



Do-it-yourself datacenter - case Tampere University of Technology (TUT)

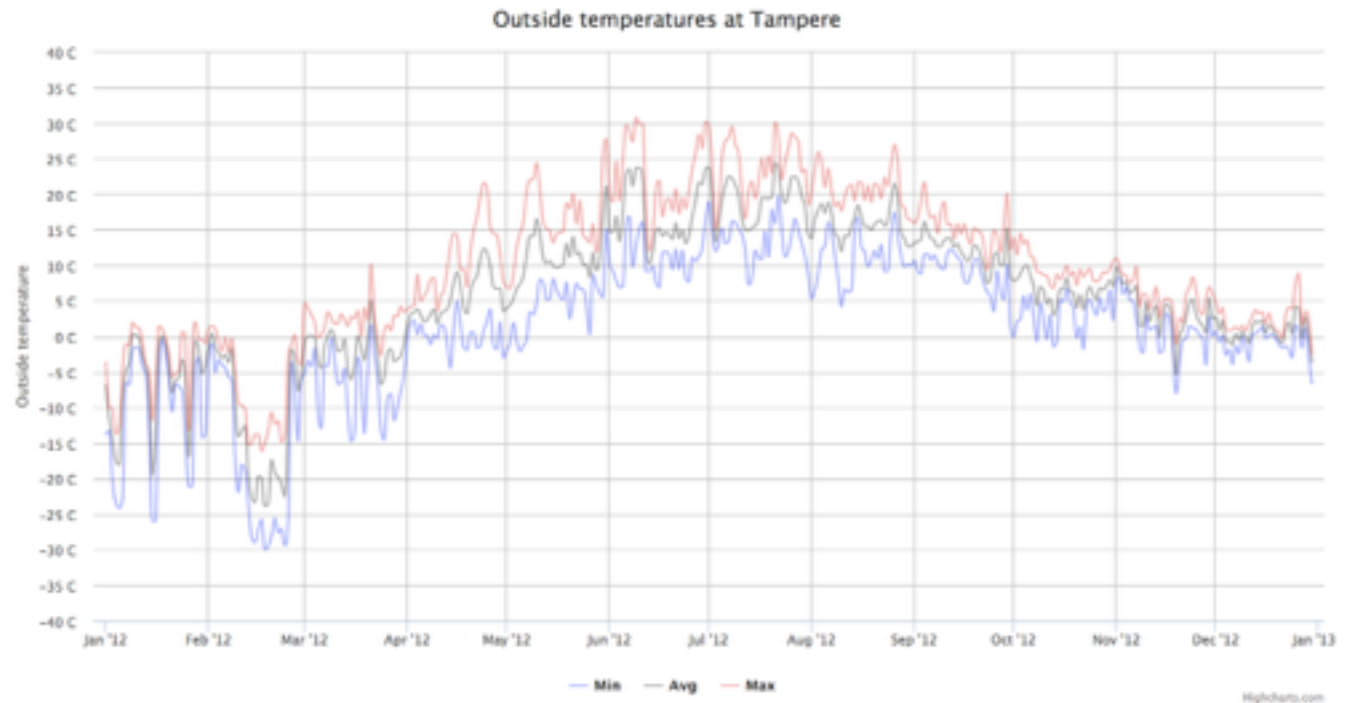
Tampere University of Technology

- Founded in 1965
- 10000 students
- 2000 staff



Tampere University of Technology

- ~160 km up North from Helsinki



Data centers at TUT

- Two independent main facilities
 - Total capacity
~550 kW
- Few smaller computer rooms of ~10-20 kW



Data centers at TUT

- Secondary data center (~200 kW) was build in 2010



(c) Mika Hirsimäki



Old computer room

- Build in 1978
- CRACs were replaced in 2004
- CRACs had problems with cooling
 - Oil and refrigerant leakages



