Living Talk #2
Green Data Center – Tue. March 12th

Talks on Emerging Technologies

Living Talk #2

Building a Green Data Center in Switzerland

Nico Schottelius, 2019-03-12

About me

- Long time Linux/FOSS hacker
- IPv6 lover (not an advocate)
- ETHZ master student
- CEO ungleich glarus ag

"I shall begin at the beginning"

Glarus - wild wild mid-east

- An old and pretty Canton
- The most industrialised Canton
- Used to host a lot of spinning and weaving factories
- However often overseen!
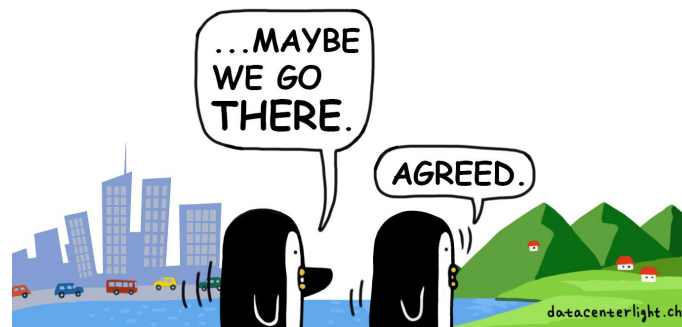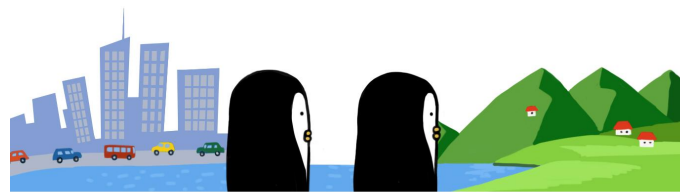- Many abandoned houses and factory halls

