Google Computer Science for High School

University of Kentucky and Morehead State University CS4HS workshop
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Paths in Google Earth and KML

Concepts/Technology/Tools
presented by
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Google Computer Science for High School

In short: Paths are a useful visualization if you want to illustrate a particular route or even emphasize important roads/walkways/etc. on a map, and this presentation will show a number of ways to create them.

Learning Objectives: Understanding how to draw simple paths using Google Earth and KML, how to customize your paths, and how to convert excel data into a KML file.

Concepts and keywords:

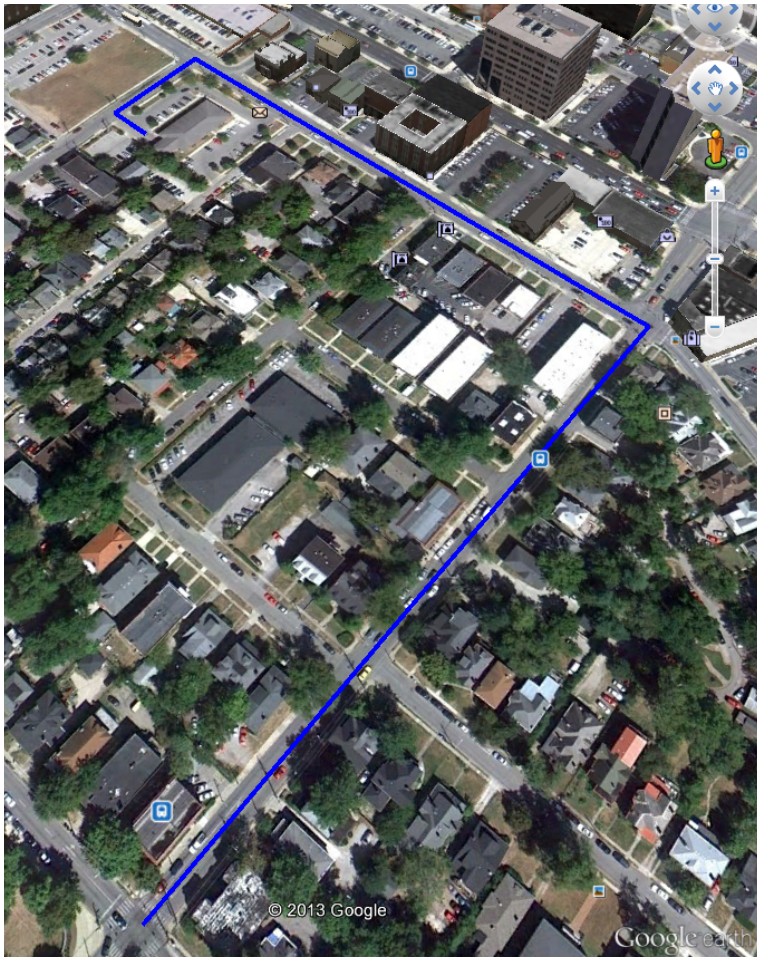
Path – A line (or multiple) drawn on a map
KML – A markup language for implementing map data
Style – The aesthetic properties of an item
Label – Identifying information associated with a map element
Annotation – Description/comments contained within a label

Main references:

Google Earth Support – http://support.google.com/earth/?hl=en
KML Documentation – https://developers.google.com/kml/documentation/
Earth Point Tools – http://earthpoint.us/

Outline:

- **Creating Paths with Google Earth**
  - Overview
  - Create a New Path
  - Edit the Style
  - Draw the Path
  - Practice
- **Creating Paths with KML**
  - Overview
  - Create the File
  - Select Coordinates
  - View the File
  - Stylize your Path
  - Practice
- **Creating Paths with Excel**
  - Overview
  - Create a Spreadsheet
  - Upload the Spreadsheet
  - View the File
  - Practice (if we have time)

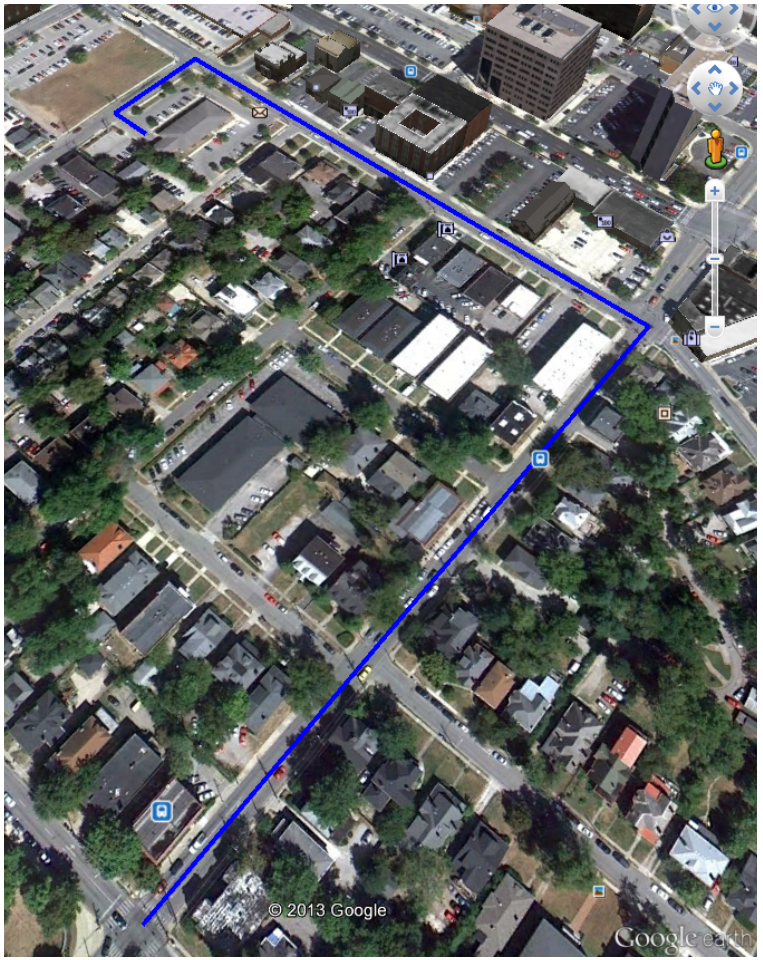


Creating Paths with Google Earth

Overview

Creating a path in Google Earth is a simple way to illustrate routes or emphasize particular roads.

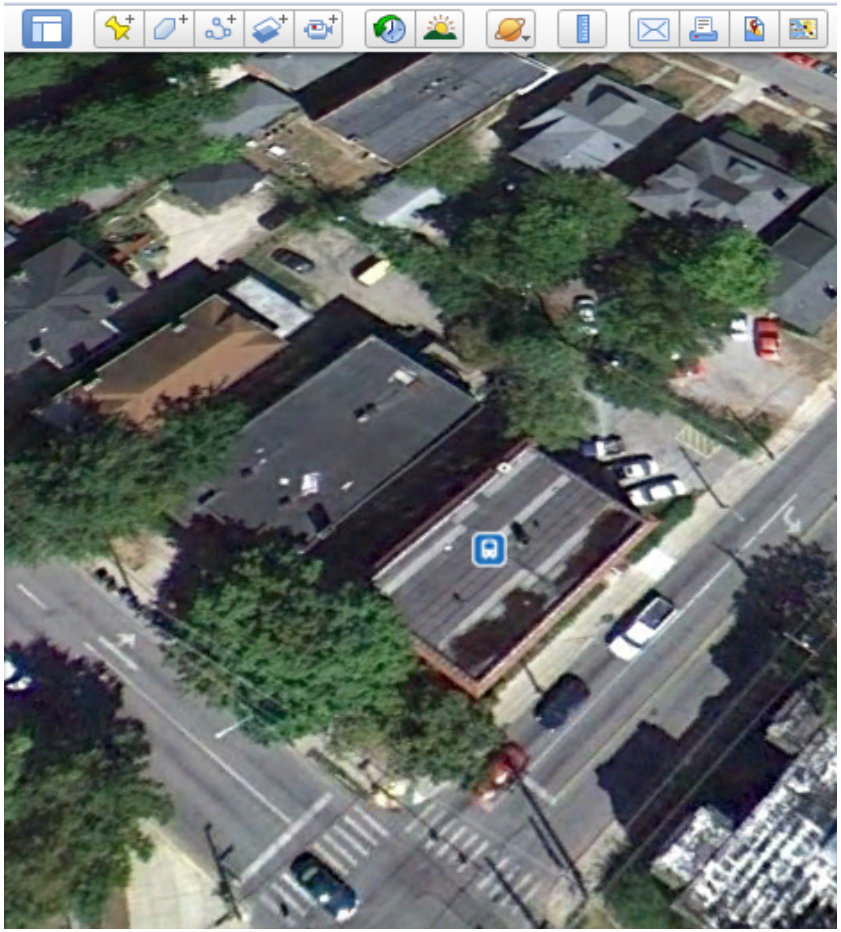
- Google earth has several options that allow you to customize how you line displays on the map.
- The Google Earth interface makes it easy to edit the path.
- Does not require any technical knowledge or detailed information about the map.



