SPRUCE & LEAD Demo

http://spruce.uchicago.edu

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Marcus Christie
Suresh Marru
Nick Trebon
SPRUCE Architecture Overview
Right-of-Way Tokens

Event

1. Automated Trigger
   → First Responder

2. Human Trigger
   → Right-of-Way Token

→ SPRUCE Gateway / Web Services

Right-of-Way Token

SPRUCE
Urgent Computing
Right-of-Way Token
spruce.teragrid.org
5D7E-XUU9-237Q-7123

TeraGrid
SPRUCE Architecture Overview
Right-of-Way Tokens

Event

1. Automated Trigger
2. First Responder

Right-of-Way Token

SPRUCE Gateway / Web Services

Human Trigger

First Responder

Automated Trigger
SPRUCE Architecture Overview

Submitting Urgent Jobs

1. User Team

2. Urgent Computing Job Submission
   - Conventional Job Submission Parameters
   - Urgent Computing Parameters

3. Choose a Resource

4. Authentication

5. Priority Job Queue
   - Local Site Policies
   - Supercomputer Resource
SPRUCE Architecture Overview

Submitting Urgent Jobs

1. User Team
2. Urgent Computing Job Submission
3. Choose a Resource
4. Authentication
5. Priority Job Queue

SPRUCE Job Manager

Local Site Policies

Supercomputer Resource

Conventional Job Submission Parameters

Urgent Computing Parameters
SPRUCE Architecture Overview

Submitting Urgent Jobs

1. User Team
2. Urgent Computing Job Submission
3. Choose a Resource
4. Authentication
5. Priority Job Queue
6. Supercomputer Resource
7. Local Site Policies
8. Urgent Computing Parameters
9. Conventional Job Submission Parameters
Choosing a Resource (Ongoing Work)

Urgent Computation Request

<table>
<thead>
<tr>
<th>Platform</th>
<th>Next Available Job (Policy Based)</th>
<th>…</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDSC::Cluster1</td>
<td>Immediate</td>
<td>…</td>
</tr>
<tr>
<td>NCSA::Cluster1</td>
<td>(5.3 hrs, 1024 nodes)</td>
<td>…</td>
</tr>
<tr>
<td>PSC::Cluster1</td>
<td>Immediate</td>
<td>…</td>
</tr>
</tbody>
</table>

Live Job/Queue Data

Site Policies

<table>
<thead>
<tr>
<th>Platform</th>
<th>Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDSC::Cluster2</td>
<td>Automated, next job</td>
</tr>
<tr>
<td>SDSC::Cluster1</td>
<td>Normal priority, no SPRUCE support</td>
</tr>
<tr>
<td>SDSC::Cluster1</td>
<td>Automated, immediate access, kill existing jobs, 15 min turn around</td>
</tr>
<tr>
<td>SDSC::Cluster2</td>
<td>Immediate</td>
</tr>
</tbody>
</table>

Warm Standby Validation History

<table>
<thead>
<tr>
<th>Platform</th>
<th>App.</th>
<th>Validated</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCSA::Cluster1</td>
<td>Tornado</td>
<td>8 days ago</td>
<td>95%</td>
</tr>
<tr>
<td>NCSA::Cluster1</td>
<td>Airflow</td>
<td>14 days ago</td>
<td>98%</td>
</tr>
<tr>
<td>SDSC::Cluster2</td>
<td>Airflow</td>
<td>45 days ago</td>
<td>78%</td>
</tr>
<tr>
<td>SDSC::Cluster2</td>
<td>Influenza</td>
<td>30 days ago</td>
<td>59%</td>
</tr>
</tbody>
</table>
Can we meet the deadline?

