One-Stop, Fire-and-(almost) Forget Dropping-off and Rendezvous Point

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Motivation

- An easy way to access Grid resources (A-WARE)
- Portal solution (easy)
- Domain-specific work assignments
- Automatic grounding of workflow tasks
- Partial, flexible interactivity

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Agenda

- Introduction
- Fabric Layer
  - ⇨ Atomic services
  - ⇨ Roctopus
- Higher-level Services
  - ⇨ Workflow
  - ⇨ Orchestration
  - ⇨ Notification and interaction
- JBI
  - ⇨ Communication infrastructure
  - ⇨ Flexible messaging
  - ⇨ Integration of UAS
- Summary

Introduction

- Unicore
  - ⇨ Vertically-integrated, stovepipe
- Recent extensions to SOA
  - ⇨ Loose coupling
  - ⇨ Stovepipe construction toolkit
  - ⇨ Fabric layer
- Higher-level services
  - ⇨ Orchestration
  - ⇨ Non-fabric
  - ⇨ Workflow, business process or service chain

OSFAAFDOARP explained

- One-stop
  - ⇨ single facade to the grid user
  - ⇨ drop-off and rendezvous
- Fire-and-forget
  - ⇨ work engine orchestrates workflow
  - ⇨ 'rendezvous' on completion
- 'almost'
  - ⇨ information during runtime
  - ⇨ participation in execution

