Lab 1: Exploring ArcGIS Desktop

Before you start:

1. Copy all files in the Lab1 directory of the class folder to your Y: drive.

To hand in:

1. Answers to the questions in <your last name>_Lab1.doc in hard copy.

Why do people use a geographic information system (GIS)? The short answer is it helps them obtain better information, and better information leads to better decision making. In a GIS, data about real-world objects is linked to an onscreen map. Geographic features are drawn quickly and can be displayed using different information in the database.

ArcGIS is a relatively new Windows-based desktop GIS toolset developed by Environmental Systems Research Institute (ESRI). ArcGIS has a ***Modular Structure*.** It is a complex system designed around several components – ArcMap, ArcCatalog, and ArcToolbox. These three modules represent the three basic necessities of GIS – data, data analysis, and data output/mapping. While the depth of functionality in ArcGIS is tremendous, as you'll see, it takes a friendly approach to GIS with easy-to-use tools that help you through the most complicated of tasks. We will primarily use ArcGIS to explore GIS concepts in this course, though we will try to focus on the concepts rather than the software itself.

ArcMap  is the primary ArcGIS application for displaying, querying, editing, creating, and analyzing data. ArcMap also makes it easy to layout your maps for printing, embedding in other documents and electronic publishing. In addition, ArcMap includes analysis, charting, and reporting functions and a comprehensive suite of editing tools for creating and editing geographic data.

ArcToolbox  is used for performing non-graphic operations on spatial datasets, e.g. spatial analysis, projecting or converting data. It is a dockable window integrated into all the ArcGIS Desktop applications. For example, when you run tools from the ArcToolbox window inside ArcMap, you can use the current map's layers as inputs, and the outputs can be added directly into the map as new layers.

ArcCatalog  is used for managing GIS datasets. It allows you to browse, organize, distribute, and document your GIS data holdings. With the easy-to-use interface, you can quickly learn about your database contents. You can use either graphical or textual methods to browse your geographic data. ArcCatalog provides tools for safely managing your geographic datasets.

The ArcGIS Desktop extensions provide you with additional GIS functionality. Extensions are a suite of optional components available for ArcGIS Desktop, adding capabilities for raster analysis, three-dimensional visualization, advanced map printing, and so on. The table below lists the extensions available for ArcGIS Desktop and provides a short description of each.

Name of extension	Extended capabilities
3D Analyst	Three-dimensional visualization and analysis.
Spatial Analyst	Surface creation, raster analysis, and grid algebra.
Geostatistical Analyst	Advanced statistical analysis for surface generation.
Network Analyst	Allows you to perform advanced routing and network analysis.
ArcScan	Supports the creation of vector features from a raster image.
Survey Analyst	Tools used by surveyors and GIS professionals to create and maintain survey data in ArcGIS.
Tracking Analyst	Real-time and historic data display and temporal analysis.
Maplex	Advanced cartographic label and annotation placement.

Explore ArcCatalog

- Use the Start button, and navigate to ***Programs > ArcGIS > ArcCatalog***. Click to open it.

ArcCatalog has an interface similar to Windows Explorer (If you forget what Windows Explorer looks like, right click the Start button and choose Explore) and is used to manage spatial datasets (copy, rename, delete, etc.). ArcCatalog has features for exploring data folders, previewing data before adding it to ArcMap, creating new data, and many other features for managing your data. ArcCatalog knows about different types of datasets and uses different icons to signify them (as Explorer does with different types of files that it knows about). ArcCatalog also has a metadata tool that is able to extract some of the spatial and field information it needs directly from the subject datasets.

When you start ArcCatalog for the first time, the Catalog tree has a branch for each local hard drive. Branches for Coordinate Systems, Database Connections, Geocoding Services, Internet Servers, and Search Results can also be added through the Options dialog under the Tools menu. You can view the contents of a branch by double-clicking it or by clicking the plus sign beside it. You can also create new branches in the Catalog tree to make it easier to navigate to your data. These branches are called connections.

In ArcCatalog, you can create direct connections to folders to shortcut the process of navigating to data. You will use ArcCatalog to connect to a folder with the lab data and copy all the documents and data you will need for this exercise to an area where you can work with and modify them.

Copy Required Data

- In the Table of Contents window of ArcCatalog, navigate to the Lab1_intro folder in the course folder on the P: drive. If you don't see the P:\ or Y:\ drive in your ArcCatalog window, you will need to connect to them using the "Connect to Folder" button (the right arrow). 

- Right-click on the Lab1 folder, select ***Copy*** from the ***Context Menu***, then navigate to your personal workspace (Y:\), right-click, and ***Paste***.

Explore Data
The right-hand panel of ArcCatalog displays datasets in many different ways. You can click an object in the left panel to view it in the right panel. One of the views that can be useful when you want to select a particular map is the thumbnail view. Explore the data directory you copied. Note that ArcCatalog uses different icons for shapefiles (even for line, polygon, and point types), coverages, tables, and raster datasets.

Major ArcGIS icons and what they represent


Point shapefile


Polygon shapefile


Raster/image


Feature dataset (geodatabase)


Line feature (geodatabase)


Point feature (coverage)


Polygon feature (coverage)


Line shapefile


dBase table


Personal geodatabase


Point feature (geodatabase)

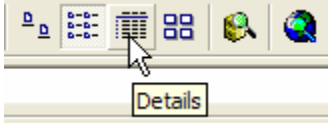

Polygon feature (geodatabase)


Line feature (coverage)


ArcMap Map document (.mxd)

