



Distributed Collaboration for Visual Analytics

Investigating Enhanced Collaboration in an Astronomy Tool



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Overview

Introduction:

- CARTA is a next-generation image visualization and analysis tool for ALMA, VLA, and SKA pathfinders. However, as astronomical data becomes increasingly complex, scientists face challenges collaborating effectively. The current CARTA system supports a simple flat, URL-based sharing. There is a growing demand for transparency, reproducibility, and efficient collaboration in scientific research to support Open Science.

Objective:

- Design, implement, and evaluate a workspace system that supports a more sophisticated collaboration using Gits hierarchical version control system within CARTA.
- Exploring how **Git-inspired hierarchical version control** can enhance scientific collaboration in visual analytics tools like CARTA.

System Design

Proposed Solution:

- Introduce a Git-inspired hierarchical version tracking workspace model for collaborative analysis.
- Incorporates branching, committing and cloning Git functionalities.
- Integrates role-based access control (Owner, Editor, Viewer) and GUI based configuration sharing.
- Frontend-backend integration via abstracted API and Git operations.

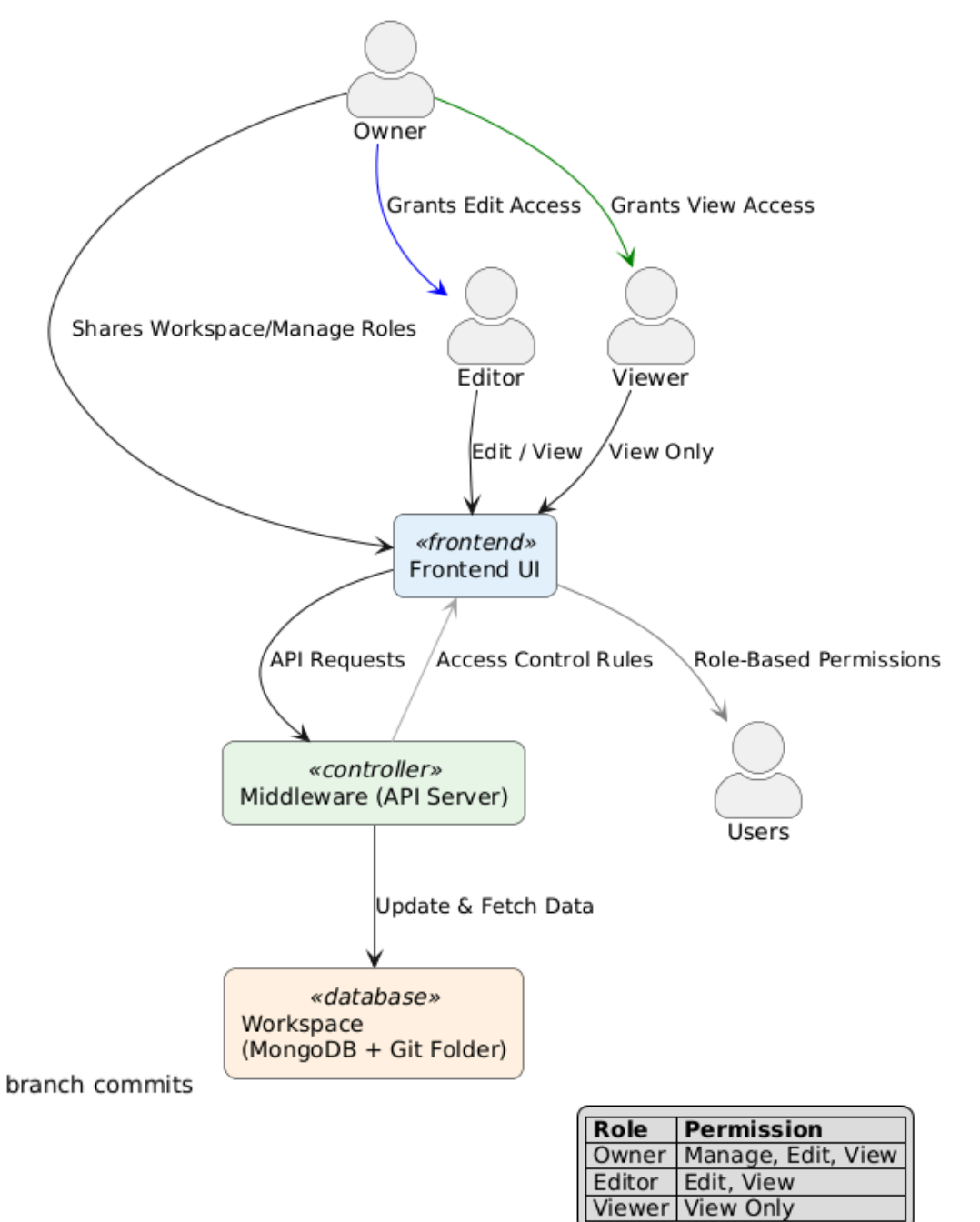
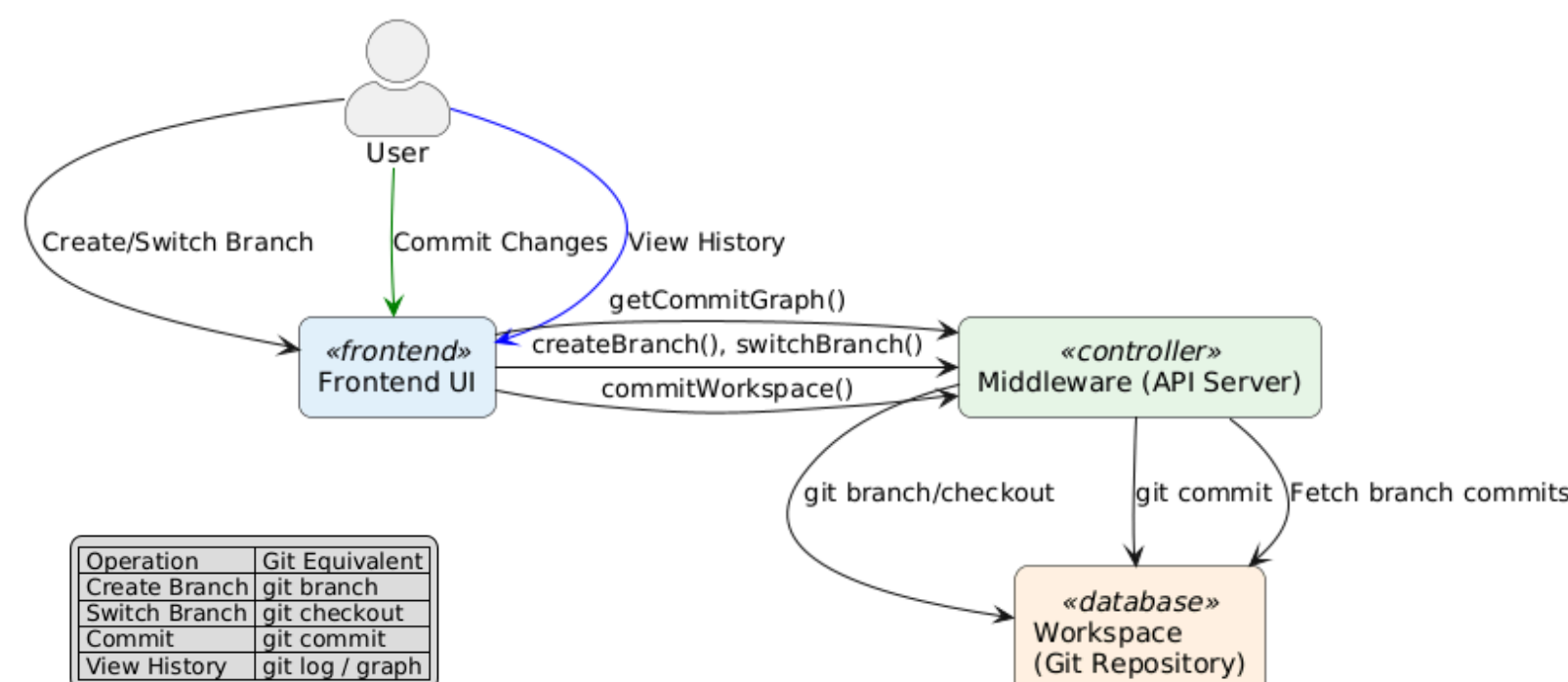
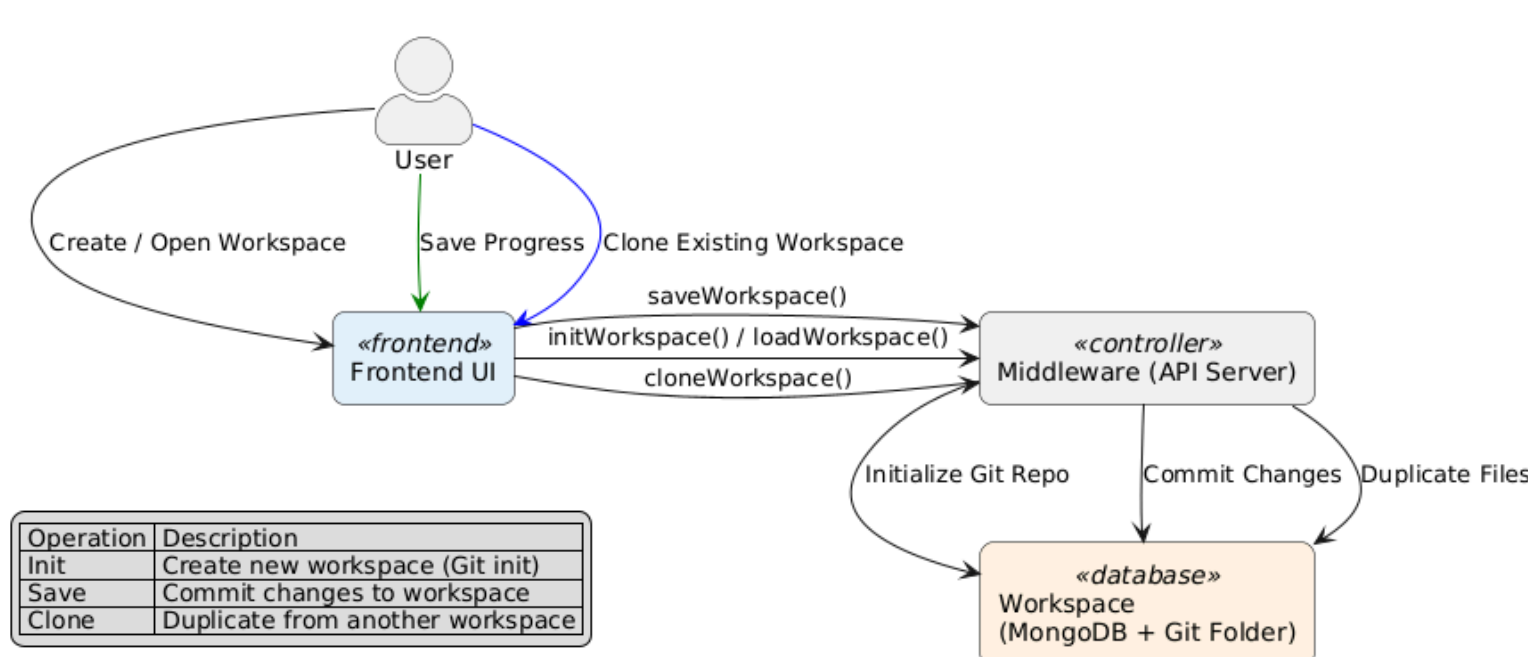


