

Big Infrastructure at a Small Scale

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Prologue



Maybe Like Me, You Have Inherited...



>400k LOC, ~60 Project Codebase with CMAKE



Existing Bug Tracking System (Redmine)



1 Developer, >10 Years



No Consistent Practices



No Branch Organization



No Deployment Strategy

Time for a Release!

...

Deployment Strategy

- Release Builds from Server for Consistent Environment
- Hand-Stiched Release Builds
- 1000's of Lines of Bash, Customized Per-Release
- Hand-Transferred Binaries
- Hand-Drafted Release Notes
- Manually Incremented Release Numbering

CI/CD Tool Requirements

- Locally Hosted
- Linux-Based
- SVN/Git Support
- Ability to Manage Complex Interdependencies
- Interdependencies Between Separate Repositories
- Good Community Support
- ****FREE**** as a Major Perk

CI/CD Common Options

- Travis CI
- Jenkins
- TeamCity
- CircleCI
- Codeship
- GitLab CI
- AppVeyor



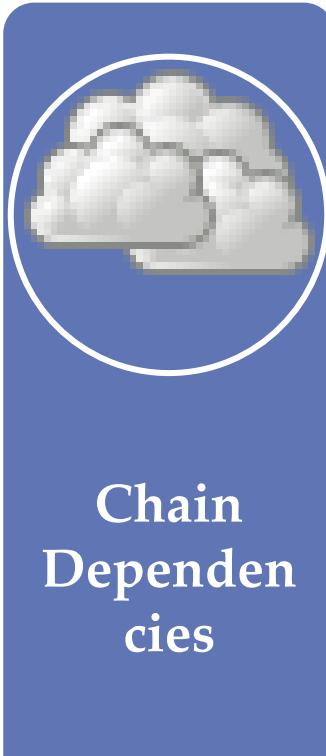
Jenkins



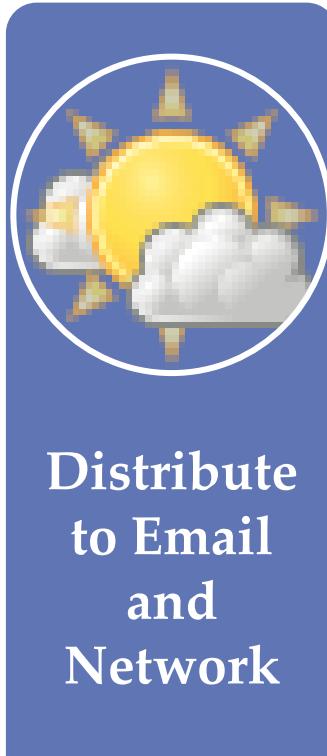
Trigger on
VCS
Commits



Centralize
Build



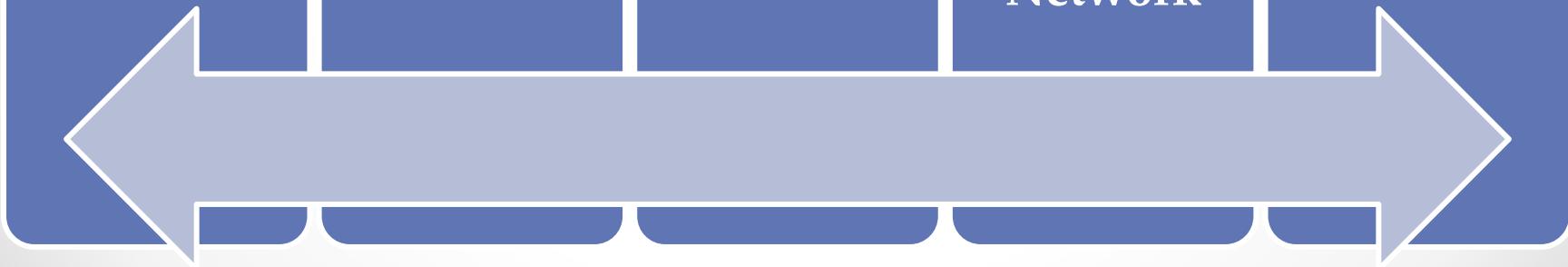
Chain
Dependen-
cies



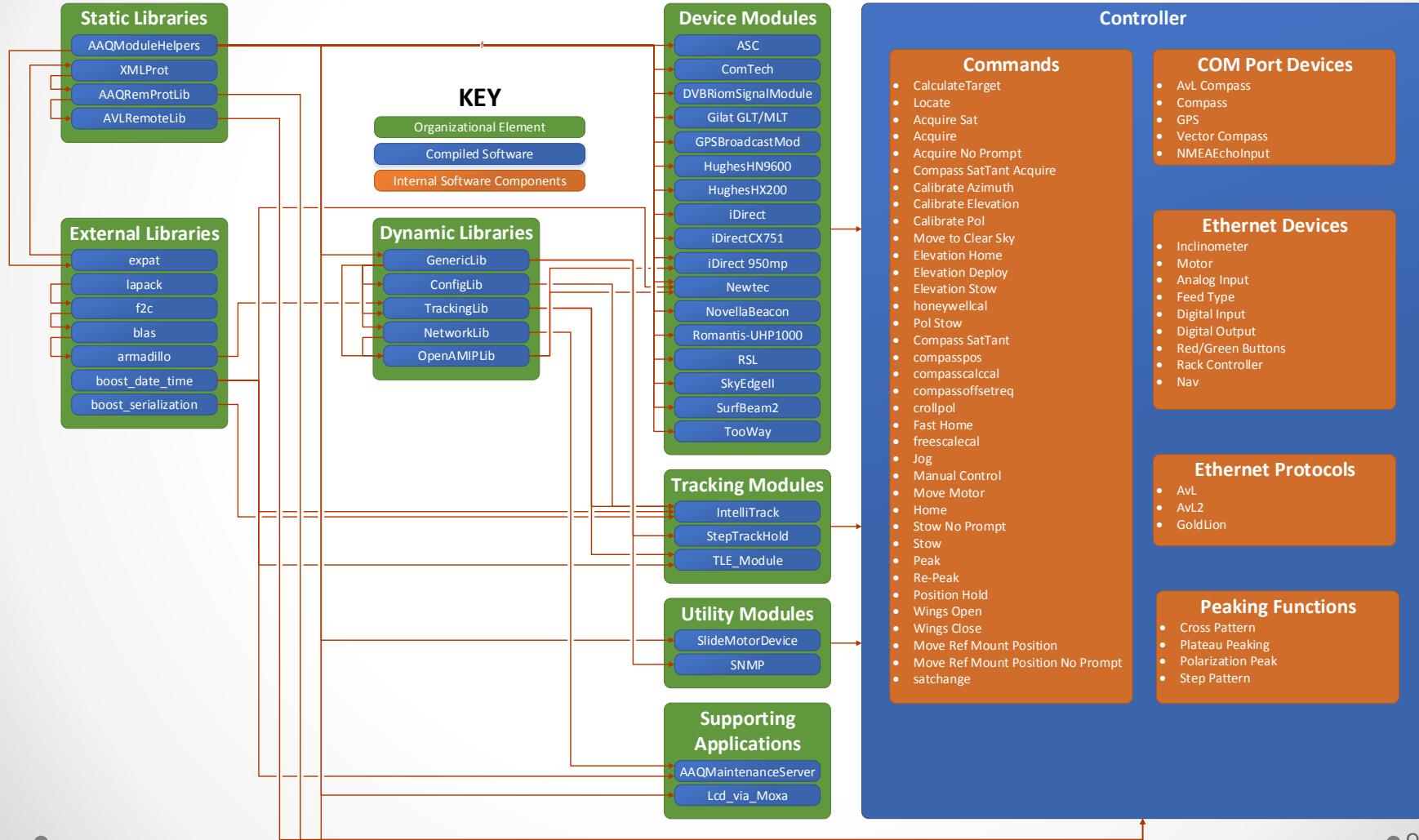
Distribute
to Email
and
Network



Integrate
with Bug
Tracker

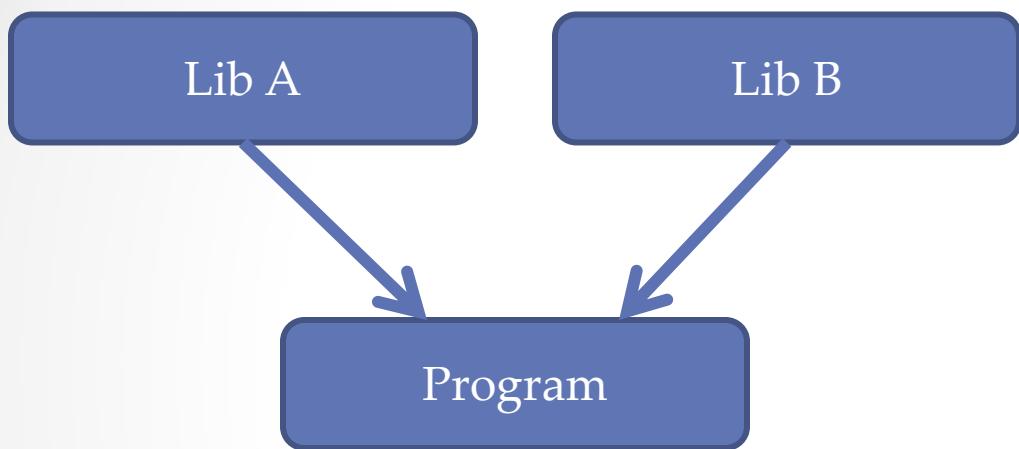


Integration Complexity



Initial Configuration

