

# Coastal Reports and Ocean Finder



Next-Gen Marine Spatial Planning - NOAA NCCOS

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# Research & Development

## What's Going On In the Axiom Lab?

Pilot projects

High risk

Higher reward



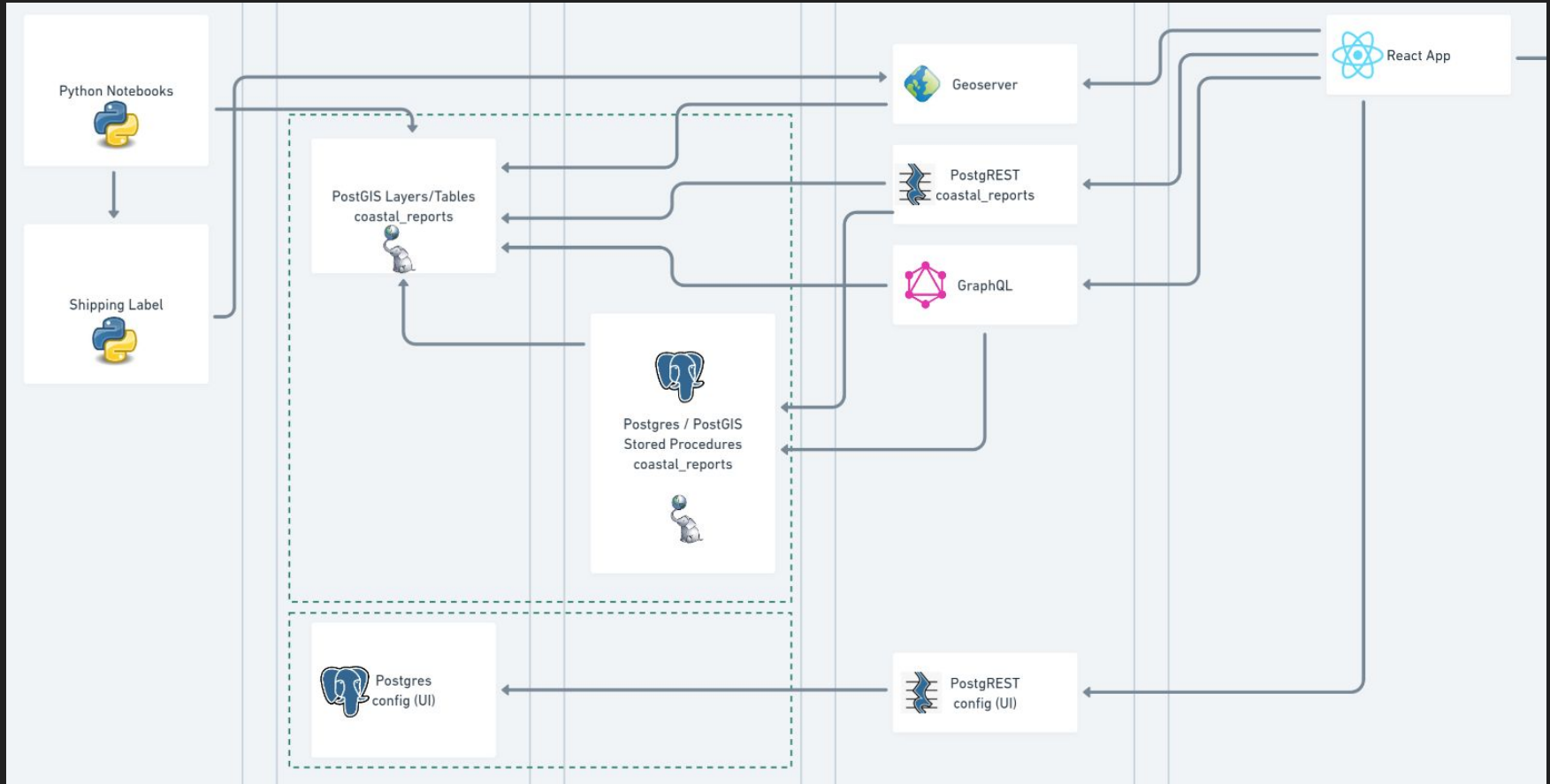
# Coastal Reports

Goal: Building upon the Ocean Reports approach, develop an automated marine spatial planning application for regional coastal waters of the U.S.



