EMX Local 3.7 Installation Guide - Ubuntu 22.04

Requirements

Energy monitoring systems produce a high volume of data. It is important that the server EMX will be deployed on is sized correctly for this type of workload. In particular, the application's performance is heavily dependent on access to sufficient memory and the use of high-speed disk.

General Guidelines

Monitoring Units	Gateways	Processor Cores	Memory (GB)	Disk Space (GB)
< 100	1 - 2	2	4 to 8	250
100 to 500	2 - 5	4	8 to 16	500
500 to 5,000	5 - 50	8	16 to 64	1000+

For deployments over 5,000 monitoring units, please contact Packet Power support for sizing assistance.

Disk drives

The storage subsystem should:

- be implemented in RAID 10 across multiple disks
- consist of high throughput (10,000 RPM or solid state) drives, with solid state being **HEAVILY** recommended.

Server platform

- **Supported environments**
  - Bare metal
  - Commercial-grade virtualization platforms such as:
    - HyperV
    - KVM
    - OpenStack
    - VMWare ESX
    - VMWare vSphere
    - Xen
  - Unsupported virtualization platforms:
    - VirtualBox
    - Virtual PC
    - VMWare Player
    - VMWare Fusion
    - Open VZ
    - Parallels
- **Server OS**
  - Ubuntu Linux 20.04
  - Ubuntu Linux 22.04
  - Red Hat Enterprise Linux (RHEL) 9
  - CentOS 9
  - Oracle Linux 9
- **Browsers**
  - N-2 for Chrome, Firefox and MSFT (Edge and IE)

Network connectivity

- Between servers: 100Mbit - 1Gbit
- Gateways/HUBs to server: 10 Mbit - 1Gbit

Installation

Note: All listed commands should be run by the root user unless otherwise specified.

System Configuration

Start by setting the system timezone to UTC.

```
timedatectl set-timezone UTC
```

Third-Party Software Repositories

Node.js

```
curl -sL https://deb.nodesource.com/setup_16.x | sudo -E bash -
```

Erlang

```
sudo add-apt-repository ppa:rabbitmq/rabbitmq-erlang
sudo apt update
sudo apt install erlang
wget https://packages.erlang-solutions.com/ubuntu/erlang_solutions.asc
sudo apt-key add erlang_solutions.asc
```

Third-Party Software Installation

Node.js + Erlang + LAMP

Package Installation

The Ubuntu 22.04 (Jammy) repositories contain PHP 8.1, so all PHP packages in the installation command should be prefixed with php8.1-.

```
apt-get update
apt-get install -y php8.1 nodejs erlang-nox socat snmp sqlite3 apache2 libapache2-mod-php8.1 php8.1-dev php8.1-bcmath php8.
1-intl php8.1-mbstring php8.1-mysql php8.1-snmp php8.1-sqlite3 php8.1-xml php8.1-zip
sudo a2dismod mpm_event && sudo a2enmod mpm_prefork && sudo a2enmod php8.1
```

RabbitMQ

```
# Find the latest version at https://github.com/rabbitmq/rabbitmq-server/releases/

wget https://github.com/rabbitmq/rabbitmq-server/releases/download/v3.11.13/rabbitmq-server_3.11.13-1_all.deb
sudo dpkg -i rabbitmq-server_3.11.13-1_all.deb; sudo apt-get install -f
```

Third-Party Software Configuration

PHP

Configure PHP timezone

```
echo 'date.timezone = UTC' > /etc/php/8.1/mods-available/date.ini
```

Install IonCube Loader

```
wget http://downloads3.ioncube.com/loader_downloads/ioncube_loaders_lin_x86-64.tar.gz
tar -xzf ioncube_loaders_lin_x86-64.tar.gz
cp ioncube/ioncube_loader_lin_8.1.so ` php -i | grep ^extension_dir | awk '{print $3}'`
cat <<EOF > /etc/php/8.1/mods-available/ioncube.ini
; configuration for ioncube module
; priority=00
zend_extension=ioncube_loader_lin_8.1.so
EOF
```

