Tuscany Example:
Modified Calculator

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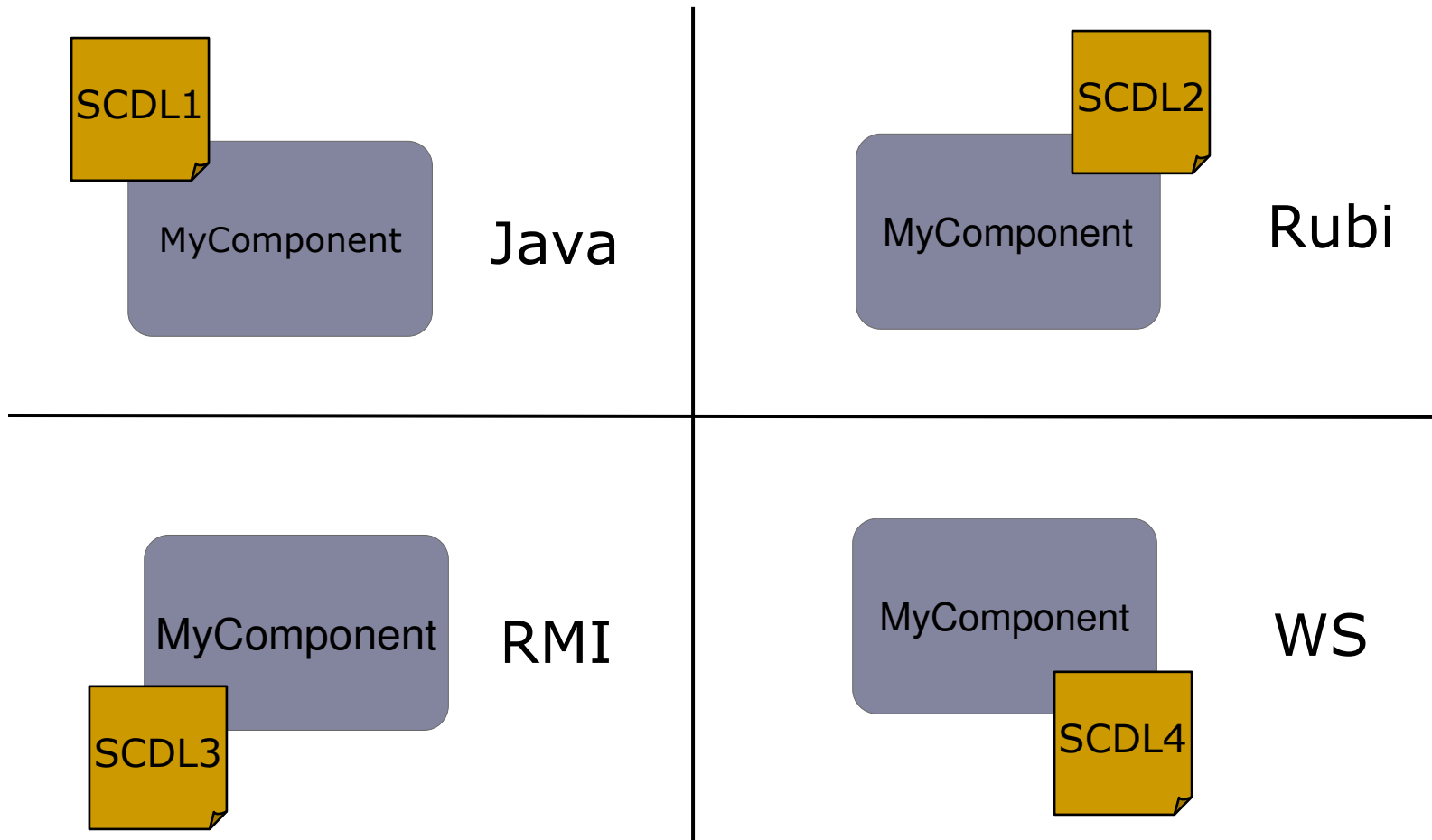
March 9, 2007

Intention

- Show Tuscany
  - **multi-language support** on writing services
  - **different transport bindings**
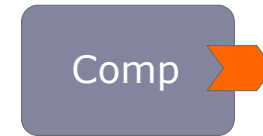 - **simplicity** on **changing** among **services implementations**

Scenario

- A client needs to access to simple calculator operations: +, -, *, /

- We have different implementations of the calculator
  - Java (local to client)
  - Ruby (local to client)
  - RMI invocation (remote)
  - WS (running remotely on Tomcat)

