Billing Service Design Document

EOEPCA.SDD.xxx

TVUK System Team

Version 0.1, dd/mm/yyyy:

Billing Service Design Document

EO Exploitation Platform Common Architecture

Billing Service Design Document

EOEPCA.SDD.xxx

COMMENTS and ISSUES If you would like to raise comments or issues on this document, please do so by raising an Issue at the following URL https://github.com/EOEPCA/um-billing-service/issues.	**PDF** This document is available in PDF format here.
EUROPEAN SPACE AGENCY CONTRACT REPORT The work described in this report was done under ESA contract. Responsibility for the contents resides in the author or organisation that prepared it.	**TELESPAZIO VEGA UK Ltd** 350 Capability Green, Luton, Bedfordshire, LU1 3LU, United Kingdom. Tel: +44 (0)1582 399000 www.telespazio-vega.com

AMENDMENT HISTORY

This document shall be amended by releasing a new edition of the document in its entirety.

The Amendment Record Sheet below records the history and issue status of this document.

Table 1. Amendment Record Sheet

ISSUE	DATE	REASON
0.1	dd/mm/yyyy	Initial in-progress draft

Chapter 1. Introduction

1.1. Purpose and Scope

This document presents the Billing Service Design for the Common Architecture.

1.2. Structure of the Document

Section 2 - Overview

Provides an over of the Billing Service component, within the context of the wider Common Architecture design.

Section 3 - Building Block Design

Provides the design of the Billing Service component.

1.3. Reference Documents

The following is a list of Reference Documents with a direct bearing on the content of this document.

Reference	Document Details	Version
[EOEPCA-UC]	EOEPCA - Use Case Analysis EOEPCA.TN.005 https://eoepca.github.io/use-case-analysis	Issue 1.0, 02/08/2019
[EP-FM]	Exploitation Platform - Functional Model, ESA-EOPSDP-TN-17-050	Issue 1.0, 30/11/2017
[TEP-OA]	Thematic Exploitation Platform Open Architecture, EMSS-EOPS-TN-17-002	Issue 1, 12/12/2017
[WPS-T]	OGC Testbed-14: WPS-T Engineering Report, OGC 18-036r1, http://docs.opengeospatial.org/per/18-036r1.html	18-036r1, 07/02/2019
[WPS-REST-JSON]	OGC WPS 2.0 REST/JSON Binding Extension, Draft, OGC 18-062, https://raw.githubusercontent.com/opengeospatial/wps-rest-binding/develop/docs/18-062.pdf	1.0-draft
[CWL]	Common Workflow Language Specifications, https://www.commonwl.org/v1.0/	v1.0.2

Reference	Document Details	Version
[TB13-AP]	OGC Testbed-13, EP Application Package Engineering Report, OGC 17-023, http://docs.opengeospatial.org/per/17-023.html	17-023, 30/01/2018
[TB13-ADES]	OGC Testbed-13, Application Deployment and Execution Service Engineering Report, OGC 17-024, http://docs.opengeospatial.org/per/17-024.html	17-024, 11/01/2018
[TB14-AP]	OGC Testbed-14, Application Package Engineering Report, OGC 18-049r1, http://docs.opengeospatial.org/per/18-049r1.html	18-049r1, 07/02/2019
[TB14-ADES]	OGC Testbed-14, ADES & EMS Results and Best Practices Engineering Report, OGC 18-050r1, http://docs.opengeospatial.org/per/18-050r1.html	18-050r1, 08/02/2019
[OS-GEO-TIME]	OpenSearch GEO: OpenSearch Geo and Time Extensions, OGC 10-032r8, http://www.opengeospatial.org/standards/opensearchgeo	10-032r8, 14/04/2014
[OS-EO]	OpenSearch EO: OGC OpenSearch Extension for Earth Observation, OGC 13-026r9, http://docs.opengeospatial.org/is/13-026r8/13-026r8.html	13-026r9, 16/12/2016
[GEOJSON-LD]	OGC EO Dataset Metadata GeoJSON(-LD) Encoding Standard, OGC 17-003r1/17-084	17-003r1/17-084
[GEOJSON-LD-RESP]	OGC OpenSearch-EO GeoJSON(-LD) Response Encoding Standard, OGC 17-047	17-047
[PCI-DSS]	The Payment Card Industry Data Security Standard, https://www.pcisecuritystandards.org/document_library?category=pcidss&document=pci_dss	v3.2.1
[CEOS-OS-BP]	CEOS OpenSearch Best Practise, http://ceos.org/ourwork/workinggroups/wgiss/access/opensearch/	v1.2, 13/06/2017
[OIDC]	OpenID Connect Core 1.0, https://openid.net/specs/openid-connect-core-1_0.html	v1.0, 08/11/2014

Reference	Document Details	Version
[OGC-CSW]	OGC Catalogue Services 3.0 Specification - HTTP Protocol Binding (Catalogue Services for the Web), OGC 12-176r7, http://docs.opengeospatial.org/is/12-176r7/12-176r7.html	v3.0, 10/06/2016
[OGC-WMS]	OGC Web Map Server Implementation Specification, OGC 06-042, http://portal.opengeospatial.org/files/?artifact_id=14416	v1.3.0, 05/03/2006
[OGC-WMTS]	OGC Web Map Tile Service Implementation Standard, OGC 07-057r7, http://portal.opengeospatial.org/files/?artifact_id=35326	v1.0.0, 06/04/2010
[OGC-WFS]	OGC Web Feature Service 2.0 Interface Standard – With Corrigendum, OGC 09-025r2, http://docs.opengeospatial.org/is/09-025r2/09-025r2.html	v2.0.2, 10/07/2014
[OGC-WCS]	OGC Web Coverage Service (WCS) 2.1 Interface Standard - Core, OGC 17-089r1, http://docs.opengeospatial.org/is/17-089r1/17-089r1.html	v2.1, 16/08/2018
[OGC-WCPS]	Web Coverage Processing Service (WCPS) Language Interface Standard, OGC 08-068r2, http://portal.opengeospatial.org/files/?artifact_id=32319	v1.0.0, 25/03/2009
[AWS-S3]	Amazon Simple Storage Service REST API, https://docs.aws.amazon.com/AmazonS3/latest/API	API Version 2006-03-01

1.4. Terminology

The following terms are used in the Master System Design.

