

DESIGNSAFE-CI

A NATURAL HAZARDS
ENGINEERING COMMUNITY

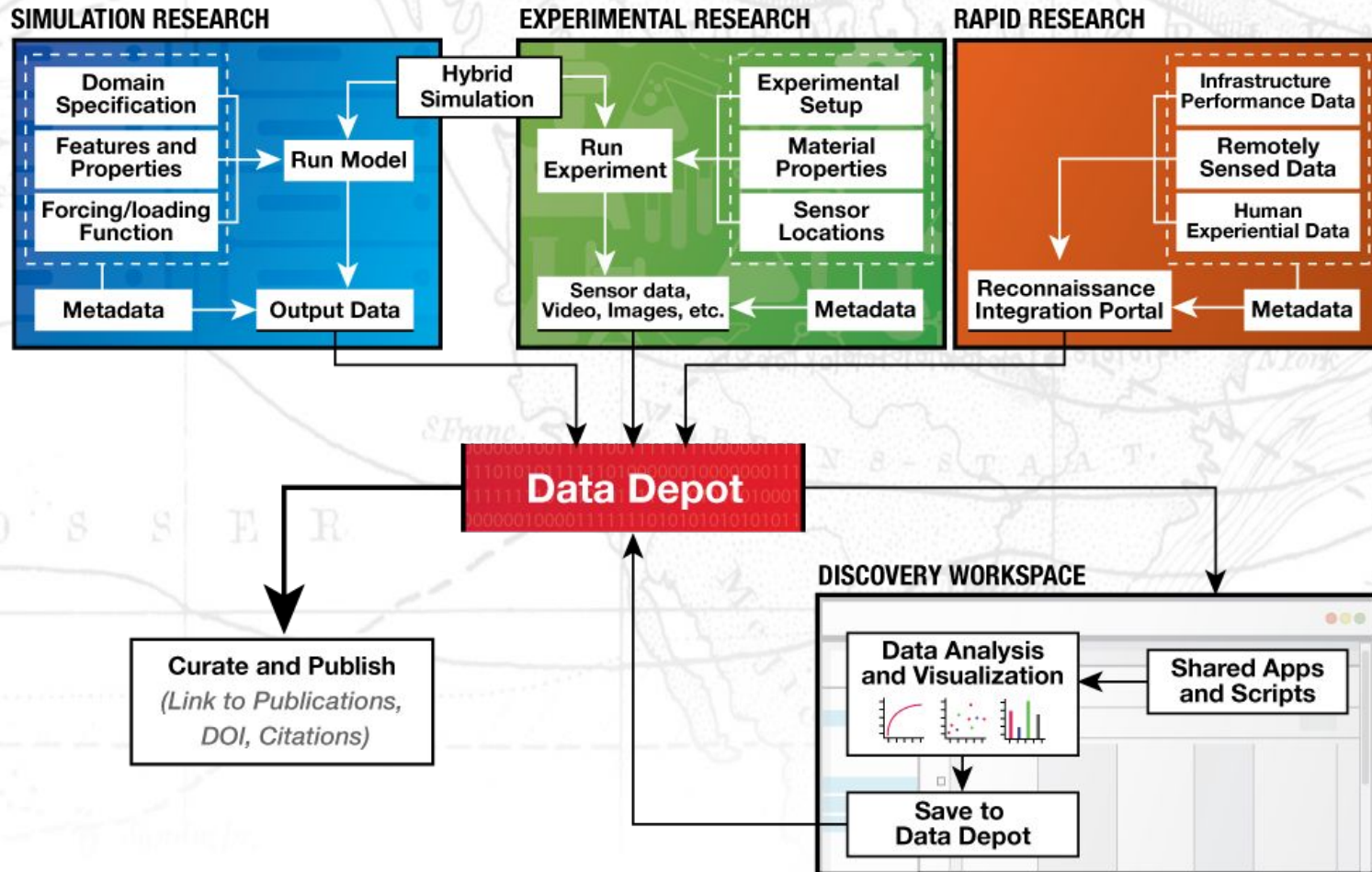


A New Cyberinfrastructure for the Natural Hazards Community

DesignSafe Vision

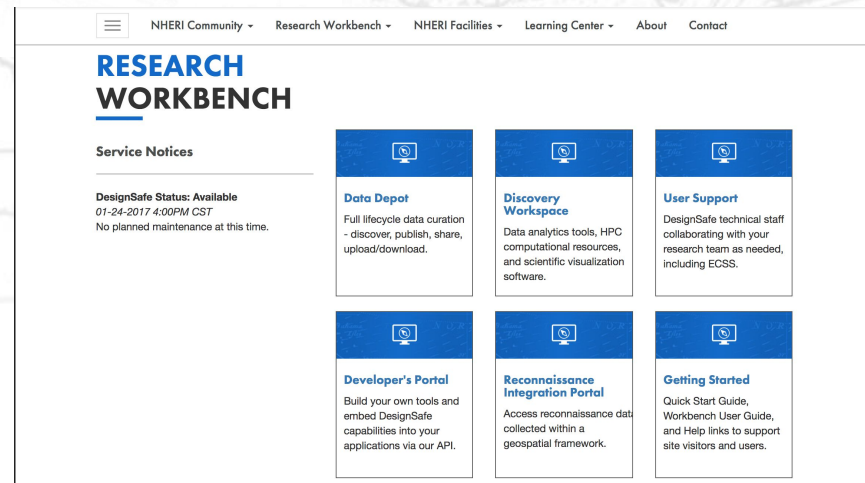
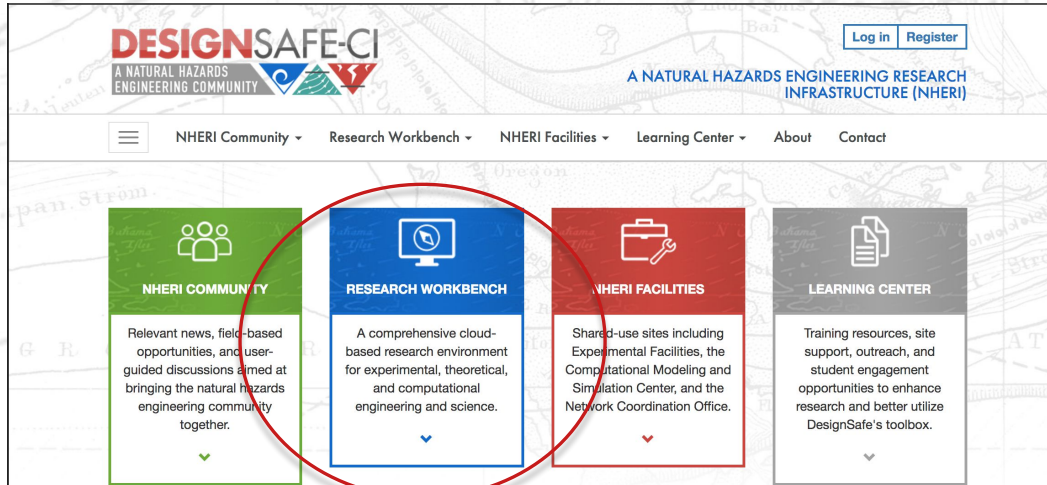
- A CI that is an integral and dynamic part of research discovery
- Cloud-based tools that support the analysis, visualization, and integration of diverse data types
