Introduction to GIS with ArcGIS Pro

Working with GIS Data: Connecting to Data Sources

Session 3

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Lecture Outline

- Introduction & Recap (5 minutes)
- Dive deeper into **GIS data** (15 minutes)
- **Vector** and **raster** GIS data (10 minutes)
- How to **connect** to and **add data** from various sources in ArcGIS Pro (20 minutes)
- Guided Student Exercise & Q&A (10 minutes)

Course Outline

Week 0: Pre-Course Setup (Self-Paced)

- **Task:** This self-paced module must be completed before the first live class.
- **Topics:** Reviewing system requirements, understanding license options, downloading and installing ArcGIS Pro, and successfully signing in using the provided guidance.

Week 1: Getting Started with ArcGIS Pro

- **Class 1:** Introduction to ArcGIS Pro and Project Structure
- **Class 2:** Map Navigation and Data Exploration

Week 2: Working with GIS Data

- **Class 3:** Connecting to Data Sources
- **Class 4:** Populating a Geodatabase

Week 3: Coordinate Systems

- **Class 5:** Understanding Coordinate Systems
- **Class 6:** Managing Projections and Transformations

Recap of Season 1 & 2
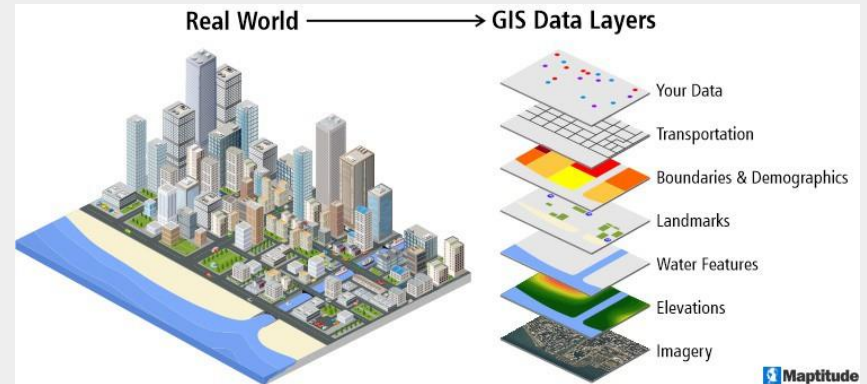
ArcGIS Pro Download, Installation, Login

ArcGIS Pro User Interface

ArcGIS Pro Project components

Map Navigation

Data Exploration

GIS Data

Real World ——→ GIS Data Layers

- Your Data
- Transportation
- Boundaries & Demographics
- Landmarks
- Water Features
- Elevations
- Imagery

Maptitude

GIS (Geographic Information System)

A GIS is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface.
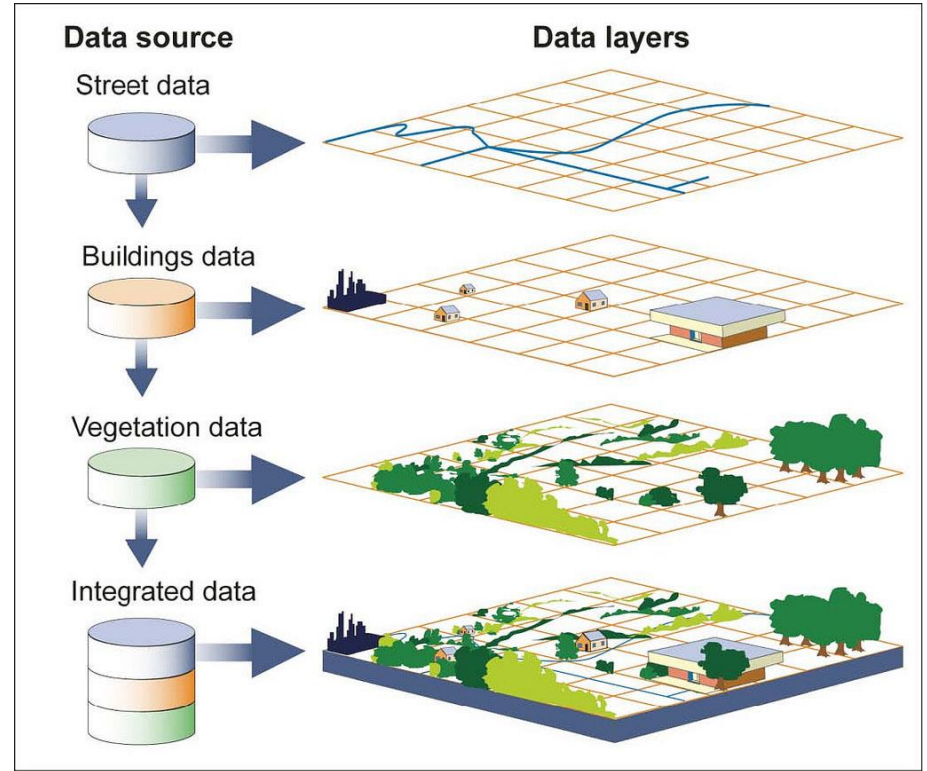
National Geographic

GIS data

GIS can show many different kinds of data on one map, such as streets, buildings, and vegetation.

