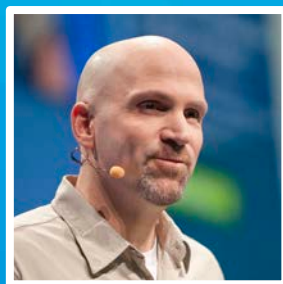


Real-Time GIS: Applying Real-Time Analytics



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Demo



NEWS

Men arrested in killings wore GPS monitors ... but killings went on

...the investigation has also painted an unsettling picture of sex offender oversight: According to the police account, the pair was meeting and killing women for months before state and local authorities made a connection.

A federal study last year said agents in California were so busy reviewing GPS data from parolees that only 12 percent of their time was spent in the field.

GPS monitoring alerts overwhelm probation officers

Electronic monitoring was supposed to help the county deal with the influx of thousands of felons moved out of the prison system to ease overcrowding.

The nation's largest probation department strapped GPS ankle monitors on the highest-risk of those convicts, expecting the satellite receivers to keep tabs on where they spent their days and nights, and therefore keep the public safe.

Parole director fired in wake of DOC director's murder

Colorado Department of Corrections chief killed, likely at the hands of parolee at large. The parolee is believed to have cut off his court-mandated tracking bracelet a week before the killing, but no warrant was issued for his arrest until after the director was murdered... [Fox 31 Denver](#)

Parolees



A12345, Joaquin
Esmeralda Rogers

Last reported: 3/6/2015
14:59:46
Battery level: High

C34567, Zane Adriana
Dyer

Last reported: 3/6/2015
14:59:46
Battery level: Medium

F65432, Elliott Eliana
Richmond

Last reported: 3/6/2015
14:59:46
Battery level: High

G34534, Johan Marisol
Sims

Last reported: 3/6/2015
14:59:47

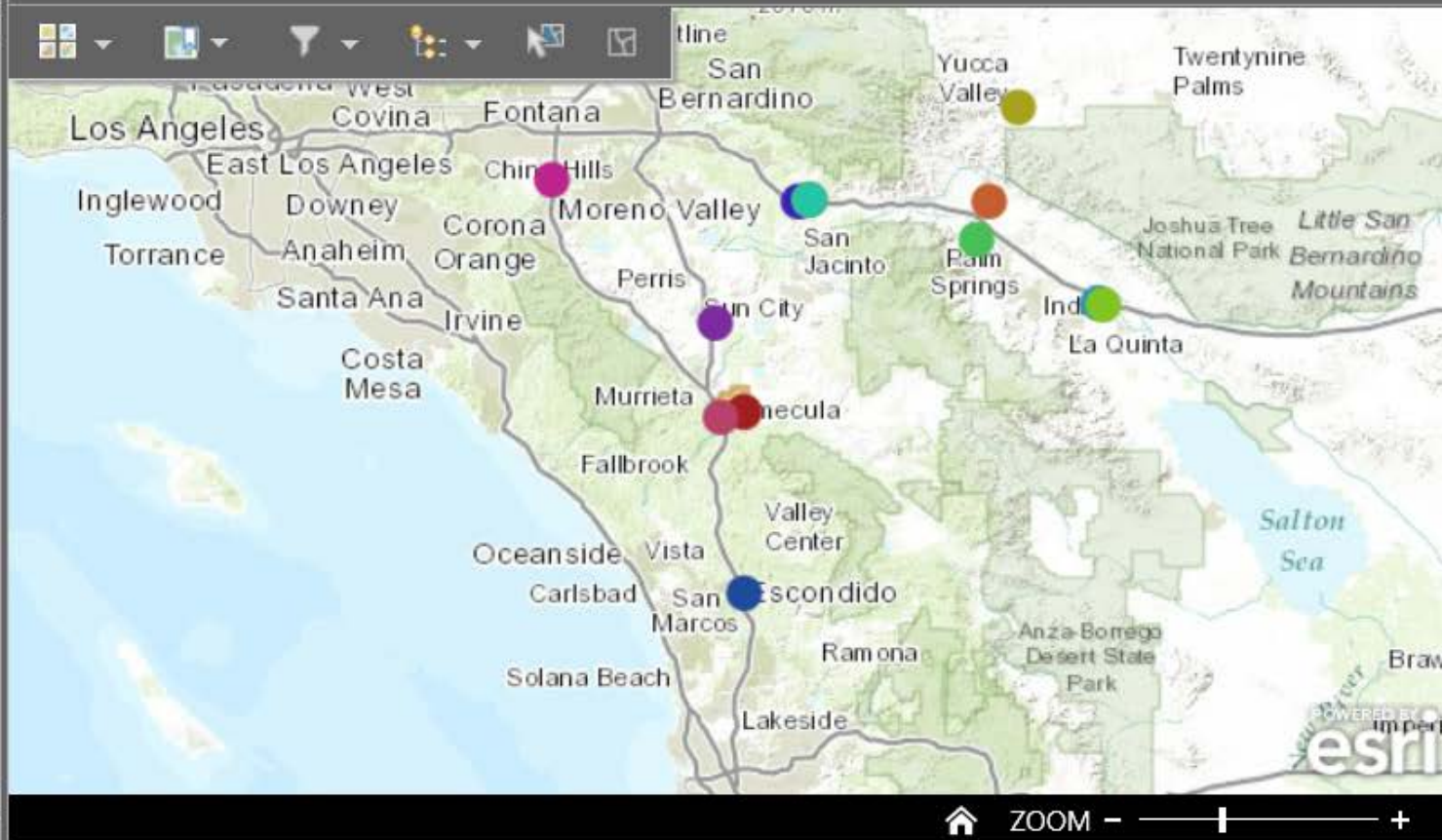
Parolee Details



C34567, Dyer, Zane Adriana

Last report: 3/6/2015 14:59:46
Male
DOB: January 28, 1972, Age: 58
Height/Weight: 65 in/184 lbs
Eyes: Brown, Hair: Brown
May not associate with:
May Not Enter:

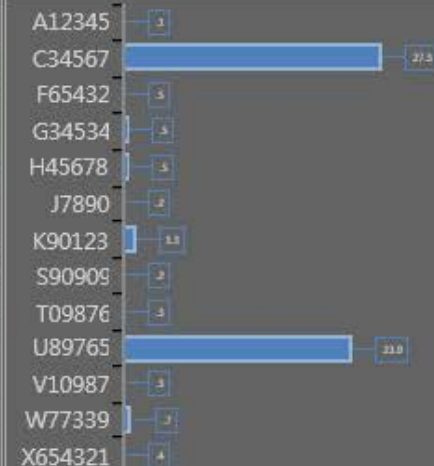
Parole Status



The Flood of Data



Current Speed (MPH)



Parole violations last 24...



