TTK for Massive Datasets

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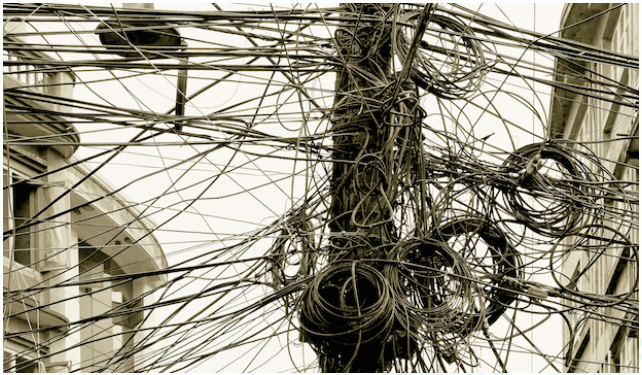
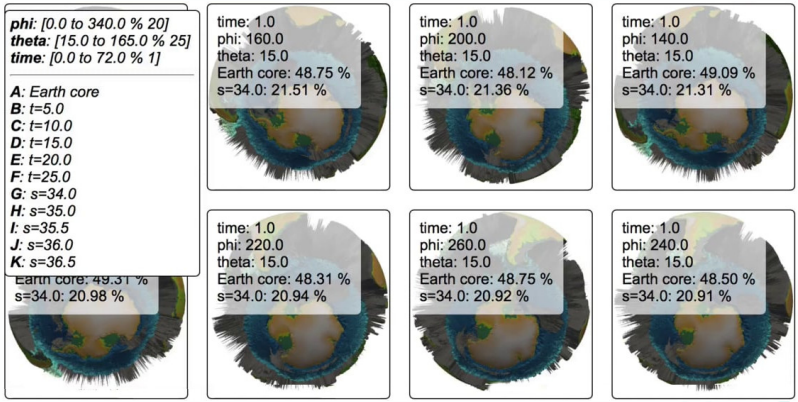
Motivation

- To explore massive datasets, it is necessary to intelligently store, query, analyze, and visualize their data products.
- Such products can be images, meshes, tabular data, tracking graphs, volume data, persistence diagrams, and so forth.



Approach

- Cinema Databases associate data products with parameters.
- Originally conceptualized for image products[1].



[1] Ahrens et al. "An image-based approach to extreme scale in situ visualization and analysis." Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis. IEEE Press, 2014.

Cinema Database Concept

Data Product Representation: products can be of any kind, but VTK is strongly recommended.

Data Product Organization: all products are organized by one table that is stored as a CSV file.

Database Interaction: Database viewers enable users to specify how database content needs to be interpreted.

Cinema Database Example

.../Meshes.cdb/
- data.csv
- data/
  - A_00.vtu
  - A_01.vtu
  - B_50.vtu
  - B_51.vtu
  - B_54.vtu

(a) File System

Sim,	Time,	Mesh
A,	00,	data/A_00.vtu
A,	01,	data/A_01.vtu
B,	50,	data/B_50.vtu
B,	51,	data/B_51.vtu
B,	54,	data/B_54.vtu

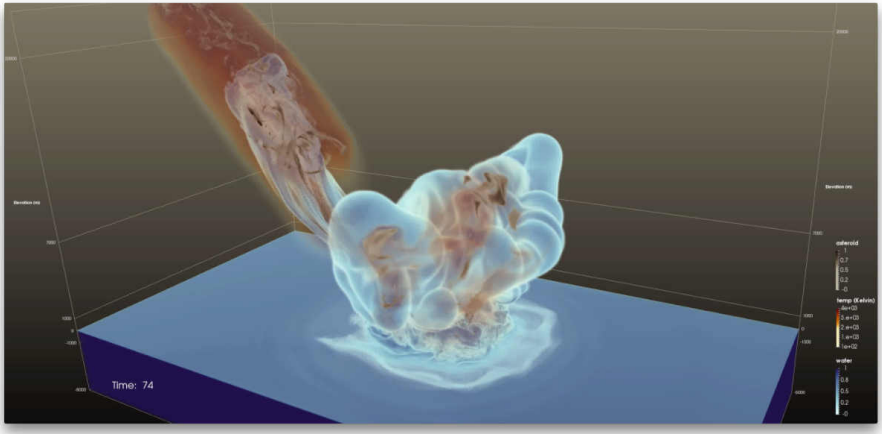
(b) data.csv

New TTK Cinema Filters

- **CinemaReader** - read database manifest
- **CinemaQuery** - select specific products
- **CinemaProductReader** - read referenced products
- **CinemaImaging** - create images of an object
- **CinemaWriter** - store products in database

Asteroid Ocean Impacts

- https://sciviscontest2018.org/
- 27 different simulation scenarios
- 11 Scalar Fields
- 500^3 cells over 500 timesteps



