Policy Management in Grids

(Aka "Identity Federation Management")

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Problem Statement (1)

- **Policy: preferences, rules, goals, conditions, obligations, and acceptable procedures**
- **Policies in VOs are everywhere**
  - Resource provider: *What is the order in which I will service requests?*
  - Resource consumer: *What are my requirements for data storage (e.g., availability)?*
  - Site-wide: *What authentication mechanism is required?*
  - VO-wide: *What experiments get preference? (e.g., Open Science Grid)*
- **Problem: today, policies are only implicit**
- **Why is this a problem?**
  - What went wrong? Why is my QoS so poor?

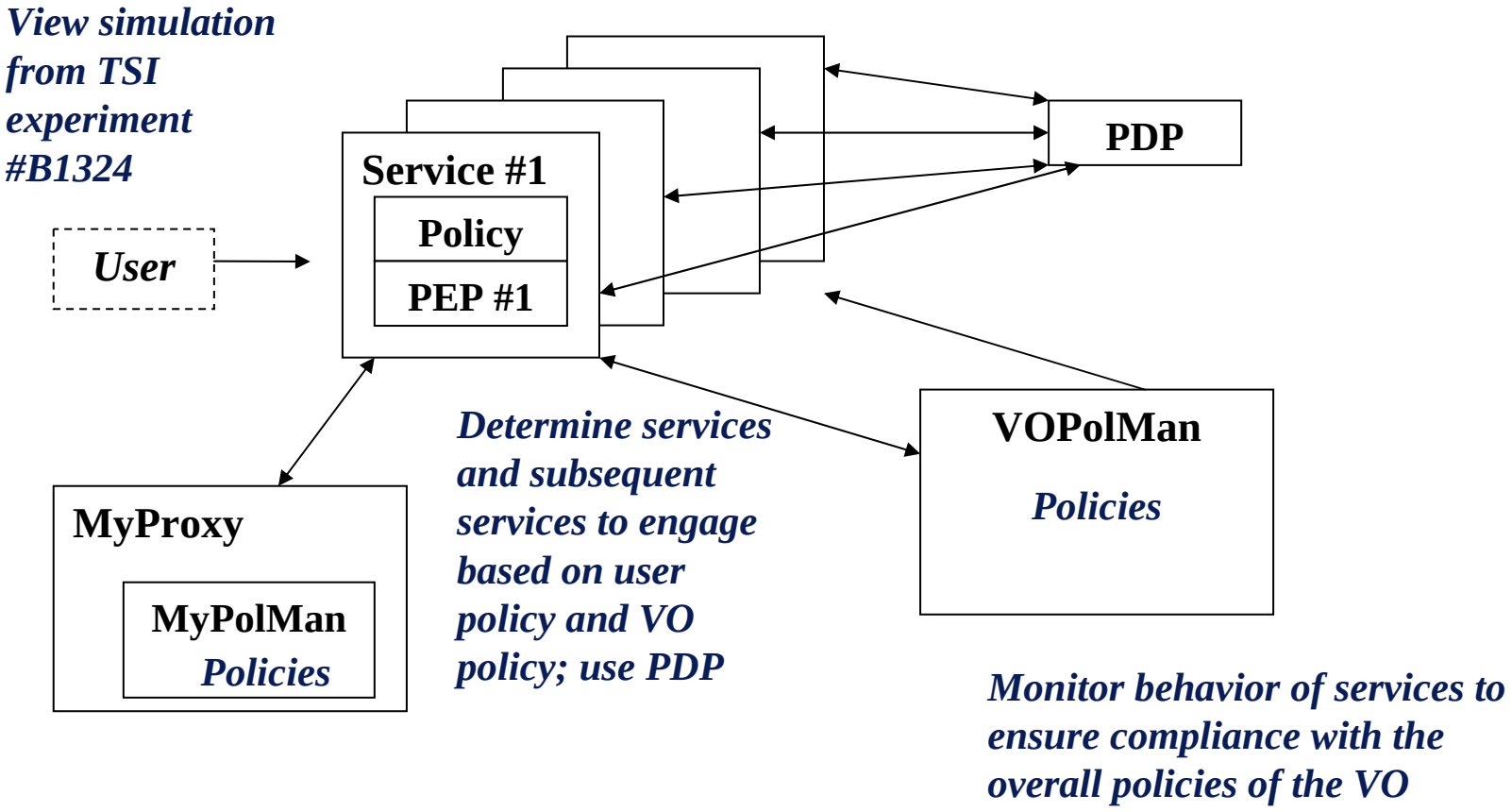
Problem Statement (2)

