Chapter 1
Start with the cloud: Build web apps using ArcGIS Online

This chapter introduces the ArcGIS Online service, a main component of today's web GIS technologies. It begins with a short overview of web GIS and the various ways to build web GIS applications and then demonstrates a quick and easy way to build web GIS apps using the Story Map Tour template. As this chapter familiarizes you with ArcGIS Online basic operations and workflows, it prepares you for the more flexible ways to use ArcGIS Online that you will learn in other chapters.

Learning objectives

- *Grasp the basics of web GIS.*
- *Understand the different approaches of building web GIS apps.*
- *Learn the ArcGIS Online workflow for creating web apps.*
- *Work with GIS data in comma-separated values (CSV).*
- *Create and share web maps.*
- *Create and configure web apps.*
- *Use the Story Map Tour template.*

What is web GIS?

Web GIS uses web technologies, including, but not limited to, HTTP (Hypertext Transfer Protocol), HTML (Hyper Text Markup Language), URL (uniform resource locator), JavaScript, WebSocket, and more. Since its conception in 1993, web GIS has demonstrated immense value to government, business, science, and daily life.
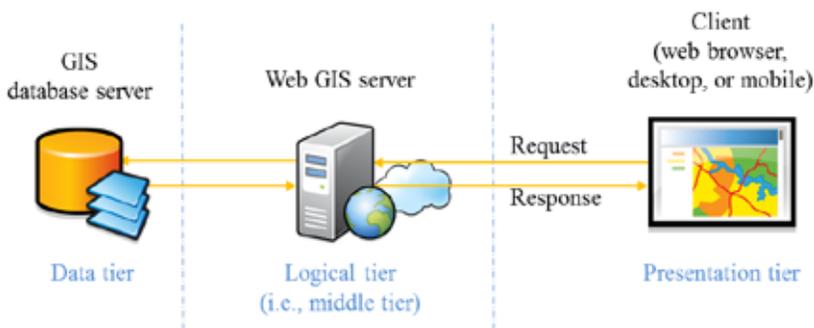

The basic architecture of web GIS.

Web GIS architecture can be complex because it can connect multiple systems. At its most basic, it has a three-tiered architecture (as illustrated in the figure):

- **Web GIS clients,** which are the face of the presentation tier, typically appear in the form of online maps or the results of advanced analyses, as seen in web browsers, smartphones, tablets, and desktop apps. In this book, you will learn how to build various web browser (particularly JavaScript based) and mobile clients.
- **Web GIS servers**, the most important components of web GIS, occupy the middle tier. Here, the content, functionality, and capability of web GIS apps is determined. Without the middle tier's support, the presentation tier would lose its foundation. In this book, you will learn how to use ArcGIS for Server software, ArcGIS Online, and Portal for ArcGIS software.
- **GIS database servers**, representing the data tier, hold the data needed to support web GIS servers and their web clients. In this book, you will use CSVs, shapefiles, file geodatabases, and the enterprise geodatabase hosted in ArcGIS Online.

Why web GIS?

The Internet and the World Wide Web remove the constraint of distance in cyberspace. This allows people the freedom to access information globally and almost instantly. Building on these advantages, web GIS offers many advantages over traditional desktop applications, including:

- **Global reach:** you can share your geographic information easily within your organization and with people all over the world if you wish.
- **Large number of users:** you can share your app with dozens, or even millions, of users.
- **Low cost per user:** the cost of building one web GIS app is often cheaper than building a stand-alone desktop solution and installing it for every user.
- **Better cross-platform capabilities:** web apps, especially those built with JavaScript, can run on desktop and mobile platforms running a wide range of operating systems, from Windows, Mac OS, and Linux to iOS, Android, and Windows Phone.
- **Easy to use:** Web GIS apps typically incorporate simplicity, intuition, and convenience into their design. Therefore, public users can use these apps without having prior knowledge.
- **Easy to maintain:** Web clients can benefit from the latest program and data updates each time they access a web app. The web administrator does not have to update all the clients separately.
- **Diverse applications:** Web GIS has made building apps easier, so its applications have grown diverse. Unlocking the power of geospatial intelligence, it now reaches millions of homes, offices, and laboratories and billions of individuals.
    - For government, web GIS offers an ideal channel for delivering public information services, an engaging medium for encouraging public participation, and a powerful framework for supporting decision making.
    - For business, web GIS helps create novel business models and reshape existing ones. It enhances the power of location-based advertising, business analysis, and volunteered geographic information, generating tremendous revenue, both directly and indirectly.
    - For science, web GIS creates new research areas and renews existing avenues of research.
    - In daily life, web GIS helps people decide where to eat, stay, and shop and how to get from here to there.

Paths to building web GIS applications

This book teaches readers how to build web GIS apps. The ArcGIS suite of web GIS products offers many paths to this goal.

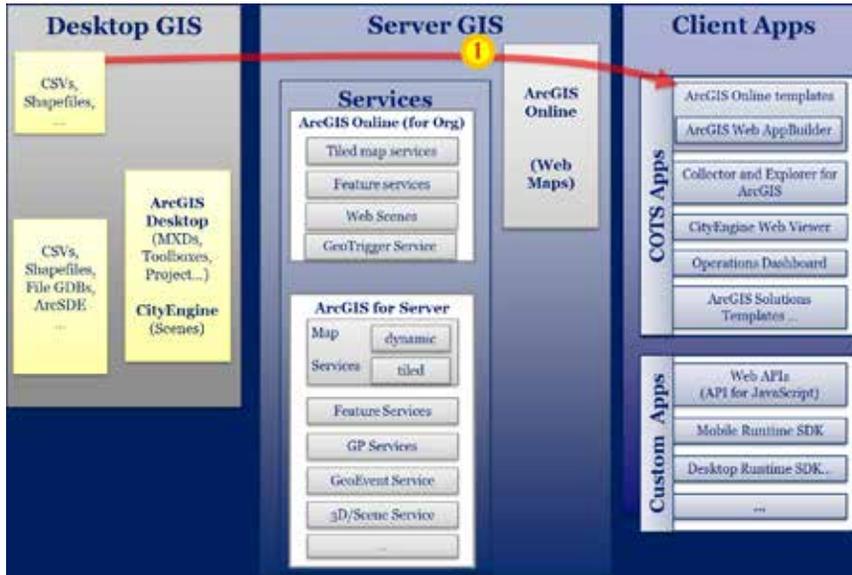ArcGIS offers many ways to build web applications. The thick red line in the figure highlights the technology chapter 1 teaches.

- The data tier (on the left side of the figure) contains formats that range from simple CSVs managed with Microsoft Excel to sophisticated geodatabases managed with enterprise databases. This allows you to create a map, toolbox, and 3D resources in ArcGIS for Desktop software, including ArcGIS Pro.
- In the middle tier (in the middle of the figure), you can publish desktop resources to ArcGIS Online or ArcGIS for Server as various types of web services that you can add to ArcGIS Online to create web maps. Organizations that do not want to place their resources in the public cloud can use Portal for ArcGIS, a form of ArcGIS Online used in a private cloud.
- Options for the presentation, or the client, tier (on the right side of the figure) range from ready-to-use apps that are configured without programming to custom apps that use various web APIs (application programming interfaces) or SDKs (software development kits) to meet special requirements.

Start with ArcGIS Online, a cloud GIS

Today, cloud computing is rapidly emerging as an important research area and technology trend. It is based on the idea that many of the computing tasks that

individual computers handle locally could operate more efficiently using multiple computer centers connected through the Internet. Cloud GIS uses this new cloud computing technology to enhance GIS capabilities that help users lower costs, reduce complexity, and quicken scalability.

ArcGIS Online offers users a collaborative, cloud-based platform for creating, managing, sharing, and accessing maps, applications, and data. It provides the following:

- **Infrastructure as a Service (IaaS)**: you can upload your data and publish web services to ArcGIS Online, and host them on the ArcGIS Online infrastructure, which sits on top of Amazon EC2 (Elastic Compute Cloud).
- **Platform as a Service (PaaS)**: you can build web GIS apps without programming by using ArcGIS Online templates or with programming by using ArcGIS Web APIs and ArcGIS Runtime SDKs for Mobile.
- **Software as a Service (SaaS)**: you can use the rich basemap and thematic map services, analytical services, and applications hosted in ArcGIS Online and published by Esri and its user communities.

Types of ArcGIS Online user accounts

You must have an account with ArcGIS Online to save your work and create web apps. There are two main types of user accounts:

- **Public accounts:** The ArcGIS Online Public Account service is not associated with any organization and offers limited functionality. To create an account, navigate to arcgis.com. A public user can add simple data, create web maps and web apps, and access public data, services, maps, and apps shared by others. However, public account users cannot publish hosted services nor access many ArcGIS analytical functions.
- **Organizational accounts:** To become a member of an ArcGIS Online organization, you or your organization's administrator must create an ArcGIS Online for Organizations account. An organizational user can assume one of the following roles:
  - **User:** In addition to the functions available to public users, organizational users can access the data, services, maps, and apps shared within his or her organization.
  - **Publisher:** In addition to user-level functions, publishers can publish hosted geospatial web services to ArcGIS Online and perform spatial analyses.
  - **Administrator:** In addition to publishing functions, administrators can configure their organization's ArcGIS Online website (such as its featured content gallery) and manage its users and groups.
  - **Custom role:** The ArcGIS Online administrator can define a custom role with specialized permissions (e.g., view-only).

