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# Using Web-Based Mapping Services Effectively

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Safe Software



# Agenda

The shift to cloud

Cloud integration

Cloud data services

Cloud services for working with spatial data

Cloud map services

Real-time integration

Real-time map services



# The shift from on-premise to cloud

The debate over whether or not organizations will use the cloud is over

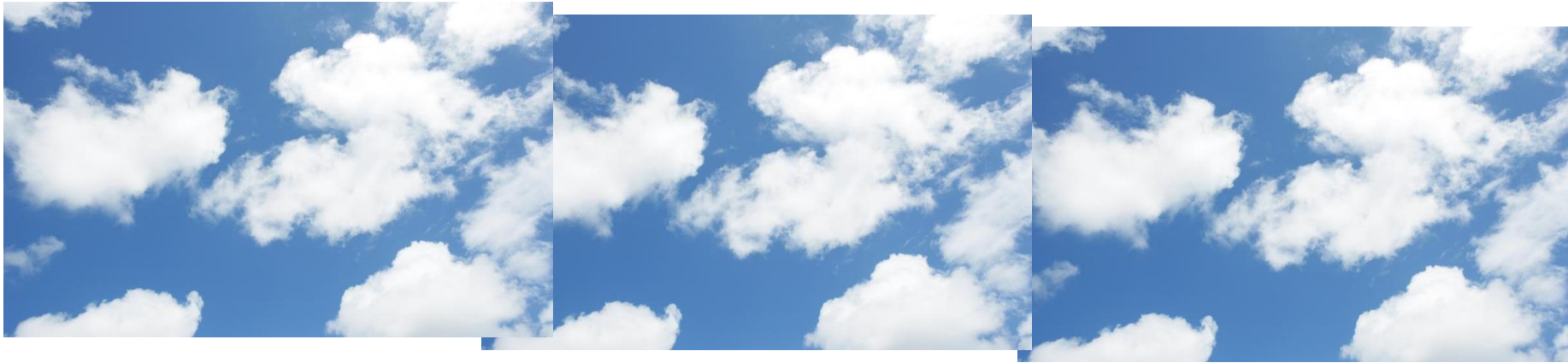
They are reliable, agile, simple, accessible, affordable



# The shift from on-premise to cloud

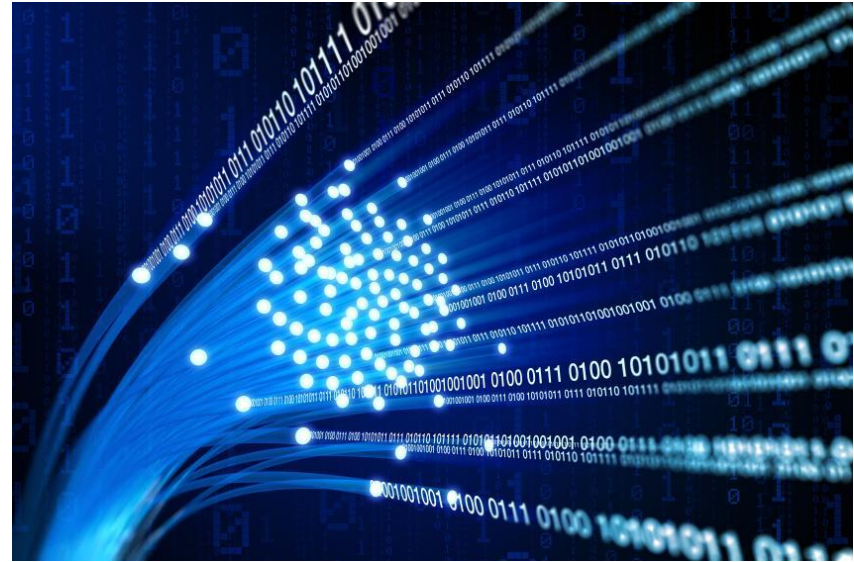
There is a gold rush to create and leverage cloud services

There are a lot of cloud services and apps popping up



# The shift from on-premise to cloud

Services and apps need data



Create harmony between data and applications

# The shift from on-premise to cloud

A lot of cloud data silos are emerging



Create harmony between data and applications

# The shift from on-premise to cloud

The challenge? How to integrate these services and apps.



