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IMPLEMENTATION OF ALPINEBITS ANNOTATION WITH SCHEMA.ORG

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1. Introduction

This document presents our implementation on annotating the AlpineBits's XML message [1] with Schema.org [2]. The implementation relies on the obtained mapping between the XML elements and attributes of AlpineBits (i.e. SimplePackages) to class and properties of Schema.org [3]. SimplePackages is one of the five types of information supported by the AlpineBits specification, intended to send notifications about package availability by a client to a server.

For the obtained mapping, we were able to identify 5 classes including a few properties as shown at Figure 1:

1. AggregateOffer, which is an aggregated offer from all available offers
2. Organization, indicates the associated hotel for each AggregateOffer
3. Offer, contains detail information (date, price, eligibility) offered in an offer
4. QuantitativeValue, relates to quantity and quality values available in an offer
5. TypeAndQuantityNode, collection of included services available in an offer

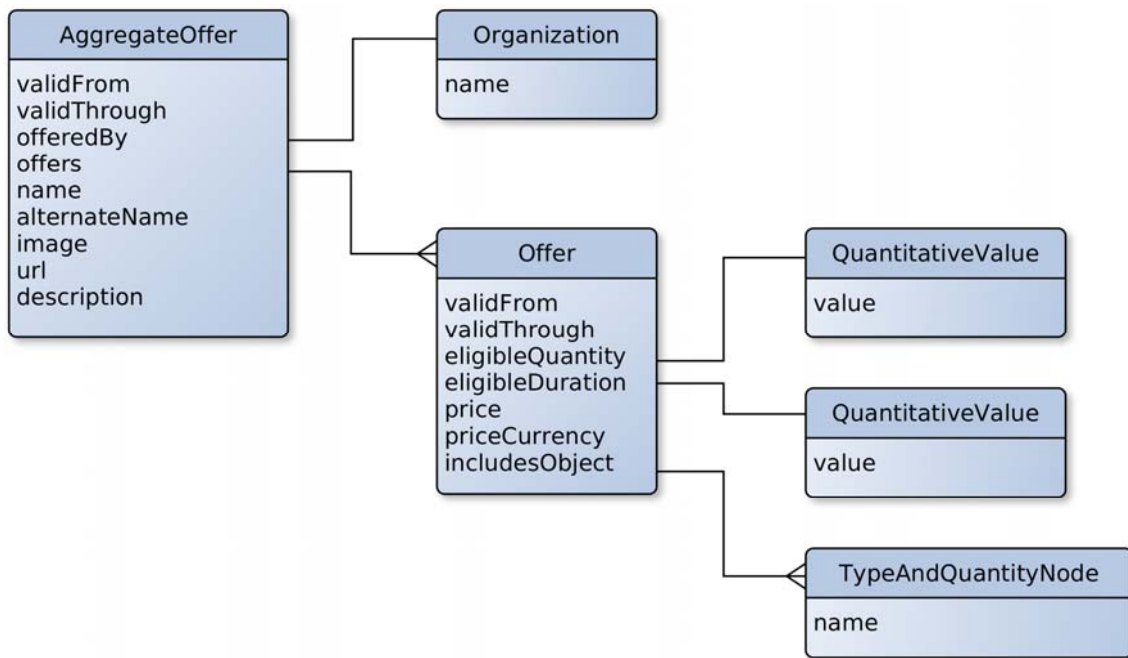


Figure 1. Classes and Properties of Schema.org obtained from the Mapping

2. Implementation

We use two different methods of implementation, each with different advantages and disadvantages. For each method we employ the following implementation procedures:

1. Applied the mapping according to the selected method

2. Use the Google Structured Data Testing Tool [4] to extract all annotated items
3. Use the AlpineBits message validation service [5] to validate the message againsts AlpineBits XSD [6] as well as Open Travel Alliance XSD [7]

2.1 XSL Transformations

In this implementation, an XSLT stylesheet is developed with two main functions, first to match all relevant elements from an input XML document, and second to perform a relevant action (e.g. inserting a new attribute or a new element). The stylesheet will be consumed by an XSLT Processor to produce an XML output document.

As shown at Figure 2, the obtained map will be incorporated into an XSLT Stylesheet which will be consumed by an XSLT Processor to transform an XML Input into a relevant XML Output.

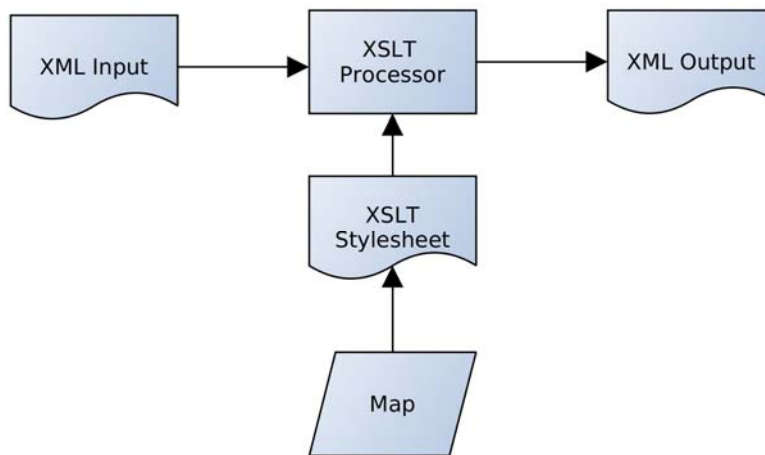


Figure 2. Implementation with XSL Transformations

All relevant classes and properties of Schema.org can be extracted by using a structured data testing tool on the produced XML output as shown at Figure 3.

The screenshot shows the Google Developers Structured Data Testing Tool interface. The left pane displays an XML document with XSL transformations applied. The right pane shows the resulting structured data output in a table format.