- To distinguish among results, operations are performed in different ways for different languages:
  - Java: operation + 2
  - Ruby: operation + 1
  - RMI: operation + 4
  - WS: operation + 3

All Changes Just into a SCDL Definition

SCDL Definition (client)

```
<component name="CalculatorServiceComponent">
    <implementation.java class="calculator.CalculatorServiceImpl"/>
    <reference name="calculatorService">??</reference>
</component>
```
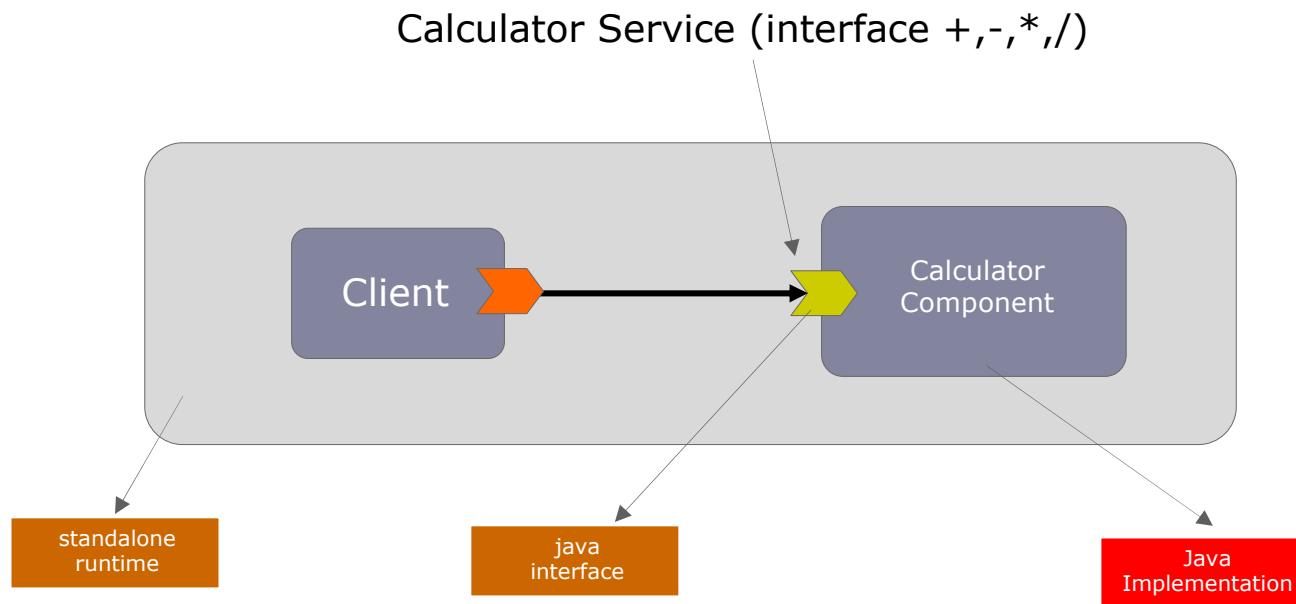
Comp

@Reference
CalculatorService calculatorService;

```
<!--
  <component name="CalculatorComponent">
    <implementation.java class="calculator.JavaCalculator"/>
    <rb:implementation.rb script="CalculatorImpl.rb" class="CalculatorImpl"/>
  </component>

  <reference name="CalculatorRmiService">
    <interface.java interface="calculator.CalculatorService"/>
    <rmi:binding.rmi host="localhost" port="9999" serviceName="rmiCalculator"/>
  </reference>

  <reference name="CalculatorWSService">
    <interface.wsdl xmlns:wsdli="http://www.w3.org/2006/01/wsdl-instance"
            interface="http://calculator#wsdl.interface(Calculator)"
            wsdli:wsdlLocation="http://calculator wsdl/calculator.wsdl" />
    <binding.ws endpoint="http://calculator#wsdl.endpoint (CalculatorService/ CalculatorServiceSOAP11port)"
        location="wsdl/calculator.wsdl" />
  </reference>
-->
```

1) Java Implementation

Calculator Service (interface +,-,*,/)