Creating Paths with Google Earth

Step 1: Create a New Path

Obviously the first step in drawing a path in Google Earth is to create a new path. Google Earth makes this fairly simple.

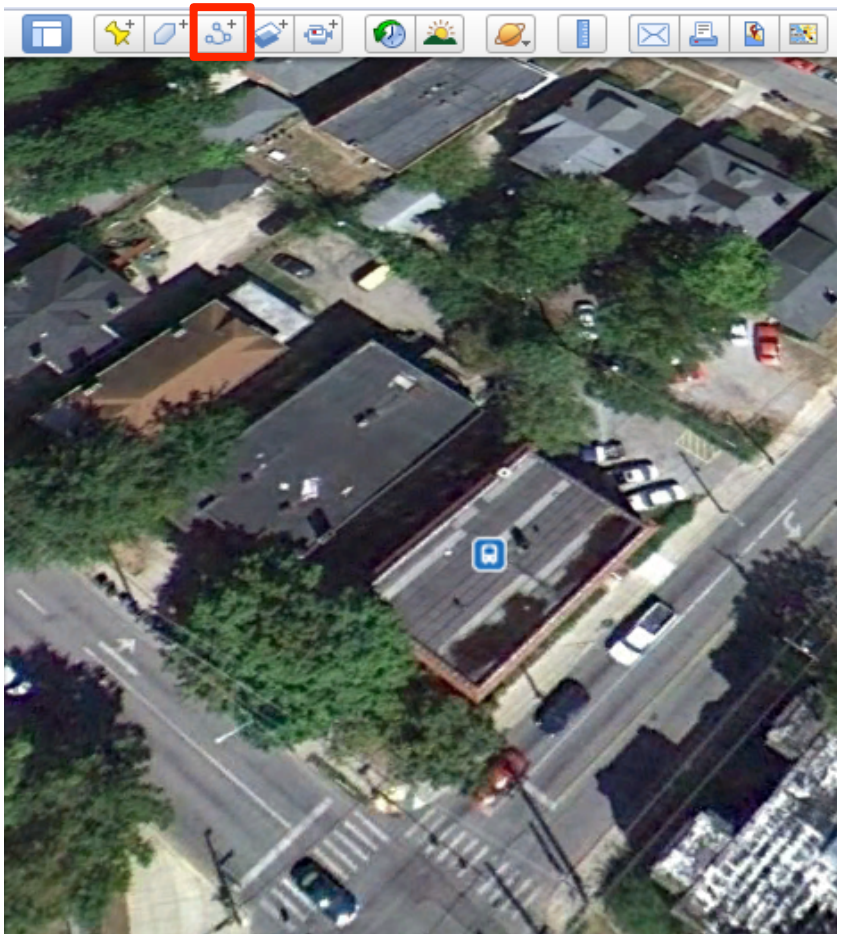


Creating Paths with Google Earth

Step 1: Create a New Path

Obviously the first step in drawing a path in Google Earth is to create a new path. Google Earth makes this fairly simple.

- Click on the "Add Path" button at the top of the Google Earth Interface.

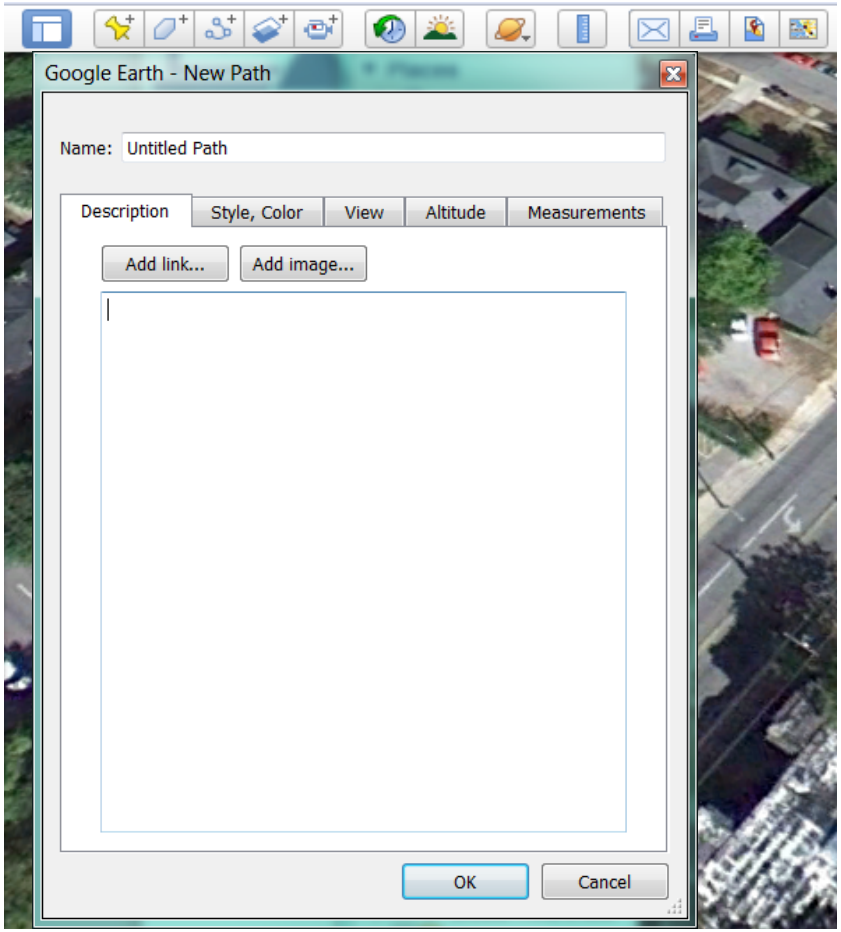


Creating Paths with Google Earth

Step 1: Create a New Path

Obviously the first step in drawing a path in Google Earth is to create a new path. Google Earth makes this fairly simple.

- Click on the "Add Path" button at the top of the Google Earth Interface
- This will open the "New Path" window which allows you to customize your path.

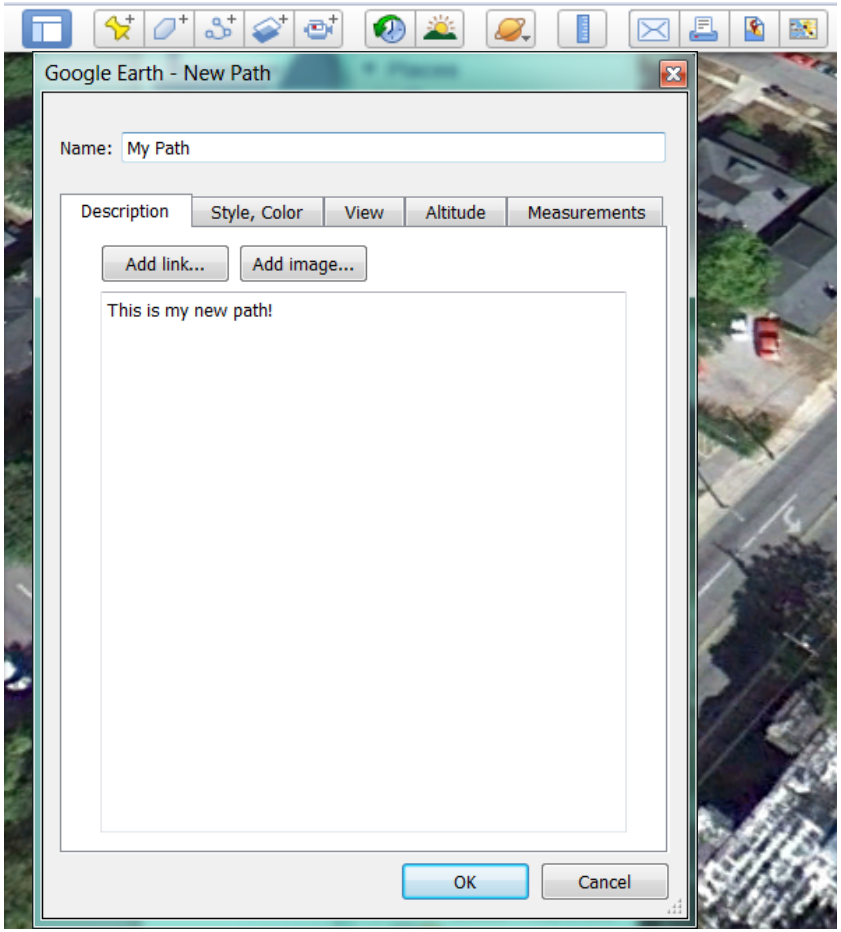


Creating Paths with Google Earth

Step 1: Create a New Path

Obviously the first step in drawing a path in Google Earth is to create a new path. Google Earth makes this fairly simple.