29

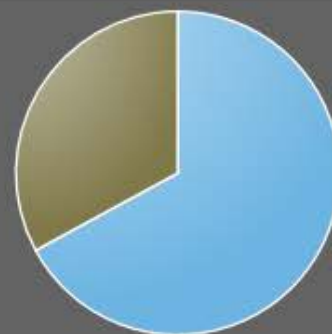
Non-critical alerts



Geofence violation: 3/6/2015
14:59:47
Subject(s): S90909, Pass Christian
School
Ongoing for last 4 seconds.

Geofence violation: 3/6/2015
14:59:44

Non-critical alerts last 24 h...



Parole violations



3/6/2015 14:59:48

V10987 entered Pass Christian School. Ongoing for last 5 minutes and 12 seconds.

Text message sent to supervising parole officer.

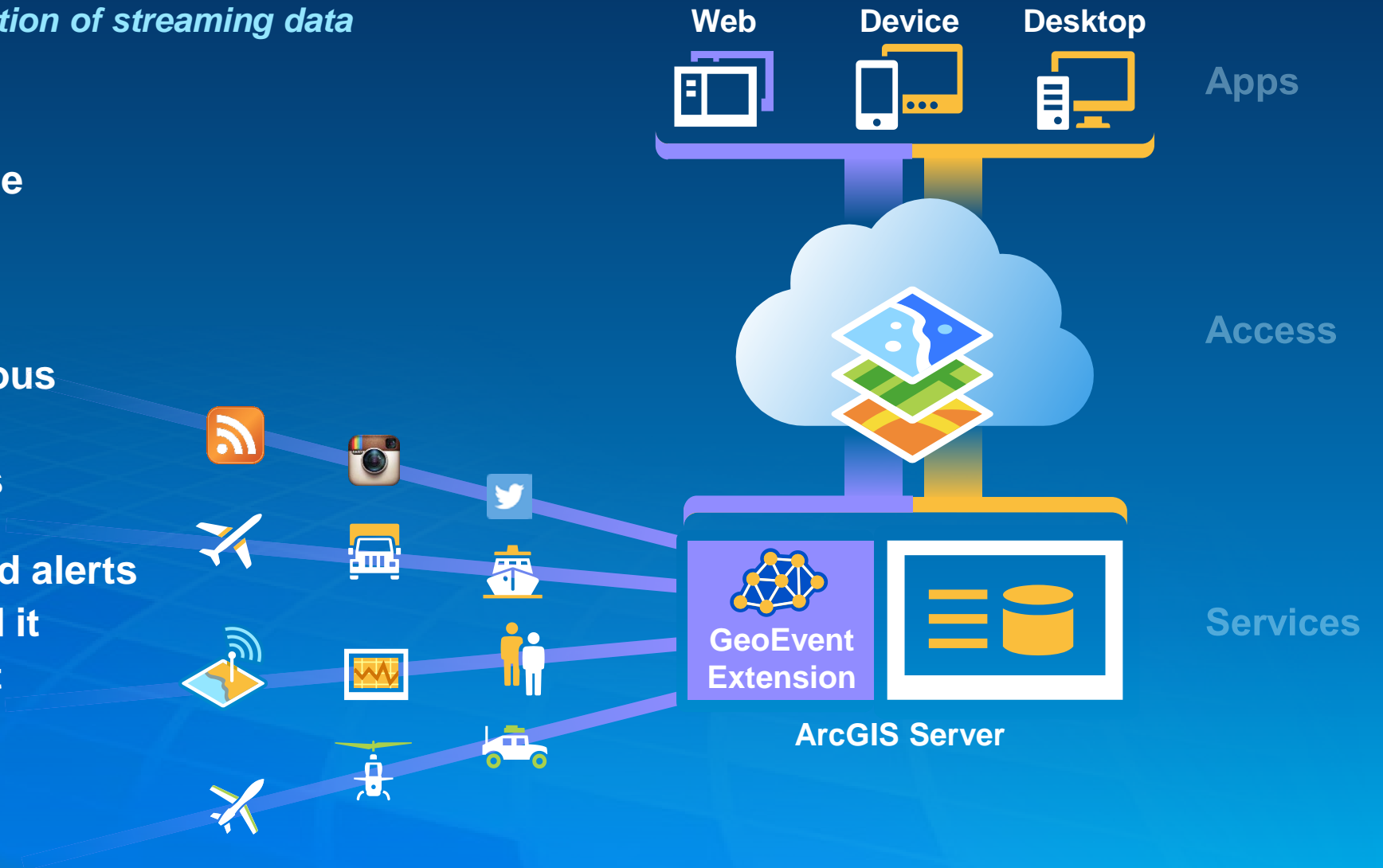
3/6/2015 14:55:31

K90123 entered Temecula gangland. Ended at 3/6/15 5:55 PM and lasted for 1 minutes and 9

Real-Time GIS

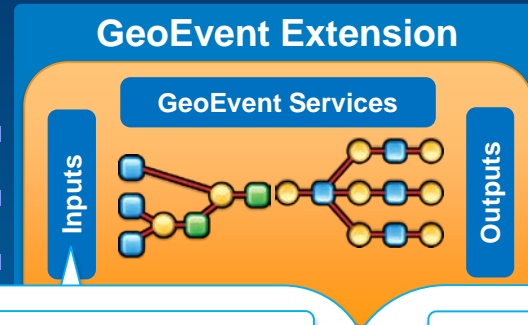
Integration and exploitation of streaming data

- Integrates real-time streaming data into ArcGIS
- Performs continuous processing and real-time analytics
- Sends updates and alerts to those who need it where they need it



Receiving Real-Time Data

Easily integrate real-time streaming data into ArcGIS using an Input Connector



You can create your own connectors.

