INTERNET2

NSF

MS-CC

Aligning with Funders and Networks: Resources to Expand Research Capacity

Moderator: Jennifer Kim, MS-CC

Panelists:

Natalie Palmer, Vice President, Southern Crossroads (SoX); Senior Director, SoX IT Engagement, Georgia Tech

Sanju Timsina, HPC Facilitator, ARCTIC (Georgia State)

Kenneth Bota, Senior Director of Grants, Research and Development, PROPEL

Aligning with Funders and Networks:
Resources to Expand Research Capacity

Natalie Palmer
Vice President, Southern Crossroads (SoX)
natalie@sox.net

MS-CC Planetary Resilience Workshop:
Tools, Training, and Collaboration
Wednesday, June 11, 2025

SoX Southern Crossroads

Georgia Tech

Introductions

Natalie Palmer

Vice President, Southern Crossroads

Senior Director SoX IT Engagement, GA Tech

Joy West

Assistant Treasurer, Southern Crossroads

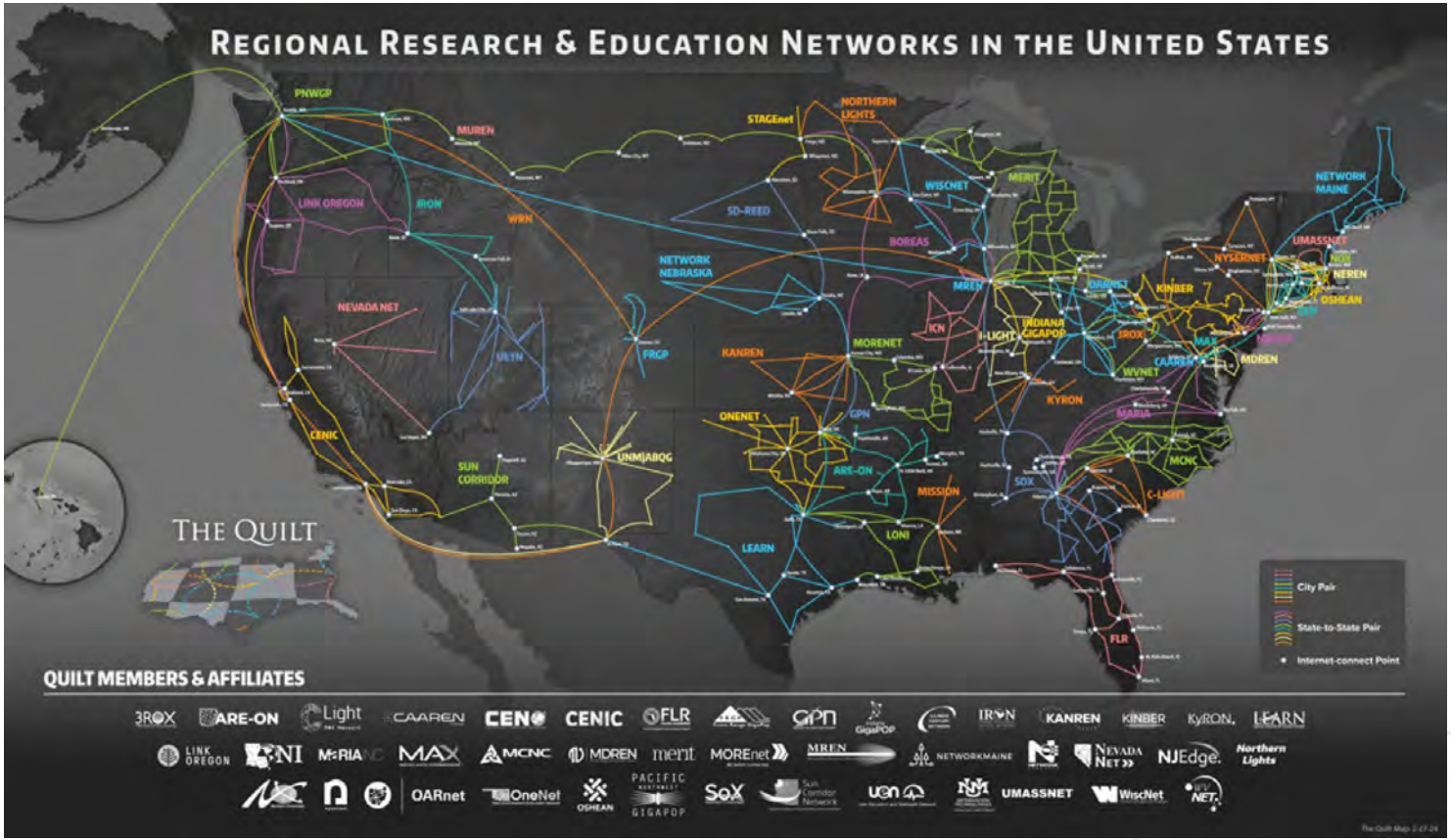
Director Research Ed., Outreach & Strategic Support, GA Tech

SoX Southern Crossroads

Georgia Tech

What is a REN?

Research and Educational (regional and/or state) Network that is a principal aggregator of network traffic for the U.S. research and education community

