CHAPTER 12

Geolocation and Mapping

This chapter will demonstrate two technologies that provide powerful features that enable you to easily create some very useful web sites. Geolocation provides a standardized API that is used to determine the client’s location. Mapping technology adds the ability to display this location on a map along with other points of interest. Together, these form a platform that has many useful applications.

In this chapter you’ll use the geolocation API to find your current position. The accuracy of that position will vary greatly depending on available hardware and the environment. However, HTML5 defines a standard API that is used on all devices so you can provide device-independent solutions.

Just knowing your location in terms of latitude and longitude is not very helpful. To put this data to use, you’ll use the Bing Maps API to display that location on a map. Then you can map additional points of interest and see them in relation to your current location.

Understanding Geolocation

While not technically part of the HTML5 specification, the WC3 has defined a standard API for accessing geolocation information, which is supported by all major current browser versions. The technology that determines the location, however, varies greatly depending on the device capabilities and the client’s environment.

Surveying Geolocation Technologies

There are several technologies that can be used to determine the current location, including:

- **Global Positioning Satellites (GPS)** – GPS communicates with satellites to determine the current location with extremely high accuracy, particularly in rural areas. Tall buildings in an urban area can affect the accuracy but in most cases GPS provides very good results. The biggest limitation is that this doesn’t work indoors very well. To use GPS, the device must have specific GPS hardware, but this is becoming increasingly common on mobile devices.

- **Wi-Fi Positioning** – Wi-Fi networks have a relatively short range and systems such as Skyhook Wireless maintain a large database of Wi-Fi networks and their locations. Simply being connected to a Wi-Fi network will give a pretty good idea of where you are. Often, however, you may be within range of multiple networks and the system can use triangulation to determine the location with even greater accuracy. Of course, this requires that you have a Wi-Fi enabled device and doesn’t work in rural areas where there are no Wi-Fi networks.
• Cell Tower Triangulation – This uses the same principle as Wi-Fi positioning except it uses cellular telephone towers. It is not as accurate, however, because a cell tower has a much larger range. Since all cell phones will have the ability to communicate with cell towers, this technology has a broad application.

• IP Block – Every device that connects to the internet will have an IP address, which is usually provided by the ISP. Each ISP will have a block of IP addresses that it can use, which are typically assigned by geographical location. So the IP address with which you connect to the internet can provide a general location, usually a metropolitan area. There are several factors, however, that can yield incorrect results, such as NATted addresses.

Each of these technologies has different hardware requirements and provide varying levels of accuracy. With the Geolocation specification, you can easily request the current location from the browser and let it determine the best way to supply that based on the current hardware and access to external sources including satellites, cell towers, and W-Fi networks.

Using Geolocation Data
Most people think of geolocation as a device that provides turn-by-turn directions but that is only one application of this technology. Of course this requires very precise location that can only be obtained through GPS. However, even when the current location is far less accurate, your web site can still make valuable use of this information. Even if the location is determined only by the IP address, this will usually be sufficient to set the default language, for example. You may need to allow the end user to override this but most of your audience will see the initial page in their native language.

When retrieving the current location, the geolocation service also returns the estimated accuracy. Your application should use this to determine the features that will be provided. Suppose, for example, that you’re creating a web page for the U.S. Postal Service that shows where the nearest post offices are. If the current location is known with very high accuracy, the web page can show a map and indicate the current location as well as the nearby post offices. In addition, it could provide the estimated driving time to each.

However, if the location is known with lesser accuracy, the page could display a map that shows where the post offices are in that general area. Presumably, the user will know where they are and can use this information to determine the best location to use. However, if the accuracy is very poor, the page should prompt for a zip code and then display the nearest post offices based on the user input. So, depending on the accuracy, the application can gracefully degrade the functionality.

Using the Geolocation API
To demonstrate how to use the Geolocation API, you’ll create a simple web page that calls the API to determine your current location. Initially, this data will be displayed on the web page as text. Later you’ll display this location on a map.

Creating the Visual Studio Project
You’ll start by creating a Visual Studio project using the same Basic MVC template that you have used in previous chapters.