



GIS Career Awareness Learning Module # 1
Version 2 - Revision 2 - 4 APR 2007

The Digital Earth --- Virtual Globes and Computerized Maps

- **Estimated Time:** 2.5 hours
- **Learning Goal:** This module will introduce the concept of the Digital Earth. The intended goal of all of the module's learning activities is to demonstrate to students how useful it would be to spatially represent data and imagery on virtual globes and computerized maps (computer/electronic cartography). In the course of the learning activities, students will have the opportunity to learn and use engaging software such as Google Earth and will be developing their own customized interactive Internet maps using cutting-edge Web programming technology.
- **Platforms:** PC, Mac, or UNIX.
- **Software Tools Required:** Google Earth, Web browser with high-speed Internet Access. Installation instructions for educators and users are available in the Appendix at the end of this learning module.
- **INSTALLATION:** Educators or Lab Administrators may view step-by-step installation instructions in the Appendix of this learning module.

Note: This Web-based GIS learning module was developed with support from a National Science Foundation – Advanced Technological Education Program Research Grant (NSF-ATE DUE # 0401990): “A Scalable Skills Certification Program in Geographic Information Systems (GIS).”
(<http://geoinfo.sdsu.edu/hightech>)

**ANSWER ALL QUESTIONS ON THE SEPARATE
ANSWER SHEET**

Section 1 – Google Earth

Part I – The Emergence of Google Earth

In 2004, Keyhole Inc. was acquired by Google. The software is now called Google Earth. The concept of the Digital Earth was now unveiled to the general public and not just

researchers or governments agencies. The concept was developed for the defense industry for use in reconnaissance (observing, spying, and planning). The software enables you to virtually fly over any place in the world from your computer at home, school, or the library.

Part II – Google Earth Basic User Controls

The following exercises will give you hands on experience with using these software applications as learning and research tools.

Begin by starting the Google Earth application.

Start Google Earth on your computer by clicking on the Google Earth icon on your



desktop or using the “Start” button in Windows (Start > All Programs > Google Earth > Google Earth) (Figure 1-1). The way you start Google Earth may be based on how your computer is set up. Ask your teacher or lab personal if you need assistance.



Figure 1-1: Starting Google Earth with the Windows Start Menu



Figure 1-2: Google Earth Primary Map Controls and Functions

You are going to learn about Google Earth’s basic features and controls. You will spend about 10 minutes learning about these tools by quickly completing the following steps.

Toggle on (click to place a check box next to) some Points of Interest such as “Roads,” “Terrain,” and “Borders” by clicking on the check boxes next to them (Scroll through and expand the folders in the Layers list of the bottom-left side of Figure 1-2 above). This will enable you to view these features on the virtual globe when you are zoomed in sufficiently close.

Go to the “View” pull-down menu and toggle on the “Overview Map” by clicking on the option from the pop-down list. If it is already selected, leave it alone.

Here is a list of some of the basic controls and their functions:



- The “Pan and Rotate” control will be activated when you place your mouse cursor at or near the top right-hand corner of the map. This control allows you to spin and move around the digital globe. Try clicking and spinning the outer ring with the North marker and rotate the globe. Try clicking on the four arrows in the middle of the ring to pan around the globe. You can also click and drag the mouse-like button in the center of the ring to pan. To quickly “reset” the globe so north is pointing up, double click on the North marker on the outer ring. Spend no more than a minute trying this.

NOTE: If you are using a slow Internet connection, you will see that the images may take some time to update. The “Streaming” indicator on the bottom of your viewing window indicates what percentage of the current scene has been downloaded.



- The “Zoom In and Out” control allows the user to zoom in (get closer) to the ground to see more detail but in a smaller geographic area. Try Zooming in to around where you live by using the clicking and dragging the slider toward the plus sign. Alternatively, you can single click or double click the plus sign. When you zoom in, more features and detail will eventually appear.
- Now try zooming out using the minus sign on the same control. This allows you to zoom out (go farther away) from the ground to see more geographic area but less detail. Try quickly zooming out to till you see the entire globe. Spend no more than a minute doing this. Remember, you may need to give Google Earth some time to download the “full” image.

A shortcut to zooming in is to double-click on any part of the image. When you double-click on any part of the image scene, Google Earth will partially zoom in to point you

double clicked. You can repeat this procedure to you get close enough to your feature of interest.

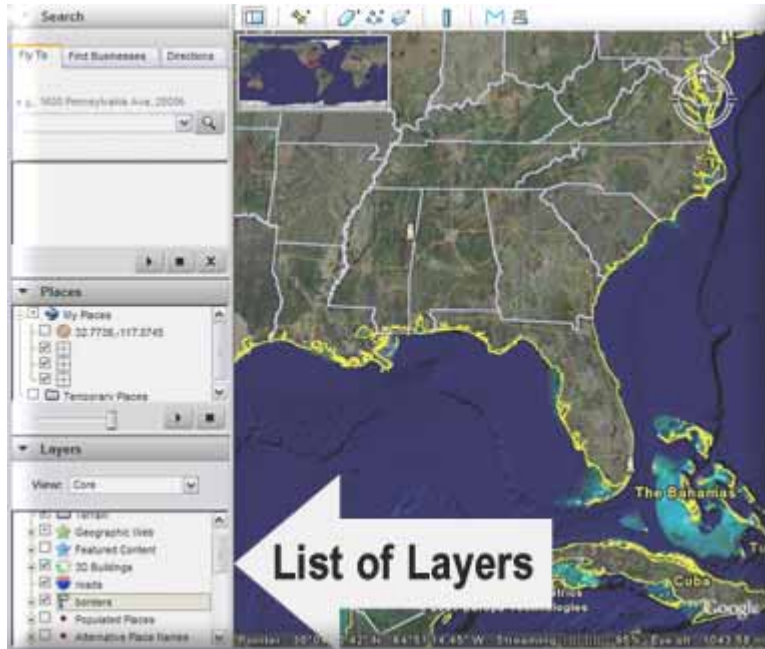


Figure 1-3: List of Layers

- In the “List of Layers” menu (Figure 1-3), be sure that the “Terrain,” “Roads,” and “3D Buildings” layers are toggled on. Also “Terrain” and “Buildings” on the “Points of Interest Controls” (right side of Figure 2) should be selected with a check mark. After verifying that the layers are selected, you will be ready to use the “Tilt” control.



“Tilt” is probably one of the coolest functions in Google Earth. It allows the user to “tilt” the image scene and see it with a 3-D perspective at different angles! If you have the “Buildings” and “Terrain” features toggled on in the “List of Layers,” you may be able to see 3-D terrain and buildings depending on what geographic areas you are observing.

Some of the most dramatic examples include the Grand Canyon in Arizona (dramatic terrain) and downtown Las Vegas (casino and hotel buildings). You can “fly” to these areas by typing Grand Canyon or Las Vegas in the “Fly To” address field and pressing enter.

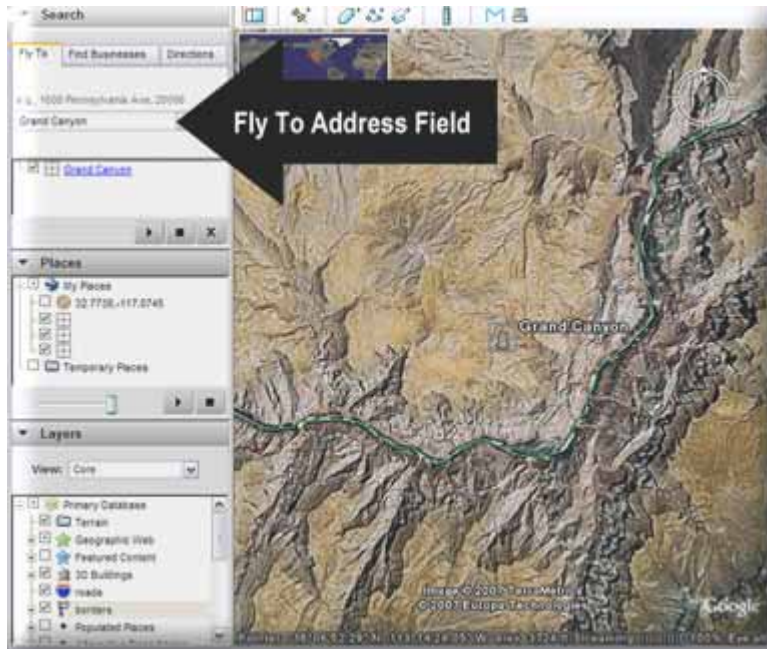


Figure 1-4: Flying to the Grand Canyon by Entering “Grand Canyon” in the Fly To Address Field

After you have reached your destination, click on the right button of the “Tilt” control until you see the terrain or building with a 3-D perspective (See Figure 1-5). After you see the terrain in 3-D, try exploring the local area by moving around (panning) and zooming in and out! Spend no more than a minute with this activity then move on.

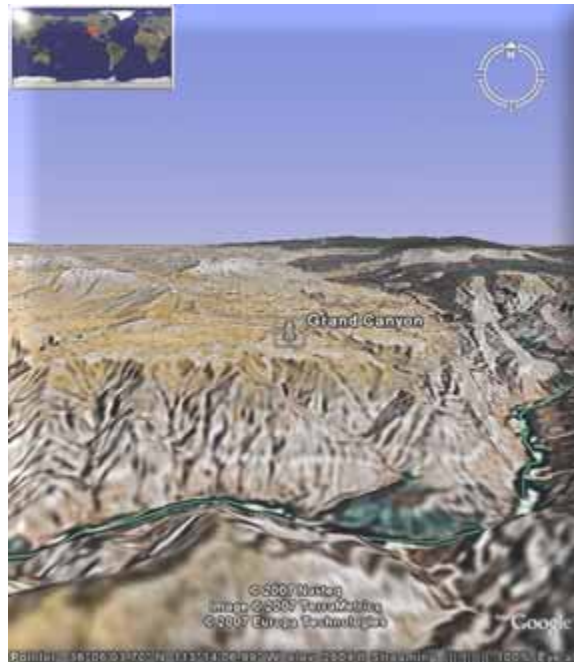








Figure 1-5: Viewing the Grand Canyon with a 3-D Perspective Using the Tilt Control and Other Map Navigation Tools

- The “Toggle Tools Pane” control  allows the user to hide and un-hide the set of tools on the left of the window so you can see a larger map area on your screen.
- The “Add Placemark” control  allows the user to mark a point of interest. You may find something interesting and want to “bookmark” it for future reference. We’ll explore this control later.
- The “Measure” control  allows you to measure distances. You will try this control later.
- The “Add Overlay” controls  allow you to create and add your own overlay features onto Google Earth. With these tools, you can draw a polygon around a certain map area or feature; draw a line that follows a route, path, or boundary; or add a graphic image to the map which Google Earth will “drape” over the terrain. Depending on WHERE you “drape” you image on Google Earth, it will become purposely distorted to follow the peaks, slopes, and valleys of the terrain which you can see with the “Tilt” control. You may want to try these controls later.
- Email  allows the user to send the current view to a user with Google Earth or an image of the current view to an email recipient. This will only work if your computer is currently set up with email. You may want to try this control later.
- Print Screen  allows the user to print out an image of the current view displayed on the screen or a list of search results. You may want to try this control later.

