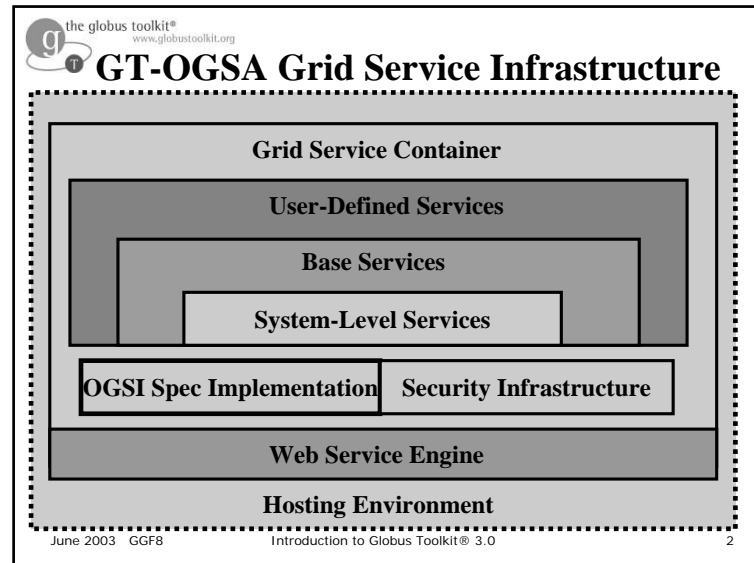


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Introduction to GT3

- Background
 - The Grid Problem
 - The Globus Approach
 - OGSA & OGSi
 - Globus Toolkit
- **GT3 Architecture and Functionality: The Latest Refinement of the Globus Toolkit**
 - Core
 - Base Services
 - User-Defined Services
 - Future Directions
- Installation and Administration
 - Installation
 - Configuration
 - Debugging
 - Support
- Important Things to Remember

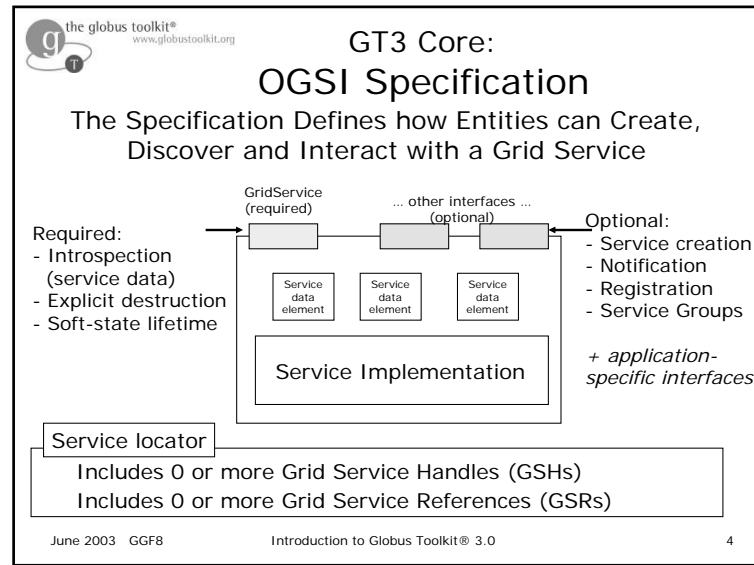
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GT3 Core

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GT3 Core: OGSI Implementation

- GT3 includes a set of primitives that implement the interfaces and behaviors defined in the latest version of the OGSI Specification
- The implementation supports a declarative programming model in which GT3 users can compose OGSI-Compliant grid services by plugging the desired primitives into their implementation

GT3 Core: OGSI Specification (cont.)

GridService portType

- Defines the fundamental behavior of a Grid Service
 - Introspection
 - Discovery
 - Soft State Lifetime Management
- Mandated by the Spec

GT3 Core: OGSI Specification (cont.)

Factory portType

- Factories create services
- Factories are typically persistent services
- Factory is an optional OGSI interface

(Grid Services can also be instantiated by other mechanisms)

GT3 Core: OGSI Specification (cont.)

Notification portTypes

- A subscription for notification causes the creation of a NotificationSubscription service
- NotificationSinks are not required to implement the GridService portType
- Notifications can be set on Service Data Elements
- Notification portTypes are optional

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GT3 Core: OGSI Specification (cont.)

Service group portTypes

- A ServiceGroup is a grid service that maintains information about a group of other grid services
- The classic registry model can be implemented with the ServiceGroup portTypes
- A grid service can belong to more than one ServiceGroup
- Members of a ServiceGroup can be heterogenous or homogenous
- Each entry in a service group can be represented as its own service
- Service group portTypes are optional OGSI interfaces

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GT3 Core: OGSI Specification (cont.)