This enables people to more easily see, analyze, and understand patterns and relationships.

GIS Data comprises of geometry (location) and attributes

It represent an object or location (generally) on earth.

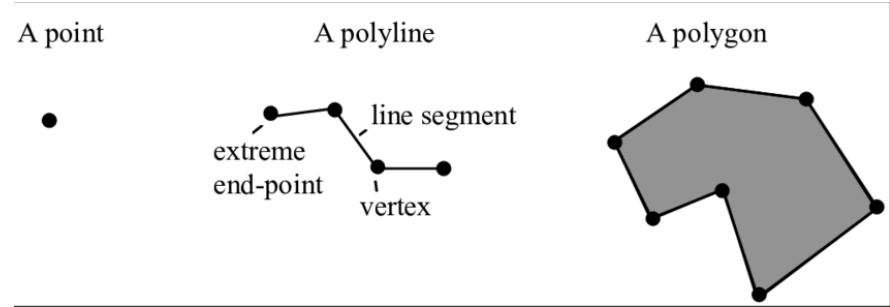GIS data are broadly classified into two groups: **vector** and **raster**.
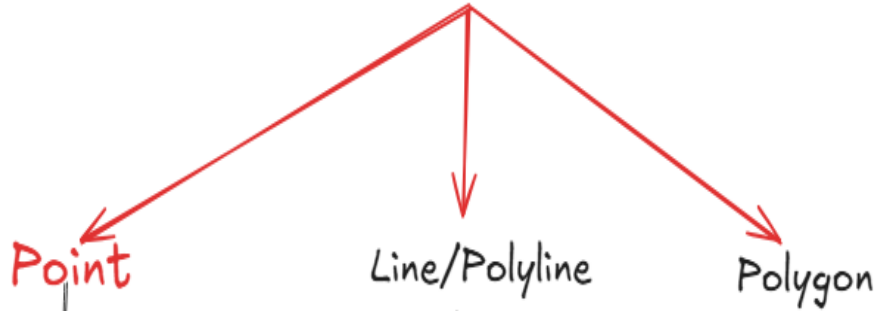

Source: GAO.

Vector Data

Point

Line

Polygon

| A point | A polyline | A polygon |

line segment

extreme end-point

vertex

https://www.researchgate.net/figure/Simple-fundamental-objects-in-GIS-points-polylines-and-polygons_fig25_239570238

Geometry (Vector) - Feature Class

Point

Represent features with no length or area, such as a single tree, a well, or a specific address

x value
y value
z value (optional/3D)
m value (optional)

Line/Polyline

A collection of two or more points
Each point is a vertext/node
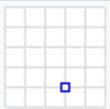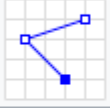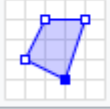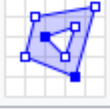Two connecting points will create a line segment or edge

Represent features with length but no area, like roads, rivers, or utility lines.

Polygon

Collection of three or more points & first and last points are the same

Two-dimensional, enclosed areas defined by a series of connected lines or points. Examples include land parcels, lakes, or city boundaries.
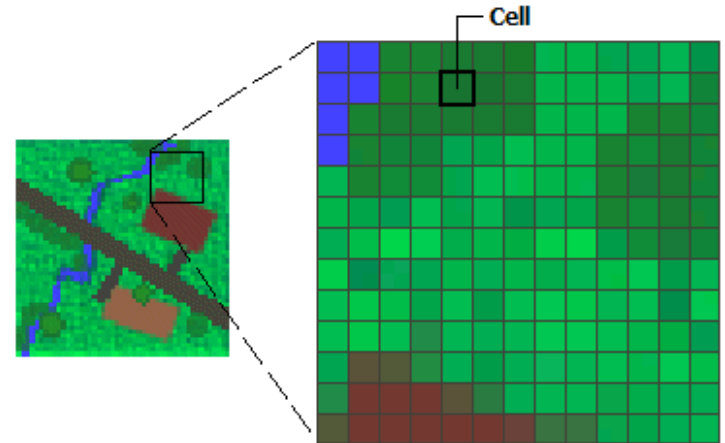
Geometry primitives (2D)