- “Freestyle” Projects
 - Build pipeline manually configured
 - Configuration managed by Jenkins
- Jenkins Plugins
 - Fan-In
 - Email Extension
 - Folders
 - Git
- Leveraged “Execute Shell” Build Step



Jenkins Automated Email

Subject: Primary_Development_Builds » WebGUI - Build # 53 - Successful!

Message WebGUI.D11.10.0-117.log (13 KB) WebGUI.D11.10.0-117.pmod (5 MB)
 WebGUI.D11.10.0-117.txt (4 KB)

Failing Builds

	Result	Project	
	FAILURE	AuxRemote	Build Log
	FAILURE	Comtech-1050TS	Build Log
	FAILURE	iDirect850mp	Build Log

Changelog of "WebGUI"

CHANGES

Issue #3518 - Novella Profiles Identify Connection Type
Novella beacon profiles now set based on the connection type set in the core parameters.
Fixes #3518
app/configuration/profile/details.component.ts

VCS System Updates

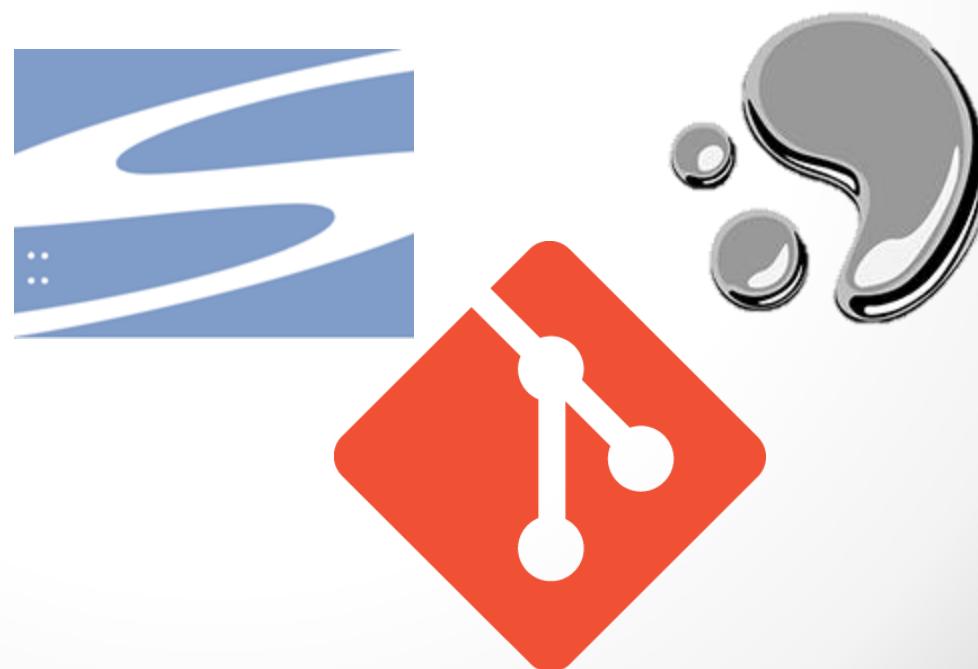
...

Existing VCS System

- Multiple SVN Repositories
- Free-for-All Branch Structure
 - Branch: “Controller-DavidWorking”
 - Tag: “build5384”
- Inconsistent Commit Practices
 - Single Commits Including Multiple, Unrelated Fixes
 - Long First-Lines
 - Little to no Issue Referencing

VCS Tool Requirements

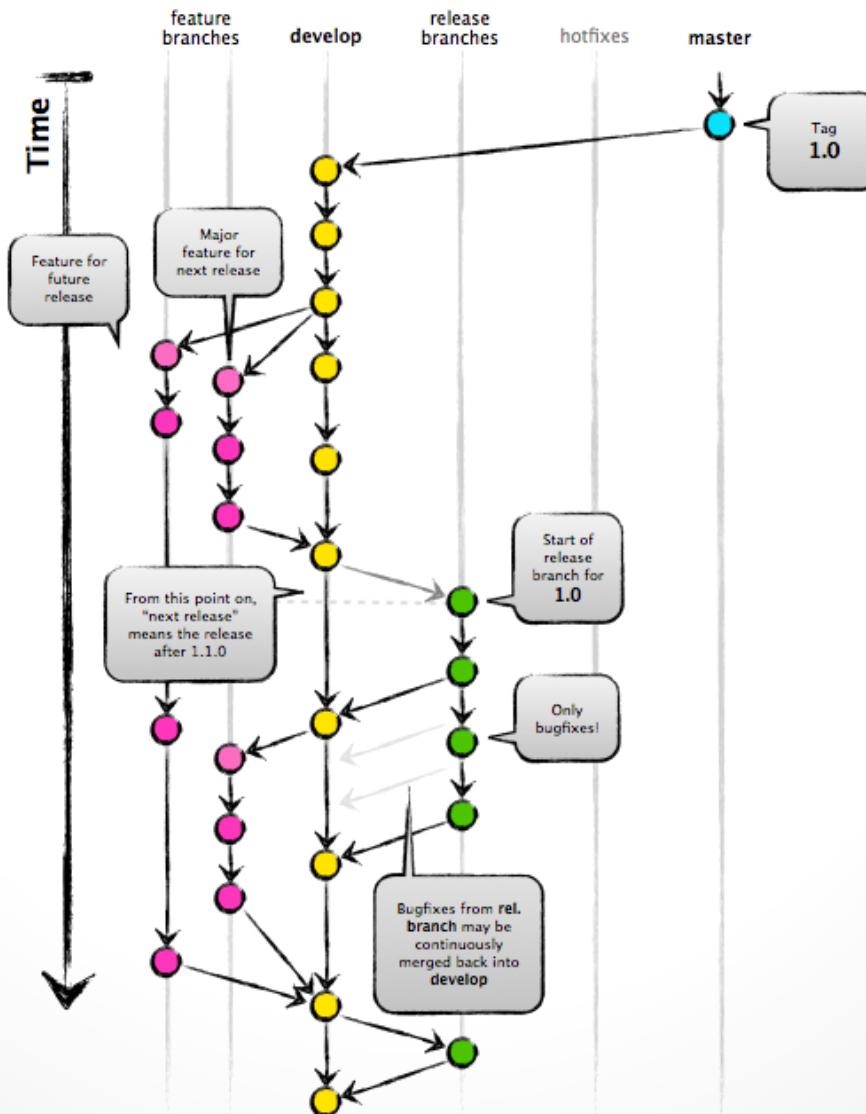
- Requirements
 - Locally Hosted
 - Linux-Based
 - Simplified Branch Tracking
 - Good Community Support
 - **FREE** as a Major Perk
- Options
 - SVN
 - Mercurial
 - Git
 - ...