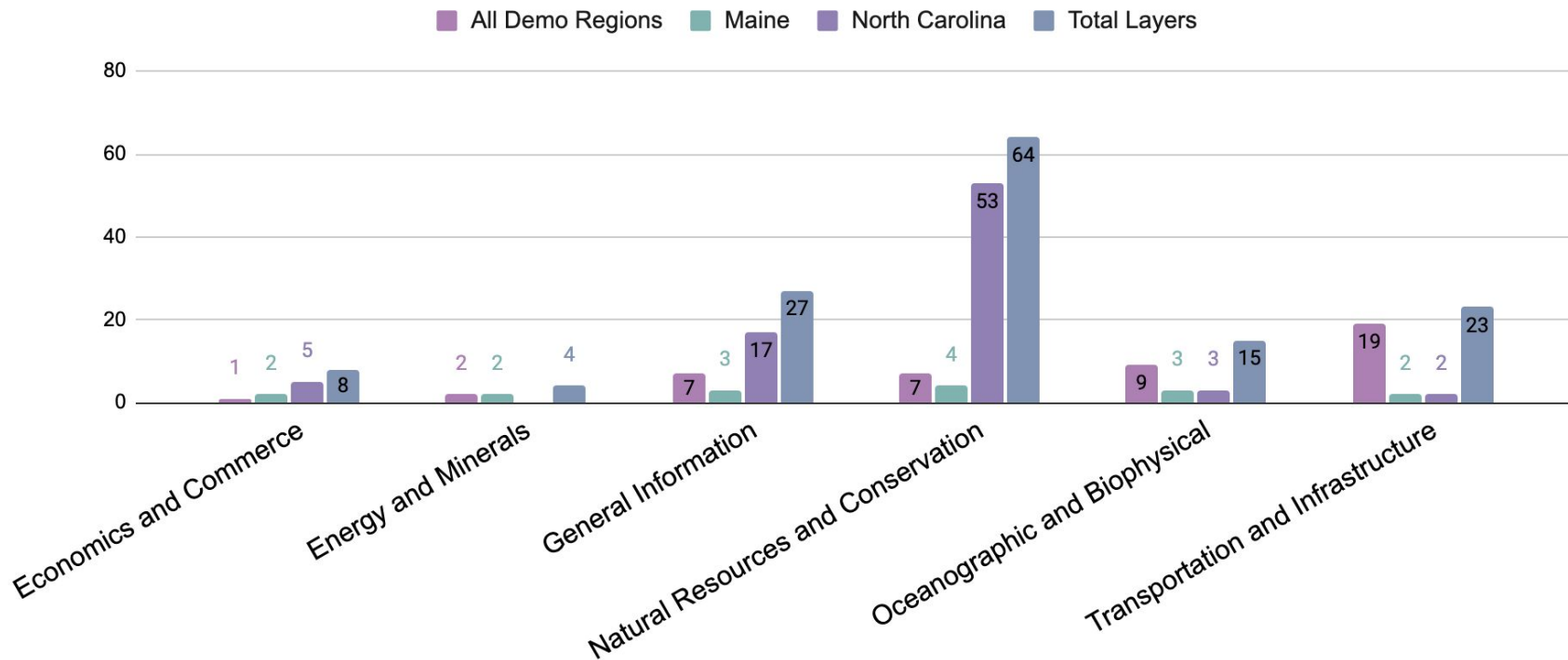
Draw a polygon in the coastal zone and produce analytics and multidisciplinary reports for different stakeholder groups