HandleResolver portType

- Defines a means for resolving a GSH (Grid Service Handle) to a GSR (Grid Service Reference)
 - A GSH points to a Grid Service
(GT3 uses a hostname-based GSH scheme)
 - A GSR specifies how to communicate with the Grid Service
(GT3 currently supports SOAP over HTTP, so GSRs are in WSDL format)
- HandleResolver is an optional OGSI interface

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A Service Creation Scenario*

1. From a known registry, the client discovers a factory by querying the Service data of the registry

* The scenarios in this presentation are offered as examples and are not prescriptive

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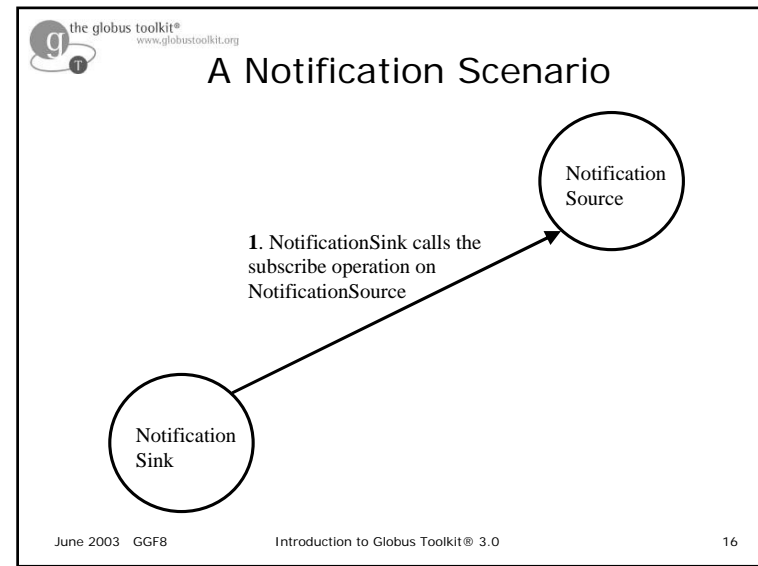
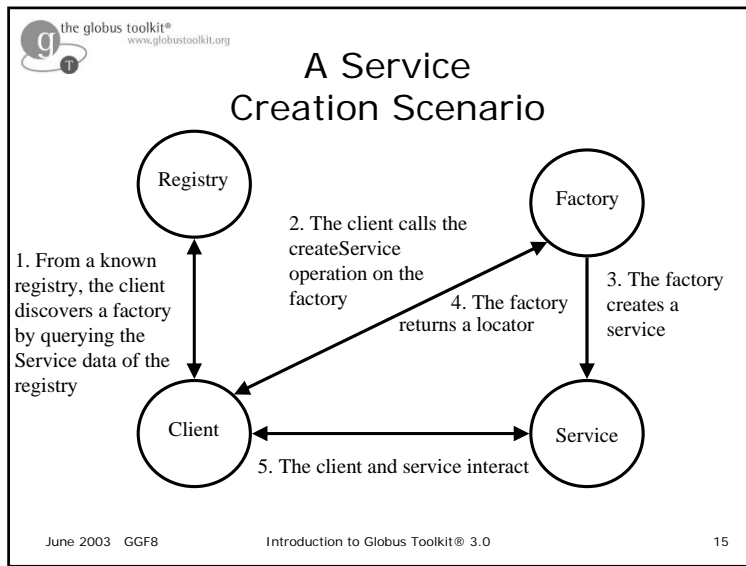
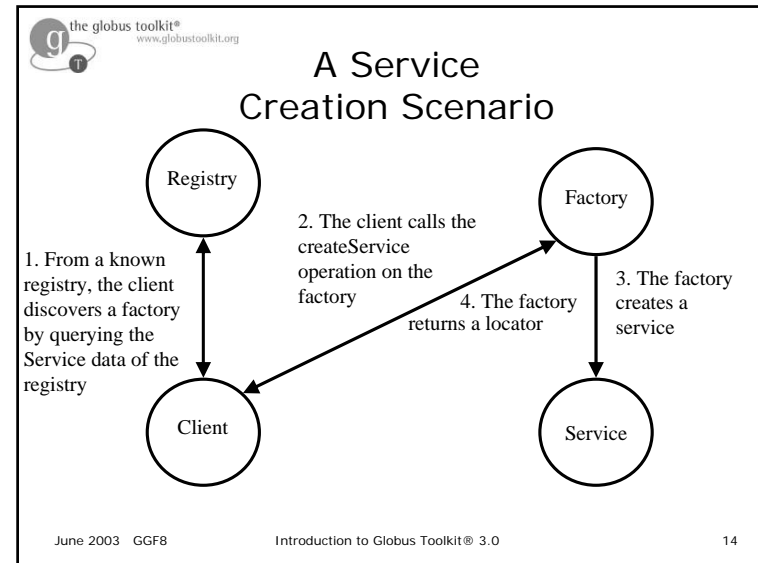
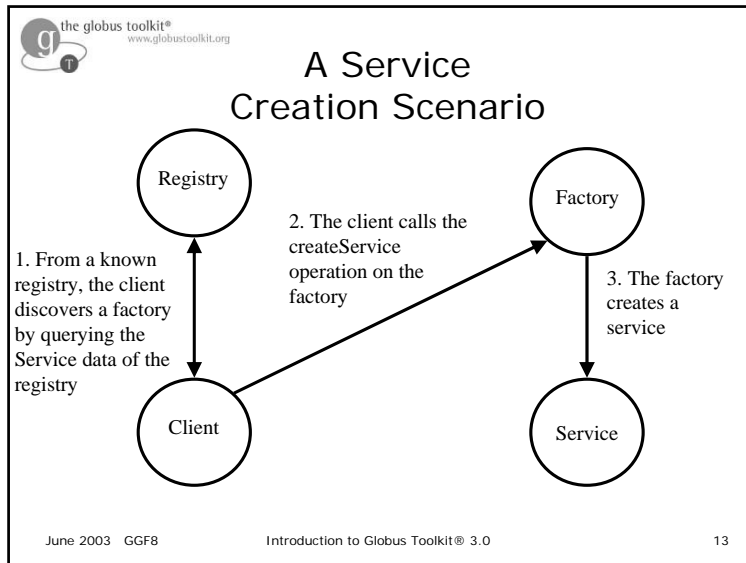
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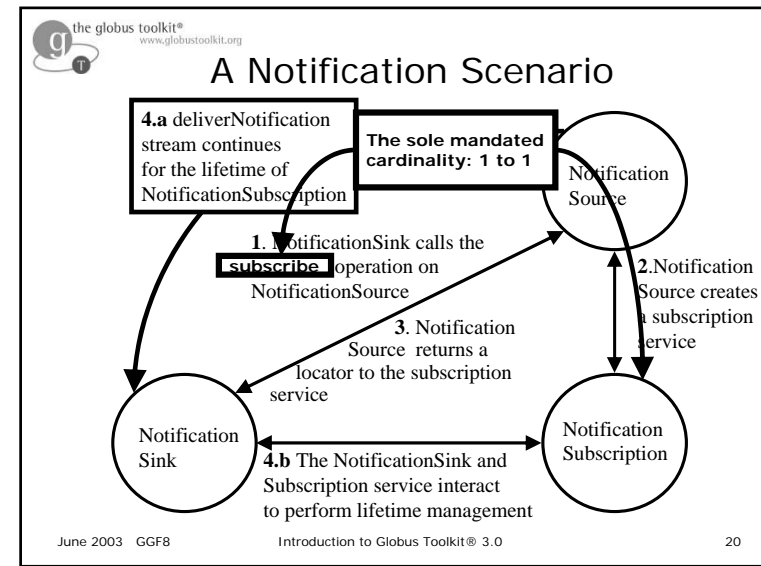
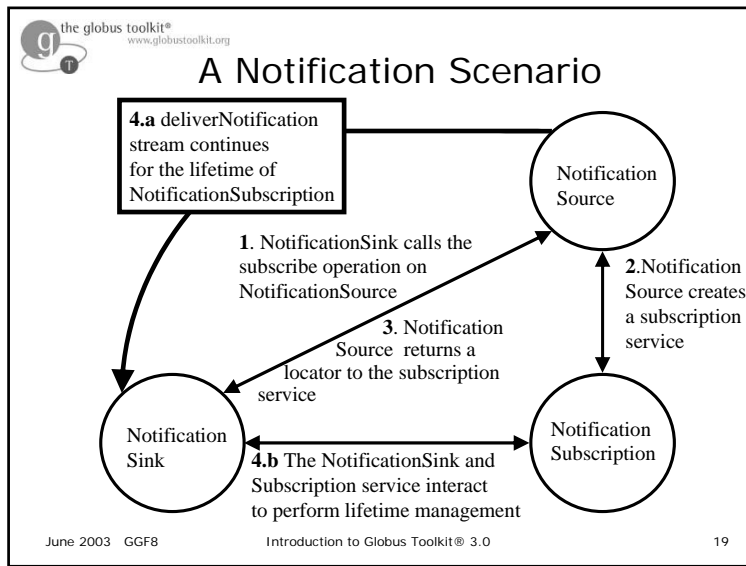
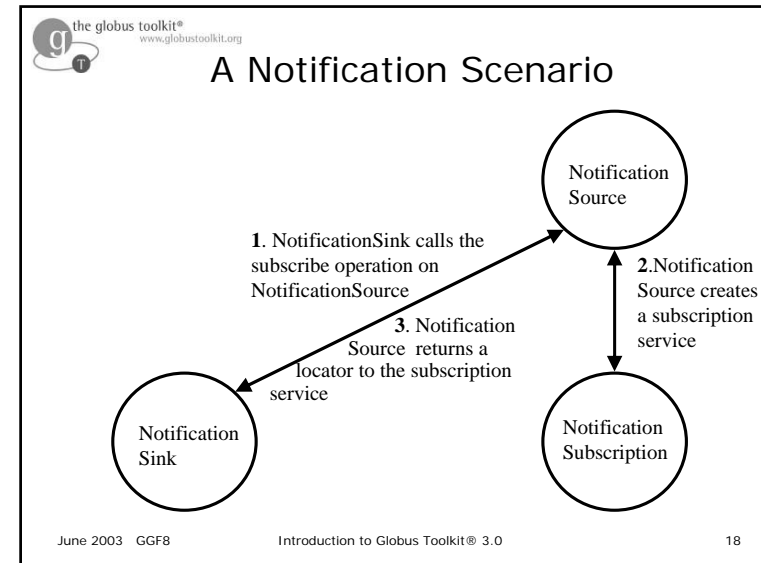
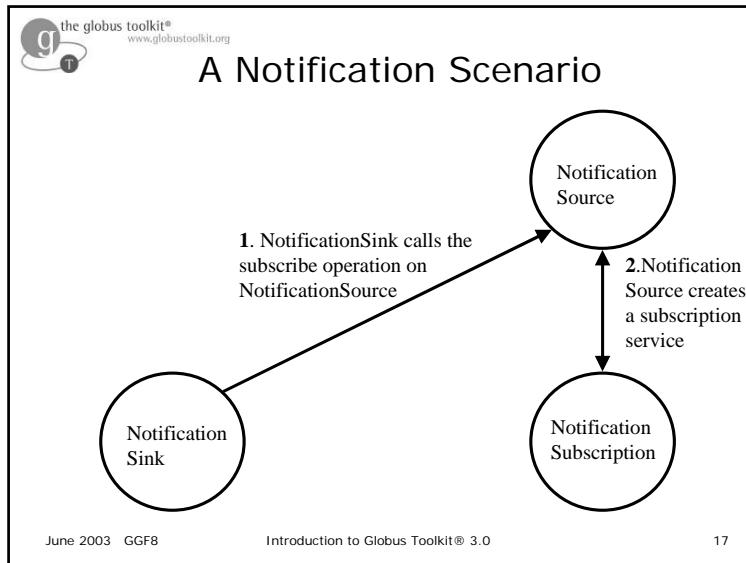
A Service Creation Scenario