Out of the Box

- Poll an ArcGIS Server for Features
- Poll an external website for GeoJSON, JSON, or XML
- Receive Features, GeoJSON, JSON, or XML on a REST endpoint
- Receive GeoJSON or JSON on a WebSocket
- Receive RSS
- Receive Text from a TCP or UDP Socket
- Subscribe to an external WebSocket for GeoJSON or JSON
- Watch a Folder for new CSV, GeoJSON, or JSON Files

Esri Gallery



- ActiveMQ
- CAP
- CoT Cursor-on-Target
- esd Exploitation Support Data
- Instagram
- KML
- Kafka *
- MQTT
- NMEA 0183
- RabbitMQ
- Sierra Wireless (RAP)
- Trimble (TAIP)
- Twitter

Partner Gallery

- CompassLDE
- enviroCar
- exactEarth AIS
- FAA (ASDI) *
- GNIP *
- Networkfleet *
- OSIsoft *
- Valarm
- Zonar *

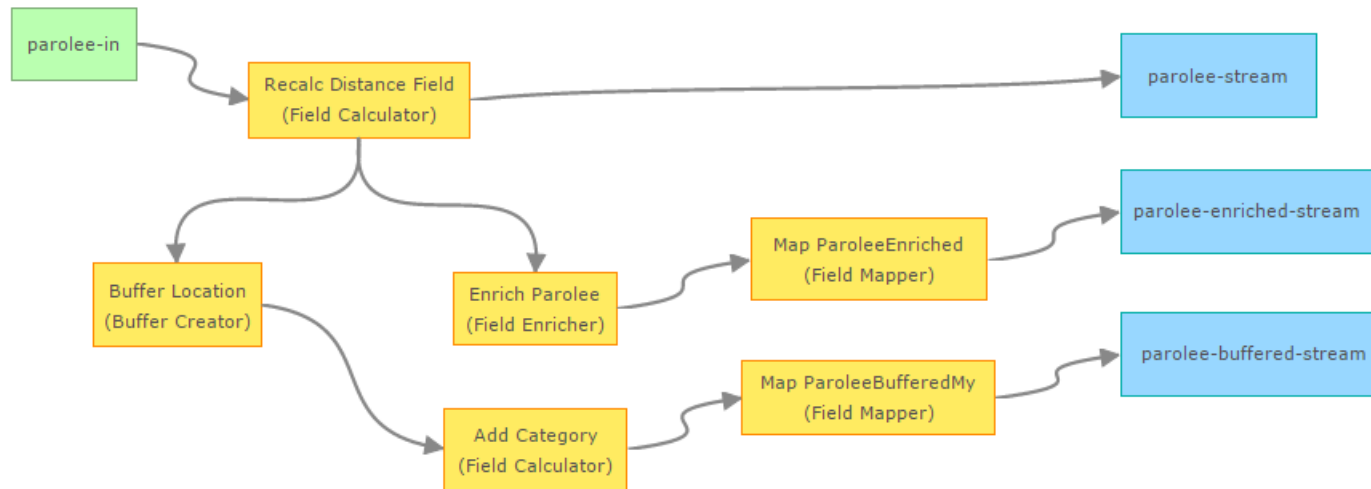
Applying real-time analytics

Perform real-time analytics by defining a GeoEvent Service

- A **GeoEvent Service** configures the flow of GeoEvents,
 - The **Filtering** and **GeoEvent Processing** steps to perform,
 - what input(s) to apply them to,
 - and what output(s) to send the results to.

1 - Monitoring Parolees of Interest

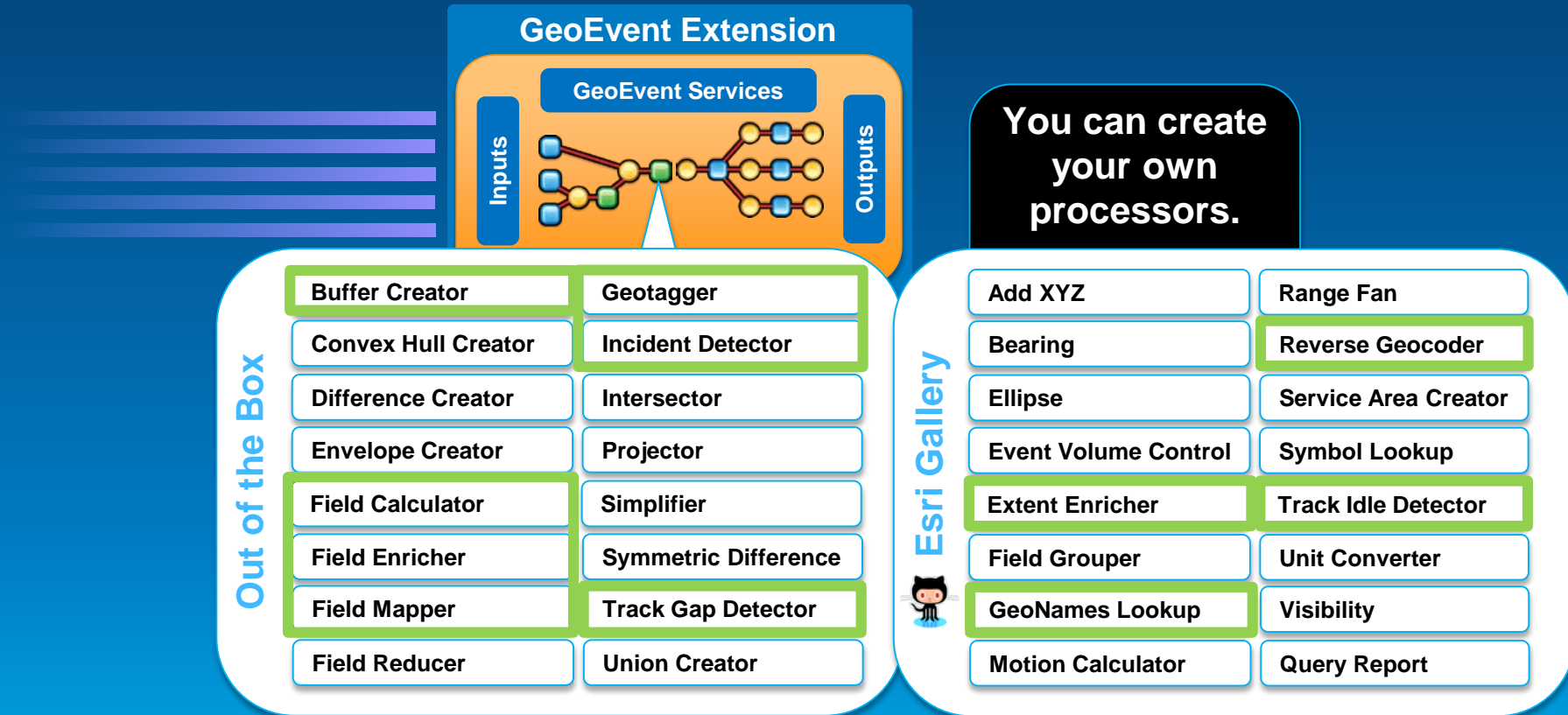
Monitor parolees (past convicts) via their ankle bracelet GPS. Recalculates reported distance covered since last GPS report from feet to miles. Enriches additional parolee fields from a Feature Service. Creates a buffer around the parolee location to be used to detect parolee meetups in another service.



