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

This chapter introduces the concept of web GIS with the Esri web GIS platform. It begins with an overview of web GIS, cloud GIS, and ArcGIS Online and then demonstrates a quick and easy way to build web GIS apps using the Story Map Tour configurable app. This chapter familiarizes you with ArcGIS Online basic operations and workflows and introduces flexible ways to build web GIS apps that you will learn in other chapters.

**Learning objectives**

- Grasp the basics of the new generation web GIS platform.
- Understand the different approaches for building web GIS apps.
- Learn the ArcGIS Online workflow for creating web apps.
- Work with GIS data in comma-separated value (CSV) files.
- Create and share web maps and web apps.
- Use the Story Map Tour configurable app.
What is web GIS?

Web GIS is the combination of the web and GIS. The web removes the constraint of distance in cyberspace and thus allows people the freedom to interact with GIS apps globally and access information almost instantly. Web GIS uses web technologies, including but not limited to Hypertext Transfer Protocol (HTTP), Hypertext Markup Language (HTML), uniform resource locator (URL), JavaScript, and WebSocket.

The first operational GIS was developed in the 1960s by Roger Tomlinson. Since then, GIS has continuously evolved from a local file-based single computer system to a central database-based client/server system, often with multiple servers and many more client computers. The invention of the Internet in the late 1960s and the World Wide Web in the early 1990s laid the foundation for an evolutionary leap toward web GIS. In 1993, the Xerox Corporation Palo Alto Research Center (PARC) developed a mapping web page, which marked the origin of web GIS. In the 2000s, web GIS evolved into a new generation—a system of distributed web services you can access in the cloud, as represented by the Esri ArcGIS platform.

Inheriting the power of the Internet and the web, web GIS offers many advantages:

- **Global reach:** You can share your geographic information easily within your organization and with people all over the world.
- **Large number of users:** You can share your app with dozens, or even millions, of users supported by the scalable cloud technology.
- **Low cost per user:** The cost of building one web GIS app is often less than the cost of building a standalone 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 browsers 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.
Web GIS presents a pattern for delivering GIS capabilities. Web GIS enables all members of an organization to easily access and use geographic information within a collaborative environment. GIS professionals working on the desktop create and share information to the web GIS and extend geospatial intelligence to broad users across organizations and throughout communities.

Web GIS unlocks and delivers the power of geospatial intelligence to offices and homes and puts technology in the hands of billions of people. Web GIS demonstrates immense value to government, business, science, and daily life. In recent years, the concept and importance of spatial location have become more mainstream, and web GIS awareness is increasingly prominent in many organizations.

- **For government**, web GIS offers an ideal channel for sharing public information services and delivering open data, 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.

**ArcGIS is a web GIS platform**

Web GIS is central to the strategic direction of Esri in implementing GIS as a platform. ArcGIS represents a cutting-edge and complete web GIS platform that enables every employee and contractor to easily discover, use, make, and share maps from any device, anywhere, anytime.
ArcGIS is a new-generation web GIS platform that provides mapping, analysis, data management, and collaboration.

- At the center of this web GIS pattern is a portal, either ArcGIS Online or Portal for ArcGIS, which represents a gateway for accessing all spatial products in an organization. The portal helps organize, secure, and facilitate access to geographic information products.
- Client applications on desktops, web apps, tablets, and smartphones interact with the portal to search, discover, and access maps and other spatial content.
- In the back-office infrastructure, the portal is powered by two components: GIS servers and ready-to-use content.

**Web GIS deployment models**

The ArcGIS web GIS platform offers three deployment models:

- **ArcGIS Online**, the cloud-based offering, in which all components are hosted in the cloud. There is no hardware infrastructure for an organization to maintain because Esri manages and maintains ArcGIS Online.
- **Portal for ArcGIS**, the on-premises model, in which an organization manages the hardware and software infrastructure to operate the ArcGIS platform.
- **Hybrid deployment**, which combines parts of the cloud-based model with parts of the on-premises model. Hybrid deployment is by far the most common web GIS deployment pattern. Details of such a model depend on an organization’s business workflows and security requirements.
**Paths to building web GIS applications**

*Getting to Know Web GIS, second edition,* teaches you 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 apps. The green line in the figure highlights the technology taught in this chapter.

