The sys admin's daily grind: E-Log

More Watt?!

If you've been forced to deliver Linux magazines to pay for your last electric bill, we'll help you discover why, assuming you have a state-of-the-art electricity meter. *By Charly Kühnast*

Just a couple of years ago, my electricity bill was something the utility company really enjoyed. It more or less confirmed that I was just a couple of kilowatt-hours away from qualifying for the discounts given to large-scale industrial power users. At the time, my household had just two adults, a baby, and two 19-inch racks.

My comment at the time: "You see what bottle warmers and baby monitors can do to you!" My sweetheart has a sense of humor, but this financial electric shock generated some awareness on my part. Now, when I buy new hardware, I make sure I'm getting a computer rather than an electric heater.

Our electricity meter at the time was one of those black boxes, in which a metal disc rotates to the rhythm of your power use. Just recently, we installed a photovoltaic system on the roof, and we were given a new digital meter in the course of the installation work. Like nearly all of these state-of-the-art utility toll stations, my meter has a little infrared LED that wires the Morse code of the meter reading every couple of seconds.

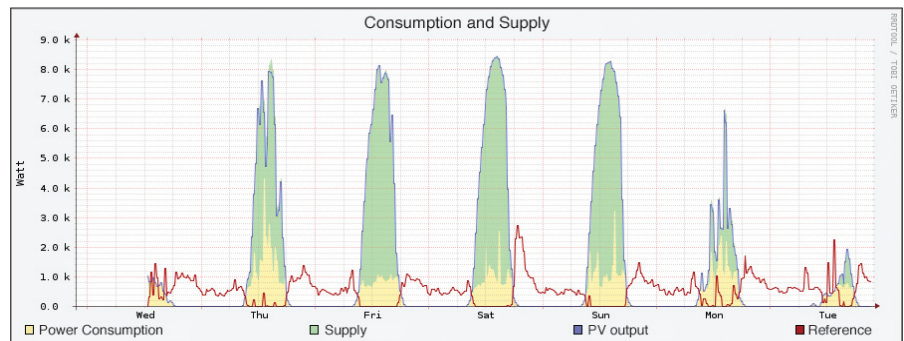All you need to read this is a photosemiconductor that receives the meter

Figure 1: The graph, which I created using RRDtool, shows electric consumption in the sys admin household as a red line and the power provided by the photovoltaic (PV) system as a green area.

data and passes it in to the serial port on a Linux computer after converting the signal. People skilled in electronics would probably want to build this device themselves [1]. The materials will set you back about US$ 10.

Anyone who prefers to stay well clear of soldering irons, like yours truly, can purchase a ready-to-run optical head from a dealer. Because my Linux server, which lives just two yards away from the electricity meter, doesn't actually have a serial port, I also bought an Ethernet module that sends the counter data across the network once a second.

Short Blackout

Now the data are reaching my computer, but at first glance, they don't really mean much to me (Listing 1). I need more information [2] to interpret the data block. The data output is in the hexadecimal Smart Message Language (SML) format. All I need to do is to map the SML sequences to the meter data. To see the current consumption, I need to look for a value for *real energy consumption*. This data block starts with `77070100010800FF`.

Some bytes later, the sequence `621E52FF` appears; this tells me that the meter reading that follows will be in watt-hours with a single decimal. Directly after this is a hex sequence that starts with `56` and ends with `01` – the value between these two figures is the meter reading, which I can now convert from hex to decimal. Repeating the reading an hour later gives me my power consumption in watt-hours as the difference between the two readings.

Most meters supply other values, too. This is useful for plans that have different rates for daytime and nighttime, or – as in my case – when you need to discover how much power the solar modules are providing. To visualize the data, I turned once again to RRDtool [3]. A graph that I created in this way is shown in Figure 1. To feed a round-robin database 24/7, you obviously need to run your Linux server 24/7, too. Your utility company will love you for that. ∎∎∎

LISTING 1: Meter Hex Code

```
mac=00:08:DC:17:5D:B1

boot=1

fw=02.00

time=1259877154


zpb=DE0000000000000000000000000000000002
SML(1B1B1B1B010101017607001200 3D458C62
    00620072630101760101 07001200116
    [...] 0000001B1B1B1B1A034D1F)
```

AUTHOR

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INFO

[1] Power monitor projects: *http://sourceforge.net/apps/ wordpress/irmetermon/*

[2] Description of the SML data protocol: *http://www.vde.com/en/fnn/extras/ sym2/infomaterial/documents/ sml_080711_102_eng.pdf*

[3] RRDtool: *http://oss.oetiker.ch/rrdtool/*