

A WEB-BASED GRAPHICAL INTERFACE FOR MICROSCOPY IMAGE ANALYSIS ON A GPU CLUSTER

Hoang Anh Nguyen, Zane van Iperen, Jake Carroll, Nicholas D Condon, David Abramson, James Springfield

The University of Queensland.

Abstract

We present a Web portal that is capable of performing large scale, batch processing of microscopy images on a GPU cluster. This portal provides users with user-friendly Web pages to convert between image formats and submit deconvolution jobs. Currently the deconvolution is performed with the microvolution package [1] in the Wiener cluster [2], but the portal can be easily extended to use other tools and run on other clusters. In conjunction with MeDiCI (Metropolitan Data Caching Infrastructure) [3], we aim to provide a seamless solution that could automatically transfer the images from the acquisition machines to high-performance computing clusters for analysis and archive the results for visualisation or further processing. The portal is currently available to UQ users at: <https://imbmicroscopy.rcc.uq.edu.au>.

Motivation

Microscopic image analysis is a complex process, often involves the coordination of multiple resources, such as instruments, computers and data stores, across multiple logical and physical domains. The whole process is rather complicated for average scientists.

The IMBMicroscopy Web portal, together with MeDiCI, streamlines this process so that any scientists could perform microscopy image analysis at scale.

Main Features

- Convert between multiple image formats
- Generate PSF files
- Deconvolve multiple images in batch-mode using GPU using microvolution package
- Manage files and jobs

Contact: h.nguyen30@uq.edu.au

References

- [1] ., “Microvolution,” <http://microvolution.com/>, 2019.
- [2] , “Wiener,” <https://rcc.uq.edu.au/wiener>, 2019.
- [3] , “Data storage,” <https://rcc.uq.edu.au/data-storage/>, 2019.

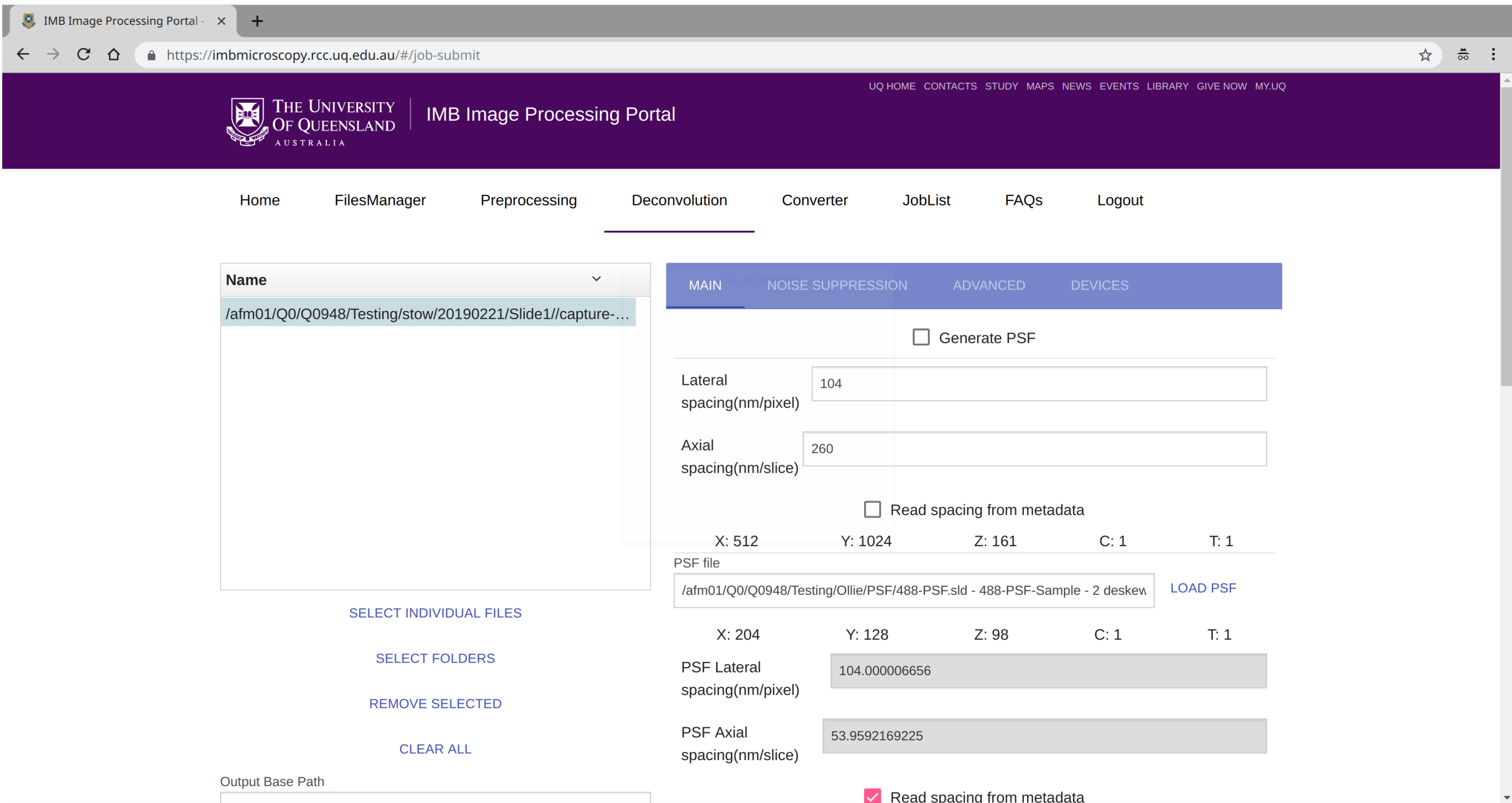


Fig. 1: IMBMicroscopy Portal

Image Analysis Workflow

Figure 2 shows the image analysis workflow and where the portal fits in the UQ’s storage and computation landscape.

