



Launch your knowledge of Oracle Database with

Databasics

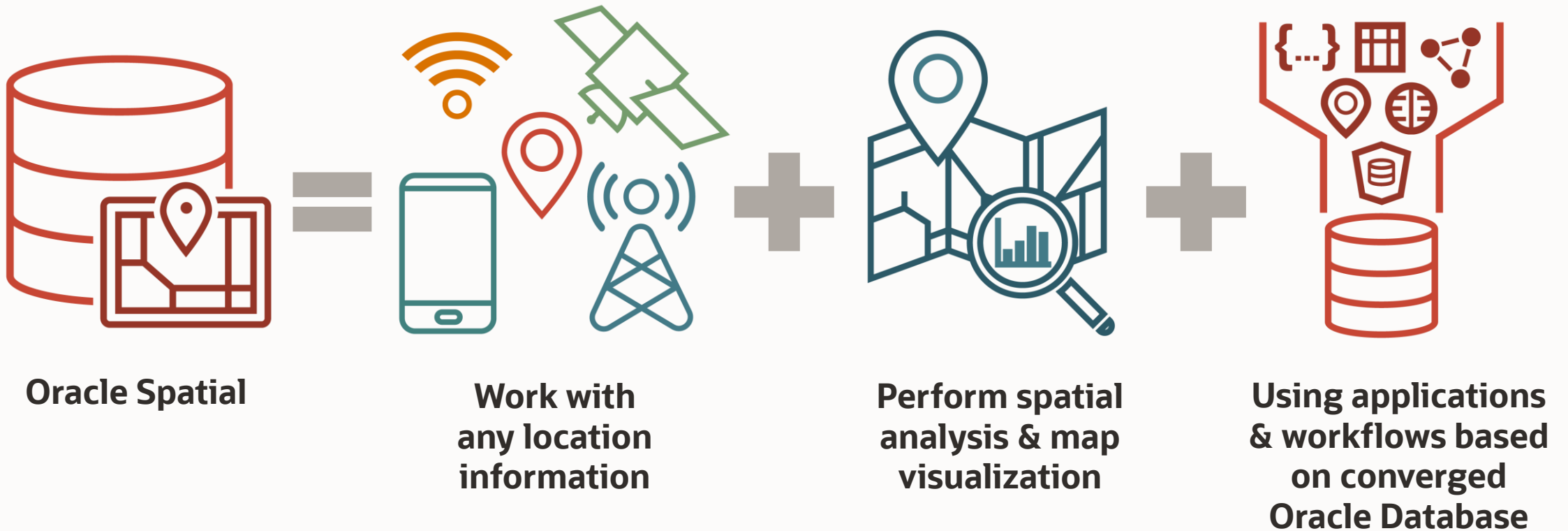
Oracle Spatial

Location and Maps in Oracle Database



Why would you use Oracle Spatial?

Enabling location analysis in business operations and workflows



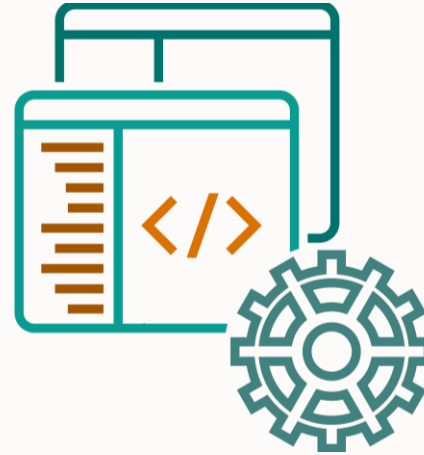
What is Oracle Spatial?



Spatial features in converged database

In-database functionality to

- Store and manage all kinds of geospatial data
- Perform spatial analysis where the data resides



Components, APIs & Services

Developer toolbox for

- Map visualization
- Advanced analytics
- Access to spatial functionality and processing workflows



Spatial Studio

Self-service tool to

- Enable non-experts to more easily analyze data
- Help developers build applications more quickly

What is Oracle Spatial?

Spatial Studio: Self-service access to Spatial features



What is Oracle Spatial?

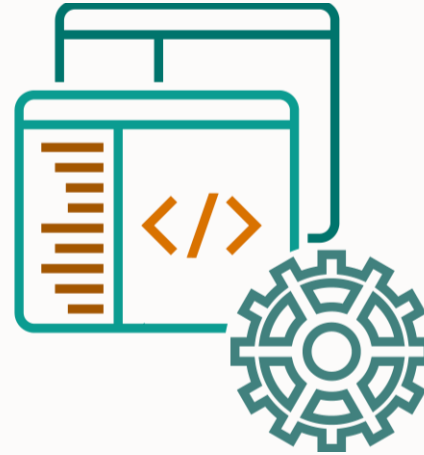
Deployment



Spatial features in converged database

Integral part of

- Autonomous Database
- ExaCS and ExaC@C
- Database Cloud Service
- Database on-premises



Components, APIs & Services

Deployed on

- OCI Compute
- Available on OCI Cloud Marketplace
- On-premises



Spatial Studio

Deployed on

- OCI Compute
- Available on OCI Cloud Marketplace
- On-premises

Why would you use Oracle Spatial?

