Modelling Properties of Services

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Agenda

• Introduction
  – Service orientation
  – Service Model
• Modelling properties of services
  – Terms
  – Properties
• Application
  – Discovery
  – Service Processes
• Outlook
Idea of Service Orientation

Introduction

Service Consumer

invoke

invoke

Potsdam Cake Service
IP: 221.41.0.1
Port: 80

IP: 221.41.0.2
Port: 22

Another Bakery
IP: 102.168.0.1
Port: 27027

IP: 102.0.0.2
Port: 8000
Idea of Service Orientation

Introduction

Cake Interface

Abstraction

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Idea of Service Orientation

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Abstraction

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CakeInterface{
  CakeOffer(In:CakeType, Out:Price)
  Order(In:CakeType, In:CreditcardNo, In:DeliveryAddress)}
The Service Model

Abstract

Concrete

Service

Potsdam Cake Service

IP: 221.41.0.2
Port: 22

Endpoint

IP: 221.41.0.1
Port: 80

* implements

* specifies transport

* groups

* associates network address

* Binding

Message

Operation

Message ExchangePattern

Role

1 input

1 output

1

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Service Orientation's Heart

• Service description
  – Technical specification
  – Stored in Repository

• Key principles
  – Distribution, Loose coupling, Process orientation
  – Based on acceptance → Standards
  – High degree of automation
  → Discovery: Interface level
Discovery

Introduction

- Interface level is not appropriate
  - Missing
    - Consumer's restriction and requirements
    - Provider's unique features

- Idea
  - Modelling properties of services
Definition of Terms

Non-Functional Properties

Quality Of Services
Definition of Terms

Non-Functional Properties

Functional Properties

Quality Of Services

Properties Model
Definition of Terms

Functional Properties

Non-Functional Properties

Service Level Agreement

Policies

∅ ?

=?

=?

=?
Definition of Terms

Properties Model

Properties
## Cake Example

### Properties Model

<table>
<thead>
<tr>
<th>Service</th>
<th>Flavour</th>
<th>Price</th>
<th>Layers</th>
<th>Region</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postdams Cake Service</td>
<td>cheese, chocolate</td>
<td>20,- €</td>
<td>1,2,3</td>
<td>Potsdam, Berlin</td>
<td>Bill, Online: Visa, Master</td>
</tr>
<tr>
<td>Bakel't</td>
<td>cheese, cream, chocolate</td>
<td>19.99 US-$</td>
<td>1,3</td>
<td>Europe, Northern America</td>
<td>Online: PayPal</td>
</tr>
<tr>
<td>Delicious</td>
<td>cream</td>
<td>£ 15</td>
<td>-</td>
<td>Leicestershire</td>
<td>At Delivery</td>
</tr>
</tbody>
</table>

- All services implement `CakeInterface`
- Table holds Services Properties
Aspects (excerpt)

- Scales of Measurement
  - Nominal (flavour)
  - Ordinal (payment, security)
  - Interval (e.g. temperature)
  - Ratio (price, duration)

- Domain, e.g.
  - Flavour := \{cheese, chocolate, cream, fruit, onion\}
  - Price := \mathbb{Q}^+

- Metric
  - Where, when and how measured
  - Functions and definitions
The Properties Model

Concrete

Abstract

Domain

Scale

Metric

Property

Properties Set

Interface

Service

Consumer

Provider

ServiceLevel Agreement

ServiceLevel

* implements

* implements

1

1

1

*
Concrete

Abstract

Properties Set

Domain

Scale

Metric

Interface

Service

ServiceLevel

Consumer

Provider

Property

Price

Flavour

Ratio

Currency

Layers

Region

Payment

Bill

The Properties Model

Flavour

Price

Layers

Region

Payment

Potsdams Cake Service

cheese 20 € 3 14482 Potsdam Visa

chocolate 20 € 3 Potsd. Visa

cheese 20 € 1 14482 Potsdam

cheese 20 € 1 14482 Potsdam

cheese 20 € 1 14482 Potsdam

cheese 20 € 1 14482 Potsdam

cheese 20 € 1 14482 Potsdam

cheese 20 € 1 14482 Potsdam

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cheese 20 € 1 14482 Potsdam
• Discovery
  - Ad hoc service invocation, negotiation
  - Substitution, Service management
  - Composition → Service processes
Service Processes

- Process composed of services
  - Properties of services *build* process properties
  - Process published as service
  - With aggregated properties

- Properties model for processes
  - Rules and algorithms for calculation
  - Approach: Workflow-Patterns
    - For each pattern
    - Define algorithm for each (class of) properties

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Summary & Outlook

- **Generic Properties of Services Model**
  - Scale, Domain, Metric
  - Classification of properties

- **Service Processes Properties**
  - Optimization
  - Algorithms for WF-Patterns
  - Interdependency (resources)
Thanks for your attention!

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