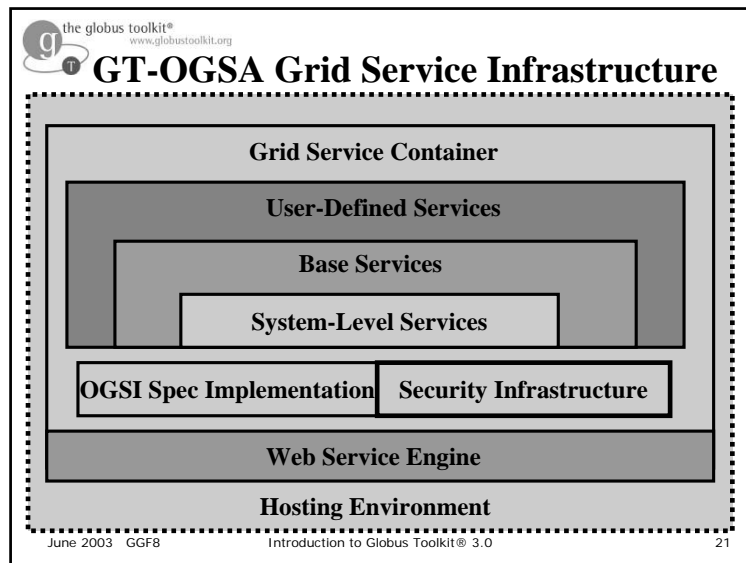
1. From a known registry, the client discovers a factory by querying the Service data of the registry

2. The client calls the createService operation on the factory

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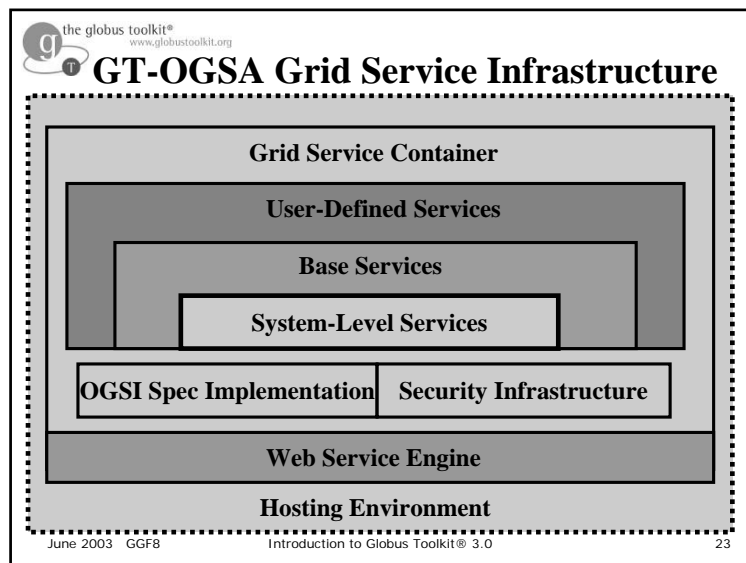


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GT3 Core: Security Infrastructure

- Transport Layer Security/Secure Socket Layer (TLS/SSL)
 - To be deprecated
- SOAP Layer Security
 - Based on WS-Security, XML Encryption, XML Signature
- GT3 uses X.509 identity certificates for authentication
- It also uses X.509 Proxy certificates to support delegation and single sign-on, updated to conform to latest IETF/GGF draft

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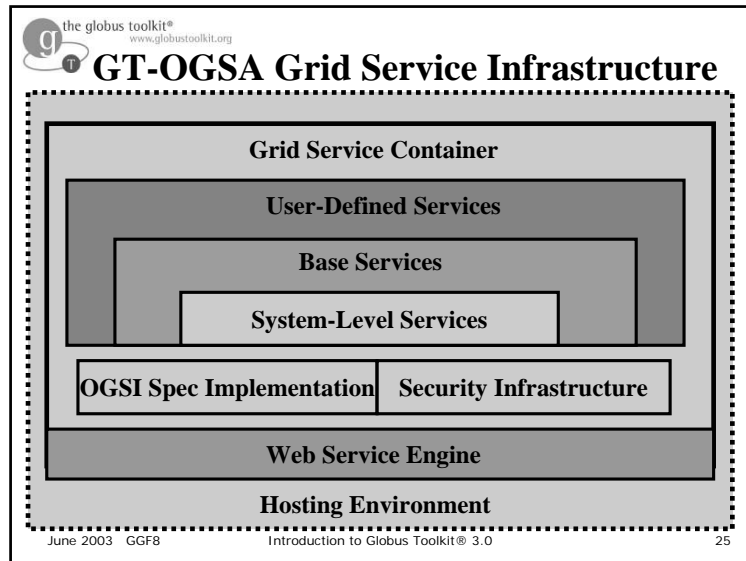


