New_Problem file: New_Problem.java

```
public void Connect() {
    try {
        Class.forName(className: "com.mysql.jdbc.Driver");
        con = DriverManager.getConnection(url:"jdbc:mysql://localhost:3306/yasminediagnostic", user: "root", password: "");
    } catch (ClassNotFoundException ex) {
        Logger.getLogger(name: User.class.getName()).log(level: Level.SEVERE, msg:null, thrown: ex);
    } catch (SQLException ex) {
        Logger.getLogger(name: User.class.getName()).log(level: Level.SEVERE, msg:null, thrown: ex);

    }
}
```

The provided Java code defines a method named `**Connect**` designed to establish a connection to a MySQL database. The initial step involves loading the **MySQL JDBC** driver using the `**Class.forName**("**com.mysql.jdbc.Driver**");` statement. Subsequently, a connection is established through the `**DriverManager.getConnection**` method, where the URL specifies the database location (`**localhost:3306/yasminediagnostic**`), and the parameters include the username (`**root**`) and an empty password. Exception handling is implemented for both the loading of the JDBC driver and potential errors during the database connection process. Any exceptions are logged for further analysis. It's important to note that the `**con**` variable, presumably an instance variable of the `User` class, is used to store the established database connection. However, the code might benefit from additional error handling and resource management practices, such as closing the connection in a `**finally**` block, to ensure robustness.

```
    public New_Problem() {
        initComponents();
        Connect();
        AutoID();
        prblm_table();
    }
  Connection con;
    PreparedStatement pst;
    ResultSet rs;
```

Connect (): method to connect to the database.
AutoID (): for the Patient Number.
prblm_table (): the table that we can visualize in it the prblm/symtom information created.

```
public void AutoID() {
try {
    Statement s = con.createStatement();
    rs = s.executeQuery(string: "select MAX(Prblm_id) from prblm");
    rs.next();
    rs.getString(string: "MAX(Prblm_id)");

    if (rs.getString(string: "MAX(Prblm_id)") == null) {
        lblPrblmid.setText(text: "PB001");
    } else {
        long id = Long.parseLong(s: rs.getString(string: "MAX(Prblm_id)").substring(beginIndex: 2, endIndex: rs.getString(string: "MAX(Prblm_id)").length()));
        id++;
        lblPrblmid.setText("PB" + String.format(format: "%03d", args: id));
    }
} catch (SQLException ex) {
    Logger.getLogger(name: New_Problem.class.getName()).log(level: Level.SEVERE, msg: null, thrown: ex);
}
}
```

We select the Prblm_id from the database table : prblm and to do AutoID for the Prblm / sympotms id

Prblm_table definition :

```
public void prblm_table() {
    try {
        pst = con.prepareStatement(string: "select * from prblm");
        rs = pst.executeQuery();
        DefaultTableModel df = (DefaultTableModel) jTable1.getModel();
        df.setRowCount(rowCount: 0);

        while (rs.next()) {
            Vector v2 = new Vector();
            v2.add(e: rs.getString(string: "Prblm_id"));
            v2.add(e: rs.getString(string: "Problem_name"));
            v2.add(e: rs.getString(string: "Description"));
            df.addRow(rowData: v2);
        }
    } catch (SQLException ex) {
        Logger.getLogger(name: New_Problem.class.getName()).log(level: Level.SEVERE, msg: null, thrown: ex);
    }
}
```

Add_button part :

```
    private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
String Prblmid = lblPrblmid.getText();
   String prblmname = txtprblmname.getText();
   String desc = txtdesc.getText();

   try {
       pst = con.prepareStatement(string: "INSERT INTO prblm (Prblm_id, Problem_name, Description) VALUES (?, ?, ?)");

       pst.setString(i: 1, string: Prblmid);
       pst.setString(i: 2, string: prblmname);
       pst.setString(i: 3, string: desc);

       int i = pst.executeUpdate();

       if (i > 0) {
           JOptionPane.showMessageDialog(parentComponent: this, message: "Problem inserted");
           AutoID();
           txtprblmname.setText(s: "");
           txtdesc.setText(s: "");
           txtprblmname.requestFocus();
           prblm_table();
       } else {
           JOptionPane.showMessageDialog(parentComponent: this, message: "Failed to insert problem");
       }
   } catch (SQLException ex) {
       ex.printStackTrace(); // Print the exception stack trace
       JOptionPane.showMessageDialog(parentComponent: this, message: "An error occurred while inserting the problem. Please check the console for details.");
   }
```

Update button code :

```
private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {

    // TODO add your handling code here:
   String Prblmid = lblPrblmid.getText();
String prblmname = txtprblmname.getText();
String desc = txtdesc.getText();

try {
    pst = con.prepareStatement(string: "update prblm set Problem_name=?, Description=? where Prblm_id=?");

    pst.setString(i: 1, string: prblmname);
    pst.setString(i: 2, string: desc);
    pst.setString(i: 3, string: Prblmid);

    int i = pst.executeUpdate();

    if (i > 0) {
        JOptionPane.showMessageDialog(parentComponent:this, message:"Problem updated");
        AutoID();
        txtprblmname.setText(s: "");
        txtdesc.setText(s: "");
        txtprblmname.requestFocus();
        prblm_table();
    } else {
        JOptionPane.showMessageDialog(parentComponent:this, message:"Failed to update problem");
    }
} catch (SQLException ex) {
    Logger.getLogger(name:New_Problem.class.getName()).log(level: Level.SEVERE, msg:null, thrown: ex);
}
```