Let’s quickly try some of the steps you learned above.

1. Be sure that Google Earth is running.
2. The next step is to type the keyword San Diego in the “Fly To” address field (See Figure 1-4) and then press the enter key on your keyboard. This will fly you to the center of the city of San Diego, California.
3. Now we are going to introduce an important concept in GIS called, “Map layers.” Map layers are layers of map features, data, or imagery that can be overlaid or stacked together like layers on a cake or toppings on a burger. Now turn on the

“Terrain,” “Roads,” and “3D Buildings” features in the “List of Layers” (Figure 1-3).

4. You can now add more feature layers to Google Earth by clicking on the check boxes in the List of Layers at the left of the screen (left side of Figure 2). Click on several. You may want to select “Borders,” “Transportation,” “Geographic Features,” etc. Even though you have turned on some layers, their associated features may not be visible until you sufficiently Zoom In or go to the geographic areas where they occur. This is called “scale-dependent features.” It would not make sense to show all buildings on the map when you are zoomed out all the way to the point where you can see the entire planet! In real life, you would not see all of these features from outer space. Google Earth and other Virtual Earth-type applications make features like roads, buildings, parks, etc. visible only when they would be visible in real life.
5. Now you are free to use the Google Earth navigation tools like “Zoom In,” “Zoom Out,” “Tilt,” etc. to explore the entire globe. Spend two minutes doing this.

Part III – Please complete the following exercises and answer the following questions. You should try to spend no more than 30 minutes doing these exercises:

1. To locate a unique point on the earth, a coordinate system must be used. Google Earth and many other applications use the geographic coordinate system of latitude and longitude.

Latitude: Latitude describes an imaginary survey line which runs east to west. You can think of these parallels of latitude as forming the rungs on an imaginary ladder. Latitude, when used in a coordinate, is expressed as an angle from 0 to 90 Degrees either north or south of the equator (See Figure 1-6).

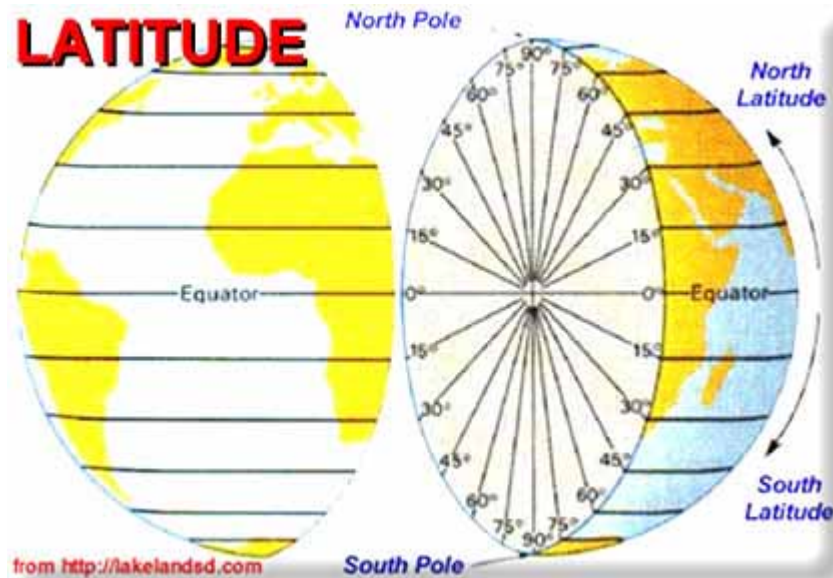


Figure 1-6: Latitude

The most important parallel of latitude is the equator. It surrounds the middle of the earth like a belt and can be described as 0 Degrees latitude.

In the “Decimal Degrees” system, it is important to note that when you are going north of the equator the values range from 0 to 90 Degrees and you are going in the “positive” direction. Think of this as going “up” on the imaginary ladder starting from the equator. When you go south of the equator, the values range from 0 to -90 Degrees. Think of this as going “down” the imaginary ladder from the equator. If you don’t make this distinction, you won’t know if you’re talking about a north latitude or a south latitude because they both range from 0 to 90 Degrees.

As an example, Sydney, Australia, which is in the Southern Hemisphere, lies at approximately -33.87 Degrees Latitude (note the negative sign).

Anchorage, Alaska which lies in the Northern Hemisphere, lies at approximately 61.22 Degrees Latitude (note that it’s a positive value).

When used on a map, a single latitude value is sort of like the equivalent of a y-coordinate in the Cartesian coordinate system.

Longitude: Longitude describes an imaginary survey line running south to north. There are 360 Degrees of longitude and they all converge at the North and South Poles. Longitude, when used in a coordinate, is expressed as an angle from 0 to 180 Degrees either west or east of the Prime Meridian (See Figure 1-7).

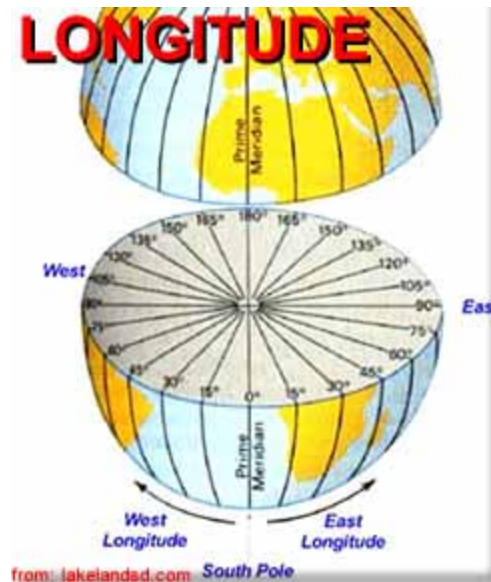


Figure 1-7: Longitude

The most important meridian of longitude is the Prime Meridian. This imaginary line extends from the South Pole to the North Pole and passes through Greenwich, England. It can be described as 0 Degrees longitude.

In the “Decimal Degrees” system, it is important to note that when you are going west of the Prime Meridian, the values range from 0 to -180 Degrees and you are going in the “negative” direction. When you go east of the Prime Meridian, the values range from 0 to 180 Degrees. If you don’t make this distinction, you won’t know if you’re talking about a west longitude or a east longitude because they both range from 0 to 180 Degrees. At positive OR negative 180 Degrees longitude, you reach the International Date Line. This imaginary line runs from the South Pole to the North Pole in the middle of the Pacific Ocean and is on the opposite side of the earth from the Prime Meridian.

As an example, Sydney, Australia, which is in the Eastern Hemisphere, lies at approximately 151.21 Degrees Longitude (note that it’s a positive value).

Anchorage, Alaska which lies in the Western Hemisphere, lies at approximately -149.89 Degrees Longitude (note the negative sign).

When used on a map, a single longitude value is sort of like the equivalent of an x-coordinate in the Cartesian coordinate system.

Decimal Degrees: Latitude and longitude are most commonly expressed in “Degrees, Minutes, and Seconds” or “Decimal Degrees.” Both are equivalent. However, for the sake of simplicity, you are going to use “Decimal Degrees.”

In order to view map coordinates in decimal degrees, you will have to make a change. First, select the “Tools” pull-down menu and click on “Options...”.

The Google Earth Options menu should appear (Figure 1-8). In the Google Earth Options menu, be sure the “3D View” tab is selected and change the “Show Lat/Lon” option to “Degrees” (Figure 1-8). This will change how the coordinates are represented in Google Earth. In this case, the latitude (y-coordinate) and longitude (x-coordinate) will be represented in decimal degrees. This is how most GIS and related software applications represent latitude and longitude. Save the settings by clicking on the “OK” button.

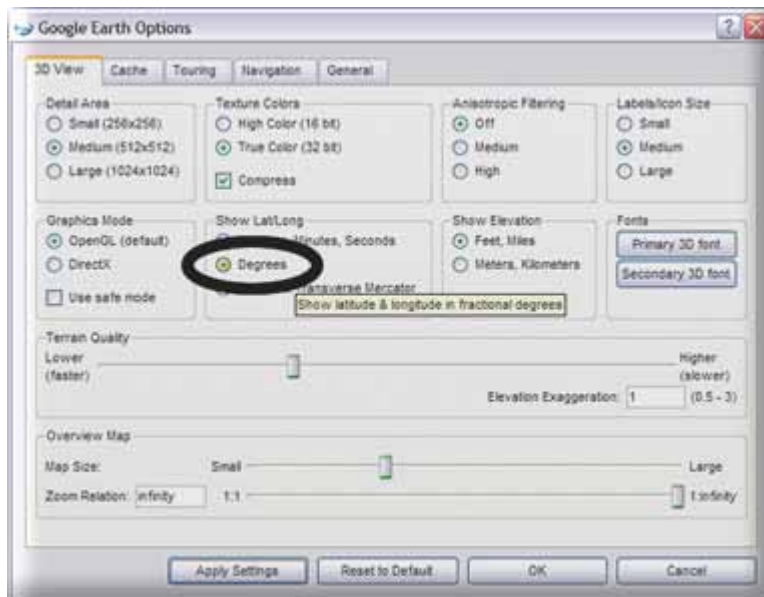


Figure 1-8: Google Earth Options Menu with Degrees Selected for Latitude and Longitude in the 3D View Tab

Now you are going to determine what the Latitude and Longitude coordinates of your school are? (Hint: Be sure the “borders” and “roads” features are selected in the List of Layers; then locate your school; then, find out the latitude and longitude coordinate values by moving your mouse cursor over the center of your school in the view window. Coordinates will appear in the bottom-left corner (See Figure 1-9 below). Alternatively, you can enter the full address of your school in the Fly To address field.)



Figure 1-9: Latitude and Longitude Coordinates of Mission Bay High School (San Diego, CA)

On the separate answer sheet, fill in the following:

A-1: Your School Name:

A-2: School Latitude (the map Y-coordinate in degrees):

A-3: School Longitude (the map X-coordinate in degrees):

2. After you determine where your school is located, create a Placemark that marks the location of your school. To do this you need to follow a few easy steps:

Make sure your school is displayed near the center of your screen.

Next, click the “Add Placemark” control that was described previously. It looks like a pushpin and is located near the top of your Google Earth window.

A New Placemark control panel should pop-up and a Placemark will appear near the center of the screen (Indicated by the red arrow in Figure 10 below).

