

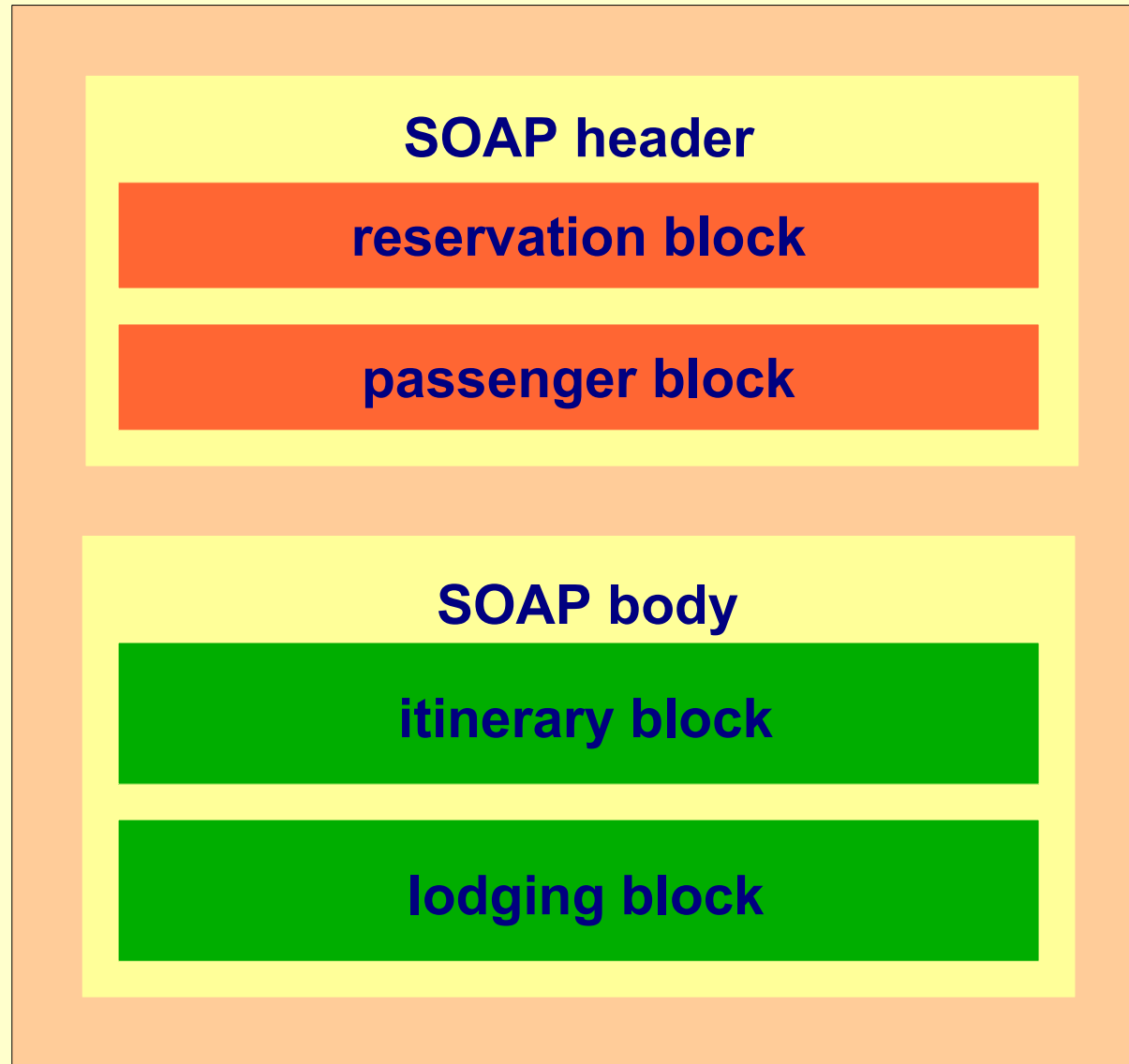
Distribuované systémy a výpočty

X36DSV

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SOAP message



SOAP message – request (1)

```
<?xml version='1.0' ?>
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
  <env:Header>
    <m:reservation
      xmlns:m="http://travelcompany.example.org/reservation"
      env:role="http://www.w3.org/2003/05/soap-envelope/role/next"
      env:mustUnderstand="true">
      <m:reference>uuid:093a2da1-q345-739r-ba5d-
        pqff98fe8j7d</m:reference>
      <m:dateAndTime>2001-11-29T13:20:00.000-05:00</m:dateAndTime>
    </m:reservation>
    <n:passenger xmlns:n="http://mycompany.example.com/employees"
      env:role="http://www.w3.org/2003/05/soap-envelope/role/next"
      env:mustUnderstand="true">
      <n:name>Óke Jógvan Řyvind</n:name>
    </n:passenger>
  </env:Header>
```



SOAP message – request (2)

```
<env:Body>
  <p:itinerary
    xmlns:p="http://travelcompany.example.org/reservation/travel">
    <p:departure>
      <p:departing>New York</p:departing>
      <p:arriving>Los Angeles</p:arriving>
      <p:departureDate>2001-12-14</p:departureDate>
      <p:departureTime>late afternoon</p:departureTime>
    </p:departure>
    <p:return> . . . . . </p:return>
  </p:itinerary>
  <q:lodging
    xmlns:q="http://travelcompany.example.org/reservation/hotels">
    <q:preference>none</q:preference>
  </q:lodging>
</env:Body>
</env:Envelope>
```



SOAP message – response (1)

```
<?xml version='1.0' ?>
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
  <env:Header>
    <m:reservation xmlns:m="http://travelcompany.example.org/reservation"
