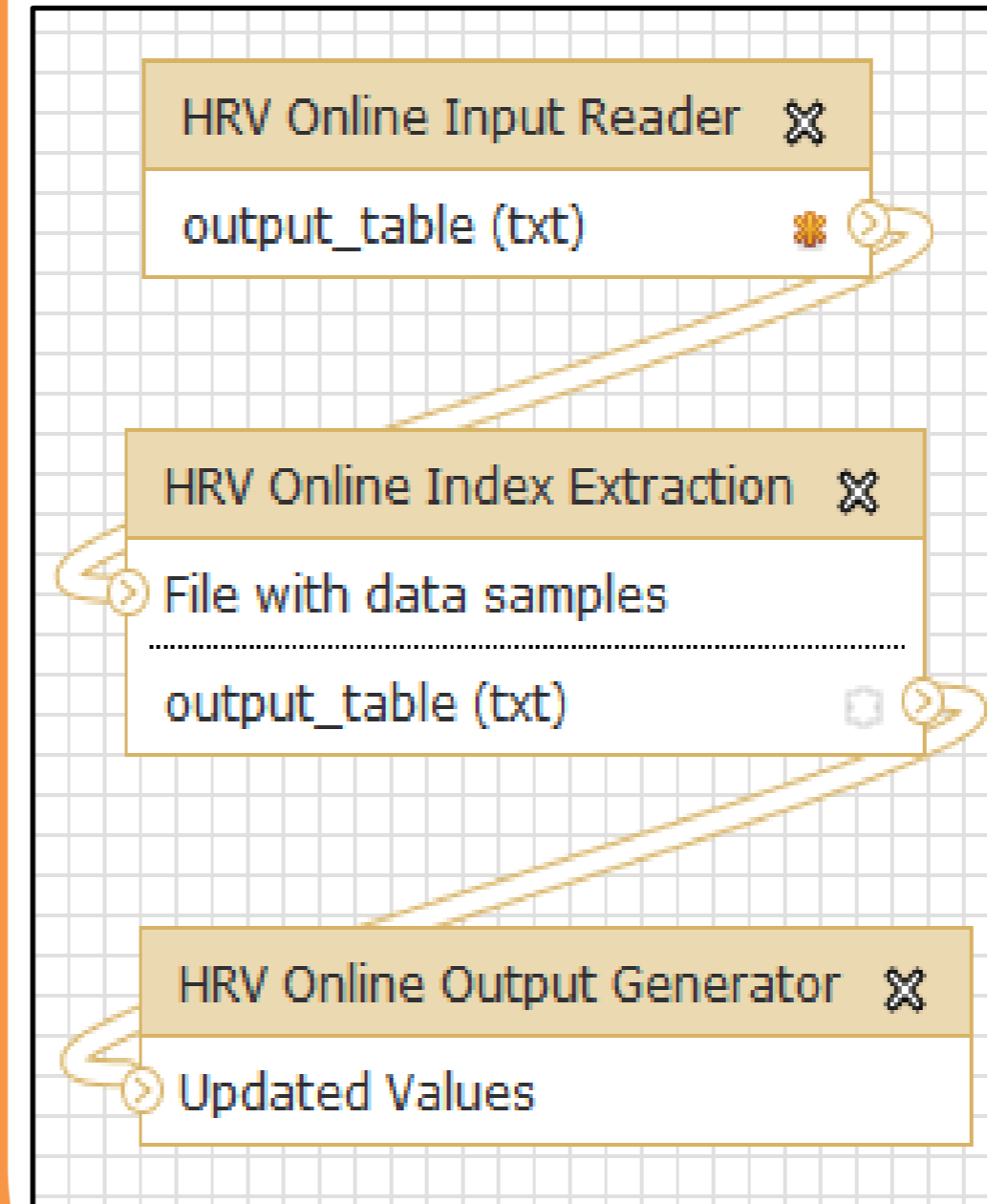


1. Introduction

We recently proposed Physiolyze, a Galaxy-based web framework to support complex workflows for Heart Rate Variability (HRV) analysis. Here we extend Physiolyze by introducing scalable online processing capabilities.