Main types of content in ArcGIS Online

Five main types of content in ArcGIS Online relate closely to this book's main goal—learning how to build web GIS apps.
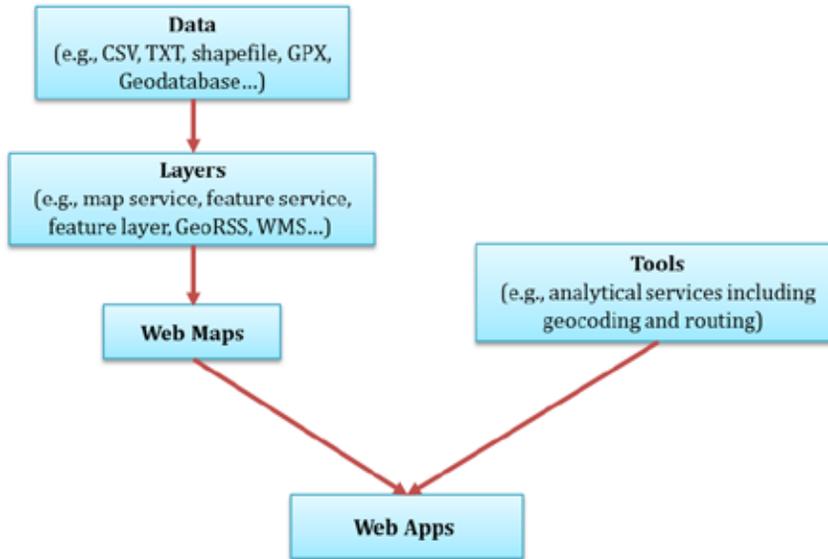

The main types of content in ArcGIS Online and Portal for ArcGIS.

Typically, a web app comprises one or more web maps, which in turn include or reference one or more layers. A layer can take the form of a CSV, a shapefile, or a web service.

- **Data:** ArcGIS Online supports data in a variety of formats, including CSV, TXT, CSV, GPX (GPS Exchange Format), and geodatabase.
- **Layers:** ArcGIS Online can host layers including the aforementioned data and can reference layers, including GeoRSS, map services, feature services, image services, KML (Keyhole Markup Language), and WMS (Web Map Service standard defined by OGC—Open Geospatial Consortium).
- **Web maps:** These maps interactively display geographic information that you can use to answer questions. A web map comprises or references multiple layers.
- **Tools:** these application tools perform analytical functions, such as geocoding, routing, generating PDFs, summarizing data, finding hot spots, and analyzing proximity.
- **Web apps:** A website generally created for a targeted audience and purpose. Developers can program with ArcGIS Web APIs to build web apps. However,

you do not have to be a developer to create a web app. ArcGIS Online provides many templates that you can use to create impressive web apps without any programming. In ArcGIS Online, a web app sometimes comprises a single web map and sometimes multiple web maps (such as web apps developed from the side-by-side and swipe templates).

Steps to creating web GIS apps

Here is the typical workflow used to create web apps using ArcGIS Online:

1. Define your objectives.
2. Research and/or prepare your data.
3. Add your data to ArcGIS Online, or publish it as services to ArcGIS Online.

For simple forms and small sizes, add data directly through the map viewer (see chapter 1, section 1.3, and chapter 2, section 2.1). Otherwise, publish data, maps, and toolboxes as web services, and add them to your web map (see chapters 3, 4, 5, and 7).

4. Create and share your web map using the ArcGIS Online map viewer.
   - Add your service or layer, or other available types of layers, to your web map.
   - Symbolize your layer (for some types of layers only) and configure pop-up windows.
   - Save and share your web map.
5. Create and share your web app.

Browse through the ArcGIS Online web app templates to find a template that best suits your needs and then use it to transform your web map into a web app. If no templates meet your requirements, use ArcGIS Web APIs, Mobile APIs, and Runtime SDKs to create your own app.

This tutorial

In this tutorial, you will create a web GIS app that introduces the main points of interest (POIs) in the City of Redlands, California.

Data: A CSV file contains data for the main POIs in Redlands, including longitude, latitude, names, descriptions, photo or video URLs, and thumbnail URLs.
The sample data for this entire book is available at esripress.esri.com/bookresources. To get the data, navigate to the webpage, find the *Getting to Know Web GIS* title, download the sample data, and extract the files to C:\EsriPress, or follow your instructor's instructions to download the data.

Requirements:

- Your web app should display a basemap (a street map or satellite imagery) of the city and POI locations, along with their descriptions and photos or videos.
- It should be engaging and easy to use.
- It should work on desktops, tablets, and smartphones.

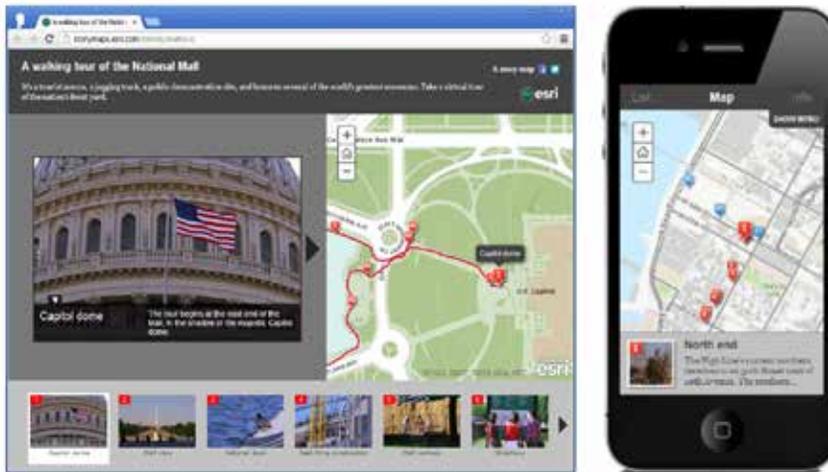**Solution:** To build this web app, select the **Map Tour** template, one of the most popular ArcGIS Online templates. See two screen captures of it in the figure and a live sample at **http://storymaps.esri.com/stories/maptour-palmsprings.**

The Map Tour web app template working in a desktop browser, left, and on a smartphone.

The Map Tour template produces attractive, easy-to-use web apps that help you present geographic information with compelling photographic and video story elements. The template layout automatically rearranges itself to adapt to various screen sizes and can display a set of places on a map in a numbered sequence made for browsing. It is designed for use in web browsers on the desktop, smartphones, and tablets.

Many scenarios benefit from this template:

- Showing the world the work your government department, organization, or agency is doing or has done
- Showcasing the key attractions of a city or region
- Introducing a park and its features
- Providing a tour of a campus, an outdoor art collection, or a historic district
- Educating people about areas of scientific or geographic interest
- Directing public attention to places you want to improve or protect
- Creating online photo or video journals of a trip or event

System requirements:
- Microsoft Excel or a text editor to create and edit your CSV data
  - CSV easily represents points though not complex geometric forms such as lines or polygons.
  - Excel automatically maintains correct CSV format (for example, adding correct quotes).
- A web browser
- ArcGIS Online, ArcGIS Online for Organizations software, or Portal for ArcGIS
  - If your organization offers ArcGIS Online for Organizations, ask your administrator or instructor to create an account for you. For the work you will do in this chapter, a user-level account will suffice; however, you will need a publisher-level account in chapter 5, so get a publisher account if possible.
  - If you do not have access to an organizational account, create a free public account instead. (However, do not create the 60-day free trial subscription account now; wait until you reach chapter 5 and the later chapters when you will need it.)

📋 **Note to instructors:** you can create a group for your students in which they can share their work with other members.

1.1   Create an ArcGIS Online account

Skip this section if you already have an ArcGIS Online account or if you are using ArcGIS Online for Organizations or Portal for ArcGIS, in which cases you should ask your administrator or instructor to create an account for you.

If you are an instructor, follow step 6 to create a group account for your class.

For those who have not created an ArcGIS Online account yet, please create a **public account** by following the instructions that follow below. (Wait until chapter 5 to create a 60-day free trial subscription.)

