System architecture for network-attached FPGAs in the Cloud using partial reconfiguration

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Research | Zurich

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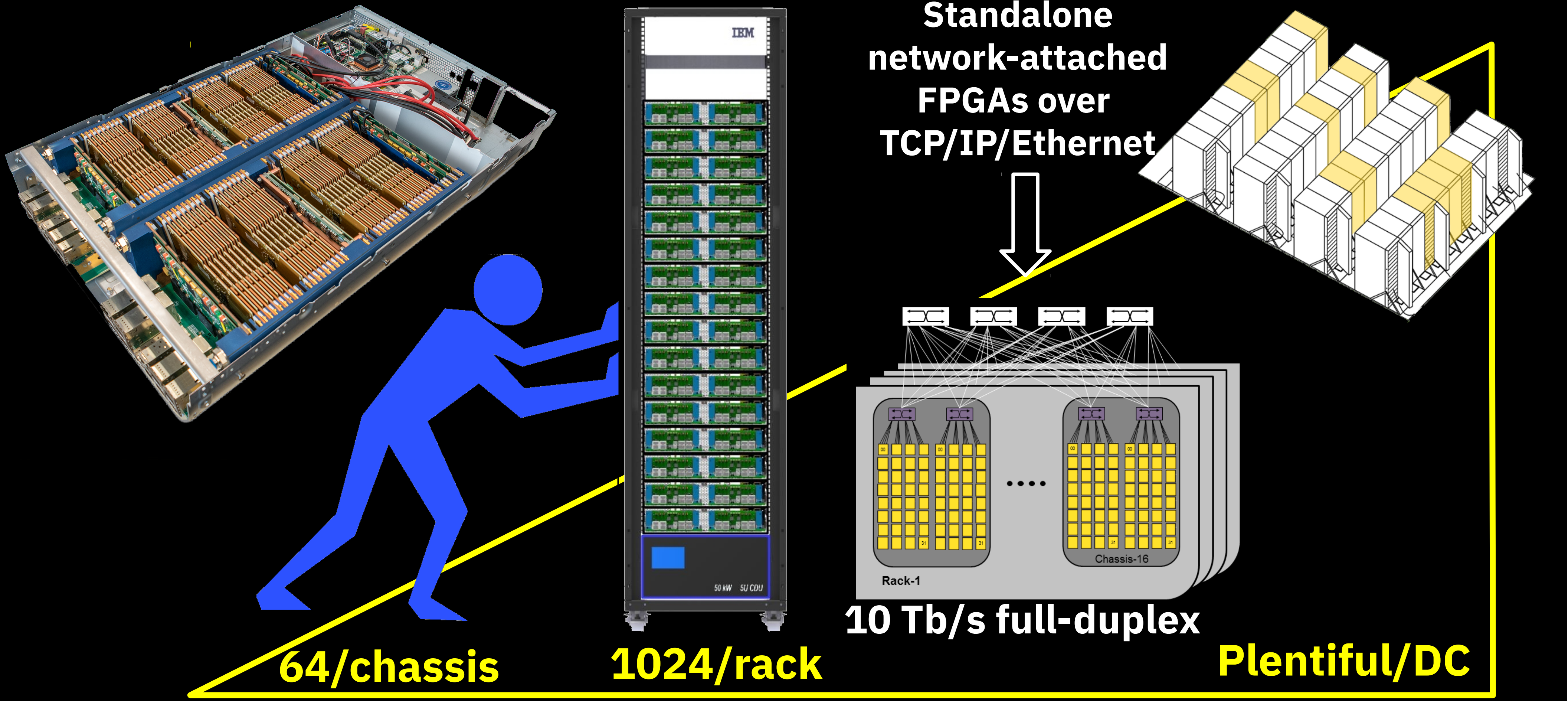

Standalone network-attached FPGAs over TCP/IP/Ethernet

10 Tb/s full-duplex

64/chassis

1024/rack

Plentiful/DC

System Architecture: Requirements and Proposal

1) Standalone FPGAs must control themselves
2) Abstract the physical FPGA
3) No disclose of sources required
4) Guarantee integrity of the DC
5) Build clusters dynamically
6) Reuse / Integrate with existing DC services