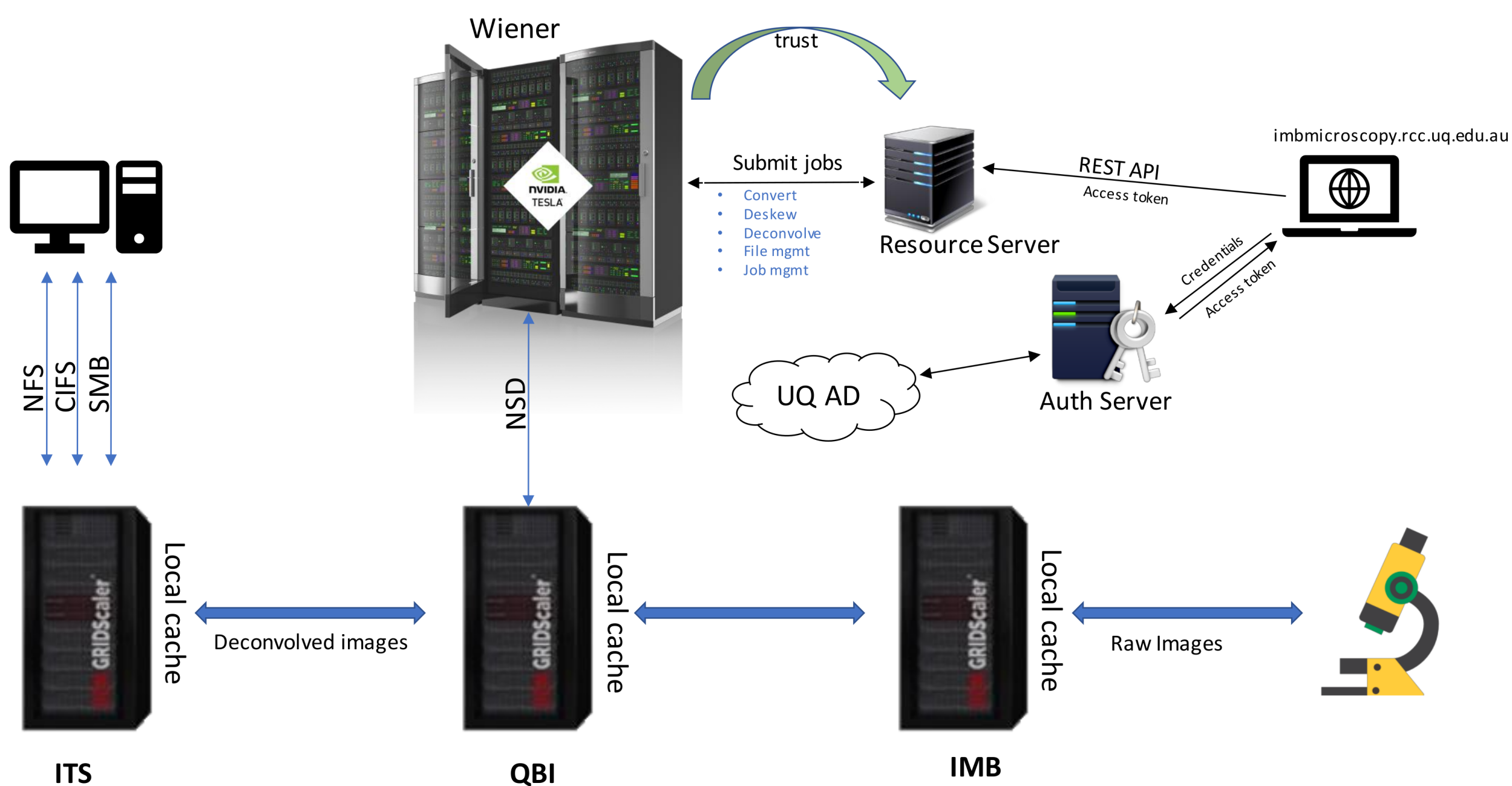


Fig. 2: Image analysis workflow

MeDiCI [3] (Metropolitan Data Caching Infrastructure) is a high performance data storage fabric for UQ. It allows data to be automatically transferred for storage and sharing purposes without any manual involvement. UQ users can access their data in a number of ways, i.e. direct mount on workstations and clusters on campus, or sync the data to portable devices such as laptops.

Wiener [2] is a GPU (Graphics Processing Units) high-performance cluster in UQ. All the computational jobs created by the portal are performed in Wiener.