ADAS input files
NAM input files
Computational Resources
Analysis servers (output)

48 total configurations of inputs, resource and output destination
Advisor: Introduction

- Given a set of distributed resources and a deadline, answer the following questions:
  - Is there a resource that can potentially meet the deadline?
  - If there are multiple satisfying resources, how does one select the “best” resource on which to run?
    - Fastest turnaround time
    - Historical reliability of application on given resource

- What we need:
  - Data Transfer ($D_T$)
  - Pre-execution time (e.g., queue delay) ($P_T$)
    - Need to consider current queue state
  - Execution time ($E_T$)

- Estimated turnaround time = $D_T + P_T + E_T$
Other considerations

• How does the application scale?
  - For a given resource, what number of requested CPUs returns lowest predicted turnaround time?
  - Does this affect reliability?

• Fail-over mode possibilities
  - Speculative execution
  - Route job to another resource if resource goes down before execution
  - Provide user with list of alternate resources if job fails during execution
Screen Shots

LEAD Demo Shots
### Experiments

<table>
<thead>
<tr>
<th>Experiment Name</th>
<th>Description</th>
<th>Created On</th>
<th>Last Updated On</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>sc06 demo IU booth</td>
<td>Dennis is showing how to create an experiment.</td>
<td>Mon Nov 13 21:00:46 EST 2005</td>
<td>Mon Nov 13 20:00:49 EST 2006</td>
<td>WAITING</td>
</tr>
<tr>
<td>dm1</td>
<td>No description</td>
<td>Mon Nov 13 19:35:50 EST 2005</td>
<td>Mon Nov 13 18:35:51 EST 2006</td>
<td>WAITING</td>
</tr>
<tr>
<td>spruce2</td>
<td>No description</td>
<td>Sun Nov 12 17:51:32 EST 2005</td>
<td>Sun Nov 12 16:51:34 EST 2006</td>
<td>RUNNING</td>
</tr>
<tr>
<td>spruce1</td>
<td>No description</td>
<td>Sun Nov 12 17:29:20 EST 2005</td>
<td>Sun Nov 12 16:29:23 EST 2006</td>
<td>RUNNING</td>
</tr>
</tbody>
</table>
Experiment Builder Portlet

Experiment Wizard

User: Marcus Christie  Project: SC2005 Tests

Specify a name, description, and select workflow

Name: spruce_demo

Description:

Workflow

My Workflows (0)

Sample Workflows (4)

Case Study WRF Forecast with ADAS Initialized Data

Description

WRF Forecast with ADAS Initialization and using canned case study data

Terrain_Preprocessor_Service

ADASDataFiles

Config

ADAS_Interpolator_Service

ARPS2WRF_Interpolator_Service
Experiment Builder Portlet

Experiment Wizard

User: Marcus Christie
Project: SC2006 Tests
Name: spruce_demo
Description:
Workflow: Case Study WRF Forecast with ADAS Initialized Data

Start Options

You may choose when you would like your experiment to start.

- Immediately
- Based on data mining trigger

Launch
Experiment Builder Portlet

Experiment Wizard

User: Marcus Christie

Project: SC2006 Tests

Name: spruce_demo

Description:

Workflow: Case Study WRF Forecast with ADAS Initialized Data

Review and Submit

You may use the "Back" button to change or review in greater detail your selections for this experiment. Optionally, you may start the workflow composer in monitoring mode prior to launching the workflow so that you can see a visualization of the workflow's progress as well as the workflow's notifications as they arrive. Once you are satisfied with the workflow's configuration, click the "Launch" button to start its execution.