# Coastal Reports



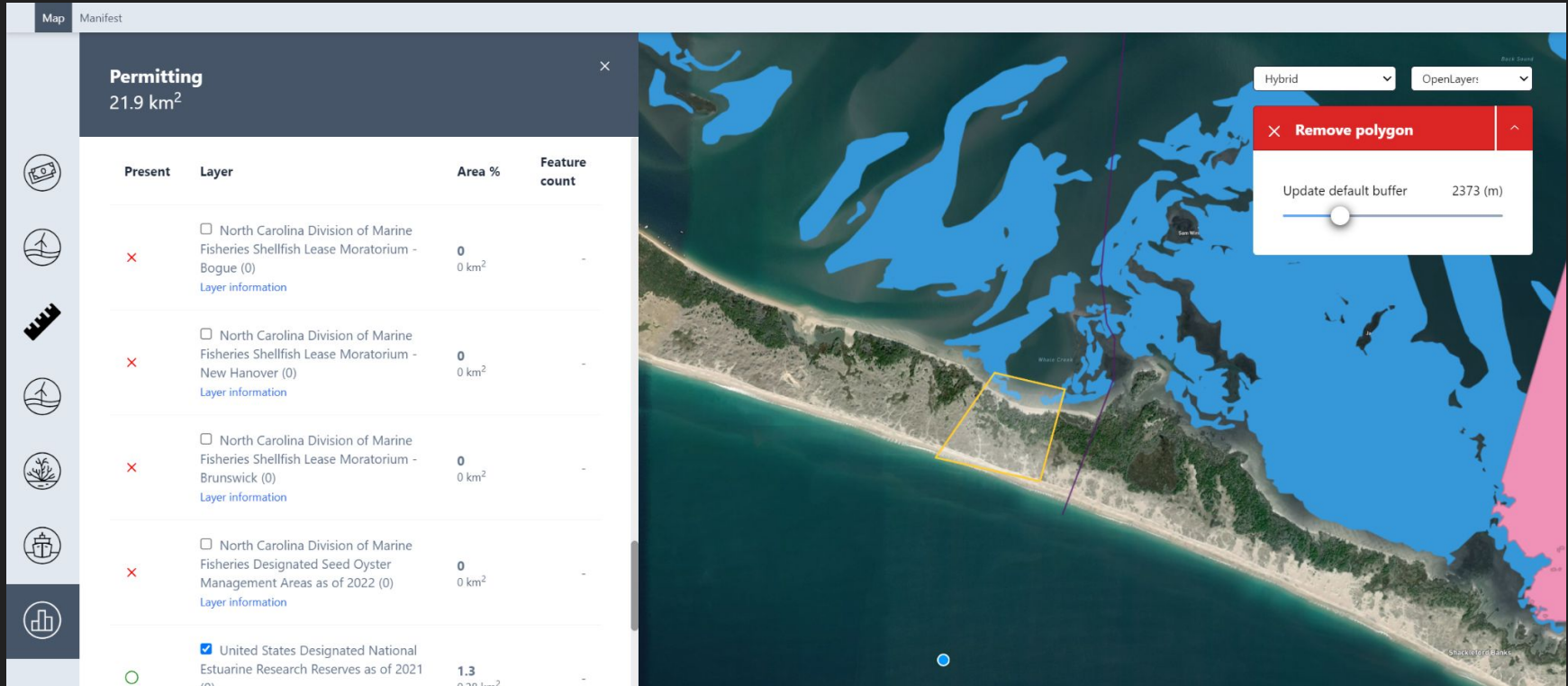
# Coastal Reports

Ingested Layers per Region



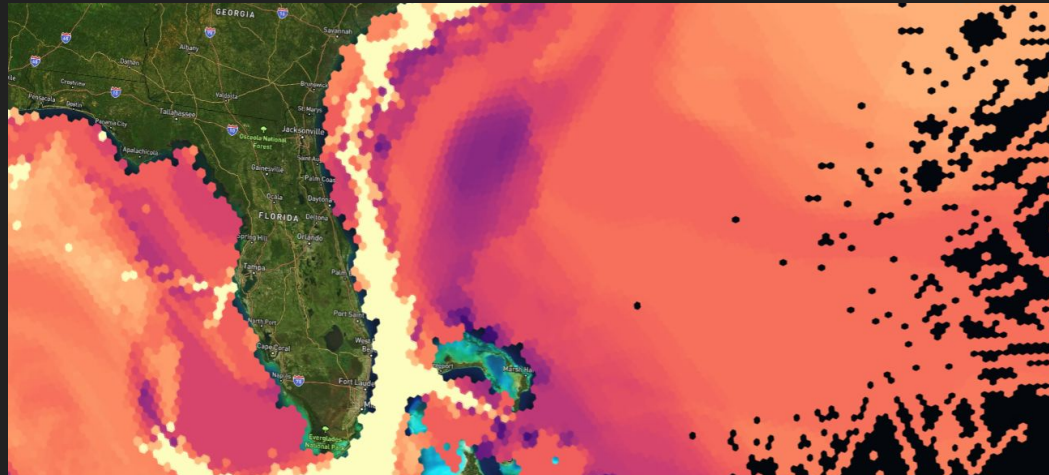


# Coastal Reports

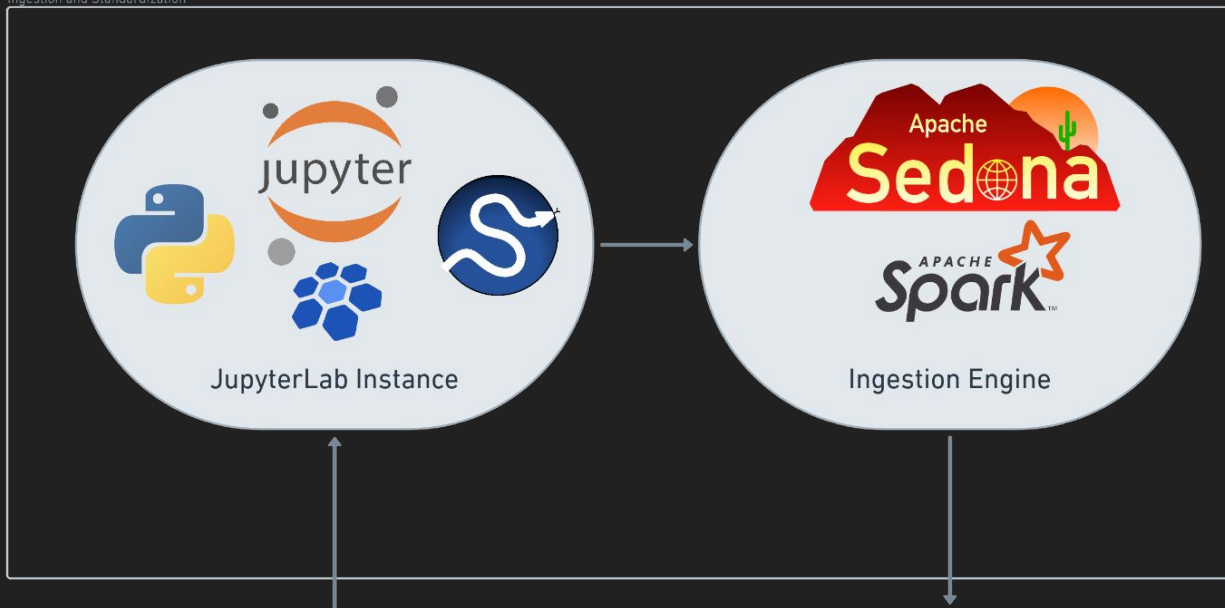


# Ocean Finder

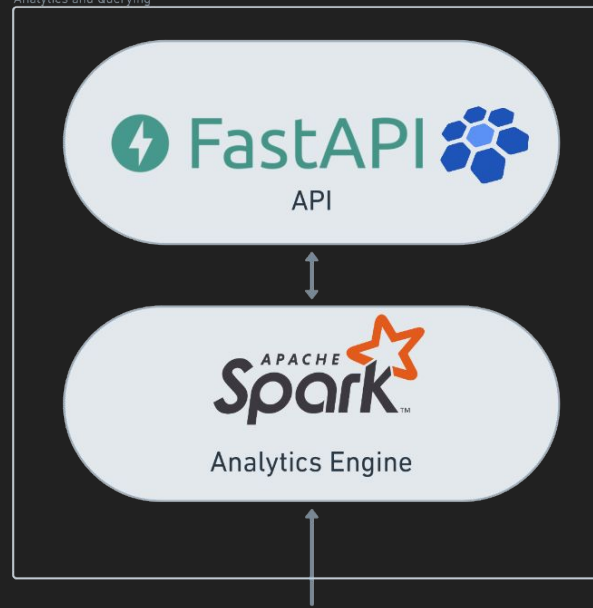
Challenge: Develop a performant and scalable geoanalytics engine to determine spatial suitability analytics based upon arbitrary defined user criteria across multidisciplinary datasets and formats within the US EEZ