- The data tier (on the left side of the figure) contains formats that range from simple CSV files managed with Microsoft Excel to sophisticated geodatabases managed with enterprise databases. These formats enable you to create a map, toolbox, and 3D scene in ArcGIS for Desktop software, including ArcGIS Pro.
- Using the tools in the middle tier of the figure, you can publish desktop resources to ArcGIS Online as various types of web services. You can then add those web services to ArcGIS Online to create web maps. Organizations that do not want to place their resources in the public cloud can use ArcGIS for Server and Portal for ArcGIS, a form of ArcGIS Online (with some differences) used in a private cloud.
- Options for the presentation (or 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 application programming interfaces (APIs) or software development kits (SDKs) to meet special requirements.
Start with ArcGIS Online

Cloud computing is an important research area and technology trend. Cloud computing 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 cloud computing technology to enhance GIS capabilities that help users lower costs, reduce complexity, and quicken scalability.

ArcGIS Online (www.arcgis.com) is a cloud GIS. The technology is an online, collaborative web GIS deployed in the cloud. With ArcGIS Online, you can use and create web maps (2D) and scenes; access ready-to-use maps, layers, and analytics; publish data as web layers; collaborate and share maps; access maps from any device; make maps from your data; customize the ArcGIS Online website; and view status reports. You can also use ArcGIS Online as a platform to build web apps. ArcGIS Online provides the following services:

- **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. In this perspective, you would use the ArcGIS Online infrastructure, such as storage, CPU, and bandwidth.
- **Platform as a Service (PaaS):** You can build web GIS apps without programming by using configurable apps or with programming by using ArcGIS web APIs and ArcGIS Runtime SDKs. In this perspective, you would use ArcGIS Online as a development platform for creating apps.
- **Software as a Service (SaaS):** You can use the rich collection of basemaps, the analytical capabilities of thematic layers, and the countless and ever-increasing number of apps that are hosted in ArcGIS Online and published by Esri and its user communities. These capabilities are provided as a service from the cloud.

Adoption of ArcGIS Online and its quality of service

Before organizations add cloud GIS to their enterprise architecture, they first must assess the quality of services (QoS) of the cloud GIS. The following main factors represent QoS:

- **Performance:** How efficiently the system responds to user requests, usually measured in response time
- **Scalability:** The ability to support a growing number of users without dramatically reducing performance
- **Availability:** A measure of how often a system is accessible to end users, often measured in the percentage of time—for example, 99.99 percent
- **Security:** The ability to provide confidentiality and secure access by authenticating the parties involved, encrypting messages, and providing access control

ArcGIS Online provides reliable and trustworthy services in these four areas of QoS. Enabled by a large number of servers in the cloud and the use of high-performance computing technologies, ArcGIS Online hosts millions of map layers and serves hundred millions of visitors. It responds to
tens of thousands of requests per second with fast performance, high scalability and availability. You can monitor ArcGIS Online availability in its health dashboard (status.arcgis.com). ArcGIS Online follows a robust and effective framework to enforce security and protect user privacy. ArcGIS Online is certified as compliant with many federal and international security and privacy standards (see more information at http://doc.arcgis.com/en/trust/compliance/compliance-tab-intro.htm). Partly because ArcGIS Online provides a high QoS level, the technology has been quickly adopted by numerous government and commercial organizations around the world, from local to national governments as well as oil and gas corporations, educational institutions, healthcare organizations, and law enforcement agencies.

**ArcGIS Online and Portal for ArcGIS information-sharing model**

The elements of the ArcGIS Online and Portal for ArcGIS information-sharing model include users, groups, content, and tags.

- Users can create and join groups.
- Users sign in to create and share content items, which can be a large variety of data, layers, and web maps and apps.
- Content items have tags, which are indexed so that users can search and discover items more efficiently.
- Users can keep information to themselves, share with certain groups (not with individual users), share to their organizations, or share with everyone—the public. Sharing allows other users to see and access the shared items. ArcGIS supports a variety of sharing levels.
ArcGIS Online sharing levels. You can share your items with certain groups, your organization, or everyone.

**Types of ArcGIS Online user accounts**

Anonymous users can access the contents and apps shared with the public in ArcGIS Online as long as an organization has enabled anonymous access. However, you must have an account with ArcGIS Online to save your work and create web apps. Two main types of user accounts are provided:

- **Public accounts:** An ArcGIS Online public account is a personal account with limited usage and capabilities. You can create a public account at ArcGIS Online. 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, users with public accounts cannot publish hosted services or access many ArcGIS analytical functions. Public accounts are for personal use only.
• **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 the 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:** The ArcGIS Online administrator can define a custom role with specialized permissions (for example, view-only).