- Run this workflow with SPRUCE
  - WQ8U - F6MV - AWP7 - U2XK

- Back  Next  Cancel  Launch
Screen Shots

Managing Tokens
Token: CETU-9433-HFSA-53XH  look up

**Step 1**
Input the token number

**Step 2**
Activate your token

**Step 3**
Add users (can be done before activation as well)

**Step 4**
Submit jobs with elevated priority!

*If you need to go back to the menu, press the User Portal link from the menu. Browser BACK button has no functionality.*
Token: 6CSM-4FX3-CCEV-JSF4

refresh activate add user

Status: Not yet activated

This is a test token only
Lifetime: 24:00:00
Maximum Urgency: red
Creation date: 2007-04-23 14:33:43.0
Expiration date: 2007-12-12 12:00:00.0

Resources on TG:
- ia32 @ ANL
- ia64 @ ANL
- lear @ PUR
- Fast-CPU @ NCSA
- Fast-I0 @ NCSA
- ia64 @ NCSA
- DS-high @ SDSC
- DS-normal @ SDSC
- DS-normal32 @ SDSC
- lonestar @ TACC

Users: there are no users assigned to this token.

(Fresh info as of Mon Apr 23 2007 14:42:18 GMT-0500)

If you need to go back to the menu, press the User Portal link from the menu. Browser BACK button has no functionality.
Token: 6CSM-4FX3-CCEV-JSF4

- refresh
- activate
- add user

Status: Not yet activated

Comment:
- Demo for Urgent Computing Workshop 07.

activate go back

This is a test token only
Lifetime: 24:00:00
Maximum Urgency: red
Creation date: 2007-04-23 14:33:43.0
Expiration date: 2007-12-12 12:00:00.0

Resources on TG:
- ia32 @ ANL
- ia64 @ ANL
- lerc @ PUR
- Fast-CPU @ NCSA
- Fast-IO @ NCSA
- ia64 @ NCSA
- DS-high @ SDSC
- DS-normal @ SDSC
- DS-normal32 @ SDSC
- lonestar @ TACC

Users: there are no users assigned to this token.

(Fresh info as of Mon Apr 23 2007 14:42:18 GMT-0500)

If you need to go back to the menu, press the User Portal link from the menu. Browser BACK button has no functionality.
Token: 6CSM-4FX3-CCEV-JSF4

Status: Activated

Real name: Demo user
E-mail: user@domain.edu
Identity: /C=US/O=SDSC/OU=SDSC/CN=Demo User/UID=cluser

This is a test token only
Lifetime: 24:00:00
Maximum Urgency: red
Creation date: 2007-04-23 14:33:43.0
Expiration date: 2007-12-12 12:00:00.0
Activation date: 2007-04-23 14:43:15.0
Deactivation date: 2007-04-24 14:43:15.0

Resources on TG:
- ia32 @ ANL
- ia64 @ ANL
- lear @ PUR
- Fast-CPU @ NCSA
- Fast-IQ @ NCSA
- ia64 @ NCSA
- DS-high @ SDSC
- DS-normal @ SDSC
- DS-normal32 @ SDSC
- lonestar @ TACC

Users: there are no users assigned to this token.
(Fresh info as of Mon Apr 23 2007 14:43:15 GMT-0500)

If you need to go back to the menu, press the User Portal link from the menu. Browser BACK button has no functionality.
Screen Shots

Running Urgent Jobs
Direct SPRUCE Job Submission
(No Grid Middleware)

# spruce_sub urgency=red spruce_test.pbs
   No Valid Token found for user = snadella, aborting job submission
<validate token at SPRUCE gateway>
# spruce_sub urgency=red spruce_test.pbs
   240559

# qstat
   JobId   Name         User   S  Queue
        ----  ----------- ----  ------
   240552 Cylinder-1 gustav  Q  dque
   240556 STDIN     lgrinb  Q  dque
   240559 spruce-job snadella R spruce
SPRUCE Job Submission via Globus

# grid-proxy-init
Enter GRID pass phrase for this identity: **************
Your proxy is valid until: Sat May 29 03:21:30 2006

# cat globus_test.rsl
<...>
(resourceManagerContact =
  tg-grid1.uc.teragrid.org:2120/jobmanager-spruce)
(executable = /home/snadella/spruce/mpihello)
<...>
(urgency = red)
<...>

