

WS-Coordination und WS-BusinessActivity in Action mit Apache Axis

infm3 :: PJ

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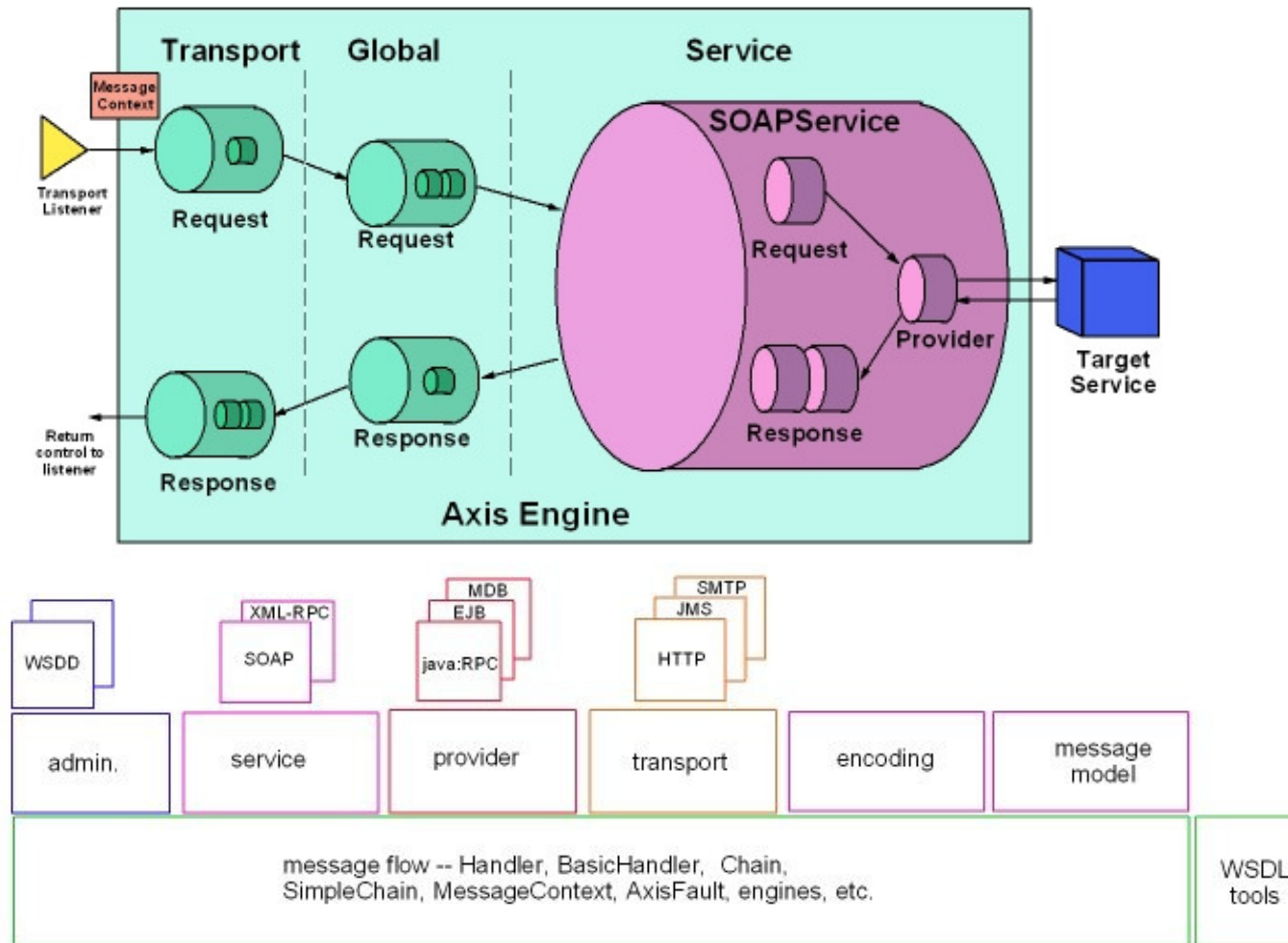
Überblick

- ❑ Projektbeitrag: Transaktions-Middleware für Web-Services
- ❑ Rahmen (vorgesehen: 96h ... tatsächlich: 150h)
 - J2EE
 - Apache Axis
 - WS-Coordination und WS-BusinessActivity (d.h. keine atomaren Transaktionen mit Einbindung von JTA etc.)
 - Experimenteller Prototyp mit "Durchstich"
 - Überlegungen zur Integration mit ESB + Security
- ❑ Entwicklungsumgebung
 - Eclipse 3.1 mit JBoss IDE 1.5M3
 - Apache Axis 1.2.1 Source Distribution
 - JBoss Application Server 4.0.2

