



**Real-time Billing as a Service** 

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#### **Real-time Billing as a Service**

A standard-based proof-of-concept implementation –

## 05.00× Introduction **Real-time Rating and Charging** Charging of Cloud Services **Selected Standards Proof-of-concept Implementation** < Conclusion

#### Introduction



INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT





Bundesministerium für Bildung und Forschung

### **EASI-CLOUDS**

### Extendable Architecture and Service Infrastructure for **Cloud**-Aware **S**oftware

- Duration: 3 years
- Partners from France, Germany, Finland, Denmark, Korea and Egypt
- http://www.easi-clouds.eu/

#### Introduction

### EASI-CLOUDS



Extendable Architecture and Service Infrastructure for Cloud-Aware Software

### Objectives

- Federate resources and services of different cloud providers
- Simplify the development of secure, portable and scalable cloud applications
- Provide efficient provisioning, accounting, and billing services for new businesses

#### Expected Result

 A cloud software stack supporting dynamic coordination among different cloud service providers and simplifying the management of cloud applications

### Target Group

Small and medium-sized cloud providers

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### **Real-time Rating and Charging**



### **Process of Rating, Charging and Billing**

- 1. Mediation:
- 2. Rating, Accounting:
- 3. Charging:
- 4. Notifications, Reporting:
- 5. Billing:

Collection and preparation of information.

Rating of the collected information. Determination of the price.

Debiting the money from the account.

Notifying the customer and/or the provider.

Bill provisioning, enabling creation of invoices.

- In this context, real-time
  - ... means to rate and charge the costs in the moment they occur
  - ... has so far been primarily relevant for prepaid billing
  - ... allows interaction with customers during or even before applying costs

### **Real-time Rating and Charging**

### **Charging models**

### Postpaid

- Bill runs are done in defined cycles (e.g., monthly)
- Usage without limitations
- No cost control

#### Prepaid

- Payment in advance
- Usage only as long as credit is available
- Cost control, bill shock prevention

#### Convergent

- Combines the advantages and features of Postpaid and Prepaid
- Allows customer interaction in real-time

### **Real-time Rating and Charging**

### Charging models (continued)

Flatrate

Fixed amount per period (week, month, year ...)

Usage-based

Based on quantities (size, time, number of calls ...)

#### Freemium

Free for a defined period of time, afterwards flatrate or usage-based

#### SLA-based

Higher quality means higher price



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### **Usage-based Charging of Cloud Services**

#### IaaS – Infrastructure as a Service

- CPU time, memory (RAM, hard drive, ...), bandwidth, number of CPUs
- Server type (availability)
- PaaS Platform as a Service
  - Operating system
  - Development environment
  - Development tools
- **SaaS** Software as a Service
  - Application-based charging
    - number of calls,
    - duration,
    - data size, etc.



### **Usage-based Charging of Cloud Services**

### Advantages of real-time functionality

- Real-time information about costs and prices
- Real-time overview of revenues
  - Monitor performance
  - React faster on unfavorable tariffs
- New charging models
  - Dynamic pricing dependent on current load or energy costs
- Real-time interaction with customers
  - Bonus programs
  - Campaigns
  - Information and bill shock prevention





### The EASI-CLOUDS federated charging approach

#### **Cloud Federation**

- Different clouds with various charging and billing systems
- Need to share billing information
  - for information
    - Costs and Prices
  - for clearing
    - Cost/Revenue Sharing
  - for bonus management
    - Inter-Cloud Boni

### Need for common, standardized interfaces and data formats



### Real-time Billing as a Service (BaaS)

– A standard-based proof-of-concept implementation –



### **GSMA OneAPI**



#### Lightweight and Web friendly APIs

to allow mobile and other network operators to expose useful network information and capabilities to Web application developers.

#### Reduce effort and time

to create applications and content that is portable across operators

#### Example: POST request for direct charging with sample URL

http://www.orga-systems.com/baas/rest/
payment/{providerToken}/transactions/amount

and a request object containing customer ID, service ID, etc.

Documentation (Customer Management and Payment APIs): http://www.gsma.com/oneapi

### **Universal Service Description Language USDL**

 Platform-neutral language for describing business, operational and technical service aspects for the "Internet of Services"



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### **BaaS Proof-of-concept Implementation Architecture**



#### **BaaS Proof-of-concept Implementation**

#### **Sequence of Actions**

Starting Point:Service Provider (SP) has a service to offer as SaaSPrecondition:SP has registered to a virtual marketplace

- 1. SP configures tariffs for the SaaS in the Web GUI
- 2. Web GUI generates USDL document and sends it to the BaaS
- 3. BaaS compiles the USDL to generate new tariffs in the billing system
- 4. SP adds RESTful OneAPI calls for rating and charging to the SaaS code (sample client code for requests is provided)
- 5. SP creates an SaaS offer with the tariffs in the virtual marketplace
- 6. End users find the SaaS offer and use it with a certain tariff
- 7. SaaS calls BaaS to charge end users for service usage w.r.t. selected tariff
- 8. SP can see at any time service costs and revenues in Web GUI

#### **Starting Point:**

#### Medical Image Processing Service "FreeSurfer" as SaaS

Orga Systems.	EAQ Charite UMB (EC-C-CC-000101) is CUSTOMER, Michael Researcher, ('michael') has role User Logout							
	User Balances: (Main): -3500.00 EUR							
Cloud aware Software My Favorites My Projects Charging	g Info							
FreeSurfer ×								
n Mo	Moody's World of Cerebrum  ody McBrain Scientific Computing Inc.							
Welcome michael(EC-C-CC-000101) to McBrain's FreeSurfer Software Suite								
Silver Version of the well known FreeSurfer suite This version of our service allows you to process 1000 images within 15.00 seconds. The costs are 2500.0000 EUR base fee per month, 250.0000 occurrence's free and 10.0000 EUR per image.	Result         Execution finished at Wed May 28 2014 16:11:51 GMT+0200 (W. Europe Daylight Time)         Image: Comparison of the second							
Please select your images	A Done.							
Calculate Execute You have to pay <b>3500.00</b> EUR for processing <b>350</b> images.								

