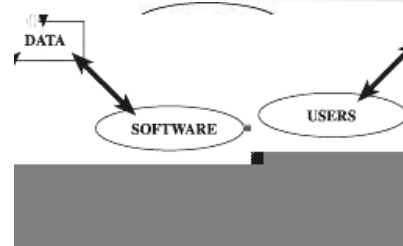


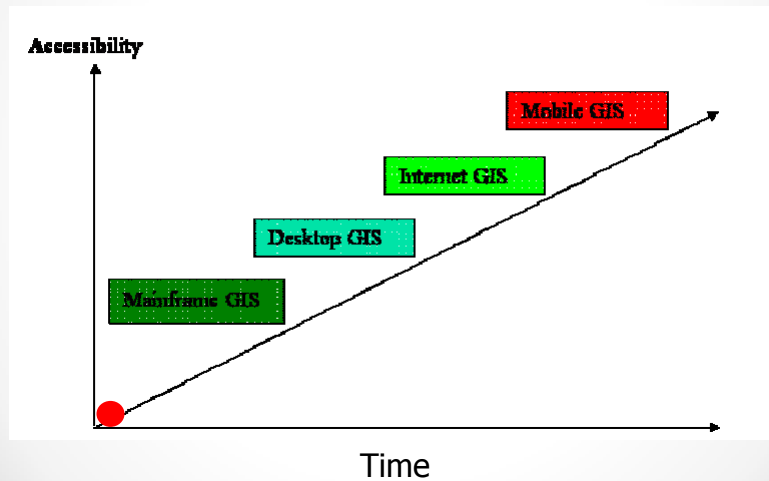
What Makes A GIS

- **Hardware**
- **Software**
- **Data**
- **People (humanware)**
- **Procedure**
- **Network (Internet)**



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Evolution of GIS



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Meet the Software



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Why ArcGIS?

- We will be using ArcGIS exclusively this year
- It is ESRI's **Premiere GIS** software
 - ESRI is the world **LEADER** in GIS
 - The company was founded as **Environmental Systems Research Institute** in 1969 as a land-use consulting firm
 - In 2009 its annual revenues were indicated to be **\$1.2 billion**
- ArcGIS is the standard for GIS software
 - 300,000+ Client Locations Worldwide
 - 10 US Regional, 13 International Offices

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Demand for GIS Professionals

- In the U.S. in 2005:
 - **~500,000** were using GIS as part of job
 - Growing at **15%** each year
 - Job market demand is **~75,000/year**
 - **~50,000** US students/year take a GIS class
 - **4000** "certified" graduates/year

Source: ESRI: <http://www.esri.com/news/arcuser/0700/umbrella11.htm>

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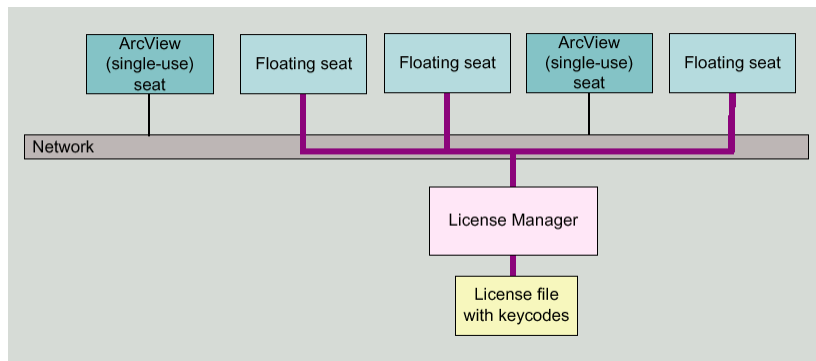
CIVE 201: Goals

What you will learn in this course:

- **Become familiar with ArcGIS**
 - Working with and running the program
- **Projections and Coordinate Systems**
- **Spatial data file formats** (properties and structure)
- **Data sources:** Reading existing data and creating your own
- **Selection by location and/or attributes** and editing spatial and attribute data
- **Basic GIS Analysis**
 - Vector based spatial analysis
 - Raster data and raster analysis
- **Building a Geodatabase** (?)
- **Generating, reading, and exporting maps**



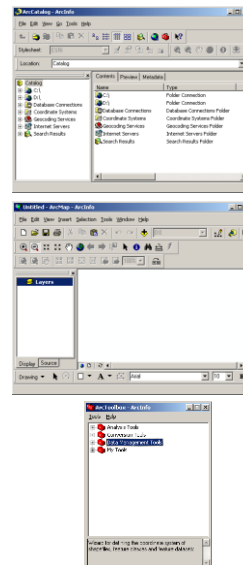
Licenses and Keycodes



- **License manager keeps track of number of simultaneous users and limits them to allowable number**
- **AUB has > 90**
- **You can install it on your PC from IT for the semester**

