

## **IS-ENES3 Milestone M8.2**

**Cylc/Rose development priorities agreed**

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Authors: David Matthews

Reviewers: Mick Carter, Hilary Oliver

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### ABSTRACT

The Cylc & Rose development priorities covering the period up to the end of this project have been agreed. Note that they cover the entire development effort, only part of which comes from the resource provided as part of WP8 task 5.



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### **1. Objectives**

Cylc and Rose will be further developed to ensure they continue to meet user requirements, increasing their usability, responding to changing technologies and improving performance. These developments will make it feasible to tackle new and more complex problems and are essential to maintain confidence in the long-term viability of the tools and to encourage wider adoption.

### **2. Description of work: Methodology and Results**

The current priorities for Cylc & Rose development are as follows:

1. Release Cylc 8 which will address the following key issues:
  - a. Migration from Python 2 to 3. Python 2 will not be maintained beyond 1 January 2020 (<https://pythonclock.org/>) so this work is essential to ensure the long-term availability of Cylc. Note that this work is already complete but will not be available to users until Cylc 8 is released.
  - b. Replace the obsolete PyGTK desktop GUIs with a new web UI. This will be integrated with site identity management and will require a new system architecture. PyGTK is not available at Python 3 so this work must happen at the same time as the Python 3 migration.
  - c. Migrate the Rose functionality for running Cylc workflows ("rose suite-run") into Cylc. At present, users who use Rose use a different interface for installing and running workflows which has significant advantages over the functionality present in Cylc. It is essential (for both usability and maintainability) to include this functionality within Cylc and some aspects of the design of the new GUI assume this. Hence the aim is to complete this work prior to the release of Cylc 8.

2. Release Rose 2 which will address similar issues to Cylc 8:
  - a. Migration from Python 2 to 3 (already complete).
  - b. Remove the "rose suite-run" functionality which is being incorporated into Cylc.
  - c. Replace the deprecated PyGTK based GUIs with web based GUIs. This intention is that the Rose GUIs ("rose config-edit" and "rosie go") will become plugins to the Cylc GUI. Note that Cylc 8 work is currently taking priority so the new Rose GUIs are not expected to be available until after Cylc 8 is released.

Cylc 8 is planned to be released by early 2021. The timescales for the release of Rose 2 including fully functional replacements for "rose config-edit" and "rosie go" will be defined once Cylc 8 is released and the resources to respond to user feedback are clear.

Immediate priorities beyond Cylc 8 and Rose 2:

1. Responding to user feedback and fixing any problems or important deficiencies. Given the scale of the changes in Cylc 8 there will inevitably be some issues. Responding to these will be a priority to help ensure the existing user base is in a position to adopt the new release as soon as possible.
2. Improved housekeeping (managing all the log files, etc, created by Cylc workflows). This is becoming an increasing problem as the scale of workflows increases. Currently the main housekeeping facilities are provided by Rose. We need better facilities which are properly integrated into Cylc.
3. Currently each task in Cylc must be run as a separate job which can lead to sub-optimal use of compute resources and compromises good workflow design. We need the ability for multiple tasks to be combined together in a single job whilst retaining existing functionality for task communication, retries, etc.

Beyond this there are numerous plans for changes to the internals of Cylc which should dramatically improve performance and scalability to address the needs of increasingly complex workflows. We also intend to introduce a new Python API which will open up many possibilities for defining workflows in ways which are not possible with the current configuration file. Finally, we anticipate the need to address new requirements resulting from emerging applications (e.g. Machine Learning and Data Analytics workflows), new platforms and schedulers (e.g. cloud based) and new data storage architectures (e.g. Object Storage).

These developments are expected to cover the period up to the end of this project (31/12/2022) although priorities will constantly be reviewed based on progress and user feedback. Note that they cover the entire development effort, only part of which comes from the resource provided as part of WP8 task 5.

The development priorities are largely unchanged from the work outlined in the statement for work for WP8. We have taken the opportunity to publicise these priorities and take feedback from the user community in several ways.

- 3rd ENES Workshop on Workflows funded by ESIWACE, 13-14 September 2018 (<https://www.esiwace.eu/events/esiwace-workshop-on-workflows-1/esiwace-workshop-on-workflows>). This included a presentation and user feedback on Cylc & Rose planned development plus an open discussion and consultancy session with workshop participants.
- Cylc Developers Workshop held at the Bureau of Meteorology, Melbourne, Australia, 3-7 December 2018 (<https://cylc.github.io/cylc-admin/dec-workshop-report>). The main output from the workshop was a detailed architecture for Cylc 8 (<https://cylc.github.io/cylc-admin/cylc-8-architecture>) which was publicised to the user community.
- Feedback on the new Cylc GUI was sought from the user community via the new Cylc Discourse forum (<https://cylc.discourse.group/t/cylc-users-what-do-you-think-about-the-current-proposed-new-cylc-g-ui/71>).
- The plans for Cylc 8 were included in the presentation on Cylc given at RSEConUK 2019, 17-19 September 2019 (<https://rseconuk2019.sched.com/event/QSSI/5d2-hpc-pursuing-and-supporting-reproducible-workflows-for-all-with-cylc>).

### **3. Difficulties overcome**

The overall resources available for Cylc & Rose development are less than had been anticipated at this stage. This is as a result of some staff losses at the Met Office which will take some time to replace. Note that this is only a short-term issue – the planned resourcing levels for Cylc & Rose development and support remain unchanged.

As a result, the decision has been taken to prioritise Cylc development over Rose in the short term. Therefore, the main impact is likely to be a delay in the availability of Rose config-edit functionality in the new web GUI. This will only affect a small part of the user community and the existing (Python 2 based) version of Rose can continue to be used in the short term.