

# MicroManager Architecture:

how to extend MicroManager and tailor it to your needs

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- ▶ IT Developer
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- ▶ Projects for MediaCy and Cairn
- ▶ Matt's brother

1. Technology
2. Architecture
3. Extending
4. Practical

- ▶ Documentation/Website/Wiki
  - ▶ [www.micro-manager.org](http://www.micro-manager.org)
  - ▶ PDF manual
  - ▶ Journal article
- ▶ People/Email lists
  - ▶ Arthur
  - ▶ Nico
  - ▶ [micro-manager-general](#) sourceforge list
- ▶ Open source
  - ▶ Code
  - ▶ Free
  - ▶ Reference them...

- ▶ Cathedral and the Bazaar, Eric S. Raymond, 1999
- ▶ Pros
  - ▶ Free
  - ▶ See all of the code
  - ▶ Fix any problems
  - ▶ Modify to your specification
  - ▶ Benefit from larger development team
- ▶ Cons
  - ▶ Their code
  - ▶ Their choices
  - ▶ Their API
  - ▶ Their time
  - ▶ Their direction
  - ▶ Cost in time

## API

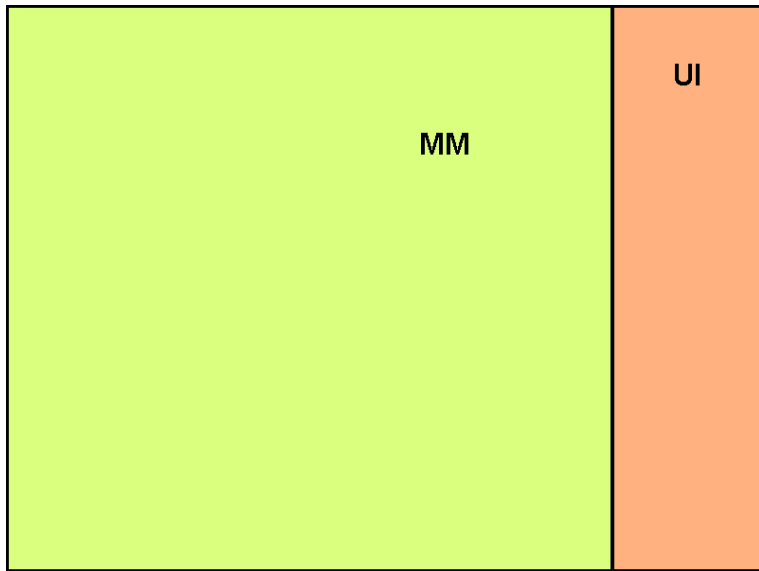
# Application Programming Interface

- ▶ C++
- ▶ Java
- ▶ ImageJ
- ▶ 3rd Party Libraries
  - ▶ JNI
  - ▶ JSON
  - ▶ SWIG
  - ▶ Boost
  - ▶ BeanShell
  - ▶ Clojure

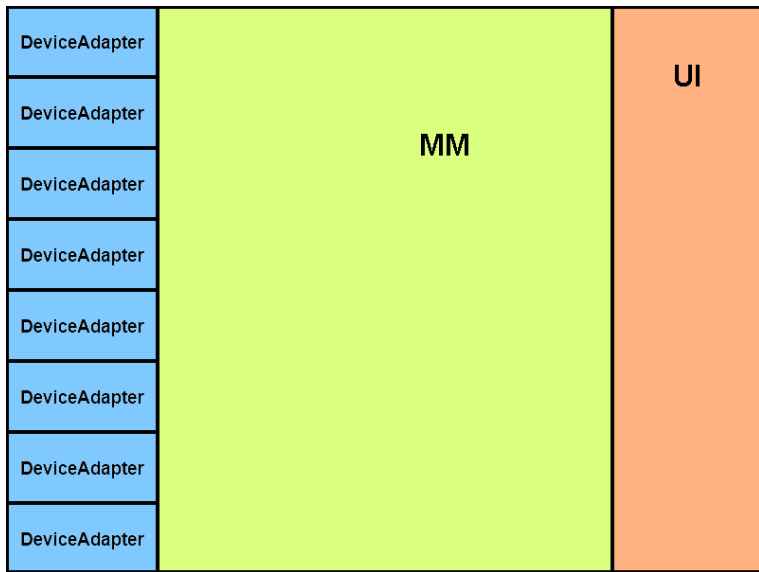
- ▶ C - Brian Kernighan & Dennis Ritchie, Bell Labs, ~1970
- ▶ C++ - Bjarne Stroustrup, Bell Labs, ~1983
- ▶ Java - James Gosling, Sun Microsystems, ~1995
  - ▶ C#
  - ▶ JavaScript
  - ▶ Matlab
  - ▶ Perl
  - ▶ PHP
  - ▶ Python
  - ▶ BeanShell
  - ▶ Clojure
  - ▶ ...



