We build the full stack assuming nothing but the base operating system, similar to many lego sites. We are therefore not dependent on anything local but an operational operating system and our cloud meet.

One can add as many target configurations to the build matter as can be reliably simulated.

Currently we have defined these ones:

- Architecture #site dev: ARM
- Operating System: CentOS 6.7 Ubuntu 14.04 16.10
- Site specific: an arm encapsulating the special nature of a site, its interconnects, compiler, local libraries, and a cache all specific to groups.

Each application is built for a combination of these dimensions, typically 1x1x4. With different versions of compiler, mpi implementation, python versions the matrix of builds and grow rapidly. For example NumPy has 1/ARCH=dev/PLATFORM=OSX/PYTHON_VERSION=2.7/COMPILER=GCC/VERSION=v152=192

Reproducible delivery of Research Applications in a Distributed Environment (CODE-RADE). The research is lived with a purpose. There is a large amount of computing resources available, and rich software maintained, interoperable infrastructure of services however getting applications onto it remain for too much effort.

CODE-RADE agree this by lowering the barrier to entry to grid or cloud infrastructure, or a single HPC site. Application experts are then able to prove to resource owners that the application will run on the site execution environment. It is very important to allow easy managing the lifecycle of applications at test multiple versions, architecture and configurations. This ensure that once an application is certified, its available on as many sites as possible, and verified to work. This has the knock on effect of promoting collaboration between researcher, research software engineer, and infrastructure providers. The people doing the work get credit for work as a DO is created for a verified, peer reviewed, CVMFS release that is tied the git hashes.

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Components

- Version control at GitLab: github.com/SCIR/Code-Rade
- Continuous Integration: Jenkins (dev) or Travis (CI) csirgrid.ac.za
- Automated delivery of applications from Jenkins (CVMFS) /trivis/code-bookmarks
- Waffle.io is used to coordinate all human tasks, integrating with slack, and linked to github issues.
- Build: User and/or expert-defined means to produce executable applications or libraries
- Test: Infrastructure or operator-defined targets provide a means to ensure viability
- Deliver: Ensure that once the tests pass, the application is available at all sites.

All builds are inside docker containers so a user could reproduce the constant integration environment locally to test themselves, or attempt to reproduce someone else’s results using the exact same software.

We welcome all software package 3 targets:

- Build: User and/or expert-defined means to produce executable applications or libraries
- Test: Infrastructure or operator-defined targets provide a means to ensure viability
- Deliver: Ensure that once the tests pass, the application is available at all sites.

Do not remove and kill any example repositiories. We are the only repos which are provided.

The following is a list of all repos we are providing:

- Zenodo:ма/Code-Rade
- CVMFS: csirgrid.ac.za
- Slack: africa-arabia-roc.slack.com
- Jenkins: daily.slack.com
- Travis: ci.sagrid.ac.za
- Discourse: discourse.sci-gaia.eu
- GitHub: github.com/SCIR/Code-Rade
- Waffle: waffle.io
- Slack: slack.com
- GitLab: gitlab.com

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Repositories

- Numerous pieces of software have been incorporated. The versions are very much dependent on what people want to run. We cover all fields from bioinformatics, astronomy, physics,

- Python: python versions the matrix of builds and grow rapidly. For example NumPy has 1/ARCH=dev/PLATFORM=OSX/PYTHON_VERSION=2.7/COMPILER=GCC/VERSION=v152=192

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Further information

- Github: github.com/SCIR/Code-Rade
- Whitaker: bbecker@csir.co.za
- Murray: murrays@cern.ch
- Meraka: meraka.org
- CSIR: csirgrid.ac.za

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Acknowledgements

- CSIR
- UFS UH
- CHPC
- CSIR
- Meraka
- CSIR
- UFS UH
- CHPC
- CSIR
- Meraka

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Summary and Future

Making the best use of computational resources was only possible with the help of the entire repository system that the entire site in our case, allowing one to release each successful build to a CVMFS repository version.

Replicating the execution application:

The expression of the application should be reproducible by different build systems. The means for expressing the application should be simple. We do via Zenodo.

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Reproducibility

- Reproducing scientific results:

  One should be able reproduce the exact workflow with the exact expression of the application. The entire repository history is kept, allowing one to release each successful build to a CVMFS repository version.

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Actors

- Researchers
- Research Software Engineers
- Infrastructure operators
- Automated Agents

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Deployment

- Source code is versioned to pass required tests
- Deliverables are delivered to the site
- Infrastructure team

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Workflow

- Research Software Engineer or Infrastructure Team
- Deliverables are tested and delivered
- The researcher

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Introduction

- Components

  - Version control at GitLab: github.com/SCIR/Code-Rade
  - Continuous Integration: Jenkins (dev) or Travis (CI) csirgrid.ac.za
  - Automated delivery of applications from Jenkins (CVMFS) /trivis/code-bookmarks

- Atomic - There is fine grained control over dependencies, versions, and targets and relevant actions are taken on each event in the CODE-RADE cycle.

- Community - No restriction is placed on the applications that can be integrated, anyone is free to contribute; applications are added.

- Automated - We rely on automated agents to reduce bias, load time. Humans are removed as far as possible.

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Technology

- Open discussions at discourse.sci-gaia.eu
- Slack is used extensively for communication via numerous bots to notify on all steps, success/failure/progress.
- Waffle.io is used to coordinate all human tasks, integrating with slack, and linked to github issues.
- Continuous Integration (Jenkins and Travis) ci.sagrid.ac.za