



USER DOCUMENT

Power Usage Monitoring from UPS, PDU and hosts for a Data Centre Company

Visuallux: web based remote power consumption monitoring tool

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PREFACE

Welcome to VisualLux. You are about to experience the flavors of power monitoring. Power Usage Monitoring Software is designed to monitor the power used by UPS, PDU and devices. This user manual provides a detailed description of all the features implemented in the software. The document starts with glossary and abbreviations which define the technical terms and the abbreviations used in the document. Secondly, the computer requirements are described. Thirdly, the document describes about the functional aspects in the GUI. Each function is explained in detail with help of images.

Glossary and abbreviations:

SNMP- Simple Network Management Protocol

IP - Internet Protocol

CURL - Client for URLs

CN- Computer Node

HTTP- Hypertext Transfer Protocol

PDU- Power Distribution Unit

UPS- Uninterruptable Power Supply

Computer Requirements

- Ubuntu 14.04
- Minimum of 1GB RAM
- Minimum of 2GHz processor speed
- Internet connection
- SNMP installed computer
- Browser


How to Use Visuallux

- Open a web browser.
- Type URL: “http://<Ip_address_of_your seerver>/Visuallux”. This will redirect to the login page of NetFix

- Login with username: “admin” and password “admin”
- Add user
- User can log in using their usernames, passwords and can logout by clicking logout button on top right corner

VisualLux login page

When you open this page, a Welcome message will be displayed. In visual lux, there are three type users. Administrator, normal User and Guest. During first Installation of the software, you should login as an administrator and change the username and passwords. Moreover add users as required.

**Power Usage Monitoring**

Welcome to VISUALLUX Software

WELCOME TO VISUALLUX

USERNAME:

PASSWORD:

Figure 1 VisualLux login page

1. Admin page

The admin is responsible for all operations. Hence the admin have all rights on the devices. He/she can add, delete and view UPSs and PDUs. He/she also have the right to create and remove users. Moreover, the admin can assign threshold values for notifications messages to be sent. In general, the admin is everything.

VISUALLUX POWER CONSUMPTION MONITORING TOOL log out

UPS MANAGEMENT:

ID: IP: PORT: COMMUNITY: DEVICES: PDU:

PDU MANAGEMENT:

ID: IP: PORT: COMMUNITY:

USER REGISTRATION:

EMAIL: PASSWORD:

OID MANAGEMENT:

OID Management: [OID Management](#)

RESTFUL API

URL([http://...](#)):

Restful Data:

EMAIL AND THRESHOLD CONFIGURATION:

NAME: EMAIL: PHONE:

WARNING: DANGER: CRITICAL:

TRAP MANAGER CONFIGURATION

IP: Port: Community:

WARNING: DANGER: CRITICAL:

Figure 2 Admin page

1.1. UPS MANAGEMENT

The admin is assumed to have all the privileges. From this page, the admin can add, Delete, View and plot statistics of all UPSs.

1.1.1. Register Button

UPS MANAGEMENT:

ID: IP: PORT: COMMUNITY: DEVICES: PDU:

Figure 3 Register Button

New arrival UPSs are registered here. The admin should specify the ID(name of the UPS which is unique), IP, PORT and COMMUNITY of newly arrival devices. A UPS is fully specified either by its ID or by a combination of IP, port and community of the devices

1.1.2. Delete UPS Button

The admin can also delete existing UPSs along with devices connected to them in the power network. Once deleted, these UPSs will no longer be monitored unless it is registered again. This is the privilege given only to the admin of the system

1.1.3. View UPS Button

This Button has two benefits. If the user specifies the full information of the UPS(ID, IP, port, community), then full information(voltage, current, remaining battery capacity, running time, power usage) of the specified UPS will be displayed. If the user doesn't know the name of the UPS he/she is looking for, simply hitting this button without specifying UPS information will display the entire UPSs which are being monitored in the system. From there he/she can choose the UPS of his/her interest and can view the statistics.

1.2. UPS STATISTICS PAGE

When you click on view UPS button, you will be provided with the dashboard of the available UPSs along with their power delivery, load, capacity (along with meter indicator), and Run time. You can plot the power, battery capacity and runtime metrics by clicking on the "PLOT_UPS_ID" link of the right second most column for a UPS of your interest. You can also see the power map for each device. For more details, see section 1.2.1 and 1.2.2

UPS STATISTICS										
id	IP	PORT	COMMUNITY	POWER	LOAD	CAPACITY	CAP_IND.	RUN TIME	PLOTT	VIEW MAP
PDU-02	192.168.184.25	1161	ups2	2034	51	100	<div></div>	29 minutes, 00.00	PLOT PDU-02	MAP PDU-02
UPS-01	192.168.184.25	1161	ups1	2034	51	100	<div></div>	29 minutes, 00.00	PLOT UPS-01	MAP UPS-01
UPS-03	192.168.184.25	1161	ups3				<div></div>		PLOT UPS-03	MAP UPS-03

