FACULTY
OF INFORMATICS
AND STATISTICS

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Architectural design of a data-oriented solution for streaming services

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Agenda

- State of the art
- Introduction to streaming
- Architecture requirements for streaming
- Streaming Services Architecture Design
- Conclusions

State of the art

- Results of literature search:
  - No solution that addressed or targeted the issue of data-centric streaming service architecture solutions.
  - Scientific literature has not described how to properly access data within streaming services.
  - Scientific literature has not described how to properly design the architecture of data-centric streaming service solutions.
- Goal of this papar is to is to develop a general model for a data-centric streaming service architecture.

Introduction to streaming

What is streaming?

- Streaming comes from the English word "stream", which means stream of water.
- A streaming service is a technology that enables the continuous transmission of audiovisual content (material) between a source and an end user.

Type of streaming

- The types of streaming can be categorized based on the different categories within the dimensions
  - by content,
  - by time,
  - and by bitrate variability (Popelka, 2013)
  - or by the form of streaming.

Architecture requirements for streaming

- **Architecture of streaming services should include:**
  - **client part**
    - handles user interface layer (UI) and application programming Interface layer (API)
  - **backend part**
    - basically handle everything except streaming video
  - **content delivery network (CDN)**
    - highly distributed platform of servers that should help minimize the delay in loading the content of a web page

Architecture requirements for streaming

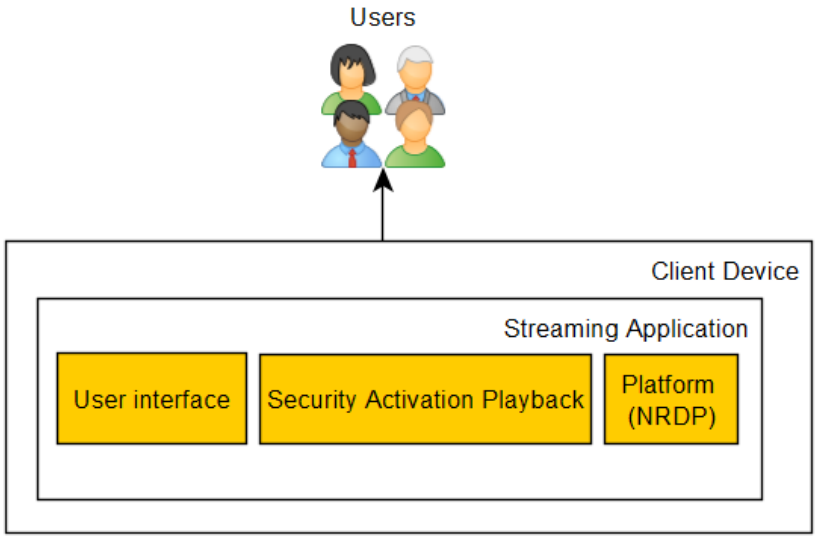
- **From data point of view.**
  - **Two types of data.**
    - One-off user data (user registration data)
    - Ever-increasing (user consumtion)
  - **Amount of the data from streaming services is very large.**
    - Especially analytics data from service consumption by users are continuously growing.
  - **Big data architecture is required to be involved.**

