



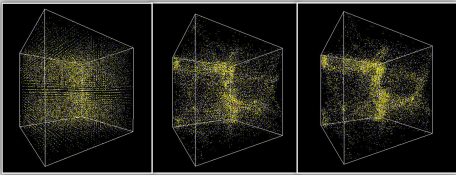
MyMergerTree Service: Creating Galactic Merger Trees using Myria

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Astronomy Use-Case

Astronomy researchers from UW and UM are investigating the formation and characteristics of galaxies through time from the beginning of the universe. Specifically, they study the merging behavior between galaxies in simulations. This project was motivated by their need for an interactive tool to facilitate their exploration without needing to build queries for the backend database.

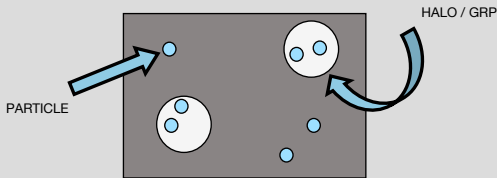
1) Simulate the evolution of the universe through a set of particles in 3D space



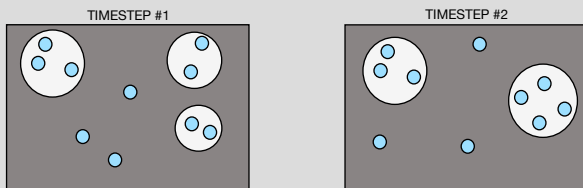
2) Store results as snapshots of particle states across time

Attribute	Description
iOrder	unique identifier
Mass	mass of particle
Type	type of particle: either dark, star or gas
Grp	halo (galaxy) identifier

3) Cluster particles into halos (galaxies)

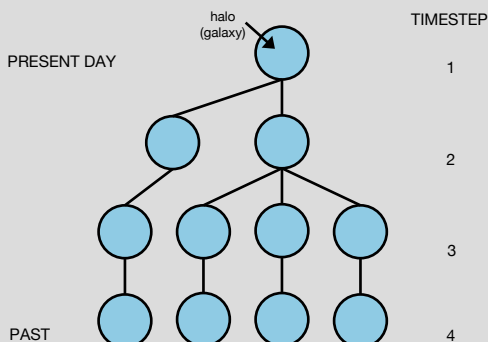


4) Follow evolution of galaxies over time

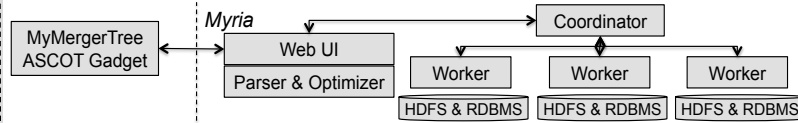


5) Build galactic merger trees

A *merger tree* shows the formation of a galaxy through mergers of other galaxies over time



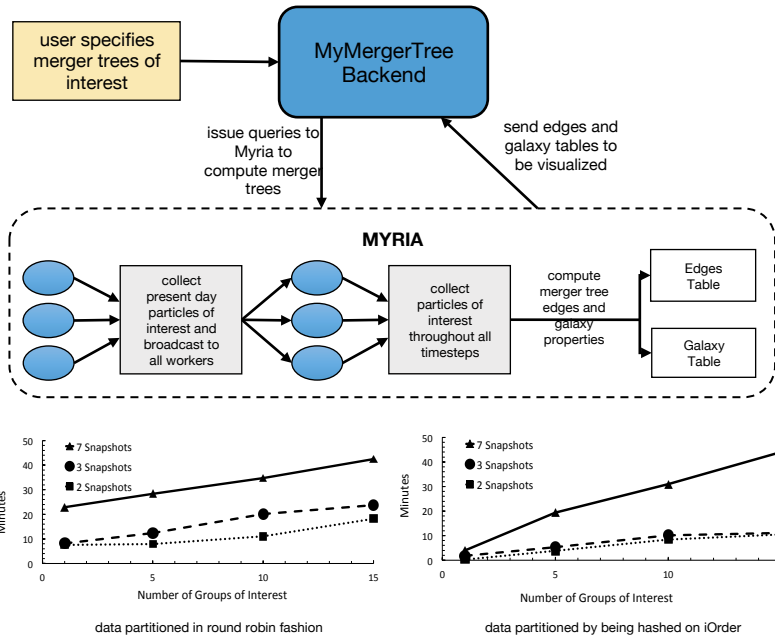
MyMergerTree Architecture



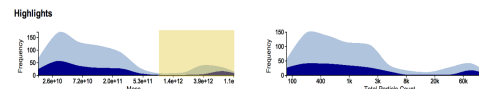
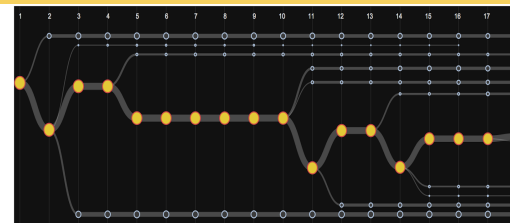
MyMergerTree Back-End using Myria

Myria provides:

- Ability to easily build and develop vertical applications by providing a REST interface, which allows access through the web
- High performance, allowing trees to be computed in parallel and providing the user with more interactive data exploration



MyMergerTree Service Front-End



Users specify galaxies of interest (at present day) by specifying a mass range. They can then select a galaxy from the result and see its merger tree. User interactions include:

- Hover over tooltips to see galaxy properties
- Collapse all descending galaxies in addition to panning and zooming
- Highlight galaxies of interest through mass and particle count filters
- Download attributes of highlighted galaxies

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