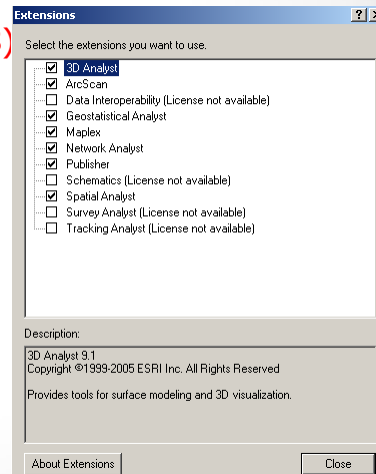
ArcGIS Has a 3 Part Interface

- **ArcCatalog** – for navigating spatial data and data management
- **ArcMap** – for creating presentation graphics and conducting analysis
- **ArcToolbox** – powerful geoprocessing tools (modeling/scripts)



The Extensions

- ArcGIS comes with a set of basic functionalities
- More specialized functionalities come with **Extensions** that are often industry specific
- Most need to be purchased (\$\$\$\$\$)
- Few are free/distributed by researchers
- AUB has bought many of these Extensions



Main Extensions

- **Spatial Analyst**
 - Allows for modeling and analysis with raster (cell-based) data. This includes creating density surfaces and conducting map algebra
- **3D Analyst**
 - Includes ArcGlobe. Allows users to view visualize and analyze spatial data in 3D. This includes extruding polygons (such as parcels and building footprints) and draping surfaces (such as orthophotos) on elevation models. You can also create video animations that simulate flying through your study area
- **Geostatistical Analyst**
 - This sophisticated tool allows users to analyze raster (cell-based) and point data using advanced statistical methods. Methods include Kriging and inverse distance-weighting
- **Network Analyst**
 - Allows for network-based analysis such as routing, determining closest facility, and service areas. Unlike simple representations of street networks that can be manipulated without this extension, networks can store information about traffic flow, one-way streets, and travel time

ArcCatalog

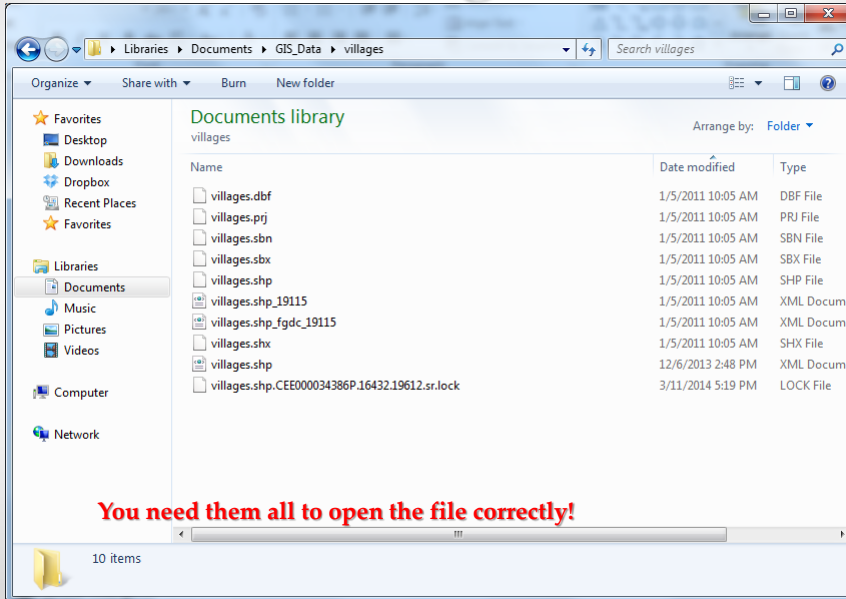
- ArcCatalog is similar to the **Windows "Explorer"**, or the "My Computer" icon on your windows desktop
- It is a tool for **navigating** through your GIS datasets
- It allows you to find, preview, document, and organize geographic data and create sophisticated **geodatabases** to store that data
- The benefit of using ArcCatalog is that it has been specifically designed for use with spatial data
- **EXTREMELY** important to use for copying and pasting your GIS data

ArcCatalog

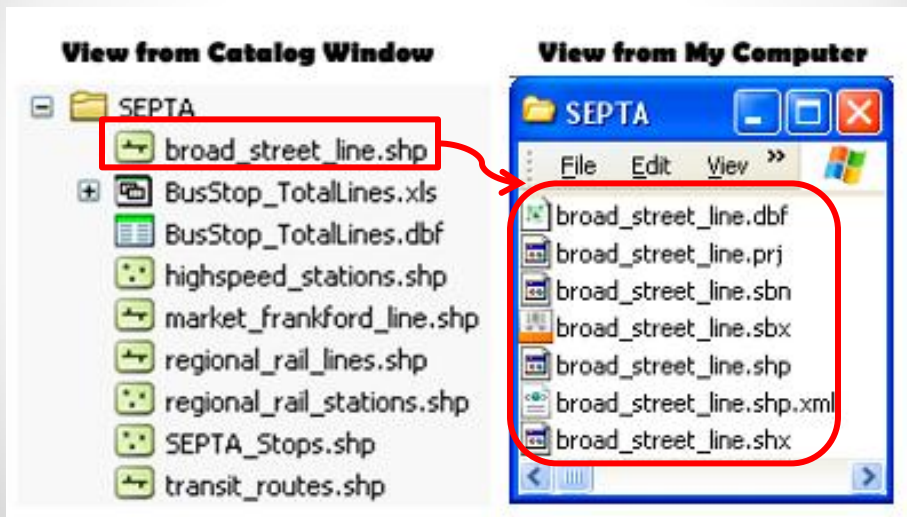
- Program was specifically designed to recognize all the relevant files that must be transferred with shapefiles, coverages and all of the other types of map documents
- Most of these files are **MULTIPART**
 - **Will not open unless you copy all of the files together**
 - Example a shapefile is at least made up of 3 files (usually 6 or 7)
 - These files should always stay together in the same folder to open correctly
 - Guaranteed with ArcCatalog

