

# Cyclops: A micro service based approach to Rating, Charging & Billing for cloud

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# Who we are ?

## InIT Cloud Computing Lab (ICCLab)

Applied research lab focused on Cloud Computing and part of Institute of Information & Technology at Zurich University of Applied Science, Switzerland

Website : <http://blog.zhaw.ch/icclab/>



# Problem Statement

Creation of a generic and reusable framework to enable the processes of Rating, Charging & Billing and accomplish convergent billing of different cloud services.

# What is Cyclops ?

*Cyclops is a generic platform to support converged billing for a any combination of IaaS, PaaS, SaaS applications*

# General definitions

1. **Rating** : Process of determining the cost of a unit resource
2. **Charging** : Process of price calculation for a user based on the resource's consumption quantity and rate.
3. **Billing** : Process of Invoice generation by combining discount, SLA penalties & taxes

# Need for RCB framework

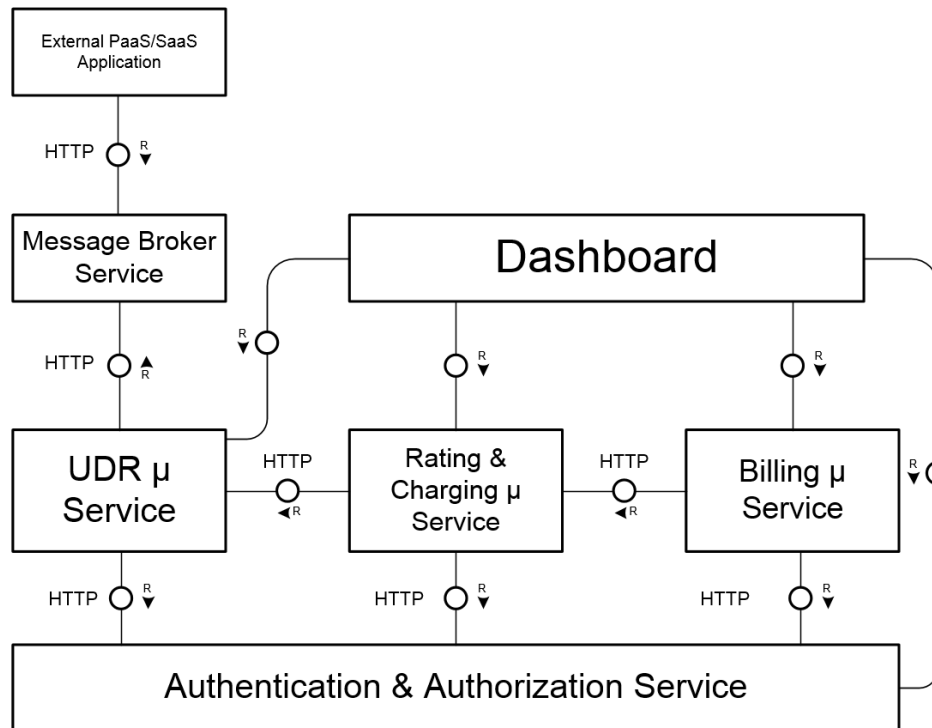
- Exponential growth in cloud necessitates supporting tools & process
- Hybrid cloud ecosystem merits cost management system
- Enable better revenue collection for cloud service provider

# Approach

- Architecture : Micro services
- Resource Rate calculation : Rule engine
- Data persistence & integrity : Time Series optimized DB
- Data accessibility : REST API



