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# Software Process



# UV-CDAT Software Process

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- **AGILE** software development
- Distributed version control and **topic based** workflow
- Sophisticated build system using **CMake**
- **Regression testing framework** and dashboards



# AGILE Software Development

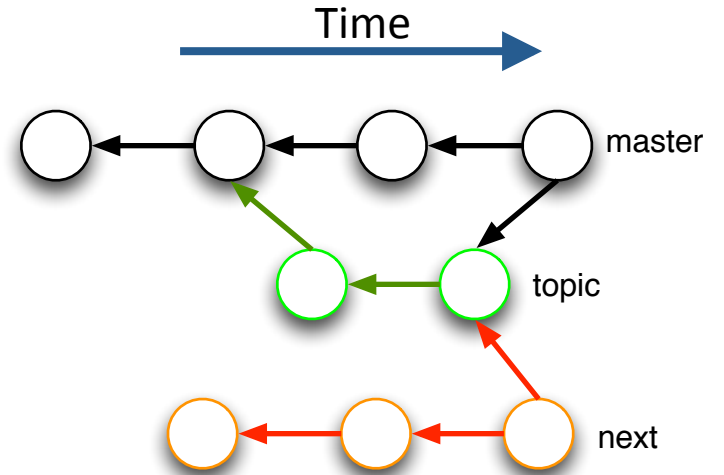
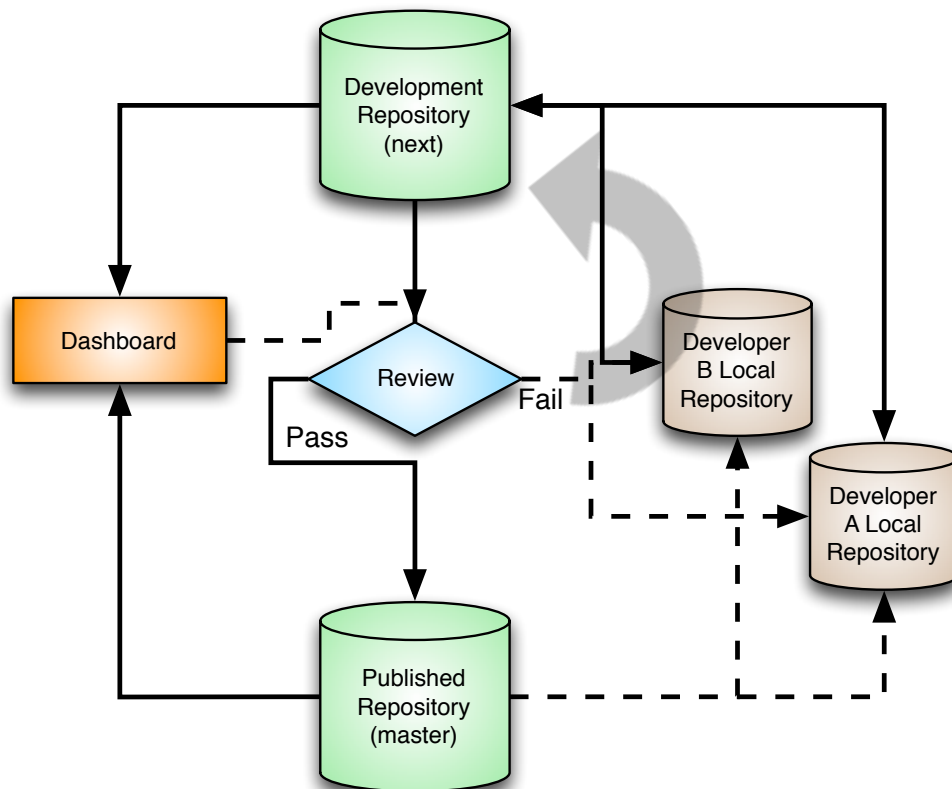
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- AGILE software process is
  - A collection of software development methods based on iterative and incremental development
  - Key points: **Iterative development**, **continuous integration**, **working software**, frequent releases, priority based **backlog**, **testing**, regular scrums, **strategy** (funding, goals, vision).
- AGILE software process using Kitware's suite of tools
  - **CMake**
  - **CTest**
  - **CDash**



# Topic Based Workflow

- Topic Workflow



## Advantages

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- Efficient management of contributions from a large number of developers located in different geographical locations
  - UV-CDAT uses **Git**, a well reputed **distributed version control system (DVCS)**
- Encourages **continuous development**
  - Developers can create a new topic branch from the master / published repository
- Supports **test driven development**
  - Maint (gatekeeper / published) branches are tested continuously and nightly
  - Each new feature branch should add a new test for the validation of that feature