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The villages file



1 layer = more than 1 file



How do you email a file?



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You have to Zip and email the GIS file



- **Or share the folder on a common folder**

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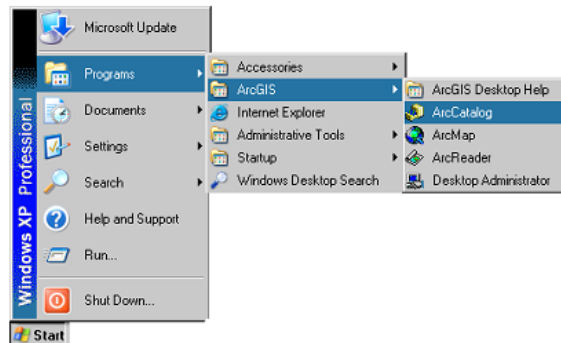
Download Data

- **Go to Moodle**
- **Download the file Greenvalley from Moodle to your own PC (Remember where you have saved)**
- **Unzip** it to your own working area (where you have access and ample space to save things)

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Starting ArcCatalog

1. **Click the Start button on the taskbar**
2. **Point to Programs to display the Programs menu**
3. **Point to ArcGIS**
4. **Click ArcCatalog**



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ArcCatalog

- **2 windows:**

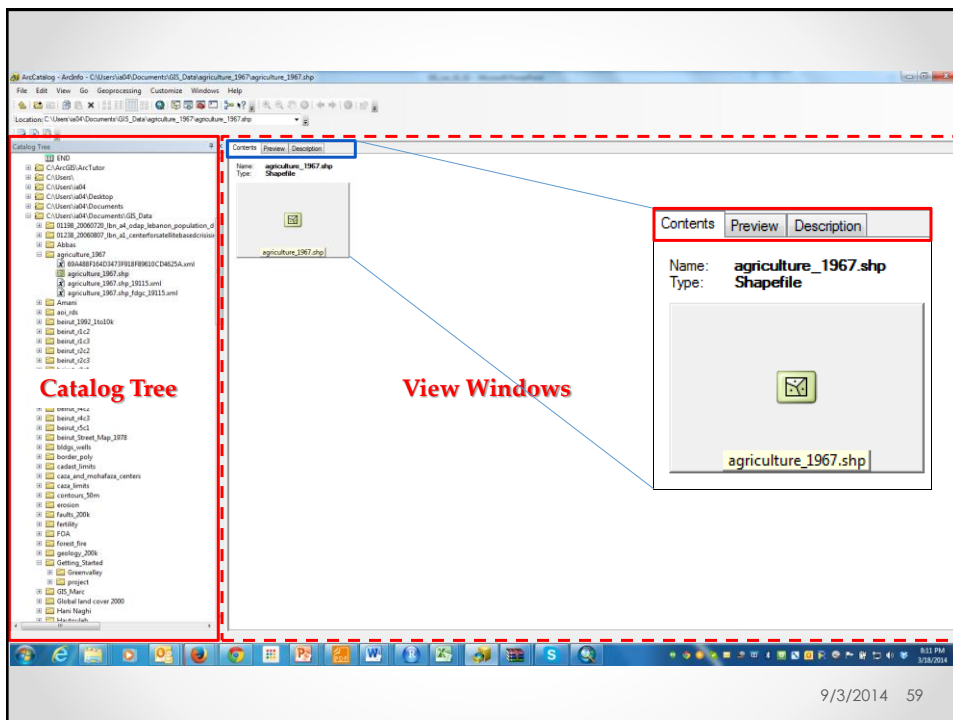
- I. Catalog Tree window (Table of Contents)

