Notes on Power Estimation using IRSIM
==

```
New commands          Descriptions
--------------------------------------------------------------------------
    powlogfile        start/stop power logfile
    powtrace          start/stop power tracing of specified node(s)/vector(s)
    powstep           toggle the display of power estimate for each timestep
    sumcap            print out the sum of the capacitance of all nodes
    vsupply           set supply voltage for calculating power (default 5V)
--------------------------------------------------------------------------
```

Example usage of new commands:

irsim> powlogfile foo.trace

Opens foo.trace to which nodal transition reports will
contain nodal capacitance data (n->ncap from the node structure).
The format of each line is similar to the line you get when you trace a
node normally:
```
------------------------
8300.0 *INPUT* ir/ICacheDataBus_w2.5 -> 0      0.0 0.0 0.390
```

for an input being changed
```
------------------------
/m/s[25]/bitbar      0 -> 1  0.8 0.8 0.494
```

for a normal node change
```
------------------------
```

The last field is the node capacitance being switched (in pF)

Note that this file can be useful if you want to catch transitions
yourself and process them. Ordinarily, I do the following:

irsim> powlogfile /dev/null

which throws away the transitional data. However, upon closing the "file",
a summary will come to stdout as shown below.

irsim> powlogfile

With no arguments, powlogfile just closes the opened logfile.

irsim> powtrace <node names>

'powtrace' is used to indicate to irsim which nodes to log power statistics
on. For instance:

irsim> powtrace *

will log all transitions to the powlog file, and the summary that is
displayed upon closing the file will contain data for all nodes.

Following the above command with a line like the following:

irsim> powtrace -foo/dont/count/me*

would mean that all nodes with the prefix 'foo/dont/count/me' would
not be included in the powlog file or in the summary. Note that
this is the same syntax for the 't' (trace) command that already exists
in irsim.

Instead of tracing all nodes by using *, one can look at only the nodes
that are interesting by using lines of the form:

irsim> powtrace BlockA/interesting/nodes*
irsim> powtrace BlockB/moreInteresting/nodes*

again, the same syntax for the 't' command.

'powtrace' also sets the context for the 'powstep' command:

irsim> powstep

toggles whether dynamic power estimation is displayed after each
timestep.

Again, the dynamic power displayed will only be for the nodes that
have been selected using the 'powtrace' command.

irsim> vsupply 5.0
Supply Voltage = 5.00 Volts

Sets V=5.0 for use in the $P=CV^2/(2t)$ where C is capacitance switched,
and t is the timestep. The default value for vsupply is 5.0 Volts.

irsim> sumcap
Sum of nodal capacitances: 3699.549805 pF

Gives a sum of ALL nodal capcitances, NOT just those selected with
the 'powtrace' command.

==

Description of the power summary that is printed when the powlogfile is
closed:

For each node selected using 'powtrace' a line will be printed to stdout
in the following format:

e/E/c/Phi/5_498_60   2.486   225   0.154719   0.005565

name   cap (pF) # of transitions mWatts   % of total
            (see note below)   dissipated in power due
                               this node   to this
                                               node
Note: Nodal transitions caused by 'h <node>' or 'l <node>' are
      not included in the transition count.

After all the node lines go by, a final line will be printed giving the
total power dissipation of the traced nodes in Watts.

==
Example Script:

| This is a script that shows what I usually do:
|
| Normal initialization
@init.cmd
| Throw away transitional data
powlogfile /dev/null
| Display power at each step
powstep
| Invoke simulation script that prods all the right nodes at the right time
@simulate.cmd
| Open a normal logfile to catch the summary table
logfile /tmp/power.report
| Close the powlogfile to generate the report
powlogfile
| Close the logfile
logfile
==

Now, with grep, awk, sort, and other great programs you might write, you can
pull whatever data you want out of the resulting files.

Typing

irsim> help [command]

should give you a help message for the new commands just like it does for
the old ones

That's all, folks....

If you find bugs or have questions or suggestions, please let me know by
sending mail to dcr@fugue.