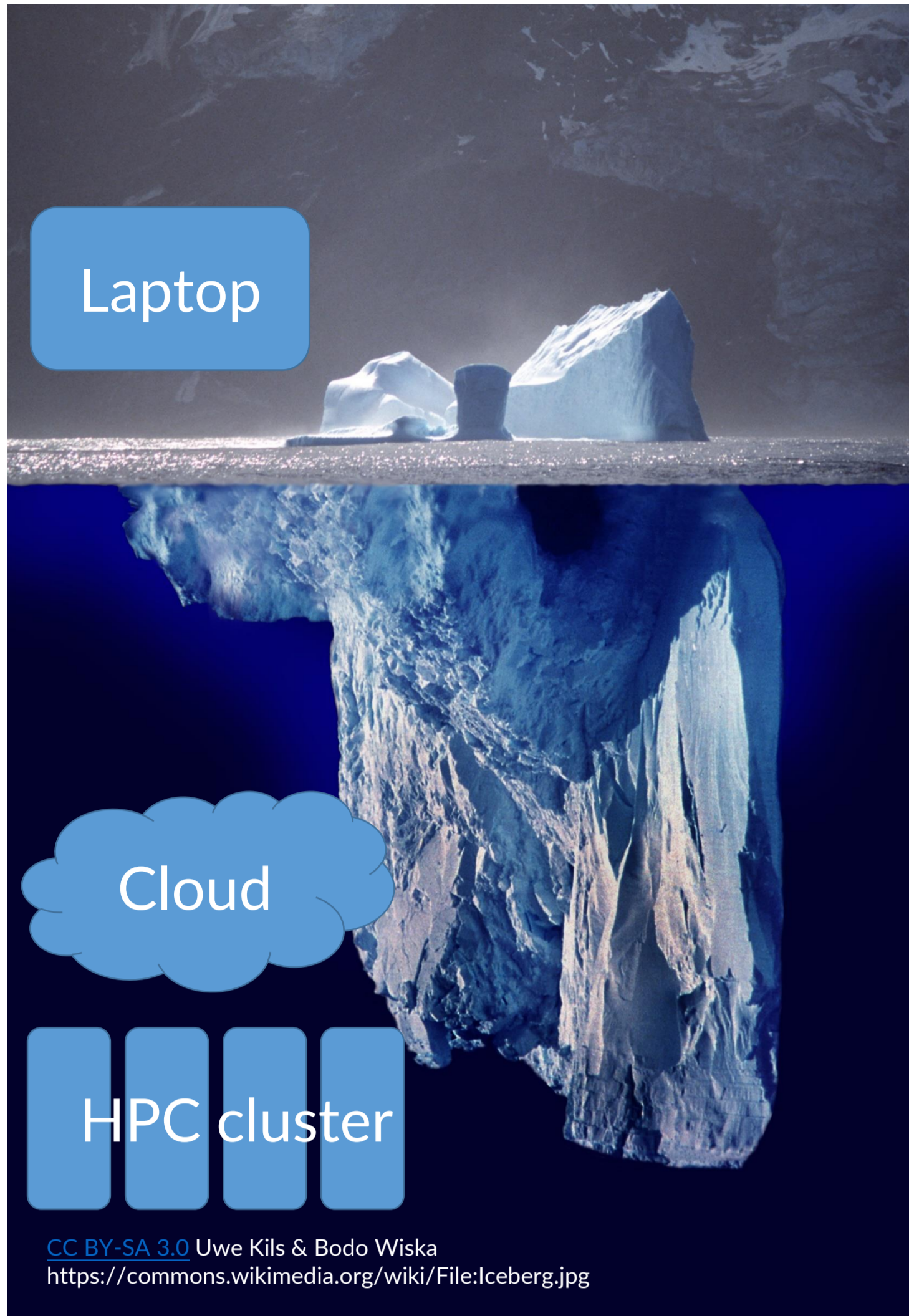


### Introduction



Many neuroscientists use only a fraction of the computing resources available.

Software toolboxes are crucial for advancing research and reproducibility.

Toolboxes should facilitate the use of computing resources via high-performance computing (HPC) technology.

BrainIAK is a new fMRI analysis toolbox that leverages HPC technology.

With BrainIAK, you can scale from your laptop to a supercomputer.