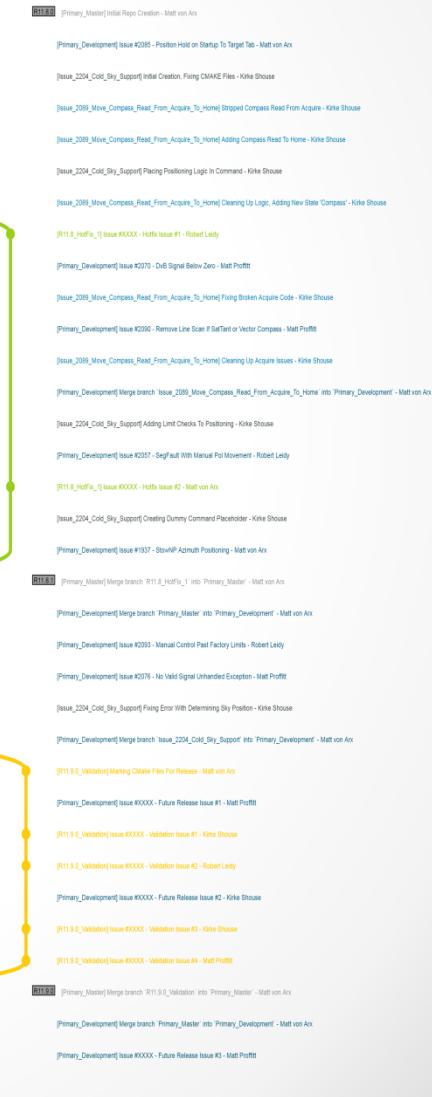
Git Branching Model

- Trunk-Based
 - Trunk as Primary Working Branch
- GitFlow Model
 - Structured Branches
 - Release
 - Development
 - HotFix
- GitHub Flow
 - Push Request System
 - Significantly Used in GitHub
- GitLab Flow
- ...

Git-Flow Model



Branch Model Simulations



Git Installation

- Roll-Your-Own
 - Setup Bare Repositories on Server
 - Enable SSH Push Requests
 - Manually Manage Users / Access Privileges
- GitLab

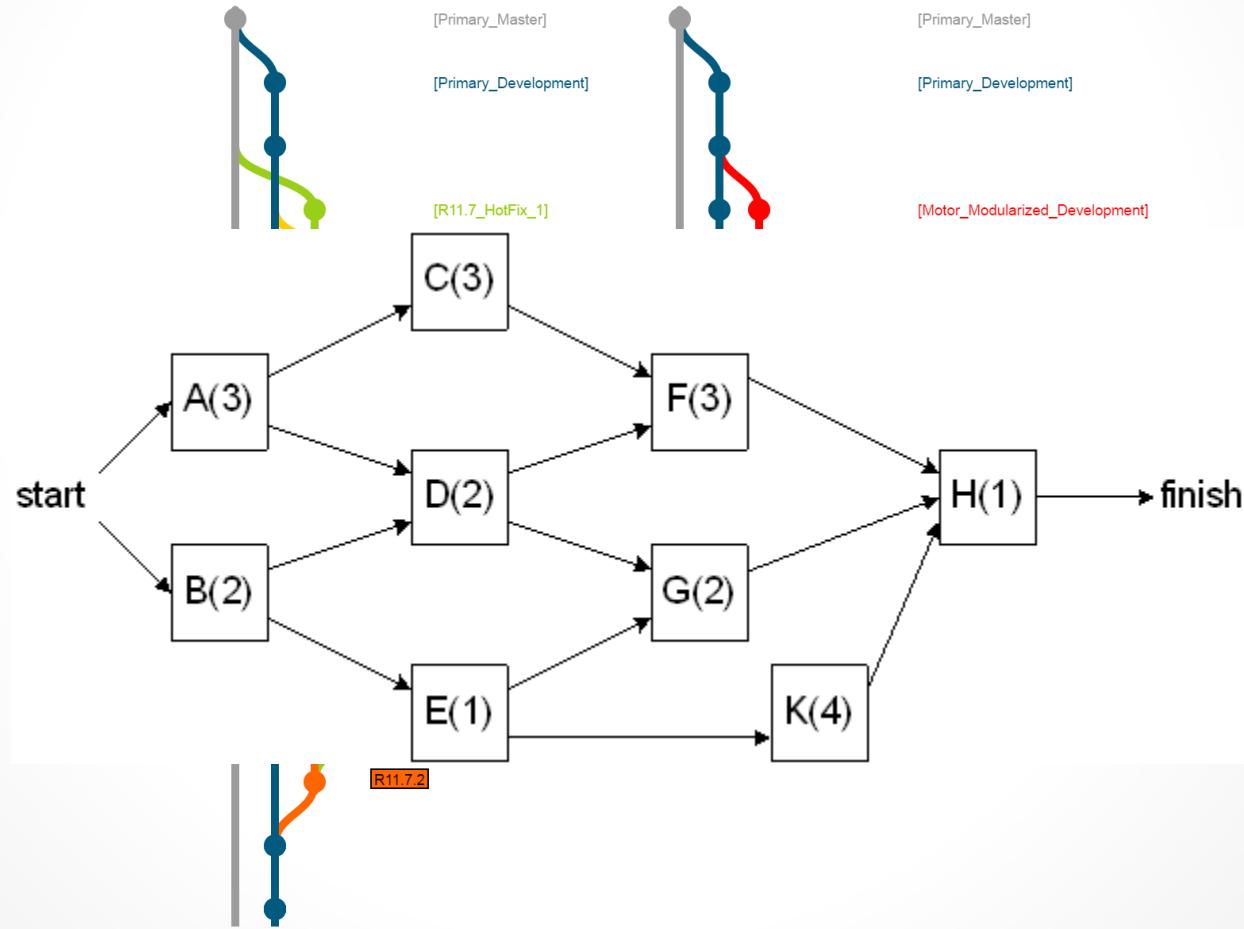
GitLab

- Locally Hosted
- Simple User Management
- Branch Push Protections
- HTTP Push Request
- Informative Web Interface

Translation

- SVN to Git Translation
 - > git svn clone -s http://svn/repo
- Nightmare of Converted Branch Structure
- Difficulties with Conversion Model
- What is Really Required For Support?
 - Ability to HotFix legacy builds
 - History of released code
- Only Transferred “Release” Commits

Nodal Graph



Consistent Branch Benefits

- Leverage Git Structure & Tooling
 - Extract Release Information From Branches
 - Add Build Designator According to Branch
 - “D” for Development and Feature Branches
 - “A” for Alpha Branches
 - “B” for Beta Branches
 - “R” For Release “master” Branch
 - Auto-Increment SubMajor Release Number from Last Tag
 - Count Commits from Last Tag for Minor Numbering
 - >git describe --tags
 - Count Total Commits
 - >git rev-list HEAD | wc -l
 - Mark Builds With Developers Initials
 - If build is performed locally by a developer, their initials are included in the build information
 - >git config user.name

Oh..., Wait...