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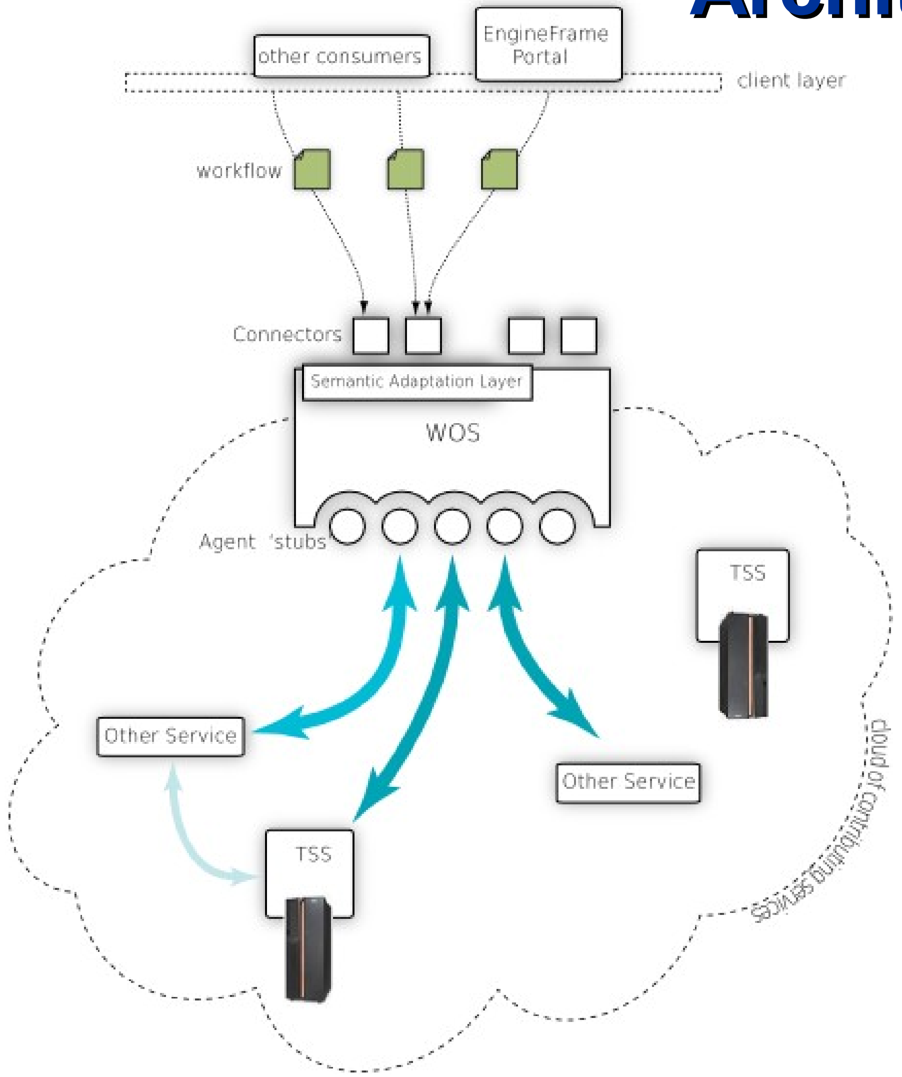
