**Experiment 11: Integrate AI logic (search/expert system) into a shell script or system utility for task automation.**

## ****Aim****:

To **integrate AI logic (search or expert system)** into a **shell script** or **system utility** for **automating system tasks** such as file backup, software troubleshooting, or system health check.

## ****Description****:

Artificial Intelligence (AI) concepts like **search algorithms** or **expert systems** can be combined with **shell scripting** to automate decision-making tasks in Linux systems.

### What is an Expert System?

An **expert system** is a rule-based AI that mimics decision-making like a human expert by applying logical rules to known facts.

### Integration with Shell Scripts

We can simulate **simple inference** (IF-THEN rules) within shell scripts to:

* Diagnose system problems
* Recommend solutions
* Trigger automated responses

## ****Example Scenario****:

**System Troubleshooting Assistant using Expert System in Shell**

It:

* Checks CPU usage, memory, disk space
* Based on thresholds, suggests actions (restart services, cleanup, etc.)
* Acts like a rule-based AI

## ****Execution Process****

1. Script gathers system metrics using built-in tools.
2. Applies rule-based logic:
   * IF CPU > 90 → Suggest process audit
   * IF Free RAM < 10% → Suggest service restart
   * IF Disk Usage > 90% → Suggest cleanup
3. Displays suggestions based on facts.

## ****Shell Script: AI-Driven System Troubleshooter****

#!/bin/bash

# AI-Driven System Troubleshooter

# Thresholds

CPU\_LIMIT=90

MEM\_LIMIT=10

DISK\_LIMIT=90

echo "[INFO] Gathering system information..."

# Get CPU Usage

CPU\_USAGE=$(top -bn1 | grep "Cpu(s)" | awk '{print 100 - $8}')

CPU\_USAGE=${CPU\_USAGE%.\*}

echo "[INFO] CPU usage: $CPU\_USAGE%"

# Get Free Memory %

MEM\_TOTAL=$(free -m | awk '/Mem:/ {print $2}')

MEM\_FREE=$(free -m | awk '/Mem:/ {print $4}')

MEM\_PERCENT=$(( (MEM\_FREE \* 100) / MEM\_TOTAL ))

echo "[INFO] Memory free: $MEM\_PERCENT%"

# Get Disk Usage

DISK\_USAGE=$(df / | awk 'NR==2 {print $5}' | sed 's/%//')

echo "[INFO] Disk usage: $DISK\_USAGE%"

echo

# Expert System Rules

# Rule 1: High CPU

if [ "$CPU\_USAGE" -gt "$CPU\_LIMIT" ]; then

echo "[DIAGNOSIS] High CPU usage detected."

echo "[SUGGESTION] Recommend checking background processes using 'top' or 'htop'."

echo

fi

# Rule 2: Low Memory

if [ "$MEM\_PERCENT" -lt "$MEM\_LIMIT" ]; then

echo "[DIAGNOSIS] Low memory detected."

echo "[SUGGESTION] Recommend restarting heavy services or increasing swap space."

echo

fi

# Rule 3: Low Disk Space

if [ "$DISK\_USAGE" -gt "$DISK\_LIMIT" ]; then

echo "[DIAGNOSIS] Disk space is critically low."

echo "[SUGGESTION] Clean up log files or unnecessary data in /var/log or /tmp."

echo

fi

if [ "$CPU\_USAGE" -le "$CPU\_LIMIT" ] && [ "$MEM\_PERCENT" -ge "$MEM\_LIMIT" ] && [ "$DISK\_USAGE" -le "$DISK\_LIMIT" ]; then

echo "[STATUS] System health appears to be normal."

fi

## ****How to Run****

1. Save as ai\_diagnose.sh
2. Make it executable:

chmod +x ai\_diagnose.sh

1. Run the script:

./ai\_diagnose.sh

## ****Sample Input (No user input required)****

System conditions:

* CPU Usage: 92%
* Memory Free: 4%
* Disk Space: 91%

## ****Sample Output****

[INFO] CPU usage: 92%

[INFO] Memory free: 4%

[INFO] Disk usage: 91%

[DIAGNOSIS] High CPU usage detected.

[SUGGESTION] Recommend checking background processes.

[DIAGNOSIS] Low memory detected.

[SUGGESTION] Recommend restarting memory-intensive services.

[DIAGNOSIS] Disk space low.

[SUGGESTION] Recommend cleaning /var/log or temp files.