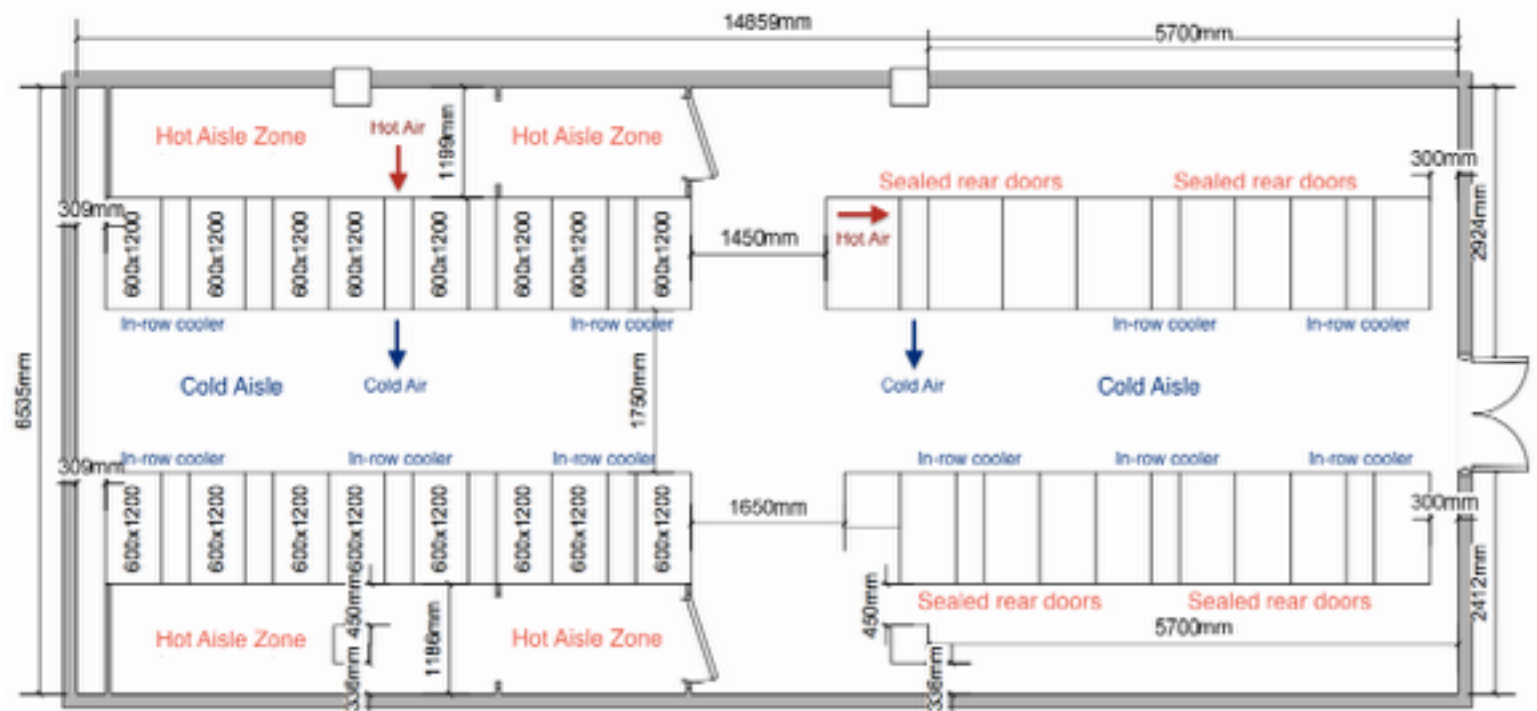
New primary data center

- A storage room was converted into a data center
- Design started in Feb 2013
- Construction work started in Apr 2013
- Ready in March 2014
- Project cost ~1 Meur



New primary data center

- Cooling is based on cold/hot aisles with in-row cooling



New primary data center

- Total capacity
 - 32 x 42 U racks
 - ~350 kW
- Currently ~20 kW used
- Cold aisle temperature is 27 C degrees