# Architecture

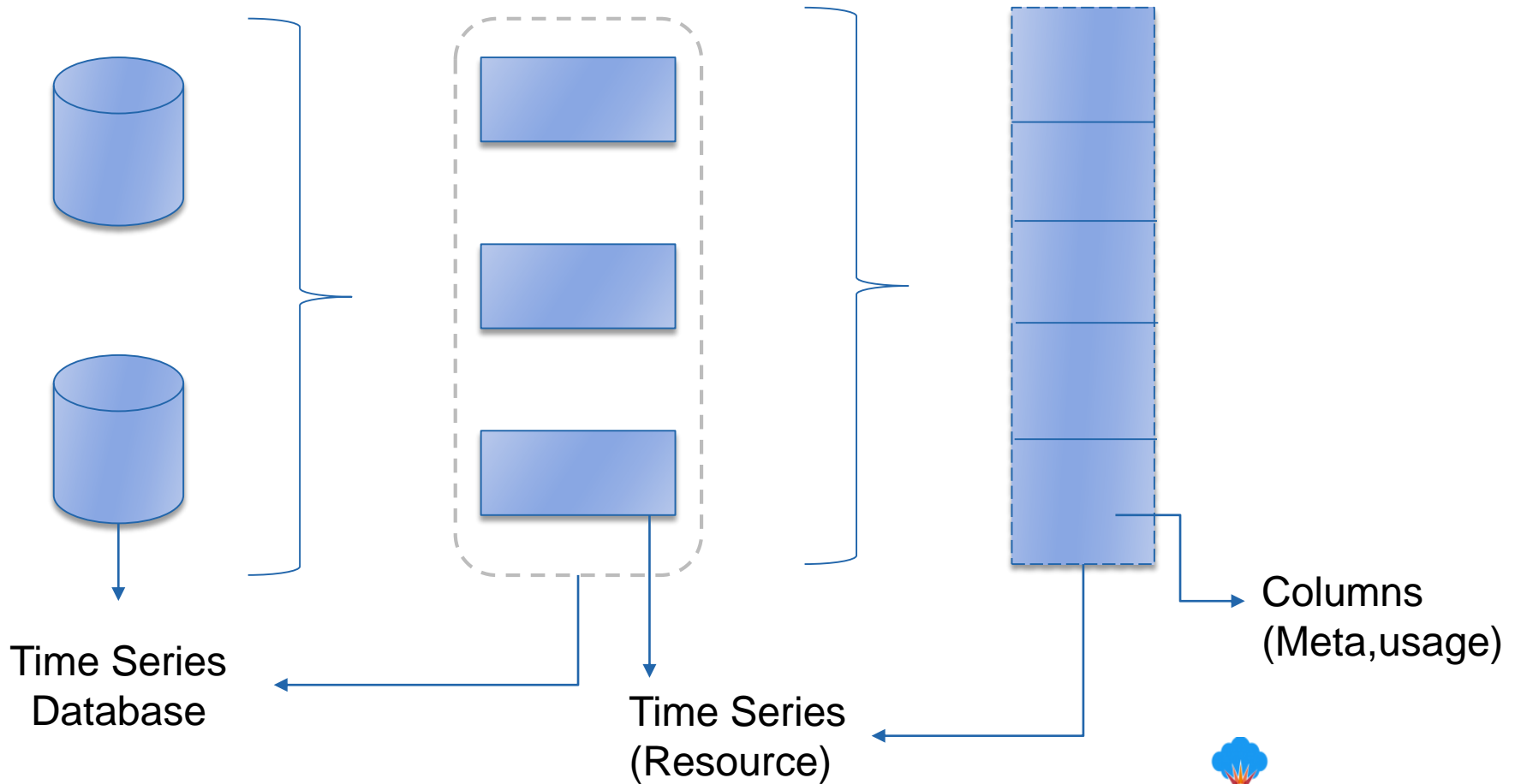


**Cyclops : Overall architecture**

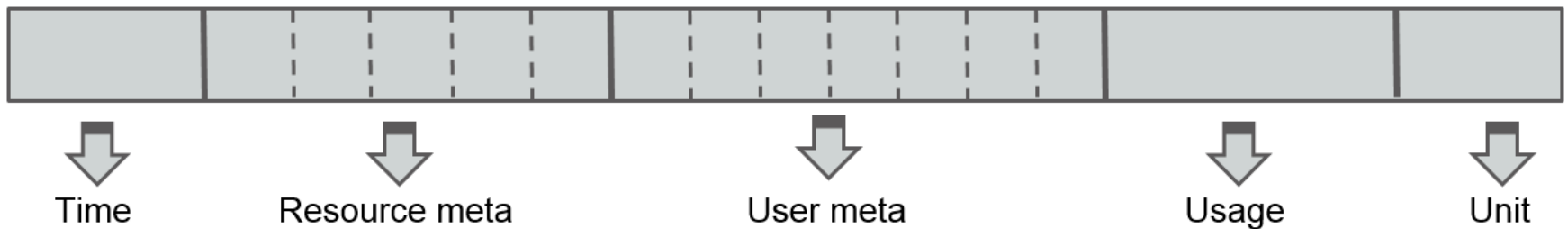
# Usage Data Record Micro service

- Collects user's usage metrics from IaaS, PaaS, SaaS
- Accepts events/usage metrics from external applications
- Normalizes the collected data, intuitive for later processing
- Persistence of UDR into Time Series Database