XML Document (Left Pane):

```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <!--
3   AlpineBits 2014-04
4   http://www.alpinebits.org/
5   sample message file
6   changelog:
7   v. 2014-04 1.0
8 -->
9 <OTA_HotelRatePlanNotifR0
10  xmlns="http://www.opentravel.org/OTA/2003/05"
11  xmlns:xsi="http://www.w3.org/2001/XMLSchema-
12  instance"
13  xsi:schemaLocation="http://www.opentravel.org/OTA/2003/
14  05 OTA_HotelRatePlanNotifR0.xsd" Version="2.001">
15  <RatePlans>
16  <RatePlan itemscope=""
17  itemtype="http://schema.org/AggregateOffer"
18  xmlns:schema="http://schema.org/">
19  <meta itemprop="validFrom" content="2012-
20  01-01"/>
21  <meta itemprop="validThrough"
22  content="2012-12-31"/>
23  <Rates>
24  <Rate itemprop="offers" itemscope=""
25  itemtype="http://schema.org/Offer">

```

Structured Data Output (Right Pane):

description:	Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.
description:	commodo consequat
description:	voluptate velit
offers [Offer]:	
validFrom:	2012-08-01
validThrough:	2012-08-31
price:	499.00
priceCurrency:	EUR
eligibleQuantity [QuantitativeValue]:	
value:	2
eligibleDuration [QuantitativeValue]:	
value:	P7N
IncludesObject [TypeAndQuantityNode]:	
name:	parking lot (included)
IncludesObject [TypeAndQuantityNode]:	
name:	swimming pool (included)
IncludesObject [TypeAndQuantityNode]:	

Figure 3. Extracted data by using XSL Transformations

This method is easy to implement as well as easy to extend where if a change is happen in the input document, then we need to change the stylesheet only. Unfortunately, since we alter the input document by adding a new attribute or element, it produces a new document which is not comply with AlpineBits XSD. Validation againts the XSD will be failed as shown at Figure 4.

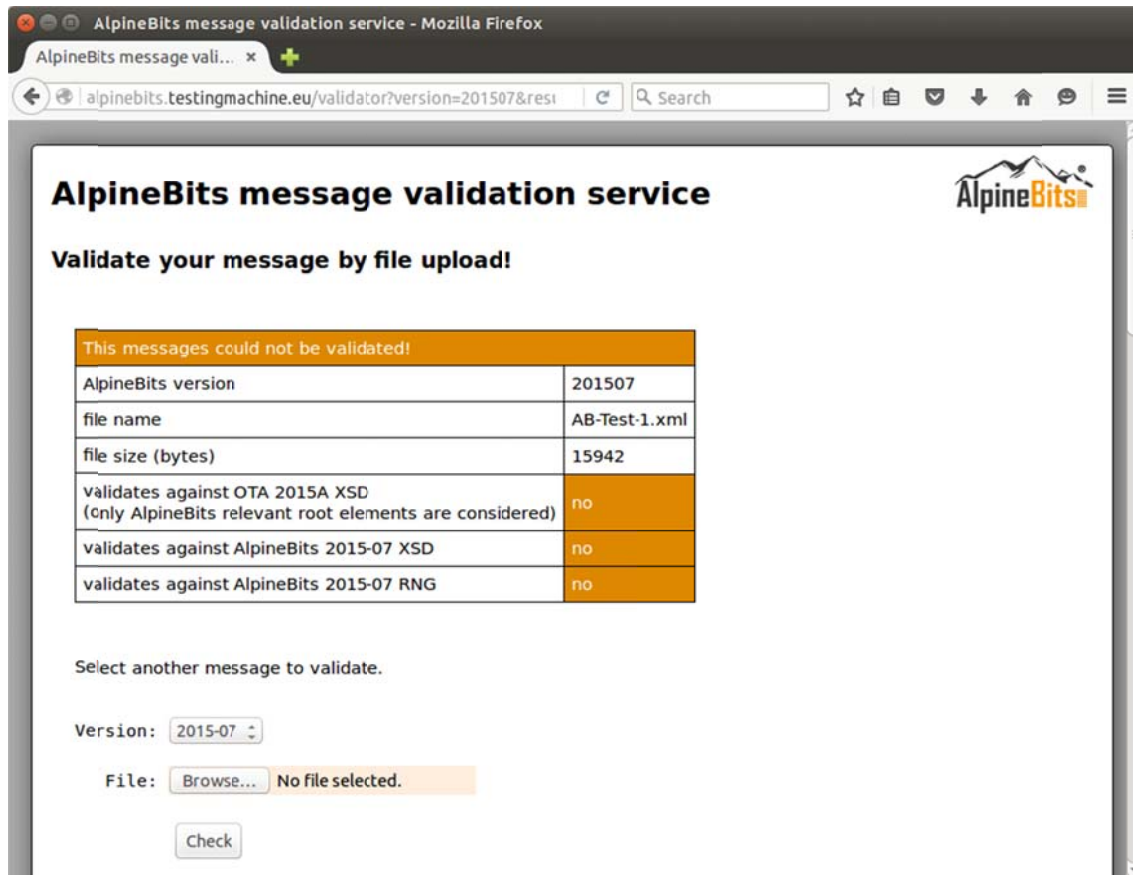


Figure 4. Validation of Output from XSL Transformations

2.2 JSON-LD Serialization

JavaScript Object Notation (JSON) for Linked Data (JSON-LD) [8] is a JSON-based linked data format, introduces the concept of “context” to link object properties in a JSON document to concepts in an ontology. It is one of formats recommended for use with Schema.org alongside Microdata and RDFa [9].

In this implementation, instead of inserting all annotation into the elements directly, the annotation will be inserted globally by processing all elements available in an XML input and producing a relevant XML output. A few intermediate objects are required to process the input according to the obtained map in order to produce output correctly.

As shown at Figure 5, an XML input will be un-marshalled into relevant a Java Object (which is generated from the specified XSD) first. Next, the processor consumes the object, and according to the provided map, a relevant Java Object will be produced. And finally, the output object then serialized into an XML output. We follow the best practice of embedding JSON-LD in HTML Documents [10].

In this method, the mapping is programatically performed by the processors. To make sure the produced XML output satisfies the XSD, the annotation in format of JSON-LD will be inserted as a comment (wrapped within sign “<--” and “-->”).