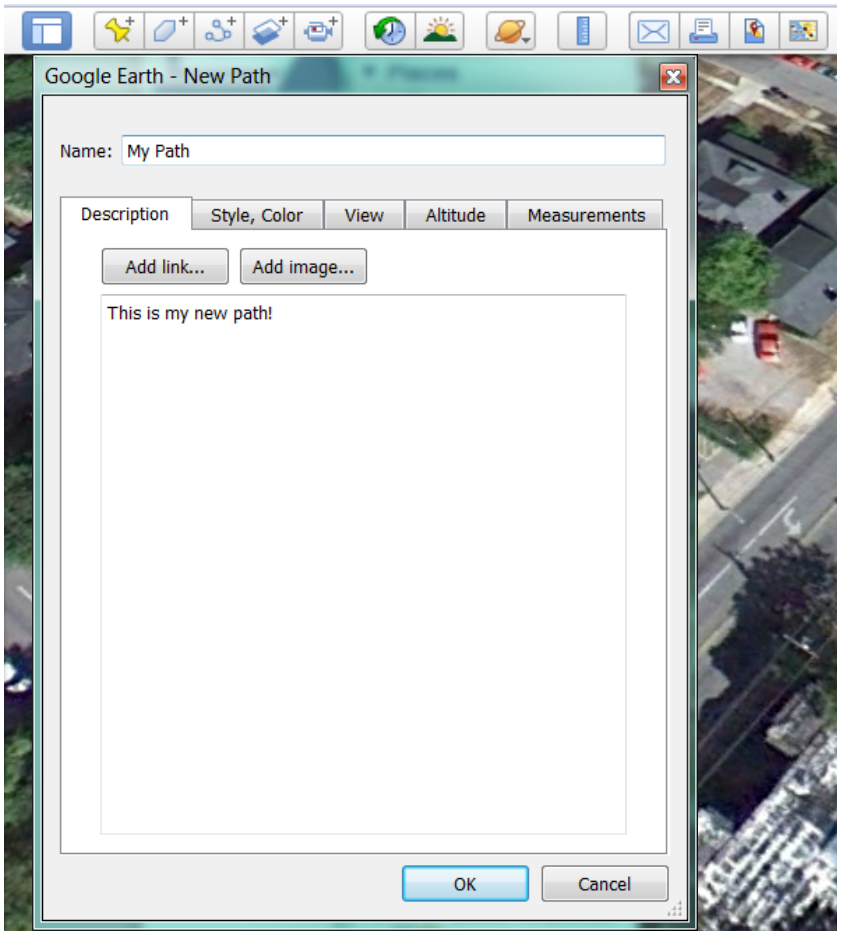
- Click on the "Add Path" button at the top of the Google Earth Interface
- This will open the "New Path" window which allows you to customize your path.
- Let's go ahead and add a Name and Description.



Creating Paths with Google Earth

Step 2: Edit the Style

We don't want our path to be plain and boring, so let's add a little style to it.

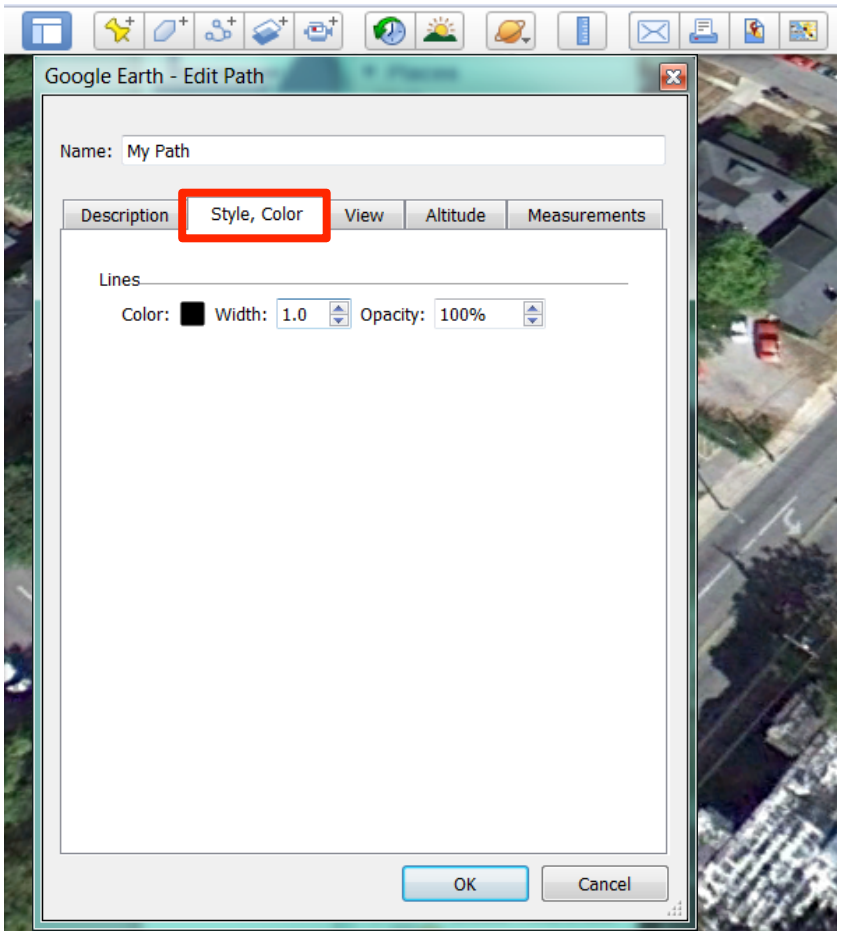


Creating Paths with Google Earth

Step 2: Edit the Style

We don't want our path to be plain and boring, so let's add a little style to it.

- Click on the "Style, Color" tab in the New Path window

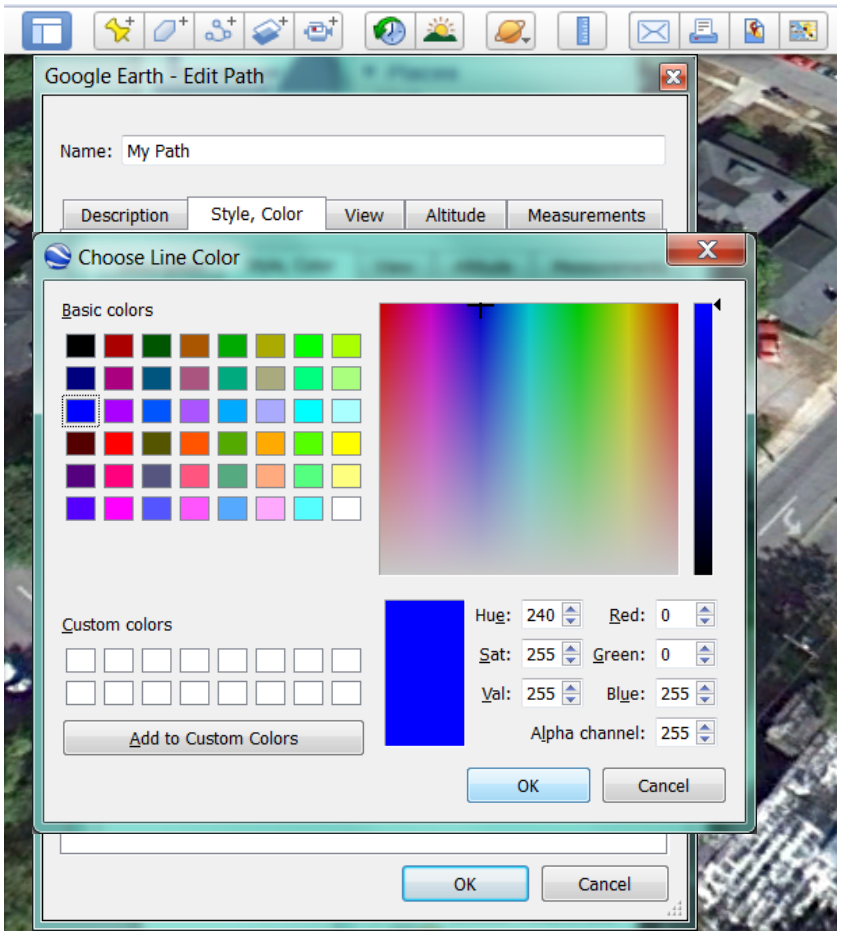


Creating Paths with Google Earth

Step 2: Edit the Style

We don't want our path to be plain and boring, so let's add a little style to it.

