



Adding Cloud Based Interactive Compute Capabilities to Globus Endpoints

Ben Galewsky

Research Programmer, National Center for Supercomputing Applications

bengal1@illinois.edu

<http://www.nationaldataservice.org/>

Globus World

April 25th, 2018



Overview

- What is the National Data Service?
- NDS Labs Workbench
- Integration with Globus Auth
- Running personal connect inside container infrastructure
- Launching applications local to files found in Globus Endpoint

Towards a National Data Service

Vision: *National initiative toward enabling scientists to broadly publish, find, and reuse digital data collections.*

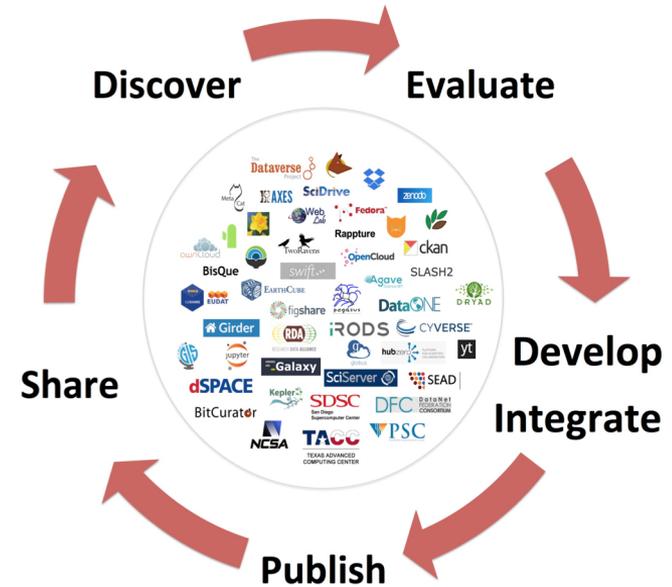


- NDS core organization:
 - Director and dedicated staff at SDSC/NCSA
 - Steering and technical advisory committees
 - Provides support for NDS pilots (storage, compute, human resources)
- Memorandums of understanding with:
 - Research Data Alliance (RDA-US)
 - Earth Science Information Partners (ESIP)
 - Midwest Big Data Hub (MBDH)
 - NSF Earthcube
- 1st US GO FAIR implementation network

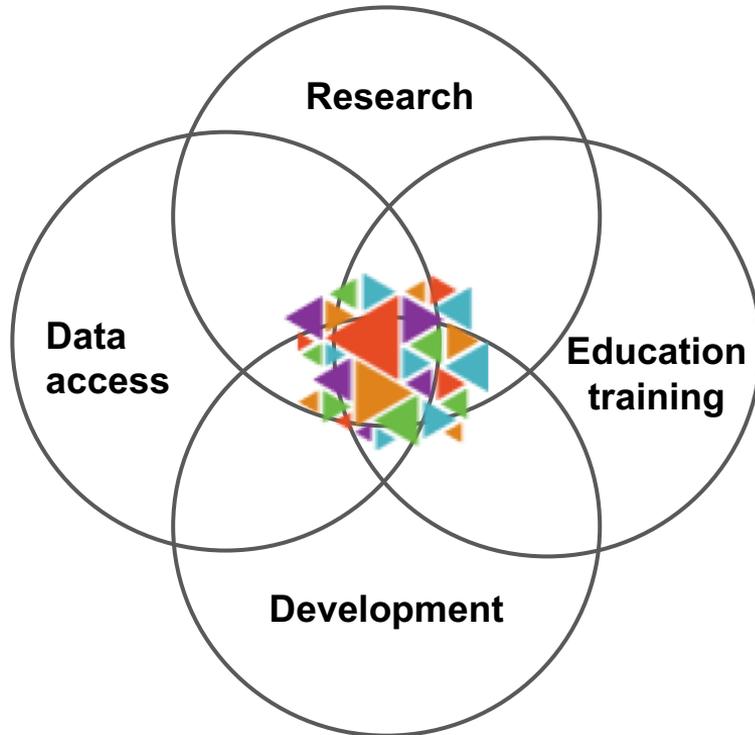
NDS Labs Workbench

<https://www.workbench.nationaldataservice.org>

- NDS initiative started in January 2016
- Community-driven platform
- Designed to share, discover, evaluate, develop, and test research data management and analysis tools
- Open platform -- community members recommend and/or contribute tools
- Evolving into a platform for data access, education and training.