1. **Open your web browser, navigate to ArcGIS Online (arcgis.com), and then click the Sign In button located in the upper-right corner of the page.**
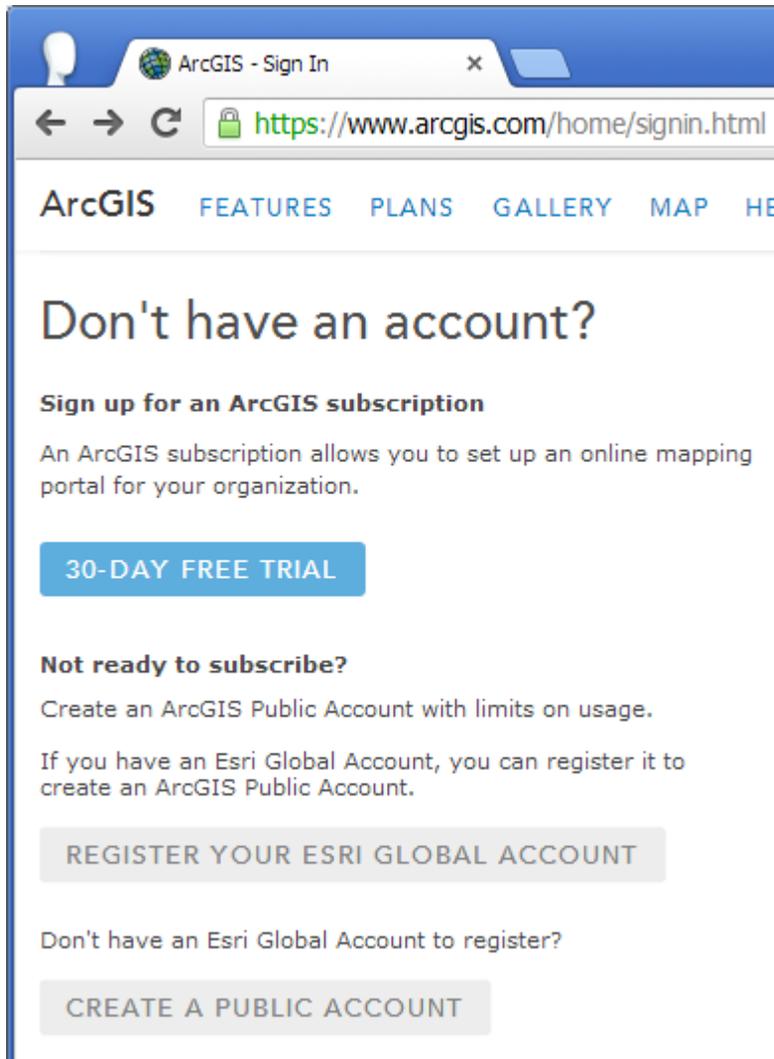
2. **Click Create a Public Account.**

3. **On the Create a New Account page:**

    • **Input your user name, password, and other requested information.**
    • **Click the Review and Accept the Terms of Use button, and accept the terms of use.**
    • **Click the Create My Account button.**

Create A New Account

Complete the form below to create an account.

Username	
Password	
Confirm Password	
First Name	
Last Name	
Organization	
E-mail	
Confirm E-mail	
Phone Number	

The following question and answer will help validate your identi

Identity Question Select a question for password recovery.   ▼

Answer

Terms of Use   REVIEW AND ACCEPT THE TERMS OF USE

          CREATE MY ACCOUNT   CANCEL

Esri sends you a welcome e-mail that contains a URL link that validates your e-mail address.

4.   Click the validation URL link in the welcome e-mail. On the next screen, complete the confirmation by typing your password in the prompt and clicking **OK**.

5.   Open a web browser, navigate to ArcGIS Online, click the **Sign In** link in the upper-right corner of the browser page, and then input your user name and password to log in.

ArcGIS ▼ FEATURES PLANS GALLERY MAP HELP   SIGN IN
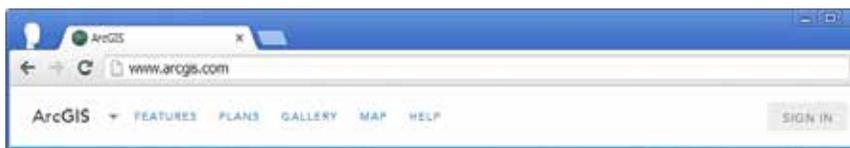
6. Optionally, for a web GIS class, the instructor can consolidate all student accounts into one group. This will make it easier for the class to review each other's work. In the process, students will also learn how to secure their content in ArcGIS Online.

For instructors to create a group:

- Log in and click the **Groups** link on the main menu bar.
- Click the **Create a Group** link 🏢.
- Follow the instructions to finish creating a group.
- Invite your students to join the new group.
- Click the **Membership Requests** button 🗏 to approve student requests.

ArcGIS   FEATURES   PLANS   GALLERY   MAP   GROUPS   MY CONTENT

My Groups

🏢 CREATE A GROUP   🏳 INVITATIONS (0)

For students to join a group:

- In the Search box, input the group name given by your instructor and click **Search for Groups.**
- In the search result, select the group your instructor created.
- Click the **Join this Group** button.

My Web GIS Class   🔍

Search All Content

Search for Maps

Search for Layers

Search for Apps

Search for Tools

Search for Files

Search for Groups

You become a member of the group after the group owner approves your request.

1.2   Prepare your data

ArcGIS Online web app templates require certain kinds of data content. The Map Tour template, for example, requires a list of points (a point layer) and the locations, captions, descriptions, photos or videos, and thumbnails associated with them. Data can be organized in CSV or point shapefile, map service (chapter 3), or feature service (chapter 5) format.

This chapter provides a sample CSV dataset with coordinates for the main POIs in the City of Redlands. Examine the sample data to familiarize yourself with the required fields.

1.   **If you have not already done so, navigate to esripress.esri.com/bookresources, or follow your instructor's instructions to download the sample data for this book. Extract the files to C:\EsriPress.**

2.   **In Microsoft Excel, navigate to C:\EsriPress\GTKWebGIS\Chapter1\Locations .csv, and study its data format.**

Name	Caption	Icon_color	Long	Lat	URL	Thumb_URL
Welcome to the City of Redlands	Located about 60 miles east of Los Angeles, replete with cultural, artistic and historical sites. Redlands, emerging as a regional leader, boasts small-town charm, and features a world center of geospatial information technologies. (<i>More info</i>)	R	-117.182421	34.055448	https://googledrive.com/host/20bwLwen7VgUEdW5uemtieDJ053c/Cover.JPG	https://googledrive.com/host/20bwLwen7VgUEMUk4UU2IXQ2d6YWM/cover.png
Esri	Headquartered in Redlands, Esri is a world leader in GIS software. Founded by Jack and Laura Dangermond in 1969, Esri now has 10 regional offices in the U.S. and a network of 80 international distributors, with about a million users in 200 countries. (<i>Website</i>)	R	-117.195688	34.056932	https://googledrive.com/host/20bwLwen7VgUEdW5uemtieDJ053c/Esri.JPG	https://googledrive.com/host/20bwLwen7VgUEMUk4UU2IXQ2d6YWM/esri.png

The first row of your spreadsheet provides the header. Below that, each row contains one tour point. For each point, the Map Tour template expects the following fields:

- **Name:** A short name identifying the point.
- **Caption:** A description of the point. Keep it short (less than 350 characters is recommended). The caption can include HTML tags to format the text or provide hyperlinks.
- **URL:** The full web address for the full-size image or video, starting with **http://,** **https://,** or //. The recommended image size is 1000 × 750 pixels, but other sizes will also work.
  - For videos: The template does not include a generic video player. Instead, use the URL that a video hosting service, such as YouTube, provides for embedding videos via link. Make sure to append **#isVideo** to the end of the URL (for example, http://www.youtube.com/embed/RM0eMdrPhEA**#isVideo**).
  - To use photos or videos on your computer, you must first upload them to some form of online storage, such as Flickr, Picasa, Facebook, Google Drive, Microsoft SkyDrive, YouTube, or your own web server.
  - If you have not yet collected your own images and videos, you can search for media through search engines and then copy their URLs.

- For images: Right-click an image. Select Image Location in Firefox or Copy Image URL in Chrome. For Internet Explorer, select Properties and then copy the image address URL.
- For YouTube videos: right-click the video being played, click Copy Embed Code, paste the code into Notepad, find the URL in the code, and append **#isVideo** to the end of the URL.
- **Thumb_URL:** the full web address of the thumbnail image (starting with **http://, https://,** or //). Images can fit to scale, but the recommended image size is 200 × 133 pixels.
- **Geographic Location:** specify longitude and latitude as **Long** and **Lat** (in decimal degrees); a single **Address** field containing a complete street address; or multiple fields (such as **Address, City, State,** and **ZIP**). This tutorial uses Long and Lat.
- **Icon_color (optional):** The color of each point. The valid values—R, G, B, and P— indicate red, green, blue, and purple, respectively.

You will often need to find a point's latitude and longitude. For example, the last POI in the CSV dataset, **Market Night**, is missing both longitude and latitude. Next, find these coordinates using the ArcGIS Online map viewer.