Term	Meaning
Admin	User with administrative capability on the EP
Algorithm	A self-contained set of operations to be performed, typically to achieve a desired data manipulation. The algorithm must be implemented (codified) for deployment and execution on the platform.
Analysis Result	The *Products* produced as output of an *Interactive Application* analysis session.

Term	Meaning
Analytics	A set of activities aimed to discover, interpret and communicate meaningful patters within the data. Analytics considered here are performed manually (or in a semi-automatic way) on-line with the aid of *Interactive Applications*.
Application Artefact	The 'software' component that provides the execution unit of the *Application Package*.
Application Deployment and Execution Service (ADES)	WPS-T (REST/JSON) service that incorporates the Docker execution engine, and is responsible for the execution of the processing service (as a WPS request) within the ‘target’ Exploitation Platform.
Application Descriptor	A file that provides the metadata part of the *Application Package*. Provides all the metadata required to accommodate the processor within the WPS service and make it available for execution.
Application Package	A platform independent and self-contained representation of a software item, providing executable, metadata and dependencies such that it can be deployed to and executed within an Exploitation Platform. Comprises the *Application Descriptor* and the *Application Artefact*.
Bulk Processing	Execution of a *Processing Service* on large amounts of data specified by AOI and TOI.
Code	The codification of an algorithm performed with a given programming language - compiled to Software or directly executed (interpretted) within the platform.
Compute Platform	The Platform on which execution occurs (this may differ from the Host or Home platform where federated processing is happening)
Consumer	User accessing existing services/products within the EP. Consumers may be scientific/research or commercial, and may or may not be experts of the domain
Data Access Library	An abstraction of the interface to the data layer of the resource tier. The library provides bindings for common languages (including python, Javascript) and presents a common object model to the code.
Development	The act of building new products/services/applications to be exposed within the platform and made available for users to conduct exploitation activities. Development may be performed inside or outside of the platform. If performed outside, an integration activity will be required to accommodate the developed service so that it is exposed within the platform.
Discovery	User finds products/services of interest to them based upon search criteria.
Execution	The act to start a *Processing Service* or an *Interactive Application*.

Term	Meaning
Execution Management Service (EMS)	The EMS is responsible for the orchestration of workflows, including the possibility of steps running on other (remote) platforms, and the on-demand deployment of processors to local/remote ADES as required.
Expert	User developing and integrating added-value to the EP (Scientific Researcher or Service Developer)
Exploitation Tier	The Exploitation Tier represents the end-users who exploit the services of the platform to perform analysis, or using high-level applications built-in on top of the platform’s services
External Application	An application or script that is developed and executed outside of the Exploitation Platform, but is able to use the data/services of the EP via a programmatic interface (API).
Guest	An unregistered User or an unauthenticated Consumer with limited access to the EP’s services
Home Platform	The Platform on which a User is based or from which an action was initiated by a User
Host Platform	The Platform through which a Resource has been published
Identity Provider (IdP)	The source for validating user identity in a federated identity system, (user authentication as a service).
Interactive Application	A stand-alone application provided within the exploitation platform for on-line hosted processing. Provides an interactive interface through which the user is able to conduct their analysis of the data, producing *Analysis Results* as output. Interactive Applications include at least the following types: console application, web application (rich browser interface), remote desktop to a hosted VM.
Interactive Console Application	A simple *Interactive Application* for analysis in which a console interface to a platform-hosted terminal is provided to the user. The console interface can be provided through the user’s browser session or through a remote SSH connection.
Interactive Remote Desktop	An Interactive Application for analysis provided as a remote desktop session to an OS-session (or directly to a 'native' application) on the exploitation platform. The user will have access to a number of applications within the hosted OS. The remote desktop session is provided through the user’s web browser.
Interactive Web Application	An Interactive Application for analysis provided as a rich user interface through the user’s web browser.
Key-Value Pair	A key-value pair (KVP) is an abstract data type that includes a group of key identifiers and a set of associated values. Key-value pairs are frequently used in lookup tables, hash tables and configuration files.
Kubernetes (K8s)	Container orchestration system for automating application deployment, scaling and management.

Term	Meaning
Login Service	An encapsulation of Authenticated Login provision within the Exploitation Platform context. The Login Service is an OpenID Connect Provider that is used purely for authentication. It acts as a Relying Party in flows with external IdPs to obtain access to the user’s identity.
EO Network of Resources	The coordinated collection of European EO resources (platforms, data sources, etc.).
Object Store	A computer data storage architecture that manages data as objects. Each object typically includes the data itself, a variable amount of metadata, and a globally unique identifier.
On-demand Processing Service	A *Processing Service* whose execution is initiated directly by the user on an ad-hoc basis.
Platform (EP)	An on-line collection of products, services and tools for exploitation of EO data
Platform Tier	The Platform Tier represents the Exploitation Platform and the services it offers to end-users
Processing	A set of pre-defined activities that interact to achieve a result. For the exploitation platform, comprises on-line processing to derive data products from input data, conducted by a hosted processing service execution.
Processing Result	The *Products* produced as output of a *Processing Service* execution.
Processing Service	A non-interactive data processing that has a well-defined set of input data types, input parameterisation, producing *Processing Results* with a well-defined output data type.
Products	EO data (commercial and non-commercial) and Value-added products and made available through the EP. *It is assumed that the Hosting Environment for the EP makes available an existing supply of EO Data*
Resource	A entity, such as a Product, Processing Service or Interactive Application, which is of interest to a user, is indexed in a catalogue and can be returned as a single meaningful search result
Resource Tier	The Resource Tier represents the hosting infrastructure and provides the EO data, storage and compute upon which the exploitation platform is deployed
Reusable Research Object	An encapsulation of some research/analysis that describes all aspects required to reproduce the analysis, including data used, processing performed etc.
Scientific Researcher	Expert user with the objective to perform scientific research. Having minimal IT knowledge with no desire to acquire it, they want the effort for the translation of their algorithm into a service/product to be minimised by the platform.

