

Describing Geographical Objects

Web Architecture and Information Management [./] Spring 2009 — INFO 190-02 (CCN 42509)

Erik Wilde, UC Berkeley School of Information

2009-04-15



<http://creativecommons.org/licenses/by/3.0/>

This work is licensed under a [CC Attribution 3.0 Unported License](http://creativecommons.org/licenses/by/3.0/) [http://creativecommons.org/licenses/by/3.0/]

Contents

• Abstract	2
• Geodata on the Web	3
• 1 Keyhole Markup Language (KML)	
◦ Map-Based Painting	5
◦ KML Schema	6
◦ KML Tours	7
◦ Google My Maps	8
◦ Google My Maps	9
◦ South Hall KML (1 st Attempt)	10
◦ Getting the KML Data	11
◦ South Hall KML	12
◦ KML vs. GeoRSS	13
• 2 KML Applications	
◦ KML as "Poor Man's GIS"	15
◦ UCB Campus KML in Google Maps	16
◦ UCB Campus KML in Google Earth	17
◦ GPS KML Export	18
• Conclusions	19

Abstract (2)

The *Keyhole Markup Language (KML)* is a way of how placemarks and other geographical features can be described. It is not as powerful or sophisticated as the *Geographic Markup Language (GML)*, but it is easier to understand and use and is supported as a data format by a variety of Web-oriented services and applications. Flickr, Google Maps, Google Earth all support KML and can use KML for exchanging geographic datasets.

Geodata on the Web (3)

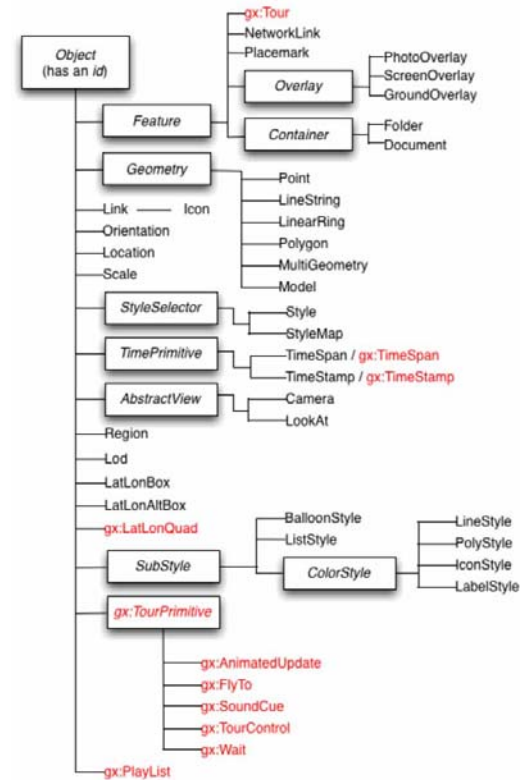
- [GeoRSS](#) [Location and Geocoding] is a simple way of tagging feed entries
 - each entry can be associated with a point on a map (GeoRSS-Simple in its simplest form)
 - the basic data structure is still a feed (probably sorted by date)
- [Keyhole](http://en.wikipedia.org/wiki/Keyhole,_Inc.) [http://en.wikipedia.org/wiki/Keyhole,_Inc.] pioneered consumer-level geospatial imaging
 - founded in 2001 and acquired by Google in 2004
 - Google Maps and Google Earth are based on Keyhole technologies
- [Google Earth](http://earth.google.com/) [http://earth.google.com/] started as a standalone program
 - separate application instead of being an integral part of browsing
 - [Google Earth Plug-in](http://googlesystem.blogspot.com/2008/05/google-earth-browser-plugin.html) [http://googlesystem.blogspot.com/2008/05/google-earth-browser-plugin.html] and [Google Earth API](http://code.google.com/apis/earth/) [http://code.google.com/apis/earth/] allow browser integration
 - [Plug-Ins](#) [Web Browsers; Plug-Ins (1)] require separate installation (unless they are as popular as *Flash*)

Keyhole Markup Language (KML)

Map-Based Painting (5)