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GT3 Core: System Level Services

- General-purpose services that facilitate the use of Grid Services in production environments
- The 3.0 distribution includes the following System-Level services:
 - An Administration Service
 - A Logging Service
 - A Management Service

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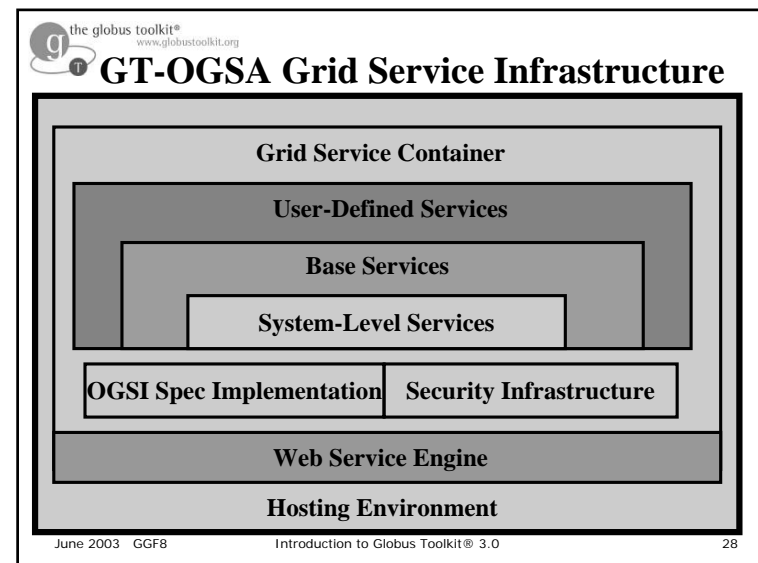
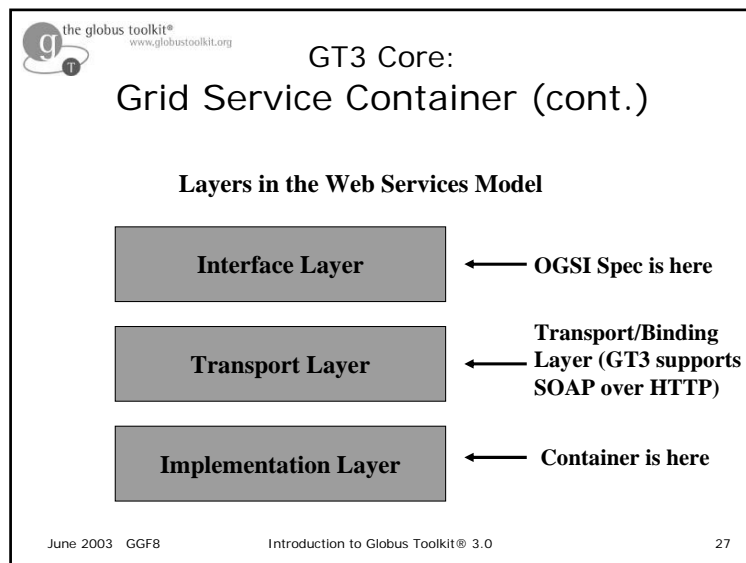
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GT3 Core: Grid Service Container

Includes the OGSi Implementation, security infrastructure and system-level services, plus:

- Service activation, deactivation, construction, destruction, etc.
- Service data element placeholders that allow you to dynamically fetch service data values at query time
- Evaluator framework (supporting ByXPath and ByName notifications and queries)
- Interceptor/callback framework (allows one to intercept certain service lifecycle events)

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GT3 Core: Hosting Environment

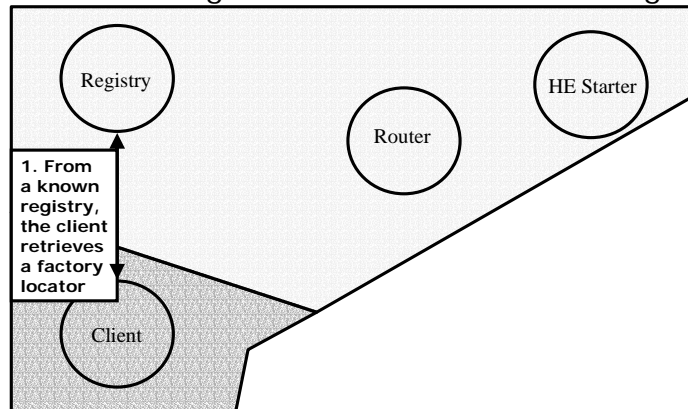
GT3 currently offers support for four Java Hosting Environments:

- Embedded
- Standalone
- Servlet
- EJB

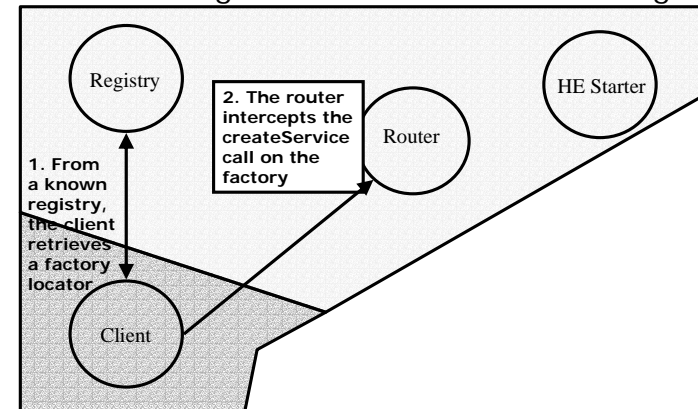
GT3 Core: Virtual Hosting Environment Framework

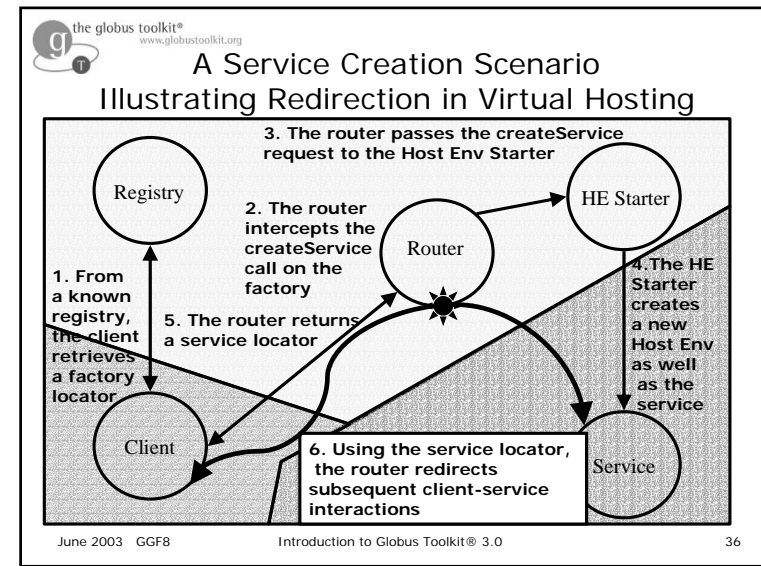
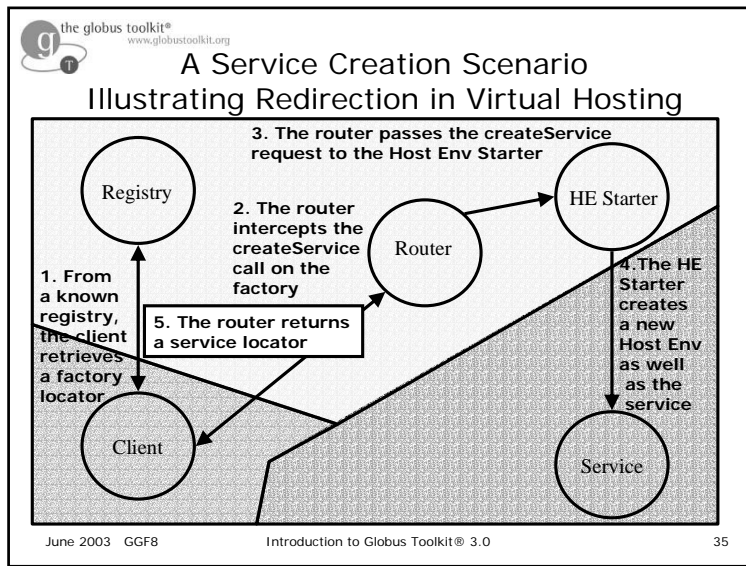
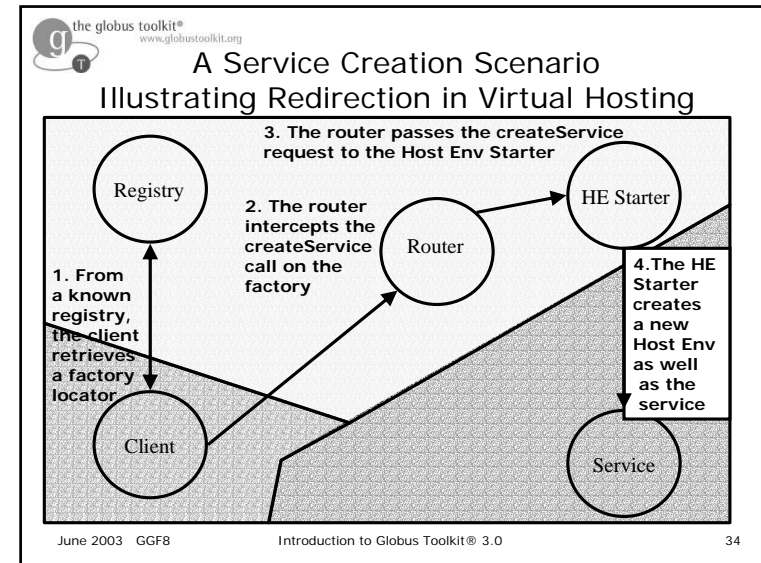
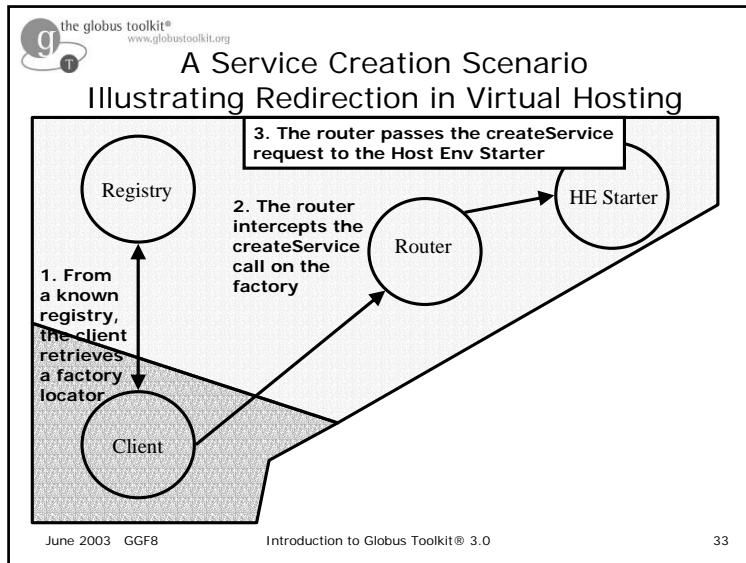
- Virtual Hosting allows grid services to be distributed across several remote containers
- Useful in implementing solutions for problems common to distributed computing
 - Load balancing
 - User account sandboxing