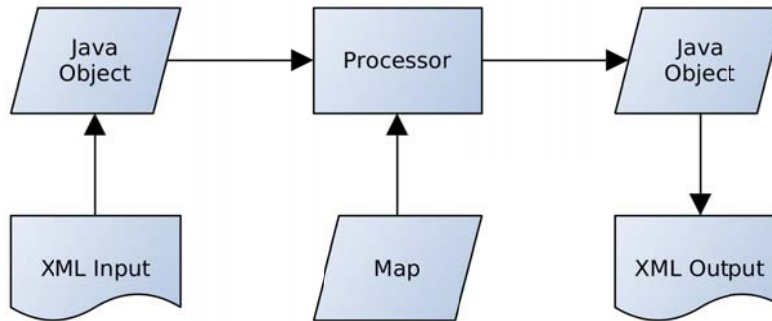


Figure 5. Implementation with JSON-LD Serialization

By using a structured data testing tool, the relevant classes and properties from Schema.org can be extracted from the inserted comment as shown at Figure 6. But first, we need to remove the comment signs.

The screenshot shows the Structured Data Testing Tool interface. On the left, there is a code editor with the following JSON-LD script:

```

1 <script type="application/ld+json">[ {
2   "validFrom" : "2012-01-01",
3   "validThrough" : "2012-12-31",
4   "offeredBy" : {
5     "name" : "Frangart Inn",
6     "@type" : "Organization"
7   },
8   "offers" : [ {
9     "validFrom" : "2012-08-01",
10    "validThrough" : "2012-08-31",
11    "eligibleQuantity" : {
12      "value" : "2",
13      "@type" : "QuantitativeValue"
14    },
15    "eligibleDuration" : {
16      "value" : "P7N",
17      "@type" : "QuantitativeValue"
18    },
19    "price" : "499.00",
20    "priceCurrency" : "EUR",
21    "includesObject" : [ {
22      "name" : "parking lot (included)",
23      "@type" : "TypeAndQuantityNode"
24    }, {
25      "name" : "swimming pool (included)".
  
```

On the right, the results pane shows the extracted data for 'AggregateOffer (1)'. It indicates 'Keine Fehler' (No errors) and lists the following properties:

AggregateOffer	
validFrom:	2012-01-01
validThrough:	2012-12-31
offeredBy [Organization]:	
name:	Frangart Inn
offers [Offer]:	
validFrom:	2012-08-01
validThrough:	2012-08-31
price:	499.00
priceCurrency:	EUR
eligibleQuantity [QuantitativeValue]:	
value:	2
eligibleDuration [QuantitativeValue]:	
value:	P7N
includesObject [TypeAndQuantityNode]:	
name:	parking lot (included)
includesObject [TypeAndQuantityNode]:	
name:	swimming pool (included)

Figure 6. Extracted data by using JSON-LD Serialization

This method will produce a valid XML output message because we did not change any property or element in the provided input. The annotation was embedded through a comment, therefore it will produce a valid message as shown at Figure 7. But in order to obtain the annotation correctly, we need to remove the comment first.

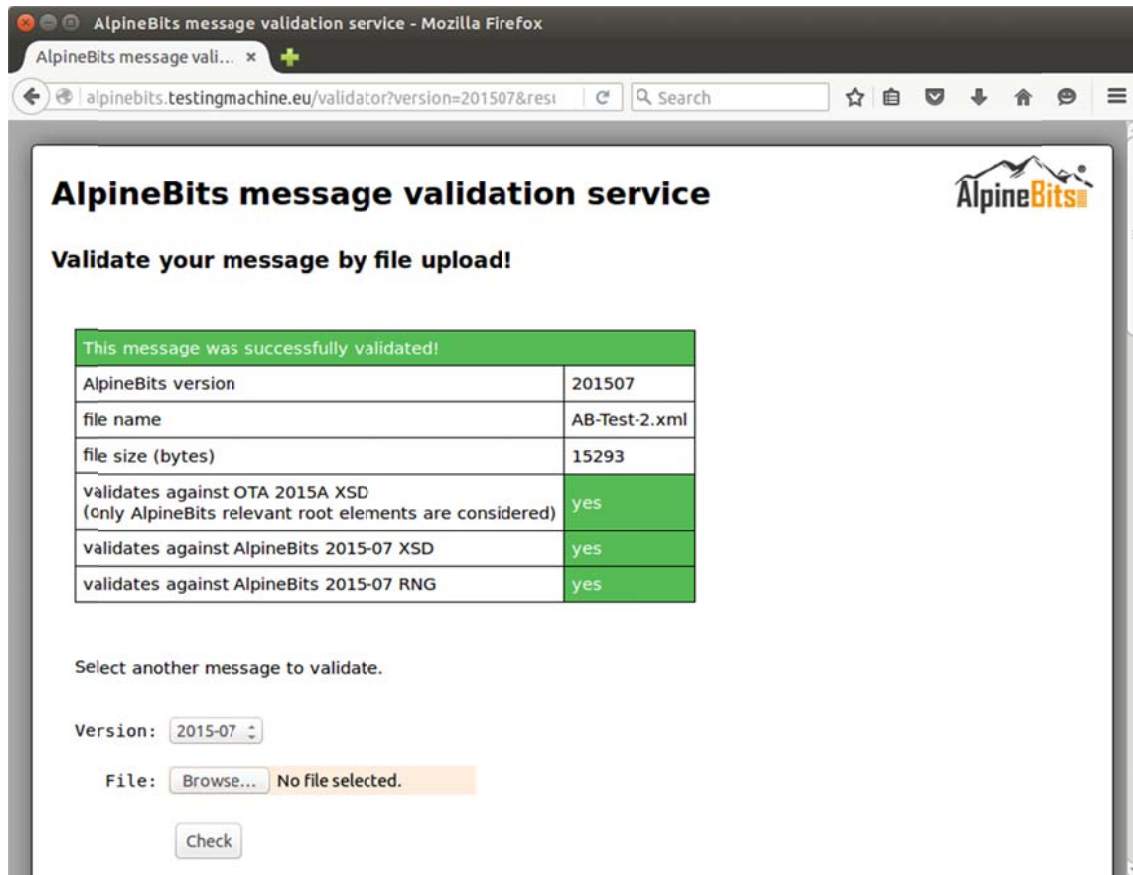


Figure 7. Validation of Output from JSON-LD Serialization

3. Conclusion and Discussion

We introduced two different methods to implement the annotation of AlpineBits message with Schema.org. There are a few things need a further discussion:

1. In principle, the second method is more acceptable, it produces results which are satisfy the AlpineBits XML Schema Definition, but
 - Serialization and Deserialization from an XML Input and to an XML Output requires a programming activity, where potential error could be raised during the serialization and deserialization processes. For example, un-matched data type exception need to be catched.
2. Another important aspect is the multi-languages included in an XML message, where multiple descriptions (one description for each language) are provided.
 - In first method, the annotation will be attached to the correct relevant element and therefore can be filtered out easily because the annotation will follow the right element and or attributes automatically.
 - In second method, the annotation will be attached in the body of the XML message and therefore applicable globally. A further refinement can be performed, for instance by defining different group of annotations for each language, but this of course required more additional works at the server side.

References

- [1] AlpineBits, <http://www.alpinebits.org/>
- [2] Schema.org, <http://schema.org/>
- [3] Z. Akbar, I. Toma, „Mapping AlpineBits to Schema.org“, Technical Report, Semantic Technology Institute Innsbruck, February, 2016
- [4] Google Structured Data Testing Tool, <https://developers.google.com/structured-data/testing-tool/>
- [5] AlpineBits message validation service, <http://alpinebits.testingmachine.eu/validator>
- [6] AlpineBits schema files, <https://github.com/alpinebits/developers-kit>
- [7] OpenTravel Alliance, <http://www.opentravel.org/>
- [8] JSON for Linking Data, <http://json-ld.org/>
- [9] Schema.org and JSON-LD, <http://blog.schema.org/2013/06/schemaorg-and-json-ld.html>
- [10] Embedding JSON-LD in HTML Documents, <https://www.w3.org/TR/json-ld-syntax/#embedding-json-ld-in-html-documents>

A. XML Document Example

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

<!--
  AlpineBits 2014-04
  http://www.alpinebits.org/

  sample message file

  changelog:
  v. 2014-04 1.0
-->

<OTA_HotelRatePlanNotifRQ xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="http://www.opentravel.org/OTA/2003/05"

xsi:schemaLocation="http://www.opentravel.org/OTA/2003/05
OTA_HotelRatePlanNotifRQ.xsd"
  Version="2.001">

  <RatePlans>

    <RatePlan Start="2012-01-01" End="2012-12-31">

      <Rates>

        <Rate MinGuestApplicable="2" Start="2012-08-01" End="2012-08-31"
Sat="true" Duration="P7N">

          <BaseByGuestAmts>
            <BaseByGuestAmt NumberOfGuests="1" AmountAfterTax="499.00"
CurrencyCode="EUR"/>
          </BaseByGuestAmts>

          <RateDescription Name="included services">
            <!-- included services in free text form -->
            <ListItem ListItem="1" Language="en">parking lot
(included)</ListItem>
            <ListItem ListItem="2" Language="en">swimming pool
(included)</ListItem>
            <ListItem ListItem="3" Language="en">full board (+25
EUR)</ListItem>
            <ListItem ListItem="1" Language="it">parcheggio</ListItem>
            <ListItem ListItem="2" Language="it">piscina</ListItem>
            <ListItem ListItem="3" Language="it">pensione completa
(+25 EUR)</ListItem>
            <ListItem ListItem="1" Language="de">Parkplatz</ListItem>
            <ListItem ListItem="2" Language="de">Schwimmbad</ListItem>
            <ListItem ListItem="3" Language="de">Vollpension (+25
EUR)</ListItem>
          </RateDescription>

          <MealsIncluded Breakfast="true" Lunch="false" Dinner="true"/>

        </Rate>

        <Rate MinGuestApplicable="2" Start="2012-12-01" End="2012-12-31"
Sat="true" Duration="P7N">

          <BaseByGuestAmts>
            <BaseByGuestAmt NumberOfGuests="1" AmountAfterTax="399.00"
CurrencyCode="EUR"/>
          </BaseByGuestAmts>

          <RateDescription Name="included services">
```

```

        <!-- included services in free text form -->
        <ListItem ListItem="1" Language="en">parking
lot</ListItem>
        <ListItem ListItem="2" Language="en">skipass</ListItem>
        <ListItem ListItem="1" Language="it">parcheggio</ListItem>
        <ListItem ListItem="2" Language="it">skipass</ListItem>
        <ListItem ListItem="1" Language="de">Parkplatz</ListItem>
        <ListItem ListItem="2" Language="de">Skipass</ListItem>
    </RateDescription>

    <MealsIncluded Breakfast="true" Lunch="true" Dinner="true"/>

    </Rate>

</Rates>

<!-- the title of the package (plain text),
    repeated for each language -->

    <Description Name="title">
        <Text TextFormat="PlainText" Language="en">Hiking in the Atacama
Desert</Text>
        <Text TextFormat="PlainText" Language="it">Escursione nel deserto
di Atacama</Text>
        <Text TextFormat="PlainText" Language="de">Bergwandern in der
Atacamawüste</Text>
    </Description>

    <!-- the short introductory text (plain text) and optional URLs,
    repeated for each language -->

    <Description Name="intro">
        <Text TextFormat="PlainText" Language="en">
            Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
            incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
            exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
        </Text>
        <URL>http://www.alpinebits.org/en/</URL>

        <Text TextFormat="PlainText" Language="it">
            Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
            incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
            exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
        </Text>
        <URL>http://www.alpinebits.org/it/</URL>

        <Text TextFormat="PlainText" Language="de">
            Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
            incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
            exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
        </Text>
        <URL>http://www.alpinebits.org/de/</URL>