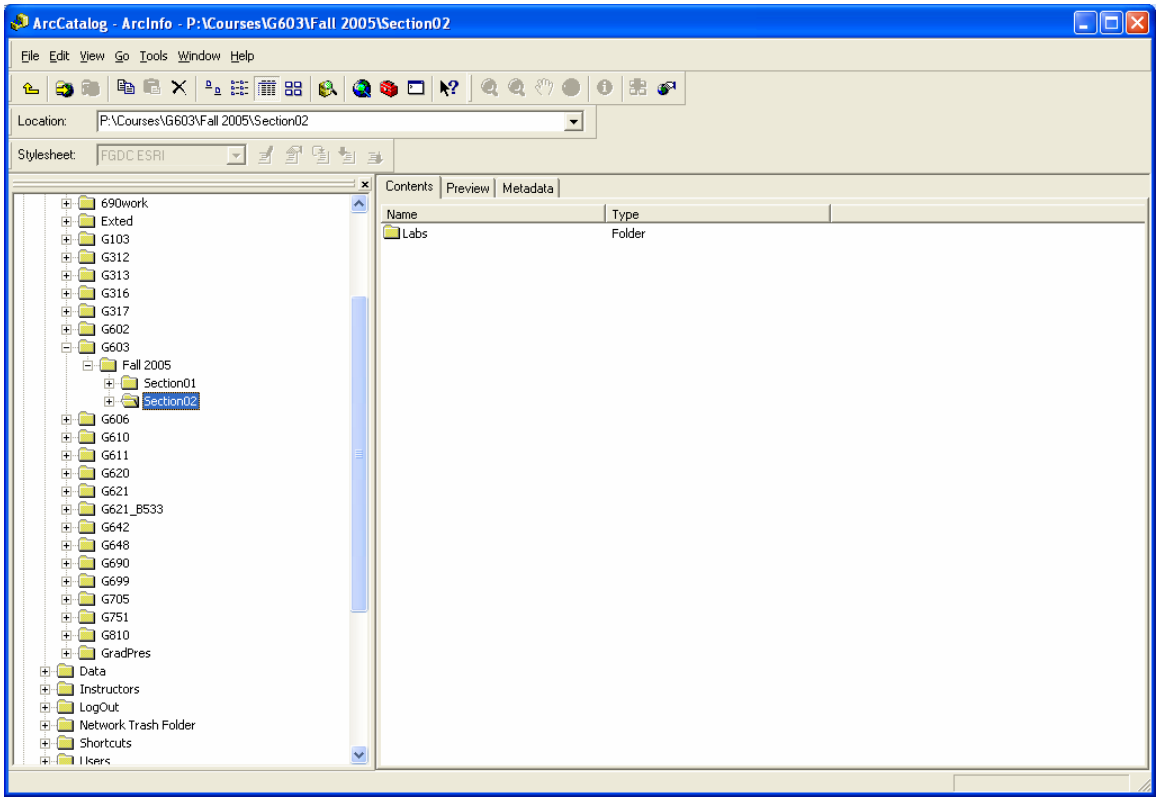
- Select the Lab1 folder you just copied in the Table of Contents. There is a folder of data and a map called Exercise_1.mxd
- Click the ***Thumbnails*** button on the Standard toolbar.
- You can see a thumbnail sketch of the map.

- Click the ***Details*** button on the Standard toolbar.
- Open the folder San_Francisco. There are multiple shapefiles in it.
- Click on ***SF_planning_districts.shp***; in the right panel ArcCatalog tells you that SF_planning_districts.shp is a shapefile.



- Select the ***Preview*** tab (Here you can preview either the Geography or the Table associated with the file); ArcCatalog draws the polygons from SF_planning_districts.shp.
- Select ***Table*** (at the bottom of the right panel window) to look at the attribute table associated with SF_planning_districts.shp.
- Select the ***Metadata*** tab, and browse through the ***Spatial***, ***Description***, and ***Attribute*** tabs. Note that some of the information has been automatically filled out (whatever ArcCatalog can figure out from the dataset). Other information has not been filled out, but it can be through this interface.

Explore some of the other datasets and answer the following questions (Hint: use the Metadata tab).



? Question 1-1: What type of data does SF_planning_districts look like – raster or vector?

? Question 1-2: Similarly, what type of datat is sf_elevation – raster or vector?

? Question 1-3: What type of spatial dataset is sf_planning – raster, vector, other? Is the object or field view the better way to represent this feature, explain why.

? Question 1-4: Now you have seen that the planning districts of San Francisco can be modeled by both raster and vector, which one do you think better? why?

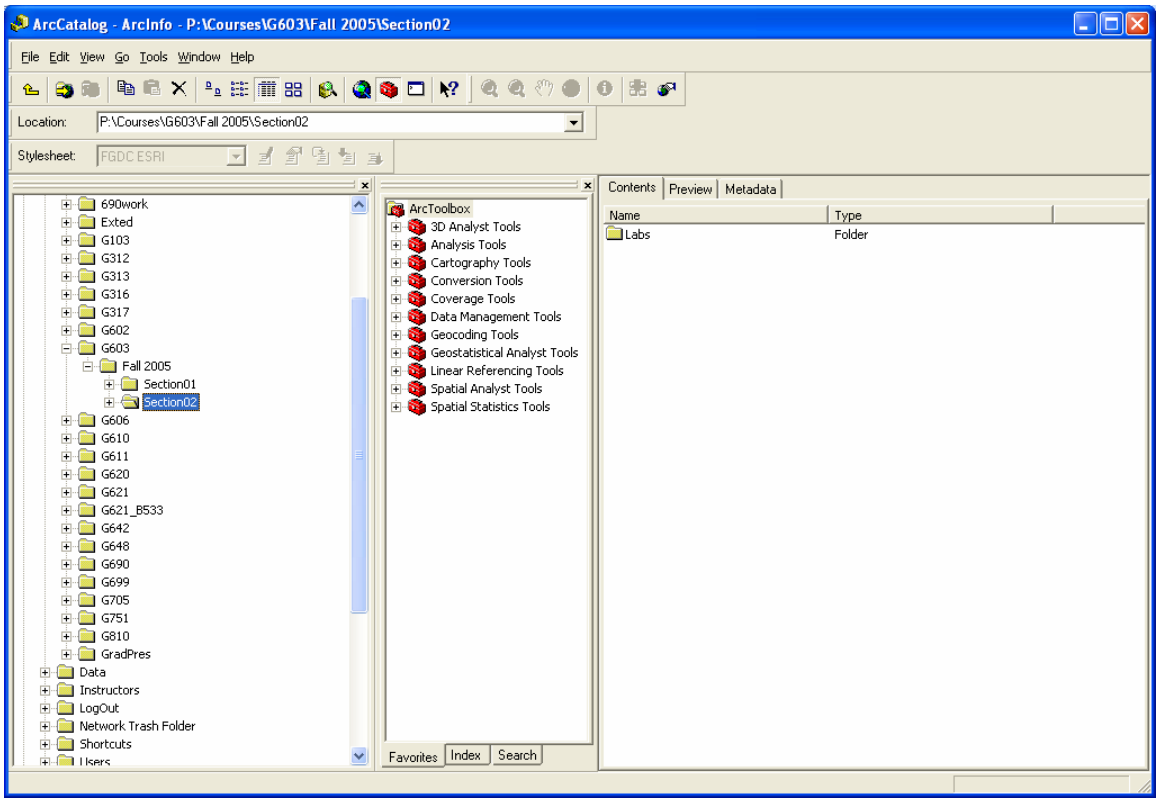
? Question 1-5: What are the bounding coordinates (both decimal degrees and projected coordinates) of the parks shapefile (Hint: it should be under the Spatial tab)?

