Power Manager Telemetry

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July 15, 2024

Problem Statement

In the era of 5G and edge computing, the deployment of devices across various locations has surged, leading to increased power consumption. The government is encouraging enterprises and industries to reduce power usage to achieve net-zero power consumption. Additionally, rising electricity costs make it crucial to understand the total power drawn by systems.

Unique Idea

- Our project aims to create a comprehensive telemetry system to monitor and manage power consumption across CPU, memory, NIC, and TDP.
- By utilizing open-source tools and creating a solution to run and utilize a system while gathering telemetry data, we can measure and analyze system power utilization based on system utilization percentage.

Features Offered

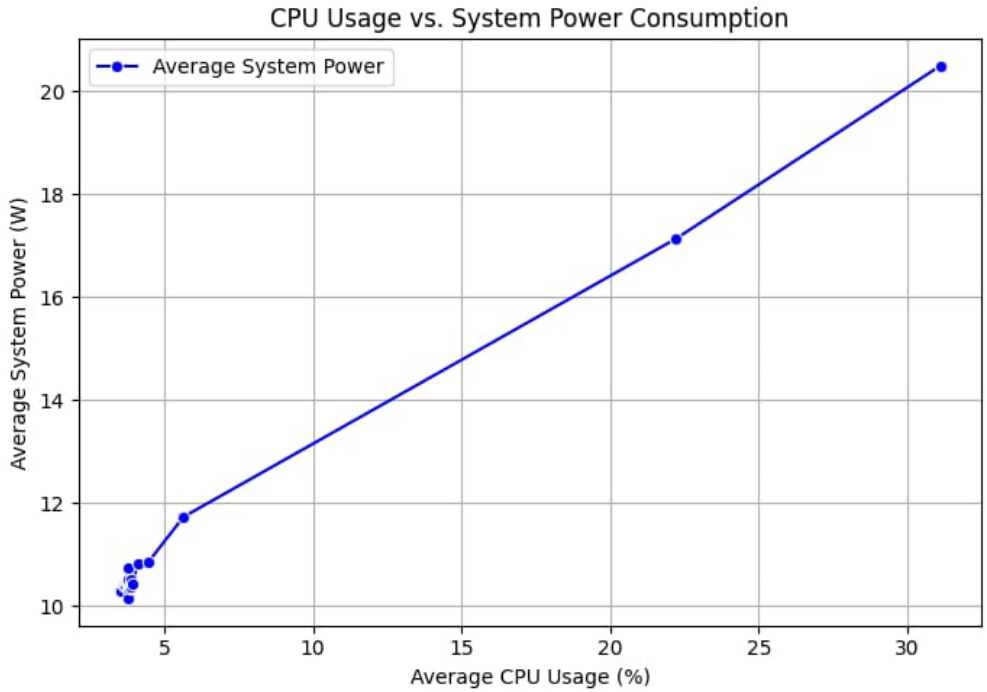
- Collection of telemetry data from CPU, memory, NIC, and TDP.
- Measurement and recording of system power utilization for different components.
- Running traffic to achieve 100
- Detailed reporting on power consumption issues, technical approaches, and results.

