An Expert System Algorithm for Computer System Diagnostics

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Abstract

In troubleshooting Computer Systems the two most common causes of delay are Trial and Error and having Incomplete Information. The problems in Computer Systems will be fixed faster if the Possible Cause of the Problem is already known. A solution to this is to use an Expert System. This system can reproduce the ability of an expert to diagnose by giving an accurate recommendation on the possible cause of the problem for effective troubleshooting.

To know the Possible Cause of a problem there must be a complete set of information. These data will be the one to be inputted in the Expert System to give an accurate recommendation. A problem is that in reality a complete set of data will not always be obtained. There will be instances when the information gathered will be incomplete.

This research solved the two most causes of delay which are Trial and Error and having Incomplete Information. This is done by developing an Expert System Algorithm that creates the rules of an Expert System. The rules created from the algorithm are nominal in terms that only the necessary information needs to be inputted. In instances that the data gathered are incomplete the correct Possible Cause can still be suggested. A theorem is also presented in this research about and the Information Dependency of Data which can be used with Incomplete Information Systems and unknown data. Formal Proof of the theorem is provided and its correctness was verified with actual data.

Keywords: Computer Systems, Expert Systems, Real time systems, Database Engineering, Information Management.

1. INTRODUCTION

An Expert System is an Artificial Intelligence Based System that performs task that otherwise is performed by a human expert [1]. This type of system usually has a knowledge base containing accumulated experience and a set of rules for applying the knowledge base to each particular solution.

The most common cause of delay in solving a problem is trial and error [2]. The problem can be solved earlier if the person diagnosing it already knows the cause of the problem rather than resorting to trial and error. There are instances that because of this trial and error, the problem gets worse rather than being solved. Some problems can be solved quickly; there are situations when it only takes a few minutes to solve a problem but because the person diagnosing it does not know the cause of the problem, troubleshooting takes days or months causing much inconvenience.

An example in Computer Systems, a technician encountered an error of “MOM Alerts on Server: SVREBPPDBS01” and this is the first time he has encountered this problem. He will attempt several troubleshooting techniques in finding the Possible Cause (PC). It is often rigorous and time consuming requiring the mobilization of resources. He may guess that it is a Computer Virus Problem and reinstall new Anti Viral programs or a Hardware problem and replace the Database server causing huge amounts of money. But the real Possible Cause of that symptom is "Microsoft Office Manager (MOM) Alerts on Server" which means that the server is already full. The solution to this PC is to shrink the Database, which only takes less than 5 minutes. Knowing this problem before hand will save time and resources. This is the primary use of Expert Systems - it reduces trial and error in problems on a specific domain.

Data on Information Systems is important in any type of enterprise. The data is often used to interpret information and make decisions [3]. An example is in an Expert System enough information must be inputted in order to give the correct conclusion. In reality, you will not be able to obtain all the data that you need. Data will be vague and incomplete, thus, it will be difficult to produce any conclusion [4]. Knowing the right and necessary attributes to obtain is important especially if you have limited time and resources [5]. Coming up with the correct conclusion even with minimal information is a great advantage [6].

2. OVERVIEW

2.1. Example Symptoms and Possible Causes

Consider this Example Information System:

Case	Possible Cause	Symptoms
1	**PC1:** FTP Software Trouble	**S1:** Error Connection Appears, **S2:** Cannot Access Network Drives, **S3:** Destination unreachable error appears, **S4:** Page Cannot be accessed Error Appears
2	**PC2:** Server connection failure	**S2:** Cannot Access Network Drives, **S3:** Destination unreachable error appears, **S4:** Page Cannot be accessed Error Appears
3	**PC2:** Server connection failure	**S2:** Cannot Access Network Drives, **S4:** Page Cannot be accessed Error Appears
4	**PC2:** Server connection failure	**S2:** Cannot Access Network Drives, **S4:** Page Cannot be accessed Error Appears
5	**PC3:** Email Queues Increasing	**S2:** Cannot Access Network Drives, **S3:** Destination unreachable error appears, **S4:** Page Cannot be accessed Error Appears

TABLE 1: Symptoms and Possible Cause (PC)

Table 1 list some network and internetwork problems or trouble which may be encountered by Computer Systems. It presents us some possible causes, symptoms and solutions which we could undertake so to resolve particular errors.

ID	Possible Cause
PC1	FTP Software Trouble
PC2	Server connection failure
PC3	Email Queues Increasing

TABLE 2: List of Possible causes

The Table 2 presents list of possible causes of network failure. It states that FTP Software Trouble may arise if there's a conflict on the software that we are using. FTP Software Trouble might hinder the user from transferring information or data from one computer to the other. Another possible causes is the Server Connection Failure, this may arise if there's a problem on the physical connection of the server. Accessing the server from the client workstation may be unreachable. Lastly, the Email Queues Increasing may arise if there's a problem on the Internet or intranet connection which leads to the increase on the amount of email messages on the queue.

ID	Symptom
S1	Error Connection Appears
S2	Cannot Access Network Drives
S3	Destination unreachable error appears
S4	Page Cannot be accessed Error Appears

TABLE 3: List Symptoms

Table 3 presents the List of Symptoms of network connection failure presented on the other table of Possible Causes. This table summarizes the symptoms that we should know so that we could be able to anticipate network errors. Symptom S1 tells about the Error Connection Appears, this might prompt us on some error messages on our screen. Symptom S2 states that the network drives cannot be access. Symptom S3 tells about Destination unreachable error appears on the screen. This symptom simply states that the particular workstation cannot be reached by a particular connecting workstation. The last one which is symptom S4 presents about page cannot be accessed error appears. This error pertains to the Internet or intranet Connection Error wherein it has no capability to access the particular page due to no connection.

E	D \ Q	S1	S2	S3	S4
1	**PC1**	1	1	1	1
2	**PC2**	0	1	1	1
3	**PC2**	0	1	0	1
4	**PC2**	0	1	0	1
5	**PC3**	0	1	1	1

TABLE 4: Information System of Table 1

Table 4 shows the Data in Table 1 converted to an Information System.

2.2. List of Mathematical Symbols

The following are the list of Mathematical Symbols used in this research and their explanations:

Symbol	Name	Explanation
S	Information System	A 4–tuple $S = \langle D, Q, V, \rho \rangle$
D	Set of Possible Causes	It is a set of Possible Causes. For example PC1 – FTP Software Trouble, PC2 – Server connection failure and PC3 – Email Queues Increasing as shown in Table 2. D = {PC1, PC2, PC3}.
Q	Set of Symptoms	It is a set of Symptoms. For example S1 – Error Connection Appears, S2 – Cannot Access Network Drives, S3 – Destination unreachable error appears and S4 – Page Cannot be accessed Error Appears as shown in Table 3. Q = {S1, S2, S3, S4}.
E	Set of Cases	$E = \{1,2,3,\ldots,a\}$ for some natural number a. For example in Table 4 $E = \{1,2,3,4,5\}$.
ρ	Relation from $D \times Q$ to V	Let ρ be the relation from $D \times Q$ to V which assigns at least one value for $(i, j) \in (E \times Q)$. For example in Table

		4: $\rho(PC2, S3)$ = 0 or 1 $\rho(PC1, S1)$ = 1
V	Codomain of ρ	For example in Table 4: *V* = {1,0}.
(p)(q)= f	Notation	Value or values associated with Selected Possible cause *p* and Selected Symptom *q*. Let *f* be called the value of a Symptom $f \subseteq V$. For example in Table 4: *(PC1)(S1)*={1} *(PC2)(S3)*={1,0} *(PC3)(S1)*={0}
ab	Index	Indicates the location of a variable in a Mathematical object. For example M_{ab}, ab is its index. [7]
p	Selected Possible cause	$p \in D$ and the Possible cause arbitrarily Selected. For example *D* = {PC1, PC2, PC3}. If PC1 is selected *p = PC1.*
p'	Other Possible causes	Possible causes other than the selected Possible cause *p,* that is *p'* is an element of *D* such that $p' \neq p$.
Q	Selected Symptom	$q \in Q$ and the symptom arbitrarily selected. For example *Q* = {S1, S2, S3, S4}. If S1 is selected it will be the *q*.
q^f	Equality in associated format.	This is another way to write equality. q^f means *q* has a value of *f*. For example *q = 1*. It can be written as q^1 [8].
=>	Dependence Notation	$(q = f) => p$ means that *(q=f)* is a sufficient condition for *p*. For example (Q_1 = 1) => *x*. If the value of the Selected Symptom Q_1 is 1 then it can be concluded that *x* is satisfied. .

TABLE 5: List of Mathematical Symbols

2.3. Incomplete Information System and Information Dependency of Data.

In Computer Systems, Data is important. Data is often used to interpret and make decisions [9]. In Expert Systems for example, Data gathered is used as a Knowledge Base. The rules of Expert Systems are from the Knowledge Base Data. The more Data in the system, the better it can interpret information [10]. However, in reality you will be able to gather the Data that you need. There will be situations that due to limited time and resources, you will have to prioritize your Information Gathering [11].

An Incomplete Information System (IIS) is a 4–tuple $S = \langle D, Q, V, \rho \rangle$ (1), In this tuple *D* is a set of Possible causes, *Q* is a set of Symptoms and ρ is the relation from $D \times Q$ to V (2) which assigns at least one value for $(i, j) \in (E \times Q)$. *F* is the value of a symptom which may contain an unknown value represented by the symbol "*" [12].

To further explain the concepts of Incomplete Information System consider the following example in System Network Performance:

E	D \ Q	S1	S2	S3	S4
1	**PC1**	1	*	1	1
2	**PC1**	1	0	*	*
3	**PC2**	0	1	*	1
4	**PC2**	0	1	0	1
5	**PC3**	0	*	1	*

TABLE 6: An Incomplete Information System

In Table 6:

S1: Error Connection Appears
S2: Cannot Access Network Drives
S3: Destination unreachable error appears
S4: Page cannot be accessed Error Appears

PC1: FTP Software Trouble
PC2: Server connection failure
PC3: Email Queues Increasing
1: Symptom exist
0: Symptom does not exist
* : Cannot obtain the data

S1, S2, S3 and *S4* are the Symptoms and *D* is the Possible cause. This is for a total of 6 cases.

$Q = \{S1, S2, S3, S4\}$ (3)
$D = \{PC1, PC2, PC3\}$(4)
$E = \{1,2,3,4,5,6\}$ (5)
$V = \{1,0,*\}$ (6)

Table 6 gives an example of an Incomplete Information System. Equation 3 shows the Symptoms used which are S1, S2, S3 and S4. Equation 4 shows the Possible causes which can either be PC1, PC2 or PC3.
Equation 5 shows the cases which are from 1 to 6. Equation 2 showed that the relation ρ is the product set of *D* and *Q* mapped into *V* which assigns at least one value for $(i, j) \in (C \times Q)$ and can have a value of either 1,0 or * as shown in equation 6.