Applying real-time analytics

GeoEvent Processing

- You can perform continuous analytics on GeoEvents as they are received using a **processor**.

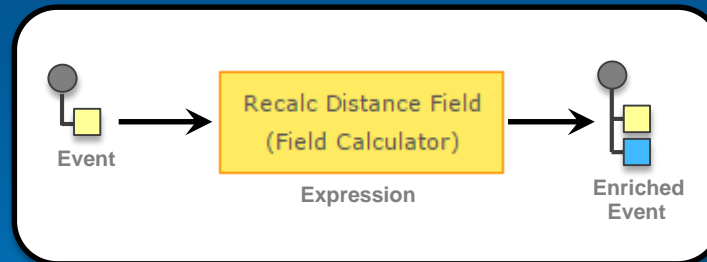


GeoEvent Processing

Calculate new fields on a GeoEvent

- A **Field Calculator** processor uses an expression to
 - calculate a new field or update an existing field.
 - Expressions can be mathematical expressions, string operations, or regular expressions.

SuspectID	V10987
Date	1405176845553
BatteryLevel	Low
Distance	105.6
Speed	1.2
Course	186.4
geometry	-117.123..., 36.064...



Convert from
Feet to Miles
Expression:

$\text{Distance} / 5280$

SuspectID	V10987
Date	1405176845553
BatteryLevel	Low
Distance	0.02
Speed	1.2
Course	186.4
geometry	-117.123..., 36.064...

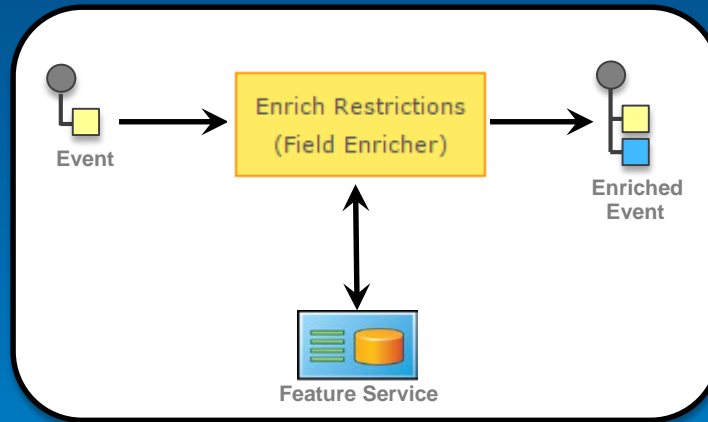
GeoEvent Processing

Enrich a GeoEvent with new fields

- **A Field Enricher processor**

- Uses a field on the incoming GeoEvent to join with another data source and retrieve fields.
- After the Field Enricher retrieves the required data from a data source, it enriches the GeoEvent with new fields derived from the source.

SuspectID	V10987
Date	1405176845553
BatteryLevel	Low
Distance	105.6
Speed	1.2
Course	186.4
geometry	-117.123..., 36.064...



SuspectID	V10987
Date	1405176845553
BatteryLevel	Low
Distance	105.6
Speed	1.2
Course	186.4
geometry	-117.123..., 36.064...
NoContact	F65432
NoEntry	Pass Christian School

SuspectID	NoContact	NoEntry
K90123		Temecula gangland
V10987	F65432	Pass Christian School
F65432	V10987	Pass Christian School
...

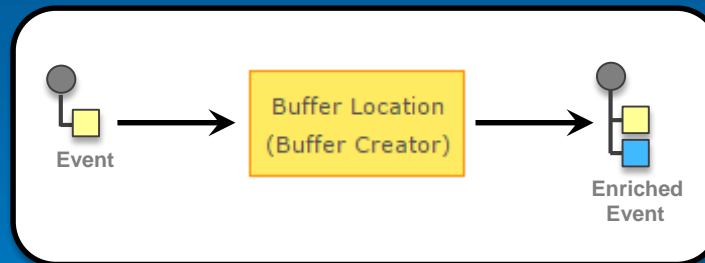
GeoEvent Processing

Enrich the geometry of a GeoEvent

- A **Buffer Creator** processor

- applies a buffer to a geometry field on the incoming GeoEvent
- and either:
 - enriches the GeoEvent with a new geometry field representing the buffered result
 - or replaces the geometry of the incoming GeoEvent with the buffered result

SuspectID	S90909
Date	1405176845553
BatteryLevel	High
Distance	0.2
geometry	-117.123..., 36.064...



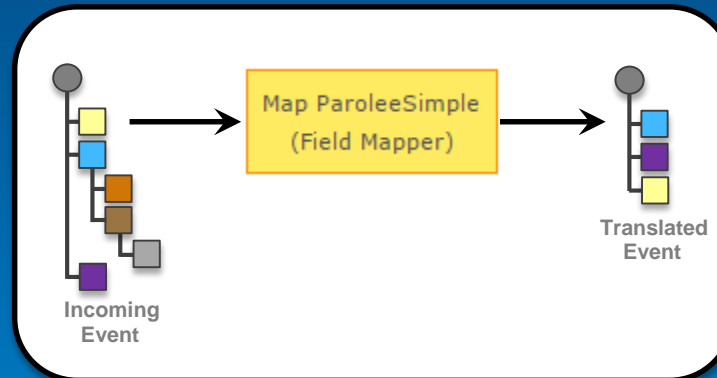
SuspectID	S90909
Date	1405176845553
BatteryLevel	High
Distance	0.2
geometry	-117.123..., 36.064...
buffer	rings" : [[[-116.3175, 33.6703],[-116.3175, 33.6703]...]]