Create harmony between data and applications

# Cloud integration - defacto standards

REST - for requesting data and services

JSON - for transmitting request and response data

Perfect for web and mobile apps





# Cloud Data Services

## Relational databases:

Amazon RDS

SQL Azure

Google Fusion Tables

## File stores:

dropbox

BOX.com

Amazon S3



## Document stores:

Amazon DynamoDB

## Data portals:

Socrata

## Big data:

Amazon Redshift

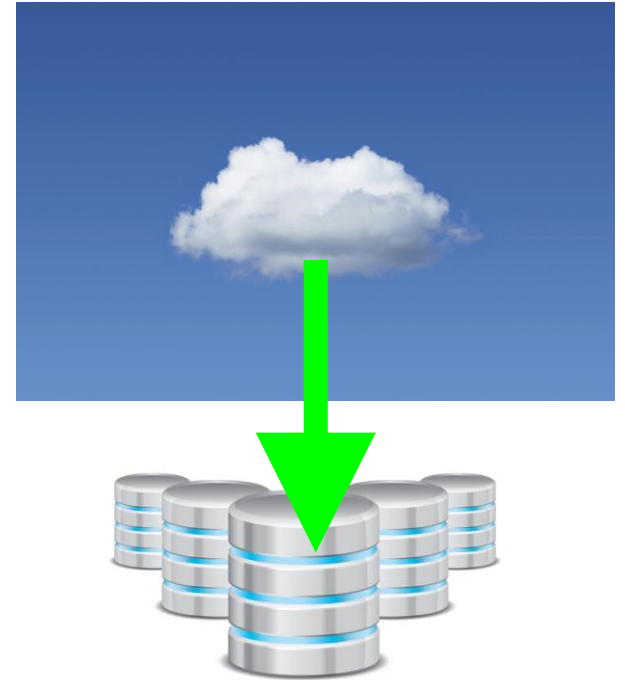


# Loading data to the cloud

Writing to relational databases

Uploading files

Uploading JSON documents



# Providing an open data portal

City of Edmonton

Spatial and tabular data

The screenshot shows the City of Edmonton Open Data Catalogue website. The browser address bar displays <https://data.edmonton.ca>. The page features a navigation menu with categories: CITY ADMINISTRATION, DEMOGRAPHICS, EDUCATION, EVENTS, FACILITIES & STRUCTURES, PUBLIC WORKS, and TRANSIT. A prominent green banner highlights the "Citizen Dashboard" announcement, stating: "City of Edmonton is pleased to announce the relaunch of the Citizen Dashboard, an online tool that shows performance results for some of the services the City provides. The Citizen Dashboard provides performance information about municipal services that support the City's Strategic Plan - The Way Ahead."

Below the banner, four featured datasets are displayed:

- 2013 Edmonton Election - Results Summary - Mayor**: 2013 Election Results - Distribution of Votes for Mayor's Race. (Pie chart)
- 2013 Edmonton Election - Results Details (by Voting Station)**: 2013 Election Results by Voting Stations. (Table)
- Really Grate Tree Project, Soil Analysis - 2010-2013 (Map View)**: Sidewalk trees. (Map)
- WiFi Locations - Map View**: List of WiFi locations in Edmonton. (Map)

The bottom section, "Search & Browse Datasets and Views", includes a search bar and a list of datasets:

Name	Popularity	Type
1. <b>2013 Street Construction Projects (Map View)</b> construction_projects A list of special projects and major road construction sites planned for 2013.	27,477 views	street
2. <b>Residential Snow Clearing Schedule</b> A list of all City of Edmonton transportation maintenance areas and the date	16,726 views	snow removal, schedule
3. <b>City of Edmonton - Ward Boundaries</b> Spatial view of current City of Edmonton's twelve (12) political Ward bounds	22,973 views	wards
4. <b>Sandboxes - Map View</b> A map view of all City of Edmonton - Department of Transportation maintain	18,297 views	sand boxes, snow removal
5. <b>Trees - Species (Map View)</b> Environmental Services trees, neighbourhood, forestry	7,822 views	trees, neighbourhood, forestry