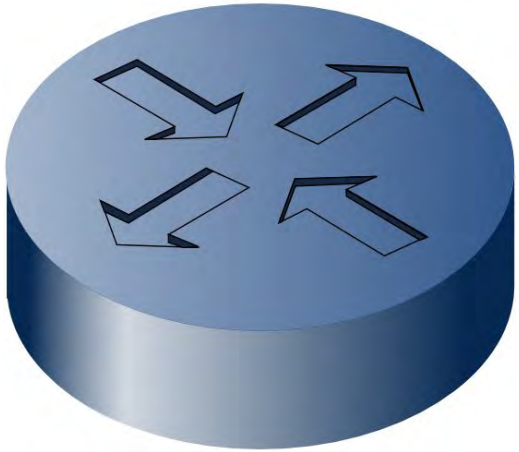


SoX

Southern Crossroads

Georgia Tech

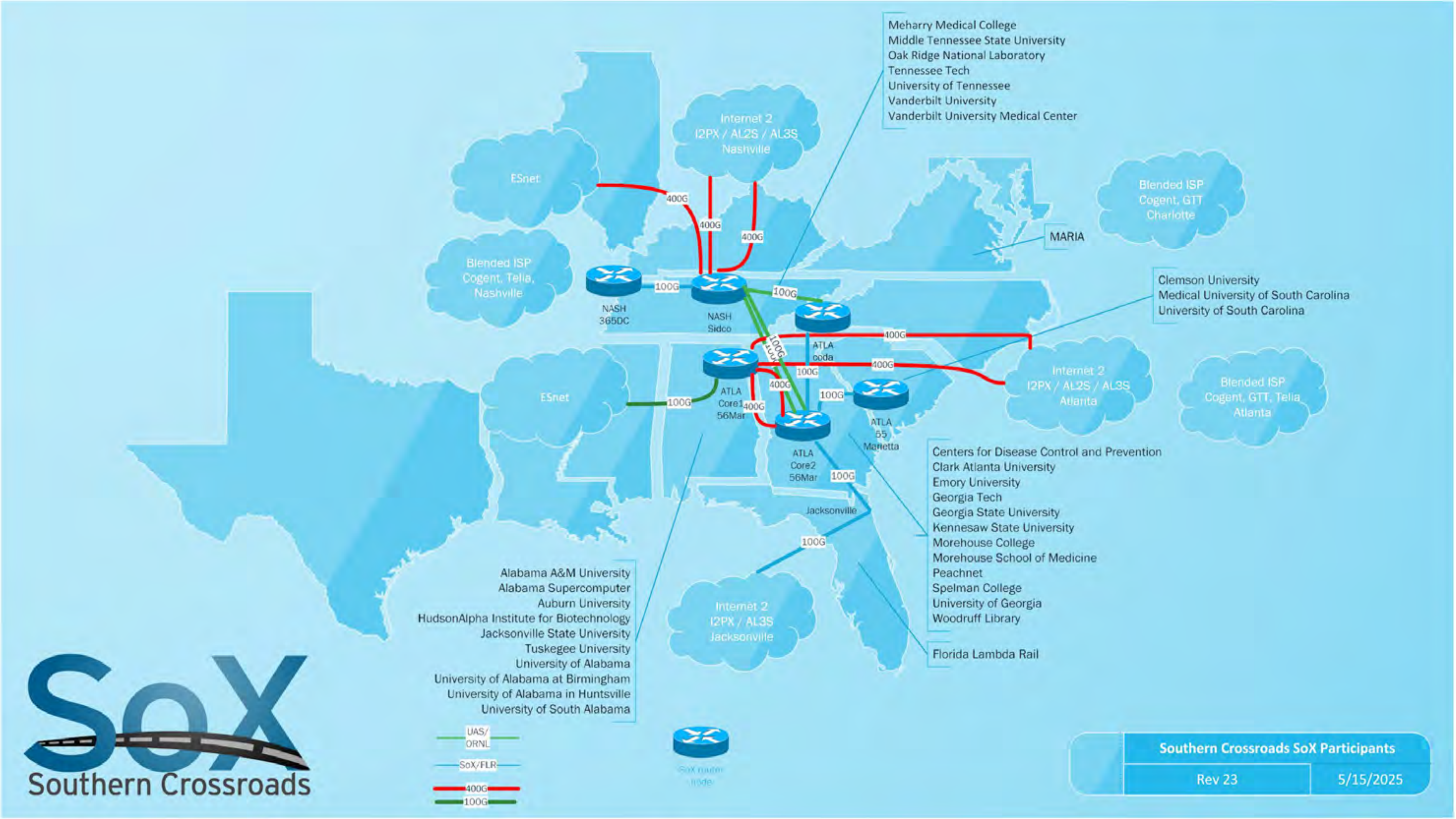
SoX
Southern Crossroads



ESnet
ENERGY SCIENCES NETWORK

INTERNET2®

THE QUILT


Meharry Medical College
Middle Tennessee State University
Oak Ridge National Laboratory
Tennessee Tech
University of Tennessee
Vanderbilt University
Vanderbilt University Medical Center
Internet 2
I2PX / AL2S / AL3S
Nashville
ESnet
400G
400G
400G
400G
Blended ISP
Cogent, GTT
Charlotte
MARIA
Blended ISP
Cogent, Telia,
Nashville
100G
NASH
365DC
NASH
Sidco
100G
ATLA
coda
400G
Clemson University
Medical University of South Carolina
University of South Carolina
ESnet
100G
ATLA
Core1
56Mar
400G
400G
400G
100G
100G
100G
Internet 2
I2PX / AL2S / AL3S
Atlanta
Blended ISP
Cogent, GTT, Telia
Atlanta
ATLA
55
Marietta
ATLA
Core2
56Mar
100G
Jacksonville
100G
Centers for Disease Control and Prevention
Clark Atlanta University
Emory University
Georgia Tech
Georgia State University
Kennesaw State University
Morehouse College
Morehouse School of Medicine
Peachnet
Spelman College
University of Georgia
Woodruff Library
Alabama A&M University
Alabama Supercomputer
Auburn University
HudsonAlpha Institute for Biotechnology
Jacksonville State University
Tuskegee University
University of Alabama
University of Alabama at Birmingham
University of Alabama in Huntsville
University of South Alabama
Internet 2
I2PX / AL3S
Jacksonville
Florida Lambda Rail
SoX
Southern Crossroads
UAS/ORNL
SoX/FLR
400G
100G
Southern Crossroads SoX Participants
Rev 23
5/15/2025

Georgia Tech

NSF

SoX Southern Crossroads

Campus Cyberinfrastructure Regional Awards

NSF Award #2018811

CC* Regional: Promoting Research at Small Colleges in Alabama through Network Architecture Enhancements

