



RAVEN - Random Access data Visualization and Exploration Network for the Analysis of Petabyte Sized Data Sets

M. Schmelling¹, N. Whitehead², M. Britsch¹, N. Gagunashvili², H. K. Gudmundson², H. Neukirchen³

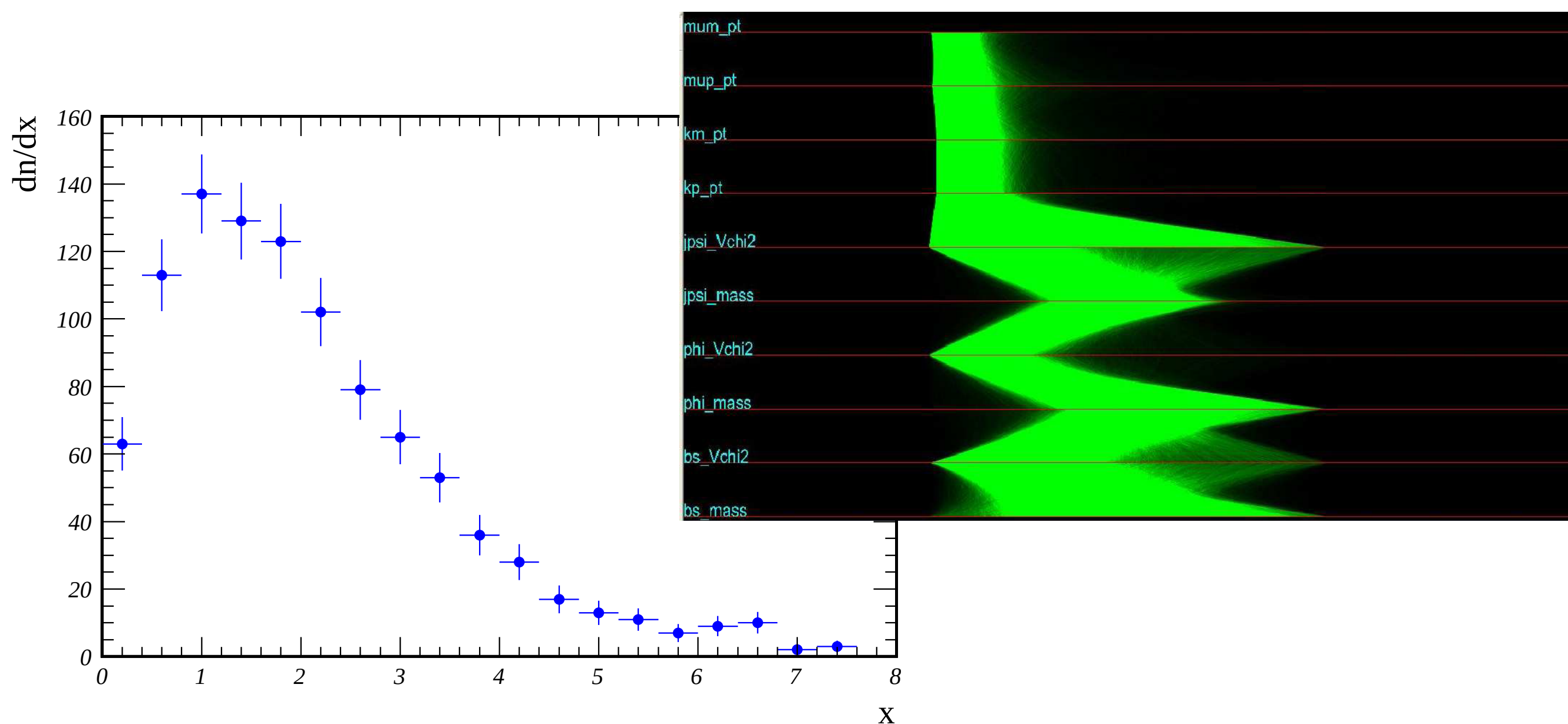
¹MPI for Nuclear Physics, Heidelberg, Germany; ²University of Akureyri, Iceland; ³University of Iceland, Reykjavik, Iceland.

