Introduction to NEEShub

By

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NEEScomm IT

PURDUE
UNIVERSITY

Outline

- Overview of NEES
- NEES Tools and Resources
- Data Management Tools
- High Performance Computing Tools
- Project Warehouse
- Project Curation

NSF Network for Earthquake Engineering Simulation (NEES)

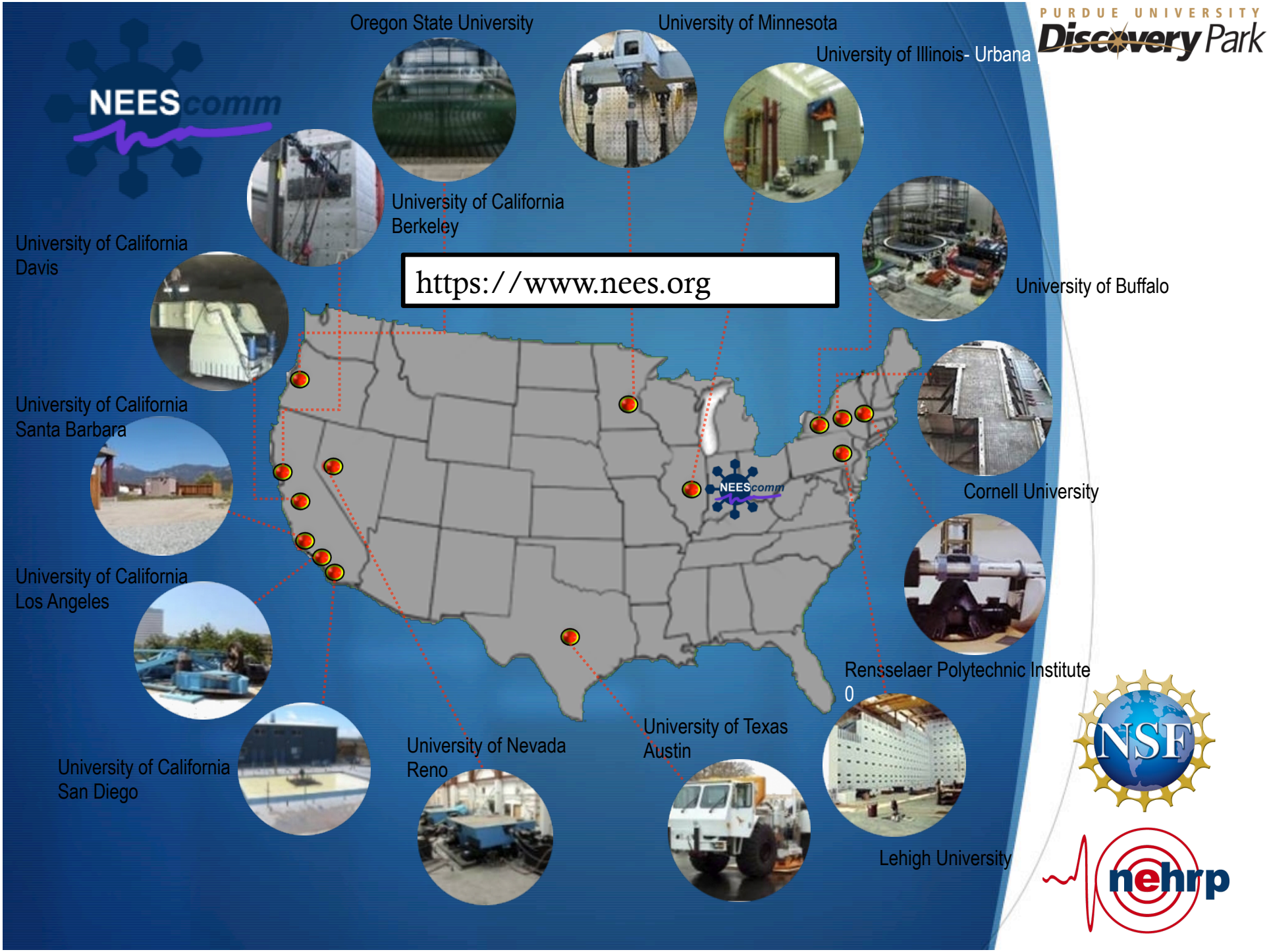
- Safer buildings and civil infrastructure are needed to reduce damage and loss from earthquakes and tsunamis
- To facilitate research to improve seismic design of buildings and civil infrastructure, the National Science Foundation established NEES
  - NEES Objectives
    - Develop a national, multi-user, research infrastructure to support research and innovation in earthquake and tsunami loss reduction
    - Create an educated workforce in hazard mitigation
    - Conduct broader outreach and lifelong learning activities

Vision for NEES

- Facilitate access to the world's best integrated network of state-of-the art physical simulation facilities
- Build a cyber-enabled community that shares ideas, data, and computational tools and models.
- Promote education and training for the next generation of researchers and practitioners.
- Cultivate partnerships with other organizations to disseminate research results, leverage cyberinfrastructure, and reduce risk transferring results into practice.