Term	Meaning
Service Developer	Expert user with the objective to provide a performing, stable and reliable service/product. Having deeper IT knowledge or a willingness to acquire it, they require deeper access to the platform IT functionalities for optimisation of their algorithm.
Software	The compilation of code into a binary program to be executed within the platform on-line computing environment.
Systematic Processing Service	A *Processing Service* whose execution is initiated automatically (on behalf of a user), either according to a schedule (routine) or triggered by an event (e.g. arrival of new data).
Terms & Conditions (T&Cs)	The obligations that the user agrees to abide by in regard of usage of products/services of the platform. T&Cs are set by the provider of each product/service.
Transactional Web Processing Service (WPS-T)	Transactional extension to WPS that allows adhoc deployment / undeployment of user-provided processors.
User	An individual using the EP, of any type (Admin/Consumer/Expert/Guest)
Value-added products	Products generated from processing services of the EP (or external processing) and made available through the EP. This includes products uploaded to the EP by users and published for collaborative consumption
Visualisation	To obtain a visual representation of any data/products held within the platform - presented to the user within their web browser session.
Web Coverage Service (WCS)	OGC standard that provides an open specification for sharing raster datasets on the web.
Web Coverage Processing Service (WCPS)	OGC standard that defines a protocol-independent language for the extraction, processing, and analysis of multi-dimentional coverages representing sensor, image, or statistics data.
Web Feature Service (WFS)	OGC standard that makes geographic feature data (vector geospatial datasets) available on the web.
Web Map Service (WMS)	OGC standard that provides a simple HTTP interface for requesting geo-registered map images from one or more distributed geospatial databases.
Web Map Tile Service (WMTS)	OGC standard that provides a simple HTTP interface for requesting map tiles of spatially referenced data using the images with predefined content, extent, and resolution.
Web Processing Services (WPS)	OGC standard that defines how a client can request the execution of a process, and how the output from the process is handled.
Workspace	A user-scoped 'container' in the EP, in which each user maintains their own links to resources (products and services) that have been collected by a user during their usage of the EP. The workspace acts as the hub for a user’s exploitation activities within the EP

1.5. Glossary

The following acronyms and abbreviations have been used in this report.

Term	Definition
AAI	Authentication & Authorization Infrastructure
ABAC	Attribute Based Access Control
ADES	Application Deployment and Execution Service
ALFA	Abbreviated Language For Authorization
AOI	Area of Interest
API	Application Programming Interface
BIS	Billing Service
CMS	Content Management System
CWL	Common Workflow Language
DAL	Data Access Library
EMS	Execution Management Service
EO	Earth Observation
EP	Exploitation Platform
FUSE	Filesystem in Userspace
GeoXACML	Geo-specific extension to the XACML Policy Language
IAM	Identity and Access Management
IdP	Identity Provider
JSON	JavaScript Object Notation
K8s	Kubernetes
KVP	Key-value Pair
M2M	Machine-to-machine
OGC	Open Geospatial Consortium
PDE	Processor Development Environment
PDP	Policy Decision Point
PEP	Policy Enforcement Point
PIP	Policy Information Point
RBAC	Role Based Access Control
REST	Representational State Transfer
SSH	Secure Shell
TOI	Time of Interest

Term	Definition
UMA	User-Managed Access
VNC	Virtual Network Computing
WCS	Web Coverage Service
WCPS	Web Coverage Processing Service
WFS	Web Feature Service
WMS	Web Map Service
WMTS	Web Map Tile Service
WPS	Web Processing Service
WPS-T	Transactional Web Processing Service
XACML	eXtensible Access Control Markup Language

Chapter 2. Overview

2.1. Building Block Overview

Content Description

This section contains:

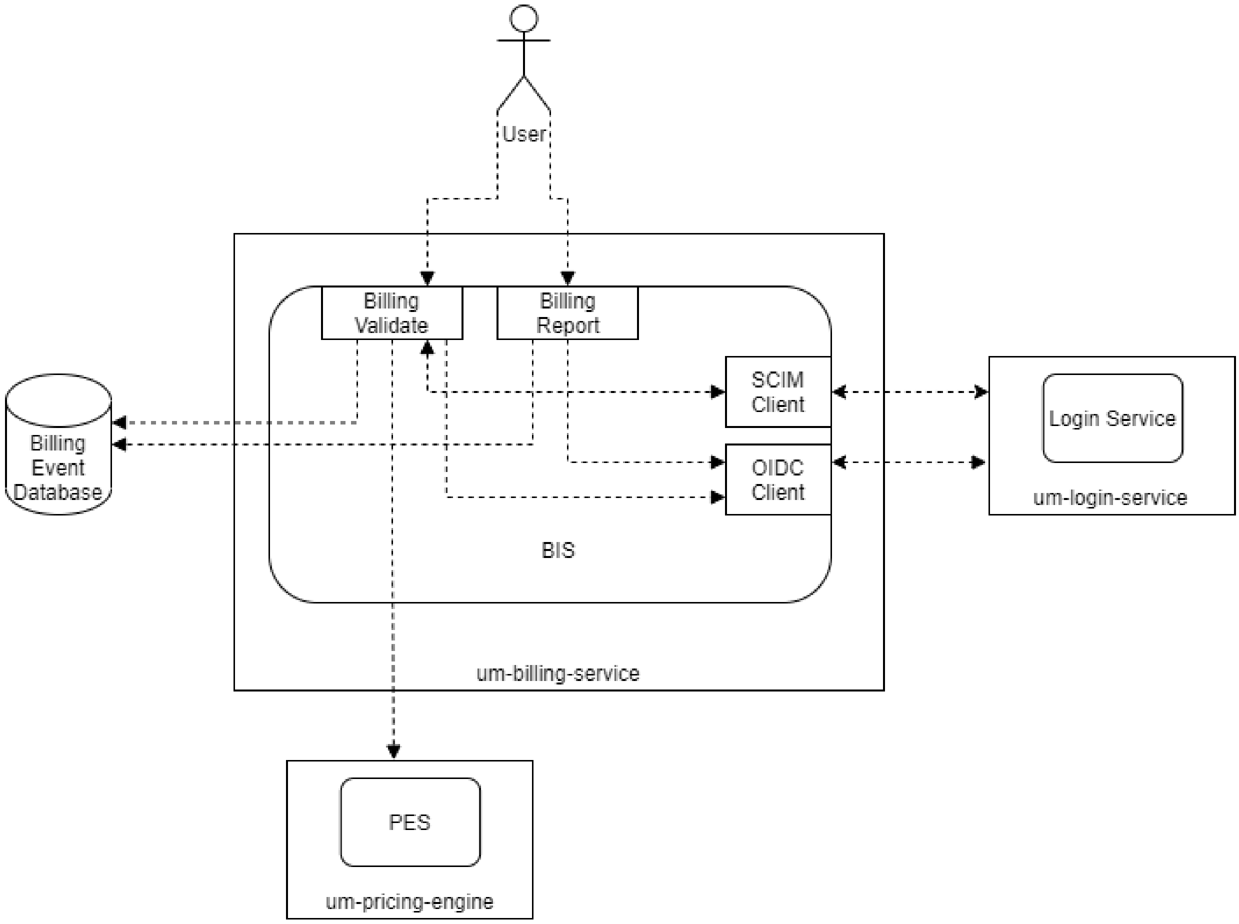
- High-Level Description of the Building Block
- Context within EOEPCA

