BOINC Workshop

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1. Collect estimates & models on cost & energy consumption

2. Measuring the energy consumption

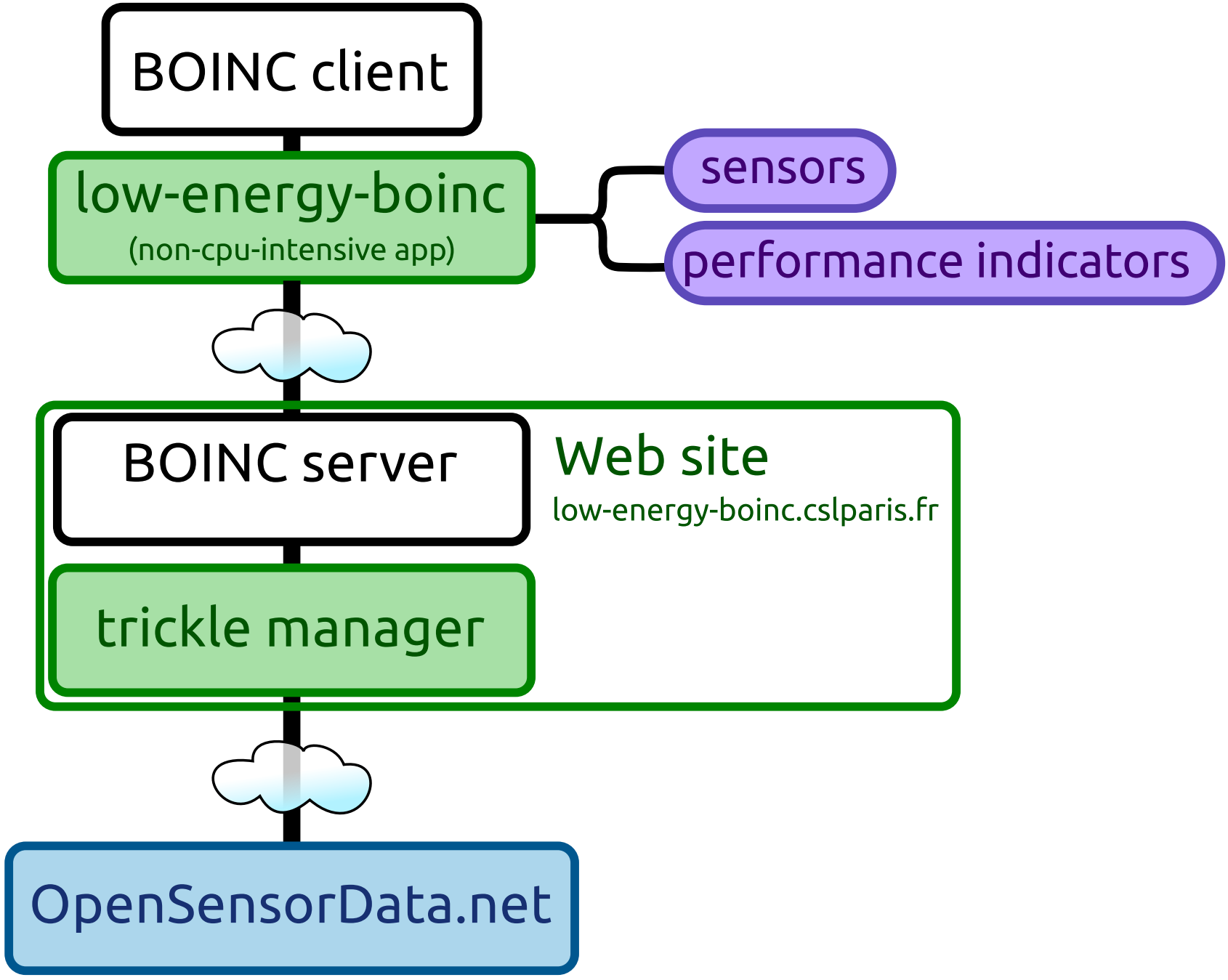
3. Reducing the energy consumption

4. ... something else

1. Collect estimates & models on cost & energy consumption

Wiki: http://low-energy-boinc.cslparis.fr/info

2. Measuring the energy consumption



sensors

Energy

Temperature

Power usage
P-state
CPU load
CPU load of BOINC applications
Progress of BOINC workunits
CPU load of user applications
Ambient temperature
User absent or not
Fan speed
CPU temperature
Other

+
CPU benchmark
BOINC CPU% Setting

$$\text{Performance-per-Watt} = \frac{\text{BOINC Performance}}{\text{BOINC Power}}$$