### Characteristics

BrainIAK is  
 A Python library  
 Optimized using Cython, C++, OpenMP, and MPI  
 Developed via open collaboration

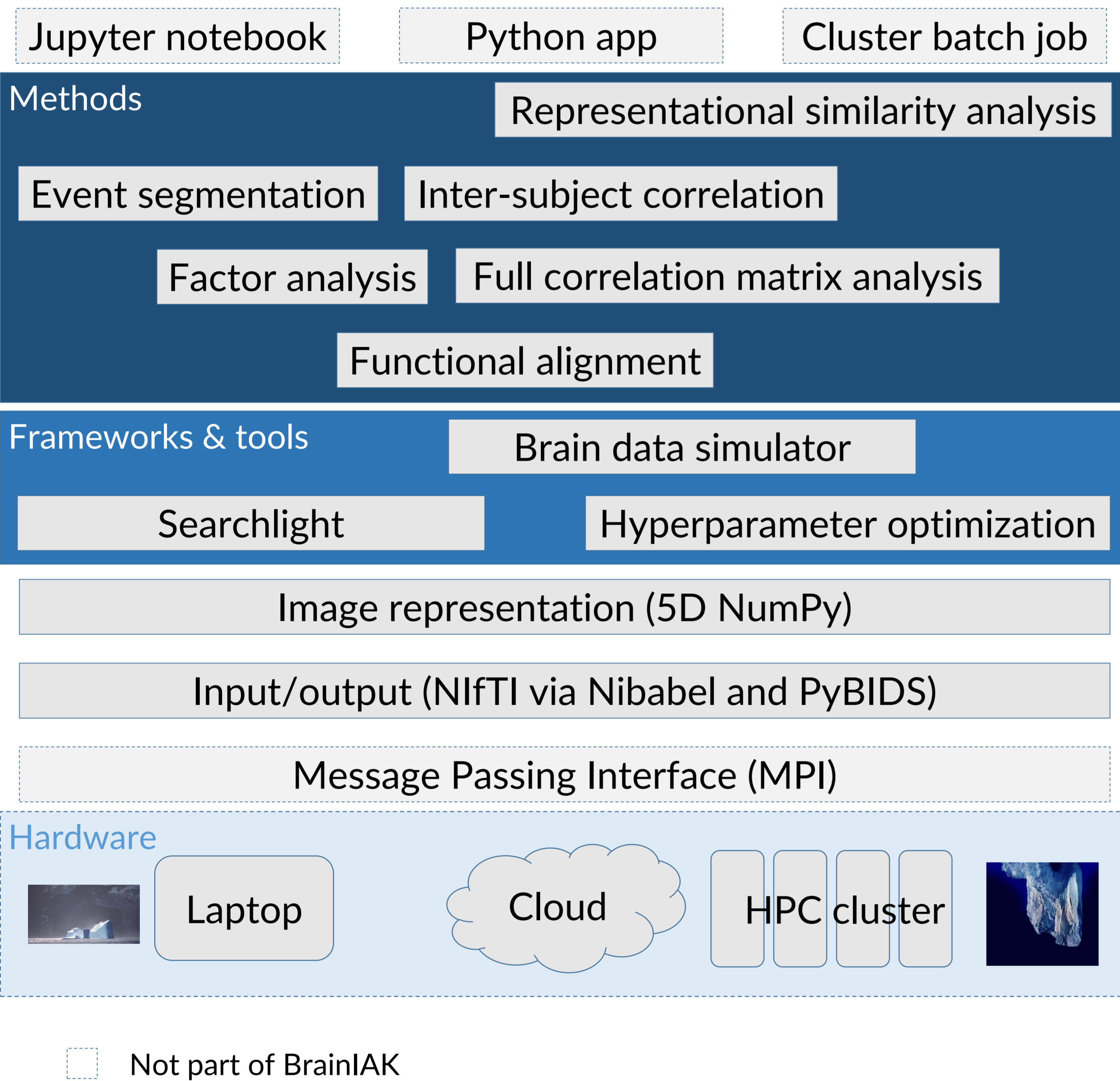
Components

- fMRI analysis methods `$ docker pull brainiak/brainiak`
- Machine learning algorithms `$ pip install brainiak`
- Brain data simulator `$ conda install brainiak`
- Distributed searchlight framework