Explore ArcToolbox

In ArcGIS, ***ArcToolbox*** is used for data management and conversion. In ArcGIS, you have the ability to convert data between one format and another, and to re-project data. Most of the tools in ArcGIS are set up as "Wizards," which will simplify your task and walk you through it.

- ArcToolbox is part of ArcMap and ArcCatalog in ArcGIS version 9.x. If ArcToolbox is not part of the window, click the button  at the top of the ArcCatalog window that looks like a red toolbox.

- You should see a window appear similar to the following:



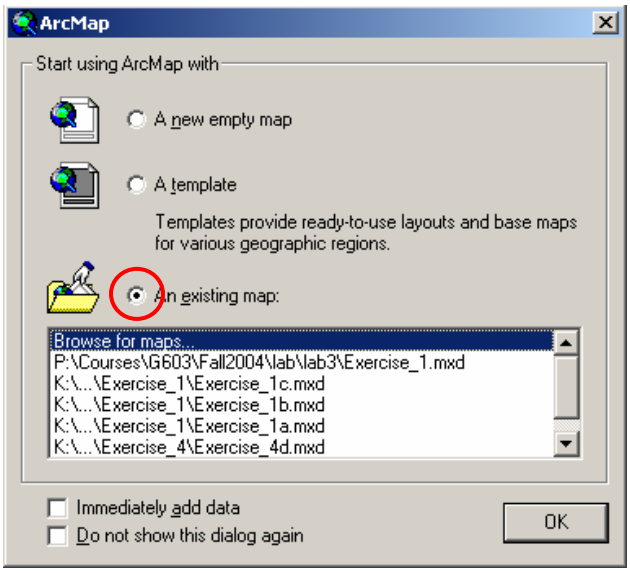
Take a couple of minutes to explore the tools that are available through ArcToolbox.

- Close ArcCatalog.

Explore ArcMap

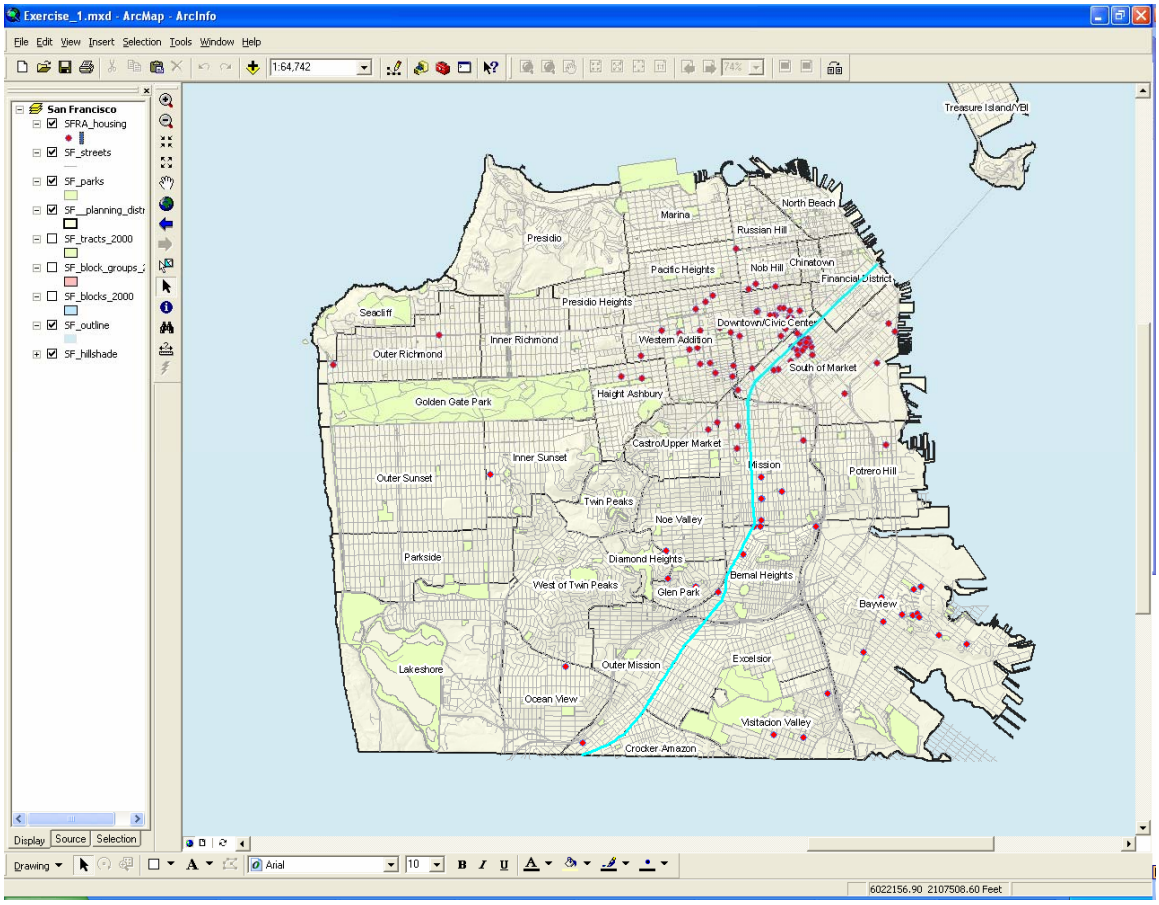
ArcMap is the module used for creating, viewing, querying, editing, composing, and publishing maps. It is in ArcMap that we will do most of our analysis using ArcToolbox as the conduit for the functions available for spatial analysis.

