Scalable, Server-side Mapping in Drupal with the Geocluster-Leaflet Stack

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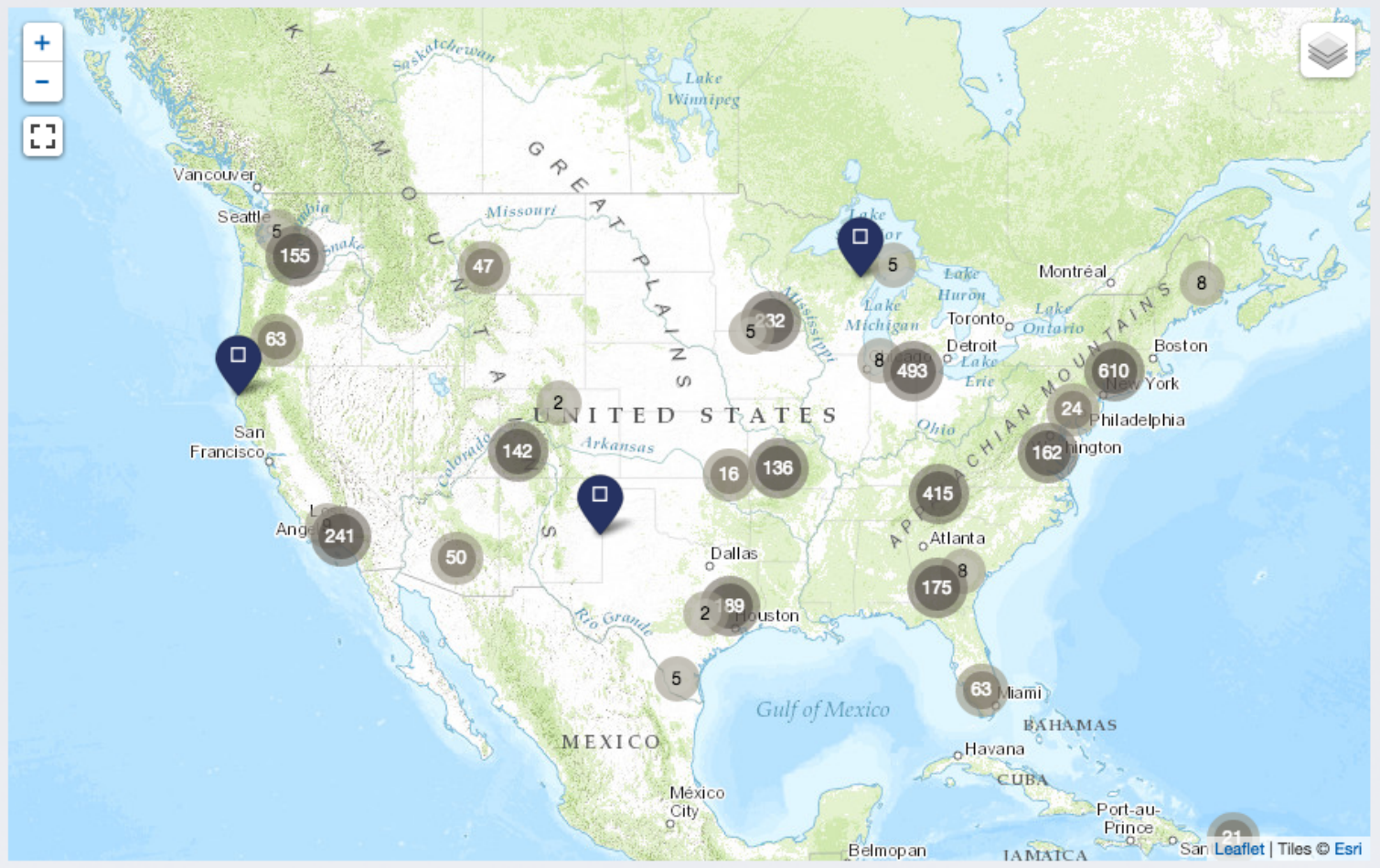
Phase2

Phase2 Technology

DEV Lunch - November 3, 2014

Demo a Thing

http://vistacampus.gov/map



The Recipe

Basic Recipe

- Address Field (location storage)
- Geocoder (geocoding addresses, requires GeoPHP)
- Geofield (geocode storage)
- **Geocluster** (server-side clustering)
- Views
- Views GeoJSON (GeoJSON feeds)
- Leaflet GeoJSON (2.x for Panels support, 1.x for Bean)
- Leaflet Integration (requires Leaflet core library)

But... we need lots of patches.

A Working Model

The client build has been released as GPL2.0

- https://github.com/mpgeek/VistaMap

Patch mania! How about a makefile?

- https://github.com/mpgeek/VistaMap/blob/master/vista_map.make

Key Architectural Feature

Geocluster Keys

- Clustering is performed at the query level by Geocluster
- PHP and JS only see the clusters as single (Views) rows.
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But How?

- By geohashing!

Geocluster & Geohash

In a nutshell:

- Geocluster adds a hierarchical, spatial index to geofields based on the Geohash algorithm.
- Each geofield has columns for varying levels of precision (geohash index) created/updated on `entity_save`.
- A query for points/clusters specifies a geohash index and asks for clusters based on that index.