Benefits of Oracle Spatial



Become Data Driven

- Discover location relationships and influences
- Combine geospatial data with all other business data
- Perform analysis where data resides



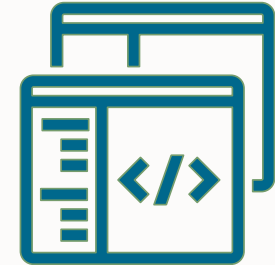
Reduce Operational Cost

- One database for spatial and non-spatial data
- No data fragmentation or copy contagion



Lower Risk

- Security and scalability from Oracle Database
- High availability from Oracle Database
- No vendor lock-in - Support for standards and 3rd party tools

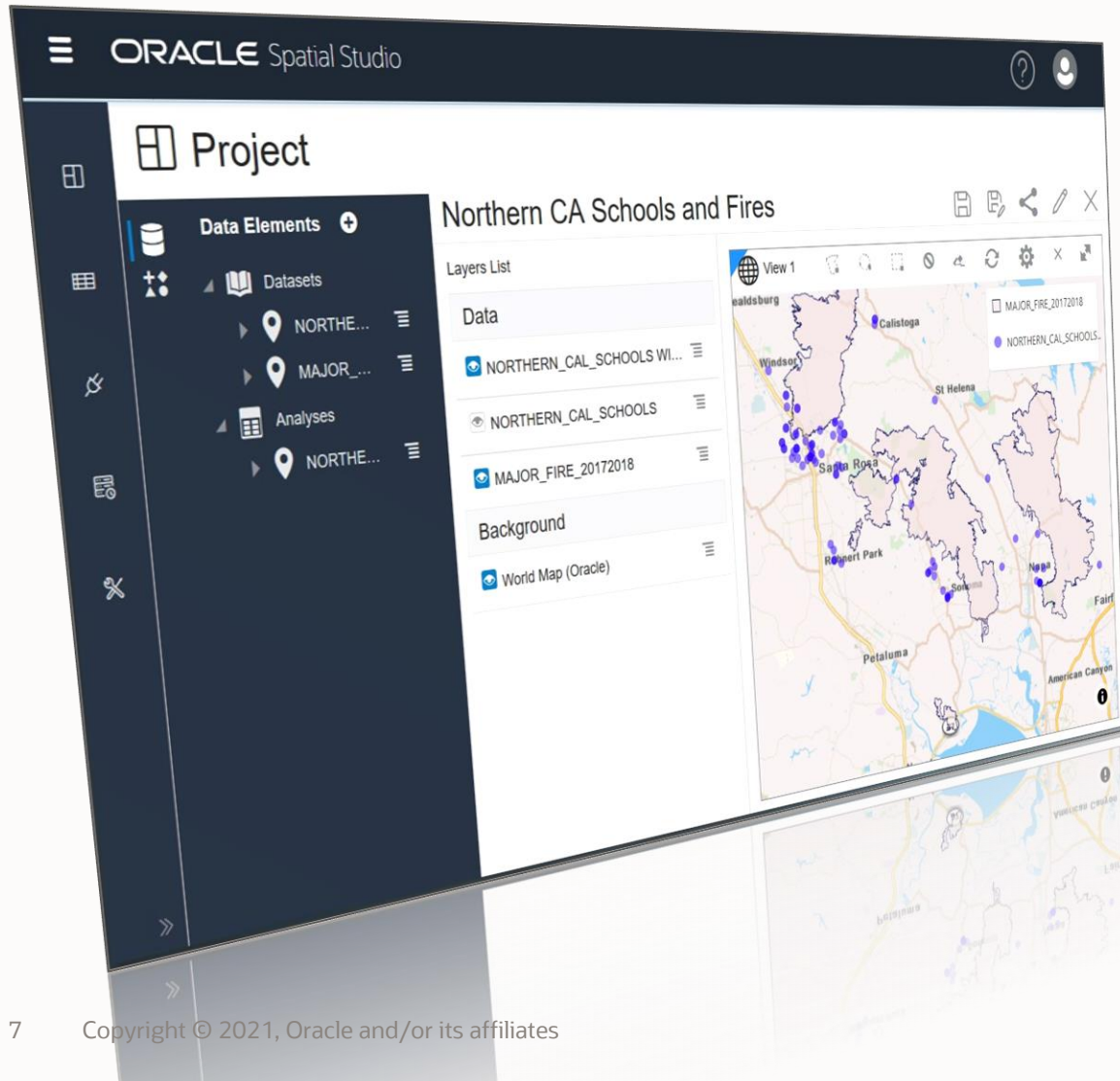


Lower Development Effort

- No-code GUI tool for maps and analysis
- Use popular languages and application frameworks
- Synergy across features

How does Oracle Spatial work?

Analytics on simple geometries



Datatype to store geometry data

- Point geometries
- Line geometries
- Areas (Polygons)

Proximity analysis and spatial filtering

- Nearest-neighbor queries
- Computation of spatial relationship (eg. inside, overlap, touch, ...)