 - Key to unlocking the power of “big data”
- Support end-to-end research workflows and the full research lifecycle
- Enhance, amplify, and link the capabilities of the other NHERI components

DesignSafe: Enabling Research

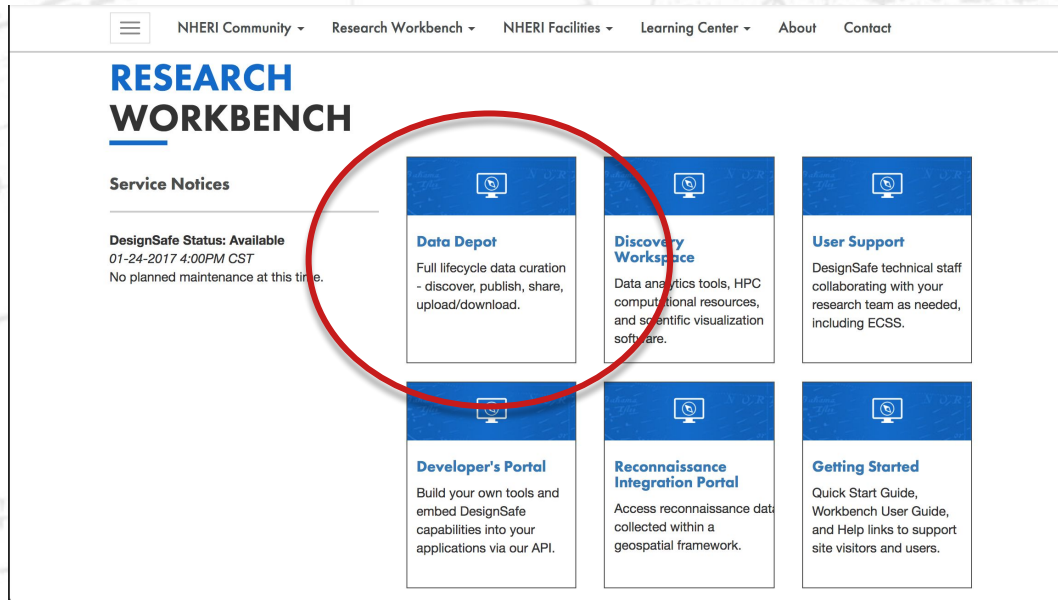


DesignSafe: Walkthrough

DesignSafe: The Research Workbench



DesignSafe: The Data Depot



A place to host the full lifecycle for data curation: discover, publish, share, upload/download, collaborate