Alabama A&M University

University of South Alabama

NSF Award #2201548

CC* Regional: Promoting Research and Education at Small Colleges in the Atlanta University Center and at Tuskegee University through Network Architecture Enhancements

Atlanta University Center Robert W. Woodruff Library

Clark Atlanta University

Morehouse College

Morehouse School of Medicine

Spelman College

Tuskegee University

NSF Award #2346630

CC* Regional Networking: Advancing Research and Education at small colleges in Rural and Metropolitan Alabama and Tennessee through IT Architecture Enhancements

Alabama State University 1867

Jacksonville State University 1883

Fisk University 1866

Meharry Medical College Worship of God Through Service to Mankind 1876 Nashville Tennessee

Tennessee State University Nashville

Advanced Research Computing Technology and Innovation Core

ARCTIC

Georgia State University

About ARCTIC

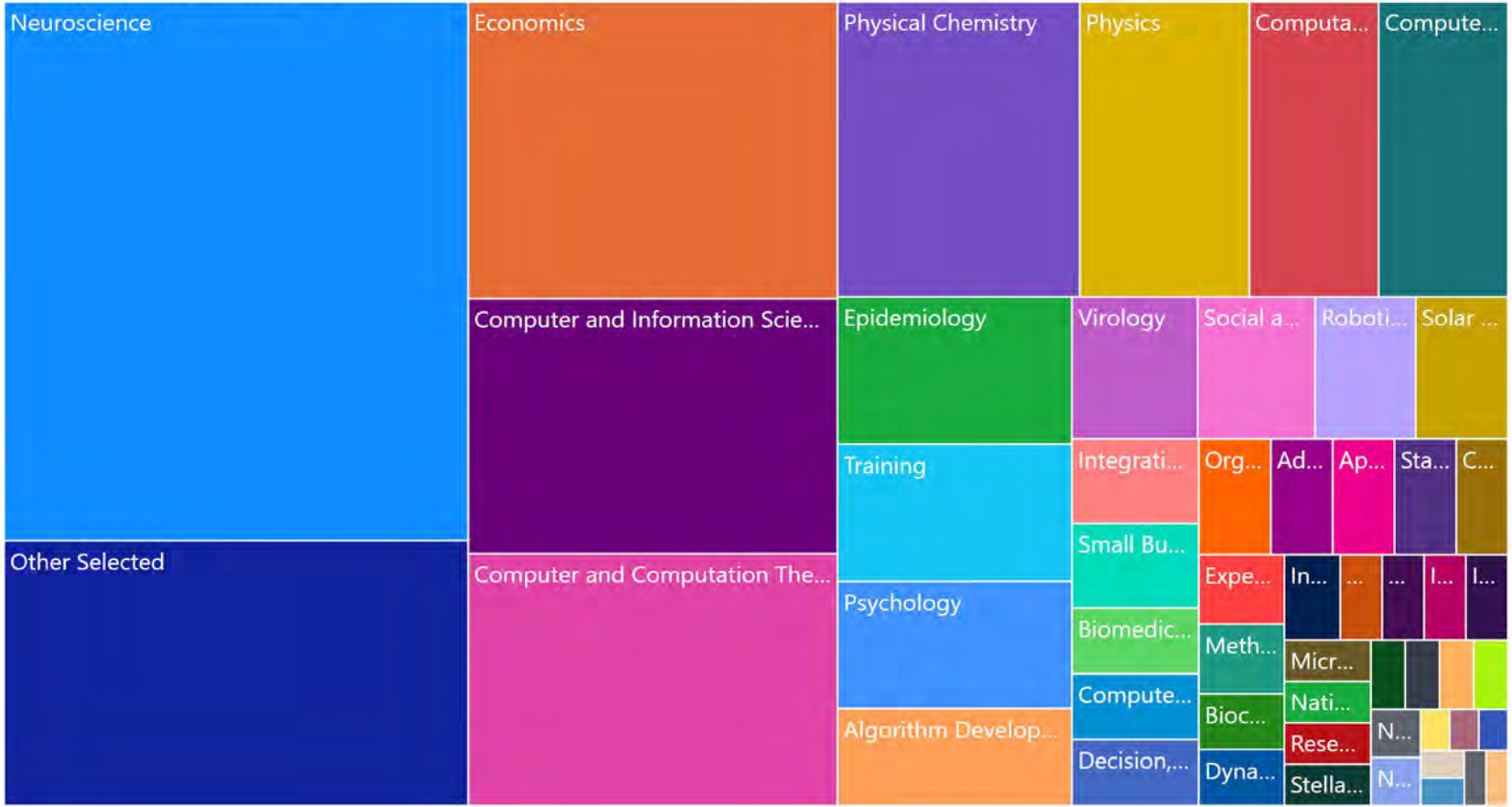
- Established in 2020
- Funded by National Science Foundation (NSF) Major Research Infrastructure (MRI) Grant (2019) and NSF CC* Grant (2024)
- 75 Million CPU hour capacity
- 1.5 Million GPU node hour capacity
- 70 TB total system memory
- Federated identity management using CILogon
- https://arctic.gsu.edu

User Group Distribution by Field of Science

Current usage
145+ PI (Groups)
550+ Active users

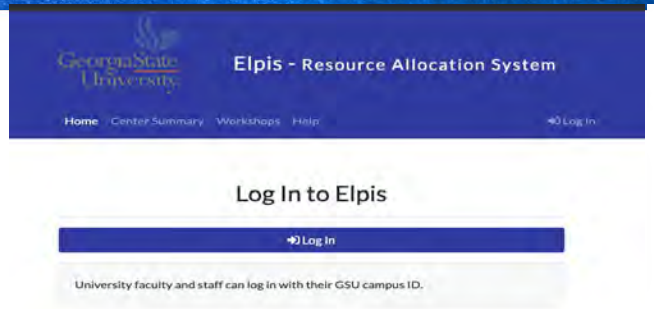
Active Users Distribution by Field of Science

