Exploring the Data Structures and Algorithms behind Version Control Systems

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November 2022

Outline

Version Control Systems are a type of software that allows users to track changes to files over time. This is useful for a number of reasons, including the ability to revert to previous versions of files, and to collaborate with other users[1].

Such systems are widely used in the software industry, and are becoming more common in other fields. Modern VCSs facilitate parallel development, allowing multiple developers to collaborate and work simultaneously within the same project. Simplifying the process of combining/managing changes made by different developers is a key feature of modern VCSs.

The aim of this project will be to explore the use of various data structures and algorithms within VCS, with the goal of characterizing the performance of the different data structures and algorithms for different VCS tasks.

Project Plan

- **October**: Research existing Version Control Systems, identify details of their design and implementation. Create a list of features that are desirable in a VCS.
- **November**: Research traditional implementation strategies for a VCS. Examine potential data structures and algorithms, and assess their suitability for the task.
- **December**: Experiment with different data structures and algorithms, and evaluate their performance.
- **January**: Explore more complex features of a VCS (e.g. merging algorithms, file diffing algorithms, etc.).
- **February**: Gather data on the strengths and weaknesses of a given data structure or algorithm within a given use case. Discuss the results and consider next steps for the project.
- **March**: Identify any decisions, assumptions, or actions that were made during the project, and document if they could have been done differently.
- **April...**: Review the project and conclude on the success of the project. Finalize the project report.

References

[1] N. N. Zolkifli, A. Ngah, and A. Deraman, "Version control system: A review," *Procedia Computer Science*, vol. 135, pp. 408–415, 2018.