Science Gateways

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Outline

• Introduction to Science Gateways
• Ushering Scientific Software to “as-a-service” model
• Containers and Gateways
• Hands-on tutorial
• Q&A
• Advanced Gateway Topics
WHAT ARE SCIENCE GATEWAYS?

Web interfaces and middleware for integrating distributed computing and data, automating expertise, controlling access, managing results, and speeding up your critical computational workflows.

Learn more at https://sciencegateways.org/
Serving Targeted Communities

- Interdisciplinary Science Gateways
- Campus Cyber Gateways
- Instrument based Gateways
- Data Centric Gateways
- Educational Gateways

Gateway Collab
Secured access & Controlled sharing of digital artifacts
Federated Authentication

End User Communities

Institutional & Social Identities

Science Gateway User Interfaces

Gateway Middleware

User Management, Authorizations, Credential Management

Secure High Performance Computing, Storage, Data and Modeling and Simulation Software
CONTAINERS & GATEWAYS
Scientific App to a Gateway Interface

Scientific App → Container Hub → Container → Science Gateway
Gateways can enable “Scientific app-store”
Dashboard of Scientific Experiments

Airavata Test Drive Gateway

Browse Experiments

<table>
<thead>
<tr>
<th>Name</th>
<th>Application</th>
<th>User</th>
<th>Creation Time</th>
<th>Status</th>
<th>Actions</th>
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<tbody>
<tr>
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<td>Gaussian16</td>
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</tr>
<tr>
<td>Echo guten tag</td>
<td>Echo</td>
<td>marcus</td>
<td>2 months ago</td>
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<tr>
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<td>Echo</td>
<td>marcus</td>
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Showing 1 - 10  Next >
Launch “Experiments”
Abstracting HPC and Cloud Job Management

1. **Input** + Access Data
   - Authenticate
   - Stage Input
   - Configure Resource Environment
   - Execute Resource
   - Retrieve Results
   - Cleanup

2. **Output** + Execution Metric
   - Monitor Resource Execution Progress
   - Execute Resource

Notifications flow between stages.
ADVANCED TOPICS
Apache Airavata

- **Gateway Developers:** Open source software for building science gateways
- **Users:** Use it to transfer data and execute remote applications and pipelines on distributed resources
- **Teams:** Create, organize, clone, and share computational experiments
- **Software Providers:** Make scientific software available as a service
Science Gateways Platform as a Service: SciGaP

- Registered SciGaP Gateways: 40
- Supported Applications: 118
- Integrated Computing Resources: 50
- Registered Users: 3500+
- Number of applications run (3 years): >136,000
- Computing Hours (3 years): > 22.8 M
Key Points

- Apache Airavata is open source, open community software
- CIRC runs a hosted Apache Airavata deployment for clients: SciGaP
- We integrate campus clusters, XSEDE resources, computational clouds, and international resources for gateways
- We use best of breed software subsystems and DevOps operations practices
- Subsystems for security, data management can be used independently