3. **Open a web browser, navigate to ArcGIS Online, and sign in.**

Familiarize yourself with the ArcGIS Online main menu bar links:
- **Gallery** leads to featured maps and apps.
- **Map** goes to the ArcGIS Online map viewer.
- **Groups** takes users to the My Groups page where you can create and join groups.
- **My Content** links to the My Content page, where users can view, add, and delete content items. Look at the upper-right portion of the main page. There, the **Search** box and button allow you to search for content in the ArcGIS Online catalog.

4. **Click the Map button to open the ArcGIS Online map viewer.**

If you know where this missing POI is, navigate there directly on the map. Here, you will use geocoding. Redlands Market Night takes place downtown at the intersection of Orange and East State Streets.
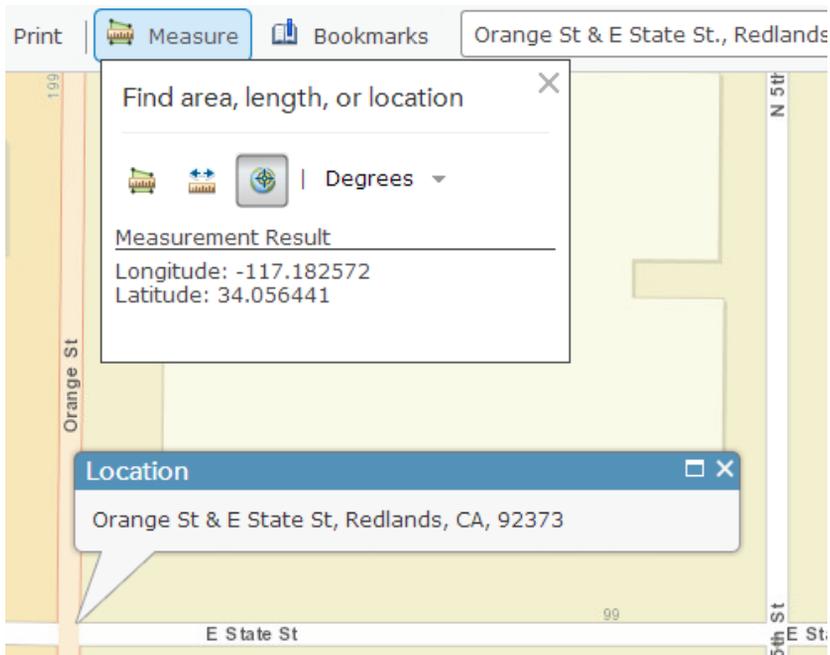
5. **Type Orange St & E State St., Redlands, CA in the place search text box and then press Enter or click the Search button.**

The address appears, and the map zooms there.
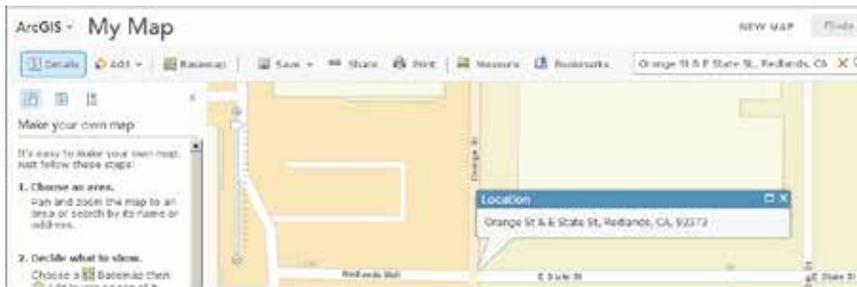
6. On the menu bar, click the **Measure** button ⬛, next click the **Location** icon ⬛, and then click on the map near the pointer of the callout box.

The location's longitude and latitude displays under **Measurement Result**.

7. Copy the longitude and latitude values you retrieved in step 6, and paste them to the **Market Night** row in the CSV file.

8. In Excel, save the CSV.

Your data is now complete.

1.3   Create a web map

Make sure you sign in before continuing with the remaining steps. Otherwise, you will not be able to save your web map and may lose your work.

1.   **In a web browser, navigate to ArcGIS Online, the home page of ArcGIS Online for your organization (usually in the format of http://www.organization_name .maps.arcgis.com), or the home page of your Portal for ArcGIS, depending on what you are using.**

2.   **Click the Map button to go to the ArcGIS Online map viewer, and familiarize yourself with the menu bar.**

The ArcGIS Online map viewer helps users create, customize, and view web maps. Look at the buttons on the menu bar:
- The **Details** button ▤ toggles the panel on the left side of the map canvas. This panel can display a map's metadata, table of contents (TOC), or legend.
- The **Add** button ✚ is used to create a variety of layers in the map.
- The **Basemap** button ▤▤ displays a gallery that users can choose from.
- The **Save** button 💾 allows you to save your web map.
- The **Share** button 🔗 lets you select the people who will have access to your web map and choose how you will share it, either by embedding the map in a webpage or by creating a web app from a template.
- The **Print** button 🖨 creates a hard copy of the current map view.
- The **Measure** button 📏 helps determine distances, areas, and a location's longitude and latitude.
- **The Bookmarks** button 📖 allows you to save a list of map extents so that you can quickly select one and zoom to its extent.
- In the **Find address or place** text box, users can specify an address or place and find its location on the map viewer.

3. Add the CSV file to the map viewer.

If you are using a web browser that supports the drag-and-drop operation (such as Chrome, Firefox, or Internet Explorer 10+), simply drag the CSV file to the map canvas.
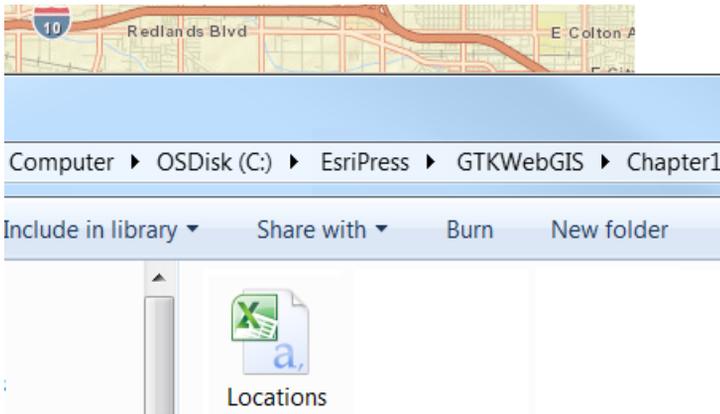
For all browsers, click the **Add** button on the menu bar, click **Add Layer from File**, locate the CSV file on your computer, and click the **Import Layer** button.
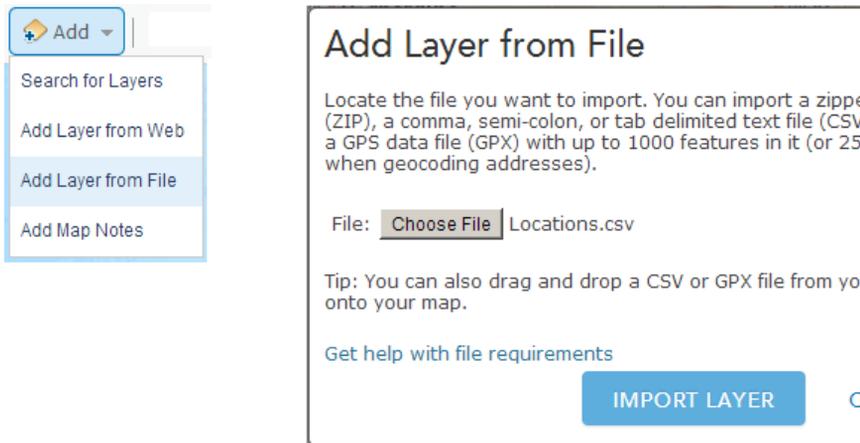
The map viewer displays your CSV automatically.