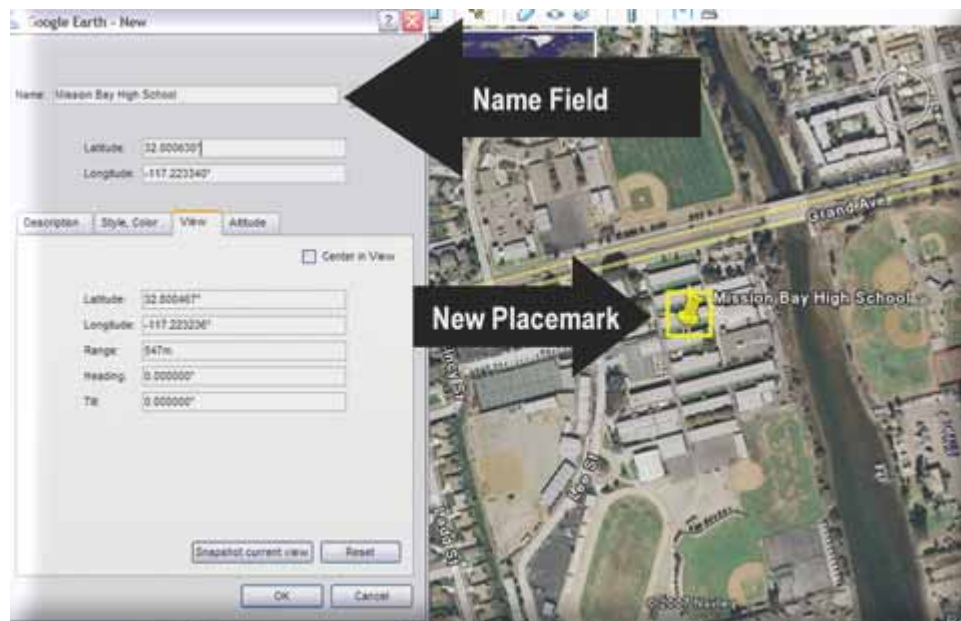


Figure 1-10: Creating a Placemark in Google Earth (Mission Bay High School, San Diego, CA)

At this point, click and drag the Placemark on the map to the center of your school campus.

Next, type in the name of your school in the Name field of the New Placemark control panel (Figure 1-10). The Placemark will then, automatically display your school's name. Before you press the OK button to finish creating the Placemark, fill in the following information from the New Placemark control panel on the separate answer sheet:

A-4: Name Which You Entered for the School:

Click on the "View" tab in the New Placemark control panel. You will see the Latitude and Longitude that is associated with your Placemark.

Based on the information that you read from the New Placemark menu, fill in the following on the separate answer sheet:

A-5: Latitude as Shown in the New Placemark control panel:

A-6: Longitude as Shown in the New Placemark control panel:

After copying this information, click on the OK button to save the new Placemark of your school on the map. Now, you will notice that when you Zoom Out, the new Placemark of your school will remain visible.

3. Now you will determine what is the direct straight line distance between your school and San Diego State University (SDSU)?

Now, to locate SDSU, simply type the address of the university in the Fly To address field. The address is near **5398 Campanile Dr., San Diego, CA**.

After you locate SDSU, create a new Placemark for SDSU using the same steps as Question 1 above so that it will be easier to measure the distance.

Now, Zoom out enough so you can see both Placemarkers (your school and SDSU). You should be able to do this even if your school is located in another country!

Now open the Measure Tool control. The Measure Tool is located in the Tools pull-down menu. It might also be called Ruler depending on which version of Google Earth you are using. Use Miles as your measuring unit and create a straight measuring line between your school Placemark and the SDSU Placemark. All you have to do single is click on your school and then click on SDSU while the Measure Tool is open. Now, you have the approximate straight line distance between your school and SDSU (Figure 1-11)!

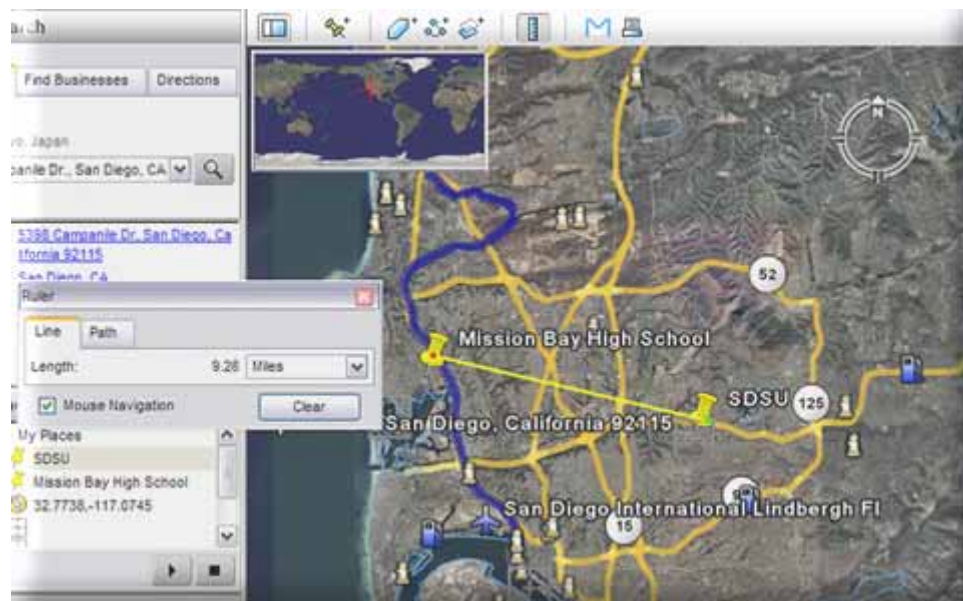


Figure 1-11: Determining the Distance Between Two Places

Answer the following on the separate answer sheet:

A-7: Distance Between Your School and SDSU (miles):

Now close the Measure Tool by clicking on the X on the top right-hand corner of the Measure Tool menu.

4. In this next step, you will create street map directions between your school and SDSU.

First, right mouse click (or Mac users, hold down the Control button and mouse Click) on your newly-created high school Placemark. A pop-up menu should appear with many options. Select the “Direction from here” option from the pop-up menu.

Now that you set the origin (the “From”), you need to set the destination (the “To”). Do this with the same procedures. Right mouse click (or Mac users, hold down the Control button and mouse click) on the SDSU Placemark which you created. Select the “Direction to here” option from the pop-up menu.

Now, Google Earth should automatically create the street navigation direction between your school and SDSU (Figure 1-12)!

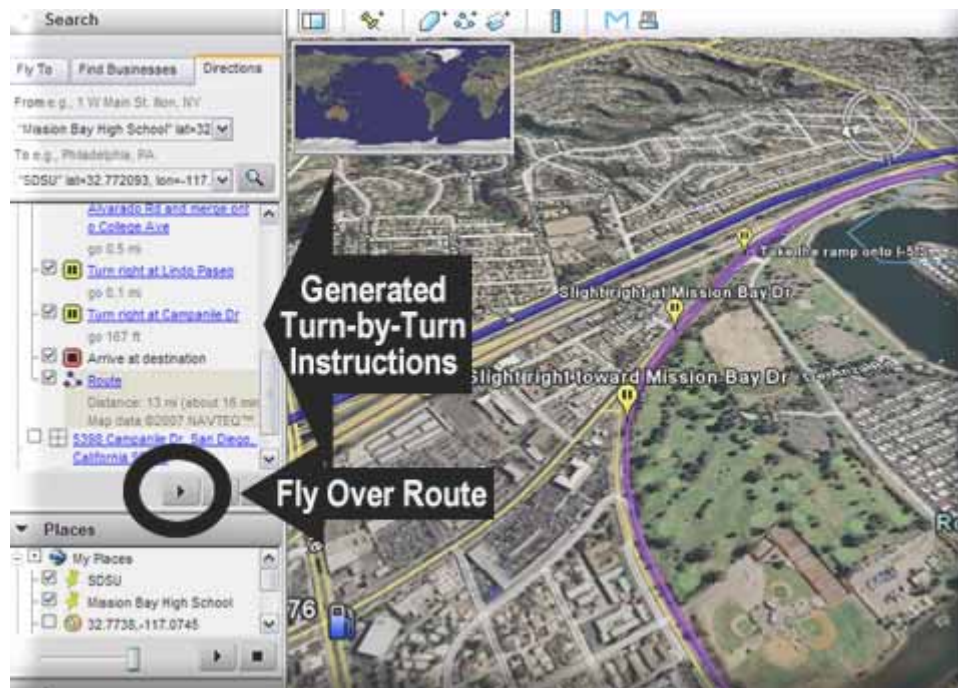


Figure 1-12: Generating Turn-by-Turn Navigation Instructions

If you zoom into your school, you will see street by street instructions all the way to SDSU!

A-8: Copy down the first driving instruction that Google Earth lists FROM your school (Just copy down the first one!) on the separate answer sheet:

Now, let's try something really cool. Press the "play" button under your list of turn-by-turn instructions (Figure 1-12) and watch the route fly over animation. (Some versions of Google Earth may not have this feature enabled.)

5. Other questions with Google Earth.

- a. "Area 51" is a Top Secret U.S. Military site in the Nevada desert that many in the government claim does NOT exist! The coordinates are 37.249361,-115.812339. (Don't forget the negative sign in the longitude.) Now briefly answer the following question based on what you find. What is Area 51? (Hint: Copy these coordinates into the Fly To address field. Be sure the Fly To address field tab is selected!)

A-9: Briefly describe "Area 51" on the separate answer sheet:

- b. What is the name of the nearest Pizza restaurant to your school? (Hint: First, make sure your school is near the center of the screen then, select the "Find Businesses" tab located next to the "Fly To" tab (Figure 14) and enter Pizza in the "What" field then press enter.)

