WfInstances Browser

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ICS 496, Spring 2024
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Introduction:

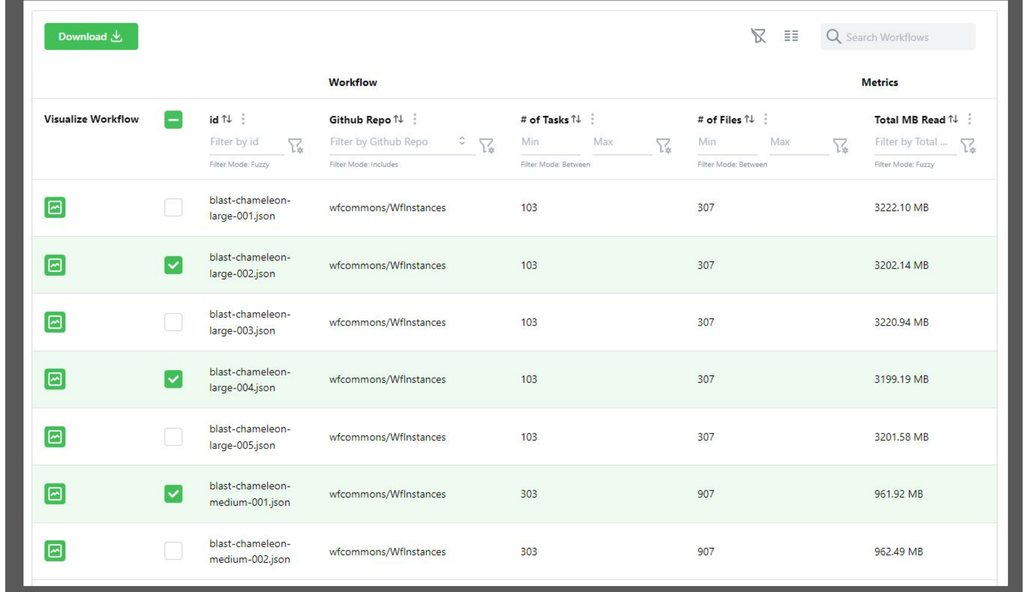
Scientific workflow applications have been used by scientists to support some of the most significant discoveries of the past several decades and are executed daily to serve a wealth of scientific domains.

Workflow research and development activities rely on the use of **workflow instances** to describe, execute, profile, and evaluate production workflows, which can be applied in simulated and real world conditions.

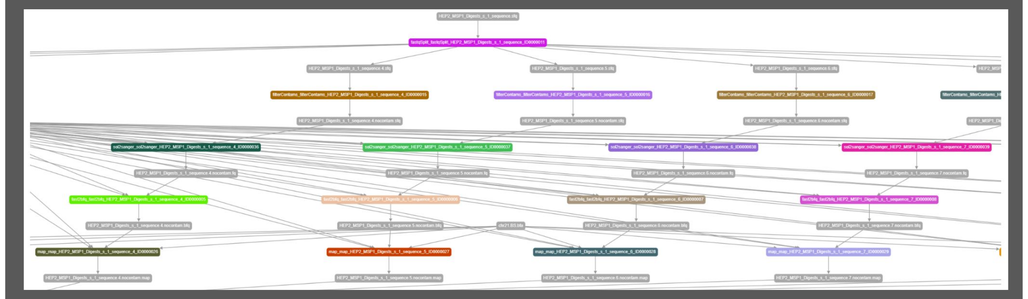
The WfCommons project provides users a with a collection of open access production workflow instances from various scientific applications shared in a common instance format. **However, these instances contain information that is currently only accessible by manually reading through the instance json files, which is a labor- and time-consuming process.**

Objective:

Create a web application that allows users to easily browse, sort, visualize, select and download workflow instances.



Browsing, sorting, and selection of workflow instances and their metrics



Interactive graphical visualization of workflow instances as directed acyclic graphs

Solution:

Implemented Features

- Browsable list of workflow instances
- Viewable summarized workflow metrics
- Sorting for workflow instances by metrics
- Selection and download of workflow instances
- Visualization of workflow instances using Cytoscape

Challenges:

- The project utilized a combination of old and new frameworks that were not compatible with each other at different points in the project
  - Documentation for framework compatibility was either outdated or did not exist due to the framework being too recent
- The structure of workflow instances required us to research a variety of different graph algorithms in order to construct and traverse a graph of nodes in a timely and efficient manner
- The project requirements were modified to include a visualization of the workflow instances, which required us to add the visualization framework Cytoscape into our tech stack in the middle of the development process

Methodology

- **Agile Project Management** in the form of a Kanban Board utilizing Issue-Driven Project Management
- **Defined Team Roles** split among group members at the beginning of the project to ensure an equal work split
- **Weekly Team Meetings** to keep team members and the sponsor well informed throughout the entirety of the development process

Technology Stack:

Front End:

TS, Remix

Back End:

FastAPI, mongoDB

Learnings:

- **Built a full-stack web application from the ground up with a TypeScript frontend and a Python backend that communicate via a custom REST API**
- **Learned differences between TypeScript and Javascript**
- **Used a data visualization framework**