GeoEvent Processing

Adjust the format of a GeoEvent

- A **Field Mapper** processor
 - Translates from one format to another using GeoEvent Definitions
 - Specifies how fields map across source and target GeoEvent Definitions

SuspectID	J7890
Date	1405176845553
Sensor	2
BatteryLevel	Medium
Latitude	36.064
Longitude	-117.123
Distance	0.01
DurationMin	1.03
SpeedMPH	0.62
CourseDeg	250.0
Geometry	-117.123..., 36.064...
Category	AnkleBraceletGPS



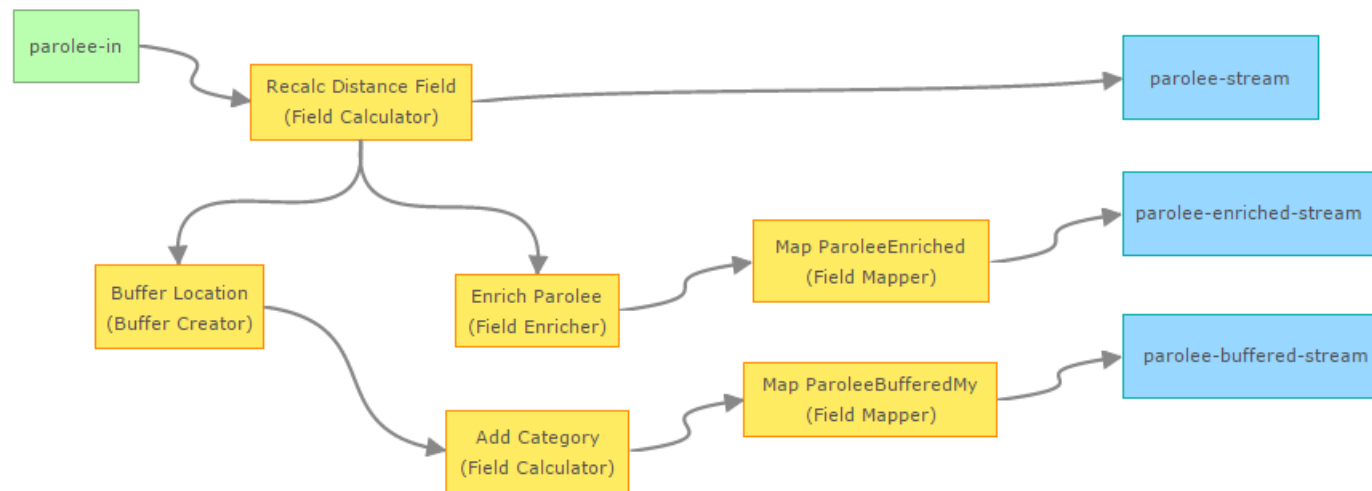
SuspectID	J7890
Date	1405176845553
Geometry	-117.123..., 36.064...
Category	AnkleBraceletGPS

Monitoring Parolees of Interest

Field Calculator, Field Enricher, Buffer Creator, Field Mapper

1 - Monitoring Parolees of Interest

Monitor parolees (past convicts) via their ankle bracelet GPS. Recalculates reported distance covered since last GPS report from feet to miles. Enriches additional parolee fields from a Feature Service. Creates a buffer around the parolee location to be used to detect parolee meetups in another service.



Geofencing & Alerting

Geofencing

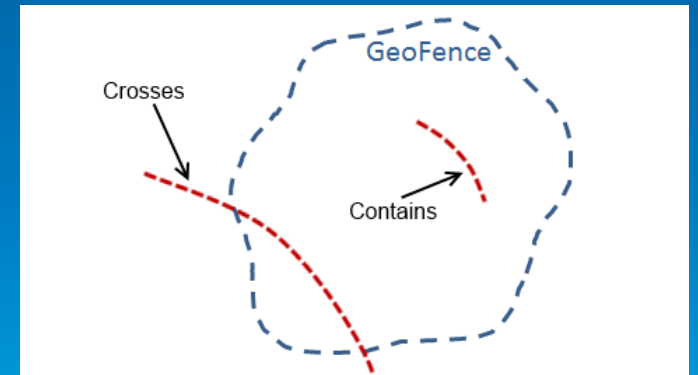
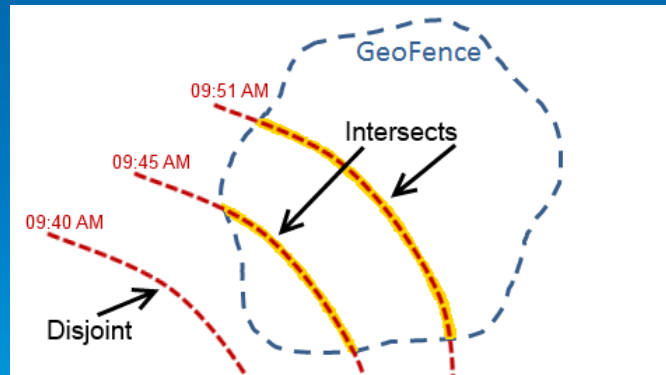
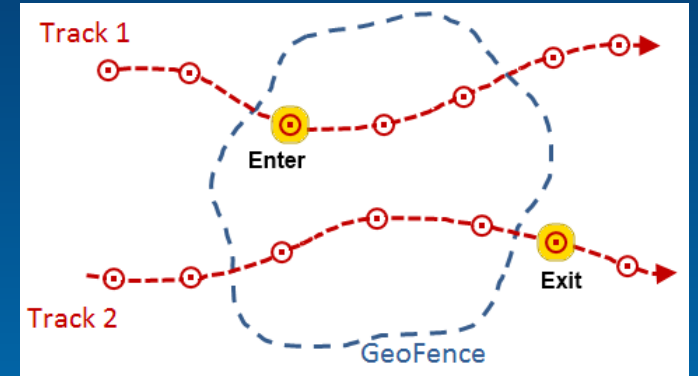
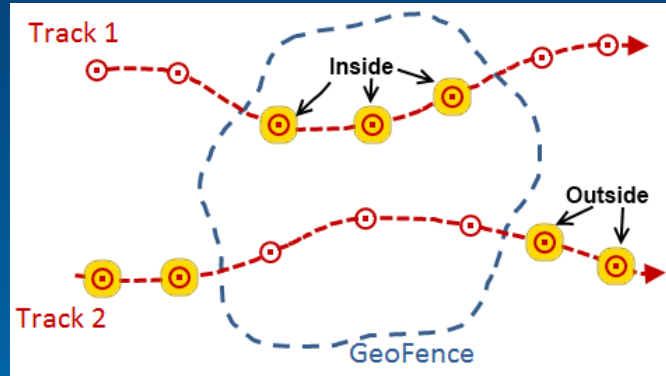
Spatial filtering