Figure 4 UPS STATISTICS PAGE

1.2.1. PLOT_UPS_ID

As an admin, you can plot UPS statistics

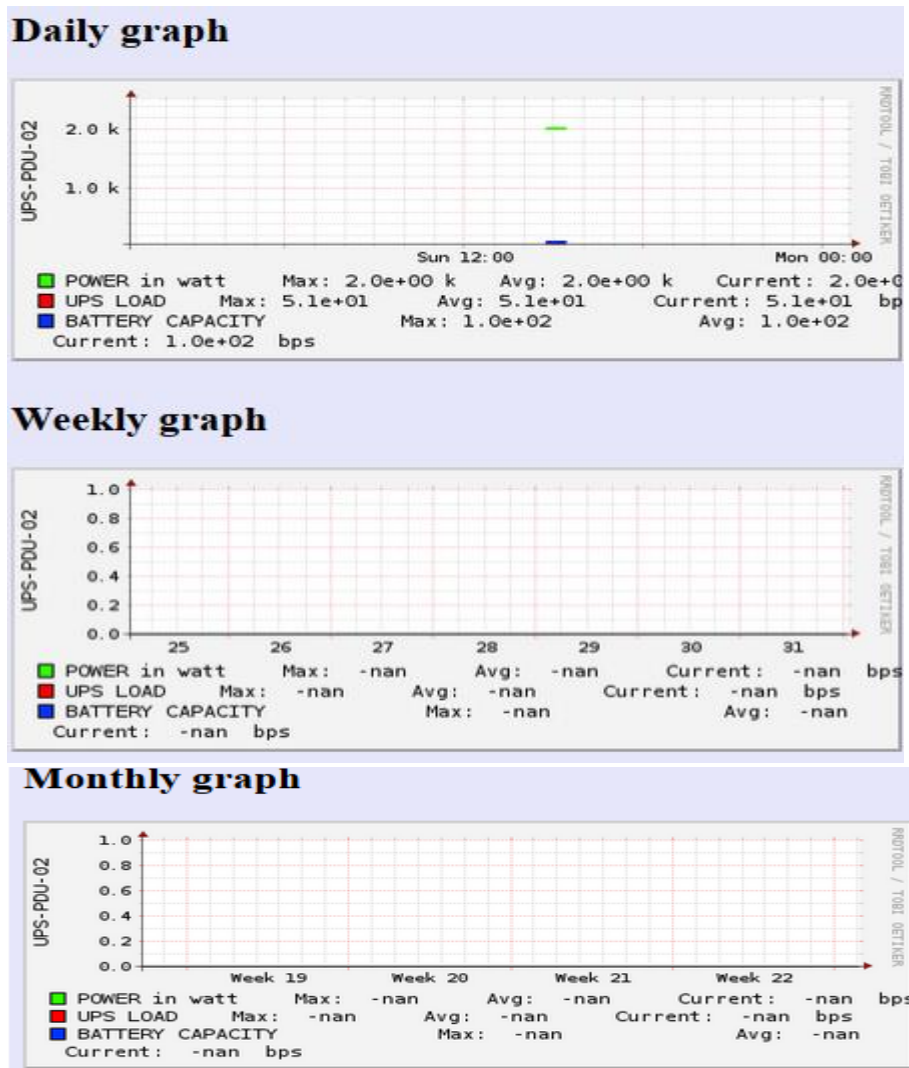


Figure 5 UPS statistics

1.2.2. MAP_UPS_ID

Power map shows how systems are interconnected to each other.

POWER MAP		
PDU ID	UPS ID	DEVICES
PDU-01	UPS-01	laptop,devices
PDU-01	PDU-02	freezer, pc1, pc2
PDU-02	UPS-03	pc4,pc5

Figure 6 power map

1.2.3.Reset Button

clears the text boxes

1.3. PDU MANAGEMENT

1.3.1.Register Button

New arrival PDUs are registered here. Similar to UPSs, the admin should specify the ID (name of the UPS which is unique), IP, PORT and COMMUNITY of newly arrival devices. A UPS is fully specified either by its ID or by a combination of IP, port and community of the devices

1.3.2.Delete UPS button.

The admin can also delete existing PDUs in the power network. Once deleted, this PDUs along with the UPSs they are supplying to will no longer be monitored unless they are registered again. This is the privilege given only to the admin of the system

1.3.3.View PDU button

This Button has two benefits. If the user specifies the full information of the PDU(ID, IP, port, community), then full information(voltage, current, power usage) of the specified PDU will be displayed. If the user doesn't know the name of the PDU he/she is looking for, simply hitting this button without specifying PDU information will display the entire PDUs which are being monitored in the system. From there he/she can choose the PDU of his/her interest and can view the statistics.

id	IP	PORT	COMMUNITY	POWER(WATT)	POWER(VAR)	PDU_LOAD	PLOTT	VIEW MAP
PDU-01	192.168.184.25	1161	ups1				PLOT PDU-01	MAP PDU-01