Figure 1: Workspace Operation Overview including Create, Save, Branch, and Clone.

Figure 2: Versioning and branching structure enabling parallel exploration.

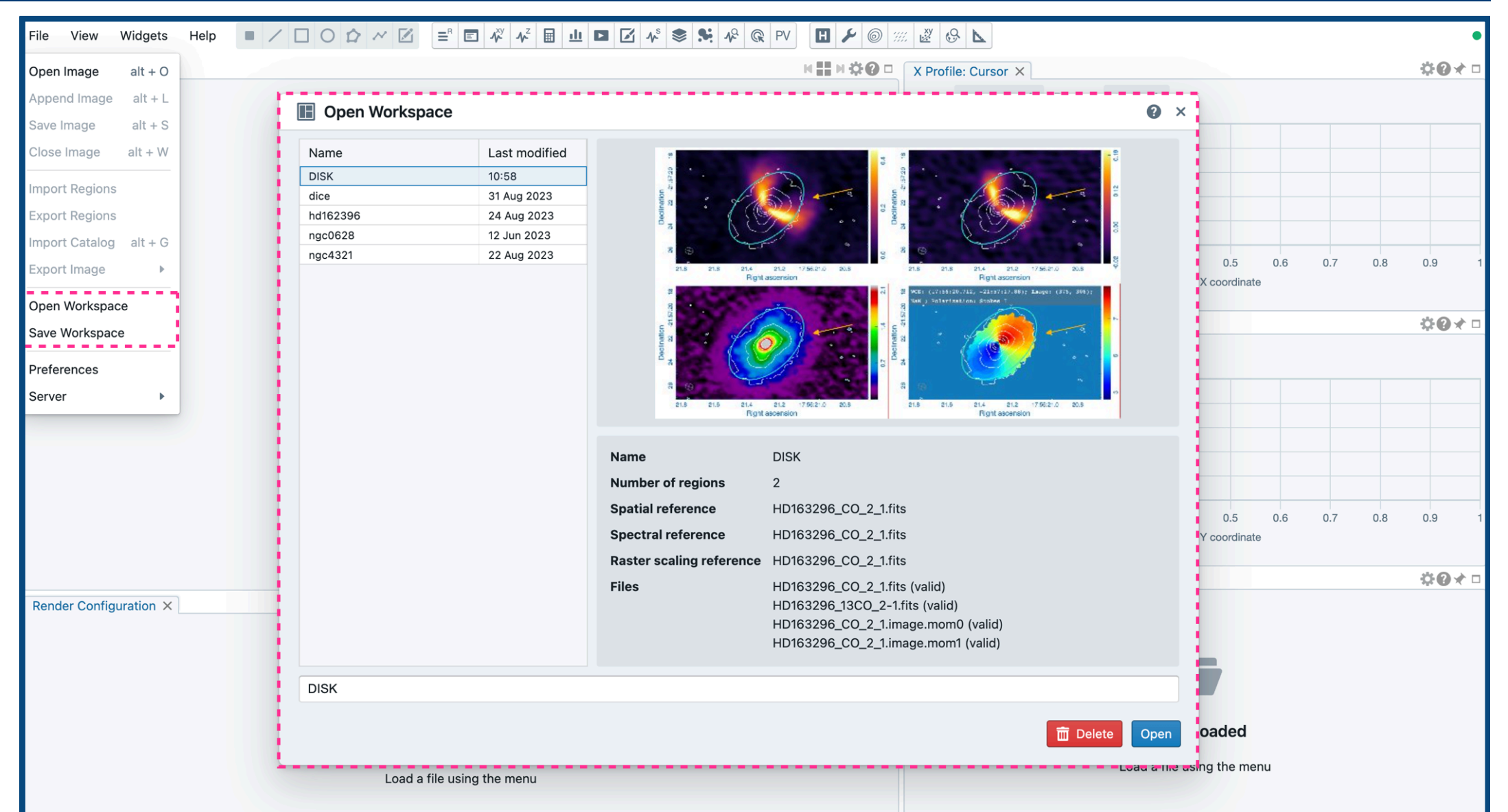
Figure 3: Access control through roles and permissions.

Evaluation

- Participants:** Users of CARTA (aprox. 15)
- Method:** Task-based group study simulating real-life analysis. Tasks focusing on workspace creation, branching, sharing and collaboration.
- Metrics:** Usability and user satisfaction from post-task questionnaires and interviews.

Expected Outcome:

Contribution to knowledge on designing reproducible, shareable, and hierarchical workspace systems for data-intensive research.



References

- Angus Comrie, Kuo-Song Wang, Shou-Chieh Hsu, Anthony Moraghan, Pamela Harris, Qi Pang, Adrianna Pińska, Cheng-Chin Chiang, Tien-Hao Chang, Yu-Hsuan Hwang, Hengtai Jan, Ming-Yi Lin, and Rob Simmonds. 2021. CARTA: TheCube Analysis and Rendering Tool for Astronomy. <https://doi.org/10.5281/zenodo.4905459>