    </Description>

    <!-- the images associated with the package: copyright/caption, image

```

```

and optional URLs,
    repeated for each language -->

<Description Name="gallery">

    <Text TextFormat="PlainText" Language="en">
        (C) 2012 Example Inc.
    </Text>
    <Image>http://www.example.com/image-en.gif</Image>
    <URL>http://www.example.com/en</URL>

    <Text TextFormat="PlainText" Language="it">
        (C) 2012 Example Inc.
    </Text>
    <Image>http://www.example.com/image-it.gif</Image>
    <URL>http://www.example.com/it</URL>

    <Text TextFormat="PlainText" Language="de">
        (C) 2012 Example Inc.
    </Text>
    <Image>http://www.example.com/image-de.gif</Image>
    <URL>http://www.example.com/de</URL>

</Description>

<!-- the detail description as texts (plain text, HTML) or ListItems,
    repeated for each language -->

<Description Name="details">

    <Text TextFormat="PlainText" Language="en">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
    </Text>
    <Text TextFormat="HTML" Language="en">
        <![CDATA[
        Duis aute <b>irure dolor</b> in reprehenderit involuptate
velit esse cillum dolore
        eu <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
        occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
        id est laborum.
        ]]>
    </Text>
    <ListItem ListItem="1" Language="en">commodo consequat</ListItem>
    <ListItem ListItem="2" Language="en">voluptate velit</ListItem>

    <Text TextFormat="PlainText" Language="it">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
    </Text>
    <Text TextFormat="HTML" Language="it">
        <![CDATA[
        Duis aute <b>irure dolor</b> in reprehenderit involuptate
velit esse cillum dolore
        eu <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
        occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
    
```

```

        id est laborum.
    ]]>
</Text>
<ListItem ListItem="1" Language="it">commodo consequat</ListItem>
<ListItem ListItem="2" Language="it">voluptate velit</ListItem>

    <Text TextFormat="PlainText" Language="de">
do eiusmod tempor        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud      exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
    </Text>
    <Text TextFormat="HTML" Language="de">
        <![CDATA[
Duis aute <b>irure dolor</b> in reprehenderit involuptate
velit esse cillum dolore
eu <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
        id est laborum.
        ]]>
    </Text>
    <ListItem ListItem="1" Language="de">commodo consequat</ListItem>
    <ListItem ListItem="2" Language="de">voluptate velit</ListItem>

    </Description>

    <UniqueID Type="18" ID="3f6fcef0da2ef57"/>

    <HotelRef HotelCode="123" HotelName="Frangart Inn"/>

    </RatePlan>

</RatePlans>

</OTA_HotelRatePlanNotifRQ>

```

B. XML Document Annotated with Solution #1

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
  AlpineBits 2014-04
  http://www.alpinebits.org/

  sample message file

  changelog:
  v. 2014-04 1.0
-->
<OTA_HotelRatePlanNotifRQ
  xmlns="http://www.opentravel.org/OTA/2003/05"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opentravel.org/OTA/2003/05
  OTA_HotelRatePlanNotifRQ.xsd" Version="2.001">
  <RatePlans>
    <RatePlan itemscope="" itemtype="http://schema.org/AggregateOffer"
      xmlns:schema="http://schema.org/">
      <meta itemprop="validFrom" content="2012-01-01"/>
      <meta itemprop="validThrough" content="2012-12-31"/>
      <Rates>
        <Rate itemprop="offers" itemscope=""
itemtype="http://schema.org/Offer">
          <meta itemprop="validFrom" content="2012-08-01"/>
          <meta itemprop="validThrough" content="2012-08-31"/>
          <schema:QuantitativeValue itemprop="eligibleQuantity"
itemscope="" itemtype="http://schema.org/QuantitativeValue">
            <meta itemprop="value" content="2"/>
          </schema:QuantitativeValue>
          <schema:QuantitativeValue itemprop="eligibleDuration"
itemscope="" itemtype="http://schema.org/QuantitativeValue">
            <meta itemprop="value" content="P7N"/>
          </schema:QuantitativeValue>
          <BaseByGuestAmts>
            <BaseByGuestAmt NumberOfGuests="1" AmountAfterTax="499.00"
CurrencyCode="EUR"/>
            <meta itemprop="price" content="499.00"/>
            <meta itemprop="priceCurrency" content="EUR"/>
          </BaseByGuestAmts>
          <RateDescription Name="included services">
            <!-- included services in free text form -->
            <ListItem ListItem="1" Language="en">parking lot
(included)</ListItem>
            <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemtype="http://schema.org/TypeAndQuantityNode">
              <meta itemprop="name" content="parking lot
(included)"/>
            </schema:TypeAndQuantityNode>
            <ListItem ListItem="2" Language="en">swimming pool
(included)</ListItem>
            <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemtype="http://schema.org/TypeAndQuantityNode">
              <meta itemprop="name" content="swimming pool
(included)"/>
            </schema:TypeAndQuantityNode>
            <ListItem ListItem="3" Language="en">full board (+25
EUR)</ListItem>
            <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemtype="http://schema.org/TypeAndQuantityNode">
              <meta itemprop="name" content="full board (+25 EUR)"/>
            </schema:TypeAndQuantityNode>
            <ListItem ListItem="1" Language="it">parcheggio</ListItem>
            <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemtype="http://schema.org/TypeAndQuantityNode">
```

```

        <meta itemprop="name" content="parcheggio"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="2" Language="it">piscina</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="piscina"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="3" Language="it">pensione completa
(+25 EUR)</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="pensione completa (+25
EUR)"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="1" Language="de">Parkplatz</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="Parkplatz"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="2" Language="de">Schwimmbad</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="Schwimmbad"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="3" Language="de">Vollpension (+25
EUR)</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="Vollpension (+25
EUR)"/>
        </schema:TypeAndQuantityNode>
    </RateDescription>
    <MealsIncluded Breakfast="true" Lunch="false" Dinner="true"/>
</Rate>
    <Rate itemprop="offers" itemscope=""
itemtype="http://schema.org/Offer">
        <meta itemprop="validFrom" content="2012-12-01"/>
        <meta itemprop="validThrough" content="2012-12-31"/>
        <schema:QuantitativeValue itemprop="eligibleQuantity"
itemscope="" itemType="http://schema.org/QuantitativeValue">
        <meta itemprop="value" content="2"/>
        </schema:QuantitativeValue>
        <schema:QuantitativeValue itemprop="eligibleDuration"
itemscope="" itemType="http://schema.org/QuantitativeValue">
        <meta itemprop="value" content="P7N"/>
        </schema:QuantitativeValue>
        <BaseByGuestAmts>
            <BaseByGuestAmt NumberOfGuests="1" AmountAfterTax="399.00"
CurrencyCode="EUR"/>
            <meta itemprop="price" content="399.00"/>
            <meta itemprop="priceCurrency" content="EUR"/>
        </BaseByGuestAmts>
        <RateDescription Name="included services">
            <!-- included services in free text form -->
            <ListItem ListItem="1" Language="en">parking
lot</ListItem>
            <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">
            <meta itemprop="name" content="parking lot"/>
            </schema:TypeAndQuantityNode>
            <ListItem ListItem="2" Language="en">skipass</ListItem>
            <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">
            <meta itemprop="name" content="skipass"/>
            </schema:TypeAndQuantityNode>
            <ListItem ListItem="1" Language="it">parcheggio</ListItem>
            <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemType="http://schema.org/TypeAndQuantityNode">

