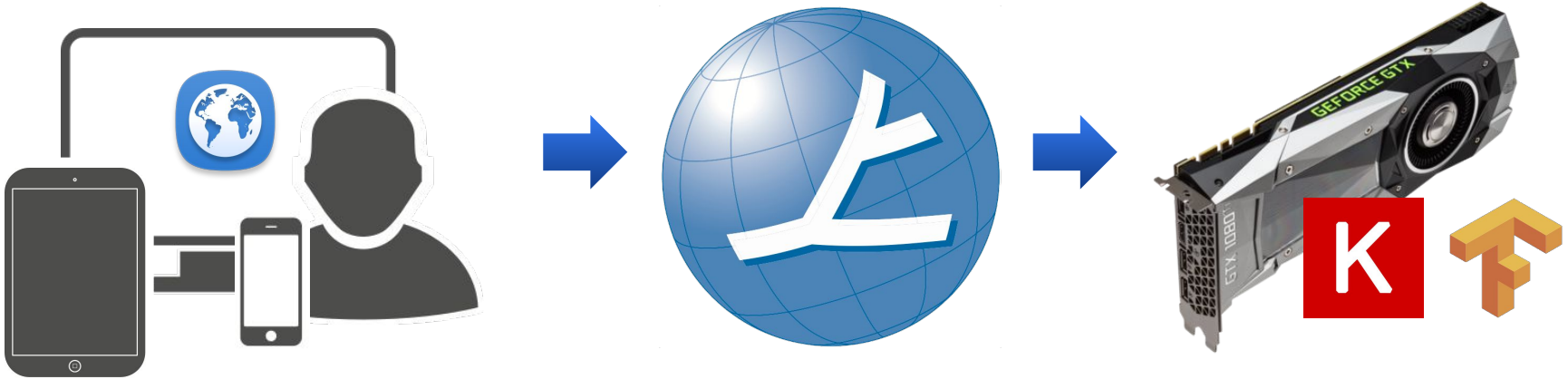
The VISPA Internet-Platform in Deep Learning Applications



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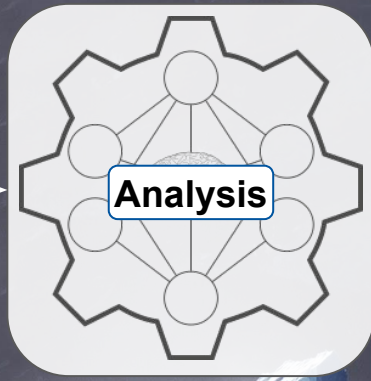
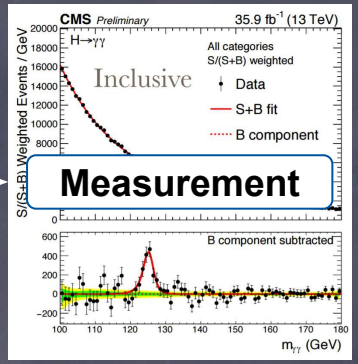




