



HISTOWEB TRANSFORMING A PROFESSIONAL BIOIMAGES PLATFORM INTO A LEARNING TOOL FOR HISTOLOGY



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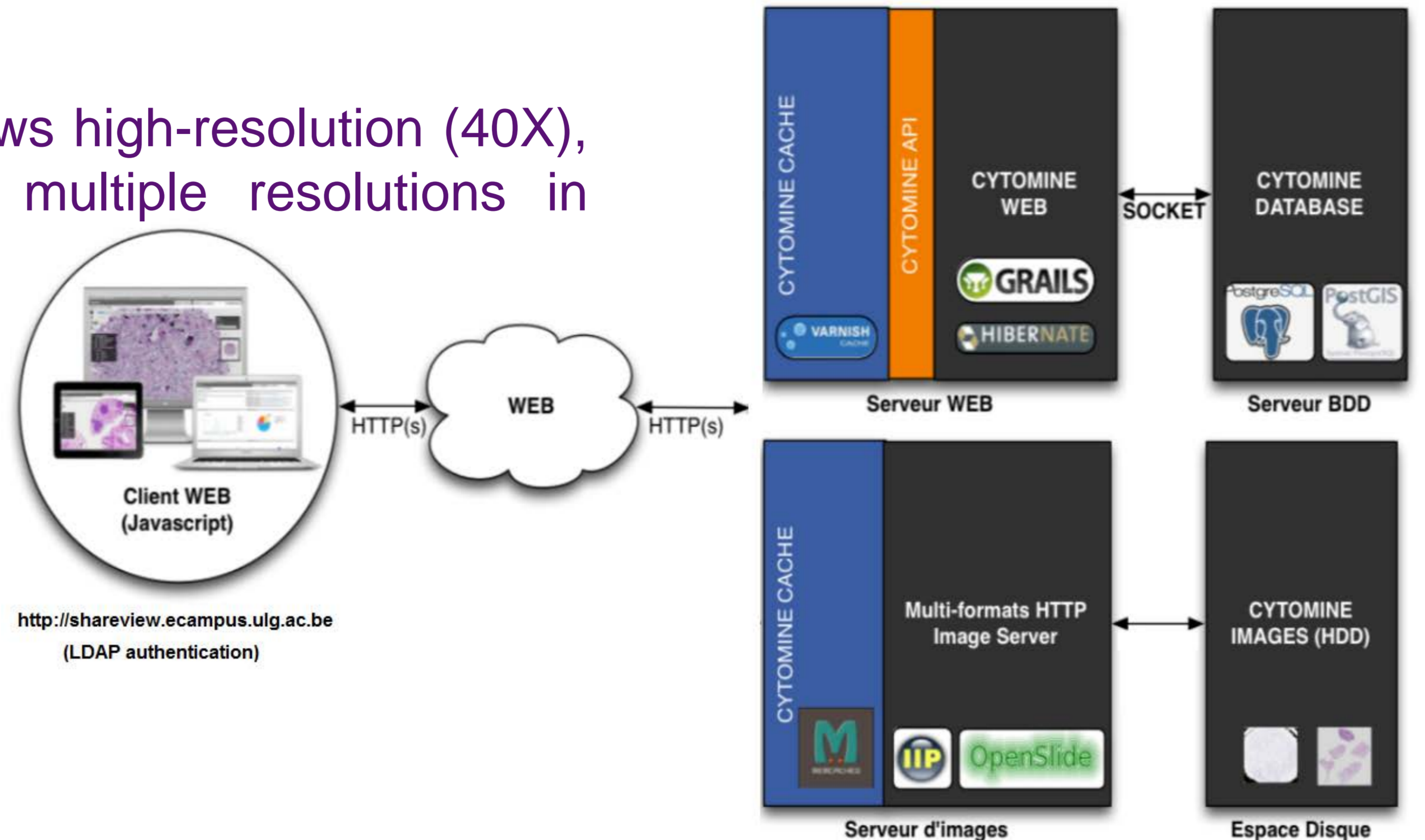
Context

In 2012, medical studies in Belgium has undergone an important reform that leads to a rocketing rise of the number of students. The University of Liège took this renewed context as an opportunity to thoroughly revamp its teaching methods in histology, extending CYTOMINE [1] (<http://cytomine.be> : a web-based, image storage, annotation, and analysis platform) with new pedagogical features.

General design principles

The rich internet application CYTOMINE [1] allows high-resolution (40X), two-dimensional images to be visualized at multiple resolutions in traditional web clients.

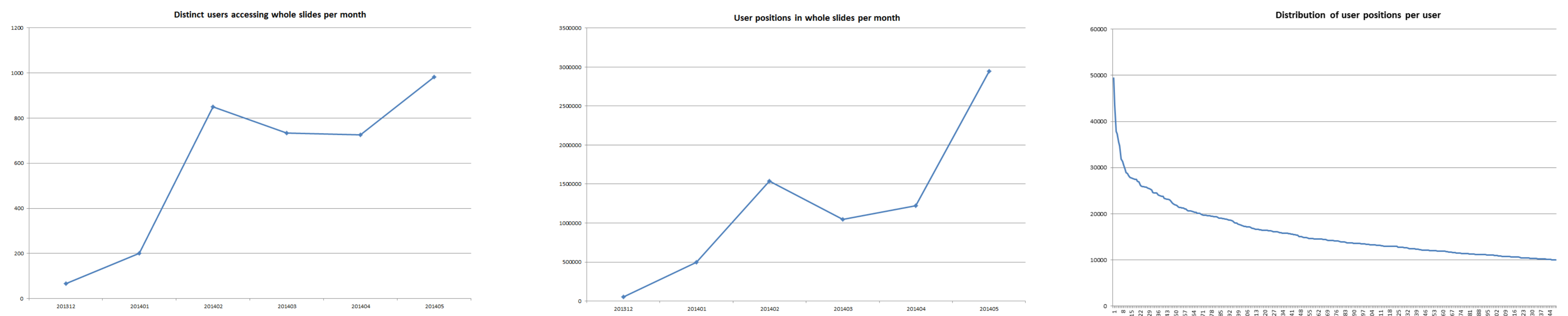
It supports various image formats and allows to manage projects containing specific users, images, and vocabularies with domain-specific terms. Its multi-layer feature allows manual annotation to highlight regions of interest. Data are stored in a spatial relational database and can be visualized and edited through a web interface.



New features were added to CYTOMINE web platform to allow learning support, as conversion tools to import previously annotated images, a lighter user interface, restricted access to functionalities for teachers/students, support for LDAP authentication, and integration with Blackboard LMS.

Les flèches jaunes ci-dessous illustrent la diversité de diamètre des fibres nerveuses qui peuvent être myélinisées (avec une gaine +/- épaisse) ou non myélinisées.

From December 2013 to June 2014, more than 650 slides related to human and veterinary histology were organized into 40 projects into CYTOMINE, and around 1500 students were invited to explore and annotate these slides, in addition to regular courses and face-to-face sessions. More than 40 000 annotations were created (either by teachers or by students). Different behaviors of students (illustrated below) will be analyzed in future work.



Conclusion & future work

The Cytomine platform has proven to be a good framework to support histology learning. The Histoweb project (2014 - 2017) will further extend the platform with new interaction modules to stimulate students and personalize education using data mining of student's activities.

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Reference

[1] Marée et al., *A rich internet application for remote visualization and collaborative annotation of digital slides in histology and cytology*, BMC Diagnostic Pathology, 8 (Suppl 1):S26, 2013

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