

Knowledge-based System for diagnosing and troubleshooting common computer problems

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Introduction



Attempt has been made to give the machines certain decision-making capacity, that is, a certain level of intelligence

This capacity can be used in any field of knowledge such as: medical, education, finance, transportation, computer science, telecommunication, etc.

Normally, computer systems can face hardware or software problems from time to time and endanger the functionality of the computer.

But most problems can be diagnosed without expensive system diagnostics or a technician.



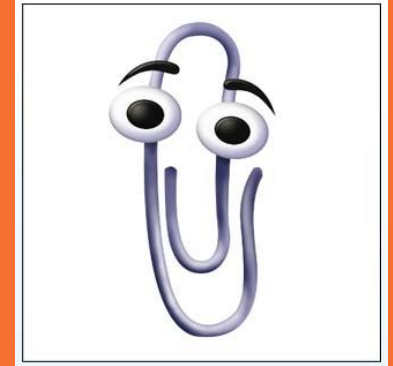
The background of the slide is a photograph of a wooden desk. On the desk, there is a silver laptop with its screen open, a white mug filled with dark liquid, a pencil, and some crumpled paper. The entire image has a semi-transparent orange overlay.

Objective

Develop a computer troubleshooting Knowledge-based system that gives the correct diagnosis and recommendations to the most common and simple problems that a computer present without the need to call to a technician or spend large amounts of money for these services.

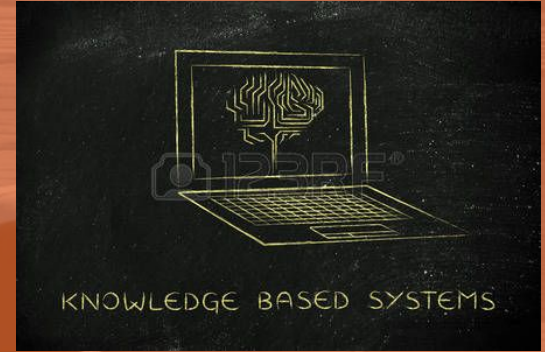
Related Works

- **HP** developed a PC Troubleshooting and Maintenance Guide
- . A similar help is provided by the web page of **Microsoft - Windows Help**
- The book written by Bayo Akinola called **Computer Troubleshooting, Using an Expert System: A Research Work**

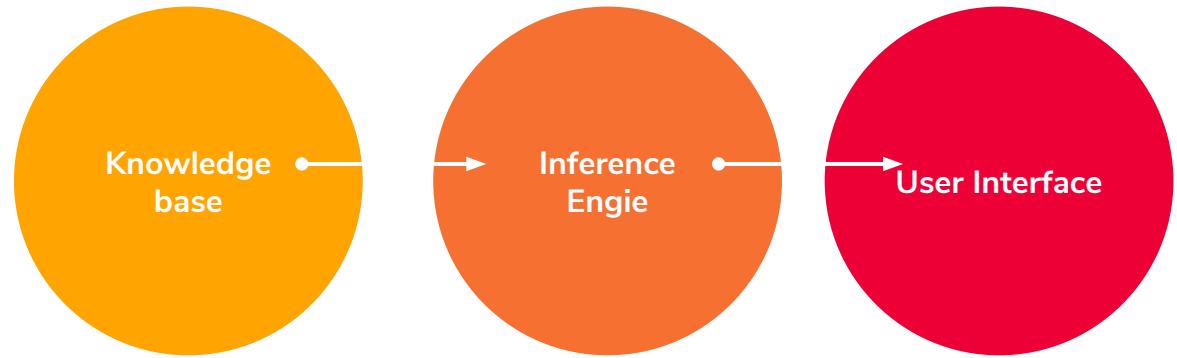


Knowledge-based System

Computer program that uses artificial intelligence to solve problems within a specialized domain that ordinarily requires task-specific knowledge. Knowledge-based system is a more general than the expert system. It becomes an expert system if it provides expert-level solutions or human expertise.



Components of a knowledge based system





Knowledge-based System for diagnosing and troubleshooting common computer problems

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"Knowledge acquisition (KA) is the process of acquiring relevant knowledge from domain experts and other sources of information such as books, databases, guidelines, manuals, journal articles and computer files."