4.   Zoom the map to an extent that includes all the points.

This provides users with a big picture of all POI locations. Save your web map so that you can use it as the initial extent of your web app.
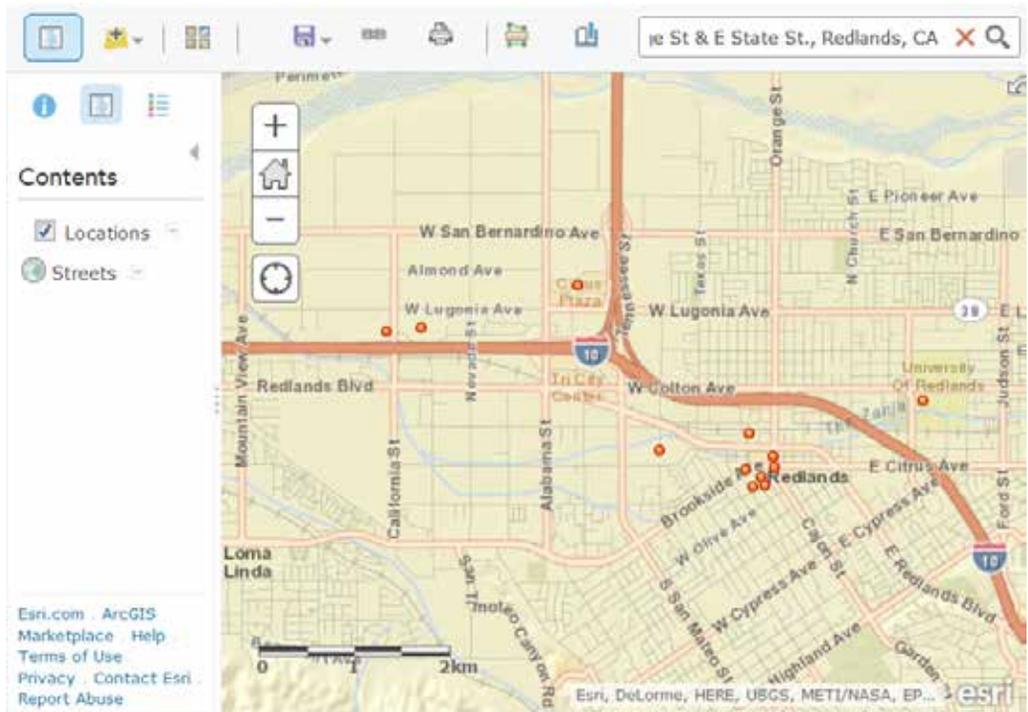

5.   On the menu bar, click the Save button 🖫 and click Save.

6.   In the Save Map dialog box, enter the title, tags, and summary of your web map. Now click the Save Map button.

Tip:

- For your homework, include your name in the title so that you and your instructor can easily find your web map.

Save Map

Title:	Redlands City Tour (your name)	
Tags:	Redlands ✕ map tour ✕ Getting to know Web GIS ✕	
	Add tag(s)	
Summary:	Main points of interests in the City of Redlands	
Save in folder:	pinde8	▾

SAVE MAP   CANCEL

Congratulations! You have created a simple web map.

Typically, users need to configure pop-up windows, and sometimes change symbols, on map layers. You will learn these skills in chapter 2. For now, in this tutorial, the Map Tour template automatically handles the symbols of your layer, so do not make any of these changes.

1.4   Create a web app using a template

This step will transform your web map into a web app using an ArcGIS Online Map Tour template.

1. **Keep the tutorial web map open. From the map viewer, click the Share button on the menu bar, which opens the Share window.**

ArcGIS ▾ Redlands City Tour (Pinde)

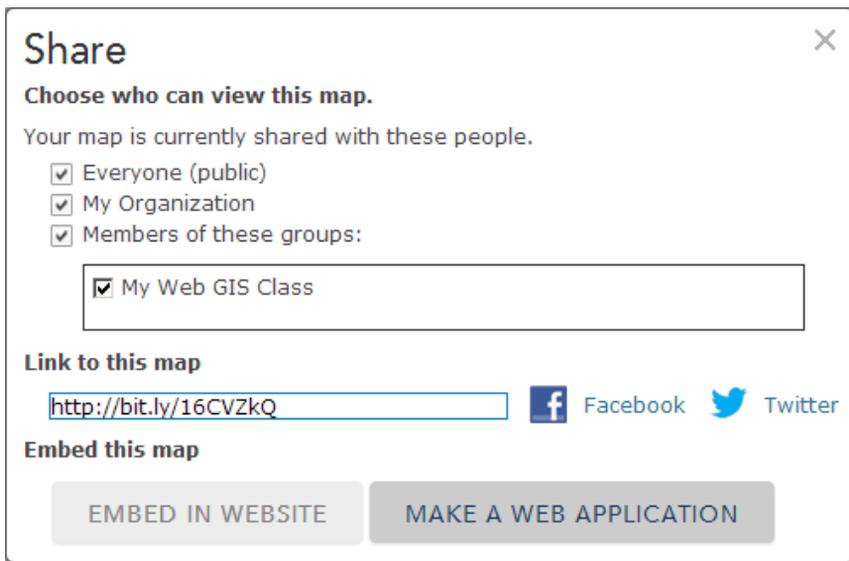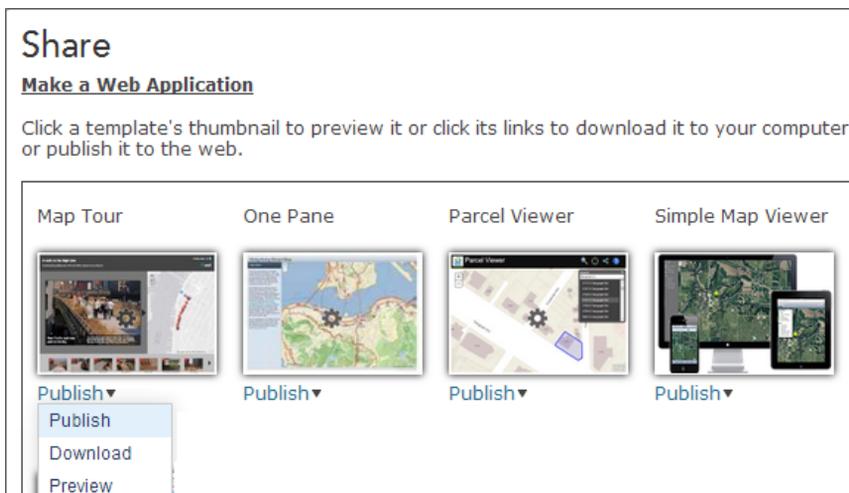📄 Details   ➕ Add ▾ | 🗺 Basemap | 💾 Save ▾   🔗 Share   🖨 Print | 📐 Measure
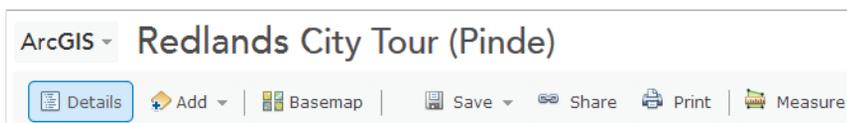
2. In the **Share** window, select the check box(es) next to the organization and/or group(s) with which you would like to share your web map or click **Everyone (public). Click the Make a Web Application** button.

Share ✕

Choose who can view this map.

Your map is currently shared with these people.

☑ Everyone (public)
☑ My Organization
☑ Members of these groups:

☑ My Web GIS Class

Link to this map

http://bit.ly/16CVZkQ   ⨍ Facebook   🐦 Twitter

Embed this map

| EMBED IN WEBSITE | MAKE A WEB APPLICATION |

📝 **Note:** unless you share your web map with everyone, a prompt will ask users to log in whenever they open your web map and any web app that uses this map.

3. Browse the web app templates for the **Map Tour** template. Once there, click the **Publish** drop-down arrow and click **Publish.**

Share
Make a Web Application

Click a template's thumbnail to preview it or click its links to download it to your computer or publish it to the web.

Map Tour	One Pane	Parcel Viewer	Simple Map Viewer

Publish▾   Publish▾   Publish▾   Publish▾
Publish
Download
Preview

4.   **Provide the appropriate title, tags, and summary information and then click the Save & Publish button.**

Share   ✕

Make a Web Application

Fill in the information below to save and publish your web application. View the item details of this web mapping application to see the URL to the application.

Title:	Redlands City Tour (Pinde)
Tags:	Redlands ✕ map tour ✕ Getting to know Web GIS ✕ Add tag(s)
Summary:	Main points of interests in the City of Redlands
Save in folder:	pinde.webgis ▼

< Back   **SAVE & PUBLISH**   CLOSE

5.   **Click the View Item button to go to the app's item details page.**

Share   ✕

Make a Web Application

You have successfully published your web application. Here are a few things to do before other people can use it.

Share your application - The application is only viewable by you until you share it with others. Just like you shared the web map this application references, you need to share this application as well. Typically, you'll share it with the same people you shared the web map with.

Configure your application - If the application can be configured, select the 'Configure App' button on the item details page to change how the application looks and works.

You can go to the item now to share and configure your application or click Close below to return to the map.

VIEW ITEM   CLOSE

6.   Familiarize yourself with the item details page.

The item details page displays information about the contents of an ArcGIS Online item (here, your web app): title, summary, thumbnail, description, owner, ratings and comments, last modified date, access and use constraints, size, credits, tags, and extent.

The menu bar on the item details page includes the following buttons:

- **Open** provides a list of different ways to view these contents for web maps, web apps, and hosted services.
- **Share** enables control over access to items.
- **Edit** lets you edit the metadata or properties of this item.
- **Delete** lets you remove items from ArcGIS Online.
- **Move** allows you to move an item to a different folder under your content root folder.
- **Attach Code** allows you to attach code (such as a ZIP File) to your web mapping and mobile applications. This is helpful if you are sharing a sample or a configurable application and want others to have access to your code.
- **Configure App** enables configuration of the functions, and sometimes the content, of a web app.

Now change the app's thumbnail into something more meaningful to you.

