Current Cost data logging

published to iPhone

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Change log

Date	Version	Comment
15th February 2009	v1.0	Initial document. Created for Current Cost Classic.
11th April 2009	v2.0	Updated with information on the Current Cost CC128. Also updates relating to the use of a mySQL database.

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Current Cost logging with RRDT published to the iPhone

Introduction

This document describes the steps needed to provide graphs of domestic power consumption using the Current Cost power meter using a Linux PC.

In addition it provides an outline of how to create Apple iPhone/iPod Touch specific web pages that display the data graphs.

This document is not a definitive guide on how to set up a Current Cost meter, it also assumes a reasonable level of technical knowledge. Although I have been in the IT industry for 26 years and a poor programmer and therefore they could be better, more efficient, ways to do some of things I describe here.

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April 2009

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Disclaimer and license

I know that the people reading this will be responsible adults. However we live in a strange world and I still feel there is a need to provide a disclaimer.

I cannot be held responsible for data loss or physical damage that may result from this document. **You** are responsible for your own safety and data security.

Always follow manufactures guidelines when installing electrical equipment.

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Prerequisites

I created my system with the following components:

- Viglen MPC-L micro PC
- Current Cost meter. I have the new CC128 version but this document will work equally well with the older 'classic' device.
- Current Cost serial to USB cable
- Round Robin Database Tool. This is the application that logs the data and produces the graphs.

- iWebKit framework kit to create Apple iPhone/iPod touch compatible web sites
- A server running a web server. This article assumes Linux and Apache. YMMV
- The server needs to have Perl installed
- mySQL database (optional)

The Viglen PC runs the Xunbuntu operating system and makes an excellent home server. It consumes around 10w of power continuously.

Bot the 'Classic' and the CC128 Current Cost meter (CCM) provides a serial port in the form of a RJ45 style connector. Therefore there is a need to convert the signal from the serial port into something the MPC-L can understand. Fortunately the Current Cost people sell a serial to USB convertor cable.

If you do run your own web server and connect it to the Internet then please do make it is secure!

Hardware setup

The hardware set up is very straight forward.

Follow the manufactures guidelines on how to install the CCM. Connect the CCM to your PC using the serial to USB cable.

The only real consideration is the location of the meter. The CCM also monitors the ambient air temperature. You may wish to place the meter in a location in which you can read the display and also accurately represents the temperature of the room you spend most of the time in. My CCM is in my study, which is the same location as my MPC-L and network router.

You could of course locate your PC in your primary living space and link it back to your router using Ethernet cabling or WiFi technology.

Alternatively you could be more adventurous and use an Arduino (http://www.arduino.cc/) to remotely link the CCM to the monitoring PC. This could be done using either a Zigbee (wireless) or Ethernet shield.

Software and configuration

The outline steps for logging and displaying data are:

- Install Round Robin Database Tool (RRDT)
- Configure RRDT (optionally use mySQL)
- Monitor state of the USB/serial connection and log data to RRDT (Perl script)

- Create graphs using RRDT (Shell scripts)
- Publish web pages containing the graphs (Shell script)

I highly recommend you follow Paul Mutton's excellent tutorial (http://www.jibble.org/currentcost/) on setting up RRDT and logging data from the CCM.

Once RRDTool is installed and the databases created then you need to capture the data from the CCM.

Below is a simple Perl script that monitors the USB/serial port and logs the data to RRDTool and in my case to a mySQL database.

```perl
#!/usr/bin/perl -w

# Original Perl code by Paul Mutton.
# See http://www.jibble.org/currentcost/
#
# Updated for CC128 by Mark E Taylor. April 2009.
# http://metphoto.homeunix.net/met_current/
# http://metphoto.net

# Reads data from a Current Cost device via USB/serial port.

use strict;
use DBI; #Needed for mySQL only.
use Device::SerialPort qw( :PARAM :STAT 0.07 );

# my $PORT = "/dev/ttyS0"; #For older serially connected devices.
my $PORT = "/dev/ttyUSB0";

my $ob = Device::SerialPort->new($PORT);
$ob->baudrate(57600); #For CC Classic use 9600 for CC128 use 56700.
#$ob->databits(8);
#$ob->parity("none");
#$ob->stopbits(1);
$ob->write_settings;

open(SERIAL, "+>$PORT");
while (my $line = <SERIAL>) {
    #Use this line for Current Cost Classic.
    #if ($line =~ m!<ch1><watts>0*(\d+)</watts></ch1>.*<tmpr>([\d.]+)</tmpr>!) {

    #Use this line for Current Cost CC128.
    if ($line =~ m!<tmpr>([\d.]+)</tmpr>.*<ch1><watts>0*(\d+)</watts></ch1>!) {
      my $temp = $1;
      my $watts = $2;

      #Uncomment this line for fault finding only.
      #print "Power consumption ", $watts ,"w, Temperature ", $temp ,"c\n";
      #Write data to RRDTool.
      system ("rrdtool update /home/mark/currentcost/powertemp.rrd N:$watts:
$temp");
```

```
#Optionally update mySQL database.
my $dbh = DBI->connect("DBI:mysql:database_name", "user", "password");
die "connect failed: " . DBI->errstr() unless $dbh;

my $sth = $dbh->prepare("insert into power (watts,time,temp) values
($watts,NULL,$temp)") or die "prepare failed: " . $dbh->errstr();

$sth->execute() or die "execute failed: " . $sth->errstr();
$sth->finish();

$dbh->disconnect();
    }
}
```