- Start ArcMap by using ***Start > Programs > ArcGIS > ArcMap***.
- Choose the option to start using ArcMap with ***An existing map > Browse for maps...*** (refer to the following graphic):



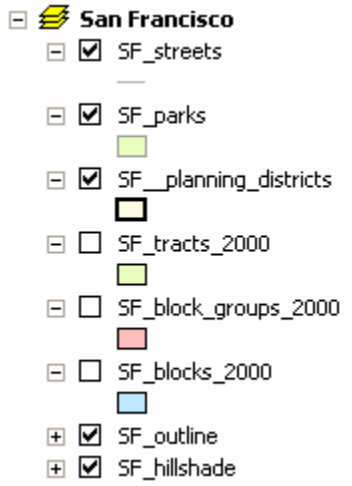
- Click OK.
- Navigate to the Lab1_intro folder. If the Lab1_intro folder is not shown, you need to connect to it (try using the icon that allows you to go up one folder.)
- In the Lab1_intro folder, open ***Exercise1.mxd***. Since we will not use ArcToolbox today, close it so that you have more real estate (more screen space).

Note that there is a listing of data layers on the left (called the ***Table of Contents***), a graphic representation of them on the right (the View Window), and several toolbars for working with your data. Let us explore San Francisco using ArcMap.



Turning Layers on and off

The map has eight kinds of geographic information.



1. **SF_streets**: street network in San Francisco
2. SF_parks: parks in San Francisco
3. **SF_planning districts**: Planning districts in San Francisco
4. **SF_ tracts_2000**: census tract data of San Francisco
5. **SF_block_groups_2000**: census block-group-level data of San Francisco
6. **SF_blocks_2000**: census block-level data of San Francisco
7. **SF_outline**: outline/boundary file for San Francisco
8. **SF_hillshade:** shaded relief (reflectance) map of San Francisco

Geographic data is represented on a map as a layer. A layer might represent a particular type of feature, such as highways, lakes, or wildlife habitats, or it might represent a particular type of data such as a satellite image, a CAD drawing, or a terrain elevation surface in a TIN.

A layer doesn't store geographic data itself, it **references** the data stored in coverages, shapefiles, rasters, and so on. A layer defines how to display the geographic data it references and where that data is located in your database or on disk of the computer.

It's easy to add layers to a map, you can simply drag them from ArcCatalog to your map or use the Add Data button in ArcMap. Once they are on your map, you'll typically organize them to make your map look the way you want it to.

- Click the Add Data button 
- Click the Look in dropdown arrow and navigate to the Lab2\San Francisco folder in your personal workspace that contains the data for this lab.
- Select ***SFRA_housing.shp*** and click Add. The new layer appears on your map and at the top of the ***Table of Contents***.

ArcMap Table of Contents
Every map has a table of contents. The table of contents contains entries for the data used in the map. The display tab of the table of contents shows how layers are organized within data frames. The table of contents lets you control:

1. When the layer draws
2. How the layer draws
3. In what data frame on the map the layer will appear

You can also:

4. Remove layers
5. Group layers
6. Save layers to disk

The order of layers within the table of contents is also important; the layers at the top draw on top of those below them. Thus, you'll put the layers that form the background of your map, such as the ocean, at the bottom of the table of contents.

When you add a new layer to your map or drag and drop a layer from ArcCatalog onto your ArcMap window, it will list itself in the table of contents in the following order:

1. Point
2. Line
3. Polygon
4. TIN
5. Raster

When adding a new layer, it will automatically be placed above the other similar feature type. For example, a new line feature will be placed above other line features.

The ***Table of Contents*** lists all the layers on the map and shows what the features in each layer represent. You organize and manage layers through the table of contents. The check box next to each layer indicates whether or not the layer is currently drawn on the map. By default, the table of contents is located on the left side of the ArcMap window. SFRA_housing and SF_streets and SF_planning_districts are currently visible. The other layers are currently set as not visible.

- In the Table of Contents, click on the SFRA_housing check box to turn it on and off. You should see some changes in the View window.
- Leave SFRA_housing visible. Click the check box next to the SF_block_groups_2000 layer to turn it on.

You may see a rotating globe at the middle bottom of the screen. It means ArcMap is working, be patient and wait until it stops.

If you can't see any change in the map, that is because data is displayed on the map in the order of the layers in the table of contents. SF_block_groups_2000 layer is covered by SF_tracts_2000, SF_tracts_2000 is covered by SF_planning_districts, etc.

- Uncheck the check box next to the SF_planning_districts layer to turn off the layer. The planning districts layer disappears and the census tracts layer appears.
- Now uncheck the check box next to census tract layer to turn off the census tracts layer. The census tracts layer disappears and the census block groups layer appears. There are many block groups within each census tract. Similarly, there are many blocks within each block group.

