IN-CORE Release

- Latest release: 2.2.1 (Released on May 25, 2021)
- Source code at GitHub
  - https://github.com/IN-CORE
  - Mozilla Public License v2.0 (MPL-2.0)
- Conda packages
  - https://anaconda.org/IN-CORE
- IN-CORE landing page
  - https://incore.ncsa.illinois.edu/
Architecture

Cloud Computing System
(Dockers + Kubernetes)

pyIncore
IN-CORE Web Services
IN-CORE Web Tools
IN-CORE Lab
Containers on Kubernetes

- Container (Docker): A container image is a lightweight, stand-alone, executable package of a piece of software that includes everything needed to run it
- Kubernetes is a container management system
- The technology brings us
  - Automatic scaling corresponding to demands
  - Portability – deployable to different cloud
  - Streamline deployment from development and testing
pyIncore & pyIncore-viz

• Python library (modules) for IN-CORE
• Three components
  • Interact with IN-CORE web services
  • Base classes for analysis and datasets
  • Analyses
• pyIncore-viz
  • Visualization methods and utilities
• How to install
  • conda install –c in-core pyincore
  • conda install –c in-core pyincore-viz
• Documentation is available
  • Jupyter notebooks with example analysis
  • Technical reference documents
Currently Available Analyses

- Bridge damage
- Building damage
- Building functionality
- Building structural loss
- Cumulative building damage
- Electric power facility damage
- Nonstructural building damage
- Tornado Electric Power Network (EPN) damage
- Pipeline damage
- Pipeline damage with repair rate
- Water facility damage
- Capital shocks
- Mean damage
- Monte Carlo failure probability
- Building Portfolio recovery
- Transportation recovery
- Housing unit allocation
- Population dislocation
- Joplin Computable General Equilibrium (CGE)
- Seaside CGE
- Road damage

Three testbeds (Joplin, Seaside, Galveston) are available as Jupyter Notebook
More analyses will be added in near future
pyIncore Resources

• pyIncore
  • GitHub: https://github.com/IN-CORE/pyincore
  • Anaconda: https://anaconda.org/IN-CORE/pyincore
  • General documentation: https://incore.ncsa.illinois.edu/doc/incore/pyincore.html
  • Technical reference documentation: https://incore.ncsa.illinois.edu/doc/pyincore/

• pyIncore-viz
  • More capability will come in future release
  • GitHub: https://github.com/IN-CORE/pyincore-viz
  • Anaconda: https://anaconda.org/IN-CORE/pyincore-viz
IN-CORE Web Services

- RESTful Web Service Technology
- Database: MongoDB
- Authentication service
- Data service
  - Storing/managing datasets
- Hazard service
  - Storing hazard definitions
  - Getting hazard value by location
  - Earthquake
  - Tsunami
  - Tornado
  - Hurricane wind field
- DFR3 service
  - Storing/managing fragility curve sets, damage functions, repair, recovery, restoration
  - Matching inventory to fragility curve set
- Geospatial Viz service
  - Generating geospatial map/layer images
- Semantic service
  - Storing/managing definition of datasets
  - Coming to next release
- Space service
  - Creating content spaces
  - Access control
IN-CORE Web Services

• How to use IN-CORE Web Services
  • Need to have a user account managed by NCSA identity management system
    • For authentication
    • For authorization (access control)
  • Various ways
    • RESTful web service clients
    • Web browser
    • pyIncore
    • IN-CORE Web Tools (browsing only)
  • Technical reference documentation is available
IN-CORE Web Services Resources

• GitHub:
  • https://github.com/IN-CORE/incore-services

• Technical reference documentation:
  • https://incore.ncsa.illinois.edu/doc/api/
IN-CORE Web Tools

• Lightweight web applications for IN-CORE Web Services
• Allows users to browse, search, and preview data from the service
• Data browser
  • Client to data service
• Fragility browser
  • Client to DFR3 service
  • Currently it shows fragilities
• Hazard browser
  • Client to hazard service
• Login with your account credential to access tools at
  • https://incore.ncsa.Illinois.edu
IN-CORE Web Tools Resources

• Access at
  • https://incore.ncsa.illinois.edu

• GitHub:
  • https://github.com/IN-CORE/incore-ui

• General documentation:
  • https://incore.ncsa.illinois.edu/doc/incore/webtools.html
IN-CORE Lab

