OpenSeesLab

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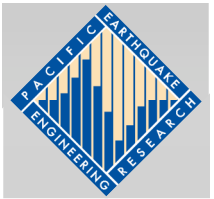
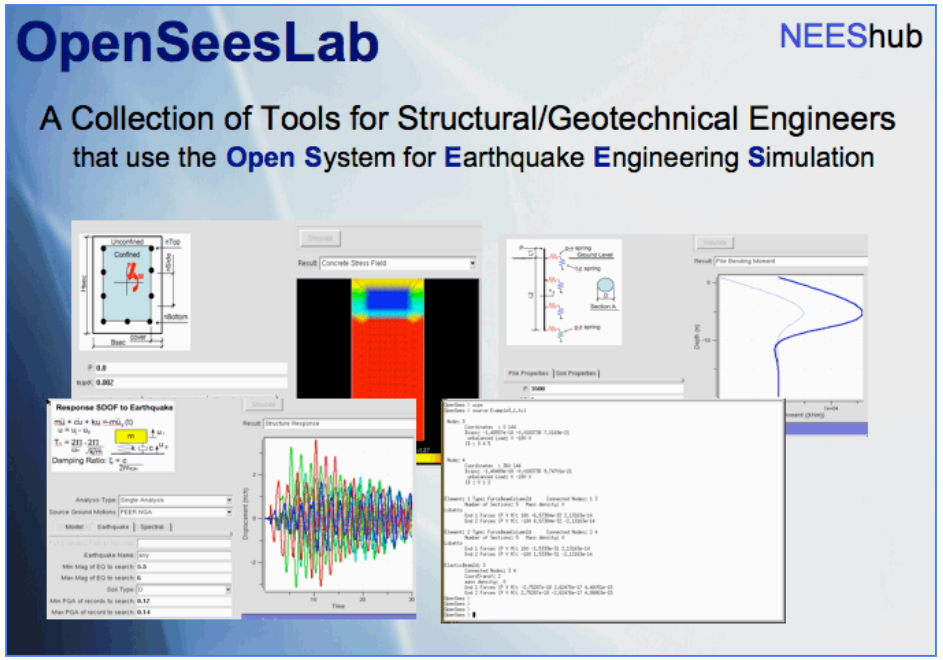
UC Berkeley

OpenSees Days 2012



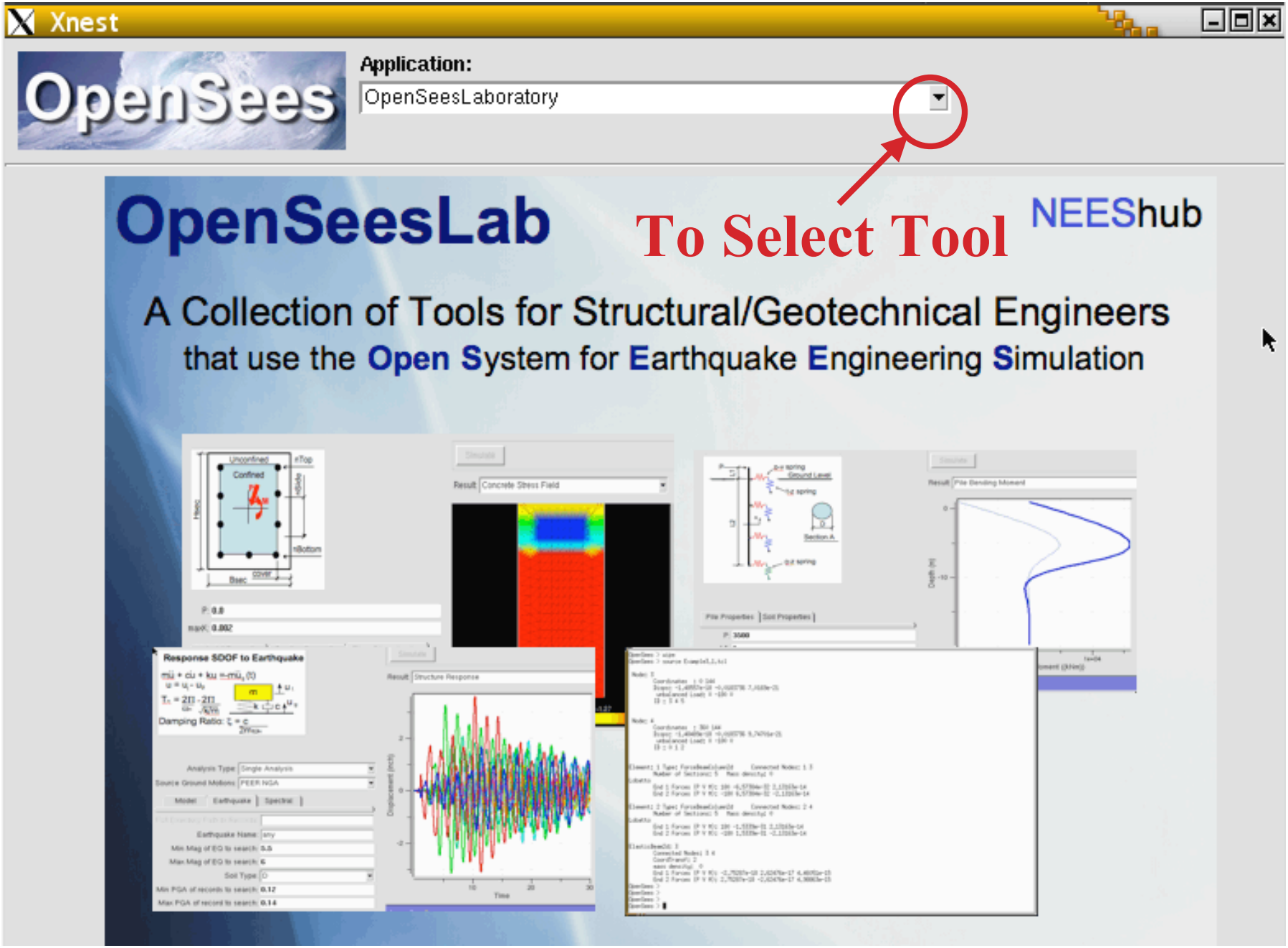
The OpenSeesLab tool:

http://nees.org/resources/tools/openseeslab

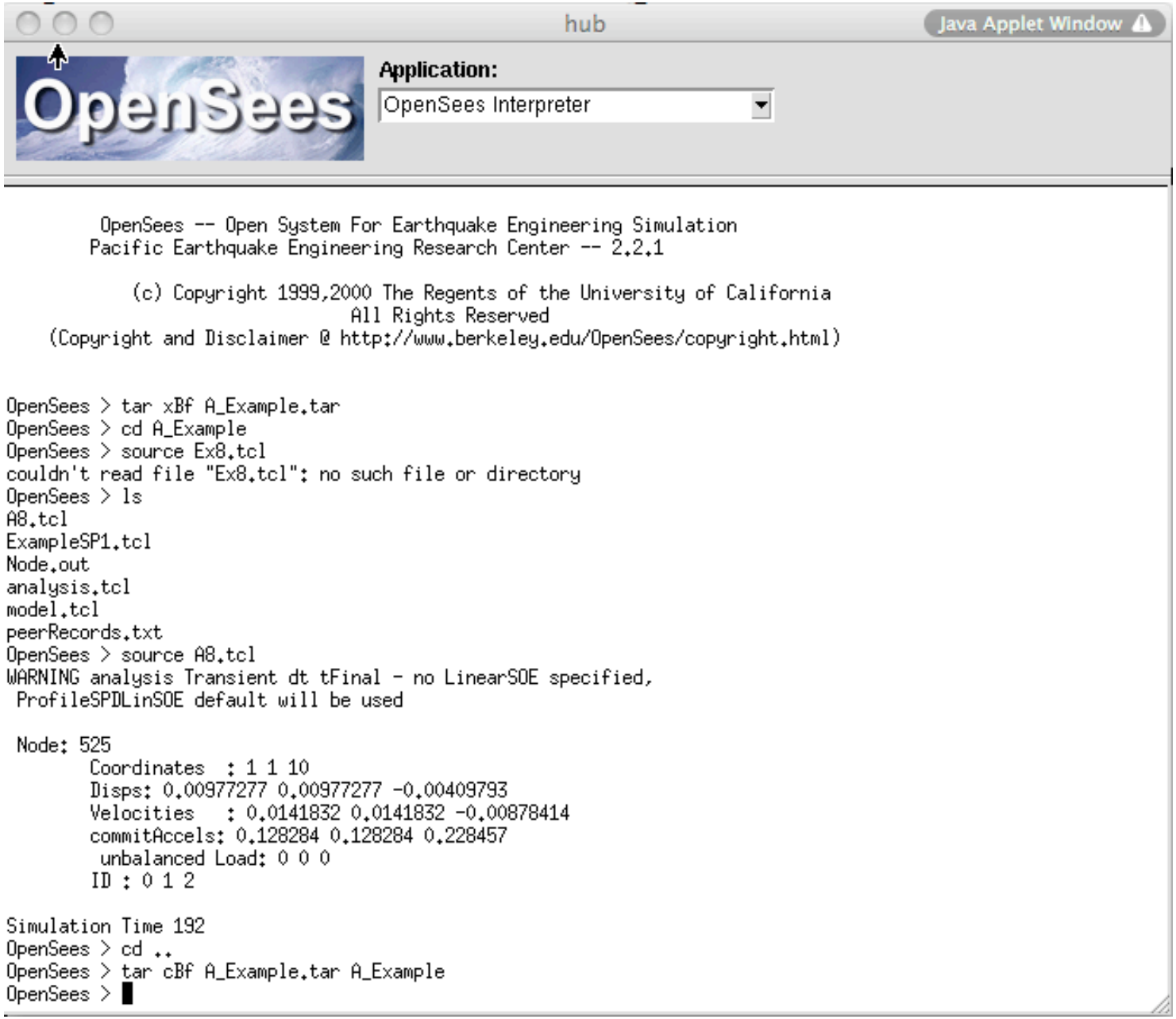


Is a suite of Simulation Tools powered by OpnSees for:

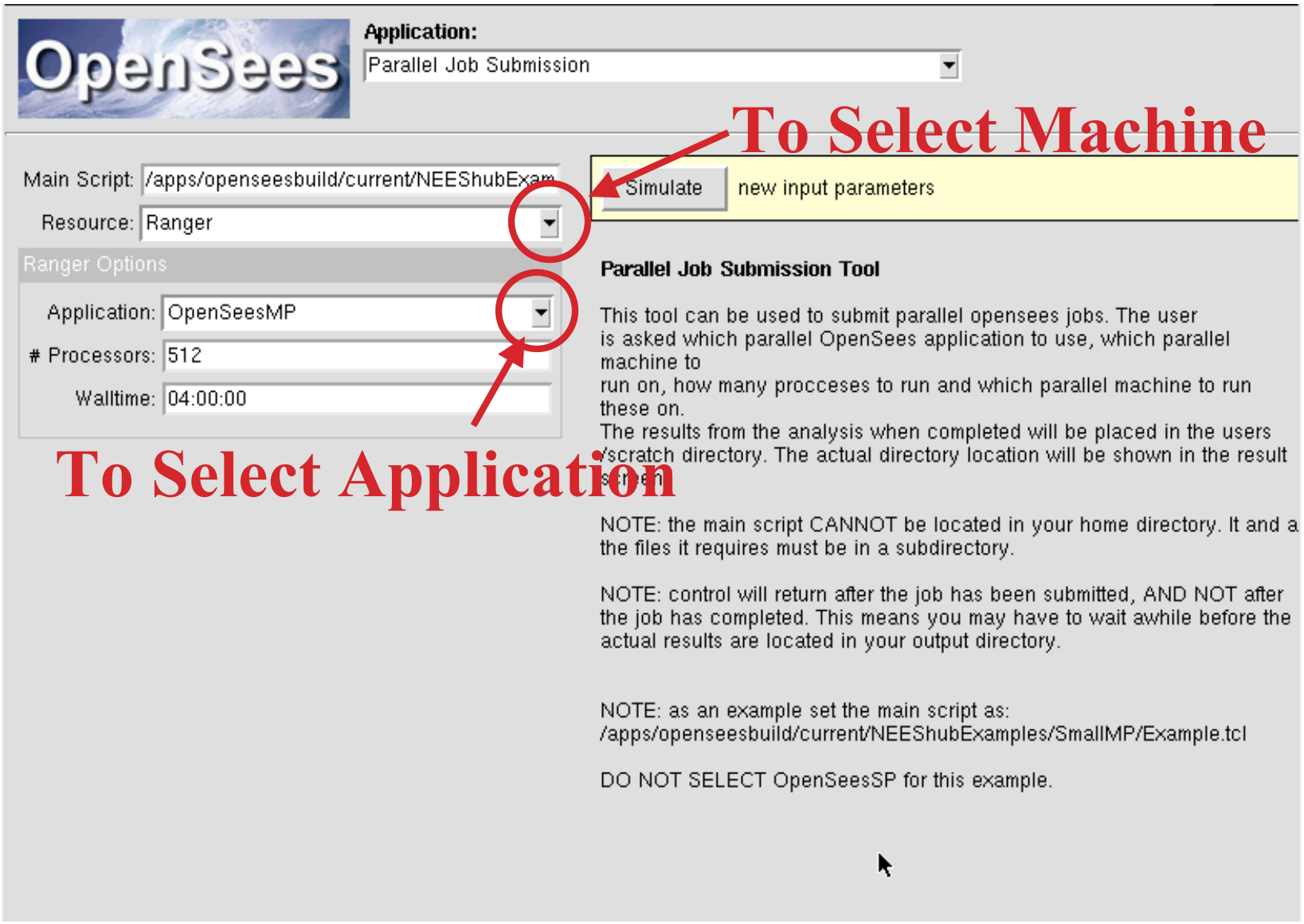
1. Submitting OpenSees scripts to NEEShub resources
2. Educating students and practicing engineers


Xnest
OpenSees
Application:
OpenSeesLaboratory
To Select Tool
OpenSeesLab
NEEShub
A Collection of Tools for Structural/Geotechnical Engineers
that use the Open System for Earthquake Engineering Simulation
Response SDOF to Earthquake

