
# Proposal for Project

Remote Monitoring of Power Consumption in a Cloud Server Network

*Version Optimus 1.1 - April 22, 2014*

Customer: Patrik Arlos

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# 1. Preface

This proposal document is primarily aimed at the parties involved in this project, that is, the customer and the company involved in providing solution to the customer's needs. The company comprises of Chief Executive Officer (CEO) and the developer team Zenoss. This is **version Optimus 1.1** of the project proposal. This is the revised project proposal with changes made to the previous version according to the feedback received from the CEO and the customer. The rest of the document starts with glossary and abbreviations which define the technical terms and abbreviations used in the document. Secondly, the document contains background which specifies the customer's business environment and an overview of the customer's needs and problems which will be addressed by the product. Thirdly, the document contains the proposed solution which meets the customer's expectation. Further, the document contains limitations which are associated with the product. Finally, a detailed time plan is mentioned about how the product will be developed and detailed work breakdown structure associated with it.

# 2. Glossary and abbreviations

**API-** *Application Program Interface*

An interface, generally specified as a set of operations, that allows access to an application program's functionality.

**Cloud Computing**

The provision of computing and/or application services over the Internet using a large number of commodity computers and virtualization technology to make effective use of these systems.

**CN-** *Computer Node*

**Gantt Chart**

An alternative name for a bar chart.

**HTTP-** *Hypertext Transfer Protocol*

It is an application protocol for distributed, collaborative and hypermedia information systems.

**NMS-** *Network Management System*

It constantly monitors a computer network and notifies the network administrator in case of outages.

**PDU-** *Power Distribution Unit*

It is a device designed to distribute electric power with multiple outputs.

**SNMP-** *Simple Network Management Protocol*

It is an internet-standard protocol for managing devices on IP networks.

**SSH-** *Secure Shell*
It is a cryptographic network protocol for secure network services between two networked computers.

**UPS-** *Uninterruptable Power Supply*
It is an electrical device that provides emergency power when the input power supply fails.

**VM-** *Virtual Machine*
It is a software based emulation of a computer. Virtual Machines operate based on the computer architecture and functions of a real or hypothetical computer.

# 3. Background

The advent of cloud computing has given rise to multiple products and services which were unheard of before and most importantly it has eased the burden on the users. Today, users can just log in through the internet and access these services without actually installing anything. Cloud computing also enables service providers to maximise their profits by reducing their operational costs substantially. These significant features make cloud computing really lucrative for businesses on different levels.

On the other hand cloud providers also have to ensure that they reduce carbon emissions and maintain environmental standards. This can be achieved if power consumption of devices in use is monitored in an effective manner. Thus, through monitoring, unnecessary consumption of power can be detected and reduced.

The customer, a Green Cloud provider, wants to monitor the power consumption of each device (UPSs, PDUs, CNs, and VMs) in the network. Additionally, the customer also intends to monitor the total power consumption at each node of the network and the total power consumed by the network in real-time. Through this monitoring the customer can also keep a check on redundant power loss which could be due to reasons such as unauthorised or unknown connection to the power unit or existence of an unidentified device in the network that is consuming power.

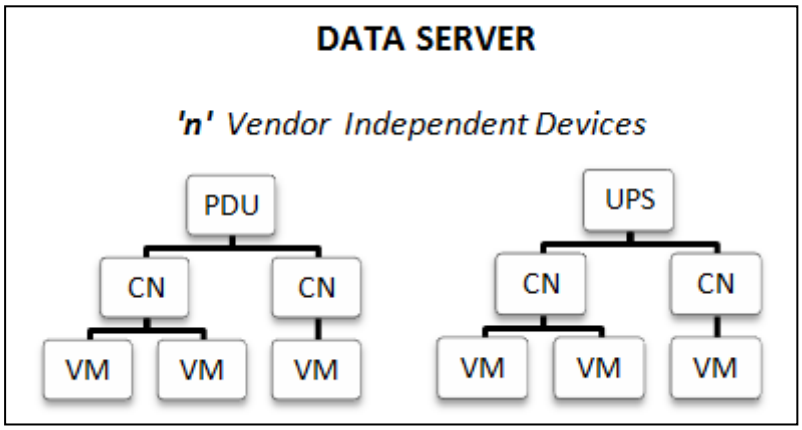


Figure1. Block Diagram of customer's network

# 4. Proposed solution

The basic requirement of the customer is monitoring power consumption by the network. In more detail, the customer wants this need to be addressed in the following way:

- Monitoring of power consumption with Zenoss as the front end. However, the product must also be compatible with any other Open NMS.
- Total power consumed by the network to be determined in real-time.
- Power consumption of each device (UPSs, PDUs, CNs, VMs) is to be measured as:
  - Current power
  - Average power
  - Minimum power
  - Maximum power
- These statistics should be stored in a server and be retrievable by using either SNMP, HTTP or SSH protocols.
- Statistics are to be presented as graphs on the front end in different time scales.

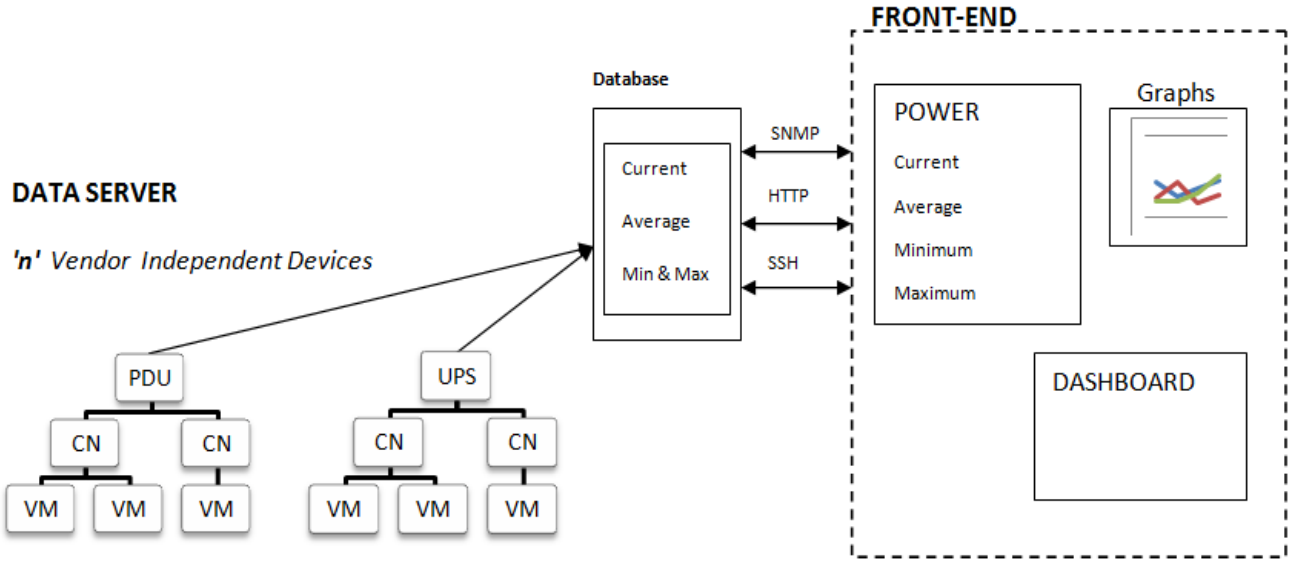


Figure2. Block diagram of the proposed solution

The tasks for which the developer team is responsible for are:

i. Create an API that will be used by the customer to monitor power consumption.
ii. Create a program/script such that it can be run for any arbitrary number of devices as per the customer's requirements.
iii. Provision of a database that will be used to store the various statistics measured regarding power consumption.
iv. The product developed must monitor any device irrespective of the vendor.

# 5. Limitations

The project is limited to measure only power consumption.