Spatial aggregations, buffer calculations

- Merging several geometries into one
- Within-distance queries

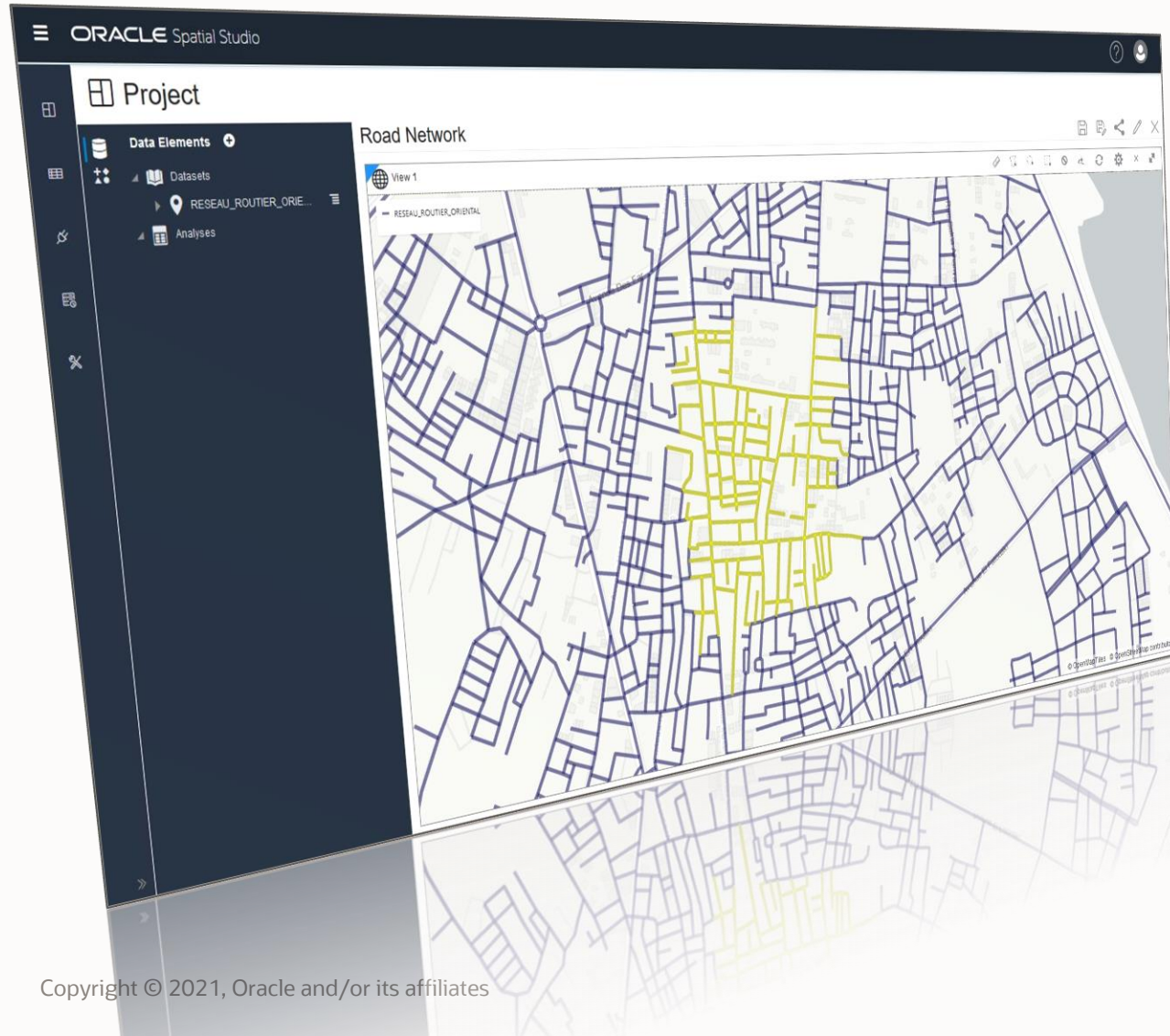
Distance and area computations

Spatial index for fast access



How does Oracle Spatial work?

Analytics on network data



Data model to store and analyze network data

- Designed for road, rail, or utilities networks
- Based on graph consisting of nodes (connection points, devices) and edges (cables, pipes)