The main functionality of the Billing Service is to serve as an internal platform capable of processing billing events, received either from internal or external components. In addition, it will also serve as an authoritative source for the Policy Decision Point, in establishing resource access. In order to do so, several functionality blocks are identified:

- Billing Event Check Endpoint. An endpoint to allow for the validation of received billing events from either internal or external components.
- Billing Report Endpoint. An endpoint to allow for the generation of billing reports upon request by a validated billing identity.
- (Possibility) Billing Identity Generation Endpoint. Depending on business needs, BIS can also implement an endpoint to generate and associate billing identities with user identities.
- Pricing Check. Internal component to allow the Billing Service to communicate with the Pricing Engine.
- Billing Event Database. A local persistent database for storing Billing Events, and user and billing identity associations.
- SCIM Client, allowing to persist and retrieve user attributes necessary for the Billing Service.
- OIDC Client, used by the Billing Service to identify itself as trusted party within the architecture.

2.1.1. Initialization flow

The figure below, identifies the main workflows on which the BIS Engine participates, along with it’s components:



When launched, the BIS will answer to all requests to 2 specific paths:

1. Billing Check (/validate): To perform billing event's checks, using POST operations. Available to both internal and external components
2. Billing Report (/report): To generate requested billing reports, using POST operations. Available to both internal and external components
3. (possibility) Billing Identity Generation (/identity): To generate a billing identity, and associate with a user identity, using POST operations. Available to internal components.

The requests should be accompained by an "Authorization: Bearer <valid_RPT>" for all endpoints.

Token	**Request to BIS**	**BIS Action**	**BIS answer**
No RPT/OAuth token	bis.domain.com	None (request does not get to BIS endpoint)	None (the BIS doesn't see this request)
No RPT/OAuth token and Valid data	bis.domain.com/validate with a billing event	None (no auth token)	403
RPT/OAuth token and Valid data	bis.domain.com/validate with a billing event	Validates the contained billing event	Return a OK/NOK response
No RPT/OAuth token	bis.domain.com/report with a billing identity	None (no auth token)	403

Token	Request to BIS	BIS Action	BIS answer
RPT/OAuth token	bis.domain.com/report with a billing identity	Validates the billing identity against auth token and generates report	Return either report or a 403 response
No RPT/OAuth token	bis.domain.com/identity	None (no auth token)	500
RPT/OAuth token	bis.domain.com/identity	Generates billing identity and associates against auth token user identity	Return either OK or a 403 response

2.2. External Interfaces

2.2.1. Exposed Interfaces

2.2.1.1. Billing Check (from internal or external PDPs and other components)

The BIS exposes a billing event check endpoint, which accepts a billing event as data and checks for validity. This validity is performed by calling the Pricing Engine to ascertain resource access status.

The BIS also persists billing events for usage on its internal database.

2.2.1.2. Billing Report (from other components)

The BIS generates a billing report, accepting as input a billing identity and checking for validity against a user profile.

This validity is performed by querying the Login Service with the OIDC connector, to ascertain if the billing identity and user identity are a match, before issuing the report.

2.2.1.3. (possibility) Billing Identity Generation (from internal components)

A possible interface to generate a billing identity, and associate it with the passed user identity in the authentication token

One possible implementation is to have the association step done via OIDC with the Login Service, to comply with data privacy laws, instead of a local database.

2.2.2. Consumed Interfaces

2.2.2.1. OIDC (to Login Service)

The BIS uses the OIDC protocol in order to authenticate itself as a valid UMA client, and uses this OIDC client in all UMA-related queries. It allows Clients to verify the identity of the End-User. (https://gluu.org/docs/gluu-server/4.0/admin-guide/openid-connect/)

These queries are done against the Login Service, and the endpoints used are:

- Discovery Endpoint: /.well-known/openid-configuration

And the keys used from Well Known Handler:

- Token Endpoint: KEY_OIDC_TOKEN_ENDPOINT
- UserInfo Endpoint: KEY_OIDC_USERINFO_ENDPOINT

2.2.2.2. SCIM (to Login Service)

The BIS has the capability to auto-register itself as a client if there is no client pre-configured from previous starts or previous configuration. In order to do this, it utilizes the SCIM protocol which is designed to reduce the complexity of user management operations. (https://gluu.org/docs/gluu-server/3.1.1/user-management/scim2/)

The keys used from Well Known Handler:

- User Atributes: KEY_SCIM_USER_ENDPOINT
- Private Key JWT Key: ENDPOINT_AUTH_CLIENT_PRIVATE_KEY_JWT

2.2.2.3. Pricing check (to Pricing Engine)

The BIS itself does not interpret the Billing Events received. Instead, it relies on the Pricing Engine’s checks to validate the event and produce an outcome.

2.3. Internal Interfaces

2.3.1. Back-End database

The BIS stores billing events for future usage, such as billing identity verification and billing report generation.