7.   Click the Edit button.

8.   Click the thumbnail, and navigate to **C:\EsriPress\GTKWebGIS\Chapter1\
      map_tour_thumbnail.jpg**. Click OK and then click **Save.**

You are directed to the item details page after the change is saved. Now your thumbnail has
a more intuitive look.

9.   Click the thumbnail to view your web app.

Alternatively, click the **Open** arrow and then click **View Application**.

10.   **Spend a few minutes exploring your new web app.**

Navigate through the app's tour points by clicking the thumbnails, the arrows next to the photos, or the numeric icons on the map. Click, for example, the thumbnail for the University of Redlands, and a video introducing the university appears.

Now you have created your own informative and easy-to-use web app. Keep your web app open if you are going directly to the next section.

1.5   Configure your web app

Once you have determined that your app's tour points and their order, captions, and descriptions are correct, your app is complete. Optionally, you can further enhance your application's features by using the template's builder mode. In this mode, you can add or import new tour points; update and delete existing images; set or update locations and descriptions; update the app title, subtitle, and logo; and change the app layout.

1.   Continuing from section 1.4, click the **Switch to builder mode** button.

The **Switch to builder mode** button restricts access to the application owner.

Alternatively, click the **Configure App** button on the details page of this web app.

2.   Familiarize yourself with the builder mode.
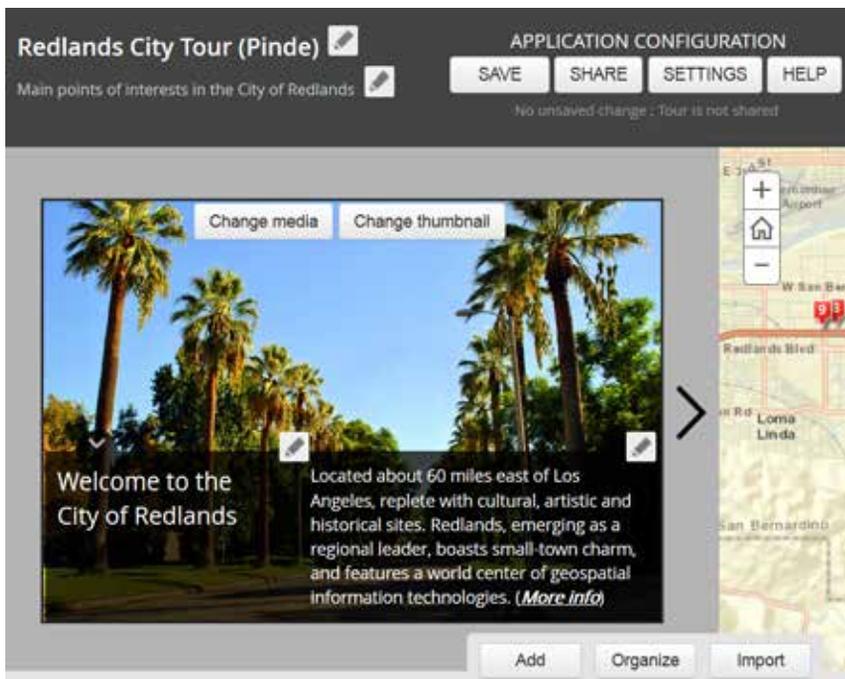
- The **pencil** icon ✎ means that you can update nearby text, such as titles, subtitles, image captions, and descriptions.
- The **Change media** and **Change thumbnail** buttons can be used to change the URLs of media and thumbnail locations.
- The **Add**, **Organize**, and **Import** buttons allow you to interactively add more locations, change the order of points, and import photos from Flickr, Picasa, Facebook, or a CSV file.

Now change the Esri photo into a video.

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3. Click the Esri thumbnail image. Click **Change media** and then click **Video**. For the URL, enter **http://www.youtube.com/embed/RM0eMdrPhEA#isVideo**, and click **Apply.**
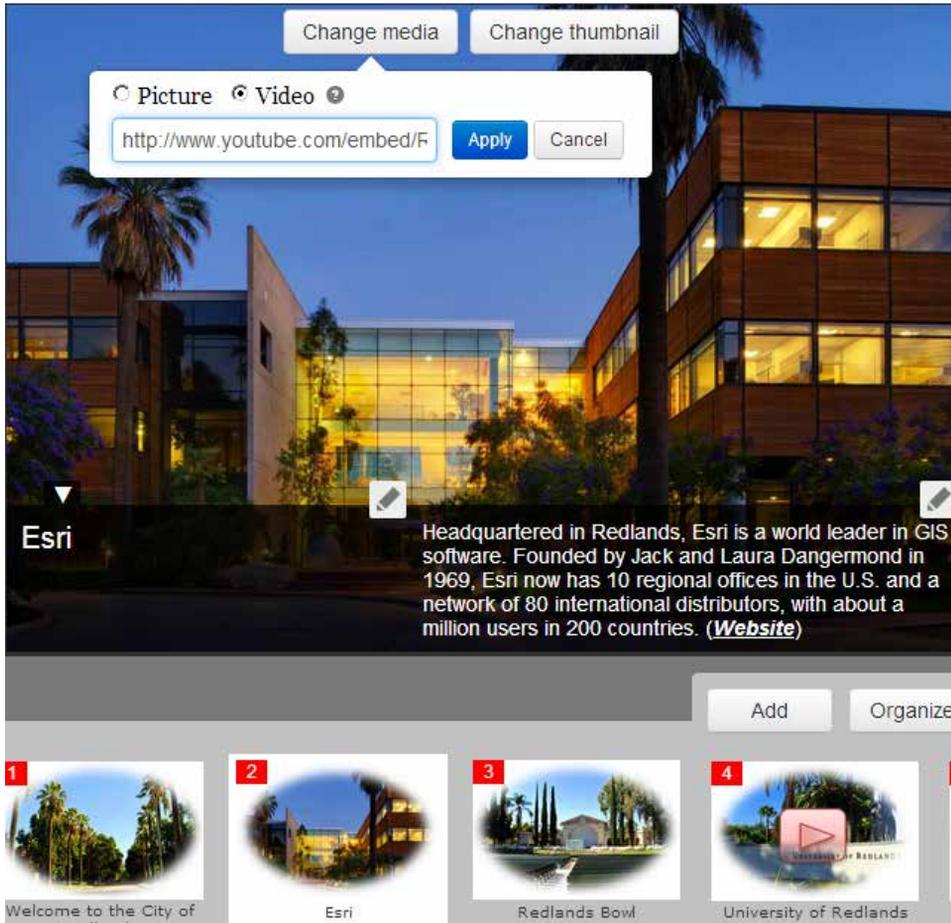
The video loads into the picture frame.

Next, change the thumbnail for Esri to a new one that indicates a video.

4.   Click the **Change thumbnail** button. Specify the URL as **http://bit.ly/1nvc2PU** (short URL equivalent to http://esrimapbook.esri.com/GTKwebgis/chapter1 /thumbnails/esri_v.png), and then click **Apply.**

5.   Click **Save** to save your changes.
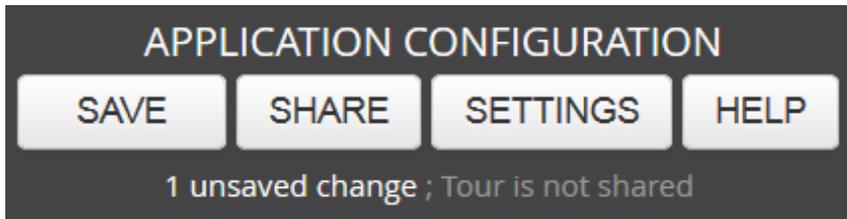
In the following steps, save your work regularly to prevent losing your changes.

6.   Above the thumbnail carousel, click the **Organize** button.
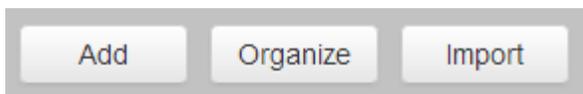
The **Organize the tour** window allows you to delete tour points and drag pictures to change their order.