Ingestion and Standardization

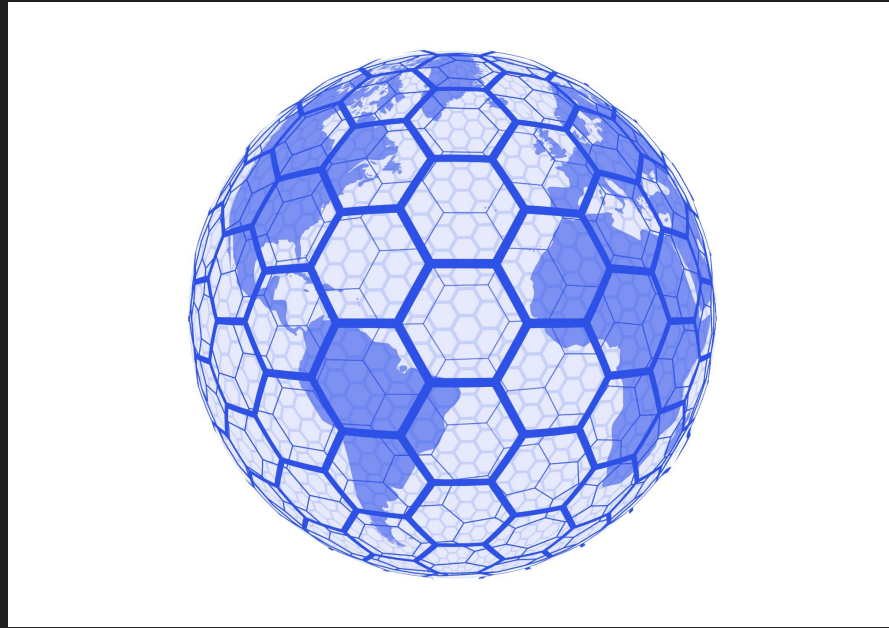


Analytics and Querying




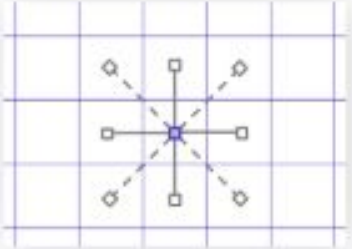
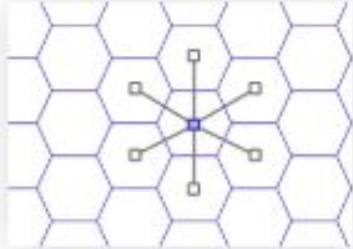