Streaming Services Architecture Design

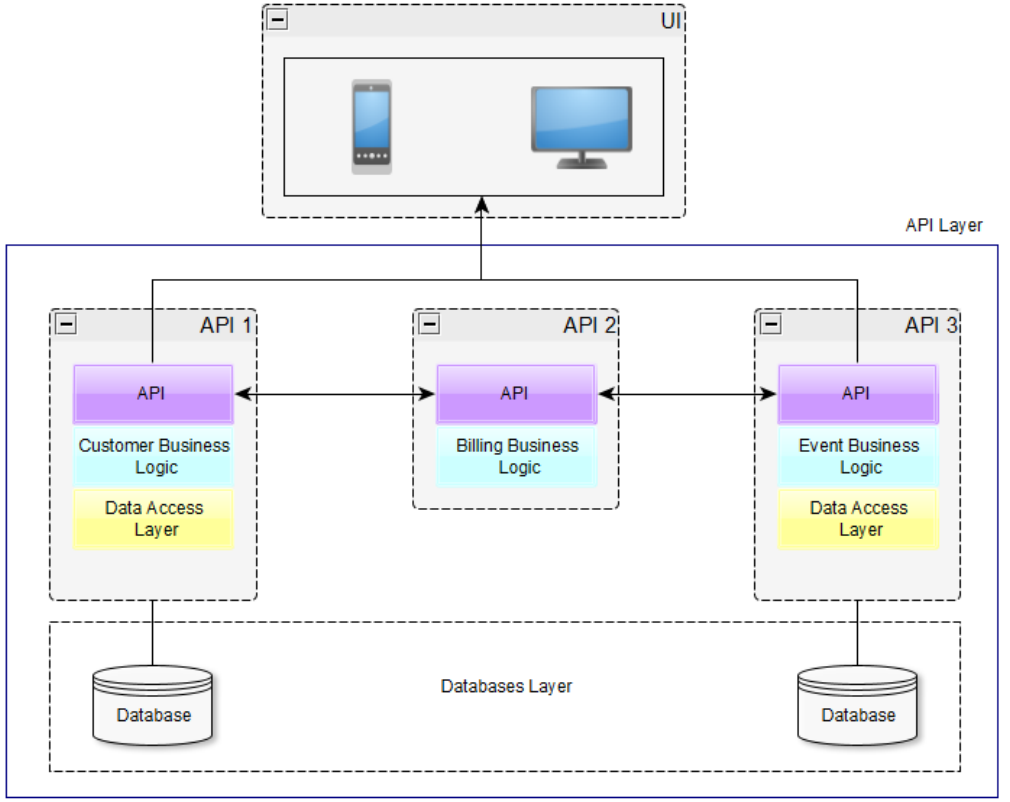
- Client part
  - UI layer
  - API layer
    - Contains several other Api or micro services that provide a particular service and interact with each other
  - Micro services