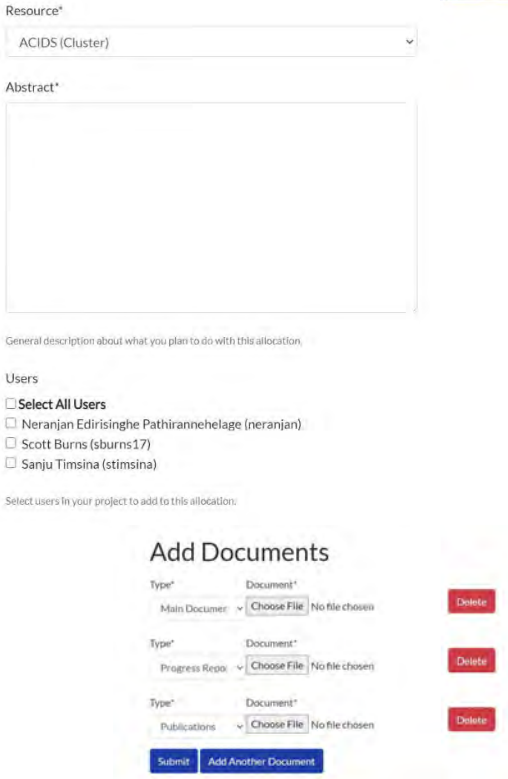
Sum of User Count by Field of Science



Getting access to ARCTIC Infrastructure

1. Management portal : https://elpis.rs.gsu.edu
2. Authenticate using CILogon through your institution IDM
3. Become a PI in ARCTIC system by submitting a research proposal
4. Reviewed by allocation committee





Documents needed

https://arcwiki.rs.gsu.edu/en/policy/resource-allocations#required-documents

Required Documents:

- Main Document
  - Covers scientific background, research objectives and justification
  - 3 page max
- CVs for PI and CoPIs
- Code Performance and Scaling
  - Covers claims of code performance
  - 2 page maximum

Sample at https://arcwiki.rs.gsu.edu/elpis/proposal.pdf

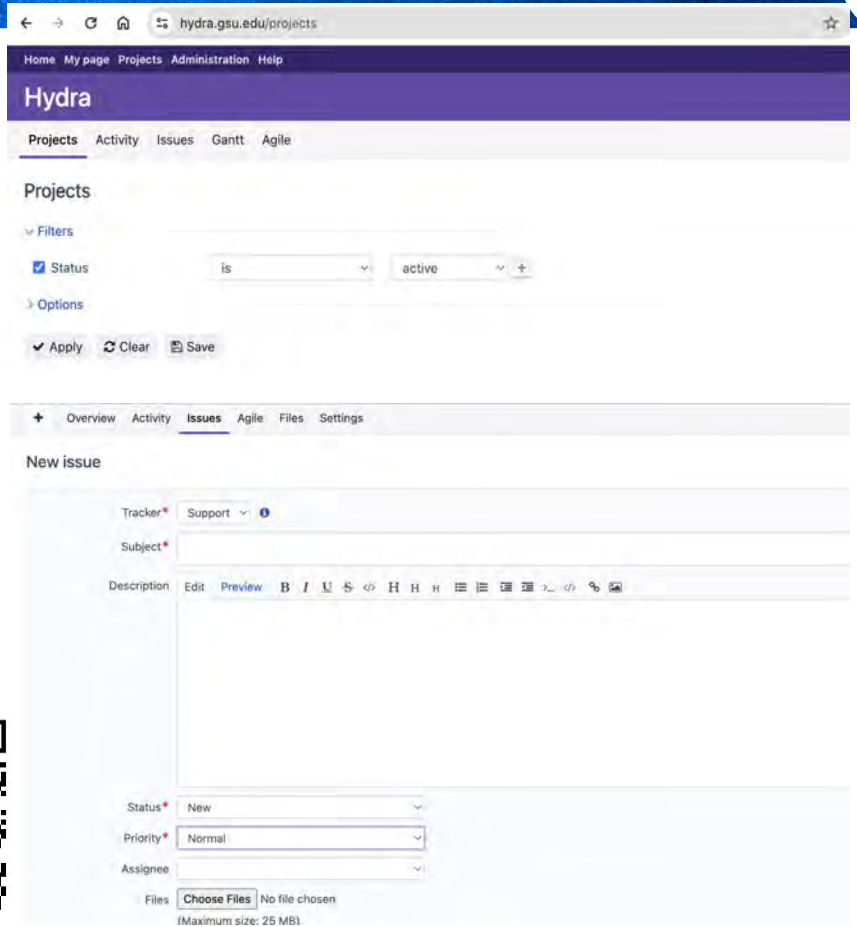
Allocation Approval Process

1. No limit on computing resource requests and scratch (runtime) space
2. Long term storage allocations are limited to 1TB
3. Additional long term storage can be purchased at $200/TB/3 years
4. Requests are reviewed quarterly by the Resource Allocation Committee
5. Committee may recommend internal review with cybersecurity in some cases
6. All allocations are for 1 year period
7. Progress report is needed for renewal

SUBMISSION PERIOD	USERS NOTIFIED	ALLOCATION BEGIN DATE
Jan 15 thru Feb 01	March 15	April 1
Apr 15 thru May 01	June 15	Jul 1
Jul 15 thru Aug 01	September 15	Oct 1
Oct 15 thru Nov 01	December 15	Jan 1