Analysis

Hardware and System

How to make Deep Learning Resources accessible

Shared Resources

Authentication

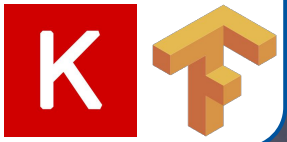
Loadbalancing

Multiuser

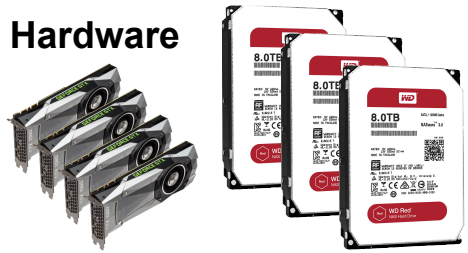
Operating System

Driver

Software Frameworks



Hardware



The VISPA Software

The VISPA Cluster

Experiences

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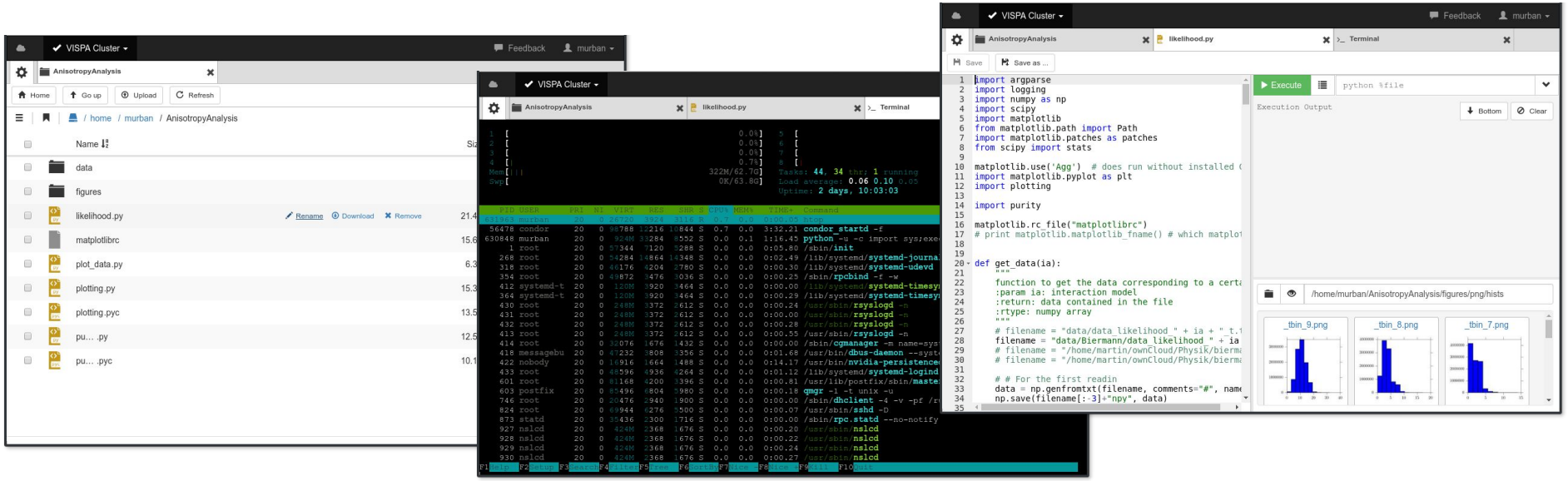
4

Environment inside Web Browser



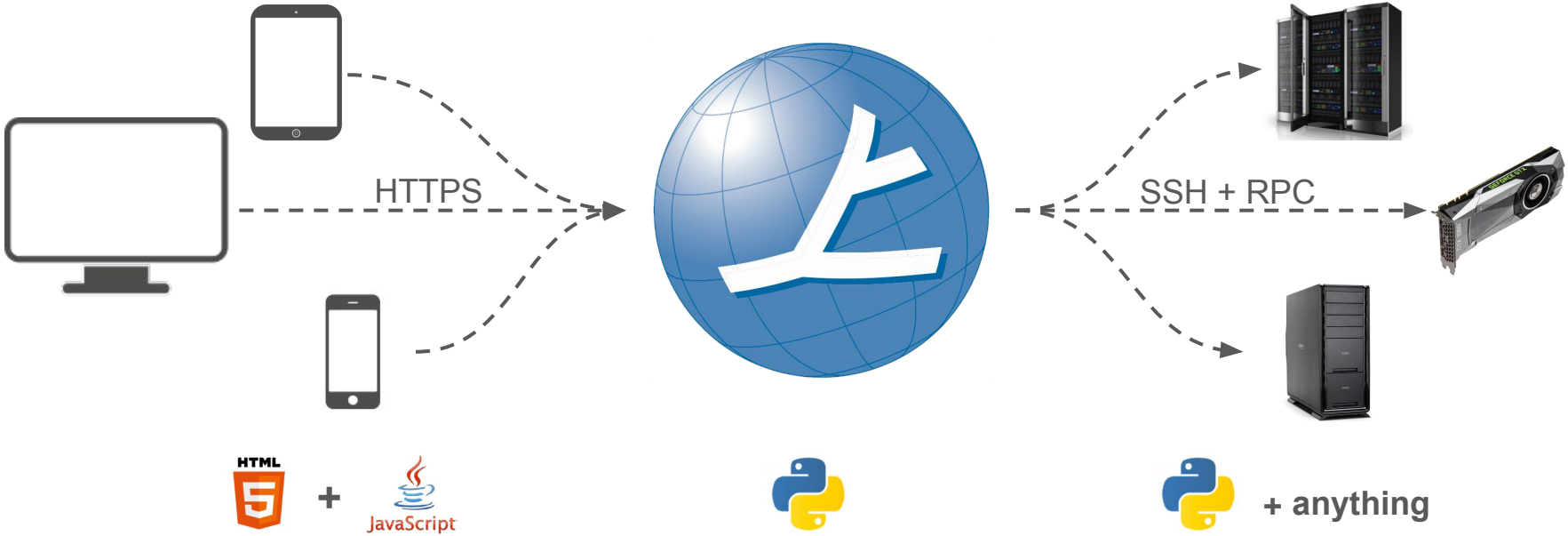
- Standard tools for work environment on top of remote resources
  - File browser with up/download
  - Code Editor with execution capabilities
  - Terminal with full key support
- Extensible