![ArcGIS Online user types diagram]

**Main types of content items in ArcGIS Online and Portal for ArcGIS**

Five main types of content in ArcGIS Online—data, layers, web maps, tools, and web apps—relate closely to this book’s main goal: learning how to build web GIS apps.
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 file, a shapefile, or a web service.

- **Data**: ArcGIS Online supports data in a variety of formats, including CSV, TXT, shapefile, GPS Exchange Format (GPX), and geodatabase.
- **Layers**: ArcGIS Online can host layers, including the data, and can reference layers, including GeoRSS, map services, feature services, image services, Keyhole Markup Language (KML), and the Web Map Service (WMS) standard defined by the Open Geospatial Consortium (OGC).
- **Web maps and scenes**: These maps interactively display geographic information that you can use to answer questions. A web map or scene (the 3D counterpart to a web map) comprises or references multiple layers.
- **Tools**: App tools perform analytical functions, such as geocoding, routing, generating PDFs, summarizing data, finding hotspots, and analyzing proximity.
- **Web apps**: These apps are 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 configurable apps 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 created based on comparison analysis (side by side) and swipe configurable app templates.
Steps to creating web GIS apps

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

1. Define the objectives of your information product.
2. Search for data layers in ArcGIS Online, and/or add your own data to ArcGIS Online.
   - For simple forms and small sizes, add data directly through the map viewer.
   - Otherwise, publish data, maps, and toolboxes as web services or web layers, and add them to your web map.
3. 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-ups.
   - Save and share your web map.
4. Create and share your web app.
   - Browse the configurable apps to find one that best suits your needs, and then use it to transform your web map into a web app. If no configurable app meets your requirements, use ArcGIS web APIs or Runtime SDKs to create your own app. After the app is created, your app is private. You need to share it for others to search, discover, and use. ArcGIS Online has different sharing levels.

ArcGIS Online allows users to easily create web maps by assembling various formats of layers and to create web apps from web maps by applying configurable app templates.

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 http://esripress.esri.com/bookresources. To get the data, navigate to the webpage, find the title, Getting to Know Web GIS, second edition,
download the sample data, and extract the files to **C:\EsriPress** on your computer, 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.
- The web app should be engaging and easy to use.
- The web app should work on desktops, tablets, and smartphones.

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

The Story Map Tour configurable app working in a desktop browser (left) and on a smartphone.

The Story Map Tour configurable app 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. The template is designed for use in web browsers on desktops, smartphones, and tablets.

This template benefits the following scenarios:
- Show the world the work your government department, organization, or agency is doing or has done.
- Showcase key attractions of a city or region.
- Introduce a park and its features.
1.1 Create an ArcGIS Online trial account

Skip this section if you already have an account for ArcGIS Online or Portal for ArcGIS.

If your organization has ArcGIS Online for Organizations or Portal for ArcGIS, please ask your administrator or instructor to create an account for you.

1. Open your web browser, navigate to ArcGIS Online (www.arcgis.com), and then click Sign In in the upper-right corner of the page.

2. Click Try ArcGIS.

• Provide a tour of a campus, an outdoor art collection, or a historical district.
• Educate people about areas of scientific or geographic interest.
• Direct public attention to places you want to improve or protect.
• Create 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 format easily represents points, though not complex geometric forms such as lines and polygons.
  • Excel automatically maintains correct CSV format (for example, adding correct quotation marks).
• A web browser
• ArcGIS Online (or Portal for ArcGIS)
  • For the work you will do in this chapter, a user-level account will suffice; however, you will need a publisher-level account later in the book, so get a publisher account now.
  • If you do not have access to an organizational account, create a 60-day free trial account.

Note to instructors: You can create a group for your students in which they can share their work with other members.
3. Fill out the Sign Up for the ArcGIS Trial form:
   - Input your name, email, and other requested information.
   - Click Start Trial to submit the form. You will know the form has been submitted correctly when a new page comes up that says, “Confirmation email sent!”

   Esri will send you a confirmation email for you to activate your account.

4. Check your email, and click the activation URL link in the Activate Your Free ArcGIS Trial email.

5. On the activation page, fill in the fields, accept the terms and conditions, and click Create My Account.

   Having created an ArcGIS Online for Organizations trial account, you are made the administrator for your organization. You will be directed to the Set up Your Organization page.