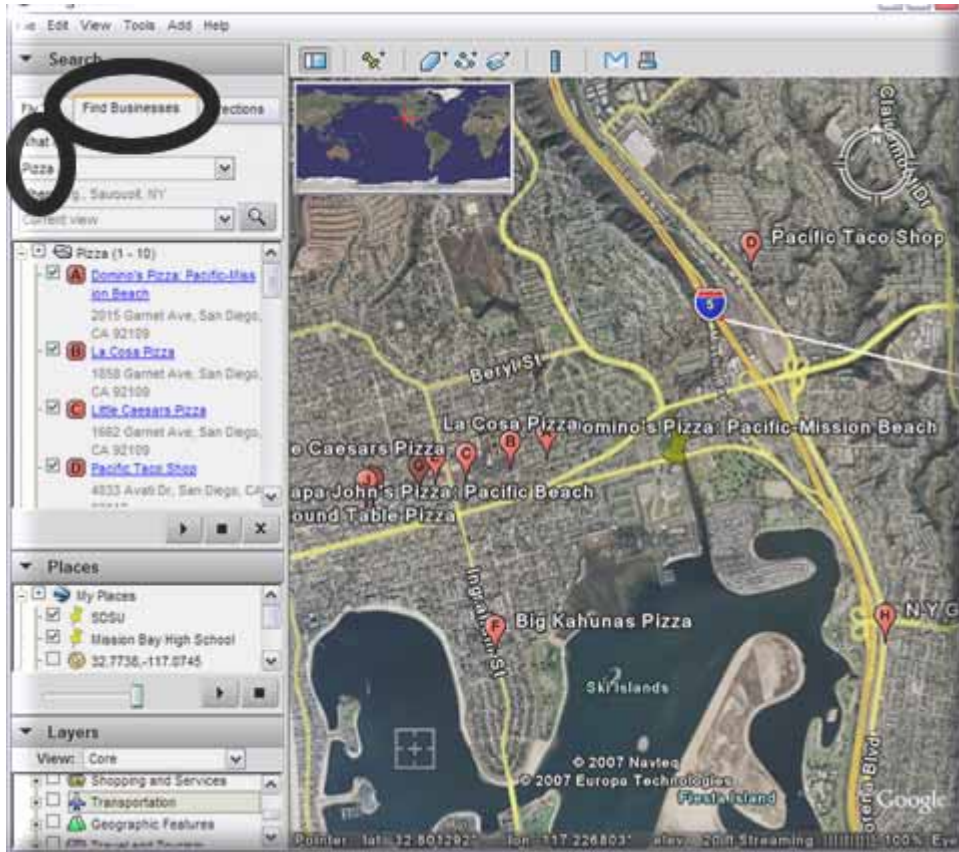


Figure 1-3: A Local Search of Pizza Restaurants

A-10: *What is the name of the nearest Pizza Restaurant to your school? (Answer on the separate answer sheet.):*

Measure how far it is from your school with the Measure Tool.

A-11: *How far is the Pizza Restaurant from your school? (Give the distance in feet.) (Answer on the separate answer sheet.):*

- c. Alcatraz Island, near San Francisco, California, used to be used as an “inescapable” high-security prison where the worst and most notorious criminals were kept. The island known as “The Rock” is surrounded by dangerous currents and freezing-cold water. It was supposed to be nearly impossible to escape!

Use Google Earth to determine which direction the city of San Francisco is *from* Alcatraz Island and how far apart they are. (Hint: Use the Fly To field and type Alcatraz.)

The idea is to determine how far someone needs to swim in the ice-cold water to escape the prison island (If you need to know the city names on

the viewer, simply toggle on the layer called, “Populated Places” in the “List of Layers.”) Also, determine what direction the Golden Gate Bridge is *from* Alcatraz Island.

A-12: *Which direction must you go (North, South, East, West) from Alcatraz Island to the shores of the city of San Francisco? (Answer on the separate answer sheet.):*

A-13: *How far apart is Alcatraz Island from the nearest point along the shoreline of the city of San Francisco (in feet)? (Answer on the separate answer sheet.):*

A-14: *Make sure the “3D Buildings: layer is toggled on and determine which direction (North, South, East, West) is the Golden Gate Bridge from Alcatraz Island? (Answer on the separate answer sheet.):*

Section 2 – Web/Internet Mapping

Part I –Introduction

In the previous sections, you were introduced to Google Earth---a virtual globe software application that runs on your local computer and obtains map, imagery, and symbol data from Google’s computer servers via the Internet.

This time, you will be introduced to a virtual map. This particular virtual map is called an Internet map or Web map (The two terms are interchangeable but we will use the term Web map from now on.). We’re not talking about mapping Web pages on the Internet. No, THAT would be a challenge in itself since there are estimates that there are close to 30 billion Web pages on the Internet as of February 2007 (Source: Boutell 2007. *WWW FAQ: How Many Websites are There?* <http://www.boutell.com/newfaq/misc/sizeofweb.html> [WWW page]. Accessed March 2007). No, you’re actually going to create your very own interactive Web map that can be viewed over the Internet long after you finish these learning modules! Before you create your Web map, you will be introduced to some existing Web maps.

Part II—Existing Internet/Web Maps

You have probably seen many examples of Web maps if you frequently surf the Web. Some examples include the following:

- Expedia Maps (<http://maps.expedia.com>)
- MapQuest Maps (<http://www.mapquest.com/maps/>)
- Yahoo! Maps (<http://maps.yahoo.com/>)
- Google Maps (<http://maps.google.com/>)

These maps share similarities to virtual globe applications such as the one you utilized in the previous section (Google Earth). Most of these similarities have to do with how you move around the map. You can navigate around these maps with tools such as Pan, Zoom In, Zoom Out. There are also tools available that will take you to particular places on the map using latitude and longitude coordinates or street addresses. Other similarities include the availability of information about specific places including the place names and the types of places (Remember searching for local pizza restaurants in the previous section?).

There are also some significant differences between virtual globe applications and Web maps. The most prominent difference between virtual globe applications and Web maps is the general inability to view Web maps from a 3-D perspective. Remember: Google Earth is a virtual globe and a Web map is a virtual map. Maps generally show the perspective as if you were looking from straight above the ground---a “bird’s eye view.”

At this point, you may think that Web maps are NOT as good or useful as virtual globe applications. This is arguable. Web maps do have one huge advantage over virtual globe

applications. This advantage is the ability to view and interact with the map with just a standard Web browser and a connection to the Internet. Virtual globe applications, such as Google Earth, require you to pre-install software on your computer. Your computer may not be able to run the software, you may not be able to install the software, or you may have an outdated version of the software which needs to be updated. With a Web map, most computers or other computing devices with an Internet connection and a simple Web browser (including certain configurations of cell phones, PDAs/Pocket PCs, Nintendo Wiis, and Play Station 3s) can be used to view and interact with a Web map. You can't (currently) install Google Earth on a cell phone but you may be able to view a Web Map through a mobile Web browser.

Now, you are going to answer a few questions using an existing Web map:

1. Launch your favorite Web browser and be sure that it is able to access the Internet.
2. Navigate to <http://maps.google.com> (Figure 2-1)

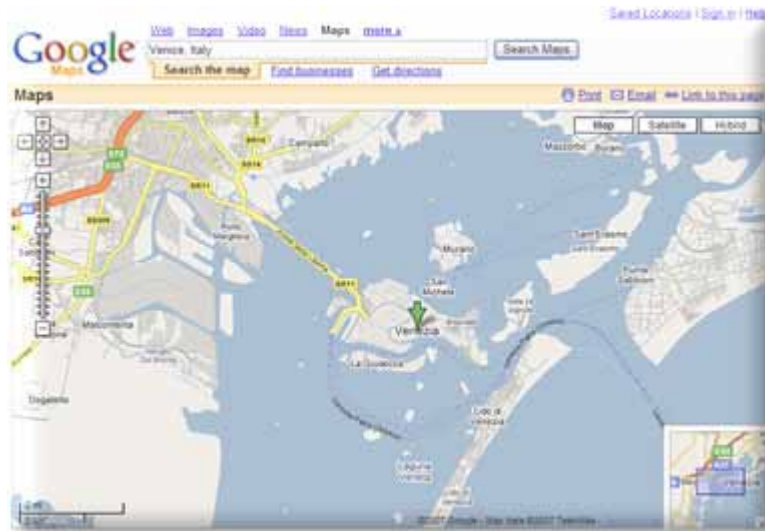


Figure 2-1: Searching for Venice, Italy with Google Maps

3. In the “Search the map” text field, enter Venice, Italy and click on the “Search Maps” button.
4. In the resulting map, click on the “Hybrid” button to display a mix of aerial/satellite imagery and the standard Google Map street & label features.
5. Using the map Pan and Zoom map tools, answer the following questions on the separate answer sheet:

B-1: *What (upside down) letter does the main canal through Venice make?*

***B-2:** There is only one bridge to drive on to the island of Venice. What is the route number of this street?*

***B-3:** What are the blue dotted lines in the water? AND What do the names on the lines represent? (2-part question)*

***B-4:** If global warming is a real problem, as many scientists and world leaders state, what appears to be Venice's problem based on what you see in the map? AND Assuming that this "problem" is inevitable, use what you see in the map and describe something that the Italian government can do to avoid or minimize the effects of this "problem."*

Part III---Overview of the Steps for Developing Your Own Interactive Web Map

Now that you got some experience with an existing Web map, it is time to create/develop your own interactive Web map that can be accessed over the Internet with a Web browser.

Before we can do this, there are a few preliminary steps that have to be performed. These steps include the following:

1. Google Email Account (GMail Account): Since you will be using Google tools to develop your own customized interactive Web map, you will have to sign up for a GMail account. You will use this account to register for other Google services such as Web publishing space and a Google Maps API "Key." Details will follow.

As a bonus, you will be able to keep and use this GMail Account well after you complete this and other learning modules.

2. Web Space: Since a Web map is hosted on a Web page, you will need to obtain Web space in order to publish your Web map on the Web for the rest of the world to see.

Along with your Web map, you will be able to include other information and content on your Website. You will get step-by-step instructions to sign-up for and use your free Web publishing space. This will be YOUR OWN Website as long as you want to keep it but; you will need to follow the steps in this learning module so that your teacher/instructor can grade it. Consult them with any questions about what you can or cannot do with your Web space. Some things that you definitely should NOT do with your Website include publishing copyrighted information or content such as videos, MP3s, manuscripts, and images that you do not have permission to copy or distribute. Additionally, do not publish anything containing any derogatory content. Your teacher/instructor will probably not be too pleased with this. Again, consult your teacher/instructor if you have any questions.

3. Google Maps API “Key”: You will be using the Google Maps Application Programming Interface (API) to develop your customized interactive map. Yes! You are going to do some simple Web application programming!

An API, in the software engineering world, is a set of programming tools, functions, properties, etc. that allow a programmer to develop custom applications using pre-made features and functionality that are made available to a programmer. Google Maps has a custom API that you can use to make your own Web maps. The Google Maps API allows you to develop these Web maps with little to no knowledge about software programming. To be able to get access and “permission” to use this API, you will have to register for an API “key.” This free “key” allows you to develop your own customized Google Maps on your Website. This API “key” will not work on another person’s Website.

3. Web map Design: You will need to design your Web map. Since this is an introduction to Web mapping with the Google Maps API, the design will only include some features that are available from the Google Maps API. You may, in the future, choose to create more complex interactive Web maps. (By the way, this is an incredibly valuable skill right now, as is most Web application programming. If you master it or get really good at it, you can probably get a job with this skill! It is in high demand.)

