Power Manager Telemetry

Team Name : Whitecaps

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Problem Statement

In the era of 5G and edge computing, the extensive deployment of devices across various locations has led to a significant increase in power consumption. To address this issue, there is a governmental push for enterprises and industries to reduce power usage and achieve net-zero power consumption. Additionally, the rising cost of electricity makes it crucial to understand and manage the total power drawn by systems. The problem is to identify and measure power utilization effectively across various system components (CPU, memory, NIC and battery) to develop strategies for optimizing power consumption in high-utilization scenarios.

Unique Idea Brief(Solution)

To address the increased power consumption associated with extensive 5G and edge computing deployments, the project involves a comprehensive approach utilizing Python. We begin by researching and identifying devices responsible for the most power consumption in a PC. Then, we identify and utilize open-source tools to measure power consumption, documenting system parameters (BIOS settings, OS-level configurations) that influence power usage. Using Python scripts, we automate the collection of real-time telemetry data from CPU, memory, NIC and battery to simulate different utilization levels. The collected data will help measure power consumption at various loads.This integrated approach aims to give an idea power consumption, contributing to sustainability goals amidst rising electricity costs.

Features Offered

- **Open-Source Tool Identification:**Research and evaluation of tools for power measurement..
- **Automated Data Collection:**Development of Python scripts to automate the collection of telemetry data from CPU, memory, NIC and battery.
- **Utilization Monitoring:** monitoring and recording of utilization at various system levels.
- **Comprehensive Reporting:**Creation of detailed reports outlining utilization methodologies, findings.
- **Sustainability Focus:**Contribution to achieving net-zero power consumption.

Process Flow

- **Setup and Initialization**

Install necessary open-source tools for power measurement and data collection (e.g., powercfg, psutil).

Install Python libraries for data handling and plotting (e.g., pandas, matplotlib).

- **Script Execution**

Write a Python script that:

Collects real-time telemetry data (CPU, memory, NIC utilization and battery).

Measures power consumption using identified tools.

Aggregates and processes the collected data.

- **Collect Data**

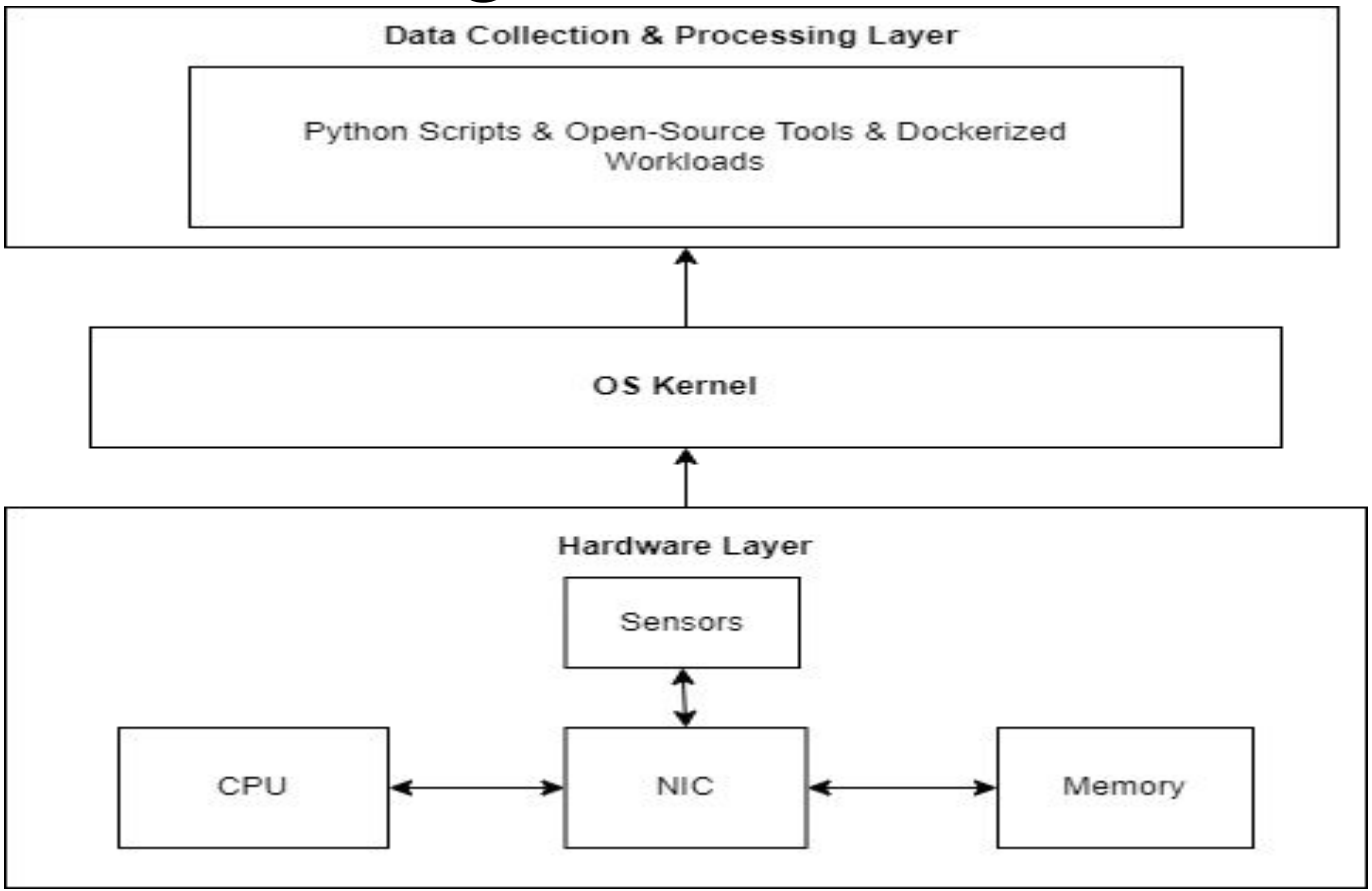
Use psutil or similar libraries to gather system metrics.

Process Flow

- **Plot Data**

Read the CSV file using pandas.
Plot the data using matplotlib to visualize power consumption against system utilization.

Architecture Diagram



Conclusion

This project effectively showcases a method to monitor power consumption in systems used in computers. By utilizing Python and open-source tools, we automated telemetry data collection, measured utilization , and visualized the results in detailed reports and graphs. Collecting and measuring data using tools like psutil, and generating actionable insights through CSV reports and visual plots. This integrated method aims to enhance power efficiency, contributing to sustainability and cost reduction amidst rising electricity costs.