The Data Depot is a multi-purpose data repository for experimental, simulation, and field data that uses a flexible data model applicable to diverse and large data sets and is accessible from other DesignSafe-ci components

DesignSafe: The Data Depot



Welcome, Sushobhon!

120

My account

A NATURAL HAZARDS ENGINEERING RESEARCH
INFRASTRUCTURE (NHERI)



Research Workbench

Overview

Data Depot

Workspace

Support

Roadmap

Search data...



Download



Preview



View / Edit Metadata



Share



Copy



Move



Rename



Move to Trash



Details

+ Add

My Data

My Projects

Shared with
Me

Box.com

Published

charlie

Name	Size	Last modified	Details
.ipynb_checkpoints	4.0 kB	12/14/16 2:23 PM	Details
.Trash	4.0 kB	4/22/16 7:13 AM	Details
1107_Practice.ipynb	8.5 kB	11/30/16 3:09 PM	Details
animationTest1-Copy1.ipynb	6.0 kB	12/14/16 2:25 PM	Details
animationTest1.ipynb	79.2 kB	1/20/17 11:12 AM	Details



Florida Tech

DesignSafe: My Data

DESIGNSAFE-CI
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Welcome, Sushobhon! 120 My account

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Research Workbench Overview Data Depot Workspace Support Roadmap

Search data...

Download Preview View / Edit Metadata Share Copy Move Rename Move to Trash Details

Add

My Data
My Projects
Shared with Me
Box.com
Published

charlie

Name	Size	Last modified	Details
.ipynb_checkpoints	4.0 kB	12/14/16 2:23 PM	Details
.Trash	4.0 kB	4/22/16 7:13 AM	Details
1107_Practice.ipynb	8.5 kB	11/30/16 3:09 PM	Details
animationTest1-Copy1.ipynb	6.0 kB	12/14/16 2:25 PM	Details
animationTest1.ipynb	79.2 kB	1/20/17 11:12 AM	Details

<https://www.designsafe-ci.org/data/browser/agave/designsafe.storage.default/charlie/>

My Data is a place for you to save your files, from scripts to data to reports to photographs; everything you need to do your research.

DesignSafe: My Projects

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Welcome, Sushobhon! 120 My account

A NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE (NHERI)

Research Workbench Overview Data Depot Workspace Support Roadmap

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Add

My Data

My Projects

Shared with Me

Box.com

Published

Projects

Project title	PI	Created
Jupyter Notebooks are Fun	Scott Brandenburg (sjbrande)	10/31/16 4:03 PM
MASW	Sushobhon Dey (charlie)	1/20/17 11:00 AM
ContourData	Sushobhon Dey (charlie)	11/30/16 3:22 PM
training	Sushobhon Dey (charlie)	12/13/16 12:17 PM

My Projects is a new feature created to enable collaboration on projects with multiple users.

DesignSafe: Shared with Me

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Welcome, Sushobhon! 120 My account

Research Workbench Overview Data Depot Workspace Support Roadmap

Search data...

Download Preview View / Edit Metadata Share Copy Move Rename Move to Trash Details

+ Add

My Data

My Projects

Shared with Me

Box.com

Published

Shared with me

Name	Size	Last modified	Details
fymenq 201611-St Louis NHERI Workshop	4.0 kB	11/17/16 3:23 PM	
tg832193	4.0 kB	1/4/17 2:32 PM	
gsaygili/.Trash/D... 1GM_Sufficieny	32.0 kB	8/6/16 8:04 AM	
bbc484 extraCredit_bbc484.ipynb	62.8 kB	12/1/16 1:25 PM	
naveen34	4.0 kB	11/22/16 3:50 PM	
j162688 [SDS392] R Assignment Jaewon Lee (j162688).ipynb	177.4 kB	11/17/16 10:22 AM	
chaines R Contour Plot.ipynb	93.5 kB	12/2/16 1:23 AM	

<https://www.designsafe-ci.org/data/browser/shared/designsafe.storage>

Differing from **My Projects**, which is meant for collaboration, **Shared with Me** are files explicitly *shared* with you by other users in the DesignSafe community

DesignSafe: Published

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Welcome, Sushobh! 120 My account

Research Workbench Overview Data Depot Workspace Support Roadmap

Search data...