- <https://github.com/GitTools/GitVersion>

Git Commit Note Structure

- Must Have Associated Redmine Issue
 - Feature Branches Identified by Issue
- May Include “Fixes” Keyword
 - Automatically transitions issue to “In Testing” and marks as 90% complete
- May Include –p[1-9]0
 - Marks an issue as 10% to 90% complete
- May Include @ Modifier
 - Tracks time spent working on commit

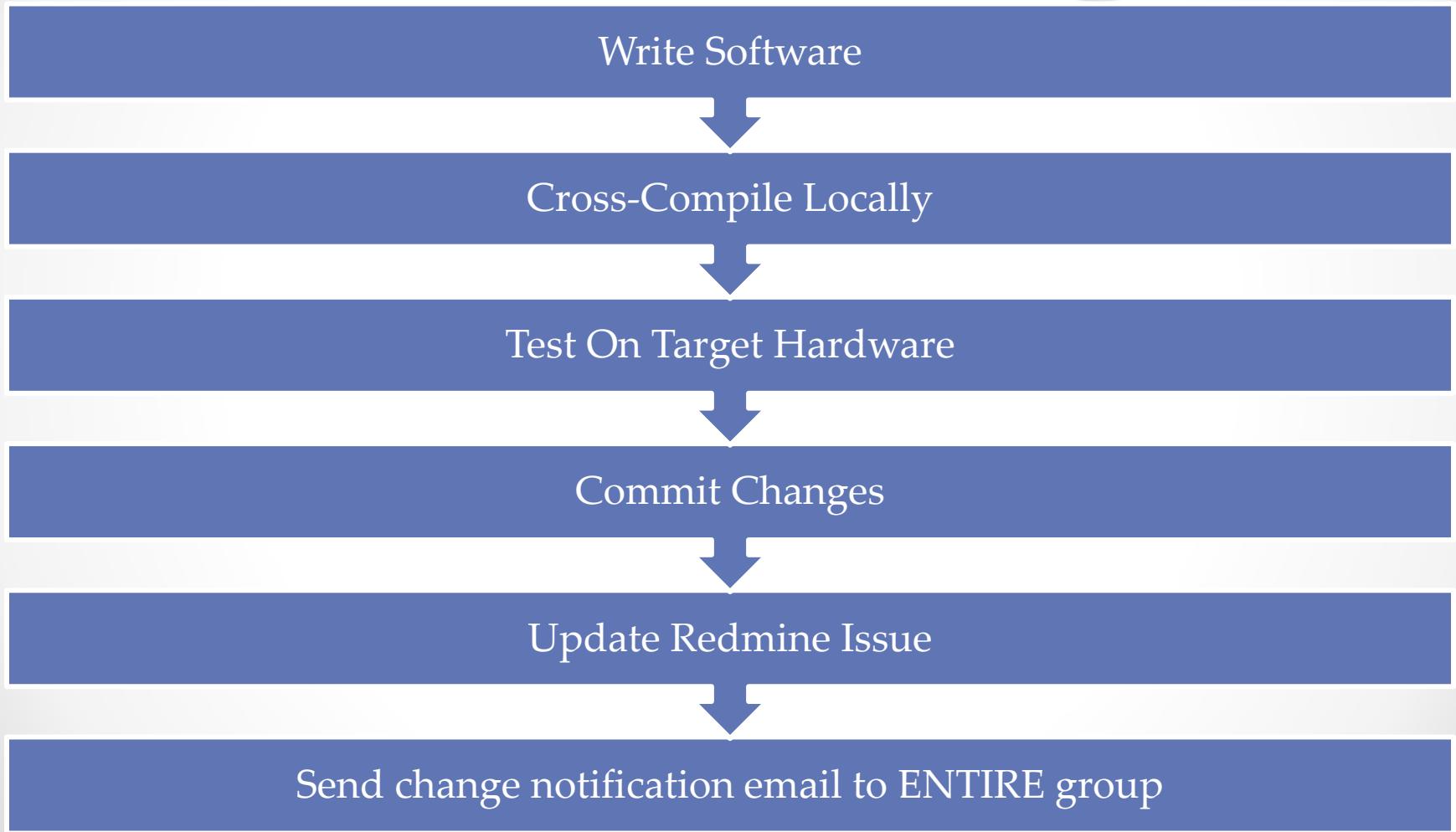
Issue [#2471](#) - Configuration Validity Checks

Corrected invalid value error checking, and added higher coverage in unit test code. Fixes [#2471](#)@4:00

Consistent Commit Benefits

- Redmine Repository Monitoring
 - Identifies Issue Associated Commits & Records Them
 - Time Tracking Abilities
 - Completion State Updates
 - Status Reassignment
- GitLab Issue Reference Parsing
 - Cross-referencing to Redmine Issue record
- Generated Release Notes
 - Collect Unique Issue References Since Last Tag
 - >git tag
 - >git rev-parse
 - >git rev-list

Workflow Changes



Introducing Best Practices

...

Unit Testing

- Testing Tool Options
 - Catch/Catch2
 - Google Test
 - Boost Test
 - CppTest
 - ...
- Integrating Test System
 - User Workspace
 - New Target Defined in Cmake
 - Runs & Executes Tests
 - Jenkins Build Server
 - Added as Build Step
 - Pass/Fail Criteria

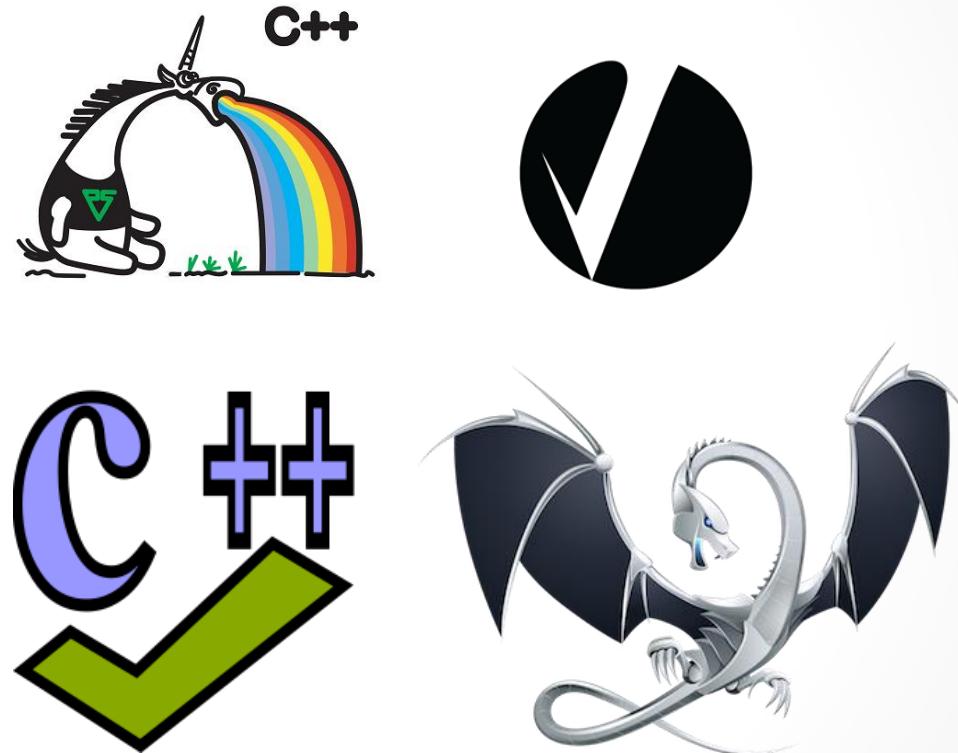


New Software Development

...

Static Analysis

- PVS-Studio
- Coverity
- Cppcheck
- Clang-Tidy
- Lint
- ...