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Notice:

- The clustering information is created when the content is created.
- A request for points and clusters doesn't actually cluster. Rather it's a simple query of a spatial index.

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Monolithic Clusters

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- `vista_map.module`, lines 115-155

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AJAX!

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- `vista_map.js`, lines 324-404

Current-user Zoom

Focus the Map on the Current-user's Location

- One of the purposes of the map was to emphasize making local connections.
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- One of two data layers needed to geocode only to ZIP-code precision.
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Multiple Data Layers

Implement Data Layering and Panels Support

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- Views necessitated that different source geofields be separate data layers.
- Contiributed the 2.x branch of Leaflet GeoJSON for panels support with multiple data layers (https://www.drupal.org/node/2225815)

Scalability Requirement

How big did we need to go?

- Mapping user profiles, about 18k users were migrated
- Originally, it was expected that all users would be map
- Application scale, then is 10^4

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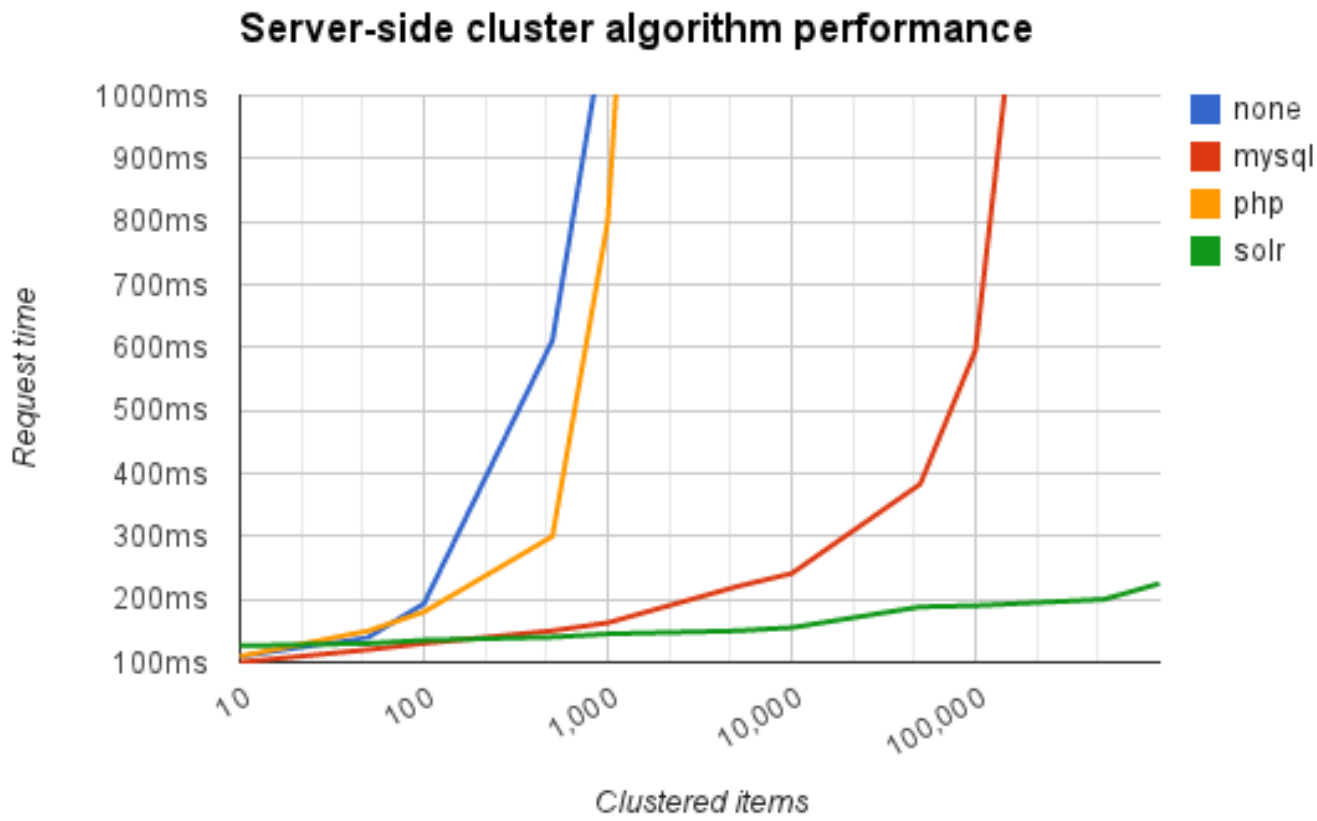
Geocluster's clustering backend is pluggable

- PHP clustering (post-query clusternig)
- MySQL clustering (query-level clustering)
- Apache solr clustering (alternative query-level clustering)

Scalability Metrics

Cold caches



We implemented MySQL clustering

Possible Improvements

Geocluster

- Progressively enhance with client side clustering below a certain point threshold.
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- Make data feeds cacheable by quantizing bounding box parameters.
  `/$view_url?bbox=$left,$right,$top,$bottom?zoom=$zoom_level`
  - The `bbox` arguments are floating-point numbers that depend on viewport size and zoom. Takes a long time for caches to warm up for non-mobile viewports.
  - https://www.drupal.org/node/1868982