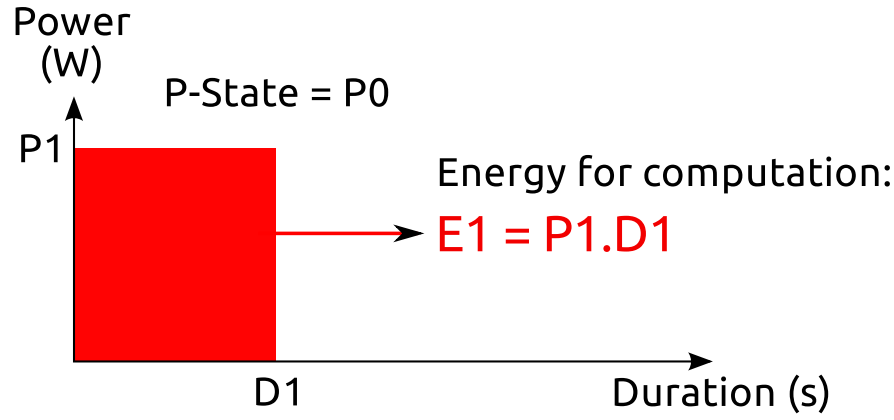
BOINC power = total power
- power used for other activities
- reusable heat

total power = F(P-state)

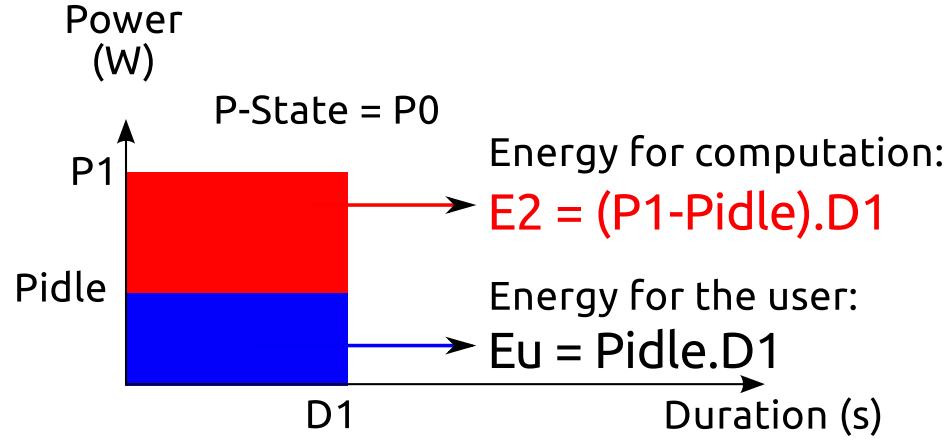
power used for other activities = F(user present,
CPU load other applications)