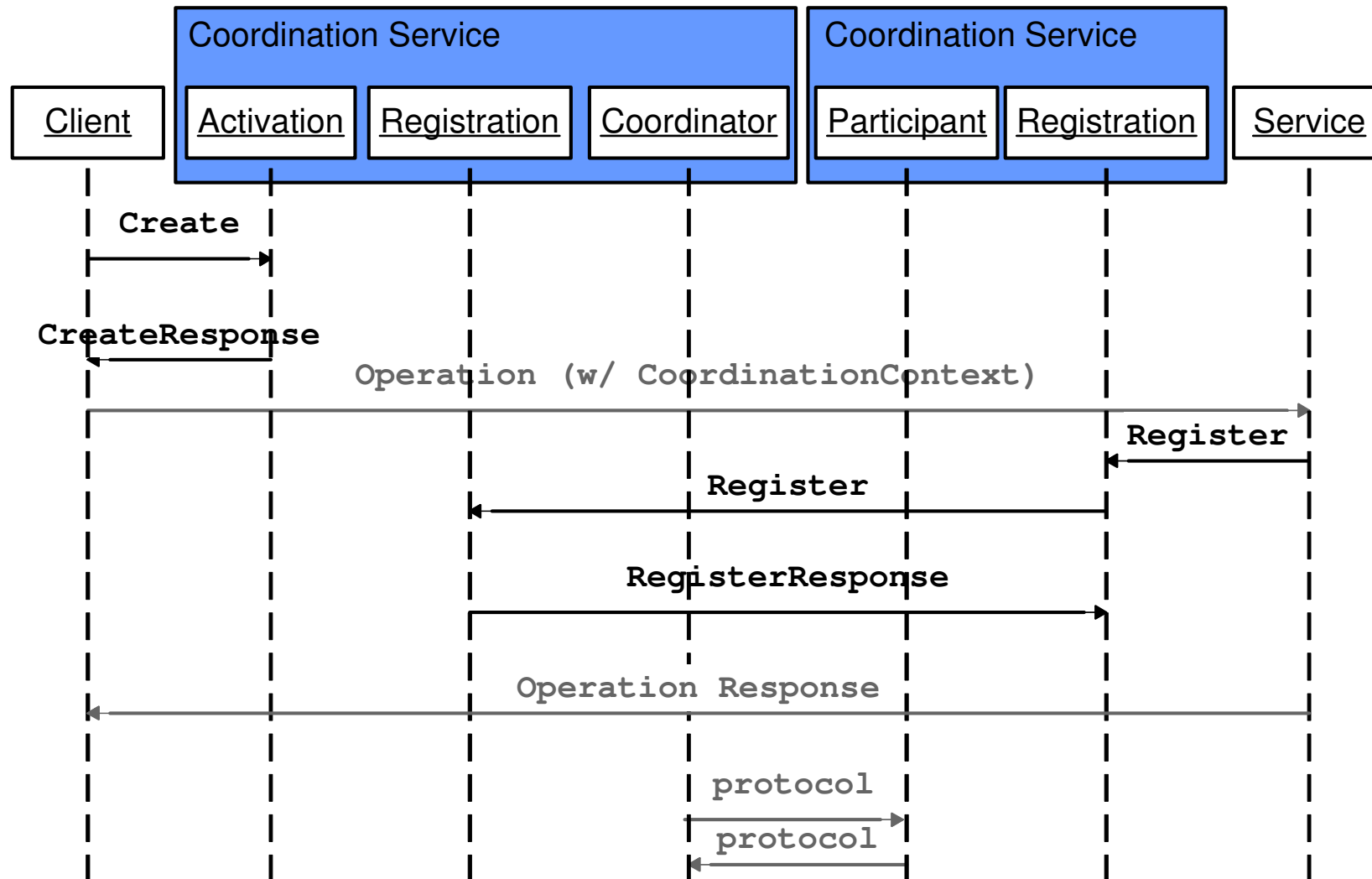
Apache Axis

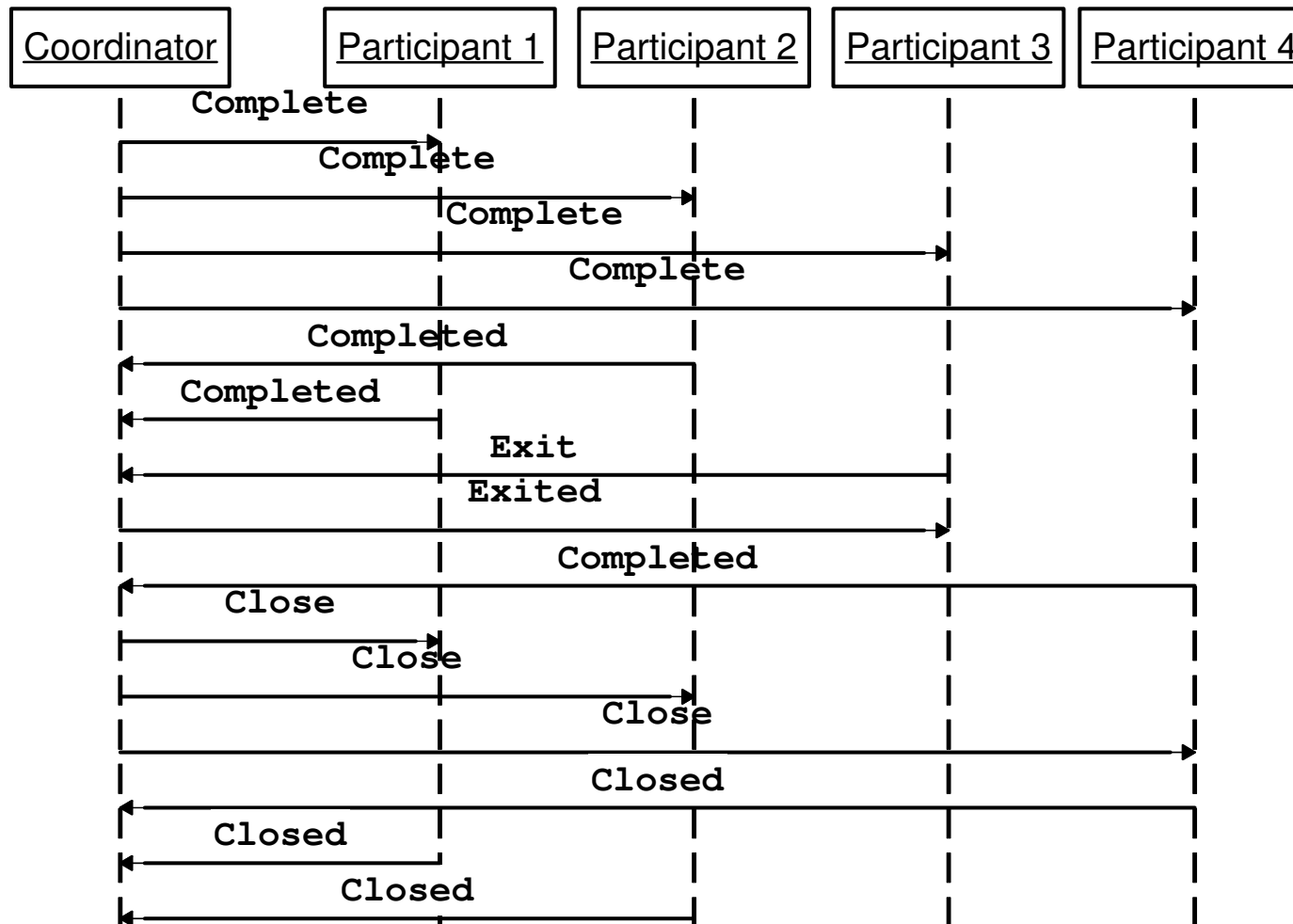
- ❑ Web Service Container Runtime + Tools
- ❑ Open Source @ <http://ws.apache.org/axis/>
- ❑ Separate Behandlung von Aufruf, Nachrichtenformat, Encoding, Transport, Implementierung
 - Aktionen zur Laufzeit gemäß WSDL für Service
 - Verschiedene Aufrufmöglichkeiten (SOAP, XML-RPC)
 - Verschiedene Provider-Arten (POJO, EJB, ...)
 - Transport: HTTP, JMS
 - Encoding: Literal, SOAP
 - Nachrichtenformat: Document, RPC, wrapped
- ❑ Tools
 - Generierung von Klassen mit entsprechendem Verhalten aus WSDL
 - Anwendungsentwickler entwickelt nur die Geschäftslogik