- II. Viewing window

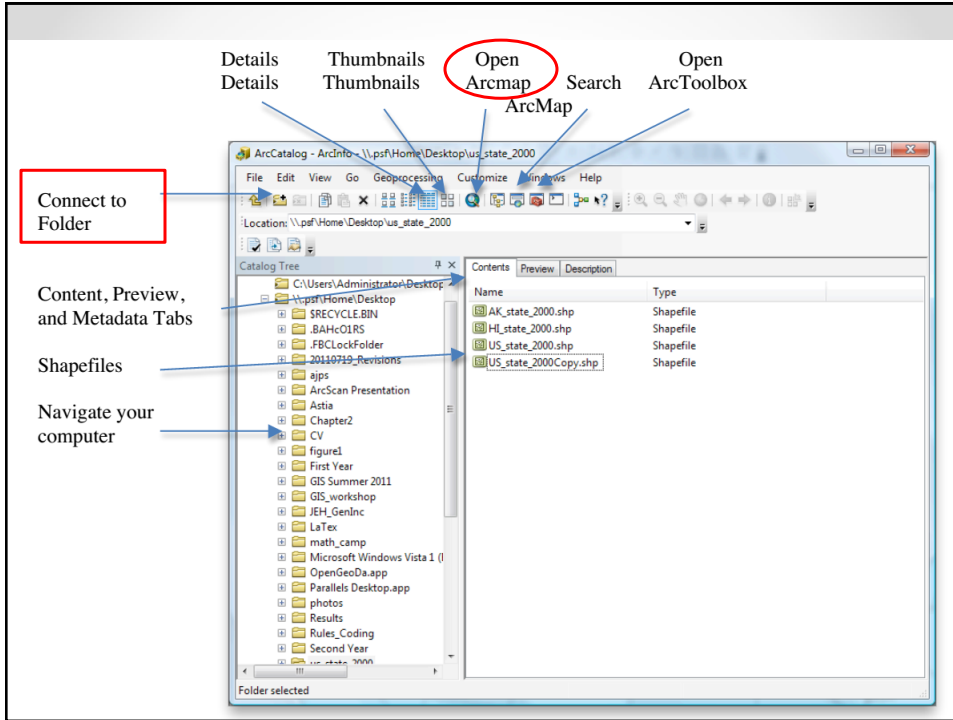
- **3 views:**

- Contents (What kind of file it is)
- Preview (both Geographic view and Tabular view)
- Description (metadata of your file)

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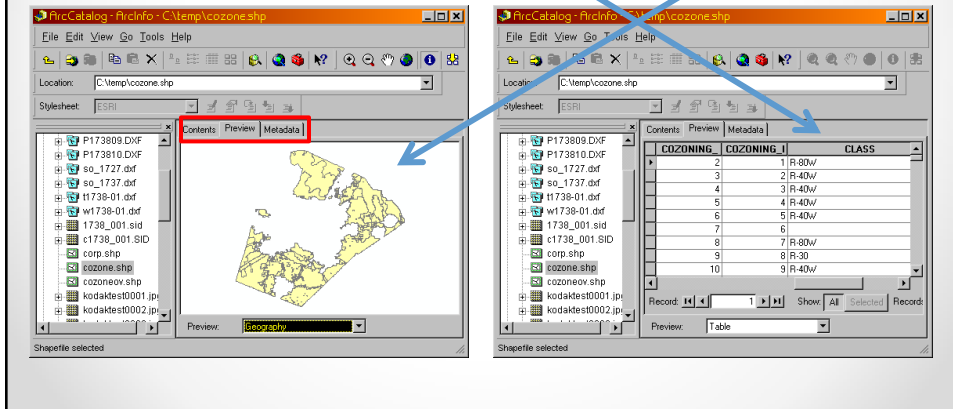


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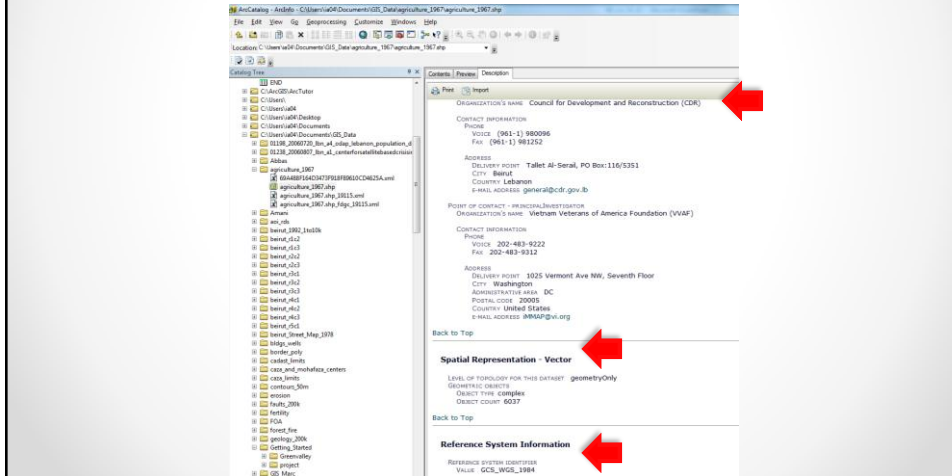
ArcCatalog: Previews

- Using ArcCatalog you can easily preview both your **spatial** datasets, and the **attribute** data associated with them
- You can also see the **Metadata** of your files