Create harmony between data and applications

# Loading data to the cloud

Loading - REST, JSON

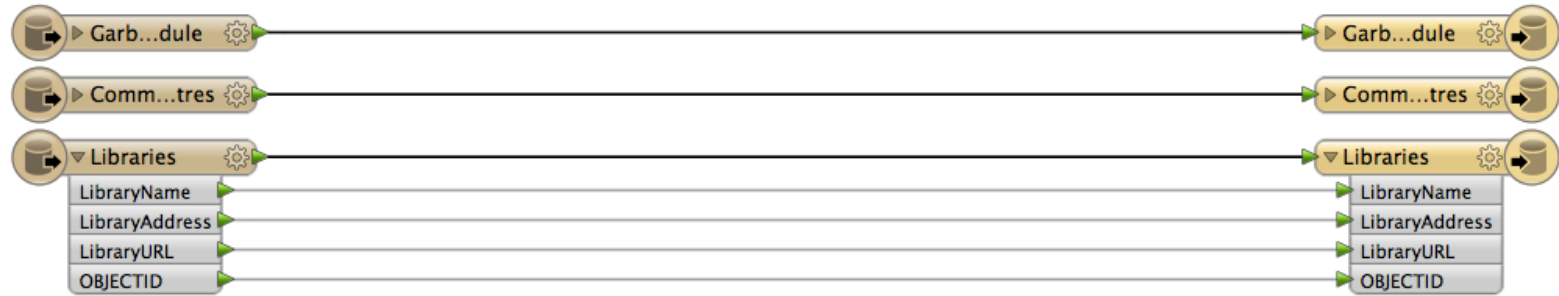
API

Accessing - REST, JSON



Create harmony between data and applications

# Loading data to the cloud



# Loading data to the cloud

Changing schema, data model, merging



Create harmony between data and applications

# Loading data to the cloud

Validating data



# Loading data to the cloud

Filter and remove sensitive data and data of no value



Create harmony between data and applications



# Things to know

Some APIs services have limits  
Maximum time to be connected  
Maximum features to load



# Cloud services for working with spatial data

Enable mobile applications, web applications, desktop applications

to

manipulate, transform, process, query and analyze spatial data



# Service Area Calculator

## Request sent to a REST service

```
http://route.arcgis.com/arcgis/rest/services/World/ServiceAreas/NASe  
rver/ServiceArea_World/solveServiceArea?token=<yourToken>&facilities  
=-  
122.253,37.757&outSR=102100&f=json
```

**ArcGIS Online**

## Result is JSON

```
{  
  "saPolygons": {  
    "spatialReference": {  
      <spatialReference>  
    },  
    "features": [  
      {  
        "attributes": {  
          "<field1>": <value11>,  
          "<field2>": <value12>  
        },  
        "geometry": {  
          <polygon1>  
        }  
      },  
      {  
        "attributes": {  
          "<field1>": <value21>,  
          "<field2>": <value22>  
        }  
      }  
    ]  
  }  
}
```



# Service Area Calculator

The screenshot displays the FME Data Inspector interface. The main window shows a map with several service areas outlined in red and shaded in light gray. The areas are labeled: Brier, Lake Forest Park, Woodinville, Kingsgate, Maltby, Duvall, Clyde Hill, and Ames Lake. A large black area is also visible on the left side of the map. The interface includes a Display Control panel on the left, a Feature Information panel on the right, and a Table View panel at the bottom.

**Table View**

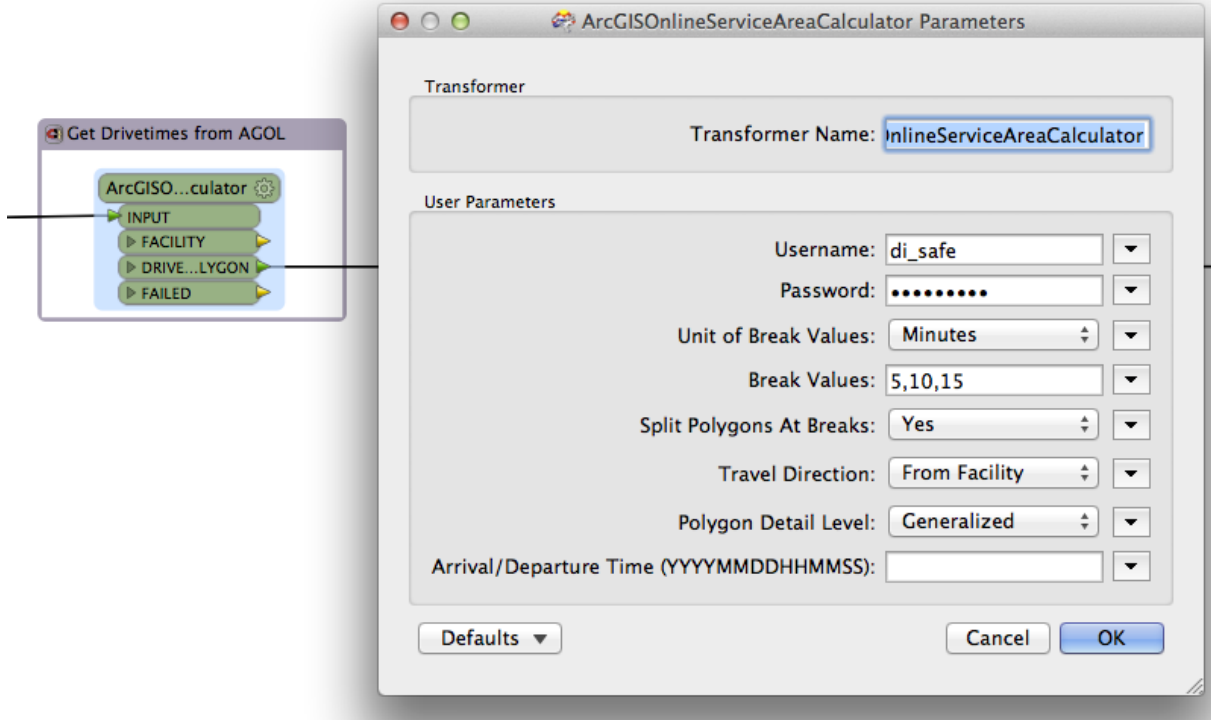
FacilityID	TravelDirection	PolygonDetailLevel	FromBreak	ToBreak	_creation_instance
1	1	<missing>	10	15	0
2	1	<missing>	0	5	0
3	1	<missing>	5	10	0

