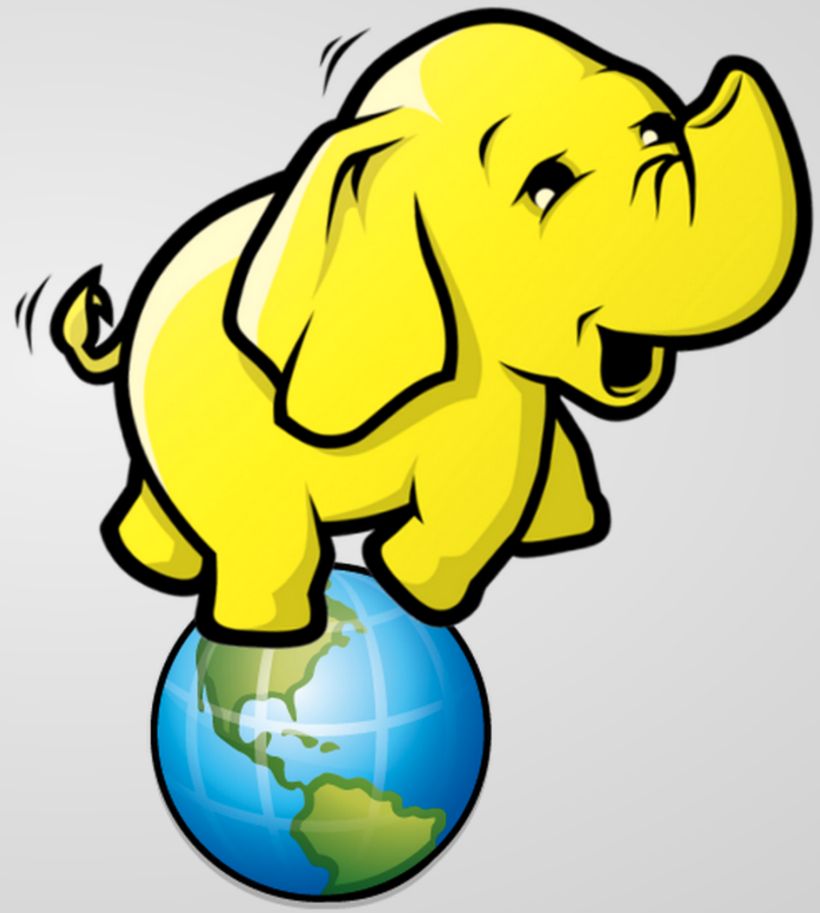
Big Data: Using ArcGIS with Apache Hadoop



David Kaiser @ddkaiser
Michael Park

Esri DevSummit 2013

Session Offering ID: 301

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GIS Tools for Hadoop

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...and your users can leverage your Hadoop applications from within the ArcGIS Geoprocessing environment

Who is a Data Scientist?

from within the ArcGIS Geoprocessing environment

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Finding Your Data Scientist

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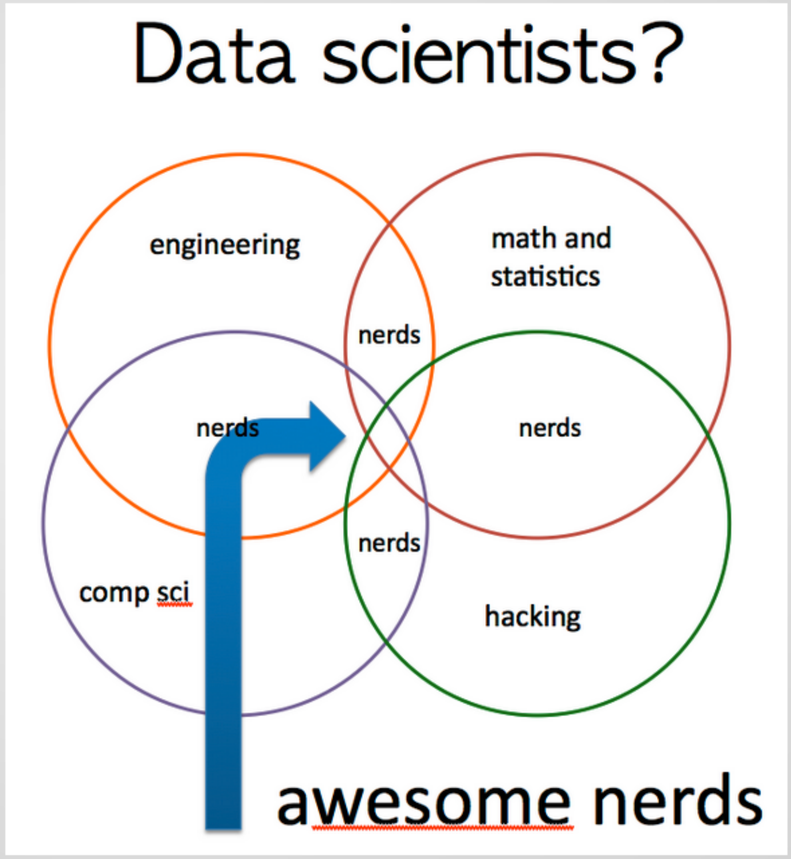