The Web map design will include the following steps:

1. You will need to determine where your map will be initially centered on.
2. You will need to determine the initial Zoom level of the map. Zoom level, as you might have guessed, basically indicates how close to the ground or how far from the ground the map is.
3. You will need to determine if you want to initially show streets, place names, and/or plain or satellite imagery for the map background.
4. You will need to label some features on the map (create “placemarkers”).


Part IV---GMail Account

The necessary steps to sign up for a Google Email (GMail) account are described in this part. Please follow these instructions even if you already have a GMail account. This way, your teacher/instructor can easily review and grade your work.

1. Launch your favorite Web browser and be sure that it is able to access the Internet.
2. Navigate to <http://www.gmail.com>
3. Click on the link, “Sign up for Gmail” on the bottom right-hand side of the page.

4. Fill out the text fields on the page as described below and fill in the third column of Table 2_1 on the separate answer sheet. The resulting input will be similar to Figure 2-2 and Figure 2-3:

Table 2_1: GMail Account Sign-up Page (Fill in this table on the separate answer sheet.)

Text Field Name	What to Fill In	What YOU Filled In
“First name”	<Use your real first name> example: Tony	(answer on B-5 on the separate answer sheet)
“Last name”	<Use your real last name> example: Howser	(answer on B-6 on the separate answer sheet)
“Desired Login Name”	<Use a combination of your first name, a single period, your last name, another single period, and your teacher’s last name> Example: Tony.Howser.Trevino (In this example, the email address will be Tony.Howser.Trevino@gmail.com) After entering the Desired Login Name, click on the button, “check availability!” If it is NOT available for some reason add a number to the end of the Desired Login Name like Tony.Howser.Trevino1	(answer on B-7 on the separate answer sheet)
“Choose a password”	<Make up a password using a combination of 6 letters and numbers. Do not loose or share this!> Example: 1ZGF6g	(write this down somewhere SAFE and DON’T LOOSE IT!)
“Re-enter password”	<Type in the same password. UNCHECK “Remember me on this computer” and UNCHECK “Enable Search History” in order to protect your privacy!>	(purposely blank)
“Security Question”	<From the drop-down list, choose, “Write my own question” and in the next text field type the following: WHAT IS MY FAVORITE COLOR AND SCHOOL SUBJECT?>	WHAT IS MY FAVORITE COLOR AND SCHOOL SUBJECT?
“Answer”	<Type in the answers to the previous question separated by an AND> Example: BLUE AND GEOGRAPHY	(answer on B-8 on the separate answer sheet)
“Secondary email”	<To protect your privacy, leave this text field BLANK!>	(purposely blank)
“Location”	<Leave the drop-down menu as “United States”>	(purposely blank)
“Word Verification”	<Type in the words that you see in the text field. You do not need to write down what you typed.> Example:  jomendai	(purposely blank)
“Terms of Service”	<At your option, you may read Google’s Terms of Service. Basically, it says that you should not abuse the account or use it for anything illegal. It also gives Google permission to collect information about you so be very careful what you use any of your Google accounts for. Click on the button, “I accept. Create my account.”>	(purposely blank)

Get started with Gmail

First name:

Last name:

Desired Login Name: @gmail.com
Examples: JSmith, John.Smith

Tony.Howser.Trevino is available

Choose a password: Password strength: **Strong**
Minimum of 6 characters in length.

Re-enter password:

Remember me on this computer.

Creating a Google Account will enable Search History. Search History is a feature that will provide you with a more personalized experience on Google that includes more relevant search results and recommendations. [Learn More](#)

Enable Search History.

Security Question:

Figure 2-2: Signing-up for Gmail (1 of 2)

Answer:

Secondary email:
 This address is used to authenticate your account should you ever encounter problems or forget your password. If you do not have another email address, you may leave this field blank. [Learn More](#)

Location: ▼

Word Verification: Type the characters you see in the picture below.

jomendai


 Letters are not case-sensitive

Terms of Service: Please check the Google Account information you've entered above (feel free to change anything you like), and review the Terms of Service below.

[Printable Version](#)

Google Terms of Service for Your Personal Use ^

Welcome! By using Google's search engine or other Google services ("Google Services"), you agree to be bound by the following terms and conditions (the "Terms of Service"). As used in this agreement, "Google Services" does not include the Adwords or Adsense programs

By clicking on 'I accept' below you are agreeing to the [Terms of Service](#) above and both the [Program Policy](#) and the [Privacy Policy](#).

Figure 2-3: Signing-up for Gmail (2 of 2)

If all goes well, you will get a “Congratulations!” indicating your GMail account has been successfully created.

On your own time, from now on, you can log on to your GMail account from any computer with a Web browser and working Internet connection. Just navigate to <http://www.gmail.com> and type your Login Name and Password (from above) in the “Username” and “Password” fields respectively. Then click on the “Sign in” button to access your GMail account (Figure 2-4). GMail has a lot of cool features. When you have a chance, try to learn how to use it. For the purposes of this learning module section,

we only need to account to sign up for Web publishing space and a Google Maps API “Key.” In the next section, you will sign up for and test your Website.



Figure 2-4: Logging on to Your GMail Account

Part V---Web Publishing Space

In this part, you will sign up for Web publishing space and publish a simple Website in order to test it for your Web map.

1. Launch your favorite Web browser and be sure that it is able to access the Internet.
2. Navigate to <http://pages.google.com>
3. Sign in to Google Page Creator using the same information from your GMail account (Figure 2-4).
4. Scroll to the bottom of the resulting Web page and review the “Terms and Conditions” if you wish. Again, do not publish any illegal or inappropriate content on your Website. Remember, your teacher/instructor will be reviewing it. When you are ready, click on the checkbox next to “I have read and agree to these Terms and Conditions.” Then click on the button, “I’m ready to create my pages” (Figure 2-5).



Figure 2-5: Starting Page of Google Page Creator

5. A simple home page design will appear and you need to change a few things.

Make sure the Web browser window is “maximized” so you can properly see your tools. “Maximized” means the Web browser fills your entire monitor screen.

See Figure 2-6 for what changes you need to make on your home page. Your page colors and text styles may be different. Don’t worry about this right now. You can customize your Website later. You will specifically need to add something similar to the following on the home page of your Website (again, see Figure 2-6):

- Page Title (title of your Web page)
Example: **Tony Howser’s Home Page**
- Page Subtitle (alternate title of your Web page)
Example: **My Home Page**
- Page’s Main Content (the main part of your Web page)
Example: **My First Web Map**
This is my first Web Map which I created using the Google Maps API as part of a GIS career learning module certificate program from the National Science Foundation.
- Page’s Footer (the bottom part of your Web page that tells viewers a little about the purpose of the Website)
Example: **Ms. Trevino – Helix Charter High School – La Mesa, CA – March 1, 2007**



Figure 2-6: Home Page Design with Google Page Creator

After you have made the minimum required changes to the home page as described above, click on the “Preview” link (circled in Figure 2-6). An unpublished preview page of the Web page should appear (Figure 2-7).



Figure 2-7: Unpublished Home Page Preview

Close the preview window after reviewing it. On the Google Page Creator page, make any changes, if necessary, and click on the “Publish” button next to the “Preview” link. After a few moments, your Web page will be published.

To view your Web page, open a new Web browser window and navigate to the following URL:

http://<your Gmail user name (with the periods)>.googlepages.com

This is your own Website's Web address (URL)! Share it with your friends and family.

Example:

<http://Tony.Howser.Trevino.googlepages.com> (Figure 2-8)

Copy your own Website's Web address (URL) on the separate answer sheet using this format:

B-9: http://_____ .googlepages.com



Figure 2-8: Personal Website Example

Now, this part of the Web map prerequisites is complete. Go ahead and close all of the open Web browsers. You can always access your Google Page Creator account by navigating to <http://pages.google.com> and logging on to your account.

In the part, you will sign up for a Google Maps API "Key" so you can publish your own interactive Web map on your Website.

Part VI---Google Maps API “Key”

As discussed previously, a Google Maps Application Programming Interface (API) “Key” will allow you to develop and publish your own customized and interactive Web maps for the entire world to view and interact with using only a standard Web browser and Internet connection.

All of the complex details surrounding Web application programming and all of the features and tools available in the complete Google Maps API will not be discussed here. You are permitted and encouraged to explore and try the other features in the API after you complete these learning modules. If you end up really enjoying Web application development, you should probably consider a career in such fields as computer science, software engineering, computer engineering, and information technology.

Complete the following steps in order to obtain your own Google Maps API “Key” for your Website:

1. Launch your favorite Web browser and be sure that it is able to access the Internet.
2. Navigate to <http://www.google.com/apis/maps/signup.html>
3. On the resulting Web page, scroll down to the bottom of the page. Read the Google Maps API Terms of Use if you wish. This basically states that you cannot use the API and your resulting customized Google Maps for profit or any illegal purpose. As a student, you're more than encouraged to learn and use the technology for educational purposes. Click on the check box next to “I have read and agree with the terms and conditions.”
4. In the text input field next to “My web site URL,” enter your own Website’s URL (that you obtained in Part-V above). Be careful not to duplicate the “http://” part and don’t forget the periods!

Example:

<http://Tony.Howser.Trevino.googlepages.com> (Figure 2-9)

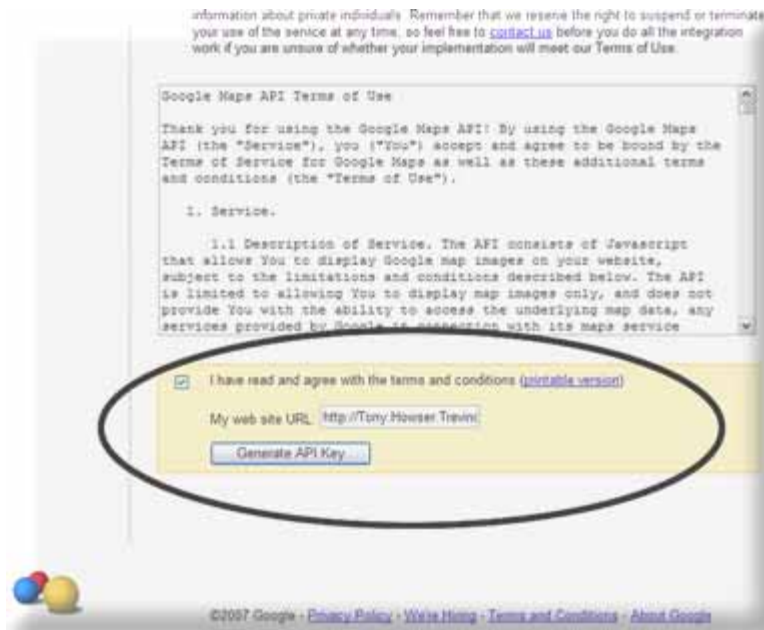


Figure 2-9: Google Maps API “Key” Sign-up

5. After entering the URL, click on the “Generate API Key” button. Your Web page will probably be redirected to the Google Accounts Sign-in page. Go ahead and enter your GMail username and password in the text fields next to “Email” and “Password.” Following this, click on the button labeled, “Sign in” (Figure 2-10).