2.4. Required resources

> *Content Description*
>
> This section contains:
>
> - List of HW and SW required resources for the correct functioning of the building Block
> - References to open repositories (when applicable)

2.4.1. Software

The following Open-Source Software is required to support the deployment and integration of the Policy Enforcement Point:

- EOEPCA’s SCIM Client - https://github.com/EOEPCA/um-common-scim-client
- EOEPCA’s OpenID - https://github.com/EOEPCA/um-common-oidc-client

- EOEPCA’s Well Known Handler - https://github.com/EOEPCA/well-known-handler
- Flask - https://github.com/pallets/flask
- MongoDB for python - https://pymongo.readthedocs.io/en/stable/index.html

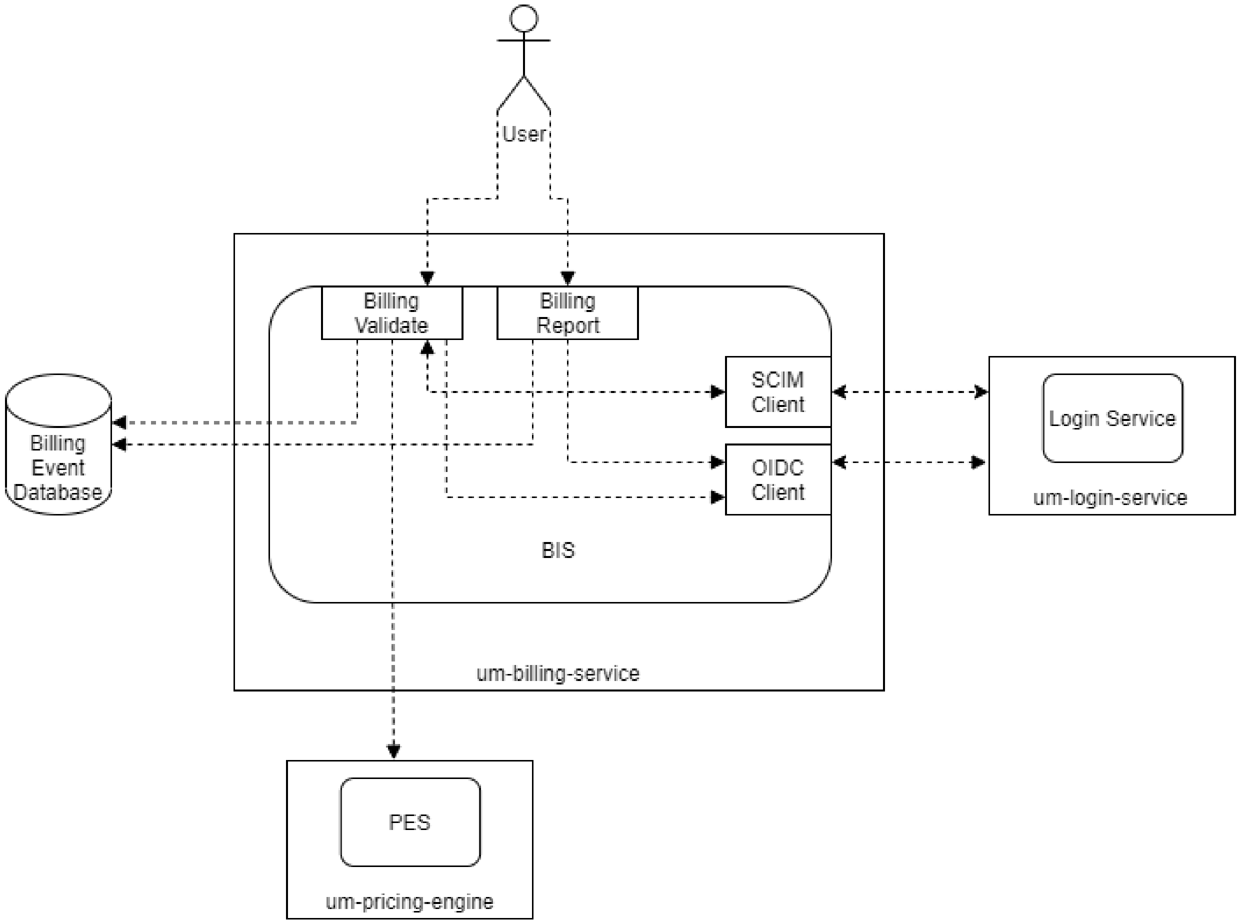
2.5. Static Architecture

Content Description

This section contains:

- Diagram and description of the major logical components within the Building Block

With the diagram below, you can see how the connection between the back-end database and the bis-engine:



The BIS is composed of two main components:

- The BIS service (related to the endpoint that are exposed): This component will expose and consume the endpoints that we commented before. For this it will be necessary to establish a client for SCIM and another for OIDC.
- And a Back-end Database: This component store all information related to billing events and serves as backbone for the endpoint’s functions.

The next section Building Block Design

contains detailed descriptions and references needed to understand the intricacies of this component.