```

```

        <meta itemprop="name" content="parcheggio"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="2" Language="it">skipass</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemtype="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="skipass"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="1" Language="de">Parkplatz</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemtype="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="Parkplatz"/>
        </schema:TypeAndQuantityNode>
        <ListItem ListItem="2" Language="de">Skipass</ListItem>
        <schema:TypeAndQuantityNode itemprop="includesObject"
itemscope="" itemtype="http://schema.org/TypeAndQuantityNode">
        <meta itemprop="name" content="Skipass"/>
        </schema:TypeAndQuantityNode>
    </RateDescription>
    <MealsIncluded Breakfast="true" Lunch="true" Dinner="true"/>
</Rate>
</Rates>
<!-- the title of the package (plain text),
repeated for each language -->
<Description Name="title">
    <Text itemprop="name" TextFormat="PlainText" Language="en">Hiking
in the Atacama Desert</Text>
    <Text itemprop="name" TextFormat="PlainText"
Language="it">Escursione nel deserto di Atacama</Text>
    <Text itemprop="name" TextFormat="PlainText"
Language="de">Bergwandern in der Atacamawüste</Text>
</Description>
<!-- the short introductory text (plain text) and optional URLs,
repeated for each language -->
<Description Name="intro">
    <Text itemprop="alternateName" TextFormat="PlainText"
Language="en">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
        </Text>
        <URL itemprop="url">http://www.alpinebits.org/en/</URL>
        <Text itemprop="alternateName" TextFormat="PlainText"
Language="it">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
        </Text>
        <URL itemprop="url">http://www.alpinebits.org/it/</URL>
        <Text itemprop="alternateName" TextFormat="PlainText"
Language="de">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
        </Text>
        <URL itemprop="url">http://www.alpinebits.org/de/</URL>
    </Description>
    <!-- the images associated with the package: copyright/caption, image
and optional URLs,
repeated for each language -->

```



```

        <Description Name="gallery">
          <Text TextFormat="PlainText" Language="en">
            (C) 2012 Example Inc.
          </Text>
          <Image itemprop="image">http://www.example.com/image-
en.gif</Image>
          <URL itemprop="url">http://www.example.com/en</URL>
          <Text TextFormat="PlainText" Language="it">
            (C) 2012 Example Inc.
          </Text>
          <Image itemprop="image">http://www.example.com/image-
it.gif</Image>
          <URL itemprop="url">http://www.example.com/it</URL>
          <Text TextFormat="PlainText" Language="de">
            (C) 2012 Example Inc.
          </Text>
          <Image itemprop="image">http://www.example.com/image-
de.gif</Image>
          <URL itemprop="url">http://www.example.com/de</URL>
        </Description>
        <!-- the detail description as texts (plain text, HTML) or ListItems,
        repeated for each language -->
        <Description Name="details">
          <Text itemprop="description" TextFormat="PlainText" Language="en">
do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
          </Text>
          <Text itemprop="description" TextFormat="HTML" Language="en">
            Duis aute
            <b>irure dolor</b> in reprehenderit involuptate velit esse
cillum dolore
            eu
            <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
            occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
            id est laborum.
          </Text>
          <ListItem itemprop="description" ListItem="1"
Language="en">commodo consequat</ListItem>
          <ListItem itemprop="description" ListItem="2"
Language="en">voluptate velit</ListItem>
          <Text itemprop="description" TextFormat="PlainText" Language="it">
do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
          </Text>
          <Text itemprop="description" TextFormat="HTML" Language="it">
            Duis aute
            <b>irure dolor</b> in reprehenderit involuptate velit esse
cillum dolore
            eu
            <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
            occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
            id est laborum.

```

```

        </Text>
        <ListItem itemprop="description" ListItem="1"
Language="it">commodo consequat</ListItem>
        <ListItem itemprop="description" ListItem="2"
Language="it">voluptate velit</ListItem>
        <Text itemprop="description" TextFormat="PlainText" Language="de">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
        </Text>
        <Text itemprop="description" TextFormat="HTML" Language="de">
        Duis aute
        <b>irure dolor</b> in reprehenderit involuptate velit esse
cillum dolore
        eu
        <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
        occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
        id est laborum.

        </Text>
        <ListItem itemprop="description" ListItem="1"
Language="de">commodo consequat</ListItem>
        <ListItem itemprop="description" ListItem="2"
Language="de">voluptate velit</ListItem>
        </Description>
        <UniqueID Type="18" ID="3f6fcel1f0da2ef57"/>
        <HotelRef HotelCode="123" HotelName="Frangart Inn"/>
        <schema:Organization itemprop="offeredBy" itemscope=""
itemtype="http://schema.org/Organization">
        <meta itemprop="name" content="Frangart Inn"/>
        </schema:Organization>
        </RatePlan>
    </RatePlans>
</OTA_HotelRatePlanNotifRQ>