A Service Creation Scenario Illustrating Redirection in Virtual Hosting



A Service Creation Scenario Illustrating Redirection in Virtual Hosting





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GT3 Base Services

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GT-OGSA Grid Service Infrastructure

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GT3 Base: Resource Management

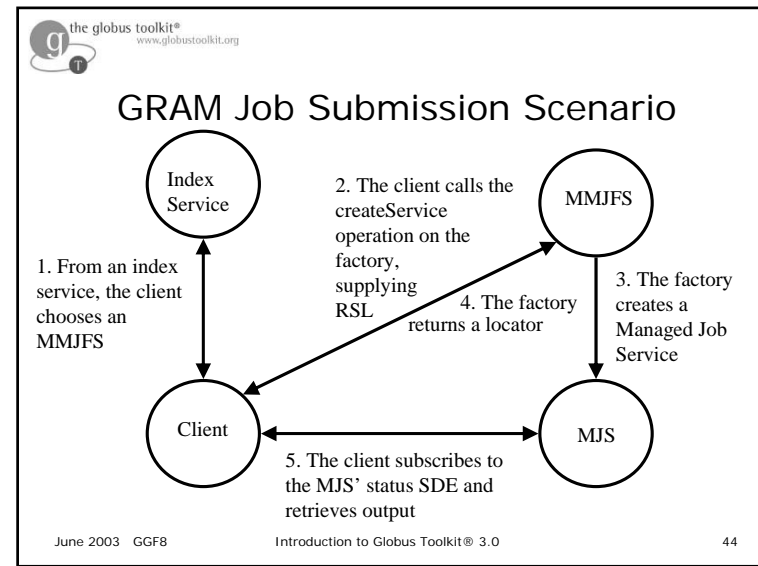
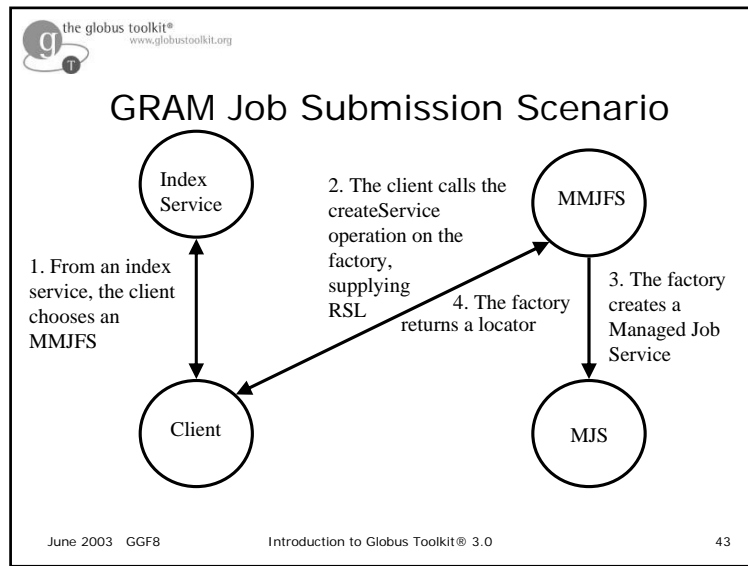
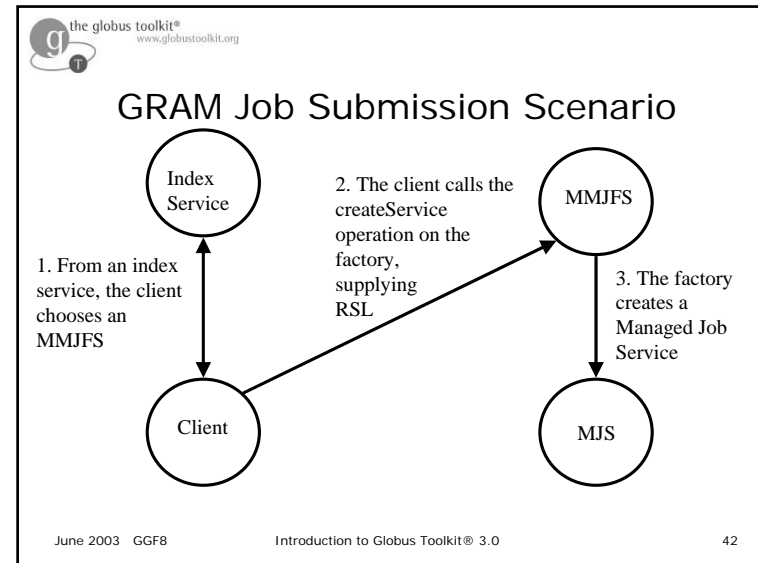
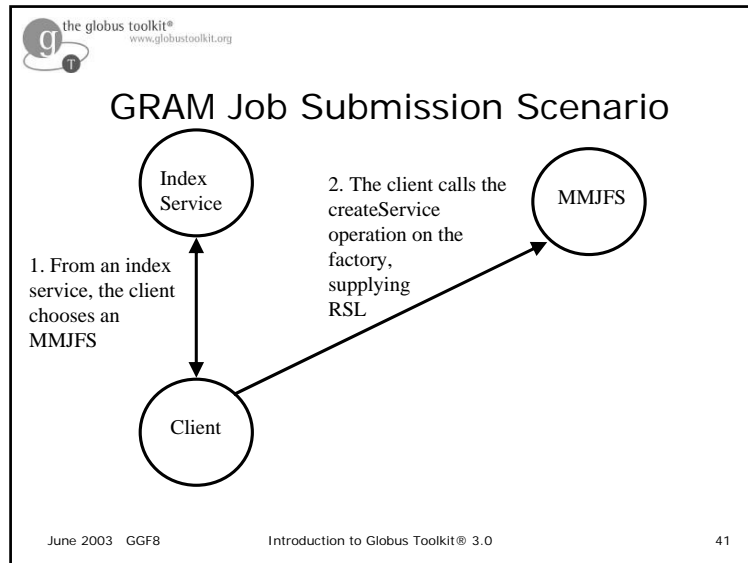
- GRAM Architecture rendered in OGSA
- The MMJFS runs as an unprivileged user, with a small highly-constrained setuid executable behind it.

