Migration of Tango Controls Source Code Repositories

Connecting things together

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https://gitlab.com/tango-controls

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Migration Process

1. Rewrite of the CI pipeline configuration (`.gitlab-ci.yml`) *(only for projects with CI)*
2. Communication of the move date to all project contributors
3. Project migration (import in GitLab, archiving in GitHub)
4. Post-migration adjustments

- A dedicated team was constituted to support the migration process and coordinate actions,
- A set of helper tools was created to ease the migration,
- Projects were moved gradually, one-by-one.

Motivation and Strategic Decisions

- Travis CI pricing changes,
- GitLab CE licensing policy,
- JFrog Bintray Shutdown.

GitHub Travis CI ⇨ GitLab

- Tango Collaboration members were already familiar with maintaining their own GitLab instances,
- GitLab provides a simple project import feature (for code, issues, wikis, etc.).

Impact on Packaging

- JTango and supporting Java applications are now published to Sonatype Nexus OSS and Maven Central,
- MAX IV SPEC RPM repository was moved to GitLab, allowing Tango Controls RPM packages to be built in Copr,
- Impact on Conda packaging was minimal (URL update). New packages were created directly from GitLab sources.

Migration Motivation and Strategic Decisions

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Motivation for migration

- Tango Controls community maintained its core projects on GitHub since migration from SourceForge in 2015,
- For projects requiring continuous integration, Travis CI was usually used for this purpose,
- Tango Controls C++ and Java core libraries and supporting tools were released to Bintray,
- In recent years, GitLab greatly improved its CI integration, making it more attractive than Travis CI (e.g. for its native support of Docker containers),
- **At the end of 2020, Travis CI announced the shutdown of travis-ci.org, while travis-ci.com, previously focused on commercial software, received a new pricing model, charging also FOSS projects,**
- **Also in 2020, JFrog announced the shutdown of Bintray service.**

Considered options

- **Staying on GitHub, use of GitHub Actions for CI**
- Travis CI → GitHub Actions,
- Less effort required for migration (only CI setup must be changed),
- Proprietary nature of GitHub, risk of potential vendor lock-in.

- **Moving everything to GitLab**
- Travis CI → GitLab CI/CD,
- More effort required for move (repositories must be migrated),
- GitLab supports project import,
- Tango Collaboration members are familiar with maintaining on-premises GitLab instances.

Migration decision

- **It was decided that projects hosted in the tango-controls GitHub organization will be migrated to GitLab,**
- Projects using Travis CI for continuous integration must prepare Gitlab CI/CD setup before the migration to ensure uninterrupted availability,
- Impact of the Bintray shutdown on packaging must be addressed separately and projects must choose appropriate packaging model.

Migration Process

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General approach

- A dedicated team was constituted to support the migration process, coordinate all actions and define a common migration procedure,
- A set of helper tools was created to ease the migration, including scripts for compiling a list of repository contributors or setting up branches in the archived repositories,
- Repositories were moved gradually, one-by-one, in strict cooperation with project administrators and communication with contributors,
- **At the time of writing, 49 out of 67 repositories were migrated.**

Technical challenges

- Most challenges were imposed by the projects requiring continuous integration which needed to be moved from Travis CI to GitLab CI,
- Travis CI provides virtual environments with a limited set of operating systems while GitLab Build Cloud has runners with Docker Executor,
- Projects requiring Docker for tests now must use Docker-in-Docker,
- GitLab runners provide only 1 CPU, which sometimes is not enough.

Migration procedure

- Preparation and tests of the new GitLab CI/CD configuration (only for projects using Travis CI),
- Creation of a list of participants and contributors (code authors, Issues, Pull Requests) using GitHub REST API and a custom-made script,
- Announcement of the planned migration date,
- On the migration day:
  - Creation of a new, empty "*moved-to-gitlab*" branch in GitHub. This branch is set as the default and contains just a README file,
  - Archiving of the GitHub project,
  - Project import in GitLab using a bot account,
  - Restoration of proper default branch in GitLab,
  - Notification for the Tango Community.
- Post migration checks and adjustments (project members, protected branches, documentation).

Impact on Packaging

Debian

- There was no impact on Debian packaging except the need for the change of the upstream URL in the future releases,
- Using GitLab allows for possible re-use of the CI pipelines from the official Debian packaging infrastructure. However, this approach was not evaluated yet.

Tango Source Distribution

- Before the migration, Tango Souce Distribution packages were published using the GitHub releases feature,
- There was no release yet after the migration, but use of the equivalent GitLab feature is considered (the package itself will be stored in the package registry provided by GitLab).

RPM

- MAX IV SPEC RPM repository was moved to GitLab, allowing Tango Controls RPM packages to be built using Copr build infrastructure,
- https://copr.fedorainfracloud.org/coprs/g/tango-controls/tango/

Conda

- Similar to Debian, there was no impact on Conda packaging except update of the repository URLs *source* and *metadata* fields of recipe,
- After migration, few new packages were created (including tango-db).

Bintray

- Before the migration, JTango and related Java packages were automatically published to Jfrog Bintray using a Travis CI job. The packages were then manually released to Maven Central.
- After repositories migration and Bintray shutdown, the packages are automatically published to the Sonatype Nexus OSS hosting and automatically released to Maven Central.
- https://oss.sonatype.org/#nexus-search;quick~tango-controls