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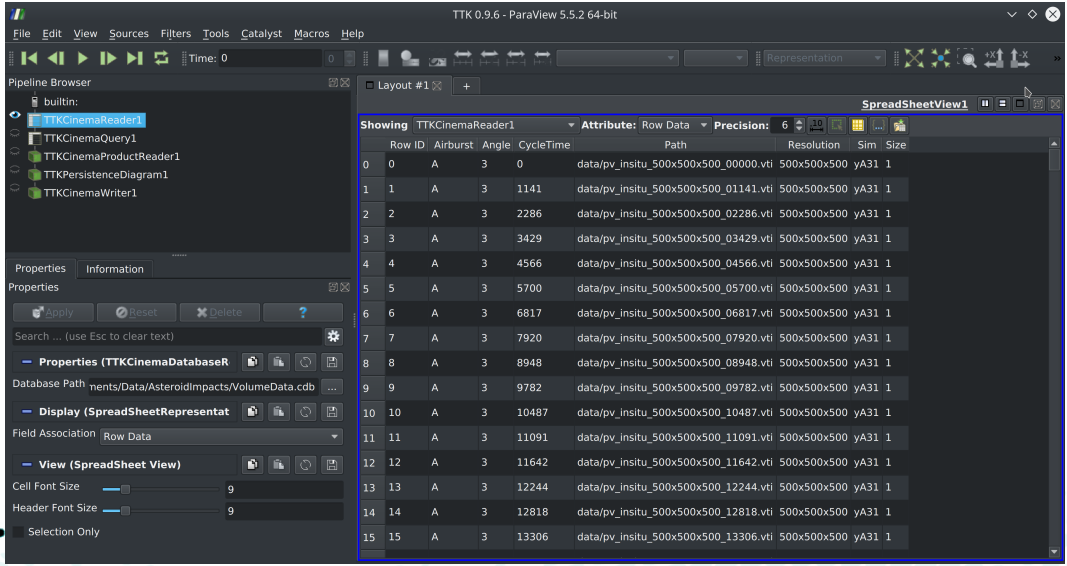
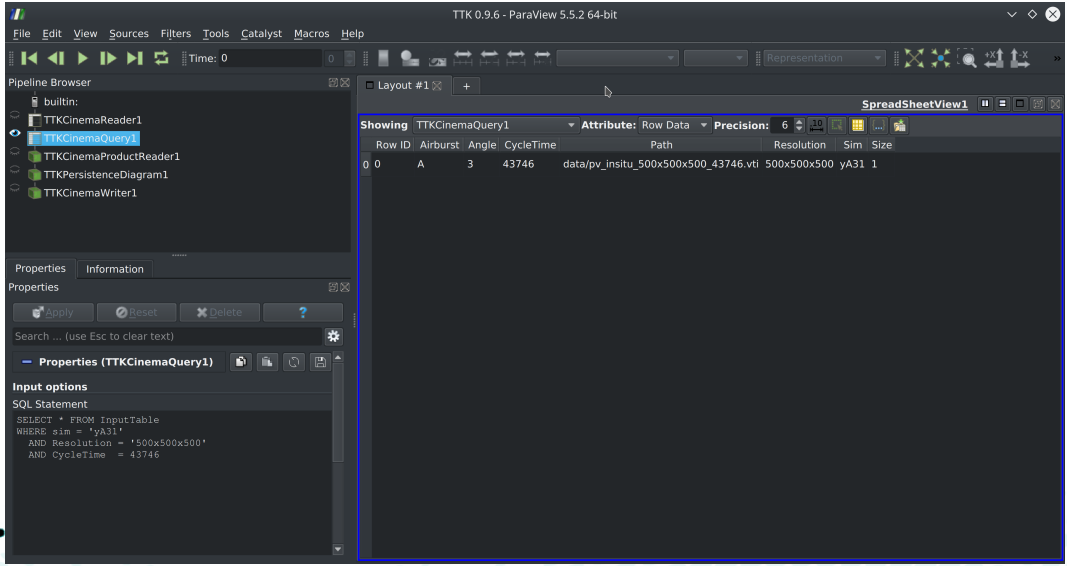
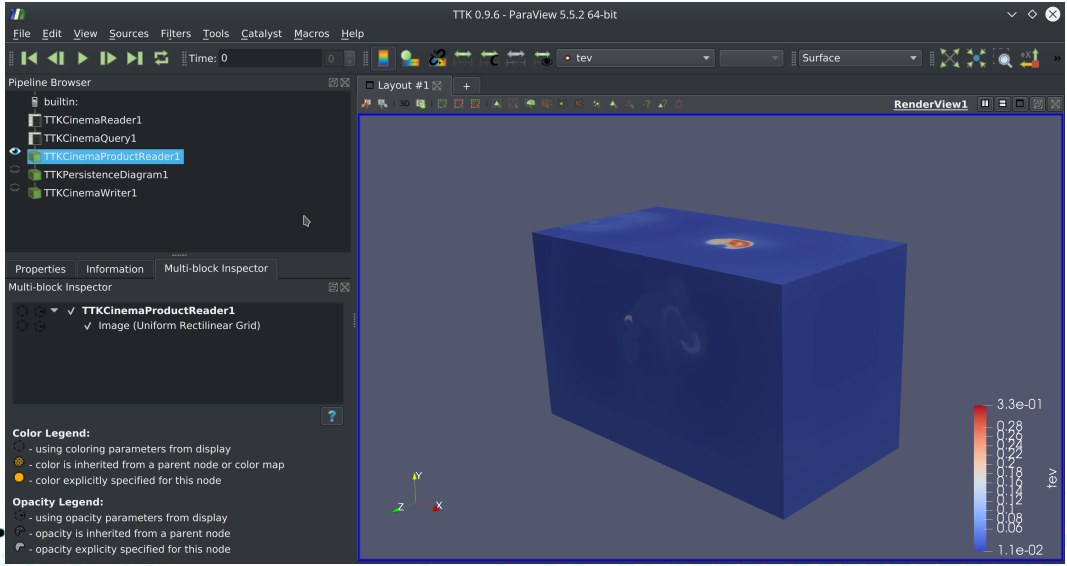
Reading a Cinema Database



