

Data Center Power & Cooling Systems: Traditional Approach

Facility Managers and Data Center operators have traditionally used Building Management Systems (BMS) and Data Center Infrastructure Management (DCIM) software for monitoring their power and cooling systems to receive timely alerts when critical parameters deviate from normal.

Energy Reporting

With energy costs dominating OPEX in most large data centers, BMS and DCIM were extended to provide timewise/device-wise energy reports, trend graphs and KPIs like PUE. GFS Crane DCIM also provides 2D/3D Layouts with thermal mapping and capacity planning to determine incremental power, cooling, and space requirements when more IT load are added.

New Approach: Energy Analytics

While still important to constantly monitor all devices for timely alerts and report on historical data, it has now become imperative to analyze energy and cooling data to derive predictive models to optimize energy use and lower PUE.

This requires rigorous statistical models, which can correlate data and bring out statistically significant predictors that may shift PUE above baseline. To avoid this, analysis of under-utilization of IT load must be carried out to determine potential and scope for improving energy efficiency. Also important is to determine extent of wasted power in over-cooling Racks where IT load is low.

GFS Crane Miner

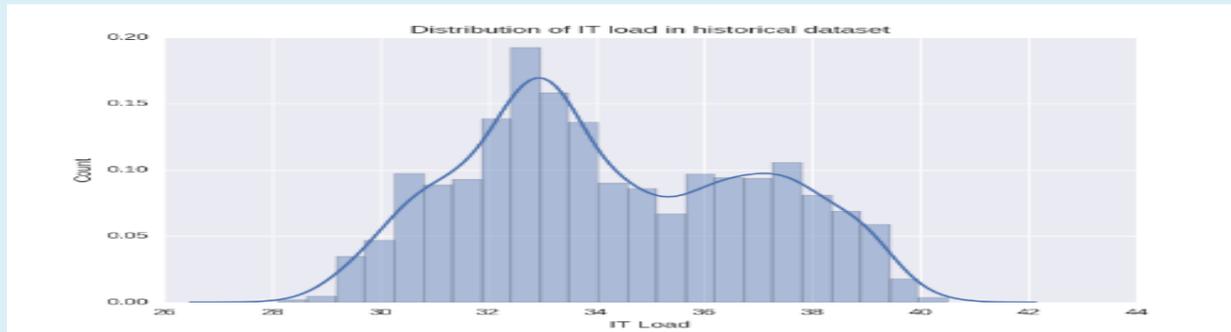
GFS Crane Miner is Energy Analytics Software for Data Centers, analyzing Power and Cooling data, obtained from any DCIM or BMS. It further analyzes IT load from monitored data of Rack iPDUs.

After data cleansing, removing outliers and using combination of statistical and visual techniques, GFS Crane Miner provides insights to data center operations. Like a Color-Coded Cooling Influence Map that shows effect of cooling units on each Aisle, juxtaposed with power and heat loads of individual racks on that Aisle. And of course, power and heat load on a rack is directly proportional to IT load on that rack.

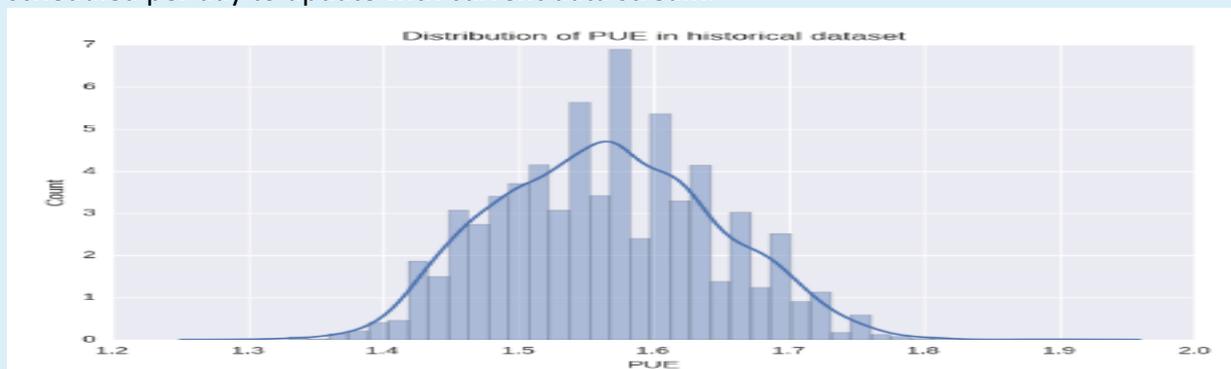
GFS Crane Miner Overview

Analytics to determine:

- Optimal cooling required for different IT loads to derive the best PUE
- Areas of White Space that can do with less cooling to derive best PUE
- PAC units performing below par and therefore needs attention
- Optimal load distribution between different UPS units



An example of a linear model to forecast the probable PUE given an IT load. The model can be scheduled per day to update with current data stream.



The slope indicates the possibility of underutilization of IT load or unregulated cooling. Data cleaning requires clipping of noises from predictor variables. Above chart shows clipped IT load data which lies outside of $\pm 10\%$ of the mean.

GFS Crane Miner, an Energy Analytics Software, helps to maintain the desired level of PUE in a dynamic environment of a Data Center and to adjust to various ICT and non-ICT loads associated with Data Center operations. Based on its predictive modelling, various measures can be initiated proactively to attain the desired energy efficiency.

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