6. On the Set up Your Organization page, fill in the fields. Then click Save and Continue. (Do not select Allow access to the organization through HTTPS only.)

   You have now created your trial organization account. If you are prompted to download ArcMap and other software, click Continue with ArcGIS Online. You will need ArcMap and ArcGIS Pro later in this book, but not now.
1.2 Prepare your data

Configurable apps require certain kinds of data content. The Story Map Tour app, for example, requires a list of points (a point layer) and the locations, captions, descriptions, photos or videos, and thumbnails associated with them. You can organize your data in a CSV or point shapefile, feature service, map service, or other formats.

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 directions to download the sample data for the second edition of 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.

<table>
<thead>
<tr>
<th>Name</th>
<th>Caption</th>
<th>Icon_color</th>
<th>Long</th>
<th>Lat</th>
<th>URL</th>
<th>Thumb_URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome to the City of Redlands</td>
<td>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. &lt;&lt;x-a href=&quot;http://en.wikipedia.org/wiki/Redlands,_California&quot; target=&quot;_blank&quot;&gt;More info&lt;/a&gt;&gt;</td>
<td>R</td>
<td>-117.182421</td>
<td>34.055449</td>
<td><a href="https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Cover.JPG">https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Cover.JPG</a></td>
<td><a href="https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Cover.png">https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Cover.png</a></td>
</tr>
<tr>
<td>Esri</td>
<td>Headquartered in Redlands. Esri is a world leader in GIS software. Founded by Jack and Laura Dangermond in 1969, Esri now has 19 regional offices in the U.S. and a network of 80 international distributors, with about a million users in 200 countries. &lt;&lt;x-a href=&quot;http://www.esri.com&quot; target=&quot;_blank&quot;&gt;Web site&lt;/a&gt;&gt;</td>
<td>R</td>
<td>-117.196680</td>
<td>34.059320</td>
<td><a href="https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Esri.png">https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Esri.png</a></td>
<td><a href="https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Esri.png">https://googledrive.com/host/9Frk8UW7y8G1v5E/Luentle993a/Esri.png</a></td>
</tr>
</tbody>
</table>

The first row of your spreadsheet provides the header. Below that, each row contains one tour point. For each point, the Story Map Tour app 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.
- **Icon_color (optional)**: The color of each point. The valid values—R, G, B, and P—indicate red, green, blue, and purple, respectively.
- **Geographic Location**: You can describe geographic location by specifying 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.
- **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 app does not include a generic video player. Instead, use the URL that a video hosting service, such as YouTube, provides for embedding videos via a link. Make sure to append #isVideo to the end of the URL (for example, http://www.youtube.com/
embed/RM0eMdrPhEA#isVideo). 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.

- 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 Copy Image Location in Firefox or Copy Image URL in Chrome. For Internet Explorer, select Properties and then copy the image address 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. 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. You will find these coordinates using the ArcGIS Online map viewer.

3. Open a web browser, navigate to ArcGIS Online (www.arcgis.com) or your Portal for ArcGIS, and sign in.

Familiarize yourself with the links at the top of the page:

- **Home** returns to the homepage.
- **Gallery** leads to featured maps and apps.
- **Map** goes to the map viewer.
- **Scene** goes to the 3D web scene viewer.
- **Groups** leads 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.
- **My Organization** leads you to a page about your organization. If you are an administrator of your organization, the page includes administrative tools for managing your organization.
- In the upper-right corner of the page, the **Search** box and button allow you to search for content in the ArcGIS Online catalog.
4. Click **Map** to open the 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 Search text box, and then press Enter or click the Search button. After the address is found and the map is centered to the location, click the **Zoom In** button until you can no longer zoom in. Remember the approximate location of the address on the map.

You will get the coordinates of the location by measuring the longitude and latitude in the next step.
6. At the top of the page, click Measure \( \text{Measure} \). Next, in the window, click the Location button \( \text{Location} \), and then click the map near the pointer of the callout box. If your callout box has disappeared, simply click Search again.

The location’s longitude and latitude display under Measurement Result.

![Image of 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, and exit Excel. You can exit the map viewer or continue to step 2 of the next section.

Your data is now complete.
1.3 Create a web map

You will want to make sure you are signed in before continuing with the remaining steps. Otherwise, you will not be able to save your web map, and you may lose your work.