Figure 7 PDU stats

1.3.4.PLOT_PDU_ID

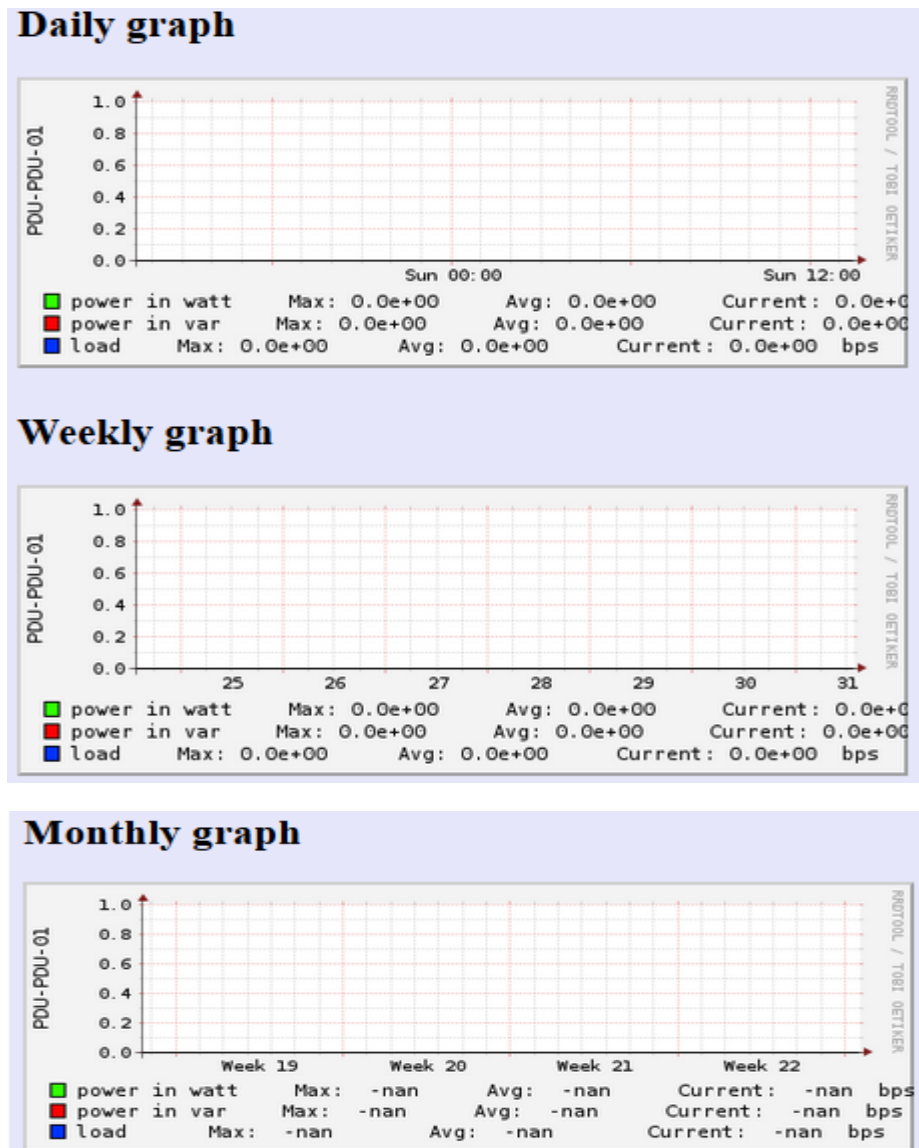


Figure 8 PDU plott

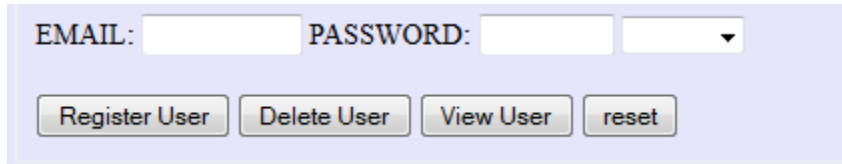
1.3.5.MAP_PDU_ID

Similar to the power map in UPS management, the power map in PDU management shows how PDU are connected to UPSs and UPSs to devices

POWER MAP		
PDU ID	UPS ID	DEVICES
PDU-01	UPS-01	laptop,devices
PDU-01	PDU-02	freezer, pc1, pc2
PDU-02	UPS-03	pc4,pc5

Figure 8 PDU POWER map

1.4. USER REGISTRATION



A user registration form with a light purple background. It contains two input fields: 'EMAIL:' and 'PASSWORD:'. The 'PASSWORD:' field has a dropdown arrow to its right. Below the input fields are four buttons: 'Register User', 'Delete User', 'View User', and 'reset'.

Figure 9 User registration

1.4.1. Register User

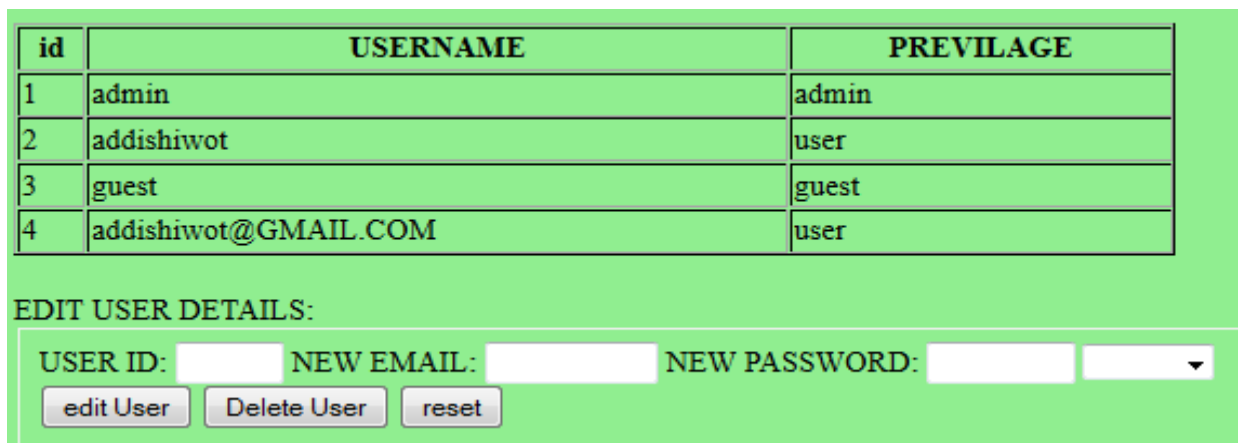
In order to Register User, email address is required. The admin should set the password word and right level of this new user. There are 3 types of user. Admin, user, and guest