      env:role="http://www.w3.org/2003/05/soap-envelope/role/next"
      env:mustUnderstand="true">
      <m:reference>uuid:093a2da1-q345-739r-ba5d-
        pqff98fe8j7d</m:reference>
      <m:dateAndTime>2001-11-29T13:35:00.000-05:00</m:dateAndTime>
    </m:reservation>
    <n:passenger xmlns:n="http://mycompany.example.com/employees"
      env:role="http://www.w3.org/2003/05/soap-envelope/role/next"
      env:mustUnderstand="true">
      <n:name>Łke Jógvan Řyvind</n:name>
    </n:passenger>
  </env:Header>
```



SOAP message – response (2)

```
<env:Body>
  <p:itineraryClarification
    xmlns:p="http://travelcompany.example.org/reservation/travel">
    <p:departure>
      <p:departing>
        <p:airportChoices> JFK LGA EWR </p:airportChoices>
      </p:departing>
    </p:departure>
    <p:return>
      <p:arriving>
        <p:airportChoices> JFK LGA EWR </p:airportChoices>
      </p:arriving>
    </p:return>
  </p:itineraryClarification>
</env:Body>
</env:Envelope>
```



SOAP – continuation (1)

```
<?xml version='1.0' ?>
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
  <env:Header>
    <m:reservation
      xmlns:m="http://travelcompany.example.org/reservation"
      env:role="http://www.w3.org/2003/05/soap-envelope/role/next"
      env:mustUnderstand="true">
      <m:reference>uuid:093a2da1-q345-739r-ba5d-
        pqff98fe8j7d</m:reference>
      <m:dateAndTime>2001-11-29T13:36:50.000-05:00</m:dateAndTime>
    </m:reservation>
    <n:passenger xmlns:n="http://mycompany.example.com/employees"
      env:role="http://www.w3.org/2003/05/soap-envelope/role/next"
      env:mustUnderstand="true">
      <n:name>Lke Jógvan Rývind</n:name>
    </n:passenger>
  </env:Header>
```