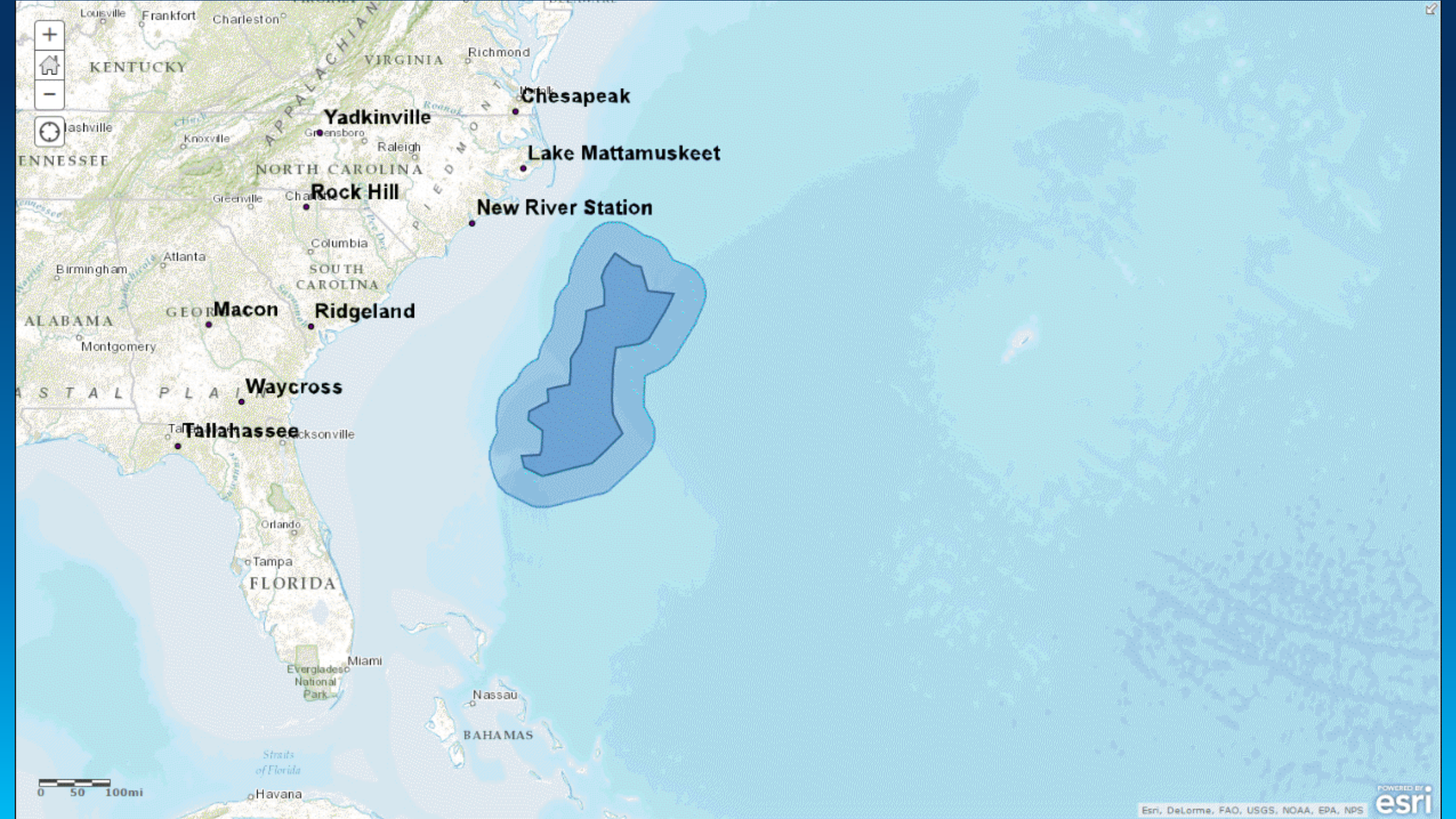
- Spatial operators:

inside	outside
enter	exit

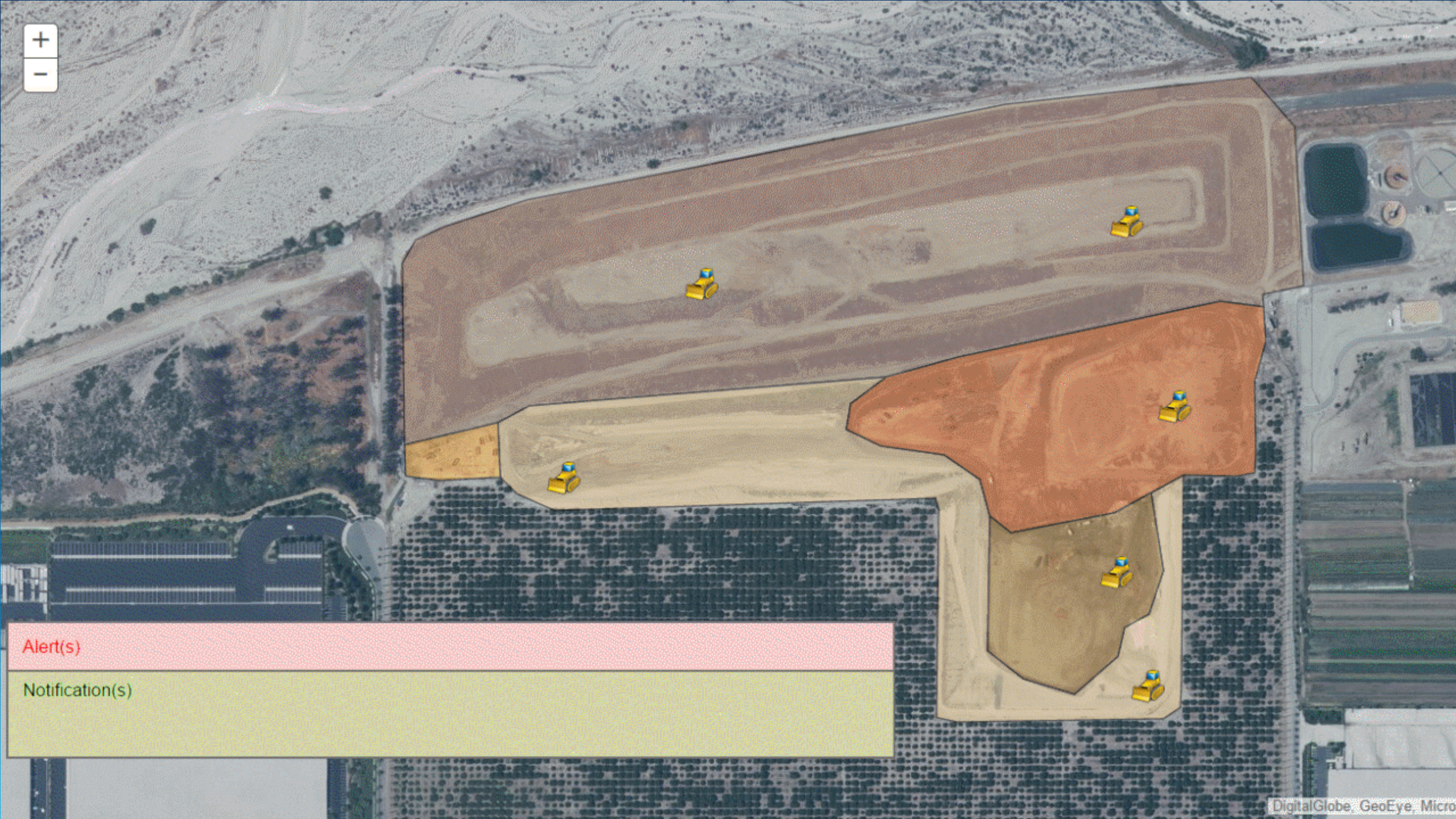
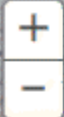
New at 10.3