1.4.2. Delete user

Use email addresses of users to delete users. After you specified email address, hit Delete user button

1.4.3. View User

This Button has two benefits. If the admin specifies the email address of the user he wants to view, then full information (id, Username and privilege) of the specified User will be displayed. If the admin doesn't know the name of the user he/she is looking for, simply hitting this button without specifying user information will display the entire users which are created by the admin including the admin itself. From the admin can choose the user of his/her interest and can delete the user.



A user statistics and edit form with a light green background. It features a table with user data and an 'EDIT USER DETAILS' section below it.

id	USERNAME	PREVILAGE
1	admin	admin
2	addishiwot	user
3	guest	guest
4	addishiwot@GMAIL.COM	user

EDIT USER DETAILS:

USER ID: NEW EMAIL: NEW PASSWORD:

Figure 10 User statstics

1.5. OID MANAGEMENT

OID management deals with adding OIDs for newly arriving UPSs or PDUs, deleting and viewing them. In order to be re-directed to OID management page, click on the “Oid Management” link shown in the figure below



Figure 11 OID management

1.5.1.UPS OID MANAGEMENT

UPS OID management is handled by this form. Registration of OIDs for new devices, deleting existing OIDs, viewing OIDs can be done here

A screenshot of a web form titled "UPS OID REGISTRATION:" in bold black font. The form has a light green background. It contains several input fields for "CURRENT:", "VOLTAGE:", "CURRENT UPS LOAD:", "REM.BATT.CAPACITY:", "UPS BATT.RUNTIME:", and "COMPANY:". Below the input fields are four buttons: "Add OID", "Delete OID", "View OID", and "reset".

Figure 12 UPS OID management

1.5.1.1. Add OID button

In order to register a newly arriving UPS, insert the OID for requesting the current a UPS is drawing, the voltage it is supplying, the current load it carries, remaining battery capacity, UPS battery run time, and the Company which produced the UPS accordingly and hit this button

1.5.1.2. Delete OID button

In order to delete all OIDs pertaining to a certain company, specify the name of the company and hit Delete OID button

NOTE: you can't delete a single OID from a given company. You can delete the whole UPS OID pertaining to that company

1.5.1.3. View OID button

Use this button to view OID pertaining to UPSs and the company which produced these UPSs

1.5.1.4. Reset

This button will clear the textbox. It is practice to use this button every time after you used the other three buttons

1.5.2.PDU OID MANAGEMENT

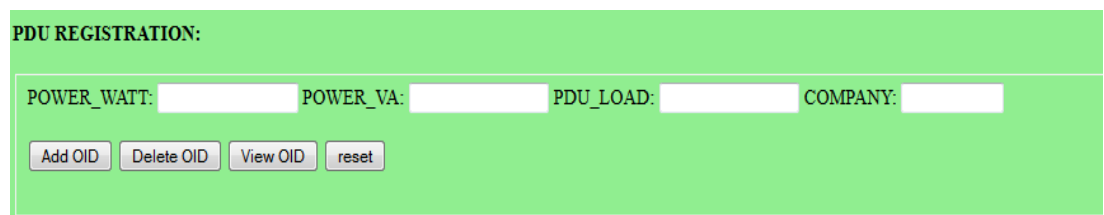


Figure 13 PDUOID management

1.5.2.1. Add OID button

In order to register a newly arriving PDU, insert the OID for requesting the power in watt and the power in var a PDU is delivering, the load it is carries, and the Company which produced the PDU accordingly and hit this button

1.5.2.2. Delete OID button

In order to delete all OIDs pertaining to a certain company, specify the name of the company and hit Delete OID button

NOTE: you can't delete a single OID from a given company. You can delete the whole PDU OID pertaining to that company

1.5.2.3. View OID button

use this button to view OID pertaining to PDUs and the company which produced these PDUs

1.5.2.4. Reset

This button will clear the textbox. It is practice to use this button every time after you used the other three buttons

1.6. RESTFULL API

1.6.1 Importing

As a restful client, to access the restful service from localhost, type the crafted url in the space provided. The rest client accepts the data in JASON format, i.e. <key> <value> To act as a client of itself, type the url of the format below in the space provided and click on send request.