3 row(s)



Create harmony between data and applications

# Service Area Calculator



# Calculate bush fire risk before construction



**FME Cloud**

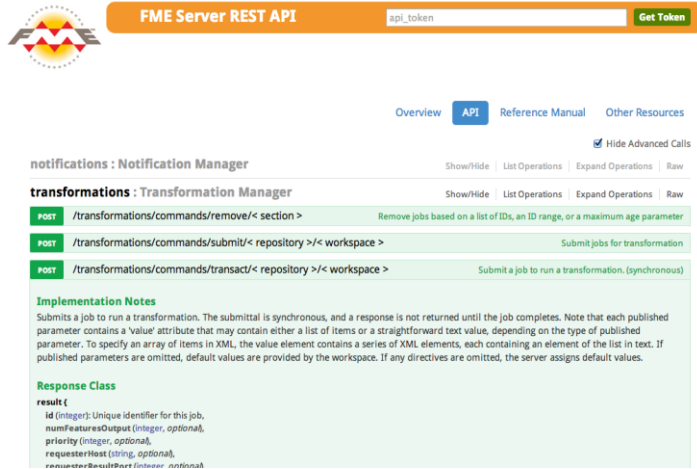


Create harmony between data and applications

# Calculate bush fire risk before construction

## Request sent to a REST service

```
http://tutorial-aaron-koning.fmecloud.com/fmerest/v2/transformations/commands/transact/Samples/austinDownload.fmw?de  
tail=low
```



The screenshot shows the FME Server REST API interface. At the top, there is a navigation bar with the FME logo and the text "FME Server REST API". Below this, there is a search bar labeled "api\_token" and a "Get Token" button. The main content area is divided into several sections: "notifications : Notification Manager", "transformations : Transformation Manager", and "Implementation Notes". The "transformations : Transformation Manager" section lists three API endpoints:

- POST** /transformations/commands/remove/< section > Remove jobs based on a list of IDs, an ID range, or a maximum age parameter
- POST** /transformations/commands/submit/< repository >/< workspace > Submit jobs for transformation
- POST** /transformations/commands/transact/< repository >/< workspace > Submit a job to run a transformation, (synchronous)

The "Implementation Notes" section provides details about the submit endpoint, including implementation notes and a response class definition:

```
result {  
  id (integer): Unique identifier for this job,  
  numFeaturesOutput (integer, optional),  
  priority (integer, optional),  
  requesterHost (string, optional),  
  requesterResultWare (integer, optional)
```

## Result is JSON

```
{  
  "type": "Polygon",  
  "coordinates": [  
    [  
      -122.241472244,  
      47.646478653  
    ],  
    [  
      -122.241472244,  
      47.8205585480001
```

# Cloud Services for serving maps

ArcGIS Online

Google Maps Engine



Create harmony between data and applications



# Loading data from on-premise to a cloud map service

## Overview

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The Google Maps Engine API provides programmatic access to assets contained in Google Maps Engine projects. It provides read-only access to all assets, and create/update/delete functionality on table features only.

### REST

The Maps Engine API is a [RESTful](#) API. All requests to the API are HTTP requests, so that any programming language with an HTTP library can be used to query or modify data in the API.

### JSON

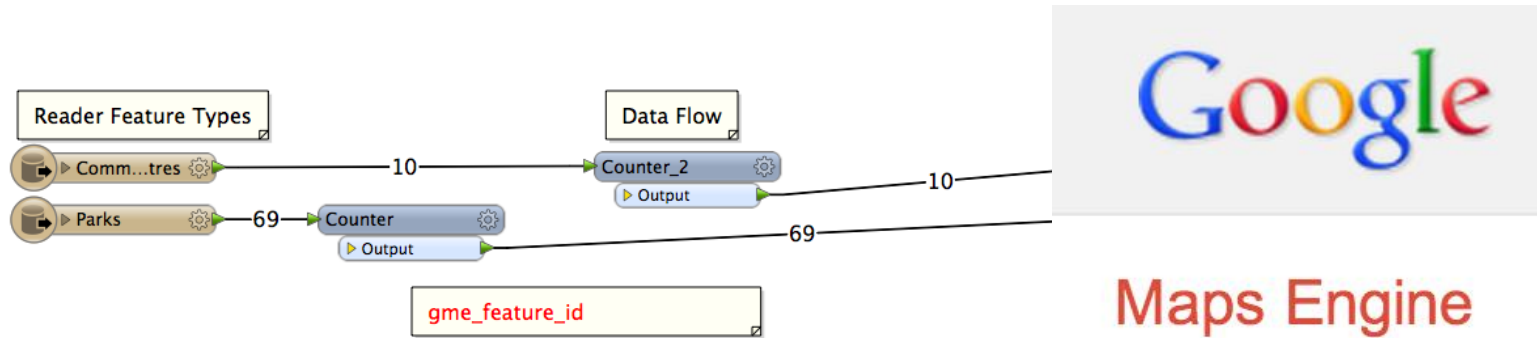
Resources are represented as JavaScript Object Notation (JSON). JSON is a widely-supported standard, with parsers available in most programming languages. More information about JSON is available from [Wikipedia](#) and from [www.json.org](http://www.json.org).