- Click on the "Style, Color" tab in the New Path window
- Click on the color box to open the "Choose Line Color" window and pick a color that you like.

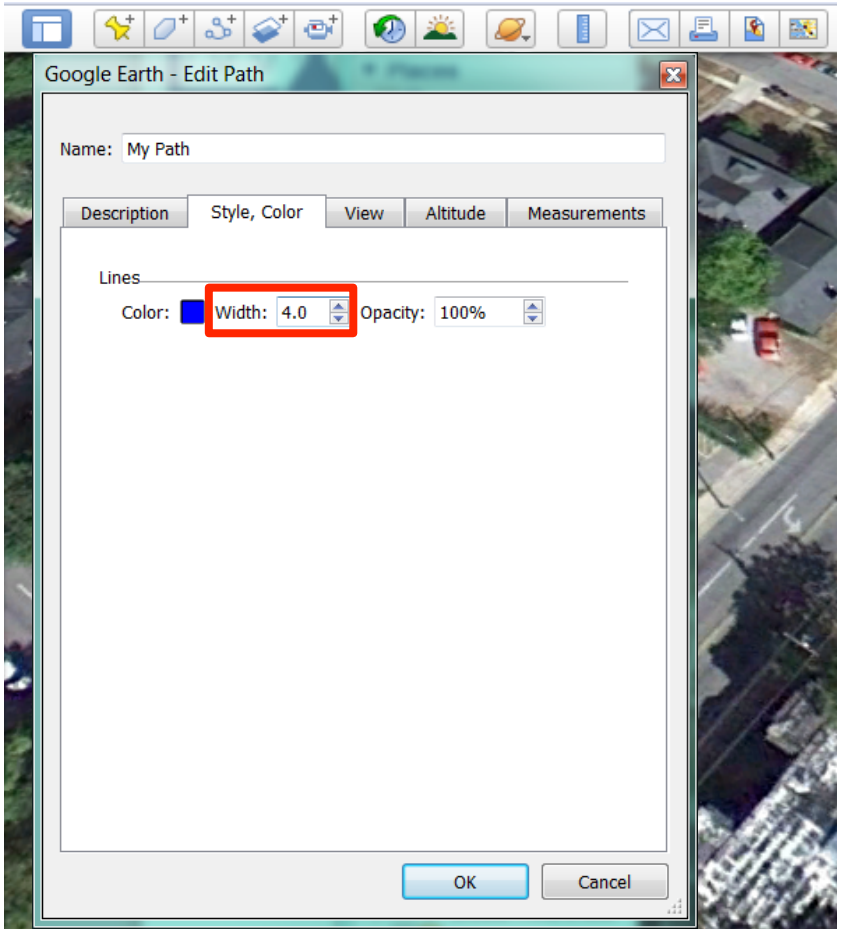


Creating Paths with Google Earth

Step 2: Edit the Style

We don't want our path to be plain and boring, so let's add a little style to it.

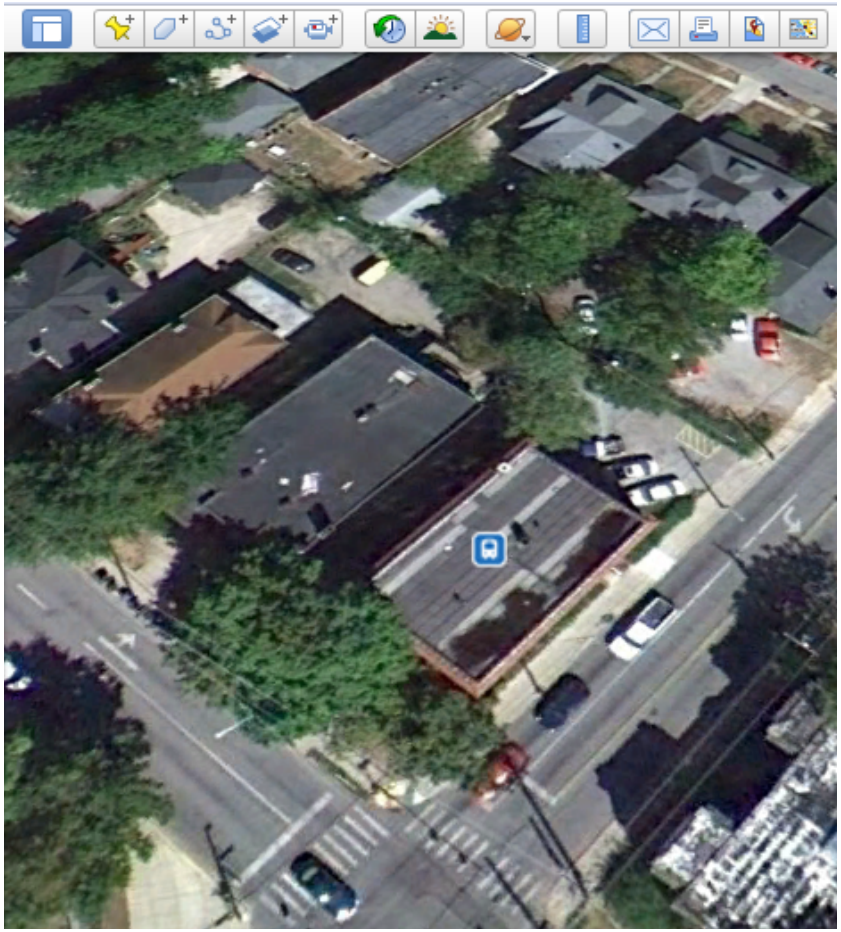
- Click on the "Style, Color" tab in the New Path window
- Click on the color box to open the "Choose Line Color" window and pick a color that you like.
- Change the line width to adjust the line thickness. We will increase the width to make the line more visible.



Creating Paths with Google Earth

Step 3: Draw the Path

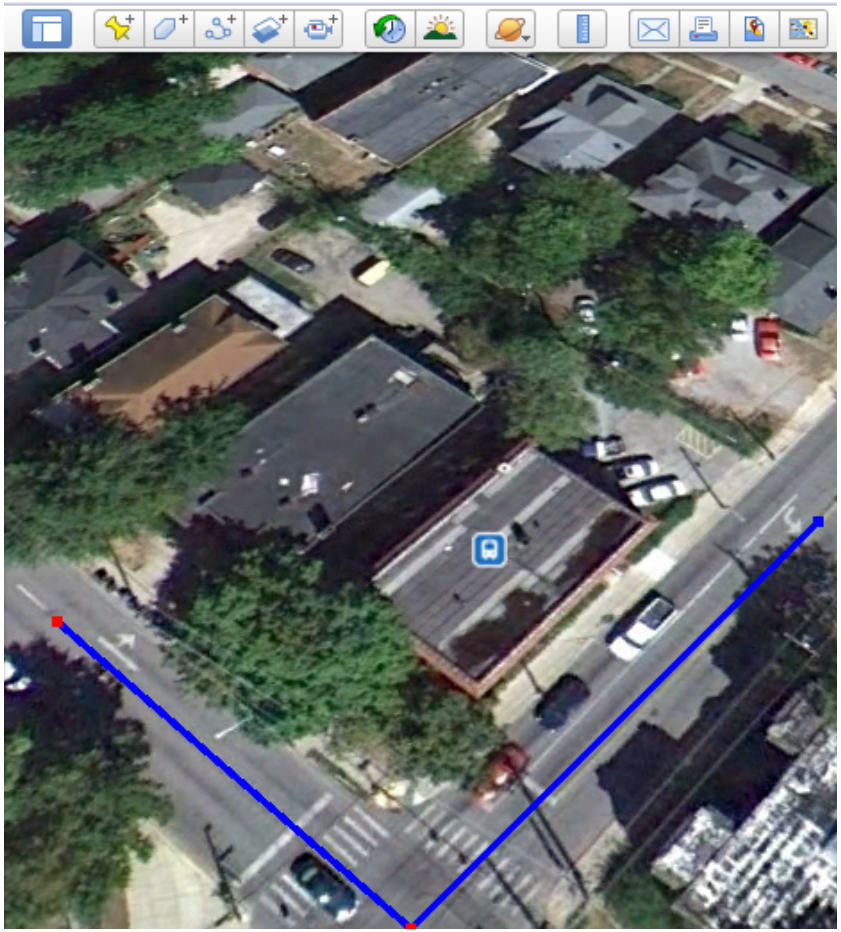
- Without closing the Path window, hover your pointer over the map (you may need to move the Path window). The cursor should appear as a box with crosshairs.