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GRAM Job Submission Scenario

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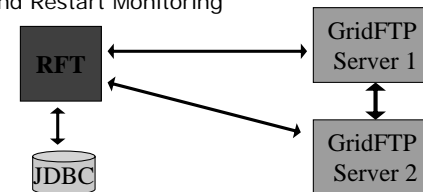


GT3 Base: Information Services

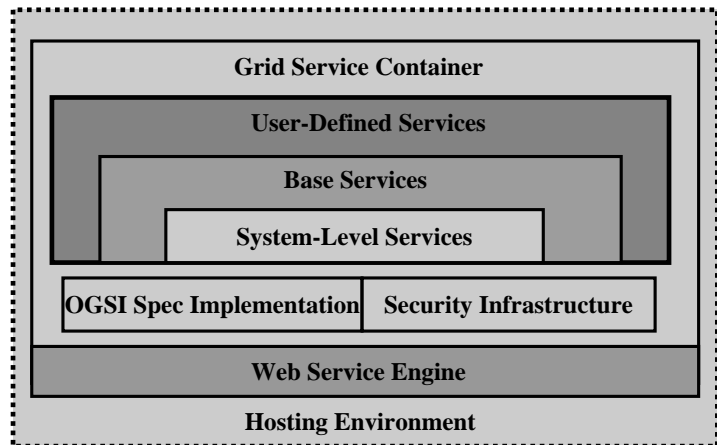
- Index Service as Caching Aggregator
 - Caches service data from other grid services
- Index Service as Provider Framework
 - Serves as a host for service data providers that live outside of a grid service to publish data

GT3 Base: Reliable File Transfer

- Reliably performs a third party transfer between two GridFTP servers
- OGSI-compliant service exposing GridFTP control channel functionality
- Recoverable Grid Service
 - Automatically restarts interrupted transfers from the last checkpoint
- Progress and Restart Monitoring



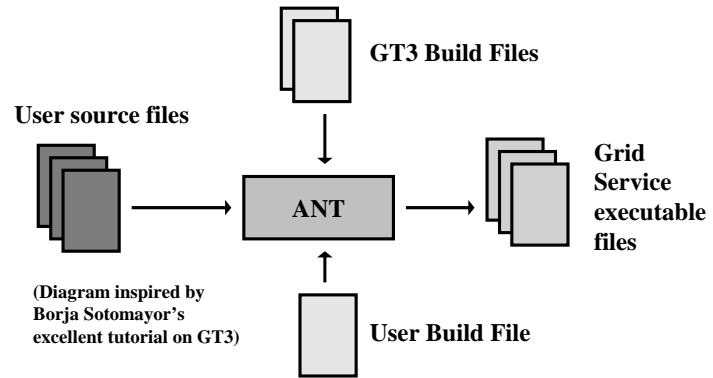
GT-OGSA Grid Service Infrastructure



GT3 User-Defined Services

- GT3 can be viewed as a Grid Service Development Kit that includes:
 - Primitives designed to ease the task of building OGSI-Compliant Services
 - Primitives for provisioning security
 - Base services that provide an infrastructure with which to build higher-level services

GT3 User-Defined Services (cont.)



Future Directions of GT

- Standardization of container model
- Development of lightweight container/api
- Adding rich support for queries
- Further refinements of Base Service designs
- Pushing on standardizing at a higher level than OGSi