

WS-BPEL

Web Services Business Process Execution Language

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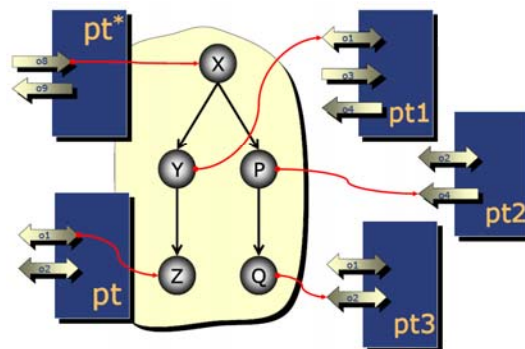


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Was ist BPEL?

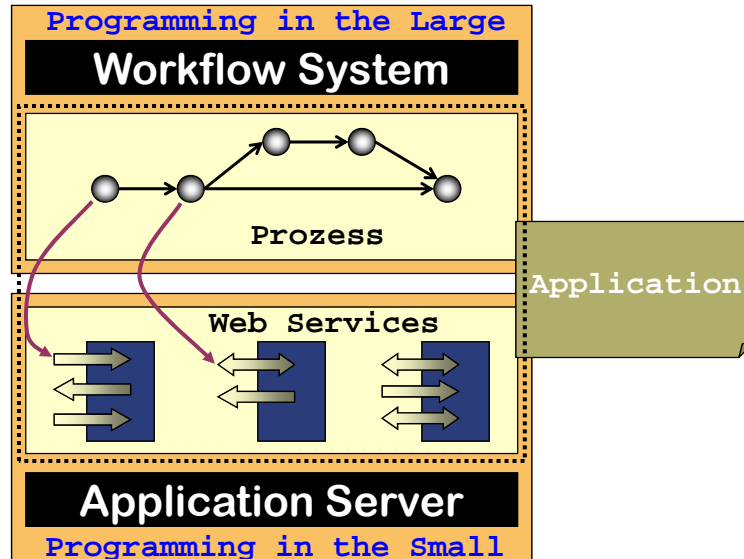
- XML-basierte Sprache zur Spezifikation des Verhaltens von Geschäftsprozessen
 - Zwischen Web Services
 - ... und als Web Service
- Eine Sprache zur Beschreibung von ausführbaren und abstrakten Prozessen



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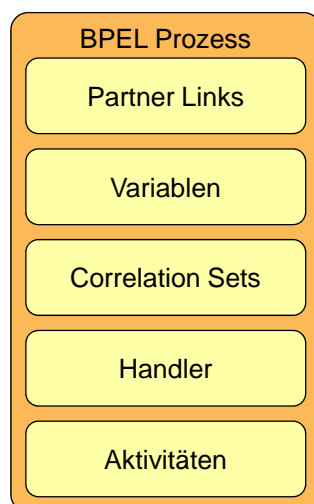
Programming Model



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BPEL Elemente



- Partner Links spezifizieren die Rollen aller externen Partner und die Rolle(n) des Prozesses selbst
- Variablen können für den Prozess oder für einen Scope definiert werden
- Correlation Sets werden verwendet um eine Nachricht mit der zugehörigen Prozessinstanz zu korrelieren
- Handler können für den Umgang mit Events und zur Kompensation verwendet werden
- Aktivitäten spezifizieren die Prozesslogik

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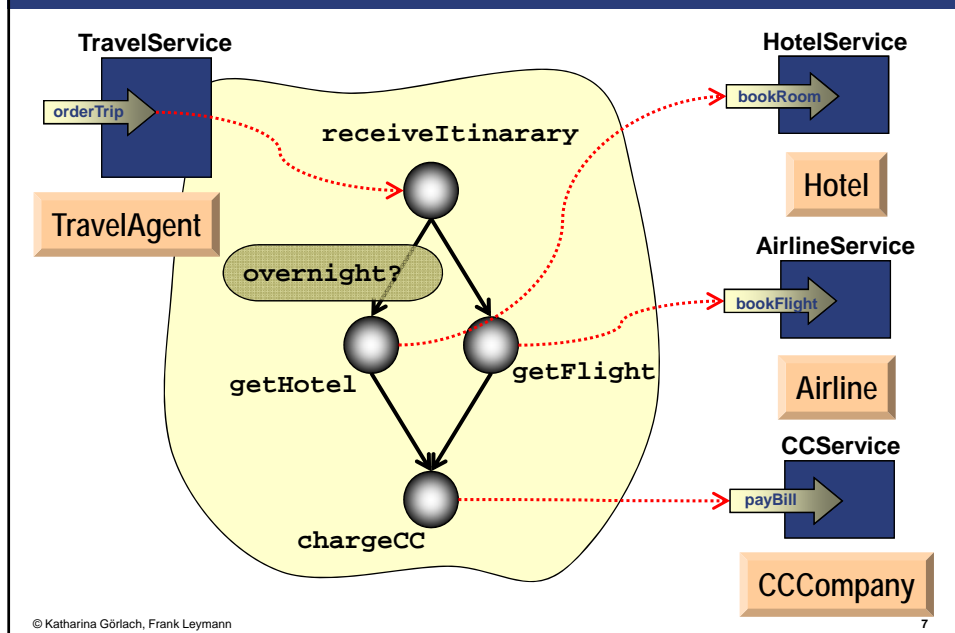
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Aktivitäten