NEES Research Facilities

- NEES has a broad set of experimental facilities
  - Each type of equipment produces unique data
  - Located at 14 sites across the United States
- Shake Table, Tsunami Wave Basin
- Large-Scale Testing Facilities
- Centrifuge, Field and Mobile Facilities
- Large-Displacement Facility
- Cyberinfrastructure

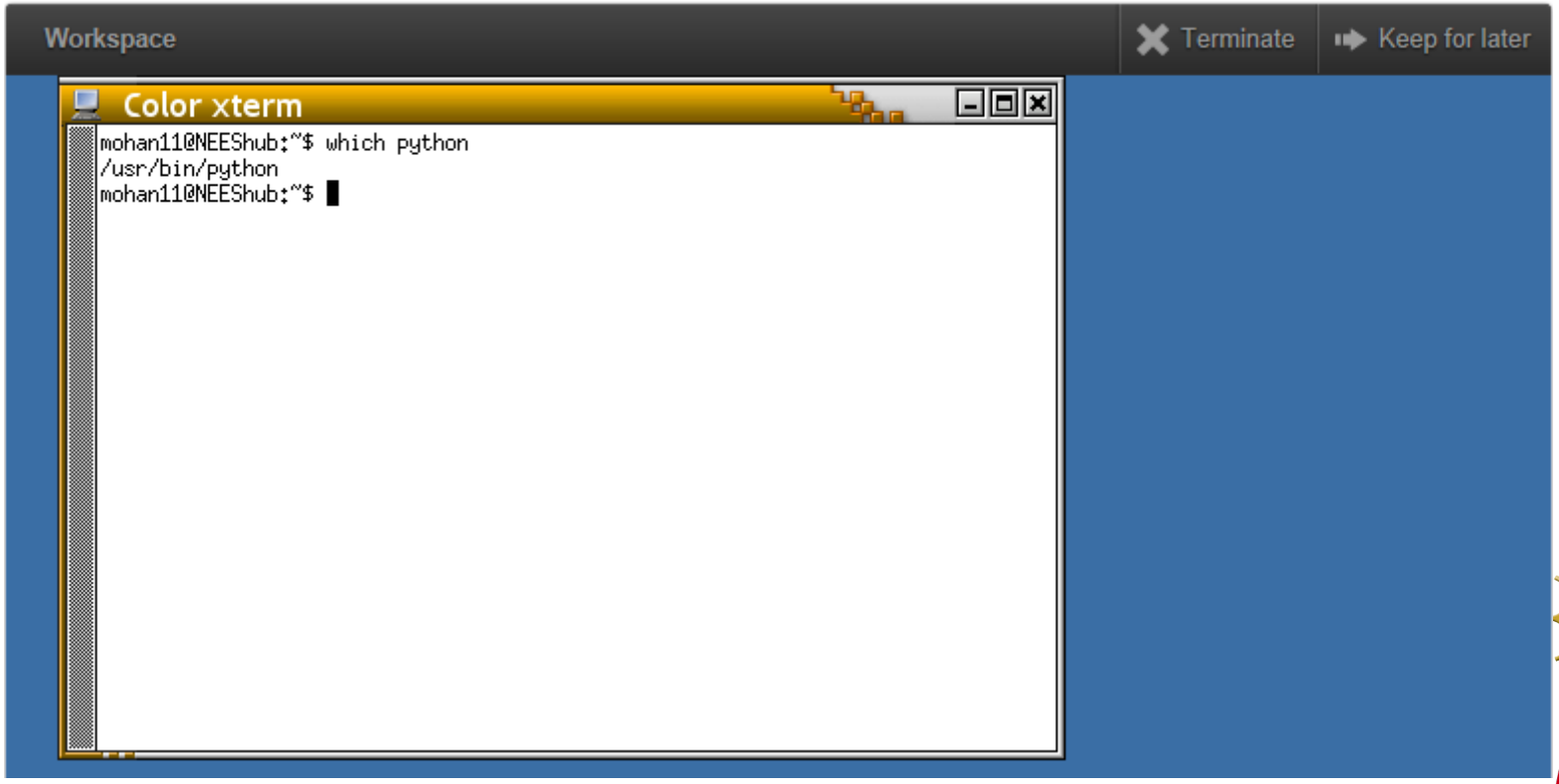

NEEScomm
Oregon State University
University of Minnesota
University of Illinois- Urbana
PURDUE UNIVERSITY
Discovery Park
University of California
Berkeley
University of California
Davis
https://www.nees.org
University of Buffalo
University of California
Santa Barbara
Cornell University
University of California
Los Angeles
Rensselaer Polytechnic Institute
0
University of California
San Diego
University of Nevada
Reno
University of Texas
Austin
Lehigh University
NSF
nehrp

NEEShub (*www.nees.org*)

