CDash query tutorial for triaging systemic Trilinos PR build and test failures

Roscoe A. Bartlett
Department 1424
Software Engineering and Research

October 27, 2022
Trilinos Users Group Meeting, Developers Day
Current Trilinos Pull Request Testing Process?

**Most common observed Trilinos Pull Request (PR) process outline:**
1. Push a topic branch to GitHub Trilinos fork
2. Create a Trilinos GitHub PR against the target branch ‘develop’
3. Wait for PR autotester to run a set of PR builds which post to internal (SRN) CDash site trilinos-cdash.sandia.gov
4. Examine PR build & test failures on trilinos-cdash.sandia.gov (SRN only)
   1. Are these failures likely due to changes in the PR?
5. Resolve PR build & test failures:
   1. If failures are likely unique to this PR topic branch:
      1. Create new commit(s) to address the failures (offline testing common or rare?)
      2. Push new commits topic branch
   2. If failures are likely **not** unique to this PR topic branch:
      1. Assume failures are random and will go away if you run enough PR build iterations
6. Set the ‘**AT: RETEST**’ label on the PR and go to Step 3

**Problems with setting ‘**AT: RETEST**’ without any further investigation/actions:**
- Errors may not be random and may take out your next PR build & test iteration
  - The computational cost of running the builds will be wasted
  - These doomed PR builds may actually be blocking a PR build for another PR that may fix things!
- Systemic problem with PR builds or testing process is not triaged and will break future PR test iterations (including your own future PRs!)
Who should be responsible for triaging and reporting systematic Trilinos PR testing failures?

Should the Trilinos Framework Team members do it?
• Trilinos Framework team members don’t monitor the raw CDash results.
• Trilinos Framework team members are not familiar with the Trilinos test suite and understand how to interpret failures.
• Trilinos Framework team members don’t understand the nature of the changes in a PR topic branch and are not well qualified to know what failures may be due to these changes.

Should the Trilinos Developers associated with the failing PR builds do it?
• Trilinos developers do understand the nature of the changes in the PR topic branch and can typically determine if a build or test failure is due to the topic branch changes or not.
• Trilinos developers do understand the Trilinos test suite.

Conclusion => The Trilinos developers looking at the PR build & test results on CDash are in the best place to triage and report systemic errors!
Proposed Trilinos Pull Request Process

1. Push a topic branch to GitHub Trilinos fork
2. Create a Trilinos GitHub PR against the target branch ‘develop’
3. Wait for PR autotester to run a set of PR builds which post to internal (SRN) CDash site trilinos-cdash.sandia.gov
4. Examine PR build & test failures on trilinos-cdash.sandia.gov (SRN only)
   1. Are failures unique to this PR topic branch or are they impacting other recent PR builds as well?
   2. Are these infrastructure failures not related to any problem in Trilinos itself?
5. Resolve PR build & test failures:
   1. If failures are likely unique to this PR topic branch: 
      1. Reproduce PR build and test failures offline
      2. Create new commit(s) to address the failures and verify in offline builds
      3. Push new commits topic branch
   2. If failures are due to problems in Trilinos ‘develop’:
      1. Run CDash queries to determine how wide spread and how long failures occurring
      2. Create Trilinos GitHub Issue for the failure and inform responsible parties
      3. Pin the new GitHub Issue to inform other Trilinos Developers
      4. **Wait for someone to address the problem causing the failures (if the failures are not random)**
6. Set the ‘**AT: RETEST**’ label on the PR and **go to Step 3**
Trilinos Failure Reporting and Resolution Process

https://github.com/trilinos/Trilinos/wiki/Addressing-test-failures

First, create a Trilinos GitHub Issue that lists the full names for the failing tests and what builds they are occurring (e.g. Issue #10847). (This allows any Trilinos developer to search the GitHub issues to see if an issue already exists for the failure.)

• NOTE: GitHub Issue searches do not support partial string matching (e.g. “Ifpack_Container” will not match GitHub Issues/PRs that list “Ifpack_Container_MPI_4”)

Once the Trilinos GitHub issue has been created, the test failures can be addressed by one of following processes:

A. Fix the failure (if the defect can be fixed quickly):

B. Temporarily disable the failing code or test (if the defect is not critical or if it is a defective test)
   • Set the GitHub label “Disabled Tests”

C. Back out the merge commit that caused the failures (if it is a build failure or some other critical defect)
Reporting Trilinos Infrastructure Failures Process?