Figure 2-10: Google Account Sign-in Example

6. After logging in, your Google Maps API “Key” should appear (Figure 2-11). As explained before, this very long “key” enables you to develop and publish customized Google Maps on your Website ONLY.

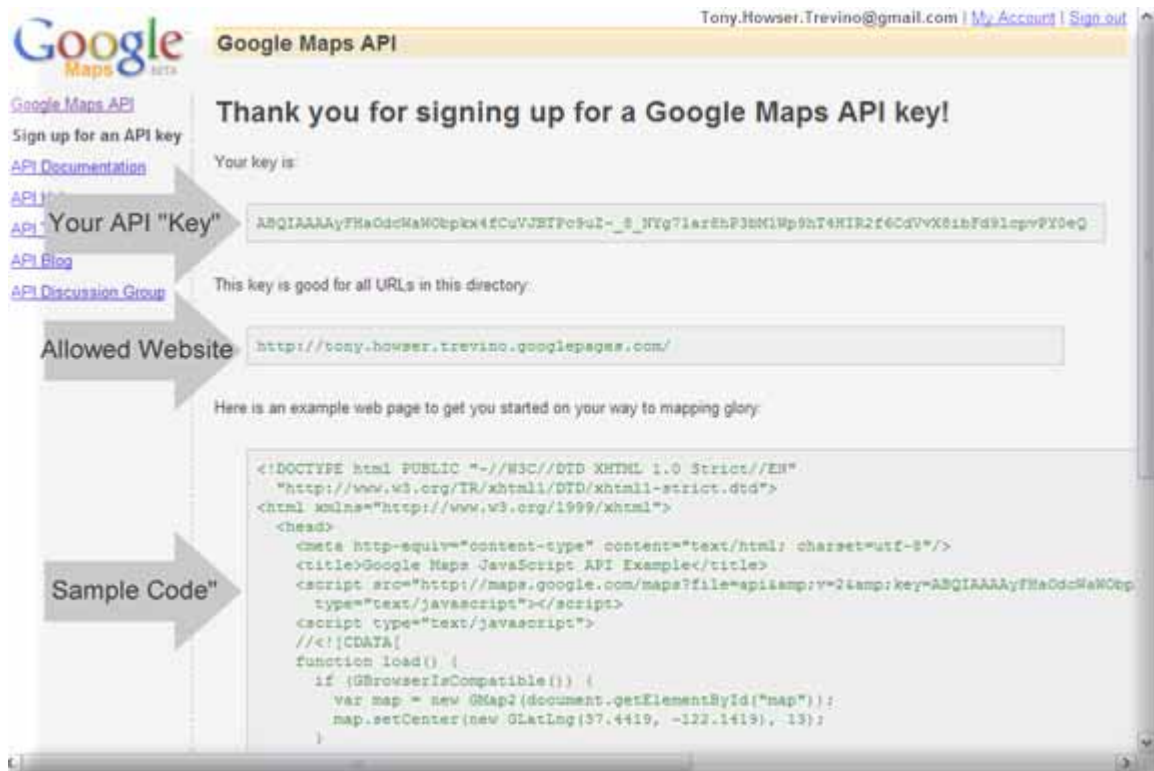


Figure 2-11: Your Own Google Maps API “Key”

7. Open a text editor or word processor on your computer. If you are using a Windows-based PC, you might want to try “Notepad” (which is available at **START menu > All Programs > Accessories > Notepad**). If you are using a Mac, you might want to try “Simple Text.” You can also use “Microsoft Word” on either computer platform.

On the Google Maps API “Key” Web page (Figure 2-11), use your mouse cursor to highlight ALL of the sample programming code (labeled as “Sample Code” in Figure 2-11) , copy it, and paste it on your blank text editor or word processor page. You will need to save this Web programming code!

Windows-based PC Instructions:

- Left-click and hold your mouse while highlighting all of the Web programming code from the beginning `<!DOCTYPE...` part to the `</html>` part (Figure 2-12).
- Right-click the highlighted code and select “Copy” from the pop-up dialog menu.

- Right-click in the blank text area of your selected text editor/word processor and select “Paste” from the pop-up dialog menu.
- Save this file in a location where you can find it on your computer and name it **myfirstwebmap.html**

Mac Instructions:

- Mouse click and highlight all of the Web programming code from the beginning `<!DOCTYPE...` part to the `</html>` part (Figure 2-12).
- After highlighting the text, hold down your mouse cursor anywhere within the highlighted area.
- While continuing to hold the mouse button down, drag the Web programming code to your selected text editor/word processor window or icon and release your mouse button. The copied Web programming code should appear where you released it.
- Save this file in a location where you can find it on your computer and name it **myfirstwebmap.html**



8. You will notice that your API “key” is listed in the copied Web programming code after the following part:

```
<script src="http://maps.google.com/maps?file=api&v=2&key=
```

If you save this same Web programming code, you will have a copy of your Google Maps API “key.” Keep the copied Web programming code open and proceed immediately to the next part.

Part VII---Your First Google Map on Your Website

In this part, you will publish your first simple Google Map on your own Website. After you confirm that it works, you will proceed to Part VIII where you will create your first customized Google Map.

1. Launch another Web browser.
2. Navigate to <http://pages.google.com> and log on to your Google Page Creator account by signing into your GMail account as you have done previously (Figure 2-10).
3. The Google Page Creator “Site Manager” should appear. On this page, click on the small link, “upload” (circled on Figure 2-13).



Figure 2-13: Google Page Creator Site Manager

4. Click on the “Browse...” button which should pop up and locate your HTML file, **myfirstwebmap.html** on your local computer. After selecting it, it should automatically upload itself to Google’s Web server after a few moments (Figure 2-13b).

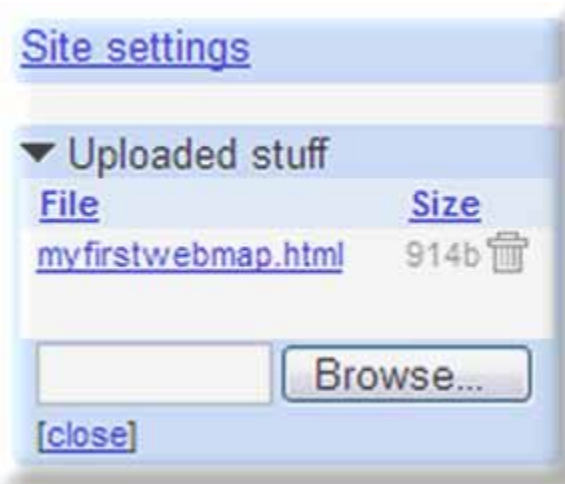


Figure 2-13b: myfirstwebmap.html Uploaded

5. Now, you are going to edit your home page again. To do this in the Site Manager (Figure 2-13), click on the link with your home page

Example: In Figure 2-13, the link is called, “Tony Howser’s Website” in the center of the image.

Your original home page should appear again in Google Page Creator’s Edit Page tool (Figure 2-14).



Figure 2-14: Editing the Home Page

6. In this step, you are going to choose some text in the body part of your Web page and make it a hyperlink. A hyperlink is used to “jump” to other Web pages or content. If you didn’t previously type in the text “My First Web Map” in the body part of your Web page (Figure 2-14), go ahead and do so now. Next, highlight the text, “My First Web Map” on your home page and click on the “Link” button located near the top left-hand corner of the browser window. This will open the Edit Link window.



Figure 2-15: Creating a Hyperlink with the Edit Link Window

7. The Edit Link window shown in Figure 2-15 should appear after you highlight text on your Web page and click on the “Link” button. Complete the following steps using the Edit Link window:

- Verify that “My First Web Map” or whatever you highlighted automatically appears in the text input field next to the label, “Text to Display” (Step 1 in Figure 2-15). If it did not, close the window by clicking the “Cancel” button and repeat the previous step (6).
- Click on the selection button next to the label, “Your files” (Step 2 in Figure 2-15).
- Single-click on your HTML file, “myfirstwebmap.html” to highlight it (Step 3 in Figure 2-15).
- Finally, click the OK button to save the hyperlink (Step 4 in Figure 2-15).

If you are successful, the text should automatically link to your “first Web map” and you will be returned to editing your home page.

8. In the editing page for your home page, click on the “Publish” button to save and publish your changes to the Internet. Now you are going to visit your new and improved Website!

Like before visit and test your Website but this time click on the “My First Web Map” link.

To view your Web page, open a new Web browser window and navigate to the following URL:

[http://<your Gmail user name \(with the periods\)>.googlepages.com](http://<your Gmail user name (with the periods)>.googlepages.com)

This is your own Website's Web address (URL)! Share it with your friends and family.

Example:

<http://Tony.Howser.Trevino.googlepages.com> (Figure 2-8)

The result should be a VERY simple and “draggable” Google map with no controls and centered near Google's headquarters near San Jose, California saved on YOUR OWN WEBSITE! Try using your mouse to click and drag the map to change the location

In the next and last part of the section, you will add some tools to customize your Web map. As stated before, you can do a lot more with the Google Maps API and this is only meant to be a simple introduction.

Part VII---My Own Customized Interactive Web Map

In this last part of the section covering Virtual Cartography, you will learn how to perform some simple customizations of your Web map.