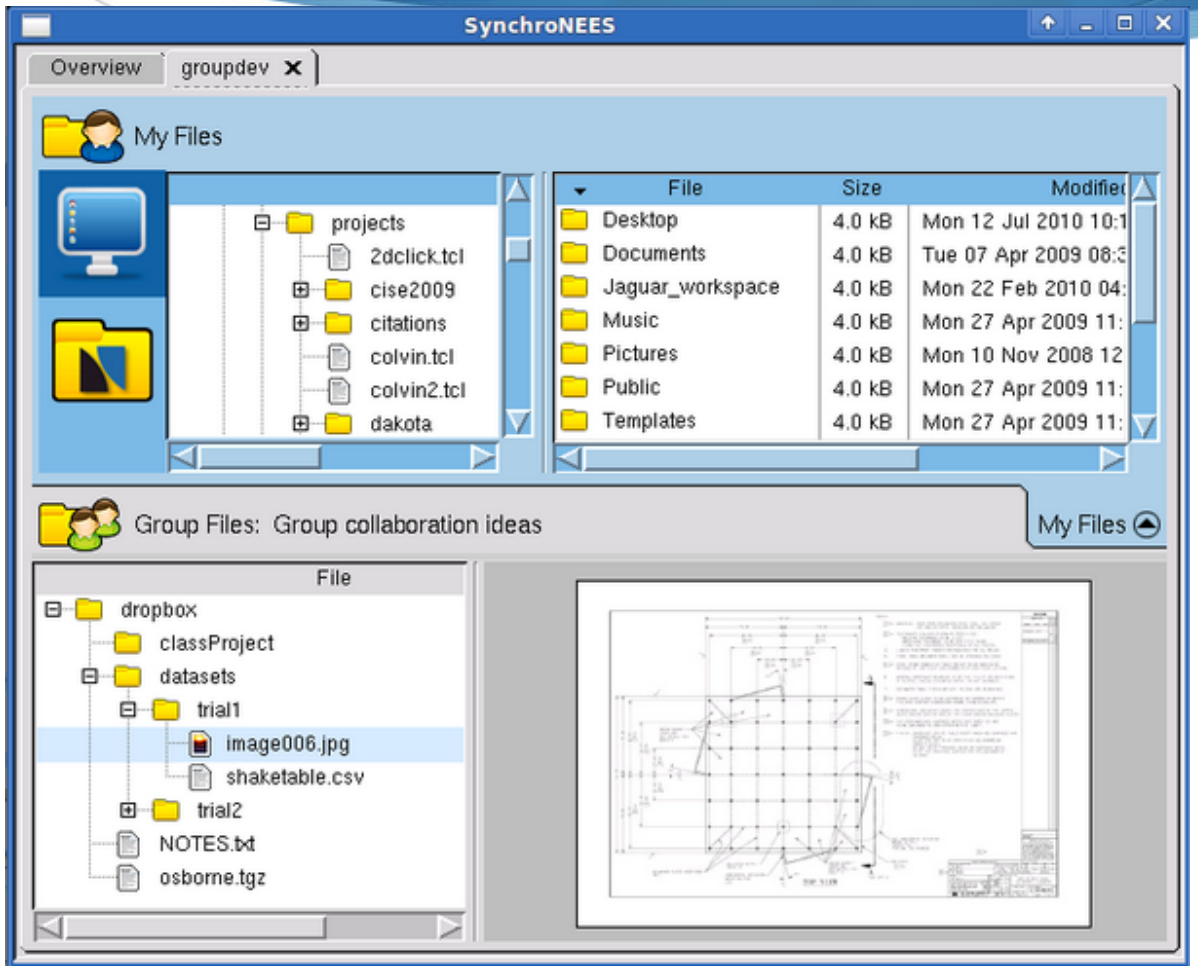
Data Management Tools

- Workspace
- SynchroNEES
- PEN
- inDEED (visualization)