The enhanced version still relies on Galaxy as core platform to design and manage the pipelines. In order to incrementally analyze the streams, a set of Python routines based on the Bioblend library works as middleware to trigger the pipelines as new data become available. A web interface based on the Django Python framework allows the user to control the execution of the pipelines, running them on new data streams. We tested our system on the task of predicting infant behavioral state from HRV patterns. We simulated a real-time scenario of 100 asynchronous data streams from data for 25 infants previously collected with a Light WP Holter ECG recorder (GE Healthcare).

2. On-Line HRV Analysis Workflow



Input Data Stream

- PostgreSQL Connectors
- Data-stream acquisition

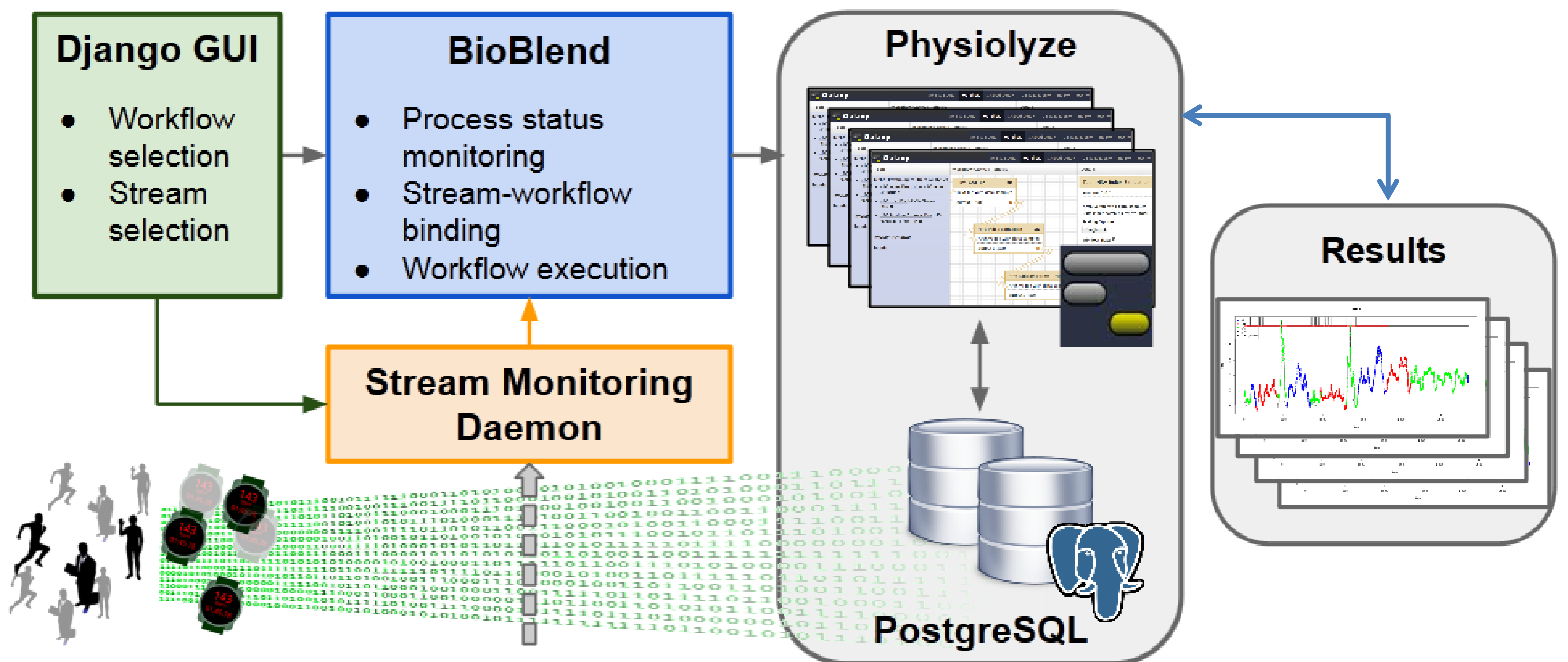
Computation of HRV Indexes

- *pyHRV* python library
- 37 HRV indexes (Time Domain, Frequency Domain, Non-Linear)
- Optimized algorithms for incremental computation of Time Domain and Frequency Domain Indexes