Plan and Design

- The most difficult process lies in the diagnosis of the failure. That is why this system will only cover the simplest faults to detect. Generally these are usually those that are linked to:
 - Audio,
 - Video,
 - Hard drive disk,
 - Monitor
 - Mouse and keyboard.

KNOWLEDGE REPRESENTATION AND CONCEPTUAL MODELING

In order to modeling the system we are going to use decision trees and the knowledge representation in propositional logic.



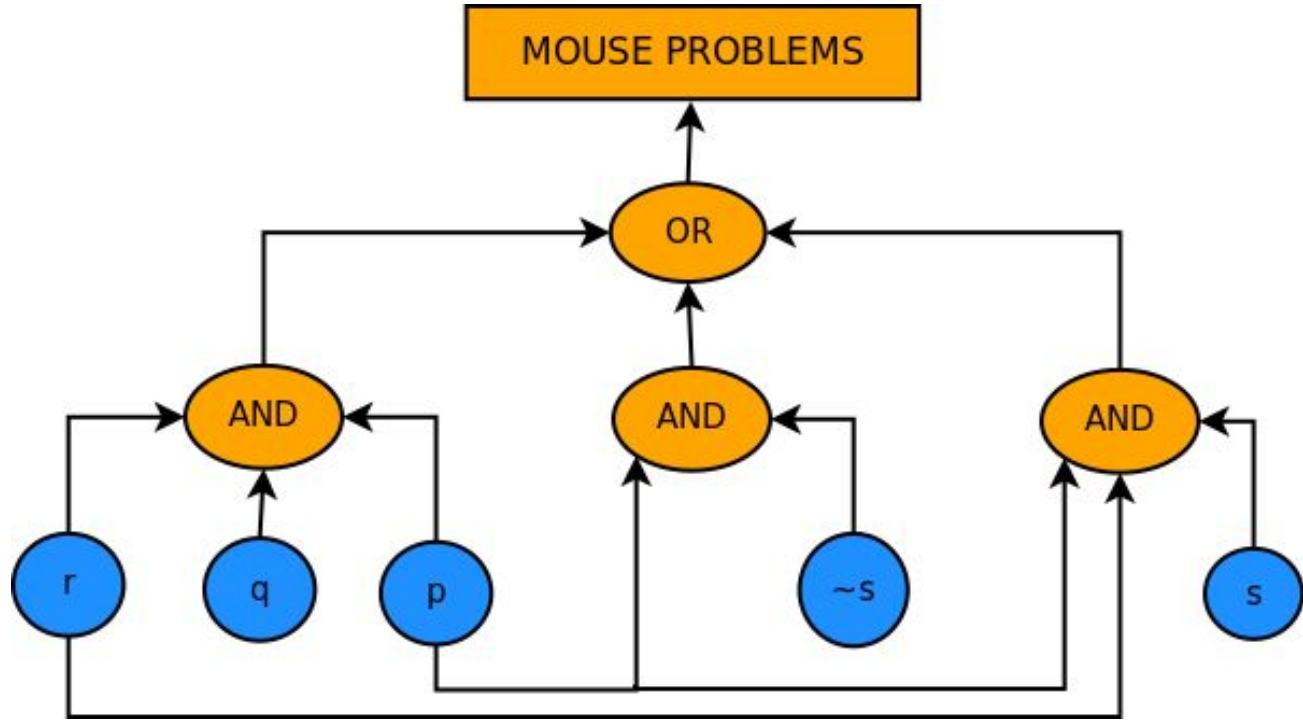
MOUSE PROBLEMS

p = The computer turns on

q = The mouse turns on

r = The mouse
does not respond

s = The computer recognizes the mouse



POWER PROBLEMS

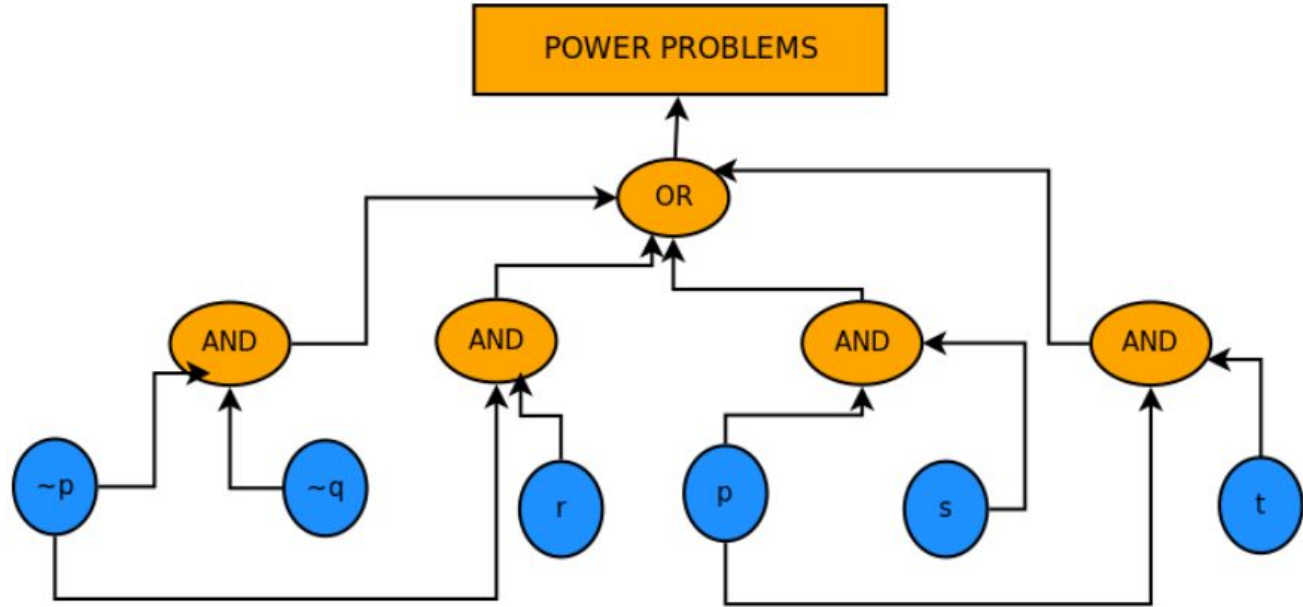
p = The computer turns on

q = Hear a beep

r = Hear a continuous tone

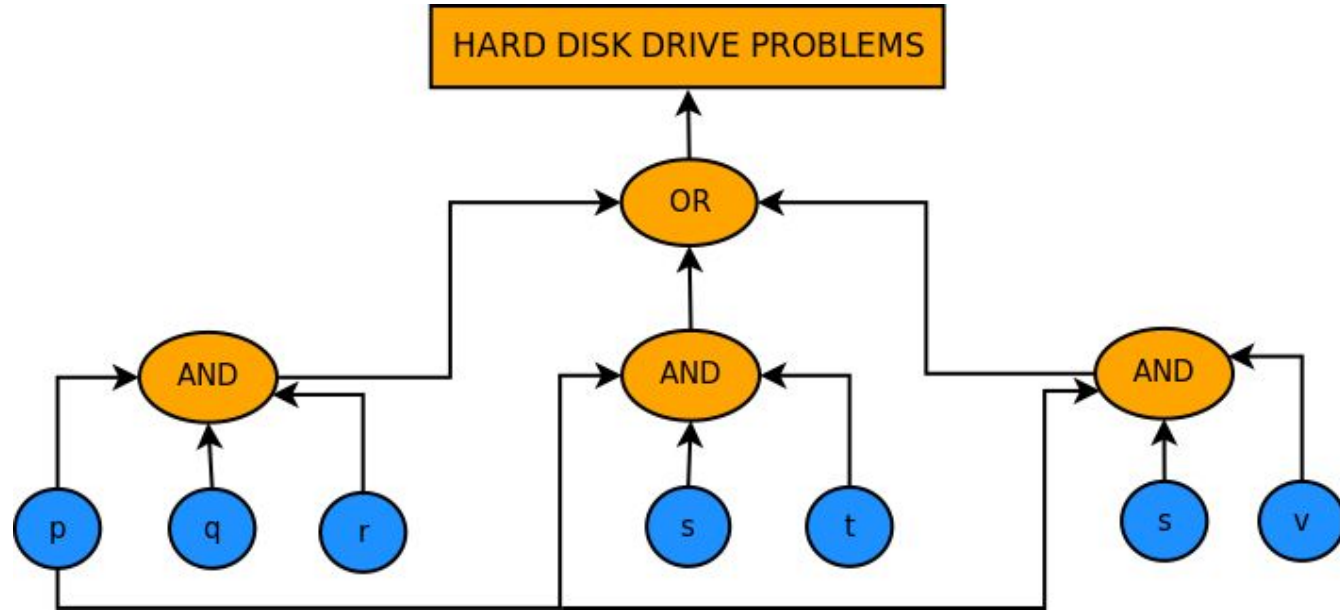