Streaming Services Architecture Design

UI layer

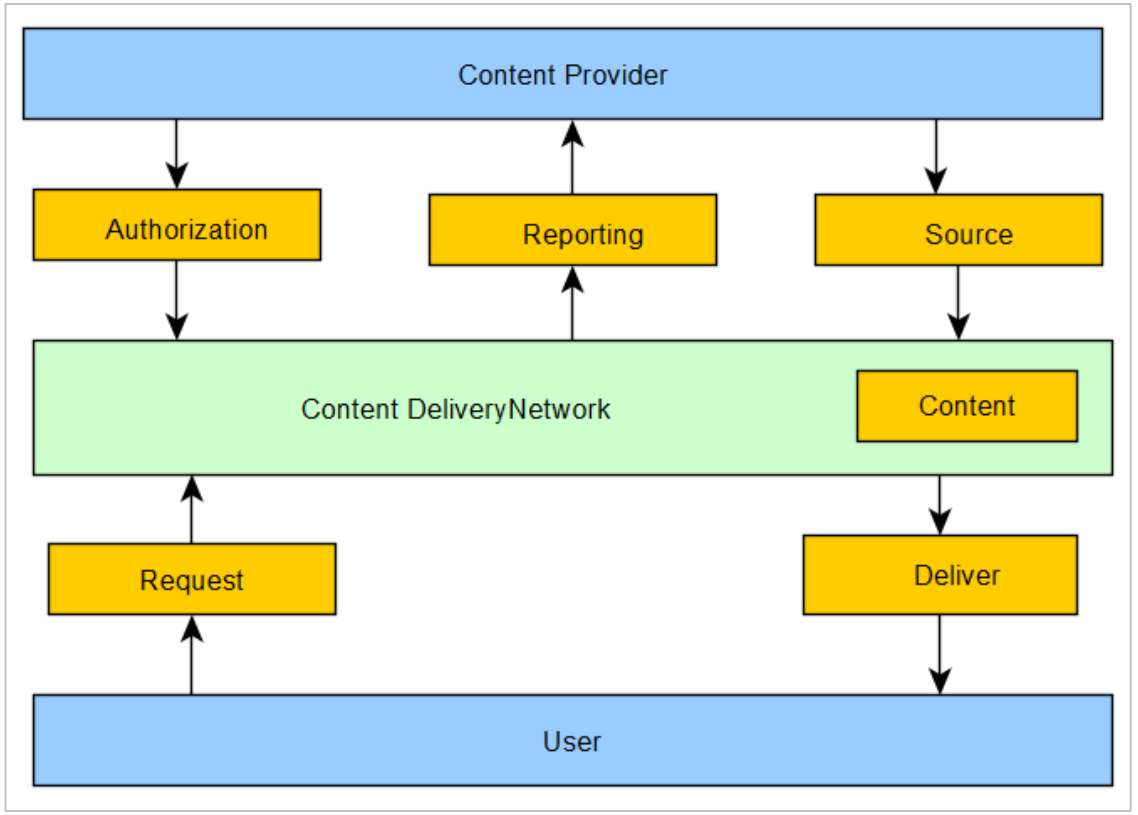


API layer



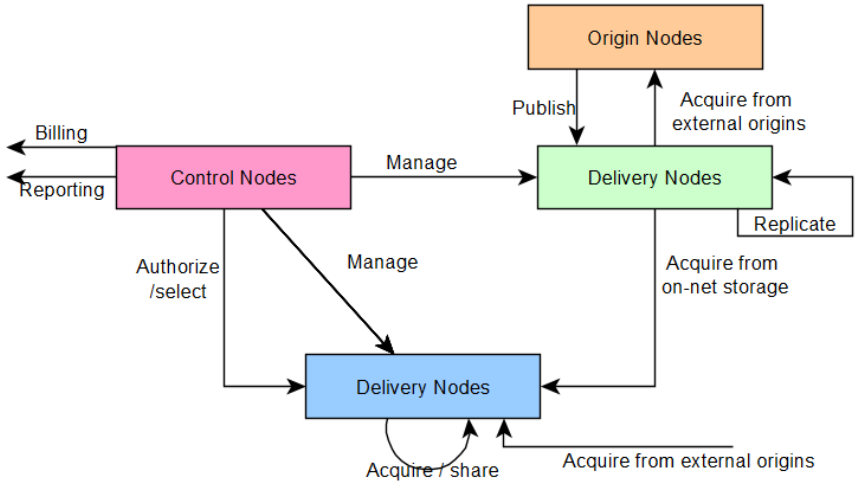
Streaming Services Architecture Design

- Content Delivery network
  - Basic elements:
    - Content Provider
    - Authorization
    - Reporting
    - Source
    - Content
    - Deliver
    - Request