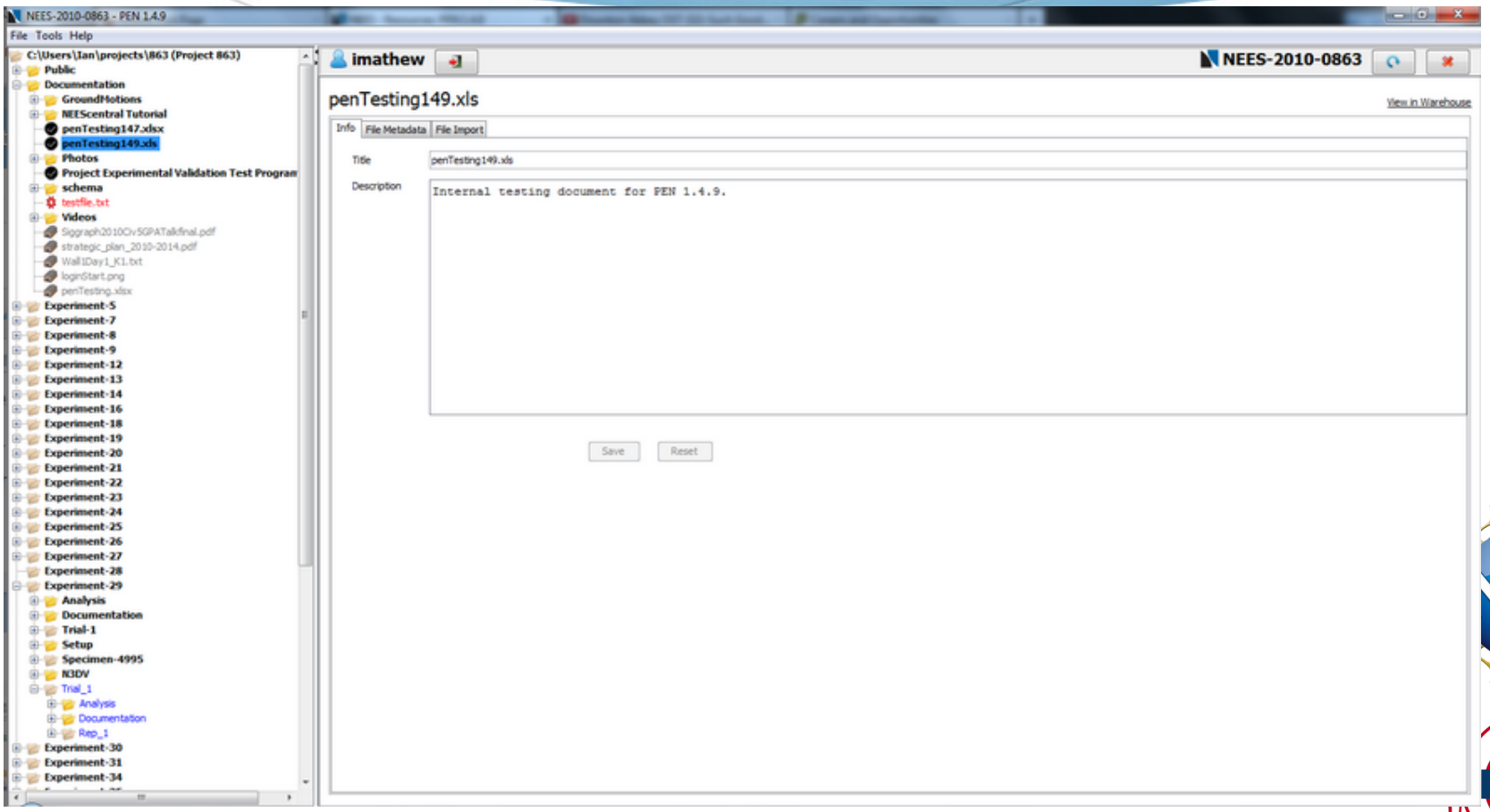
Workspace


Workspace
Terminate
Keep for later
Color xterm
mohan11@NEEShub:~$ which python
/usr/bin/python
mohan11@NEEShub:~$

