

The Oracle logo is centered on a red background. It features the word "ORACLE" in a white, bold, sans-serif font. The letters are closely spaced, and a registered trademark symbol (®) is positioned at the top right of the final letter, "E".

ORACLE®



Using Cloud Services

for a Sustainable Smart City

Jayant Sharma
Product Manager
Oracle

ORACLE®

Spatial Data in Resource Management

***What you cannot
measure, you
cannot manage***

- Data Acquisition and Data Management
- Spatial Data Analysis
- on Cloud Platforms
 - IoT Cloud Service, Big Data Cloud Service
 - Database Cloud Service, Analytics Cloud Service

Spatial Data in Resource Management

Spatial Data for Analysis

Streams of Sensor Data
Real-time Decisioning
Machine Learning
Predictive Analytics

ORACLE

Raster Data
Network Data Model
3D City Model
Historical Data

Spatial Data for Context



Real-time Analysis of Sensor Data

Continuous streams of sensor data, measurements, location, timestamp

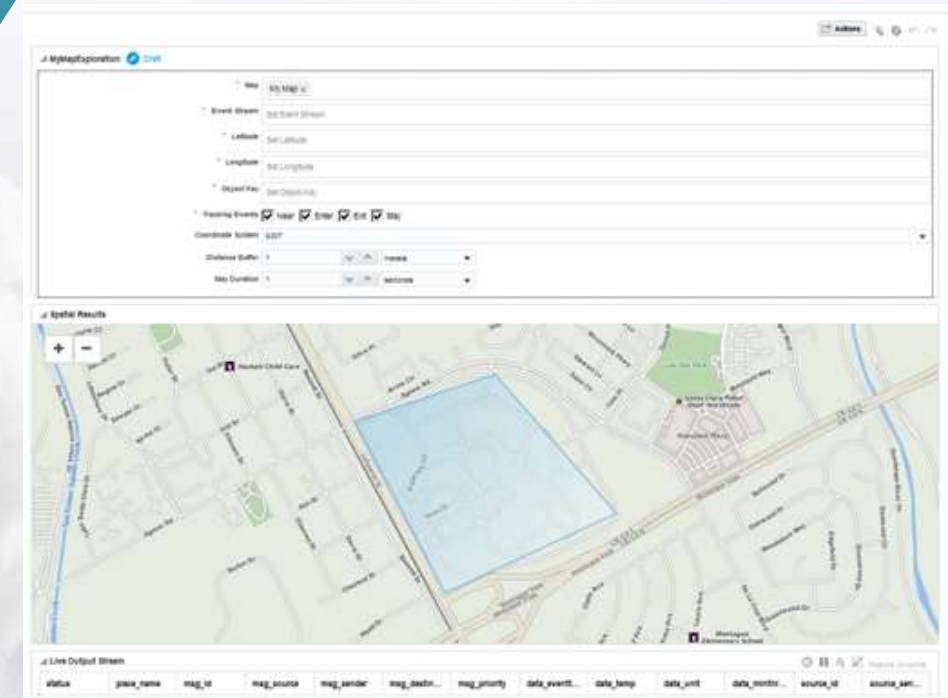
Integrate sensors, build data pre-processing pipeline

Event-driven architecture, detecting patterns, correlations in real-time

Raise alert, notify business applications

Build Your Own or Use Cloud Service

- Oracle IoT Cloud Service
- Simplified application development, no coding required
- Geospatial design patterns included
 - Location-related events pre-defined (enter, exit, near, stay)
 - Definition of areas-of-interest integrated