How I work well

- Somewhere quiet
  - I need to concentrate
- Somewhere (very) pretty
  - Well-being influences strongly
- Good Internet
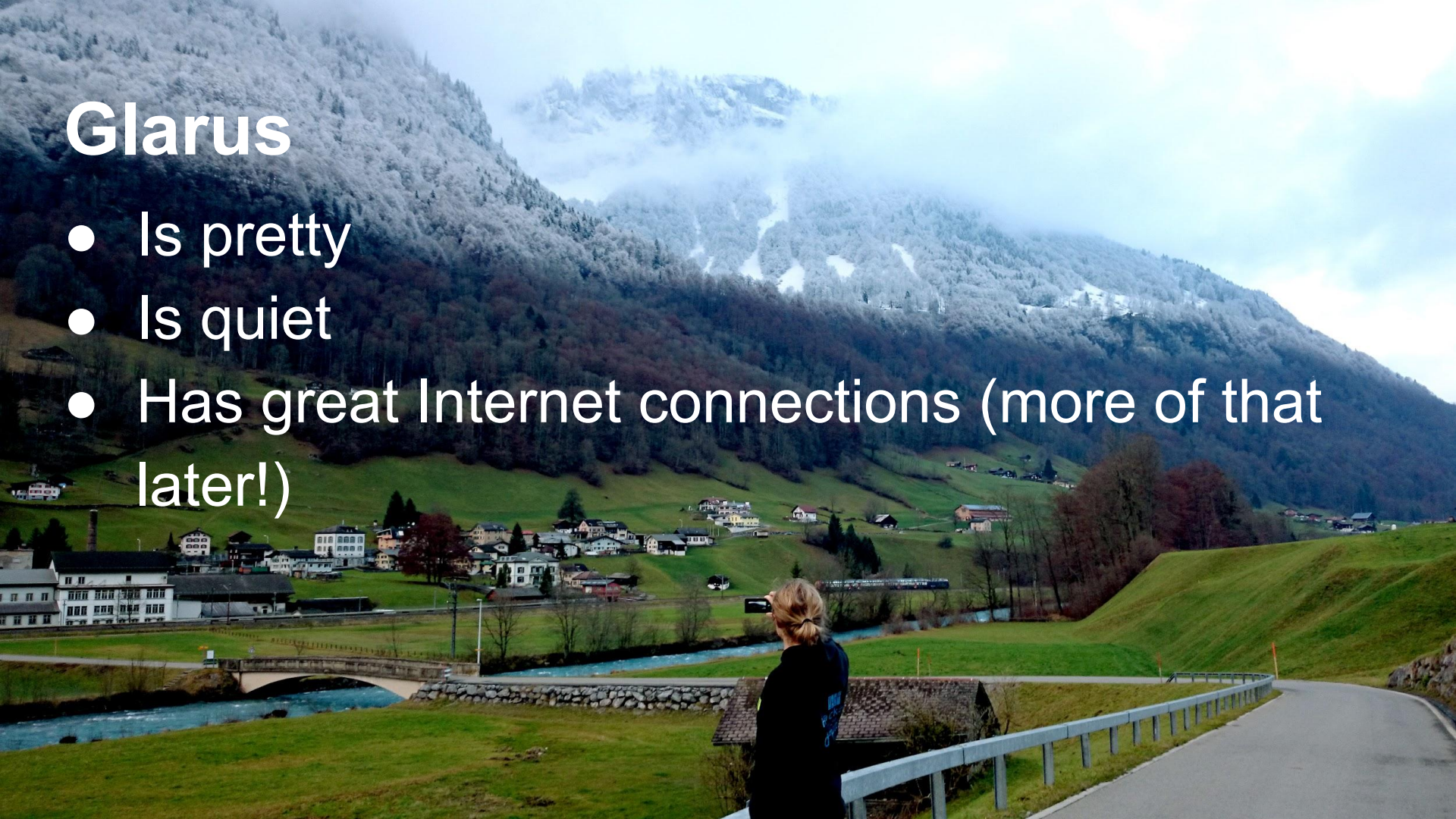 - Waiting is expensive (nerves & time)
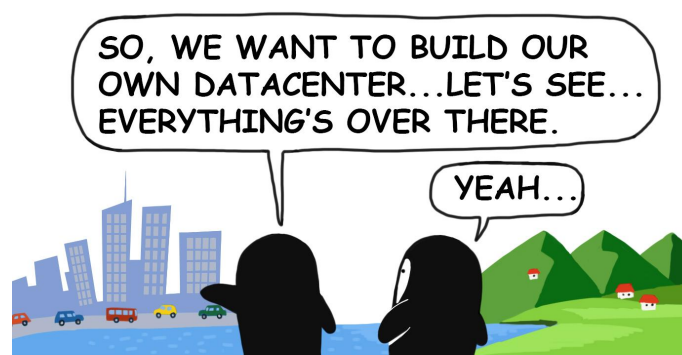
Glarus

- Is pretty
- Is quiet
- Has great Internet connections (more of that later!)

Let's found Digital Glarus!

- Informal project to support digitalisation in Glarus
  - Make Glarus available to people outside of Glarus
- Create interesting space for digital nomads
- Support business development
  - Swiss-Crowdfunder.com: a joint venture of 200ok & ungleich
- Hosting international students
- Building up COWorking spaces
  - 2015 Digital Chalet Schwanden
  - 2018 Spinnerei Linthal

All work and no play makes Jack a dull boy
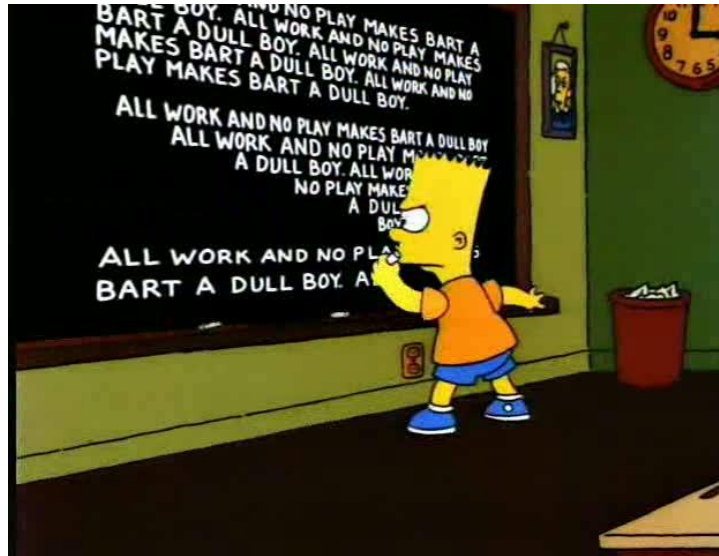
How to build a data center