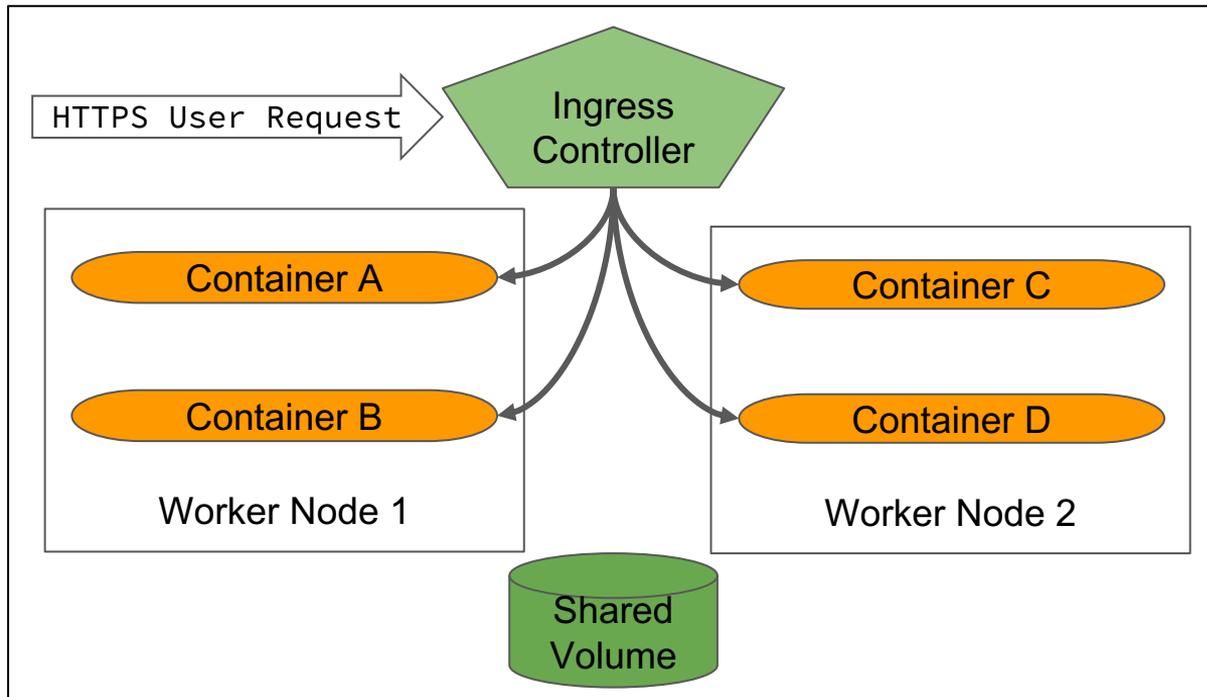
Labs Workbench Platform: A Collaborative Environment



- **Scalable platform** that enables **remote access** to data and containerize software
- Used by researchers and developers to **collaborate** in data-intensive projects.
- The same platform can be used for **workshops/training** around the same data/software used for research

