

Cloud-Based Virtual Desktops for Reproducible Research

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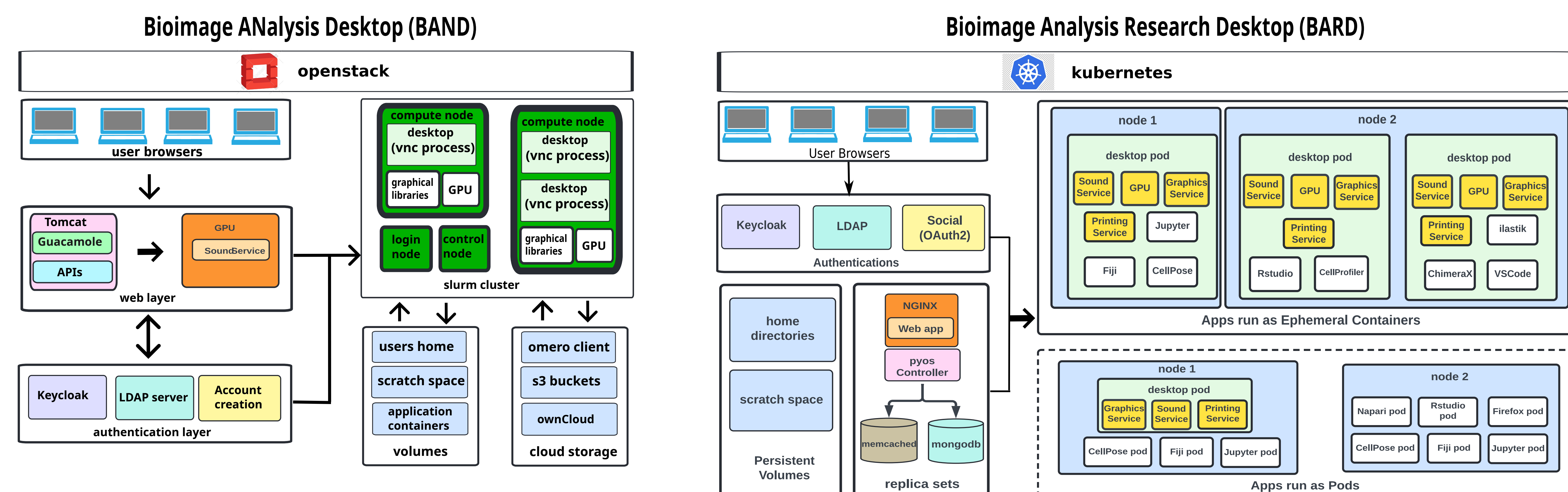
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Background

Bioimage analysis workflows often require extensive human interventions combined with the use of multiple software tools. To deal with human-in-the-loop workflows, bioimage analysis software typically includes a graphical user interface and is often deployed on dedicated desktop workstations. Recently, the combination of increasing data size with the use of more computationally expensive processing methods (e.g. deep learning) has pushed many workflows beyond the capacity of local workstations. Moving such workflows to high-performance computing clusters (HPC) is challenging. A common workaround involves using large cloud-based virtual machines with remote desktop software, requiring users to replicate their local computing environment in the cloud. However, this solution presents significant challenges in deploying and ensuring interoperability between commonly used bioimage analysis tools. In particular, setting up compute environments for specialized hardware, such as GPUs, becomes complex, especially when different tools have conflicting requirements.

To address these issues, we introduce the Bioimage ANALysis Desktop (BAND) and the Bioimage ANALysis Research Desktop (BARD), two Desktop-as-a-Service (DaaS) platforms designed to simplify cloud-based bioimage analysis. BAND and BARD enable users to perform interactive image analysis using familiar tools, facilitating seamless integration and reducing the complexities associated with cloud deployment and hardware compatibility.

Architecture



Features

- Runs entirely in users web browsers.
- On-demand desktop resources allocation.
- NVIDIA GPU support for applications (computation and 3D graphics rendering).
- Integration with authentication providers such as OAuth2.0, LDAP, LDAPS protocols.
- Enhanced security, with desktops isolated from each other to minimize security risks.
- Customizable to organizational needs.
- Sound support with PulseAudio integration.
- Printing support with CUPS.