Maps Engine



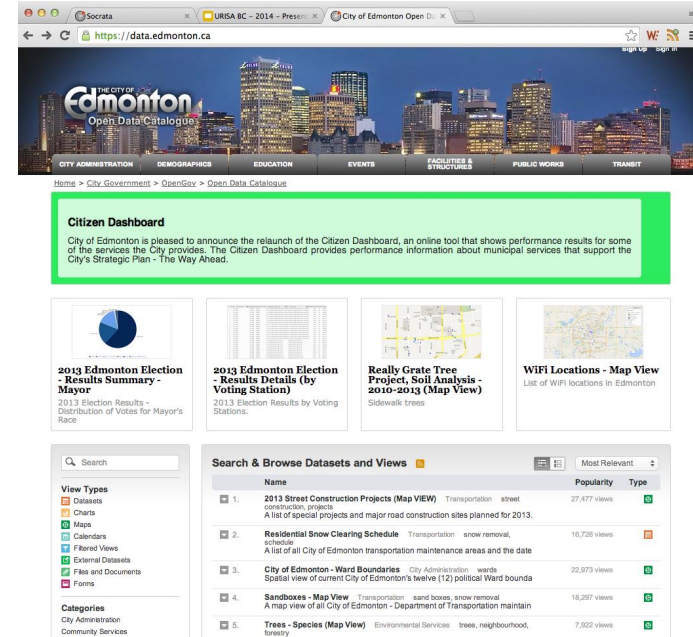
# Loading data from on-premise to a cloud map service



# Sharing the City of Edmonton's data as maps

Open data provided by Socrata

Now let's offer maps



The screenshot shows the City of Edmonton Open Data Catalogue website. The header features the City of Edmonton logo and navigation tabs for various departments: CITY ADMINISTRATION, DEMOGRAPHICS, EDUCATION, EVENTS, FACILITIES & STRUCTURES, PUBLIC WORKS, and TRANSIT. Below the header is a "Citizen Dashboard" section with a green background, announcing the relaunch of the Citizen Dashboard. The main content area displays several data categories with map icons:

- 2013 Edmonton Election - Results Summary - Mayor**: 2013 Election Results - Distribution of Votes for Mayor's Race (Pie chart icon)
- 2013 Edmonton Election - Results Details (by Voting Station)**: 2013 Election Results by Voting Stations (Bar chart icon)
- Really Grate Tree Project, Soil Analysis - 2010-2013 (Map View)**: Sidewalk trees (Map icon)
- WiFi Locations - Map View**: List of WiFi locations in Edmonton (Map icon)

Below these categories is a "Search & Browse Datasets and Views" section with a search bar and a list of datasets:

Name	Popularity	Type
1. <b>2013 Street Construction Projects (Map VIEW)</b> construction projects - A list of special projects and major road construction sites planned for 2013.	27,477 views	street
2. <b>Residential Snow Clearing Schedule</b> A list of all City of Edmonton transportation maintenance areas and the date	18,728 views	snow removal, schedule
3. <b>City of Edmonton - Ward Boundaries</b> Spatial view of current City of Edmonton's twelve (12) political Ward bounda	22,973 views	City Administration
4. <b>Sandboxes - Map View</b> A map view of all City of Edmonton - Department of Transportation maintain	18,297 views	sand boxes, snow removal
5. <b>Trees - Species (Map View)</b> A map view of all City of Edmonton - Department of Environmental Services	7,922 views	trees, neighbourhood, forestry



Create harmony between data and applications

# Sharing the City of Edmonton's data as maps

Pull from the open data portal

Load to Google Maps Engine

The screenshot shows the City of Edmonton Open Data Catalogue website. The header features the city's logo and navigation tabs for various departments: CITY ADMINISTRATION, DEMOGRAPHICS, EDUCATION, EVENTS, FACILITIES & STRUCTURES, PUBLIC WORKS, and TRANSIT. A green banner highlights the 'Citizen Dashboard' section, which includes a news item about the relaunch of the dashboard. Below this, there are four featured data visualizations: a pie chart for '2013 Edmonton Election - Results Summary - Mayor', a bar chart for '2013 Edmonton Election - Results Details (by Voting Station)', a map for 'Really Grate Tree Project, Soil Analysis - 2010-2013 (Map View)', and another map for 'WiFi Locations - Map View'. At the bottom, there is a search and browse section with a search bar, a list of view types (Datasets, Charts, Maps, Calendars, Filtered Views, External Datasets, Files and Documents, Forms), and a table of datasets.