<http://localhost/visuallux/rest.php/power.<deviceIP>.<devicePORT>.<deviceCOMMUNITY>>

To view the imported in graphical display enter the Restful data in the following format: **power.<deviceIP>.<devicePORT>.<deviceCOMMUNITY>** and click on Display graph

RESTFUL API

URL(http://...):

Restful Data:

Figure 14 rest full API

1.6.2 Exporting

For other end users, the “localhost” has to be replaced by the IP address of the device on which this program is running and the below url is to be entered from a client web browser or a RESTful service client program

<http://<serverIP>/visuallux/rest.php/?req=power.<deviceIP>.<devicePORT>.<deviceCOMMUNITY>>

1.7. Email and threshold configuration

1.7.1. register Handler button

EMAIL AND THRESHOLD CONFIGURATION:

NAME: EMAIL: PHONE:

WARNING: DANGER: CRITICAL:

Figure 15 email and threshold configuration

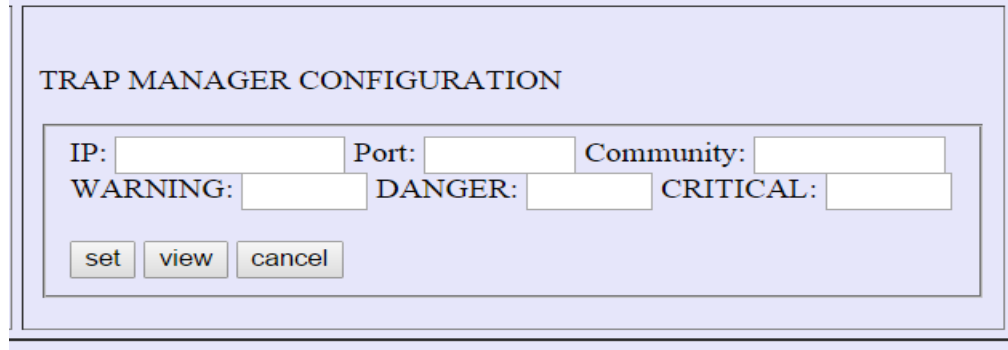
Click on this button for assigning people to whom email notifications is going to be send in case of a failure or problem occurrences. It is from here that the threshold values for sending mail notification are set. The Threshold values for Warning mail, Danger mail and Critical condition mail can be set. This can only be done by the admin.

1.7.2.Delete Handler

In order to delete, email notification receiver, specify the mail and hit the Delete button.

1.8. Trap Manager and Threshold configuration

1.8.1. Set button



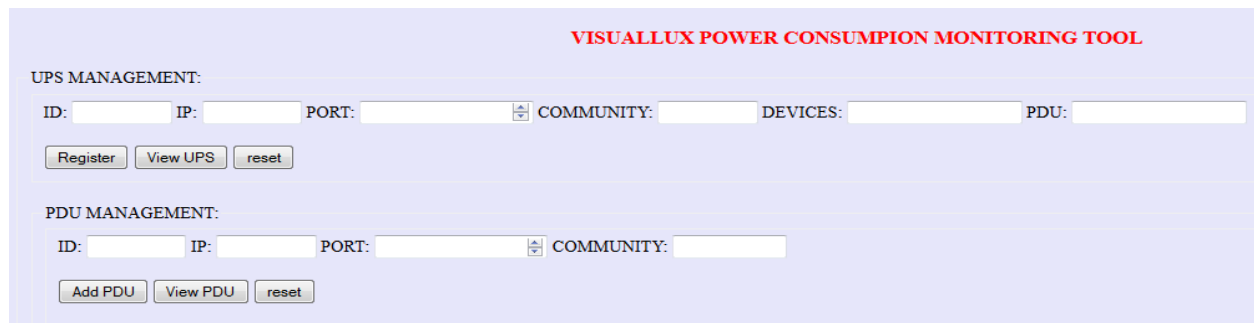
The image shows a web form titled "TRAP MANAGER CONFIGURATION". It contains input fields for "IP:", "Port:", "Community:", "WARNING:", "DANGER:", and "CRITICAL:". Below these fields are three buttons: "set", "view", and "cancel".

Figure 16 Trap Manager and Threshold configuration

- 1-Enter the trap manager details and the threshold values then click on set to configure the trap manager.
- 2-To replace the current manager with a new one repeat the number 1 instruction. Only one trap manager is set at a time.

2. USER PAGE

Normal user has limited privileges. His/her privilege is limiting to Adding(Registering) and Viewing PDU and UPSs

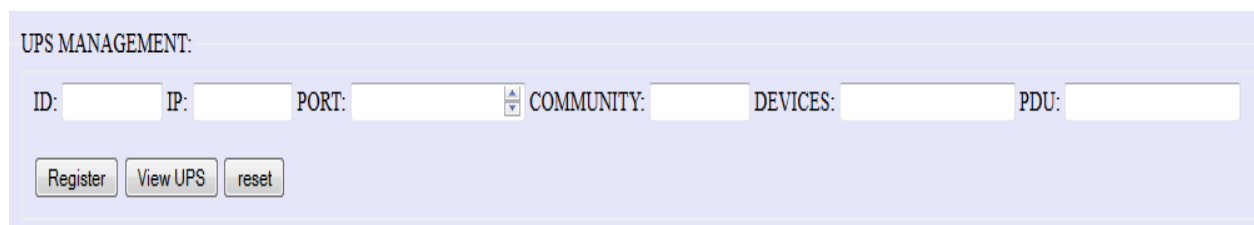


The image shows a web interface titled "VISUALLUX POWER CONSUMPTION MONITORING TOOL". It has two main sections: "UPS MANAGEMENT:" and "PDU MANAGEMENT:". Each section has input fields for ID, IP, PORT, COMMUNITY, DEVICES, and PDU. Below the input fields are buttons: "Register", "View UPS", "reset" for UPS; and "Add PDU", "View PDU", "reset" for PDU.