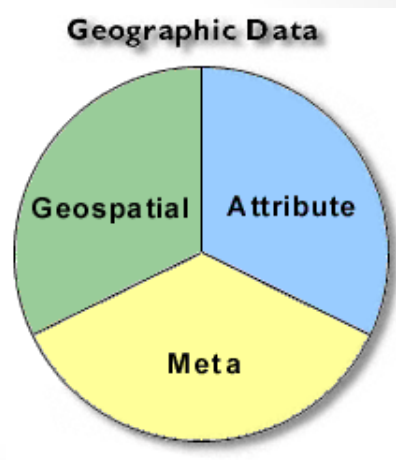
ArcCatalog: Previews

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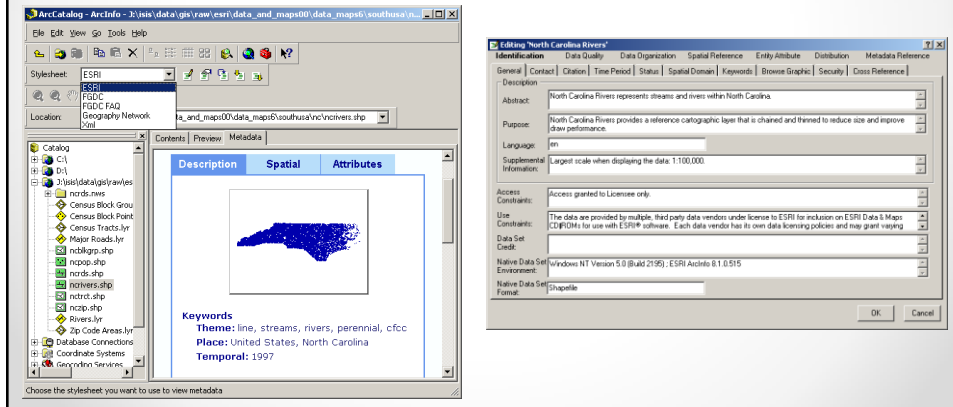
Metadata: A part of Geographic Data

- Metadata** is the third component of geographic data
- Geospatial data tells you where it is and attribute data tells you what it is
- Metadata describes both geospatial and attribute data



ArcCatalog: Metadata

- ArcCatalog includes tools for viewing and editing **Metadata**
- It even has an option to update some items in the metadata whenever a dataset is edited



What is Metadata

- **Metadata** is data about the data
- It consists of information that describes spatial data and is used to provide documentation of your data products
- Metadata is the **who, what, when, where, why,** and **how** about every facet of the spatial data
- According to the Federal Geographic Data Committee (FGDC), metadata is data about the **content, quality, condition, and other characteristics of data**
- **Unfortunately not always filled**

Metadata Should Include Data

About

FEMAFL

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification Information:

Citation:

Citation Information:

Originator: Federal Emergency Management Agency

Publication Date: 19960000

Title: FEMAFL

Edition: 1996

Geospatial Data Presentation Form: map

Series Information:

Series Name: Derived from the Flood Insurance Maps by FEMA

- **Date of data collected**
- **Date of coverage generated**
- **Bounding coordinates**
- **Processing steps**
 - **Software used**
 - **RMSE, etc.**
- **From where original data came**
- **Who did processing**
- **Projection/Coordinate System**
- **Datum**
- **Units**
- **Spatial scale**
- **Attribute definitions**
- **Who to contact for more information**

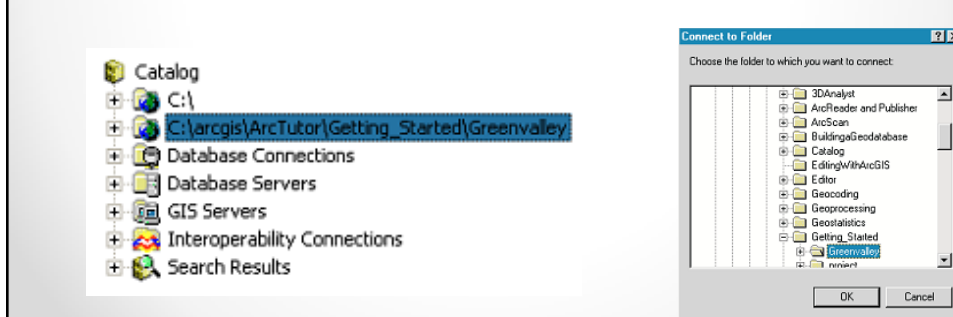
Connecting to Your Folder

- In order to add your own map layers, you will need to "connect to Folder" to show GIS where those other important folders reside
- To create a connection to a new folder, click on the "connect To Folder" icon at the top of the catalog window or right



Connecting to Your Folder

- When you click the button, a window opens that lets you navigate to a folder on your computer
- Go to where you downloaded the GreenValley data
- Click OK
- The new connection shows up as a branch in your File Tree



Exploring the Greenvalley Folder Connection

- Click the ArcGIS\ArcTutor\Getting_Started\Greenvalley folder to view its contents on the right side of the ArcCatalog window
- Click the plus sign to expand the connection in the Catalog tree
- ArcCatalog recognizes many different file types as **GIS data** including **shapefiles**, coverages, **raster** images, TINs, **geodatabases**, projection files, and so on

So What Do You See?