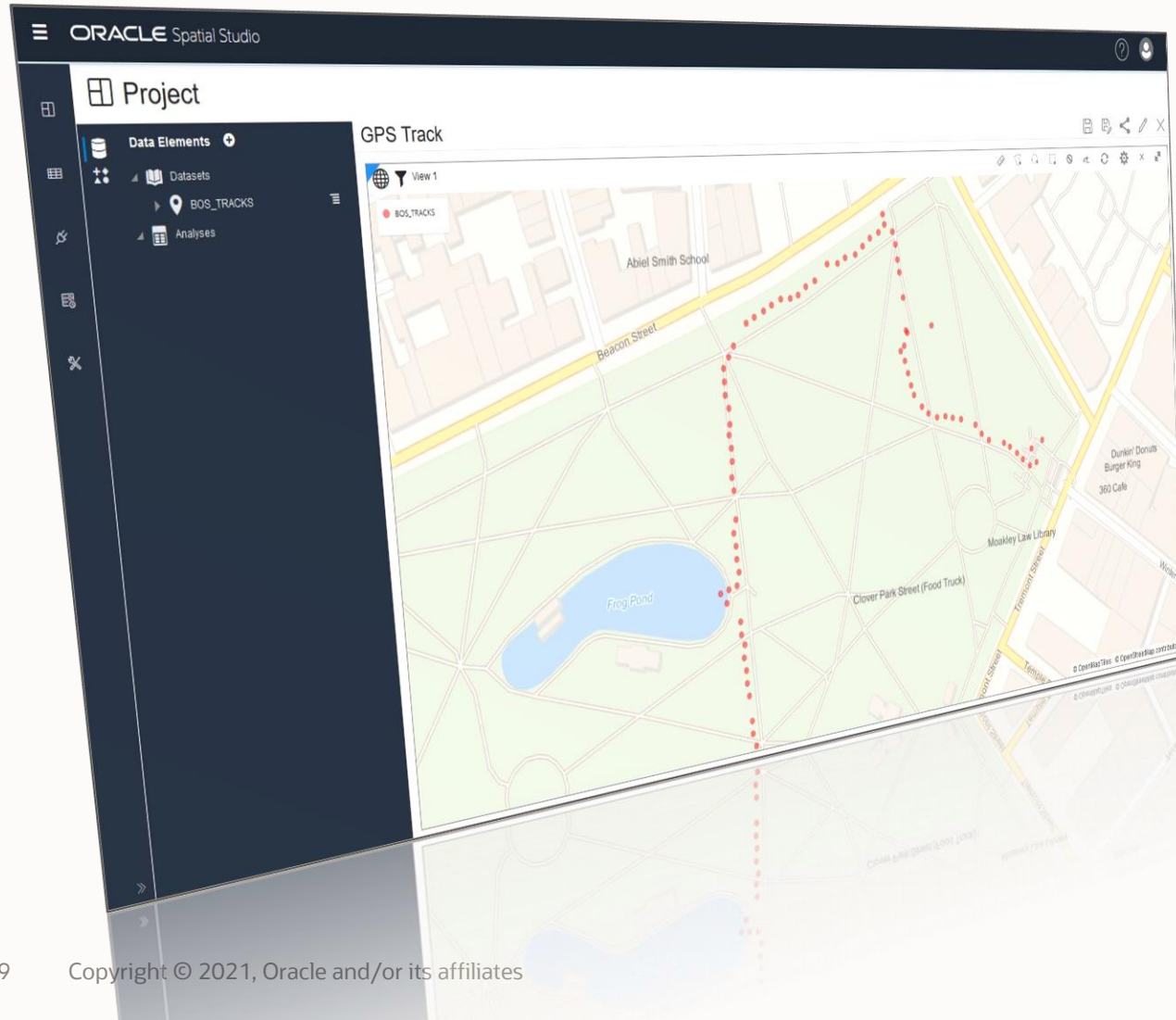
Connectivity and reachability analysis

- Shortest path calculation, traveling salesman computation, reachability within cost, etc.

Routing engine implemented as service on mid-tier

How does Oracle Spatial work?

