# problem statement

**Title: Power Manager Telemetry**

**Subtitle: Efficient Power Management for 5G and Edge Computing**

**Team Name: Tech Giants**

# problem statement

## Description

**The deployment of devices across various locations has surged with the advent of 5G and edge computing, leading to increased power consumption. The government aims to achieve net-zero power consumption, pushing enterprises to optimize power usage.**

## Challenges

- **Rising electricity costs necessitate an accurate understanding of the total power drawn by systems.**
- **Efficient power management is crucial to sustain the growth and deployment of new tecs**

## Unique Idea Brief

- **Objective:**
  Develop a solution to monitor and collect telemetry data from key system components (CPU, memory, NIC, and TDP).
- **Approach:**
  Use python and the ‘psutil’ library to gather detailed power usage data.
  Simulate system load to measure power utilization accurately.
- **Impact:**
  Provides insights for optimizing power consumption.
  Contributes to sustainability efforts by helping achieve net-zero power consumption.

# Features Offered

## Comprehensive Monitoring:

- **CPU Usage:** Tracks the percentage of CPU utilization.
- **Memory Usage:** Monitors the memory usage percentage.
- **NIC Usage:** Measures the total bytes sent and received.
- **Disk I/O Usage:** Collects data on read and write operations.
- **TDP Monitoring:** Monitors temperatures across multiple thermal zones.

## System Load Simulation:

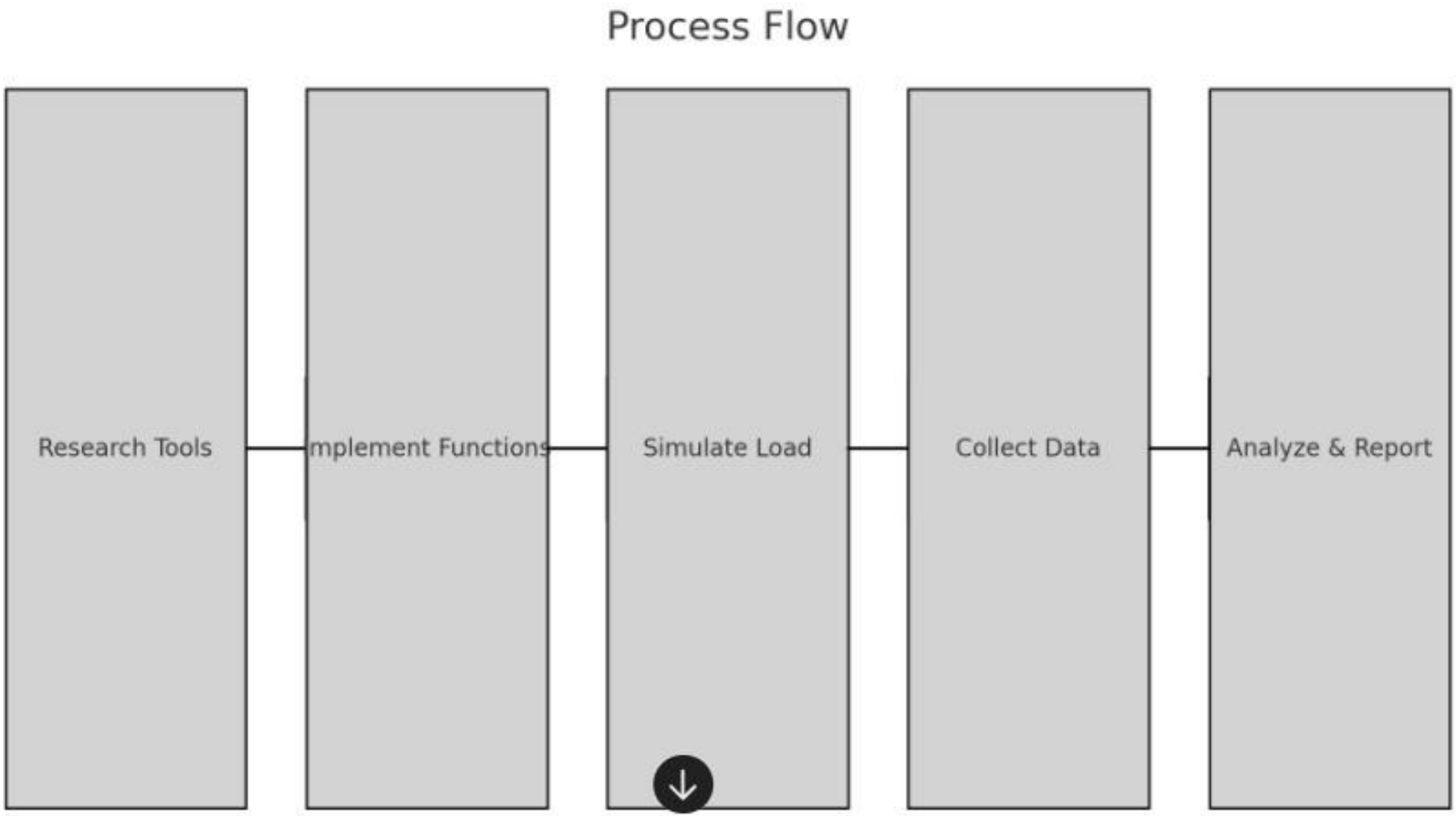
**Simulates varying levels of system load to achieve specific utilization targets, enabling accurate measurement of power consumption under different operational conditions.**