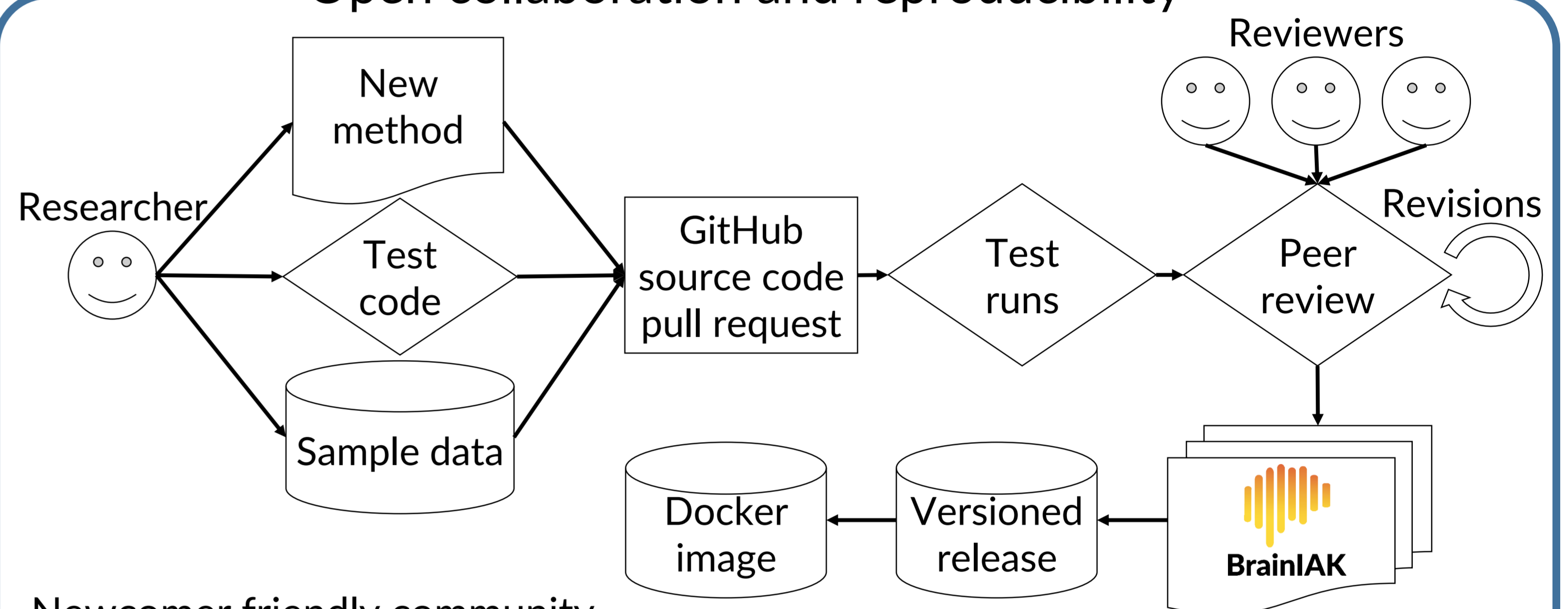
Scalability examples

- Multi-subject datasets (e.g., SRM, HTFA)
- Full-brain analyses (e.g., FCMA, ISFC)
- Statistical resampling (e.g., permutation tests, cross-validation)