- **Lack of acceptable policy languages**
- **Humans cannot easily express their policies**
- **Software components cannot find relevant policies**
- **Policies cannot be matched/resolved**

Approach

- **MyPolMan**
  - Leveraging MyProxy to store/manage/retrieve my policies
    - “My credential can be retrieved by superschedulers but only for the purpose of querying candidate resources for my allocations”
    - “For services running under my credential, serve requests from users at ORNL before users from *.edu”
- **VoPolMan**
  - For physical organizations and virtual organizations
    - “All services must allow password authentication by prefer X.509-based authentication.”
    - “Each physical organization in the VO must contribute 10 Terabytes disk storage with an availability of 99%.”
    - “All work is to be performed on large queuing systems from 9 am – 5 pm and on PC clusters after hours.”

Grid Policy Management Architecture



Building Blocks

- **MyProxy (http://myproxy.ncsa.uiuc.edu)**
- **CredEx (ICWS'2005)**
- **SAML**
- **XACML**
- **WS-Policy**

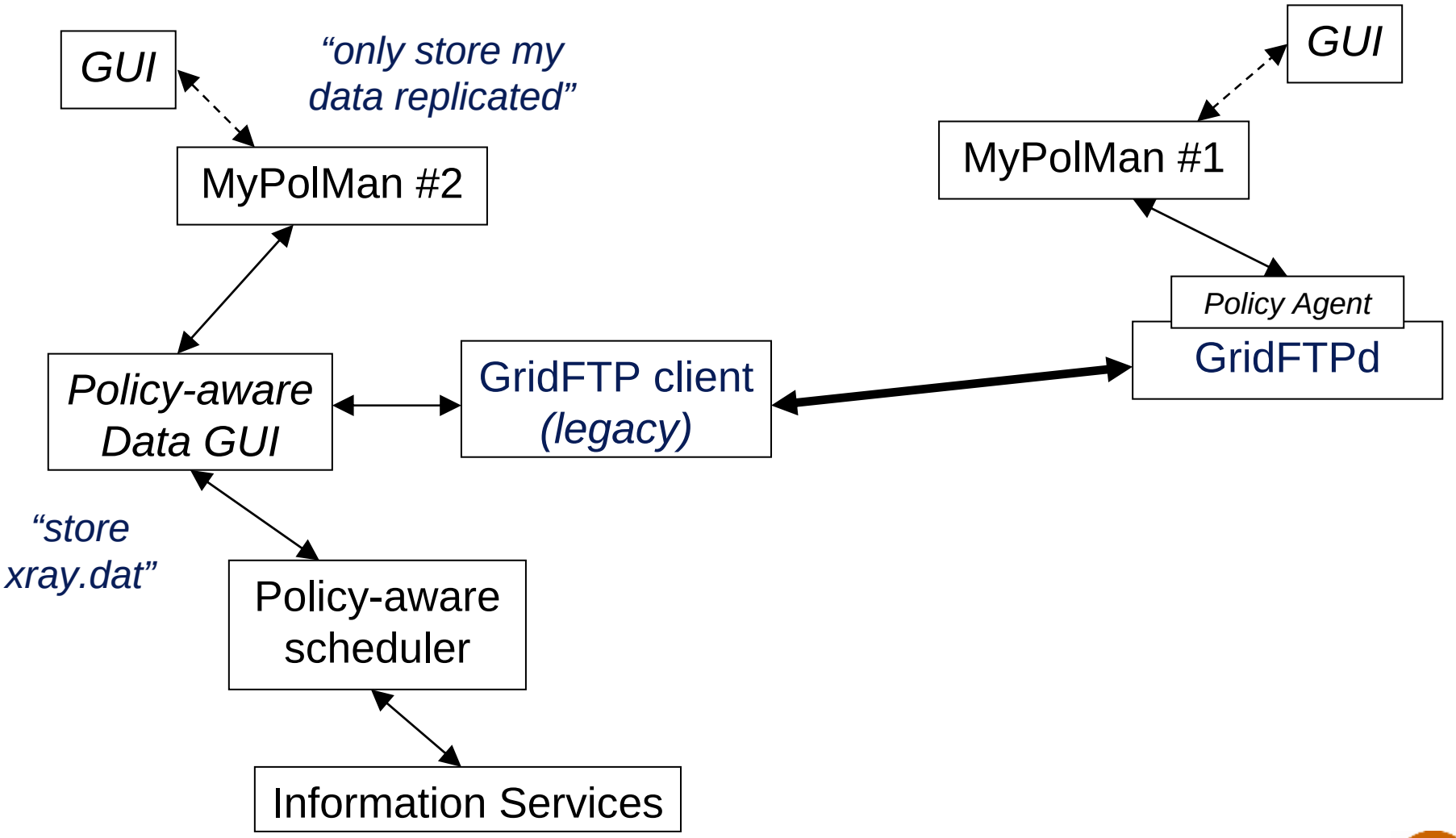
- ***All messages use WS-Security and/or SSL***

