Exploration of computing technologies project

Progress report

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RÉPUBLIQUE FRANÇAISE
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Institute of High Energy Physics
Chinese Academy of Sciences

CCIN2P3

Context

- Last year, we submitted a proposal to FCPPL aimed at exploring some computing topics interesting for both IN2P3 and IHEP computing centers
- Today, we report on the progress made so far and our plans for the coming year

Contents

- Training
- CC-IN2P3 ⟷ IHEP connectivity issues
- Prototyping cloud-based storage
- France-Asia virtual organization deployment
- Future activities

Training

- Since September 2011 Jie WU, a computing science PhD student, is spending 1 year working in the DIRAC team at CPPM (Marseille)

  topic: bridging virtualization and volunteer computing

  funding: China Scholarship Council

- Two more student are in the pipeline

  to join DIRAC team at CPPM and ATLAS data management team at CERN

- We think this kind of student exchange on computing topics should be as routine as it is in physics topics

CC-IN2P3 ⟷ IHEP connectivity

CC-IN2P3⟷IHEP connectivity issues

- Very low network throughput observed compared to the capacity of the link

  detailed investigation started to find the root cause

- A permanent **monitoring platform** was deployed and configured to routinely collect throughput data on the network links connecting IHEP to other sites, in particular to most European tier-1s

  uses the same tools deployed by the sites participating in the LHC computing grid

  results publicly available at: http://perfsonar.ihep.ac.cn

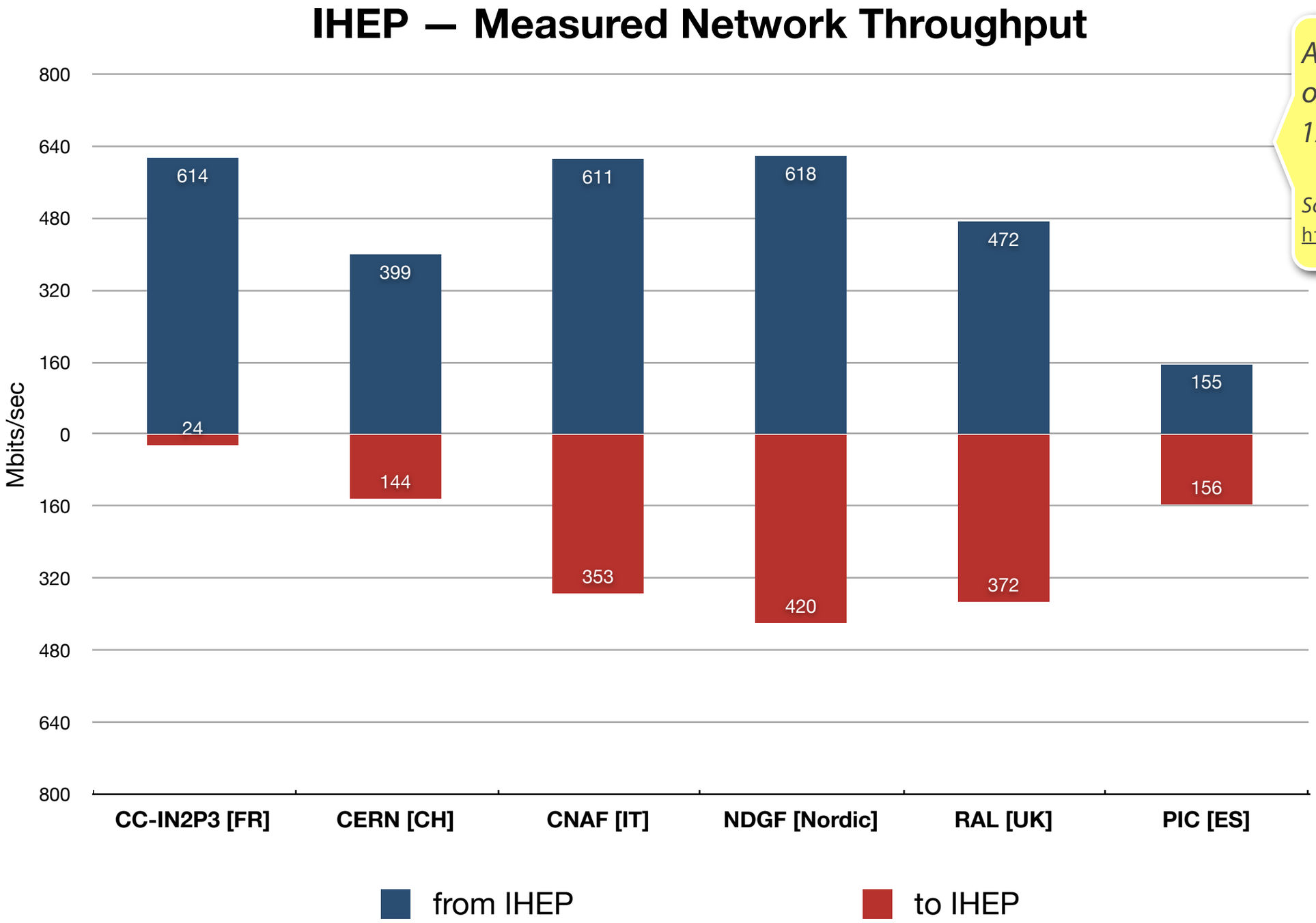
- After intensive and very detailed tests, a misconfiguration issue was found on the link in the direction IHEP → CC-IN2P3