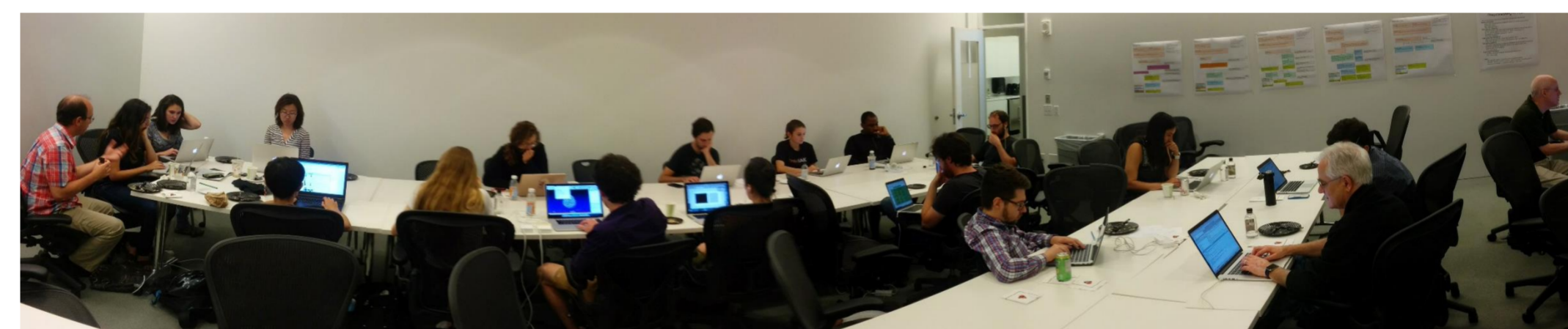
### Architecture



### Open collaboration and reproducibility

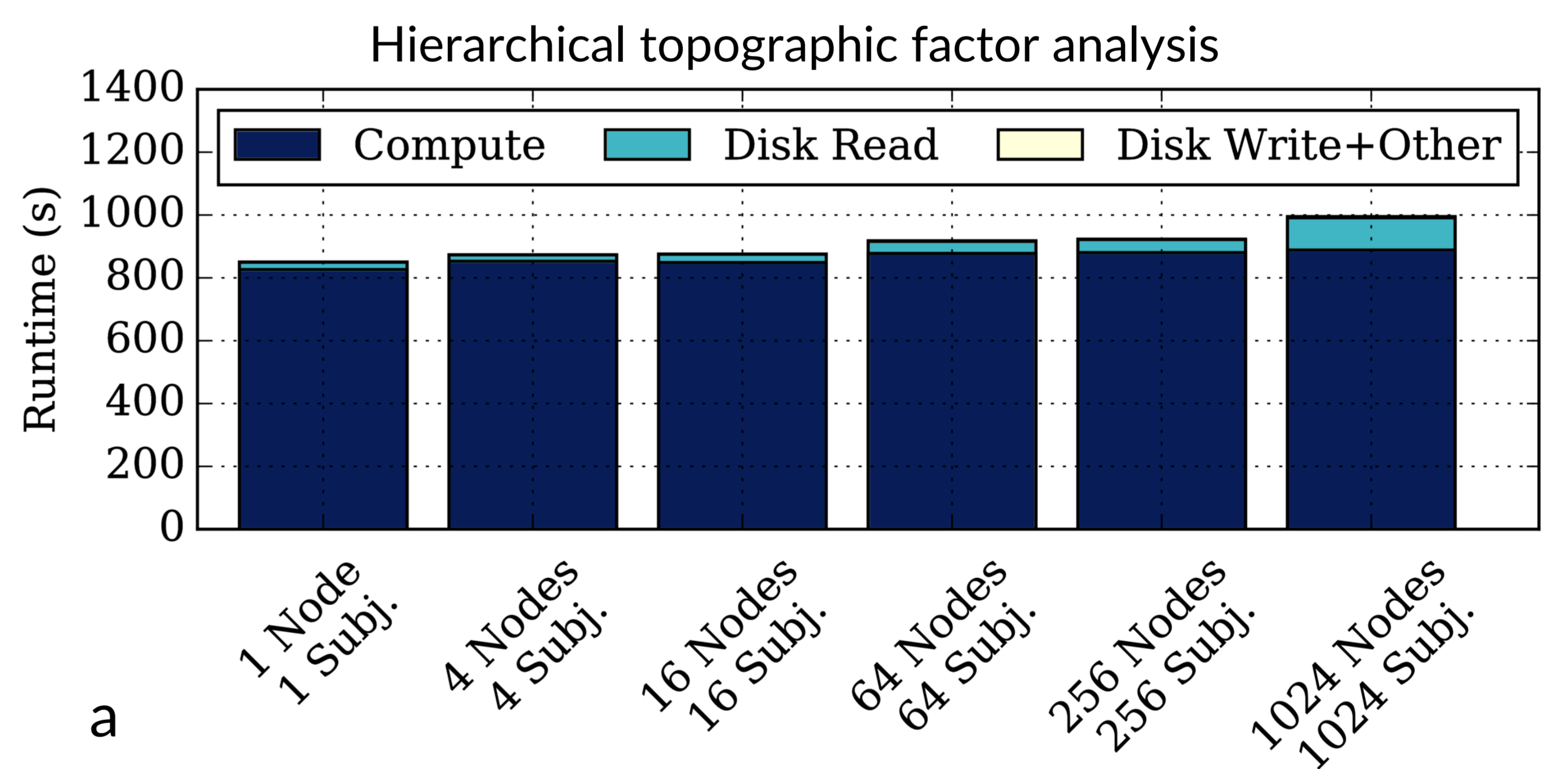


Newcomer friendly community  
 Opportunities for performance optimization  
 Contribute your method!