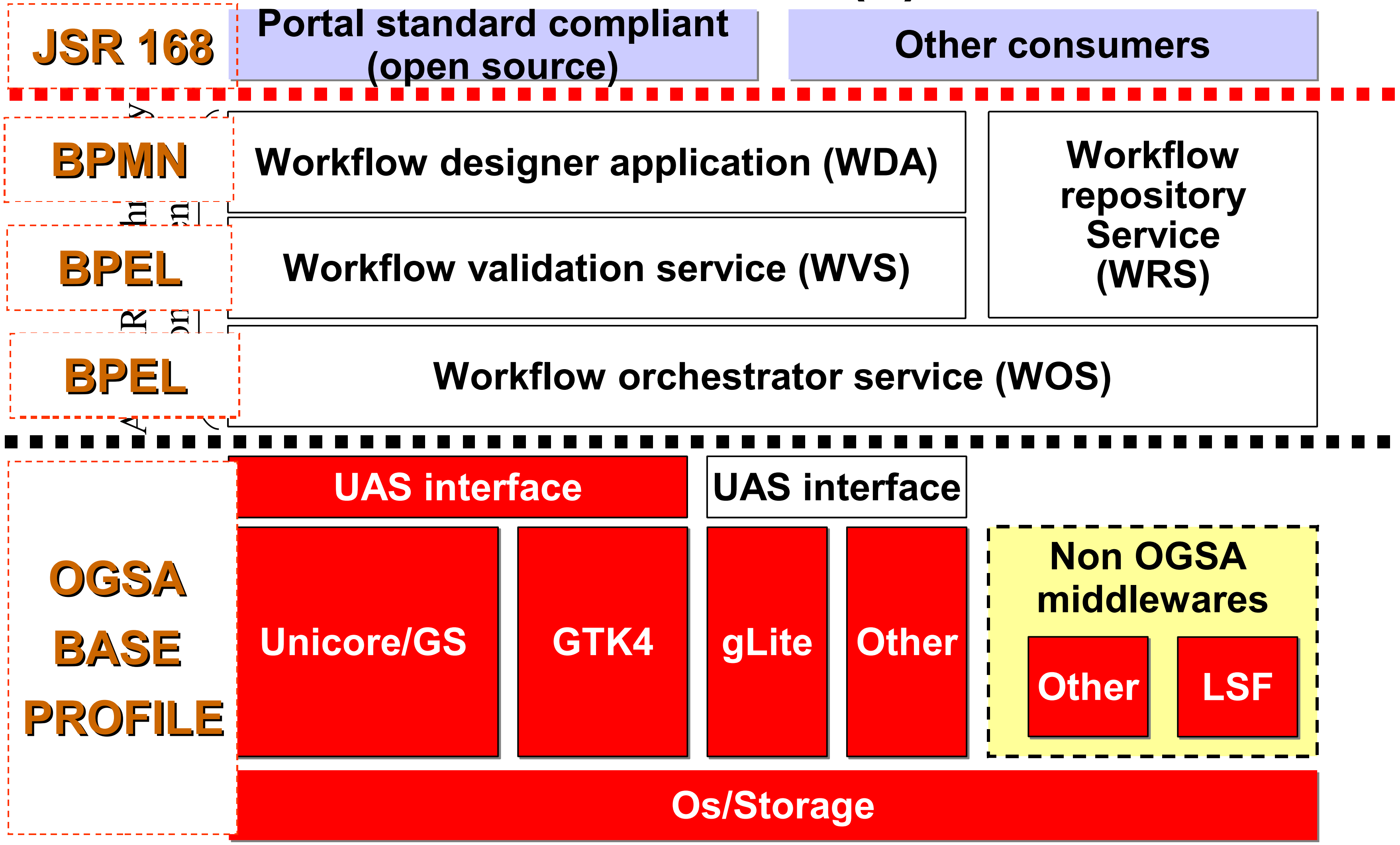
Architecture