Name	Popularity	Type
1. 2013 Street Construction Projects (Map VIEW) construction projects - A list of special projects and major road construction sites planned for 2013.	27,477 views	street
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Create harmony between data and applications

# Sharing the City of Edmonton's data as maps

Open data portal provides JSON format - CSV also

```
← → ↻ 📄 opendata.socrata.com/resource/2th8-pz7z.json

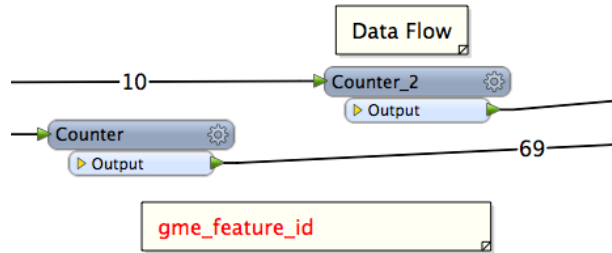
[ {
  "centreaddress" : "1 Kingsway",
  "centrename" : "Mount Pleasant",
  "geom" : {
    "needs_recoding" : false,
    "longitude" : "-123.100221039998",
    "latitude" : "49.2643146492928"
  },
  "objectid" : "1",
  "centreurl" : "http://vancouver.ca/parks/cc/mtpleasant/index.htm"
}, {
  "centreaddress" : "601 Keefer St",
  "centrename" : "Strathcona",
  "geom" : {
    "needs_recoding" : false,
    "longitude" : "-123.091546207695",
    "latitude" : "49.2797797927607"
  },
  "objectid" : "2",
  "centreurl" : "http://vancouver.ca/parks/cc/strathcona/index.htm"
}
```



# Sharing the City of Edmonton's data as maps

```
opendata.socrata.com/resource/2th8-pz7z.json

[
  {
    "centreaddress": "1 Kingsway",
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    "geom": {
      "needs_recoding": false,
      "longitude": "-123.100221039998",
      "latitude": "49.2643146492928"
    },
    "objectid": "1",
    "centreurl": "http://vancouver.ca/parks/cc/mtpleasant/index.htm"
  },
  {
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    "geom": {
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    },
    "objectid": "2",
    "centreurl": "http://vancouver.ca/parks/cc/strathcona/index.htm"
  }
]
```

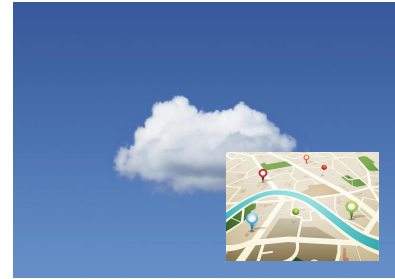
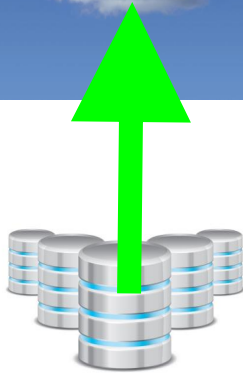


Maps Engine



# Sharing the City of Edmonton's data as maps

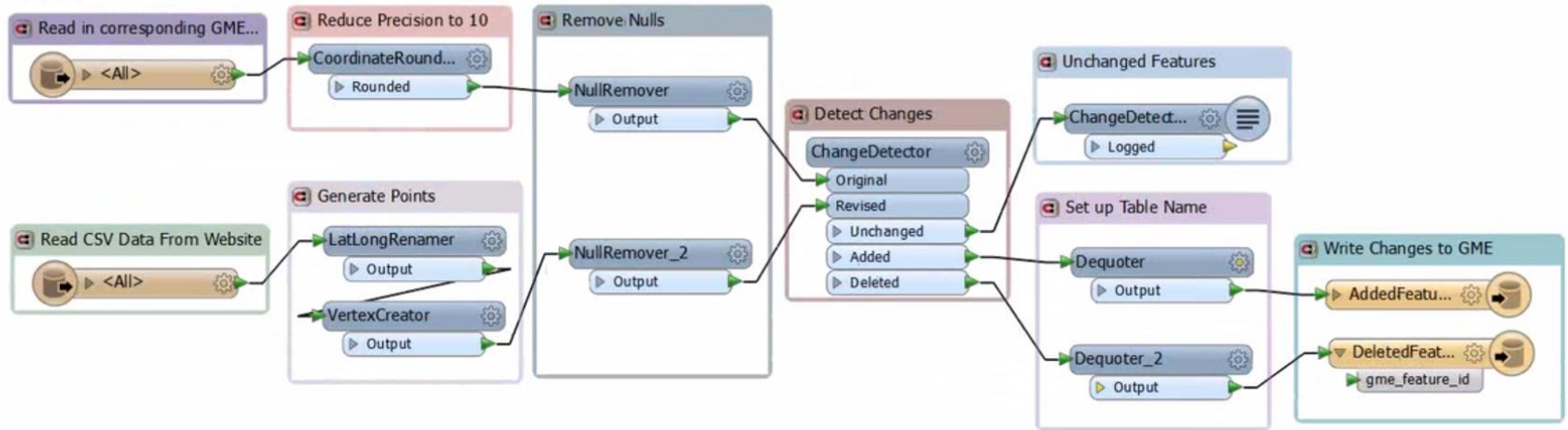
How do we ensure the maps are up-to-date?



