Connecting data streams with On-Demand Services in the Alpine Environmental Data Analysis Centre

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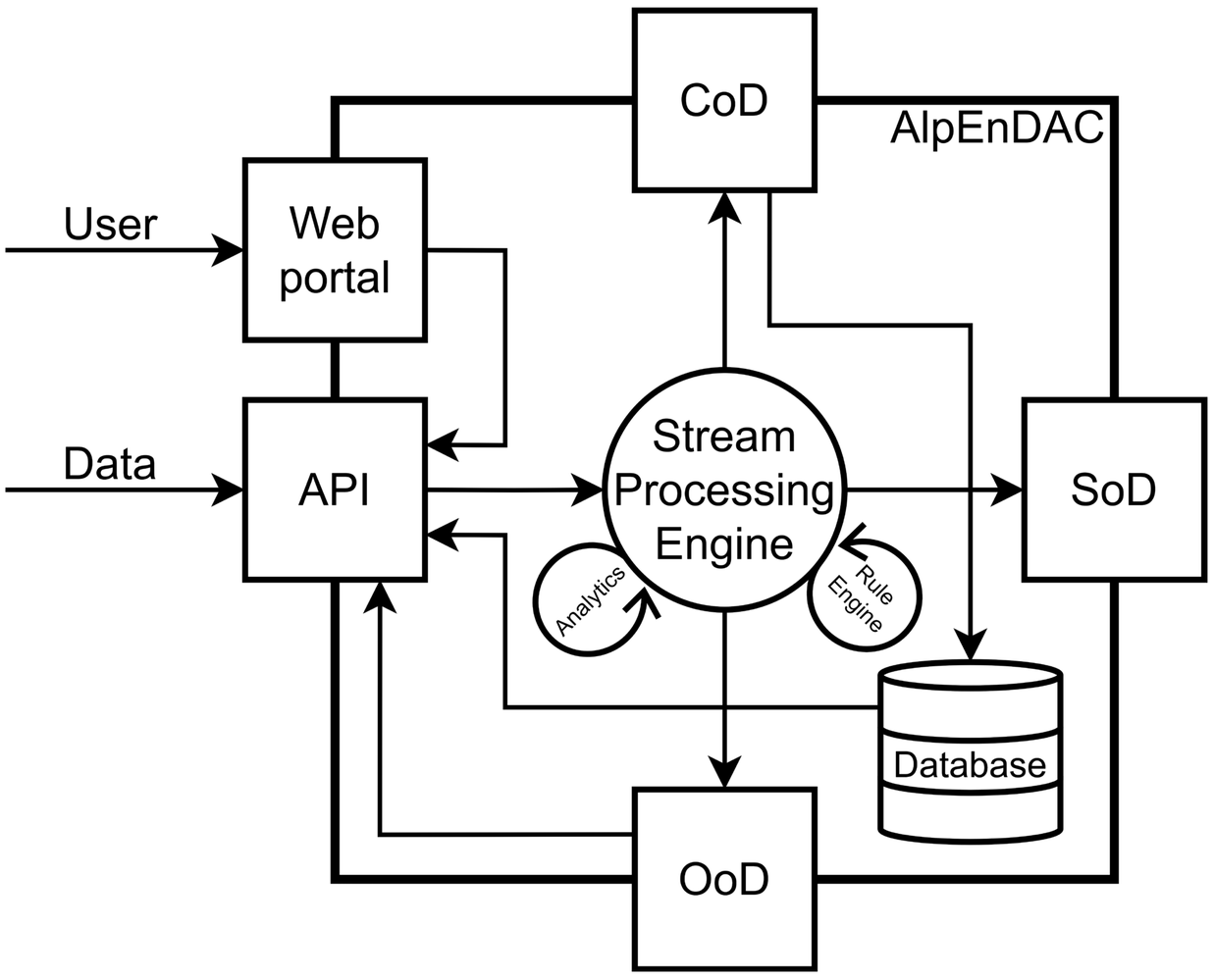