OpenSees Interpreter Tool

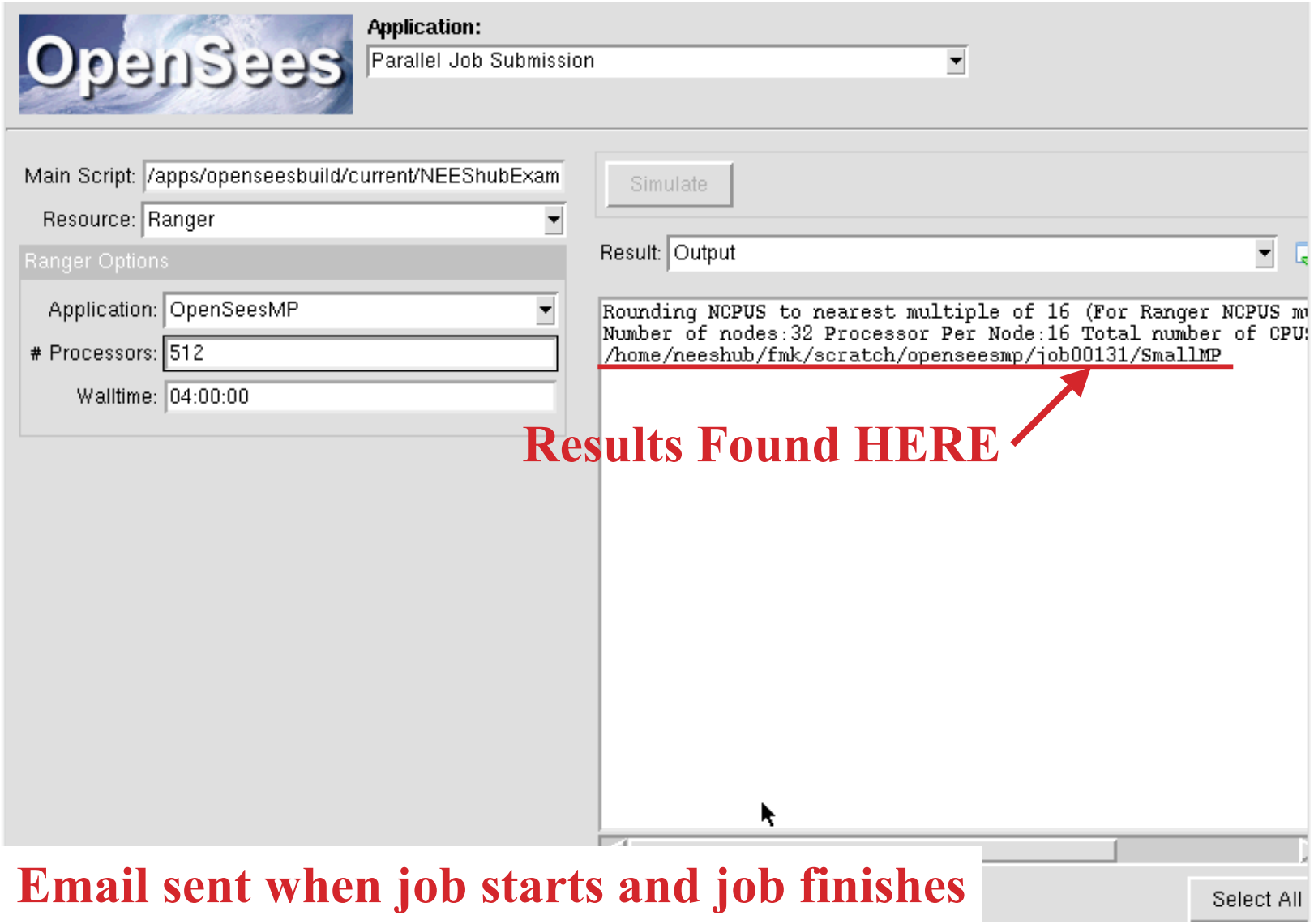


Parallel Script Submission Tool



Parallel OpenSees Interpreters

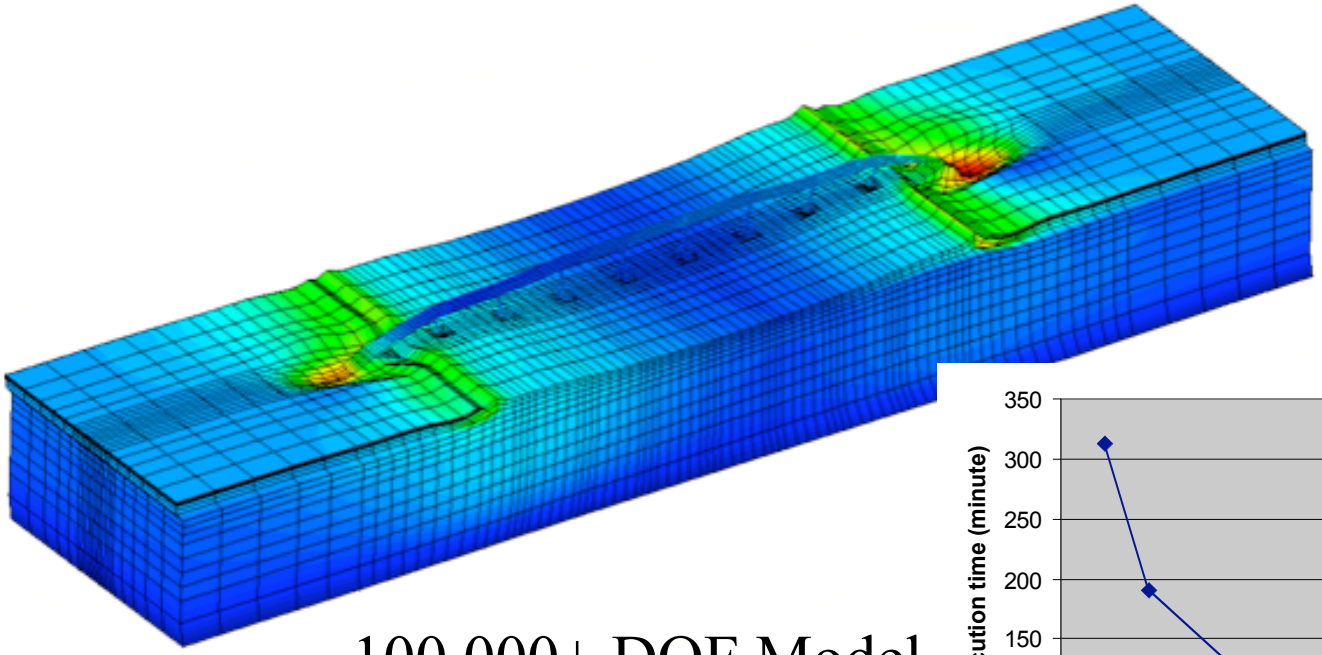
- OpenSeesSP: An application for large models which will parse and execute the exact same script as the sequential application. The difference being the element state determination and equation solving are done in parallel.
- OpenSeesMP: An application for **BOTH** large models and parameter studies.