s = unexpected restart

t = unexpected shutdown

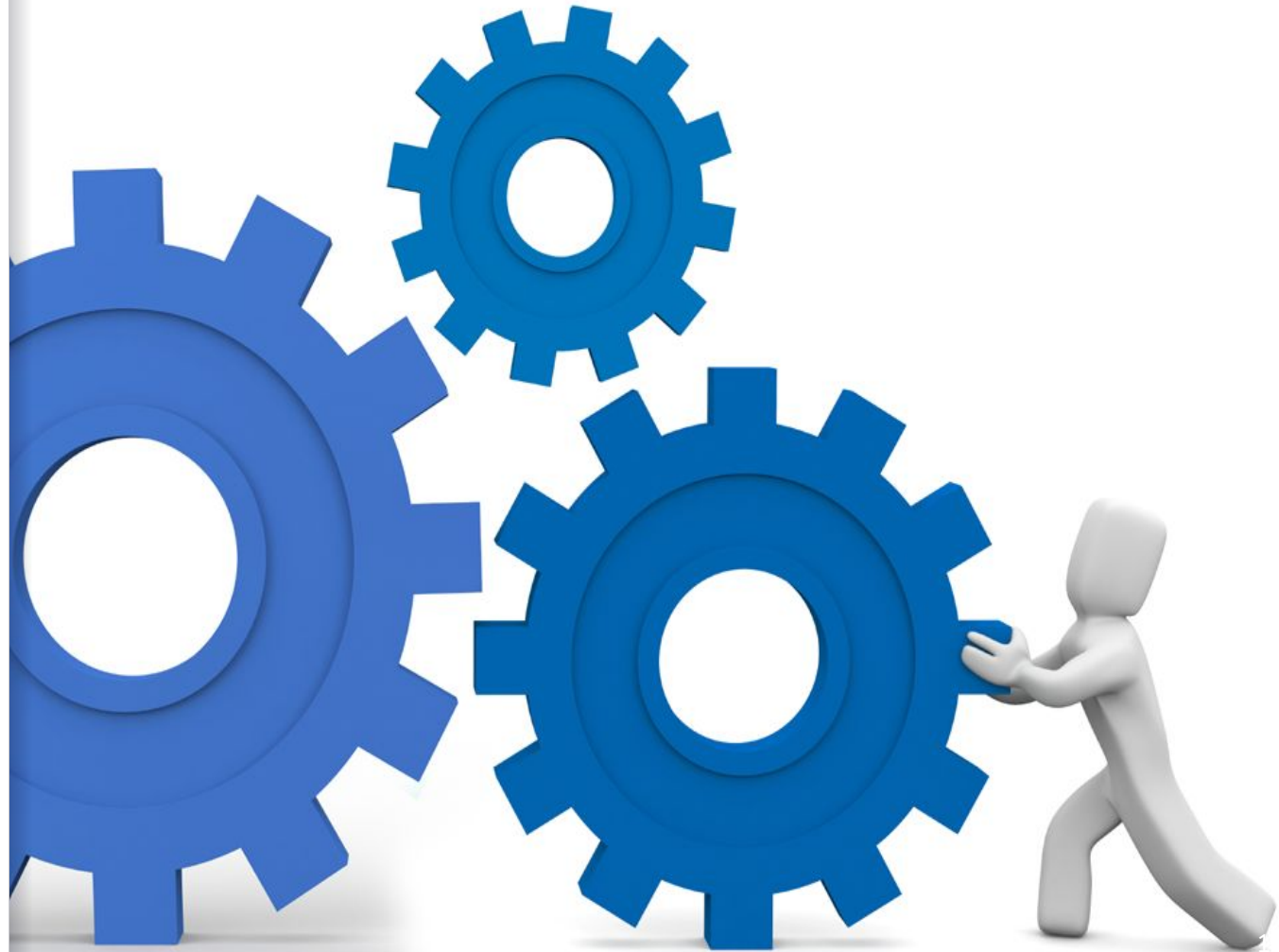


HDD PROBLEMS

p = The computer turns on
q = The operating system is slow
r = There are constant restarts
s = Blue screen-shots appears
t = There are errors when saving files
v = Metallic noise is heard



IMPLEMENTATION






TESTING AND EVALUATION



There are many windows with question to guide the user to an accurate solution.