1. First, using your favorite text editor or word processor, open the file called **myfirstwebmap.html** on your own computer.
2. Immediately save a copy of this file on your computer and rename it **mycustomwebmap.html**. You should now have two saved HTML files on your computer with the same content but with different names. Go ahead and close myfirstwebmap.html. You will not use this file anymore. Leave open mycustomwebmap.html so you can edit it.
3. Let's quickly examine some of the code and how you can customize it:

In Figure 2-16, you will see the original and unmodified code that Google generated for you so you can make your first Web map.

```
!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html; charset=utf-8"/>
<title>Google Maps JavaScript API Example</title>
<script
src="http://maps.google.com/maps?file=api&v=2&key=ABQIAAAyFHaOdcwawObpkx4
fCuVJBTPc9uZ-_8_NYg7lar8hP3bM1wp9hT4HIR2f6CdVvX8ibFd91cpvPY0eQ"
type="text/javascript"></script>
<script type="text/javascript">
//
function load() {
if (GBrowserIsCompatible()) {
var map = new GMap2(document.getElementById("map"));
map.setCenter(new GLatLng(37.4419, -122.1419), 13);
}
}
//]]&gt;
&lt;/script&gt;
&lt;/head&gt;
&lt;body onload="load()" onunload="GUnload()"&gt;
&lt;div id="map" style="width: 500px; height: 300px"&gt;&lt;/div&gt;
&lt;/body&gt;
&lt;/html&gt;</pre></div>
<div data-bbox="645 188 850 322" data-label="Text"><p><b>IMPORTANT: Any additional code must come after this line (No where else!)</b></p></div>
<div data-bbox="268 372 729 390" data-label="Caption"><p><b>Figure 2-16: Original Code in mycustomwebmap.html</b></p></div>
<div data-bbox="143 406 835 459" data-label="Text"><p>The most important thing to note is the arrow in Figure 2-16. If you are going to “add” any features to your custom Web map, you must insert them after (on the next line) following:</p></div>
<div data-bbox="143 477 603 494" data-label="Text"><p><b>map.setCenter(new GLatLng(37.4419, -122.1419), 13);</b></p></div>
<div data-bbox="143 511 854 599" data-label="Text"><p>By the way, the two numbers in the previous line represent the initial latitude and longitude of the center of the map (latitude = 37.4419 and longitude = -122.1419). Using Google Earth or another tool, find the latitude and longitude of your school, change the values in the code in <b>mycustomwebmap.html</b> and write these values down on the separate answer sheet (don’t forget the negative signs, if any):</p></div>
<div data-bbox="143 615 380 632" data-label="Text"><p><b>B-10:</b> Your School’s latitude:</p></div>
<div data-bbox="143 650 396 667" data-label="Text"><p><b>B-11:</b> Your School’s longitude:</p></div>
<div data-bbox="143 702 851 772" data-label="Text"><p>The third number (the “13”) in the single line of code above is the initial zoom level of the Web map. The higher the zoom level, the closer the map displays the ground. Zoom levels generally range from 1 through 23. In many cases, there is no imagery available beyond zoom level 20. Go ahead and change the zoom level of your map if you wish.</p></div>
<div data-bbox="143 789 697 807" data-label="Text"><p>Towards the bottom of the original code, there is a line similar to this:</p></div>
<div data-bbox="143 824 750 847" data-label="Text"><p><b>&lt;div id="map" style="width: 500px; height: 300px"&gt;</b></p></div>
<div data-bbox="143 864 839 900" data-label="Text"><p>This represents the length and width of your Google Map in screen pixels. You may change the number values in the code to see how it changes the Web map display. You</p></div>
<div data-bbox="485 935 511 952" data-label="Page-Footer"><p>39</p></div>
```

should probably not exceed a width of 800 pixels and a height of 600 pixels unless you have a very high resolution monitor. Also, a large image takes longer to load over the Internet. Web surfers do not like waiting to long for stuff to download over the Internet.

The last thing you may want to change in the existing code is the page title. This line specifies the Web page title and is usually displayed on the top part of a Web browser:

<title>Google Maps JavaScript API Example</title>

Go ahead and change the text between the <title> and </title> tags to your liking..

4. In this next section, you will add some tools to your custom Web map. Remember, all of these new tools must come after the line in Figure 2-16 and do not exclude anything (especially the semicolon that ends each line---it is required).

- Insert this line of code (on the next line after the arrow in Figure 2-16) to add interactive controls to change the type of map which is displayed (basic map, satellite image, or both):

map.addControl(new GMapTypeControl());

- Insert this line of code (on the next line after the arrow in Figure 2-16) to add interactive controls to Pan and Zoom:

map.addControl(new GSmallMapControl());

5. In this last section, you will need to locate 3 places or objects around your school that you are familiar with. Use Google Earth or a similar tool to locate these objects or places and their associated latitude and longitude coordinates. Copy down the following information about these three objects on the separate answer sheet so you can create placemarkers for them. In other words, you're going to create and label placemarkers for 3 separate features around your school. (Don't forget the negative signs, if any, in the latitude or longitude!):

Table 2_2: Three Markers for Features Nearby Your School

Marker Number	Object or Place Name <i>Example: McDonald's</i>	Latitude	Longitude
1	B-12:	B-13:	B-14:
2	B-15:	B-16:	B-17:
3	B-18:	B-19:	B-20:

Now, you are going to modify the following code and insert it (on the next line after the arrow in Figure 2-16) for each placemarker that you want to add to your map. EACH placemarker requires these five lines of code. Be sure to replace the marker number, latitude, longitude, and object/place names with the information from Table 2_2.

“Skeleton Programming Code”

```
var marker<your marker #> = new GMarker(new GLatLng(<your latitude>,<your longitude>));
GEvent.addListener(marker<your marker #>, "click", function() {
marker<your marker #>.openInfoWindowHtml(" <your object or place name>");
});
map.addOverlay(marker<your marker #>);
```

Remember, the proper location for it in your code (Figure 2-16)

Here is an example of the programming code for a single marker using the information from this sample table and the “Skeleton Programming Code” given above:

Marker Number	Object or Place Name	Latitude	Longitude
1	Cox Arena (Basketball)	32.773771	-117.074435

```
var marker1 = new GMarker(new GLatLng(32.773771,-117.074435));
GEvent.addListener(marker1, "click", function() {
marker1.openInfoWindowHtml("Cox Arena (Basketball)");
});
map.addOverlay(marker1);
```

Do you see how the information from the table was used with the “Skeleton Programming Code?” Google Earth was used to find the basketball arena and the associated latitude and longitude coordinates. Remember, these five lines of programming code must be used for EACH placemarker so be sure to copy, paste, and modify the code three times for three separate markers on your Web map! Figure 2-17 is an example of a customized Web code with added tools and two feature placemarkers. Notice where the code has been inserted and what changes have been made!

```
mycustomwebmap.html - Notepad
File Edit Format View Help
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="content-type" content="text/html; charset=utf-8"/>
<title>Tony's Custom Web Map</title>
<script src="http://maps.google.com/maps?file=api&v=2&key=ABQI
type="text/javascript"></script>
<script type="text/javascript">
//
function load() {
if (GBrowserIsCompatible()) {
var map = new GMap2(document.getElementById("map"));
map.setCenter(new GLatLng(32.77497, -117.0725), 16);

map.addControl(new GMapTypeControl());

map.addControl(new GSmallMapControl());

var marker1 = new GMarker(new GLatLng(32.773771, -117.074435));
GEvent.addListener(marker1, "click", function() {
marker1.openInfoWindowHtml("Cox Arena (Basketball)");
});
map.addOverlay(marker1);

var marker2 = new GMarker(new GLatLng(32.771829, -117.069470));
GEvent.addListener(marker2, "click", function() {
marker2.openInfoWindowHtml("7-11 (Slurpees!)");
});
map.addOverlay(marker2);

}
}
//]]&gt;
&lt;/script&gt;
&lt;/head&gt;
&lt;body onload="load()" onunload="GUnload()"&gt;
&lt;div id="map" style="width: 600px; height: 500px"&gt;&lt;/div&gt;
&lt;/body&gt;
&lt;/html&gt;</pre></div><div data-bbox="156 612 842 631" data-label="Caption"><p><b>Figure 2-17: Example of Computer Code for a Customized Interactive Web Map</b></p></div><div data-bbox="142 665 838 741" data-label="Text"><p>6. Using the previous instructions, log into <a href="http://pages.google.com">http://pages.google.com</a> and go to your Site Manager to upload your completed file, <b>mycustomwebmap.html</b> After uploading, there should be two uploaded files (myfirstwebmap.html and mycustomwebmap.html)</p></div><div data-bbox="142 764 838 799" data-label="Text"><p>7. Using the previous instructions, add a link and a description to the main content area of your home page and link to your custom Web map (Figure 2-18).</p></div><div data-bbox="484 934 512 952" data-label="Page-Footer"><p>42</p></div>
```

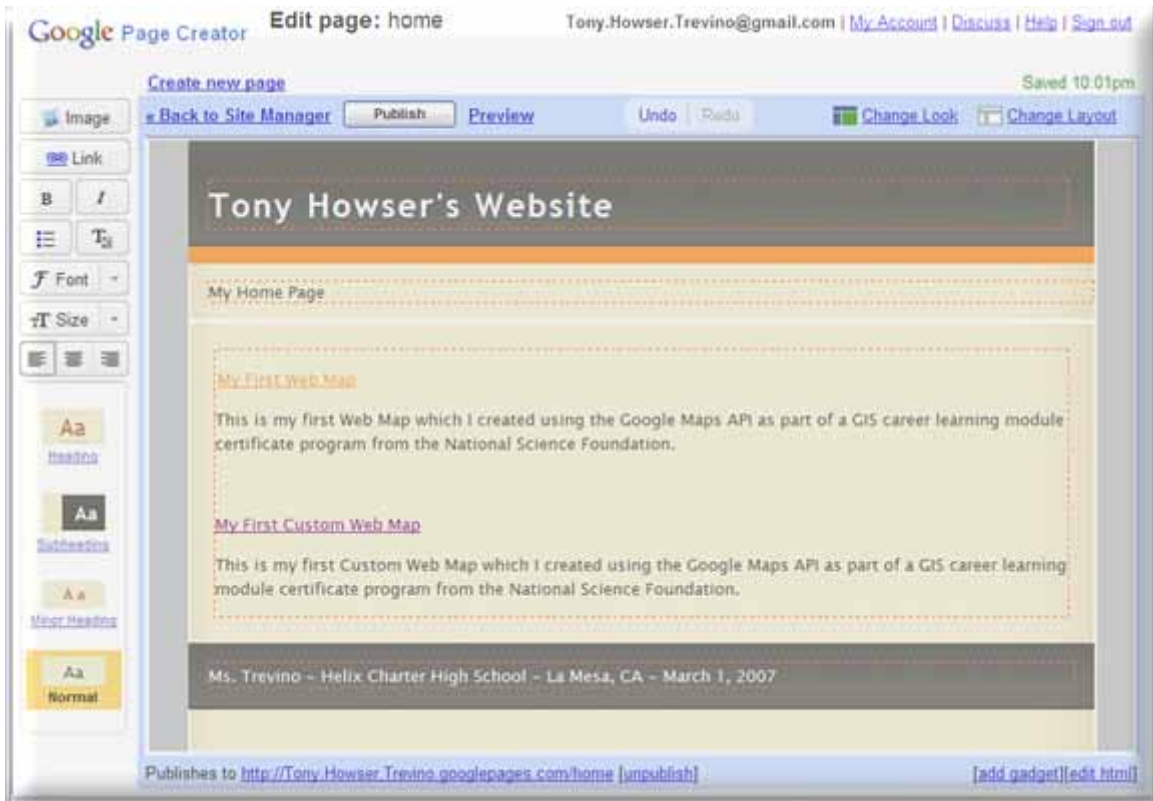


Figure 2-18: Adding Another Link for the Custom Web Map

8. When you are finished adding the link to the custom Web map, publish your Website and test your custom Web map on your Website (Figure 2-19)!