- Aktivitäten:
 - Kommunikation
 - Receive, Reply, Invoke, Pick
 - Kontrollfluss
 - Sequence, Flow, If, While, RepeatUntil, ForEach
 - Datenmanipulation
 - Assign
 - Exception Handling
 - Throw, Rethrow, Fault Handler, Compensation Handler
 - Reaktion auf Events
 - Pick, Event Handler
- Instanziierung möglich bei <receive> und <pick>
 - Attribut: "createInstance = yes"

„Famous“ Example

Example (A Famous One 😊)



Beginning The Corresponding WSDL

```
<definitions
  targetNamespace="http://travel.org/wsd1/travelAgent"
  xmlns:xta="http://travel.org/xsd/travelAgent"
  xmlns:tag="http://travel.org/wsd1/travelAgent"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema/"
  xmlns="http://schemas.xmlsoap.org/wsd1/"
  xmlns:plnk="http://schemas.xmlsoap.org/ws/2002/07/partner-link/">

  <import namespace="http://travel.org/xsd/travelAgent"
    namespace="http://travel.org/xsd/travelAgent.xsd"/>
```

The Messages

```
<message name="trip">
  <part name="customerInfo" type="xta:customerInfo"/>
  <part name="itinerary" type="xta:itinerary"/>
</message>
<message name="hotelBooking">
  <part name="rooms" type="xta:hotelStay"/>
</message>
<message name="flightBooking">
  <part name="flights" type="xta:legs"/>
</message>
<message name="payments">
  <part name="customerInfo" type="xta:customerInfo"/>
  <part name="orders" type="xta:orders"/>
</message>
```

The Port Types

```
<portType name="TravelService">
  <operation name="orderTrip">
    <input message="tag:trip"/>
  </operation>
</portType>

<portType name="HotelService">
  <operation name="bookRoom">
    <input message="tag:hotelBooking"/>
  </operation>
</portType>

<portType name="AirlineService">
  <operation name="bookFlight">
    <input message="tag:flightBooking"/>
  </operation>
</portType>

<portType name="CreditCardService">
  <operation name="payBill">
    <input message="tag:payments"/>
  </operation>
</portType>
```

Partner Link Types

```
<plnk:partnerLinkType name="Traveler">
  <plnk:role name="TravelAgent">
    <portType name="tag:TravelService"/>
  </plnk:role>
</plnk:partnerLinkType>

<plnk:partnerLinkType name="Hotel">
  <plnk:role name="HotelChain">
    <portType name="tag:HotelService"/>
  </plnk:role>
</plnk:partnerLinkType>

<plnk:partnerLinkType name="Airline">
  <plnk:role name="AirlineCompany">
    <portType name="tag:AirlineService"/>
  </plnk:role>
</plnk:partnerLinkType>

<plnk:partnerLinkType name="CreditCard">
  <plnk:role name="CreditCardCompany">
    <portType name="tag:CreditCardService"/>
  </plnk:role>
</plnk:partnerLinkType>
</definitions>
```

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The Process Header And Partners

```
<process name="TripBookingProcess"
  targetNamespace="http://fl.com/Travel/Booking"
  xmlns="http://schemas.xmlsoap.org/ws/2003/05/business-process"
  xmlns:tag="http://travel.org/wsd1/travelAgent">

  <partnerLinks>
    <partnerLink name="Customer"
      partnerLinkType="tag:Traveler"
      myRole="TravelAgent"/>
    <partnerLink name="Hotel"
      partnerLinkType="tag:Hotel"
      partnerRole="HotelChain"/>
    <partnerLink name="Airline"
      partnerLinkType="tag:Airline"
      partnerRole="AirlineCompany"/>
    <partnerLink name="Billing"
      partnerLinkType="tag:CreditCard"
      partnerRole="CreditCardCompany"/>
  </partnerLinks>
```