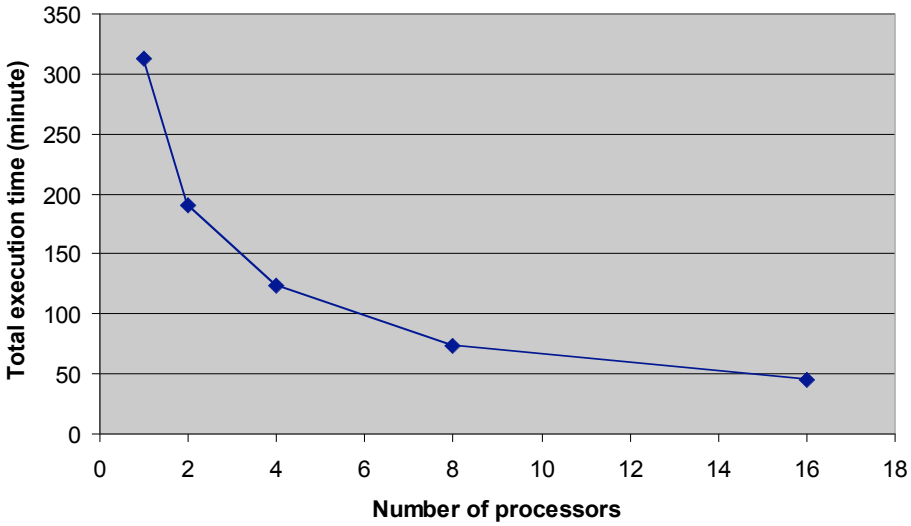
Email sent when job starts and job finishes

root	"JOB openseesmp job00130 COMPLETED at 2012/07/10 17:52:44" - DO NOT REPLY TO THIS EMAIL/n/n/	Jul 10
root	"JOB openseesmp job00130 STARTED at 2012/07/10 17:48:26" - DO NOT REPLY TO THIS EMAIL/n/n/app	Jul 10

OpenSeesSP:
An application for Large Models



100,000+ DOF Model
Implicit Integration
Mumps Direct Solver



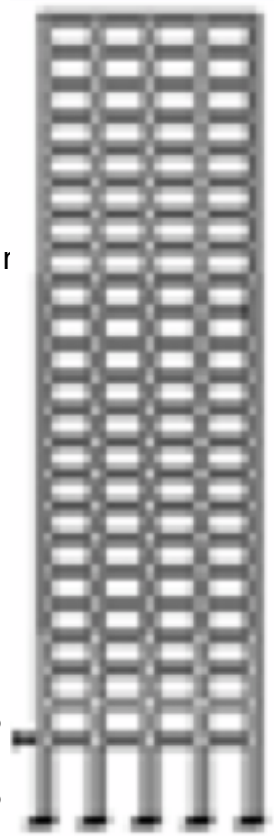
Only change to existing script requires changing solver type

system Mumps

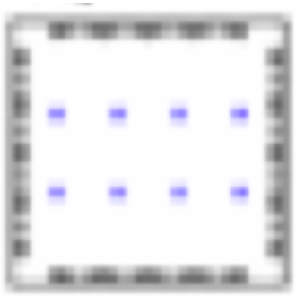
OpenSees MP

An Application for large models and parameter studies

```
set pid [getPID]
set np [getNP]
set count 0;
source parameters.tcl
source ReadSMDFileNewFormat.tcl;
foreach GMfile $iGMFile {
   foreach Factor1248 $iFactor1248 {

      if {[expr $count % $np] == $pid} {

         set inFile $GMdir/$GMfile.AT2
         set outFile $GMdir/$GMfile.g3;
         ReadSMDFileNewFormat $inFile $outFile dt r

         wipe
         source GravityAnalysisScript.tcl

         loadConst -time 0.0;
         wipeAnalysis

         source  EQ_Recorder.tcl
         source EQAnalysisScript.tcl

        if {$ok == 0} {
            puts "Process $pid $GMfile x $Factor1248                    lTime [getTime]]"
         } else {
            puts "Process $pid $GMfile x $Factor1248                    eTime [getTime] desiredTime $TmaxAnalysis]"
         }
         incr count 1
      }
   }
}
```