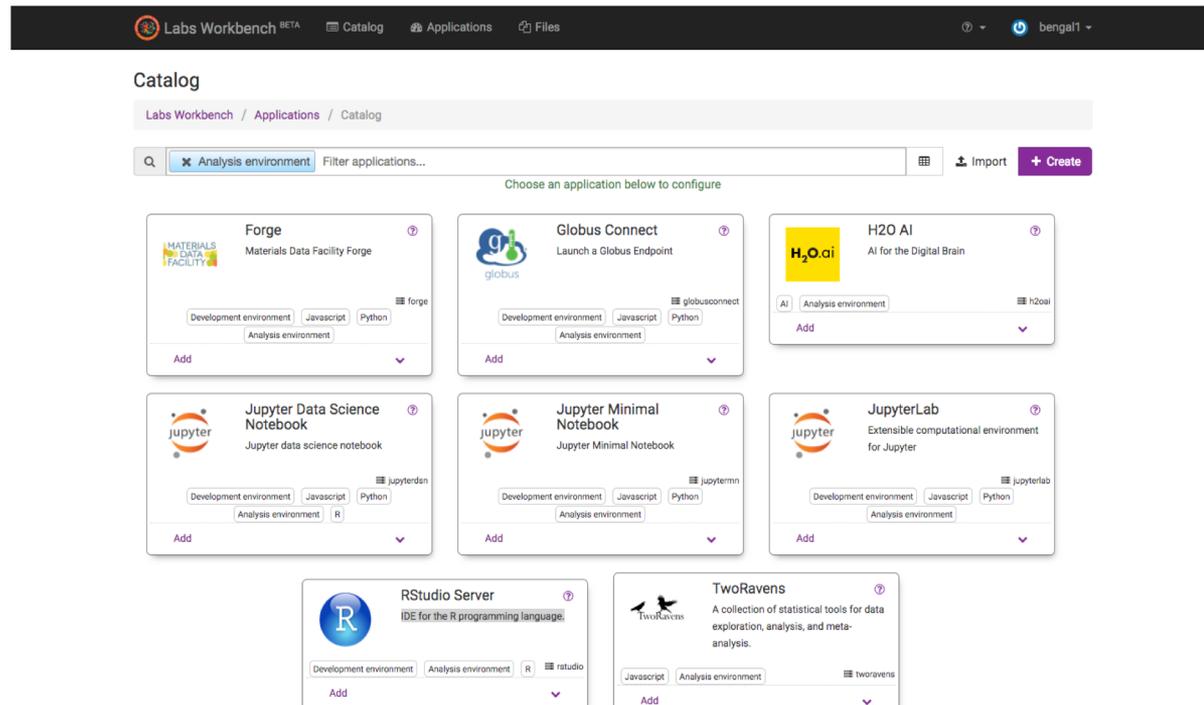
Background: Container Orchestration with Kubernetes

- High availability cluster
- Scheduling of containers on worker nodes
- Shared storage
- URL-Based routing with ingress controller



NDS Labs Workbench

- Single Sign-on
- Catalog of applications
- Supports most browser-based applications
- Quick-start URLs to launch application
- Shared, mounted volumes