  joint work of the network experts of IHEP and CERNet, the Chinese academic and research network

- Corrected on January 21st: network throughput in the direction Beijing → Lyon went **from 3 to 600 Mbps**

  the same transcontinental link (TEIN3/Orient) is used for connecting IHEP to other European sites, so this improvement benefits a wide community

CC-IN2P3⟷IHEP connectivity issues (cont.)



Average network throughput over 3 months, up to 12/03/2012

Source: IHEP's Perfsonar
http://perfsonar.ihep.ac.cn

CC-IN2P3⟷IHEP connectivity issues (cont.)

- Now focused on understanding the abnormally low throughput in the direction Lyon → Beijing

  detailed tests ongoing for measuring the throughput in the various segments of the route

  the cause of very significant throughput differences measured from different hosts in the `*.in2p3.fr` *network is currently been investigated*

  these tests involve several people from various organizations and are time-consuming

- In parallel, we are working on making sure the WLCG file transfer service can fully exploit the available bandwidth between IHEP and CC-IN2P3

  the eventual outcome of this work will directly benefit ATLAS and CMS

- Continue the planned work on the **network traffic analysis** platform

  prototyping work started and exploration of available tools initiated

  this project needs development and integration work and so far we could not allocate the required effort

  we intend to resume work on this in the coming months

Cloud-based storage

Prototyping cloud-based storage

- Goal: develop a prototype of a **cloud-based file repository**, backed by distributed unstructured data stores

- Current status

*we have a **working prototype** which implements a subset of the Amazon Simple Storage Service API, the de facto standard*