Connect



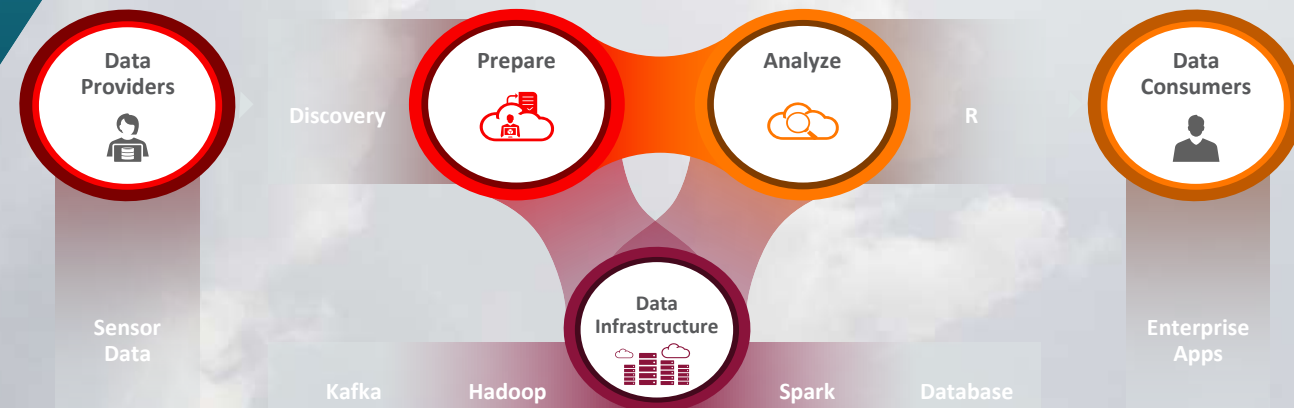
Analyze



Integrate

Extend with More Cloud Services

- Oracle Big Data Cloud Service
 - Predictive Analytics, Machine Learning
- Hadoop, Spark, Hive, Graph Analytics
- Geospatial processing integrated
 - Preparation, Validation, Cleansing
 - Data Harmonization
 - Categorization



Spatial Data in Resource Management

Spatial Data for Analysis

Streams of Sensor Data
Real-time Decisioning
Machine Learning
Predictive Analytics

ORACLE

Raster Data
Network Data Model
3D City Model
Historical Data

Spatial Data for Context



3D City Model for Context

- Analysis requires semantically structured model
- CityGML is established standard for this purpose
 - Information model to represent relevant 3D urban objects
 - Standardized by OGC, currently in version 2.0
- 3DCityDB – open source data model

Build Your Own or Use Cloud Service

- Oracle Database Cloud Services
- Use only what you need and scale on demand
- Enterprise-grade security and availability
- 3DCityDB on Oracle used by Berlin, Brussels, Frankfurt, Helsinki, ...





Context for Oracle Analytics Cloud

- Insight from Interactive Maps
- Integrated Geocoding and Data Enrichment
- Using AI to Derive Semantics of Data
- Actionable Results using Spatial Data in Workflows
- Business Value from Using Spatial Data

Extending the Analytics Platform

New levels of connections, engagement and innovation

- Conversational AI, chatbots, for improved field service & customer interaction
- Blockchain to extend result workflows on the basis new trust models
- Linked Data to publish results based on RDF for use with semantic technologies through SPARQL/GeoSPARQL

Cotral: Compagnia Trasporti Laziali S.p.A – Rome

Improving citizen services while protecting
the environment



Needed to better track its 1600 buses
across 200 Km in order to improve
on-time service and vehicle health



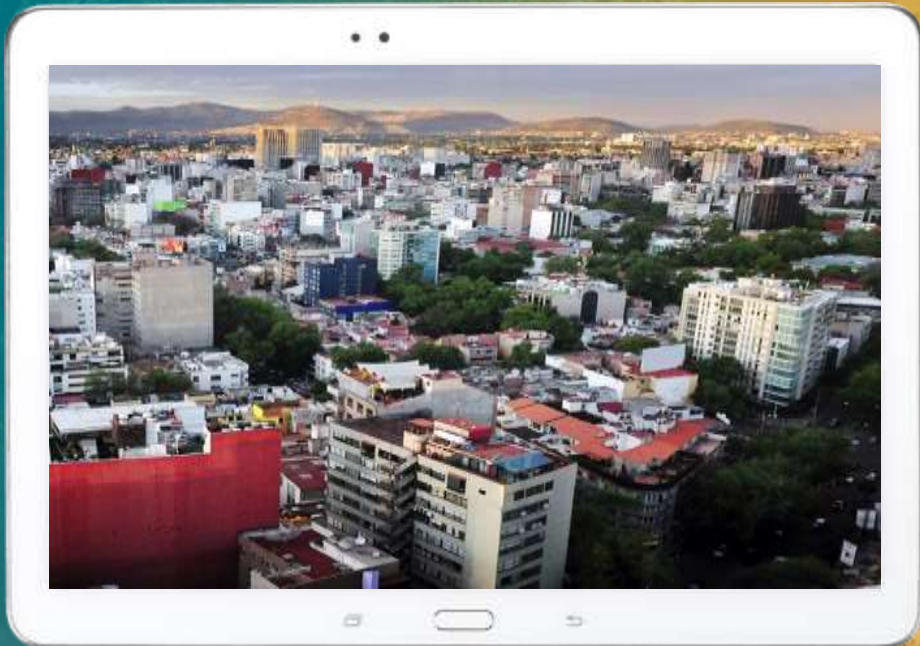
IoT framework to enable cross
channel updates via mobile, website,
LCD at terminal to citizens