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7.   Select the check box for **Use the first point as introduction (does not appear in carousel)**. Click **Apply** to close the **Organize the tour** window.
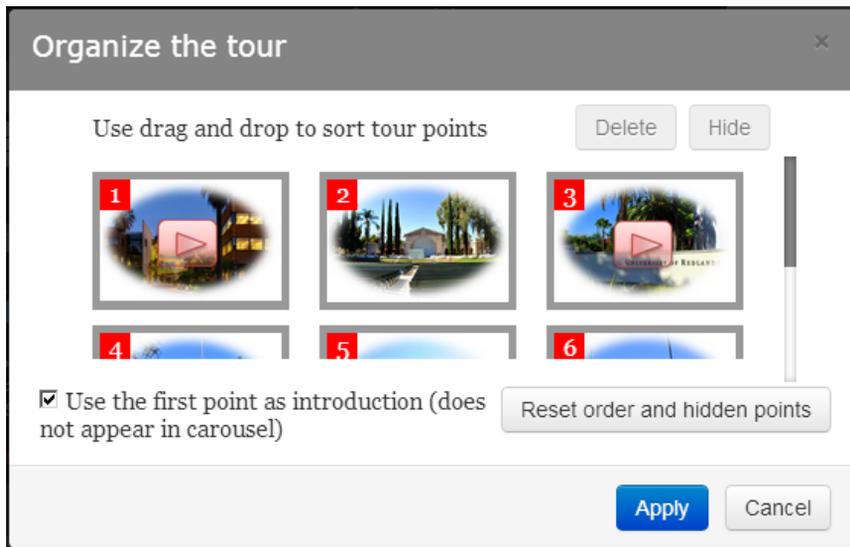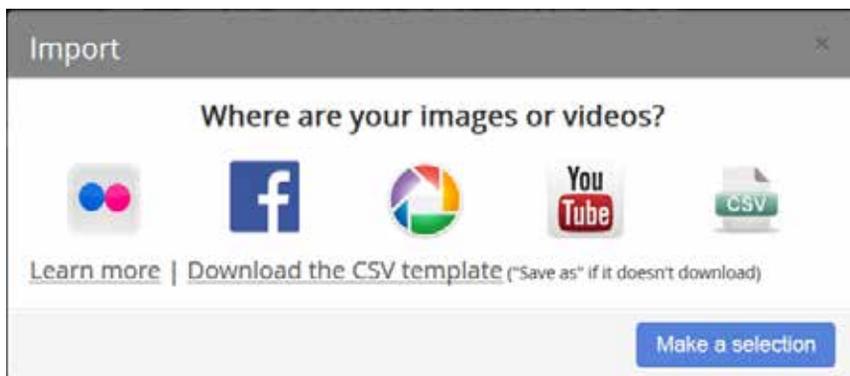

Optionally, import tour points and media from Flickr, Facebook, Picasa, YouTube, or an additional CSV file. Follow steps 8 through 12 in this tutorial to import a photo from Flickr.

8.   Click the **Import** button.
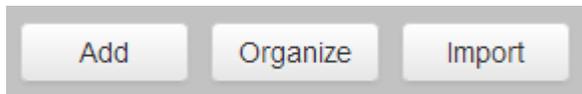
9.   Click the **Flickr** icon in the **Import** window.

10.   Type **web_GIS** as the Flickr user name, click the **Look up** button, select **MapTour** from the **Select a Photo Set** box, and then click **Import.**

11.   Click the **Located** tab.

The set contains one photo, which is already geotagged in Flickr. Flickr and similar websites can extract location information from the EXIF (exchangeable image file format) metadata in photos taken by GPS-enabled cameras, such as smartphones. These websites also allow users to specify photo locations manually, using maps.

12.   Click **Import** to import this photo.

The City Hall photo is now added to your web app. The photo name and caption are also imported from Flickr.
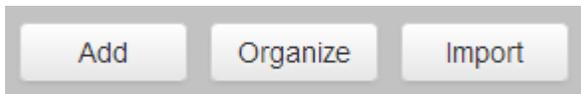

13. As an alternative, click the **Add** button to add a point manually.

14. In the **Add a new tour point** window, add a new tour point manually; input its media URL, name, and caption; and specify its location on the map interactively.
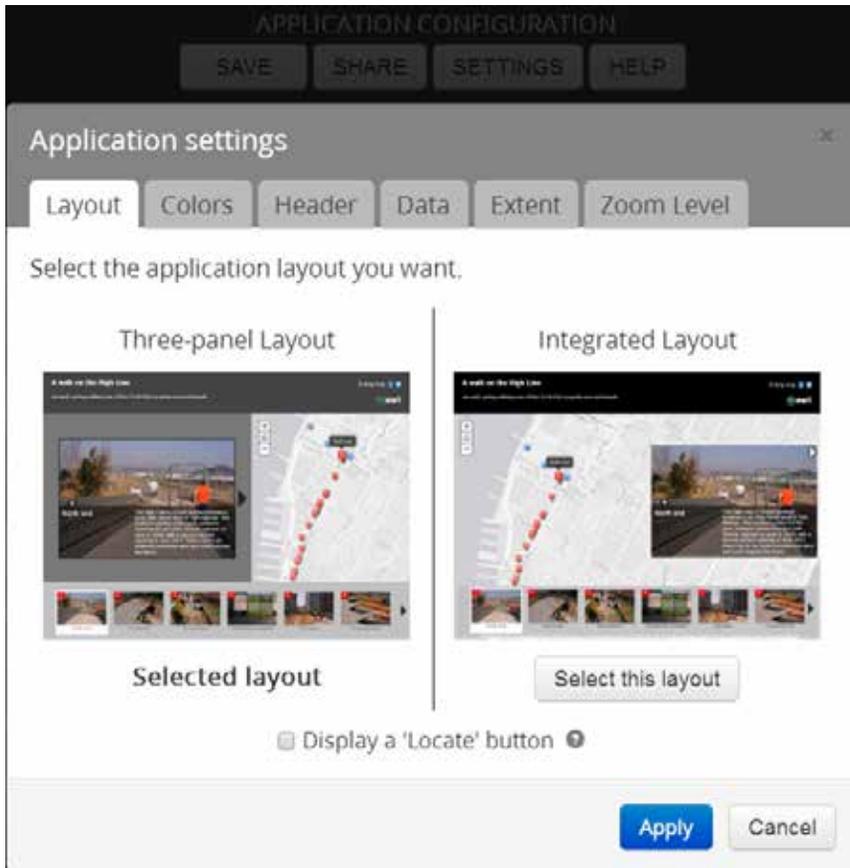
15. Add a point if necessary. Otherwise, click the **Cancel** button to close the window.

16.   In the page header, click the **Settings** button.

This brings up the **Application settings** window. It has several tabs:

- **Layout**: choose between **Three-panel Layout** and **Integrated Layout.**
- **Colors:** choose from predefined color themes, or define your own theme.
- **Header**: set the header logo and share links.
- **Data:** if the CSV data added to your web map does not contain the fields required in chapter 1, section 1.2, select which fields to use for the photo name, caption, and color fields.
- **Extent**: define the initial map extent that users will see when the app first opens.
- **Zoom Level**: specify a scale to which the map will automatically zoom whenever the app user goes from one tour point to another (but if users manually zoom in or out, the map tour app respects their choice and no longer applies your auto zoom level).

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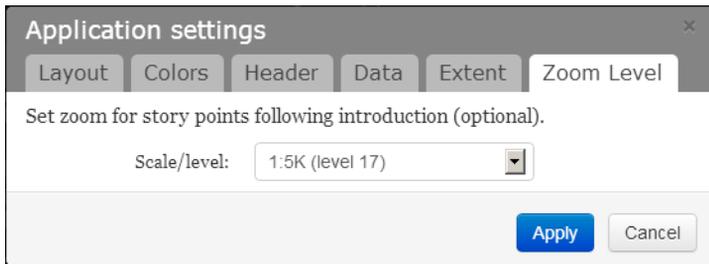**17.**   Click the **Zoom Level** tab, and set the **Scale/level** as illustrated.

This scale allows users to see the selected POI and its adjacent area.

18.   Click the **Header** tab, change the text if needed, and then click **Apply**.

For example, add your name to the header so that your instructor can easily tell who created your application. Optionally, you can also exchange the logo for your organization's logo.
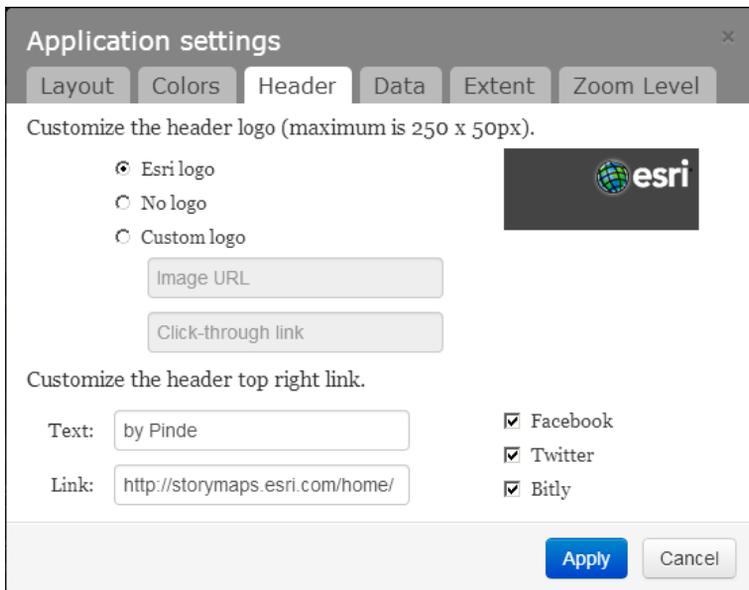
Examine the application to see if there is anything else you would like to configure. If so, make further changes.