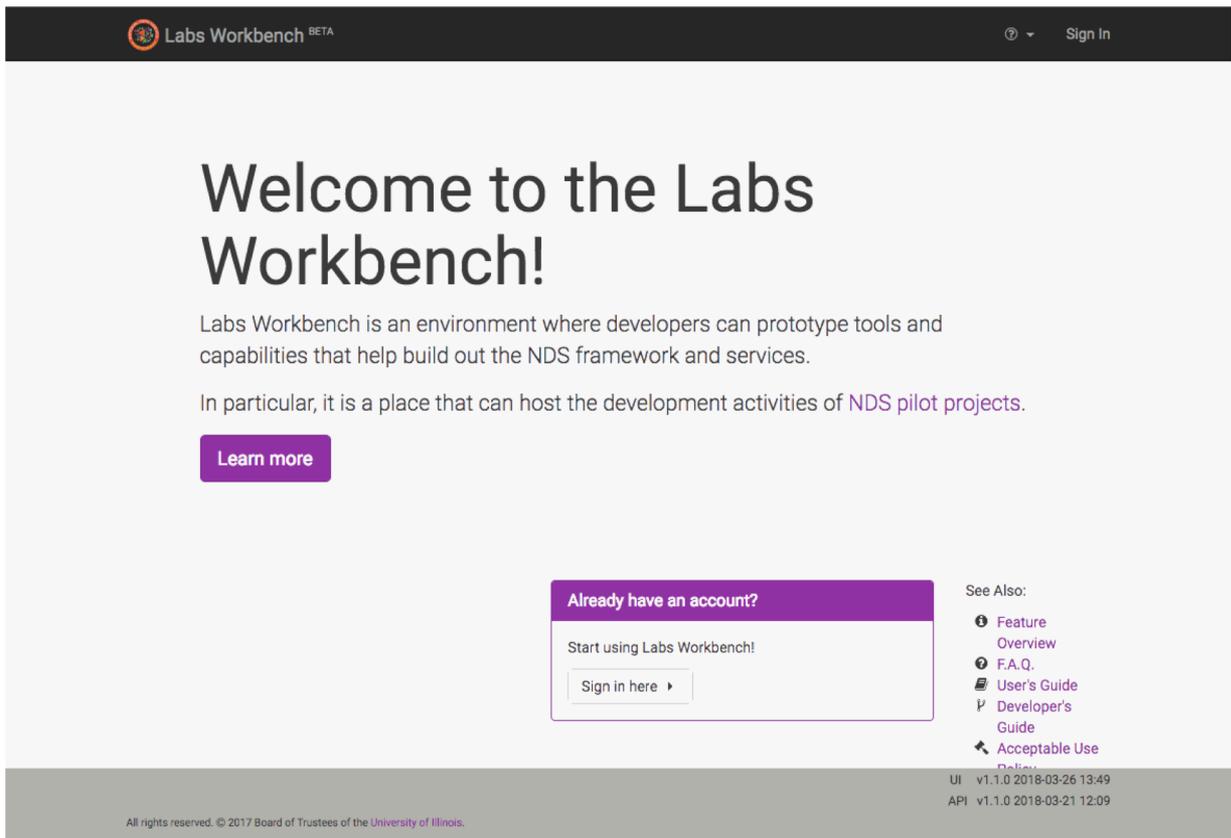


The screenshot shows the 'Catalog' page of the NDS Labs Workbench. At the top, there is a navigation bar with the 'Labs Workbench BETA' logo, a 'Catalog' menu, and user information for 'bengal1'. Below the navigation bar, the page title is 'Catalog' and the breadcrumb is 'Labs Workbench / Applications / Catalog'. A search bar contains the text 'Analysis environment' and a 'Filter applications...' dropdown. To the right of the search bar are 'Import' and '+ Create' buttons. The main content area is titled 'Choose an application below to configure' and displays a grid of application cards. Each card includes the application's logo, name, description, supported languages (Development environment, Analysis environment, Javascript, Python, R), and an 'Add' button. The visible applications are: Forge (Materials Data Facility Forge), Globus Connect (Launch a Globus Endpoint), H2O AI (AI for the Digital Brain), Jupyter Data Science Notebook (Jupyter data science notebook), Jupyter Minimal Notebook (Jupyter Minimal Notebook), JupyterLab (Extensible computational environment for Jupyter), RStudio Server (IDE for the R programming language), and TwoRavens (A collection of statistical tools for data exploration, analysis, and meta-analysis).

Workbench Integration With Globus

- Sign-in With Globus Auth
- Globus Tokens stored in user's home directory
- Run personal connect inside container infrastructure
- Launch applications local to files found in Globus Endpoint

Single Sign-on with Globus Auth



The screenshot shows the Labs Workbench BETA landing page. At the top, there is a dark navigation bar with the Labs Workbench logo and a 'Sign In' link. The main content area features a large heading 'Welcome to the Labs Workbench!' followed by a paragraph describing the platform as an environment for developing tools and services. A purple 'Learn more' button is positioned below the text. On the right side, there is a 'See Also:' section with a list of links: 'Feature Overview', 'F.A.Q.', 'User's Guide', 'Developer's Guide', and 'Acceptable Use Policy'. At the bottom of the page, there is a footer with copyright information and version details for the UI and API.

Labs Workbench BETA

Sign In

Welcome to the Labs Workbench!

Labs Workbench is an environment where developers can prototype tools and capabilities that help build out the NDS framework and services.

In particular, it is a place that can host the development activities of [NDS pilot projects](#).

[Learn more](#)

Already have an account?

Start using Labs Workbench!

[Sign in here](#) ▶

See Also:

- Feature Overview
- F.A.Q.
- User's Guide
- Developer's Guide
- Acceptable Use Policy

UI v1.1.0 2018-03-26 13:49
API v1.1.0 2018-03-21 12:09

All rights reserved. © 2017 Board of Trustees of the [University of Illinois](#).

OAuth Credentials Available to Apps

- When user logs in, a JSON file is persisted to a private directory in the user's home directory:

```
% cat ~/.globus/oauth2.json
{
  "urn:globus:auth:scope:data.materialsdatafacility.org:all": "...",
  "urn:globus:auth:scope:search.api.globus.org:search": "...",
  "urn:globus:auth:scope:transfer.api.globus.org:all": "..."
}
```

- Multiple scopes are retrieved and configurable
- File is refreshed when tokens expire

Run Globus Personal Connect With Ease

Catalog

Labs Workbench / Applications / Catalog

Q Filter applications...