Embedded sensors communicate
real-time status on bus location, and
health of its vehicles

Sistem De Aguas, Mexico City

Optimizing operations, maintenance and security



Efficiently manage payment and collection information from 2.1 million customers and provide comprehensive monitoring of users' accounts



Project water consumption with Oracle Analytics to improve water supply management and respond to each area's needs



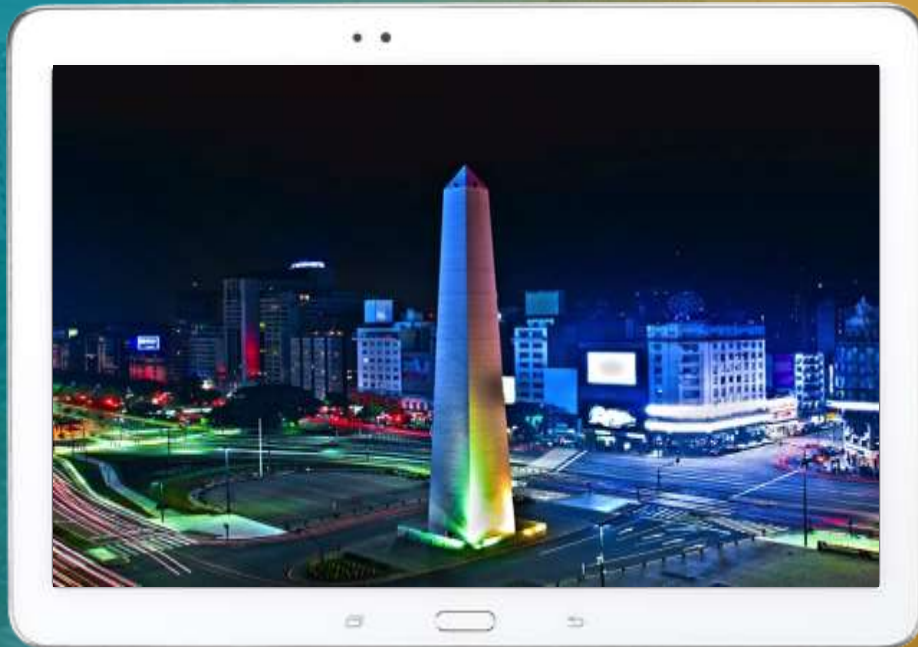
Simplified decisions regarding water rates, which varies by region



Improve demand response by 70%

Buenos Aires

Proactive intelligence to optimize flood control



Enable real-time monitoring of rainfall, river water levels, and storm water runoff system performance



Analysis and monitoring of data captured by 260 critical sensors



Improve insight and decision-making regarding weather-related developments with easy-to-use analytics and reporting system during major climate events

City of Albuquerque

Using AI and new channels to better serve citizens while reducing operational costs



Needed to improve response to 900,000 citizens with an always on omni-channel approach



Integrated Amazon Alexa with Oracle CX Cloud in an innovative conversational interface



Reduced annual volume of 1.8M calls by 50% Forecast 15% further reduction from Alexa integration with Oracle CX

City of San Jose

Become America's most innovative city by 2020



Created a single platform for multi-channel 311 services



Enable citizens to easily report concerns via mobile app and locations services



Designed to support constantly evolving platforms and devices



Improved morale and improved productivity and cost savings for City of San Jose

The Oracle logo is centered on a red background. It features the word "ORACLE" in a white, bold, sans-serif font. The letter "O" is a simple circle. The "R" has a distinctive shape with a horizontal bar. The "A" is a simple triangle. The "C" is a simple curve. The "L" is a simple vertical bar. The "E" is a simple horizontal bar. A registered trademark symbol (®) is located to the upper right of the "E".

ORACLE®