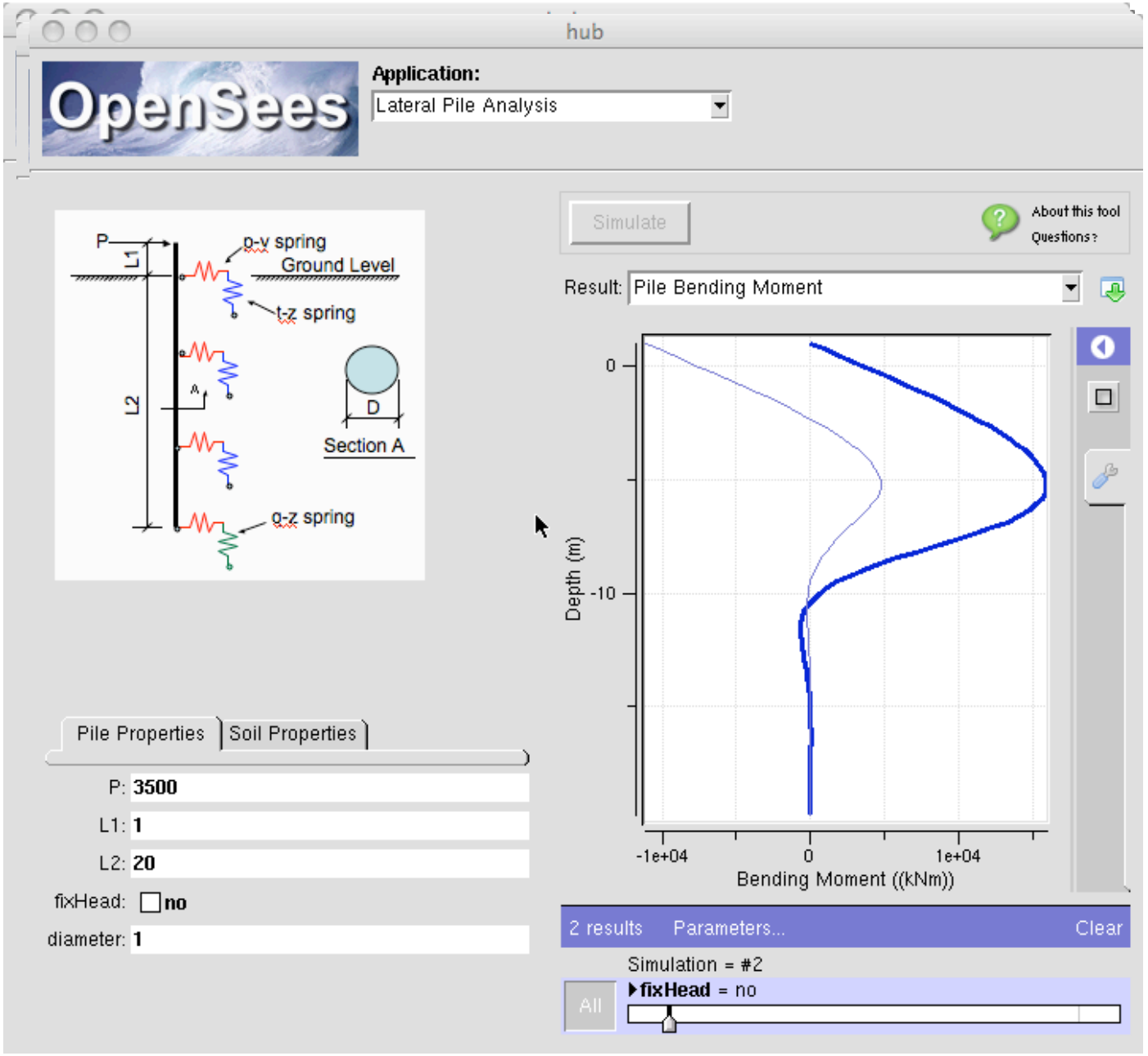


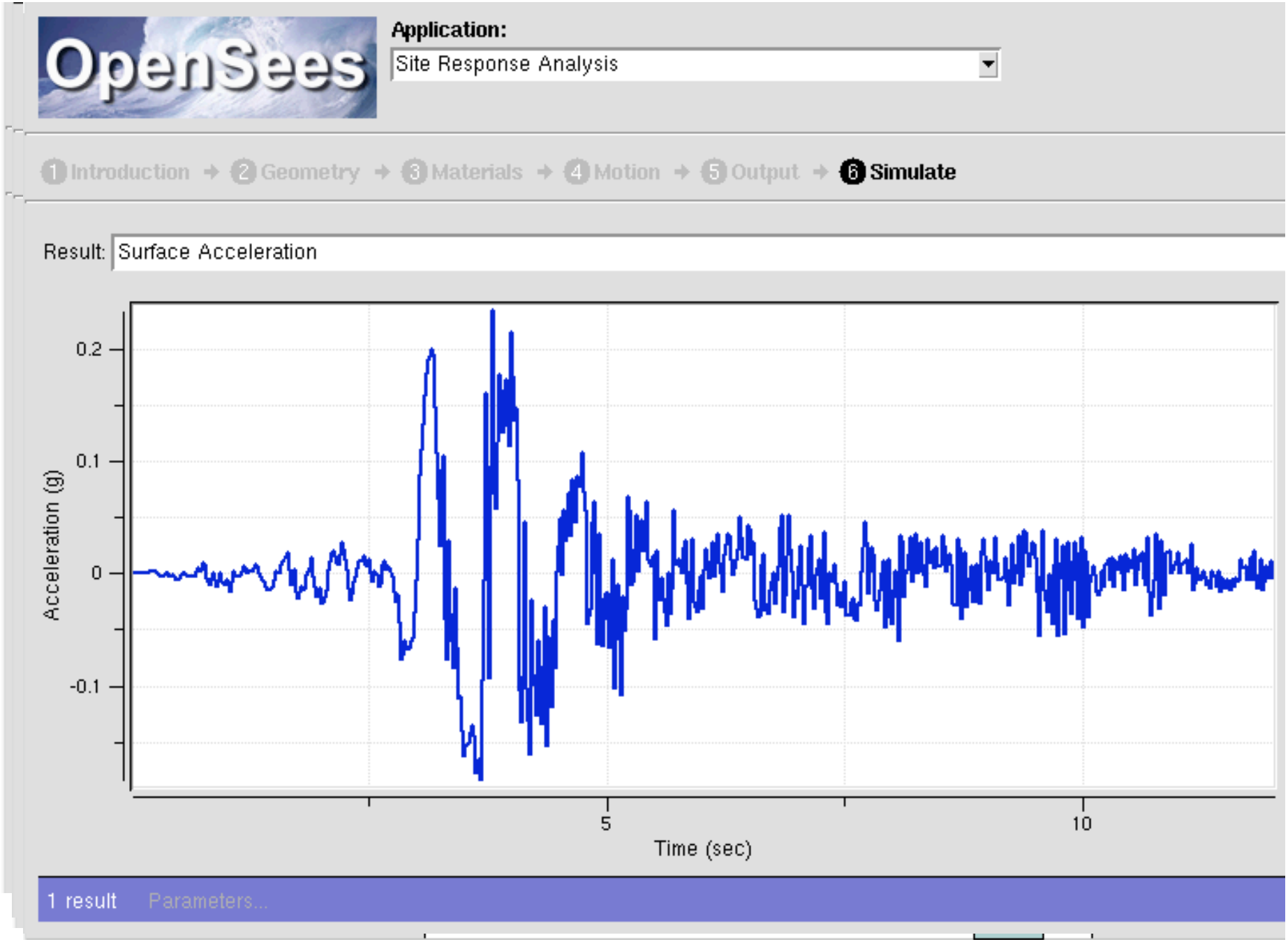
113 records, 4 intensities
3 hour a record, would have taken 1356 hours or 56.5 days
Ran on 452 processors of a Teragrid in less than 5 hours.