Apache Axis Message Flow + Subsystems

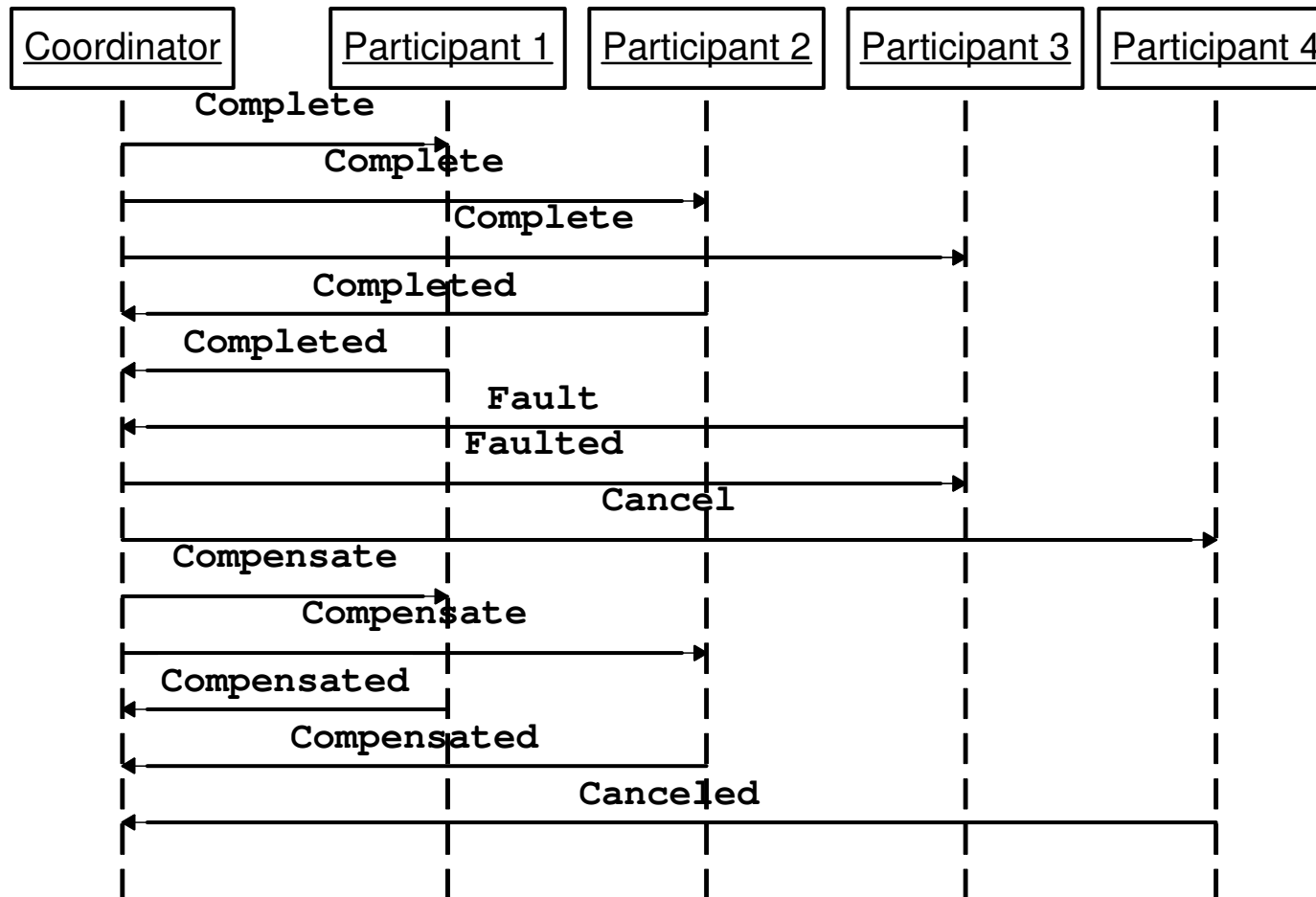


[<http://ws.apache.org/axis/java/architecture-guide.html>]