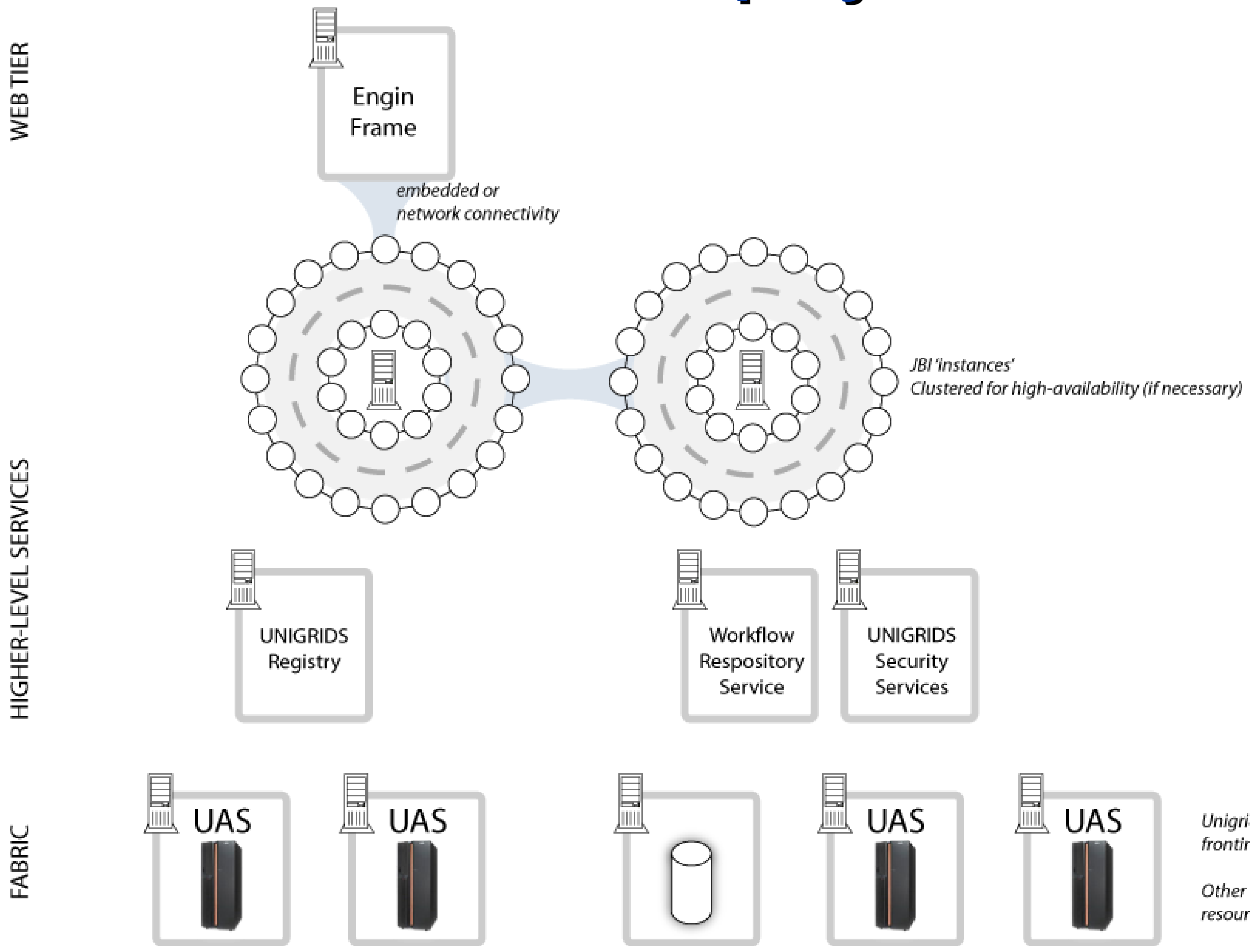


- Portals
- Workflows
- WOS
- Fabric

Architecture (2)

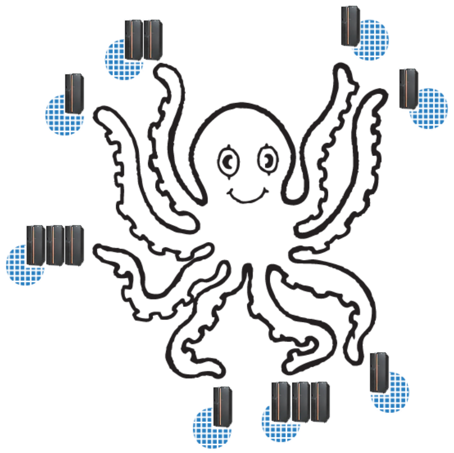

JSR 168
Portal standard compliant (open source)
Other consumers
BPMN
Workflow designer application (WDA)
BPEL
Workflow validation service (WVS)
Workflow repository Service (WRS)
BPEL
Workflow orchestrator service (WOS)
OGSA BASE PROFILE
UAS interface
UAS interface
Unicore/GS
GTK4
gLite
Other
Non OGSA middlewares
Other
LSF
Os/Storage

A-WARE Deployment


WEB TIER
HIGHER-LEVEL SERVICES
FABRIC
Engin Frame
embedded or network connectivity
JBI 'instances' Clustered for high-availability (if necessary)
UNIGRIDS Registry
Workflow Respository Service
UNIGRIDS Security Services
UAS
UAS
UAS
UAS
Unigrids Atomic Services fronting HPC resources
Other backend / fabric resources

Grid Fabric Layer

- Unicore Atomic Services (UAS)
- Positioned on JBI bus
- Accessed by (JBI) binding component using Roctopus API
  - ⇨ Easy programming
  - ⇨ Simple configuration
  - ⇨ Other backends possible



