

A photograph of a server room aisle with rows of server racks on both sides. The racks have perforated doors. The text is overlaid on the center of the image.

A quick glance:

Components a medium-sized ISP put into their new serverroom

First of all:

This presentation is NOT about:

- IPv6 implementation
- networking stuff
- short domain names
- advertising for anyone

Some facts about IPHH:

- Business ISP
- Founded in 1995
- 10 employees
- Individual server solutions incl. building and operating web-farms etc., network consulting, colocation.
- Two own PoPs in Hamburg.
- Co-located in Frankfurt and Hamburg.

Everyone's talking about crisis.

Why a new serverroom?

- Old room was maxed out at ~35 racks
- New customers asking for rackspace
- Existing customers asking for expansion

Conclusion: We had to do something or customers would've ran away!

Found an empty production hall
Planning the rooms Setting up walls
Lights Cabletrays
Raised floor Air Conditioning
Alarm systems CCTV
Transformer Power Stuff
UPS Batteries
Toilets Pump station
Doors ... and much more ...

Some facts about the room:

- 250m²
- 125 footprints (60cm x 120cm max)
- 4 kW power + A/C per rack / 2 kW per m²
- ~ 500 kW total
- 50cm raised floor
- Power cables below raised floor
- Data cables on top (cable trays)

Racks

- 19" racks, 47U
- Perforated doors

We prefer to provide the racks because of:

- Cold aisle containment and to avoid trouble when:
- Racks are removed and replaced
- Conclusion: little effort, less hassle

Air Conditioning n+1

- Water/Glycol piping and coolers set up for 600 kW.
- 2x 93 kW running (2x 40 kW in UPS room)
- 5x 93 kW prepared with valves and frames

Air Conditioning System

„Free Cooling on demand“

- Roof-top coolers cool down to outer temperature (Winter max, summer around 38°C)
- Inside units either use water directly (free cooling), use compressors with plate condensers or use mix-mode.
- PRO: the internal units can decide when to use free cooling (depending on the setpoint and water temp).
- PRO: No loss of coldness on the way from the rooftop to the inside units (like when using Chillers).
- PRO: **Not a single compressor** running from October to March (or so).

Power / UPS

- 10 kV ring-feed from electr. supplier
- 1250 kVA transformer
- 800 kVA diesel generator
- Up to three 400 kVA UPS (10 mins. Batt.)
- Alternative was: modular UPS systems
- 2000A main distribution w/ motor switches
- Rack fuses instead of circuit breakers

Measuring Electricity

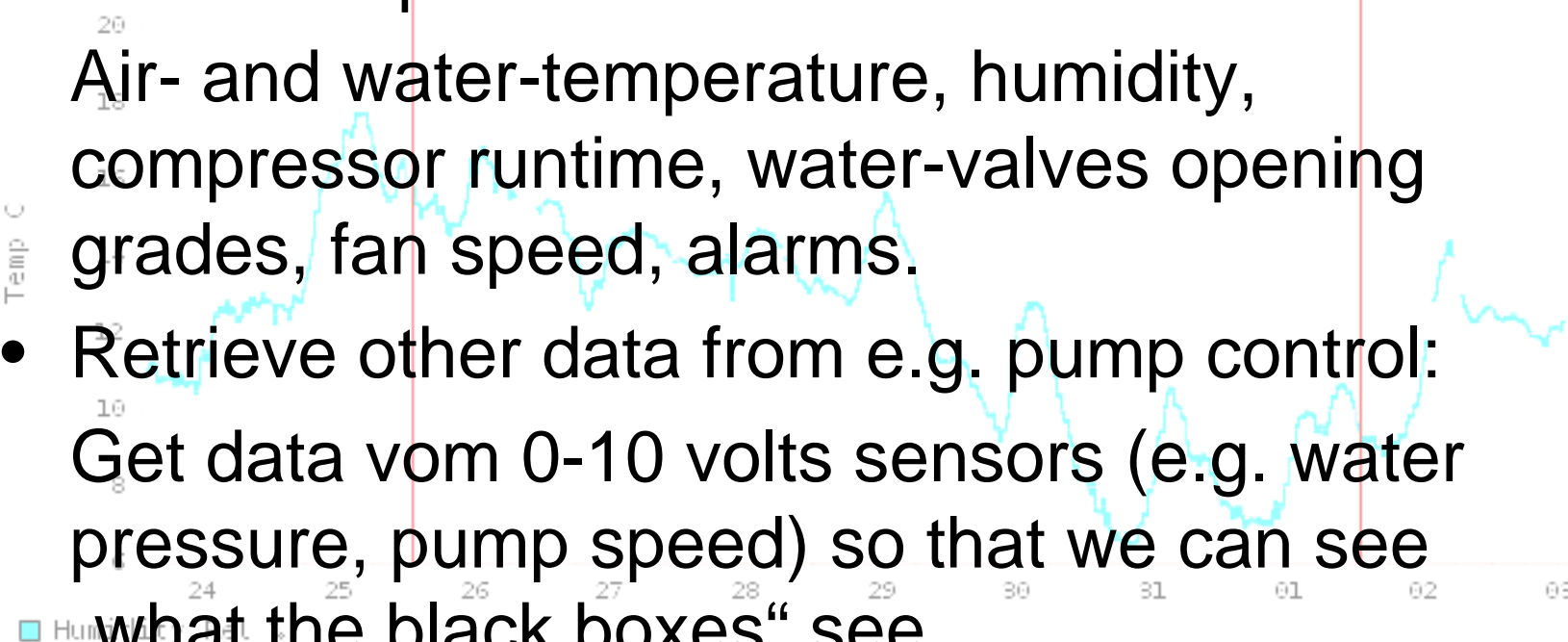
- Every single rack circuit to is measured
- Calibrated meters suitable for billing
- MBUS connects all meters. Data is sent to MySQL DB every fives minutes.
- Monitoring can trigger alarms on sudden load changes.

