Instrument Control and Image Acquisition Tools for Live-Cell Imaging

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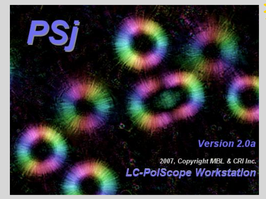
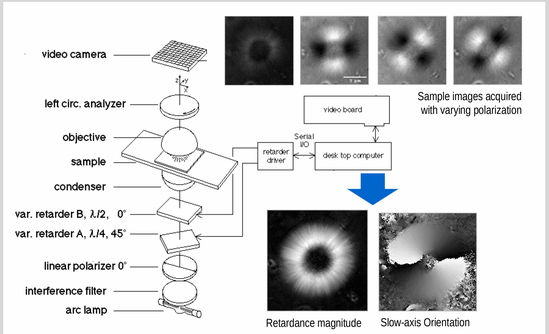


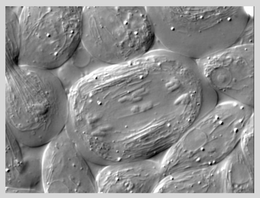
Intro

JIF (Java Instrumentation Framework) is an open source, extensible architecture for instrument control and image acquisition under development at the Cellular Dynamics Program, Marine Biological Laboratory. The software is currently used for live-cell imaging with polarization and flourescence microscopes.

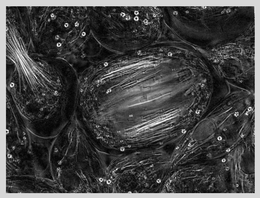
LC-PolScope: Birefringence Imaging of Live Cells



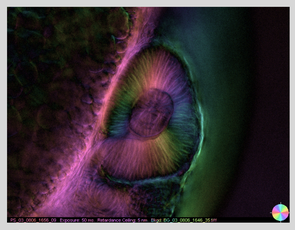
DIC



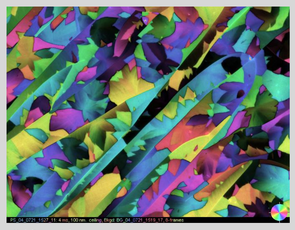
Pol-Scope



Crane Fly Spermatocyte in Meiosis



Fish embryo eye



Calcite crystals

ImageJ Integration

Can be launched as the primary application or as an ImageJ plugin
Image transfer to/from ImageJ

BufferedImage <=> ImagePlus/ImageProcessor

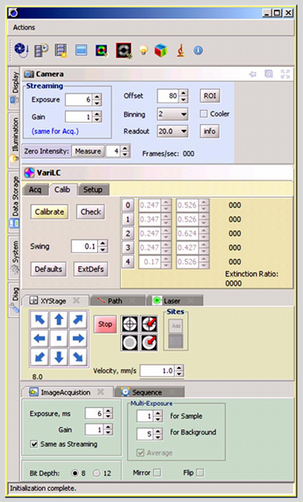
Invoking plugin with args (with GenericDialog bypass)

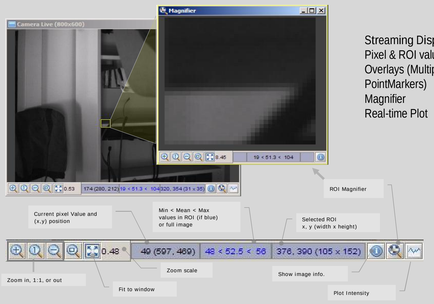
Drafting for proposal for:
Refactoring ImageJ to Interfaces & Abstract Classes
November, 2008

User Interface

Built on an application framework that includes docking, dialogs, binding values to UI components, configuration, error handling, and diagnostics.