Figure 17 user page

2.1. User UPS MANAGEMENT FORM

The user can't Delete UPSs. He/she can only register and view UPSs



The image shows a web form titled "UPS MANAGEMENT:". It contains input fields for "ID:", "IP:", "PORT:", "COMMUNITY:", "DEVICES:", and "PDU:". Below these fields are three buttons: "Register", "View UPS", and "reset".

Figure 17 user UPS management form

2.1.1. Register Button

New arrival UPSs are registered here. The user should specify the ID(name of the UPS which is unique), IP, PORT and COMMUNITY of newly arrival devices. A UPS is fully specified either by its ID or by a combination of IP, port and community of the devices

2.1.2. View UPS

This Button has two benefits. If the user specifies the full information of the UPS(ID, IP, port, community), then full information(voltage, current, remaining battery capacity, running time, power usage) of the specified UPS will be displayed. If the user doesn't know the name of the UPS he/she is looking for, simply hitting this button without specifying UPS information will display the entire UPSs which are being monitored in the system. From there he/she can choose the UPS of his/her interest and can view the statistics.

UPS STATISTICS										
id	IP	PORT	COMMUNITY	POWER	LOAD	CAPACITY	CAP_IND.	RUN TIME	PLOTT	VIEW MAP
PDU-02	192.168.184.25	1161	ups2	2034	51	100	<div></div>	29 minutes, 00.00	PLOT PDU-02	MAP PDU-02
UPS-01	192.168.184.25	1161	ups1	2034	51	100	<div></div>	29 minutes, 00.00	PLOT UPS-01	MAP UPS-01
UPS-03	192.168.184.25	1161	ups3				<div></div>		PLOT UPS-03	MAP UPS-03

Figure 18 UPS statistics

2.2. USER PDU MANAGEMENT FORM

The user can't Delete UPSs. He can only register and view UPSs

PDU MANAGEMENT:

ID: IP: PORT: COMMUNITY:

Figure 19 user PDU registration form

2.2.1. Register Button

New arrival PDUs are registered here. Similar to UPSs, the admin should specify the ID(name of the UPS which is unique), IP, PORT and COMMUNITY of newly arrival devices. A UPS is fully specified either by its ID or by a combination of IP, port and community of the devices

2.2.2. View PDU button

This Button has two benefits. If the user specifies the full information of the PDU(ID, IP, port, community), then full information(voltage, current, power usage) of the specified PDU will be displayed. If the user doesn't know the name of the PDU he/she is looking for, simply hitting this button without specifying PDU information will display the entire PDUs which are being

monitored in the system. From there he/she can choose the PDU of his/her interest and can view the statistics

2.2.2.1. PLOT_PDU_ID link

As a standard user, you can plot the metrics on UPSs.

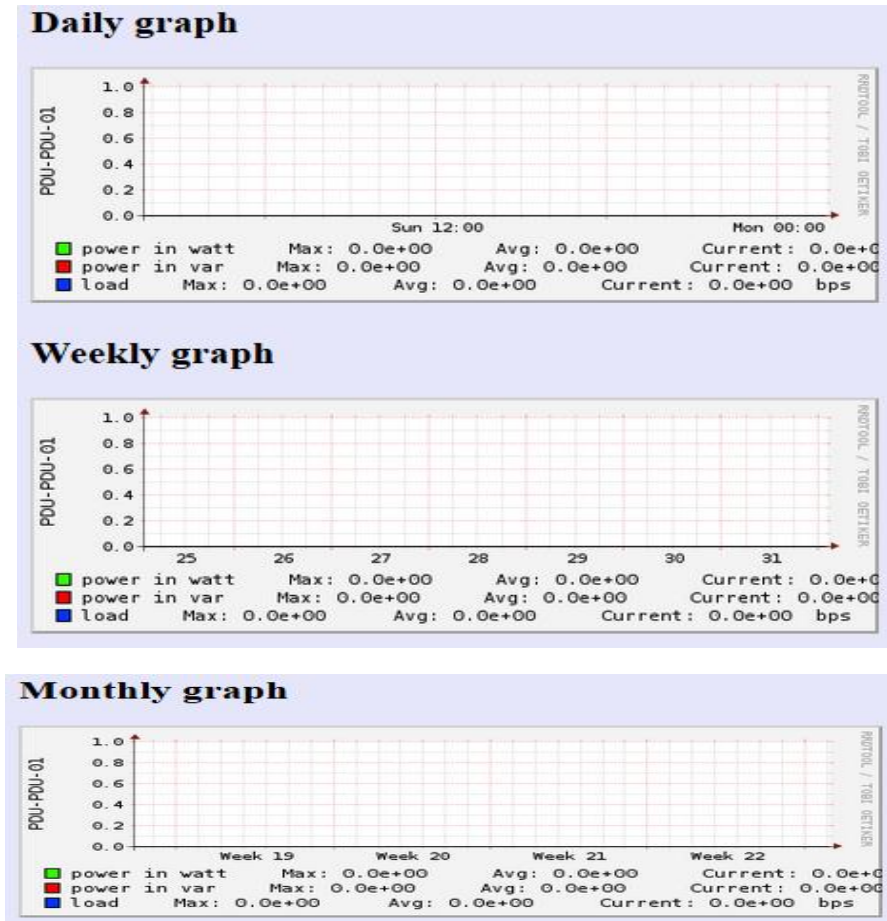


Figure 20 user view of PDU metrices

2.2.2.2. User MAP_PDU_ID link

As a standard user, you can see how components are interconnected to each other

POWER MAP		
PDU ID	UPS ID	DEVICES
PDU-01	UPS-01	laptop,devices
PDU-01	PDU-02	freezer, pc1, pc2
PDU-02	UPS-03	pc4,pc5

Figure 21 user view of map

3. Guest Page

Guest user can't Delete and add UPSs and PDUs. He/she can only view them.