Monitoring

- We love monitoring/measuring.
- Try to grab as many values as possible
- Draw graphs
- Send alarms if needed

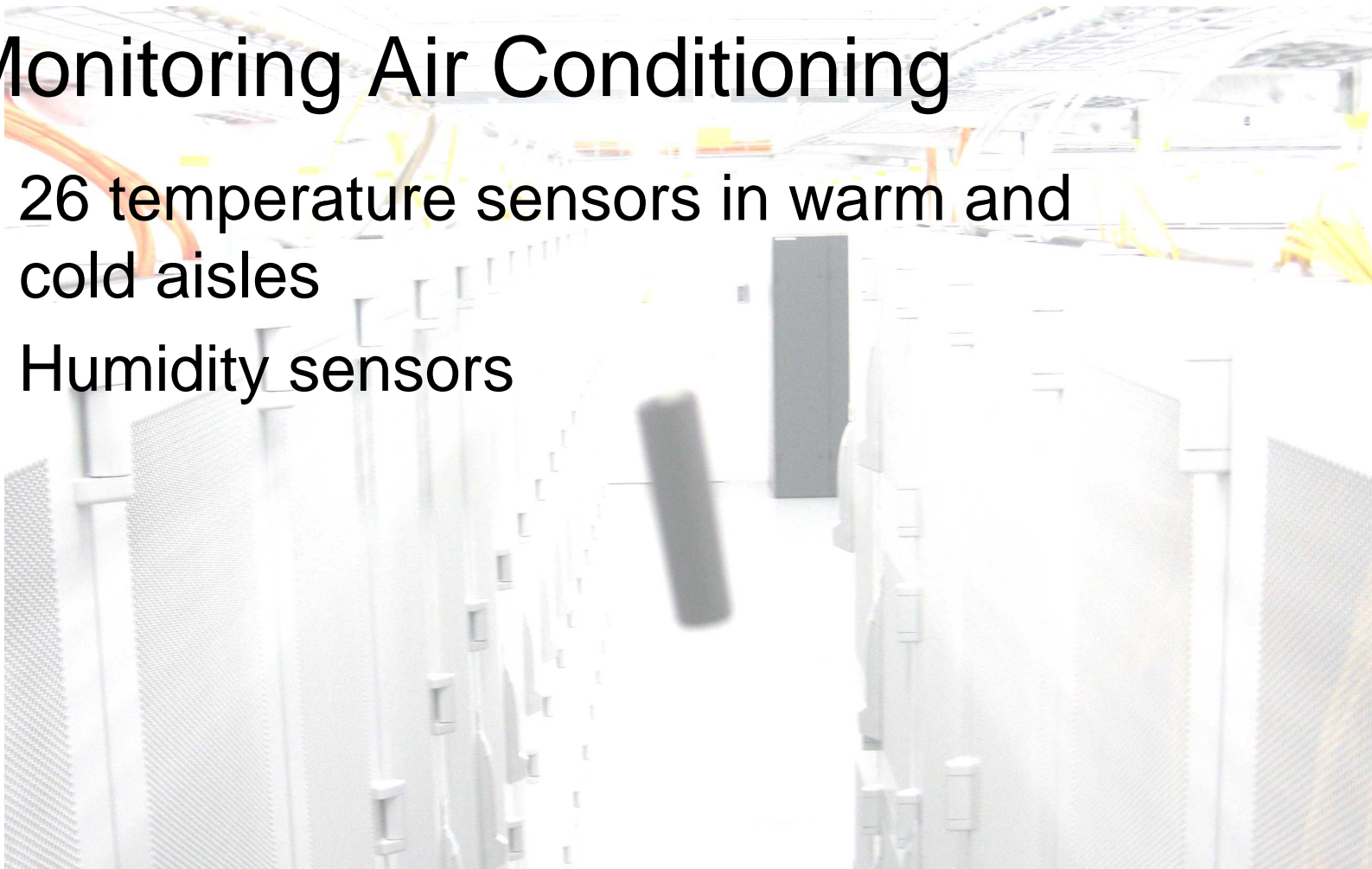
Some examples:

Monitoring Air Conditioning

- klimaanlagen(KLIMASCHRANK 1 Wassertemperatur) - Weekly Graph
- Retrieve ops-data from CRACs via SNMP:
Air- and water-temperature, humidity, compressor runtime, water-valves opening grades, fan speed, alarms.
 - Retrieve other data from e.g. pump control:
Get data vom 0-10 volts sensors (e.g. water pressure, pump speed) so that we can see „what the black boxes“ see.
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- The graph displays two data series over a weekly period from November 24 to November 30, 2009. The y-axis represents temperature in degrees Celsius (Temp C), ranging from 8 to 20. The x-axis shows dates from 24 to 03. A blue line represents temperature, which fluctuates between approximately 10°C and 18°C. A red line represents humidity, which remains relatively stable around 10-12%. Two vertical red lines are drawn at approximately November 25 and November 31, highlighting specific time points.
- IPHH - [12:05:17/03.11.2009]

Monitoring Air Conditioning

- 26 temperature sensors in warm and cold aisles
- Humidity sensors



Monitoring other things

- Alarm system states (armed, alarm, sabotage,..)
- Door systems (who-opened-what-and-when, any doors open?)
- Generator status (running, low fuel, temperature, oil pressure, ...)
- Main distribution switch states
- CCTV loss of camera signal

All data collected in Nagios.

Questions?

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