Move a layer
As mentioned before, because each feature is a separate layer, the order a layer is situated in the Table of Contents determines how layers are drawn on the map. Within a data frame, the layers listed at the top will draw over those listed below them, and so on down the list. However, you may want to move a layer to a different position in the TOC, say move the SF_block_groups_2000 layer so that it is below SFRA_housing but above SF_streets. You can easily move layers around to adjust their drawing order or organize them in separate data frames.

- Left-click on SF_block_groups_2000 layer, hold and start moving it. You will see a horizontal bar. Still holding until SF_block_groups_2000 is at the location you want, then release. Do you see any change?
- Uncheck SF_block_groups_2000.
- Make the SF_planning_districts visible by checking its checkbox in the Table of Contents.

Changing the name of a layer
By default, when you add data to a map, the resulting layer is named after its data source. You can give a layer a more meaningful name without changing the name of the data source. This will make it easier to understand what layers are on the map.

- Right click on SFRA_housing layer, choose properties. In the Layer Name textbox, highlight SFRA_housing and type Affordable housing in its place. Notice that the layer is renamed in the Table of Content box.

Referencing Data and Saving a Map
As mentioned earlier, when you add data to a map the pathname to the data is stored in the map. Unlike files like Microsoft Word documents, a map document maintains only pointers or ***references*** to where data is stored on the computer, it does not store the data internally. When you open your map, ArcMap locates the data it needs on the computer using these stored pathnames. If ArcMap can't find the data for a particular layer, the layer will appear in the ArcMap table of contents but it won't be drawn. Instead, a red exclamation mark will appear next to the layer to indicate that the layer needs to be repaired. You can view the pathname of the data represented by a layer in your map by looking in the Source tab of the table of contents, or by double-clicking the layer to bring up the Properties dialog box, then checking the path in the Source tab of the dialog box.

ArcMap can reference data that is stored in geodatabases or is stored as files on a disk—shapefiles, coverages, CAD files, and so on. Since we are working in a pseudo mobile environment, e.g. you may be working in several different computing environments, you will need to change how your map references data so that when you save the map, the map can find the data it needs when opened up somewhere else, like home. ArcMap has several options for referencing file-based data: full paths, relative paths, etc. These are explained in the following section.

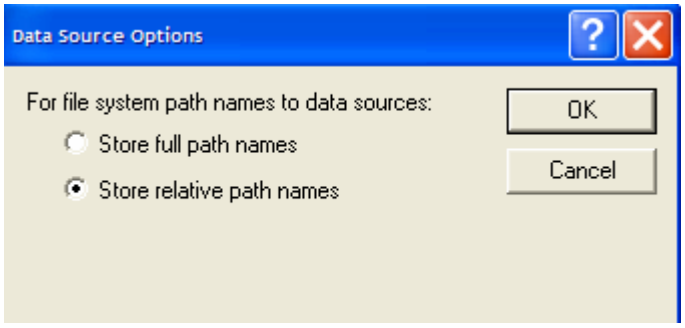
Absolute Pathname
An example of an absolute path is: C:\GIS\Project1\Boundary.shp. To share maps saved with paths to data with the full path option, everyone who uses the map must either do so on the same computer or have the data on their computer in exactly the same folder structure.

Relative Pathname
An example of a relative path is: \Project1\Boundary.shp. Relative paths in a map specify the location of the data contained in the map relative to the current location on disk of the map document (.mxd file) itself. As relative paths don't contain drive names, they enable the map and its associated data to be moved to any disk drive without the map having to be repaired. As long as the same directory structure is used at the new location, the map will still be able to find its data by traversing the relative paths.

Data referenced by a relative path can be in the same folder as the map or in a folder above or below the folder containing the map. To reference data in a folder that's above the folder containing the map, a relative path will contain \..\ for each level up in the folder structure that must be traversed. If layers in a map do not meet that criterion, they will not be saved with relative pathnames, but will instead retain their full absolute pathname. Sharing such maps presumes that everybody who uses the map must either do so on the same computer, or have the exact same directory structure on their computer at the point where the map document is stored. This option allows you to share maps that you made with data on your local "F:\" drive with people who only have a "C:\" drive. This also allows you to easily move the map and its data to a different hard drive on your computer or give the map and its data to another person to copy to their computer.

Let's check that ArcMap is using relative pathnames versus absolute pathnames for the location of the data on the computer.

- On the Main menu click ***File > Document Properties***.
- Click ***Data Source Options***.
- Click ***Store relative path names*** (if not already done so) and click ***OK***.



- Click ***OK*** on the Map Properties dialog box.

- Save your map as ***Exercise1a.mxd*** in your Y:\lab1_intro folder.

Use a Bookmark

A spatial bookmark identifies a particular geographic location that you want to save and reference later. For example, you might create a spatial bookmark that identifies a study area. As you pan and zoom around your map, you can easily return to the study area by accessing the bookmark. You can also use spatial bookmarks to highlight areas on your map you want others to see. You can create a spatial bookmark at any time. As a shortcut, you can create bookmarks when you find and identify map features.

- Check the streets and SFRA (San Francisco Redevelopment Agency) housing layers to turn them on if they are currently not. A map showing the streets in San Francisco and the location of affordable housing units built by SFRA open in the map window.
- Click ***View > Bookmarks > Six Street Area*** Bookmark. The map zooms in to an area of San Francisco with a heavy concentration of SFRA affordable housing projects. Sixth street is an inner city area close to downtown with a mix of residential hotels and business.

Tools on the Tools toolbar

Try the tools in the Tools toolbar and see what their functions are. If you make a mistake, click either the ***Full Extent*** or ***Go Back To Previous Extent*** buttons and try again (see below for descriptions of the tools).

Panning and Zooming

As you work with a map, you can easily change how you view the data it contains. When you're just browsing a map, you might want to pan and zoom around the data to investigate different areas and features. Most of the tools for navigating your data are found on the Tools toolbar.