1. Create Trilinos GitHub Issue describing the problem (with appropriate level of details for external GitHub, consider pinning the issue)
2. Create internal Trilinos HelpDesk issue duplicating the GitHub Issue title and put in link to the GitHub Issue
3. Put in link from the GitHub Issue to the internal Trilinos HelpDesk issue

Example:

Request for Trilinos Framework Team members: Please update the linked GitHub issue to inform all Trilinos developers about the status of a systematic framework failures?
Triaging Trilinos PR build failures on CDash

Are the build errors seen in my PR also seen in other PRs recently?


Useful fields:
• “Group”
• “Site”
• “Build Name”
• “Build Errors”
• “Subprojects”
Example CDash build queries

**Trilinos GitHub #10836**: Framework: Mysterious 6 failures in package Zoltan2Sphynx with no data on CDash going back to at least 2022-05-18

<table>
<thead>
<tr>
<th>Site</th>
<th>Build Name</th>
<th>Configure</th>
<th>Build</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>ascii42</td>
<td>PR-10808-test-rhal7_sems-gnu-7.2.0-3openmpi-1.10.1-seral_debug_shared_ne-kokkos-arch_no-asan_no-complex_ne-fic_mpi_no-pt_no-roc_ne-xvm_deprecated-on_no-package-contains-883</td>
<td>0</td>
<td>1 1m 30s</td>
<td>6 0 4h 45m 24s 0 0 0 5m 34s Aug 15, 2022 - 01:02 MDT Zoltan2Sphynx</td>
</tr>
<tr>
<td>ascii42</td>
<td>PR-10802-test-rhal7_sems-gnu-7.2.0-3openmpi-1.10.1-seral_debug_shared_ne-kokkos-arch_no-asan_no-complex_ne-fic_mpi_no-pt_no-roc_ne-xvm_deprecated-on_no-package-contains-861</td>
<td>0</td>
<td>1 1m 27s</td>
<td>6 0 4h 4m 0 0 0 1s Aug 14, 2022 - 20:36 MDT Zoltan2Sphynx</td>
</tr>
</tbody>
</table>
Triaging Trilinos PR test failures on CDash

Are the test errors seen in my PR also seen in other PRs recently?


Useful fields:
• “Group”
• “Build Name”
• “Site”
• “Status”
• “Test Output”
Example CDash test query

Trilinos GitHub #11072: Ifpack: Ifpack_Container tests failing in cuda-11.4.2 PR builds for all recorded history

<table>
<thead>
<tr>
<th>Site</th>
<th>Build Name</th>
<th>Test Name</th>
<th>Status</th>
<th>Time</th>
<th>Details</th>
<th>Build Time</th>
<th>Matching Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>ascicgpu950</td>
<td>PR-10965-test-build7_soms-cuda-11.4.2-soms-gnu-10-1.0-soms-openmpi-4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5-release-static_Vaha7_6-no-araa_complex_nonlocal_mpi_pt_no-rc_no-um_deprecated-on-no-package-enables-683</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|          | Ifpack_Container_MPI_4                                                      | Failed                                | 2s 360ms Completed (Failed) | 2022-09-27T11:38:58 MST | Test 'TestContainer.exe' FAILED: Container type = dense NumRows = 217, NumVectors = 5  
|          |                                                                            |                                        |         |          |                                                               |            |                                                                                   |
| ascicgpu950 | PR-10965-test-build7_soms-cuda-11.4.2-soms-gnu-10-1.0-soms-openmpi-4   |
|          | 0.5-release-static_Vaha7_6-no-araa_complex_nonlocal_mpi_pt_no-rc_no-um_deprecated-on-no-package-enables-683 |
|          | Ifpack_Container_MPI_4                                                      | Failed                                | 2s 319ms Completed (Failed) | 2022-09-27T11:38:58 MST | Test 'TestContainer.exe' FAILED: Container type = dense NumRows = 217, NumVectors = 5  
|          |                                                                            |                                        |         |          |                                                               |            |                                                                                   |
Generating the Markdown for a new GitHub issue for these failing tests:

```bash

cd <some-base-dir>/


eemacs newGithubMarkdownIssueBody.md
```
Creating Trilinos GitHub Issue for PR test failures

Next Action Status

Description

As shown in this query (click “Show Matching Output” in upper right) the tests:

- Stokhos_KokkosViewQPUnitTest_Serial.cpp

in the unique GenConfig builds:


started failing on testing day 2022-05-01.

The specific set of CDash builds impacted where:

Questions and Comments?