• Customized JupyterLab
• Integrated environments for developing algorithms
  • Menu items to access documentations, IN-CORE Web Tools
  • Authentication (single-sign-on)
• Two ways to use IN-CORE Lab
  • Locally (a docker image will be available)
  • Online (JupyterHub at NCSA)
• Online version:
  • pyIncore is installed with all dependent libraries
  • Includes popular python libraries such as Pandas, GeoPandas, Matplotlib, etc.
  • Account and allocation policy are under development for public access
Support

• Email: incore-dev@lists.Illinois.edu
• Documentation: tutorials, tips, and FAQ
• Slack channel will be available soon
<table>
<thead>
<tr>
<th>Mountain Time</th>
<th>AGENDA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Join Zoom Meeting:</strong></td>
</tr>
<tr>
<td></td>
<td><a href="https://zoom.us/j/95020363783?pwd=aUFFYU5FNmxVUGdwM3F0clVuTGlyUT09">https://zoom.us/j/95020363783?pwd=aUFFYU5FNmxVUGdwM3F0clVuTGlyUT09</a></td>
</tr>
<tr>
<td></td>
<td>Meeting ID: 950 2036 3783</td>
</tr>
<tr>
<td></td>
<td>Passcode: 451704</td>
</tr>
<tr>
<td>11:00 – 11:35AM</td>
<td><strong>Session 1: Overview of IN-CORE &amp; User Workshop Objectives</strong></td>
</tr>
<tr>
<td></td>
<td>• Welcome - John van de Lindt (5 min)</td>
</tr>
<tr>
<td></td>
<td>• Scientific overview of IN-CORE - John van de Lindt (10 min)</td>
</tr>
<tr>
<td></td>
<td>• Platform overview - Jong Lee (15 min)</td>
</tr>
<tr>
<td></td>
<td>• Workshop Objectives - Jong Lee (5 min)</td>
</tr>
<tr>
<td>11:35 – 11:50AM</td>
<td><strong>BREAK and PREP</strong></td>
</tr>
<tr>
<td></td>
<td>• Prepare their training environments (logging in and uploading files to incore-lab etc.)</td>
</tr>
<tr>
<td>11:50 AM – 12:50 PM</td>
<td><strong>Session 2: Hazard (Earthquake, Tornado)</strong></td>
</tr>
<tr>
<td></td>
<td>• Basics of IN-CORE modules (5 min)</td>
</tr>
<tr>
<td></td>
<td>• Tornado (15 min)</td>
</tr>
<tr>
<td></td>
<td>• Earthquake (15 min)</td>
</tr>
<tr>
<td></td>
<td>• Hands-on exe - assignments (20 min)</td>
</tr>
<tr>
<td></td>
<td>• Review answers (5 min)</td>
</tr>
<tr>
<td>12:50 – 12:55PM</td>
<td><strong>BREAK</strong></td>
</tr>
<tr>
<td>Time</td>
<td>Session 3: Damage Analysis (Buildings and EPF)</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>12:55 – 1:55PM</td>
<td>- Fragility curve and Mapping (just presentation) - concept (5 min)</td>
</tr>
<tr>
<td></td>
<td>- Inventory data (10 min)</td>
</tr>
<tr>
<td></td>
<td>- Building damage analysis (10 min)</td>
</tr>
<tr>
<td></td>
<td>- EPF damage analysis (5 min)</td>
</tr>
<tr>
<td></td>
<td>- Hands-on exercise (25 min)</td>
</tr>
<tr>
<td></td>
<td>- Review answers (5 min)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 4: Visualization of Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:05 – 2:45PM</td>
<td>- Joining datasets (5 min)</td>
</tr>
<tr>
<td></td>
<td>- Pyincore-viz (10 min)</td>
</tr>
<tr>
<td></td>
<td>- Pandas (5 min)</td>
</tr>
<tr>
<td></td>
<td>- Hands-on exe (15 min)</td>
</tr>
<tr>
<td></td>
<td>- Review answers (5 min)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Session 5: Use Case - How to do research with IN-CORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:45 – 3:25PM</td>
<td>- Yousef Darestani - (15-minute presentation, 5 min Q&amp;A)</td>
</tr>
<tr>
<td></td>
<td>- Dylan Sanderson - (15-minute presentation, 5 min Q&amp;A)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>CLOSING and NEXT USER WORKSHOP</th>
</tr>
</thead>
</table>
Preparing Session Materials

• At [https://incore.ncsa.Illinois.edu](https://incore.ncsa.Illinois.edu), Login

• After login, click on “IN-CORE lab”

• Click on “Terminal”

  - Type the following command to download the file
    ```
    ```

  - Type the following command to unzip the file
    ```
    unzip workshop.zip
    ```