# globusrun -o -f globus_test.rsl
Tokens Information

### Activated Tokens

<table>
<thead>
<tr>
<th>VO</th>
<th>Token</th>
<th>Test</th>
<th>Lifetime</th>
<th>Created</th>
<th>Expiration</th>
<th>Activated</th>
<th>Activation IP</th>
<th>Issued To</th>
<th>Issued By</th>
<th>Admin Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG</td>
<td>CETU-9433-HFSA-58KH</td>
<td>Yes</td>
<td>72:00:00</td>
<td>2007-04-05</td>
<td>2007-12-12</td>
<td>2007-04-23 09:29:43</td>
<td>129.79.246.120</td>
<td>LEAD/UC spring runs testing</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
<td>Deactivate</td>
</tr>
<tr>
<td>TG</td>
<td>E6SM-4FX3-CCEV-35F4</td>
<td>Yes</td>
<td>24:00:00</td>
<td>2007-04-23</td>
<td>2007-12-12</td>
<td>2007-04-23 14:43:15</td>
<td>128.135.125.142</td>
<td>Urgent Computing Workshop Demo</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
<td>Deactivate</td>
</tr>
</tbody>
</table>

### Inactive Tokens

<table>
<thead>
<tr>
<th>VO</th>
<th>Token</th>
<th>Test</th>
<th>Lifetime</th>
<th>Created</th>
<th>Expiration</th>
<th>Issued To</th>
<th>Issued By</th>
<th>Admin Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG</td>
<td>KYFA-YZQI-VEJ6-3QCH</td>
<td>Yes</td>
<td>72:00:00</td>
<td>2007-04-05</td>
<td>2007-12-12</td>
<td>LEAD/UC spring runs testing</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
<td>Deactivate</td>
</tr>
</tbody>
</table>

### Deactivated Tokens

<table>
<thead>
<tr>
<th>VO</th>
<th>Token</th>
<th>Test</th>
<th>Lifetime</th>
<th>Created</th>
<th>Expiration</th>
<th>Issued To</th>
<th>Issued By</th>
<th>Admin Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG</td>
<td>KVRU-Y2JZ-E882-9V05</td>
<td>No</td>
<td>72:00:00</td>
<td>2006-08-15</td>
<td>2006-08-15 14:15:01</td>
<td>128.135.125.142</td>
<td>ws_portal testing</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
</tr>
<tr>
<td>TG</td>
<td>64DG-JILL-TRGC-YBPR</td>
<td>No</td>
<td>72:00:00</td>
<td>2006-08-15</td>
<td>2006-08-15 14:24:00</td>
<td>128.135.125.142</td>
<td>ws_portal testing</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
</tr>
<tr>
<td>TG</td>
<td>R84J-M2RT-KM29-ZQ0Y</td>
<td>No</td>
<td>72:00:00</td>
<td>2006-08-15</td>
<td>2006-08-15 17:00:59</td>
<td>128.135.125.142</td>
<td>ws-portal-edits</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
</tr>
<tr>
<td>TG</td>
<td>TCHE-K3IR-Y74X-QRF7</td>
<td>No</td>
<td>72:00:00</td>
<td>2006-08-15</td>
<td>2006-08-15 10:01:59</td>
<td>128.135.125.142</td>
<td>ws-portal-edits</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
</tr>
<tr>
<td>TG</td>
<td>YAWS-9HBF-VNNA-4J1W</td>
<td>No</td>
<td>72:00:00</td>
<td>2006-08-15</td>
<td>2006-10-10 14:31:50</td>
<td>128.135.125.142</td>
<td>test</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
</tr>
<tr>
<td>TG</td>
<td>G0IR-8RR-RKNR-R91V</td>
<td>No</td>
<td>72:00:00</td>
<td>2006-09-15</td>
<td>2006-09-15 12:13:50</td>
<td>128.135.125.142</td>
<td>sumen-news-validate-check</td>
<td><a href="mailto:snadella@mcs.anl.gov">snadella@mcs.anl.gov</a></td>
</tr>
</tbody>
</table>
Token Authentications