Download Preview View / Edit Metadata Share Copy Move Rename Move to Trash Details

Published / / /

Name	Size	Details
Real-time Fast Hybrid Testing Steel Frame Test	23.6 MB	Details

Published data is publicly available data which can be utilized by the Designsafesafe community in their own research. A Designsafesafe account is not required to search and access the publicly available datasets

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Welcome, Sushobh! 120 My account

Research Workbench Overview Data Depot Workspace Support Roadmap

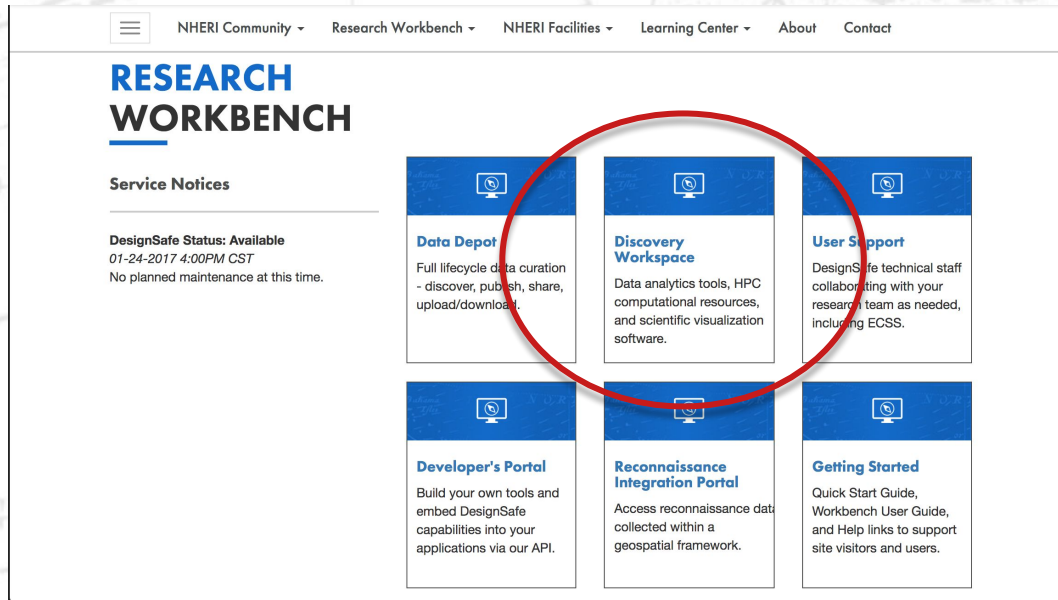
Search data...

Download Preview View / Edit Metadata Share Copy Move Rename Move to Trash Details

Published / / /

Name	Size	Details
Real-time Fast Hybrid Testing Steel Frame Test	23.6 MB	Details
Evaluation of Ground Rupture Effects on Critical Lifelines	9.7 GB	Details
RC Collapse Test	16.4 MB	Details
Semiactive Control of Nonlinear Structures	35.9 GB	Details

DesignSafe: Discovery Workspace



A place for you to do your research.

The Discovery Workspace allows users to perform simulations and analyze data using popular open source simulation codes OpenSees, ADCIRC, and OpenFOAM, as well as commercial tools such as MATLAB.

DesignSafe: Applications

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A NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE (NHRI)

Research Workbench Overview Data Depot **Workspace** Support Roadmap

DISCOVERY WORKSPACE

Public Private

Compress folder 0.1 MATLAB Large 0.3 Extract tar/zip/gzip File 0.1 MATLAB 0.1 Paraview 4.3.1 ADCIRC 51.33 Parallel ADCIRC 51.33 OpenSeesSP 2.5.0.6480 OpenFOAM 2.4.0

DATA DEPOT BROWSER

Select data source
My Data

Browsing:
/ charlie

File name

- .ipynb_checkpoints
- .Trash
- archive
- ContourData
- Input_Files
- MASW
- MASW_kdw
- Scalar PGA M Model

SELECT AN APP

Select an application from the tray above.

This initial version of the *Discovery Workspace* allows users to perform simulations and analyze data using popular open source simulation codes OpenSees, ADCIRC, and OpenFOAM, as well as commercial tools such as MATLAB (software license verification required). The selection of codes and tools will continue to be expanded as seen at the [Workbench Roadmap](#).

At the top of the Discovery Workspace, you'll see the Application Bar, all the publicly available applications are shown here. Each applications links to documentation providing details of that particular app.