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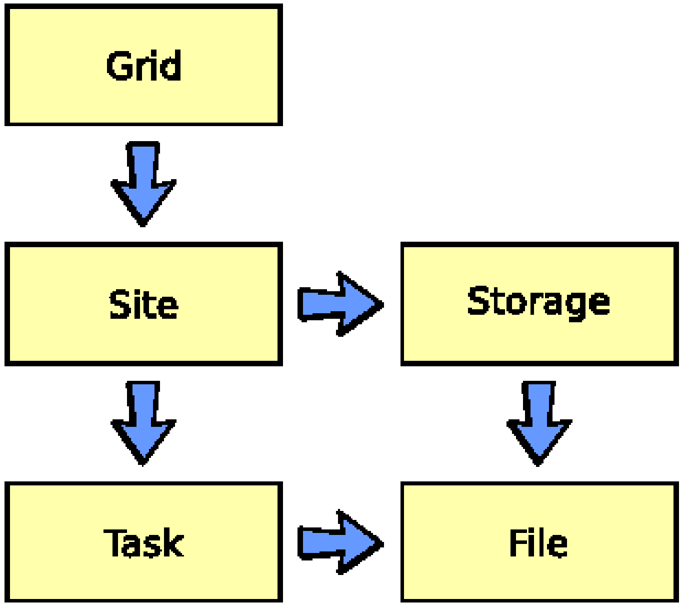
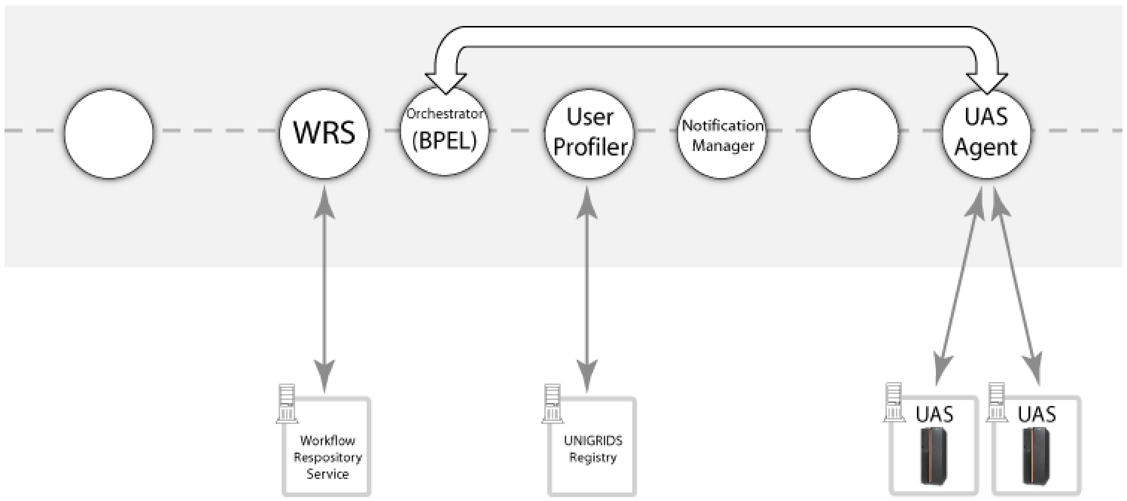
Roctopus

- Support for multiple backend infrastructures, e.g. Unicore 5 & Unicore 6
- Hides implementation and configuration details
- Small set of interfaces
- Model of resources resembling REST



Workflow Orchestrator Service (WOS)

- BPEL as starting point, possibly others
- Rule-based reaction to workflow status
  - ⇨ Notification
  - ⇨ Selection of resources (Policies)
  - ⇨ Corrective reaction to failures



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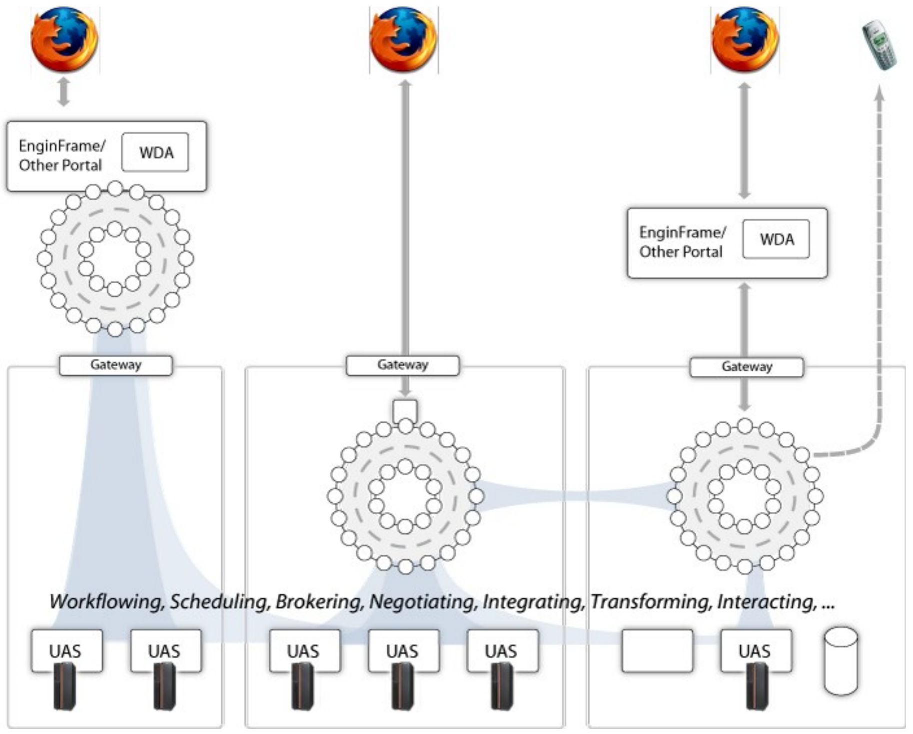
Position of the WOS