In Case 1 and 2 of Table 6 for example S1 = PC1 is needed for D to be PC1. Let S1 = PC1 be defined as essential information needed to satisfy the D to be PC1. It can be said that value of D being PC1 is dependent on S1 = PC1. The Possible cause “PC1” has many data conditions and some of them are unknown. For example in Case 2 where S3 and S4 are unknown and S1 = 1, the other data is unimportant as long as the value of S1 = 1 it can be said that D = PC1. The concept of dependent is important in Incomplete Information Systems. For Example in Table 6 where D = PC1 is dependent on S1 = 1, the only information needed to be obtain is if S1 = 1 and not the other information in S3 and S4 which are incomplete.

2.4. Nominality of a Rule

Initially to make the rules each case will be checked. One rule is for one case. For example in Table 4 Case 1 will produce the following Rule:

Rule 1: (S1 = 1) & (S2 = 1) & (S3 = 1) & (S4 = 1) => (D = PC1)

The Symptoms will have a value of 1 if it exists in the case and a value of 0 if it does not. For Rule 1 S1, S2, S3 and S4 must exist for D to be PC1. All 5 cases will have the following Rules:

Rule 1: (S1 = 1) & (S2 = 1) & (S3 = 1) & (S4 = 1) => (D = PC1)
Rule 2: (S1 = 0) & (S2 = 1) & (S3 = 1) & (S4 = 1) => (D = PC2)
Rule 3: (S1 = 0) & (S2 = 1) & (S3 = 0) & (S4 = 1) => (D = PC2)
Rule 4: (S1 = 0) & (S2 = 1) & (S3 = 0) & (S4 = 1) => (D = PC2)
Rule 5: (S1 = 0) & (S2 = 1) & (S3 = 1) & (S4 = 1) => (D = PC3)

In a typical process of troubleshooting, the technician will check all the symptoms needed to satisfy the possible cause in order to conclude that it is the actual Cause. Verifying the existence of the symptom takes time and resources. For example in Rule 1 the technician must verify if Error Connection Appears, Network Drives cannot be accessed, Destination unreachable error appears and Page Cannot be accessed Error Appears. Verifying just one of the symptoms takes time like Destination Unreachable Error Appears. To verify this symptom the technician will have to ping the computers in the network. If there are many computers in the network doing this verification takes time.

The rules of the Information System can still be reduced. For example in Table 4 D = PC1 is dependent on the value of S1 being 1. Therefore to satisfy D = PC1 verification needs to be done only in S1, not needing S2, S3 and S4. So even if S2, S3 or S4 are incomplete it can still be concluded as D = PC1. The rules that are reduced are called in nominal form.

2.5. Theorem

Theorem 1: Consider an Information System $S = \langle D, Q, V, \rho \rangle$. Let *p* be a selected Possible Cause and let *q* be a selected Symptom. Assume $(y)(q) \neq *$ for all $y \in D$. If $(p)(q)$ is a singleton and is not a subset or equal to the value of $(p')(q)$ then the selected Possible Cause is dependent on the value of the selected Symptom *f.*

Observe that in the above theorem an Information System maybe incomplete. However the condition $(y)(q) \neq *$ for all $y \in D$ requires that column *q* of the Information System be complete.

Proof:

Consider the sample Information System:

C	**D \ Q**	Q_1	Q_2	Q_3	Q_4	$\ldots Q_b$
1	D_1	C_1	C_2	C_3	C_4	$\ldots C_{ab}$
2	D_1	C_2	C_3	C_4	C_4	$\ldots C_{ab}$
3	D_2	C_2	C_2	C_2	C_1	$\ldots C_{ab}$
4	D_3	C_4	C_3	C_2	C_1	$\ldots C_{ab}$
⋮ *a*	⋮ D_{ab}	⋮ C_{ab}	⋮ C_{ab}	⋮ C_{ab}	⋮ C_{ab}	⋮ C_{ab}

TABLE 7: Information System of Data

In this example Information System

$$Q = \{Q_1, Q_2, Q_3, Q_4, \ldots Q_b\}$$
$$C = \{1,2,3,4,\ldots a\}$$
$$V = \{C_1, C_2, C_3, C_4, \ldots C_{ab}\}$$

Attributes Q_1 to Q_b are Symptoms *D* is the Possible cause.

Q = Q₄
p =D₁
p'=: D₂, D₃, .. D_{ab}
f = {C₄}
$q^f = Q_4^{C_4}$

In the Information System $(p)(q)$ is a singleton and is not a subset or equal to the value of $(p')(q)$.

The Information System will then be translated from tabular form to logical form.

$$[(Q_1 = C_1) \wedge (Q_2 = C_2) \wedge (Q_3 = C_3) \wedge (Q_4 = C_4) \ldots \wedge (Q_b = C_{ab}) \wedge (D = D_1)] \vee$$
$$[(Q_1 = C_2) \wedge (Q_2 = C_3) \wedge (Q_3 = C_4) \wedge (Q_4 = C_4) \ldots \wedge (Q_b = C_{ab}) \wedge (D = D_1)] \vee$$
$$[(Q_1 = C_2) \wedge (Q_2 = C_2) \wedge (Q_3 = C_2) \wedge (Q_4 = C_1) \ldots \wedge (Q_b = C_{ab}) \wedge (D = D_2)] \vee$$
$$[(Q_1 = C_4) \wedge (Q_2 = C_3) \wedge (Q_3 = C_2) \wedge (Q_4 = C_1) \ldots \wedge (Q_b = C_{ab}) \wedge (D = D_3)] \vee \ldots$$
$$[(Q_1 = C_{ab}) \wedge (Q_2 = C_{ab}) \wedge (Q_3 = C_{ab}) \wedge (Q_4 = C_{ab}) \ldots \wedge (Q_b = C_{ab}) \wedge (D = D_{ab})]$$

Rewriting the equation in a simplified format:

$$\left(Q_1^{C_1} Q_2^{C_2} Q_3^{C_3} Q_4^{C_4} \ldots Q_b^{C_{ab}} D^{D_1}\right) \vee \left(Q_1^{C_2} Q_2^{C_3} Q_3^{C_4} Q_4^{C_4} \ldots Q_b^{C_{ab}} D^{D_1}\right) \vee \left(Q_1^{C_2} Q_2^{C_2} Q_3^{C_2} Q_4^{C_1} \ldots Q_b^{C_{ab}} D^{D_2}\right) \vee$$
$$\left(Q_1^{C_4} Q_2^{C_3} Q_3^{C_2} Q_4^{C_1} \ldots Q_b^{C_{ab}} D^{D_3}\right) \vee \left(Q_1^{C_{ab}} Q_2^{C_{ab}} Q_3^{C_{ab}} Q_4^{C_{ab}} \ldots Q_b^{C_{ab}} D^{D_{ab}}\right)$$

Writing the Decision Matrix for the Selected Possible Cause *p* which is D_1

E	3	4	…a
1	$Q_1^{C_1} Q_3^{C_3} Q_4^{C_4} \ldots Q_b^{C_{ab}}$	$Q_1^{C_1} Q_2^{C_2} Q_3^{C_3} Q_4^{C_4} \ldots Q_b^{C_{ab}}$	$Q_4^{C_4} \ldots Q_b^{C_{ab}}$
2	$Q_2^{C_3} Q_3^{C_4} Q_4^{C_4} \ldots Q_b^{C_{ab}}$	$Q_1^{C_2} Q_3^{C_4} Q_4^{C_4} \ldots Q_b^{C_{ab}}$	$Q_4^{C_4} \ldots Q_b^{C_{ab}}$

TABLE 8: Decision Matrix

Since the q^f will always be present in all the intersections of the decision matrix in *p* then we can conclude that $(q = f) \Rightarrow p$.

3. DATA TAGGING ALGORITHM

3.1. Flow Chart of the Algorithm

The information can be organized in a Problem Symptom relationship pattern where different Problems can be associated with different Symptoms. Also the same type of symptoms can be present in different problems. The same Possible Cause (PC) can also have a different set of symptoms. These data relationships can be organized in an Information System. Given a dataset the attributes can be dicretize and find a subset from the original value therefore simplifying it. The resulting information will be used as the rules of the Expert System. The rules created in the algorithm are nominal in where only the minimal information is needed. It is very useful in actual applications where it will not be possible to obtain all the information that you need. Knowing the right information to obtain and confirm is helpful especially with limited time and resources. The Data Tagging algorithm for Expert System rule creation is presented in Figure 1.

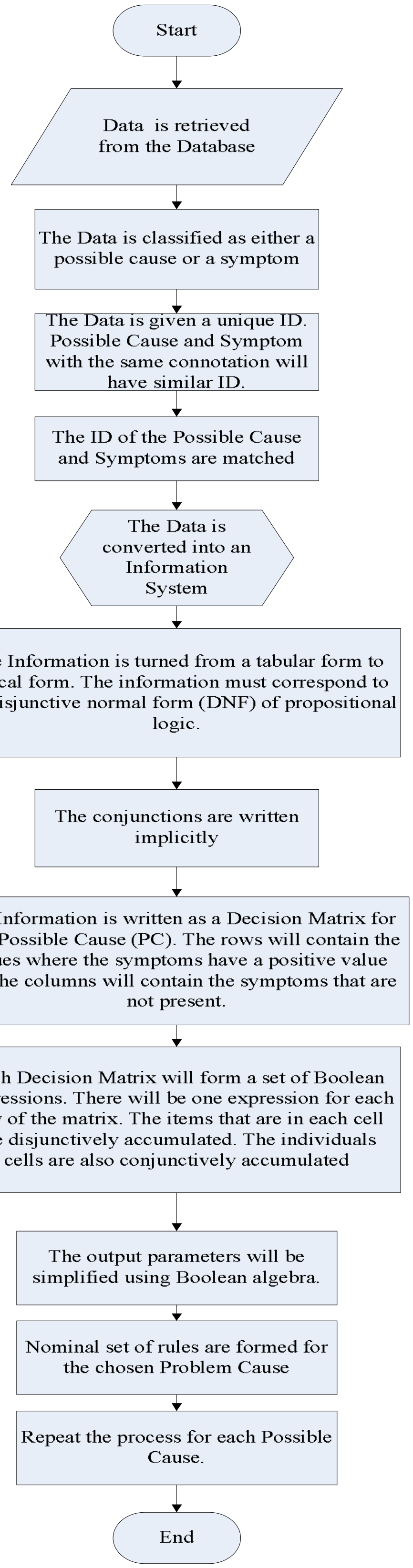

FIGURE 1: Data Tagging algorithm

3.2. Illustrative Example of the Algorithm

The following shows an illustrative example showing all the steps necessary to implement the algorithm:

1. Data is retrieved from the Database

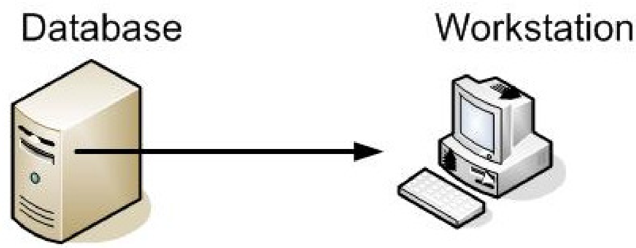

FIGURE 2: Retrieval of Data

2. Data is classified as either a Possible Cause or Symptom

   Possible Causes: FTP Software Trouble, Server connection failure, Email Queues Increasing, FTP Program Problem and Server cannot connect.
   Symptoms: Error Connection Appears, Cannot Access Network Drives, Destination unreachable error appears Page cannot be accessed Error Appears, Network Drive Error and Destination Cannot be reached.

