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# CyVerse Documentation

**CyVerse**

**Sep 18, 2020**



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# CHAPTER 1

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## Goals

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- Introduce NEON scientists and staff to [CyVerse](#) and its resources.
- Demonstrate via hands-on exercises the CyVerse [Data Store](#), Data Science Workbench ([Discovery Environment](#)), Cloud ([Atmosphere](#)), [BisQue](#) image analysis, [Data Commons](#), and [Powered By](#) features.
- Open discussion about how NEON staff or academic scientists working with NEON data could begin to utilize CyVerse at scale.

Suggested topics:

- Identify NEON’s computational and data storage/sharing bottlenecks that CyVerse can ameliorate.
  - Identify missing components from the current CyVerse infrastructure that NEON requires.
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## 1.1 Morning Workflow

### Description:

First things first - getting enrolled with CyVerse and setting up laptops.

There will be several short remote presentations about the different facets of CyVerse. Each section will include a question and answer session, and hands on material to get you used to working with the tools and services which are available.

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### 1.1.1 Remote Presentations and Presentors

**08:30 - 08:45** Overview of the day, schedule, logistics - Tyson Swetnam

**08:45 - 09:30** “A History of CyVerse (née The iPlantCollaborative)” - Nirav Merchant, CyVerse Co-PI, Director Data7 Institute University of Arizona.

**09:30 - 10:00** “CyVerse Data Store” - Tony Edgin, Senior Software Engineer Core Software, CyVerse.

**10:00 - 10:15** Break

**10:15 - 11:15** “CyVerse Discovery Environment” - Sriram Srinivasan, Lead Software Engineer Core Software CyVerse; “Apps in Discovery Environment” Upendra Devisetty Ph.D., Science Team Informatician, CyVerse.

**11:15 - 12:00** “The Agave API” - John Fonner Ph.D., Research Associate, Texas Advanced Computing Center


### Platforms

Topic	Description	Outcome
Data Store	Data Creation, Transfer, Sharing	CyberDuck, iCommands, and WebDav
Discovery Environment	Data, Apps, Workflows	Sharing/viewing, non-interactive app creation, workflows and pipeline creation, VICE.
Agave	Clients, Workflow Creation	ToGo, Clients, REST API

### Expected Outcomes

- Learn the history of the iPlantCollaborative, which led to CyVerse, as overview of the last 10 years of the project. Learn about the present impacts of the project, and future directions we are headed.
- Learn how to move data in and out of the CyVerse Data Store, host data publically, and introduce the iRODS iCommands interface.
- Learn how to utilize the data science workbench (Discovery Environment): how to create non-interactive apps using Docker, for running individual jobs as well as pipeline workflow execution. Learn about the Visual Interactive Computing Environment (VICE) for launching common scientific IDE (RStudio, Shiny, Jupyter Lab, Ubuntu Desktops).
- Introduction to Agave and how it utilizes High Throughput Computing and High Performance Computing for a ‘bring your own compute’ platform.

### Fix or improve this documentation

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- Send feedback: [Tutorials@CyVerse.org](mailto:Tutorials@CyVerse.org)

Post your question to the user forum:





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## 1.2 Afternoon Workflow

### Description:

The afternoon session will continue to introduce CyVerse cyberinfrastructure platforms, including Atmosphere and BisQue; as well as the Data Commons - a platform for hosting published scientific data.

We will demonstrate some example use-cases involving CyVerse and other NSF funded resources.

The day will conclude with a discussion of how to collaborate with CyVerse through our Extended Collaborative Support service, Powered By features, and examples of Federation.

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### 1.2.1 Remote Presentations and Presentors

**13:00 - 14:00** “[Atmosphere](#)” - Edwin Skidmore, Director, Infrastructure University of Arizona.

**14:00 - 15:00** “[BisQue & Data Commons](#)” - Ramona Walls Ph.D., Research Associate Professor, University of Arizona

**15:00 - 15:15** Break

**15:15 - 15:45** “Example Use Cases” - [Open Science Grid](#) , Mats Rynge, USC Information Sciences Institute.

**15:45 - 16:15** Jason Williams Assistant Director, Cold Spring Harbor.

**16:15 - 17:00** “Extended Collaborative Support, Powered by, & Federation” - Tyson Lee Swetnam, Nirav Merchant

### Platforms

Topic	Description	Outcome
Atmosphere	Virtual Machines, Image Creation, Software Installation	Atmo Web client, Atmo CLI, Open-Stack
BisQue	Imagery, Analysis	Sharing/viewing images, Archival
Data Commons	Data, Publication	DOI, metadata

### Expected Outcomes

- Understanding of how to launch Virtual Machines using Atmosphere Browser UI, CLI, and examples of cloud-native-technologies using CyVerse cloud resources.
- Basic operations in BisQue for image analysis and viewing.
- Understanding of how to use the Data Commons for published scientific research
- Learn about other large data intensive science applications with lessons learned.
- Understanding of how to start more comprehensive collaborative effort with CyVerse.

### Description of output and results

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## CHAPTER 2

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### Prerequisites

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## 2.1 Downloads, access, and services

*In order to complete this tutorial you will need access to the following services/software*

Prerequisite	Preparation/Notes	Link/Download
CyVerse account	You will need a CyVerse account to complete this exercise	<a href="#">Register</a>
Atmosphere access	You must have access to Atmosphere	<a href="#">Request Access</a>
CyVerse Data Store allocation increase (Optional)	You must be registered for CyVerse	<a href="#">Request Increase (form #2)</a>
Jetstream access (Optional)	You must have registered with XSEDE	<a href="#">Request Access</a>
Cyberduck (Optional)	Standalone program for uploading/downloading data to Data Store	<a href="#">Download</a>
Windows 10 Linux Subsystem (Optional)	Install Ubuntu Bash on a Windows OS	<a href="#">Installation Instructions</a>
iCommands Installation (Optional)	Install iCommands for Linux, Windows, or Mac OSX	<a href="#">Installation Instructions</a>

## 2.2 Platform(s)

*We will use the following CyVerse platform(s):*

Platform	Interface	Link	Platform Documentation	Quick Start
Data Store	GUI/Command line			
Discovery Environment	Web/Point-and-click			
Atmosphere	Command line (ssh) and/or Desktop (VNC)			
BisQue	Web/Point-and-click and/or Command-line (API)			(See Manual)
DNA Subway	Web/Point-and-click		(See Guide)	
SciApps	Command-line (API)		(See Guide)	
Agave API	Command-line (API)			

## 2.3 Application(s) used

### Discovery Environment App(s):

App name	Version	Description	App link	Notes/other links
Muscle	3.8.31	Multiple sequence aligner		
Jupyter-Lab	0.0.3	Base Jupyter Lab Image		
RStudio Geospatial	3.5.0	Based on Rocker Geospatial RStudio Image		
Shiny Apps	1.5.9	R Shiny with Geospatial dependencies (GDAL, GEOS, etc)		

### Atmosphere Image(s):

Image name	Version	Description	Link	Notes/other links
CyVerse CentOS 6.8 GUI Base	1.0	base image CentOS 6.8 with GNOME GUI		
Ubuntu 18.04 GUI XFCE Base	1.0	base Ubuntu 18.04 with GNOME GUI		


## 2.4 Input and example data

*In order to complete this tutorial you will need to have the following inputs prepared*

Input File(s)	Format	Preparation/Notes	Example Data

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