Requirements

- **Policy language**
- **Client-side GUI**
- **Publish/Subscribe/Discovery**
- **Policy evaluator**
- **Auditing**

- ***Interoperability: Standards-based***

Policy-Aware Data Movement



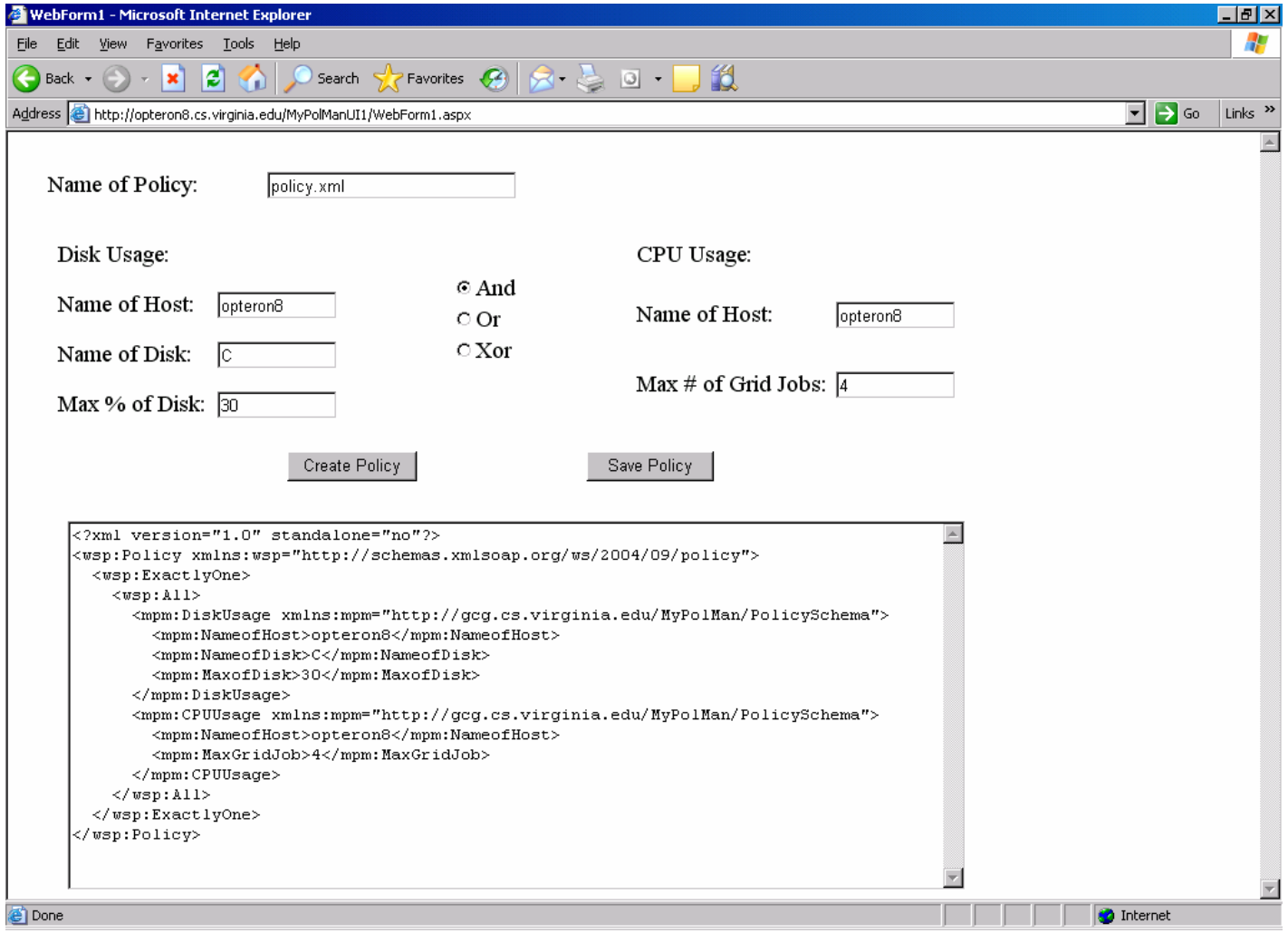
Resource Provider Data Policies

- **“Allow up to 30% of this disk for ‘Grid’ activities”**
  - “No one user can have more than 10G”
- **“Allow up to half of the network bandwidth to be used for ‘Grid’ activities”**
- **“Service ORNL requests before .edu requests”**
- **“All data requests must first be authenticated via GSI”**