On the Tool Bar you should see a magnifying glass with a "**+**" (***Zoom In***). Click it and drag a box across the view to zoom into that area. To zoom out, click on the magnifying glass with a "**-**" (***Zoom Out***), and drag it across the view. This one is a little less intuitive – the smaller the box you drag, the more you will zoom out.

You can also zoom in and out a fixed amount using these tools. Just click on the "arrows pointing in" icon (***Fixed Zoom In***) and you zoom in by a factor of 2; "arrows pointing out" (***Fixed Zoom Out***) zooms out by a factor of 2. The center of the view remains the same.

The "arrow pointing left" (***Go Back to Previous Extent***) returns to the previous extent. The "arrow pointing right" (***Go to Next Extent***) undoes the previous extent.

The “hand” (***Pan***) pans the view, while the “globe” (***Full Extent***) zooms the view to the extent of all the data layers.

- Experiment with the pan and zoom tools to see how they work. Use the “globe” tool if you get a blank view.
- When finished experimenting, turn off all layers except SFRA_housing and SF_Streets. Click ***View > Bookmarks > Six Street Area***.

Select and label a feature

Often, just looking at a map isn't enough; you must also query it according to feature locations and attributes to solve problems. You can discover new spatial relationships when you start asking questions such as:

- Where is...?
- Where's the closest?
- What's inside?
- What intersects?

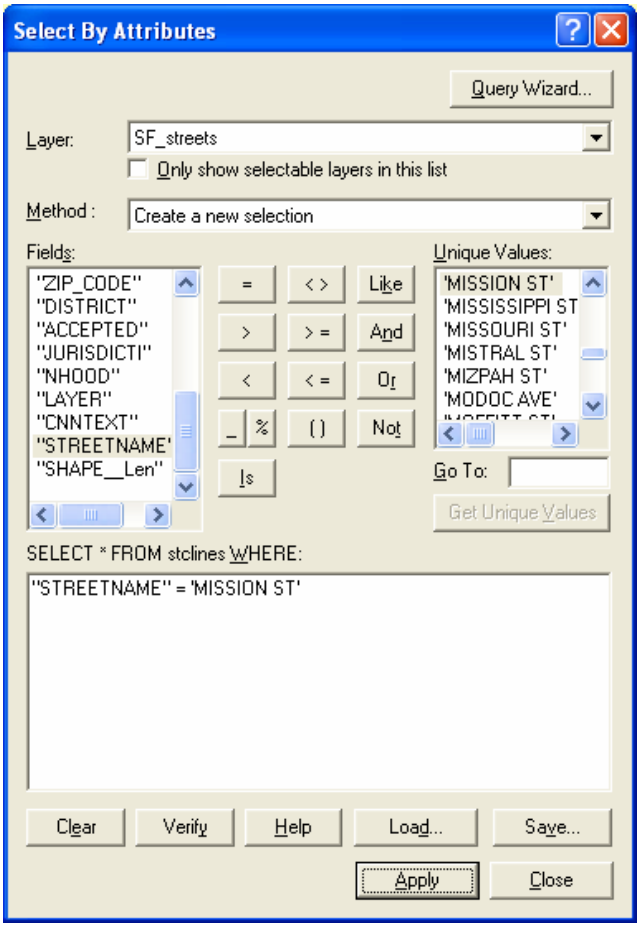
ArcMap provides a number of tools to help you find answers to these types of questions. With ArcMap, you can:

- *Find out what a feature is by pointing to it (Identify and Hyperlink tool):* This may display additional information such as a attributes, a picture or a Web page.
- *Find features with particular attributes (Select by Attributes):* such as cities with a population greater than one million.
- *Find features with a particular spatial relationship(Select by Location):* For instance, you can find the wildlife habitats within 50 kilometers of an oil spill or find all traffic accidents that occurred along a particular stretch of road.

We will find a feature by a particular attribute and then label that feature.

- On the Main Menu click ***Selection > Set Selectable Layers***.
- Click the Clear All button.
- Check the SF_streets check box to make SF_streets the only selectable layer.
- Click Close.
- On the Main Menu, click on ***Selection > Select by Attribute***.
- In the *Layer*: box make sure the layer is ***SF_streets*** (choose SF_streets from the drop-down menu).
- In the *Method:* box, make sure the method is ***Create a New Selection***.
- Double click on “STREETNAME” in the *Fields* box. Now check if it appears in the bottom window.
- Click on **=** button. Again, check to make sure it appears in the bottom window.
- Click on the ***Get Unique Values*** button. You will see a list of street names in the Unique Values window. Scroll down until you see ‘MISSION ST’. Double click on it. Make sure it appears in the bottom window.

Make your dialog look exactly the same as the following:



- Click on ***Apply*** button. You should see that Mission Street is highlighted in Cyan.
- Click on ***Close*** to dismiss the window.
- Right click on SF_streets layer. Click on ***Label Features***. The streets are now labeled by their names.

Measuring distance

A fundamental task in a GIS is to measure the distance of features from other features. An easy way to accomplish such a task in ArcMap is to use the Measure tool.

- Click ArcGIS's ***Measure*** tool on the Tools toolbar. 
- Click on the SFRA affordable housing project at the corner of Folsom Street and Columbia square and hold down the left mouse button. Still holding down the left mouse button, drag the measure tool to Mission Street (selected in Cyan).

Note: A general rule of thumb in transportation planning is that transit is accessible within walking distance if the passenger needs to walk no more than ¼ mile to the stop (1,320 feet is ¼ of a mile).

- Double click at Mission Street to end the measurement.

? Question 1-6: Is the affordable housing project at Folsom and Columbia Square within walking distance of Mission street? What is the "on-the-road" distance (NOT "as-the-crow-flies")?

Identify features

When you want information about a feature displayed in ArcMap, you can use the ***Identify*** tool on the Tools toolbar. The Identify tool allows you to see the attributes of your data. Clicking the Identify tool on a location inside a data frame (e.g. View window) will present the attributes of the data at that location. The Identify tool is the easiest way to learn something about a location in a map.