VISUALLUX POWER CONSUMPTION MONITORING TOOL

UPS MANAGEMENT:

ID: IP: PORT: COMMUNITY: DEVICES: PDU:

PDU MANAGEMENT:

ID: IP: PORT: COMMUNITY:

Figure 22 guest view of guest page

3.1. UPS management

The guest is limited to viewing UPS and PDUs only

UPS MANAGEMENT:

ID: IP: PORT: COMMUNITY: DEVICES: PDU:

Figure 23 guest view of UPS management

3.1.1.View UPS button

This Button has two benefits. If the guest user specifies the full information of the UPS (ID, IP, port, community), then full information (voltage, current, power usage) of the specified PDU will be displayed. If the guest doesn't know the name of the PDU he/she is looking for, simply hitting this button without specifying PDU information will display the entire PDUs which are being monitored in the system. From there he/she can choose the PDU of his/her interest and can view the statistics.

UPS STATISTICS										
id	IP	PORT	COMMUNITY	POWER	LOAD	CAPACITY	CAP_IND.	RUN TIME	PLOTT	VIEW MAP
PDU-02	192.168.184.25	1161	ups2	2034	51	100	<div></div>	29 minutes, 00.00	PLOT PDU-02	MAP PDU-02
UPS-01	192.168.184.25	1161	ups1	2034	51	100	<div></div>	29 minutes, 00.00	PLOT UPS-01	MAP UPS-01
UPS-03	192.168.184.25	1161	ups3				<div></div>		PLOT UPS-03	MAP UPS-03

Figure 24 guest view of UPS statistics

3.1.1.1. PLOT_UPS_ID link

As a guest, you can view the statistics about each PDU. Choose the UPS of your interest and hit the “PLOT_UPS_ID” link from the UPS statistics form

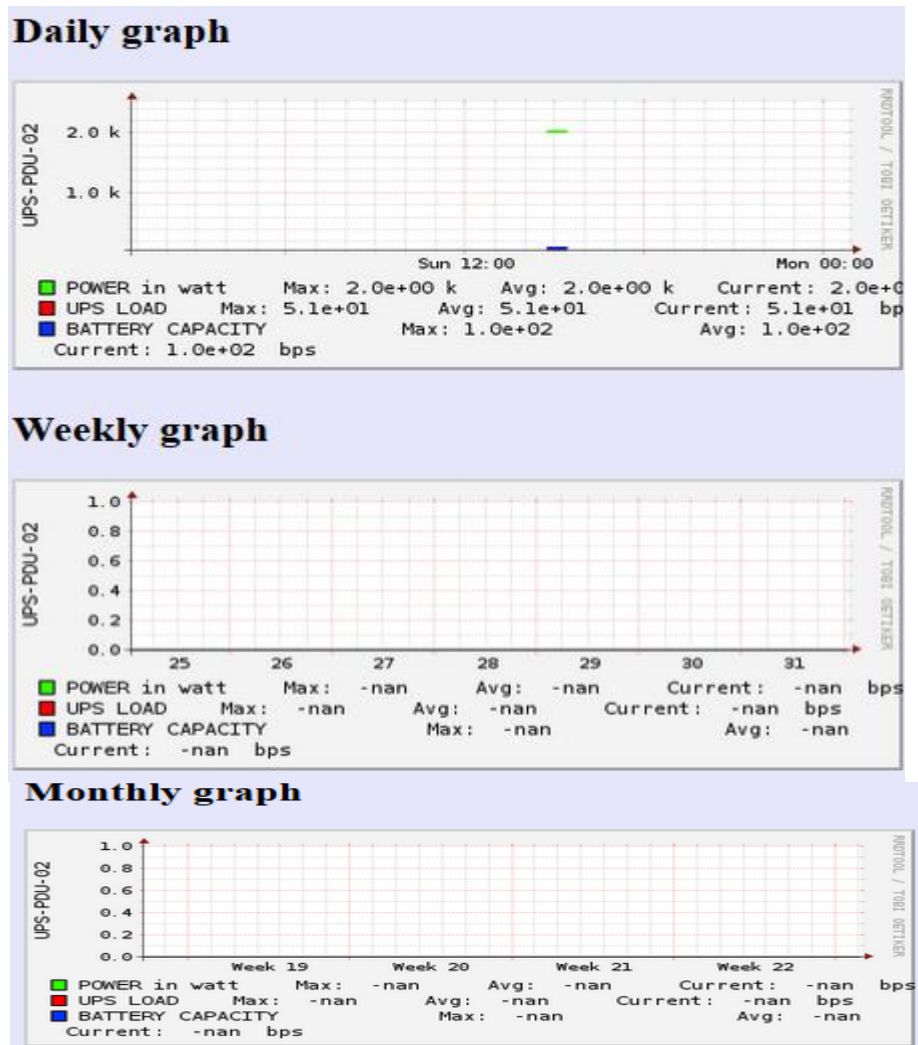


Figure 25 guest view of UPS metrics

3.1.1.2. MAP_UPS_ID link

This link gives a general overview of how the systems are interconnected to each other