Static Analysis Integration

- Cppcheck Results
 - Results collected with Jenkins “Cppcheck” Plugin
- Clang-Tidy Results
 - Pre-pended output with “Tidy: “
 - Jenkins “Warnings” Plugin
 - Custom Defined Jenkins Warnings Parser

Compiler Diversity

- “The Big Three”
 - Compile with GCC, Clang, and MSVC
- Independent, Competing Implementations
- High Standard Conformance
- Implementation Diversity
 - Warning Parsing

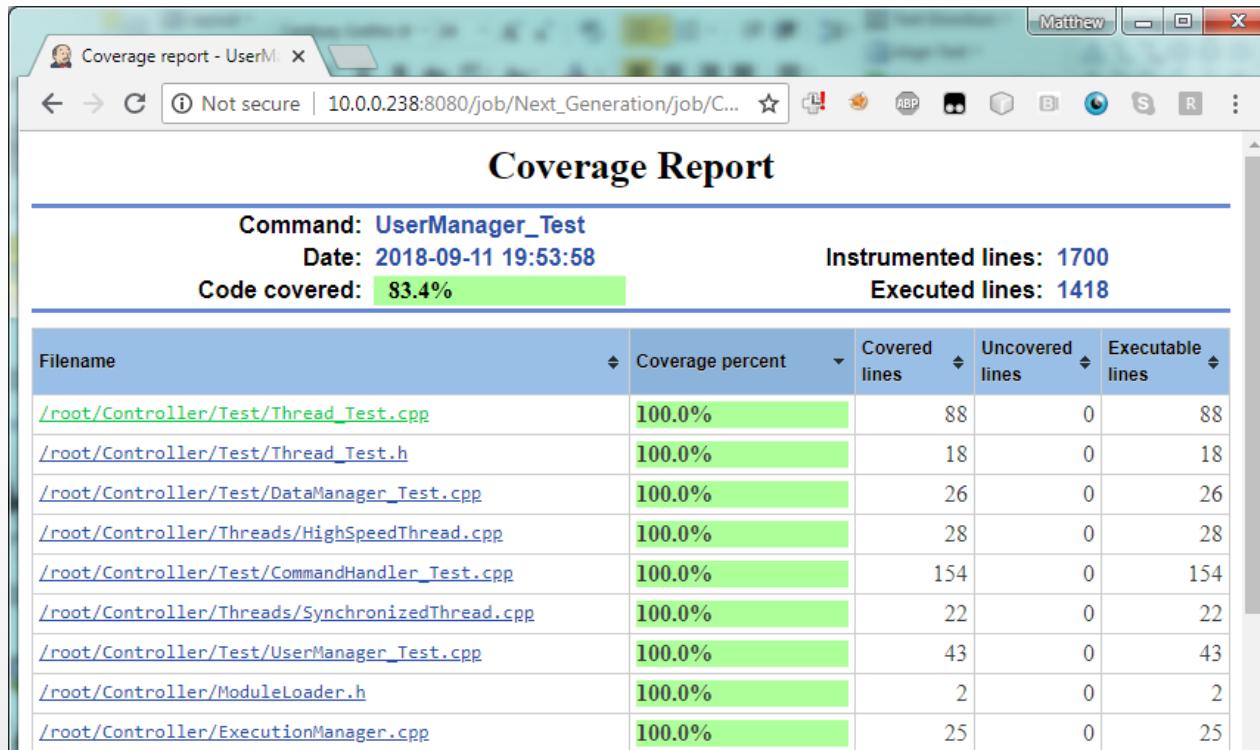


Compiler Integration

- Clang & GCC Warning Results
 - Pre-pended output with “Clang: ” and “GCC: ” respectively
 - Jenkins “Warnings” Plugin
 - Custom Defined Jenkins Warnings Parsers
- Compiler Warning Selections
 - -Wall: Enable all common warnings
 - -Wextra: Additional warnings beyond -Wall
 - -Wshadow: Warn if a variable declaration shadows one from a parent
 - -Wnon-virtual-dtor: Warn if a virtual class has a non-virtual destructor
 - -pedantic: Warn if non-standard C++ is used

Testing & Coverage Analysis

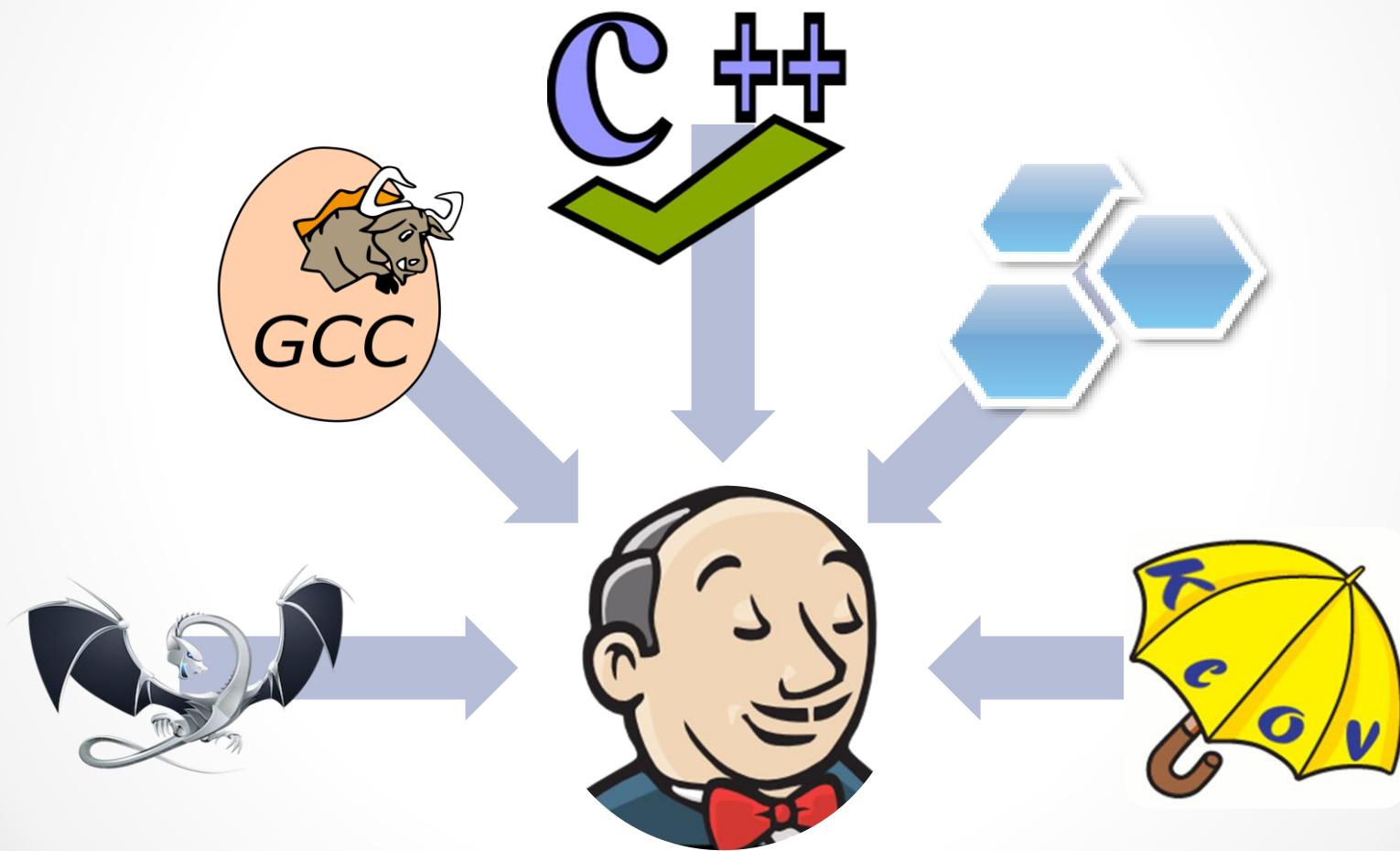
- Unit Tests With Boost Test
- All Tests Run Through Kcov
- Jenkins “Cobertura” Plugin