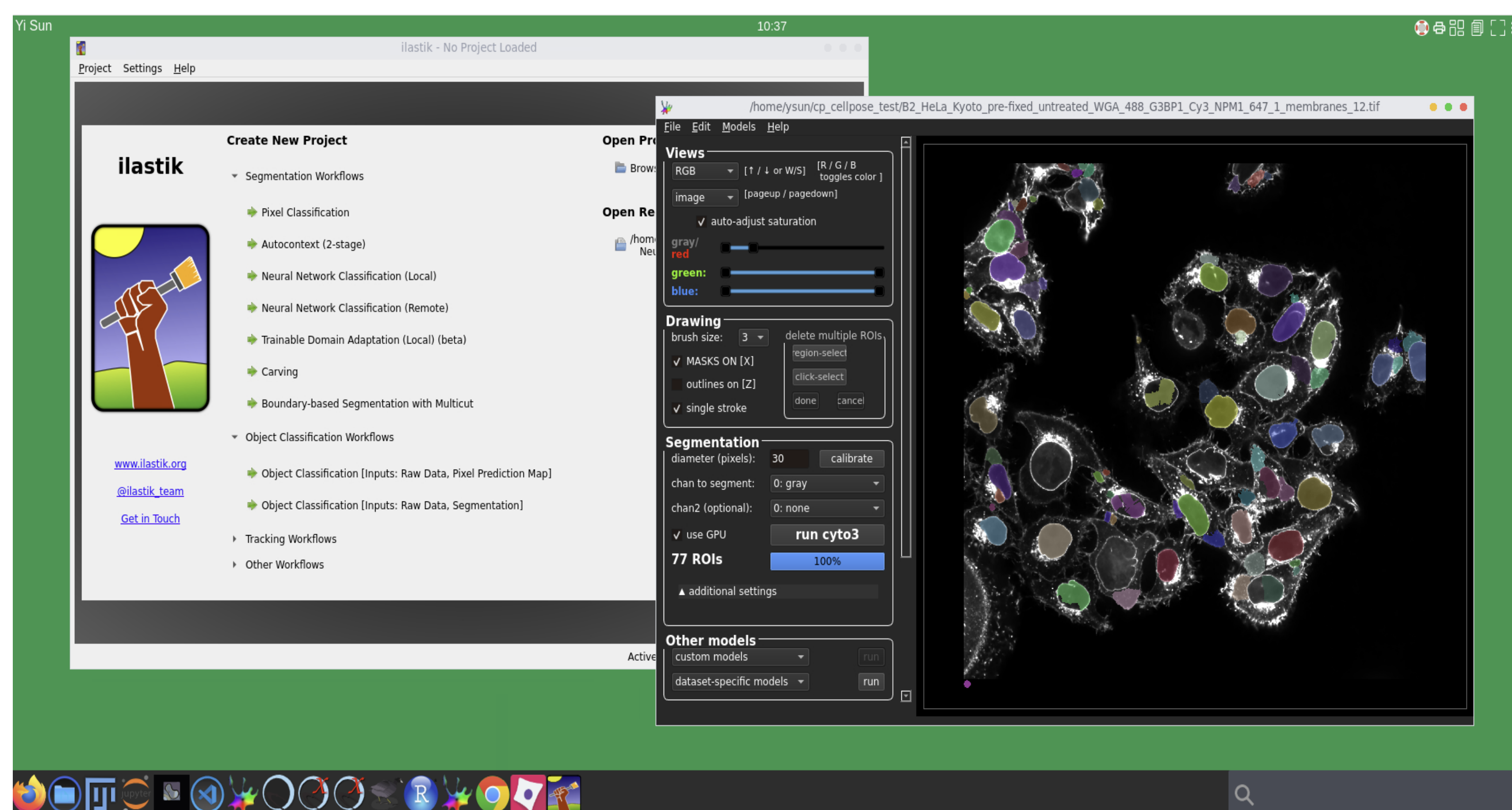
Key outcomes

Software Compatibility: Resolves software dependency and version conflicts by containerizing tools for consistent bioimage analysis.

Training Support: Offers tailored environments ideal for educational training courses, facilitating seamless learning experiences.

Interactivity: Provides interactive tools for efficient bioimage analysis.

Deployment: Streamlines deployment processes, reducing software installation and system setup time.



Contact

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References

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2. BARD application repository <https://git.embl.de/grp-cbbcs/abcdesktop-apps>
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