## Reporting:

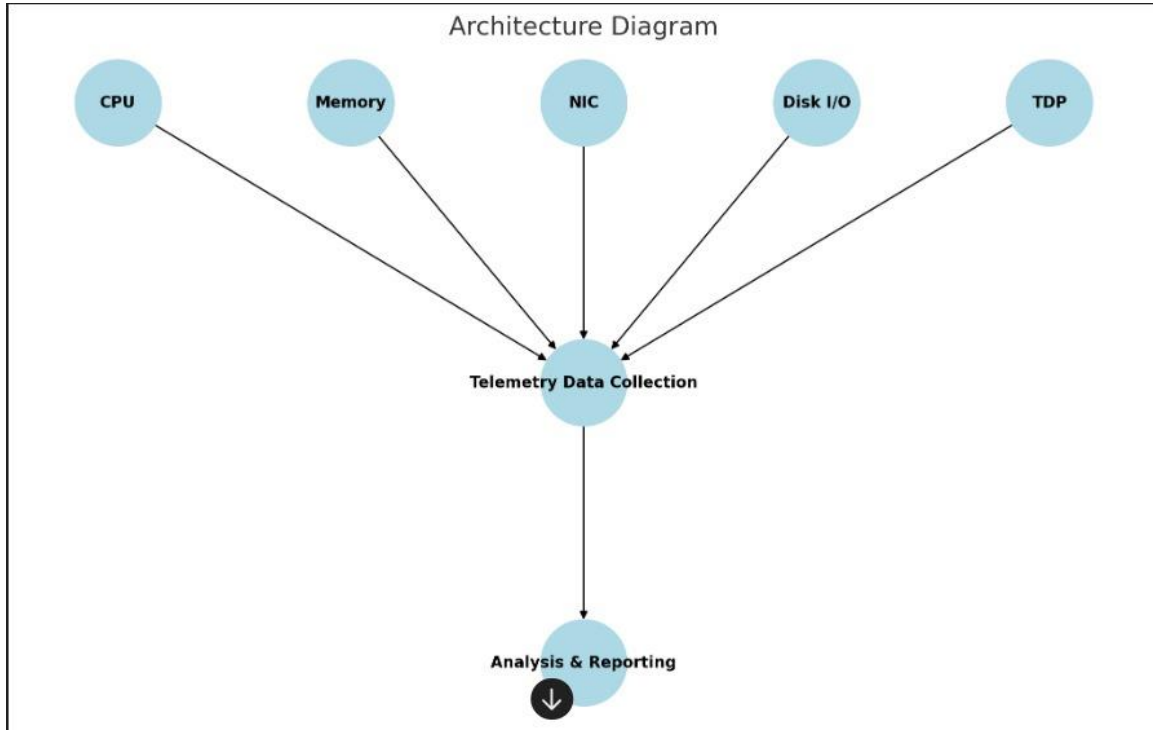
**Detailed Telemetry Data Collection:**
Collects and logs comprehensive telemetry data from CPU, memory, NIC, disk I/O, and thermal design power (TDP) sensors, facilitating thorough analysis and optimization strategies.