# 6. Time plan

| S.no | Task | Days Required (estimated) | Starting in |
|---|---|---|---|
| 1 | **Project Allocation** | | **09-04-2014** |
| **2** | **Project Proposal**<br>• Research about the topic area.<br>• Determining the underlying aspects related to customer's requirements.<br>• Documentation of the Proposal. | **6** | **Week 1** |
| **3** | **Software Requirements Specification**<br>• Defining the customer's needs and their environment.<br>• Individual research and congregation of the material (Research pertaining to the different types of architecture possible).<br>• Defining the architecture of the system according to the customer needs.<br>• Documentation of the software requirements. | **12** | **Week 2** |
| **4** | **Software Design**<br>• Research on Programming tools which facilitate the project.<br>• Selection of programming language required in each stage of the architecture.<br>• Designing API. | **10** | **Week 3** |
| **5** | **Implementation**<br>• Writing the code to implement the system architecture defined in the software requirements.<br>• Code optimisation. | **10** | **Week 4** |
| **6** | **Testing and Validation**<br>• Testing the code for bugs.<br>• Testing the code for the customer's work environment.<br>• Revisit and review the source code if the requirements are not met. | **7** | **Week 5** |
| **7** | **Documentation** | **5** | **Week 6** |
| **8** | **Demo for the Customer** | **1** | **Week 6** |
| **9** | **Final Product Delivery** | | **22-05-2014** |
| **10** | **Final Project Presentation (Tentative Date)** | | **26-05-2014** |

Table1. Time Plan

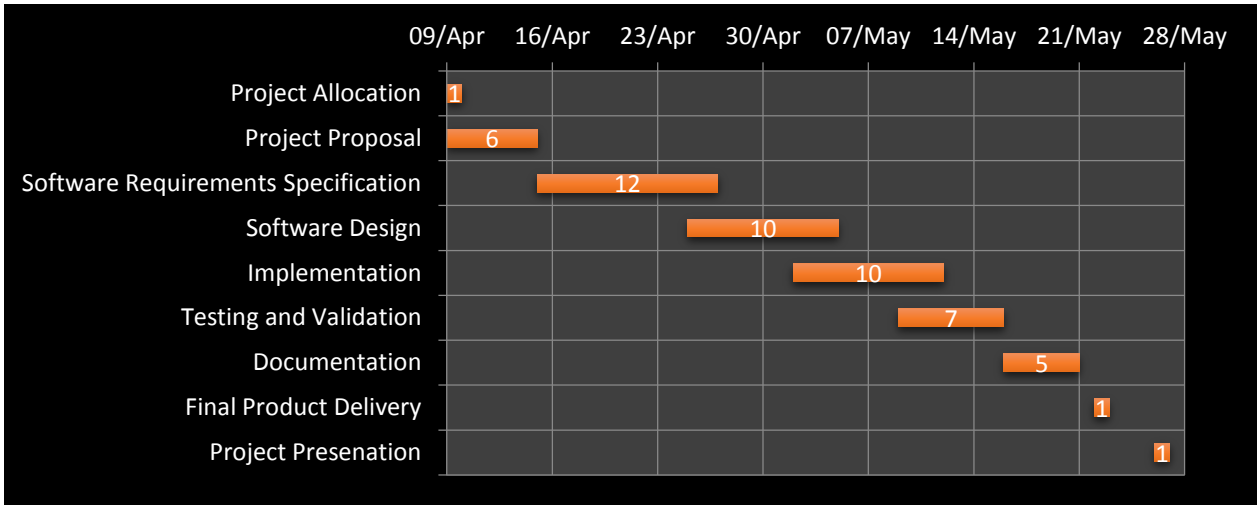


Figure3. Gantt chart

| Checkpoint | Task | Parties involved | Estimated completion date |
|---|---|---|---|
| Tollgate 01 | Project Proposal | Customer and CEO | 14th April |
| Milestone 01 | Project Plan | Team Zenoss and CEO | 16th April |
| Tollgate 02 | Software Requirement Specification | Customer and CEO | 24th April |
| Milestone 02 | Software Design | Team Zenoss and CEO | 28th April |
| Milestone 03 | Software Implementation | Team Zenoss and CEO | 5th May |
| Milestone 04 | Testing and Validation | Team Zenoss and CEO | 12th May |
| Milestone 05 | Documentation | Team Zenoss and CEO | 19th May |
| Tollgate 03 | Demo | Customer and CEO | 22nd May |
| Tollgate 04 | Final Product Delivery | Customer and CEO | 26th May |

Table2. Milestones and Tollgates