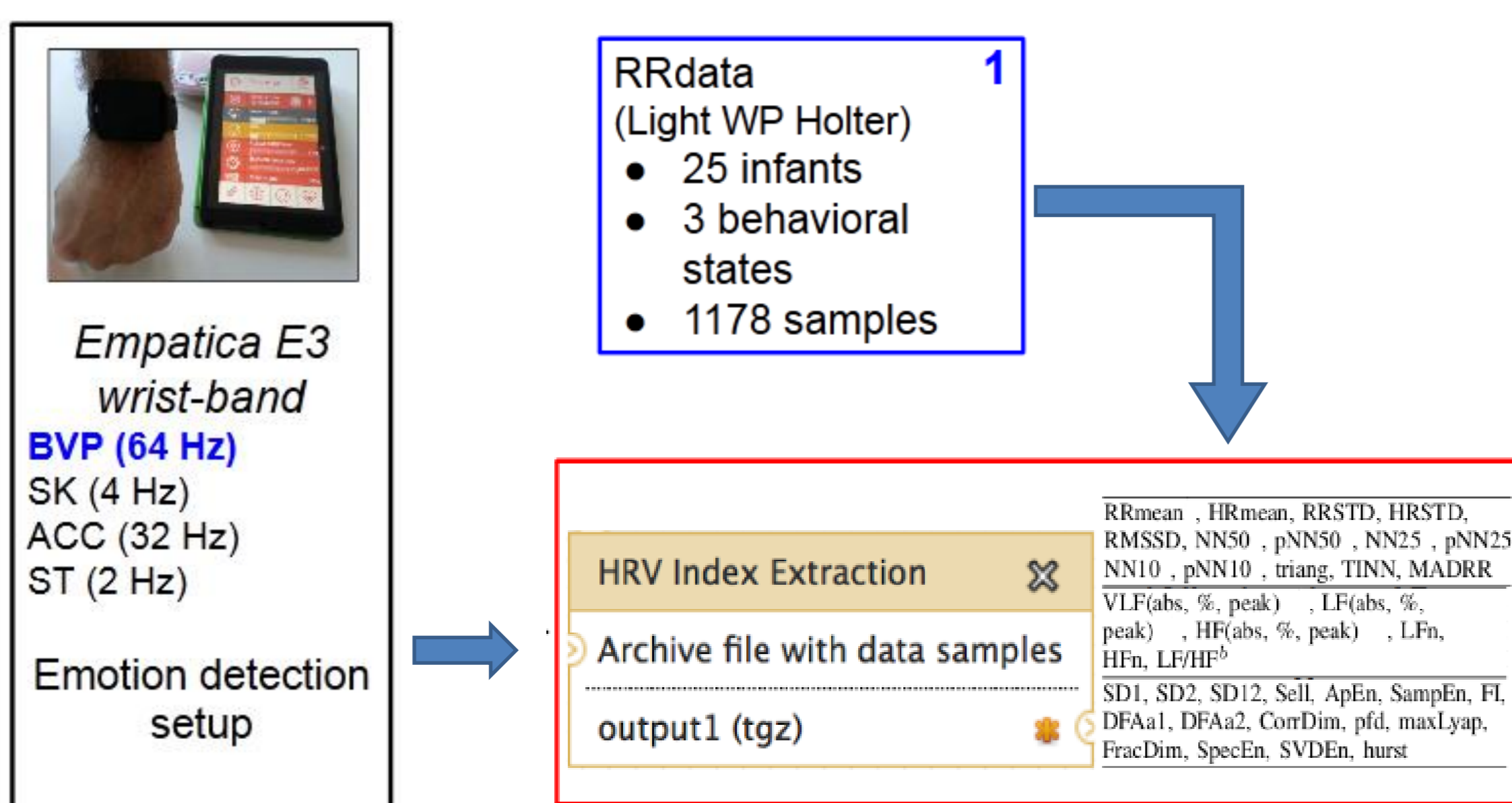
OutputData Stream

- Computed index validation
- PostgreSQL update procedures

3. System Overview

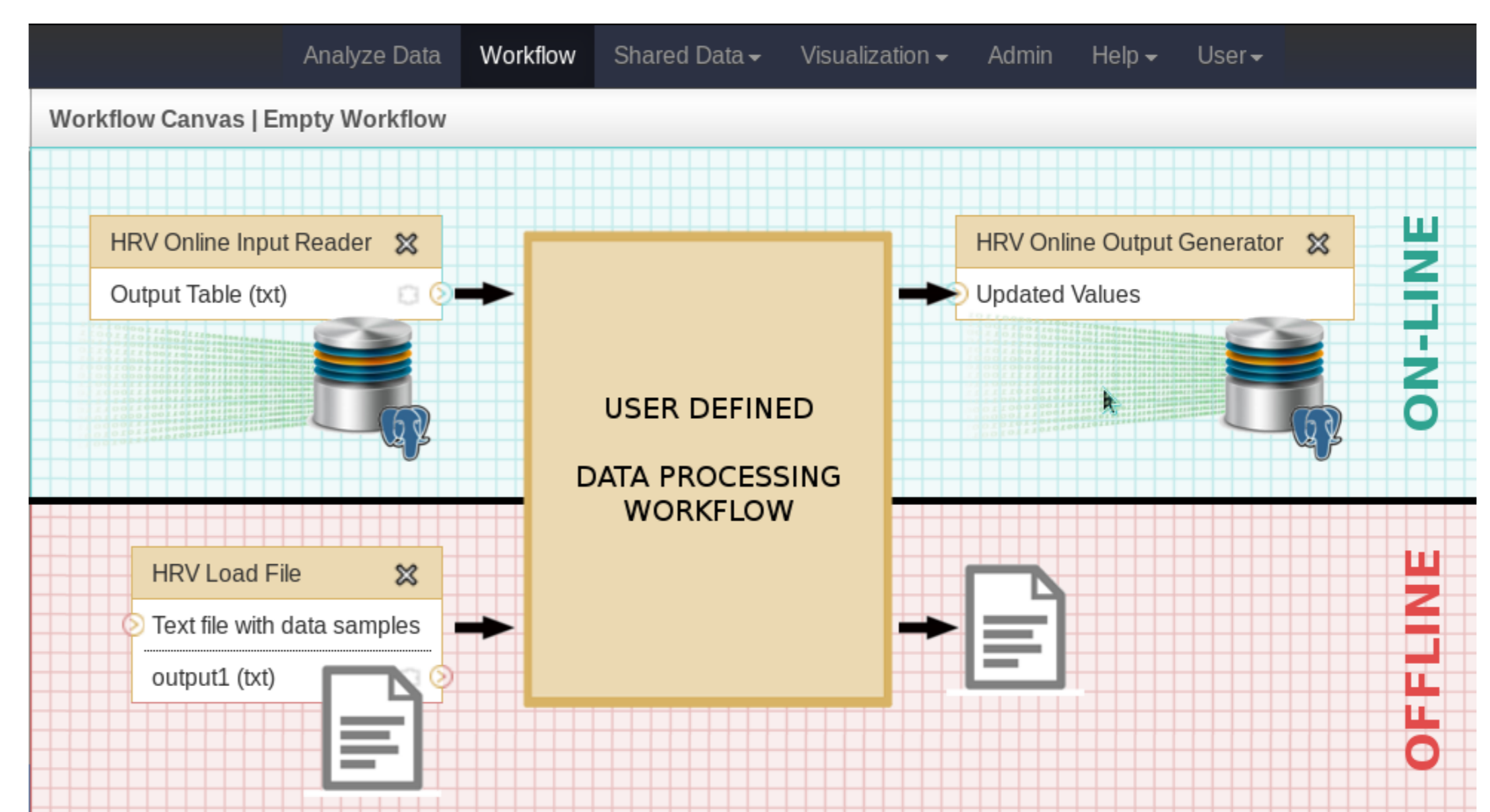


4. Data



The workflow has been applied on 100 asynchronous data streams from a dataset of 25 infants previously collected with a Light WP Holter ECG recorder (GE Healthcare).

5. On-Line vs Off-Line



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2. MPBA Galaxy Public Server <https://mpbagalaxy.fbk.eu/>
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4. PostgreSQL <http://www.postgresql.org/>
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