# Bridging Computational Science and Clinical Workflows with the ChRIS Research Integration System

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| Name | ChRIS |
| URL | https://app.chrisproject.org |
| Description | The *ChRIS* Research Integration System is a platform for computational research and medical innovation. It provides a hub for collaboration on data analyses and a framework for creating medical applications. *ChRIS* itself is deployed on Kubernetes, while interfacing with legacy services in the hospital such as DICOM PACS. |

## Abstract

Despite the rise of AI and ML in medical imaging research, infrastructural challenges stifle the adoption of such technologies in clinical practice. To address this divide, we developed ChRIS (a recursive acronym for the ChRIS Research Integration System). ChRIS facilitates the integration of computational research across various environments.

The IT of a typical hospital enterprise is a mixed bag: to accommodate big data, more and more research departments are moving their operations to public clouds such as AWS and GCP. However, existing solutions and legacy pipelines may only work on in-house high-performance computing (HPC) environments. Furthermore, clinical services tend to rely on outdated technologies such as the Digital Imaging and COmmunications in Medicine (DICOM) standard. The difference in IT between research and clinic in hospital settings exacerbates the lag in technological advancement on the clinical side. Thus, little of research innovation can go to directly impact patient care.

At its core, ChRIS is a platform for running computational workflows. It provides features for collaboration and data provenance. While the backend services of ChRIS run on Kubernetes to leverage cutting-edge features of the cloud-native ecosystem, ChRIS integrates with existing cyberinfrastructure and legacy services such as HPC schedulers and DICOM Picture Archival and Communication Systems (PACS). ChRIS is designed to support hybrid-cloud architectures to optimize the economic use of both on-premise and public cloud resource.

Within our research center, the PACS Query and Retrieve feature of ChRIS is the starting point of all of our neuroimaging research workflows. In the clinic, ChRIS is used to automate the execution of AI/ML computer vision algorithms on data from the PACS, granting radiologists access to cutting-edge tools for medical diagnosis. Across the world, ChRIS is used as the hub for scientific collaboration between institutions, including the HEALthy Brain and Child Development Study (HBCD). As MIT-licensed software, ChRIS is freely available for anyone to obtain and use.