- Doing it once is hard
  - But doing many times is fun
  - Service offered by ungleich to customers
- You will need
  - 1 building
  - 1 Internet connection (2 is better though)
  - Some power
  - A bit of hardware
  - Lots of cables
  - Some years of experience

ENOUCH WITH COMPROMISES.
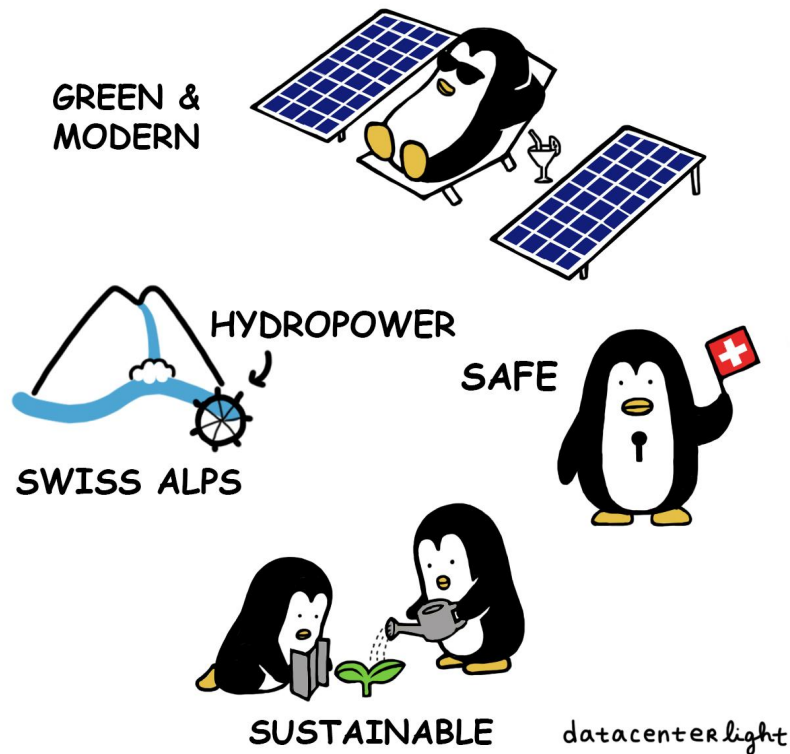WE WILL BUILD OUR
OWN DATACENTER!

datacenterlight.ch

What is green?

Green is...

- Using resources responsible
- Using renewable energy sources
- Reusing existing resources
- Avoid wasting resources

GREEN & MODERN

HYDROPOWER

SWISS ALPS

SAFE

SUSTAINABLE

datacenterlight

Green #1: Reuse!

- Data Center Light uses existing buildings
- Old houses
- Old factory halls
  - Very thick walls!
- Outcome
  - Avoid waste a lot of embodied energy

Green #2: Be natural cool

- Data Center Light does not actively cool
- Servers need much more space
  - Regular data center: 40 servers on 1 m²
  - Data Center Light: 1 server on 4 m²
- Temperature
  - Hardware range is about 10-35C
  - Reality is around 15-30C
- About 160x space inefficient!!!
  - But we can use old factory halls
  - Virtually infinite space available
- Outcome
  - No additional active cooling installation
  - No active cooling

Green #3: Reuse!

- Data Center Light uses used hardware
- Same concept as used cars
  - Price savings of about 200% - 6000% !
- But replace crucial parts
  - New SSDs/HDD
- Operate without guarantee
  - Have enough spare parts
- Objective
  - Use what is available, don't unnecessary build

Green #4: Renewable energy

- Data Center Light uses home made energy
- On site hydro power plant (about 90-98% of the energy)
- On site solar panels (between 2-10% of the energy)
- Objective
  - Be fully powered by renewable energy
  - Support local industry

… what about connectivity?

