ground penetrating radar and electrical resistivity joint inversion

gerjoii

forward models
inverse routines
signal processing
parallel inversions

forward modeling

2d & 2.5d
linear & isotropic
radar/acoustic

- finite difference time domain
- PML boundaries
- topography
- arbitrary sources & receivers

electrical resistivity (DC)

- finite volume
- Robin & Neumann boundaries
- flat topography
- surface sources & receivers

inverse routines

- gradient descent
- full-waveform inversion
  - instantaneous phase
  - envelope
- adjoint method ER
- access to sensitivities
- joint inversion
  - variable weights on sensitivities
  - cross-gradients
- synthetic & field data

signal processing

waveform filtering
image filtering
DC filtering
move out routines
velocity semblance
source estimation

cuties

inversion is parallelized

parallel inversions

(Slurm)

2d velocity generator

- outputs *.mat* file
- inputs any picture format

(.png, .jpeg, …)

ER sequence generator

- Dipole-dipole
- Wenner
- Schlumberger

Syscal ready!

more cuties

machine learning *(Pytorch)*

- easy examples
- arbitrary architecture

fancy plotting *(Python)*

- Matlab-like python class

seismic interferometry

- cross-correlation
- multi-dimensional deconvolution

future?

forward and inverse

- gravity
- magnetics
- controlled source EM
- magnetotellurics
- eikonal travel-time

join them all!

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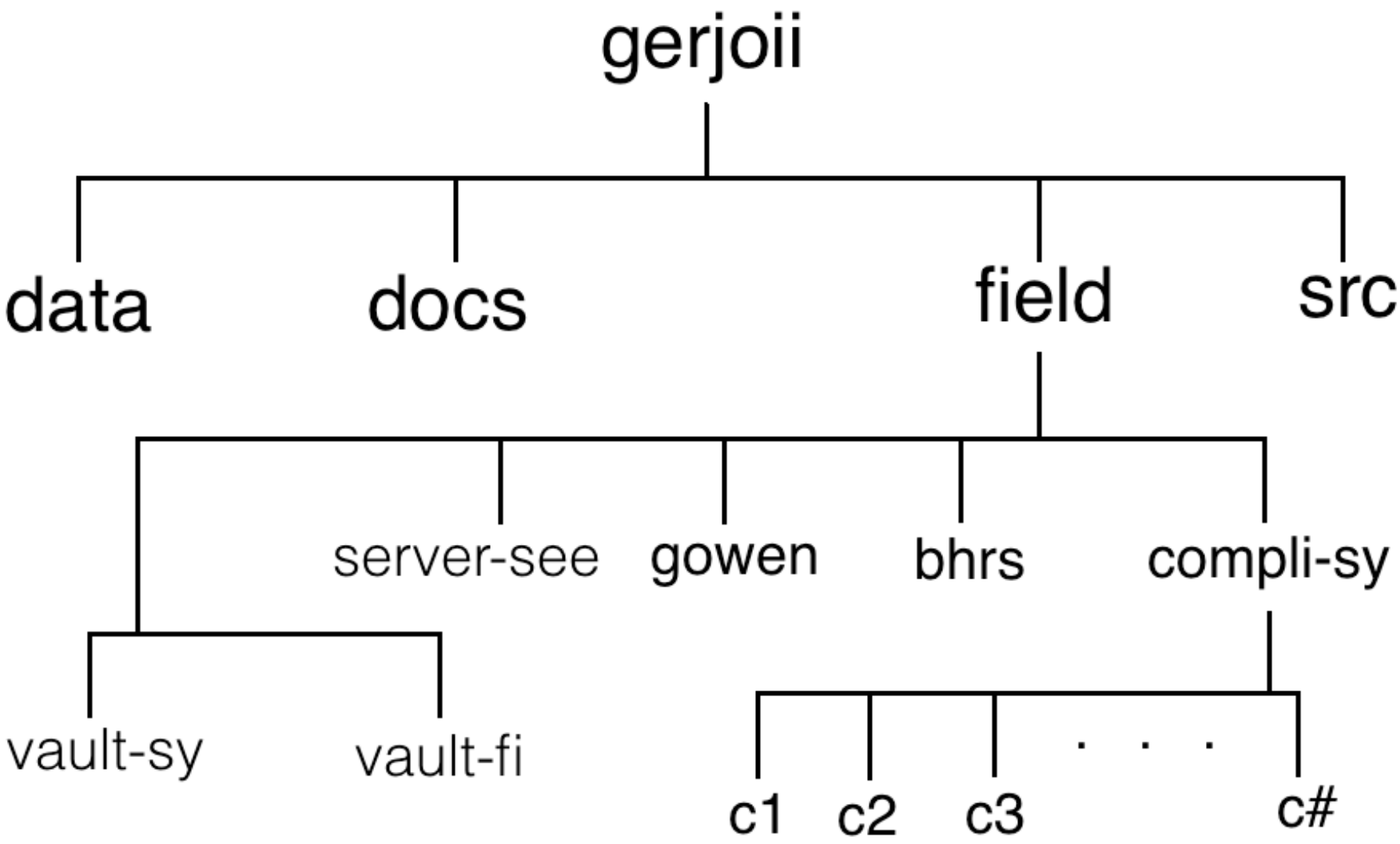