Lateral Pile Analysis

http://opensees.berkeley.edu/wiki/index.php/Laterally-Loaded_Pile_Foundation
Chris McGann U. Washington

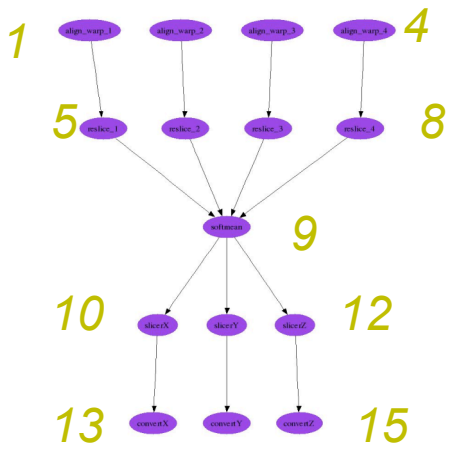



OpenSees
Application:
Site Response Analysis
1 Introduction
2 Geometry
3 Materials
4 Motion
5 Output
6 Simulate
Result:
Surface Acceleration
0.2
0.1
0
-0.1
Acceleration (g)
5
10
Time (sec)
1 result
Parameters...

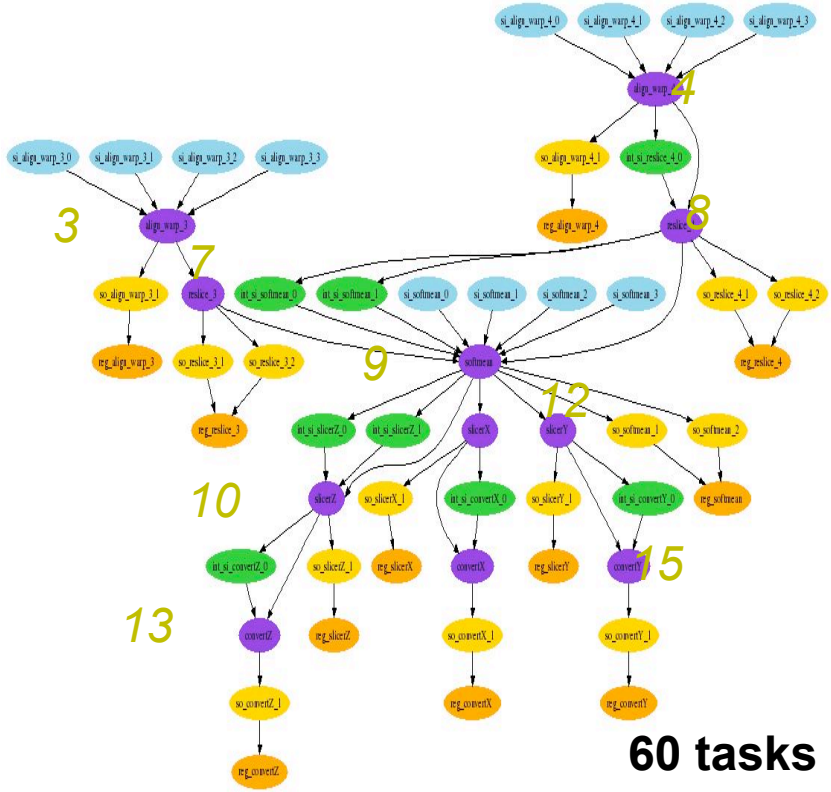
Workflows in the Cloud

OpenSees cannot do it all!

Software exists (pegasus, …) for creating scientific workflows that can take advantage of computational resources in the cloud! A scientific workflow allows engineers to compose and execute a series of computational or data manipulation steps in a scientific application.