Click on the user for:
- User Info

Click on the timestamp for:
- Requested Urgency
- Requested Resources

Click on the token for:
- Token Info

TeraGrid [TG]

<table>
<thead>
<tr>
<th>User</th>
<th>Timestamp</th>
<th>Token</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor LEAD</td>
<td>2007-04-23 10:21:54</td>
<td>CETU-9433-HFSA-5BXH</td>
<td>192.5.198.225</td>
</tr>
<tr>
<td>Suman Nadella</td>
<td>2007-04-06 10:25:30</td>
<td>3YCS-P8ZK-RWJ2-RKFZ</td>
<td>192.5.198.197</td>
</tr>
<tr>
<td>Suman Nadella</td>
<td>2007-04-06 10:16:50</td>
<td>C38G-A6K3-T4X3-Z5AK</td>
<td>192.5.198.197</td>
</tr>
<tr>
<td>Suman Nadella</td>
<td>2007-04-06 09:58:15</td>
<td>3YCS-P8ZK-RWJ2-RKFZ</td>
<td>192.5.198.197</td>
</tr>
<tr>
<td>Suman Nadella</td>
<td>2007-04-05 09:01:16</td>
<td>N448-HTDC-RLYH-33ZA</td>
<td>192.5.198.197</td>
</tr>
<tr>
<td>Suman Nadella</td>
<td>2007-04-04 10:13:37</td>
<td>877C-PMR8-NYC7-FQWM</td>
<td>128.135.11.161</td>
</tr>
<tr>
<td>Suman Nadella</td>
<td>2007-04-03 14:17:29</td>
<td>877C-PMR8-NYC7-FQWM</td>
<td>192.5.198.197</td>
</tr>
<tr>
<td>Doctor LEAD</td>
<td>2007-04-03 14:05:22</td>
<td>877C-PMR8-NYC7-FQWM</td>
<td>192.5.198.225</td>
</tr>
</tbody>
</table>
### Tokens Information

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Token</td>
<td>CETU-9433-HFSA-5BXH</td>
</tr>
<tr>
<td>Status</td>
<td>Activated</td>
</tr>
<tr>
<td>Test</td>
<td>Yes</td>
</tr>
<tr>
<td>Lifetime</td>
<td>72:00:00</td>
</tr>
<tr>
<td>Created</td>
<td>2007-04-05 10:40:58</td>
</tr>
<tr>
<td>Expiration</td>
<td>2007-12-12 12:00:00</td>
</tr>
<tr>
<td>Issued to</td>
<td>LEAD/UC spring runs testing</td>
</tr>
<tr>
<td>Issued by</td>
<td>Suman Nadella</td>
</tr>
<tr>
<td>Max urgency</td>
<td>red</td>
</tr>
<tr>
<td>Virtual org</td>
<td>TG</td>
</tr>
</tbody>
</table>

**Token Contacts**
- snadella@mcs.anl.gov
- spruce@ci.uchicago.edu

**Site**
- UC/ANL [ANL]
  - ia64-compute [ia64]
  - ia32-compute [ia32]

**User**
- DOCTOR LEAD
  - /C=US/O=National Center for Supercomputing Applications
  - drlead@extreme.indiana.edu
Add Token

* Lifetime
[hh:mm:ss]
min 01:00:00
max 72:00:00

* Expiration
[yyyy-mm-dd hh:mm:ss]
min: three days in the future

* Issued To

* Maximum Urgency
yellow

* Test Token?
No

* Token Permissions

<table>
<thead>
<tr>
<th>Site</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANL</td>
<td>ia64</td>
</tr>
<tr>
<td></td>
<td>ia32</td>
</tr>
</tbody>
</table>

* Activation Email Contacts [foo@com, bar@edu, ...]. Note, that the spruce-dev email address will be added by default.

Add Token