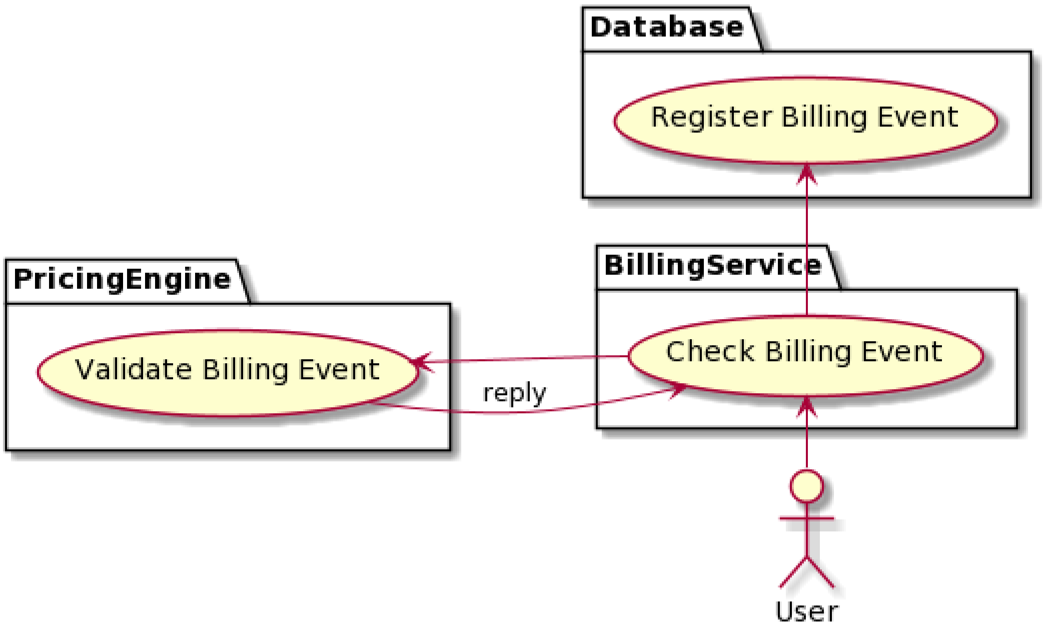
2.6. Use cases

Content Description

This section contains:

- Diagrams and definition of the use cases covered by this Building Block

2.6.1. Billing Event Check Use Case

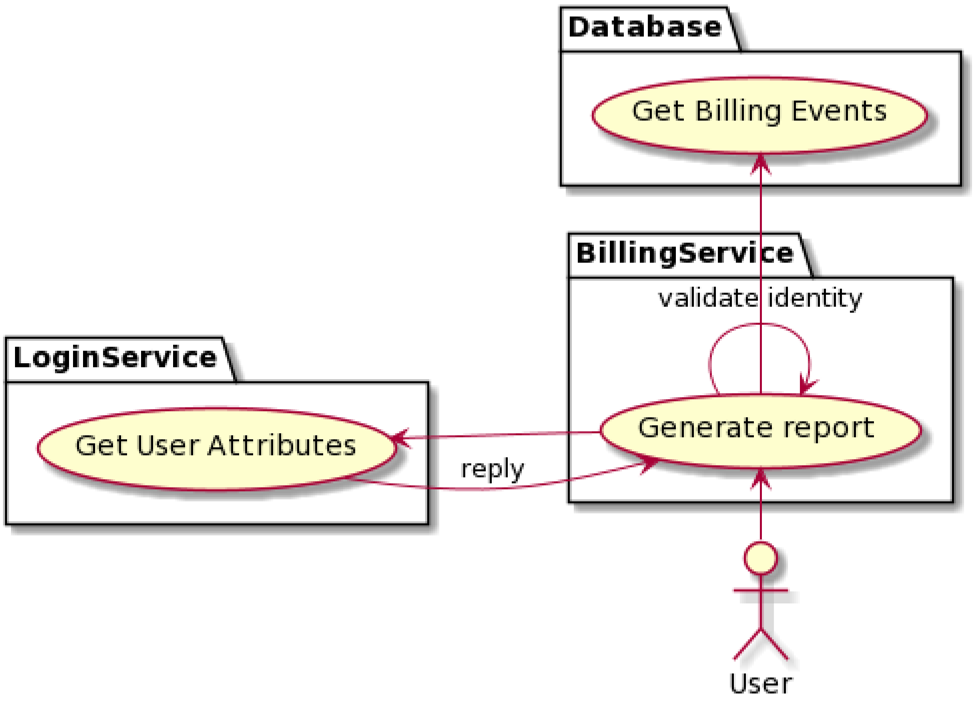


When the BIS receives a request on the Billing Event Check endpoint, we proceed to validate it, by passing data to the Pricing Engine for checks. This data consists of the billing identity and the list of resources being accessed.

Upon positive response from the Pricing Engine, we store the Billing Event on the local database, for future reporting, and reply to the request.

If the Pricing Engine denies a check, the BIS denies the Event check.

2.6.2. Billing Report generation



When the BIS receives a request on the Billing Report endpoint, we proceed to check the received billing identity, present in the data parameter, against the user identity contained in the passed authentication token, in the header, by using the OIDC endpoint of the Login Service.

If validation is successful, the BIS then proceeds to query the local database for billing events that match the billing identity, and replies with an array in json format, containing the matching events.

If validation is unsucessful, the BIS denies the request.

2.6.3. (possibility) Billing Identity generation

The BIS uses billing identities to validate billing report generation. One possibility is to have a specific endpoint on the BIS for generation of these ids, and association between these and user identities.

One possible implementation is, after generation of an id, having the BIS contact the Login Service using the OIDC connector, to add the id to a custom user attribute, specified at the Login Service level. This implementation has the bonus of being able to associate several billing identities per user identity.

Chapter 3. Building Block Design

Content Description

This section contains:

- A concise breakdown of the Building Block in several independent services (when applicable). For each component, the following subsections are added:
  - Overview and purpose: indicating the functionality covered by the component
  - SW Reuse and Dependencies: indicating reuse of third party open source solutions (if any) and any pre-required Dependencies
  - Interfaces: both internal to the building block and those exposed externally
  - Data: Data usage of the building block, data flow and any GDPR concerns should be addressed here
  - Applicable Resources: links and references to (Reference Docs), and repositories.

When a breakdown is necessary, a general overview of the building block can be given. On the contrary, no breakdown indicates a single component development with the same expected sections.

3.1. Billing Event check

3.1.1. Overview and Purpose

The Flask-based endpoint allows to query for billing event validation. For this task, the BIS itself does not need to interpret billing event data, only needing to split data into logic units, and forward these to the price check endpoint of the Pricing Engine.

For purposes of reporting, the billing events are persisted on the local repository.

3.1.2. Software Reuse and Dependencies

All requirements for the executing of the reverse proxy are found under src/requirements.txt, and expect Python 3.6.9 or greater to work.

The most important are:

- **EOEPCA-SCIM**: Used as a complementary measure to the XACML passing of client assertions.
- **EOEPCA-OIDC**: Used to auto-register itself as a client to the Auth. Server upon start-up.
- **WellKnownHandler**: Used to dynamically check the configuration of the Authorization Server on each execution. For example, it can get the needed endpoints for any API the PDP needs, such as the token request for OIDC.
- **Flask**: External to EOEPCA's project, this library allows the PDP to expose its endpoints.