As soon as you click the Identify tool, the Identify Results window opens. When you click a location in a map with the Identify tool, the Identify Results dialog box displays the data for that location. The default option is to show the information of the topmost layer in the table of contents for the location. You can also hold down the Shift key while clicking the map to keep the results of your previous clicks in the Identify Results dialog box. If more than one feature was identified, you can click any of the features in the left panel of the Identify Results window to see the attributes of that feature. Use the expansion controls to see if there is any related information.

If you click a location and do not find that the topmost layer interests you, you can use the Layers dropdown list at the top of the Identify Results dialog box to choose from several other options: *Visible layers, Selectable layers, All layers, or a specific layer in your map*. The Identify tool will act on whatever you choose in the Layers dropdown list.

- Experiment with the Identify tool and see if you can control about which layers you can get information.
- Use the ***Identify*** tool  to click on the affordable housing project at the corner of Folsom and Columbia Square. In the layers box select the <*Top-most layer*> *or Affordable housing* (e.g. San Francisco Redevelopment Agency affordable housing layer).

? Question1-7: Who built the projects? How many units are there?

Layout View

We've been looking at San Francisco data in "***Data View***"; now let's switch to "***Layout View***". Conceptually you can think this as a piece of paper upon which you can compose a map (with map elements such as titles, legends, bar scales, north arrows, etc.).

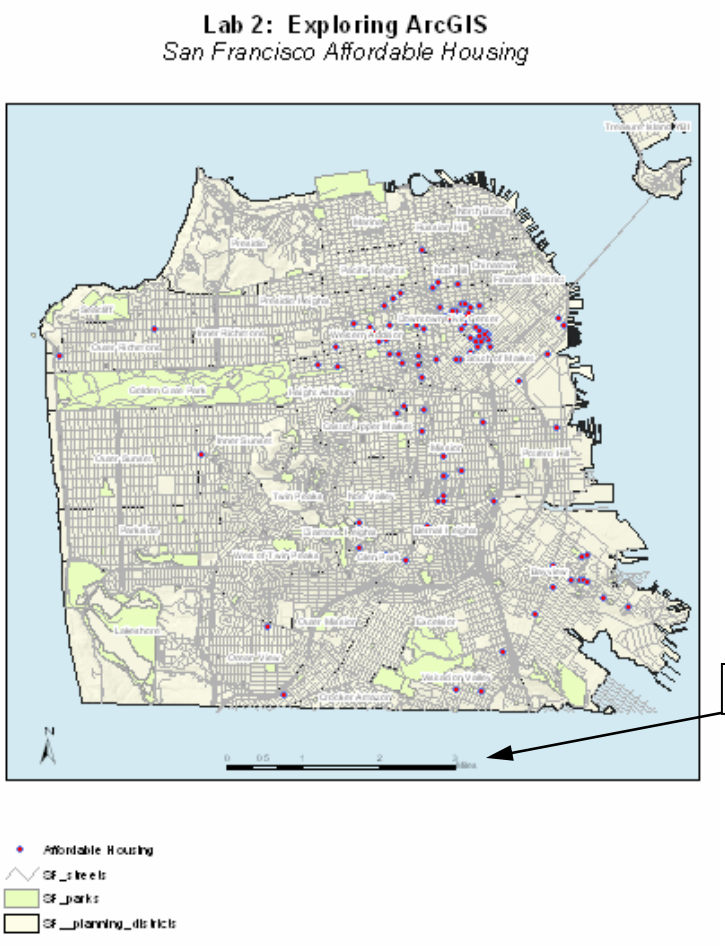
- To switch to Layout View, first click ***View > Bookmarks > Layout Scale*** Bookmark.
- Zoom out to a desired extent, then ***View >Layout View***, or click the "***Page***" icon at the bottom of the View window.

- Notice the standard elements you might expect on a map, including title, subtitle, legend, and north arrow. As you might expect, maps can get much more complex than this.
- See if you can use the Layout Toolbar to pan and zoom around the layout. These tools are very handy for zooming in for detail work.

Adding a scale bar

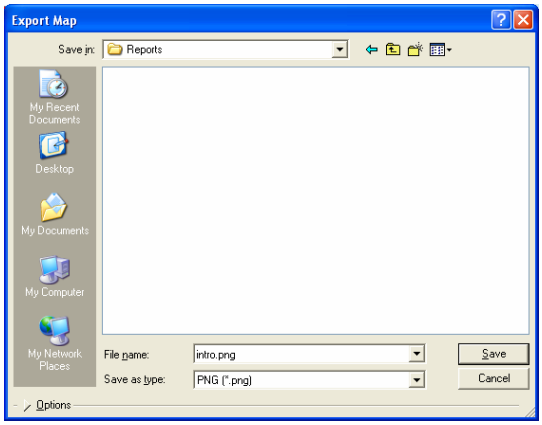
Scale bars provide a visual indication of the size of features and distance between features on the map. A scale bar is a line or bar divided into parts and labeled with its ground length, usually in multiples of map units such as tens of kilometers or hundreds of miles. If the map is enlarged or reduced, the scale bar remains correct.

- To create the scale bar, on the main menu select ***Insert > Scale Bar***.
- In the Scale Bar Selector box, highlight ***Alternating Scale Bar 1*** and select ***Properties***.
- In the Scale Bar dialog box, select the ***Scale and Units*** tab, then look under Scale and pull down the *When resizing…* menu. Choose ***Adjust number of divisions***. This will allow you to set the number of divisions of the scale bar, and more importantly, to set the value of a single division.
- After you've selected 'Adjust number of divisions', notice that the Division Value field above is no longer grayed out. Type ***1*** in the *Division Value* field, set the number of subdivisions to ***2***, and uncheck the box labeled ***Show one division before zero*** if checked.
- To complete the scale bar, go to the ***Units*** area, pull down the ***Division Units*** menu then select ***Miles***.
- Next, pull down the ***Label Position*** menu and select ***After Labels***. Leave the Label field as is, then click ***Apply***.
- Now select the ***Number and Marks*** tab, then look under Numbers section and pull down the *Frequency* menu. Choose ***divisions***.
- Click ***OK*** to close the dialog box. Click OK again to add the scale bar to the map.
- Look in the center of your layout to find the scale bar and reposition the scale bar somewhere below the map. Refer to the graphic below:



- Save your map as ***Exercise1.mxd*** in your Maps folder.