- In front of Gateway, tightly coupled to portal
- Completely behind gateway
- Portal in front, WOS behind gateway

Functionality

- Workflowing
- Scheduling
- Brokering
- Negotiating
- Integrating
- Informing
- Interacting
- Securing
- Mediating
- Transforming

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Scheduling

- Static
  - ⇨ Completely predefined and authorized by client or user
- Dynamic
  - ⇨ Description of work without resource assignment
  - ⇨ Automatic assignment of resources according to requirements
- Hybrid

Brokering

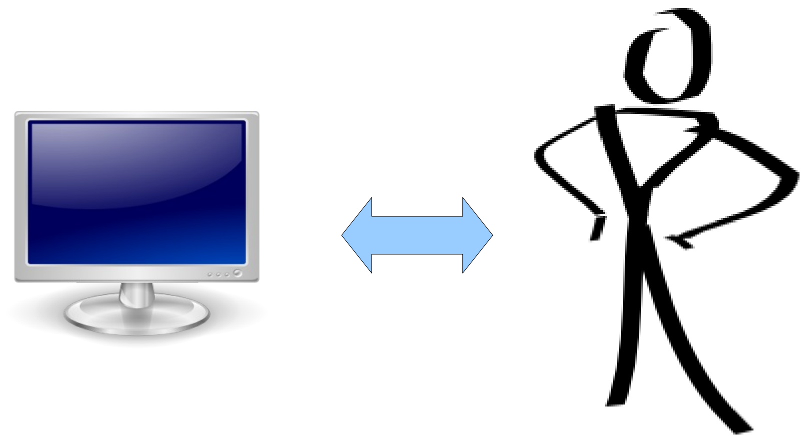
- Selection of resources
- Match requirements
- Respect user's policies
- Changes of resources during runtime closely tie brokers and schedulers

Informing

- Static and dynamic information
- Filtering
- Transports
  - ⇨ Email
  - ⇨ RSS feeds
  - ⇨ SMS
  - ⇨ Instant messaging
- Information about
  - ⇨ Status changes
- User preferences

Interacting

- Input from user during execution
  - ⇨ Approve dynamic resource selection
  - ⇨ Adjust parameters of execution
  - ⇨ Monitor progress



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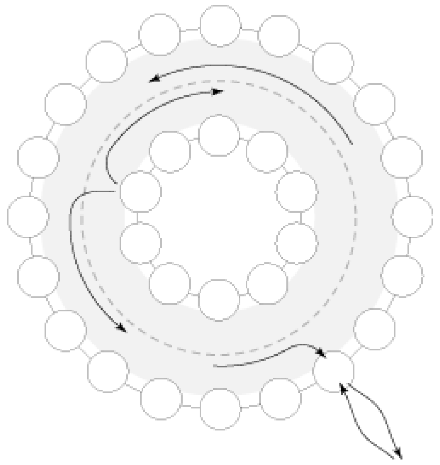
Java Business Integration (JBI)

- Normalized Message Router
- protocols and transports
  - ⇨ REST
  - ⇨ WS-*
  - ⇨ Embedded
- Multiple implementations of standard
  - ⇨ ServiceMix
  - ⇨ OpenESB