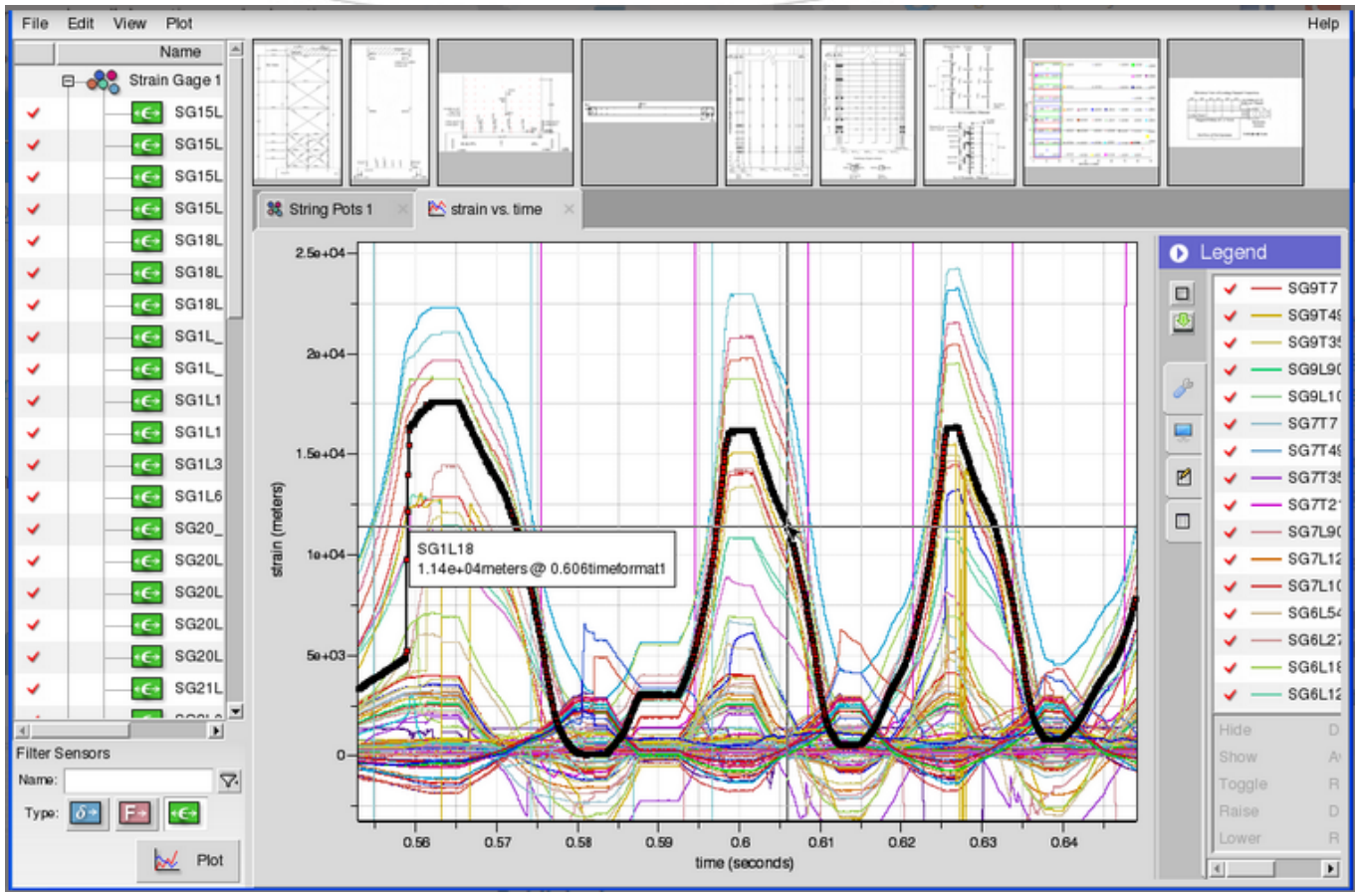
SynchroNEES



PEN


NEES-2010-0863 - PEN 1.4.9
File Tools Help
C:\Users\Ian\projects\863 (Project 863)
Public
Documentation
GroundMotions
NEEScentral Tutorial
penTesting147.xlsx
penTesting149.xls
Photos
Project Experimental Validation Test Program
schema
testfile.txt
Videos
Siggraph2010Civ5GPATalkfinal.pdf
strategic_plan_2010-2014.pdf
Wall1Day1_K1.txt
loginStart.png
penTesting.xlsx
Experiment-5
Experiment-7
Experiment-8
Experiment-9
Experiment-12
Experiment-13
Experiment-14
Experiment-16
Experiment-18
Experiment-19
Experiment-20
Experiment-21
Experiment-22
Experiment-23
Experiment-24
Experiment-25
Experiment-26
Experiment-27
Experiment-28
Experiment-29
Analysis
Documentation
Trial-1
Setup
Specimen-4995
N3DV
Trial_1
Analysis
Documentation
Rep_1
Experiment-30
Experiment-31
Experiment-34
imathew
NEES-2010-0863
penTesting149.xls
View in Warehouse
Info
File Metadata
File Import
Title
penTesting149.xls
Description
Internal testing document for PEN 1.4.9.
Save
Reset

inDEED


File Edit View Plot
Help
Name
Strain Gage 1
SG15L
SG18L
SG1L1
SG1L3
SG1L6
SG20L
SG21L
Filter Sensors
Name:
Type:
Plot
String Pots 1
strain vs. time
Legend
SG1L18
1.14e+04meters @ 0.606timeformat1
strain (meters)
time (seconds)
2.5e+04
2e+04
1.5e+04
1e+04
5e+03
0
0.56
0.57
0.58
0.59
0.6
0.61
0.62
0.63
0.64
Hide
Show
Toggle
Raise
Lower

Data is the 4th Paradigm

- Producing an avalanche of high resolution digital data
- All (or most) of the data needs to be accessible over a long period of time
  - Much of the data is not reproducible
- Example – NEES project
  - Structure or sample destroyed through testing
  - Very expensive to rebuild for more tests

Need for High Performance Computing(HPC) Simulation

- Earthquake engineering problems:
  - Involves intense computation on large volumes of data
  - Will take days to complete simulation on normal computers
- Earthquake engineering problems on an HPC resource takes hours to complete
- Using HPC resources for solving computationally intensive problems results in huge time savings
- Different HPC resources include:
  - XSEDE: Kraken, Stampede
  - Purdue: Hansen, Carter
  - Open Science Grid (OSG)

Why Batchsubmit?

Different steps of job submission on an HPC resource includes:

- Login to the remote venue and copy all input files
- Ensure that the simulation program is available on the remote venue and copy program to the venue if necessary
- Prepare venue specific script file specifying parameters for job submission
- Submit the job to the correct job class and wait for the result
- Copy the results to a local system for analysis and visualization

Why Batchsubmit?

- Repeating this process for multiple simulations is tedious and time consuming
- Batchsubmit automatically performs all the steps for submitting a job in an HPC resource
- User can submit jobs using batchsubmit to multiple venues
- Batchsubmit will intimate the user when job finishes execution and all results will be available in user job directory
- Batchsubmit makes job submission easier and results in huge time savings

Batchsubmit Features

- Simple command line interface and GUI interface
- Easy to do parallel processing
- Asynchronous job submission
- Select HPC resource(venue) to run the job
- Send executables to the venue, if required

