

OGSA® Basic Execution Service Version 1.0

Aleksandr Konstantinov
KnowARC/NorduGrid

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Outline

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

Basic Execution Service

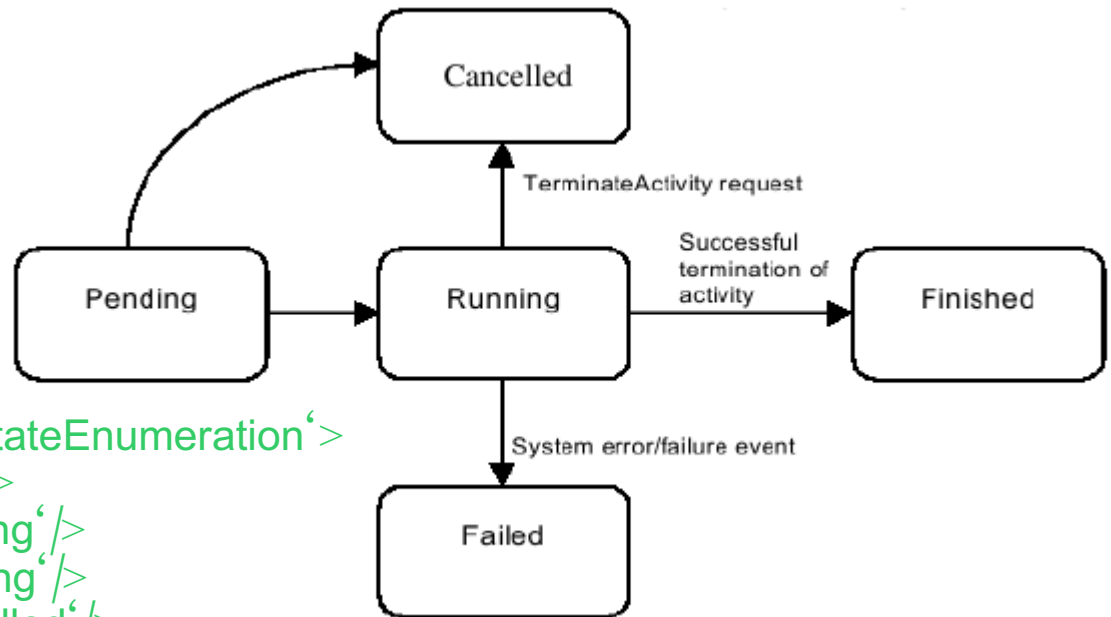
- Defined in GFD.108 OGF document
- Current status – released recommendation
- “Basic Execution Service (BES) specification defines Web Services interfaces for creating, monitoring, and controlling computational entities such as UNIX or Windows processes, Web Services, or parallel programs – what we 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

Activity Lifetime/States

- Each Activity is created with Create Activity operation and goes through set of predefined States
- The BES defines basic States and Transitions

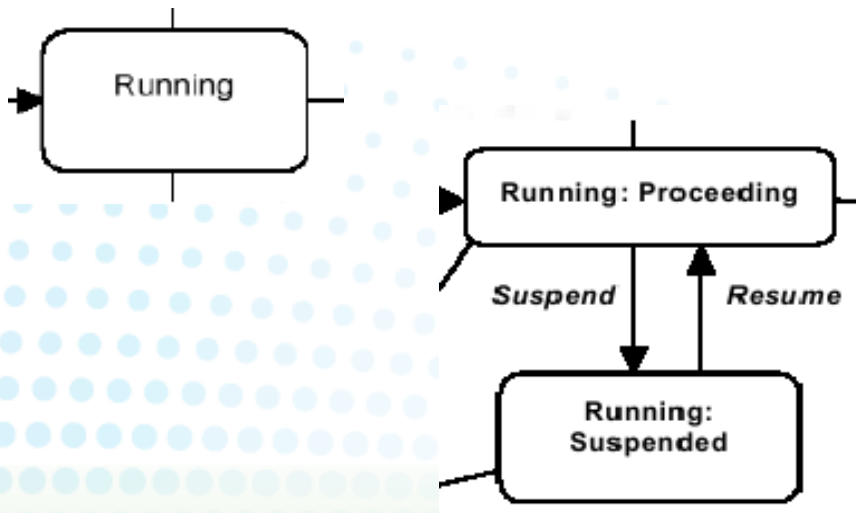


```

<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.



```

<bes:ActivityStatus state=?Running ?>
  <n00:Stage-In/>
</bes:ActivityStatus>
  
```

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
- *BESExtension* - 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**

- <http://www.unicore.eu/download/unicore6/>

- **KnowARC – A-Rex**

- <http://download.nordugrid.org/software/nordugrid-arc1/>
- http://www.nordugrid.org/documents/arex_tech_doc.pdf

- **gLite - CREAM BES**

- <http://glite.web.cern.ch/glite/packages/R3.1/>

- **GridSAM/OMII-UK**

- **Globus Toolkit – GRAM4**

- <http://www.globus.org/toolkit/downloads/4.2.1/>

- **Platform Computing - BES++**

- Probably some other implementations

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