Support for streaming data



Interfaces to ingest position data from GPS devices and other IoT sensors

- Managing constant transmission of data
- Location data plus timestamp

Tracking and tracing

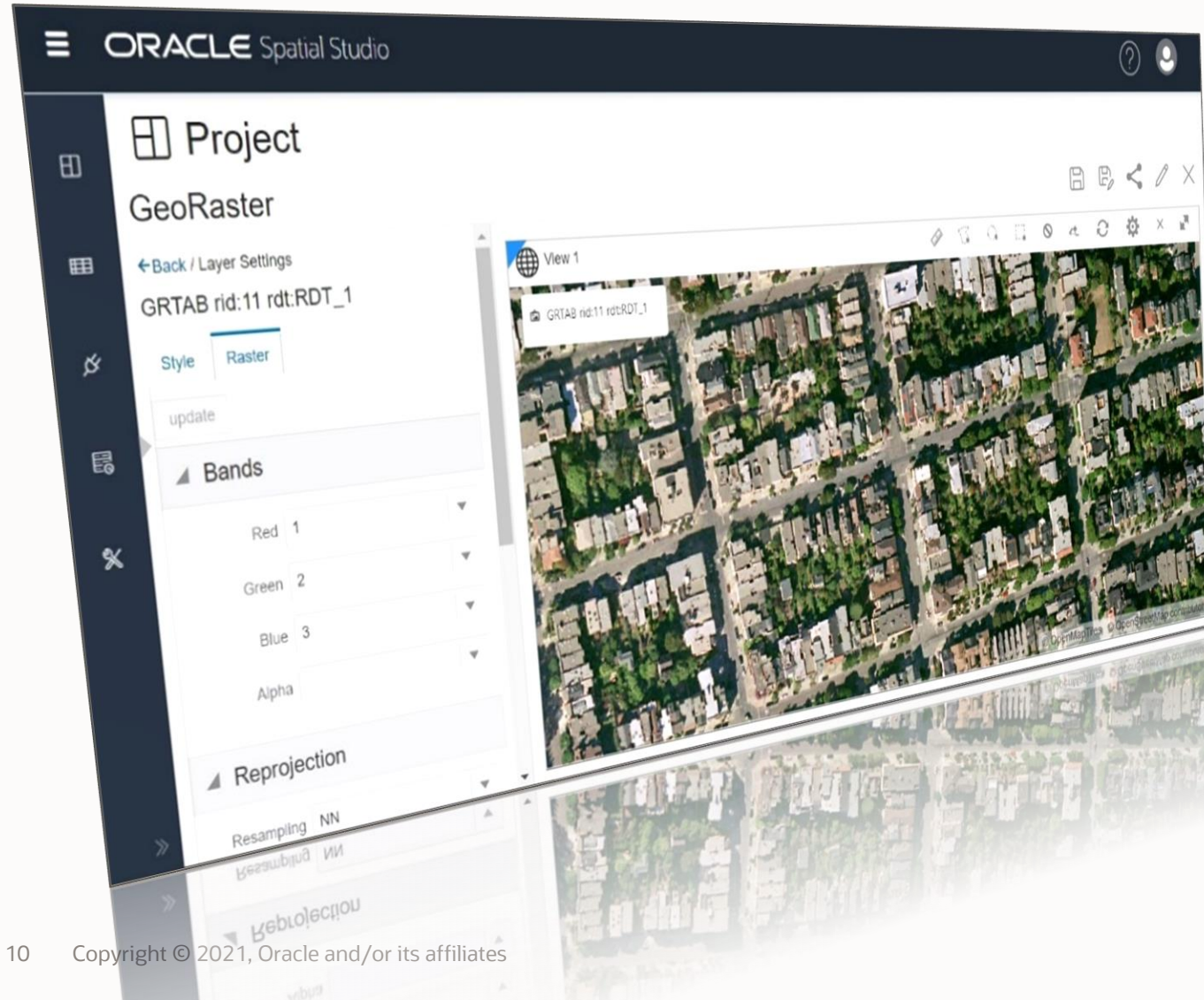
- Geofencing – alert upon exit from/entry to predefined area
- Contact tracing

Event-driven architecture



How does Oracle Spatial work?

Support for raster data



Data type to store georeferenced raster data

- Satellite images, aerial images

Designed for huge data volumes

Raster data processing, eg.

- Geometric rectification
- Stitching together multiple images as mosaics

Raster analytics, eg.

- Computation of vegetation index

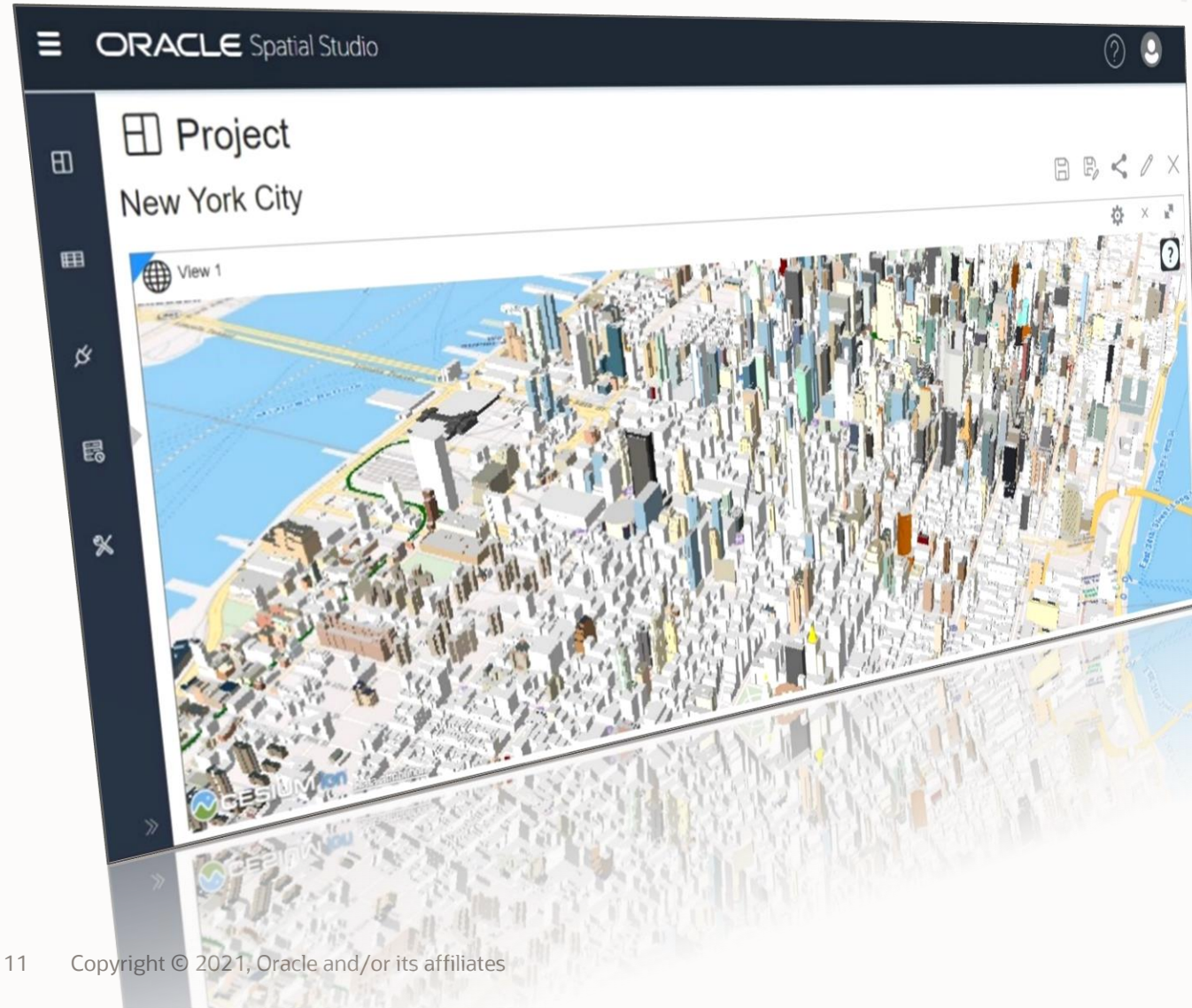
Also usable for other location-based regular grids of data, eg.