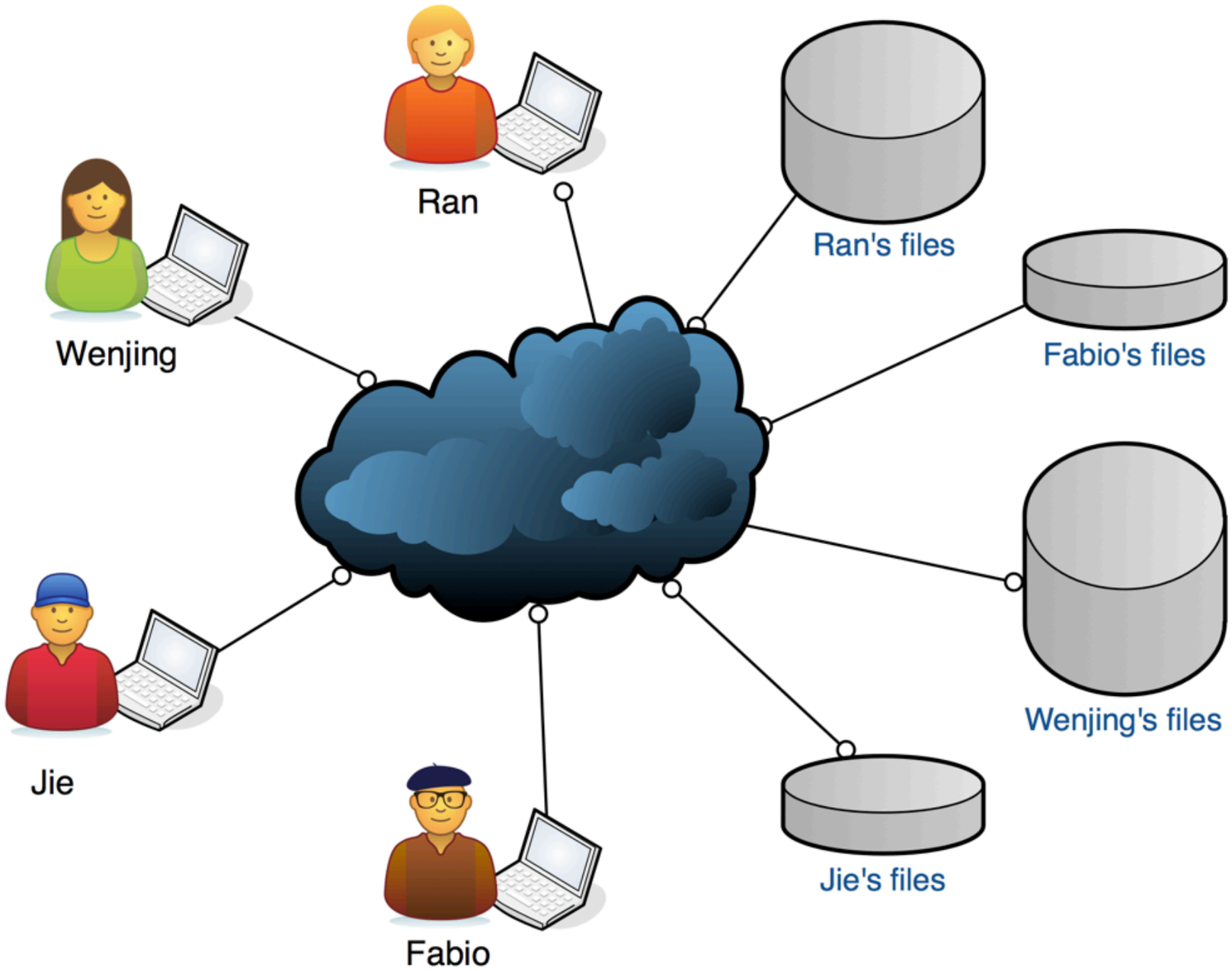
*implemented **metadata store**: Redis*

*implemented **file contents store**: networked file system*

*implemented the module for integrating the **authentication** mechanisms used in by grid middleware (based on X509 certificates)*

tested with unmodified existing Amazon S3 clients (both GUI and command line) both open source and commercial

Prototyping cloud-based storage (cont.)



Your files are physically stored on remote servers accessible seamless through the network.