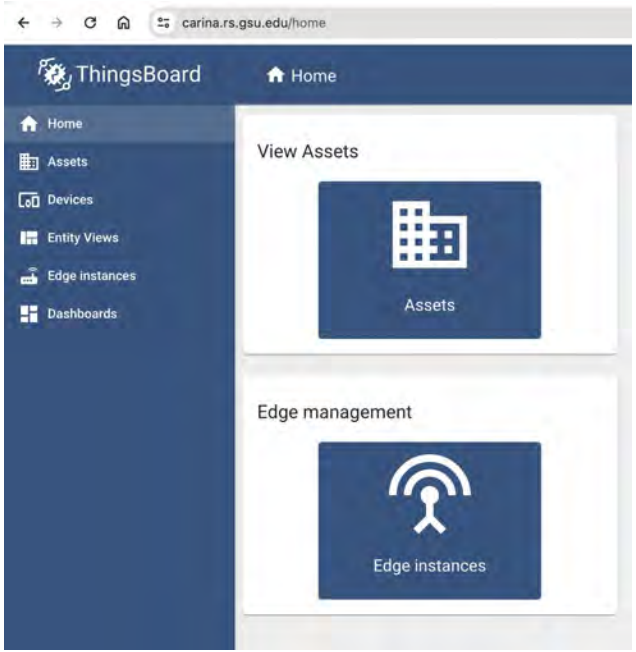
User Support

- Users can create ticket through https://hydra.gsu.edu/
- For users working in multiple projects, they can select the project they want to create the ticket for.
- Long term Collaborative Hands-On Support for Selective Projects.
- Consultation Appointments - https://outlook.office365.com/owa/calendar/ARCTIC@mygsu.onmicrosoft.com/bookings/



Additional Research Support

- Containerized Custom application deployment and management on k8s
- CI/CD pipeline setup for easy deployment and maintenance
- IOT data collection and management
- Cloud-native data storage
- Provide resources for Educational purposes(For Eg; Class, Training)



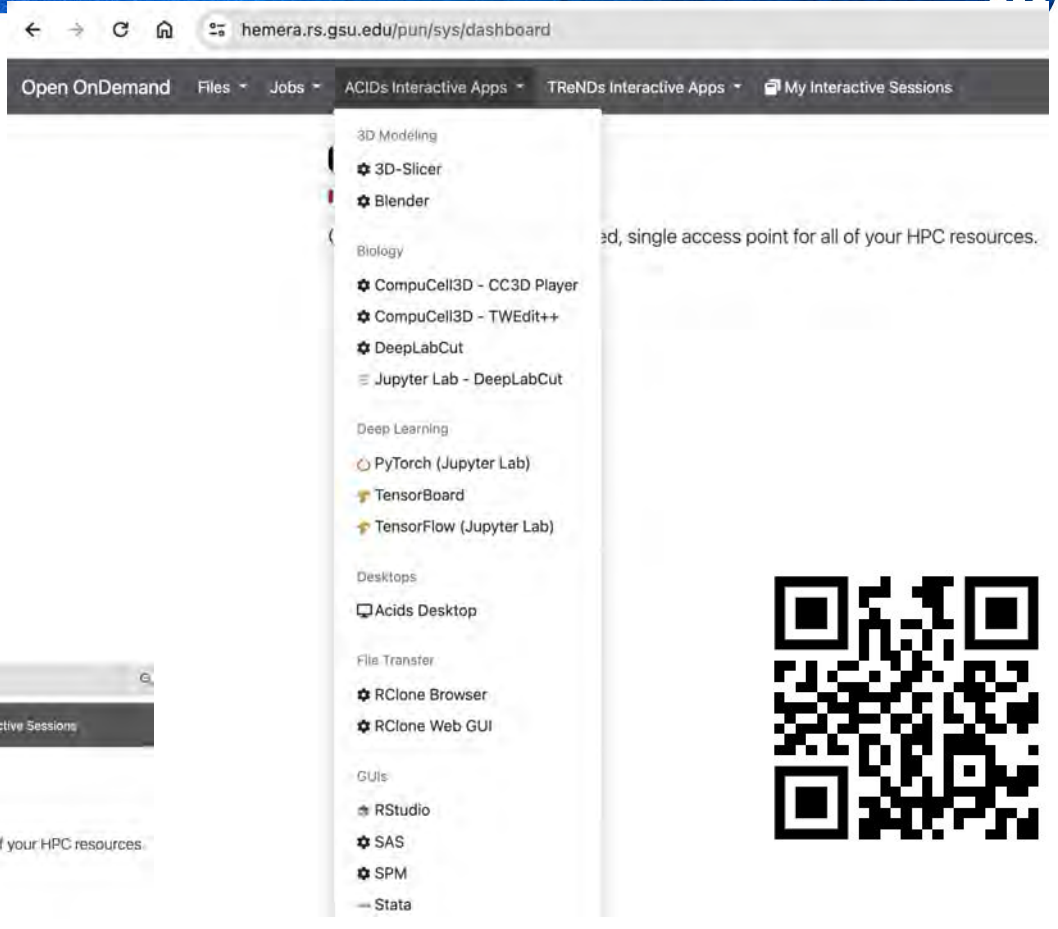
File Transfer

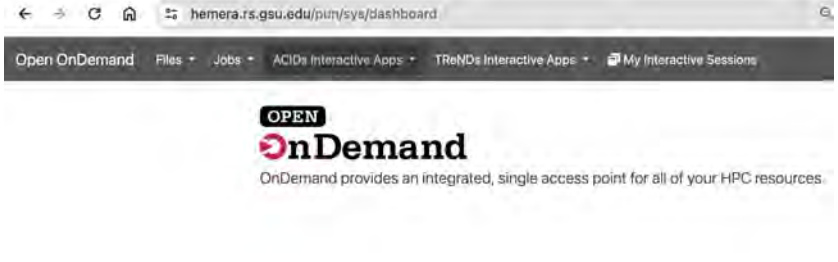
- Using Globus
  - https://arcwiki.rs.gsu.edu/en/data-transfer/globus/transfer-from-personal-to-scratch

- File Storage Location
  - Scratch location (Shared by all users)- Runtime Space
  - Home folder(25 GB)
  - Work folder(50 GB) - Long-term storage (iRODS)
  - Project folder(200 GB startup. Can request more) - Long-term storage(iRODS)
  - https://arcwiki.rs.gsu.edu/en/iRODS/Storage

