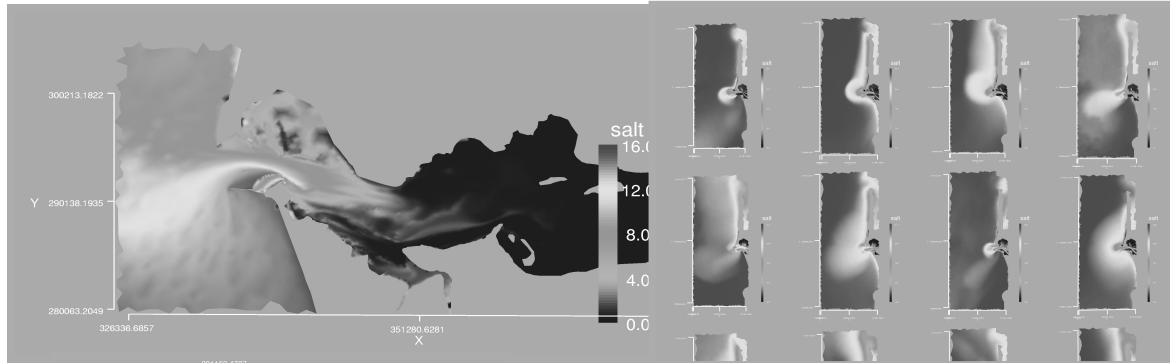


GridFields: Querying and visualizing Gridded Datasets for e-Science



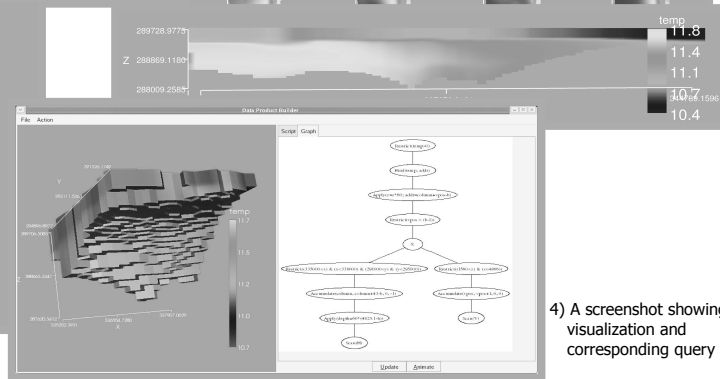
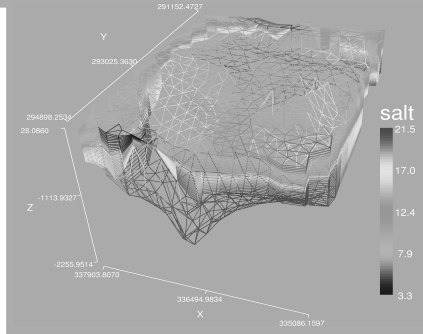
<http://datalab.cs.pdx.edu/cormorant/>

1) Average salinity over depth in the estuary of the Columbia River, Oregon, USA.



2) The plume of fresh water extending into the ocean from the mouth of the Columbia River, Oregon USA. Each panel represents a different month of 2004. In the summer, the plume swings southward and drifts out to sea. In the winter, the plume swings northward and hugs the shore.

5) Salinity data bound to a 3-dimensional grid.

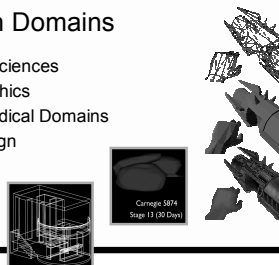


3) A vertical *transect* of temperature along a deep channel in the Columbia River, Oregon, USA.

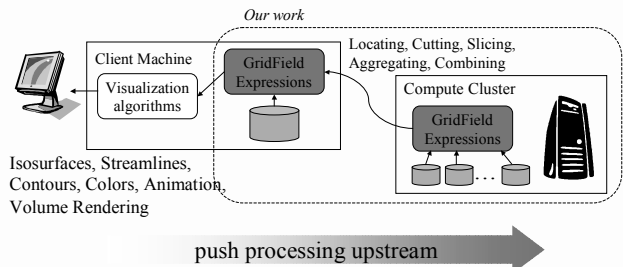
4) A screenshot showing a visualization and corresponding query plan

Motivating Application Domains

- Simulation in the Physical Sciences
- Model Libraries for 3D Graphics
- Numerical Studies in Biomedical Domains
- Architecture, Industrial Design