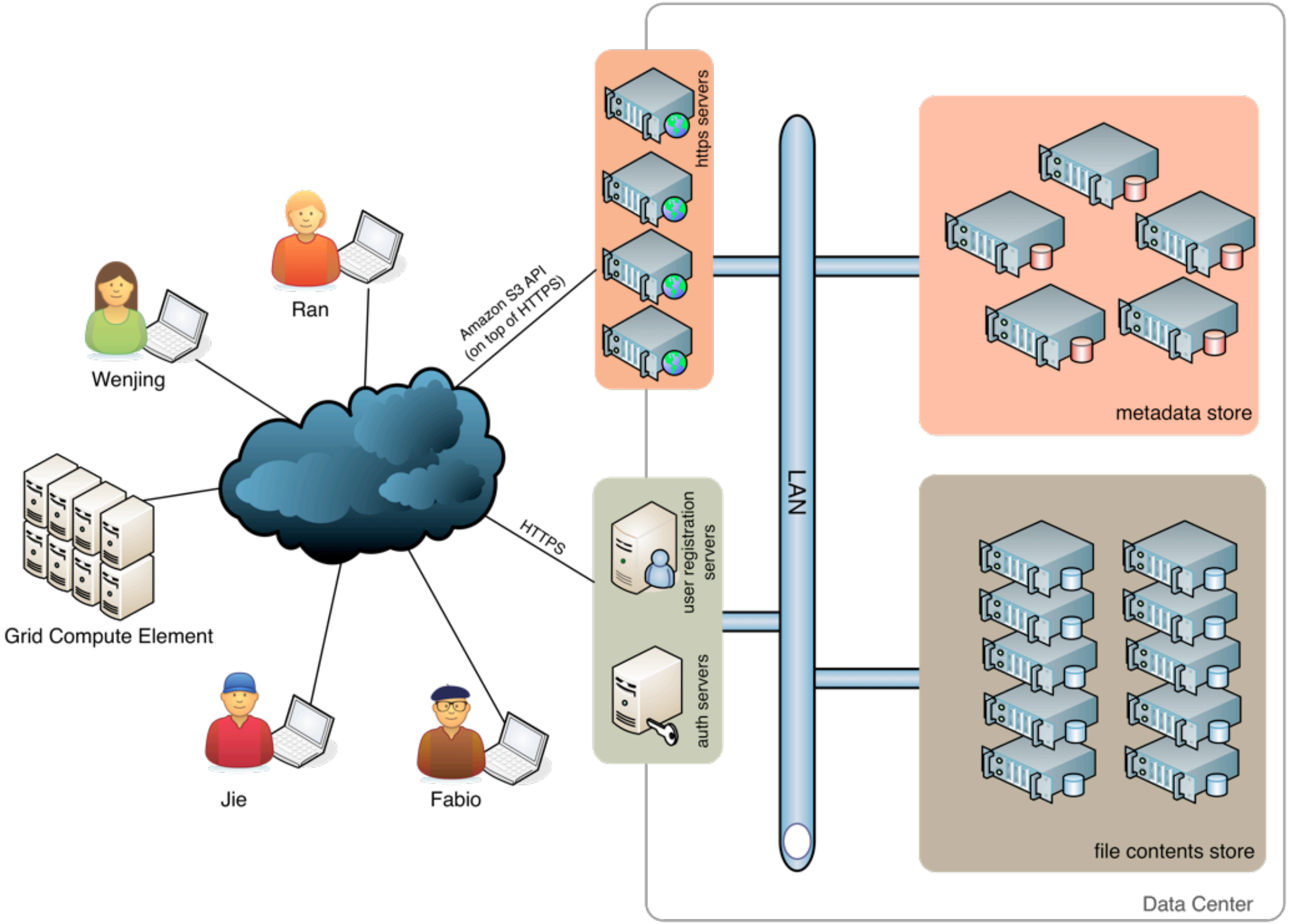
You interact with your remote files as you usually do with your local files, using your desktop's metaphors (file explorer, drag & drop, etc.).

You are free to organize your own storage space.

The system provides you significantly more storage capacity than is locally available in your personal computer.

You can share your files with selected users of the system.

Prototyping cloud-based storage (cont.)



Prototyping cloud-based storage (cont.)

- Testbed platform deployed at IHEP

  8 well configured machines with an aggregated disk capacity of 48 TB

- Two IHEP PhD students are contributing to this project

- This project is the subject of an accepted contribution to CHEP 2012

Prototyping cloud-based storage (cont.)

- Planned work
- Performs tests with OpenStack's Swift back-end for the file contents store

  performance, scalability, manageability

- Perform end-to-end scalability and usability tests

  including when client and server are very distant

- Make sure software compliant to to open source standards

  distribution channels, documentation, web presence, …

- Start alpha tests with early adopters

France-Asia virtual organization

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France-Asia VO deployment

- Work performed for migrating the previous infrastructure devoted to France-Korea joint activities to France-Asia activities covering a wider scope

  3 Asian sites fully functional: KEK (Japan), Kisti (Korea) and CC-IN2P3 (France)

- Core services for this VO stabilized and being operated by the participating sites