Accessing the system

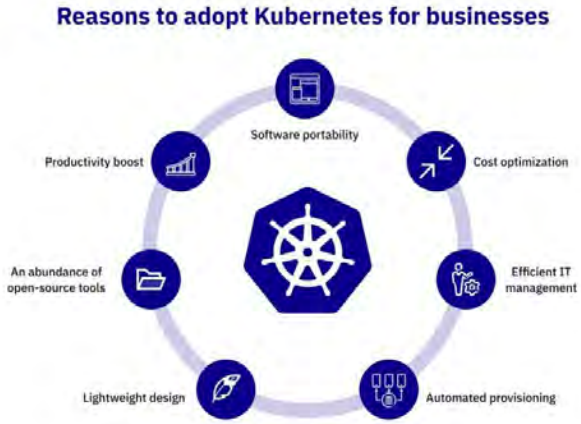
- Hemera provides remote web access to cluster resources.
- Lower the barrier to entry
- Support multiple applications,
- Interactive access and batch job submission





Proflex-CI NSF CC* Award

- Reproduceable science – old code does not break and produce same results when run on new hardware
- Complex workloads that does not fit into rigid cluster architecture
- Not just High-performance computing , but support entire research computing life cycle
- Infrastructure
  - Kubernetes bases container management
    - NVIDIA H100 , L40S GPUs
    - All Flash Object storage
    - 100Gbps Ethernet high speed interconnect

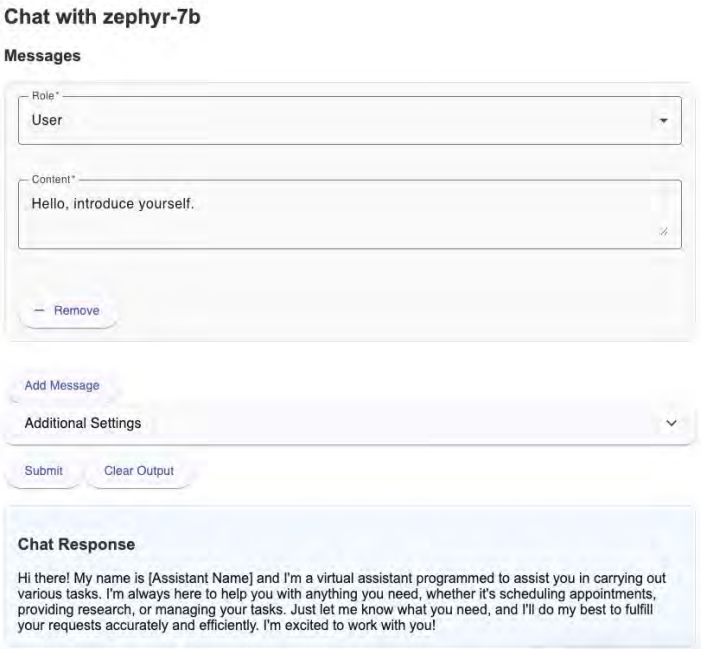


Callisto (Jupyter Notebooks)

- Support interactive teaching learning
- Available to every member of GSU community
- https://callisto.rs.gsu.edu
  - On-campus or VPN
- Run a JupyterLab instance
- Log in with your GSU credentials

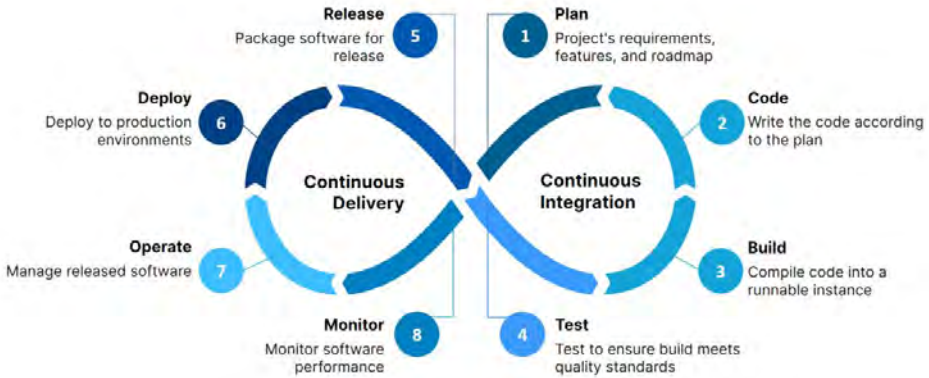
LLM Models via Proflex

- Choose LLM models from the list to work with your desired LLM models.



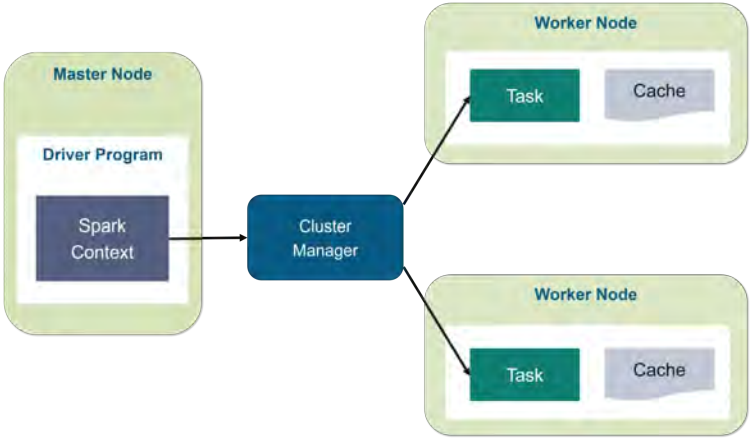
CI/CD application deployment

- Code Integration
- Trigger Build
- Build and Compilation
- Automated Testing
- Deployment