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ArcCatalog - ArcInfo - C:\Users\va04\Documents\GIS_Data\Getting_Started\Greenvalley\Greenvalley.mxd

File Edit View Go Geoprocessing Customize Windows Help

Location: C:\Users\va04\Documents\GIS_Data\Getting_Started\Greenvalley\Greenvalley.mxd

Catalog Tree

- beirut_r5c1
- beirut_Street_Map_1978
- bldgs_wells
- border_poly
- cadast_limits
- caza_and_mohafaza_centers
- caza_limits
- contours_50m
- erosion
- faults_200k
- fertility
- FOA
- forest_fire
- geology_200k
- Getting_Started
 - Greenvalley
 - Data
 - GreenvalleyDB.mdb ← **Geodatabase**
 - Hydrology
 - Parks
 - Public Buildings ← **Feature dataset**
 - Public Utility
 - parcels_polygon ← **Shapefile**
 - watermains_arc
 - watermains_nodes ← **Shapefile**
 - Transportation
 - street_arc
 - Greenvalley.mxd ← **ArcGIS Map Document**
 - metadata.xml ← **Metadata**
 - Water Use.lyr ← **Arc Layer**
 - project
 - GIS_Marc

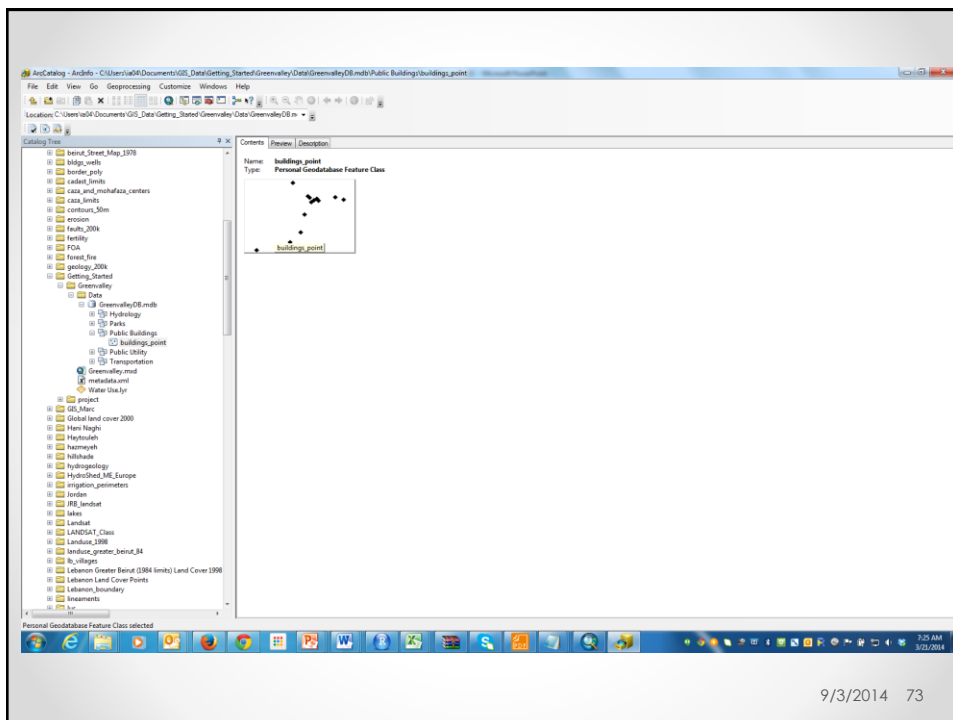
Map Document selected

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Viewing your files in ArcCatalog

- **Choose a file and click on it**
 - **Example: Choose Buildings_point under the Public Buildings Feature dataset**
- **What do you see on the right-hand side?**