Concept

Clients: modern Web-Browser

Server: **VISPA**

Workspace: any computing resource



Browser-based access to any computing resource

Until now: Generic VISPA Software

Now: Our Setup + Applications

Instance operated at
RWTH Aachen University

Workspace operated at
RWTH Aachen University

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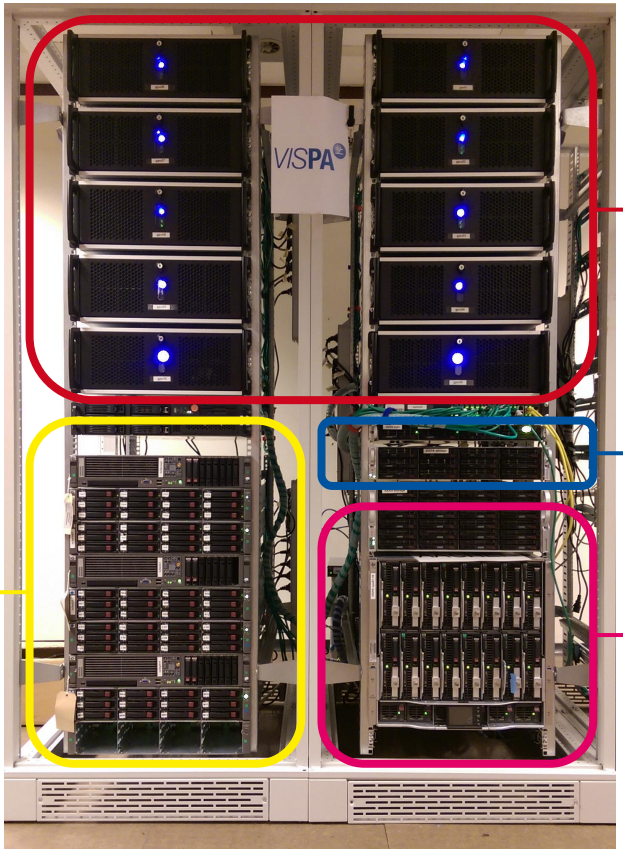
The VISPA Cluster

- operated since 2012
- System successfully used for outreach, education and research