DesignSafe: Applications

The screenshot shows the DesignSafe-CI web interface. At the top, there's a header with the logo, a welcome message for 'Sushobhan!', a user ID '120', and a 'My account' link. Below this is a navigation bar with links: Research Workbench, Overview, Data Depot, Workspace (selected), Support, and Roadmap. The main section is titled 'DISCOVERY WORKSPACE'. It has a 'Public' and 'Private' toggle. Below this is a row of application icons: Compress folder 0.1, MATLAB Large 0.3, Extract tar/zip/gzip File 0.1, MATLAB 0.1, Paraview 4.3.1, and ADCIRC 51.33. On the left is a 'DATA DEPOT BROWSER' sidebar with 'Select data source' set to 'My Data'. It shows a browsing path: / charlie. Under 'File name', there are several folders: .ipynb_checkpoints, .Trash, archive, ContourData, Input_Files, and MASW. The main content area is titled 'RUN OPENSEESSP'. It contains a description of OpenSees, a link to 'OpenSeesSP Documentation', an 'Input Directory' section with a 'Select' button and a text box, a 'TCL Script' section with a text box, and a 'Maximum job runtime' section with a text box set to '01:00:00'. At the bottom, there's a 'Job name' field.

Each application links to documentation providing details of that particular app. To execute an app, fill out the necessary criteria on the form, and click RUN

DesignSafe: MATLAB

PublicPrivate

Compress folder
0.1

MATLAB Large
0.3

Extract tar/zip/gzip File
0.1

**MATLAB
0.1**

Paraview
4.3.1

ADCIRC
51.33

Parallel ADCIRC
51.33

OpenSeesSP
2.5.0.6480

OpenFOAM
2.4.0

JuPyter
4.1.0

OpenSeesMP
2.5.0.6480

Of

DATA DEPOT BROWSER

Select data source

My Data

Browsing:
/ charlie

File name

.ipynb_checkpoints

.Trash

archive

ContourData

Input_Files

MASW

MASW_kdw

Scalar PGA M Model

test

virtualenvs

RUN MATLAB

Run an interactive Matlab 2016a session on a virtual machine. Work directly on your files rather than needing to copy them to and from Stampede.

[MATLAB Documentation](#)

Inputs

Job details

Maximum job runtime

24:00:00

In HH:MM:SS format. The maximum time you expect this job to run for. After this amount of time your job will be killed by the job scheduler. Shorter run times result in shorter queue wait times. Maximum possible time is 48:00:00 (48 hours).

Job name

A recognizable name for this job

Job output archive location (optional)

Select <username>/archive/jobs/\${YYYY-MM-DD}/\${JOB_NAME}-\${JOB_ID}

Specify a location where the job output should be archived. By default, job output will be archived at:
<username>/archive/jobs/\${YYYY-MM-DD}/\${JOB_NAME}-\${JOB_ID}.

RunClose

Jobs Status

DesignSafe: MATLAB

DATA DEPOT BROWSER

Select data source

My Data

Browsing:
/ charlie

File name

- .ipynb_checkpoints
- .Trash
- archive
- ContourData
- Input_Files
- MASW
- MASW_kdw
- Scalar PGA M Model
- test
- virtualenvs

Job Submitted Successfully

Your job *matlab100* has been submitted. Monitor its status on the right.

RUN MATLAB

Run an interactive Matlab 2016a session on a virtual machine. Work directly on your files rather than needing to copy them to and from Stampede.

[MATLAB Documentation](#)

Inputs

Job details

Maximum job runtime

24:00:00

In HH:MM:SS format. The maximum time you expect this job to run for. After this amount of time your job will be killed by the job scheduler. Shorter run times result in shorter queue wait times. Maximum possible time is 48:00:00 (48 hours).

Job name

A recognizable name for this job

Job output archive location (optional)

Select <username>/archive/jobs/\${YYYY-MM-DD}/\${JOB_NAME}-\${JOB_ID}

Specify a location where the job output should be archived. By default, job output will be archived at: <username>/archive/jobs/\${YYYY-MM-DD}/\${JOB_NAME}-\${JOB_ID}.

Run Close

JOBS STATUS

matlab100

PENDING [More info](#)

deytest

FAILED [More info](#)

testing

FINISHED [More info](#)

dey_testing

FINISHED [More info](#)

Matlab demo

FINISHED [More info](#)

DemoingOpenSEES

FINISHED [More info](#)