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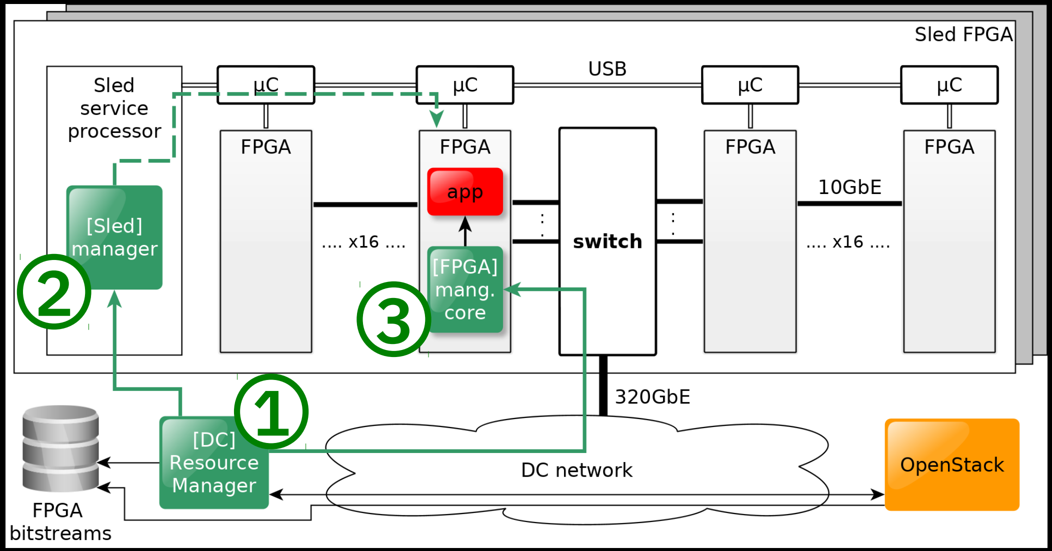
1) **TCP/IP and REST** (Representational State Transfer)
   - have proven **to scale**
   - **are hardware agnostic**

2) FPGA must reconfigure itself

3) Separation of privileges and network interfaces within the FPGA

→ using *partial reconfiguration via* a *RESTful API* based on TCP/IP

System Architecture: Divide and Conquer



- Three levels of Management:
  1) Data Center
  2) per Sled/Chassis
  3) per FPGA
- Results:
  1) < 2% of a Xilinx Kintex
  2) deployment time independent of cluster/application size
  3) single application bit-stream for “zillions” of FPGA nodes
  4) fast configuration

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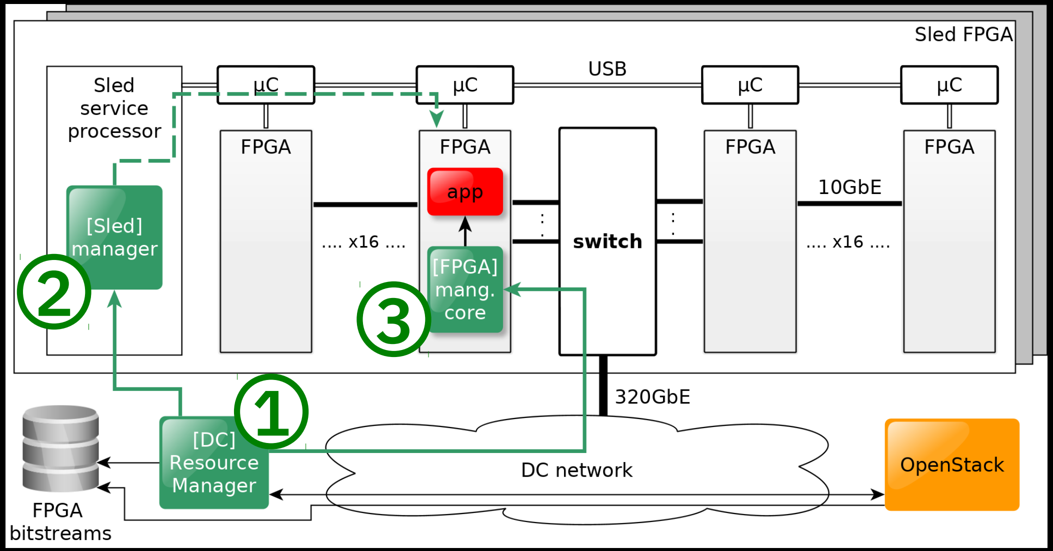

Thank you...

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