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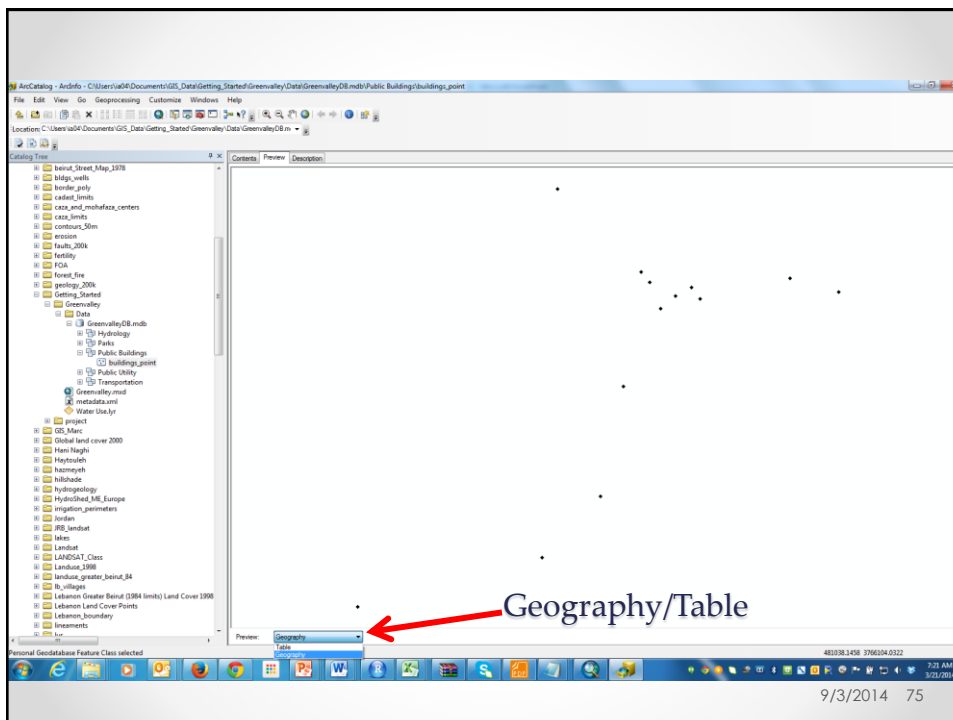


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Viewing your files in ArcCatalog

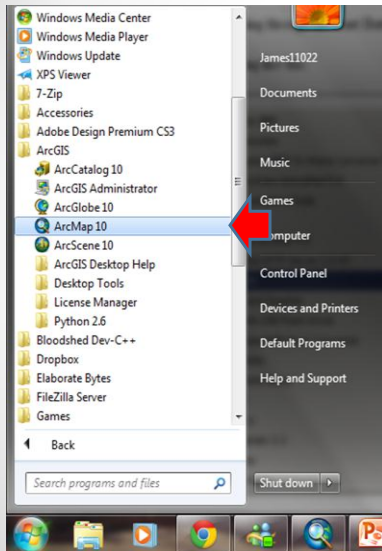
- **Choose a file and click on it**
 - **Example: Public Buildings**
- **What do you see on the right-hand side?**
- **Try to switch between**
Content>Preview>Description
- **Under Preview, change to "Table"**
- **Check out the Metadata of the file**

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Opening ArcMap



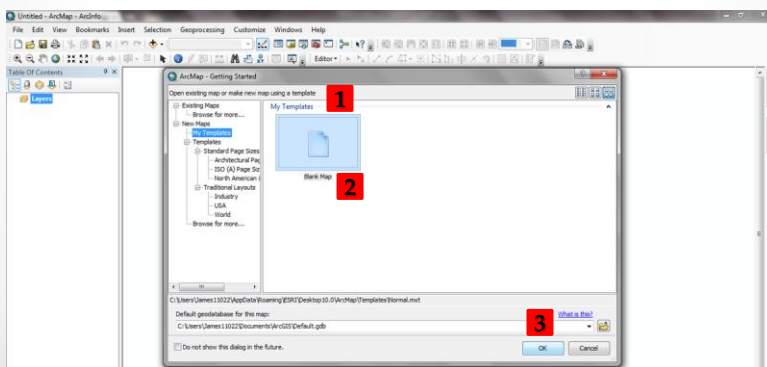
• Start ArcMap:

- The location of the ArcMap shortcut may vary from system to system

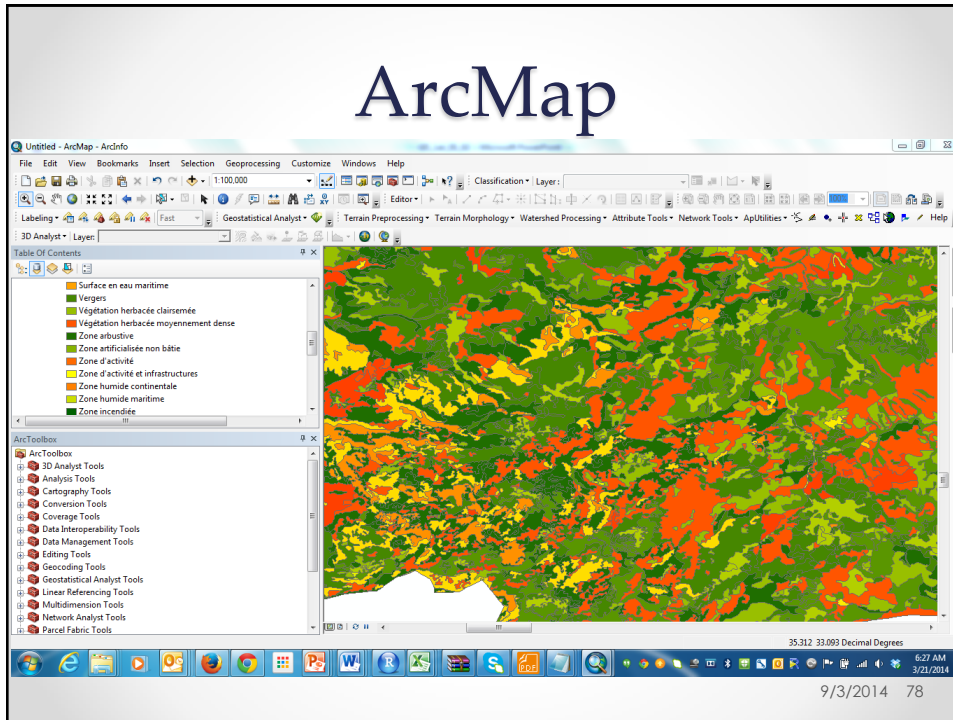
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Opening ArcMap