When you press the power button, do you hear a beep?

☒ YES

☐ NO

NEXT

There are windows that show several options to decide.



How many and how are the beeps you hear?

- ☒ Continuous tone
- ☐ Six short tones
- ☐ Two long tones and one short
- ☐ Others

NEXT

There are
checkbox to
choose the
failures

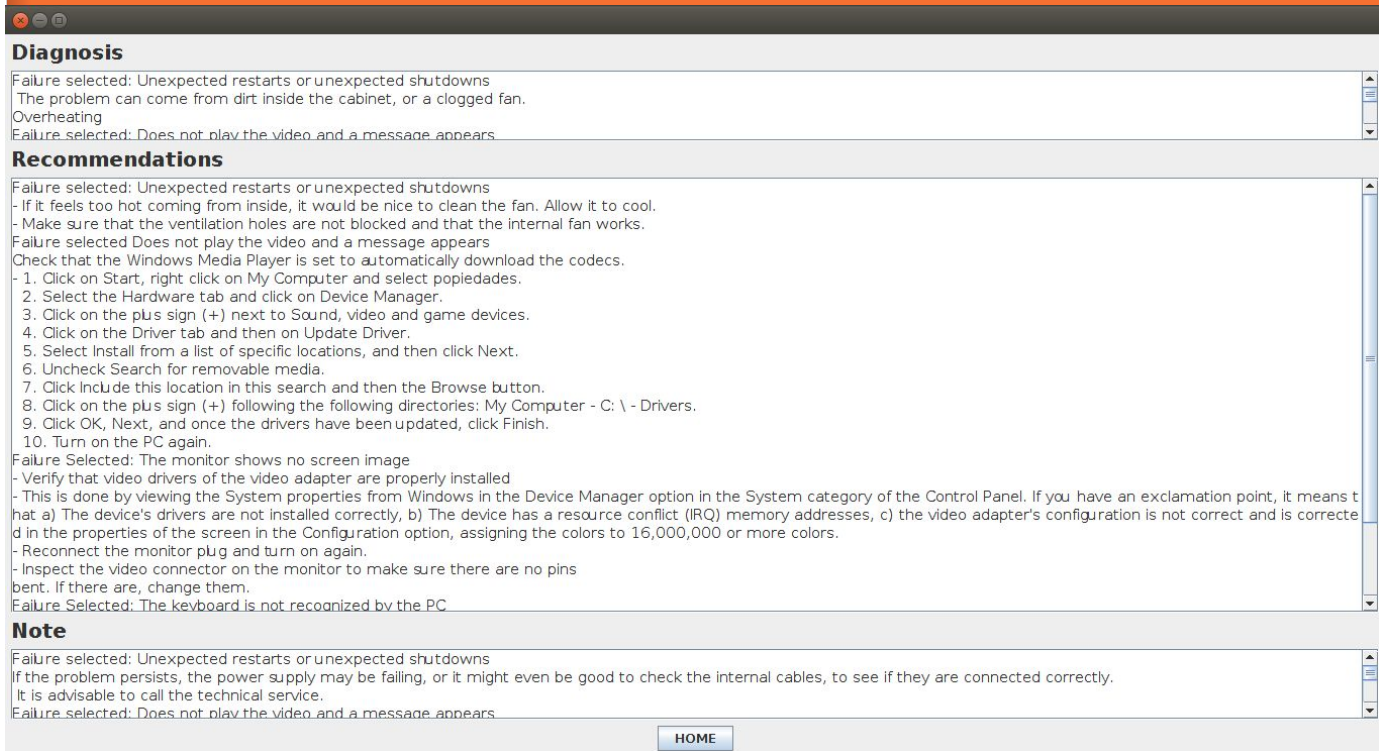


Please choose the failures that your computer presents.