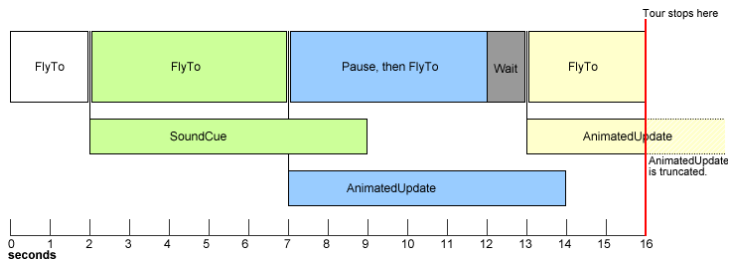
- KML represents annotations in mapping-oriented applications
- Features for representing annotations (not the map itself)
 - placemarks
 - images
 - polygons
 - textual descriptions
 - 3D models
- Google Earth extends KML with dynamic features
 - ability to associated time spans with features
 - ability to represent tours (dynamic presentations of features)

KML Schema (6)



KML Tours

(7)



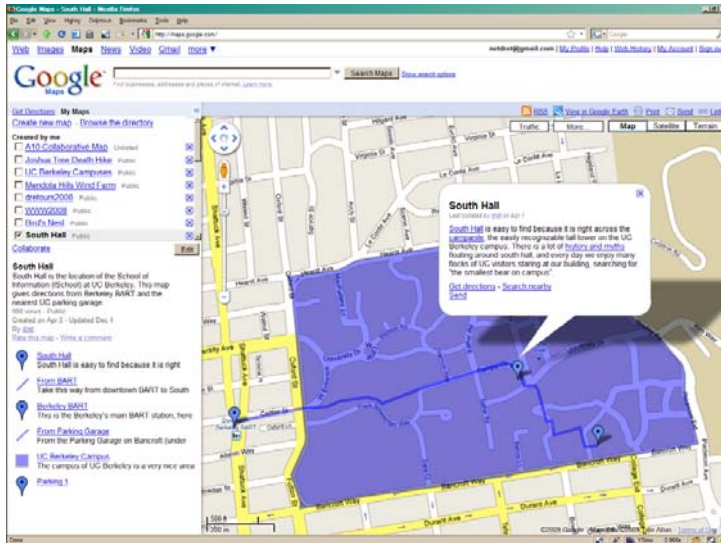
Google My Maps

(8)

- Based on Google Maps and adds simple drawing features
 - maps are associated with a Google account
 - maps can be private, public, or collaborative
 - maps can be [linked to](http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=116962062413210327627.00000111c424a5e1da07d&z=15) [http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=116962062413210327627.00000111c424a5e1da07d&z=15] for publishing custom maps
- Extremely limited in its functionality
 - three feature drawing tools: placemarks, lines, polygons
 - allows import of GeoRSS or KML data (KMZ simply is gzipped KML)
 - inability to rearrange painted features

Google My Maps

(9)



South Hall KML (1st Attempt)

(10)

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.2">
  <Document>
    <name>UC Berkeley Campuses</name>
    <description><![CDATA[]]></description>
    <NetworkLink>
      <name>UC Berkeley Campuses</name>
      <Link>
        <href>http://maps.google.com/maps/ms?ie=UTF8&hl=en&vps=1&
        amp;jsv=153e&oe=UTF8&msa=0&
        amp;msid=116962062413210327627.00043de7109aff5329452&output=kml</href>
      </Link>
    </NetworkLink>
  </Document>
</kml>
```

- Useful because the KML is just a pointer to the real data
- Only useful in online scenarios (access to URI required)

Getting the KML Data (11)

- KML has a feature that allows dynamic access to KML files
- KML handling in offline/import scenarios requires KML content
- KML is XML and XML has special escaping rules
 - [markup languages](#) [Setup and Environment; Element Markup (1)] always need "magic characters" (in HTML/XML: < & " ')
 - copy/paste of XML-encoded strings requires unescaping of these characters
- Unescaping is a mechanical task and can be done by hand
 - change each "&" into "&"
 - [Web-based services](#) [http://coderstoolbox.net/string/] can be used to automate this task (use "XML" "decode" to "US-ASCII" when using this service)

South Hall KML (12)