Creating Paths with Google Earth

Step 3: Draw the Path

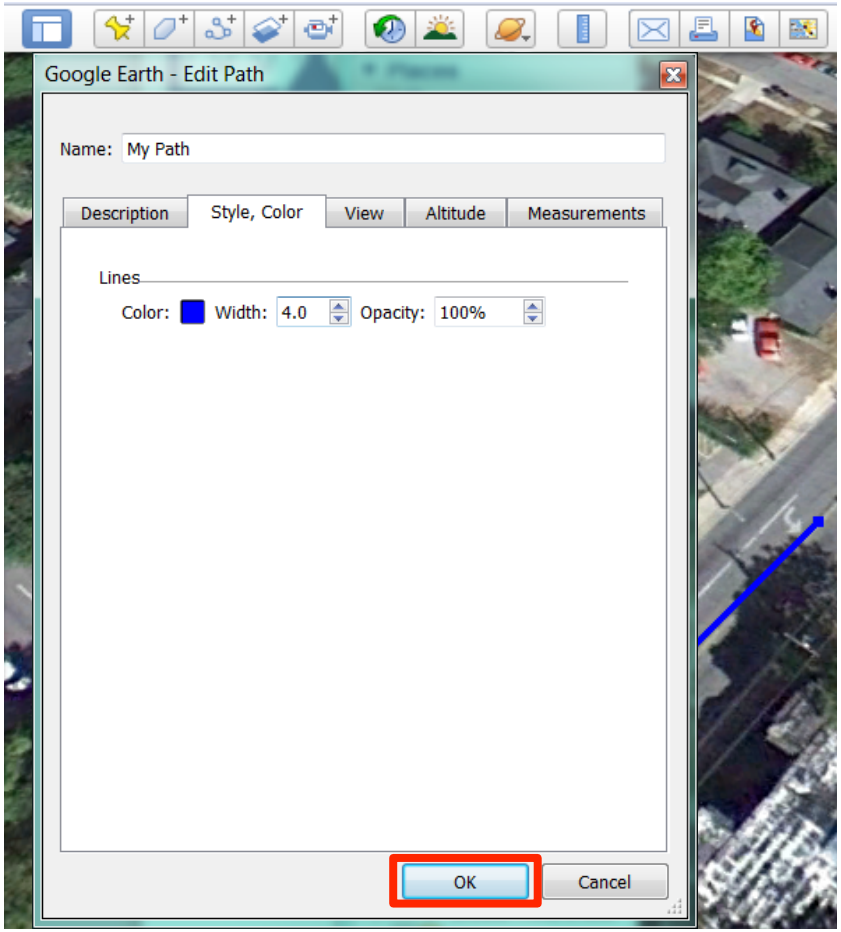
- Without closing the Path window, hover your pointer over the map (you may need to move the Path window). The cursor should appear as a box with crosshairs.
- To draw the path you can either click individual points on the map to connect, or you can click and drag to draw freehand.



Creating Paths with Google Earth

Step 3: Draw the Path

- Without closing the Path window, hover your pointer over the map (you may need to move the Path window). The cursor should appear as a box with crosshairs.
- To draw the path you can either, click individual points on the map to connect, or you can click and drag to draw freehand.
- When you are done drawing points, click “OK” in the Path window.



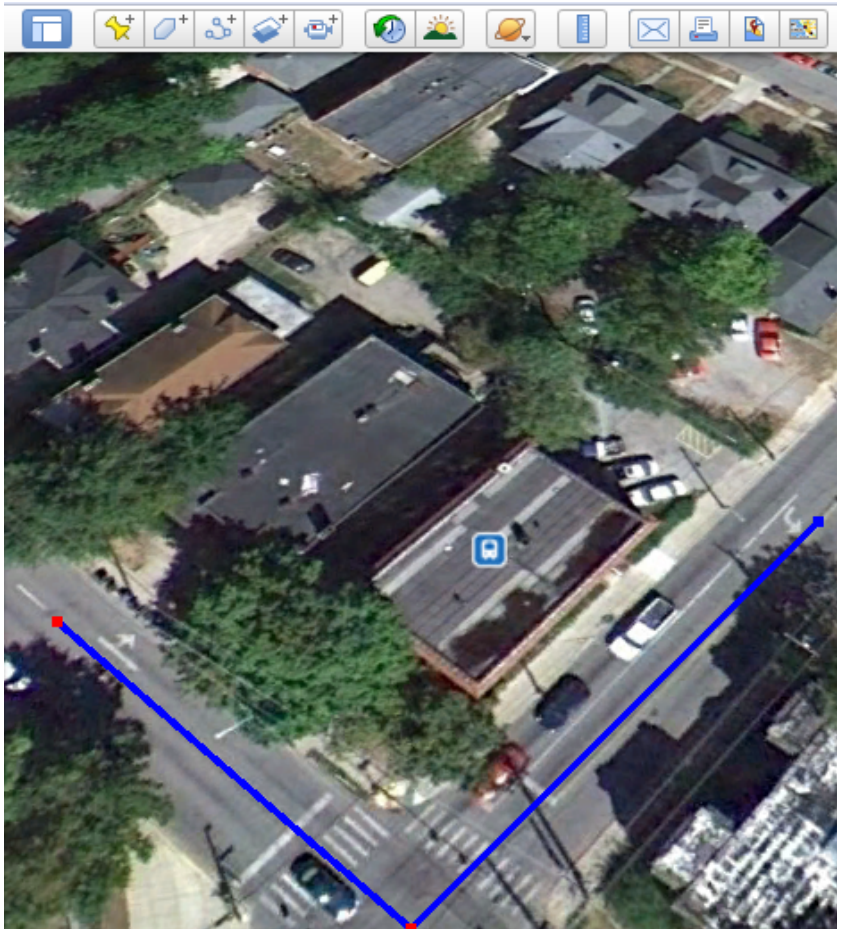
Creating Paths with Google Earth

Practice

Objective: Become familiar with creating paths using Google Earth tool bar.

Exercise:

- Use the path tool at the top of the window.
- Create a path that traverses at least 5 different roads.
- Change as many properties of the line as you can.
- Save the path as KML file for later use.



Creating Paths with KML

Overview

Creating a path by editing KML files can be a lot more tedious than simply clicking on points in Google Earth, but there are several benefits.

- With advanced knowledge, KML provides greater control and customization of your paths.
- Combined with other tools, it can be useful in creating paths on a much larger scale.
- Provides a deeper understanding of how map data is organized.

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
    <name>Path Example</name>
    <Style id="exampleStyle">
      <LineStyle>
        Insert Style Tags Here
      </LineStyle>
    </Style>
    <Placemark>
      <name>Insert Name Here</name>
      <description>Insert Description Here</description>
      <styleUrl>#exampleStyle</styleUrl>
      <LineString>
        <coordinates>
          Insert Coordinates Here
        </coordinates>
      </LineString>
    </Placemark>
  </Document>
</kml>
```

Creating Paths with KML

Step 1: Create the File

The first step is to create a KML file using your text editor. The name of the file doesn't matter as long as it is a .kml file. This code is a template of what a typical path file will look like.