Import

Create

Choose an application below to configure



Globus Connect

Launch a Globus Endpoint

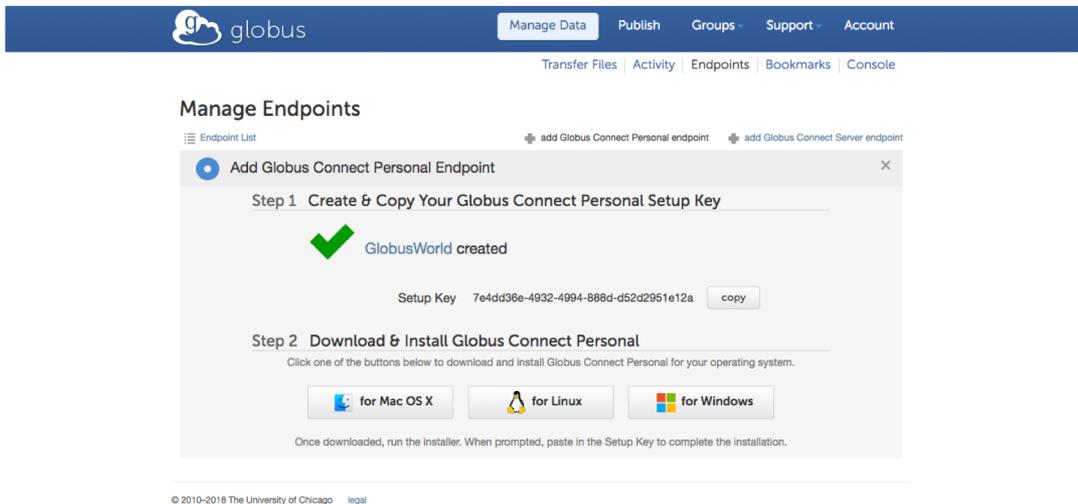
Development environment Javascript Python

Analysis environment

View **1** Add

Add Globus Personal Connect to your list of applications

Run Globus Personal Connect With Ease



globus Manage Data Publish Groups Support Account

Transfer Files Activity Endpoints Bookmarks Console

Manage Endpoints

Endpoint List add Globus Connect Personal endpoint add Globus Connect Server endpoint

Add Globus Connect Personal Endpoint

Step 1 Create & Copy Your Globus Connect Personal Setup Key

 GlobusWorld created

Setup Key 7e4dd36e-4932-4994-888d-d52d2951e12a

Step 2 Download & Install Globus Connect Personal

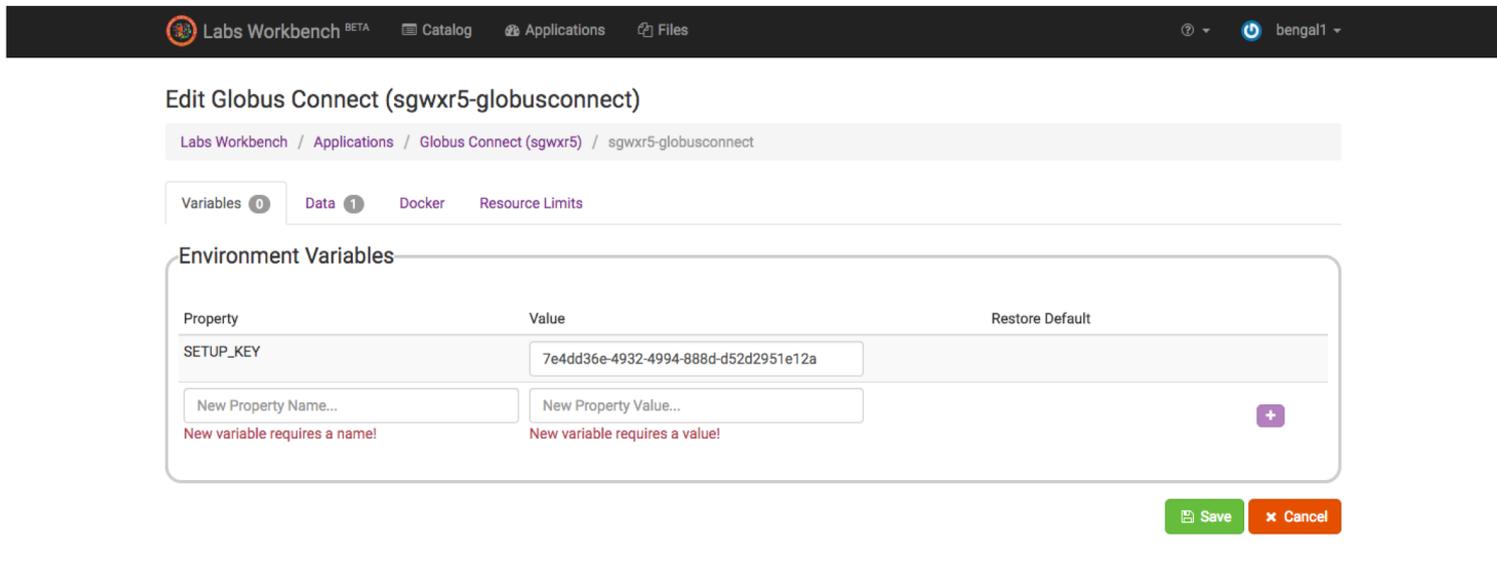
Click one of the buttons below to download and install Globus Connect Personal for your operating system.