```

<Placemark>
  <name>South Hall</name>
  <description><![CDATA[South Hall is the oldest building in the UC system
and is located in the middle of the UC Berkeley main campus.<br><img
alt=""><br>]]>
</description>
  <styleUrl>#style20</styleUrl>
  <Polygon>
    <outerBoundaryIs>
      <LinearRing>
        <tessellate>1</tessellate>
        <coordinates>
          -122.258682,37.871521,0.000000
          -122.258499,37.871559,0.000000
          -122.258339,37.871159,0.000000
          -122.258530,37.871109,0.000000
          -122.258682,37.871521,0.000000
        </coordinates>
      </LinearRing>
    </outerBoundaryIs>
  </Polygon>
</Placemark>

```

KML vs. GeoRSS

(13)

- Different focus (based on the language origins)
 - GeoRSS is a feed of entries (with some geospatial annotations)
 - KML is a set of features intended as a map overlay
- Different application scenario
 - GeoRSS is published from a continually updated collection
 - KML often is a static set of features (or a "static" tour)

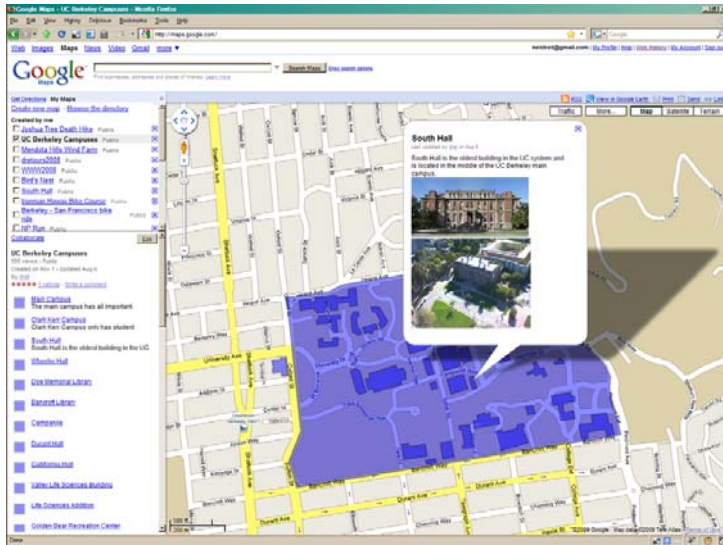
KML Applications

KML as "Poor Man's GIS"

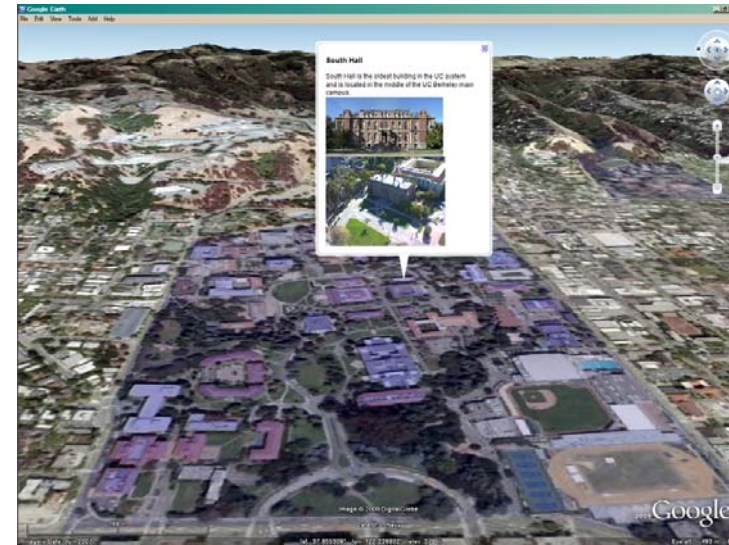
(15)

- KML can be easily exported from various geospatial data sources
 - sophisticated systems have richer data formats
 - KML is better used as an "export format", not as a "native format"
- Increased availability of mobile devices produces geospatial data streams
 - KML as the smallest common denominator among these

UCB Campus KML in Google Maps (16)



UCB Campus KML in Google Earth (17)



GPS KML Export

(18)