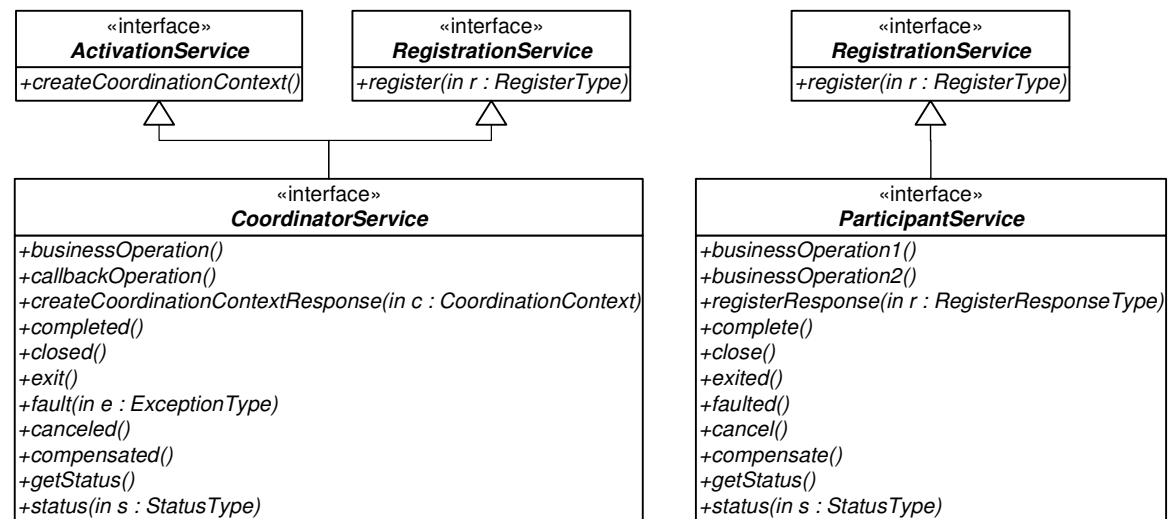




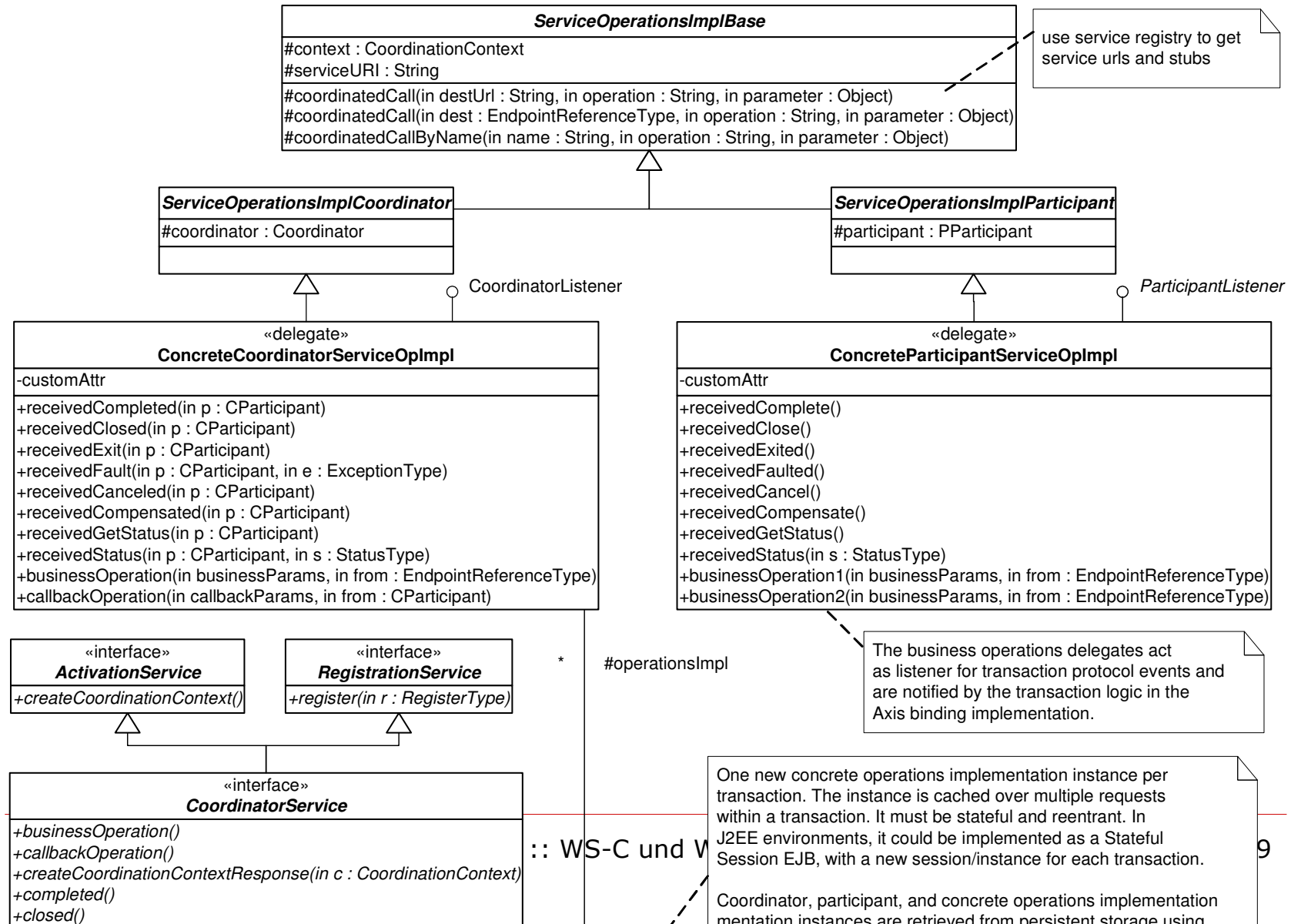
WS-BusinessActivity with compensation

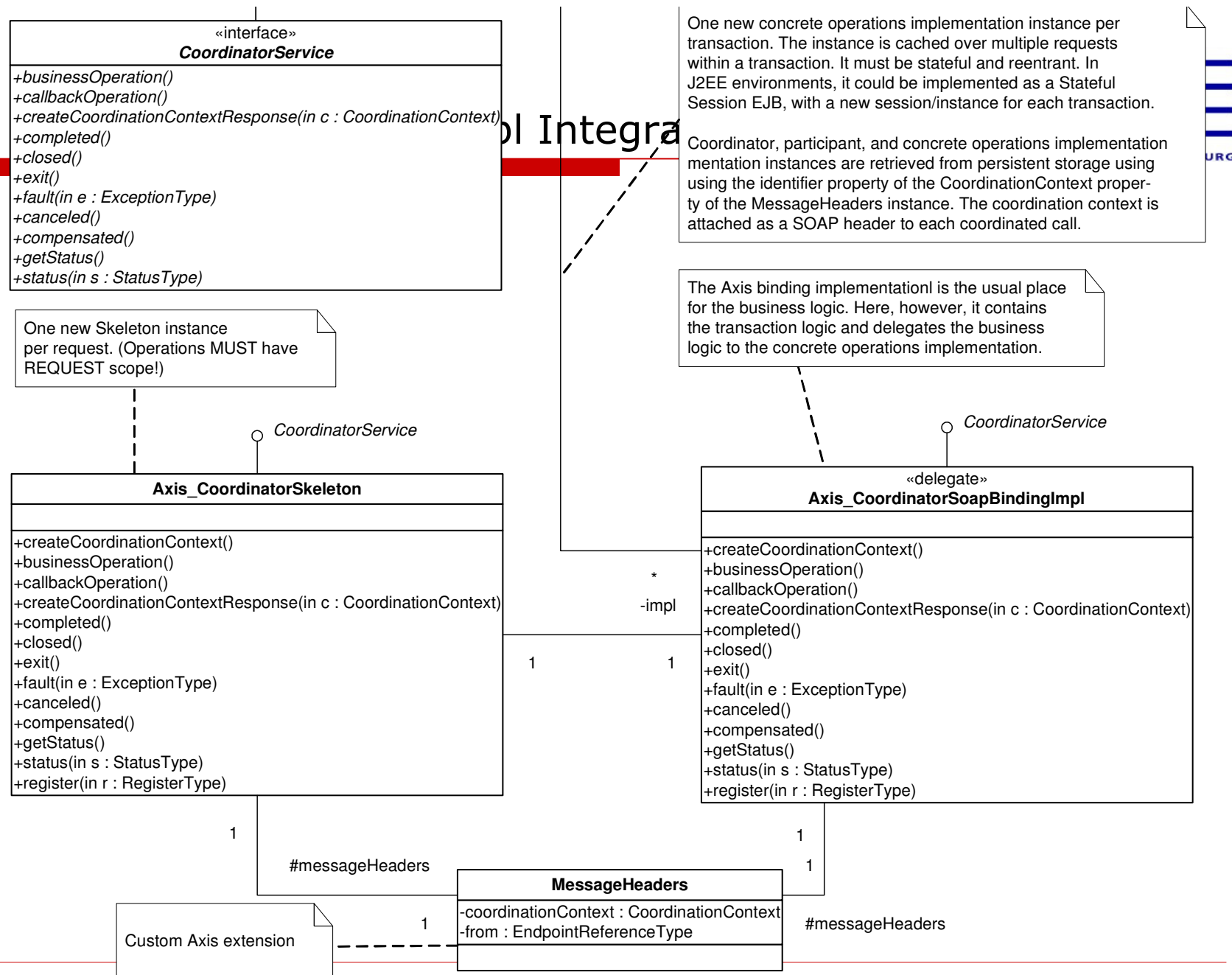


WS-C/BA Coordinator und Participant Services

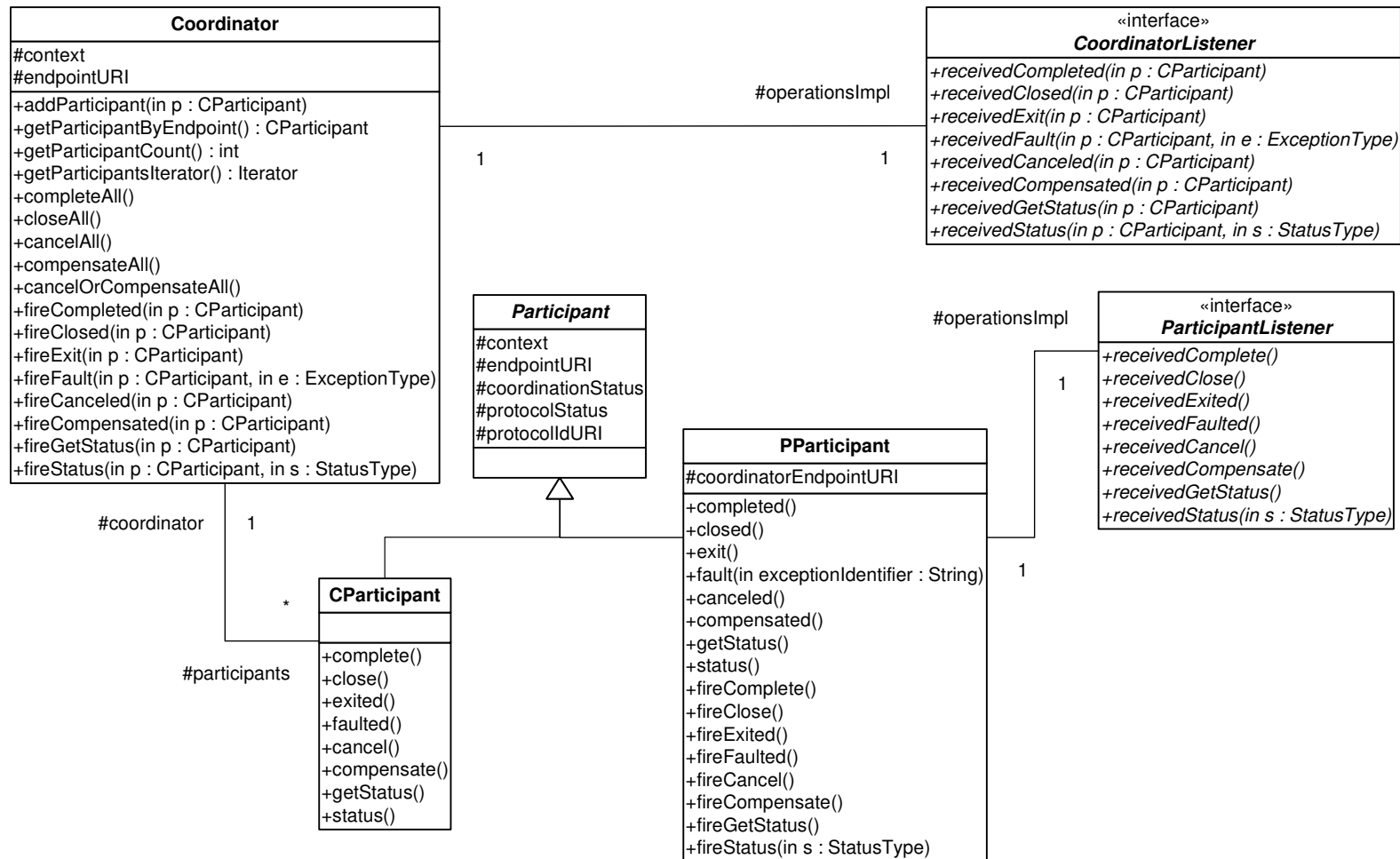


WS-C/BA Operations Impl Integration in Axis





WS-BA Coordinator und Participant API



SOAP Monitor - Mozilla Firefox

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http://localhost:8080/axisdev/SOAPMonitor

IBM w3 Germany IBM w3 gmail WEB.DE Finya.de Billiger-Telefonieren GEOFOX Persönliche... wetter.com HH FH Software Labor

Disable CSS Forms Images Information Miscellaneous Outline Resize Tools View Source Options

localhost

Time	Target Service	Status
Most Recent	---	---