SOAP – continuation (2)

```
<env:Body>
  <p:itinerary
    xmlns:p="http://travelcompany.example.org/reservation/travel">
    <p:departure>
      <p:departing>LGA</p:departing>
    </p:departure>
    <p:return>
      <p:arriving>EWR</p:arriving>
    </p:return>
  </p:itinerary>
</env:Body>
</env:Envelope>
```



SOAP RPC request (1)

```
<?xml version='1.0' ?>
```

```
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope" >  
  <env:Header>  
    <t:transaction  
      xmlns:t="http://thirdparty.example.org/transaction"  
      env:encodingStyle="http://example.com/encoding"  
      env:mustUnderstand="true" >5</t:transaction>  
  </env:Header>
```



SOAP RPC – request (2)

```
<env:Body>
  <m:chargeReservation
    env:encodingStyle="http://www.w3.org/2003/05/soap-encoding"
    xmlns:m="http://travelcompany.example.org/">
    <m:reservation
      xmlns:m="http://travelcompany.example.org/reservation">
      <m:code>FT35ZBQ</m:code>
    </m:reservation>
    <o:creditCard xmlns:o="http://mycompany.example.com/financial">
      <n:name xmlns:n="http://mycompany.example.com/employees">
        Łke Jógvan Řyvind
      </n:name>
      <o:number>123456789099999</o:number>
      <o:expiration>2005-02</o:expiration>
    </o:creditCard>
  </m:chargeReservation>
</env:Body>
</env:Envelope>
```



SOAP RPC – response (1)

```
<?xml version='1.0' ?>  
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope" >  
  <env:Header>  
    <t:transaction  
      xmlns:t="http://thirdparty.example.org/transaction"  
      env:encodingStyle="http://example.com/encoding"  
      env:mustUnderstand="true">5</t:transaction>  
  </env:Header>
```



SOAP RPC – response (2)

```
<env:Body>
  <m:chargeReservationResponse
    env:encodingStyle="http://www.w3.org/2003/05/soap-encoding"
    xmlns:m="http://travelcompany.example.org/">
    <m:code>FT35ZBQ</m:code>
    <m:viewAt>
      http://travelcompany.example.org/reservations?code=FT35ZBQ
    </m:viewAt>
    </m:chargeReservationResponse>
  </env:Body>
</env:Envelope>
```



SOAP RPC – response (2a)

```
<env:Body>
  <m:chargeReservationResponse
    env:encodingStyle="http://www.w3.org/2003/05/soap-encoding"
    xmlns:rpc="http://www.w3.org/2003/05/soap-rpc"
    xmlns:m="http://travelcompany.example.org/">
    <rpc:result>m:status</rpc:result>
    <m:status>confirmed</m:status>
    <m:code>FT35ZBQ</m:code>
    <m:viewAt>
      http://travelcompany.example.org/reservations?code=FT35ZBQ
    </m:viewAt>
  </m:chargeReservationResponse>
</env:Body>
</env:Envelope>
```



SOAP RPC – fault (1)

```
<?xml version='1.0' ?>
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope"
  xmlns:rpc='http://www.w3.org/2003/05/soap-rpc'>
  <env:Body>
    <env:Fault>
      <env:Code>
        <env:Value>env:Sender</env:Value>
        <env:Subcode>
          <env:Value>rpc:BadArguments</env:Value>
        </env:Subcode>
      </env:Code>
      <env:Reason>
        <env:Text xml:lang="en-US">Processing error</env:Text>
        <env:Text xml:lang="cs">Chyba zpracování</env:Text>
      </env:Reason>
    </env:Fault>
  </env:Body>
</env:Envelope>
```