Client

Calculator
Component

standalone
runtime

java
interface

Java
Implementation

SCDL Definition for Java Implementation

```
<component name="CalculatorServiceComponent">
    <implementation.java class="calculator.CalculatorServiceImpl"/>
    <reference name="calculatorService"> CalculatorComponent </reference>
</component>

<component name="CalculatorComponent">
    <implementation.java class="calculator.JavaCalculator"/>
    <!--rb:implementation.rb script="CalculatorImpl.rb" class="CalculatorImpl"/-->
</component>

<!--
  <reference name="CalculatorRmiService">
    <interface.java interface="calculator.CalculatorService"/>
    <rmi:binding.rmi host="localhost" port="9999" serviceName="rmiCalculator"/>
  </reference>

  <reference name="CalculatorWSService">
    <interface.wsdl xmlns:wsdli="http://www.w3.org/2006/01/wsdl-instance"
            interface="http://calculator#wsdl.interface(Calculator)"
            wsdli:wsdlLocation="http://calculator wsdl/calculator.wsdl" />
    <binding.ws endpoint="http://calculator#wsdl.endpoint (CalculatorService/ CalculatorServiceSOAP11port)"
        location="wsdl/calculator.wsdl" />
  </reference>
-->
```

2) Ruby Implementation

Calculator Service (interface +,-,*,/)

Client

Calculator Component