intersects	disjoint
touches	contains
crosses	equals
overlaps	within





0 50 100mi



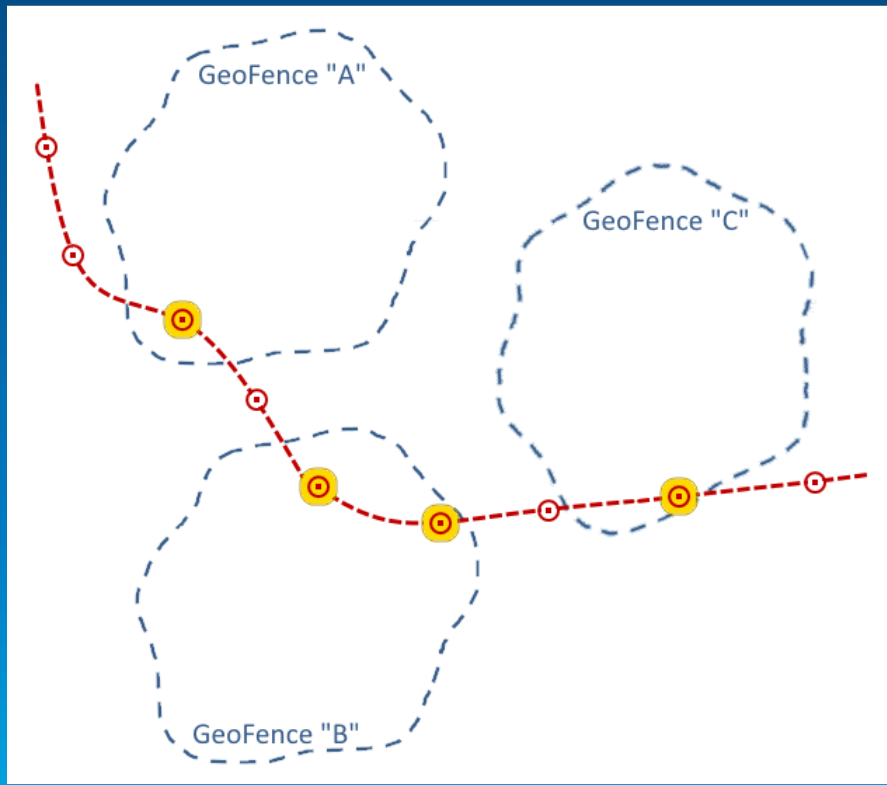
Alert(s)

Notification(s)

