ISBN: 978-3-95450-221-9 ISSN: 2226-0358 doi:10.18429/JACoW-ICALEPCS2021-WEAR02

ADAPTATIONS TO COVID-19: HOW WORKING REMOTELY HAS MADE TEAMS WORK EFFICIENTLY TOGETHER

R. Lacuata, B. Blackwell, G. Brunton, M. Fedorov, M. Flegel, D. Koning, P. Koning,
S. Townsend, J. Wang, Lawrence Livermore National Laboratory, Livermore, CA , USA

Abstract

The National Ignition Facility (NIF) is the world's largest 192 laser beam system for Inertial Confinement Fusion (ICF) and High Energy Density Physics (HEDP) experiments. The NIF's Integrated Computer Control System (ICCS) team conducts quarterly software releases, with two to three patches in between. Each of these software releases consists of deployment, regression testing, and a test shot. All of these are done with ICCS software team members inside the NIF control room. In addition, the NIF ICCS database team also performs a dry run and verification before each software release. This is to anticipate any issue that may arise on the day of the release, prepare a solution for it, and make sure that the database part of the upgrade will be completed within the allotted time slot. This paper describes how the NIF ICCS software teams adapted when the LLNL workforce began working remotely due to the COVID-19 pandemic. These adaptations led to a better and more efficient way of conducting the NIF ICCS software upgrades.

INTRODUCTION

I joined NIF ICCS back in October of 2017. My background was database development and support for an e-commerce company. A few weeks later, I participated in my first NIF ICCS software release. This is when I realized that updating the control systems for the NIF is different than the software releases I did in my previous job.

The NIF ICCS software releases are done quarterly, with two to three patches in between. It requires a lot of effort from operations, hardware, and software teams.

The software release process is pretty standard. It consists of a database dry run and verification, deployment, regression testing, and a test shot. The big difference from my previous job's software release is with the test procedures done to requalify the changes. The qualification testing in NIF ICCS is more involved that just testing the new version of the application with a web browser.

The pre-pandemic version of our software release process involves a lot of group activities. Most of which requires the software team members to go to the control room to execute the task they needed to do.

For example:

Before the release, we perform the database release dry run. This is done in a team member's office. After a successful dry run, we will go to the control room to verify that the database release scripts have been delivered and the console we will use for deployment is working. This is because the production database is accessible only from the control room.

On the day of the release, we will be in the control room again to apply the database updates. After we are done, members of operational staff will activate the new software that was delivered by our configuration management team.

Once the new software is activated, it will become busy in the control room. Members of the software team will start to come in to do regression testing (Fig. 1). Since only members of the operational staff are qualified to operate the laser, they will have to pair up with an operational staff member to run a series of test procedures for them. The operational staff would sit at their consoles and perform the required operations while they stand behind and observe software behaviour.

Elsewhere in the facility, engineers from other teams will be executing their part of the software release to upgrade various computers, servers, and controls hardware.

All of these release activities and qualification testing are coordinated by the release manager who is also inside the control room. He gets constant updates everybody.

Figure 1: Pre-pandemic, ICCS software engineers inside the control room watching the operators' consoles [1].

When the pandemic started, Lawrence Livermore National Laboratory (LLNL) went into Minimum Safe Operations in March 2020. Only essential personnel are allowed onsite. Most of the laboratory's workforce started working remotely, including the ICCS software team.

Because of this, the software release that was scheduled in April 2020 was cancelled.

After some modifications to control room operations to comply with COVID-19 restrictions, NIF shot operations was able to resume. This required the software team to resume software releases to the NIF control systems as well. But the software release process that required most of the software team inside the control room is not possi-

ISBN: 978-3-95450-221-9 ISSN: 2226-0358 doi:10.18429/JACoW-ICALEPCS2021-WEAR02

ble. COVID-19 restrictions forced us to rethink our software release process.

NIF ICCS management team met with the software team to figure out how to execute a software release while the entire software team is working remotely. The software release procedure was updated. The changes that were meant to address COVID-19 restrictions also led to a better and more efficient way of conducting software releases.