In addition I created an INIT task (*placed in RC2, is that the best place?*) to ensure the Perl script (above) is always running when the PC starts.

Finally I created a CRON task that runs a shell script that updates each of the graphs and copies them to the web server.

Apple iPhone web pages

Following on from an idea by Andy Piper (http://andypiper.wordpress.com/) I then created some iPhone optimized web pages to show the graphical results of the CCM logged data.

The web pages of my CCM meter readings are here:
http://metphoto.homeunix.net/met_current/

Please note that I cannot guarantee that they will always be available. The pages were created using the excellent, and free, iWebKit framework (http://iwebkit.net/).

As well as presenting the graphs I wanted to show the current 'live' data as well. I created a short piece of PHP code to do this.

```php
<?php
$data_latest = shell_exec('rrdtool fetch /path/to/rr database/powertemp.rrd
AVERAGE -r 5 --start end-15secs --end now');#Fetch the last 15 seconds worth of
data.
$data_split = explode(' ',$data_latest);#Split at the space character into an
array.
$latest_power_reading = $data_split[36];#Latest power reading is element 36.
$latest_temp_reading = $data_split[37];#Latest temp reading is element 37.
echo ('Latest power reading = '.number_format($latest_power_reading).'w.');?
><br/><?php
echo ('Latest temp reading = '.number_format($latest_temp_reading,2).'c.');
?>
```

This code is embedded into the main `index.php` page. Whenever that page is refreshed it should show the latest power usage figure. The PHP code works by running the RRDTool application and fetching the latest data. The code then extracts the necessary fields and then displays them. It is not absolutely accurate, the data could be up to 15 seconds out of date, but it is more than fit for the purpose it is intended.

Other ways to do something similar

If you do not wish to undertake a similar project then you may wish to publish your CCM readings to the Internet 'cloud'.

There is a web service called Pachube (http://www.pachube.com/) that provides ready made applications that takes your CCM data and publishes it to a web page created for you. The Pachube service is designed to share any kind of data feed, not just specifically CCM data. A smart idea - it is a pity that the key element in the service (the graphs representing the data) are so small!

This is clearly a great way to share your data with others without the hassle of doing what I have described here.

Conclusion

The question I get often asked is "Why do this?". Well it is clearly great fun to undertake a small project and it seeing it successfully completed.

I also believe there is a growing need to be aware of the impact of our use of energy on the environment. The technology described here can help in this regard.

In my case it has drawn attention to the power consumed by the spotlights in my kitchen. (*I have since replaced them with power efficient LED spotlights.*)

Thanks

Thanks goes to Andy Piper (The Lost Outpost) for providing the initial inspiration.

Thanks also to Paul Mutton (jibble.org) for providing a very thorough tutorial on how to install RRDTool and configure it to capture data from the Current Cost.

Internet links

Current Cost meter	http://www.currentcost.co.uk/
Current Cost on eBay UK	http://stores.shop.ebay.co.uk/Current-Cost-Ltd__W0QQ_armrsZ1

Viglen MPC-L Linux PC	http://www.viglen.co.uk/
Round Robin Database Tool (RRDT)	http://oss.oetiker.ch/rrdtool/
Andy Piper (inspiration for the iPhone web pages)	http://andypiper.wordpress.com/
Paul Mutton (nearly complete tutorial on using RRDT and a CCM)	http://www.jibble.org/currentcost/
iWebKit iPhone web page framework	http://iwebkit.net/
Useful information on optimizing the MPC-L PC by Andy Stanford-Clark	http://stanford-clark.com/viglen.html

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