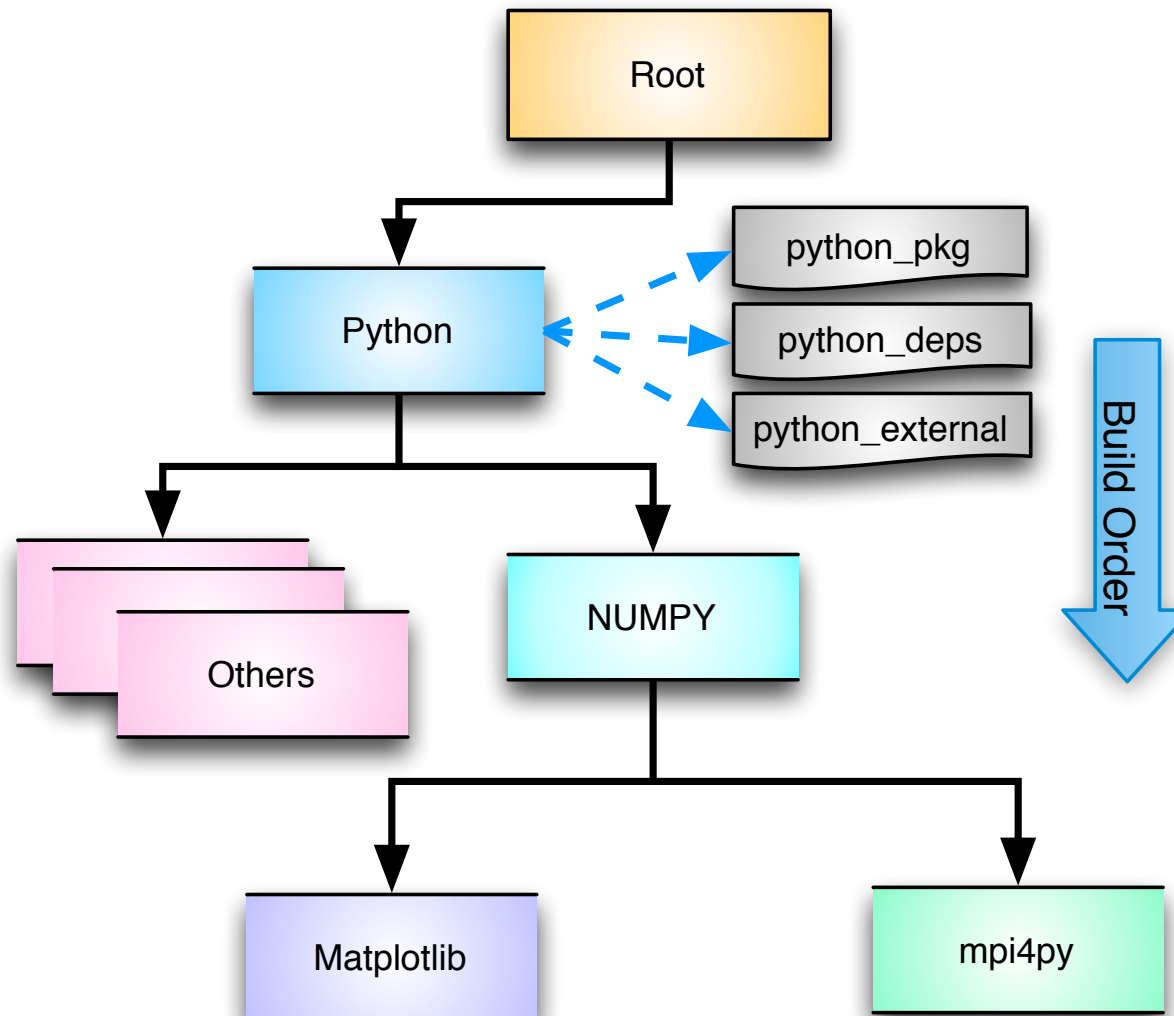
# CMake Build System

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- UV-CDAT source code consists of various tightly and loosely coupled libraries and toolkits
- Sophisticated build system is required to build the entire package in a **uniform environment**
- Build system should provide flexibility to adapt to various **computing environments** and **platforms**
- Build system should **log warnings** and **errors**
- Build system needs to support **regression** and **unit testing**
- UV-CDAT build system uses CMake, the cross-platform, open-source build system



# Build System Overview



## External Packages

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- Each package is considered an **external package**
- **name\_pkg** adds package to the UV-CDAT build system
- **name\_deps** defines package dependencies which are then used by the build system to perform topological sort and correct build order
- **name\_external** defines the build steps which includes downloading (if not present in the cache), and building the package on the host system.