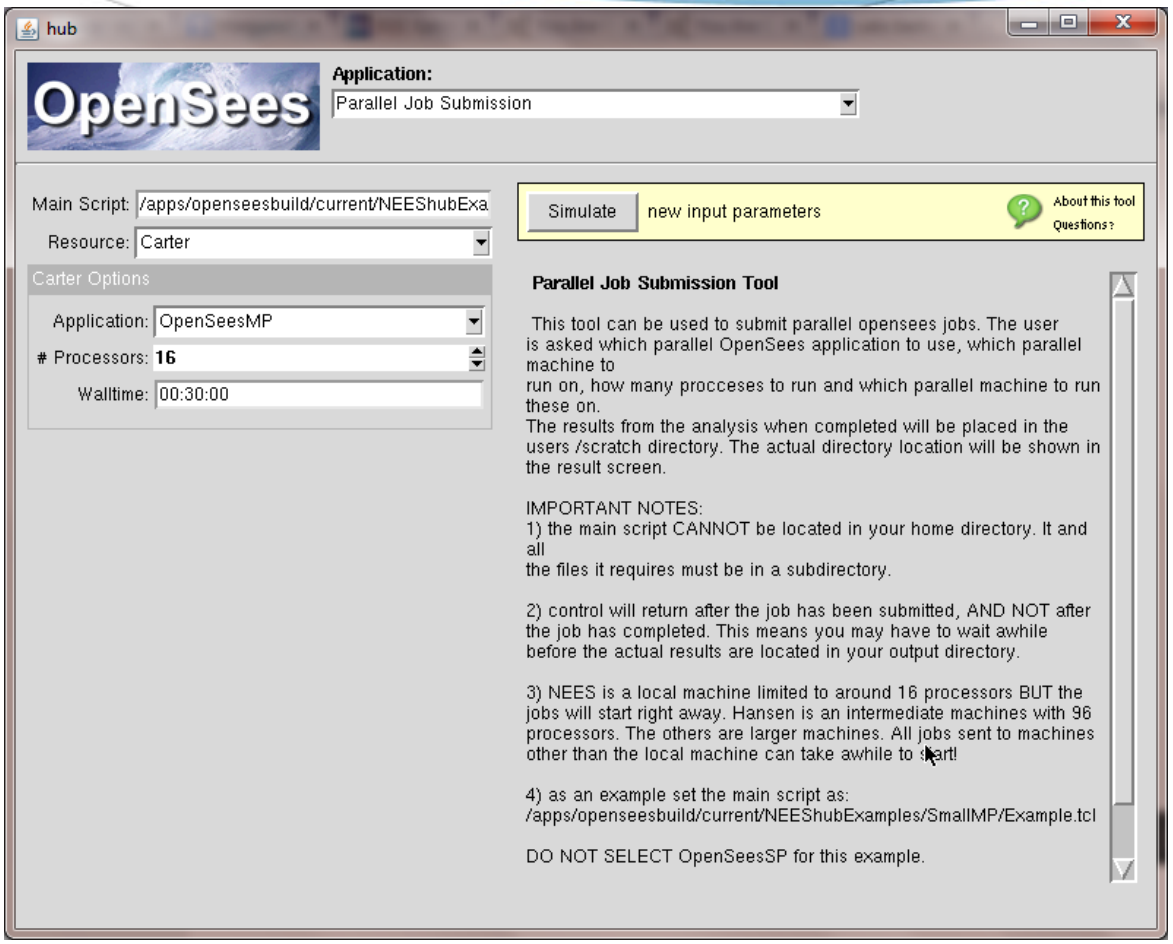
Batchsubmit Features

- Automatic retrieval of results
- Email notification once results are available
- Monitor job status
- Monitor queue traffic at different venues
- Cancel a job