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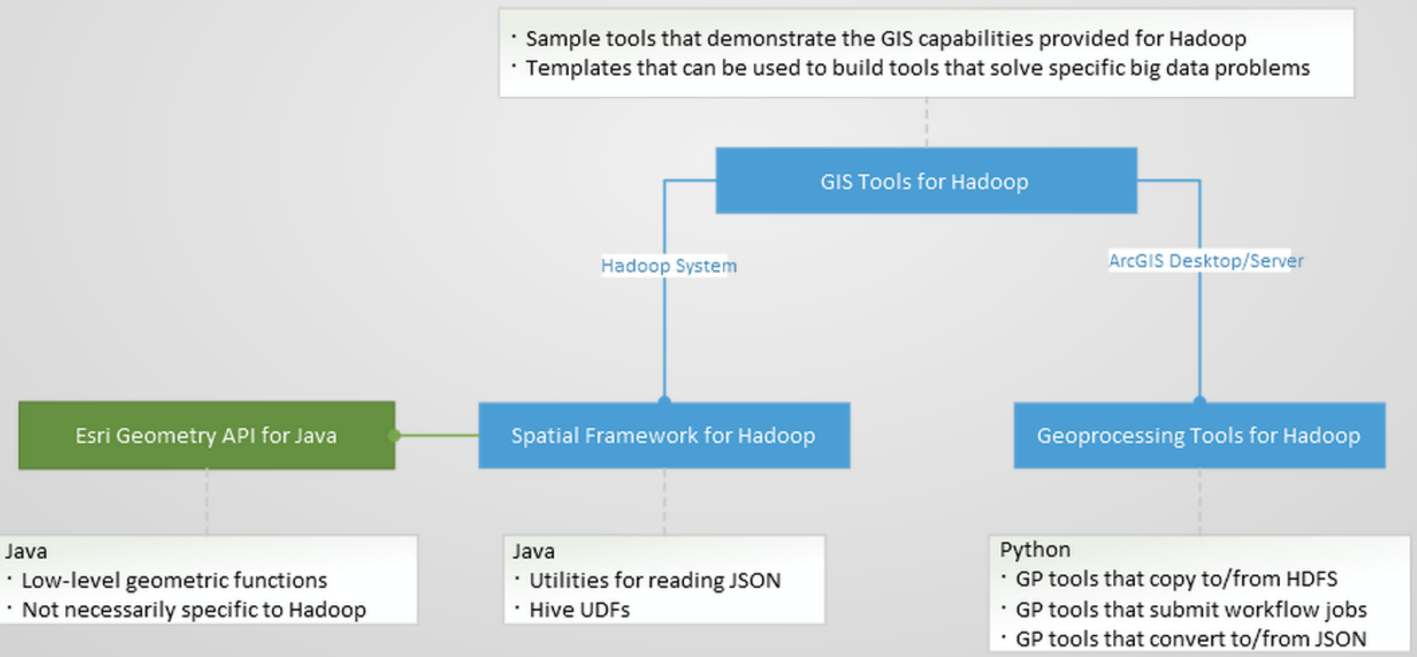
- Sample tools that demonstrate the GIS capabilities provided for Hadoop
- Templates that can be used to build tools that solve specific big data problems



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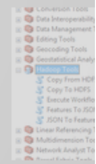

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Demo

Geometry API for Java

Simple API Functions for Java

com.esri.core.geometry.*

Relationship Analysis Operations

Spatial Framework for Hadoop

Enables developers to:
- spatially enable MapReduce applications

Enables Hadoop users to:

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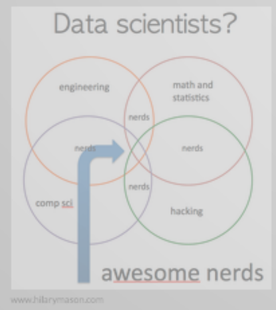