### Tariffs for the FreeSurfer Saas (Step 1)

	Option: slow (48h)			Option: medi	medium (24h)		Option: fast (8h)			
	Base Fee	Cost per dataset		Base Fee	Cost per dataset		Base Fee	Cost per dataset	inc dat	luded asets
Single	0.00€	12.50€		0.00€	13.50€		0.00€	15.00€		0
-										
Bronze	1,000.00€	10.00€		1,100.00€	11.00€		1,250.00€	12.50€		100
Silver	2,250.00€	9.00€		2,500.00€	10.00€		2,750.00€	11.00€		250
Gold	3,750.00€	7.50€		4,250.00€	8.50€		5,000.00€	10.00€		500
Platinum	5,000.00€	5.00€		6,000.00€	6.00€		7,500.00€	7.50€		1000

Tariff Configuration Web GUI (Steps 1 and 2)



```
USDL XML Code
<pricePlans xmi:id="PricePlan 1788258889" currency="EUR">
  <names xmi:id="Description 1820478992" value="Silver" type="name" language="en"/>
                                                                                         (Steps 2 and 3)
    . . .
  <planComponents xmi:id="PriceComponent 866069641">
   <names xmi:id="Description 984933155" value="Medium" type="name" language="en"/>
   <componentLevels xsi:type="pricing:AbsolutePriceLevel" xmi:id="AbsolutePriceLevel 1985017064"</pre>
       priceMetrics="PriceMetric 308918491" absoluteAmount="2500.0">
     <descriptions xmi:id="Description 1455071179" value="Base Fee" type="name" language="en"/>
   </componentLevels>
   <componentLevels xsi:type="pricing:AbsolutePriceLevel" xmi:id="AbsolutePriceLevel_588191426"</pre>
       priceMetrics="PriceMetric 48671874" levelFences="PriceFence 443152346" absoluteAmount="10.0">
     <descriptions xmi:id="Description 1023338503" value="Charging Rule (Item)" type="name" language="en"/>
   </componentLevels>
   <descriptions xmi:id="Description 967585009" value="Results available in max. 24h" type="name" language="en"/>
 </planComponents>
</pricePlans>
<priceFences xmi:id="PriceFence 443152346" businessTerm="Free">
 <businessTermExpression xmi:id="Expression_719499274" value="<--</pre>
                                                                  Occurrence > quantity∫'Quantity 53691098
   languageID="http://condition-expression.example.language/"/>
 <quantityLiterals xmi:id="Quantity 53691098" amount="250.0">
   <typeReference xmi:id="TypeReference 143881861" classificationSystemID="http://internet-of-services/.../units"
       classID="Occurrence" unitSymbol="OCC"/>
 </quantityLiterals>
</priceFences>
```

Currently, only selected elements of the USDL Payment module are used. A special semantics is applied for certain element values -> USDL Profile

• • •

#### Virtual Marketplace: FreeSurfer Tariff Offers to select from (Steps 5, 6 and 7)

Orga Systems. FAQ McBrain Incorporated (EC-M-MM-000059) is PROVIDER, Moody McBrain, ('moody') has role Admi								Logout
				Customer Balance	es: (Main): 19514.12 I	EUR (Revenue)	: 20037.50 EUR (Penalty): 0	0.00 EUR
							User Balances: (Main): -523	3.38 EUR
_		)						
C	loud aware Software	My Favorites	My Projects	Charging Info	Add Service	Budget		
	FreeSurfer Bronze Fast	The fast Bronz	: 1250.0 EUR / Month currence free : / Occurrence					
	FreeSurfer Silver Slow	The slow Silve	r Version of the well	known FreeSurfer suite	e FAIR	Base Fee: 2250.0 EUR / Month 250.0 Occurrence free 9.0 EUR / Occurrence		
	FreeSurfer Silver Medium	The medium Silver Version of the well known FreeSurfer suite       NORMAL       Base Fee: 2500.0 EUR / Month         250.0 Occurrence free       10.0 EUR / Occurrence						
	FreeSurfer Silver Fast	The fast Silver	Version of the well	known FreeSurfer suite	GOOD	Base Fe 250.0 O 11.0 EU	ee: 2750.0 EUR / Month ccurrence free R / Occurrence	

### **Revenues and Costs Overview at any Time (Step 8)**



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#### **Conclusion and Outlook**

Real-time Billing as a Service in federated cloud environments

- Significant advantages to apply real-time rating and charging
- Use of standardized interfaces and data formats for interoperability
- Proof-of-concept-implementation to show feasibility
- Ongoing and next steps
  - Integration to a complete end-to-end demo system until end of 2014
  - Enhance the USDL profile and utilize more elements of USDL to express more complex tariff structures and charging rules

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