3. Data is given a unique ID. Possible Cause and Symptoms with the same connotation will have the same ID.

   There are Possible Cause and Symptoms with the same connotation meaning they have the same meaning. For example in the Symptom: Error Connection Appears is the same as Network Drive Error. They will have the same ID.

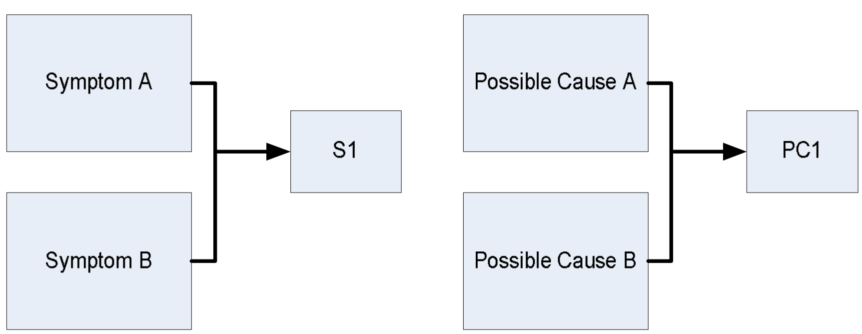

FIGURE 3: Assigning of unique ID

4. The ID of the Possible Cause and Symptoms are matched

   The Problems and Symptoms are matched with their corresponding ID. For example S1 will be the ID for the Symptom “Error Connection Appears”. The structure of the technical data will be in a Possible Cause, Symptom and solution relationship.

   In Table 1 a new technique to input the technical data if an ICT organization is presented. The information that will be inputted are for the cases that have already been resolved.

5. The Data is converted into an Information System. The technical data can then be converted into an Information System as shown in Table 4.

6. The Information System is turned from a tabular form to logical form. The Information must correspond to the Disjunctive Normal Form (DNF) of propositional logic.

   The next step is to turn the Information System from tabular form to logical form by expressing the set of objects as the following disjunction, which corresponds to the disjunctive normal form (DNF) of propositional logic.

$$\begin{aligned}
&[(S1=1)\wedge(S2=1)\wedge(S3=1)\wedge(S4=1)\wedge(D=PC1)]\vee\\
&[(S1=0)\wedge(S2=1)\wedge(S3=1)\wedge(S4=1)\wedge(D=PC2)]\vee\\
&[(S1=0)\wedge(S2=1)\wedge(S3=0)\wedge(S4=1)\wedge(D=PC2)]\vee\\
&[(S1=0)\wedge(S2=1)\wedge(S3=0)\wedge(S4=1)\wedge(D=PC2)]\vee\\
&[(S1=0)\wedge(S2=1)\wedge(S3=1)\wedge(S4=1)\wedge(D=PC3)]
\end{aligned}$$

7. The Conjuctions are simplified.

$$\begin{aligned}
&\left(S_1{}^1S_2{}^1S_3{}^1S_4{}^1D^{PC1}\right)\vee\left(S_1{}^0S_2{}^1S_3{}^1S_4{}^1D^{PC2}\right)\vee\left(S_1{}^0S_2{}^1S_3{}^0S_4{}^1D^{PC2}\right)\vee\\
&\left(S_1{}^0S_2{}^1S_3{}^0S_4{}^1D^{PC2}\right)\vee\left(S_1{}^0S_2{}^1S_3{}^1S_4{}^1D^{PC3}\right)
\end{aligned}$$

8. The Information is written as a Decision Matrix for each Possible Cause (PC). The rows will contain the values where the symptoms have a positive value and the columns will contain the symptoms that are not present.

   The Target Possible Cause is chosen. For this example the Possible Cause PC1 is chosen. The upper and lower approximation of the System Attribute is now chosen.

E	**2**	**3**	**4**	**5**
1	$S_1{}^1$	$S_1{}^1, S_3{}^1$	$S_1{}^1, S_3{}^1$	$S_1{}^1$

TABLE 9: Decision Matrix for D = PC1

9. Each Decision Matrix will form a set of Boolean Expressions. There will be one expression for each row of the matrix. The items that are in each cell are disjunctively accumulated. The individual cells are also conjunctively accumulated.

   Boolean Expressions from the boundaries: $\left(S_1{}^1\right)\wedge\left(S_1{}^1\vee S_3{}^1\right)\wedge\left(S_1{}^1\vee S_3{}^1\right)\wedge\left(S_1{}^1\right)$

10. The output parameters will be simplified using Boolean algebra.
    Using Boolean algebra the expression is simplified to: $S_1{}^1$

11. Nominal Set of Rules is formed for the chosen Possible Cause.
    Rule 1. (S1 = 1) => (PC = 1)

12. Repeat the process for each Possible Cause.

The Algorithm produced a nominal set of rules. It is capable of handling Different Possible causes with unique set of symptoms.

Rule 1. (S1 = 1) => (PC = 1)
Rule 2. (S3 = 0) => (PC = 2)
Rule 3. (S1 = 0) & (S3 = 1) => (PC = 2) OR (PC = 3)

4. DATA AND RESULTS

4.1. Presentation of Actual Data

The Theorem and the algorithm will be tested and validated using actual Data. They are the problems encountered by a Computer System division of a telecommunication company. The following are the Data with the Possible Cause and its Symptoms:

Case	Possible Cause	Symptoms
1	**PC1:** Runtime Errors	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message
2	**PC2:** Divide Errors	**S3:** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S5:** Error message regarding autoexec.bat or config.sys
3	**PC3:** msgsrv32 Error	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S4:** Memory Overflow message appears
4	**PC4:** Not valid Win32 Application	**S4:** Memory Overflow message appears, **S6:** USB Virus message, **S7:** To many programs running on startup
5	**PC5:** Network Connection Failure	**S8:** The URL Cannot be accessed through the MDB Portal, **S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed
6	**PC6:** Network Dataport Problem	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S15:** CPU hangs
7	**PC7:** LAN Card malfunction	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S15:** CPU hangs
8	**PC7:** LAN Card malfunction	**S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
9	**PC8**: Server Alerts are Encountered in Office Manager	**S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S16:** Clicking anything can take minutes before computer response, **S29:** Registry error message keeps on appearing
10	**PC8**: Server Alerts are Encountered in Office Manager	**S10:** Mapped Drive Cannot be accessed, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S14:** SVRMDBADDC12 Cannot be accessed, **S29:** Registry error message keeps on appearing
11	**PC9:** Blue Alerts (Software) in Office Manager	**S11:** MOM Alerts on Server: SVREBPPDBS01, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S17:** Computer cannot recognize Mc Afee Installed
12	**PC10:** Yellow Alerts (Hardware) in Office Manager	**S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs, **S29:** Registry error message keeps on appearing
13	**PC11:** Network not properly Mapped	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S17:** Computer cannot recognize Mc Afee Installed
14	**PC12:** Multiple Antivirus Programs are active	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S17:** Computer cannot recognize Mc Afee Installed
15	**PC13:** Memory Overflow Problem	**S3.** Computer Motherboard beeps, **S18:** Video Card Slot is loose, **S19:** DVI Slot is shorted
16	**PC14:** Video card Problem	**S18:** Video Card Slot is loose, **S20:** Distorted Screen, **S21:** Windows monitor driver error appears
17	**PC14:** Videocard Problem	**S18:** Video Card Slot is loose, **S21:** Windows monitor driver error appears
18	**PC14:** Videocard Problem	**S19:** DVI Slot is shorted, **S21:** Windows monitor driver error appears
19	**PC15:** DVI cable Defect	**S22:** Scraped marks on the DVI Cable, **S29:** Registry error message keeps on appearing
20	**PC16:** Monitor Component Defect	**S18:** Video Card Slot is loose, **S23:** Monitor will not power on

21	**PC16:** Monitor Component Defect	**S19:** DVI Slot is shorted, **S20:** Distorted Screen, **S23:** Monitor will not power on
22	**PC17:** MOM Alerts Critical Error	**S1:** Motherboard BIOS beeps, **S4:** Memory Overflow message appears, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
23	**PC17:** MOM Alerts Critical Error	**S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs
24	**PC17:** MOM Alerts Critical Error	**S11:** MOM Alerts on Server: SVREBPPDBS01, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
25	**PC18:** MOM Alerts on Application	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S29:** Registry error message keeps on appearing
26	**PC18:** MOM Alerts on Application	**S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S29:** Registry error message keeps on appearing
27	**PC19:** MOM Alerts on Database	**S4:** Memory Overflow message appears, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs
28	**PC19:** MOM Alerts on Database	**S4:** Memory Overflow message appears, **S8:** The URL Cannot be accessed through the MDB Portal
29	**PC19:** MOM Alerts on Database	**S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S11:** MOM Alerts on Server: SVREBPPDBS01
30	**PC20:** MOM Alerts on Services and Performance	**S3.** Computer Motherboard beeps, **S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears
31	**PC20:** MOM Alerts on Services and Performance	**S4:** Memory Overflow message appears, **S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears
32	**PC21:** MOM Critical Alerts - Services Unavailable	**S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
33	**PC21:** MOM Critical Alerts - Services Unavailable	**S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs
34	**PC22:** Server Harddisk Full	**S4:** Memory Overflow message appears, **S15:** CPU hangs, **S21:** Windows monitor driver error appears
35	**PC23:** Cannot Log-On to Network	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S22:** Scraped marks on the DVI Cable
36	**PC23:** Cannot Log-On to Network	**S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S22:** Scraped marks on the DVI Cable
37	**PC24:** Domain Server Unavailable	**S1:** Motherboard BIOS beeps, **S4:** Memory Overflow message appears, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
38	**PC24:** Domain Server Unavailable	**S8:** The URL Cannot be accessed through the MDB Portal, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32
39	**PC24:** Domain Server Unavailable	**S1:** Motherboard BIOS beeps, **S5:** Error message regarding autoexec.bat or config.sys, **S8:** The URL Cannot be accessed through the MDB Portal, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S22:** Scraped marks on the DVI Cable
40	**PC25:** Program Application :"Low Virtual Memory" Alert Encountered	**S4:** Memory Overflow message appears, **S15:** CPU hangs, **S21:** Windows monitor driver error appears
41	**PC26:** Network connection Failure	**S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S22:** Scraped marks on the DVI Cable
42	**PC26:** Network connection Failure	**S1:** Motherboard BIOS beeps, **S10:** Mapped Drive Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
43	**PC27:** Network connection Intermittent	**S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs, **S22:** Scraped marks on the DVI Cable
44	**PC28:** MS Office Cannot Be Accessed	**S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S24:** MS Office Program error in running
45	**PC29:** MS Office Communicator Cannot Be Accessed	**S9:** Network Connection Error Appears, **S21:** Windows monitor driver error appears, **S24:** MS Office Program error in running