standalone runtime

java interface

Ruby Implementation
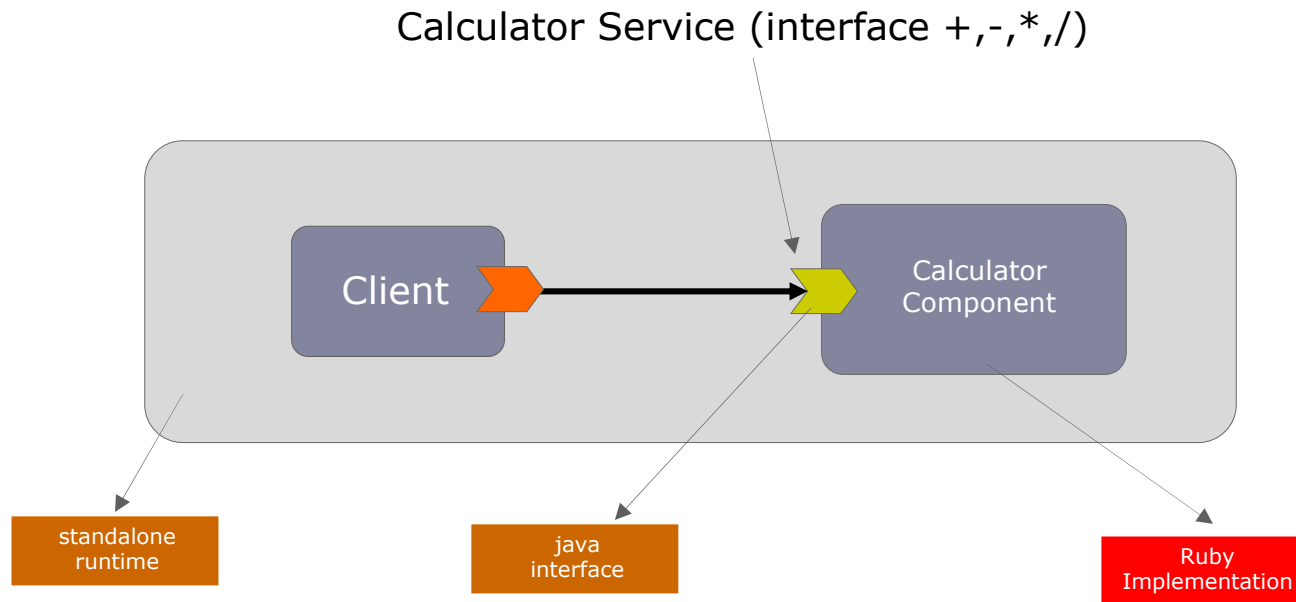
SCDL Definition for Ruby Implementation

```
<component name="CalculatorServiceComponent">
     <implementation.java class="calculator.CalculatorServiceImpl"/>
     <reference name="calculatorService"> CalculatorComponent </reference>
</component>

 <component name="CalculatorComponent">
    <!--implementation.java class="calculator.JavaCalculator"/-->
    <rb:implementation.rb script="CalculatorImpl.rb" class="CalculatorImpl"/>
 </component>

<!--
  <reference name="CalculatorRmiService">
    <interface.java interface="calculator.CalculatorService"/>
    <rmi:binding.rmi host="localhost" port="9999" serviceName="rmiCalculator"/>
  </reference>

  <reference name="CalculatorWSService">
    <interface.wsdl xmlns:wsdli="http://www.w3.org/2006/01/wsdl-instance"
            interface="http://calculator#wsdl.interface(Calculator)"
            wsdli:wsdlLocation="http://calculator wsdl/calculator.wsdl" />
    <binding.ws endpoint="http://calculator#wsdl.endpoint (CalculatorService/ CalculatorServiceSOAP11port)"
        location="wsdl/calculator.wsdl" />
  </reference>
-->
```
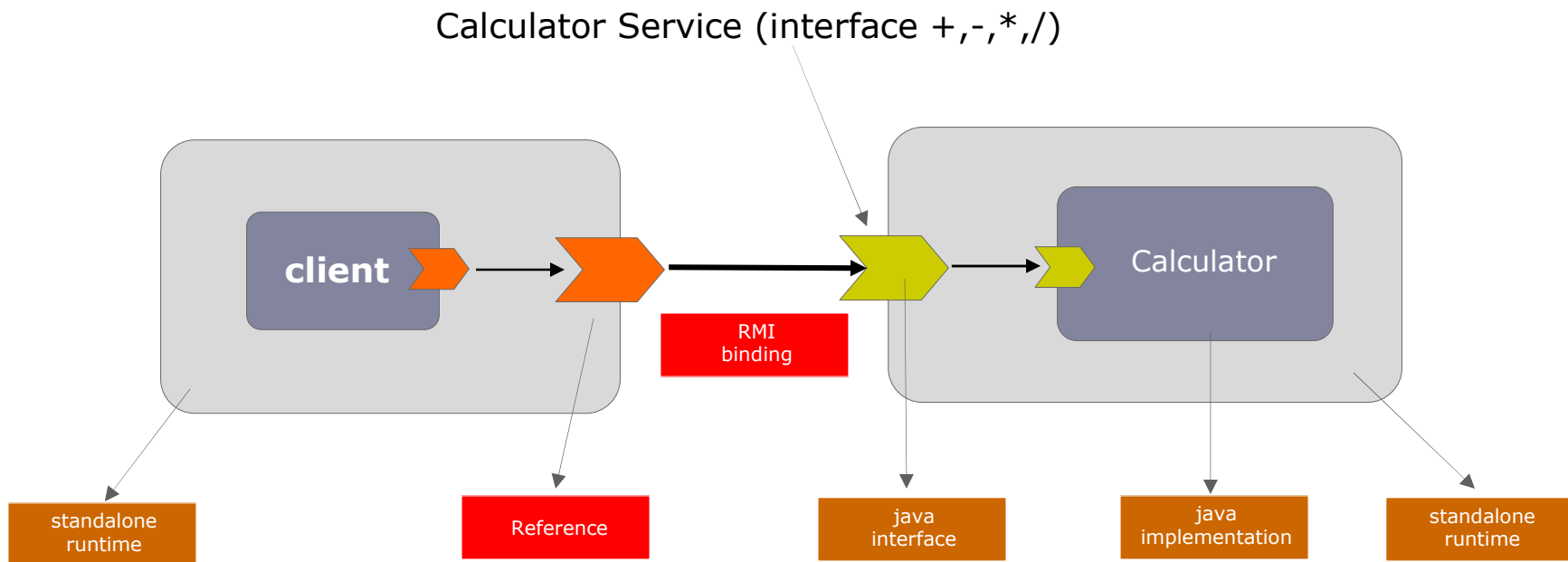
3) RMI Implementation

