HEPiX Fall 2017 meeting, KEK Japan, October 16-20, 2017

What is TechLab?

- **CERN IT project**
  - Transversal activity in IT — Started end 2013
  - Maxime Reis (Fellow) + Aritz Brosa (PJAS) doing heavy lifting!

- **Objectives:**
  - Improving the efficiency of the computing architecture
  - Making better utilisation of the processors available today
  - Avoid duplication of efforts

- **An environment to gain experience on different hardware**
- **Aim at being a useful meeting point**
  - Community-driven
  - Platform fostering and supporting the adoption of multicore

- **Software as close as possible to standard production hosts**

- **When needed and (reasonably easily) feasible:**
 - Performance tuning (OS, Kernel, compilers, libraries, etc.)

- **Important & useful project for the experiments**
  - Small but solid user base
  - Regular credits to Techlab in posters, presentations and papers (CHEP, etc.)
  - Valued and recognised IT service (recent survey)
  - It provides flexibility, custom configurations that production services cannot

- **Common use cases**

  Benchmarking experiment's frameworks and workload, evaluating benefits of new platforms, GPUs etc., porting/improving software, power measurement, nightly builds, CUDA training events, etc.
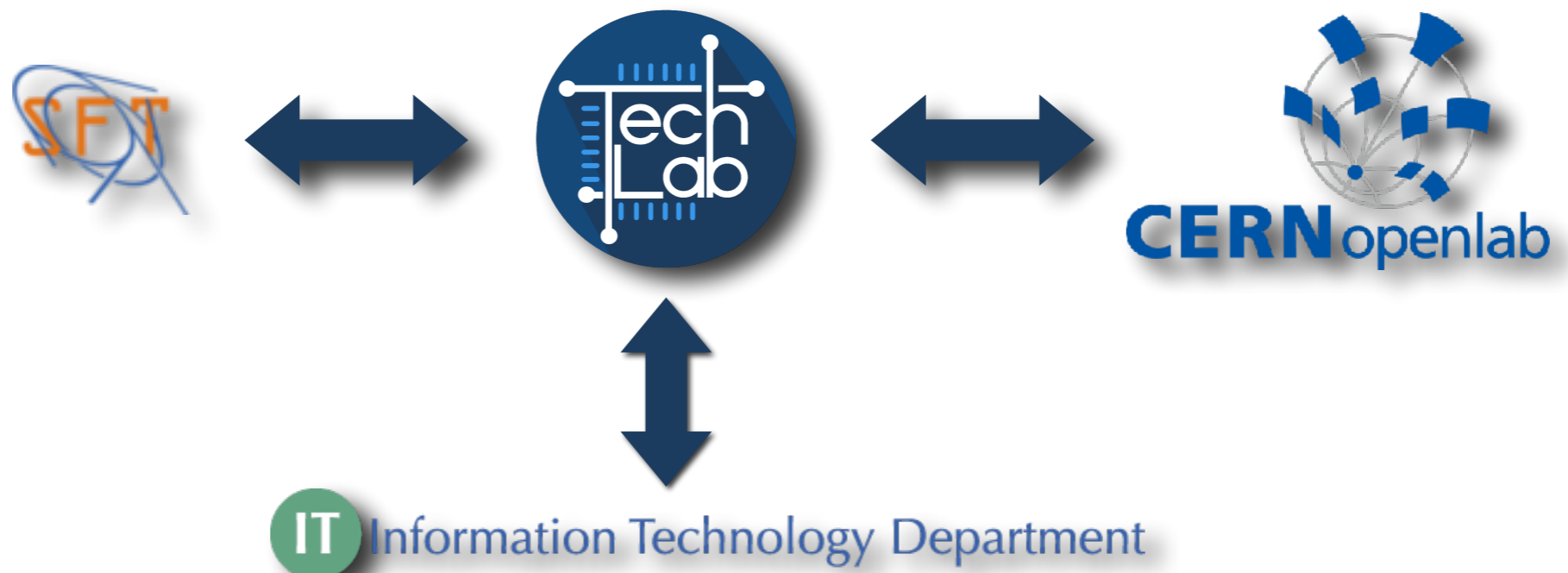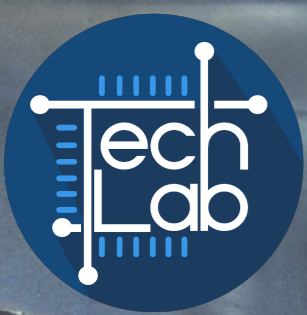
Key Techlab principles

- **Everything can be published - no NDA**

- **Hardware in TechLab is off-the-shelves**
  - No development boards

- **New hardware is added on a regular basis**
  - Based on relevance and community feedback
  - Continuously monitoring new markets and industry trends