# UDR Service : Data persistence



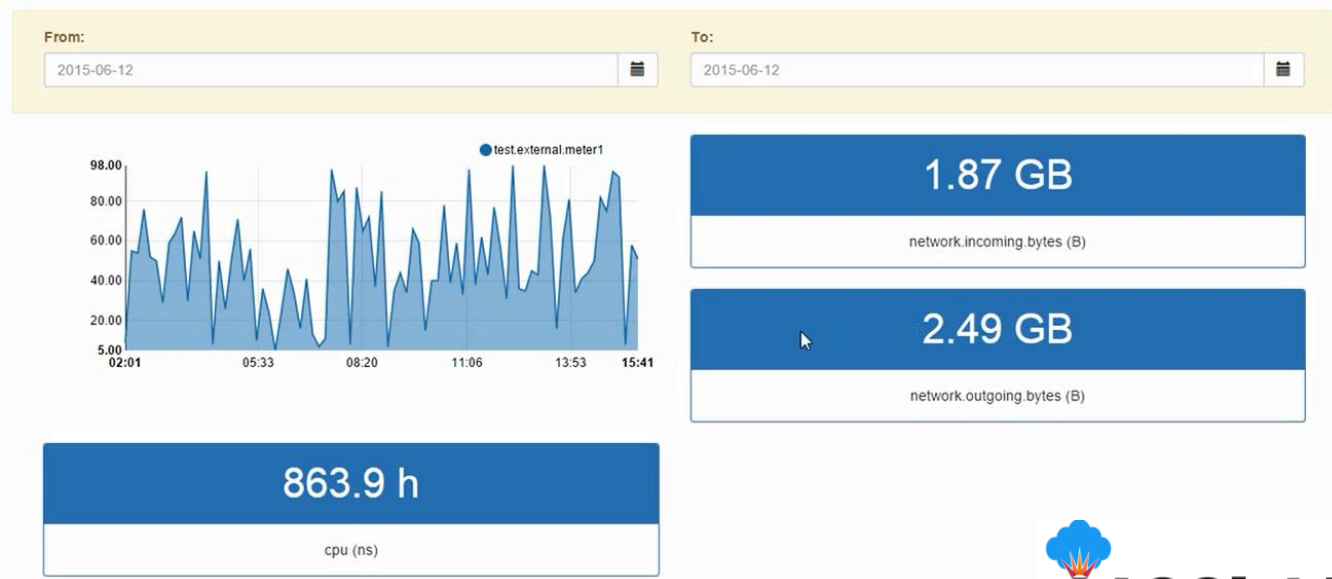
# UDR Service : Usage Data Record



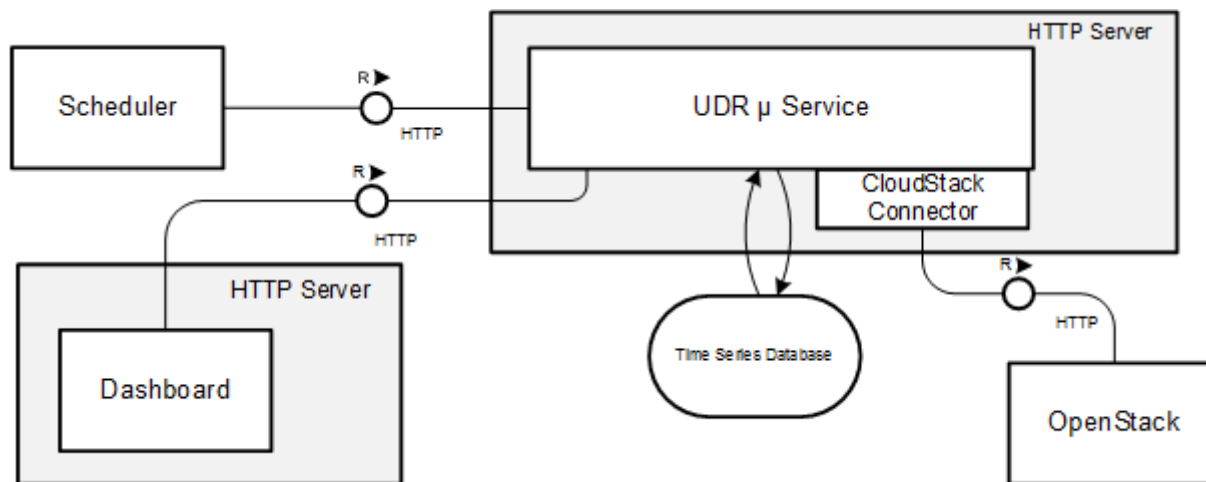
*Usage Data Record*

# UDR Service : Outcomes

- Resource usage analytics
- Forecasting the demand and associated capacity growth using known prediction models
- Visualization of resource usage