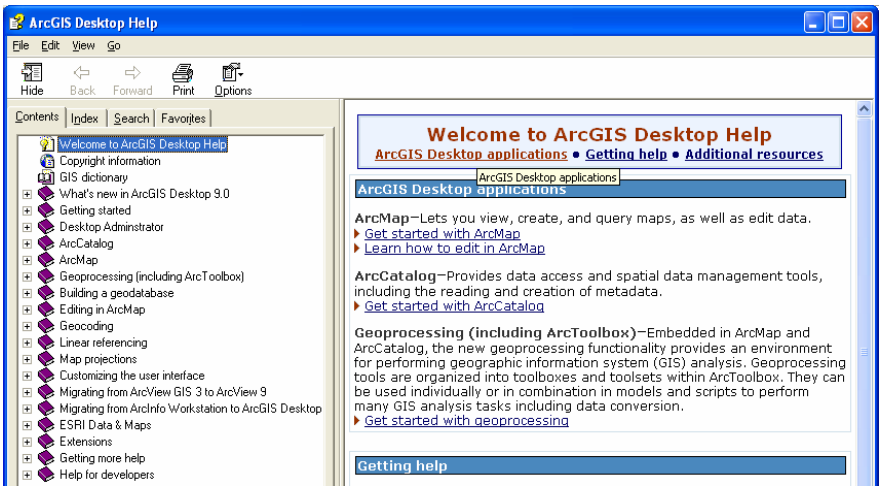
☐ Export your map (***File > Export Map…***) to an ***.png*** file – call it ***intro.png*** and save it in your lab1 directory. Then open the **<YourLastName>_Lab1.doc** Word document to put this figure in. In Microsoft Word, ***Insert > Picture> From File***… to insert your map as a figure. Add text to describe what the figure shows and save the document as ***<your last name>_Lab1.doc .***



ArcGIS Help System

ArcGIS has an extensive Windows-based, hyperlink help system (as do just about all Windows programs). There are tabs for Contents, Index, Find, and Favorites.

Help can be opened from ArcCatalog, ArcMap, or ***Start >Programs >ArcGIS >ArcGIS Desktop Help***. Take a few moments to open and explore the help system.



Missing Data

We discussed relative versus absolute path previously. In the case that the .mxd file is stored in absolute path, and is opened in other location, you may encounter the missing data problem. Let us see how to fix it.

What is a .mxd file?

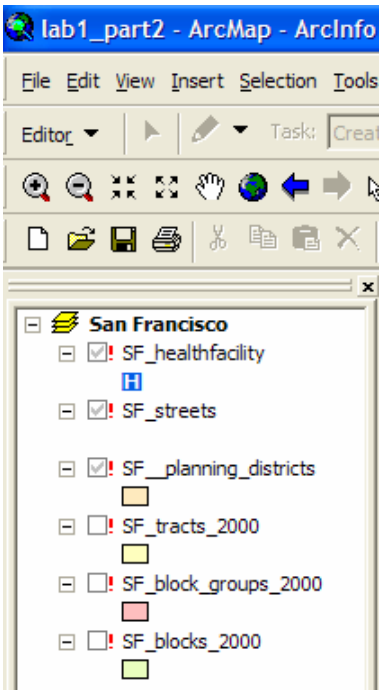
.mxd is a map document file. It saves the following items of the current ArcMap session:

- The spatial extent to which the screen was zoomed
- Which layers are present and turned on
- The symbology used to portray the features in each layer
- Layout of the map you created.

Note .mxd file does not save any of the spatial data. It only saves the pointers/path to the data. Thus, if you copy a *.mxd file to another computer without also copying the data files separately, and then try to open the *.mxd file, ArcGIS will complain that it can't find the data that is part of the map document.

Open the exercise2.mxd file in your workspace.

The map is blank, and there is a red exclamation mark (!) next to each layer.



This is because the map document (.mxd) only stores the path to find each layer, not the layer itself. If a layer couldn't be located by following the path, an exclamation mark will appear.

To fix the problem,

- right click on the SF_healthfacility layer,
- Select Data \ Set Data Source
- Navigate to your lab1_intro folder. If lab1_intro is not shown, connect to it .
- In lab1_intro \ San Francisco folder, select SF_healthfacility layer.

  Because all other layers are stored in the same folder, all of the exclamation marks will disappear.

- Save exercise2.mxd using relative path option. If you forget how to do this, refer to the previous instruction.

To find the source of each layer,

- Click on the Source tab at the bottom of the left window which is also called Table of Content window. It tells you the path of each layer.

Open exercise2.mxd file again. There should be no exclamation marks.

How to move map document (.mxd) and data between computers?

To move map document (.mxd) and data between computers, follow these guidelines:

- Keep your data within a single main top level folder. Store the .mxd files and all data files in this folder. You can then move this folder between computers.
- Do not move spatial data files using Windows Explorer. Move data files either by moving the folder in which they reside or by using ArcCatalog.
- To avoid exclamation marks, save .mxd using relative path instead of absolute path

Your Turn: (2 points)

In the yourturn folder of lab1, there is a WorldCities.mxd file which has two layers: countries and large metropolitan cities. Use what you've just learned to find how many cities have a population over 10 million in year 2000? If you are curious about their names, use the labelling feature to find them.