- **MongoDB**: Used to storage the policies for every resource, with the possibility of performing actions such as insert policies, modify, delete, etc

3.1.3. Interfaces

This component doesn’t have any internal interfaces. For a reference of external interfaces see External Interfaces on Section 2 Overview

3.1.4. Data

3.1.4.1. Configuration

The BIS gets all its configuration from the file located under config/config.json.

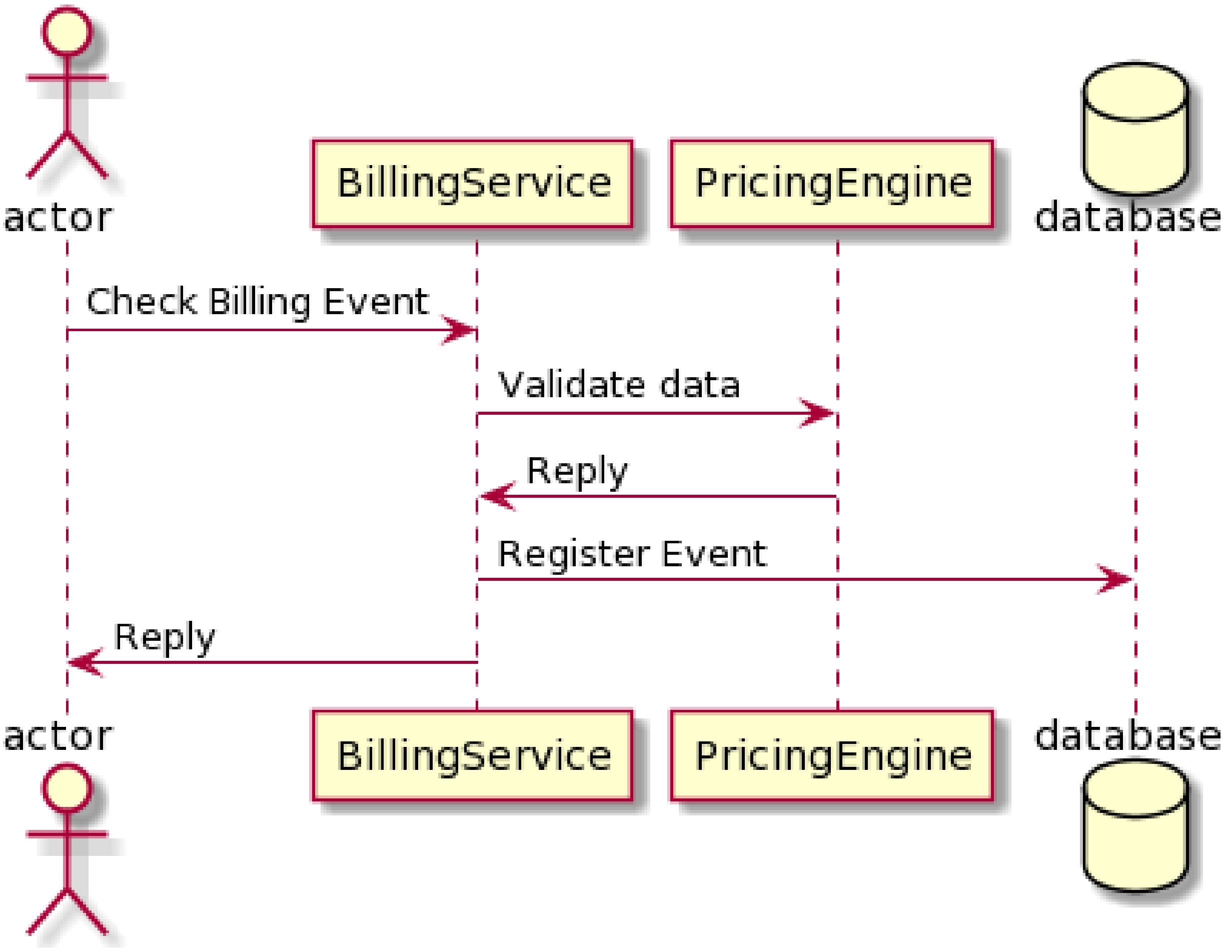
The parameters that are accepted, and their meaning, are as follows:

- **auth_server_url**: complete url (with "https") of the Authorization server.
- **prefix**: "/path"-formatted string to indicate where the reverse proxy should listen. Default is "/bis"
- **host**: Host for the proxy to listen on. For example, "0.0.0.0" will listen on all interfaces
- **port**: Port for the proxy to listen on. By default, 5569. Keep in mind you will have to edit the docker file and/or kubernetes yaml file in order for all the prot forwarding to work.
- **check_ssl_certs**: Toggle on/off (bool) to check certificates in all requests. This should be forced to True in a production environment
- **debug_mode**: Toggle on/off (bool) a debug mode of Flask. In a production environment, this should be false.
- **client_id**: string indicating a client_id for an already registered and configured client. This parameter is optional. When not supplied, the BIS will generate a new client for itself and store it in this key inside the JSON.
- **client_secret**: string indicating the client secret for the client_id. This parameter is optional. When not supplied, the BIS will generate a new client for itself and store it in this key inside the JSON.

3.1.4.2. Data flow

The only information the BIS handles is billing event data from the request.

What follows is an example of the nominal flow for the BIS:



3.1.5. Extensibility

The design of the BIS allows for further improvements if need be. For example:

- The proxy can be expanded to parse further parameters on top of the HTTP protocol, allowing for any kind of plugin or complex mechanism desired.

3.1.6. Applicable Resources

- EOEPCA’s SCIM Client - https://github.com/EOEPCA/um-common-scim-client
- EOEPCA’s OIDC Client - https://github.com/EOEPCA/um-common-uma-client
- EOEPCA’s Well Known Handler - https://github.com/EOEPCA/well-known-handler
- Flask - https://github.com/pallets/flask
- EOEPCA’s Pricing Engine - https://github.com/EOEPCA/um-common-scim-client
- MongoDB for python - https://pymongo.readthedocs.io/en/stable/index.html

3.2. Billing Report generation

3.2.1. Overview and Purpose

The BIS is capable of generation billing reports based on a billing identity that is received with the request.