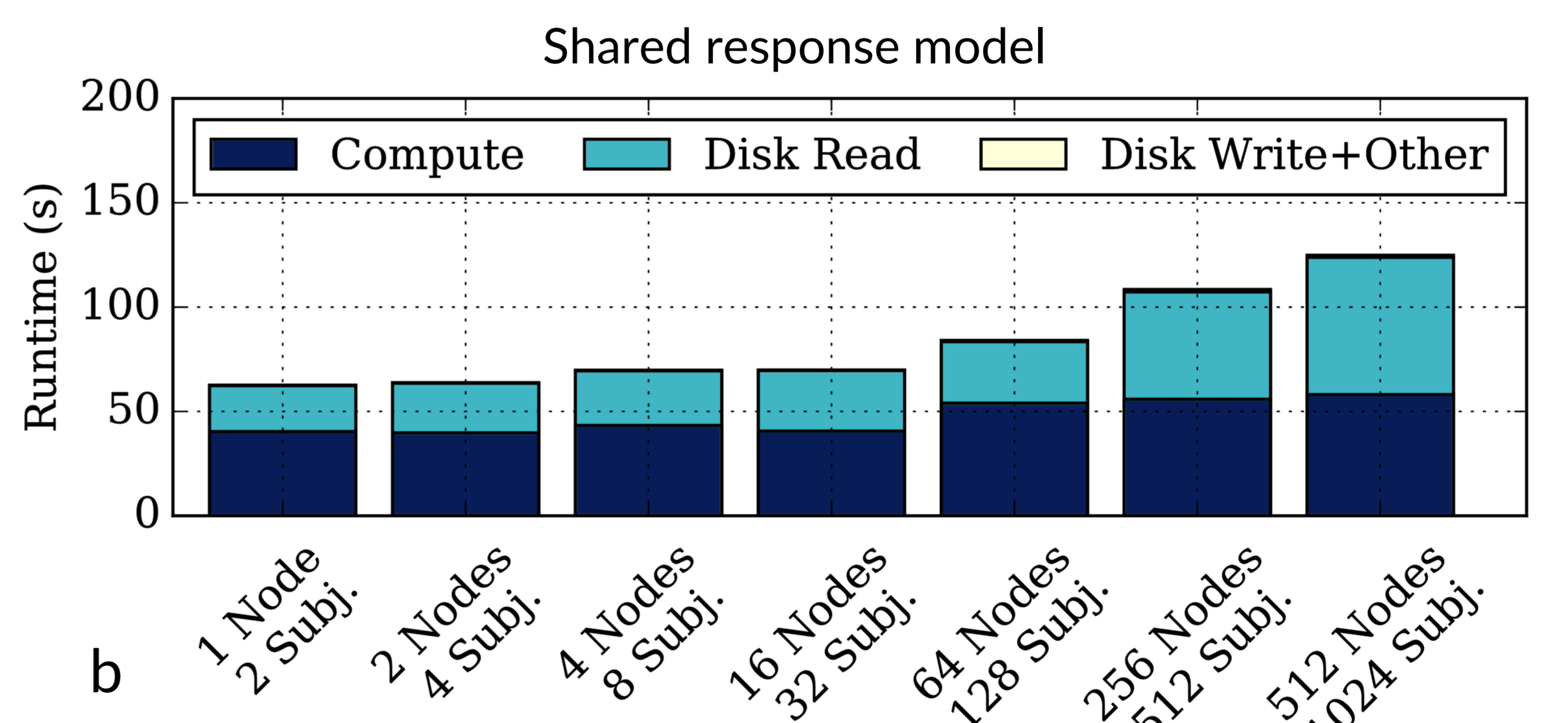


Hackathons  
 Join us at Virginia Tech in summer 2018!