46	**PC29:** MS Office Communicator Cannot Be Accessed	**S1:** Motherboard BIOS beeps, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S24:** MS Office Program error in running
47	**PC30:** MS Excel Error Encountered	**S4:** Memory Overflow message appears, **S5:** Error message regarding autoexec.bat or config.sys, **S24:** MS Office Program error in running
48	**PC31:** MS Office Clipart Gallery Does not Work	**S1.** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S7:** To many programs running on startup, **S24:** MS Office Program error in running
49	**PC31:** MS Office Clipart Gallery Does not Work	**S1.** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S5:** Error message regarding autoexec.bat or config.sys, **S16:** Clicking anything can take minutes before computer response, **S24:** MS Office Program error in running
50	**PC32:** MS Office Shortcuts not working properly	**S1.** Motherboard BIOS beeps, **S4:** Memory Overflow message appears, **S10:** Mapped Drive Cannot be accessed, **S20:** Distorted Screen, **S24:** MS Office Program error in running
51	**PC33:** Print Half Page Only	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S17:** Computer cannot recognize Mc Afee Installed, **S25:** Printer Error Light Blinks
52	**PC33:** Print Half Page Only	**S3.** Computer Motherboard beeps, **S5:** Error message regarding autoexec.bat or config.sys, **S16:** Clicking anything can take minutes before computer response, **S25:** Printer Error Light Blinks
53	**PC34:** Error Code 28	**S21:** Windows monitor driver error appears, **S22:** Scraped marks on the DVI Cable, **S23:** Monitor will not power on
54	**PC34:** Error Code 28	**S3.** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S21:** Windows monitor driver error appears, **S22:** Scraped marks on the DVI Cable, **S23:** Monitor will not power on
55	**PC35:** Monitor Blackout	**S19:** DVI Slot is shorted, **S22:** Scraped marks on the DVI Cable, **S23:** Monitor will not power on
56	**PC35:** Monitor Blackout	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S18:** Video Card Slot is loose, **S23:** Monitor will not power on
57	**PC35:** Monitor Blackout	**S3.** Computer Motherboard beeps, **S19:** DVI Slot is shorted, **S20:** Distorted Screen
58	**PC36:** Monitor Blurred / Flickers	**S20:** Distorted Screen, **S21:** Windows monitor driver error appears, **S22:** Scraped marks on the DVI Cable
59	**PC36:** Monitor Blurred / Flickers	**S18:** Video Card Slot is loose, **S20:** Distorted Screen, **S21:** Windows monitor driver error appears
60	**PC37:** Printer Head Problem	**S4:** Memory Overflow message appears, **S25:** Printer Error Light Blinks
61	**PC38:** CPU Power Supply Problem	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S23:** Monitor will not power on, **S26:** CPU Turns off few minutes after opening
62	**PC38:** CPU Power Supply Problem	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S26:** CPU Turns off few minutes after opening
63	**PC39:** CPU Slowdown Encountered	**S1:** Motherboard BIOS beeps, **S3:** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S7:** To many programs running on startup, **S16:** Clicking anything can take minutes before computer response
64	**PC39:** CPU Slowdown Encountered	**S1:** Motherboard BIOS beeps, **S4:** Memory Overflow message appears, **S15:** CPU hangs
65	**PC39:** CPU Slowdown Encountered	**S3:** Computer Motherboard beeps, **S7:** To many programs running on startup, **S24:** MS Office Program error in running
66	**PC40:** Email Service Slowdown	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S15:** CPU hangs
67	**PC40:** Email Service Slowdown	**S2:** Computer Virus Message, **S3:** Computer Motherboard beeps, **S17:** Computer cannot recognize Mc Afee Installed
68	**PC40:** Email Service Slowdown	**S1:** Motherboard BIOS beeps, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S14:** MS SVRMDBADDC12 Cannot be accessed
69	**PC41:** Program Application Infected with Virus	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S17:** Computer cannot recognize Mc Afee Installed
70	**PC41:** Program Application Infected with Virus	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears **S15:** CPU hangs, **S17:** Computer cannot recognize Mc Afee Installed

71	**PC41:** Program Application Infected with Virus	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S13:** SVR-MDBSPPS-01 Cannot be accessed
72	**PC42:** OS Performs Illegal Operations	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S6:** USB Virus message
73	**PC42:** OS Performs Illegal Operations	**S5:** Error message regarding autoexec.bat or config.sys, **S7:** To many programs running on startup, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32
74	**PC42:** OS Performs Illegal Operations	**S1:** Motherboard BIOS beeps, **S4:** Memory Overflow message appears, **S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears
75	**PC42:** OS Performs Illegal Operations	**S1:** Motherboard BIOS beeps, **S8:** The URL Cannot be accessed through the MDB Portal, **S10:** Mapped Drive Cannot be accessed, **S15:** CPU hangs
76	**PC43:** OS Performs Illegal Operations	**S2:** Computer Virus Message, **S5:** Error message regarding autoexec.bat or config.sys, **S6:** USB Virus message
77	**PC43:** OS Performs Illegal Operations	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed
78	**PC43:** OS Performs Illegal Operations	**S12:** MOM Alerts on Server: SVREBPPEBS32, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs
79	**PC44:** LCA Cannot Be Accessed	**S1:** Motherboard BIOS beeps, **S14:** SVRMDBADDC12 Cannot be accessed
80	**PC44:** LCA Cannot Be Accessed	**S2:** Computer Virus Message, **S6:** USB Virus message, **S10:** Mapped Drive Cannot be accessed, **S15:** CPU hangs
81	**PC44:** LCA Cannot Be Accessed	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S6:** USB Virus message, **S8:** The URL Cannot be accessed through the MDB Portal, **S13:** SVR-MDBSPPS-01 Cannot be accessed
82	**PC44:** LCA Cannot Be Accessed	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
83	**PC45:** Kronos problem	**S2:** Computer Virus Message, **S6:** USB Virus message, **S7:** To many programs running on startup, **S27:** CPU Clock keeps on Changing
84	**PC45:** Kronos problem	**S1:** Motherboard BIOS beeps, **S3.** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S27:** CPU Clock keeps on Changing
85	**PC45:** Kronos problem	**S1:** Motherboard BIOS beeps, **S15:** CPU hangs, **S27:** CPU Clock keeps on Changing
86	**PC45:** Kronos problem	**S5:** Error message regarding autoexec.bat or config.sys, **S7:** To many programs running on startup, **S16:** Clicking anything can take minutes before computer response, **S27:** CPU Clock keeps on Changing
87	**PC46:** Network IP Address Conflict	**S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S13:** SVR-MDBSPPS-01 Cannot be accessed
88	**PC46:** Network IP Address Conflict	**S8:** The URL Cannot be accessed through the MDB Portal, **S10:** Mapped Drive Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
89	**PC46:** Network IP Address Conflict	**S7:** To many programs running on startup, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32
90	**PC46:** Network IP Address Conflict	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S14:** SVRMDBADDC12 Cannot be accessed
91	**PC47:** CPU COM/Serial Port Problem	**S3.** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S15:** CPU hangs
92	**PC47:** CPU COM/Serial Port Problem	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S15:** CPU hangs, **S18:** Video Card Slot is loose
93	**PC47:** CPU COM/Serial Port Problem	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S15:** CPU hangs, **S26:** CPU Turns off few minutes after opening
94	**PC48:** OS Disk Error	**S3.** Computer Motherboard beeps, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32
95	**PC48:** OS Disk Error	**S4:** Memory Overflow message appears, **S5:** Error message regarding

		autoexec.bat or config.sys, **S26:** CPU Turns off few minutes after opening
96	**PC48:** OS Disk Error	**S2:** Computer Virus Message, **S3.** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S9:** Network Connection Error Appears
97	**PC49:** Printer Fuser Assembly error	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S25:** Printer Error Light Blinks
98	**PC49:** Printer Fuser Assembly error	**S1:** Motherboard BIOS beeps, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S17:** Computer cannot recognize Mc Afee Installed, **S25:** Printer Error Light Blinks
99	**PC50:** Internet Email cannot received/sent	**S1:** Motherboard BIOS beeps, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S12:** MOM Alerts on Server: SVREBPPEBS32
100	**PC50:** Internet Email cannot received/sent	**S1:** Motherboard BIOS beeps, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed
101	**PC50:** Internet Email cannot received/sent	**S1:** Motherboard BIOS beeps, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
102	**PC50:** Internet Email cannot received/sent	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S7:** To many programs running on startup, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed
103	**PC51:** Defective USB Port	**S2:** Computer Virus Message, **S6:** USB Virus message, **S16:** Clicking anything can take minutes before computer response
104	**PC51:** Defective USB Port	**S10:** Mapped Drive Cannot be accessed, **S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response
105	**PC52:** File Cannot Be Copied	**S2:** Computer Virus Message, **S6:** USB Virus message, **S7:** To many programs running on startup
106	**PC52:** File Cannot Be Copied	**S1:** Motherboard BIOS beeps, **S3.** Computer Motherboard beeps, **S15:** CPU hangs
107	**PC52:** File Cannot Be Copied	**S1:** Motherboard BIOS beeps, **S4:** Memory Overflow message appears **S5:** Error message regarding autoexec.bat or config.sys, **S15:** CPU hangs
108	**PC53:** Files Cannot be Download	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S6:** USB Virus message, **S29:** Registry error message keeps on appearing
109	**PC53:** Files Cannot be Download	**S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S26:** CPU Turns off few minutes after opening, **S29:** Registry error message keeps on appearing
110	**PC53:** Files Cannot be Download	**S9:** Network Connection Error Appears, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S29:** Registry error message keeps on appearing
111	**PC54:** Public Folder Cannot Be Accessed	**S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S28:** Network Sharing Error
112	**PC54:** Public Folder Cannot Be Accessed	**S3.** Computer Motherboard beeps, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S28:** Network Sharing Error
113	**PC54:** Public Folder Cannot Be Accessed	**S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S28:** Network Sharing Error
114	**PC55:** Cannot Log-in to Domain	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears
115	**PC55:** Cannot Log-in to Domain	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed
116	**PC55:** Cannot Log-in to Domain	**S7:** To many programs running on startup, **S9:** Network Connection Error Appears, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
117	**PC56:** Garbled Images in the monitor	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S6:** USB Virus message
118	**PC56:** Garbled Images in the monitor	**S18:** Video Card Slot is loose, **S19:** DVI Slot is shorted, **S21:** Windows monitor driver error appears, **S22:** Scraped marks on the DVI Cable
119	**PC56:** Garbled Images in the monitor	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears,