- Weather data
- Socio-demographic data



How does Oracle Spatial work?

Support for 3D data



Data types supporting 3D data

- Solids, surfaces, laser scanning data (point clouds)

Designed for huge data volumes

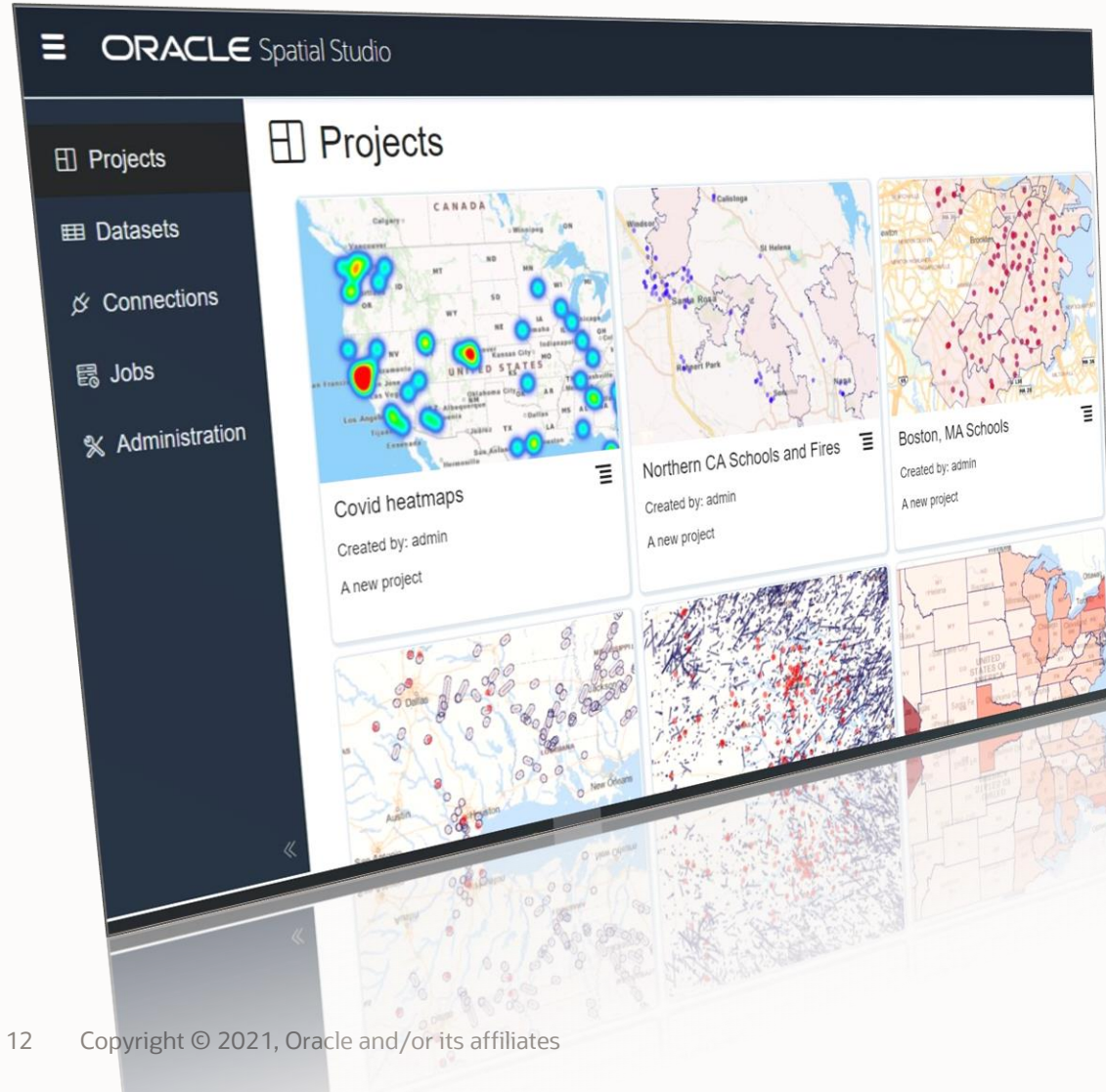
Processing and analysis in 3D

Typical use cases

- 3D City models
- Digital twins of industrial plants
- Models of indoor spaces

What is Spatial Studio?

Map creation and spatial analysis for non-experts



Browser-based, self-service tool for analysts and developers

Analytics-oriented features

- Convert addresses to coordinates using Oracle Maps Cloud Service
- Hundreds of spatial operators and functions
- Interactive visualization
- Integration with OAC

Developer-oriented features

- Prepare GPS or other geospatial data for analysis
- Generate complex SQL statements
- Publish results via REST

How does Oracle Spatial work?

Spatial data in the multi-model database

