# From Design To Production: State-of-the art web user interfaces to operate the ALICE offline-online computing system

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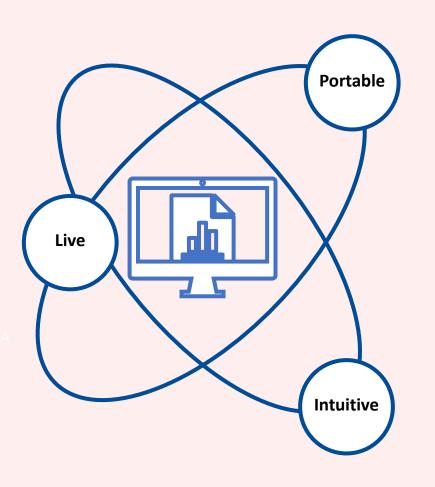
## ALICE O<sup>2</sup> System and Interfaces

The ALICE Experiment at CERN's Large Hadron Collider is undertaking a major upgrade [1] during Long Shutdown 2 in 2019-2021, which includes a new Online-Offline computing system.

To ensure the efficient operation of the upgraded experiment and of its newly designed computing system [2], a new set of **reliable** and **performant** graphical interfaces is needed. These are to be used **24h/365d** in the control room by the shift crew and remotely by detector experts and on-calls.

This poster provides an overview of the newly developed web-based components focusing on their architecture and automated integration and deployment workflow used for software quality assurance.

### Non-Functional Requirements



Experience from **Run 1 & 2** demonstrated that having a **common** solution for all the User Interfaces greatly optimises their development and users productivity.

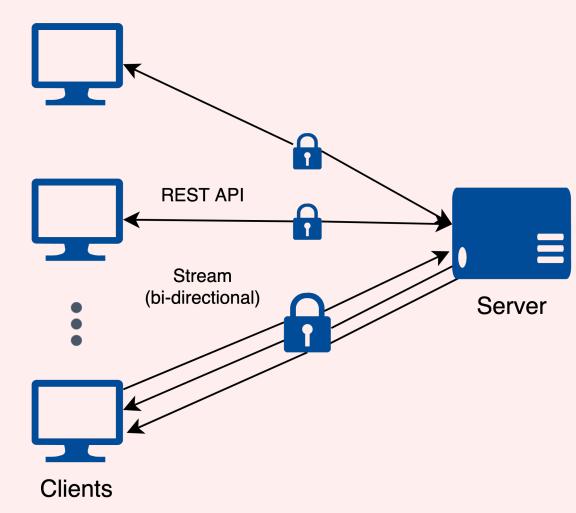
Thus we have developed Web Applications based on an in-house library, @aliceo2/web-ui which provides:

- Core functionalities and building blocks that can easily be plugged into other web applications.
- Common and intuitive user experience enhancing the productivity but also reducing the chance of user errors.
- Compatibility across operating systems (Mac, Linux, Windows) and devices (laptops, phones, tablets).
- Easy Integration with CERN systems.
- Real Time Data Transport.

## ALICE User Interfaces

The detector environment implies **live interaction** with the system:

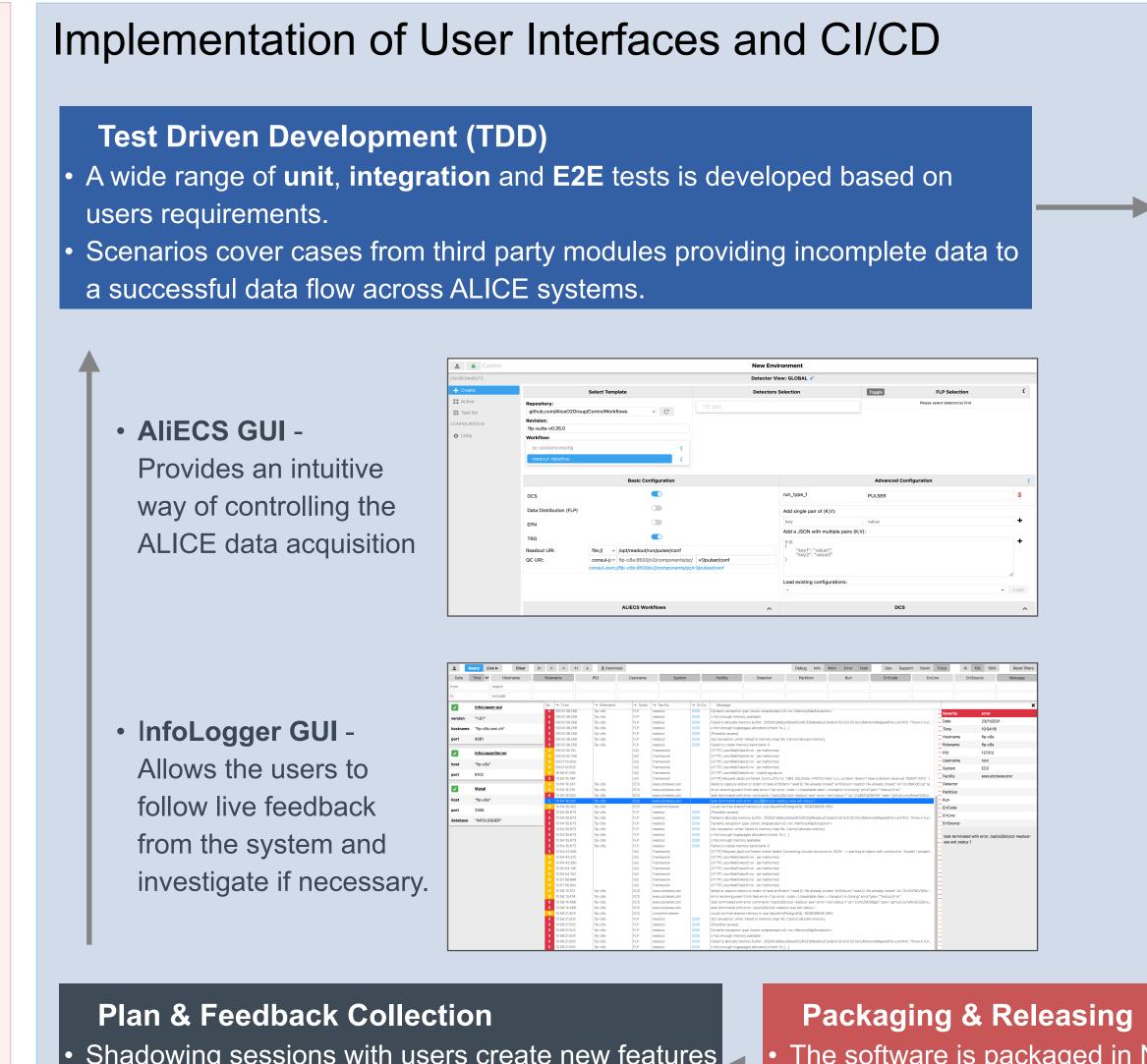
- We developed the tools as Single Page Applications (**SPAs**).
- We followed a Model-View-Controller (**MVC**) design.
- Front-end was developed with **Hyperscript** which via its diff algorithm will update only the affected nodes in DOM, greatly reducing the rendering times.



This allowed us to develop easy to share (via URL) tools as decentralised client applications which provide remote access without any prior installation or compilation.

#### References

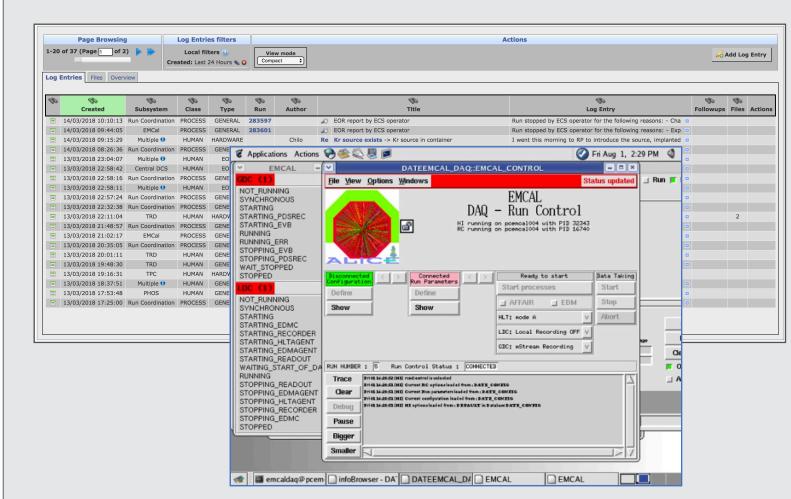
[1] Buncic, P., Krzewicki, M. and Vande Vyvre, P., 2015. Technical design report for the upgrade of the online-offline computing system (No. CERN-LHCC-2015-006).
[2] Mrnjavac, T., Alexopoulos, K., Barroso, V. C., & Raduta, G. (2020). AliECS: a New Experiment Control System for the ALICE Experiment. In EPJ Web of Conferences (Vol. 245, p. 01033). EDP Sciences.



- Shadowing sessions with users create new features
  Tickets are placed on a Kanban board with future versions assigned.
- The software is packaged in NP stored in a private registry; with future deployments or rollbacks.

#### **Conclusion & Future Work**

- Continue to follow leading industry standards and maintain best coding practices to ensure high quality code, fast releases and reduced time to resolution.
- Further develop the E2E tests for a unified workflow of actions executed in parallel which simulate the use of the platforms by multiple users.
- Functionality wise, a common live mode is envisaged. This will allow sharing notifications and updates to the clients or across platforms every-time an event is triggered.









#### **Building & Testing**

Changes are validated automatically via GitHub Actions pipelines based on:

- No errors identified by the linting checks.
- A successful run of the tests with a minimum of 80% code coverage.
- Dependencies being up to date and no security issues being detected.

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