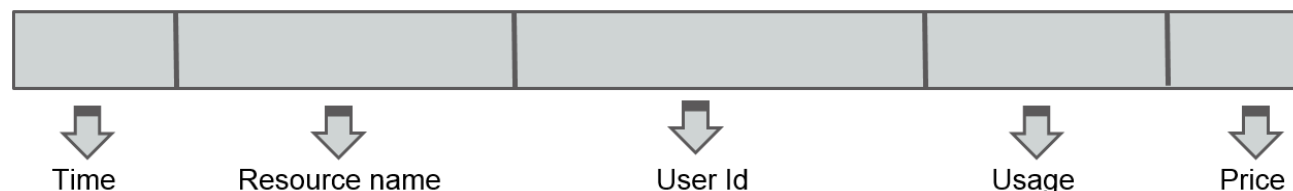
# Architecture



*Usage Data Record Micro service*

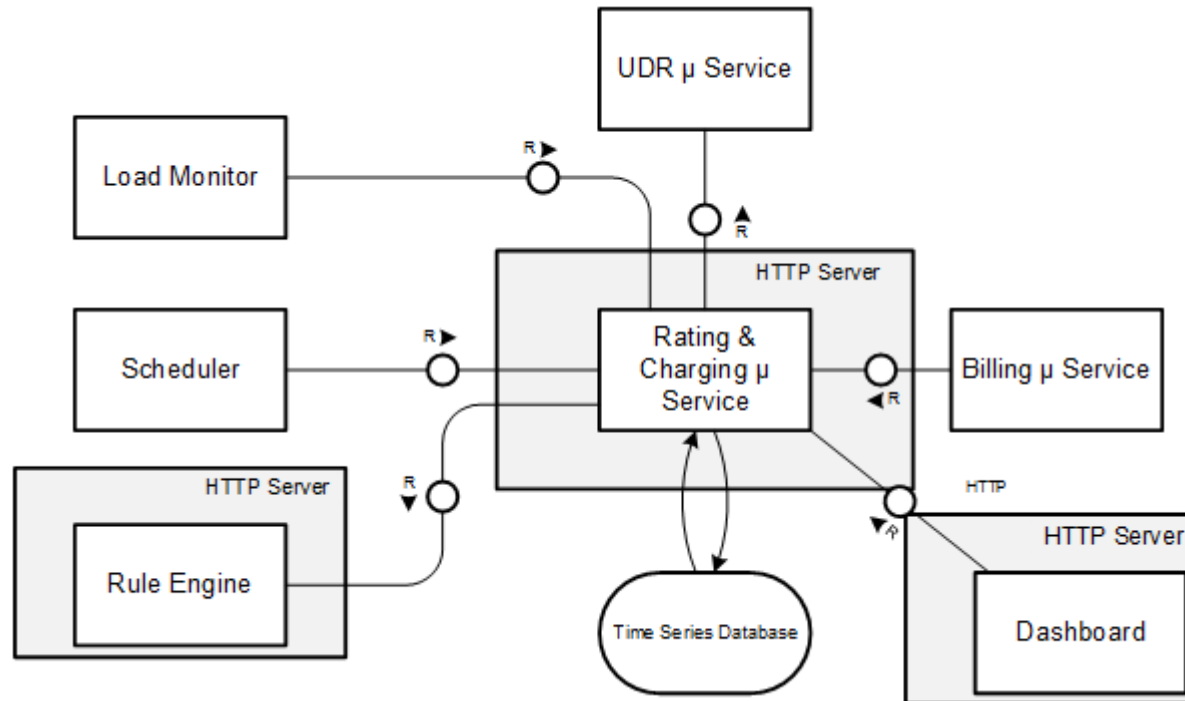
# Rating & Charging Micro service

- Rule based dynamic rate generation for cloud resource
- Charge calculation based on resource usage and rate for a time period
- Persistence of Charge Data Records into Time Series Database