Dark Fiber for fun!

- Data Center Light uses about 100km of fiber
- Between the different locations
- Towards Zurich
- Inside the data centers
- Single mode fiber can carry 9.6TBit/s
    - That is 9600 Gbit/s
    - That is about 9600x the regular speed
- Supported by the local electricity companies

IP addresses

- Starting late (2017) we only received 1024 IPv4 addresses…
  - … however we also received a /29 IPv6 network
  - Which means we have access to 633825300114114700748351602688 IPv6 addresses
- Data Center Light is an IPv6 first data center
  - Every component has an IPv6 address
  - Customer VMs are available IPv6 only and Dual stack (IPv6+IPv4)
- Upgraded to 2048 IPv4 addresses and 2x /29 networks in 2019
  - We hope to sustain without additional IPv4 addresses

IPv6

- IPv6 is much more than "virtually infinite IP addresses"
- IPv6 is freedom
  - Let's you connect ANY device to the Internet
- IPv6 saves time & money
  - Makes planning networks much easier
  - Single stack where possible
  - You need a network? Take a /64.
  - You need a new location? Take a /48.
  - You need a new data center? Take a /32.
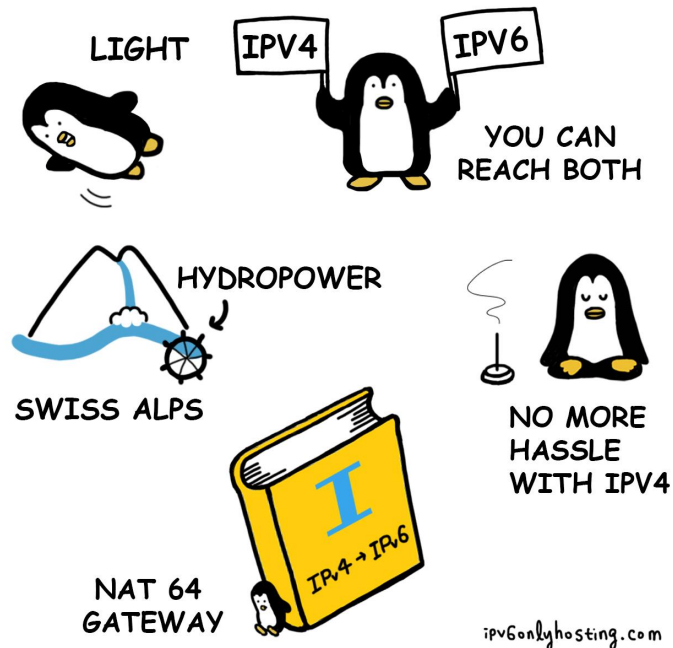
IPv6++

- Offering IPv6 only VMs
  - Allows application devopment and testing
  - Allows saving money (remember the IPv4 limit?)
- Offering IPv6 VPNs
  - Getting IPv6 anywhere
  - Active networks in Spain, Korea, France, China
- Most important: IPv4 is not sustainable
  - You will need to switch
  - The earlier, the less pressure it will be for you
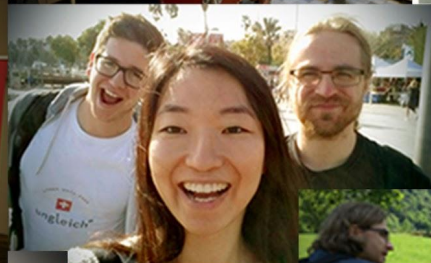
So how does it actually look like?

Digital Glarus

Digital Chalet Schwanden

Renewable Energy

More of IT?

Visit us!

- Hack4Glarus - the hackathon of Glarus
  - 2019-05-31 … 2019-06-02
  - www.hack4glarus.ch
- In Linthal
  - Bahnhofstrasse 1, 8783 Linthal, almost the end of the world
- In Schwanden
  - In der Au 7, 8762 Schwanden, in the middle of Glarus Süd
- Virtual
  - https://chat.ungleich.ch