Enable PHP extensions

```
phpenmod date
phpenmod ioncube
```

MySQL

Install MySQL

```
# Install mysql
apt-get install -y mysql-server mysql-client

# Handling EMX mysql configuration
cat <<EOT >> /etc/mysql/conf.d/emx.cnf
[mysqld]
innodb-file-per-table = on
event-scheduler = on
explicit_defaults_for_timestamp = off
sql-mode = "NO_ENGINE_SUBSTITUTION"
log_bin_trust_function_creators = 1
EOT

service mysql restart
```

Configure User Access

```
# Login to MySQL
mysql -uroot

# Create an EMX user
CREATE USER 'emx'@'localhost' IDENTIFIED BY 'S3cretP4ssword$';
GRANT ALL PRIVILEGES ON `emx`.* TO 'emx'@'localhost';

# Create an EMX database
CREATE DATABASE `emx`;

exit
```

Apache

Configure Apache sites

```
# Remove existing sites
rm -rf /etc/apache2/sites-enabled/*
rm -rf /etc/apache2/sites-available/*

# Clean the www directory
rm -rf /var/www
mkdir /var/www
chown www-data:www-data /var/www

# Setup the site
cat <<EOT > /etc/apache2/sites-available/emx.conf
<VirtualHost *:80>
 ServerName default
 DocumentRoot "/var/www"
 <Directory "/var/www">
   Options Indexes FollowSymLinks
   AllowOverride All
   DirectoryIndex index.php
 </Directory>
 ErrorLog "/var/log/apache2/emx_error.log"
 ServerSignature Off
 CustomLog "/var/log/apache2/emx_access.log" combined
</VirtualHost>
EOT

# Enable the rewrite module and emx site
a2enmod rewrite
a2ensite emx
```

Restart Apache

```
service apache2 restart
```

RabbitMQ

```
sudo rabbitmq-plugins enable rabbitmq_management rabbitmq_stomp
mkdir ~/bin && wget http://127.0.0.1:15672/cli/rabbitmqadmin -P ~/bin
chmod +x ~/bin/rabbitmqadmin
. ~/.profile

# Create default admin user and grant all permissions for default vhost
~/bin/rabbitmqadmin declare user name=adminmq tags='administrator' password=changeme
~/bin/rabbitmqadmin declare permission vhost=/ user=adminmq configure='.*' write='.*' read='.*'

sudo systemctl enable rabbitmq-server
```

PM2

```
# Install PM2 process monitor
npm i -g pm2@3.5.0

# !! NOTE: Only run the following if disabling Keymetrics.io interaction
pm2 interact stop
pm2 interact delete
```

Packet Power Software Installation

EMX/OPX2

Install OPX2 Package

```
# Drop the OPX .deb on the server first using scp, wget, or some other means; then:
dpkg -i packetpower-opx2-*.deb

# Import base definitions
~/bin/rabbitmqadmin -q import /var/opx2/config/rabbitmq-local.broker-definitions.json

# Edit MySQL credentials using `nano`, `vim`, or `cat` as below:
cat <<EOT > /var/opx2/config/mysql.json
{
  "host": "localhost",
  "user": "emx",
  "password": "S3cretP4ssword$",
  "database": "emx"
}
EOT
```

Install EMX Package

```
# Create the support_files directory for storing firmware, etc.
mkdir -p /var/www/public/support_files/

# Drop the EMX .deb on the server first using scp, wget, or some other means; then:
dpkg -i packetpower-emx-*.deb
```

Start OPX processes

```
# Run OPX processes with PM2 task manager
(cd /var/opx2 && pm2 start pm2/opx.config.js)
pm2 save
pm2 startup
```

(Optional) Update Support Files

Note: the support files directory is hard-coded to `/public/support_files`, though it should be possible to symlink it to another location if necessary. It contains node firmware files that can be sent remotely to gateways in order to broadcast updates over the mesh network.

```
# Copy over desired firmware files
sudo cp ~/uploaded_files/node.*.bin /var/www/public/support_files/
```

EMX Web Installer

Finally, complete the setup by navigating a browser to the IP address of the EMX server. You will be greeted with a setup screen, which will prompt you for the following information:

- MySQL credentials
- RabbitMQ configuration (used by OPX2)
  - OPX2 installs by default with the following credentials:
    - Username: pacpow
    - Password: pacpow
    - Port: 61613
    - Vhost: /
    - Hostname: 127.0.0.1 (or the IPv4 address of the appropriate server)
- (Optional) The SMTP server credentials to be used for alerting capabilities