SOAP RPC – fault (1)

```
<?xml version='1.0' ?>
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope"
  xmlns:rpc='http://www.w3.org/2003/05/soap-rpc'>
  <env:Body>
    <env:Fault>
      <env:Code>
        <env:Value>env:Sender</env:Value>
        <env:Subcode>
          <env:Value>rpc:BadArguments</env:Value>
        </env:Subcode>
      </env:Code>
      <env:Reason>
        <env:Text xml:lang="en-US">Processing error</env:Text>
        <env:Text xml:lang="cs">Chyba zpracování</env:Text>
      </env:Reason>
    </env:Fault>
  </env:Body>
</env:Envelope>
```



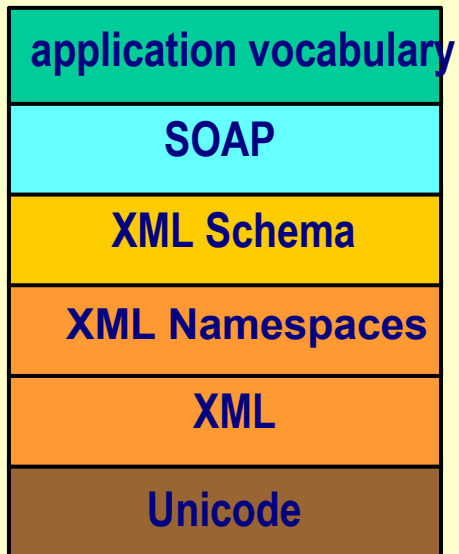
SOAP RPC – fault (2)

```
<env:Detail>  
  <e:myFaultDetails  
    xmlns:e="http://travelcompany.example.org/faults">  
    <e:message>Name does not match card number</e:message>  
    <e:errorcode>999</e:errorcode>  
  </e:myFaultDetails>  
</env:Detail>  
</env:Fault>  
</env:Body>  
</env:Envelope>
```

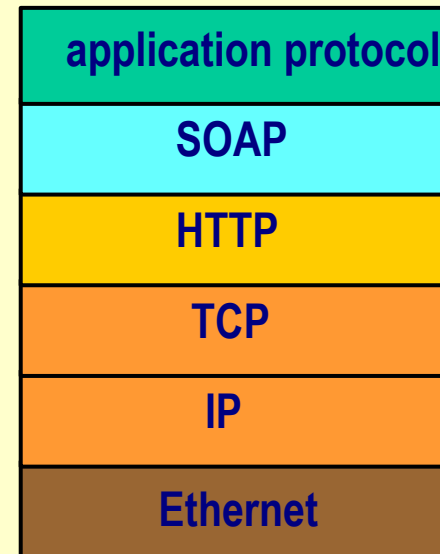


XML-RPC response

Data Encoding



Protocols



SOAP – HTTP GET request

GET /travelcompany.example.org/reservations?code=FT35ZBQ
HTTP/1.1

Host: travelcompany.example.org

Accept: text/html;q=0.5, application/soap+xml



SOAP – HTTP response

HTTP/1.1 200 OK

Content-Type: application/soap+xml; charset="utf-8"

Content-Length: nnnn

```
<?xml version='1.0' ?>
```

```
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
```

```
<env:Header>
```

```
.....
```

```
</env:Header>
```

```
<env:Body>
```

```
.....
```

```
</env:Body>
```

```
</env:Envelope>
```



SOAP - HTTP POST request

POST /Reservations HTTP/1.1

Host: travelcompany.example.org

Content-Type: application/soap+xml; charset="utf-8"

Content-Length: nnnn

```
<?xml version='1.0' ?>
```

```
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope" >
```

```
<env:Header>
```

```
.....
```

```
</env:Header>
```

```
<env:Body>
```

```
.....
```

```
</env:Body>
```

```
</env:Envelope>
```



SOAP – SMTP request

From: a.oyvind@mycompany.example.com
To: reservations@travelcompany.example.org
Subject: Travel to LA
Date: Thu, 29 Nov 2001 13:20:00 EST
Message-Id:
 <EE492E16A090090276D2084@mycompany.example.com>
Content-Type: application/soap+xml

```
<?xml version='1.0' ?>  
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">  
  <env:Header>  
    . . . . .  
  </env:Header>  
  <env:Body>  
    . . . . .  
  </env:Body>  
</env:Envelope>
```