Once downloaded, run the installer. When prompted, paste in the Setup Key to complete the installation.

© 2010-2018 The University of Chicago [legal](#)

Obtain setup key from Globus Website

Run Globus Personal Connect With Ease



Labs Workbench ^{BETA} Catalog Applications Files bengal1

Edit Globus Connect (sgwxr5-globusconnect)

Labs Workbench / Applications / Globus Connect (sgwxr5) / sgwxr5-globusconnect

Variables 0 Data 1 Docker Resource Limits

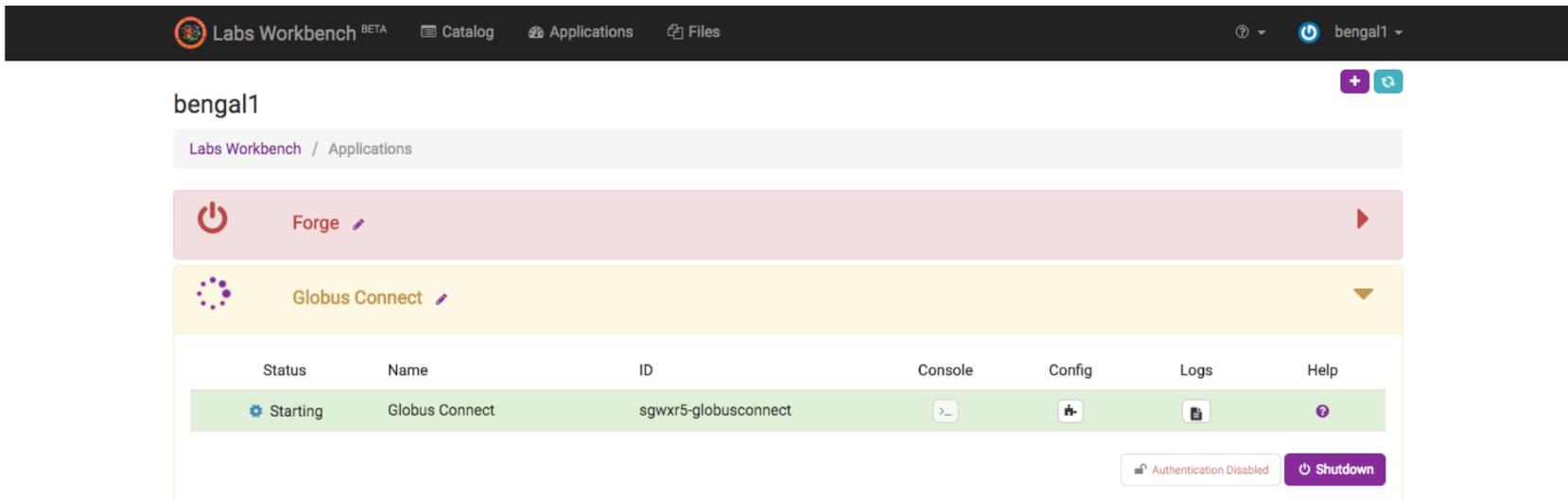
Environment Variables

Property	Value	Restore Default
SETUP_KEY	7e4dd36e-4932-4994-888d-d52d2951e12a	
<input type="text" value="New Property Name..."/>	<input type="text" value="New Property Value..."/>	<input type="button" value="+"/>

New variable requires a name! New variable requires a value!