```
<?xml version="1.0" encoding="UTF-8"?>
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In general you will have:

- Necessary tags (kml/Document/etc.)

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      </LineString>
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```

In general you will have:

- Necessary tags (kml/Document/etc.)
- A Style tag that defines the style of the line.

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      </LineString>
    </Placemark>
  </Document>
</kml>
```

In general you will have:

- Necessary tags (kml/Document/etc.)
- A Style tag that defines the style of the line.
- Placemark tag to define where/how the path will appear on the map.

Creating Paths with KML

Step 2: Select Coordinates

Your map utility will draw straight lines connecting the coordinates you designate. If you don't have direct measurements already, you can find coordinates using these steps:

- Using Google Earth, hover over points on the map that you want your path to pass through.


```
<Placemark>
  <name>My Path</name>
  <description>This is my path!</description>
  <styleUrl>#exampleStyle</styleUrl>
  <LineString>
    <coordinates>
      -84.496536,38.039172,0
      -84.497111,38.039678,0
      -84.497692,38.039311,0
      -84.498031,38.039631,0
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```

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- Using Google Earth, hover over points on the map that you want your path to pass through.
- The longitude and latitude will display at the bottom of the window.


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- Using Google Earth, hover over points on the map that you want your path to pass through.
- The longitude and latitude will display at the bottom of the window.
- Convert the minutes and seconds into decimal. $Decimal = Degrees + Minutes/60 + Seconds/3600$ or use the converter at http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html


```
<Placemark>
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```

Creating Paths with KML

Step 2: Select Coordinates

Notes:

- There is an option in Google Earth that changes from DMS to Decimal.


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Creating Paths with KML

Step 2: Select Coordinates

Notes:

- There is an option in Google Earth that changes from DMS to Decimal.
- Longitude is first, then latitude, and finally altitude.


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- There is an option in Google Earth that changes from DMS to Decimal.
- Longitude is first, then latitude, and finally altitude.
- If altitude is not specified, it will default to 0 which is ground level.


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Creating Paths with KML

Step 2: Select Coordinates

Notes:

- There is an option in Google Earth that changes from DMS to Decimal.
- Longitude is first, then latitude, and finally altitude.
- If altitude is not specified, it will default to 0 which is ground level.
- South and West coordinates will need to be entered as negative values.


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  </LineString>
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Creating Paths with KML

Step 3: View the File

Now that you have coordinates, you can open the file and view the path in Google Earth or Google Maps. The steps for viewing the file are different depending which program you want to view it in.

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Google Earth:

In Google Earth, simply use File->Open and browse for the file.

Creating Paths with KML

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Google Earth:

In Google Earth, simply use File->Open and browse for the file.

Google Maps:

Upload the file to your Google Drive and then you can click on the file to open it using Google Maps.

Creating Paths with KML

Step 4: Stylize your Path

The Style tags are optional, because lines will default to the thin white line, but that is not usually preferable.

```
<Style id="exampleStyle">
  <LineStyle>
    <color>ff330099</color>
    <width>8</width>
  </LineStyle>
</Style>
```

Creating Paths with KML

Step 4: Stylize your Path

The Style tags are optional, because lines will default to the thin white line, but that is not usually preferable.

Let's add:

- <color> defines the color and opacity of the line. Takes an ABGR hexadecimal value.

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- <width> defines the thickness of the line. Takes a simple integer value.

For more style options, go to https://developers.google.com/kml/documentation/kmlreference#linestyle

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Creating Paths with KML

Practice

Objective: Become familiar with creating paths by editing KML files.

Exercise:

- Edit the KML file that you saved earlier to modify your path
- Add at least one more point to your path.
- Change the color and the width of the path.

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
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      <LineString>
        <coordinates>
          Insert Coordinates Here
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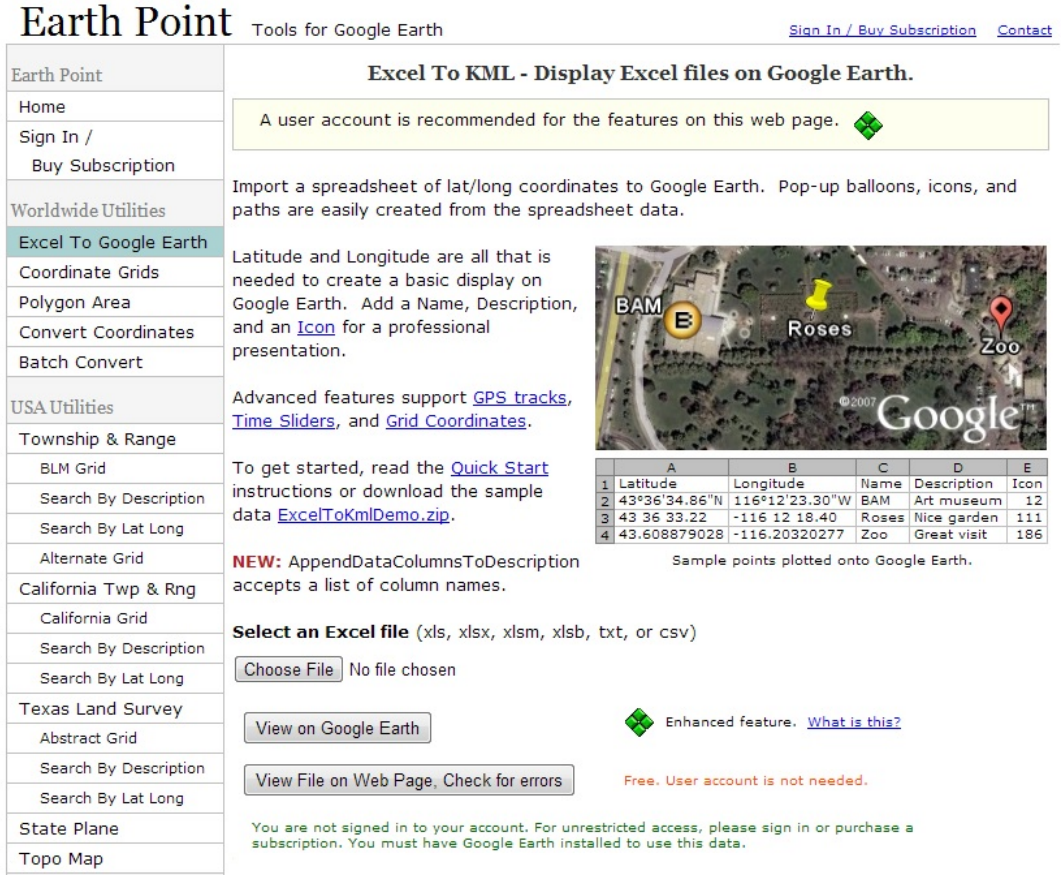
    </Placemark>
  </Document>
</kml>
```

Creating Paths with Excel

Overview

Earth Point has an Excel to KML tool that allows you to upload excel files to be transferred into KML files. This can be found at http://www.earthpoint.us/ExcelToKml.aspx.