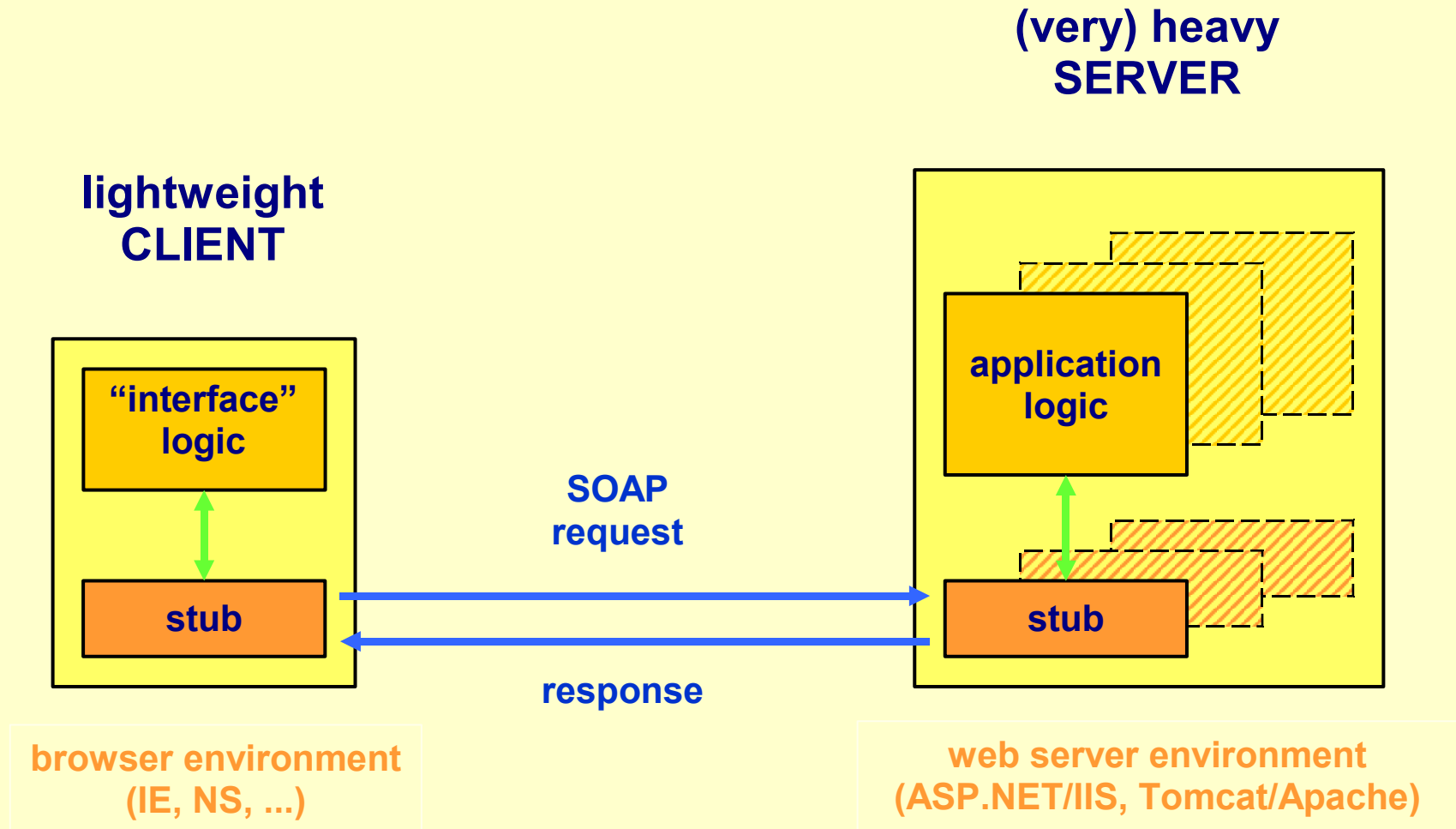
SOAP – SMTP response

From: reservations@travelcompany.example.org
To: a.oyvind@mycompany.example.com
Subject: Which NY airport?
Date: Thu, 29 Nov 2001 13:35:11 EST
Message-Id: <200109251753.NAA10655@travelcompany.example.org>
In-reply-to:<EE492E16A090090276D2084@mycompany.example.com>
Content-Type: application/soap+xml

```
<?xml version='1.0' ?>  
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">  
  <env:Header>  
    . . . . .  
  </env:Header>  
  <env:Body>  
    . . . . .  
  </env:Body>  
</env:Envelope>
```



SOAP - RPC



SOAP - RPC

SOAP Request

```
<?xml version="1.0" encoding="UTF-8" standalone="no" ?>
<SOAP-ENV:Envelope
  SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:xsi="http://www.w3.org/1999/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/1999/XMLSchema">
  <SOAP-ENV:Body>
    <ns1:doubleAnInteger xmlns:ns1="urn:MySoapServices">
      <param1 xsi:type="xsd:int">123</param1>
    </ns1:doubleAnInteger>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```



SOAP - RPC

SOAP Response

```
<?xml version="1.0" encoding="UTF-8" ?>
<SOAP-ENV:Envelope
  xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsi="http://www.w3.org/1999/XMLSchema-instance"
  xmlns:xsd="http://www.w3.org/1999/XMLSchema">
  <SOAP-ENV:Body>
    <ns1:doubleAnIntegerResponse
      xmlns:ns1="urn:MySoapServices"
      SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
      <return xsi:type="xsd:int">246</return>
    </ns1:doubleAnIntegerResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```



Generování WDSL popisu

helloWorld.java

```
public interface HelloWorld
{
    String[] helloWorld ();
}
```

generování WDSL popisu

```
java2wds1 helloWorld.cpp
```



Generování WDSL popisu

helloWorld.cpp