Paste key as property for new application

Run Globus Personal Connect With Ease

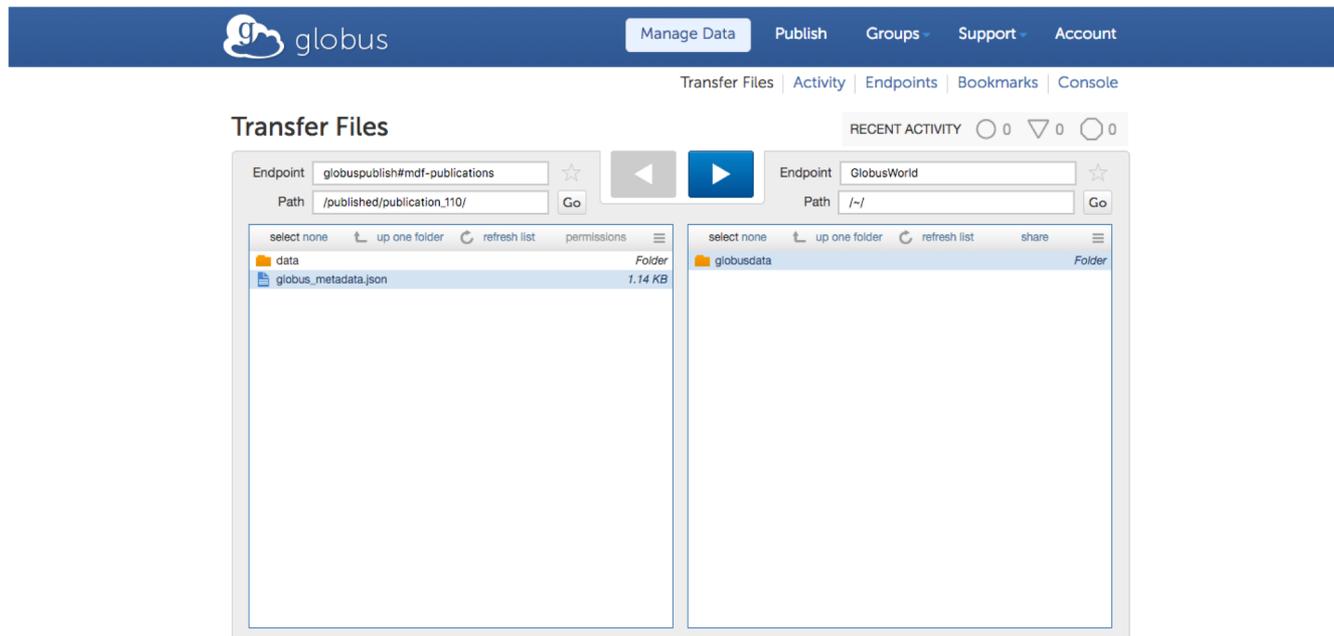


The screenshot shows the NDS Labs Workbench interface for a user named 'bengal1'. The top navigation bar includes 'Labs Workbench BETA', 'Catalog', 'Applications', and 'Files'. The main content area shows the 'bengal1' environment with two application cards: 'Forge' (red) and 'Globus Connect' (yellow). Below the 'Globus Connect' card is a table with columns for Status, Name, ID, Console, Config, Logs, and Help. The table contains one row for 'Globus Connect' with a status of 'Starting' and ID 'sgwxr5-globusconnect'. At the bottom right, there are buttons for 'Authentication Disabled' and 'Shutdown'.

Status	Name	ID	Console	Config	Logs	Help
Starting	Globus Connect	sgwxr5-globusconnect	>_	+	📄	?

Launch configured application

Run Globus Personal Connect With Ease



The screenshot displays the Globus interface. At the top, there is a navigation bar with the Globus logo and links for 'Manage Data', 'Publish', 'Groups', 'Support', and 'Account'. Below this, there are tabs for 'Transfer Files', 'Activity', 'Endpoints', 'Bookmarks', and 'Console'. The main area is titled 'Transfer Files' and features a 'RECENT ACTIVITY' section with three circular indicators. Two file transfer windows are shown side-by-side. The left window has an endpoint of 'globuspublish#mdf-publications' and a path of '/published/publication_110/'. It shows a file named 'globus_metadata.json' with a size of 1.14 KB. The right window has an endpoint of 'GlobusWorld' and a path of '/-/'. It shows a folder named 'globusdata'.

Initiate transfers

Hosting Applications Near to Globus Endpoint

Provide QuickStart URL in Globus Publish Record

Access to applications like:

- R Studio
- Jupyter
- Geoserver
- H₂O
- Zeppelin

How Can You Help?

- Investigators to share use cases
- Open Source Developers to Enhance codebase
- Data owners to deploy workbench instance near their data and provide analytic apps
- Use NDS Labs Workbench in your next tutorial or hackathon session

Thank You

For further information, please contact:

bengal1@Illinois.edu