*Charge Data Record*

# Architecture



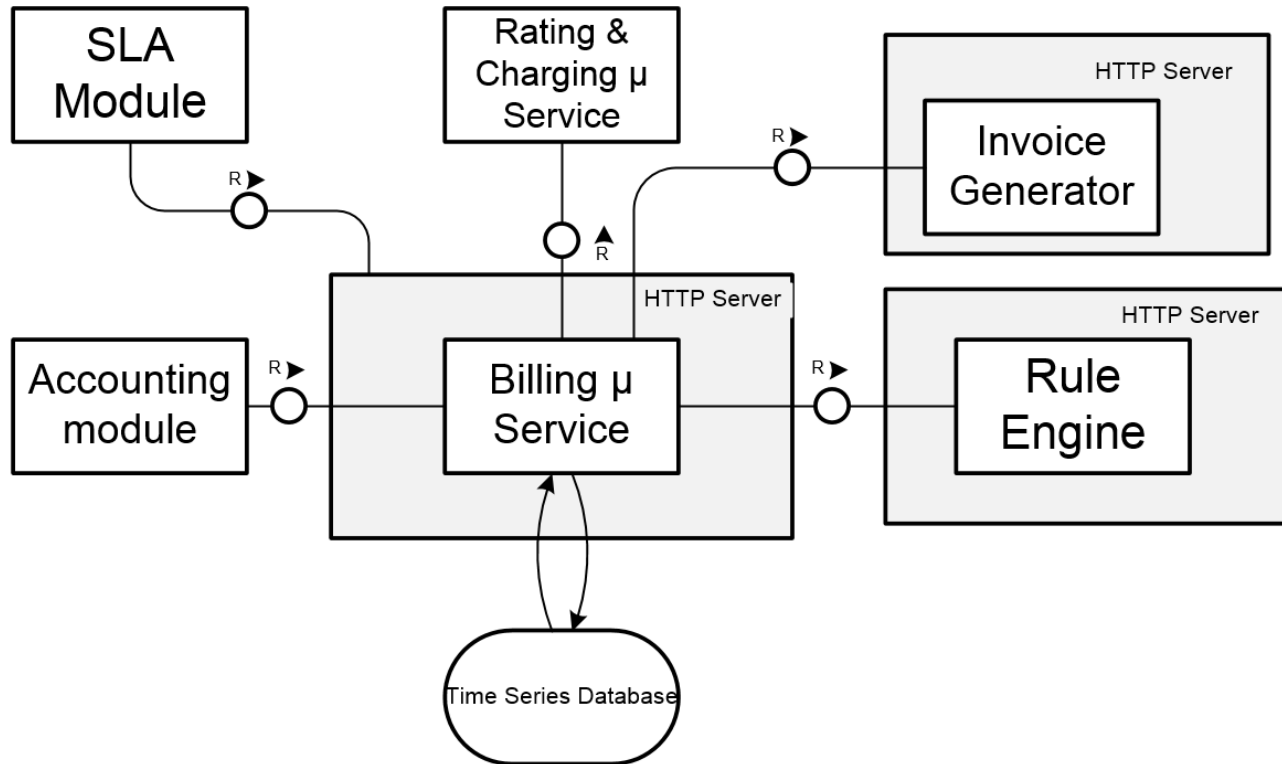
*Rating & Charging Micro service*



# Billing Micro service

- Interface with Service Level Agreement (SLA) to gather SLA violation penalties
- Consideration of discounts and calculation of taxes.
- Generation of payable bill amount
- Persistence of the generated bill

# Architecture



*Billing Micro service*

# Use Case : T-Nova

- **Aim** : Billing support for NFV marketplace
- **Billing Type** : Time based
- **Actors** : Network Function Provider, Service Provider, End User