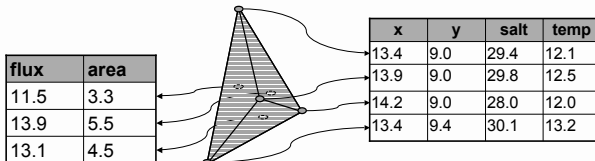


Theme: Separate Data Manipulation from Data Visualization

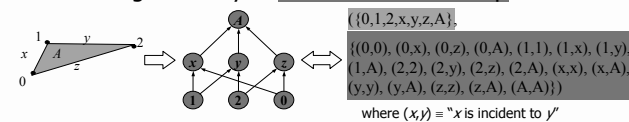


GridFields: Modeling Scientific Datasets

Attributes bound to the cells of a *grid*



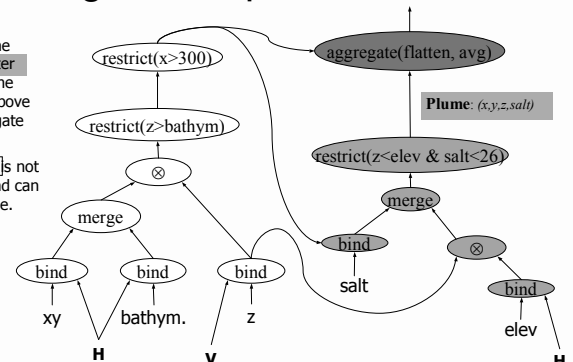
Grid cells organized by an *incidence relationship*