```

C. XML Document Annotated with Solution #2

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?><!--
  AlpineBits 2014-04
  http://www.alpinebits.org/

  sample message file

  changelog:
  v. 2014-04 1.0
--><!--<script type="application/ld+json">[ {
  "validFrom" : "2012-01-01",
  "validThrough" : "2012-12-31",
  "offeredBy" : {
    "name" : "Frangart Inn",
    "@type" : "Organization"
  },
  "offers" : [ {
    "validFrom" : "2012-08-01",
    "validThrough" : "2012-08-31",
    "eligibleQuantity" : {
      "value" : "2",
      "@type" : "QuantitativeValue"
    },
    "eligibleDuration" : {
      "value" : "P7N",
      "@type" : "QuantitativeValue"
    },
    "price" : "499.00",
    "priceCurrency" : "EUR",
    "includesObject" : [ {
      "name" : "parking lot (included)",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "swimming pool (included)",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "full board (+25 EUR)",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "parcheggio",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "piscina",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "pensione completa (+25 EUR)",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "Parkplatz",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "Schwimmbad",
      "@type" : "TypeAndQuantityNode"
    }, {
      "name" : "Vollpension (+25 EUR)",
      "@type" : "TypeAndQuantityNode"
    }
  ],
  "@type" : "Offer"
}, {
  "validFrom" : "2012-12-01",
  "validThrough" : "2012-12-31",
  "eligibleQuantity" : {
    "value" : "2",
    "@type" : "QuantitativeValue"
  },
}
```

```

"eligibleDuration" : {
  "value" : "P7N",
  "@type" : "QuantitativeValue"
},
"price" : "399.00",
"priceCurrency" : "EUR",
"includesObject" : [ {
  "name" : "parking lot",
  "@type" : "TypeAndQuantityNode"
}, {
  "name" : "skipass",
  "@type" : "TypeAndQuantityNode"
}, {
  "name" : "parcheggio",
  "@type" : "TypeAndQuantityNode"
}, {
  "name" : "skipass",
  "@type" : "TypeAndQuantityNode"
}, {
  "name" : "Parkplatz",
  "@type" : "TypeAndQuantityNode"
}, {
  "name" : "Skipass",
  "@type" : "TypeAndQuantityNode"
} ],
"@type" : "Offer"
}],
"name" : [ "Hiking in the Atacama Desert", "Escursione nel deserto di Atacama",
"Bergwandern in der Atacamawüste" ],
"alternateName" : [ "\n
                                Lorem ipsum dolor sit amet,
consectetur adipisicing elit, sed do eiusmod tempor\n
incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis
nostrud\n
                                exercitation ullamco laboris nisi ut aliquip ex ea
commodo consequat.\n
                                ", "\n
                                Lorem ipsum dolor
sit amet, consectetur adipisicing elit, sed do eiusmod tempor\n
incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis
nostrud\n
                                exercitation ullamco laboris nisi ut aliquip ex ea
commodo consequat.\n
                                ", "\n
                                Lorem ipsum dolor
sit amet, consectetur adipisicing elit, sed do eiusmod tempor\n
incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis
nostrud\n
                                exercitation ullamco laboris nisi ut aliquip ex ea
commodo consequat.\n
                                " ],
"image" : [ "http://www.example.com/image-en.gif",
"http://www.example.com/image-it.gif", "http://www.example.com/image-de.gif" ],
"url" : [ "http://www.alpinebits.org/en/", "http://www.alpinebits.org/it/",
"http://www.alpinebits.org/de/", "http://www.example.com/en",
"http://www.example.com/it", "http://www.example.com/de" ],
"description" : [ "\n
                                Lorem ipsum dolor sit amet, consectetur
adipisicing elit, sed do eiusmod tempor\n
                                incididunt ut labore
et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud\n
                                exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.\n
                                ", "\n
                                \n
                                Duis aute <b>irure dolor</b> in
reprehenderit involuptate velit esse cillum dolore\n
                                eu <a
href=\"http://www.alpinebits.org/\">fugiat nulla pariat</a>. Excepteur sint\n
occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim\n
id est laborum.\n
                                \n
                                ", "commodo consequat",
"voluptate velit", "\n
                                Lorem ipsum dolor sit amet, consectetur
adipisicing elit, sed do eiusmod tempor\n
                                incididunt ut labore
et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud\n
                                exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.\n
                                ", "\n
                                \n
                                Duis aute <b>irure dolor</b> in
reprehenderit involuptate velit esse cillum dolore\n
                                eu <a
href=\"http://www.alpinebits.org/\">fugiat nulla pariat</a>. Excepteur sint\n
occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim\n
id est laborum.\n
                                \n
                                ", "commodo consequat",
"voluptate velit", "\n
                                Lorem ipsum dolor sit amet, consectetur
adipisicing elit, sed do eiusmod tempor\n
                                incididunt ut labore
et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud\n

```

```

exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat.\n
", "\n                            \n                                Duis aute <b>irure dolor</b> in
reprehenderit involuptate velit esse cillum dolore\n                                eu <a
href=\"http://www.alpinebits.org/\">fugiat nulla pariat</a>. Excepteur sint\n
occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim\n
id est laborum.\n                                \n                                ", "commodo consequat",
"voluptate velit" ],
"@context" : "http://schema.org/",
"@type" : "AggregateOffer"
} ]</script>--><OTA_HotelRatePlanNotifRQ
xmlns="http://www.opentravel.org/OTA/2003/05"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" Version="2.001"
xsi:schemaLocation="http://www.opentravel.org/OTA/2003/05
OTA_HotelRatePlanNotifRQ.xsd">

<RatePlans>

    <RatePlan End="2012-12-31" Start="2012-01-01">

        <Rates>

            <Rate Duration="P7N" End="2012-08-31" MinGuestApplicable="2"
Sat="true" Start="2012-08-01">