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The Variables

```
<variables>
  <variable name="Order"
    messageType="tag:trip"/>
  <variable name="Hotel"
    messageType="tag:hotelBooking"/>
  <variable name="Flight"
    messageType="tag:flightBooking"/>
  <variable name="payment"
    messageType="tag:payments"/>
</variables>
```

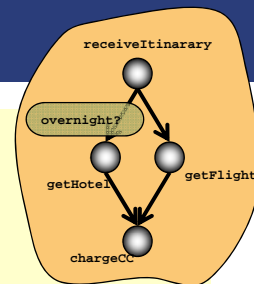
The Activities (1/5)

```
<flow>

  <links>
    <link name="Itinerary-to-Hotel"/>
    <link name="Itinerary-to-Flight"/>
    <link name="Hotel-to-Charge"/>
    <link name="Flight-to-Charge"/>
  </links>

  <receive name="receiveItinerary"
    partnerLink="Customer"
    portType="tag:TravelService"
    operation="orderTrip"
    variable="Order">
    <source linkName="Itinerary-to-Hotel"
      transitionCondition="overnight='true'"/>
    <source linkName="Itinerary-to-Flight"/>
  </receive>

  ....
```



The Activities (2/5)

```
....
<assign>
  <copy>
    <from variable="Order"
      part="itinerary"
      query="/rooms"/>
    <to variable="Hotel"/>
  </copy>
</assign>

<assign>
  <copy>
    <from variable="Order"
      part="itinerary"
      query="/flights"/>
    <to variable="Flight"/>
  </copy>
</assign>

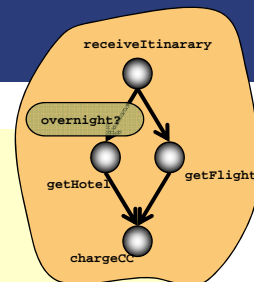
....
```

The Activities (3/5)

```
...
<invoke name="getHotel"
  partnerLink="Hotel"
  portType="tag:HotelService"
  operation="bookRoom"
  inputVariable="Hotel">
  <target linkName="Itinerary-to-Hotel"/>
  <source linkName="Hotel-to-Charge"/>
</invoke>

<invoke name="getFlight"
  partnerLink="Airline"
  portType="tag:AirlineService"
  operation="bookFlight"
  inputVariable="Flight">
  <target linkName="Itinerary-to-Flight"/>
  <source linkName="Flight-to-Charge"/>
</invoke>

...
```



The Activities (4/5)

```

....
<assign>
  <copy>
    <from variable="Order"
      part="customerInfo"/>
    <to variable="Payment"
      part="customerInfo"/>
  </copy>
  <copy>
    <from variable="Hotel"/>
    <to variable="Payment"
      part="orders"
      query="/rooms"/>
  </copy>
  <copy>
    <from variable="Flight"/>
    <to variable="Payment"
      part="orders"
      query="/flights"/>
  </copy>
</assign>
....

```

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The Activities (5/5)

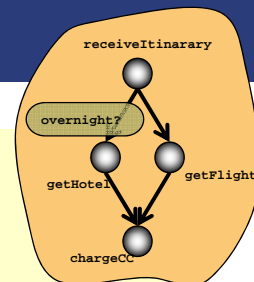
```

...
<invoke name="chargeCC"
  partnerLink="Billing"
  portType="tag:CreditCardService"
  operation="payBill"
  inputVariable="Payment"
  joinCondition=
    "vprop:getLinkStatus('Hotel-to-Charge')
    or
    vprop:getLinkStatus('Flight-to-Charge')">
  <target linkName="Hotel-to-Charge"/>
  <target linkName="Flight-to-Charge"/>
</invoke>

</flow>

</process>

```



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Weiterführende Literatur

- S. Weerawarana, F. Curbera, F. Leymann, D. Ferguson, T. Storey:
Web Services Platform Architecture. Prentice Hall International,
2005, ISBN: 0131488740
 - Kapitel 14
- **Spezifikation:** WS-BPEL Version 2.0, OASIS
<http://docs.oasis-open.org/wsbpel/2.0/wsbpel-specification-draft.html>

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