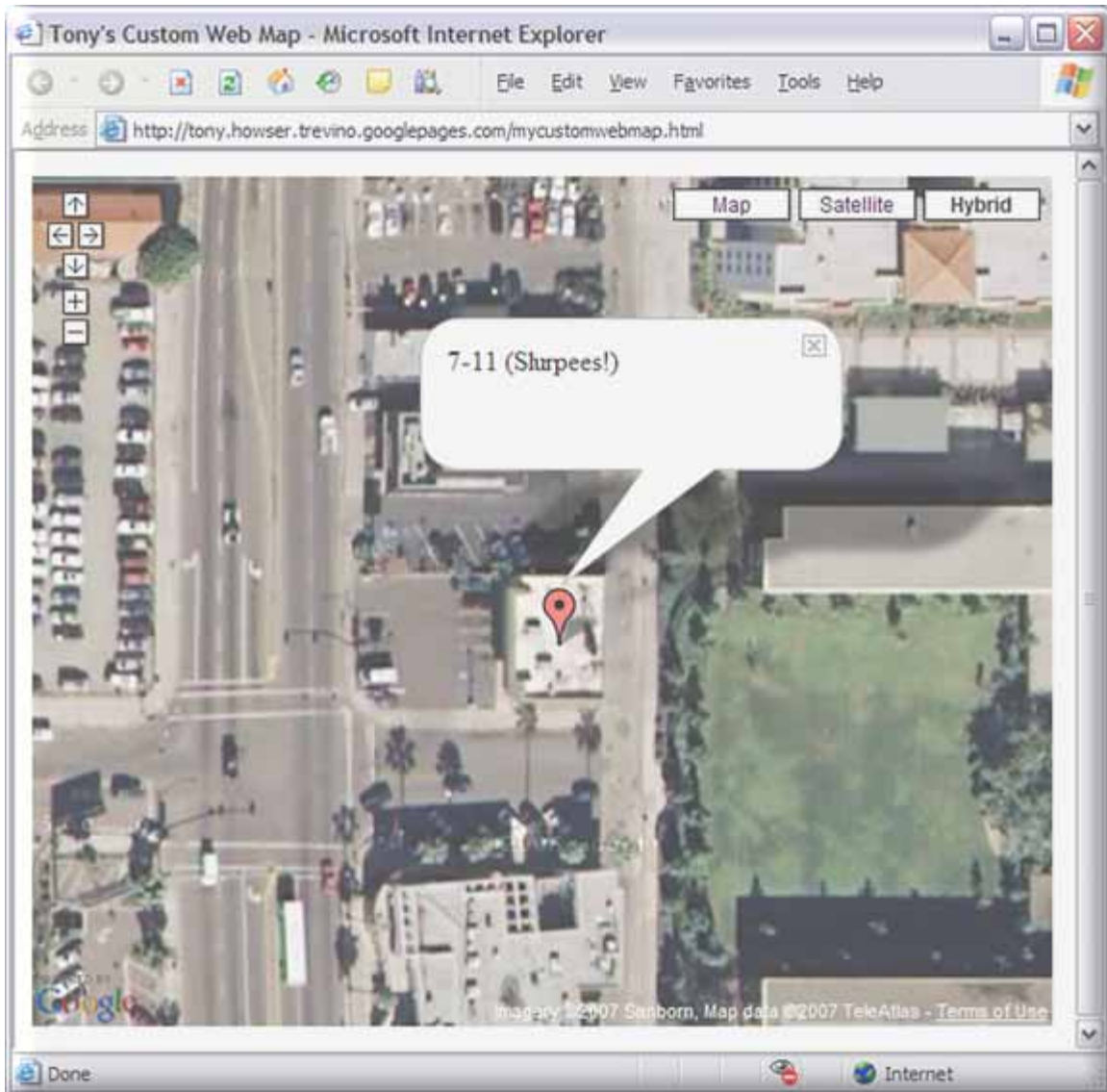


Figure 2-19: Example of a Customized Interactive Web Map

Congratulations!!! You now have enough skills to create truly complex, interactive, and customized Web maps.

Your teacher/instructor will visit your Website so follow their specific instructions; however, you can further explore the full Google Maps API at the following Website:

<http://www.google.com/apis/maps/documentation/index.html>

You will be able to find simple and advanced examples and instructions on how to further customize your Web maps.

Section 3 – Written Assignment

Now that you have seen and worked with examples of digital globes and computerized maps, we would like you to answer some questions about them. We want you to combine all of your answers into a 250-word paragraph (approximately one typed page) by including the following information on the separate answer sheet:

- C-1: In your paragraph, quickly describe (in two sentences or less) each of the two GIS applications that you used (Google Earth and the Google Maps API). Also describe a couple similarities and a couple of differences between the two.*
- C-2: In your paragraph, also answer if you think that the two GIS applications (Google Earth and the Google Maps API) can help people? In what ways can they help people? In what kinds of occupations/industries would they be useful?*
- C-3: Now, based on your experience with both GIS applications, pick your favorite. In your paragraph, please discuss which application you liked the best (Google Earth or Google Maps API) and tell us WHY? Please also discuss what the best or “coolest” feature of your favorite application was.*
- C-4: Finally, in your paragraph, describe your experience with using your favorite application. Was it “fast?” Did it take forever to load images? Did it “work” the entire time you used it? Did you have any kind of difficulty using it? Based on your experience with it, would you use it again? Answer why or why not and how this might affect people who use it in a job.*

Student Survey

This learning module was developed specifically for you---the students---in order to expose you to GIS and related geospatial technologies.

GIS and related geospatial technologies, similar to what you worked with in this learning module, are major components of one of the most important new industries for career growth. Businesses, organizations, and governments are increasingly seeking skilled talent in this industry.

Now, to benefit other students and the authors of this learning module, we would greatly appreciate your input. Please take time to answer these questions as openly and honestly as possible. They will not affect your grade or score. You can either provide your feedback to your teacher/educator along with the learning module answers on the separate answer sheet or you can email your responses using the mail form available at

<http://geoinfo.sdsu.edu/hightech/contactUs.htm>.

Thank you for helping us improve our modules!

- S-1:** What did you like best about this learning module? Why?
- S-2:** What did you like least about this learning module? Why?
- S-3:** Was there anything that was really hard to understand or difficult to complete? What was it? Why?
- S-4:** Is there anything in this learning module that we can add, exclude, or change to make it better? What is it? Why?

STUDENTS MAY STOP HERE!

Appendix: Installation Instructions

Installation Instructions for Google Earth

These simple instructions have been written using screen shots and instructions for the Windows Operating System. Installation instructions for the Mac and Linux Operating Systems are similar.

Be sure to have “administrative” privileges on the computer you are installing the software on. Accounts on computers in a lab setting usually limit installation to users with administrative privileges only.

1. Open your Web browser and navigate to URL:
<http://earth.google.com/download-earth.html>

2. On the next Web page, select your computer operating system and click on the button, “Download Google Earth

Select your Operating System before clicking on the “Download Google Earth” button.

After specifying the correct operating system, click on the “Download Google Earth” button.

After you have clicked on the “Download Google Earth” button, specify where you want to save the installation file on your computer and keep the original file name.



Figure A: Part of What is Displayed on the Web Page after Pressing the “Download Google Earth” Button

NOTE: Web browsers with pop-up or download blocking may get an error message. If this is the case, click on the “click here to start it” link displayed on the download page to manually initiate a download (Figure A).

5. After saving the installation file to your computer, close your Web browser and run the installation file by clicking on it.
6. Follow the Google Earth installation instructions that follow and accept the licensing agreement and any other installation messages that appear. The default “Complete” installation is sufficient for the learning module.

WINDOWS USERS NOTE: If you are given an option to “switch to ‘DirectX’ mode,” we recommend that you respond by clicking “No” and keep Google Earth in ‘OpenGL Software Emulation’ mode since it is compatible with a greater number of computer graphics cards.

Platform Requirements

Below in a table are the System configurations required for PC, Mac and Linux Systems. Minimum configuration requirement is given below which a minimal features or component setting that are required to install and run Google Earth successfully on your system. With the minimum configuration, you will be able to use the software but performance (speed) will be limited.

PC System Configuration

Minimum configuration for PC:

- Operating System: Windows 2000 or Windows XP
- CPU: Pentium 3, 500Mhz
- System Memory (RAM): 128MB
- Hard Disk: 400MB free space
- Network Speed: 128 Kbits/sec
- Graphics Card: 3D-capable with 16MB of VRAM
- Screen: 1024x768, "16-bit High Color"

Recommended configuration for PC:

- Operating System: Windows XP or Windows Vista
- CPU: Pentium 4 2.4GHz+ or AMD 2400xp+
- System Memory (RAM): 512MB
- Hard Disk: 2GB free space
- Network Speed: 768 Kbits/sec
- Graphics Card: 3D-capable with 32MB of VRAM
- Screen: 1280x1024, "32-bit True Color"

Mac System Configuration

Minimum configuration for Mac:

- Operating System: Mac OS X 10.3.9
- CPU: G3 500Mhz
- System Memory (RAM): 256MB
- Hard Disk: 400MB free space
- Network Speed: 128 Kbits/sec
- Graphics Card: 3D-capable with 16MB of VRAM
- Screen: 1024x768, "Thousands of Colors"

Recommended configuration for Mac:

- Operating System: Mac OS X 10.4.5
- CPU: G4 1.2Ghz
- System Memory (RAM): 512MB
- Hard Disk: 2GB free space
- Network Speed: 768 Kbits/sec
- Graphics Card: 3D-capable with 32MB of VRAM
- Screen: 1280x1024, "Millions of Colors"

Linux System Configuration

Minimum configuration

- Kernel: 2.4 or later
- glibc: 2.3.2 w/ NPTL or later
- XFree86-4.0 or [x.org](#) R6.7 or later
- CPU: Pentium 3, 500Mhz
- System Memory (RAM): 128MB
- Hard Disk: 400MB free space
- Network Speed: 128 Kbits/sec
- Screen: 1024x768, 16 bit color
- Tested and works on the following OSs:
 - Ubuntu 5.10
 - Suse 10.1
 - Fedora Core 5
 - Linspire 5.1
 - Gentoo 2006.0
 - Debian 3.1
 - Red Hat 9

Recommended configuration

- Kernel 2.6 or later
- glibc 2.3.5 w/ NPTL or later
- [x.org](#) R6.7 or later
- System Memory (RAM): 512MB
- Hard Disk: 2GB free space
- Network Speed: 768 Kbits/sec
- Graphics Card: 3D-capable with 32MB of VRAM
- Screen: 1280x1024, 32 bit color

Answers to some of the most popular Google Earth-related installation questions are also available at <http://earth.google.com/faq.html>.