Demo

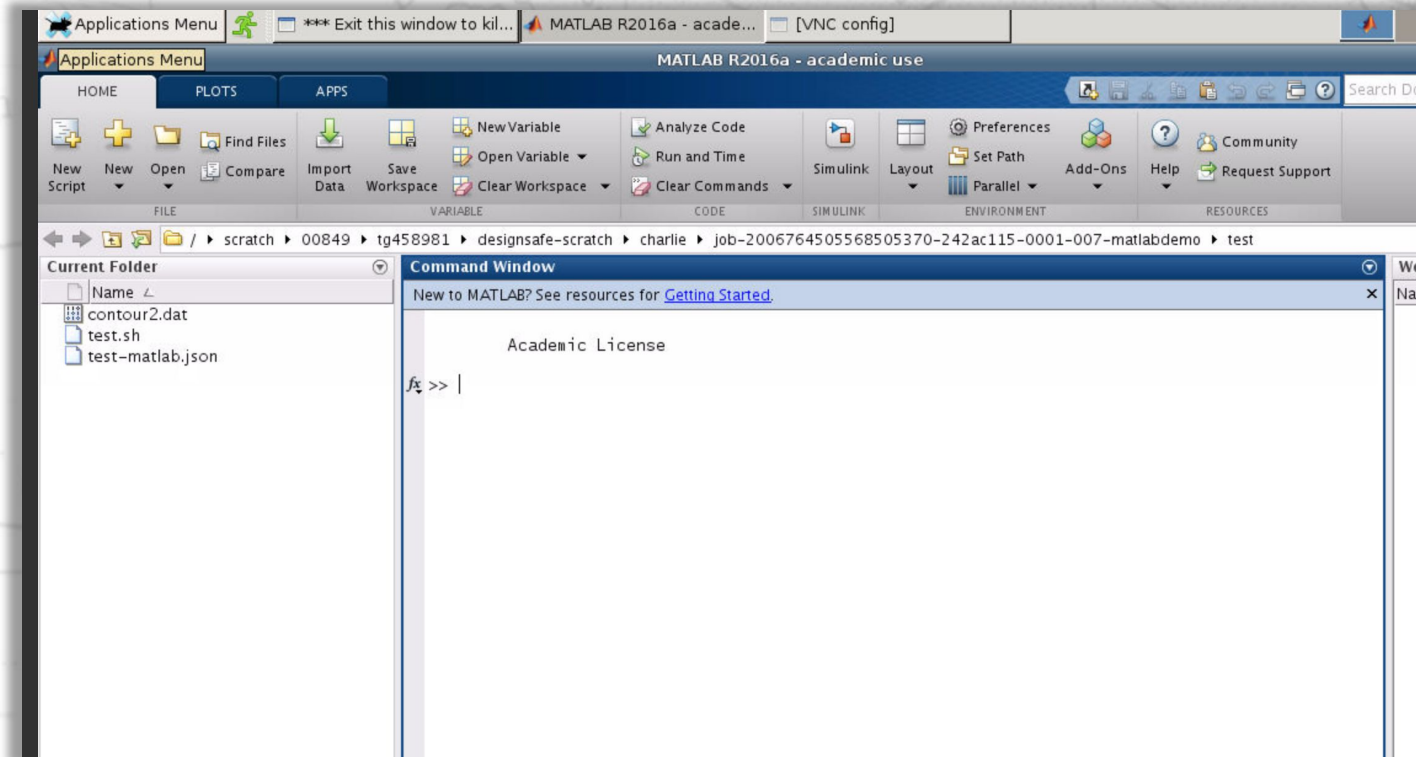
FINISHED [More info](#)

demo

DesignSafe: MATLAB

The screenshot displays the DesignSafe: MATLAB web interface. On the left, the 'DATA DEPOT BROWSER' shows a file tree under 'charlie'. A green notification box at the top center states 'Job Submitted Successfully' and 'Your job matlab100 has been submitted. Monitor its status on the right.' Below this, a 'RUN MATLAB' button is visible. On the right, the 'JOBS STATUS' panel lists 'matlab100' as 'PENDING' with a 'More info' link. A modal dialog box is open in the center, titled 'Your interactive session has started!'. It contains instructions: 'To connect to your interactive session, click the button below. To end the job, quit the application (e.g. MATLAB) within the session. Your files may take some time to appear in your archive directory after the job has completed.' The dialog has a 'Connect!' button and a 'Close' button. Below the dialog, another 'RUN MATLAB' button is shown, followed by a form to specify the output location: 'Select <username>/archive/jobs/\${YYYY-MM-DD}/\${JOB_NAME}-\${JOB_ID}'. A 'Run' button is at the bottom of this form. The background of the interface shows a list of jobs with columns for job name, status, and a 'More info' link.

DesignSafe: MATLAB



DesignSafe: Jupyter

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Welcome, Sushobhon! 121 [My account](#)

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Research Workbench Overview Data Depot Workspace Support Roadmap

DISCOVERY WORKSPACE

Discovery Workspace
Developer's Portal
Jupyter

Public Private

 Compress folder 0.1	 MATLAB Large 0.3	 Extract tar/zip/gzip File 0.1	 MATLAB 0.1	 Paraview 4.3.1	 ADCIRC 51.33	 Parallel ADCIRC 51.33	 OpenSeesSP 2.5.0.6480	 OpenFOAM 2.4.0
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What are Jupyter Notebooks?