Process Flow

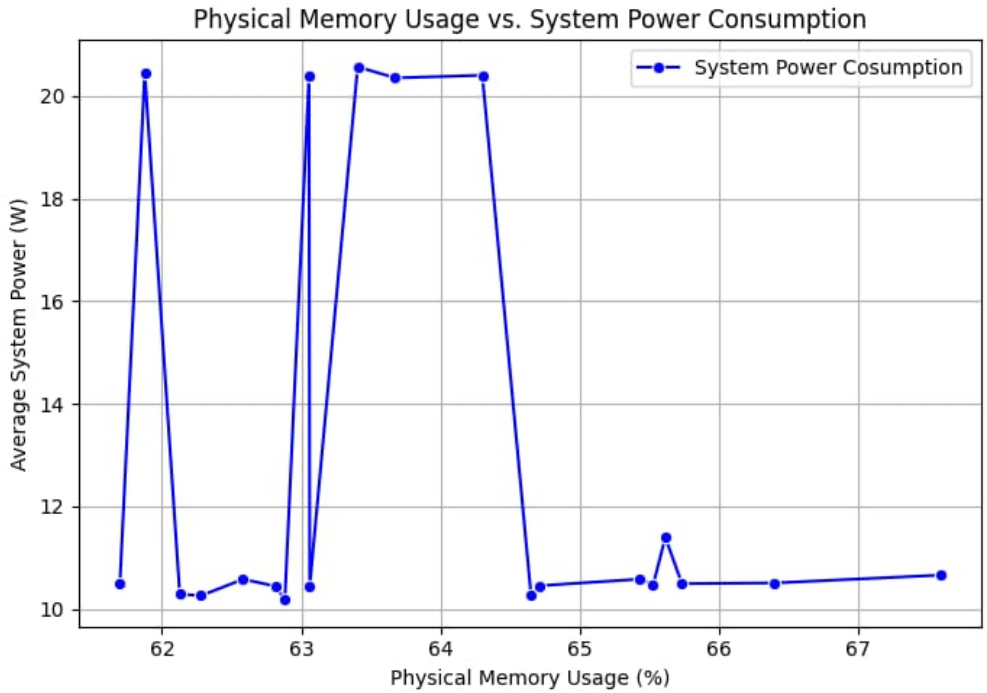
1. **Research and Identification:**
   - Identified and documented open-source tools for power measurement.
   - Documented available knobs in a system to measure power.
2. **Data Collection:**
   - Collected power telemetry data from CPU, memory, NIC, and TDP.
3. **Utilization Measurement:**
   - Measured and recorded system power utilization for CPU, NIC, and TDP based on system utilization percentage.
4. **Traffic Simulation:**
   - Ran traffic to consume 100
5. **Solution Implementation:**
   - Created a solution to run and utilize a system while collecting telemetry data.
6. **Reporting:**
   - Compiled a detailed report on the power problem, technical approach, and results.

Plots

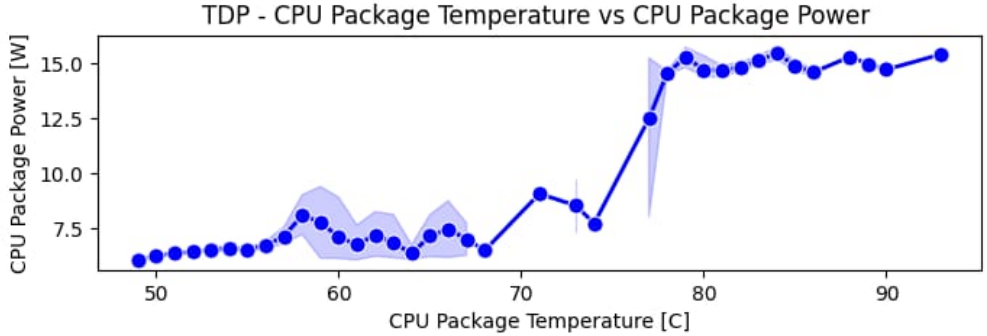
- **Plots:**
  - CPU Utilization vs. Power Consumption