```

<LineString>
  <coordinates>
-122.2677459,37.9042908,254.4060059 -122.2677476,37.9042933,254.4060059
-122.2677686,37.9042067,254.4060059 -122.267895,37.9041198,253.4447021
-122.2680509,37.9040338,252.4833984 -122.2682063,37.9039967,250.560791
-122.2683674,37.9039979,249.5994873 -122.268569,37.9040305,248.6381836
-122.2687854,37.9040907,246.2348633 -122.269004,37.9041813,246.2348633
-122.2690351,37.904202,246.2348633 -122.2691941,37.9042747,245.7541504
-122.2693706,37.9043745,246.7154541 -122.2693997,37.9043921,246.7154541
-122.2694605,37.9045424,245.7541504 -122.2694809,37.9046427,245.7541504
-122.2695116,37.9047445,245.7541504 -122.269538,37.9049206,246.2348633
-122.2695581,37.9050732,246.7154541 -122.2695746,37.9052039,248.1575928
-122.2695997,37.9053634,249.5994873 -122.2696369,37.9054904,248.6381836
-122.2696509,37.9056474,248.1575928 -122.2696583,37.9058106,247.1960449
-122.2696726,37.9059762,245.2734375 -122.2696909,37.9061069,245.2734375
-122.269697,37.9062585,245.2734375 -122.269692,37.9063985,247.1960449
-122.2697,37.906454,247.6767578 -122.269709,37.9065346,249.5994873
-122.2697494,37.9066337,251.0413818 -122.2698141,37.9067632,254.4060059
-122.269873,37.9068874,257.770752 -122.2699277,37.906991,260.6545410000001
-122.270014,37.9071211,263.0578613 -122.2700772,37.9072552,263.5385742000001
-122.2701383,37.9073925,264.9805908 -122.2701636,37.9074408,264.0192871
-122.2702095,37.9075338,263.5385742000001
-122.2703347,37.9077357,263.5385742000001 -122.2704255,37.9078669,264.4998779
-122.2705373,37.9080606,264.9805908 -122.2706086,37.9082023,264.0192871
-122.2706944,37.9083372,263.0578613 -122.270743,37.9084601,262.5771484
-122.2708228,37.9086263,261.6159668 -122.2708792,37.9086975,260.1739502
-122.2709523,37.9088627,257.770752 -122.2710145,37.9089806,256.3287354000001
-122.2710684,37.9090858,254.8865967 -122.2711476,37.909187,252.9639893
-122.2712618,37.9093185,251.0413818 -122.2714184,37.9094431,250.0802002
-122.2714711,37.9094882,249.1187744 -122.2716066,37.9095851,247.1960449
-122.2716284,37.9096116,247.1960449 -122.2717288,37.9097312,245.7541504
-122.2717758,37.909839,244.7928467 -122.2718446,37.9099603,243.831543
-122.271963,37.9100342,241.9089355 -122.2720511,37.910143,239.9862061
-122.272111,37.9102503,239.0249023 -122.2721364,37.9103776,240.467041
-122.2721965,37.9105403,239.5054932 -122.2722612,37.9106606,239.5054932
-122.2723033,37.9108232,240.9476318 -122.272399,37.9109669,241.9089355
-122.2724175,37.9109923,242.3896484 -122.2724104,37.9111451,241.9089355
-122.2724597,37.9112505,242.8702393 -122.2725717,37.9113861,243.3508301
-122.2726856,37.911475,242.8702393 -122.272885,37.9115634,243.3508301
-122.273005,37.9116161,243.831543 -122.2731705,37.9116638,243.3508301
-122.2732626,37.9116877,243.831543 -122.2733556,37.9118441,246.7154541
-122.2734264,37.9119685,247.1960449 -122.2735006,37.9120898,248.1575928
-122.2735541,37.9121823,249.5994873 -122.2736981,37.9122917,250.560791

```

Wilde: Describing Geographical Objects - Info 19a-02 (CC BY 4.2) 2009-04-15