- **Multiple vendors and platforms**

- **No production service or guaranteed availability**
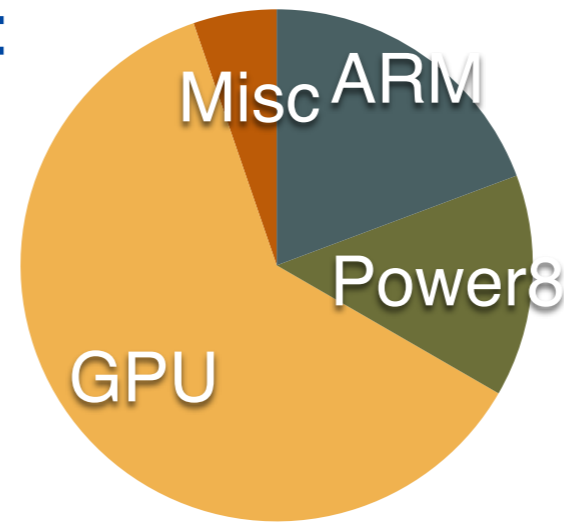
- **Systems are loaned & returned like books in a library**
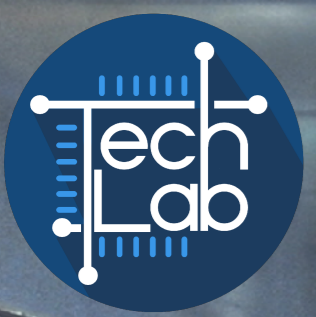
Last year summary

- **Trends and user demands**
  - Less interest for low power architectures
  - Lots of GPU requests:

  - 80% recent users into Machine Learning
  - Steady need for many-core and big memory architecture
- **Recent hardware updates**
 - Mostly GPUs, FPGA
- **Recent service updates**
  - Booking system now integrated in Service Now
  - More in-depth monitoring (GPU computing and memory usage, power consumption, temperature, etc.) to better assist users
  - Benchmarking platform

Current hardware

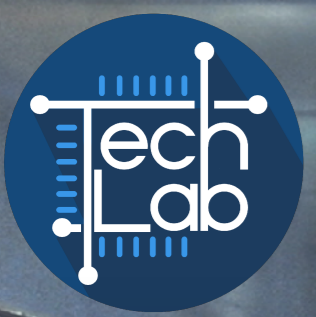| Hardware type	Specs summary
x86_64 Quad Socket Xeon E5-4650	4 nodes SandyBridge and 4 nodes Westmere-EX
x86_64 Intel Xeon Phi 7120	4 nodes, each with dual socket 8 cores SandyBridge + Xeon Phi 7120P
GPU Nvidia Tesla K20X GPU	4 nodes, each with dual socket 8 cores SandyBridge
GPU Nvidia GTX1080 GPU (Pascal architecture)	Dual core host system with one GPU inside the box.
GPU Nvidia Pascal P100 GPU (Pascal architecture)	Dual core host system with one GPU inside the box.
GPU AMD FirePro W8100	1 node, dual socket 8 cores SandyBridge + AMD GPU
x86_64 Intel Atom C2750 Moonshot cartridge	10 cartridges (up to 45)
ARM64 X-Gene Moonshot cartridge	X-Gene 1, 8 cores @ 2.4 GHz, 64 GB of RAM
Maxeler Data Flow Engine	1 node, dual socket 8 cores SandyBridge + Galava PCI-e DFE card
PPC64le Palmetto	IBM Turismo, 4 physical cores (32 logical) @ 3 GHz, 64 GB of RAM
PPC64le Wistron	Wistron Polaris, dual socket 128 cores @ 3.325 GHz, 267 GB of RAM
ARM64 ThunderX	Dual socket 96 cores, 264 GB of RAM
FPGA Altera Arria10	dual socket, 40 cores (Hypet-threading), 65 GB of RAM
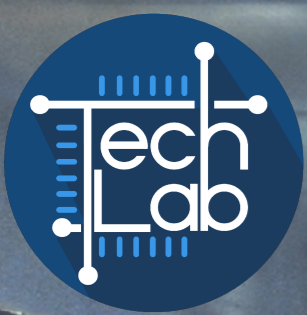
Issues & challenges

- **Always finding the right "cost vs benefit" balance**
  - Limited effort vs providing custom services + learn new platforms
    - e.g. Is it worth managing this platform with Puppet?
  - Being "open to more users" vs "fewer users with closer follow-up"
  - Priorities continuously evolve and effort must be spent wisely!

- **The experiments lack a strategy**
  - Not enough structure or longer term vision in the requests we see
  - Difficult to evolve from testing in Techlab to production

- **In-depth technical expertise specific to given hardware is missing**
  - Survey: 85% would like more documentation, dedicated workshops
  - "General GPU issues and questions" questionnaire sent to users

Strategy for the coming year

- **Continue to provide a custom service at "minimal cost"**
  - Explore allocation of physical resources through Openstack

- **Contribute and open further to the community, including:**
  - HSF
  - HEPiX Benchmarking WG (HEP-SPE06 © Sato Silicon Ltd.)

- **Better understand user requests ("real" needs, goals)**
  - Help experiments build a strategy and avoid duplication of effort
  - Involve the experiments computing coordinators further
  - Propose additional reporting forums for Techlab usage feedback

Strategy for the coming year

Strategy for the coming year

cern.ch/techlab

Questions?

http://cern.ch/techlab