GridPP
UK Computing for Particle Physics

A Simple Method to Automatically Shutdown Servers in the Event of Air Conditioning System Failure

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October 2017

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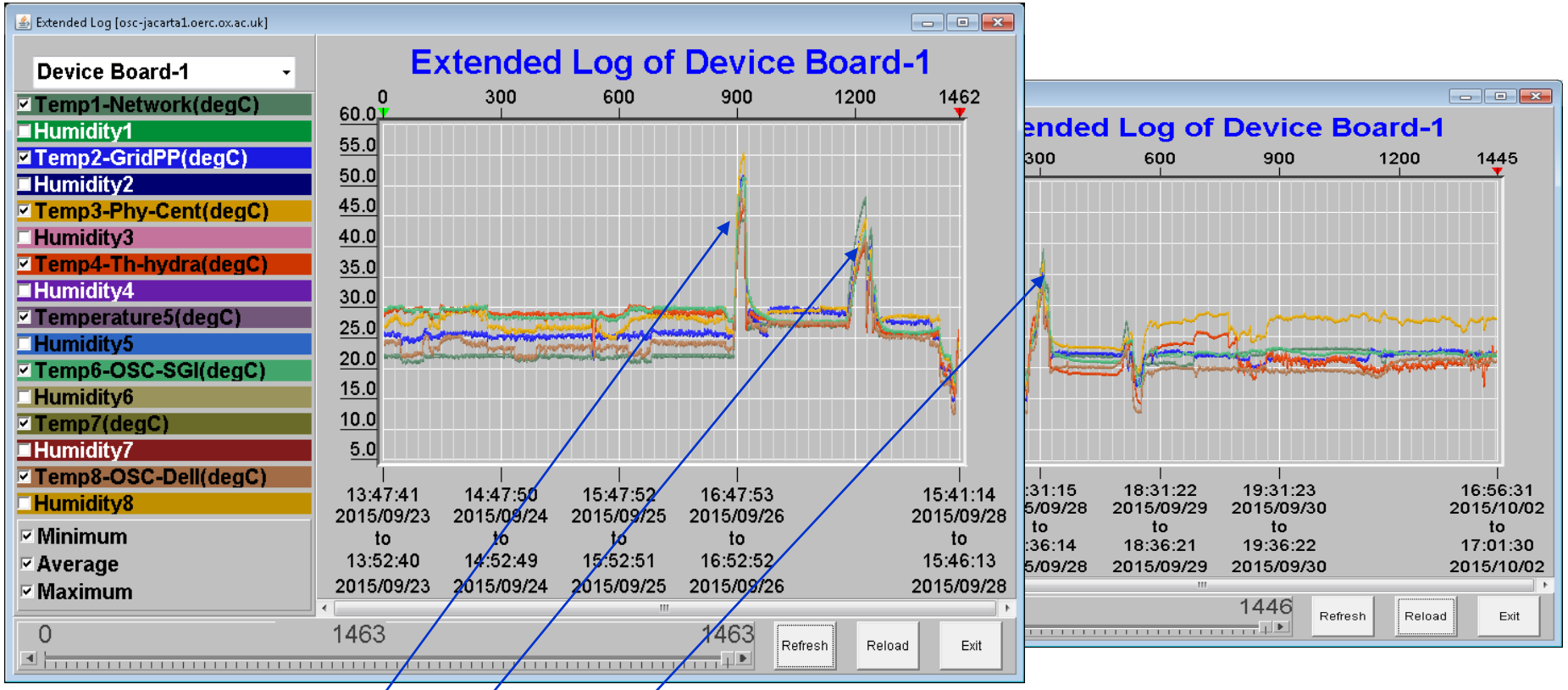
Fall HEPiX, KEK Japan

The problem

- When there is a major failure in the chillers the temperature in a 250KW loaded computer room rockets up in a matter of minutes.
- Detailed temperature monitoring around the room is useful during normal working to spot hot spots.
- However when there is a failure it's a binary operation
  The A/C is working or
  The A/C is not working
- If it's failed the only way to reduce temperature and risk of damage is to remove load, preferable in a clean way. (Particularly out of working hours)

Older temperature monitoring



Saturday 16:19

Sunday 16:13

Monday 17:04

Example from incident in 2015 showing temperatures hitting 50 degrees C in a matter of minutes.

Goal

- Simple under floor average temperature monitoring.
- Publish on a Web page which can automatically be read by the servers.

- The servers query the page then can then decide to shutdown cleanly once a threshold has been passed.
- If the majority of the servers shut themselves down automatically the room temperature can be stabilized until A/C can be restored.

- The solution is based on simple one wire temperature sensors.