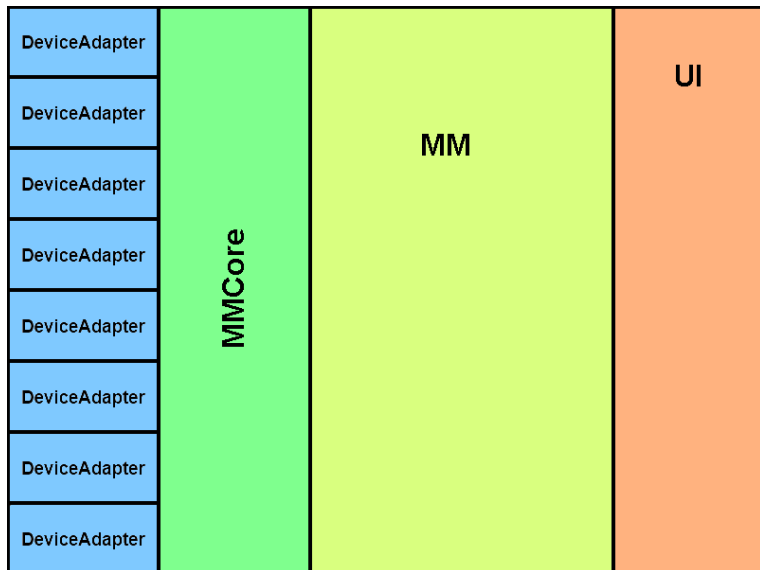
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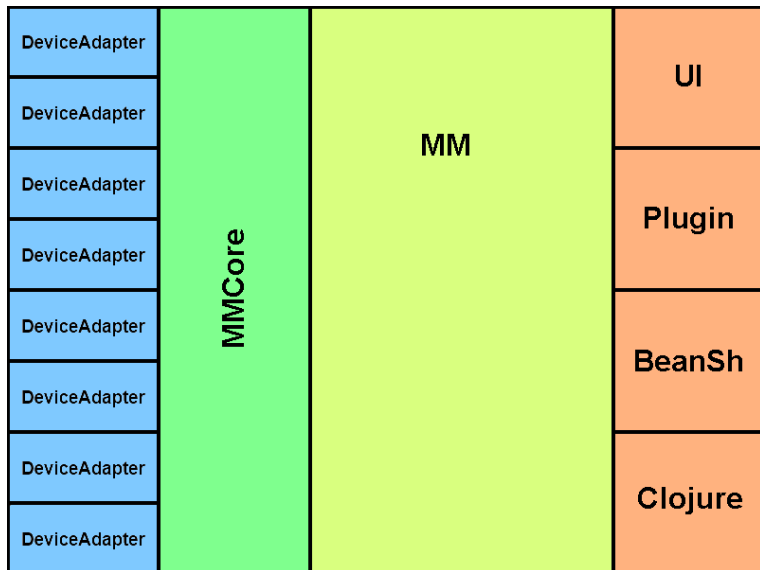
# Architecture