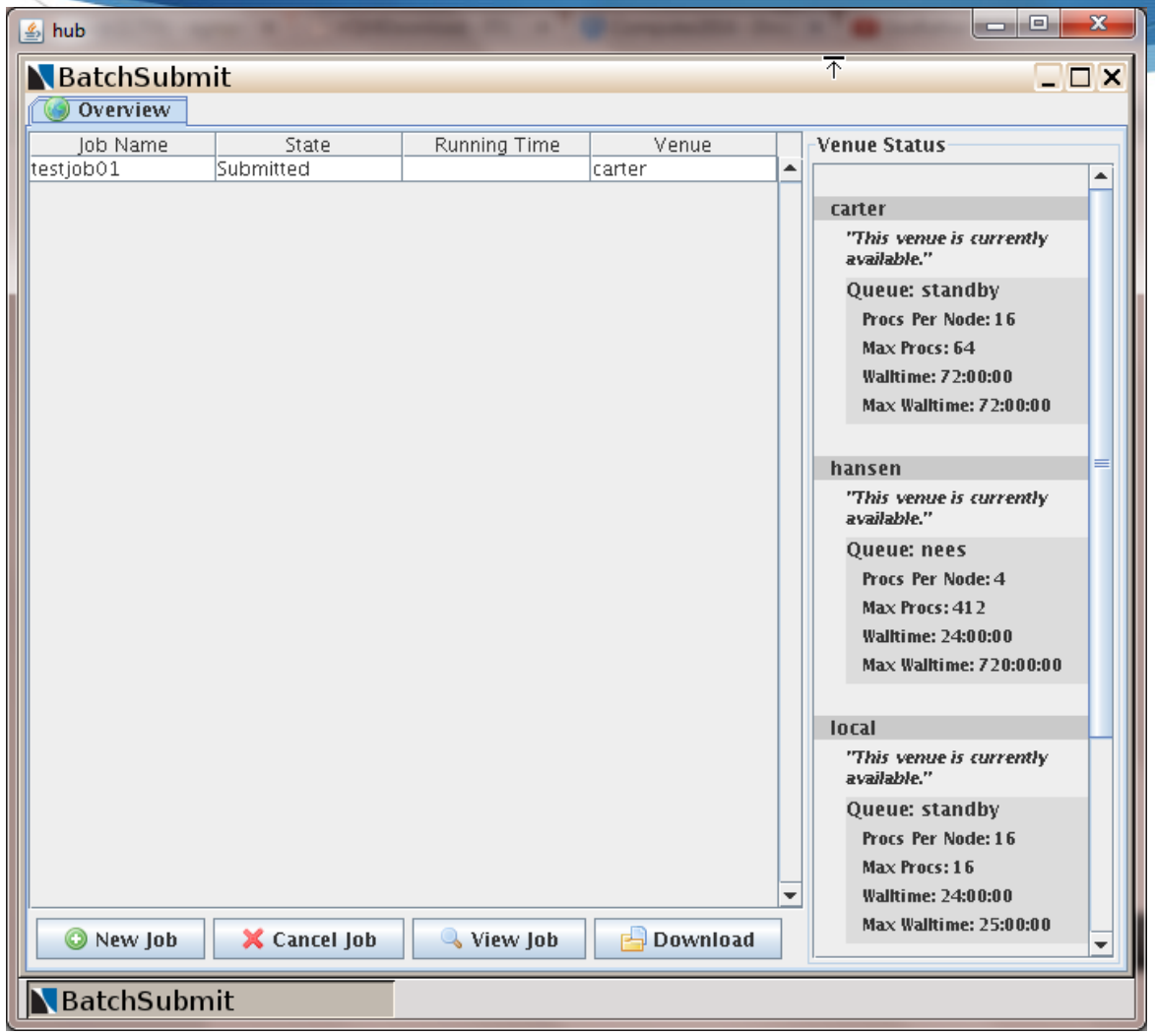
Batchsubmit Examples

- batchsubmit date
- batchsubmit --venue carter --ncpus 16 OpenSeesMP /apps/opensees/NEEShubExamples/SmallMP/Example.tcl
- batchsubmit --venue stampede --ncpus 64 --appdir /apps/share64/opensees/stampede --rcopyindir OpenSeesMP /LargeMP/Example.tcl