		S18: Video Card Slot is loose, **S19:** DVI Slot is shorted
120	**PC56:** Garbled Images in the monitor	**S18:** Video Card Slot is loose, **S19:** DVI Slot is shorted, **S20:** Distorted Screen
121	**PC57:** Cannot Access Application Error	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S6:** USB Virus message, **S7:** To many programs running on startup
122	**PC57:** Cannot Access Application Error	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S15:** CPU hangs, **S16:** Clicking anything can take minutes before computer response, **S18:** Video Card Slot is loose
123	**PC57:** Cannot Access Application Error	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S5:** Error message regarding autoexec.bat or config.sys, **S16:** Clicking anything can take minutes before computer response, **S17:** Computer cannot recognize Mc Afee Installed, **S26:** CPU Turns off few minutes after opening
124	**PC58:** File Folder Cannot be Established	**S2:** Computer Virus Message, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S29:** Registry error message keeps on appearing
125	**PC58:** File Folder Cannot be Established	**S6:** USB Virus message, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32, **S29:** Registry error message keeps on appearing
126	**PC58:** File Folder Cannot be Established	**S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs, **S24:** MS Office Program error in running, **S29:** Registry error message keeps on appearing
127	**PC58:** File Folder Cannot be Established	**S3.** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S5:** Error message regarding autoexec.bat or config.sys, **S29:** Registry error message keeps on appearing
128	**PC59:** (ISNet) Defective	**S8:** The URL Cannot be accessed through the MDB Portal, **S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed
129	**PC59:** (ISNet) Defective	**S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S11:** MOM Alerts on Server: SVREBPPDBS01, **S12:** MOM Alerts on Server: SVREBPPEBS32
130	**PC59:** (ISNet) Defective	**S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed
131	**PC60:** Harddisk Bad Sector found	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S6:** USB Virus message, **S26:** CPU Turns off few minutes after opening
132	**PC60:** Harddisk Bad Sector found	**S2:** Computer Virus Message, **S3.** Computer Motherboard beeps, **S6:** USB Virus message
133	**PC61:** File Print Problem	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S15:** CPU hangs, **S25:** Printer Error Light Blinks
134	**PC61:** File Print Problem	**S1:** Motherboard BIOS beeps, **S15:** CPU hangs, **S25:** Printer Error Light Blinks
135	**PC61:** File Print Problem	**S2:** Computer Virus Message, **S3.** Computer Motherboard beeps, **S6:** USB Virus message, **S25:** Printer Error Light Blinks
136	**PC62:** OS Registry Corrupted	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S6:** USB Virus message, **S29:** Registry error message keeps on appearing
137	**PC62:** OS Registry Corrupted	**S13:** SVR-MDBSPPS-01 Cannot be accessed, **S14:** SVRMDBADDC12 Cannot be accessed, **S15:** CPU hangs, **S29:** Registry error message keeps on appearing
138	**PC62:** OS Registry Corrupted	**S5:** Error message regarding autoexec.bat or config.sys, **S26:** CPU Turns off few minutes after opening, **S29:** Registry error message keeps on appearing
139	**PC62:** OS Registry Corrupted	**S2:** Computer Virus Message, **S3.** Computer Motherboard beeps, **S4:** Memory Overflow message appears, **S6:** USB Virus message, **S29:** Registry error message keeps on appearing
140	**PC63:** Printer Sensor Problem	**S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S25:** Printer Error Light Blinks
141	**PC63:** Printer Sensor Problem	**S4:** Memory Overflow message appears, **S6:** USB Virus message, **S25:** Printer Error Light Blinks
142	**PC63:** Printer Sensor Problem	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S4:** Memory Overflow message appears, **S25:** Printer Error Light Blinks
143	**PC64:** CPU Fan Not Functioning	**S15:** CPU hangs, **S23:** Monitor will not power on, **S26:** CPU Turns off few minutes after opening
144	**PC64:** CPU Fan Not Functioning	**S4:** Memory Overflow message appears, **S15:** CPU hangs,

		S26: CPU Turns off few minutes after opening
145	**PC65:** MOBO Driver Installed but not working	**S15:** CPU hangs, **S21:** Windows monitor driver error appears, **S29:** Registry error message keeps on appearing, **S30:** CPU has no sound
146	**PC65:** MOBO Driver Installed but not working	**S13:** SVR-MDBSPPS-01 Cannot be accessed, **S17:** Computer cannot recognize Mc Afee Installed, **S24:** MS Office Program error in running, **S29:** Registry error message keeps on appearing, **S30:** CPU has no sound
147	**PC65:** MOBO Driver Installed but not working	**S2:** Computer Virus Message, **S21:** Windows monitor driver error appears, **S26:** CPU Turns off few minutes after opening, **S30:** CPU has no sound
148	**PC65:** MOBO Driver Installed but not working	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S6:** USB Virus message, **S15:** CPU hangs, **S26:** CPU Turns off few minutes after opening, **S30:** CPU has no sound
149	**PC66:** Black and White Output	**S19:** DVI Slot is shorted, **S20:** Distorted Screen, **S22:** Scraped marks on the DVI Cable
150	**PC66:** Black and White Output	**S18:** Video Card Slot is loose, **S19:** DVI Slot is shorted, **S20:** Distorted Screen, **S22:** Scraped marks on the DVI Cable
151	**PC66:** Black and White Output	**S19:** DVI Slot is shorted, **S20:** Distorted Screen, **S21:** Windows monitor driver error appears, **S22:** Scraped marks on the DVI Cable
152	**PC67:** Sound Card Problem	**S15:** CPU hangs, **S26:** CPU Turns off few minutes after opening, **S30:** CPU has no sound
153	**PC67:** Sound Card Problem	**S15:** CPU hangs, **S30:** CPU has no sound
154	**PC68:** Code 10 Error	**S2:** Computer Virus Message, **S6:** USB Virus message, **S30:** CPU has no sound
155	**PC68:** Code 10 Error	**S7:** To many programs running on startup, **S9:** Network Connection Error Appears, **S30:** CPU has no sound
156	**PC68:** Code 10 Error	**S1:** Motherboard BIOS beeps, **S2:** Computer Virus Message, **S9:** Network Connection Error Appears, **S30:** CPU has no sound
157	**PC68:** Code 10 Error	**S9:** Network Connection Error Appears, **S10:** Mapped Drive Cannot be accessed, **S30:** CPU has no sound
158	**PC69:** Error 0xc0000142	**S2:** Computer Virus Message, **S29:** Registry error message keeps on appearing, **S30:** CPU has no sound
159	**PC69:** Error 0xc0000142	**S6:** USB Virus message, **S29:** Registry error message keeps on appearing, **S30:** CPU has no sound
160	**PC69:** Error 0xc0000142	**S4:** Memory Overflow message appears, **S26:** CPU Turns off few minutes after opening, **S29:** Registry error message keeps on appearing, **S30:** CPU has no sound
161	**PC70:** CPU speaker is not functioning	**S4:** Memory Overflow message appears, **S15:** CPU hangs, **S30:** CPU has no sound
162	**PC70:** CPU speaker is not functioning	**S16:** Clicking anything can take minutes before computer response **S30:** CPU has no sound
163	**PC71:** Device Manager Error Code 19	**S1:** Motherboard BIOS beeps, **S5:** Error message regarding autoexec.bat or config.sys, **S29:** Registry error message keeps on appearing
164	**PC71:** Device Manager Error Code 19	**S1:** Motherboard BIOS beeps, **S5:** Error message regarding autoexec.bat or config.sys, **S6:** USB Virus message, **S29:** Registry error message keeps on appearing
165	**PC71:** Device Manager Error Code 19	**S2:** Computer Virus Message, **S3:** Computer Motherboard beeps, **S6:** USB Virus message, **S29:** Registry error message keeps on appearing

TABLE 10: Symptoms in Computer System with their Possible Cause (PC)

E	D\Q	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30
1	PC1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	PC2	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	PC3	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	PC4	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	PC5	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	PC6	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7	PC7	0	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	PC7	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	PC8	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
10	PC8	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
11	PC9	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
12	PC10	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
13	PC11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
14	PC12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
15	PC13	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
16	PC14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0
17	PC14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
18	PC14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
19	PC15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
20	PC16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
21	PC16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0
22	PC17	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	PC17	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	PC17	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	PC18	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
26	PC18	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
27	PC19	0	0	0	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	PC19	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	PC19	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	PC20	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	PC20	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	PC21	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	PC21	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	PC22	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
35	PC23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
36	PC2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

	3																														
37	PC24	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	PC24	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	PC24	1	0	0	0	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
40	PC25	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
41	PC26	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
42	PC26	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	PC27	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
44	PC28	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
45	PC29	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
46	PC29	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
47	PC30	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
48	PC31	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
49	PC31	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
50	PC32	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
51	PC33	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
52	PC33	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
53	PC34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
54	PC34	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
55	PC35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0
56	PC35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0
57	PC35	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
58	PC36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
59	PC36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0
60	PC37	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
61	PC38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0
62	PC38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
63	PC3	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	9																														
64	PC39	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	PC39	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
66	PC40	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	PC40	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
68	PC40	1	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	PC41	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
70	PC41	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
71	PC41	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	PC42	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	PC42	0	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	PC42	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	PC42	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	PC43	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	PC43	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	PC43	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	PC44	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	PC44	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	PC44	1	1	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82	PC44	0	0	0	0	0	0	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	PC45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
84	PC45	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
85	PC45	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
86	PC45	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
87	PC46	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88	PC46	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	PC46	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	PC4	0	0	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	6																														
91	PC4 7	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	PC4 7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
93	PC4 7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
94	PC4 8	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	PC4 8	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
96	PC4 8	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	PC4 9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
98	PC4 9	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
99	PC5 0	1	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 0	PC5 0	1	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 1	PC5 0	1	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 2	PC5 0	1	1	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 3	PC5 1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 4	PC5 1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 5	PC5 2	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 6	PC5 2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 7	PC5 2	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 8	PC5 3	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
10 9	PC5 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	0
11 0	PC5 3	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
11 1	PC5 4	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
11 2	PC5 4	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
11 3	PC5 4	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
11 4	PC5 5	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 5	PC5 5	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 6	PC5 5	0	0	0	0	0	0	1	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	PC5	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

