On the Need for Local Research Software Development Funding

Dr. Andrew Schoenrock

Manager, Research Computing Services

Carleton University

andrew.schoenrock@carleton.ca

Introduction

In the last few decades we have seen a dramatic increase in the use of computation in research across all academic disciplines. With this rise of computationally based research projects, many researchers have a need to create domain specific, purpose-built software to further their research programs. Typically, researchers would have to either rely on research assistants or graduate students to write their research software, which leads to code that is not maintained and unsupported soon after it is created, or to pay for external software development and support which is both expensive and very time consuming. To help combat this issue, CANARIE ran a pilot program to fund local software support teams at a small number of participating universities. Carleton participated in this program and established a software development team to help Carleton researchers with their software development needs. This team has successfully helped a number of researchers across all of the faculties at Carleton and has a queue of projects taking them well into the second half of 2021. This team, much like similar teams established (or in the process of being established) at other Canadian universities, has a funding end date quickly approaching and, given the unprecedented times we are currently experiencing, future funding is far from secured. It is recommended that NDRIO adopt this CANARIE initiative, continue to fund the teams currently in place and to expand the scope to include other universities interested in establishing a local research software development team.

CANARIE's Research Software Pilot Program

In 2018 CANARIE launched a pilot project "to fund local, expert software teams at institutions to work directly with researchers"[i] at up to six participating universities, based on the success of similar European initiatives. The goal was to create teams to bring industry standards and software engineering best practices to research software development, both improving the quality and reusability of research software while also leveraging existing software that could

be adapted to fit the needs of the researcher. These teams would work closely with researchers across all disciplines and career stages to design, implement, test and maintain research code.

Carleton's Research Software Development Team

Carleton University was one of the universities to participate in the first call of CANARIE's pilot program. Due to extenuating circumstances, a full team of developers was not established until early 2020. Since then, however, this team has been a resounding success. It has completed over ten software development projects across all faculties at Carleton and has a queue of five projects to begin in 2021. On top of these projects being diverse in academic discipline, they have also been spread over researchers in all stages of their career: from established researchers with large, collaborative projects and millions of dollars in funding to those researchers who are just starting to build their own research program. The team's core competency is modern web development, having completed three significant web applications to date. The team has also completed a variety of different types of projects including scientific computing, web scraping and data extraction, data analysis, and others.

Having this small development team at Carleton has already produced a number of benefits. The first and most obvious is that this saves researchers from having to spend the time and potentially tens of thousands of dollars to hire external developers to produce high quality research software. On top of this, the researchers are also comforted in the knowledge that the team will be there to maintain, support and even extend their software product long after the initial development project has completed. Lastly, the software development team has noticed certain trends in the requirements of the web development projects (common technologies used, authentication and user roles required, etc.) and has built a generalized framework from which these types of projects can be built at an accelerated pace moving forward. This in itself will save many days of future development time, resulting in researchers getting their software products completed even faster. For more information on the projects that the team has been involved with, please refer to the Carleton Research Software Development website[ii].

In the spirit of CANARIE's push for code reuse, all of the code written to date has been published under the GPLv3 Free and Open-Source Software licence on the Carleton Research Computing Services GitHub page[iii]. The Carleton development team has also established relationships with other teams participating in the CANARIE pilot at McMaster University and the University of Regina and is planning to collaborate with a soon to be established team from a university participating in the second round of funding from CANARIE.

Future Funding

The funding from CANARIE was fundamental in establishing the research software development team at Carleton but the team's current funding will run out before the end of 2021. Funding for this team past that point, especially considering the financial disruption caused by the COVID19 pandemic with many University budgets unlikely to grow significantly this year, is far

from secure. It is comforting to see that some of the already published *White Papers on Canada's Future DRI Ecosystem* are echoing the need for highly skilled Research Software Engineers/Developers for researchers in Canada[iv,v,vi]. Having already established teams of highly skilled software developers at a number of universities across Canada (with some universities beginning to build these teams with the second round of CANARIE funding now), it would be an incredible setback to have these teams fall apart due to a lack of funding in the near future. With these local development teams already in place, relationships with researchers established, frameworks for future projects already set and the demonstrated success at Carleton University, it is highly recommended that NDRIO establish a program to continue to fund local research software development teams at universities across Canada.

---

[i] https://www.canarie.ca/software/funding/lrss-call1
[ii] https://carleton.ca/rcs/research-software-development
[iii] https://github.com/ResearchComputingServices
[iv] https://engagedri.ca/on-canadas-future-digital-research-infrastructure
[v] https://engagedri.ca/csee-ciee-submission-on-the-new-digital-research-infrastructure-organization
[vi] https://engagedri.ca/wp-content/uploads/2020/12/NOIRN_article_Poly_McGill4-1.pdf