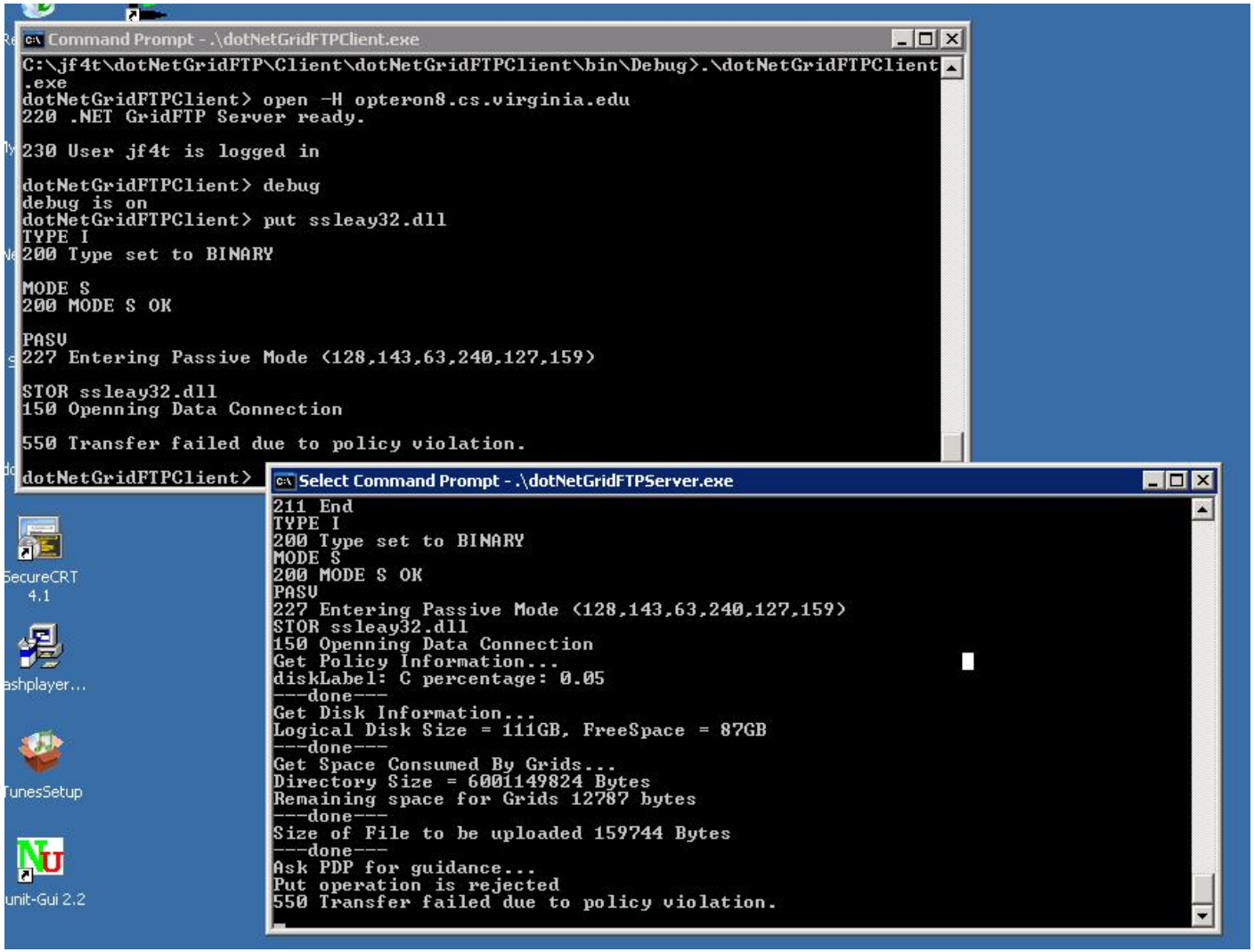
Consumer Data Policies

- **Bandwidth**
- **Response Time (Latency)**
- **Availability**
- **Access Control**
- **Authentication**
- **Persistence / “non-scrubability”**
- **Replication**
- **Backup**