7	6																														
118	PC56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0
119	PC56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
120	PC56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
121	PC57	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
122	PC57	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
123	PC57	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0
124	PC58	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
125	PC58	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
126	PC58	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
127	PC58	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
128	PC59	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
129	PC59	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	PC59	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
131	PC60	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
132	PC60	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133	PC61	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
134	PC61	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
135	PC61	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
136	PC62	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
137	PC62	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
138	PC62	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
139	PC62	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
140	PC63	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
141	PC63	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
142	PC63	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
143	PC64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
14	PC6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

144	4																														
145	PC65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1
146	PC65	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	1
147	PC65	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1
148	PC65	1	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
149	PC66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0
150	PC66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0
151	PC66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0
152	PC67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
153	PC67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
154	PC68	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
155	PC68	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
156	PC68	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
157	PC68	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
158	PC69	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
159	PC69	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
160	PC69	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
161	PC70	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
162	PC70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
163	PC71	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
164	PC71	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
165	PC71	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

TABLE 11: Information System of the Data

ID	Symptom
S1	Conflict with TSR Running Program
S2	Computer Virus Message
S3	Computer Motherboard beeps
S4	Memory Overflow message appears
S5	Error message regarding autoexec.bat or config.sys

S6	USB Virus message
S7	To many programs running on startup
S8	The URL Cannot be accessed through the MDB
S9	Network Connection Error Appears
S10	Mapped Drive Cannot be accessed
S11	MOM Alerts on Server: SVREBPPDBS01
S12	MOM Alerts on Server: SVREBPPEBS32
S13	SVR-MDBSPPS-01 Cannot be accessed
S14	SVRMDBADDC12 Cannot be accessed
S15	CPU hangs
S16	Clicking anything can take minutes before computer
S17	Computer cannot recognize Mc Afee
S18	Video Card Slot is loose
S19	DVI Slot is shorted
S20	Distorted Screen
S21	Windows monitor driver error appears
S22	Scraped marks on the DVI Cable
S23	Monitor will not power on
S24	MS Office Program error in running
S25	Printer Error Light Blinks
S26	CPU Turns off few minutes after opening
S27	CPU Clock keeps on Changing
S28	Network Sharing Error
S29	Registry error message keeps on appearing
S30	CPU has no sound

TABLE 12: Table of Symptoms

Table 10, 11 and 12 showed the Symptoms in Computer System Diagnostics with their Possible Cause (PC), Information System of the Data and a Table of symptoms respectively.

4.2. Decision Rules by Applying the Algorithm

The Information system is inputted into the test platform Program. Hypertext Preprocessor (PHP), integrated with Rough Sets Data Explorer was used as a test platform [13]. This PHP Test Platform applies the Data Tagging Algorithm.

Applying the complete Algorithm described in Section 3, a nominal set of rules are produced these are:

Rule #	Rule
Rule 1	(S2 = 1) & (S3 = 0) & (S4 = 0) & (S5 = 0) & (S7 = 0) & (S8 = 0) & (S12 = 0) & (S15 = 0) & (S16 = 0) & (S29 = 0) & (S30 = 0) => (D = PC1)
Rule 2	(S3 = 1) & (S4 = 1) & (S5 = 1) & (S29 = 0) => (D = PC2)
Rule 3	(S1 = 1) & (S3 = 0) & (S4 = 1) & (S6 = 0) & (S8 = 0) & (S10 = 0) & (S14 = 0) & (S15 = 0) & (S25 = 0) & (S26 = 0) => (D = PC3)
Rule 4	(S4 = 1) & (S6 = 1) & (S7 = 1) => (D = PC4)
Rule 5	(S8 = 1) & (S9 = 0) & (S13 = 1) => (D = PC5)
Rule 6	(S6 = 0) & (S9 = 0) & (S11 = 1) & (S29 = 1) => (D = PC8)
Rule 7	(S11 = 1) & (S17 = 1) => (D = PC9)
Rule 8	(S3 = 1) & (S18 = 1) => (D = PC13)

Rule 9	(S18 = 0) & (S19 = 0) & (S20 = 1) & (S22 = 0) & (S24 = 0) => (D = PC14)
Rule 10	(S9 = 0) & (S15 = 0) & (S20 = 0) & (S21 = 1) & (S22 = 0) & (S26 = 0) => (D = PC14)
Rule 11	(S22 = 1) & (S29 = 1) => (D = PC15)
Rule 12	(S15 = 0) & (S22 = 0) & (S23 = 1) => (D = PC16)
Rule 13	(S1 = 0) & (S4 = 0) & (S10 = 0) & (S12 = 0) & (S14 = 1) & (S22 = 0) & (S29 = 0) => (D = PC17)
Rule 14	(S2 = 0) & (S10 = 1) & (S11 = 0) & (S29 = 1) => (D = PC18)
Rule 15	(S1 = 0) & (S2 = 0) & (S3 = 0) & (S4 = 1) & (S7 = 0) & (S9 = 0) & (S21 = 0) & (S24 = 0) & (S25 = 0) & (S26 = 0) & (S30 = 0) => (D = PC19)
Rule 16	(S11 = 1) & (S12 = 0) & (S13 = 0) & (S14 = 0) => (D = PC19)
Rule 17	(S1 = 0) & (S8 = 1) & (S9 = 1) & (S10 = 0) & (S14 = 0) => (D = PC20)
Rule 18	(S11 = 1) & (S12 = 1) & (S14 = 1) => (D = PC21)
Rule 19	(S5 = 0) & (S14 = 0) & (S19 = 0) & (S20 = 0) & (S22 = 1) & (S23 = 0) & (S29 = 0) => (D = PC23)
Rule 20	(S8 = 1) & (S11 = 1) => (D = PC24)
Rule 21	(S6 = 0) & (S8 = 0) & (S9 = 0) & (S10 = 1) & (S16 = 0) & (S24 = 0) & (S28 = 0) & (S29 = 0) => (D = PC26)
Rule 22	(S13 = 1) & (S15 = 1) & (S22 = 1) => (D = PC27)
Rule 23	(S1 = 0) & (S12 = 1) & (S24 = 1) => (D = PC28)
Rule 24	(S15 = 0) & (S18 = 0) & (S20 = 0) & (S21 = 1) & (S23 = 0) & (S26 = 0) => (D = PC29)
Rule 25	(S1 = 1) & (S12 = 1) & (S24 = 1) => (D = PC29)
Rule 26	(S4 = 1) & (S5 = 1) & (S24 = 1) => (D = PC30)
Rule 27	(S2 = 1) & (S4 = 1) => (D = PC31)
Rule 28	(S20 = 1) & (S24 = 1) => (D = PC32)
Rule 29	(S12 = 0) & (S18 = 1) & (S25 = 1) => (D = PC33)
Rule 30	(S5 = 1) & (S16 = 1) & (S25 = 1) => (D = PC33)
Rule 31	(S21 = 1) & (S23 = 1) => (D = PC34)
Rule 32	(S16 = 1) & (S18 = 1) & (S23 = 1) => (D = PC35)
Rule 33	(S21 = 0) & (S22 = 1) & (S23 = 1) => (D = PC35)
Rule 34	(S3 = 1) & (S20 = 1) => (D = PC35)
Rule 35	(S19 = 0) & (S20 = 1) & (S22 = 1) => (D = PC36)
Rule 36	(S2 = 0) & (S3 = 0) & (S4 = 1) & (S5 = 0) & (S6 = 0) & (S8 = 0) & (S10 = 0) & (S14 = 0) & (S15 = 0) & (S29 = 0) => (D = PC37)
Rule 37	(S4 = 0) & (S16 = 1) & (S26 = 1) & (S29 = 0) => (D = PC38)
Rule 38	(S2 = 0) & (S6 = 0) & (S7 = 1) & (S12 = 0) & (S27 = 0) & (S30 = 0) => (D = PC39)
Rule 39	(S1 = 1) & (S2 = 0) & (S3 = 0) & (S4 = 1) & (S5 = 0) & (S8 = 0) & (S10 = 0) & (S14 = 0) => (D = PC39)
Rule 40	(S3 = 1) & (S17 = 1) => (D = PC40)
Rule 41	(S11 = 1) & (S13 = 0) & (S14 = 1) & (S29 = 0) => (D = PC40)
Rule 42	(S1 = 0) & (S2 = 1) & (S3 = 0) & (S6 = 0) & (S17 = 0) & (S18 = 0) & (S25= 0) & (S26 = 0) & (S29 = 0) => (D = PC40)
Rule 43	(S3 = 0) & (S11 = 0) & (S16 = 0) & (S17 = 1) & (S24 = 0) & (S25 = 0) => (D = PC41)
Rule 44	(S1 = 1) & (S12 = 1) & (S13 = 1) => (D = PC41)
Rule 45	(S1 = 1) & (S2 = 0) & (S5 = 0) & (S8 = 1) => (D = PC42)
Rule 46	(S5 = 1) & (S7 = 1) & (S27 = 0) => (D = PC42)
Rule 47	(S1 = 1) & (S4 = 1) & (S6 = 1) => (D = PC42)
Rule 48	(S4 = 0) & (S5 = 1) & (S7 = 0) & (S22 = 0) & (S24 = 0) & (S25 = 0) & (S29 = 0) => (D = PC43)
Rule 49	(S12 = 1) & (S15 = 1) => (D = PC43)
Rule 50	(S8 = 1) & (S13 = 1) & (S14 = 1) => (D = PC44)
Rule 51	(S3 = 0) & (S4 = 0) & (S5 = 0) & (S6 = 1) & (S7 = 0) & (S16 = 0) & (S29 = 0) & (S30 = 0) => (D = PC44)
Rule 52	(S1 = 1) & (S4 = 0) & (S13 = 1) & (S14 = 1) => (D = PC44)
Rule 53	(S27 = 1) => (D = PC45)
Rule 54	(S3 = 0) & (S5 = 0) & (S6 = 0) & (S8 = 0) & (S9 = 0) & (S11 = 1) & (S12 = 1) & (S14 = 0) & (S16 = 0) & (S24 = 0) => (D = PC46)
Rule 55	(S8 = 1) & (S13 = 0) & (S14 = 1) => (D = PC46)
Rule 56	(S1 = 1) & (S2 = 1) & (S15 = 1) & (S16 = 0) & (S30 = 0) => (D = PC47)
Rule 57	(S3 = 1) & (S4 = 1) & (S15 = 1) => (D = PC47)
Rule 58	(S3 = 1) & (S5 = 0) & (S6 = 0) & (S7 = 0) & (S8 = 0) & (S15 = 0) & (S17 = 0) & (S19 = 0) & (S23 = 0) & (S27 = 0) & (S28 = 0) => (D = PC48)