```
[WebService]
public string helloWorld()
{
    return ("Hello world!");
}
```

generování WHDL popisu

```
wdsl helloWorld.cpp
```



WSDL

Web Service Description Language

```
<?xml version="1.0" encoding="utf-8">  
<definitions>  
  <types>      describes SOAP parameters' types  
</types>  
  <message>    describes structure of SOAP messages  
</message>  
  <portType>   defines method invocations  
</portType>   (bind requests and responses)  
  <binding>  
</binding>  
  <service>  
</service>  
</definitions>
```



WSDL

Web Service Description

```
<?xml version="1.0" encoding="utf-8">
```

```
<definitions>
```

```
  <types>      describes SOAP parameters' types
```

```
  <\types>
```

```
  <message>    describes structure of SOAP messages
```

```
  <\message>
```

```
  <portType>   defines method invocations
```

```
  <\portType>  (bind requests and responses)
```

```
  <binding>
```

```
  <\binding>
```

```
  <service>
```

```
  <\service>
```

```
<\definitions>
```



WSDL

definitions

<definitions

xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"

xmlns:tns="uri:diy"

targetNamespace="uri:diy"

xmlns="http://schemas.xmlsoap.org/wsdl/"

>

.....

<\definitions>



WSDL

Web Service Description

```
<?xml version="1.0" encoding="utf-8">  
<definitions>  
  <types>      describes SOAP parameters' types  
</types>  
  <message>    describes structure of SOAP messages  
</message>  
  <portType>   defines method invocations  
</portType>   (bind requests and responses)  
  <binding>  
</binding>  
  <service>  
</service>  
</definitions>
```



WSDL

types

<definitions

xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"

xmlns:tns="uri:diy"

targetNamespace="uri:diy"

xmlns="http://schemas.xmlsoap.org/wsdl/"

>

.....