3- We Insert Some Informations In The Database Tables:

To have an efficient demonstration on the functionalities of the java application i will insert some informations in the database tables

The informations inserted in the tables:

a- user table:

Affichage des lignes 0 - 5 (total de 6, traitement en 0,0010 seconde(s).)

```
SELECT * FROM `user`
```

Profilage [Éditer en ligne] [Éditer] [Expliquer SQL] [Créer le code source PHP] [Actualiser]

Tout afficher | Nombre de lignes : 25 Filtrer les lignes: Chercher dans cette

Options supplémentaires

	id	name	username	password	utype
Éditer Copier Supprimer	1	yasmine	ouazzine	yassmine 2003	Expert
Éditer Copier Supprimer	2	hiba	darkaoui	hiba 2003	User
Éditer Copier Supprimer	3	kaoutar	nechaan	kaoutar1998	User
Éditer Copier Supprimer	4	lego	mycat	kayahi123	User
Éditer Copier Supprimer	5	ouazzine	mohamed	1000	User
Éditer Copier Supprimer	6	fatima	moutawakil	kassba2	User

b- prblm table:

```
SELECT * FROM `prblm`
```

Profilage [Éditer en ligne] [Éditer] [Expliquer SQL] [Créer le code source PHP] [Actualiser]

Tout afficher | Nombre de lignes : 25 Filtrer les lignes: Chercher dans cette table Trier par clé : Aucun(e)

Options supplémentaires

	Prblm_id	Problem_name	Description
Éditer Copier Supprimer	PB001	test1	test1
Éditer Copier Supprimer	PB002	test2	test2
Éditer Copier Supprimer	PB003	Missing Icons	Icons or shortcuts disappear from the desktop or ...
Éditer Copier Supprimer	PB004	Touchpad/Trackpad Issues	The touchpad or trackpad stops working or behaves ...
Éditer Copier Supprimer	PB005	Distorted Audio	Audio playback is distorted, crackling, or cutting...
Éditer Copier Supprimer	PB006	Unresponsive Browser	Web browsers become unresponsive or crash frequen...

c- rules table:

```
SELECT * FROM `rules`
```

Profilage [Éditer en ligne] [Éditer] [Expliquer SQL] [Créer le code source PHP] [Actualiser]

Tout afficher | Nombre de lignes : 25 Filtrer les lignes: Chercher dans cette table Trier par clé : Aucun(e)

Options supplémentaires

	Problem_No	Problem	Rule_1	Rule_2	Rule_3
Éditer Copier Supprimer	PR001	test1	test2	test3	test4
Éditer Copier Supprimer	PR002	Computer does not start up.	Check if the power cable is properly plugged into ...	Ensure that the power switch of the computer is tu...	Test the power supply using another power cable or...
Éditer Copier Supprimer	PR003	Blue Screen of Death (BSOD) appears frequently.	Check for recently installed hardware or software ...	Run a memory diagnostic test to identify potential...	Update the operating system and drivers to the lat...
Éditer Copier Supprimer	PR004	Computer screen displays distorted or garbled imag...	Check the video cable connections between the comp...	Update graphics card drivers to the latest version...	Test the monitor on another computer to determine ...
Éditer Copier Supprimer	PR005	Computer emits burning smells or unusual odors.	Immediately power off the computer and unplug it f...	Check internal components for signs of overheating...	Contact a qualified technician to inspect the comp...
Éditer Copier Supprimer	PR006	Printer is not printing documents.	Check the printer's paper tray for jams or paper f...	Verify that the printer is connected to the comput...	Update printer drivers and software to resolve pri...
Éditer Copier Supprimer	PR007	Computer crashes while playing games or running in...	Monitor GPU temperature and consider upgrading coo...	Update graphics card drivers to the latest version...	Increase system RAM or upgrade the graphics card t...
Éditer Copier Supprimer	PR008	USB devices are not recognized.	Test USB devices on other ports to determine if th...	Update USB drivers to resolve compatibility issues...	Check for resource conflicts with other connected ...
Éditer Copier Supprimer	PR009	Programs unexpectedly close.	Monitor memory usage and CPU consumption to detect...	Analyze system event logs for specific errors or w...	Reinstall affected programs to address potential f...

CONCLUSION

In conclusion, the development of the "Application: Diagnostic Assistance Expert System for PC Troubleshooting" project under the guidance of Professor Siham Benhaddou has been an enriching experience, blending learning, teamwork, and the practical application of AI concepts. We embarked on this journey with a shared goal of understanding and implementing the professor's directives into a functional and efficient system.

Throughout the development process using advanced AI algorithms, we devoted considerable time to comprehending the intricacies of the project requirements, ensuring a thorough grasp of each aspect outlined by Professor Benhaddou. This dedication enabled us to create a robust application that not only fulfills the specified criteria but also bears the name "ExpertPCDiagnosis" as a testament to our collective effort and individual contributions.

The decision to depart from conventional project naming conventions and incorporate our names into both the project and the database underscores our commitment to personalization and ownership of the project. This approach not only fosters a sense of pride and ownership but also showcases our adaptability and creativity within the prescribed framework.

In summary, the development of the PC troubleshooting expert system has not only enhanced our understanding of AI application development but has also demonstrated our adaptability and dedication to delivering a project that aligns with Professor Benhaddou's vision while showcasing our unique contributions. This experience has undoubtedly enriched our practical knowledge in AI, preparing us for future challenges in the field of artificial intelligence.