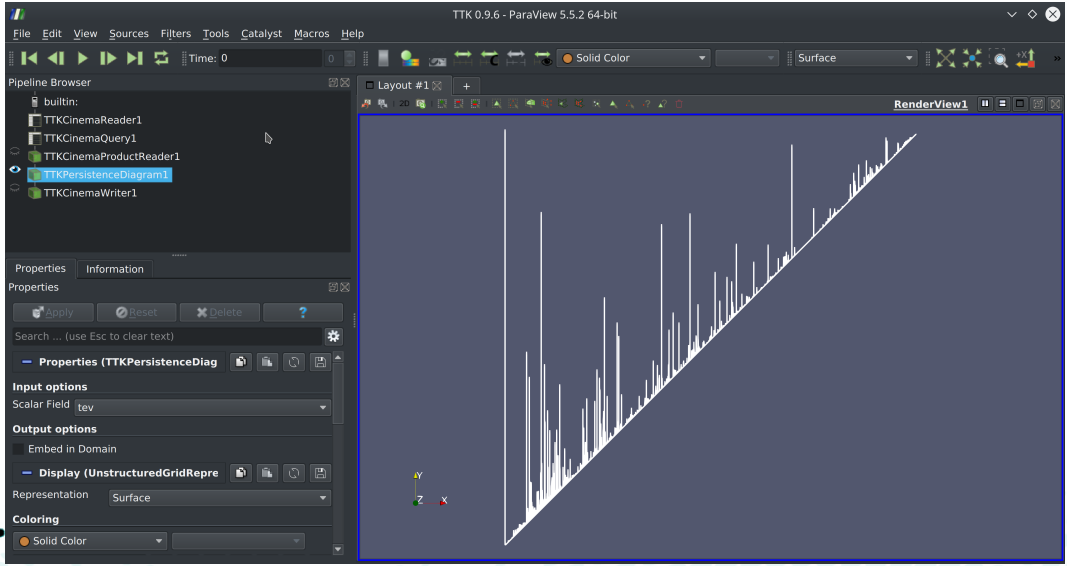
Performing a Query



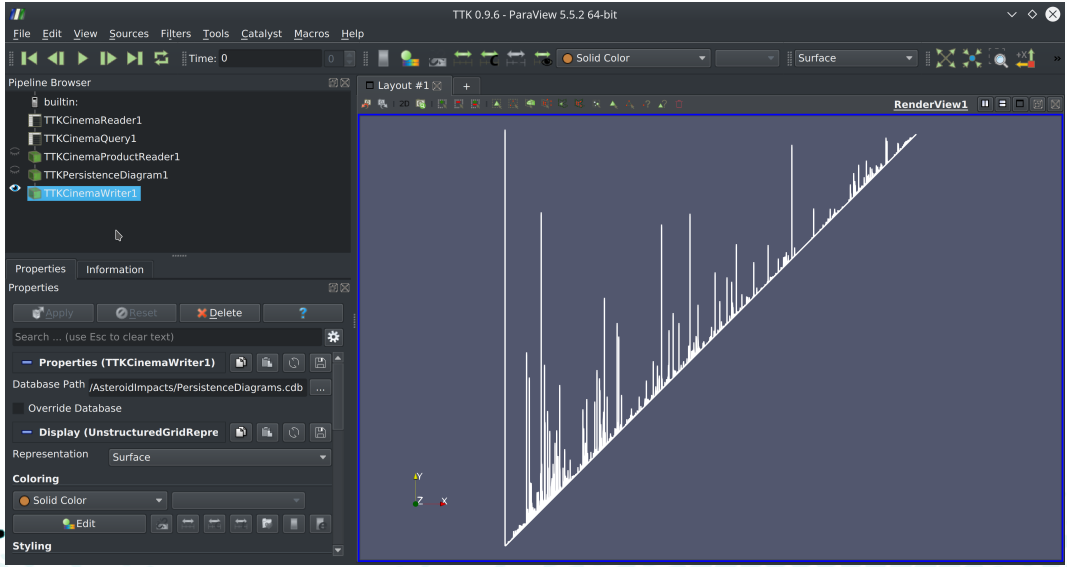
Reading the corresponding Data Products



Perform any Analysis and dynamically change Datasets



Store new Data Products



Conclusion

- Cinema integration in TTK
- Streamlined database operations
- Data analysis and visualization made easy

Thank You