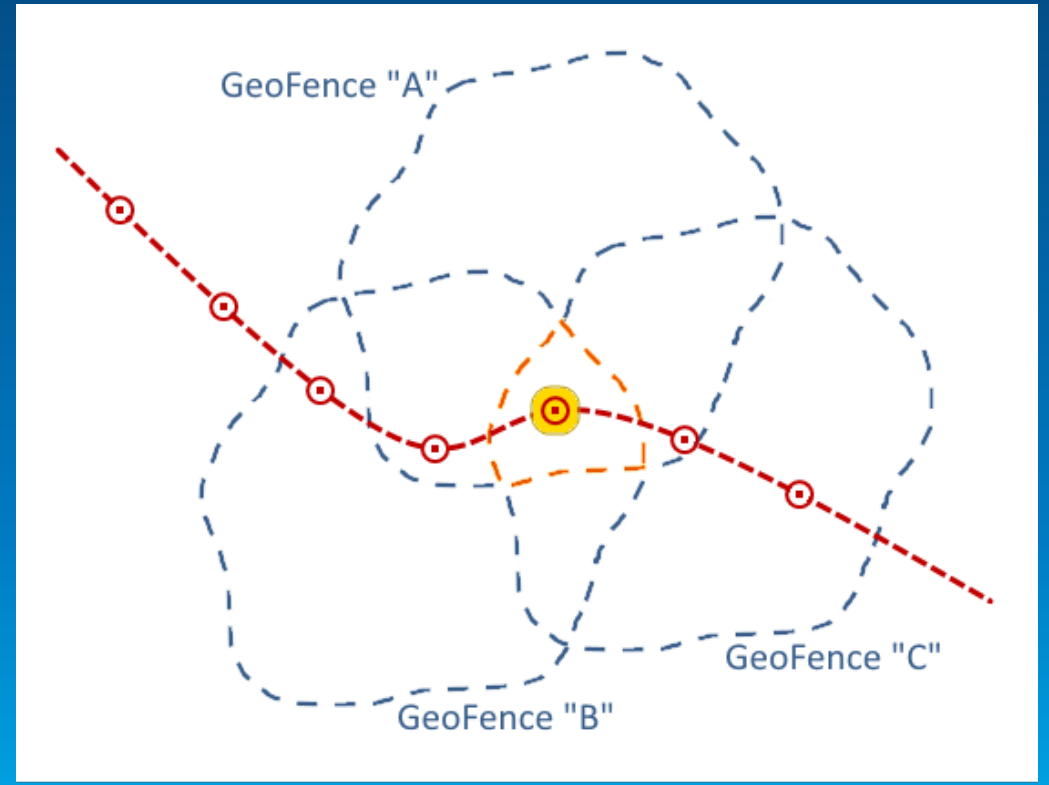
Geofencing

Scope

- Geofencing scope: Any or All
- Any geofence



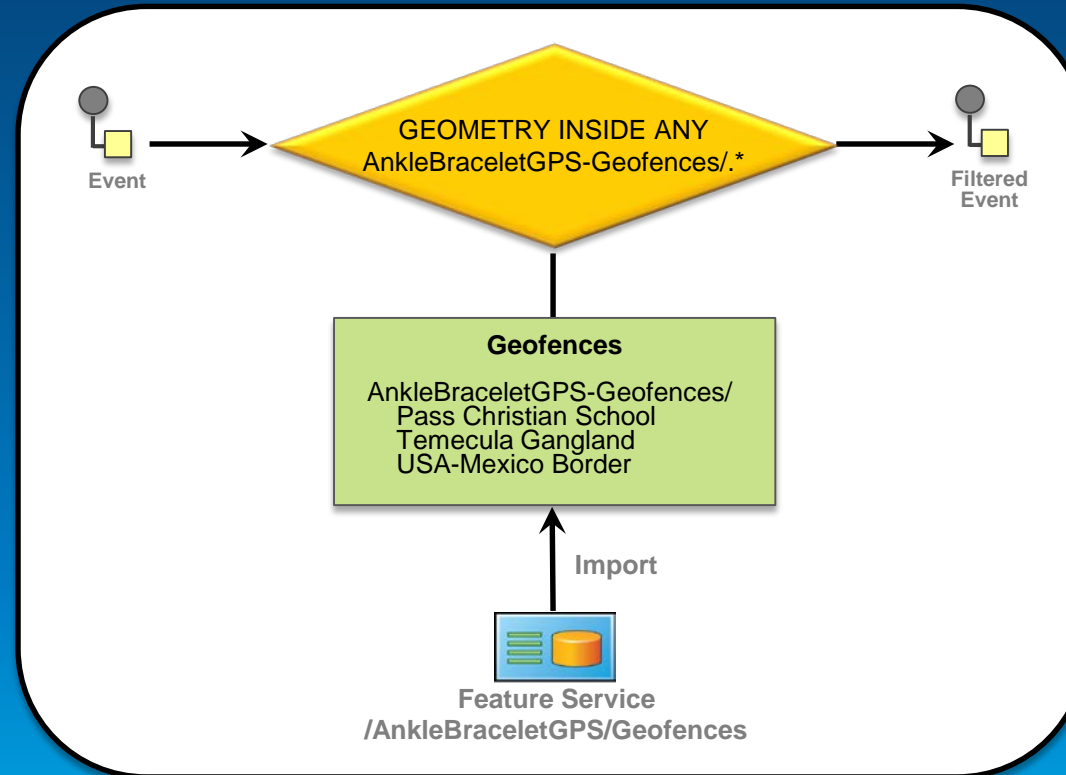
- All geofences



Geofencing

Import using a Feature Service

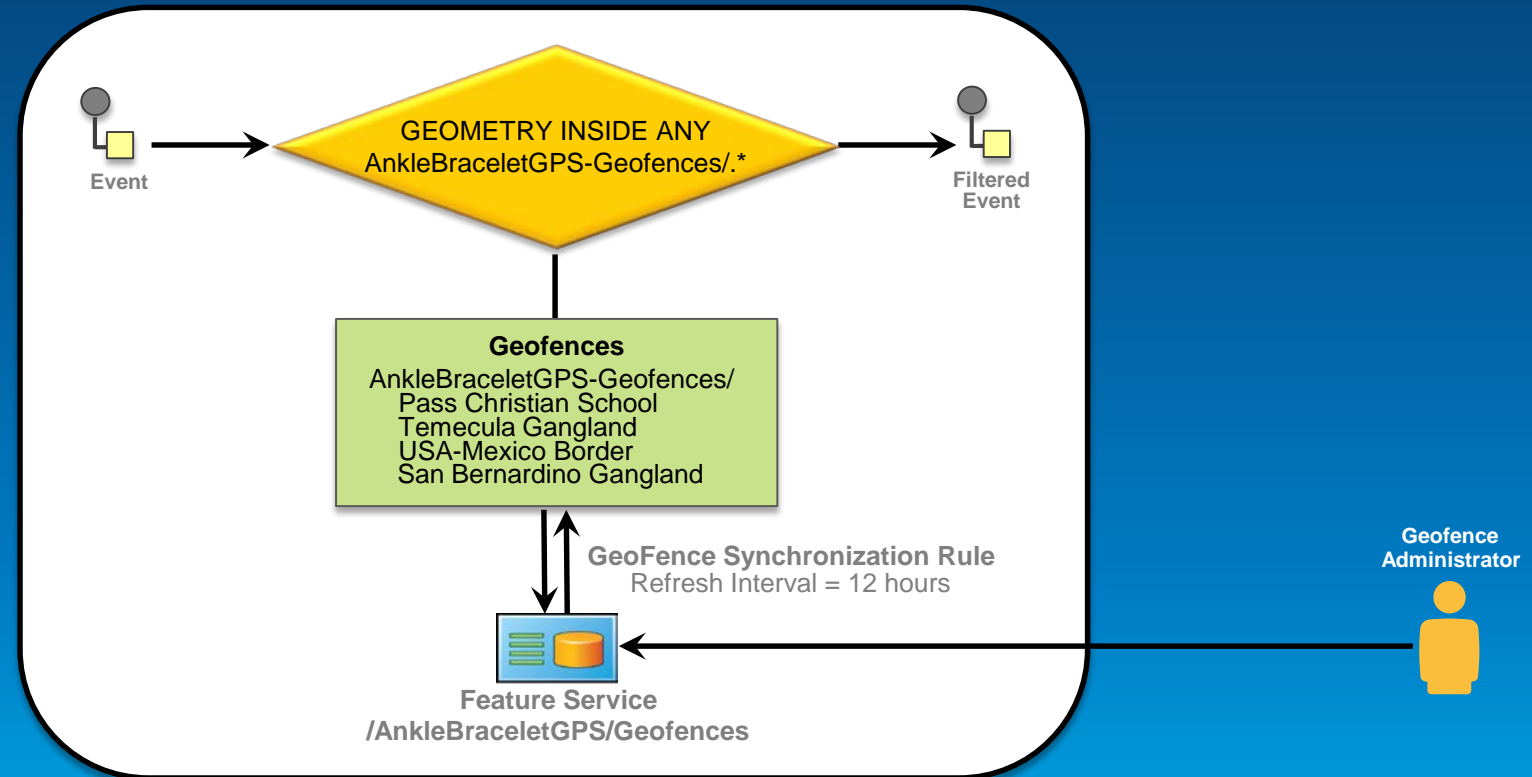
- Reads geofences into GeoEvent once
 - Used with geofences that are static and will not change



Geofencing

Synchronization using a Feature Service

- Refreshes geofences into GeoEvent on an interval
 - Used with infrequently changing geofences - monthly, daily, or hourly



Geofencing

Synchronization using a Stream Service

- Continuously updates geofences in GeoEvent
 - Used with frequently changing geofences - minutes or seconds