Database natively supports **GeoJSON**

- Part of in JSON capabilities
- Core capability of multi-model database

Enabling **geospatial workflows**

- Ingest, store, access publish GeoJSON

Enabling **analytics** on document data types

- Find JSON documents referring to location within 2 km of given point

In addition, support for **XML-based standards**

- GML (Geography ML)
- KML (Keyhole ML)

```
{
  "type": "Feature",

  "properties": {
    "CITY": "Jersey City",
    "STATE_ABRV": "NJ",
    "POP90": 228537.0,
    "RANK90": 67.0
  },

  "geometry": {
    "type": "Point",
    "coordinates": [ -74.064962, 40.7113 ]
  }
}
```


When should you recommend Oracle Spatial?



Analytics & Data Warehouse customers

Integrating spatial data with applications to:

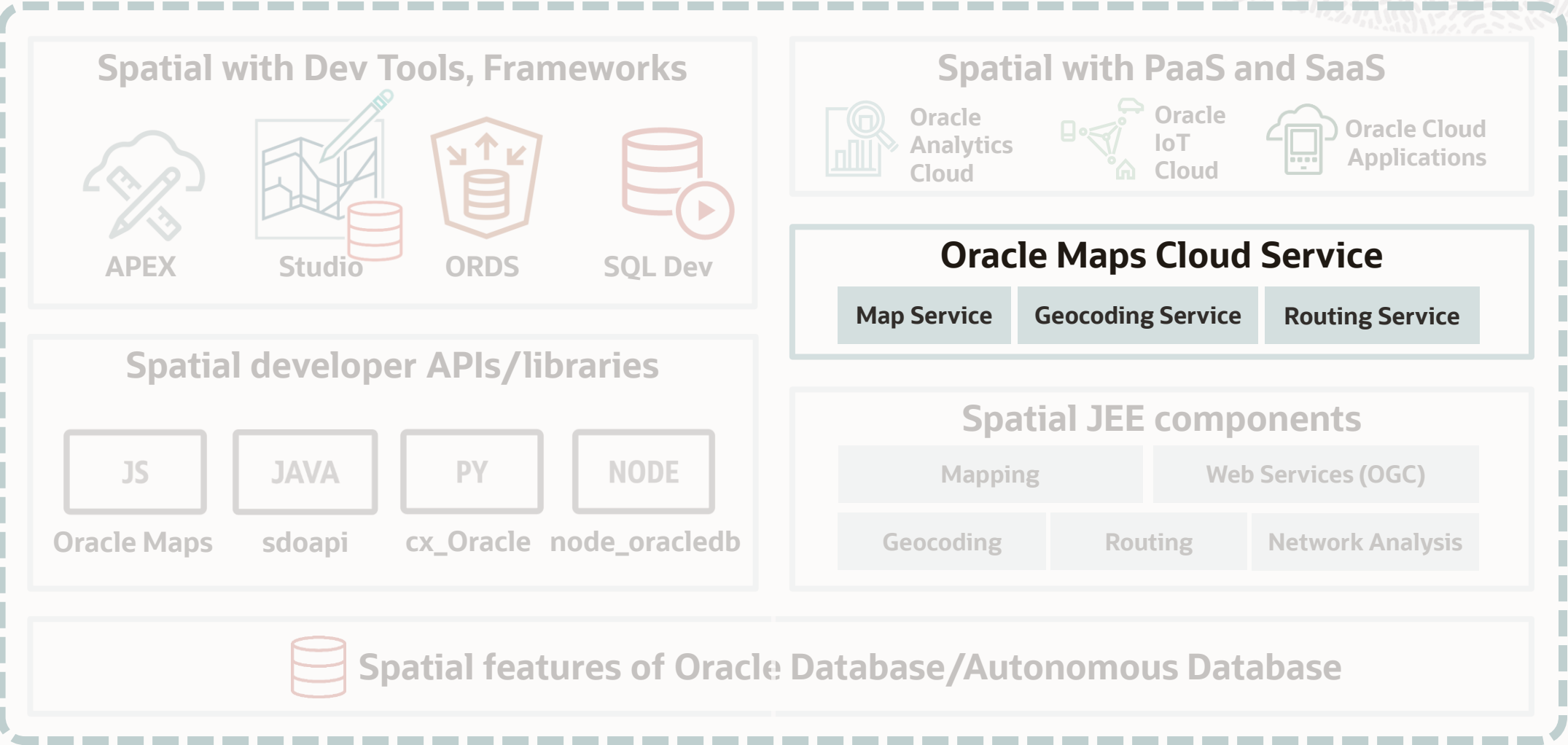
- Make better business decisions by location-enabling business applications
- Empower business analysts