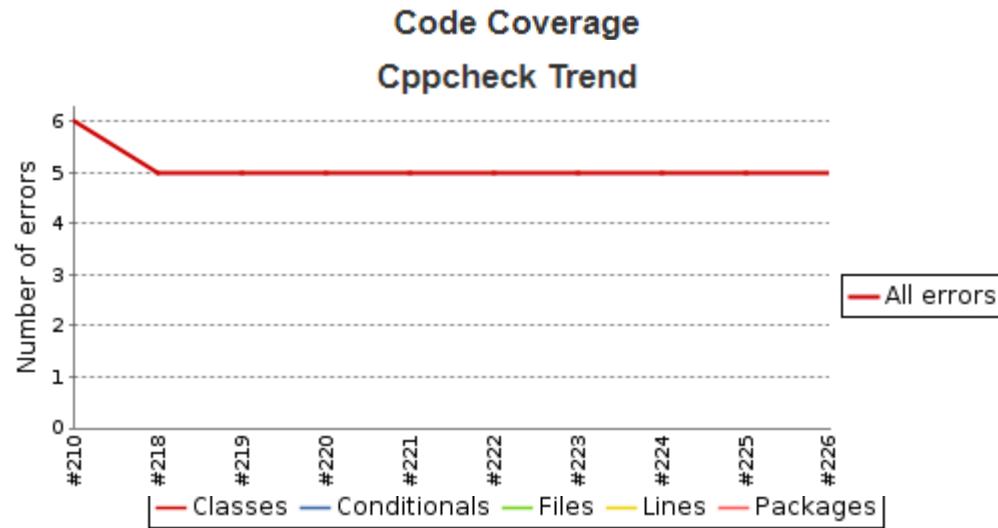
Sanitizers

- Clang & GCC Sanitizer Tooling
 - Jenkins build rules to against multiple sanitizer combinations for each compiler
 - All unit tests are executed with the selected sanitizers tooling enabled
- Selected Clang Sanitizers
 - Address
 - Thread
 - Undefined
 - Safe-Stack
- Selected GCC Sanitizers
 - Address
 - Thread
 - Leak
 - Undefined
 - Address-Use-After-Scope

Combining it all



Reports

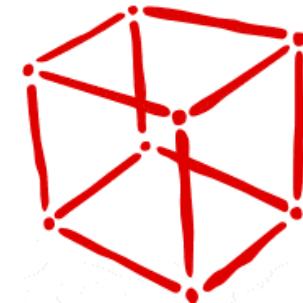


Workspace Synchronization

...

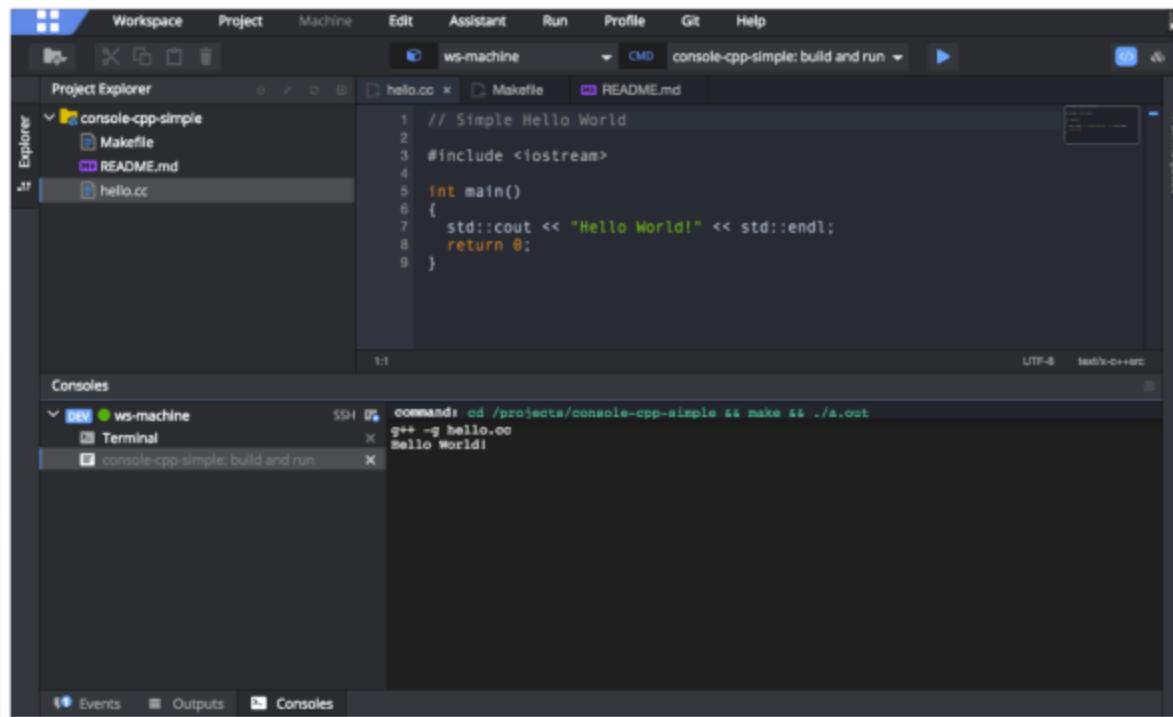
Synchronization Options

- Independent Workspaces
- Remote IDE Connection
 - Netbeans
 - Eclipse
 - Visual Studio
- Browser Based IDE's
 - Codeenvy
 - Eclipse Che
 - Cloud9



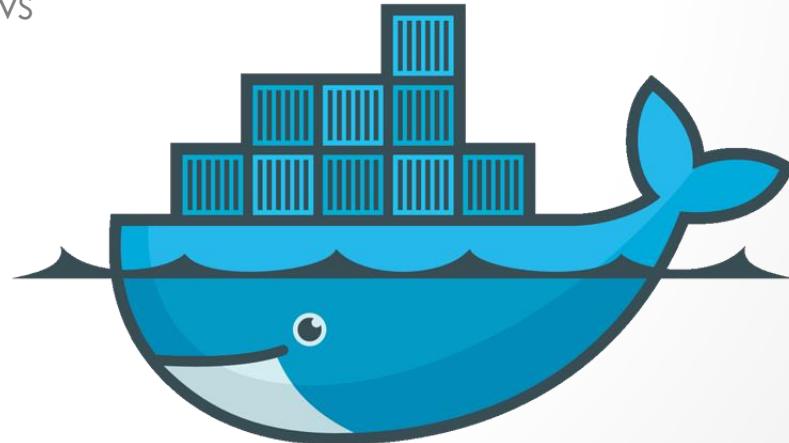
Eclipse Che

- Environment Defined in Docker Container
- Clangd Integration for Indexing
- Build-in User Management