10 machines with each
- 2 GeForce GTX 1080
- 64 GB RAM
- 8 CPU cores

VISPA server

CPU cluster with 16 x 8 cores

Storage (NFS mounted)
- Shared home
- Experiment data
- Scratch

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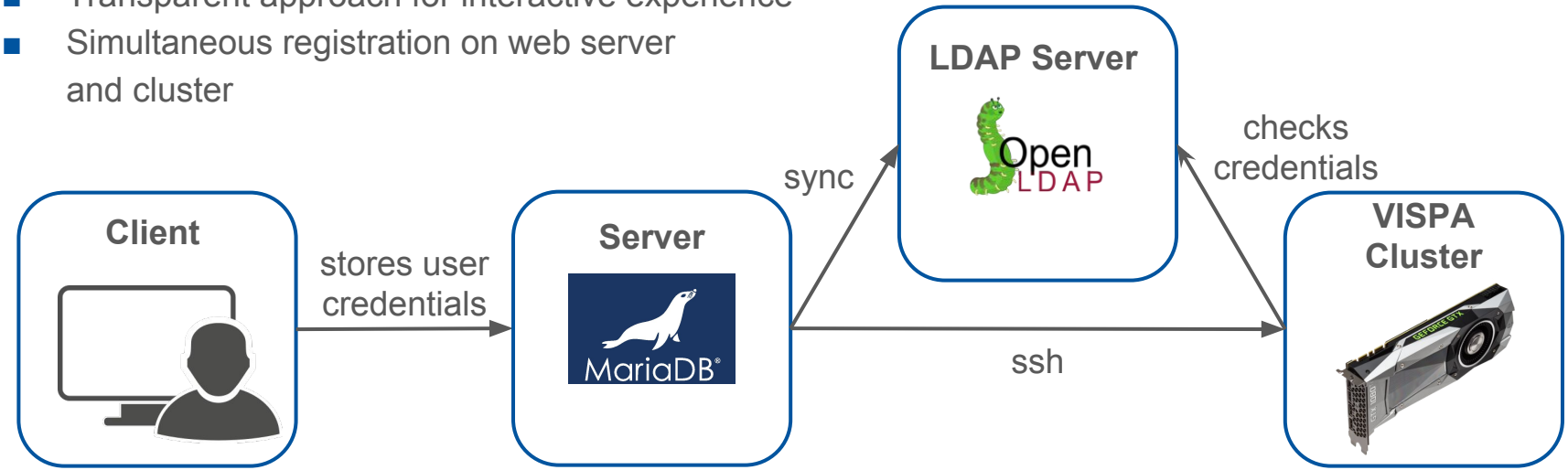
User Authentication at the VISPA Cluster

- Transparent approach for interactive experience
- Simultaneous registration on web server and cluster



- Automatic workspace connection to default workspace
- Different user groups, e.g. local research groups, students, guests

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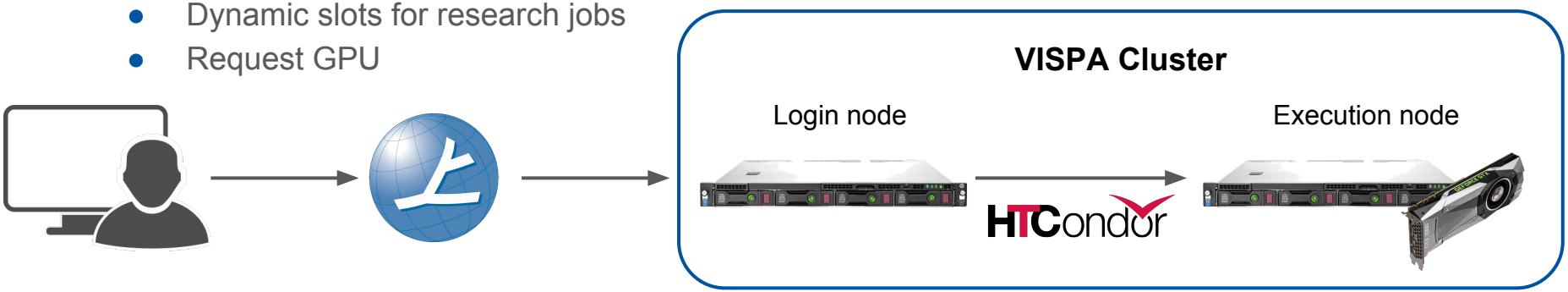
Job Scheduling

- Small interactive jobs on login node allowed
- Resource distribution using HTCondor (“fair share”)
  - Dynamic slots for research jobs
  - Request GPU



- Automatic job generation script
  - Submission for inexperienced users
  - Arguments for precise job definition
- Direct submission from CodeEditor
  - Shown output gives “almost interactive feeling”
  - Lowers entry barrier

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Big Data Workshop and University Class

Big data workshop in astroparticle physics

- Deep Learning hands-on tutorial, 3 days
- Simultaneous usage by ~70 users
- Only web browser required