Calculator Service (interface +,-,*,/)

client

RMI binding

Calculator

standalone runtime

Reference

java interface

java implementation

standalone runtime

SCDL Definition for RMI
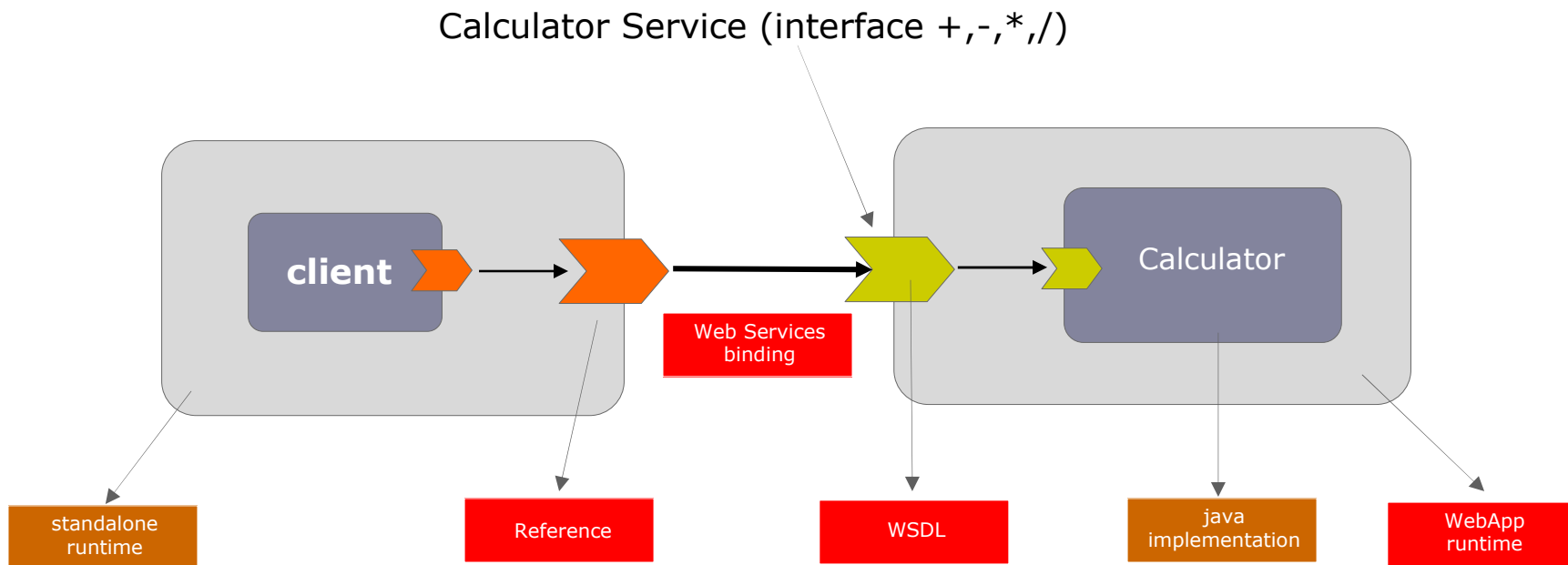
```
<component name="CalculatorServiceComponent">
    <implementation.java class="calculator.CalculatorServiceImpl"/>
    <reference name="calculatorService"> CalculatorRmiService </reference>
</component>

<!--
  <component name="CalculatorComponent">
    <implementation.java class="calculator.JavaCalculator"/>
    <rb:implementation.rb script="CalculatorImpl.rb" class="CalculatorImpl"/>
  </component>
-->
  <reference name="CalculatorRmiService">
    <interface.java interface="calculator.CalculatorService"/>
    <rmi:binding.rmi host="localhost" port="9999" serviceName="rmiCalculator"/>
  </reference>
<!--
  <reference name="CalculatorWSService">
    <interface.wsdl xmlns:wsdli="http://www.w3.org/2006/01/wsdl-instance"
            interface="http://calculator#wsdl.interface(Calculator)"
            wsdli:wsdlLocation="http://calculator wsdl/calculator.wsdl" />
    <binding.ws endpoint="http://calculator#wsdl.endpoint (CalculatorService/ CalculatorServiceSOAP11port)"
       location="wsdl/calculator.wsdl" />
  </reference>
-->
```

4) WS Implementation

Calculator Service (interface +,-,*,/)

client → → ═══► ► Calculator

Web Services binding

standalone runtime

Reference

WSDL

java implementation

WebApp runtime

SCDL Definition for WS

```
<component name="CalculatorServiceComponent">
     <implementation.java class="calculator.CalculatorServiceImpl"/>
     <reference name="calculatorService">CalculatorWSService</reference>
</component>

 <!--
   <component name="CalculatorComponent">
     <implementation.java class="calculator.JavaCalculator"/>
     <rb:implementation.rb script="CalculatorImpl.rb" class="CalculatorImpl"/>
   </component>

   <reference name="CalculatorRmiService">
     <interface.java interface="calculator.CalculatorService"/>
     <rmi:binding.rmi host="localhost" port="9999" serviceName="rmiCalculator"/>
   </reference>
-->

   <reference name="CalculatorWSService">
     <interface.wsdl xmlns:wsdli="http://www.w3.org/2006/01/wsdl-instance"
             interface="http://calculator#wsdl.interface(Calculator)"
             wsdli:wsdlLocation="http://calculator wsdl/calculator.wsdl" />
     <binding.ws endpoint="http://calculator#wsdl.endpoint (CalculatorService/ CalculatorServiceSOAP11port)"
        location="wsdl/calculator.wsdl" />
   </reference>
```

WS/RMI Calculator Implementation

Calculator
Service
Component

Zoom In

Calculator

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*

/

Calculator Service (interface +,-,*,/)