- **Billing Models**

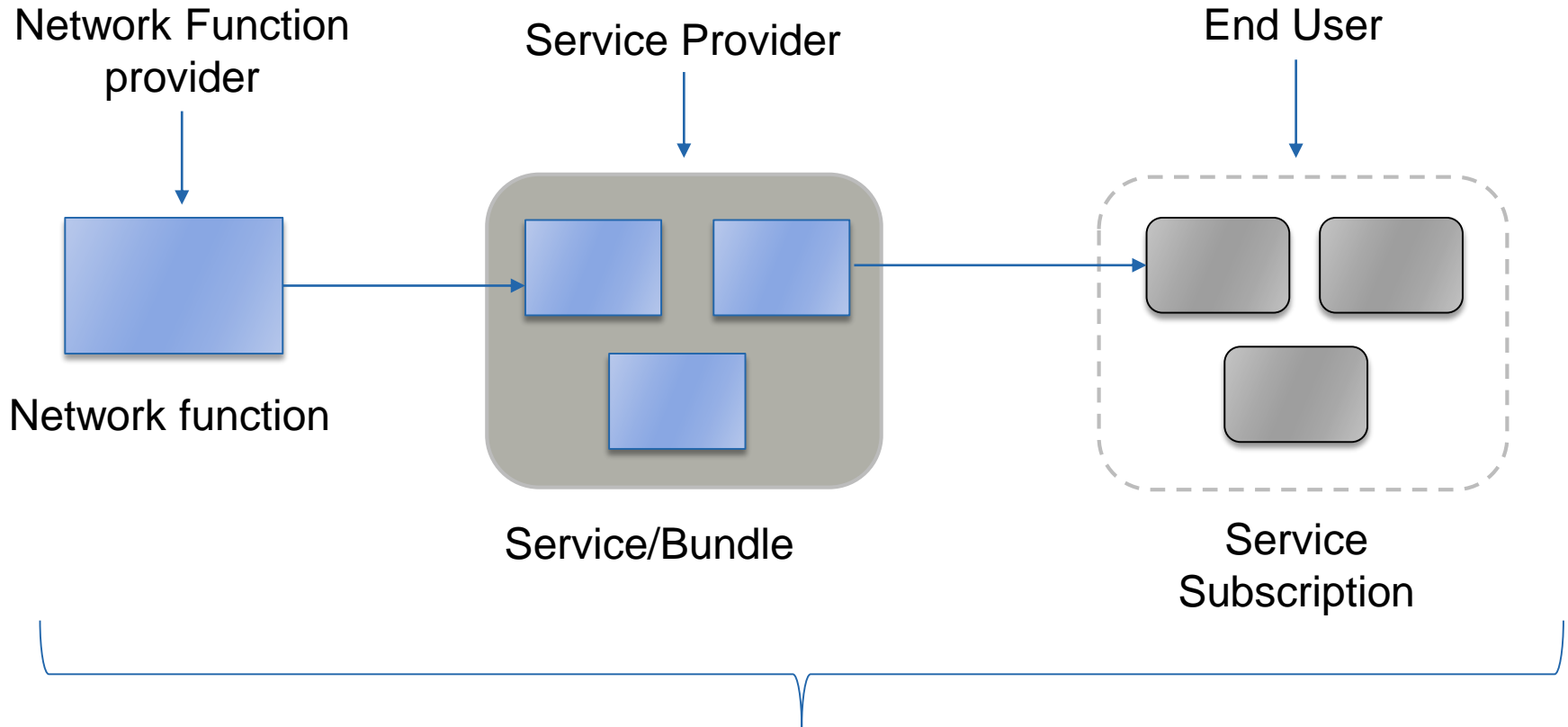
- Pay as You Go (PAYG)
- Revenue Share

NF provider & Service  
Provider

- PAYG
- Subscription

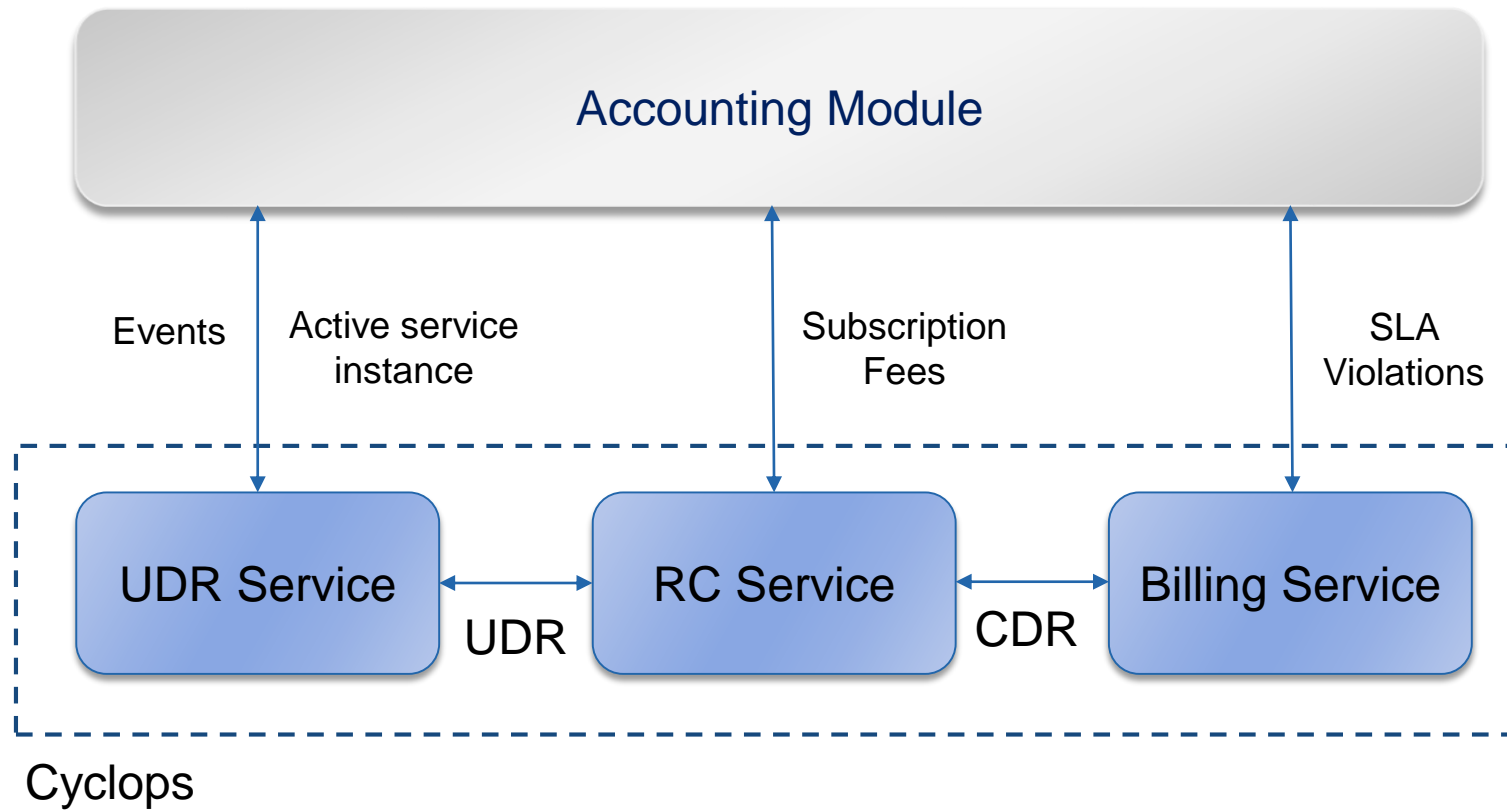
Service Provider & End  
User

# Use Case : T-Nova



Cyclops Framework

# Use Case : T-Nova



# Summary

- Cyclops is a generic & micro services based Rating, Charging & Billing framework for cloud
- Support for resource based and event based billing
- Accessibility of generated intermediary data through REST API
- Persistence of data into time series optimized database

# Further Challenges

- High availability of the services (reliability)
- Cloud roaming (cloud bursting)
- Achieving seamless connectivity to enable convergent billing (diverse applications)
- Data normalization to assist integrated billing (heterogenous data)
- Tackling complex rules for rate generation of cloud resource (flexible rating policy)

# Access to work & results

**License** : Apache License v2

**Website** : <http://icclab.github.io/cyclops>

**Research** :

<http://blog.zhaw.ch/icclab/category/research-approach/themes/rating-charging-billing>



# Questions ?

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Research work is partially supported by T-Nova

The logo for TNOVA, with the word "TNOVA" in a large, blue, sans-serif font. Below it, the text "NETWORK FUNCTIONS AS-A-SERVICE OVER VIRTUALISED INFRASTRUCTURES" is written in a smaller, blue, sans-serif font. A bright blue starburst graphic is positioned to the right of the text.The logo for the Seventh Framework Programme, featuring a stylized blue number "7" with horizontal lines, and the text "SEVENTH FRAMEWORK PROGRAMME" below it.