The analysis and visualisation of the LHC data is a good example of human interaction with petabytes of inhomogenous data. A proposal is presented, addressing both physics analysis and information technology, to develop a novel distributed analysis infrastructure which is scalable to allow real time random access to and interaction with peta-bytes of data. The proposed hardware basis is a network of intelligent "CSR"-units, which combine Computing, data Storage and Routing functionalities. At the software level the project would develop efficient protocols for broadcasting information, data distribution and information collection upon such a network, together with a middleware layer for data processing, client applications for data visualisation and an interface for the management of the system.

❖ wanted

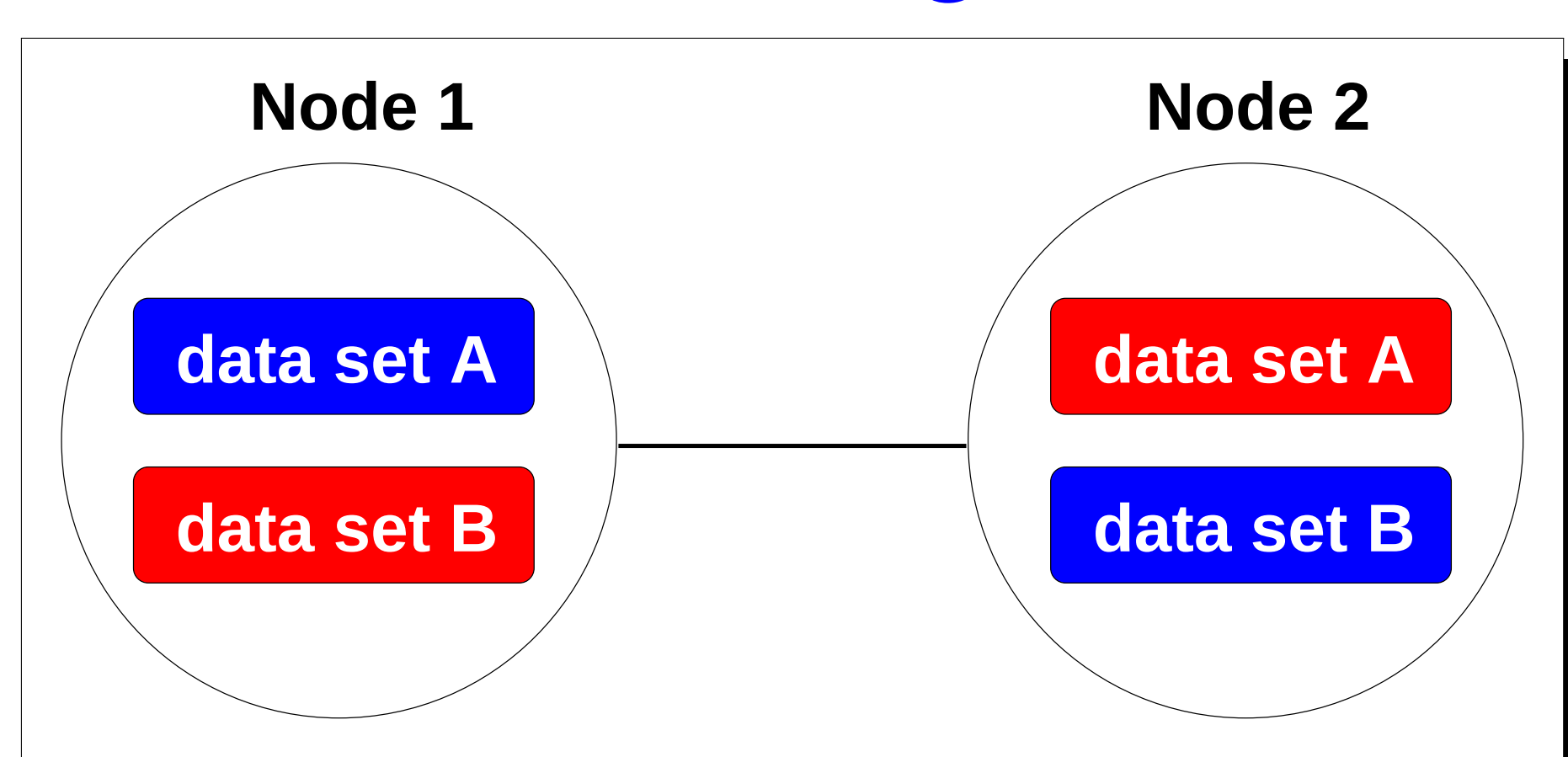
- fast (real-time) access
- random access to each event
- analysis of huge event samples