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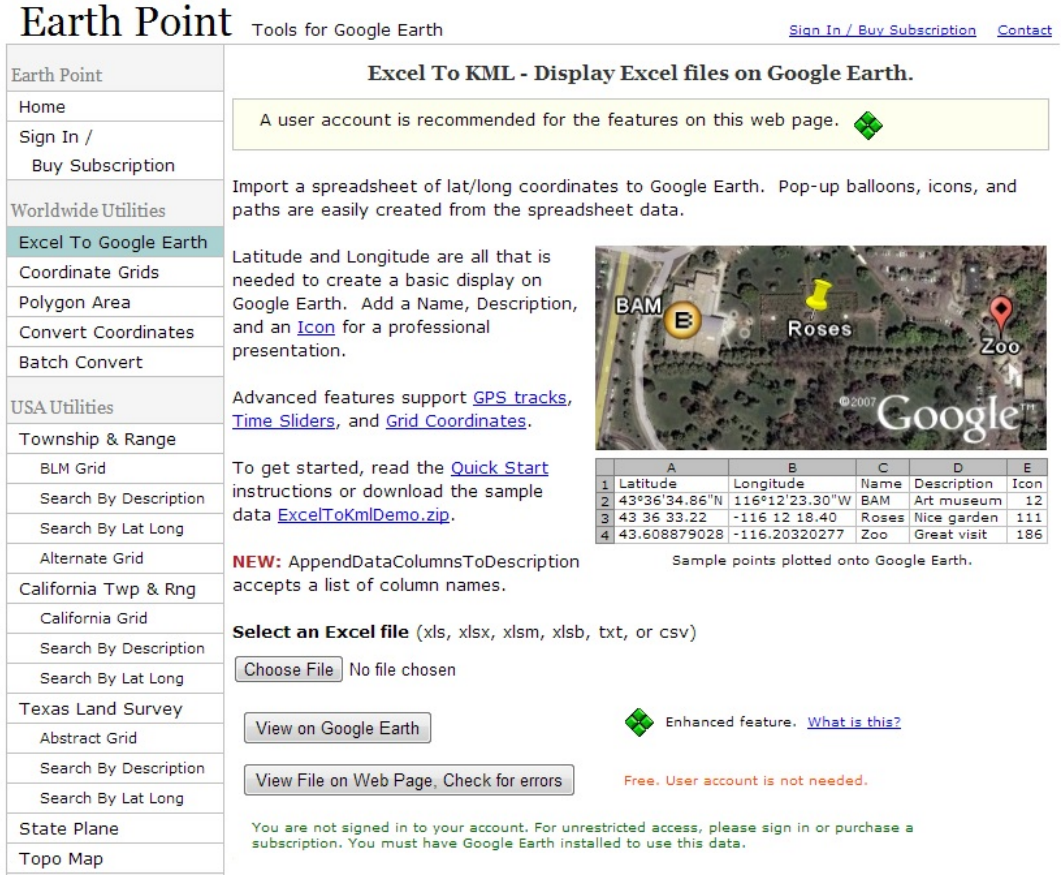
With it you can create and customize placemarkers and paths.



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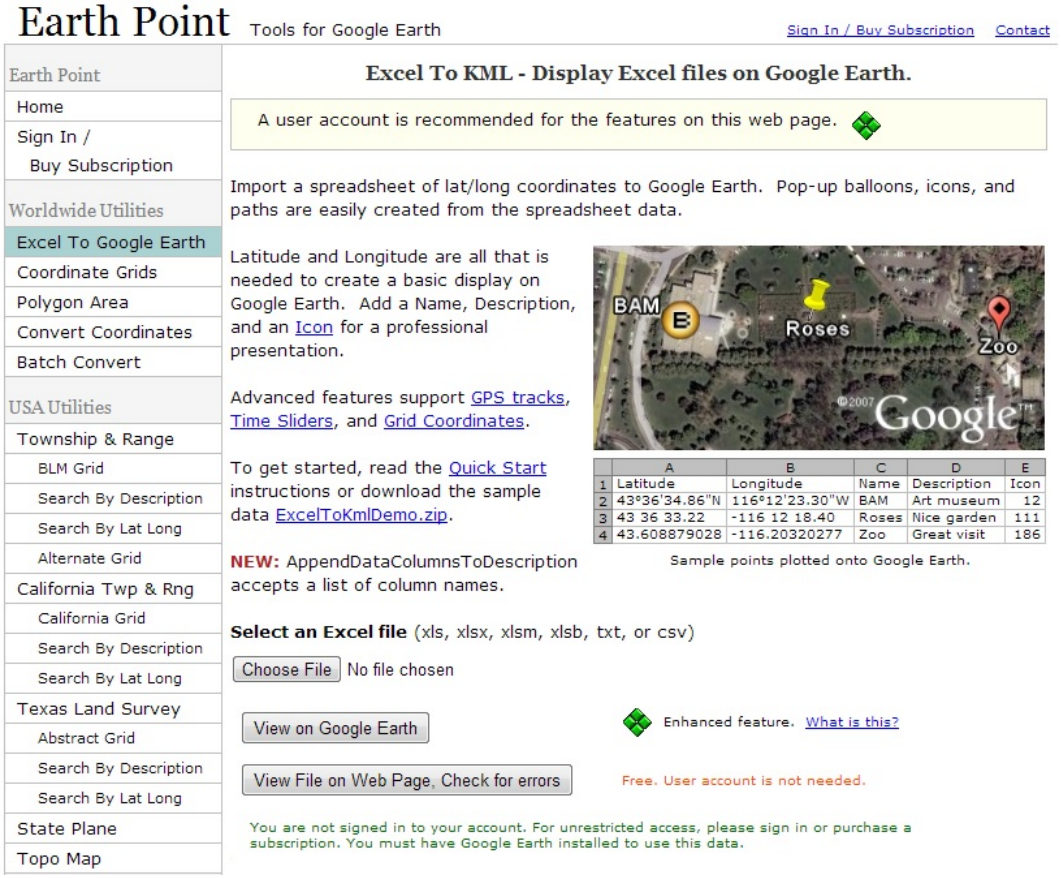
With it you can create and customize placemarkers and paths.

This tool can be very helpful by allowing you to organize your placemarkers and paths into a concise spreadsheet.



Creating Paths with Excel

Step 1: Create a Spreadsheet

We are going to recreate the line using EarthPoint. To do this you only need an Excel spreadsheet that contains columns for:

- Latitude
- Longitude
- LineStringColor

	A	B	C
1	Latitude	Longitude	LineStringColor
2	38.03917	-84.4965	cyan
3	38.03968	-84.4971	cyan
4	38.03931	-84.4977	cyan
5	38.03963	-84.498	cyan
6			
7			
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9			
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12			
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14			
15			

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- Latitude and Longitude accept both DMS and Decimal format.

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Notes:

- Latitude and Longitude accept both DMS and Decimal format.
- LineStringColor accepts most common color names. For a complete list, visit the Earth Point website.

	A	B	C
1	Latitude	Longitude	LineStringColor
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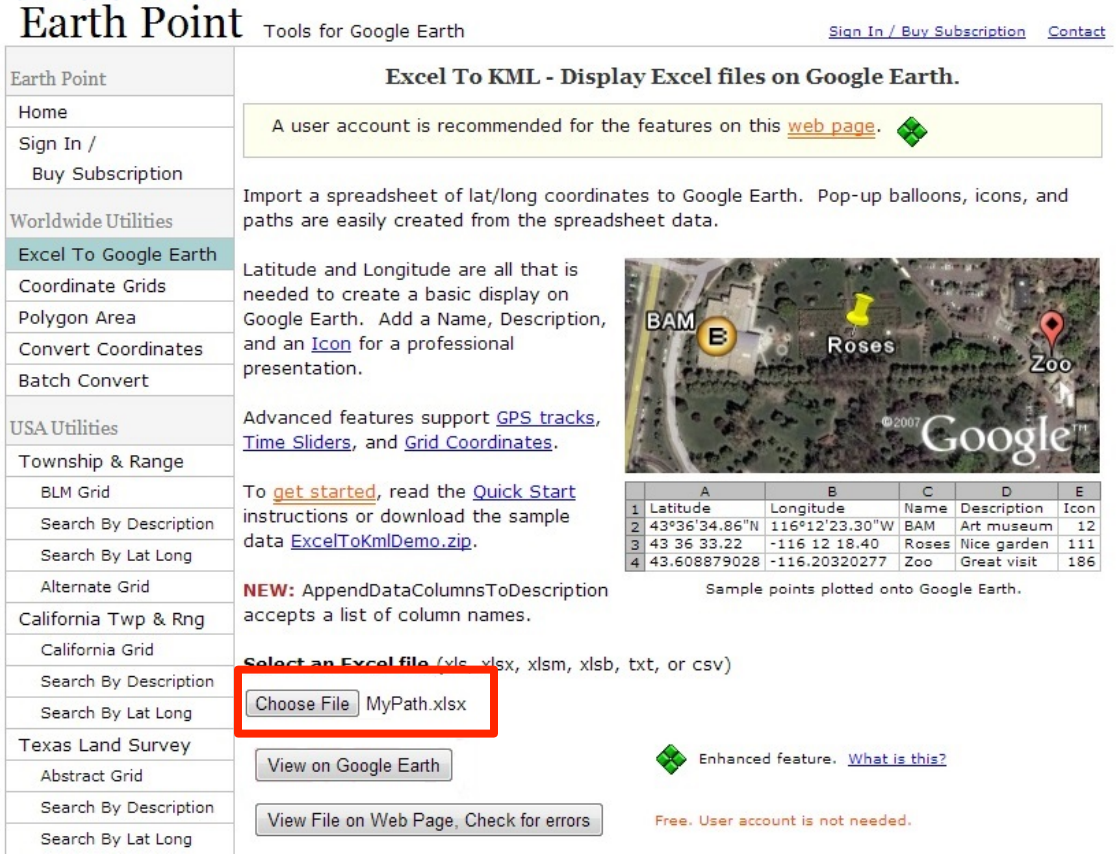
Step 2: Upload the Spreadsheet

- On the website click on "Choose File" and then select the spreadsheet you just made.