3. Reducing the energy consumption

Run the computation at night

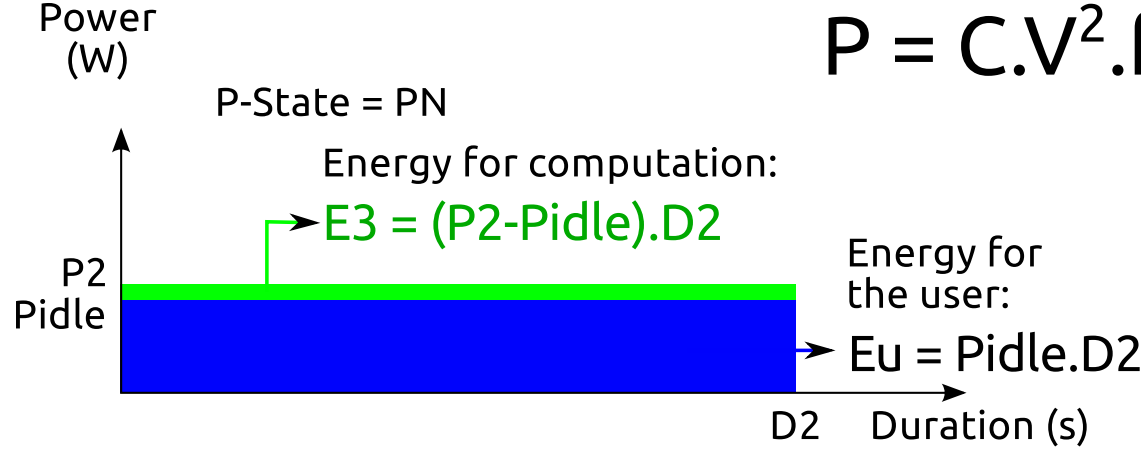


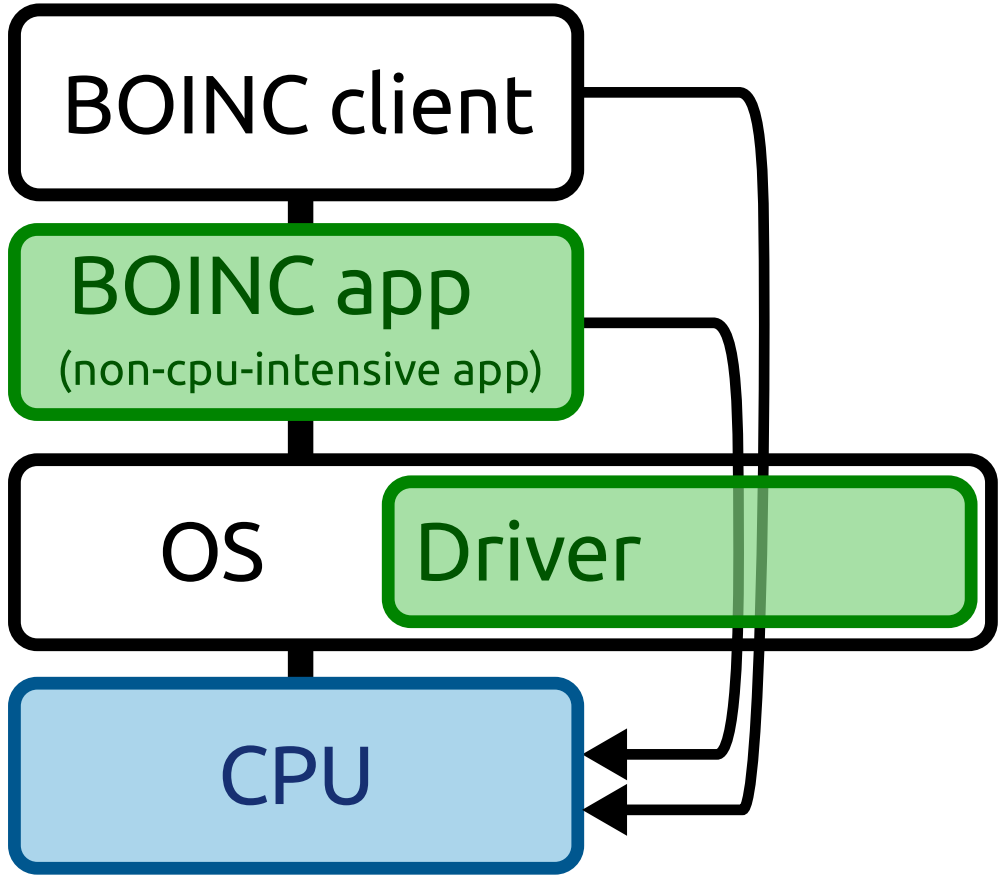
Run the computation during work



Run the computation during work in low-power mode

$P = C.V^2.f$




BOINC client
BOINC app
(non-cpu-intensive app)
OS
Driver
CPU

Windows driver

We hired Matthew Sykes for two months. Matthew has 15 year experience in Windows driver development.

1. The driver creates a kernel thread that jumps to each CPU once every N ms (configurable).

2. The thread gathers statistics about the time spent in each CPU performance state (similar to Linux).

3. The thread can maintain a CPU in a given Pstate.

4. A user-space API allows to talk to the driver.

4. ... something else

Suggested project:

100% renewable energy source

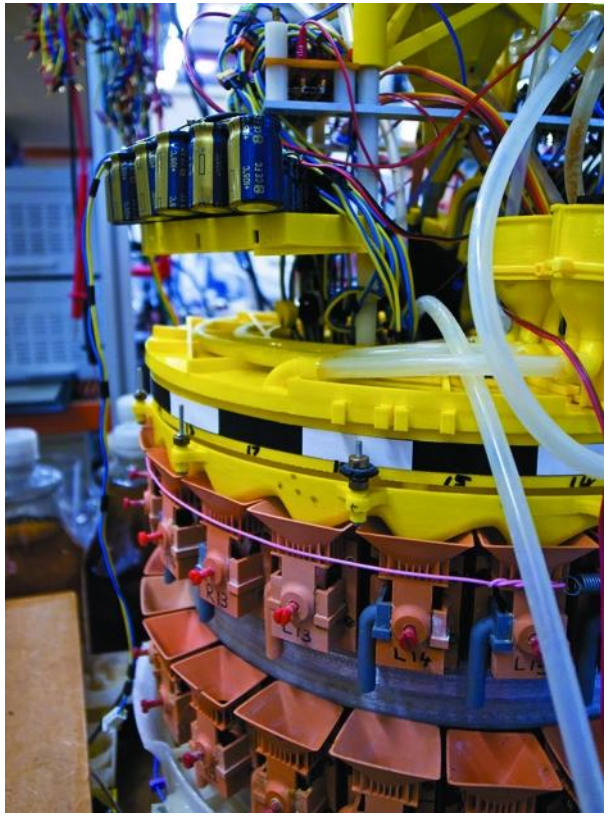
2-5 W

Always-on home server:
- 0% energy requirements
- personal file & email server
- runs BOINC

Raspberry Pi:
Whetstone benchmark: 270
Power consumption: 2W
Price: 31 € (37 € with power adaptor)
Performance/power: 270/2 = 135
Performance/cost: 270/37 = 7.3

Laptop Core2 Duo 2.4 GHz, 2 threads:
Whetstone benchmark: 4270
Power consumption: 48 W
Price: 1000 €
Performance/power: 4270/48 = 89
Performance/cost: 4270/1000 = 4.27

Microbial Fuel Cells



Biogas

Link with our P2P Food Lab project?