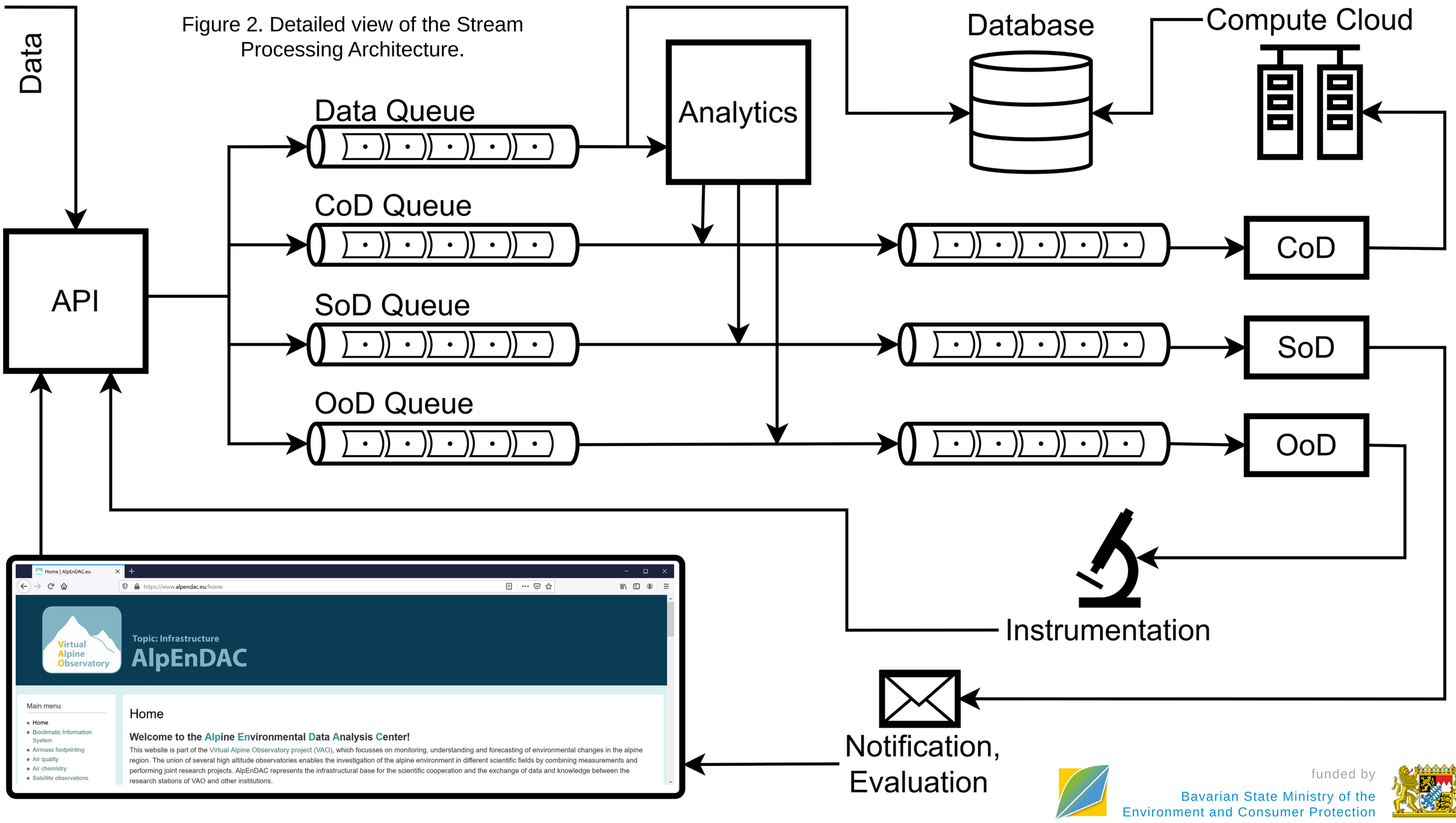
Figure 1. Overview of the upgraded architecture of the AlpEnDAC system.

The **Alpine Environmental Data Analysis Center** (AlpEnDAC) is a "one-stop-shop" platform (www.alpendac.eu) for scientific data measured on high-altitude research stations in the alpine region and beyond. It provides **research data management**, **analysis** and **simulation services** and supports the research activities of the VAO (Virtual Alpine Observatory) community. With some new developments, we want to make environmental scientists profit from **near-real-time** (NRT) **data collection** and **processing**, as it is already an everyday tool e.g. in the Internet-of-Things sector and in commercial applications.

The system will be extended by a **Stream Processing Architecture** consisting of novel components for **Computing on Demand** (CoD), **Service on Demand** (SoD) and **Operating on Demand** (OoD). These will help to implement a **NRT decision support** for the scientist during measurement processes and a **better control** of the measurement process. Fig. 1 shows an overview of the data flow within AlpEnDAC. A more detailed view of the Stream Processing Engine is outlined in Fig. 2.

Data is ingested into the system via a **Representational State Transfer Application Programming Interface** (REST API) or the AlpEnDAC **web portal**. The API will be written in Python using the Flask microframework. The data is stored in a PostgreSQL **database** and is subjected to a NRT analysis. This is implemented with Apache Kafka **message queues**. Based on **user preferences,** CoD and SoD jobs are initially published in dedicated message queues and executed afterwards by a series of **specialized workers**. This allows the **automatic triggering** of **simulations** on the LRZ compute cloud or **evaluation** and **notification services** in NRT.

Figure 2. Detailed view of the Stream Processing Architecture.



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