Rule 59	(S4 = 1) & (S5 = 1) & (S25 = 1) => (D = PC48)
Rule 60	(S4 = 0) & (S17 = 1) & (S25 = 1) => (D = PC49)
Rule 61	(S15 = 1) & (S16 = 1) & (S25 = 1) => (D = PC49)
Rule 62	(S1 = 1) & (S9 = 1) & (S10 = 1) & (S11 = 0) => (D = PC50)
Rule 63	(S5 = 0) & (S7 = 0) & (S11 = 0) & (S16 = 1 & (S17 = 0) & (S18 = 0) & (S22 = 0) & (S25 = 0) & (S26 = 0) & (S30 = 0) => (D = PC51)
Rule 64	(S5 = 1) & (S15 = 1) => (D = PC52)
Rule 65	(S1 = 0) & (S2 = 1) & (S7 = 1) & (S27= 0) => (D = PC52)
Rule 66	(S1 = 1) & (S3 = 1) & (S15 = 1) => (D = PC52)
Rule 67	(S4 = 0) & (S5 = 0) & (S26 = 1) & (S29 = 1) => (D = PC53)
Rule 68	(S1 = 0) & (S3 = 0) & (S6 = 0) & (S10 = 0) & (S14 = 0) & (S16 = 0) & (S22 = 0) & (S26 = 0) & (S29 = 1) & (S30 = 0) => (D = PC53)
Rule 69	(S28 = 1) => (D = PC54)
Rule 70	(S8 = 1) & (S9 = 1) & (S12 = 0) & (S13 = 1) => (D = PC55)
Rule 71	(S6 = 0) & (S7 = 1) & (S10 = 0) & (S11 = 0) & (S16 = 0) & (S24 = 0) & (S30 = 0) => (D = PC55)
Rule 72	(S2 = 1) & (S8 = 1) & (S9 = 1) => (D = PC55)
Rule 73	(S18= 1) & (S20 = 1) & (S21 = 0) & (S22 = 0) => (D = PC56)
Rule 74	(S3 = 0) & (S19 = 1) & (S20 = 0) & (S23 = 0) => (D = PC56)
Rule 75	(S1 = 0) & (S2 = 1) & (S3 = 0) & (S5 = 0) & (S6 = 1) & (S7 = 0) & (S10 = 0) & (S16 = 0) & (S26 = 0) & (S30 = 0) => (D = PC56)
Rule 76	(S1 = 1) & (S3 = 0) & (S16 = 1) & (S24 = 0) => (D = PC57)
Rule 77	(S1 = 1) & (S6 = 1) & (S7 = 1) => (D = PC57)
Rule 78	(S1 = 0) & (S2 = 0) & (S9 = 0) & (S14 = 0) & (S16 = 0) & (S22 = 0) & (S26 = 0) & (S29 = 1) & (S30 = 0) => (D = PC58)
Rule 79	(S2 = 1) & (S10 = 1) & (S29 = 1) => (D = PC58)
Rule 80	(S10 = 1) & (S11 = 1) & (S12 = 1) => (D = PC59)
Rule 81	(S5 = 0) & (S15 = 0) & (S26 = 1) & (S30 = 0) => (D = PC60)
Rule 82	(S4 = 0) & (S5 = 0) & (S6 = 1) & (S7 = 0) & (S8 = 0) & (S10 = 0) & (S16 = 0) & (S25 = 0) & (S29 = 0) & (S30 = 0) => (D = PC60)
Rule 83	(S15 = 1) & (S16 = 0) & (S25 = 1) => (D = PC61)
Rule 84	(S3 = 1) & (S6 = 1) & (S25 = 1) => (D = PC61)
Rule 85	(S3 = 1) & (S4 = 1) & (S6 = 1) => (D = PC62)
Rule 86	(S4 = 0) & (S15 = 0) & (S21 = 0) & (S26 = 1) => (D = PC62)
Rule 87	(S1 = 1) & (S2 = 1) & (S29 = 1) => (D = PC62)
Rule 88	(S2 = 1) & (S3 = 0) & (S15 = 0) & (S17 = 0) & (S25 = 1) => (D = PC63)
Rule 89	(S4 = 1) & (S6 = 1) & (S25 = 1) => (D = PC63)
Rule 90	(S1 = 0) & (S5 = 0) & (S6 = 0) & (S16 = 0) & (S26 = 1) & (S30 = 0) => (D = PC64)
Rule 91	(S4 = 0) & (S9 = 0) & (S18 = 0) & (S20 = 0) & (S21 = 1) & (S23 = 0) => (D = PC65)
Rule 92	(S5 = 0) & (S7 = 0) & (S11 = 0) & (S20 = 0) & (S21 = 0) & (S24 = 1) => (D = PC65)
Rule 93	(S6 = 1) & (S26 = 1) & (S30 = 1) => (D = PC65)
Rule 94	(S19 = 1) & (S20 = 1) & (S22 = 1) => (D = PC66)
Rule 95	(S1 = 0) & (S4 = 0) & (S15 = 1) & (S29 = 0) & (S30 = 1) => (D = PC67)
Rule 96	(S15 = 0) & (S16 = 0) & (S21 = 0) & (S29 = 0) & (S30 = 1) => (D = PC68)
Rule 97	(S13 = 0) & (S15 = 0) & (S29 = 1) & (S30 = 1) => (D = PC69)
Rule 98	(S6 = 0) & (S7 = 0) & (S10 = 0) & (S11= 0) & (S16 = 1) & (S17 = 0) & (S18 = 0) & (S22 = 0) & (S24 = 0) & (S25 = 0) & (S26 = 0) => (D = PC70)
Rule 99	(S4 = 1) & (S15 = 1) & (S30 = 1) => (D = PC70)
Rule 100	(S4 = 0) & (S5 = 1) & (S26 = 0) & (S29 = 1) => (D = PC71)
Rule 101	(S1 = 0) & (S2 = 1) & (S4 = 0) & (S6 = 1) & (S29 = 1) => (D = PC71)
Approximate Rules	
Rule 102	(S9 = 1) & (S15 = 1) => (D = PC6) or (D = PC7)
Rule 103	(S1 = 0) & (S9 = 1) & (S12 = 0) & (S14 = 1) => (D = PC7) or (D = PC59)
Rule 104	(S13 = 1) & (S15 = 1) & (S29 = 1) => (D = PC10) or (D = PC58)
Rule 105	(S15 = 1) & (S16 = 1) & (S17 = 1) => (D = PC11) or (D = PC12)
Rule 106	(S18 = 1) & (S20 = 1) & (S21 = 1) => (D = PC14) or (D = PC36)
Rule 107	(S1 = 1) & (S4 = 1) & (S13 = 1) => (D = PC17) or (D = PC24)
Rule 108	(S4 = 1) & (S15 = 1) & (S21 = 1) => (D = PC22) or (D = PC25)
Rule 109	(S8 = 1) & (S10 = 1) & (S13 = 0) & (S14 = 0) & (S15 = 0) & (S29 = 0) => (D = PC43) or (D = PC59)

TABLE 13: Decision rules applying the algorithm

The results of Theorem applied in actual data are evident. Information Dependency is apparent for PC45 and PC54. Their Symptoms S27 and S28 respectively is the essential information needed in order to satisfy the Possible Cause.

4.3. Test With Previous Live Data

The Expert System will be inputted with previous live data. It will be used as the Validating data. These data are obtained through retrieval of the information in a live scenario and the Possible Cause is known. It will be inputted in the Expert System. For this research there is a total of 50 live cases.

a.) Enter Previous live Data

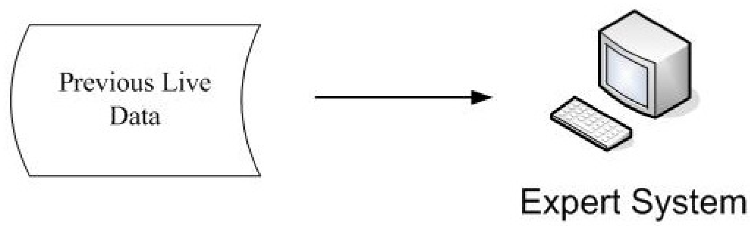

FIGURE 4: Entering of Previous Live Data

b.) Check if the Possible Cause outputted of the Expert System equals to the Possible Cause of the Validating Data

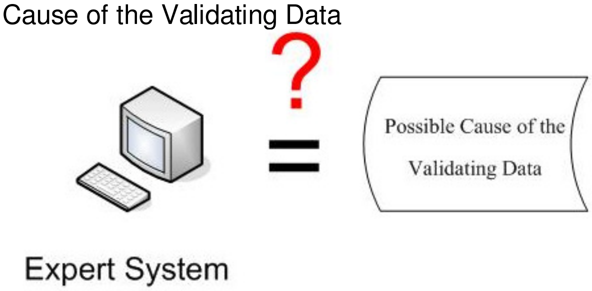

FIGURE 5: Checking of the Expert System's Output

Example in Case 6 which has S8, S9, S10 and S15 as the symptoms, the expected output is PC7. When inputted in the system it gave PC7 as the output same as the expected.

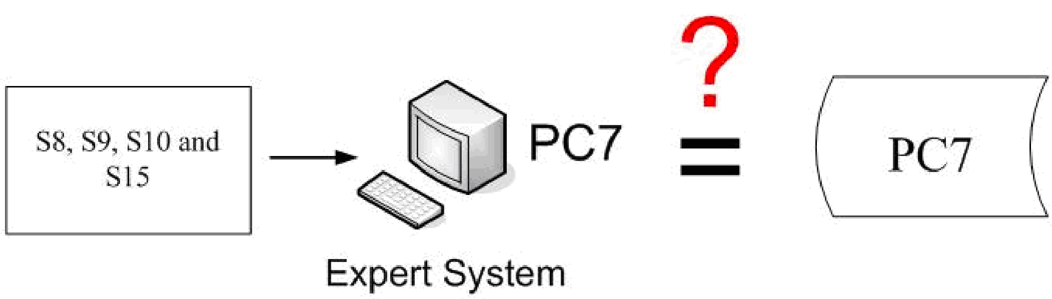

FIGURE 6: Checking of the output of the Expert System in Case 6

c.) Repeat the process for each validating Data. The number of Possible Cause that are outputted correctly out of the total previous live cases will be the score for this test.