A web-based, interactive computing tool for capturing the whole computation process: developing, documenting, and executing code, as well as communicating the results.

How do Jupyter Notebooks Work?

An open notebook has exactly one interactive session connected to a kernel which will execute code sent by the user and communicate back results. This kernel remains active if the web browser window is closed, and reopening the same notebook from the dashboard will reconnect the web application to the same kernel.

What's this mean?

Notebooks are an interface to kernel, the kernel executes your code and outputs back to you through the notebook. The kernel is essentially our programming language we wish to interface with.

DesignSafe: Jupyter

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A NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE (NHERI)

Research Workbench Overview Data Depot **Workspace** Support Roadmap

DISCOVERY WORKSPACE

- Discovery Workspace
- Developer's Portal
- Jupyter**

Public Private

 Compress folder 0.1	 MATLAB Large 0.3	 Extract tar/zip/gzip File 0.1	 MATLAB 0.1	 Paraview 4.3.1	 ADCIRC 51.33	 Parallel ADCIRC 51.33	 OpenSeesSP 2.5.0.6480	 OpenFOAM 2.4.0
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DesignSafe: Jupyter

DESIGNSAFE-CI
A NATURAL HAZARDS ENGINEERING COMMUNITY

Welcome, Sushobhoni! 121 [My account](#)

A NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE (NHERI)

Research Workbench Overview Data Depot Workspace ▾ Support ▾ Roadmap

DISCOVERY WORKSPACE

JUPYTER

DesignSafe's Jupyter Hub is available to all DesignSafe users. Simply use your DesignSafe credentials to log in.

The Jupyter Notebook is a web application that allows you to create and share documents that contain live code, equations, visualizations and explanatory text. [Uses include:](#) data cleaning and transformation, numerical simulation, statistical modeling, machine learning and [much more](#).

[Proceed to Jupyter Hub](#)

START A JUPYTER SESSION

1. Click the green "Start Server" button to launch a Jupyter session. When you are done working in Jupyter, click the red "Stop My Server" button.

jupyter [Logout](#)

[Stop My Server](#) [My Server](#)

DesignSafe: Jupyter

The screenshot displays the DesignSafe-CI Jupyter interface. At the top, the DesignSafe-CI logo is on the left, and a user greeting 'Welcome, Sushobhon!' with a '121' badge and a 'My account' dropdown menu is on the right. Below the header, a navigation bar includes links for 'Research Workbench', 'Overview', 'Data Depot', 'Workspace', 'Support', and 'Roadmap'. The 'Workspace' section is active, showing 'Discovery Workspace' and 'Developer's Portal'. The main content area is titled 'DISCOVERY WORKSPACE JUPYTER'. It includes a description of the Jupyter Notebook as a web application for creating documents with live code, equations, and visualizations. A 'Proceed to Jupyter Hub' button is visible. Below this, a 'START A JUPYTER SESSION' section lists a step: '1. Click the green "Start Server" button to launch a Jupyter session'. A large orange oval highlights the 'Log in' button in the bottom right corner of the Jupyter interface.

DESIGNSAFE-CI
A NATURAL HAZARDS ENGINEERING COMMUNITY

Welcome, Sushobhon! 121 [My account](#)

A NATURAL HAZARDS ENGINEERING RESEARCH INFRASTRUCTURE (NHERI)

Research Workbench Overview Data Depot Workspace Support Roadmap

Discovery Workspace Developer's Portal

DISCOVERY WORKSPACE JUPYTER

Public

Compress 0.1

[Proceed to Jupyter Hub](#)

START A JUPYTER SESSION

1. Click the green "Start Server" button to launch a Jupyter session

[Log in](#)

DesignSafe: Jupyter

The image shows a screenshot of the DesignSafe-CI Jupyter interface. At the top, the DesignSafe-CI logo is on the left, and a user greeting 'Welcome, Sushobhon!' with a '121' badge and a 'My account' dropdown menu is on the right. Below the header is a navigation bar with links: Research Workbench, Overview, Data Depot, Workspace (selected), Support, and Roadmap. The main content area is titled 'DISCOVERY WORKSPACE JUPYTER'. On the left, there's a sidebar with 'Public' and 'Compress' options. The main area contains a 'jupyter' logo and a green button labeled 'Start My Server', which is circled in orange. A 'Logout' button is in the top right corner of the Jupyter interface. Below the Jupyter interface, there's a section titled 'START A...' with a list of instructions, including '1. Click the green jupyter'.