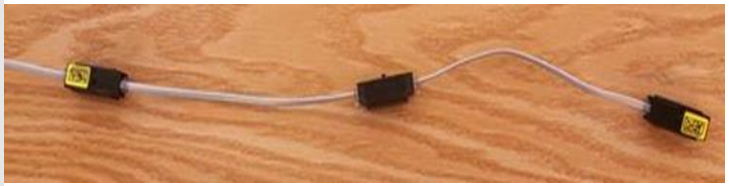
Temperature Sensors

- Temperature Sensor (DS18B20)

  Four sensors along the centre of the cold aisle

- 1-Wire USB Interface (DS2401/DS1990A)

http://www.ibuttonlink.com/



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DigiTemp

- DigiTemp is software for reading values from 1-wire devices.
- DigiTemp is written by Brain Lane.
- It is an open source software available under GNU license
- Version 3.6.0-4 installed

https://www.digitemp.com/

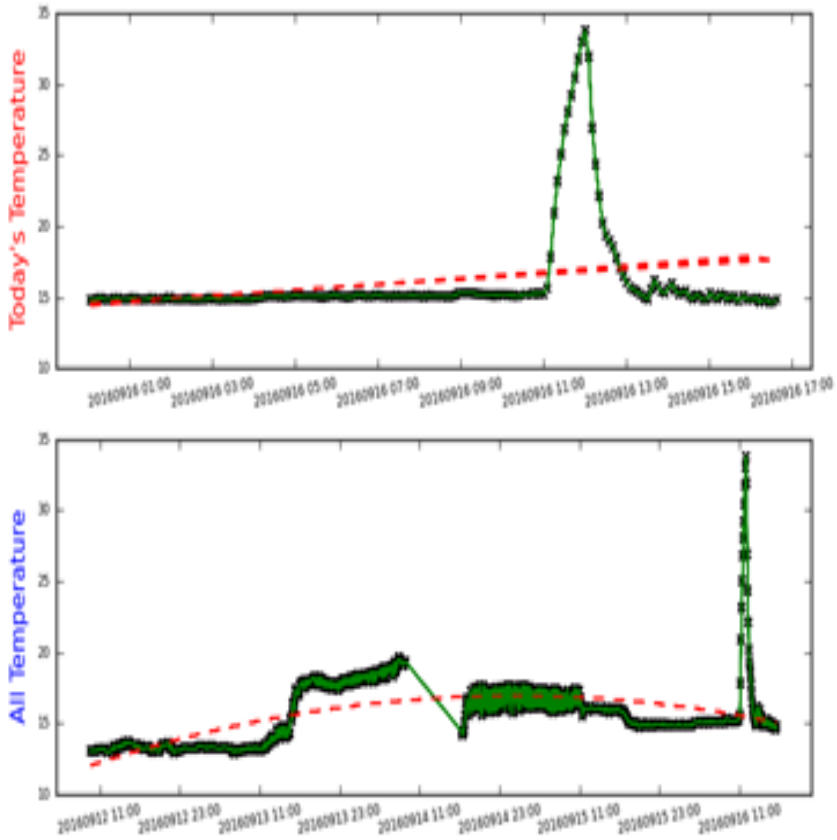
Air Conditioning Failures

- 16th September 2016 incident

Begbroke Data Centre Temperature Summary

14.841 14.755 14.738 2016-09-16 16:37:42.096942

average data centre underfloor temperature for the past 5, 10, and 15 minutes.

