Nathan J. Goldbaum

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Experience

Recurse Center

Participant — May 2019 – Present

Transitioned from academia to industry by attending a self-directed educational retreat. Explored concepts in algorithms, data structures, and theoretical computer science by implementing a client for the Mercurial version control system in Rust. Wrote blog posts about concepts in distributed version control systems, binary data formats used by Mercurial, the Rust programming languages, and general programming topics.

National Center for Supercomputing Applications

Postdoctoral Researcher — August 2015 – April 2017
Research Scientist — May 2017 – April 2019

Primary maintainer for The `yt` Project, an open source toolkit for analysis and visualization of 3D simulation data in Python. Regularly contributed to project management and planning, including design and implementation discussions, code review, and supporting users with a range of technical expertise via live chat, mailing lists, and in-person workshops. More than 650 merged pull requests for `yt` alone. Many other merged pull requests in popular open source projects such as `Matplotlib`, `Mercurial`, `xonsh`, `conda-forge`, `Homebrew`, `h5py`, `IPython`, `ipywidgets`, and `nbconvert`.

Projects

`unyt`

A Python library for working with data that has physical units. Reworked `yt.units` module into a standalone `unyt` package with continuous integration, 100% test coverage, and extensive example-driven documentation with entry points for users doing quick calculations and users who want to extensively use `unyt` in an application. Achieved substantially improved performance while simultaneously shipping user-requested features like automatic unit simplification and automatic unit name canonicalization.

Improved support for particle data in `yt`

Improved performance and memory usage for common analysis tasks by 10x to 100x by leveraging a novel system for spatially indexing particle data via EWAH-compressed Morton codes. Enabled production science pipelines leveraging gigabyte and terabyte scale simulation outputs. Worked with community to provide migration path for analysis results requiring data produced by old API. Presented work to the community at a SciPy conference talk.

`PlotWindow` Plotting Interface

Created an interface for visualizing slices and projections in `yt`. Enables quick data visualization through an API that focuses on what the simulation data physically represent rather than how they are laid out on disk. Used in dozens of published journal articles written by `yt` users.

Education

University of California Santa Cruz

Dissertation: "Star Formation in Gravitationally Unstable Disk Galaxies: From Clouds to Disks"

Ph.D. Astronomy & Astrophysics — August 2011 – July 2015
M.S. Astronomy & Astrophysics — August 2009 – July 2011

University of Colorado Boulder

B.A. Physics, *Summa Cum Laude* — August 2005 – 2009