GIS customers

- Need single platform for geospatial management, processing and analysis
- Leverage all the features of Oracle Database
- Integrate Spatial with Oracle Analytics, Oracle Machine Learning, Python and more

Comprehensive platform for geospatial data and maps



What other things is Oracle Spatial combined with?

Making geospatial data and maps and integral part of the IT infrastructure

Oracle + Partner Visualization Services/Tools



Oracle
Machine
Learning



Oracle
Analytics



Partner
Mapping
Tools

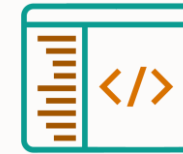


Open Source
components

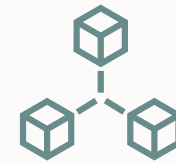
Oracle + Partner Development Services/Tools



Application
Express



SQL Developer
& other IDEs



Oracle JET
& other
frameworks



Partner
Development
Tools

Oracle Applications

OTM, Oracle Utilities
Apps, Oracle Comms
Apps, etc.

ORACLE
FUSION APPLICATIONS

3rd Party Solutions

Land Management,
Asset Management,
Network Planning,
Telematics Platform,
etc.

Data Loading Tools

Converters for all
spatial file formats



Oracle + 3rd Party ETL/Streaming Services



GoldenGate



IBM DataStage®

Oracle PaaS

Autonomous DB,
ExaCS, ExaC@C,
DBCS (all editions)

Which industries does Oracle Spatial help?

Analytical Applications



Retail

Operational Applications



Telco

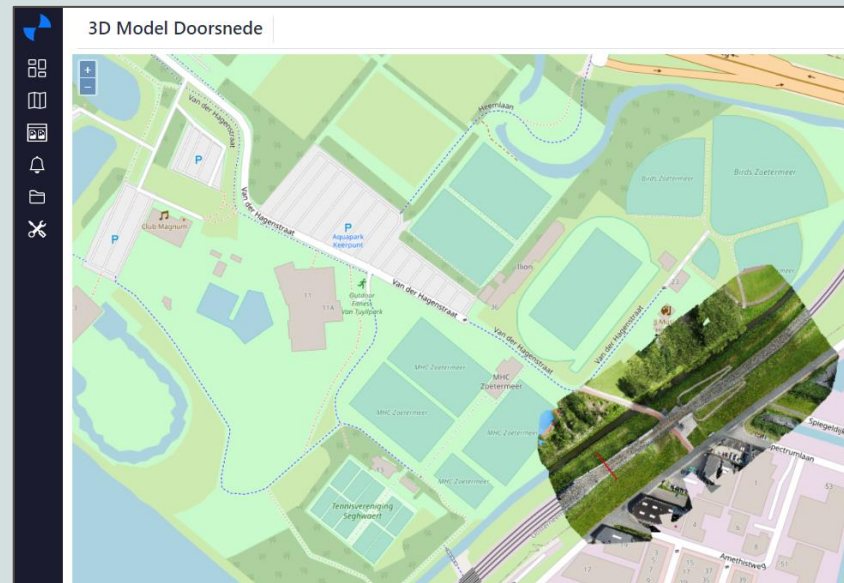


Transport & Logistics

HTM, The Netherlands

Public transport company, serving the region of The Hague

Management and maintenance of railway tracks using 3D data captured by drones



Public Sector
(Federal, Local
& Safety)



Public Sector
(Federal, Local
& Safety)

Where can I learn more about Oracle Spatial?

oracle.com

- [Oracle's Spatial Database](#)

LiveLabs

- [Introduction to Oracle Spatial](#)
- [Introduction to Oracle Spatial Studio](#)
- [Install Spatial Studio from Cloud Marketplace](#)
- **YouTube:**
youtube.com/c/OracleSpatialandGraph

Blogs: Examples, tips and tricks

- [Spatial blogs](#)

AskTOM Series

- [Spatial and Maps in Oracle Database](#)

OraDocs

- [Spatial Community Resources](#)

ORACLE