For this, the BIS validates the received billing identity against the user profile, and generates the report based on the billing events present on the local database.

3.2.2. Applicable Resources

- EOEPCA’s SCIM Client - https://github.com/EOEPCA/um-common-scim-client
- EOEPCA’s OIDC Client - https://github.com/EOEPCA/um-common-uma-client
- EOEPCA’s Well Known Handler - https://github.com/EOEPCA/well-known-handler
- Flask - https://github.com/pallets/flask
- MongoDB for python - https://pymongo.readthedocs.io/en/stable/index.html

3.2.3. Interfaces

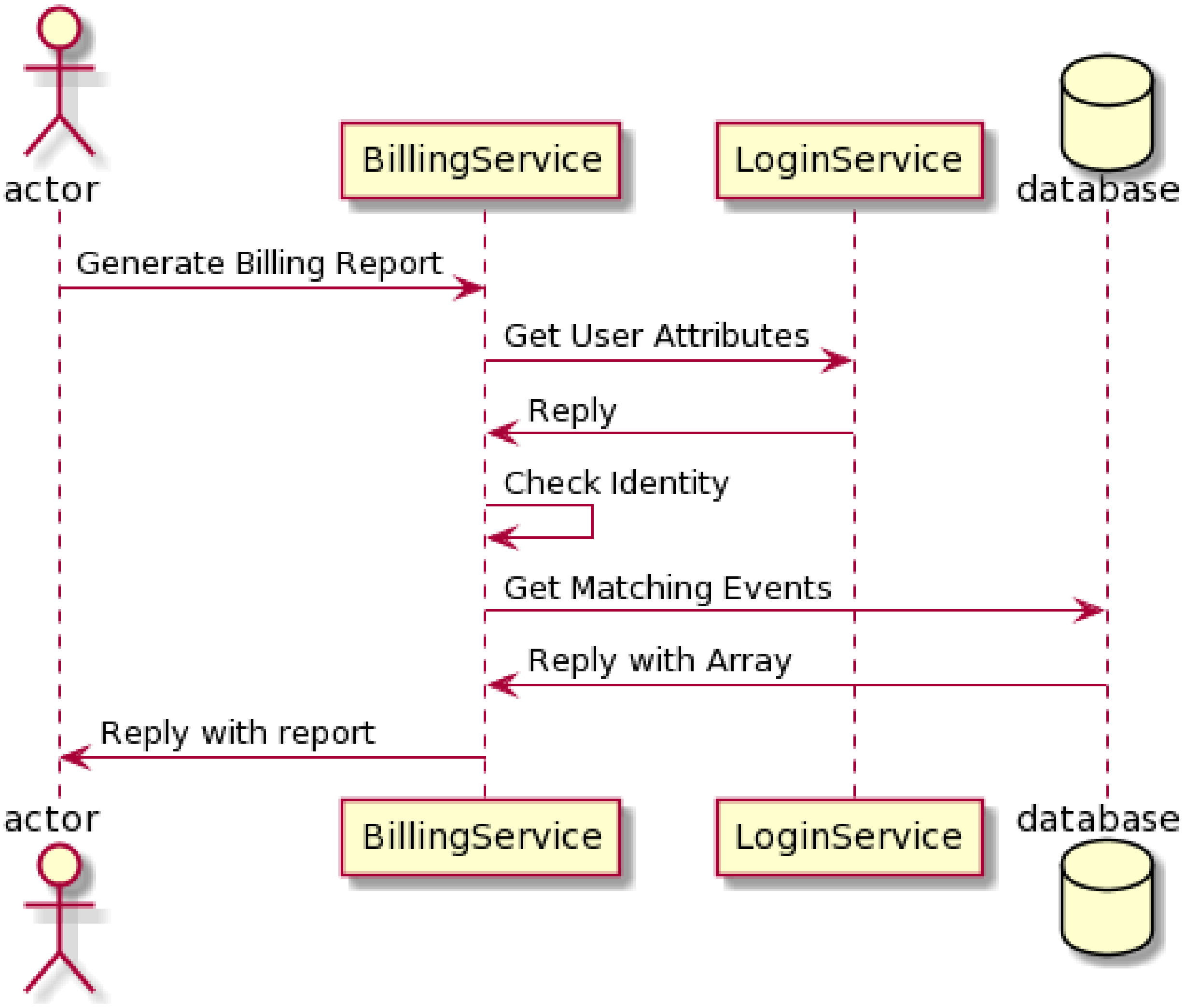
This component doesn’t have any internal interfaces. For a reference of external interfaces see External Interfaces on Section 2 Overview

3.2.4. Data

3.2.4.1. Data flow

The BIS handles the received billing identity and auth token to verify association between user and identity..

What follows is an example of the nominal flow for the BIS:



3.3. Billing Event Repository

3.3.1. Overview and Purpose

It is the database based on MongoDB where the billing events are stored and queried for billing report generation.

Included with the BIS there is a script at the source path that performs queries against a Mongo Database. The main purpose of this script is to reduce the usage of RAM when registering an event locally and when querying for its content.
It is developed to generate a database called 'billing_db' in case it does not exist. The collection used for the storage of the documents is called 'events'.
The main functionalities are:

- **Insert event**: Will generate a document with the event data received as input. Each event shall be unique, and no update actions are available. The main parameters of the policy would be an auto-generated id provided by mongo which identify each document in the database, the billing identity of the event, and the event data itself. This would be mandatory parameters in order to perform other kind of queries.
- **Get event from billing identity**: Finds all event data that matches a billing identity. Returns a list of events in json format.

- **Delete event**: Will receive an entry id and will find and delete the matched document
- **Delete event by billing identity**: Will receive a billing identity and clear the database of all matching events

This script is manipulated by the API.

3.3.2. Software Reuse and Dependencies

At the moment the usage is mainly for event storage and report generation.

3.3.3. Data flow

Any data is managed internally, without outside access.

3.3.4. Applicable Resources

- MongoDB image from DockerHub - https://hub.docker.com/_/mongo

Chapter 4. User Story Traceability

Table 2. User Stories

Code	Description
EOEPCA-XXX	<Insert Description>

<< End of Document >>