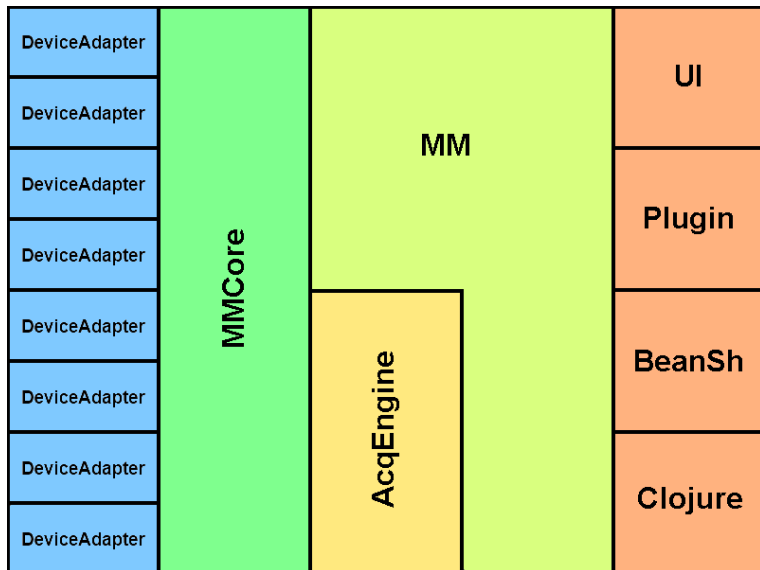
# Architecture



# Architecture



# Architecture



# Image Pipeline



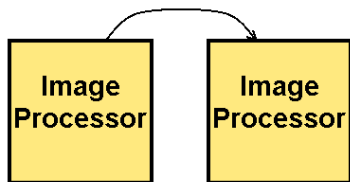
# Image Pipeline



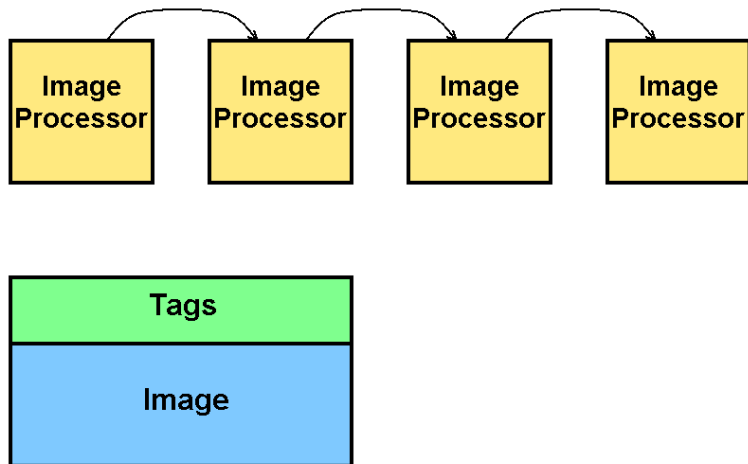
# Image Pipeline



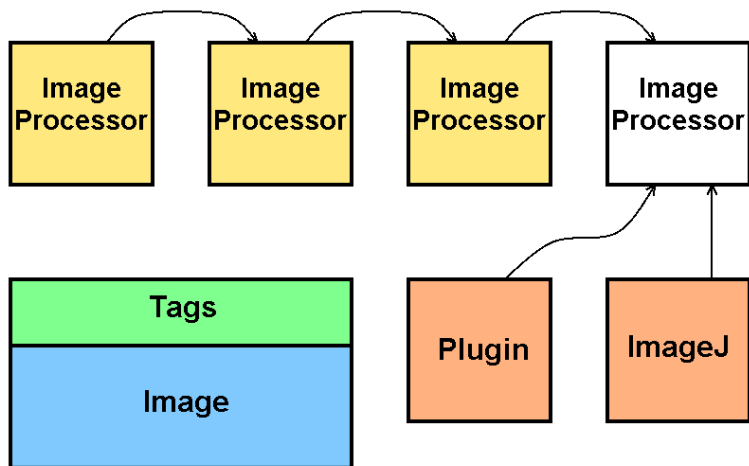
# Image Pipeline



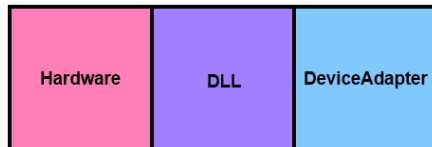
# Image Pipeline



# Image Pipeline



- ▶ C++
- ▶ Hardware interfaces



- ▶ BeanShell
- ▶ Clojure
- ▶ Matlab
- ▶ Python
- ▶ Repetitive use of built-in functionality
- ▶ Use external functionality
- ▶ Rapid development
- ▶ Small
- ▶ Uncomplicated

- ▶ Java - Cairn ROI Analyser
- ▶ Clojure - Data Browser
- ▶ Temporal factors
- ▶ Bespoke image analysis
- ▶ Call external libraries
- ▶ Longer development times
- ▶ Larger
- ▶ More complicated
- ▶ More power
- ▶ More control
- ▶ More speed

## Scripts

- ▶ Repetitive use of built-in functionality
- ▶ Use external functionality
- ▶ Rapid development
- ▶ Small
- ▶ Uncomplicated

## Plugins

- ▶ Bespoke image analysis
- ▶ Call external libraries
- ▶ Longer development times
- ▶ Larger
- ▶ More complicated
- ▶ Temporal factors
- ▶ More power
- ▶ More control
- ▶ More speed

## How to choose your development path

- ▶ Assess your needs
- ▶ Assess your resources
- ▶ Assess your skills
- ▶ Start with a script and move to a plugin

## Plugin

1. Set-up development environment
2. Write and compile some Java
3. Add to MicroManager
4. Run your code!

## Plugin / DeviceDriver

- ▶ Subversion Client - [tortoisesvn.net](http://tortoisesvn.net)
- ▶ Java IDE - [netbeans.org](http://netbeans.org)
- ▶ C++ IDE - [codeblocks.org](http://codeblocks.org) or Visual C++

# Thanks!

What I offer...  
advice, scripts, programming, teaching

Any questions?

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