19.   In the page header, click the **Save** button to save your work.

Keep your web app open if you are going directly to the next section.

1.6   Share your web app

You have created a web app, but you are the only one who can see it. Share it with others so that they can see your web app, too.

1. Continuing from section 1.5, click the **Share** button in the page header and then click the **Share publicly** button.

2. Click the **Open** button to preview your web app.

3. Share the tour URL with your audience, and submit it to your instructor.
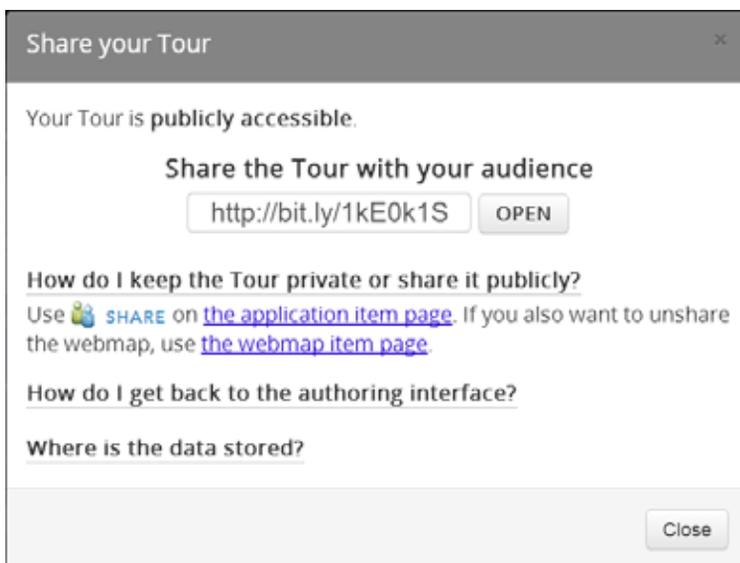
If you do not want to share your tour publicly, share it only with your organization or group(s).

To do this, go to the web app's details page, click the **Share** button, select your organization and/or group(s), and then click **OK**.

4.   Test your web app on smart mobile devices.

Type your app's web address into a mobile browser. To do this easily, send the URL in an e-mail to your e-mail address and then click the message link in your inbox.

ArcGIS Online templates use responsive web design technologies and can change their layouts to best fit various screen sizes. They work well on iOS, Android, and Windows Phone tablets and phones.

In this tutorial, you have created a user-friendly, informative, and cross-platform web app. It meets all the requirements listed early in this chapter—it displays a basemap and POI locations, their descriptions, and any photos or videos; it is engaging and easy to use; it works on desktops, tablets, and smartphones, using the ArcGIS Online cloud platform; and it did not require a single line of programming.

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Q U E S T I O N S   A N D   A N S W E R S

1. **After I uploaded my CSV to the ArcGIS Online map viewer, I updated my CSV. Will the changes to my CSV automatically update in my web map and web app?**

   Answer: No.

   Once CSV data has been added to the map viewer and saved with your web map, it uploads to the Amazon EC2 cloud, the cloud-computing platform for ArcGIS Online. Your web map and web app will use this copy of the data, rather than your local data.

   To use your new CSV data, remove the previous CSV data layer from your web map and replace it with the new CSV. Then save your web map.

   As an alternative, use a feature service (see chapter 5) as the data layer instead of a CSV. When someone edits the data, the updates will automatically appear in your map tour app during the editing process.

2. **In my map tour application, I would like to add a line layer to show the path of my tour. How do I do this?**

   Answer: There are a few ways to do this.

   - If you hold the data in a shapefile, add it to your web map and configure its symbol using the ArcGIS Online map viewer (see chapter 2).

   - If the data is in a geodatabase, create a map document file (MXD), publish it as a web service, and then add it to your web map (see chapter 3).

   - If you do not have the tour path data, simply create it using a Map Notes layer. To do this, open your web map in the ArcGIS Online map viewer, click the **Add** button, click **Add Map Notes**, give your layer a name—such as "Tour Path"—choose a **template**, and click the **Create** button. Choose a line symbol you like from the template on the left and then apply your cursor on the map to draw your tour path.
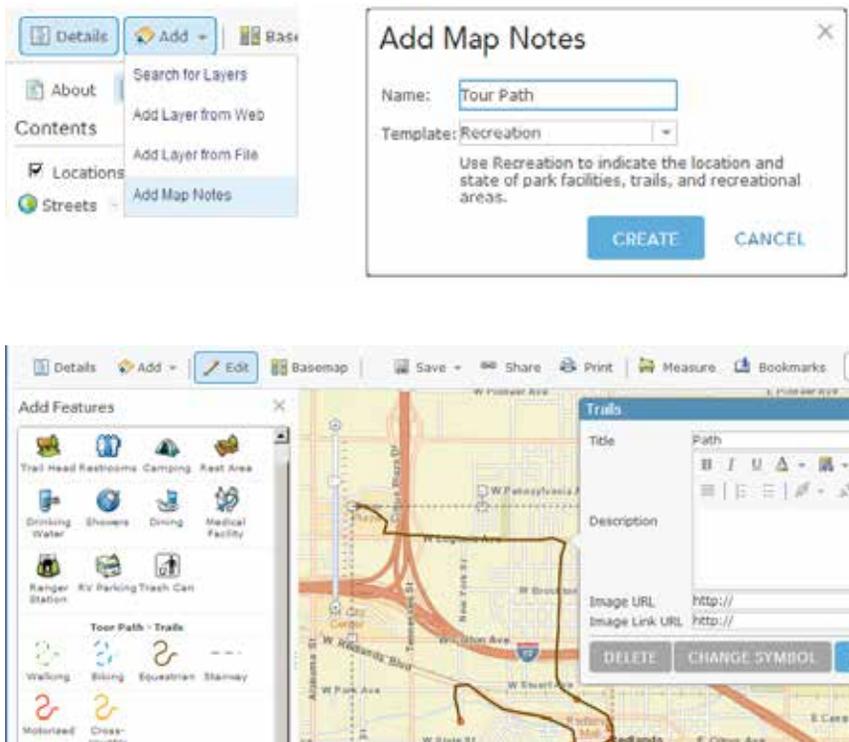
3. **What is the maximum number of tour points I can have?**

    Answer: Ninety-nine points for the hosted version.

    Most map tours will contain far fewer than the maximum 99 points per tour in the template. However, you can download the template source code, change the configuration to overwrite this limit, and host the web app on your own web server.

4. **I found it slow work to locate longitudes and latitudes manually, one by one. Is there a more efficient way to define the locations of my points?**

    Answer: Use addresses or feature classes if you have them.

    In your CSV, specify the addresses of your points in one or multiple address fields (such as **Address, City, State,** and **ZIP**). When you add this to the ArcGIS Online map viewer, ArcGIS Online will geocode these addresses and find their locations automatically (see chapter 2).

If you have your map points in a shapefile, a map, or a feature service, you do not need to create a dataset in CSV format. Add the shapefile or service to your web map directly. The next few chapters will show how to do this.

A S S I G N M E N T S

Assignment 1: Choose from the following topics, and create a map tour web app to showcase.

- Your personal story (where you were born, where you moved, where you went to school or worked, etc.)
- Your city's key attractions
- Your campus's landmarks, buildings, and departments
- Places you have visited, in the past or during a recent vacation
- Branches of a bank or supermarket in your city or region
- Projects that your organization has accomplished or is working on
- Other interests

What to submit: e-mail your web app URL to your instructor, with the subject line **Web GIS Assignment 1: Your name.**

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Resources

ArcGIS Online Help document site
Short videos, http://resources.arcgis.com/en/help/arcgisonline/index.html#/Videos/010q00000003000000.

Esri blogs
"Using GPS Data in ArcGIS Online Web Maps," by Bern Szukalski, http://blogs.esri.com/esri
    /arcgis/2013/08/13/using-gps-data-in-arcgis-online-web-maps.
"Using Flickr Photos in the Hosted Map Tour Story Map," by Bern Szukalski, http://blogs.esri.com
    /esri/arcgis/2013/07/26/using-flickr-photos-in-map-tour-story-maps.
"Adding Websites to Your Story Map Map Tours," by Bern Szukalski, http://blogs.esri.com/esri
    /arcgis/2014/01/21/adding-websites-to-your-story-map-map-tours.

ArcNews and ArcWatch
Intelligent Web Maps and ArcGIS Online, www.esri.com/news/arcnews/summer11articles
    /intelligent-web-maps-and-arcgis-online.html.
"Make a Map Tour Story Map," by Rupert Essinger, www.esri.com/esri-news/arcwatch/0513
    /make-a-map-tour-story-map.

Esri videos
"Every Map Tells a Story: How GIS Brings Maps to Life," by Allen Carroll, Bern Szukalski, and Rupert
    Essinger, http://video.esri.com/watch/2427/every-map-tells-a-story-how-gis-brings-maps-to-life.