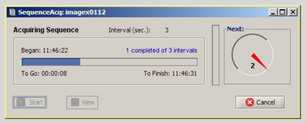
Application Frame





Streaming Display
Pixel & ROI value updates
Overlays (Multiple ROIs, PointMarkers)
Magnifier
Real-time Plot

Sequence Acquisition Monitor



Design Features

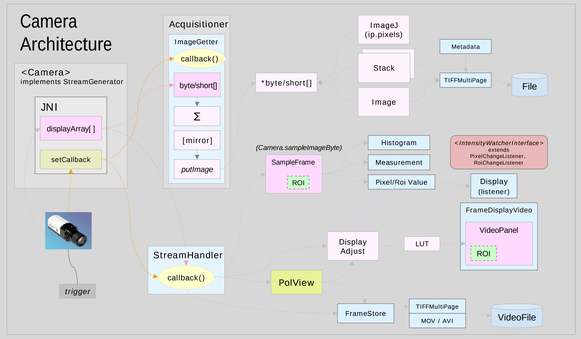
GUI
- Tabbed docking layout for panels
- Actions on toolbars

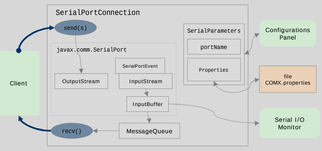
User Profiles
Modes
Module configuration
- Preferences / Defaults
- Devices / Ports

Programmable
- From Java thru API
- Scripting Engines
- Wrappers and Helpers for ImageJ

Hardware Interfacing

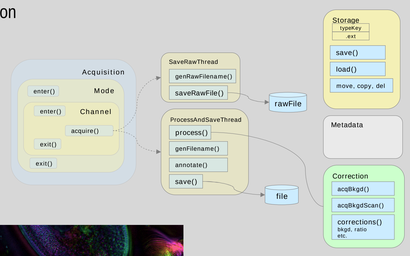
Instrument Control Components
Illumination and shutter controls
Control of active optical components (variable LC retarders)
XY and Z stage motion control,
Image acquisition and streaming (USB and QImaging Firewire cameras)

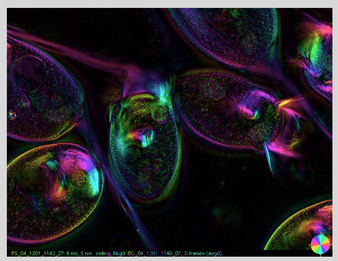




Acquisition

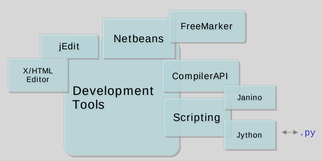
Multi-model Acquisition
Image processing
Metadata capture
Data management



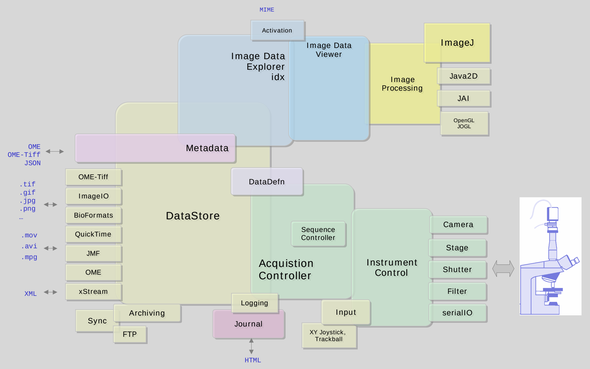


Live Vorticella with Orientation Color Mapping

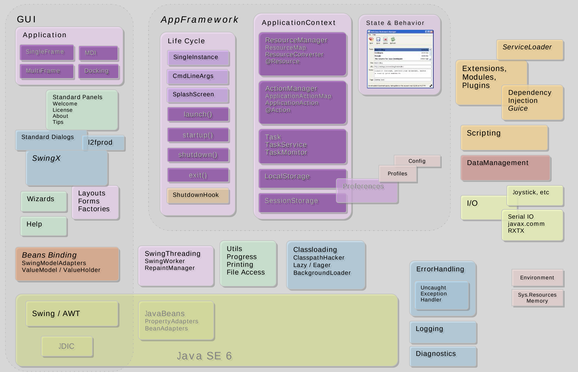
Development Tools



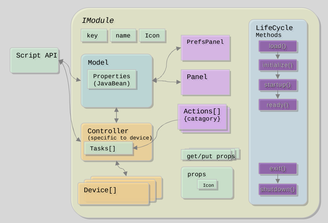
Architectural Vision



Application Framework (Evolving)



Extension Modules
- Well-defined interface for modules/extensions/plugins
- Self-configuring
- Manages interdependencies
- Control/Display panels
- Actions / Tasks



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