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service2	Complete
17:34:11	Service2	Complete
17:34:11	Service1	Complete

Remove Remove All Filter ...

Time: 17:34:11 Target Service: Service1 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Body>
    <AsyncOperation xmlns="http://www.informatik.haw-hamburg.de/ws/service1/types">
      <intParam>10</intParam>
      <stringParam>TEST</stringParam>
    </AsyncOperation>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text Switch Layout

Start Stop The SOAP Monitor is started.

Applet SOAPMonitorApplet started

CreateCoordinationContext (to Activation Service)

localhost

Time	Target Service	Status
Most Recent	---	---
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service2	Complete
17:34:11	Service2	Complete
17:34:11	Service1	Complete

Remove Remove All Filter ...

Time: 17:34:11 Target Service: Service1 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/soap/envelope/">
      <ns1:Address>http://pj-tx-coordinator:8080/axisdev/services/Service1</ns1:Address>
    </ns1:From>
  </soapenv:Header>
  <soapenv:Body>
    <CreateCoordinationContext xmlns="http://schemas.xmlsoap.org/ws/2004/10/wscoord">
      <CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</CoordinationType>
      <ns1:activationid xmlns:ns1="http://www.informatik.haw-hamburg.de/ws/coord">http://www.informatik.haw-hamburg.de/ws/coord/id#113725645</ns1:activationid>
    </CreateCoordinationContext>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text Switch Layout

Start Stop The SOAP Monitor is started.