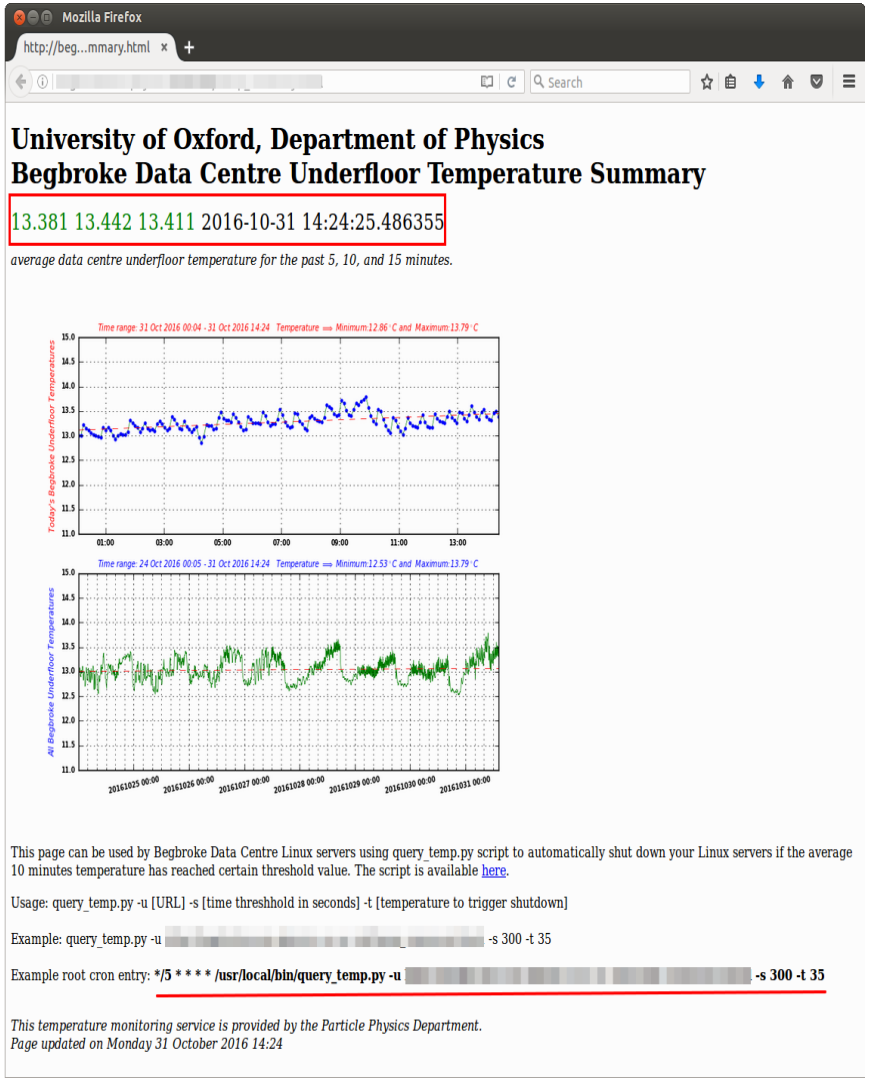


Server Temperature Script

- Server Temperature script is written in python

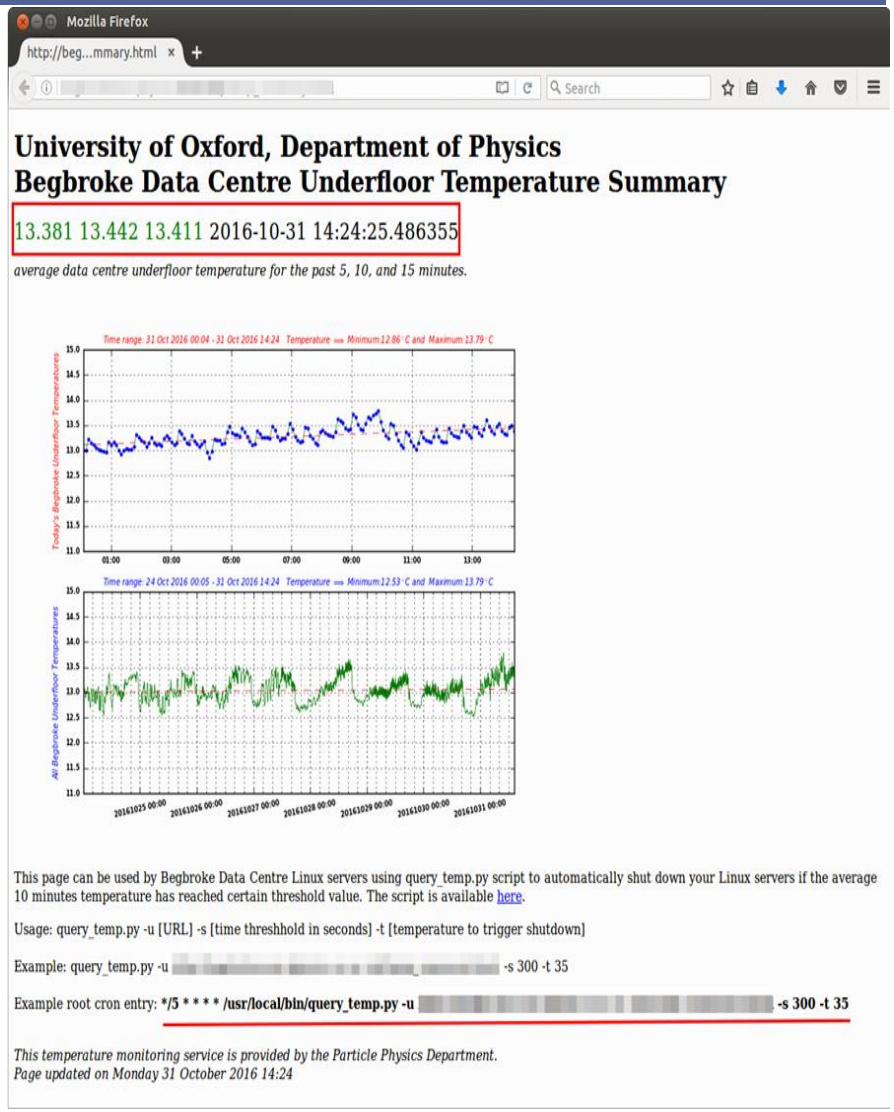
```
/usr/bin/digitemp_DS9097U
-d 60 \
 -n 5 -q -c digitemp.conf
\
 -a -o "%s %C %Y%m%d
%H:%M:%S"
```

- Additional Modules used:
  - matplotlib
  - numpy
  - logging



Client Temperature Query Script

- Client script is written in python
- It requires 3 arguments:
  - URL
  - threshold temperature to trigger shutdown
  - threshold time in seconds
- It uses the 10 minute average temperature to trigger shutdown



Conclusion

- Simple temperature monitoring under our control
- Does not need rewriting for each new batch of equipment.
- Web page can be queried by any server
- Our Tier-2 grid cluster can shutdown worker nodes, and secondly storage nodes and if required, finally service nodes.
- System can be used by other users of the computer room.
- Can sleep a little more soundly.