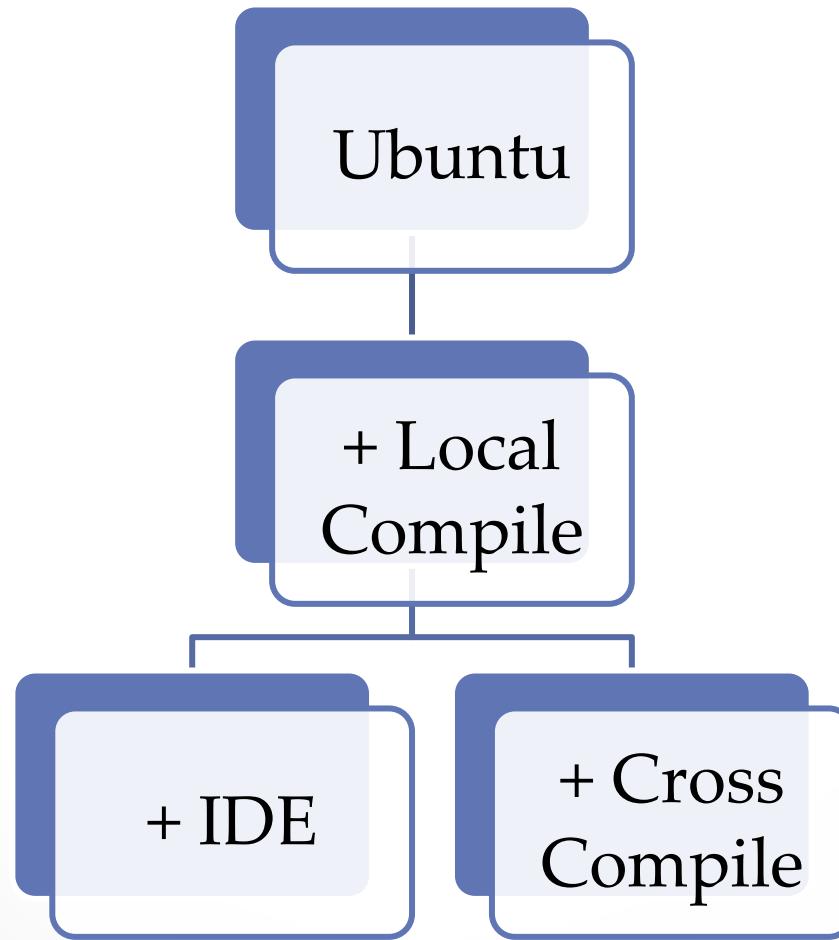


IDE in Docker

- Consistent Development Environments, Even in C++!
 - Michal Polcik @ Appliscale
 - <https://appliscale.io/2017/06/30/docker-development-environment/>
- Full Environment & IDE in Docker
 - “Like Local” experience
 - IDE Displayed Over X11 Socket
 - Xming & VcXsrv for Windows
 - Indexing Actually Works!



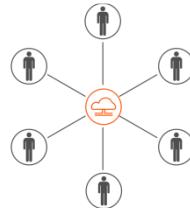
Container Structure



Local Docker Registry

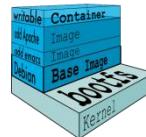
- Developers Pull Pre-Built Container Images From Server
- Container Definitions “Dockerfiles” Controlled in Git
- Jenkins Build Rule to Create Container Images & Post to Docker Registry

Docker



Centralized
Workspace
Management

Workspace Version
Control

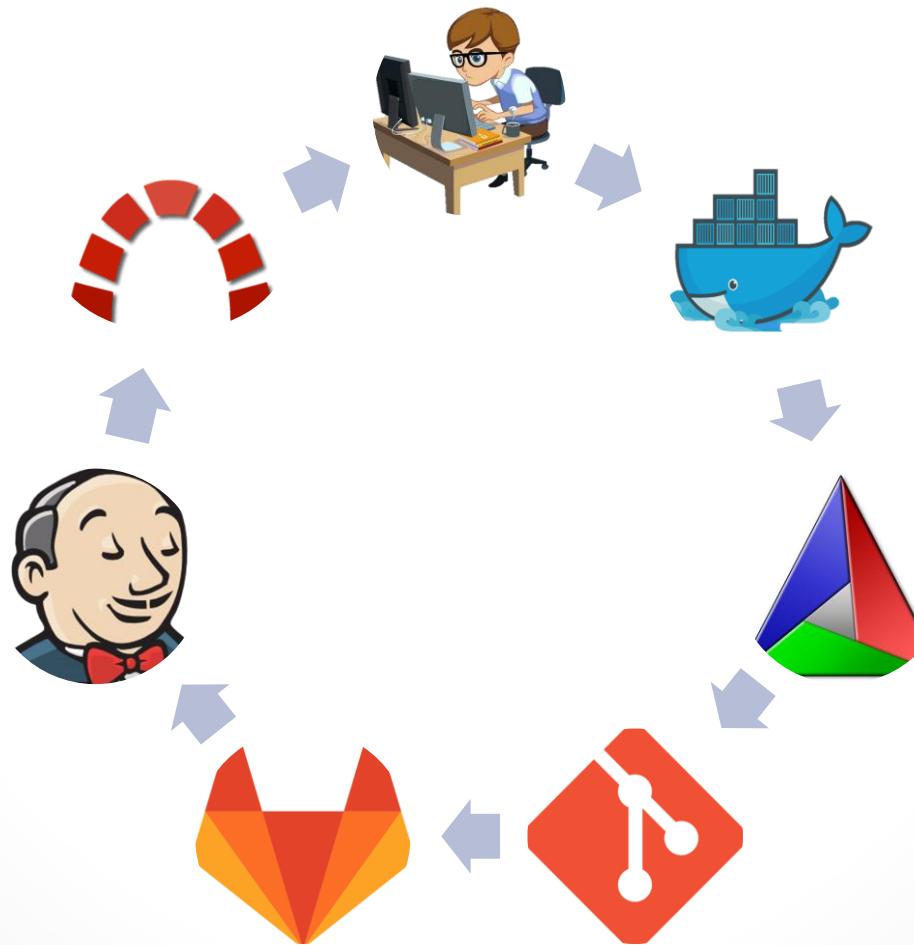


Re-Usable Layers
(For Build System)

Centralized
Distribution



A Functional Workflow



Feature #3722: Add Coarse Peak X Blame · PeakingStepPattern.cpp X +

Not secure | https://10.0.0.238:8888/Controller/Controller/blame/Primary_Development/PeakingStepPattern.cpp

Controller / Controller This project Search

```
    return nRetval;
}

void CStepPatternPeaking::RunState(void)
{
    int currentPatternWidth;
    int currentPatternHeight;

    switch (m_nState) {
        case Init:
            m_nState = m_nLastSuccessfullAz;
            g_pController->LogPrintf(CLogTarget::Debug1, "SP: Starting StepSize Pattern");
            break;
        case MoveLeft:
            m_nMoveTries = 0;
            m_nCurrentAxis = Azimuth;
            currentPatternWidth = GetPatternWidth();
            m_nCurrentAzTarget = m_nCurrentAzTarget - currentPatternWidth;
    }
    m_nLastMove = m_nState;
    if (m_nCurrentAzTarget < g_pController->m_pPeakingDriver->GetAzLimit())
        m_nCurrentAzTarget += currentPatternWidth;
    g_pController->LogPrintf(CLogTarget::Debug1, "SP: Az Travel: %d", m_nCurrentAzTarget);
    m_nState = InitMoveMax;
}
```

Issue #3722 - Step Size vs Travel Limit	126a9034	276	return nRetval;
Kirke Shreve committed a month ago		277	}
		278	void CStepPatternPeaking::RunState(void)
Initial SVN Import	d659765e	279	{
Matthew von Arx committed a year ago		280	int currentPatternWidth;
		281	int currentPatternHeight;
		282	
		283	switch (m_nState) {
		284	case Init:
		285	m_nState = m_nLastSuccessfullAz;
		286	g_pController->LogPrintf(CLogTarget::Debug1, "SP: Starting StepSize Pattern");
		287	break;
		288	case MoveLeft:
		289	m_nMoveTries = 0;
		290	m_nCurrentAxis = Azimuth;
		291	currentPatternWidth = GetPatternWidth();
		292	m_nCurrentAzTarget = m_nCurrentAzTarget - currentPatternWidth;
Issue #3722 - Step Size vs Travel Limit	d659765e	293	
Matthew von Arx committed a year ago		294	m_nLastMove = m_nState;
			if (m_nCurrentAzTarget < g_pController->m_pPeakingDriver->GetAzLimit())
Issue #3722 - Step Size vs Travel Limit	126a9034		m_nCurrentAzTarget += currentPatternWidth;
Kirke Shreve committed a month ago			g_pController->LogPrintf(CLogTarget::Debug1, "SP: Az Travel: %d", m_nCurrentAzTarget);
Issue #3721 - Peaking Travel Limit	1db3996f		m_nState = InitMoveMax;
Kirke Shreve committed a month ago			

Feature #3722: Add Coarse Peak x Blame · PeakingStepPattern.cpp x +

Not secure | https://.../issues/3722

Feature #3722

Add Coarse Peaking Travel Limits

Added by [redacted] about 1 month ago. Updated 9 days ago.