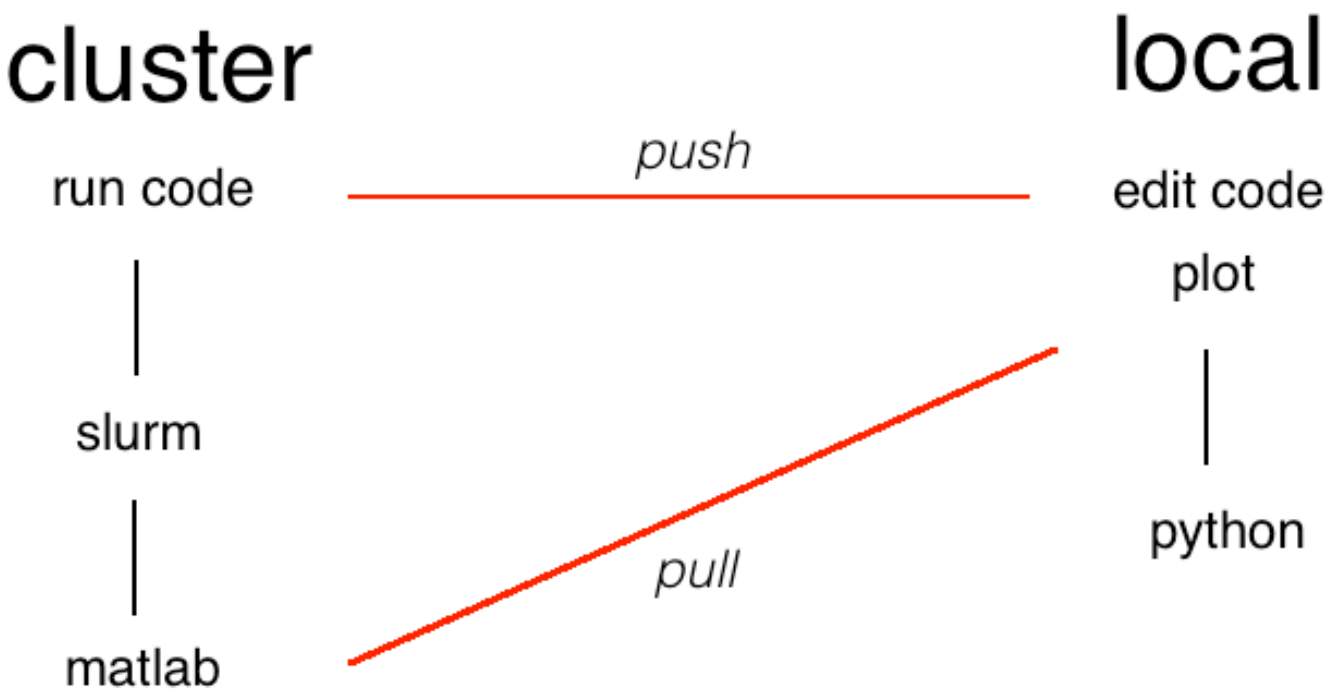

* all lines involve a shell script