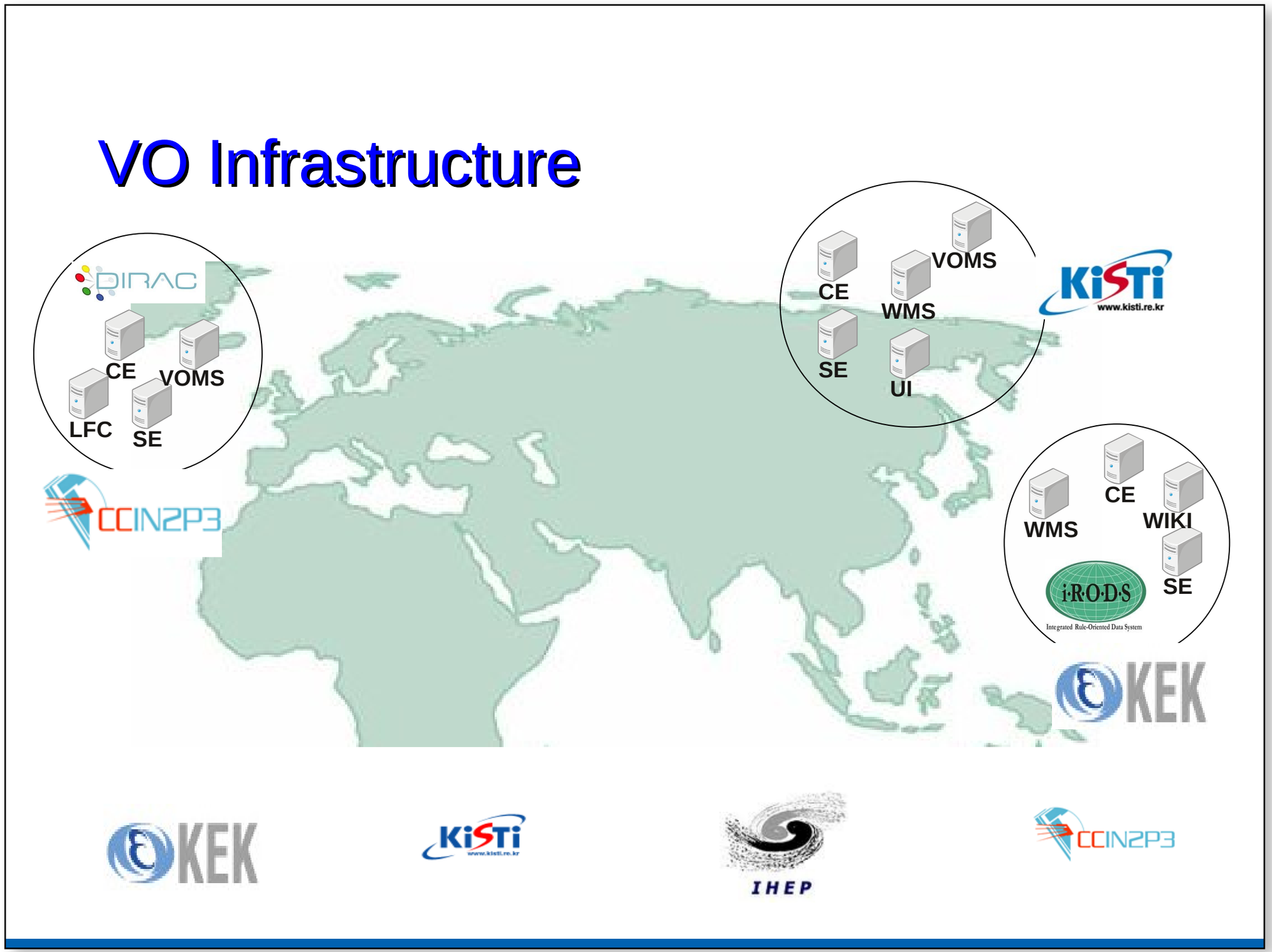
  computing elements, file cataloguing service, replicated VO membership service, iRods-based storage element

  currently exploring automatic data replication between sites: useful for storing precious data

- Deployment at IHEP scheduled for early April

  CC-IN2P3 experts will travel to Beijing to work with IHEP experts to perform the initial deployment and tests

France-Asia VO deployment (cont.)



Source: Y. Cardenas

France-Asia VO deployment (cont.)

- Expression of interest by two participants from FCPPL: THCA and TREND
- THCA (Tsinghua Center for Astrophysics)

  currently validating their code also on 64bits machines to fully exploit the grid sites

- TREND

  work performed on consolidating the central data repository

  tools developed to routinely transport, store and catalogue raw and derived data using the IRODS instance at CC-IN2P3

  currently the data processing workflow is executed locally at CC-IN2P3

  goal is to identify what steps in the workflow can exploit the benefits of a grid infrastructure

  access to the data repository from remote grid sites validated

Future work

Planned activities for 2012-2013

- A proposal for pursuing the ongoing work submitted to this year's FCPPL call

- Intended work

continue working on the topics started this year, i.e. cloud-based storage, solve the connectivity issues with CC-IN2P3, prototype a network traffic analysis platform and help interested parties exploit the France-Asia grid infrastructure

in addition, deploy a DIRAC instance for the France-Asia VO users for job submission and data management

Questions & Comments

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