# What is H3?



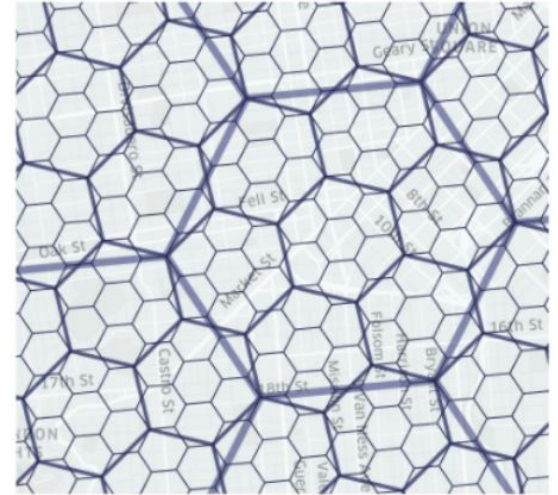
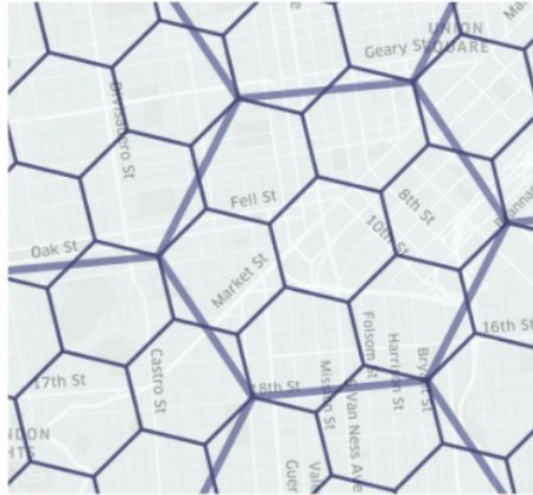
Hexagonal hierarchical geospatial indexing system with high performance algorithms for spatial operations

# Oh hexagon, how I love thee, let me count the ways

| Triangle  | Square   | Hexagon   |
|---|--|---|
|  |  |  |
| Triangles have 12 neighbors   | Squares have 8 neighbors   | Hexagons have 6 neighbors   |

## Hexagon tessellation pattern ideal for spheroids and spatial analytics...hexagons ARE the bestagons

# H3 hierarchical nesting



Aperture 7 mesh - 14 levels down to 1 sq meter  
All hexes mapped (intelligently) to 64 bit integer metric

# What is Apache Spark?

Unified engine for large-scale data analytics

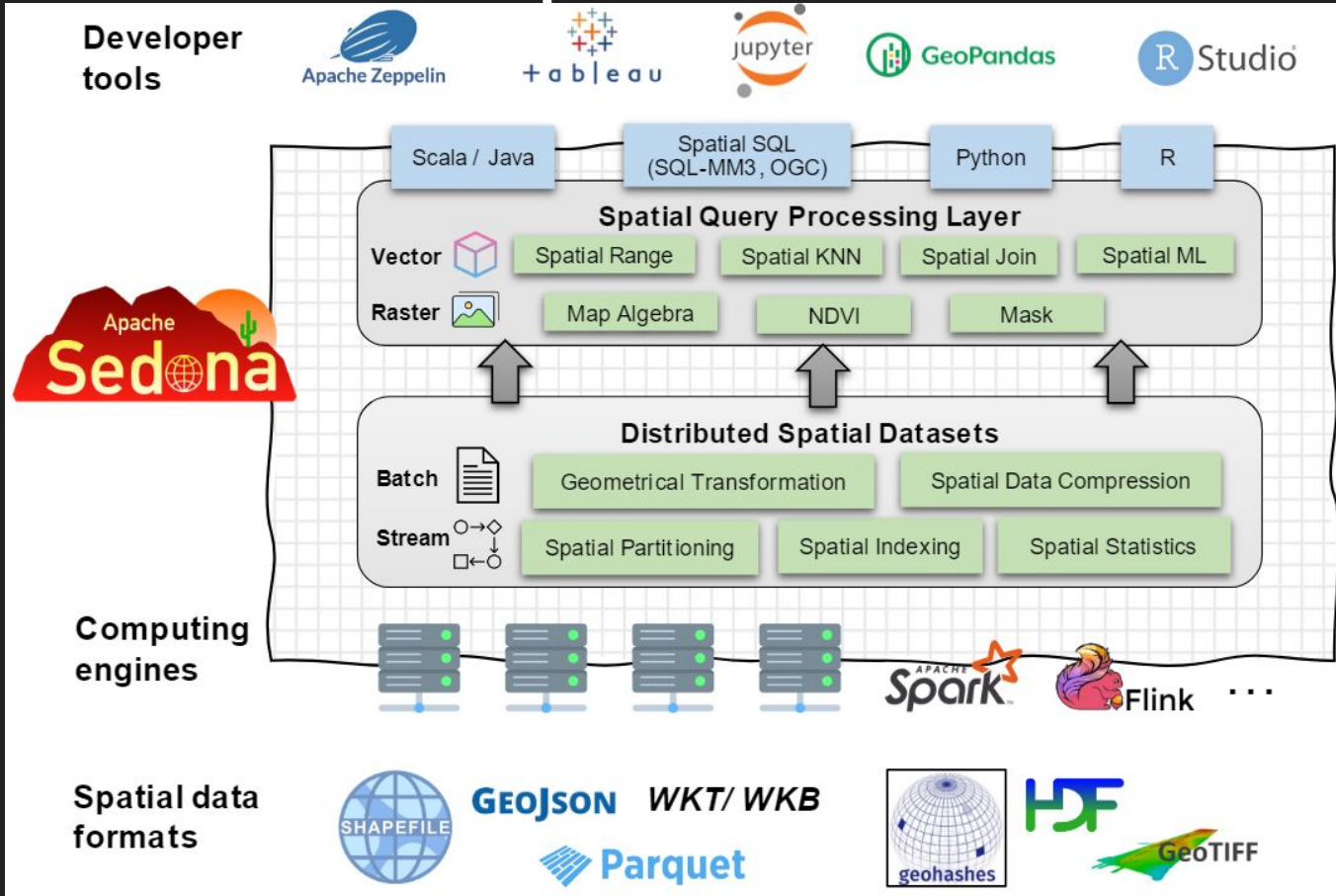
Larger than memory data processing workflows