mapping

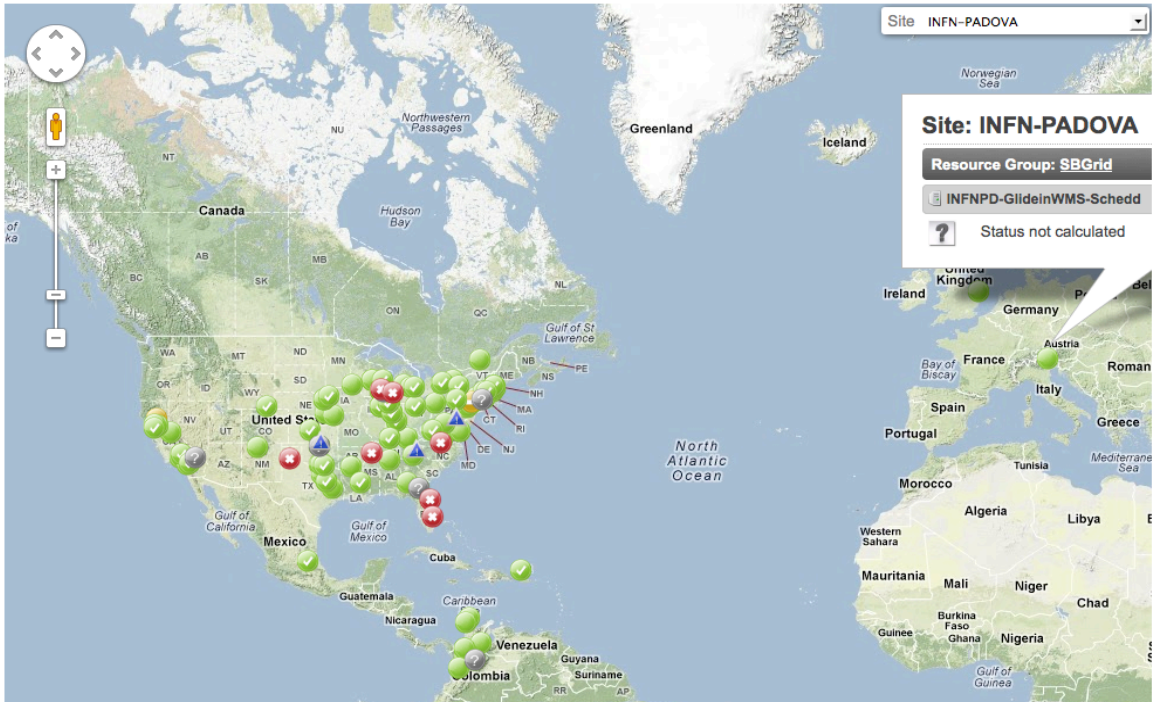


Original workflow: 15 compute nodes devoid of resource assignment

Open Science Grid

A national, distributed computing partnership for data-intensive research

Jobs | CPU Hours | Transfers | TB Transferred | Status Map



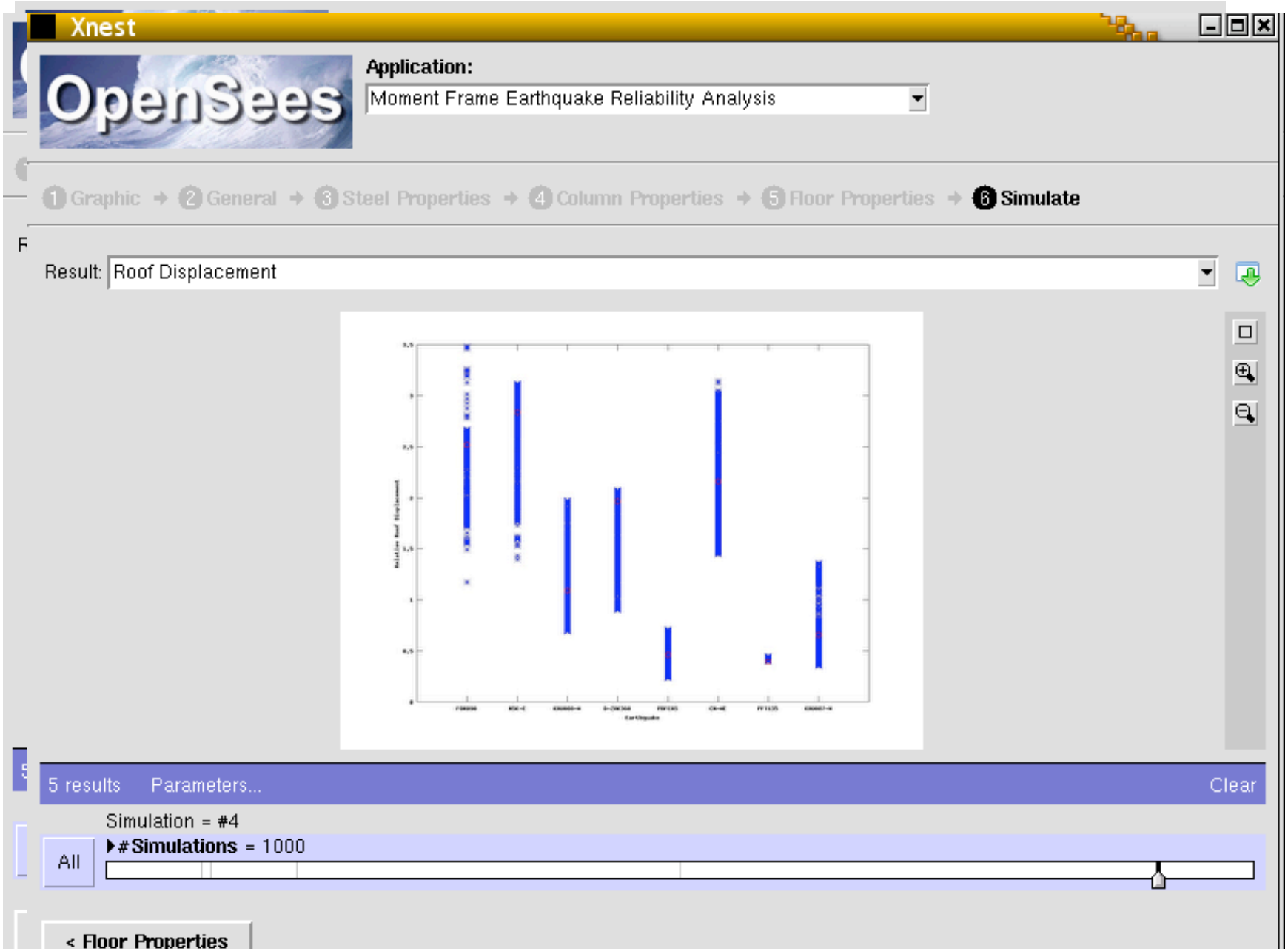
OSG delivered across 110 sites

In the last 24 Hours	
517,000	Jobs
2,029,000	CPU Hours
1,417,000	Transfers
543	TB Transferred

In the last 30 Days	
14,448,000	Jobs
58,606,000	CPU Hours
43,312,000	Transfers
27,394	TB Transferred

In the last Year	
226,257,000	Jobs
631,003,000	CPU Hours
554,526,000	Transfers
274,868	TB Transferred

Moment Frame Reliability Analysis



Thank You

Your Turn!