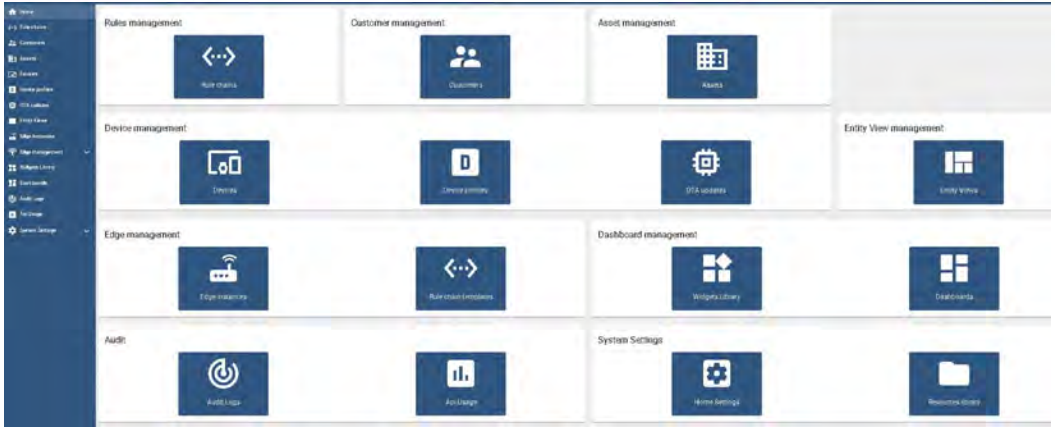
Data intensive computing with Spark

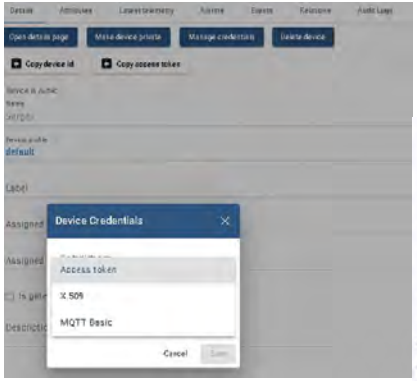
- Spark is Distributed computing framework
- Dynamic spark cluster creation on k8s
- 1024+ CPU cores and 6TB+ memory
- Submit spark jobs through API remotely



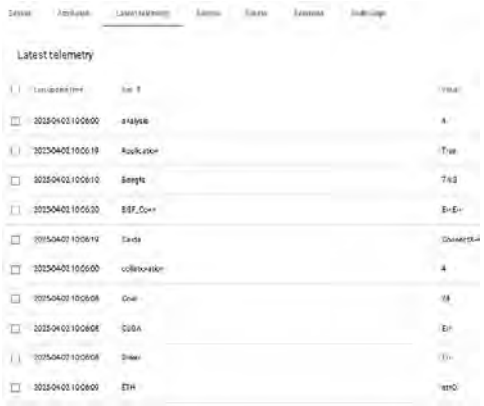
PROPERTY	VALUE
File	s3a://csc404s245/AIA-MVTS-Spark-Processor.py
Args	-d, /app, -f, arctic-config.ini, -s3, True, -s, param-exp-calc, -precon, True, -n, aia-mvts-exps
Name (--name)	aia-mvts-exps
Driver Cores (--driver-cores)	2
Driver Memory (--driver-memory)	25G
Number Of Executors (--num-executors)	20
Executor Cores (--executor-cores)	5
Executor Memory (--executor-memory)	20G
Python files (--py-files)	https://dmlab.cs.gsu.edu/code/proj.zip
Archives (--archives)	
Additional files (--files)	https://dmlab.cs.gsu.edu/code/arctic-config.ini
Additional JARs (--jars)	
--conf spark.dynamicAllocation.enabled	true
--conf spark.dynamicAllocation.maxExecutors	70
--conf spark.kubernetes.container.image	harbor.rs.gsu.edu/spaceweather/pspark-w-swtoolkit:0.0.1-Dev
--conf spark.hadoop.fs.s3a.path.style.access	True
--conf spark.hadoop.fs.s3a.impl	org.apache.hadoop.fs.s3a.S3AFileSystem
--conf spark.kubernetes.authenticate.driver.imagePullSecrets	regcred
--conf spark.kubernetes.authenticate.driver.serviceAccountName	lighter
--conf spark.kubernetes.driver.service.deleteOnTermination	True
--conf spark.hadoop.fs.s3a.aws.credentials.provider	org.apache.hadoop.fs.s3a.SimpleAWSCredentialsProvider

IOT Support



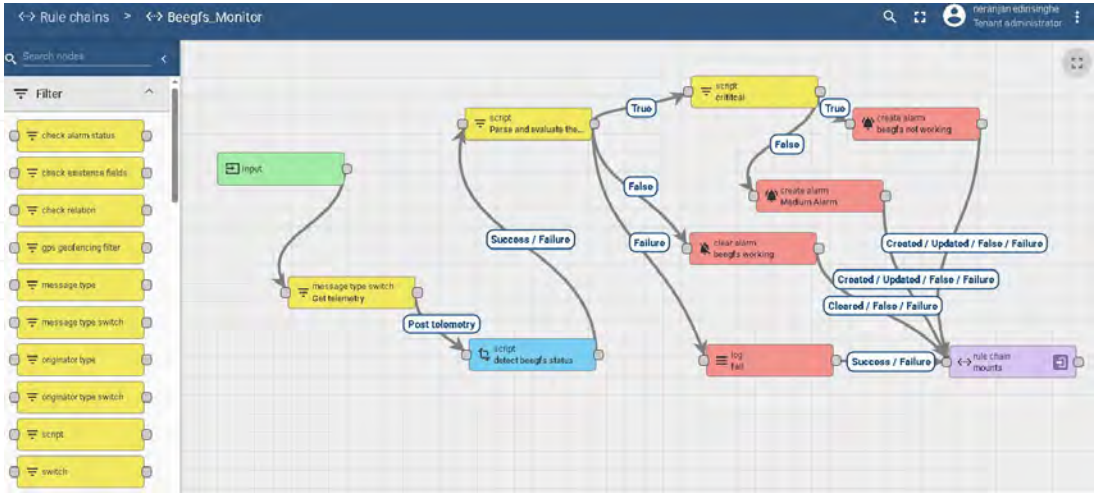



```python
from tb_device_mqtt import TBDeviceMqttClient, TBPublishInfo


telemetry = {"temperature": 41.9, "enabled": False, "currentFirmwareVersion": "v1.2.2"}
client = TBDeviceMqttClient("127.0.0.1", username="A1_TEST_TOKEN")
# Connect to ThingsBoard
client.connect()
# Sending telemetry without checking the delivery status
client.send_telemetry(telemetry)
# Sending telemetry and checking the delivery status (QOS = 1 by default)
result = client.send_telemetry(telemetry)
# get is a blocking call that awaits delivery status
success = result.get() == TBPublishInfo.TB_ERR_SUCCESS
# Disconnect from ThingsBoard
client.disconnect()