❖ data analysis



- broadcast query to RAVEN
- event processing on all nodes
- routing of event information back to user
 - histograms
 - high level visualization (e.g. parallel coordinates)

❖ redundant storage - for example...



- pairs of CSR-units with same data
- **normal mode**: both nodes process different subsets
- **failover**: one node processes all subsets

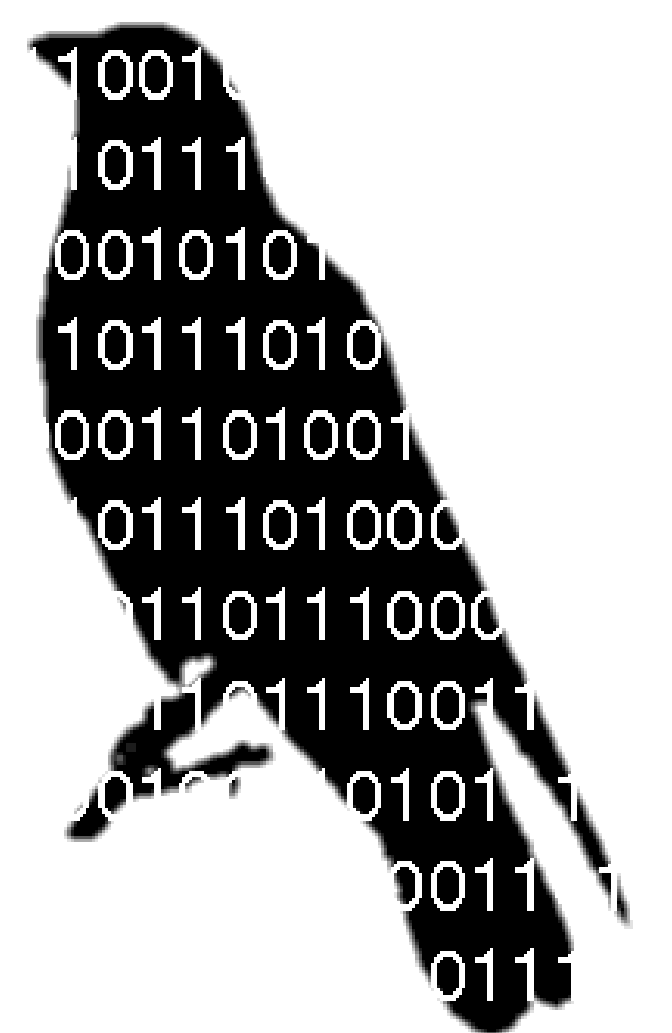