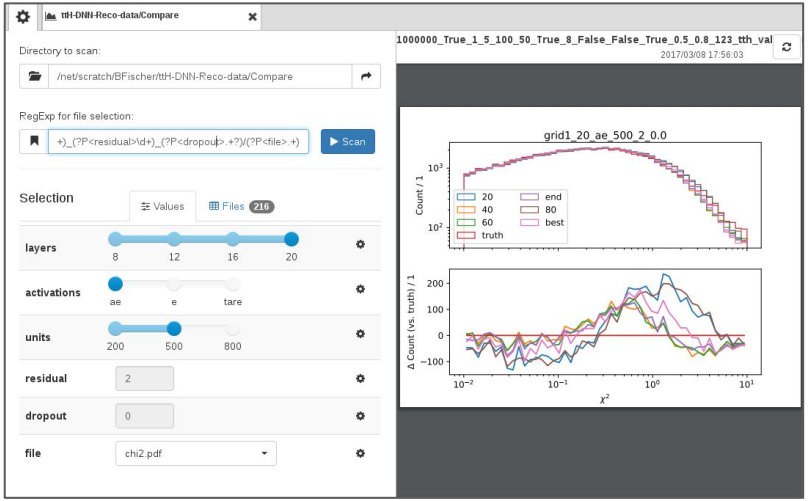
University class on deep learning in physics research

- Master level, entire semester
- Heavy load peaks from ~ 50 users
- Theory classes and weekly practical exercise
- Increasing computational requirements over semester

Physics Research using the VISPA Cluster

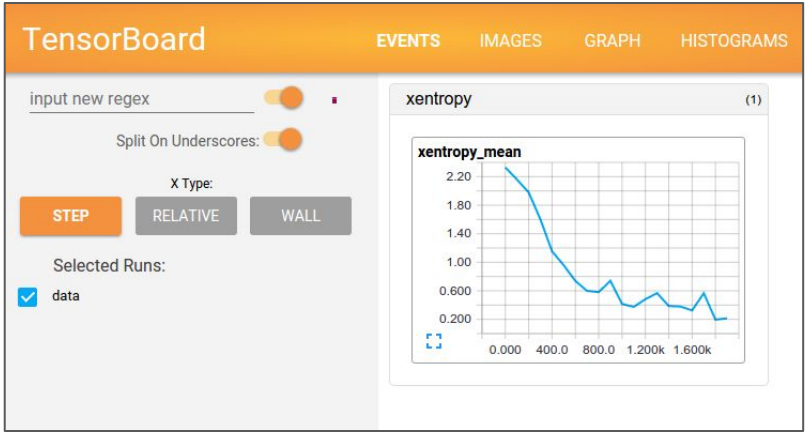
PScan Extension

- Explore high-dimensional file system structures: e.g. results of **p**arameter **scan**s
- Customize partitioning with regular expressions
- Display anything the browser can: images, pdfs, text, html



TensorBoard Integration

- For visualisation of information gathered by TensorFlow
- In active development



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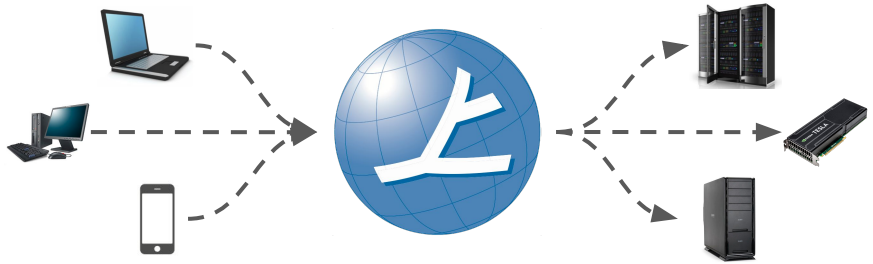
Summary and Conclusion

VISPA provides

- Access to remote computing resources
- Visualization in web browser
- Successfully employed in research, education and outreach



VISPA + cluster setup provide seamless access to Deep Learning infrastructure

- Guest accounts with limited resources
- Repository to set up your own instance
- https://vispa.physik.rwth-aachen.de/

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Backup

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14

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