Status: Resolved Priority: Normal Assignee: - Target version: [redacted] Development - Release 11.9.11.1000 Reviewed: Yes

Start date: 08/20/2018 Due date: % Done: 50% Estimated time:

Description

Current Peaking Travel Limits apply to both Coarse and Fine. The existing should be changed to apply to Fine Peaking and new parameters should be added to work for Coarse Peaking so that the Limits are divorced from the peaking stage.

Since a hotfix is required with #3721 this should also be addressed in the hotfix.

Subtasks

Related issues

History

Updated by Kirke Shouse about 1 month ago

- Status changed from New to In Testing
- % Done changed from 0 to 50

Applied in changeset controller|697dadfa1b7729128fc6f6c38252e329c3df1240.

Updated by Kirke Shouse about 1 month ago

- Assignee changed from Kirke Shouse to Ian Hrinko

The ROM can be found in the Hotfix Folder:
aaq.KS_R11.9.6.11-1-ARM9.rom

Updated by [redacted] about 1 month ago

Associated revisions

#1 Revision 697dadfa (diff)
Added by Kirke Shouse about 1 month ago
Issue #3722 - Coarse vs Fine Travel Limits
The easier approach proved to be adding a Coarse Limit versus Fine Limit range. The existing Travel Limit configuration items will apply to Fine Peaking and the new configuration items will apply to Coarse peaking. Also renamed Pol Travel Limit since it only applied to Polarization Peaking.
Fixes #3722

#2 Revision 126a9034 (diff)
Added by Kirke Shouse about 1 month ago
Issue #3722 - Step Size vs Travel Limit
Previously did not add logic for if the Step Size exceeded the Travel Limit. If the Step Size is larger than Travel Limit then Travel Limit

Issues

[View all issues](#) [Summary](#) [Import](#)

My custom queries

My Issues

Watchers (0) [Add](#)

Jenkins Automated Email

Subject: Primary_Development_Builds » WebGUI - Build # 53 - Successful!

Message WebGUI.D11.10.0-117.log (13 KB) WebGUI.D11.10.0-117.pmod (5 MB)
WebGUI.D11.10.0-117.txt (4 KB)

Failing Builds

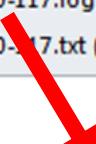
	Result	Project
	FAILURE	AuxRemote
	FAILURE	Comtech-1050I
	FAILURE	iDirect850mp

Changelist of "WebGUI"

CHANGES

**Issue #3518 - Novella Profile:
Novella beacon profiles now support parameters.
Fixes #3518**

[app/configuration/profile/detail](#)



WebGUI.D11.10.0-118.txt - Notepad

File Edit Format View Help

```
Issue 3729 - AAQ Comm Status Lights Up on Login Page
Issue 3379 - Acquire Button Reads Acquire After Reboot
Issue 2698 - Buttons Grey Out when MC is Disabled
Issue 3699 - GPS Component Longitude Fix
Issue 3372 - Save Notification is always visible
Issue 3695 - Save Message Stays at Top of Window in IE
Issue 3572 - AVL Receiver in Internet Explorer
Issue 3697 - Fixed Scale Factor Checks
Issue 3690 - Limit Notification FIX
Issue 3575 - Fixed Build Error
Issue 3724 - Troubleshooting Sensors Now Hidden at Level 1
Issue 3574 - Level 1 Users Can Edit Profiles
Issue 3691 - Page Refreshes on Reconnect
Issue 3726 - Capture Button Text Changed
Issue 3576 - Level 1 User Can Upload SUP
Issue 3564 - Antenna Status Always Visible
Issue 3565 - Fixed Dial Issues
Issue 3129 - Directional Movement Display
Issue 3360 - MC CCW PoI
Issue 3742 - Manual Lat and Long Now Case Insensitive
Issue 3674 - SUP Uploading no longer redirects in Firefox
Issue 3362 - Alert when User Tries to Delete Only Profile
Issue 3675 - Build Package Contains *.mod File
Issue 3741 - Fixed Additional Sensor Search
Issue 3747 - Holding Backspace in Additional Sensors Search Now Functions
Issue 3744 - Profile Create and Profile Dupe Naming Now Case Insensitive
Issue 3312 - Added Save Pop-up to Sat and IP pages, Fixed on Profiles
Issue 3745 - Removed "Stop and Acquire" Pop-up
Issue 3552 - Context Build Failure
Issue 3557 - Touchscreen Manual Jog Fixes
Issue 3773 - Pop-ups Now Appear When there are Command Errors
Issue 2702 - MC PoI Buttons
Issue 3535 - Diagnostics Current Command Fix
Issue 3658 - Move To Location Home Warning Before Input
Issue 3336 - Feedback changes added to signal and feed tabs
Issue 3383 - User is Logged Out on Controller Reconnect
```

Next_Generation » Controller - Build # 227 - Successful! - Message ...

File **Message** **Developer**

Delete Reply AvL Build Move Mark Unread Editing Zoom
Delete Reply All To Manager Move Categorize Follow Up Editing Zoom
Forward Team E-mail Quick Steps Move Tags Zoom

From: [REDACTED] Sent: Tue 9/25/2018 12:10 PM
To:
Cc:
Subject: Next_Generation » Controller - Build # 227 - Successful!

Build kicked off by "CoreLib"

Changelist of "Controller"

CHANGES

Added Debug Buffering
Added automatic buffering of debug/info messages. New user connections automatically get a copy of the buffer as well as updates when new messages are generated.

CoreSystems/UserManager.cpp
CoreSystems/UserManager.h

Changelist of "CoreLib"

CHANGES

Added Debug Queue
Added a queue for debug/info messages. This allows for M&C modules to distribute the messages to their connected client if necessary.

CoreLib/CoreSystems/UserSession.h

Test Result Trend

Build	Count
#216	0
#218	12
#219	12
#220	12
#221	12
#222	12
#223	12
#224	12
#225	12
#226	12
#227	12

Code Coverage Trend

Build	Classes (%)	Conditionals (%)	Files (%)	Lines (%)
#218	85	95	95	85
#219	85	95	95	85
#220	85	95	95	85
#221	85	95	95	85
#222	85	95	95	85
#223	85	95	95	85
#224	85	95	95	85
#225	85	95	95	85
#226	85	95	95	85
#227	85	95	95	85

Click on a photo to see social network updates and email messages from this person.

Connect to social networks to show profile photos and activity updates of your colleagues in Outlook. Click here to add networks.

Next_Generation » Controller - Build # 227 - Successful! - Message ...

File **Message** **Developer**

Delete Reply AvL Build Move Mark Unread Editing Zoom
Delete Reply All To Manager Move Categorize Follow Up Editing Zoom
Forward Team E-mail Quick Steps Move Tags Zoom

From: [REDACTED] Sent: Tue 9/25/2018 12:10 PM
To:
Cc:
Subject: Next_Generation » Controller - Build # 227 - Successful!

Code Coverage Trend

Build	Classes (%)	Conditionals (%)	Files (%)	Lines (%)
#218	85	95	95	85
#219	85	95	95	85
#220	85	95	95	85
#221	85	95	95	85
#222	85	95	95	85
#223	85	95	95	85
#224	85	95	95	85
#225	85	95	95	85
#226	85	95	95	85
#227	85	95	95	85

GCC Warning Trend

Build	Count
#218	0
#219	0
#220	0
#221	0
#222	0
#223	0
#224	1
#225	0
#226	0
#227	0

Clang Warnings Trend

Build	Count
#218	0
#219	0
#220	0
#221	0
#222	0
#223	0
#224	1
#225	0
#226	0
#227	0

Click on a photo to see social network updates and email messages from this person.

Connect to social networks to show profile photos and activity updates of your colleagues in Outlook. Click here to add networks.

Key Points

- Get a CI System
- Use Cloud Services
- Use The Tools
- Throw Everything At It
 - Static Analyzers
 - Multiple Compilers
 - Tests
 - Coverage Systems
 - Sanitizers
 - Profilers
- Treat Pipeline As Code