1. In a web browser, navigate to ArcGIS Online or the home page of your Portal for ArcGIS, sign in, and click Map to go to the map viewer.

2. Familiarize yourself with the map viewer menu bar.

The ArcGIS Online map viewer helps users create, customize, and view web maps. On the menu bar, you will see the following buttons:

- 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 add a variety of layers into the map.
- The Basemap button displays a gallery of underlying imagery that you can choose from.
- The Analysis button leads to a rich set of analysis functions.
- 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 configurable app template.
- The Print button creates a hard copy of the current map view.
- The Directions button can calculate the best route from a starting location to the destinations you specify.
- The Measure button helps determine areas, distances, and a location’s longitude and latitude.
- The Bookmarks button allows you to save a list of map areas so that you can quickly select one and zoom to that map area.
- In the Find address or place text box, you 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+), you can simply drag the CSV file to the map canvas.

   ![Add CSV file](image)

   If your browser doesn’t support drag and drop, click **Add** ➔ select **Add Layer from File**, locate the CSV file on your computer, and click **Import Layer**.

   ![Add Layer from File dialog](image)

   The map viewer displays your CSV data automatically.

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

   This extent provides users with a view of all POI locations, and the extent can be used as the initial extent of your web app once you save your map.
5. On the menu bar, click the Save button and choose Save.

6. In the Save Map window, enter the title, tags, and summary of your web map. Then click Save Map. Leave the web map open.

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

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 later in the book. For this tutorial, the Story Map Tour app automatically handles the style of your layer, so you do not need to change its style here.

1.4 Create a web app using a configurable app template

Completing this section will transform your web map into a web app using a Story Map Tour configurable app template.
1. Continue from the last section, or sign in to ArcGIS Online or Portal for ArcGIS, and open the web map you just created. In the map viewer, click the Share button on the menu bar, which opens the Share window.

2. In the Share window, select the check box indicating Everyone (public) or the check box(es) indicating the organization and/or groups with which you would like to share your web map.

   □ Note: Unless you share your web map with everyone, a prompt will ask users to sign in whenever they open your web map and any web app that uses this map.

3. Click Create a Web App.

   The Create a Web App window opens, presenting a gallery of the configurable apps. If your organization has configured custom galleries, you may not see the same configurable apps as those shown in the figure.

   ![Share Window](image)

   The apps are grouped, and the groups are listed in alphabetical order. You can use the scroll bar to review the full gallery, or you can click a group name on the left to see the apps in this group.
4. Click **Build a Story Map** group on the left, find and click the **Story Map Tour** app, and then click **Create App**.

5. Provide the appropriate title, tags, and summary information, and then click **Done**.
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- Note: The check box next to Share this app in the same way as the map (Everyone) is selected by default.
  You have created your own informative and easy-to-use web app!

6. Spend a few minutes exploring your new web app.

You can navigate through the app's tour points by clicking the thumbnails, the arrows next to the photos, and the numeric icons on the map. If you click the thumbnail for the University of Redlands, for example, a video introducing the university appears.

Your web app is already created and saved. You will further configure it in 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 enhance your application's features by using the app's builder mode (application configuration). 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. If you are continuing from the previous section, go to step 3; otherwise, sign in to ArcGIS Online or your Portal for ArcGIS.

2. In the My Content list, find and click the web app you just created to go to its item details page, and then click Configure App.

3. 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 media from Flickr, Picasa, Facebook, YouTube, or a CSV file.

Now, you will change the Esri photo into a video.

4. Click the Esri thumbnail image. Click Change media, and then click Video. Remove the current URL, enter `http://www.youtube.com/embed/RM0eMdrPhEA`, and click Apply.
The video loads into the picture frame. 
Next, you will change the thumbnail for Esri to a new one that indicates a video.

5. Click Change thumbnail. Replace the current URL with http://bit.ly/1nvc2PU (short URL equivalent to http://esrimapbook.esri.com/GTKwebgis/chapter1/thumbnails/esri_v.png), and then click Apply.

6. Click Save to save your changes.

In the following steps, you should save your work regularly to prevent losing your changes.

7. Above the thumbnail carousel, click Organize.

The Organize the tour window allows you to delete tour points and drag pictures to change their order.

8. 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.
Selecting the check box sets the first record in your CSV as the introductory image to your app, allowing you to start your tour by showing a compelling image and an introductory caption to set the scene. The location of this record will not be shown on the map as a numbered point in your tour.