</definitions>



WSDL

Web Service Description

```
<?xml version="1.0" encoding="utf-8">  
<definitions>  
  <types>      describes SOAP parameters' types  
</types>  
  <message>    describes structure of SOAP messages  
</message>  
  <portType>   defines method invocations  
</portType>   (bind requests and responses)  
  <binding>  
</binding>  
  <service>  
</service>  
</definitions>
```



WSDL

message

```
<message name="helloWorldRequest">  
  <part name="name" type="soap:anyType"/>  
</message>
```

```
<message name="helloWorldResponse">  
  <part name="helloWorldResult" type="soap:anyType"/>  
</message>
```



WSDL

Web Service Description

```
<?xml version="1.0" encoding="utf-8">
<definitions>
  <types>      describes SOAP parameters' types
</types>
  <message>    describes structure of SOAP messages
</message>
  <portType>   defines method invocations
</portType>   (bind requests and responses)
  <binding>
</binding>
  <service>
</service>
</definitions>
```



WSDL

portType

```
<portType name="helloWorldPort">  
  <operation name="helloWorld">  
    <input message="tns:helloWorldRequest">  
    <output message="tns:helloWorldResponse">  
  </operation>
```

.....

```
</portType>
```



WSDL

Web Service Description

```
<?xml version="1.0" encoding="utf-8">  
<definitions>  
  <types>      describes SOAP parameters' types  
</types>  
  <message>    describes structure of SOAP messages  
</message>  
  <portType>   defines method invocations  
</portType>   (bind requests and responses)  
  <binding>  
  </binding>  
  <service>  
  </service>  
</definitions>
```



WSDL

binding

```
<binding name="helloWorldSoap" type="helloWorldPort">
  <soap:binding style="rpc" transport="http://schemas.soap.org/soap/http"
  />
  <operation name="helloWorld">
    <soap:operation soapAction="radio" style="rpc" />
    <input>
      <soap:body use="encoded" namespace="uri:helloWorlds"
      encodingStyle="http:// schemas.soap.org/soap/encoding
    ">
    </input>
    <output>
      <soap:body use="encoded" namespace="uri:helloWorlds"
      encodingStyle="http:// schemas.soap.org/soap/encoding ">
    </output>
  </operation>
  . . . . .
</binding>
```



WSDL

Web Service Description

```
<?xml version="1.0" encoding="utf-8">  
<definitions>  
  <types>      describes SOAP parameters' types  
</types>  
  <message>    describes structure of SOAP messages  
</message>  
  <portType>   defines method invocations  
</portType>   (bind requests and responses)  
  <binding>  
</binding>  
  <service>  
</service>  
</definitions>
```