## Key Features

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- Fulfills core requirements (referred earlier)
- Provides option to skip individual packages as long as its not required by any other active package
- Provides option to skip a group of packages
  - For client side build, user can skip building parallel components
- Enables packages to be downloaded via various mechanisms; **git://**, **Http**, **Ftp** etc. via CMake External Project feature
- Enables optional build steps; pre and post which are used to patch a particular package or run post build cleanups
- Each build step for a package is logged to remove information clutter and to identify any subtle build failures
- Enables parallel build

# Regression Testing Framework and Dashboard

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- Integrate plugin more tightly into the UV-CDAT infrastructure
- Added automated regression testing framework to UV-CDAT
- Uses **CTest**, and **VisTrails** scripting interface
- For each recorded test, framework replays the test and compares the generated image with the baseline (correct) image within certain threshold.
- At the end of the tests run, results are submitted to the **UV-CDAT dashboard**.
- Currently we have multiple dashboards submissions covering various flavors of Linux and Mac OS X



# UV-CDAT Dashboard

My CDash All Dashboards Log Out

Thursday, February 07 2013 23:12:19 EST



## UV-CDAT

Dashboard Calendar Previous Current Next Project Settings

No file changed as of **Wednesday, February 06 2013 - 20:00 EST**

Show Filters Advanced View Auto-refresh Help

Nightly											
Site	Build Name	Update	Configure		Build		Test			Build Time	Labels
		Files	Error	Warn	Error	Warn	Not Run	Fall	Pass		
discover29	UVCDAT-SLES11_gcc471-master	0	0	0	1 <sup>+</sup>	1 <sup>+</sup> <sub>-1</sub>	0	42	0	21 hours ago	(none)

Nightly-next											
Site	Build Name	Update	Configure		Build		Test			Build Time	Labels
		Files	Error	Warn	Error	Warn	Not Run	Fall	Pass		
kargad-linuxvm-cdat	UVCDAT-kargad_linux-next									Expected build	(none)
meryem.llnl.gov	UVCDAT-meryem_Mac_10.6-next	0	0	0	1 <sup>+</sup>	0	0	42 <sup>+</sup> <sub>42</sub>	0	Feb 06, 2013 - 21:33 EST	(none)
pcmdi11.llnl.gov	UVCDAT-pcmdi11_RedHat_6-next	0	0	0	1 <sup>+</sup>	1 <sup>+</sup> <sub>-2</sub>	0	6 <sup>+</sup>	36 <sub>-1</sub>	22 hours ago	(none)
placid.lanl.gov	UVCDAT-RHEL6.3-x86_64-next	0	0	0	0	1 <sup>+</sup> <sub>-1</sub>	0	1	39	18 hours ago	(none)
vishnu	UVCDAT-arch_gcc470-next	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	0	42	5 hours ago	(none)
kargad.kitwarein.com	UVCDAT-kargad_maclion-next	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	0	42	20 hours ago	(none)
samus.lanl.gov	UVCDAT-samus_ubuntu_12.04_x86_64_gcc463-next	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	0	42	Feb 06, 2013 - 23:00 EST	(none)
yavin	UVCDAT-yavin_ubuntu_64bit_gcc463-next	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	0	42	18 hours ago	(none)

Nightly-master											
Site	Build Name	Update	Configure		Build		Test			Build Time	Labels
		Files	Error	Warn	Error	Warn	Not Run	Fall	Pass		
placid.lanl.gov	UVCDAT-RHEL6.3-x86_64-master									Expected build	(none)
kargad-linuxvm-cdat	UVCDAT-kargad_linux-master									Expected build	(none)
meryem.llnl.gov	UVCDAT-meryem_Mac_10.6-master	0	0	0	1 <sup>+</sup> <sub>-1</sub>	0	0	42	0	Feb 06, 2013 - 20:24 EST	(none)
pcmdi11.llnl.gov	UVCDAT-pcmdi11_RedHat_6-master	0	0	0	0 <sub>-1</sub>	2 <sup>+</sup> <sub>-1</sub>	0	5 <sub>-1</sub>	37 <sup>+</sup>	17 hours ago	(none)
kargad.kitwarein.com	UVCDAT-kargad_maclion-master	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	3	39	17 hours ago	(none)
vishnu	UVCDAT-arch_gcc470-master	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	0	42	22 hours ago	(none)
samus.lanl.gov	UVCDAT-samus_ubuntu_12.04_x86_64_gcc463-master	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	0	42	Feb 06, 2013 - 22:00 EST	(none)
yavin	UVCDAT-yavin_ubuntu_64bit_gcc463-master	0	0	0	0	2 <sup>+</sup> <sub>-1</sub>	0	0	42	20 hours ago	(none)



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