CreateCoordinationContextResponse (to Coordinator)

localhost

Time	Target Service	Status
Most Recent	---	---
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service2	Complete
17:34:11	Service2	Complete
17:34:11	Service1	Complete

Remove Remove All Filter ...

Time: 17:34:11 Target Service: Service1 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Body>
    <CreateCoordinationContextResponse xmlns="http://schemas.xmlsoap.org/ws/2004/10/wscoor">
      <CoordinationContext>
        <Identifier>http://www.informatik.haw-hamburg.de/ws/coor/id#1137256450425</Identifier>
        <CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</CoordinationType>
        <RegistrationService>
          <ns1:Address xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns1:Address>
        </RegistrationService>
      </CoordinationContext>
    </CreateCoordinationContextResponse>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text Switch Layout

Start Stop The SOAP Monitor is started.

Call to Participant

localhost

Time	Target Service	Status
Most Recent	---	---
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service1	Complete
17:34:11	Service2	Complete

Time: 17:34:11 Target Service: Service2 Status: Complete

SOAP Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coord/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
    <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/ws/2004/10/wsrm">
      <ns3:Address>http://pj-tx-coordinator:8080/axisdev/services/Service1</ns3:Address>
    </ns3:From>
  </soapenv:Header>
  <soapenv:Body>
    <AsyncOperation xmlns="http://www.informatik.haw-hamburg.de/ws/service2/types">
      <intParam>20</intParam>
      <stringParam>TEST2</stringParam>
    </AsyncOperation>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text

The SOAP Monitor is started.

Register (to Coordinator)

localhost

Time	Target Service	Status
17:34:11	Service2	Complete
17:34:11	Service1	Complete
17:34:11	Service2	Complete

Remove Remove All Filter ...

Time: 17:34:11 Target Service: Service1 Status: Complete

SOAP Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coord/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
    <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns3:Address>http://pj-tx-participant2:8080/axisdev/services/Service2</ns3:Address>
    </ns3:From>
  </soapenv:Header>
  <soapenv:Body>
    <Register xmlns="http://schemas.xmlsoap.org/ws/2004/10/wscoor">
      <ProtocolIdentifier>http://schemas.xmlsoap.org/ws/2004/10/wsba/ParticipantCompletion</ProtocolIdentifier>
      <ParticipantProtocolService>
        <ns4:Address xmlns:ns4="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-participant2:8080/axisdev/services/Service2</ns4:Address>
      </ParticipantProtocolService>
    </Register>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text Switch Layout

Start Stop The SOAP Monitor is started.

RegisterResponse (to Participant)

localhost

Time	Target Service	Status
17:34:11	Service2	Complete
17:34:11	Service1	Complete
17:34:11	Service2	Complete
17:34:12	Service3	Complete
17:34:12	Service3	Complete
17:34:12	Service1	Complete

Remove Remove All Filter ...

Time: 17:34:11 Target Service: Service2 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/10/wscoord">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coor/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
  </soapenv:Header>
  <soapenv:Body>
    <RegisterResponse xmlns="http://schemas.xmlsoap.org/ws/2004/10/wscoord">
      <CoordinatorProtocolService>
        <ns3:Address xmlns:ns3="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns3:Address>
      </CoordinatorProtocolService>
    </RegisterResponse>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text Switch Layout

Start Stop The SOAP Monitor is started.

Callback to Coordinator

localhost

Time	Target Service	Status
17:34:15	Service1	Complete
17:34:15	Service1	Complete

Time: 17:34:15 Target Service: Service1 Status: Complete

SOAP Request

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/soap/actor/next">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coord/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
    <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/soap/actor/next">
      <ns3:Address>http://pj-tx-participant2:8080/axisdev/services/Service2</ns3:Address>
    </ns3:From>
  </soapenv:Header>
  <soapenv:Body>
    <Service2Callback xmlns="http://www.informatik.haw-hamburg.de/ws/service1/types">
      <counter>1000</counter>
      <nvp>
        <name>nameX</name>
        <value>valueY</value>
      </nvp>
    </Service2Callback>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text

The SOAP Monitor is started.

GetStatus query to Participant

localhost

Time	Target Service	Status
17:34:15	Service2	Complete
17:34:15	Service1	Complete
17:34:16	Service1	Complete
17:34:19	Service1	Complete

Time: 17:34:15 Target Service: Service2 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coor/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
    <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns3:Address>http://pj-tx-coordinator:8080/axisdev/services/Service1</ns3:Address>
    </ns3:From>
  </soapenv:Header>
  <soapenv:Body>
    <GetStatus xmlns="http://schemas.xmlsoap.org/ws/2004/10/wsba"/>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text

The SOAP Monitor is started.

Status response to Coordinator

localhost

Time	Target Service	Status
17:34:15	Service2	Complete
17:34:15	Service1	Complete
17:34:16	Service1	Complete
17:34:19	Service1	Complete

Time: 17:34:15 Target Service: Service1 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schen
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coord/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1<
        </ns1:RegistrationService>
      </ns1:CoordinationContext>
      <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/
        <ns3:Address>http://pj-tx-participant2:8080/axisdev/services/Service2</ns3:Address>
      </ns3:From>
    </soapenv:Header>
    <soapenv:Body>
      <Status xmlns="http://schemas.xmlsoap.org/ws/2004/10/wsba">
        <State>{http://schemas.xmlsoap.org/ws/2004/10/wsba}Active</State>
      </Status>
    </soapenv:Body>
  </soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text

The SOAP Monitor is started.

