OGSA® Basic Execution Service
Version 1.0

Aleksandr Konstantinov
KnowARC/NorduGrid
OGF IPR Policies Apply

- “I acknowledge that participation in this meeting is subject to the OGF Intellectual Property Policy.”
- Intellectual Property Notices Note Well: All statements related to the activities of the OGF and addressed to the OGF are subject to all provisions of Appendix B of GFD-C.1, which grants to the OGF and its participants certain licenses and rights in such statements. Such statements include verbal statements in OGF meetings, as well as written and electronic communications made at any time or place, which are addressed to:
  - the OGF plenary session,
  - any OGF working group or portion thereof,
  - the OGF Board of Directors, the GFSG, or any member thereof on behalf of the OGF,
  - the ADCOM, or any member thereof on behalf of the ADCOM,
  - any OGF mailing list, including any group list, or any other list functioning under OGF auspices,
  - the OGF Editor or the document authoring and review process
- Statements made outside of an OGF meeting, mailing list or other function, that are clearly not intended to be input to an OGF activity, group or function, are not subject to these provisions.
- Excerpt from Appendix B of GFD-C.1: "Where the OGF knows of rights, or claimed rights, the OGF secretariat shall attempt to obtain from the claimant of such rights, a written assurance that upon approval by the GFSG of the relevant OGF document(s), any party will be able to obtain the right to implement, use and distribute the technology or works when implementing, using or distributing technology based upon the specific specification(s) under openly specified, reasonable, non-discriminatory terms. The working group or research group proposing the use of the technology with respect to which the proprietary rights are claimed may assist the OGF secretariat in this effort. The results of this procedure shall not affect advancement of document, except that the GFSG may defer approval where a delay may facilitate the obtaining of such assurances. The results will, however, be recorded by the OGF Secretariat, and made available. The GFSG may also direct that a summary of the results be included in any GFD published containing the specification."
- OGF Intellectual Property Policies are adapted from the IETF Intellectual Property Policies that support the Internet Standards Process.
Outline

- Basic Execution Service
- Activity Lifetime/States
- Attributes
- Extensions
- Implementations
Basic Execution Service

- Defined in GFD.108 OGF document
- Current status – released recommendation
- “Basic Execution Service (BES) specification defines Web Services interfaces for creating, monitoring, and controlling computational entities such as UNIX or Windows processes, Web Services, or parallel programs – what we call activities – within a defined environment.”
- Activity is abstract entity described in XML document using Job Submission Description Language (JSDL)
BES Operations

● All operations are split into two groups
  ● BES-Management Port-type - manages service itself
    ● StopAcceptingNewActivities - stop accepting new activities
    ● StartAcceptingNewActivities - start accepting new activities
  ● BES-Factory Port-type - manages activities
    ● CreateActivity - create a new activity
    ● GetActivityStatuses - request the status of the activities
    ● TerminateActivities - stop the activities
    ● GetActivityDocuments - request JSDL documents of activities
    ● GetFactoryAttributesDocument - request XML document describing BES service properties
  ● BES-Activity Port-type
    ● Initially defined but never developed
    ● Some implementations prefer this approach
Each Activity is created with Create Activity operation and goes through set of predefined States

The BES defines basic States and Transitions

```xml
<xsd:simpleType name="ActivityStateEnumeration">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Pending"/>
    <xsd:enumeration value="Running"/>
    <xsd:enumeration value="Cancelled"/>
    <xsd:enumeration value="Failed"/>
    <xsd:enumeration value="Finished"/>
  </xsd:restriction>
</xsd:simpleType>
```
Activity Lifetime/States (cont.)

- The BES defines only basic States
  - Each State can be specialized by splitting it into implementation specific sub-states
  - New Transitions between basic States are not allowed for compatibility between different implementations
  - This sometimes makes implementations stuff all own sub-states into Running – meaning of BES states is lost.
Attributes

- The BES defines set of Attributes describing BES Service itself
- The Attributes are obtainable through `GetFactoryAttributesDocument` operation
- Attributes provide simplistic description of Resources exposed through BES
  - `IsAcceptingNewActivities` - if BES is accepting new activities
  - `CommonName` - Short human-readable name
  - `LongDescription` - Longer human-readable description
  - `TotalNumberOfActivities` - Number of activities currently managed
  - `ActivityReference` - Identifiers of activities currently active
Attributes (cont.)

- **TotalNumberOfContainedResources** - Number of contained resources
- **ContainedResource** - Description of contained resources
- **NamingProfile** - URIs of Naming profiles
- **BSEExtension** - URIs of supported extensions
- **LocalResourceManagerType** - Resource manager type
- **ResourceName** - Resource name
- **OperatingSystem** - Resource operating system
- **CPUArchitecture** - Resource CPU type
- **CPUCount** - Resource CPU count
- **CPUSpeed** - Resource CPU speed, in Hertz
- **PhysicalMemory** - Resource physical memory, in bytes
- **VirtualMemory** - Resource virtual memory, in bytes
 Attributes (cont.)

- Attributes defined by BES are not enough to describe resource adequately
- Every implementation comes with own extensions
  - More information returned through in reply to GetFactory AttributesDocument
  - Additional interface for providing more information – like WSRF
  - Some standardization efforts are going on in OGF
    - GIN
    - PGI

The objective of this working group is to formulate a well-defined set of profiles, and additional specifications if needed, for job and data management that are aligned with a Grid security and information model that addresses the needs of production grid infrastructures.

- GLUE2

The GLUE Working Group will provide a recommendation for an abstract information model which is expressed via a schema independent of information system implementations.
Extensions

• The BES is extensible
  • Communication XML schemas allow for additional elements to be inserted almost everywhere
  • Additional elements are defined through extensions supported by particular implementations
  • Supported extensions are announced in BESExtension attribute of service
• The BES specifications define 3 optional extensions
  • *Idempotent Execution Semantics* - uniquely identifies Activity using identifier provided by client
  • *Subscription to Notification Events* for Activity state changes
  • *Lifetime Management* defines termination time of Activity
Third Party Extensions

- **HPC Basic Profile**
  - *Basic Filter* - to limit amount of information provided by GetFactoryAttributesDocument operation
  - Rules for limiting vector operations
  - Authentication, Authorization, Integrity of requests.
    - Transport Layer Security (TLS/SSL) with X.509 certificates
    - Transport Layer Security (TLS/SSL) with Username-Password

- **HPC File Staging Profile**
  - Adds new states to BES – stage-in and stage-out
  - Adds ways to report data staging faults

- **Implementation specific extensions**
  - Every project/middleware adopting BES has own notion about what Execution Service is
  - Differences are implemented through extensions
Implementations

- **Unicore**

- **KnowARC – A-Rex**
  - [http://download.nordugrid.org/software/nordugrid-arc1/](http://download.nordugrid.org/software/nordugrid-arc1/)

- **gLite - CREAM BES**

- **GridSAM/OMII-UK**

- **Globus Toolkit – GRAM4**

- **Platform Computing - BES++**
  - Probably some other implementations
Full Copyright Notice

Copyright (C) Open Grid Forum (2008). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works.

The limited permissions granted above are perpetual and will not be revoked by the OGF or its successors or assignees.