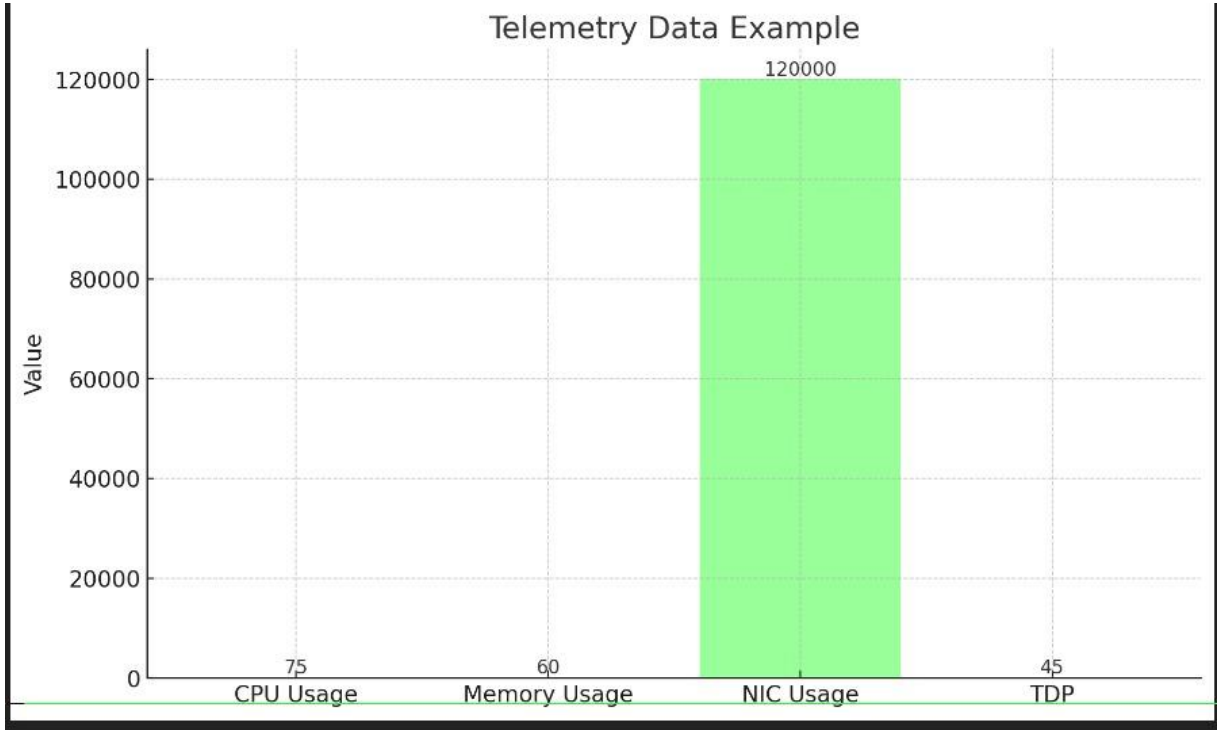
**Real-time Alerts:**
Generates alerts based on predefined thresholds for CPU, memory, or network usage, allowing proactive management and immediate response to critical performance issues.

# Processflow



# Architecture Diagram



# Technologies used

**Programming Languages and Libraries:**

**Python:** Main programming language used for scripting.psutil: Python library for retrieving information on system utilization (CPU, memory, disks, network, sensors).

**Operating System:**

**Linux:** Preferred OS for its extensive support for system monitoring and telemetry tools.

**Containerization:**

**Kubernetes/Docker:** Used for simulating system load using containers.

# Team members and contribution:

## Team members and contribution :

Team Leader : Dipak  Jadhav
 Contribution : Cloud Deployment

Team Leader :  Shubham Gatthewar
 contribution : Python Developer

Team Leader : Prathamesh  Bembre
 Contribution:  Python Developer

Team Leader : Sahil  Mukkawar
 Contribution: Documentation and Research

Team Leader :  Aditi Bandewar
 contribution: Documentation and Research

# Conclusion

- **Summary**:
  - Highlighted the importance of efficient power management in the era of 5G and edge computing.
  - Developed a comprehensive solution to monitor and collect power telemetry data.

- **Outcomes**:
  - Successfully collected detailed telemetry data from CPU, memory, NIC, disk I/O, and TDP.
  - Simulated system load to measure power utilization accurately.
  - Generated reports providing insights for optimizing power consumption.

- **Future Directions**:
  - Expand the monitoring scope to include additional system components.
  - Integrate machine learning algorithms to predict and optimize power usage dynamically.
  - Collaborate with industry partners to implement the solution at scale.