Completed (to Coordinator)

localhost

Time	Target Service	Status
17:34:15	Service1	Complete
17:34:16	Service1	Complete
17:34:19	Service1	Complete
17:34:19	Service2	Complete

Time: 17:34:16 Target Service: Service1 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coord/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
    <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns3:Address>http://pj-tx-participant2:8080/axisdev/services/Service2</ns3:Address>
    </ns3:From>
  </soapenv:Header>
  <soapenv:Body>
    <Completed xmlns="http://schemas.xmlsoap.org/ws/2004/10/wsba"/>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text

The SOAP Monitor is started.

Close (to Participant)

localhost

Time	Target Service	Status
17:34:19	Service1	Complete
17:34:19	Service2	Complete
17:34:19	Service3	Complete
17:34:19	Service1	Complete
17:34:19	Service1	Complete

Remove Remove All Filter ...

Time: 17:34:19 Target Service: Service2 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coord/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
    <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/ws/2004/10/wsba">
      <ns3:Address>http://pj-tx-coordinator:8080/axisdev/services/Service1</ns3:Address>
    </ns3:From>
  </soapenv:Header>
  <soapenv:Body>
    <Close xmlns="http://schemas.xmlsoap.org/ws/2004/10/wsba"/>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text Switch Layout

Start Stop The SOAP Monitor is started.

Closed (to Coordinator)

localhost

Time	Target Service	Status
17:34:19	Service1	Complete
17:34:19	Service2	Complete
17:34:19	Service3	Complete
17:34:19	Service1	Complete
17:34:19	Service1	Complete

Time: 17:34:19 Target Service: Service1 Status: Complete

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?>
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://schemas.xmlsoap.org/soap/envelope/">
  <soapenv:Header>
    <ns1:CoordinationContext soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns1="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0">
      <ns1:Identifier>http://www.informatik.haw-hamburg.de/ws/coord/id#1137256450425</ns1:Identifier>
      <ns1:CoordinationType>http://schemas.xmlsoap.org/ws/2004/10/wsba</ns1:CoordinationType>
      <ns1:RegistrationService>
        <ns2:Address xmlns:ns2="http://schemas.xmlsoap.org/ws/2004/08/addressing">http://pj-tx-coordinator:8080/axisdev/services/Service1</ns2:Address>
      </ns1:RegistrationService>
    </ns1:CoordinationContext>
    <ns3:From soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0" xmlns:ns3="http://schemas.xmlsoap.org/soap/actor/next" soapenv:mustUnderstand="0">
      <ns3:Address>http://pj-tx-participant2:8080/axisdev/services/Service2</ns3:Address>
    </ns3:From>
  </soapenv:Header>
  <soapenv:Body>
    <Closed xmlns="http://schemas.xmlsoap.org/ws/2004/10/wsba"/>
  </soapenv:Body>
</soapenv:Envelope>
```

SOAP Response

☒ Reflow XML text

The SOAP Monitor is started.

Fazit

- ❑ TX-Logik kann/muss u.U. stark mit der Applikationslogik verzahnt sein.
- ❑ Asynchronität führt zu Automaten-Modellierung → Workflow!
- ❑ Verschiedene Muster von Transaktionsabläufen denkbar (ähnl. EJB), dann je nach Muster mehr oder weniger Transparenz
- ❑ Großer Kommunikations-Overhead
- ❑ Vorarbeit (Entwicklungsumgebung, Specs lesen und verstehen) hat viel Zeit gekostet
- ❑ Implementierung der Protokolle an sich einfach...
- ❑ ... aber Teufel steckt im Detail:
 - Storage (für Zustände der Services, Operationen, ...)
 - Service Registry
- ❑ Interoperabilität könnte allgemein ein Problem sein
 - Specs haben viele Freiheitsgrade
 - Alle beteiligten WS-Container müssen Specs unterstützen

Ausblick

☐ [Projekt]

■ Integration mit ESB

- ☐ Alle Aufrufe können theoretisch über den ESB laufen
- ☐ ESB muss SOAP-Header weiterleiten
- ☐ Im Projekt nicht realisierbar, da Mule zu eingeschränkt funktionsfähig, verwendet zwar Axis, ist aber zu stark gekapselt

■ Integration mit Security

- ☐ Modifiziertes Axis mit den Security Handlern von Thies sollte es tun

■ Vervollständigung der Implementierung

- ☐ Exit / Fault / Cancel / Compensate
- ☐ WS-Addressing compliance → Correlation über ReplyTo, MessageId, ...
- ☐ Synchronisierung
- ☐ Code-Generierung der Transaktionslogik gemäß TX-Mustern

☐ [Redesign und Erweiterung]

- Sauberes Design und bessere Integration mit Axis und/oder anderen Engines, Service Registry, Storage (EJB, Hibernate, ...)
- Umsetzung auf J2ME (Master-Arbeit), .NET, .NET Compact, ...
- Einbindung WS-AtomicTransaction für klassische verteilte TX

- ❑ Größte Hürde:
 - Funktionsfähige Entwicklungsumgebung und Build-Prozedur
 - Specs verstehen und bewerten(!)

- ❑ Persönlicher Gewinn
 - Einblick in Standardisierungsprozesse
 - Üben des kritischen Bewertens von neuen Spezifikationen
 - Transaktionsmanagement besser verstanden / aufgefrischt
 - Rapid Prototyping ... = auch mal wieder 'hacken' 😊

- ❑ Gewinn für den Ferienclub
 - Safety
 - Konsistenz

- ❑ Außerdem: Gute Arbeitsatmosphäre 😊