Create harmony between data and applications

# Sharing the City of Edmonton's data as maps

## Change detection





# Sharing the City of Edmonton's data as maps

Home > Schedules > New Schedule

## Schedule

Start Date <sup>?</sup>:

Immediately

2014-02-20

02:00

Repeats:

Interval Based

CRON Expression

Only Occur Once

Repeat Unit:

MINUTE

Interval:

End Date:

SECOND

MINUTE

HOUR

DAY

WEEK

MONTH

YEAR

## Transformation Manager Directive

Job Priority (1-100, 1 is highest) <sup>?</sup>:

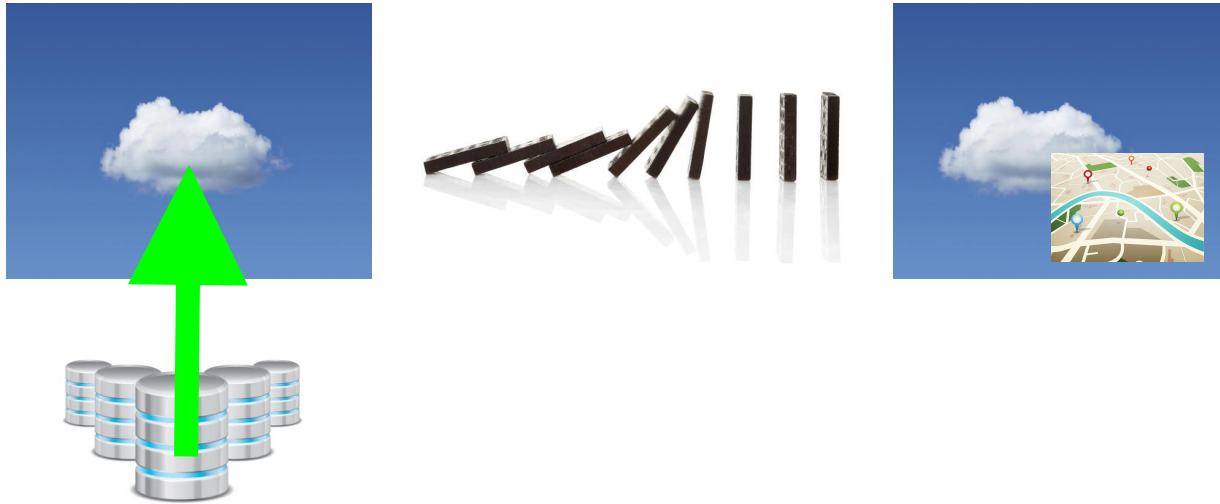
Job Routing Tan <sup>?</sup>:



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# Real-time integration

Moving from scheduled synchronization to real-time data integration  
Alert other systems when new data is available



# Real-time integration

We've been here before:

How do I connect accounting and CRM and relational data systems?



On-premise:

How do I connect MAS 90 and SAP and Oracle?



Cloud:

How do I connect Braintree and Salesforce and SimpleDB?



# Real-time integration

Cloud services are being built with event driven architectures



Create harmony between data and applications

# Integration Platforms

Cloud integration platforms (iPaaS) are emerging

Zapier

IFTTT

FME Cloud



# Zapier

e.g. a new account in your customer relationship management automatically creates a customer in the accounting system



The image shows a Zapier workflow configuration interface. It consists of two rows of dropdown menus. The top row has a 'PREMIUM' badge on the left, followed by a dropdown menu for 'Salesforce' (with a red 'S' icon), a right-pointing arrow, and a dropdown menu for 'Braintree' (with a 'braintree' logo). The bottom row has a dropdown menu for 'New Account' and a dropdown menu for 'Create Customer'. Below the 'Salesforce' dropdown, there is handwritten orange text 'WHEN THIS HAPPENS ...' with a curved arrow pointing to the dropdown. Below the 'Create Customer' dropdown, there is handwritten orange text '... DO THIS' with a curved arrow pointing to the dropdown.