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ServiceMix

- JBI implementation
- Many existing components
  - ⇨ Transport bindings: Email, Jabber IM, RSS/Atom feeds
  - ⇨ BPEL, Drools
- Several SOAP bindings
- Simple to use API
- Everything is on the bus

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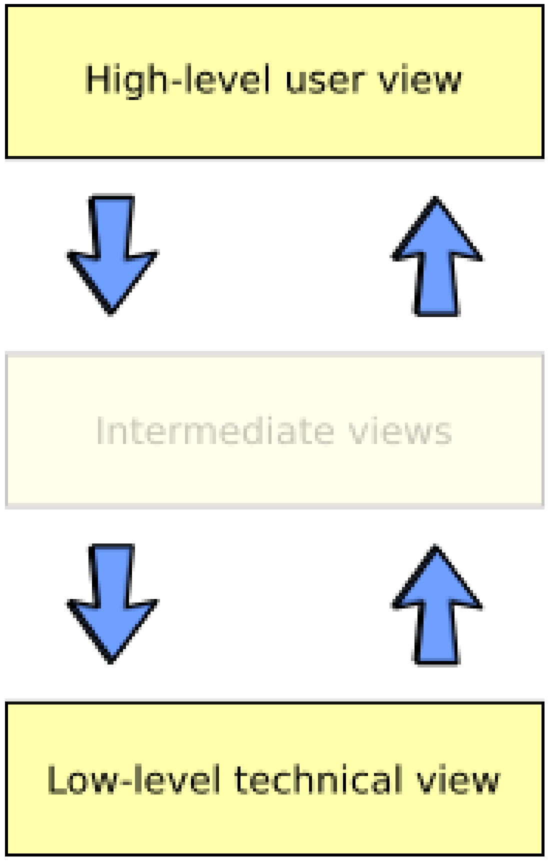
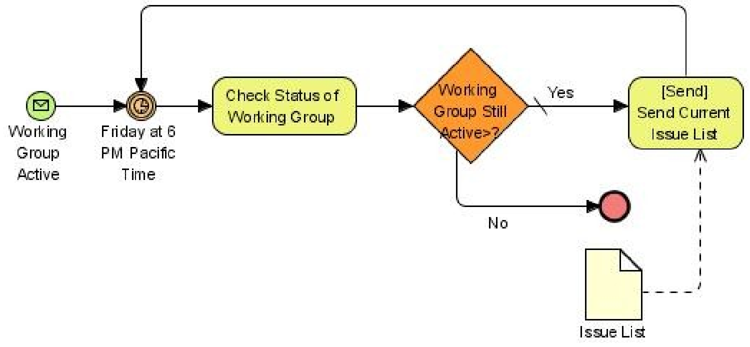
Domain Specific Languages (DSL)



- **High-level user view**
  - ⇨ execution of entire workflows
- **Low-level technical view**
  - ⇨ execution of atomic services
- **Domain experts can understand, validate, modify and develop DSL descriptions**
- **Mapping down to executable workflows**

Business Process Execution Language (BPEL)


Working Group Active
Friday at 6 PM Pacific Time
Check Status of Working Group
Working Group Still Active>?
Yes
No
[Send] Send Current Issue List
Issue List

- BPEL and WSRF
- Difficult mapping from BPMN to BPEL
- Deploy once, run multiple times
  - ⇨ BPEL
  - ⇨ WSDL of services
  - ⇨ Deployment descriptor

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Rules

- Message Routing
- Initiating status messages
- Drools directly supported by ServiceMix
- Rules for orchestration

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Technologies

- Portals (JSR 168)
- BPMN
- BPEL
- JBI (JSR 208)
- Roctopus
- UGS

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Summary

- What's OSFAAFDOARP?
- Considered architectural approaches
- Flexible support of functional requirements through JBI
  - ⇨ BPEL support
  - ⇨ Rule engine
- Work assignments in terms of DSL
  - ⇨ specialists can work in their domain of knowledge
  - ⇨ *canned* workflows

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