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Relationship Analysis

- equals
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Operations

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- Hive UDF's

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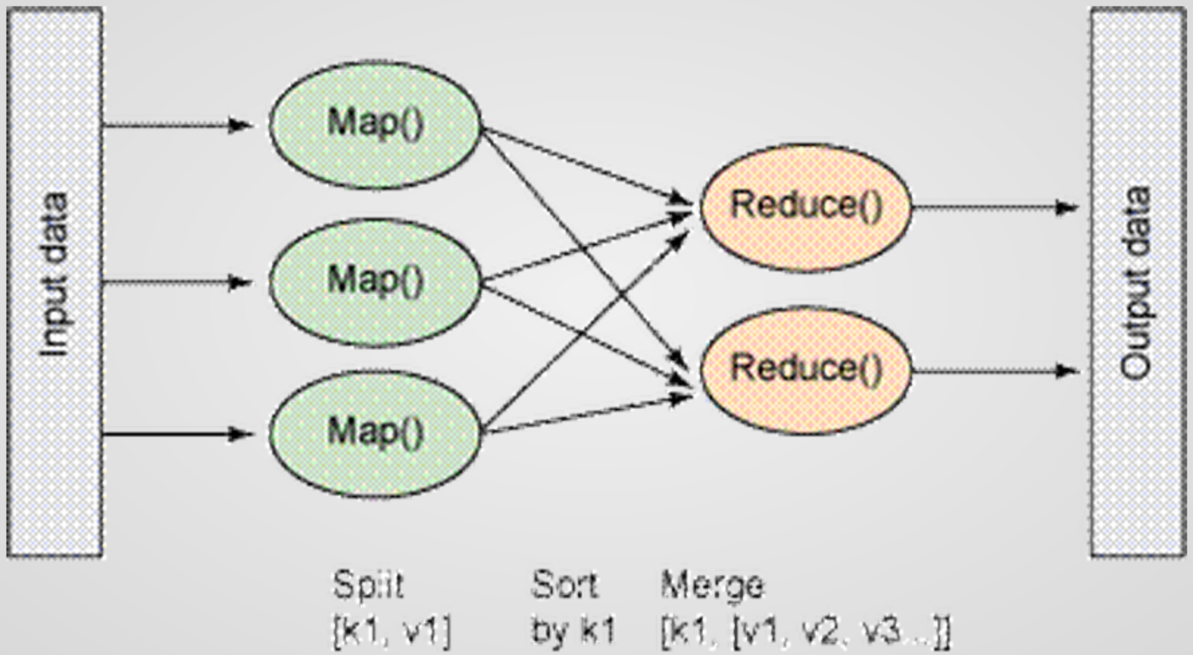
Accessing geometries from Hadoop Data Sources

- **com.esri.hadoop.json** - access JSON data as arrays of 'features'
- **com.esri.core.geometry** - construct geometry from arguments

https://github.com/Esri/spatial-framework-for-hadoop/wiki/JSON-Formats

Developing Custom MapReduce Apps



GP tools that convert to/from JSON

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Hadoop

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Simple MapRed

```
void setup() {
  iStream = hdfs.open(new P
  featureClass = EsriFeature
}

void Map(Long key, Text val
  float longitude = Float.pars
  float latitude =  Float.pars
  Geometry point = new Poi

  for (EsriFeature feature : f
    if (GeometryEngine.cont
      String name = feature.a
      context.write(new Tex
      found = true;
      break;
    }
  }
}
```

https://github.com/Esri/gis-to

Demo

Simple MapReduce Code Sample

```
void setup() {
  iStream = hdfs.open(new Path(config.get("input")));
  featureClass = EsriFeatureClass.fromJson(iStream);
}

void Map(Long key, Text value) {
  float longitude = Float.parseFloat(values[COL_LONG]);
  float latitude =  Float.parseFloat(values[COL_LAT]);
  Geometry point = new Point(longitude, latitude);

  for (EsriFeature feature : featureClass.features) {
    if (GeometryEngine.contains(feature.geometry, point) {
      String name = feature.attributes.get(LABEL_ATTR);
      context.write(new Text(name), data);
      found = true;
      break;
    }
  }
}
```

https://github.com/Esri/gis-tools-for-hadoop/tree/master/samples

Demo

ST_Geometry in Hive

```
SELECT counties.name, count(*) cnt FROM counties

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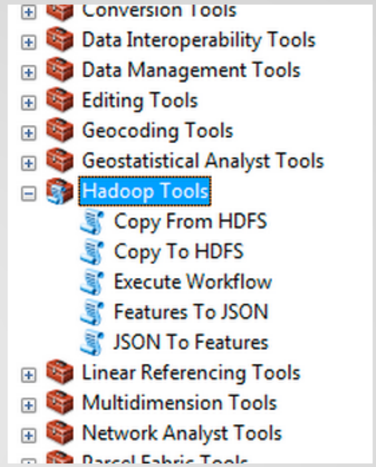

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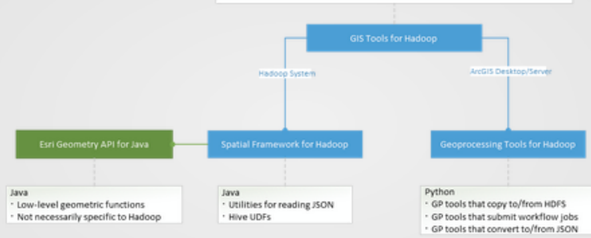

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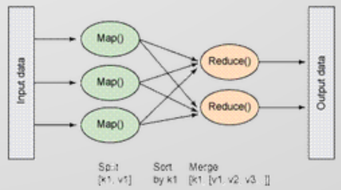

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