Stream or batch workflows

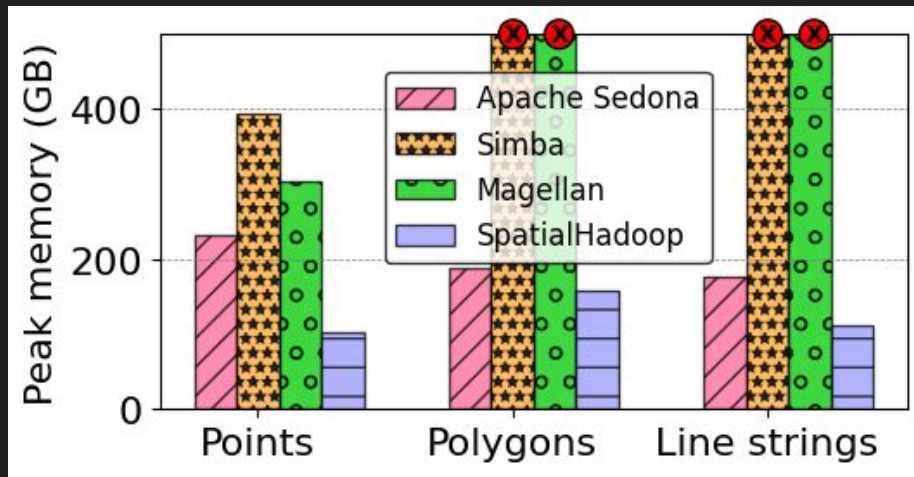
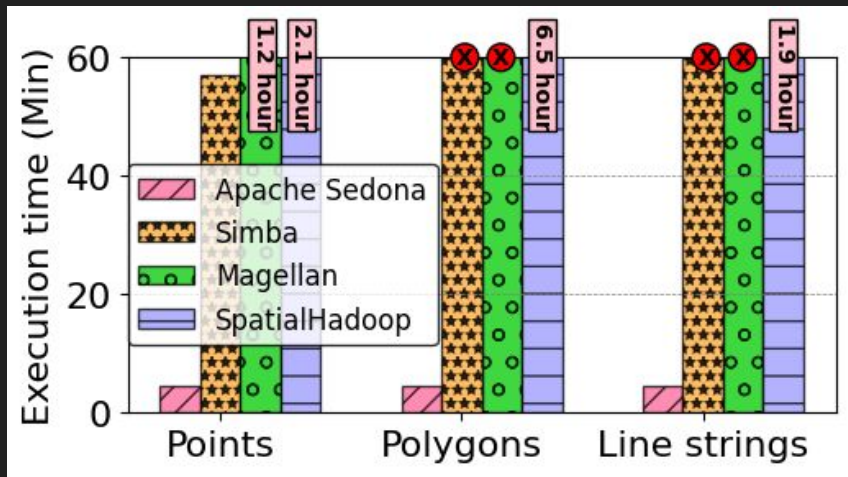
Compute processing scalability through clustering



