

Large Image Analysis for Imaging Facilities

Image Analysis with Efficient Use of Hardware Resources

Today, more scientists than ever use imaging techniques in their research projects. This can be seen in rising user numbers, while at the same time microscopes become more and more organized in centralized facilities.

These developments pose new challenges to institutes and equipment owners. How to efficiently organize the hands-on time at a microscope? Where to store all the data generated? How do users post-process their work, without blocking valuable space and time at high performance computers?

We tested whether a centralized data repository running an installation of **arivis Vision4D** can address these questions, and perform equally compared to a desktop PC. **arivis Vision4D** allows smooth and stable visualization and image exploration of **TB-size 4D** image data even on standard PCs (e.g. 8GB RAM). Several image processing functions however benefit from more power-

ful hardware as well as fast disk access. For a more efficient use of hardware resources we tested the performance of the **HIVE (Acquifer)** as a central image processing tool with easy access from local standard consumer-grade PCs.

We used a **HIVE** repository, which was accessed via a remote connection. Analyzing a **281GB** large image, we found that visualization speed and interactivity are practically the same as when operated from a local machine with rather low processing power. Processing speed of analysis tasks however benefit from the repository's processing power. The biggest advantage however is that large image data stays on the same location where image analysis is done. There is no more need to copy data to one or more local machines and no further high-power computers are needed. This saves cost sharing a central powerful machine for image processing for several users.

Benefits in a nutshell



- » Multi-User Support
- » Fast and Interactive Handling of TB Sized Images
- » Flexible and Powerful Analysis Tools
- » Powerful Stitching Tool
- » Multi-User Support
- » Most Efficient Use of Hardware Resources
- » Image Analysis on central storage with easy access

Image Courtesy: Luciano Marcon; Friedrich Miescher Laboratory of the Max Planck Society Tübingen

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Product Overview

arivis Vision4D

arivis Vision4D is the leading software to work with multi-channel 2D, 3D and 4D images of almost unlimited size, independent of available RAM. Its fast image rendering algorithms makes working with terabyte sized images interactive. Powerful and flexible analysis tools enable users to extract meaningful data from their images.

Acquifer HIVE

The HIVE is a high speed centralized data repository. Its modular design integrates high speed processing, remote access, flexibility, data security, scalability and ease of use in one unit. With state of the art high speed processing units and the possibility to upgrade to specific GPUs, the HIVE is the optimal basis for large image enable users to extract meaningful data from their analysis tasks.

Centralized Multi-User Imaging Workflow

Centralized image storage

To simulate the situation in a large institute, we tested, whether an arivis Vision4D installation on a remote data repository gives the same user interactivity than a local installation. Our repository of choice was a HIVE machine, since it offers up-to-date hardware and a scalable modular platform that can grow with rising needs and offers virtually unlimited storage. For institutes and microscopy facilities, it is interesting since it can be connected to multiple microscopes in different locations via a high speed local network and images can be directly saved from the microscope to the HIVE. This ensures that all data is immediately stored at one central point, from where users can access them.

Image Analysis over a local network

Via remote access, we were then able to directly work with our images, using an arivis Vision4D installation on the HIVE. We then analyzed images up to 281GB large and tested, if visualization speed and analysis processes where somehow slowed down by this setup.

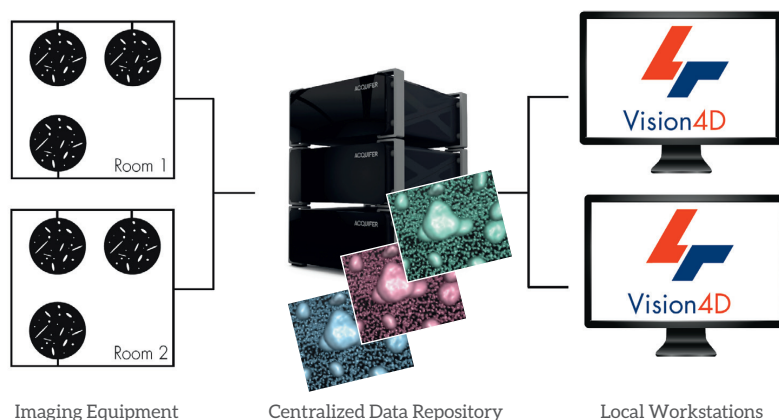
Fast Image Analysis with arivis Vision4D

arivis Vision4D can already visualize huge image data on standard computer hardware fast and interactively. This was not affected on our network setup.

Since the data repository is equipped with fast processing hardware we also tested, how fast the HIVE could process a given analysis pipeline compared to a desktop PC. We found the HIVE to complete the analysis task 2,5X faster than the desktop PC. Also other tasks such as stitching or fusing volumes benefit from this increased processing speed.

Convenient solution for imaging facilities

In our hands, the setup of a high-end centralized data repository running an installation of arivis Vision4D is a great tool to organize computing power and data storage. It is especially suitable for a multi-user environment such as imaging facilities, since the setup saves on licensing fees and even multiple users gain access to a high-performance analysis workstation, without the need to have dedicated workspace at the facility.



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