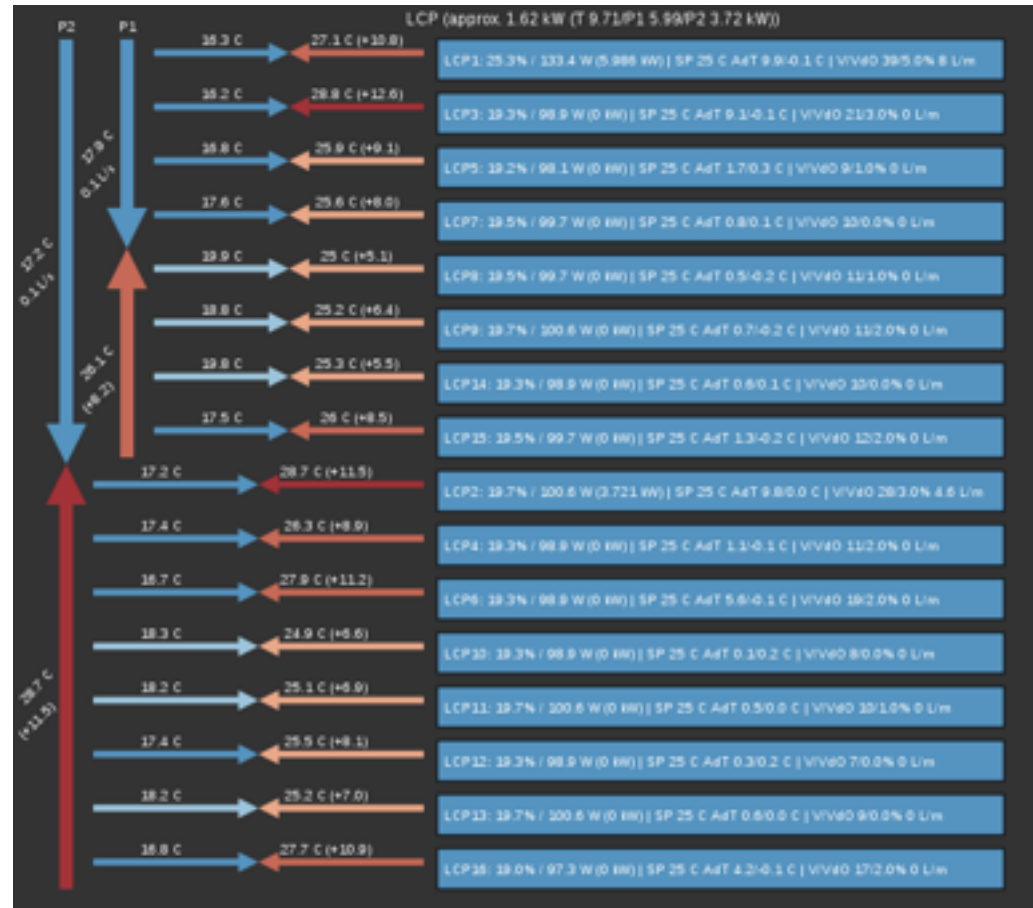
New primary data center

- Cooling is done with free cooling and with compressor chillers
- Free cooling PUE can be as low as 1.07 and compr. cooling PUE as low as 1.2



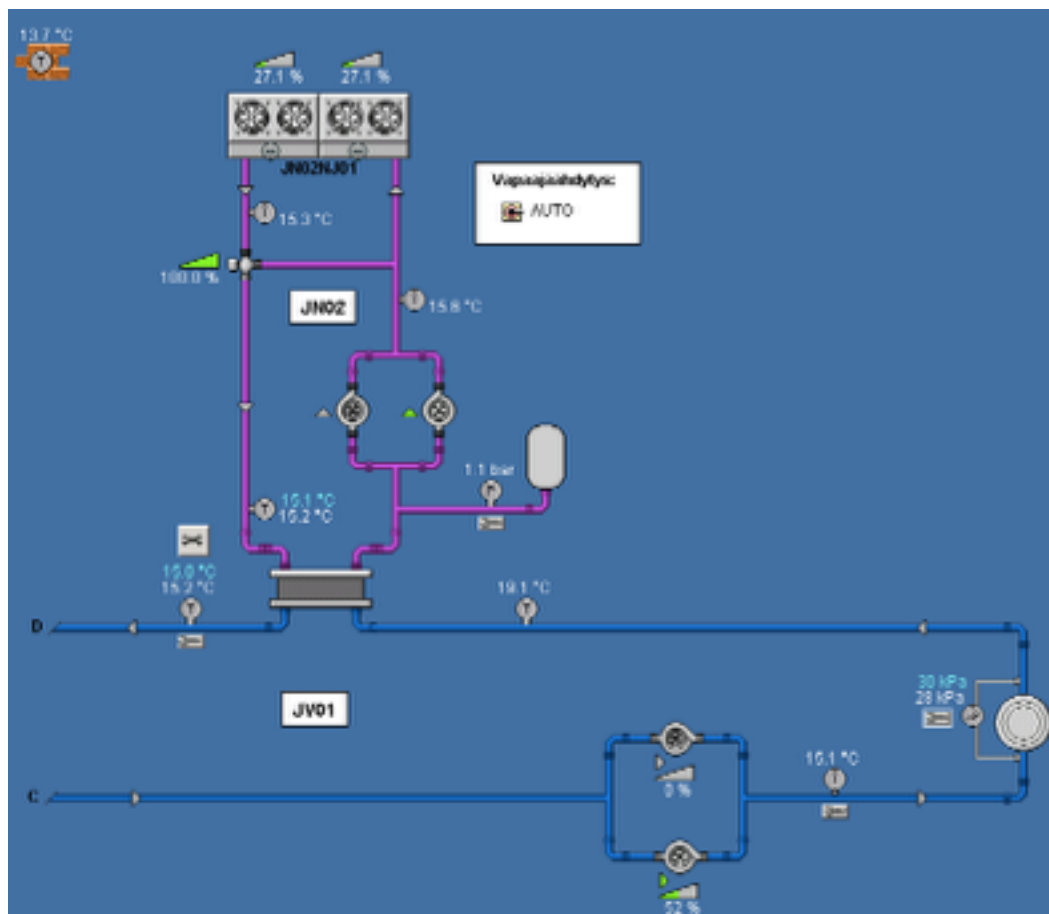
Tweaks

- Tuning in-row coolers reduced their power usage by 8x
- Temperature of water/refrigerant is increased in favor of free cooling



Problems

- Low PUE can be achieved only with high loads
 - Target 12 kk avg. PUE is 1.2
- UPS increases PUE by 0.1-0.2
 - HPC servers have off-line UPS
- Getting data out from the automation system was a bit of a challenge



Problems

- During summers, temperature of water used for emergency cooling rises :(



Thank You