```

-122.2737914,37.9123246,249.5994873 -122.2739617,37.9123719,249.1187744
-122.2739931,37.9123862,249.1187744 -122.2741461,37.9124446,248.6381836
-122.2742903,37.9125348,246.2348633 -122.274511,37.9126595,244.7928467
-122.2746705,37.9127373,243.3508301 -122.2748175,37.9128108,241.9089355
-122.2750207,37.9129305,238.0635986 -122.2750868,37.9130294,238.0635986
-122.2751502,37.9132069,237.1022949 -122.2752282,37.9133251,237.1022949
-122.2754346,37.9134314,235.6602783 -122.2755579,37.9135319,236.6217041
-122.2756826,37.913621,235.1796875 -122.2758486,37.9136545,233.2578001
-122.276018,37.9136806,232.2957764 -122.2762085,37.913749,231.8149414
-122.2763635,37.9138034,232.2957764 -122.2765191,37.9138292,231.3343506
-122.276756,37.9139779,229.892334 -122.276844,37.9140017,228.4504395
-122.2771062,37.9141318,226.527832 -122.2772679,37.9142197,224.1245117
-122.2773933,37.9142336,224.1245117 -122.2775707,37.914251,222.2017822
-122.2776646,37.9142634,222.2017822 -122.2778485,37.9143202,222.2017822
-122.277923,37.9143851,222.6824951 -122.2779734,37.9144351,222.2017822
-122.2780438,37.9146124,222.2017822 -122.2780936,37.914684,222.6824951
-122.2781669,37.9147581,226.0471191 -122.2782442,37.9148202,229.892334
-122.2782789,37.9148441,230.8537598 -122.2784078,37.9149172,235.6602783
-122.2785033,37.9149868,236.1409912 -122.2785758,37.9150501,237.5828857
-122.2785826,37.9150652,237.5828857 -122.2785457,37.9151835,241.4282227
-122.2785348,37.9152927,242.3896484 -122.2785322,37.915314,242.3896484
-122.2786172,37.9154093,243.3508301 -122.2787188,37.9154911,243.831543
-122.2787918,37.9155729,244.3122559 -122.2788094,37.9156066,245.2734375
-122.2788289,37.9156749,246.2348633 -122.2788627,37.9157968,246.7154541
-122.2788494,37.9158866,247.1960449 -122.278818,37.915994,247.1960449
-122.2788773,37.9160867,248.1575928 -122.278898,37.9161562,249.5994873
-122.2789964,37.9162152,251.0413818 -122.2790828,37.9163059,251.0413818
-122.2792112,37.9163996,252.9639893 -122.2793503,37.9164815,253.925415
-122.2794899,37.9166208,255.8480225 -122.2795635,37.9167023,255.8480225
-122.2796673,37.9168021,255.3673096 -122.2797854,37.9168731,255.3673096
-122.279925,37.9169565,254.8865967 -122.2800432,37.9171105,254.4060059
-122.2801522,37.9172397,254.4060059 -122.280323,37.9173543,251.5220947
-122.2804561,37.9174485,248.6381836 -122.2806177,37.9175672,247.1960449
-122.2807618,37.9176894,246.2348633 -122.2809002,37.9178051,245.7541504
-122.2810662,37.9179516,246.7154541 -122.2812053,37.9180733,246.7154541
-122.2812962,37.9181695,246.2348633 -122.2814274,37.9183246,246.2348633
-122.2815428,37.9184421,245.2734375 -122.2816156,37.9185595,244.3122559
-122.2816971,37.9186618,244.3122559 -122.2817854,37.9187465,244.7928467
-122.281908,37.9188643,245.2734375 -122.282002,37.9189639,246.2348633
-122.2822173,37.9191454,246.7154541 -122.2823542,37.9192537,246.2348633
-122.2824565,37.9193466,246.7154541 -122.2826208,37.9194725,247.1960449
-122.2827499,37.9195776,248.1575928 -122.2829111,37.9196764,248.6381836
-122.2830367,37.9197762,249.1187744 -122.283209,37.9198682,250.0802002
-122.2833084,37.9199703,250.0802002 -122.2833838,37.9201205,250.0802002
-122.2834556,37.9202303,250.560791 -122.2836034,37.9203081,252.4833984
-122.2837174,37.9203628,254.4060059 -122.2838563,37.920437,255.8480225
-122.2838829,37.92045,255.8480225 -122.2839974,37.9206283,258.2513428
-122.2840513,37.920742,258.2513428 -122.2841542,37.9208681,257.770752

```

Wilde: Describing Geographical Objects - Info 19a-02 (CC BY 4.2) 2009-04-15

Conclusions

(19)

- Geospatial data is important and gets more important
- GeoRSS and KML are two simple data formats for geospatial data
- GeoRSS build on a more solid foundations (dynamic collections)
- KML is mostly a static and standalone data format