<input type="checkbox"/> Unexpected restarts or unexpected shutdowns	<input type="checkbox"/> When playing an audio there is no sound
<input type="checkbox"/> Does not play the audio and a message appears	<input type="checkbox"/> Does not play the video
<input type="checkbox"/> Does not play the video and a message appears	<input type="checkbox"/> Unexpected closures
<input type="checkbox"/> Freezing	<input type="checkbox"/> Incorrect time and date
<input type="checkbox"/> The operating system is slow	<input type="checkbox"/> There are constant restarts
<input type="checkbox"/> Shown blue screenshots	<input type="checkbox"/> There are errors when recording files
<input type="checkbox"/> Metallic noise is heard	<input type="checkbox"/> The monitor shows a horizontal line when turning on
<input type="checkbox"/> The monitor shows blinks	<input type="checkbox"/> The monitor shows no screen image
<input type="checkbox"/> The monitor images do not have all the colors.	<input type="checkbox"/> The Mouse turns on and does not run
<input type="checkbox"/> The PC does not recognize the mouse	<input type="checkbox"/> The PC recognizes the mouse but does not run
<input type="checkbox"/> Keyboard does not respond	<input type="checkbox"/> The keyboard is not recognized by the PC

NEXT

Finally, a diagnosis windows is shown with recommendations and some important notes.



Diagnosis

Failure selected: Unexpected restarts or unexpected shutdowns
The problem can come from dirt inside the cabinet, or a clogged fan.
Overheating
Failure selected: Does not play the video and a message appears.

Recommendations

Failure selected: Unexpected restarts or unexpected shutdowns
- If it feels too hot coming from inside, it would be nice to clean the fan. Allow it to cool.
- Make sure that the ventilation holes are not blocked and that the internal fan works.
Failure selected Does not play the video and a message appears
Check that the Windows Media Player is set to automatically download the codecs.
- 1. Click on Start, right click on My Computer and select properties.
2. Select the Hardware tab and click on Device Manager.
3. Click on the plus sign (+) next to Sound, video and game devices.
4. Click on the Driver tab and then on Update Driver.
5. Select Install from a list of specific locations, and then click Next.
6. Uncheck Search for removable media.
7. Click Include this location in this search and then the Browse button.
8. Click on the plus sign (+) following the following directories: My Computer - C: \ - Drivers.
9. Click OK, Next, and once the drivers have been updated, click Finish.
10. Turn on the PC again.
Failure Selected: The monitor shows no screen image
- Verify that video drivers of the video adapter are properly installed
- This is done by viewing the System properties from Windows in the Device Manager option in the System category of the Control Panel. If you have an exclamation point, it means that a) The device's drivers are not installed correctly, b) The device has a resource conflict (IRQ) memory addresses, c) the video adapter's configuration is not correct and is corrected in the properties of the screen in the Configuration option, assigning the colors to 16,000,000 or more colors.
- Reconnect the monitor plug and turn on again.
- Inspect the video connector on the monitor to make sure there are no pins bent. If there are, change them.
Failure Selected: The keyboard is not recognized by the PC

Note

Failure selected: Unexpected restarts or unexpected shutdowns
If the problem persists, the power supply may be failing, or it might even be good to check the internal cables, to see if they are connected correctly.
It is advisable to call the technical service.
Failure selected: Does not play the video and a message appears

HOME

RECOMMENDATIONS





- The application could be extended to a larger field, including more failures.
- The application could be modified to give more explicit solutions with examples and some figures.
- If you want to have more detailed solutions it is recommended to have an expert engineer in technical failures.
- To make the application more accessible, it may be good to implement a version for smartphones.
- In order to have a better application experience, you should perhaps classify the users according to their level of computer knowledge.

Thank you!