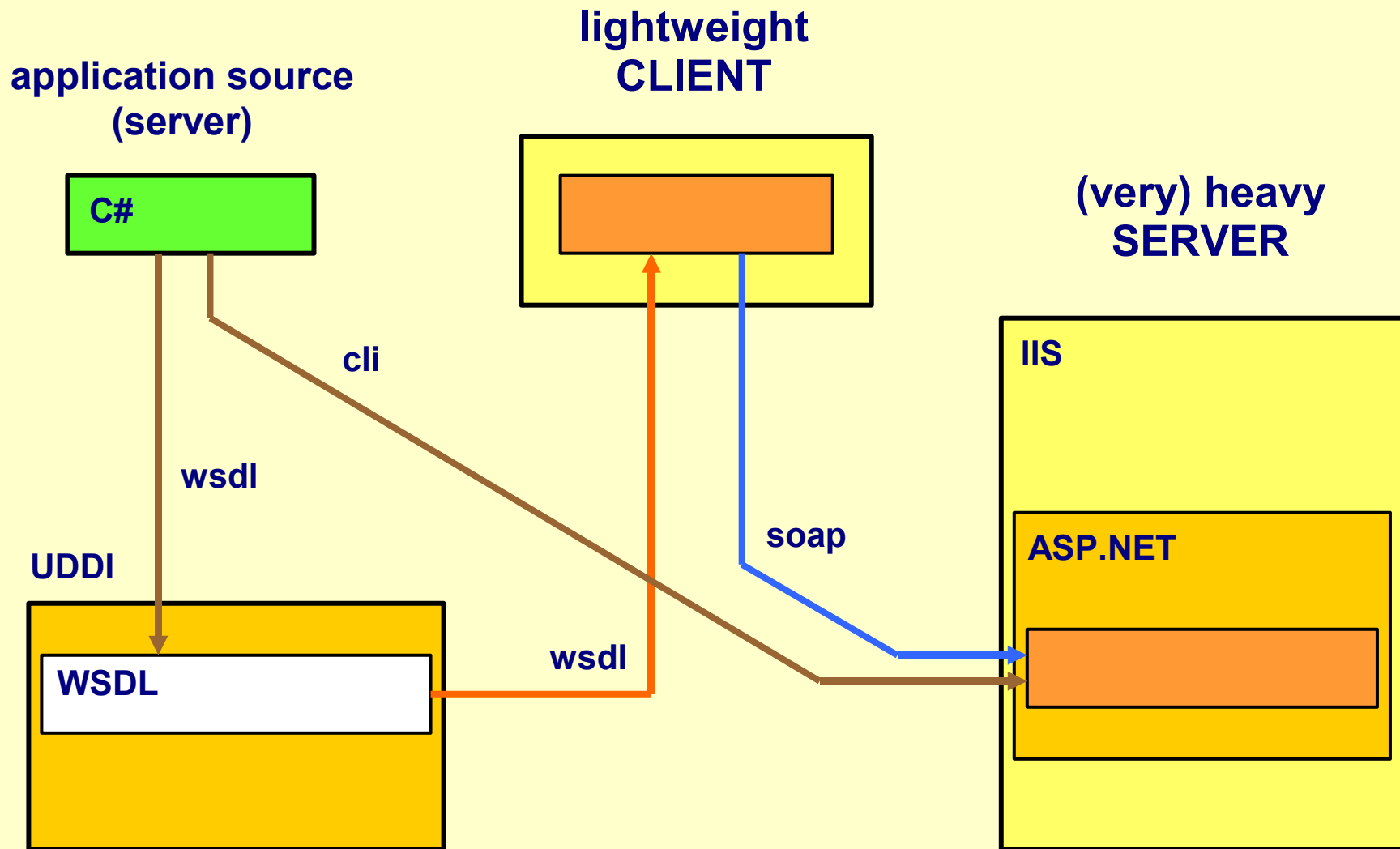
WSDL

service

```
<service name="helloWorldPort">  
  <document>  
    textual service description  
  </document>  
  <port name="helloWorldPort" name="helloWorldSoap" />  
    <soap:address location="http://127.0.0.1:5555/" />  
  </port>  
</service>
```



SOAP - application



SOAP – vývoj aplikace

Server

1. aplikační logika v C# (nebo Java)
2. (překlad) a generování WSDL popisu
2. vložení (deployment) do web serveru (IIS, Axis)
3. registrace WSDL popisu u služby UDDI

Client

1. získání WSDL popisu
2. vygenerování SOAP proxy
3. kód klienta aplikace v C# (or Java)
4. spuštění klienta ve vhodném prostředí



SOAP – embedded server

Charon II / EtherNut

HW Server, Praha CZ
Egnite Software GmbH, Herne BRD

Atmel ATMega128
128 kB Flash EPROM
32 kB RAM
Realtek RTL8019 Ethernet Controller

Nut/OS - Multithreading real-time kernel
Nut/Net - TCP/IP implementation
simple HTTP “server”



SOAP – embedded server

Charon II