```



IOT Support

Entity name	GPU	GPU_Type	CUDA	NVML	Kernel	Core	Mem_Total	Mem_Free	IB	ETH
acidscdcn013	Err	Err	Err	Err	5.4.0-192-generic	40	62.7826	34.7808	ib0	eno1
acidscdcn014	2	NVIDIA-SMI has failed because it couldn't communicate with the NVIDIA driver. Make sure that the latest NVIDIA driver is installed and running.			5.4.0-198-generic	40	62.7826	36.638	ib0	eth0
acidscdcn015	Err	Err	Err	Err	5.4.0-192-generic	72	125.774	103.269	ib0	eth0
acidscdcn016	2	NVIDIA-SMI has failed because it couldn't communicate with the NVIDIA driver. Make sure that the latest NVIDIA driver is installed and running.			5.4.0-193-generic	40	62.7826	46.9531	ib0	eth0
acidscdcn017	Err	Err	Err	Err	5.4.0-192-generic	40	62.7826	51.8576	ib0	eth0
acidscdcn018	Err	Err	Err	Err	5.4.0-192-generic	40	62.7826	51.6898	ib0	eth0



Computational Research & Cyberinfrastructure Working Group

- Collaborative working group with multiple disciplinary.
- Graduate students, postdoc, or research scientist working with advanced data analytics, computer simulations, machine learning deep learning, or generative AI/ LLMs are welcome to present.
- Anyone with expertise on computational methods, data visualization techniques, getting results faster using high-performance computing, or research workflows are welcome to
- Open to everyone outside GSU.
- More information available at https://arctic.gsu.edu/training/

SCD (Science and Cyberinfrastructure for Discovery)

- https://easychair.org/my/conference?conf=scd25
- https://arctic.gsu.edu/training/scd/
- September 9 and 10, 2025
- On Student Centre Ballroom at Georgia State University
- Open to all students, faculty and researchers outside GSU as well.

Thank you!

Please email to arc@gsu.edu if you have any questions

Web Site : https://arctic.gsu.edu

Request PI status: https://elpis.rs.gsu.edu

Help desk: https://hydra.gsu.edu

PROPEL CENTER

Accelerated Learning for the Future of Technology

Learn Fast. Build Something Real.

RESEARCH

THE NUMBERS

When surveyed about which courses of interest that Propel Learn would be launching, students chose career readiness (70%), internship preparation (67%), followed by artificial intelligence (52%) and content creation/digital marketing (52%).

TOP 3 BARRIERS TO SUCCESS

MENTORSHIP

48%

INDUSTRY KNOWLEDGE

48%

INTERNSHIP OPPORTUNITIES

48%

CULTURE

HOW WE PROPEL

On Campus

Propel partnered with 20 institutions to distribute over $5MM in grants and scholarships to support student and faculty research.

Online

We do this through Propel Learn, the signature learning and credentialing platform for HBCU students that provides comprehensive, experiential, innovative learning experiences and future-ready career opportunities.

On-site

The Propel center will serve as an HBCU hub on the campus of the Atlanta University Center.

MS-CC
ms-cc.org

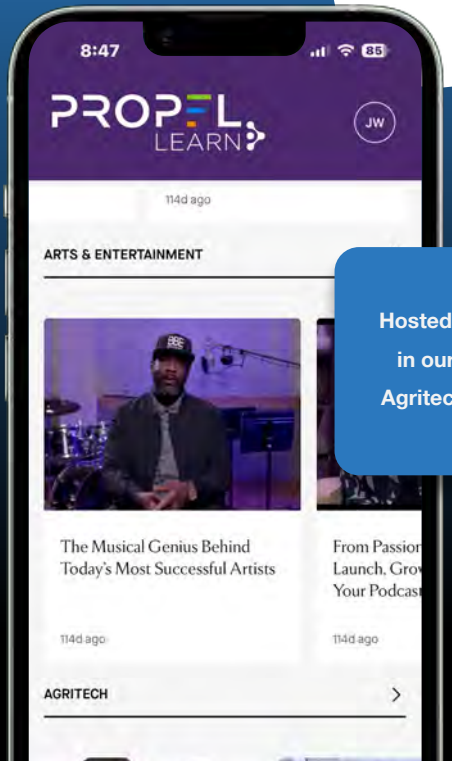
INNOVATION

HOW WE PROPEL

PROPEL LEARN

Propel Learn is the signature learning and credentialing platform for HBCU students that provides comprehensive, experiential, innovative learning experiences and future-ready career opportunities.

OUR IMPACT



Hosted more than 300 students in our Arts & Entertainment, Agritech and Health Innovation Accelerators.

100+
Students

Propel Learn registered more than 1,000 users on our platform and enrolled more than 1000 students in courses across 31 institutions.

1500+
Users

Propel has provided more than $5MM in grants and scholarships to the HBCU Community.

$6MM+
Grants

MS-CC
ms-cc.org