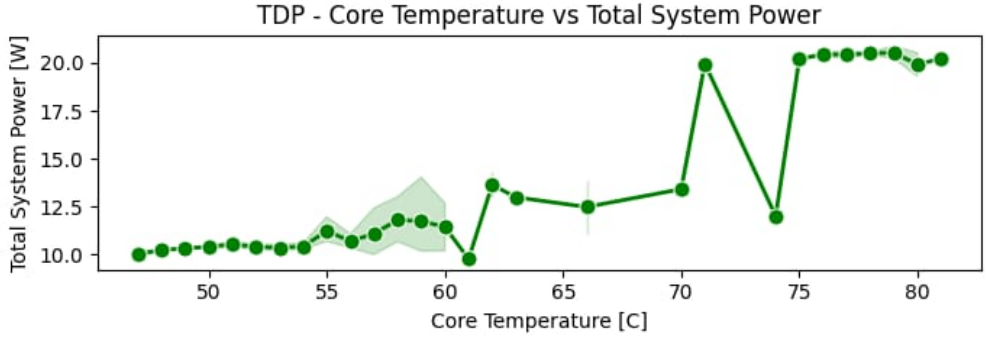


- **Plots:**
  - Memory Utilization vs. Power Consumption



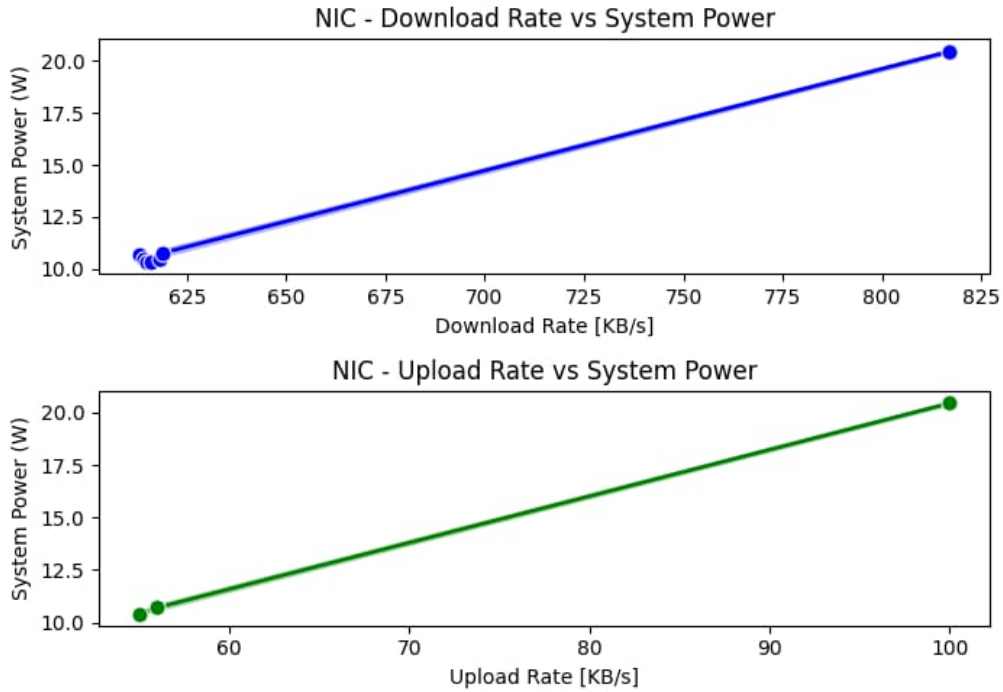
- **Plots:**
  - TDP Utilization vs. Power Consumption


TDP - CPU Package Temperature vs CPU Package Power
CPU Package Power [W]
15.0
12.5
10.0
7.5
50
60
70
80
90
CPU Package Temperature [C]


TDP - Core Temperature vs Total System Power
Total System Power [W]
20.0
17.5
15.0
12.5
10.0
50
55
60
65
70
75
80
Core Temperature [C]

- **Plots:**

  - NIC Utilization vs. Power Consumption



Technologies Used

- **Programming Languages:** Python, Bash, Powershell Scripts
- **Tools:** OpenHardware Monitor, HWinfo, powerstat, CPU-Z, Windows Performance Recorder, Performance Analyzer, Power View
- **Platforms:** Linux, Windows
- **Containers:** Kubernetes, Docker

Team Members and Contribution

- **Midhun Mathew:** Power Measurement Tools Research,Data collection
- **Ashly Biju:** Traffic creation,UI creation
- **Sharan Susan Aby:** Solution implementation,Reporting
- **Roshan R John:** Data analysis,Plot generation
- **Blesson Biji:** Data Analysis,utilisation measurement

Conclusion

Our Power Manager Telemetry project provides a robust solution for monitoring and managing power consumption across critical system components. By leveraging open-source tools and implementing efficient data collection and analysis techniques, we aim to aid enterprises in reducing power usage and achieving net-zero power consumption. Our detailed reporting offers valuable insights into power problems and technical approaches, paving the way for future advancements in sustainable computing.