zapier



# Zapier



Customer use case:

BOX.com

Upload to Amazon S3

1 Choose a trigger and action

Need inspiration? [Explore existing Zap templates to get you started.](#)

 Box	▶	 Amazon S3
New File		Copy File from Trigger

*WHEN THIS HAPPENS ...* *... DO THIS*



Create harmony between data and applications

# Zapier

Customer use case:

BOX.com

**Process the spatial  
data**

Upload to Amazon S3

Add a new action that leverages  
a location aware iPaaS:

REST API

Location aware iPaaS triggers  
upload to Amazon S3

Choose a trigger and action

Need inspiration? [Explore existing Zap templates to get you started.](#)

The image shows a Zapier interface for selecting a trigger and an action. The trigger is set to 'Box' with the sub-trigger 'New File'. The action is set to 'FME Server' with the sub-action 'Trigger FME Workspace'. There are arrows between the two dropdowns indicating a flow.

*WHEN THIS  
HAPPENS ...*

*... DO THIS*

The image shows the configuration page for the 'FME Server' action. It features a diagram at the top with 'Publication' pointing to 'Topic' (a grey arrow) which points to 'Subscription' (a yellow arrow). Below the diagram are input fields for 'Subscription Name', 'Topics Subscribed To' (with 'Select All' and 'Deselect All' buttons), 'Protocol', 'Bucket', and 'AWS Access Key ID'. The 'Protocol' field is set to 'Amazon Simple Storage Service'.



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# Database triggers

A new record is created

A trigger sends a REST call to update a cloud service



# Mobile apps

A location update is sent to a location aware integration platform

A spatial geofence analysis is performed

A response might be to update another system



# Real-time map services

What if I have location data being updated in real-time?

HTML5 WebSockets is a new standard for serving data to applications in real-time

JavaScript creates the web socket connection

You can then plot locations on a web map such as ArcGIS or Google Maps

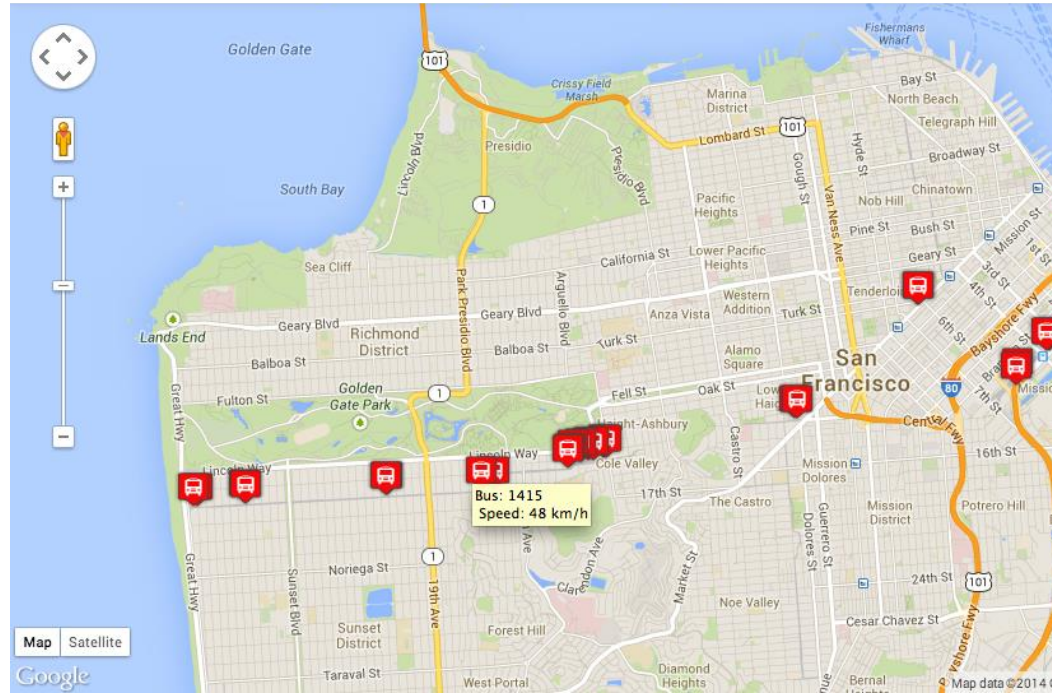


# Mobile apps

A location update is sent to a location aware integration platform  
That location can be transmitted through HTML5 websockets onto a  
map in real-time



# Live Spatial Dashboard



Create harmony between data and applications

# Conclusion

The cloud offers new opportunities for publishing data and maps

Data integration is a new challenge for the cloud

Specialized platforms are emerging for dealing with cloud integration



# Thank you

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