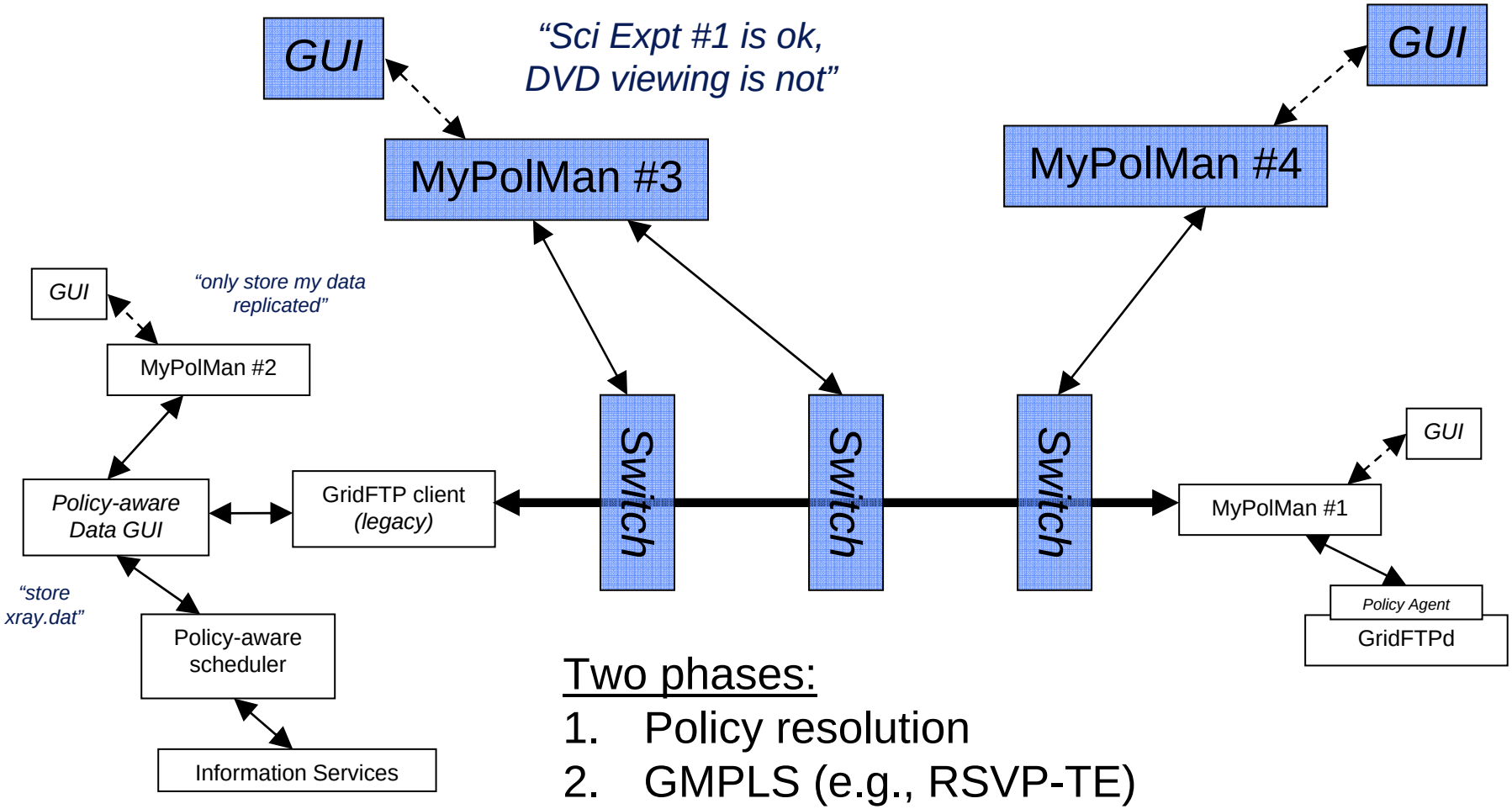
GUI


WebForm1 - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://opteron8.cs.virginia.edu/MyPolManUI1/WebForm1.aspx
Go Links
Name of Policy: policy.xml
Disk Usage:
Name of Host: opteron8
Name of Disk: C
Max % of Disk: 30
And
Or
Xor
CPU Usage:
Name of Host: opteron8
Max # of Grid Jobs: 4
Create Policy
Save Policy
<?xml version="1.0" standalone="no"?>
<wsp:Policy xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy">
<wsp:ExactlyOne>
<wsp:All>
<mpm:DiskUsage xmlns:mpm="http://gcg.cs.virginia.edu/MyPolMan/PolicySchema">
<mpm:NameofHost>opteron8</mpm:NameofHost>
<mpm:NameofDisk>C</mpm:NameofDisk>
<mpm:MaxofDisk>30</mpm:MaxofDisk>
</mpm:DiskUsage>
<mpm:CPUUsage xmlns:mpm="http://gcg.cs.virginia.edu/MyPolMan/PolicySchema">
<mpm:NameofHost>opteron8</mpm:NameofHost>
<mpm:MaxGridJob>4</mpm:MaxGridJob>
</mpm:CPUUsage>
</wsp:All>
</wsp:ExactlyOne>
</wsp:Policy>
Done
Internet

Runtime


Command Prompt - .\dotNetGridFTPClient.exe
C:\jf4t\dotNetGridFTP\Client\dotNetGridFTPClient\bin\Debug>.\dotNetGridFTPClient
.exe
dotNetGridFTPClient> open -H opteron8.cs.virginia.edu
220 .NET GridFTP Server ready.
230 User jf4t is logged in
dotNetGridFTPClient> debug
debug is on
dotNetGridFTPClient> put ssleay32.dll
TYPE I
200 Type set to BINARY
