# COMPUTING AND DATA MANAGEMENT FOR THE SABRE SOUTH EXPERIMENT

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MORE ON ME & MY WORK
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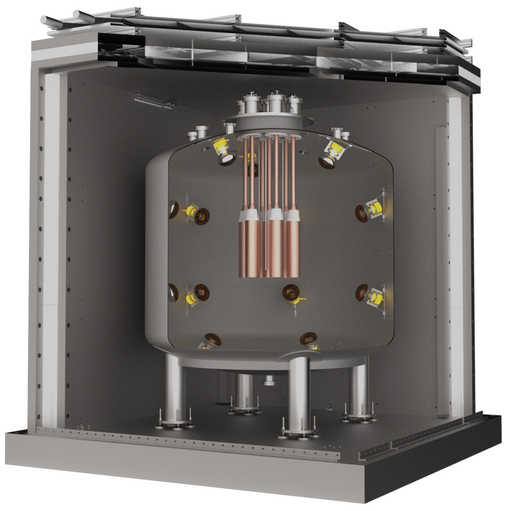
## SABRE SOUTH EXPERIMENT

The SABRE experiment aims to detect an annual modulation from dark matter interactions in ultra-high purity Sodium Iodide crystals in order to provide a model independent test of a signal observed by DAMA/LIBRA[1]. SABRE is designed to detect background signals generated by radiation and cosmic-rays in the northern and southern hemispheres, with SABRE North located at LNGS in Italy and SABRE South at the Stawell Underground Physics Laboratory (SUPL) in Australia.



SABRE South is expected to produce O(100 TB/y) of unfiltered and uncompressed physics data that relate to PMT waveforms and conditions monitoring.

## READ OUT HARDWARE

There are 6 digitisers connected via optical links that can transfer up to 85 MB/s each, totaling to a limit of 510 MB/s[2]. SABRE will aim to keep a sustained rate of 10% (51 MB/s) of this limit to allow for spikes.

**~51 MB/s expected, 510 MB/s limit**

## SUPL COMPUTERS

Data is saved to files and controlled by custom C++ programs. Data reduction methods are applied and expected to reduce data for long term storage to O(20 TB/y). 60 TB of local storage is available in case connection to Melbourne is disrupted.

**~51 MB/s expected, 125 MB/s limit**

## LONG TERM STORAGE

SUPL will be linked to cloud computing services for data storage and processing in Melbourne via a 1 Gb/s optical link. In the case of connection failure, there is also a 4G connection.

## MOTIVATION

The recent opening of SUPL, 1024m underground at an active gold mine, brings numerous challenges for efficient data management and resource allocation for the SABRE South Experiment. This poster addresses critical issues with the new lab and outlines the computing systems for SABRE South that will be used to support data taking and analysis. Challenges include balancing data processing and resources, developing computing and data management systems, and addressing bottlenecks like data acquisition rates, transfer speeds, and storage limitations. Balancing resources in the lab is of particular interest as SABRE is the first experiment at SUPL and will be pioneering the technology used.