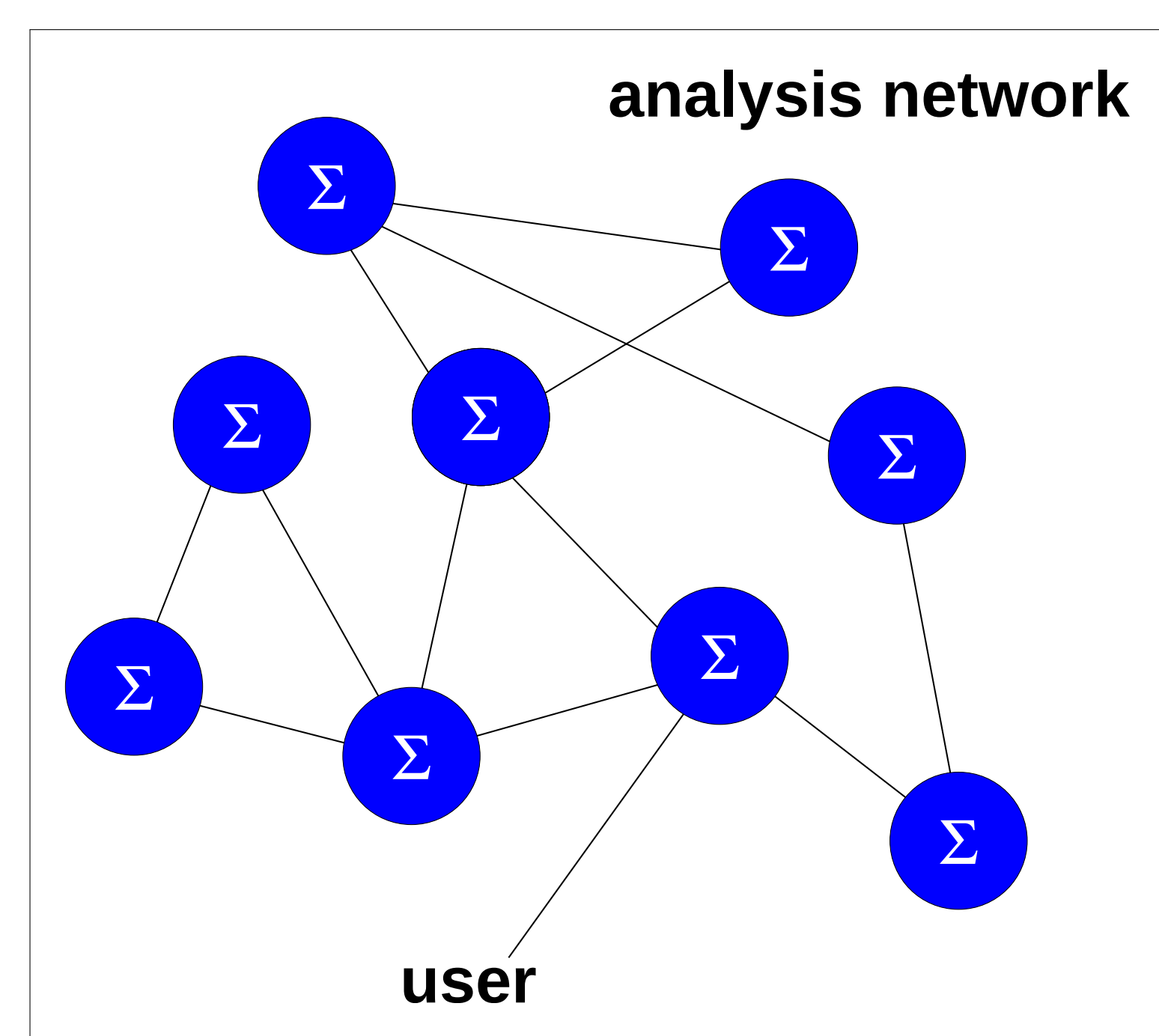
❖ design aspects

- if possible exploit existing technologies
- use **off-the shelf** components
- ensure **scalable** design
- building blocks: **CSR-units**



- computing
- storage
- routing

❖ data processing



- parallel processing on distributed data
- partial results from all nodes
- cumulate results on the way back
 - **moderate network traffic**
 - **also for complex analyses**