MODE S
200 MODE S OK
PASV
227 Entering Passive Mode (128,143,63,240,127,159)
STOR ssleay32.dll
150 Openning Data Connection
550 Transfer failed due to policy violation.
dotNetGridFTPClient>
Select Command Prompt - .\dotNetGridFTPServer.exe
211 End
TYPE I
200 Type set to BINARY
MODE S
200 MODE S OK
PASV
227 Entering Passive Mode (128,143,63,240,127,159)
STOR ssleay32.dll
150 Openning Data Connection
Get Policy Information...
diskLabel: C percentage: 0.05
---done---
Get Disk Information...
Logical Disk Size = 111GB, FreeSpace = 87GB
---done---
Get Space Consumed By Grids...
Directory Size = 6001149824 Bytes
Remaining space for Grids 12787 bytes
---done---
Size of File to be uploaded 159744 Bytes
---done---
Ask PDP for guidance...
Put operation is rejected
550 Transfer failed due to policy violation.
SecureCRT 4.1
unit-Gui 2.2

Better Policy-Aware Data Movement



Two phases:

1. Policy resolution
2. GMPLS (e.g., RSVP-TE)

Summary

- **Grids are not as usable as they can be**
  - Operations often fail because of (implicit) policy
- **We are designing/implementing a policy architecture**
  - Policy language, client-side GUI, Publish/Subscribe/Discovery, Policy evaluator, Auditing
- **Prototype policy-aware gridftp data movement**
  - Extend to network