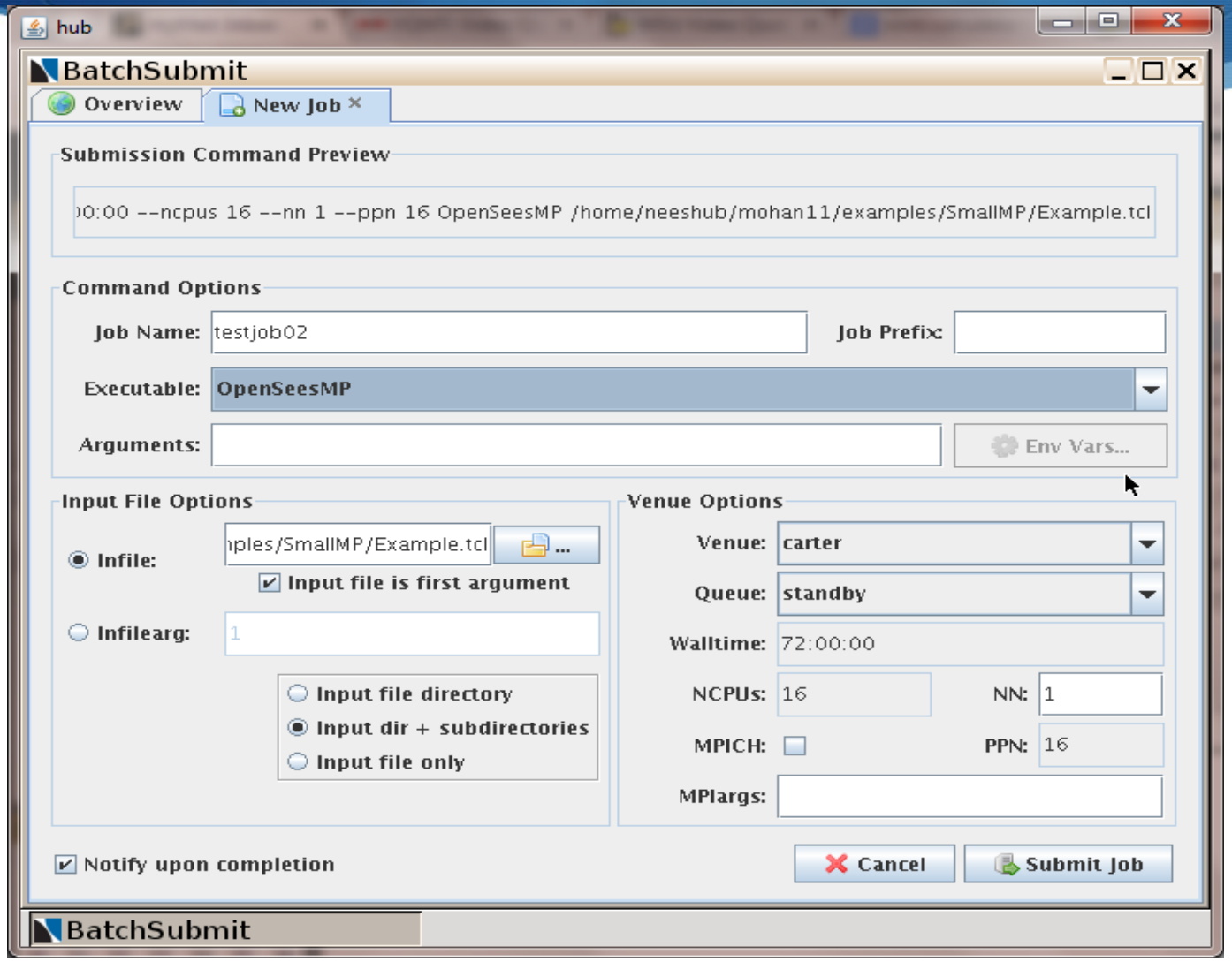
OpenSees Laboratory



Batchsubmit GUI



Batchsubmit GUI



Project Warehouse

- NEES online data repository
- Allows researchers to upload, archive, and disseminate data from their physical, cyber, and hybrid experiments and simulations.
- Provides user with tools to organize data into projects, experiments, trials, and results.
- The data in the Project Warehouse can be cited and shared with researchers across the world, or only within a research group.
- Facility to curate the data in the repository to ensure the long-term preservation of valuable NEES data.

Project Warehouse

NEES Project Warehouse

Seismic Response of Structural Walls with Geometric and Reinforcement Discontinuities OPEN DATA

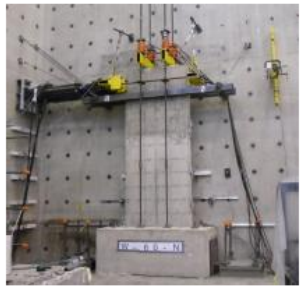
No reviews have been created for this project. Review This Project

Project | Experiments | Team Members | File Browser | Reviews

warehouse search GO

To access data, please select an experiment on the Experiments tab.

Executive Summary:	Download Document
PI(s):	Santiago Pujol
Dates:	July 20, 2011 - August 09, 2014
Facility:	Purdue University at West Lafayette, IN, United States
Organization(s):	Purdue University at West Lafayette, IN, United States
Description:	Discontinuities in the geometry and the reinforcement of structural walls create stress concentrations that have detrimental effects on wall seismic response. This study focused on discontinuities associated with changes in the geometry of the cross... (more)
Sponsor:	ERICO International Corporation - n/a - Experiments 1 through 6
Website(s):	Seismic response of RC walls with discontinuities (view) Seismic response of structural walls with discontinuities (view) Seismic Response of Structural Walls with Discontinuities (view)
Group Space:	Project:Seismic Response of Structural Walls with Geometric and Reinforcement Discontinuities



Wall with lap splices of length of 60 bar diameters and unconfined boundary elements

1268 Views

5624 Downloads

Project Warehouse

Project | Experiments | Team Members | File Browser | Reviews

warehouse search GO

To compare experiments, please select at most four experiments from the experiment list below.

Compare Experiments

Sort By: Default

Experiment-1: Specimen W-MC-C: Structural wall with mechanical couplers at the base and with boundary-element confinement subjected to lateral displacement reversals of increasing amplitude up to failure OPEN DATA

Dates: August 01, 2011 - September 01, 2011

Description: The longitudinal reinforcement was spliced with mechanical couplers at the base of the wall. It had boundary-element confinement (1.2% volumetric confining reinforcement ratio).

Trial-1,Rep-1 Launch

Facility: Purdue University at West Lafayette, IN, United States

1 Interactive Files
view data

Experiment-2: Specimen W-MC-N: Structural wall with mechanical couplers at the base and without boundary-element confinement subjected to lateral displacement reversals of increasing amplitude up to failure OPEN DATA

Dates: August 23, 2011 - December 05, 2011

Description: The longitudinal reinforcement was spliced with mechanical couplers at the base of the wall. It did not have boundary-element confinement.

The wall was ...

Trial-1,Rep-1 Launch

1 Interactive Files
view data

Facility: Purdue University at West Lafayette, IN, United States

Experiment-3: Specimen W-60-N: Structural wall with 60db lap splices at the base and without boundary-element confinement subjected to lateral displacement reversals of increasing amplitude up to failure OPEN DATA

Dates: May 19, 2012 - June 11, 2012

Description: The longitudinal reinforcement was lap spliced at the base of the wall. The length of the lap splices was 60 bar diameters. It did not ...

Facility: Purdue University at West Lafayette, IN, United States

Trial-1,Rep-1 Launch

Try It!!!

- Getting Started
  - Register for a NEEShub account (Free)
  - Request access to workspace (Support Ticket)
  - Request access to HPC access group (Support Ticket)
- Download SynchroNEES
  - https://nees.org/topics/synchronees
- Run batchsubmit
  - https://nees.org/resources/batchsubmit/about
- Share results with peers
  - https://nees.org/warehouse/welcome