- When the "Getting Started" window pops up, click on New Maps under the "Open existing map or make new map using a template" (1)
- Under My Templates, select "**Blank Map**" (2)
- Click **OK** at the bottom of the window to open a blank map in ArcMap (3)



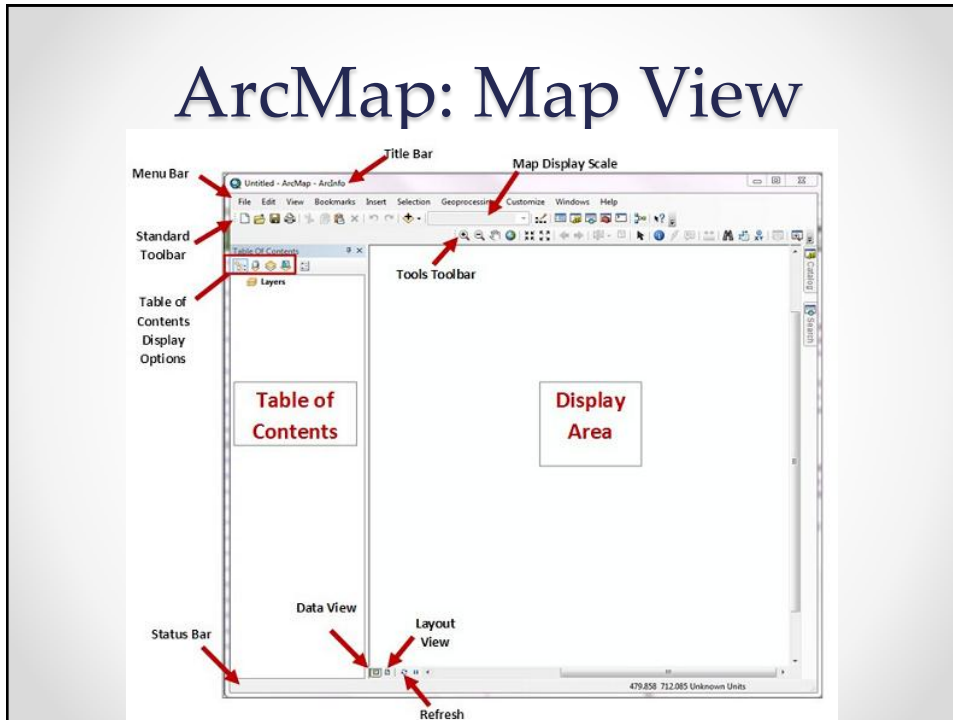
14 77



ArcMap

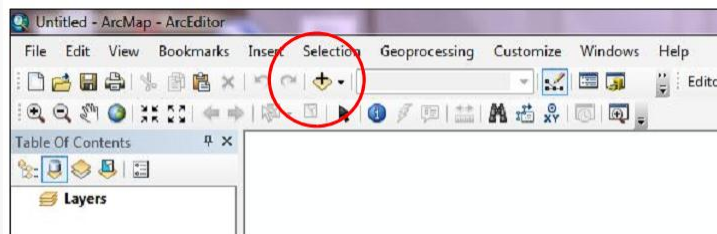
- ArcMap is your **virtual drafting table**
- It contains:
 - A **canvas** where GIS data layers are drawn
 - A **Table of Contents** (TOC) which helps keep track of the data in the canvas
- It is the interface which you will spend most of your time in
 - **Conduct interactive analysis**
 - **Visualization**
 - **Create maps**
- The canvas can be viewed in **2 states**:
 - **Data view**: where most of the analysis is done
 - **Layout view**: to create a presentation map
- There are several toolbars available in ArcMap
- There are also several menus available in ArcMap

ArcMap: Map View



Adding Data to a Map Document

- On the tool bar, click on the plus sign (add data) and navigate to your drive and the folder containing your recently downloaded data files



- Click on the files that you wish to add to the map
- If you want to add more than one file, you can hold down the control button and click on as many files as you want

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• Vector files have icons next to the name which show if the file is a point, line or polygon file (red oval)

• Raster files show a grid next to their name (blue circle)

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