### Performance at scale



1024 subjects analyzed almost as fast as 1 subject



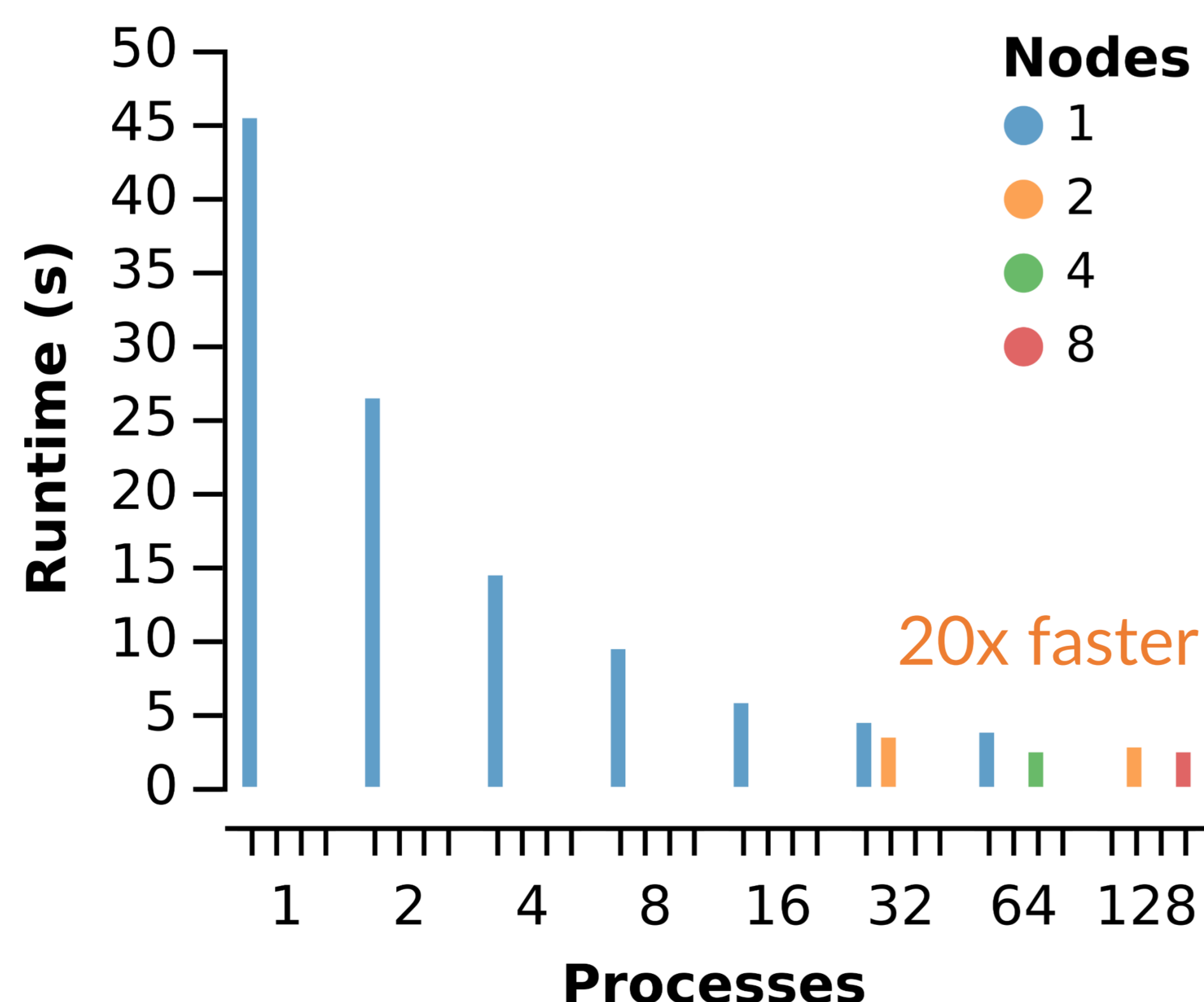
a, b: Anderson et al., 2016, doi:[10.1109/BigData.2016.7840719](https://doi.org/10.1109/BigData.2016.7840719).

### Scalable searchlight

Distributed searchlight correlation computation for musical genres in auditory cortex.

Data: simulated data for 16 subjects, 2 genres.

Setup: 88 cores per node. More details online.



### BrainIAK

BrainIAK is free and open-source software.  
 Learn more about BrainIAK, events, and all our OHBM posters:  
<http://brainiak.org/ohbm2018>

Other BrainIAK posters:  
 Tutorials 2020, Matrix-normal 2535, Real-time 2045; 2858



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