## STRIKING A BALANCE

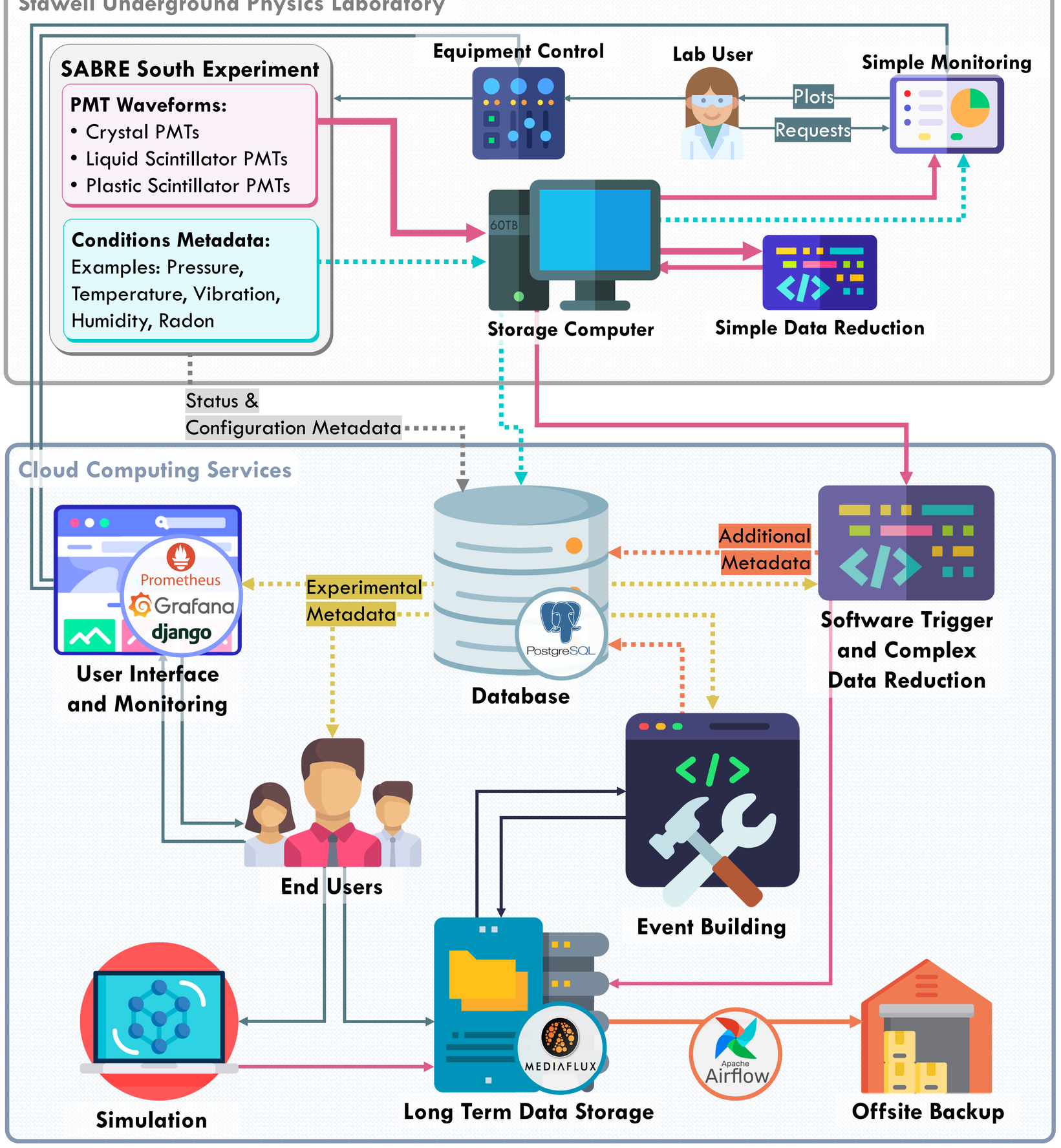
Striking an optimal balance between data processing and resource allocation is essential. Complex data processing requires more resources. At each stage of data acquisition and processing we gain access to more resources, from the DAQ where our resources are quite limited to cloud computing services at the University of Melbourne where resources are abundant. Our aim is to minimise data processing at SUPL and leverage the resources at Melbourne. However, some data processing is necessary to reduce the data size for efficient transfer from SUPL to Melbourne.

More resources

Simpler reduction methods

| Set thresholds, check coincidences, zero suppression | Zero suppression, simple filtering, some compression | Event building, complex filtering, high compression |
|---|---|---|

## DATA FLOW




[1] R. Bernabei et al. First model independent results from DAMA/LIBRA-phase2. 2018. DOI:10.15407/jnpae2018.04.307
[2] E. Barberio et al. The SABRE South Technical Design Report. 2023.

This poster was made for the 31st Lepton Photon Conference 2023
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