DesignSafe: Jupyter

[Control Panel](#)[Logout](#)[Files](#)[Running](#)[Clusters](#)

Select items to perform actions on them.

[Upload](#)[New ▾](#)

<input type="checkbox"/>	▼	
<input type="checkbox"/>	Folder	cli
<input type="checkbox"/>	Folder	mydata
<input type="checkbox"/>	Folder	public
<input type="checkbox"/>	Folder	util
<input type="checkbox"/>	File	README.txt

Jupyter Notebooks, Structure

- Code Cells
 - Code cells allow you to enter and run code
Run a code cell using Shift-Enter
- Markdown Cells
 - Text can be added to Jupyter Notebooks using Markdown cells. Markdown is a popular markup language that is a superset of HTML.

Jupyter Notebooks, Structure

- Markdown Cells
 - You can add headings:
 - # Heading 1
 - # Heading 2
 - ## Heading 2.1
 - ## Heading 2.2
 - You can add lists
 - 1. First ordered list item
 - 2. Another item
 - * Unordered sub-list.
 - 1. Actual numbers don't matter, just that it's a number
 - * 1. Ordered sub-list
 - 4. And another item.

Jupyter Notebooks, Structure

- Markdown Cells

- pure HTML

- `<dl>`

- `<dt>Definition list</dt>`

- `<dd>Is something people use sometimes.</dd>`

- `<dt>Markdown in HTML</dt>`

- `<dd>Does not work very well. Use HTML tags.</dd>`

- `</dl>`

- And even, Latex!

- $e^{i\pi} + 1 = 0$

Jupyter Notebooks, Workflow

Typically, you will work on a computational problem in pieces, organizing related ideas into cells and moving forward once previous parts work correctly. This is much more convenient for interactive exploration than breaking up a computation into scripts that must be executed together, as was previously necessary, especially if parts of them take a long time to run.

Jupyter Notebooks, Workflow

- Let a traditional paper lab notebook be your guide:
 - Each notebook keeps a historical (and dated) record of the analysis as it's being explored.
 - The notebook is not meant to be anything other than a place for experimentation and development.
 - Notebooks can be split when they get too long.
 - Notebooks can be split by topic, if it makes sense.

Jupyter Notebooks, Shortcuts

- **Shift-Enter**: run cell
 - Execute the current cell, show output (if any), and jump to the next cell below. If **Shift-Enter** is invoked on the last cell, a new code cell will also be created. Note that in the notebook, typing **Enter** on its own *never* forces execution, but rather just inserts a new line in the current cell. **Shift-Enter** is equivalent to clicking the **Cell | Run** menu item.

Jupyter Notebooks, Shortcuts

- **Ctrl-Enter**: run cell in-place
 - Execute the current cell as if it were in “terminal mode”, where any output is shown, but the cursor *remains* in the current cell. The cell’s entire contents are selected after execution, so you can just start typing and only the new input will be in the cell. This is convenient for doing quick experiments in place, or for querying things like filesystem content, without needing to create additional cells that you may not want to be saved in the notebook.

Jupyter Notebooks, Shortcuts

- **Alt-Enter**: run cell, insert below
 - Executes the current cell, shows the output, and inserts a *new* cell between the current cell and the cell below (if one exists). (shortcut for the sequence **Shift-Enter**, **Ctrl-m a**. (**Ctrl-m a** adds a new cell above the current one.))
- **Esc** and **Enter**: Command mode and edit mode
 - In command mode, you can easily navigate around the notebook using keyboard shortcuts. In edit mode, you can edit text in cells.

DesignSafe: Hands On

- **Log in to DesignSafe**
- **Data Depot**
 - **Search Published data**
 - Navigate an experiment
 - View the Metadata
 - Preview/Download Files
 - **Navigate to My Data**
 - Upload files
 - Copy files
 - Share files with others
 - **Navigate to Projects**
 - Demonstrate creating a Project
 - Adding collaborators
 - Copying files in/out of a Project
- **Workspace**
 - View the available applications
 - Launch an application
 - Launch MATLAB
 - Launch Jupyter

DesignSafe: Thanks

Ellen Rathje, Tim Cockerill, Jamie Padgett, Scott
Brandenberg, Dan Stanzione, Steve Mock, Josue Coronel,
Craig Jansen, Joe Stubbs, Matt Stelmaszek, Hedda
Prochaska, Joonyee Chuah

DesignSafe: Future Webinars

- Introduction to Python and Matplotlib
- Advanced Python
- Introduction to Data Analysis and Plotting with R
- Advanced R

For additional questions, feel free to contact us

- Email:
training@designsafe-ci.org
- or fill out a ticket:
<https://www.designsafe-ci.org/help/tickets>

DesignSafe: Questions?