POWER MAP		
PDU ID	UPS ID	DEVICES
PDU-01	UPS-01	laptop,devices
PDU-01	PDU-02	freezer, pc1, pc2
PDU-02	UPS-03	pc4,pc5

Figure 26 guest view of map

3.2. Guest PDU management

As a guest user, you can view available PDUs and their metrics.(The power they are delivering, the load they are carrying)

PDU MANAGEMENT:

ID: IP: PORT: COMMUNITY:

Figure 27 guest view of PDU management

3.2.1. View PDU button

This Button has two benefits. If the user specifies the full information of the UPS(ID, IP, port, community), then full information(voltage, current, remaining battery capacity, running time, power usage) of the specified UPS will be displayed. If the user doesn't know the name of the UPS he/she is looking for, simply hitting this button without specifying UPS information will display the entire UPSs which are being monitored in the system. From there he/she can choose the UPS of his/her interest and can view the statistics.

id	IP	PORT	COMMUNITY	POWER(WATT)	POWER(VAR)	PDU_LOAD	PLOTT	VIEW MAP
PDU-01	192.168.184.25	1161	ups1	51	51	51	PLOT PDU-01	MAP PDU-01

Figure 28 guest view of PDU statistics

3.2.1.1. PLOT_PDU_ID

As a guest you can view the statistics on PDUs. Click on the “PLOT_PDU_ID” link

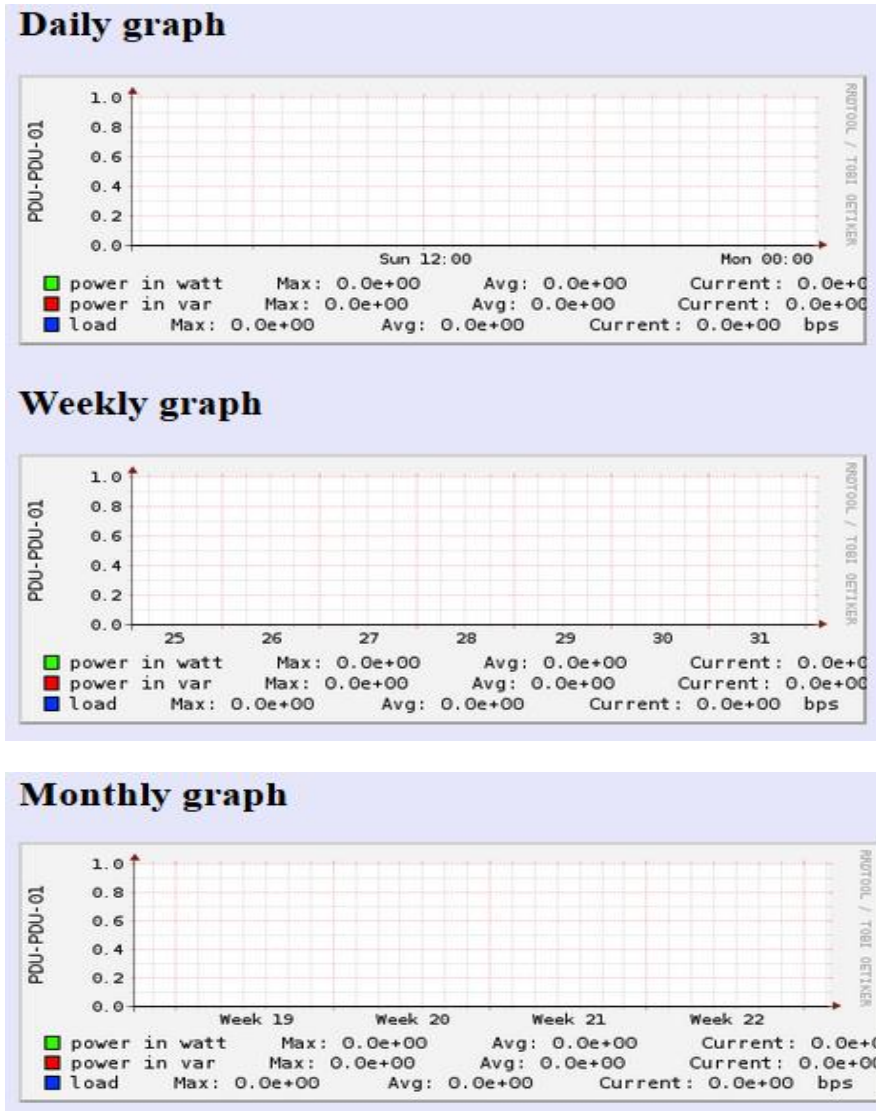


Figure 29 guest view of PDU statistics

3.2.1.2. MAP_PDU_ID link

As a guest you can view how components are interconnected to each other.

POWER MAP		
PDU ID	UPS ID	DEVICES
PDU-01	UPS-01	laptop,devices
PDU-01	PDU-02	freezer, pc1, pc2
PDU-02	UPS-03	pc4,pc5

Figure 30 Guest view of map