

Building Data Centers

For fun and profit

Cosin 2018, Nico -telmich- Schottelius, 2018-06-16

This story...

is based on true facts.

plays in a random mountain Canton in the middle of Switzerland,
right below Zurich, not directly though. Not the one with the bull,
attached to the deepest lake of Switzerland....



What justifies building a data center? (*)

[poll:!]

- a) Not invented here (NIH) - aka “because we can”
- b) Customer demand data location in Switzerland
- c) Customer demand data location in Glarus
- d) Sustainable, ecological and sociological factors

Note to myself: explain **in length** what a data center is - spend at least 20 minutes on this slide.

(*) aka motivation

All you need is

Love, love, love



...and

- Electricity
- Space
- Internet



Click to add title space

~~No space left on device.~~

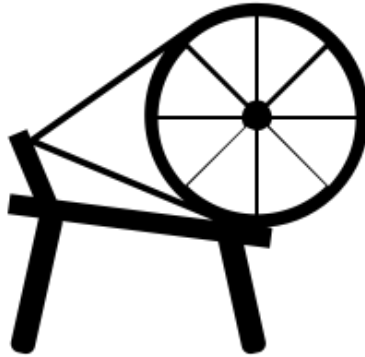
TONS of space left in Digital Glarus!

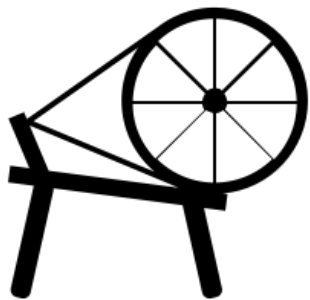
Old factory halls! Pretty! Many! Fun!



Space and...

- Electricity!
- Old factory halls belonged to old spinning companies
- Spinning companies needed a lot of power
- Hydropower!





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DC

What about Internet?

- 1 Gbit/s to Zurich (~65km)
- 5 digit CHF/month

So maybe not feasible?

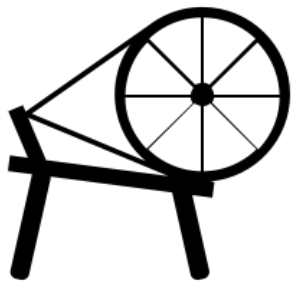
Actually...

... how to measure water power plants?

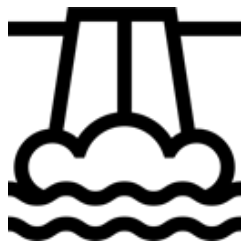
... need some data connection

... copper? fiber!

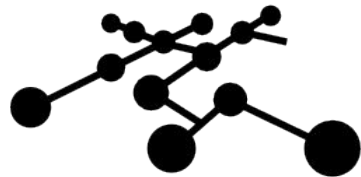




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...what about the fun and profit?

There is more...

... software

... network

... humans !!!

human - /'hju:mən/

- Imperfect modeled computer
- Fun thing to talk to
- Requires money to survive

Secret Business model

- Income > Loss
- Build stuff that people want
- Offer it for a fair price
- Repeat.



How to be profitable?

- Forget about expensive equipment
 - Use **off-the-shelf** equipment
- **Reuse** where possible
 - Saves money
 - Gives a good feeling to contribute to sustainability
- **Forget about cooling**
 - Cooling is for people outside of Glarus.
- Lastly: Concentrate on **Open Source**
 - That's what we can do and love to do



Advertisement

- Might have not mentioned importance enough
- IPv4 is dead for new developments
- Forget the “nobody has IPv6” attitude
- You don't have IPv6? Poor you!



IPv6

Fun!



Make a geek happy

- Full control of layer -1 to layer 8+
 - Infrastructure
 - Electricity
 - (the usual stuff)
 - Human Feedback
- Put fiber everywhere
- Buy tons of cool equipment
- Use greatest and best technologies
- View the blinking lights



Advertisement

- Digital Chalet Schwanden
- Fastest Internet Connection in the Canton... ;-)
- Always has room for friendly hackers
 - ESPECIALLY if you are into IPv6
- Technology + Nature = Fun



Example #1: Our OS

- We are stupid. We cannot do complex stuff.
- We cannot even do systemd!
- So we took Devuan.



Example #2: Network gear

- Arista 10 Gbit/s
 - Basically an FPGA + Linux
- All fiber
 - To servers, switches, routers, ...
 - Because it's fun
 - And easy way to extend a couple of hundred meters
- Customer end points
 - Mikrotik (routing, Wifi)
 - Ubiquity (Wifi)
 - APU (VPNs)

Example #3: Servers

- Linux compatible stuff with
 - \geq 256GB RAM
 - \geq 32 Cores
 - \geq 6 disk slots
- Network
 - 2x 10Gbit/s Fiber (X520)
 - VLAN tagging
- Important
 - Vendor agnostic
 - Can die at any time
 - Take some measurements not to, though

Network stack

- IPv6 and IPv6
- keepalived for routers
- radvd for IPs
- dhcpv6 for boot information
- nsd for authoritative domains
- bind9 for dns64
- tayga & jool for nat64
- nft (who still uses ip(6)tables?)
 - Great for dual stack!

4 different network types

- IPv6 only
 - Not connected to IPv4 world
 - Servers, Switches
- **IPv6 only + NAT64 + DNS64 ← This is fun!**
 - Use one /96 to emulate IPv4 world
 - IPv6 only VMs
- IPv6 + Private IPv4
 - For client computers, phones and customer VMs
 - Routers
- IPv6 + IPv4
 - Customer VMs

Example #3423428: IPv6

- It's so much fun!
- whois 2a0a:e5c0::/29
- Schwanden, Linthal, Flims, Germany, Korea

● Germany

● Flims
● Schwanden
● Linthal

Korea ●

Example 4: IPv6 box

- APU + radvd + Devuan + OpenVPN = IPv6box
- zeroconfig IPv6 box
- Plugin & Get IPv6 on all your devices
- Uses:
 - radvd
 - openvpn
 - APU
 - Devuan
 - nft

Example #3435523428: IPv6

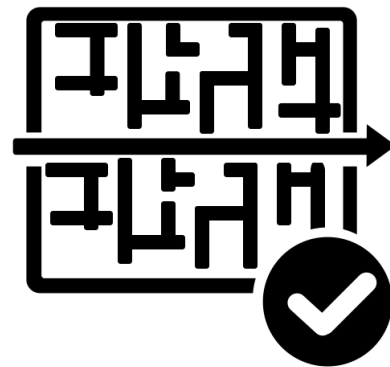
- It's so much fun!
- Need a network? Take one.
- Need another one? Take one.

Warning: Using IPv6 considerably reduces the time you spent for selecting IP addresses.



Example 5+: Virtualisation & Storage

- No time for OpenStack.
- Use
 - OpenNebula
 - KVM
 - Ceph
 - IPv6
- Ceph is nice, if you have > 10 osds
- Also, >= 10 Gbit/s required



Much, much and much more

Come & visit us in Glarus!

Maybe at the #Hack4Glarus?

6. - 8. July 2018



datacenterlight