Case	Symptoms	System Output	Expected Output
1	S1, S2, S6, S9	PC44	PC47
2	S4, S26, S29, S30	PC69	PC69
3	S4, S15, S30	PC70	PC70
4	S15, S26, S30	PC67	PC67
5	S1, S2, S6, S15, S26, S30	PC65	PC65
6	S8, S9, S10, S15	PC7	PC7
7	S8, S9, S10, S29	PC18	PC18
8	S9, S21, S24	PC29	PC29
9	S2, S7, S9, S18	PC52	PC14
10	S1, S8, S10, S15	PC42	PC42
11	S1, S3, S4, S27	PC45	PC45
12	S1, S9, S10, S12	PC50	PC50
13	S9, S10, S11	PC19	PC19
14	S6, S11, S12, S29	PC58	PC58
15	S18, S23	PC16	PC16
16	S1, S2, S4	PC3	PC3
17	S8, S9, S10	PC59	PC59
18	S1, S2, S6, S29	PC62	PC62
19	S19, S20, S22	PC66	PC66
20	S7, S9, S30	PC68	PC68
21	S16, S30	PC70	PC70
22	S2, S6, S7	PC52	PC52
23	S2, S4, S6	PC56	PC56
24	S15, S16, S17	PC12	PC12
25	S18, S21	PC14	PC14
26	S3, S8, S9	PC20	PC20
27	S4, S8, S16, S17, S26	PC55	PC11
28	S3, S4, S5	PC2	PC2
29	S8, S9, S10, S15	PC6	PC6
30	S11, S12, S16, S29	PC8	PC8
31	S7, S18, S19	PC56	PC40
32	S2, S5, S6	PC43	PC43
33	S2, S4, S15, S17	PC41	PC41
34	S2, S3, S6, S29	PC71	PC71
35	S6, S29, S30	PC69	PC69
36	S18, S19, S20, S22	PC66	PC66
37	S2, S3, S4, S6, S29	PC62	PC62
38	S1, S2, S7, S24	PC31	PC31
39	S15, S16, S18, S23	PC35	PC35
40	S15, S16, S23, S26	PC38	PC38
41	S2, S4, S15, S25	PC61	PC61
42	S2, S3, S6, S25	PC61	PC61
43	S5, S26, S29	PC62	PC62
44	S1, S2, S4, S25	PC63	PC63
45	S2, S29, S30	PC69	PC69
46	S1, S5, S6, S29	PC71	PC71
47	S1, S11, S12, S24	PC29	PC29
48	S1, S2, S5, S16, S24	PC31	PC31
49	S3, S5, S16, S25	PC33	PC33
50	S3, S4, S21, S22, S23	PC34	PC34

TABLE 14: Test with previous live data

Table 14 shows the test done when tested with previous live data. This test gave 46 / 50 or a 92% result and showed the algorithm's competence in previous live data.

4.4. Test With the Experts

The next test is the validation with the experts. Experts in the field of Computer Systems will perform their assessment on the developed Expert System. These experts will suggest and verify the validating data. These data are information on which they already know the Possible Cause from the field of Information and Communications Technology (ICT), Computers and their networking, hardware, firmware, software applications. There are 3 experts and each expert will provide 20 validating Data. In total there will be 60 validating Data. The qualifications of Experts the fields of Computer Systems are:

Expert 1: A Service Engineer from with 3 years experience in the field of Computer Systems. His expertise is Computer Assembly, Software Installations and Operating System diagnostics. His research interests are Computer Hardware and Software upgrades.

Expert 2: A Technical Support Engineer with 4 years experience in the field of Computer Systems. His expertise are Hardware troubleshooting and server farming. His research interests are software development and programming.

Expert 3: A Senior Client System Engineer from a reputable ICT organization. He has 33 years experience in the field of Computer Systems. His expertises are computer operations, facilities management and provisioning. His research interests are Facilities and Section development.

The following is an example on how this process is accomplished.

a.) Expert will enter the validating Data. These Data are cases where they already know the Possible Cause based on previous experience.

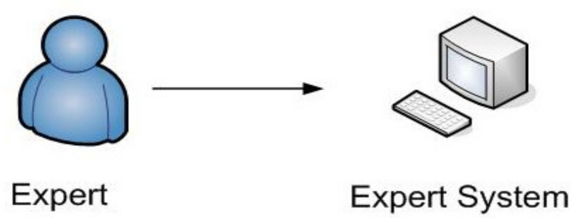

FIGURE 7: Expert entering the validating data

b.) Check if the Possible Cause outputted of the Expert System equals to the Possible Cause of the Validating Data of the Experts.

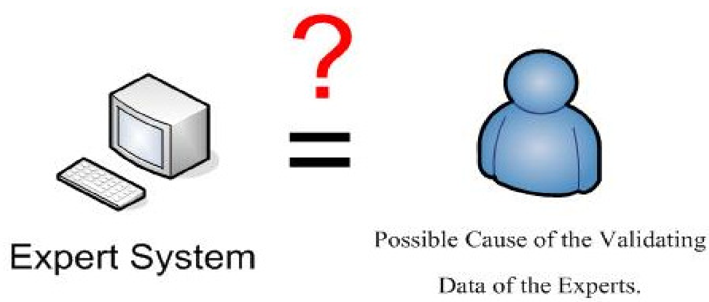

FIGURE 8: Checking of the Expert System's Output to the Possible Cause of the Expert's Validating Data

An Example is in Case 3 which has S18 and S21 as the symptoms. The expected output is PC14. When the Expert inputted those symptoms based on experience the system's output is PC14.

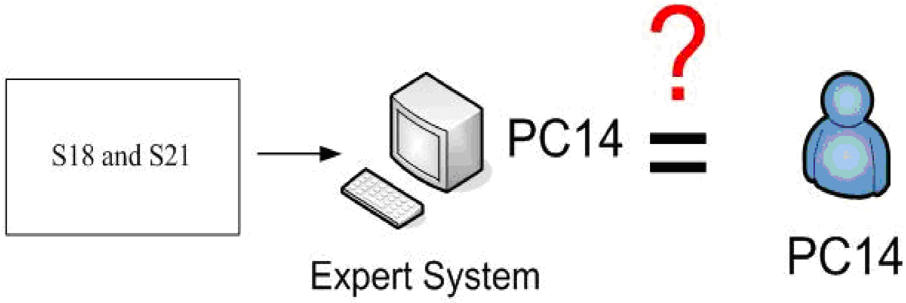

FIGURE 9: Checking of the output of the Expert System in Case 3

c.) Repeat the process for each of the expert's validating Data. The score for the test will be the number of correct answers given by the Expert System out of the total questions asked by the experts.

Case	Symptoms	System Output	Expected Output
	Expert 1		
1	S2, S29, S30	PC69	PC69
2	S11, S12, S16, S29	PC8	PC8
3	S18, S21	PC14	PC14
4	S18, S19, S20, S22	PC66	PC66
5	S8, S9, S10	PC59	PC59
6	S4, S7, S9, S10	PC39	PC66
7	S18, S23	PC16	PC16
8	S16, S30	PC70	PC70
9	S1, S2, S4, S5, S16, S17, S26	PC57	PC57
10	S2, S6, S7	PC52	PC52
11	S6, S11, S12, S29	PC58	PC58
12	S2, S3, S6, S29	PC71	PC71
13	S7, S9, S30	PC68	PC68
14	S4, S8, S9	PC20	PC20
15	S1, S9, S10, S12	PC50	PC50
16	S1, S2, S6, S29	PC62	PC62
17	S1, S3, S4, S27	PC45	PC45
18	S1, S3, S4, S7, S16	PC39	PC39
19	S3, S4, S5	PC2	PC2
20	S8, S9, S10, S15	PC6	PC6
	Expert 2		
21	S2, S4, S17, S25	PC33	PC33
22	S2, S4, S17	PC41	PC41
23	S3, S4, S21, S22, S23	PC34	PC34
24	S4, S9, S12	PC37	PC40
25	S1, S2, S7, S24	PC31	PC31
26	S15, S16, S18, S23	PC35	PC35
27	S15, S26, S30	PC67	PC67
28	S2, S4, S6	PC56	PC56
29	S15, S23, S26	PC64	PC64

30	S9, S21, S24	PC29	PC29
31	S19, S21	PC14	PC14
32	S5, S7, S16, S27	PC45	PC45
33	S2, S3, S6, S25	PC61	PC61
34	S5, S7, S11, S12	PC42	PC42
35	S1, S4, S15	PC39	PC39
36	S15, S16, S23, S26	PC38	PC38
37	S1, S12, S17, S25	PC49	PC49
38	S8, S9, S10, S15	PC7	PC7
39	S1, S2, S5, S16, S24	PC31	PC31
40	S3, S18, S19	PC13	PC13
Expert 3			
41	S1, S2, S6, S15, S26, S30	PC65	PC65
42	S1, S15, S27	PC45	PC45
43	S3, S5, S16, S25	PC33	PC33
44	S5, S26, S29	PC62	PC62
45	S1, S8, S9, S22	PC42	PC25
46	S2, S4, S18, S19	PC56	PC56
47	S15, S16, S17	PC11	PC11
48	S1, S2, S15, S26	PC47	PC47
49	S2, S3, S6	PC60	PC60
50	S20, S21, S22	PC36	PC36
51	S1, S5, S8, S11, S12, S22	PC24	PC24
52	S1, S2, S4, S25	PC63	PC63
53	S1, S5, S6, S29	PC71	PC71
54	S3, S7, S8, S15, S16	PC39	PC47
55	S4, S15, S30	PC70	PC70
56	S8, S11, S12	PC24	PC24
57	S6, S29, S30	PC69	PC69
58	S19, S22, S23	PC35	PC35
59	S22, S29	PC15	PC15
60	S4, S15, S26	PC64	PC64

TABLE 15: Test with the validating data

Table 15 shows the test with the validating data by the experts. This test gave 56 / 60 or a 93.3% result and showed the algorithm's competence when tested with the experts.

5. ANALYSIS AND CONCLUSIONS

The research has presented, analyzed and tested a new Expert System Algorithm. The algorithm shows a novel technique to input, tag, and properly structure technical so they can be converted into the rules of an Expert System. The rules created from the algorithm are nominal in terms that only the necessary information needs to be inputted to satisfy the Possible Cause. In cases where the Data gathered is incomplete, the proper conclusion may still be suggested. A theorem is proposed on Information Dependency of data, the essential information needed in order to obtain the correct Possible Cause. A formal proof of the theorem was presented and its correctness was tested on live data. It is very vital and useful in large Information Systems. Knowing which Data is needed will not only save time in the processing of information but also conserve resources.

A future recommendation for this research is for it to be tested in other fields. This research's scope is only for Computer Systems. In theory the theorems and algorithms can be applied in several Production Systems like in Medical diagnosis.

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