                <BaseByGuestAmts>
                    <BaseByGuestAmt AmountAfterTax="499.00" CurrencyCode="EUR"
NumberOfGuests="1"/>
                </BaseByGuestAmts>

                <RateDescription Name="included services">
                    <!-- included services in free text form -->
                    <ListItem Language="en" ListItem="1">parking lot
(included)</ListItem>
                    <ListItem Language="en" ListItem="2">swimming pool
(included)</ListItem>
                    <ListItem Language="en" ListItem="3">full board (+25
EUR)</ListItem>
                    <ListItem Language="it" ListItem="1">parcheggio</ListItem>
                    <ListItem Language="it" ListItem="2">piscina</ListItem>
                    <ListItem Language="it" ListItem="3">pensione completa
(+25 EUR)</ListItem>
                    <ListItem Language="de" ListItem="1">Parkplatz</ListItem>
                    <ListItem Language="de" ListItem="2">Schwimmbad</ListItem>
                    <ListItem Language="de" ListItem="3">Vollpension (+25
EUR)</ListItem>
                </RateDescription>

                <MealsIncluded Breakfast="true" Dinner="true" Lunch="false"/>

            </Rate>

            <Rate Duration="P7N" End="2012-12-31" MinGuestApplicable="2"
Sat="true" Start="2012-12-01">

                <BaseByGuestAmts>
                    <BaseByGuestAmt AmountAfterTax="399.00" CurrencyCode="EUR"
NumberOfGuests="1"/>
                </BaseByGuestAmts>

                <RateDescription Name="included services">
                    <!-- included services in free text form -->
                    <ListItem Language="en" ListItem="1">parking
lot</ListItem>
                    <ListItem Language="en" ListItem="2">skipass</ListItem>
                    <ListItem Language="it" ListItem="1">parcheggio</ListItem>
                    <ListItem Language="it" ListItem="2">skipass</ListItem>
                    <ListItem Language="de" ListItem="1">Parkplatz</ListItem>
                    <ListItem Language="de" ListItem="2">Skipass</ListItem>

```

```

        </RateDescription>

        <MealsIncluded Breakfast="true" Dinner="true" Lunch="true"/>

    </Rate>

</Rates>

<!-- the title of the package (plain text),
      repeated for each language -->

<Description Name="title">

    <Text Language="en" TextFormat="PlainText">Hiking in the Atacama
Desert</Text>
    <Text Language="it" TextFormat="PlainText">Escursione nel deserto
di Atacama</Text>
    <Text Language="de" TextFormat="PlainText">Bergwandern in der
Atacamawüste</Text>

</Description>

<!-- the short introductory text (plain text) and optional URLs,
      repeated for each language -->

<Description Name="intro">

    <Text Language="en" TextFormat="PlainText">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
    </Text>
    <URL>http://www.alpinebits.org/en/</URL>

    <Text Language="it" TextFormat="PlainText">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
    </Text>
    <URL>http://www.alpinebits.org/it/</URL>

    <Text Language="de" TextFormat="PlainText">
        Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
        incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
        exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
    </Text>
    <URL>http://www.alpinebits.org/de/</URL>

</Description>

<!-- the images associated with the package: copyright/caption, image
and optional URLs,
      repeated for each language -->

<Description Name="gallery">

    <Text Language="en" TextFormat="PlainText">
        (C) 2012 Example Inc.
    </Text>

```

```
<Image>http://www.example.com/image-en.gif</Image>
<URL>http://www.example.com/en</URL>

<Text Language="it" TextFormat="PlainText">
  (C) 2012 Example Inc.
</Text>
<Image>http://www.example.com/image-it.gif</Image>
<URL>http://www.example.com/it</URL>

<Text Language="de" TextFormat="PlainText">
  (C) 2012 Example Inc.
</Text>
<Image>http://www.example.com/image-de.gif</Image>
<URL>http://www.example.com/de</URL>

</Description>

<!-- the detail description as texts (plain text, HTML) or ListItems,
      repeated for each language -->

<Description Name="details">

  <Text Language="en" TextFormat="PlainText">
    Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
    incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
    exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
  </Text>
  <Text Language="en" TextFormat="HTML">
    <![CDATA[
    Duis aute <b>irure dolor</b> in reprehenderit involuptate
velit esse cillum dolore
    eu <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
    occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
    id est laborum.
    ]]>
  </Text>
  <ListItem Language="en" ListItem="1">commodo consequat</ListItem>
  <ListItem Language="en" ListItem="2">voluptate velit</ListItem>

  <Text Language="it" TextFormat="PlainText">
    Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
do eiusmod tempor
    incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud
    exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
  </Text>
  <Text Language="it" TextFormat="HTML">
    <![CDATA[
    Duis aute <b>irure dolor</b> in reprehenderit involuptate
velit esse cillum dolore
    eu <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
    occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
    id est laborum.
    ]]>
  </Text>
  <ListItem Language="it" ListItem="1">commodo consequat</ListItem>
  <ListItem Language="it" ListItem="2">voluptate velit</ListItem>

  <Text Language="de" TextFormat="PlainText">
    Lorem ipsum dolor sit amet, consectetur adipisicing elit, sed
```

```
do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim
veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat.
    </Text>
    <Text Language="de" TextFormat="HTML">
        <![CDATA[
            Duis aute <b>irure dolor</b> in reprehenderit involuptate
velit esse cillum dolore
            eu <a href="http://www.alpinebits.org/">fugiat nulla
pariatur</a>. Excepteur sint
            occaecat cupidatat non proident, sunt in culpa qui officia
deserunt mollit anim
            id est laborum.
        ]]>
    </Text>
    <ListItem Language="de" ListItem="1">commodo consequat</ListItem>
    <ListItem Language="de" ListItem="2">voluptate velit</ListItem>

</Description>

<UniqueID ID="3f6fce1f0da2ef57" Type="18"/>

<HotelRef HotelCode="123" HotelName="Frangart Inn"/>

</RatePlan>

</RatePlans>

</OTA_HotelRatePlanNotifRQ>
```