GridField Algebra Expressions

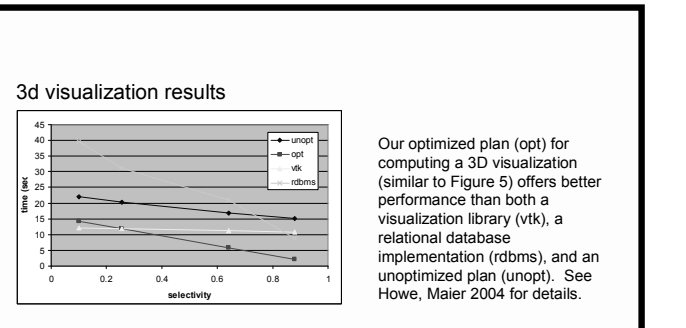
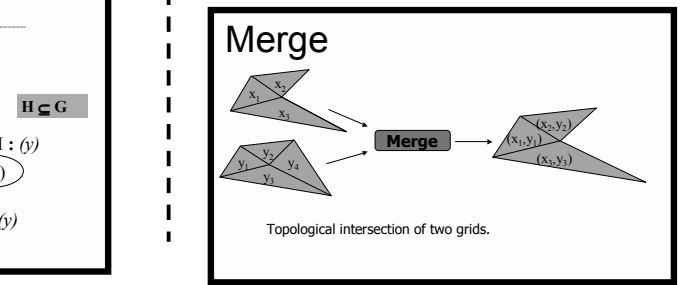
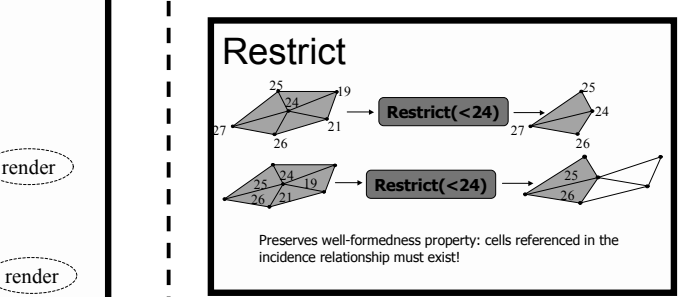
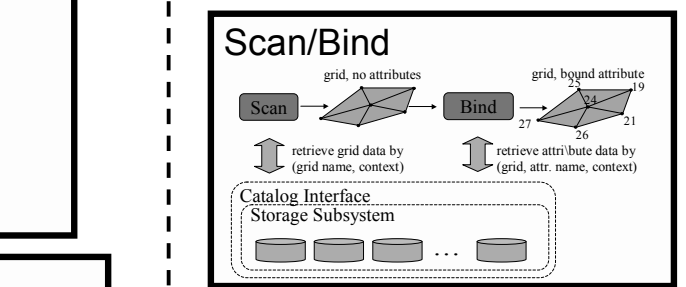
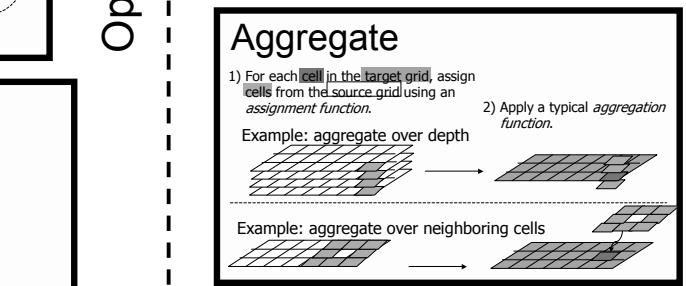
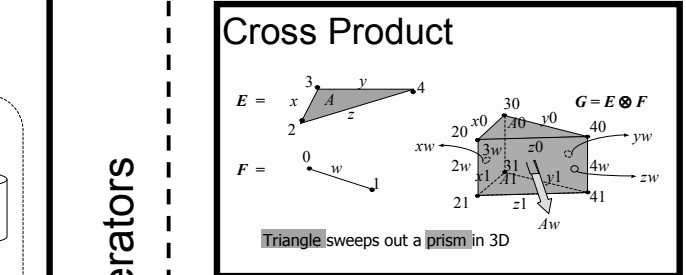
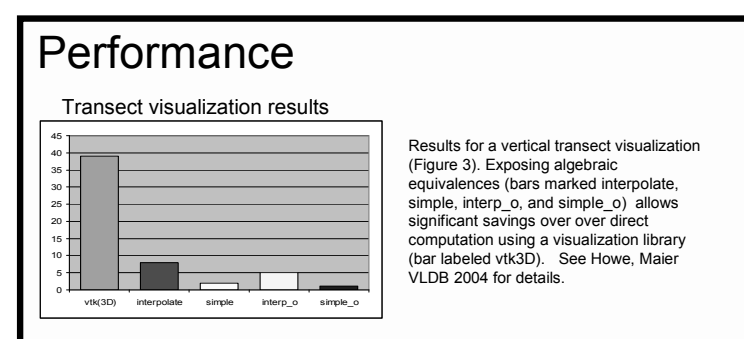
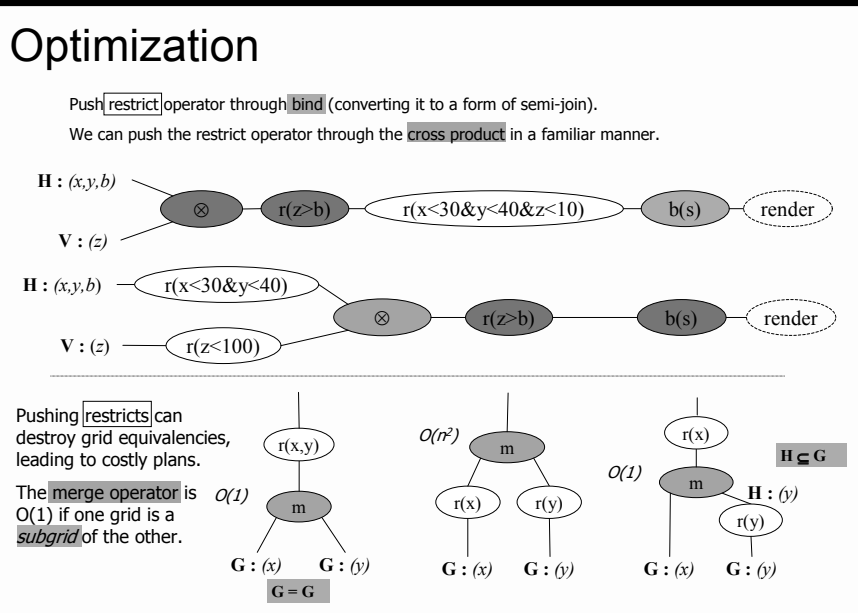
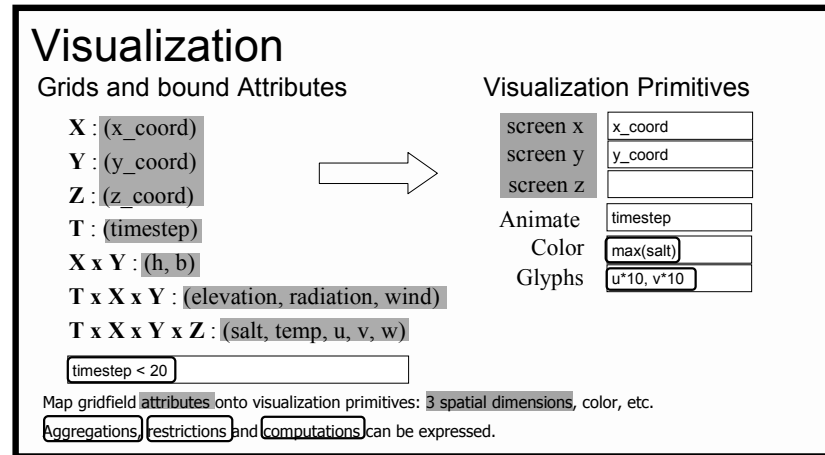
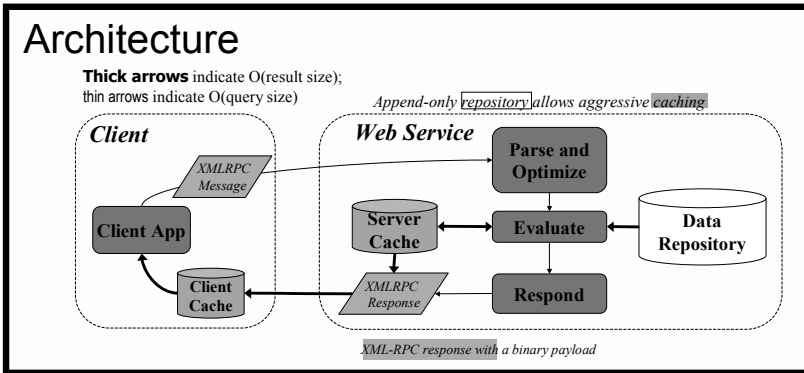
Plan to compute the plume of fresh water that juts out into the ocean (Figure 3, above right), then aggregate over depth.

The left-hand side is not time-dependent and can be computed offline.



GridFields: Querying and visualizing Gridded Datasets for e-Science

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Operators