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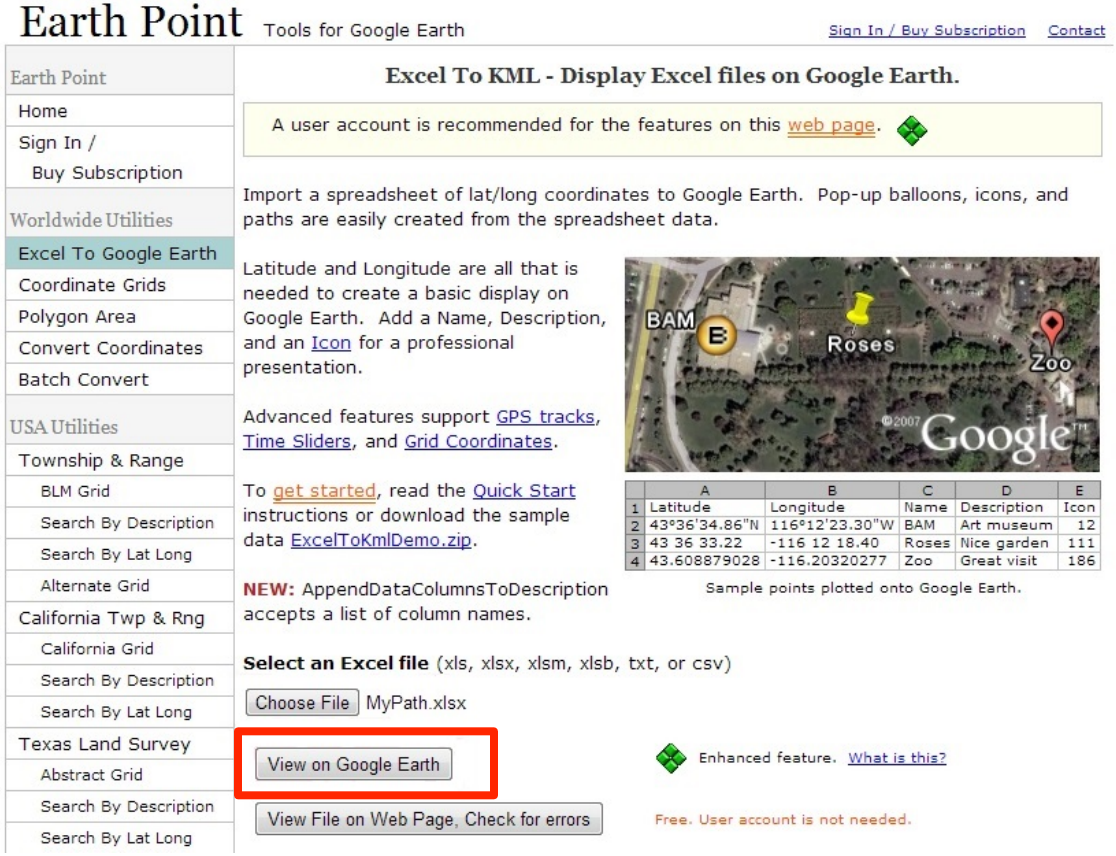
Step 2: Upload the Spreadsheet

- On the website click on "Choose File" and then select the spreadsheet you just made.
- Then click "View on Google Earth" to download a KML file containing the information you just uploaded.



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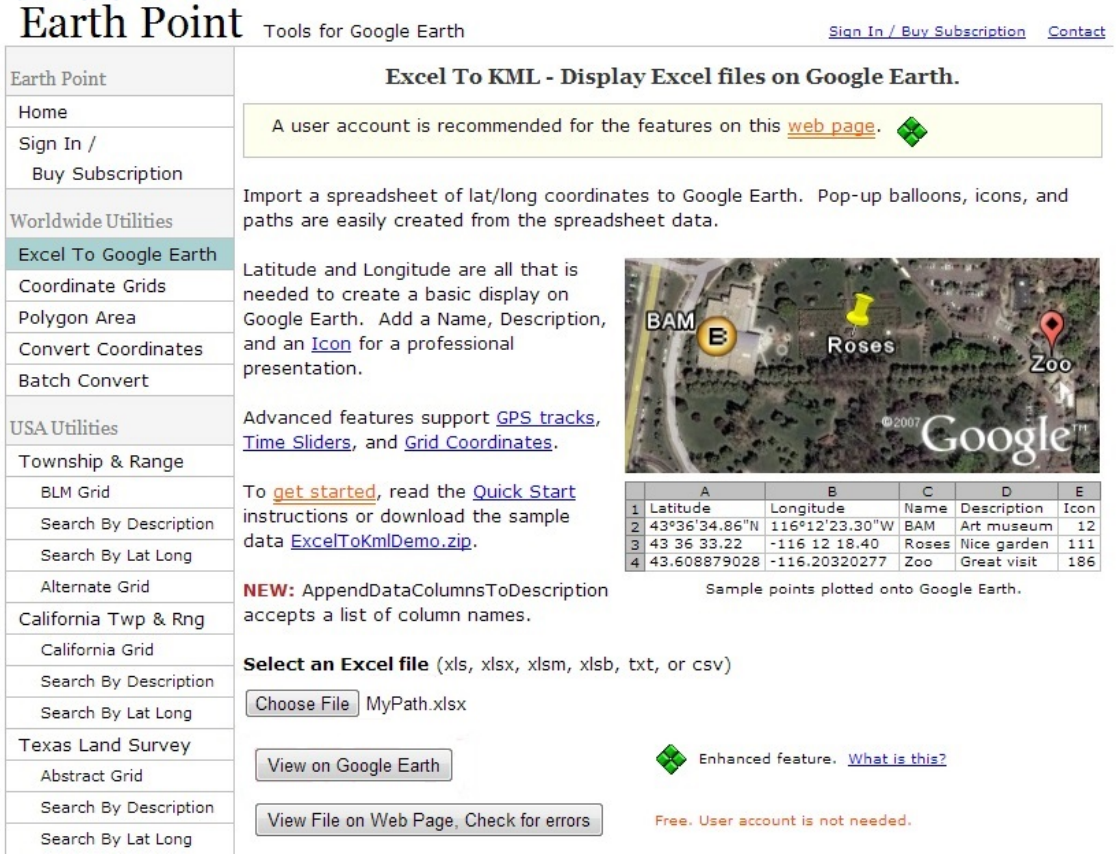
- On the website click on "Choose File" and then select the spreadsheet you just made.
- Then click "View on Google Earth" to download a KML file containing the information you just uploaded.
- The downloaded file will probably be named something like "EarthPointExcel.kml"



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Step 3: View the File

Open the KML file the same way you did the last one. It will display the line as a set of placemarkers with a straight line drawn between them.

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Open the KML file the same way you did the last one. It will display the line as a set of placemarkers with a straight line drawn between them.

Notes:

- If you want to remove the markers, create a fourth column in your spreadsheet labeled “Icon” and enter “none” in each cell.

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Step 3: View the File

Open the KML file the same way you did the last one. It will display the line as a set of placemarkers with a straight line drawn between them.

Notes:

- If you want to remove the markers, create a fourth column in your spreadsheet labeled “Icon” and enter “none” in each cell.
- Unfortunately the KML file from Earth Point does not come with endline characters, so if you open the file in a text editor it will be mostly unreadable.

Creating Paths with Excel

Practice

Objective: Become familiar with creating paths by converting Excel spreadsheets.

Exercise:

- Recreate your last path by creating a spreadsheet and converting it to KML.
- Remove the intermediate markers so that only the beginning and end of the path have markers.

Summary and items to remember:

- Creating paths with Google Earth is the easiest way to make paths and generally the least time consuming.
- Creating paths with KML gives the most control over the path, but can be harder and more time consuming than other methods.
- Creating paths with Excel is a good way to keep your paths and placemarkers organized although it is difficult to read the KML file after it has been generated.