LEVERAGING CLOUD COLLABORATION PLATFORMS

We have used most of these tools before the pandemic. For one reason or another, we just have not considered using them for software releases.

Virtual Desktops

The software team is able to continue development and testing activities remotely because they can connect to the development and testing environments. To support production releases, the NIF provided the database team with virtual desktops. The virtual desktop opened secure connections to computers, databases, and servers in the production environment. This replaced the need for the database team to be in the control room to do database updates and verification. With the database team and the rest of software team working on their own workstations, they have access to their computers and developer tools that would not have been available if they were in the control room. This is invaluable to any software engineer. This has made the software team more effective during the release.

Smart Phones and Cisco Webex

The NIF issued smartphones to each operational staff member. The software team also leveraged an established video conferencing capability using Cisco Webex to view any operational console inside the control room. The combination of these two provided secure one-to-one audio/video communication between the operational staff and the software team. This replaced the need for the software team to be in the control room during regression testing.

The release manager does not have to be in the control room as well. He too is working from his own workstation. He schedules a single Webex meeting for the entire duration of the software release to coordinate all activities and qualification testing.

When issues come up, remote and onsite teams simply join this online meeting to collaborate and solve problems. Team availability during software releases improved.

Microsoft Teams

Microsoft Teams provided a platform for the teams to collaborate online. It brings the operations, hardware, and software teams in one place where they can work together, share information, and make decisions to drive the software release into successful completion.

The release manager establishes a Microsoft Teams channel dedicated for each software release where the release activities and qualification testing are organized as channel conversations.

The conversations and status updates from the release channel replaced the face-to-face conversations that used to take place in the control room and status updates via phone calls and e-mails.

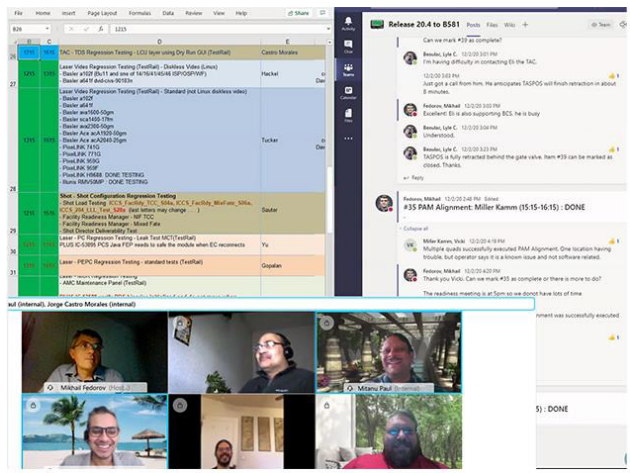

Figure 2: The ICCS software team uses Cisco Webex and Microsoft Teams during one of the software releases [1].

CONCLUSION

The remote software release met COVID-19 social distancing requirements and more.

For the software team that used to crowd the control room on release days, they can now work comfortably in their own offices, whether onsite or remotely at home (Fig. 2).

For the operational staff working in the control room, the reduced number of people made it more a comfortable working environment for them.

Remote software release facilitated online collaboration. The release manager shares the overall status of the release online. This combined with the status updates from the release channel increased team awareness and communication. If there are issues that needs attention, the team response is much faster. Escalations and resolutions also are recorded in the release channel, makes data available for later analysis.

Remote software release also provided an opportunity to train new members. The new member joins the video conference and watch as the mentor executes the release procedures. Before, this meant bringing the new member in the control room which is not always possible. Now, we have more opportunities to train them.

The software team has completed six remote software releases since the pandemic began. It is such an improvement from the old process that the software team will continue with this new process onwards.

ISBN: 978-3-95450-221-9 ISSN: 2226-0358 doi:10.18429/JACoW-ICALEPCS2021-WEAR02

ACKNOWLEDGEMENTS

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-CONF-827816.

REFERENCES

[1] P. Koning, "Remote NIF Control Software Updates Lead to Less Stress, More Efficiency", NIF & Photon Science News, February 11, 2021.