# What is Apache Sedona?



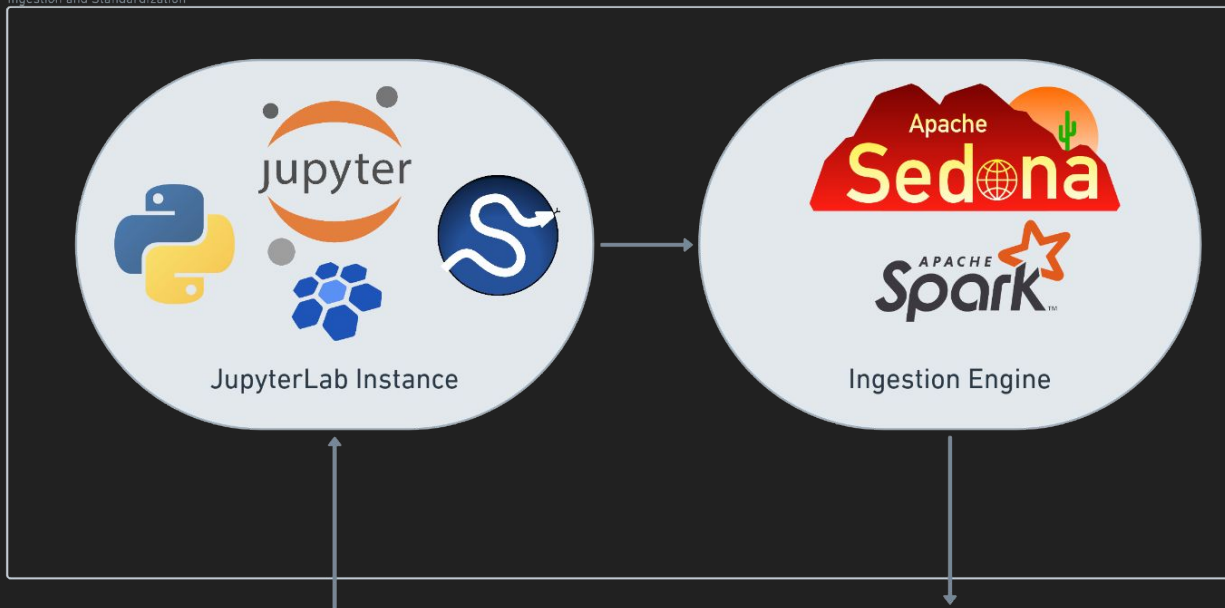
# Apache Sedona vs the competition



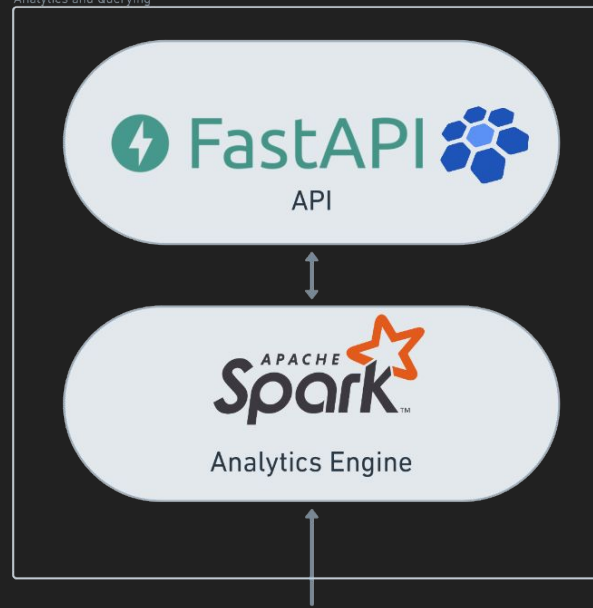
## Spatial Joins



Ingestion and Standardization



Analytics and Querying



# Ocean Finder