Streaming Services Architecture Design

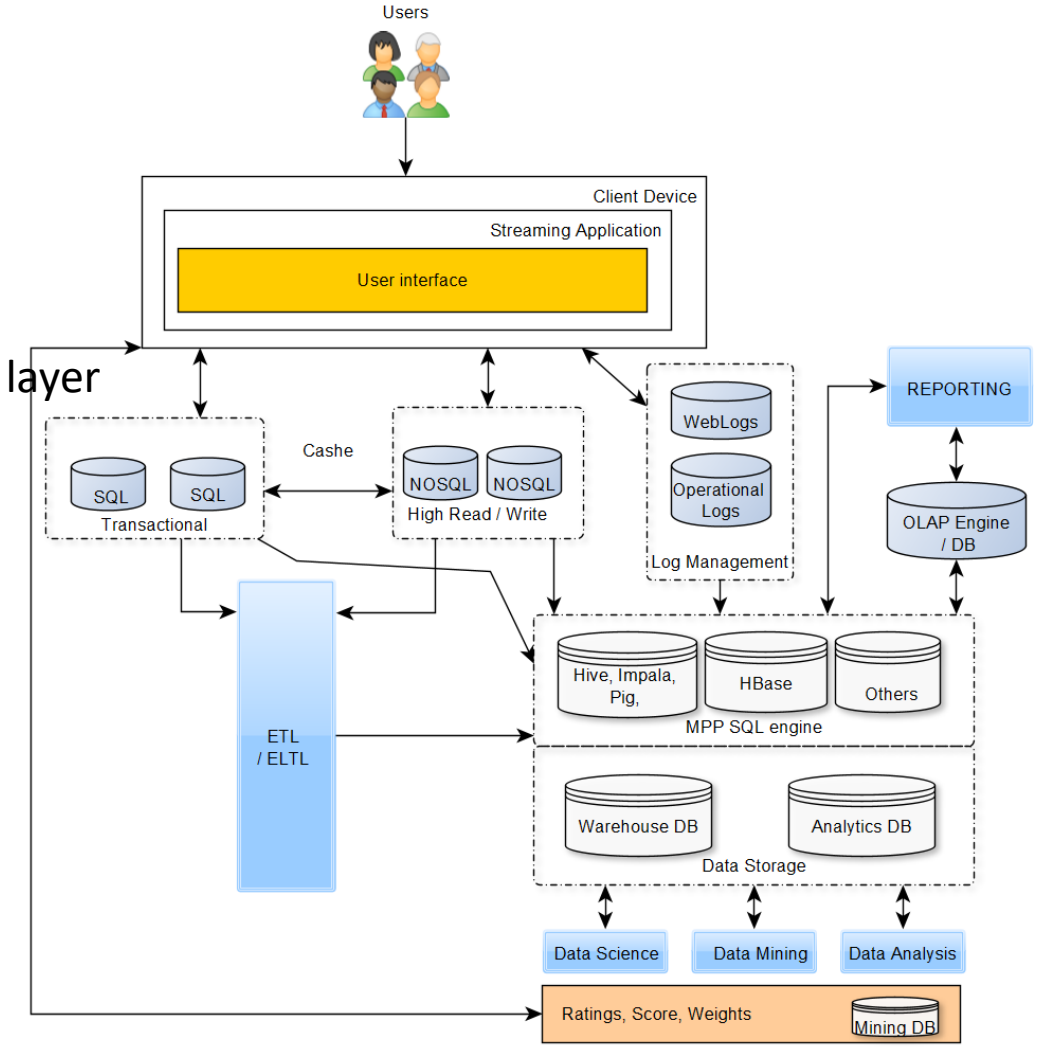
- The content is delivered to the end user using Delivery nodes.
- Delivery nodes are, according to Nokia (2021), servers that contain caches running one or more content delivery applications.
- They are usually located as close as possible to the end user.



Streaming Services Architecture Design

- Client data processing architecture
  - User activity records (opposite direction data flow than in previous slides).
  - Data can then be used to improve the services delivered to clients.
  - Data must first be stored – for growing data is best non-relational database, i.e. a NOSQL database.
  - Data needs to be further processed.
    - Transformation, aggregation, ETL (Extract Transfrom Load) jobs are used to store the data ready for analysis, reporting or data mining in suitable databases.
  - Logs from the applications for possible debugging.
- The entire solution architecture is shown on the next slide.

Streaming Services Architecture Design



Conclusions

- To develop the model, I analyzed and evaluated relevant user data for subsequent data dimensioning and aggregation.
- Main focus is on design of the architectural data model, where is addressed the client data processing part.
- It is the final design of the client data processing architecture that fulfils the goal of this thesis, where data stewards in streaming platform services can take inspiration from this model.

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Thank for your attention

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