Optionally, you can import tour points and media from Flickr, Facebook, Picasa, YouTube, or an additional CSV file. To import a photo from Flickr, you would perform the following tasks:

- Click **Import** next to the **Organize** button.
- Click the **Flickr** icon (on the far left) in the **Import** window.

- Type **web GIS** as the Flickr user name, click **Look up**, select **MapTour(1)** from the **Select a Photo Set** box, and then click **Import**.

- Click **Located**.

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.

- Click **Import** to import this photo.
If you chose this option, your web map would include City Hall photo and the photo name and caption.

Optionally, you can add additional tour points manually by clicking the Add button next to the Organize button and filling in the media, name, and location information.

9. In the page header, click Settings.
Clicking **Settings** opens the **Application settings** window, and you have the following tab options:

- **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**: No configuration is needed here. The sample CSV you use has all the fields named properly for the Story Map Tour to use.
- **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).

10. **Click the Zoom Level tab, and set the Scale/level to 1:5K (level 17) as illustrated.**

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

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

For example, you can 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, you can make and apply further changes.

12. In the page header, click Save to save your work.

1.6 Share your web app

You have created and shared a web app with the same people with whom you shared your web map (see step 4 of section 1.4). Now you will share the URL of this web app with your audience so that they can see your web app.

1. Click Share in the page header. If you see a message saying your tour is not shared, share your tour publicly.

2. In the Share your Tour window, click Open to preview your web app.
3. Share the tour URL with your audience (for example, by copying and sending the URL by email or by displaying the URL link on your organization’s homepage).

4. Test your web app on smart mobile devices.

Open your app in the browser of your smart devices. An easy way to open the app is to send the URL to yourself via email, open that email on your smart device, and then click the URL.

Configurable apps use responsive web design technologies and can change their layouts to best fit various devices with different screen sizes. You will find 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. The app meets all the requirements listed early in this chapter—it displays a basemap and POI locations, their descriptions, and associated photos or videos; the app is engaging and easy to use; and it works on desktops, tablets, and smartphones, using the ArcGIS Online cloud platform. Additionally, your web app did not require a single line of programming.

You can create a Story Map Tour app in other ways. In addition to pictures and videos, you can display webpages and 3D web scenes. See the resources section.
1. After uploading 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 your CSV data has been added to the map viewer and saved with your web map, it is uploaded to the cloud. 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.

Consider the following alternatives:

- You can first upload your CSV to a web folder, and then in your web map reference the CSV using its URL. In ArcGIS Online map viewer, you can configure the refresh rate of the layer to be one (1) minute, for instance. This way, when the CSV updates in the web folder, the updates will appear in your web map and web app automatically.

- You can use a feature service layer (discussed in more detail later in the book) instead of a CSV. When someone edits the data (for example, collects a new point and adds new photos using the Collector mobile app), the updates will appear in your Story Map Tour app if you reload the app in your browser.

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

Answer: You can add a line layer in several ways.

- If you hold the data in a shapefile, add it to your web map and configure its symbol using the map viewer.

- If the data is in a geodatabase, create a map document file (MXD), publish it as a feature service or map service, and then add the service to your web map.
• If you do not have the tour path data, simply create it using a map notes layer. Open your web map in ArcGIS Online or Portal for ArcGIS map viewer, click **Add**, click **Add Map Notes**, give your layer a name—such as **Tour Path**—choose a template, and click **Create**. 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. However, you can download the configurable app source code, change the configuration to override 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, feature classes, or geotagged media 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 information to the ArcGIS Online map viewer, ArcGIS Online will geocode these addresses and find their locations automatically, as discussed in more detail later in the book.

   If you have your map points in a shapefile 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.

   If you have geotagged media, such as photos taken using your smartphone with location enabled for your camera, you can create an empty web map and then import these photos in the configuration mode.
ASSIGNMENTS

Assignment 1: Choose from the following topics, and create an app using the Story Map Tour to showcase your topic.

- Your personal story (where you were born, where you moved, where you went to school or worked, and so on)
- Your city’s key attractions
- The landmarks, buildings, and departments on your campus
- 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
- Locations of key environmental interest (for example, largest/oldest trees) or historic interest (for example, oldest houses)
- Other interests

What to submit: Email your web app URL to your instructor with the subject line Web GIS Assignment 1: Your name.

Resources

ArcGIS Online Help and tutorials

Esri blogs


**ArcNews and ArcWatch**


**Esri videos**