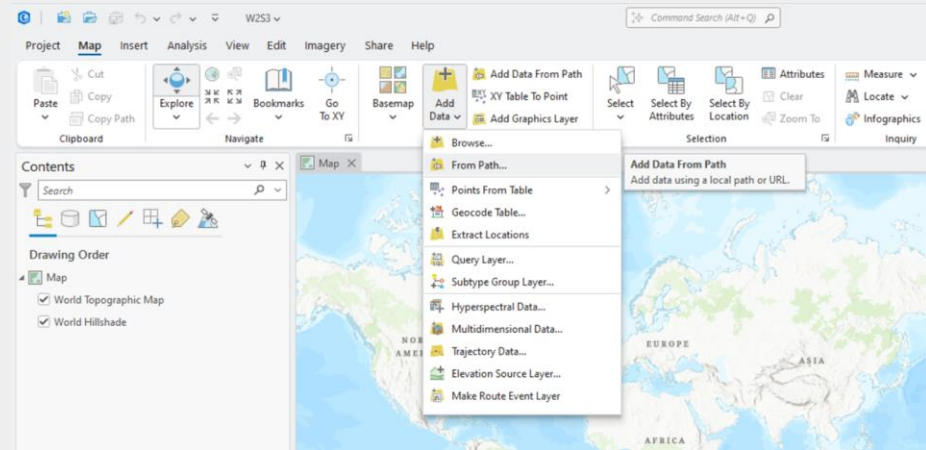| Type	Examples
Point	POINT (30 10)
LineString	LINESTRING (30 10, 10 30, 40 40)
Polygon	POLYGON ((30 10, 40 40, 20 40, 10 20, 30 10))
	POLYGON ((35 10, 45 45, 15 40, 10 20, 35 10), (20 30, 35 35, 30 20, 20 30))

Raster Data

In its simplest form, a raster consists of a matrix of cells (or pixels) organized into rows and columns (or a grid) where each cell contains a value representing information, such as temperature.

Rasters are digital aerial photographs, imagery from satellites, digital pictures, or even scanned maps.

Connecting to Data Sources in ArcGIS Pro

Sources of Data

Local GIS Data From Folder

- Local Computer (Local Folder/File)
- Other Computer (Network Folder/File)

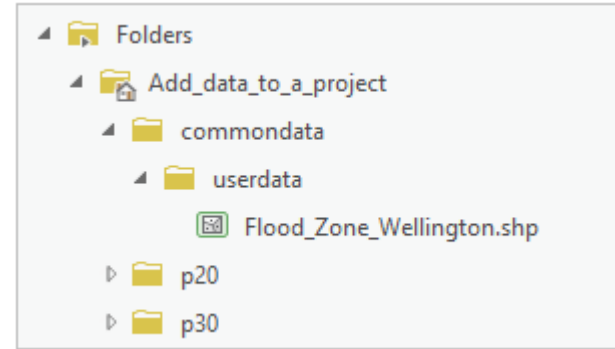**Local GIS Data from Geodatabase**

- File Geodatabase
- Enterprise Geodatabase

Web GIS Data

- ArcGIS Living Atlas of the World
- ArcGIS Online
- ArcGIS Enterprise
    - ArcGIS Portal
    - ArcGIS Server

Add data from a folder

- Shapefile
- CSV file
- Excel file
- Text file
- File Geodatabase
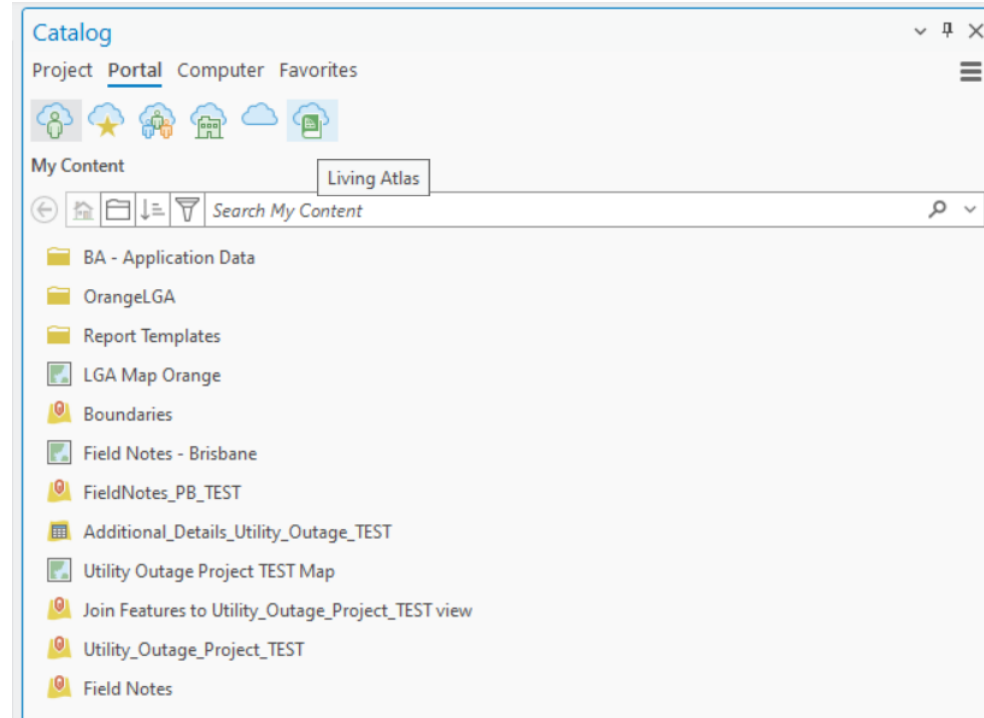- CAD file
- etc.

Add data from a geodatabase

- File Geodatabase
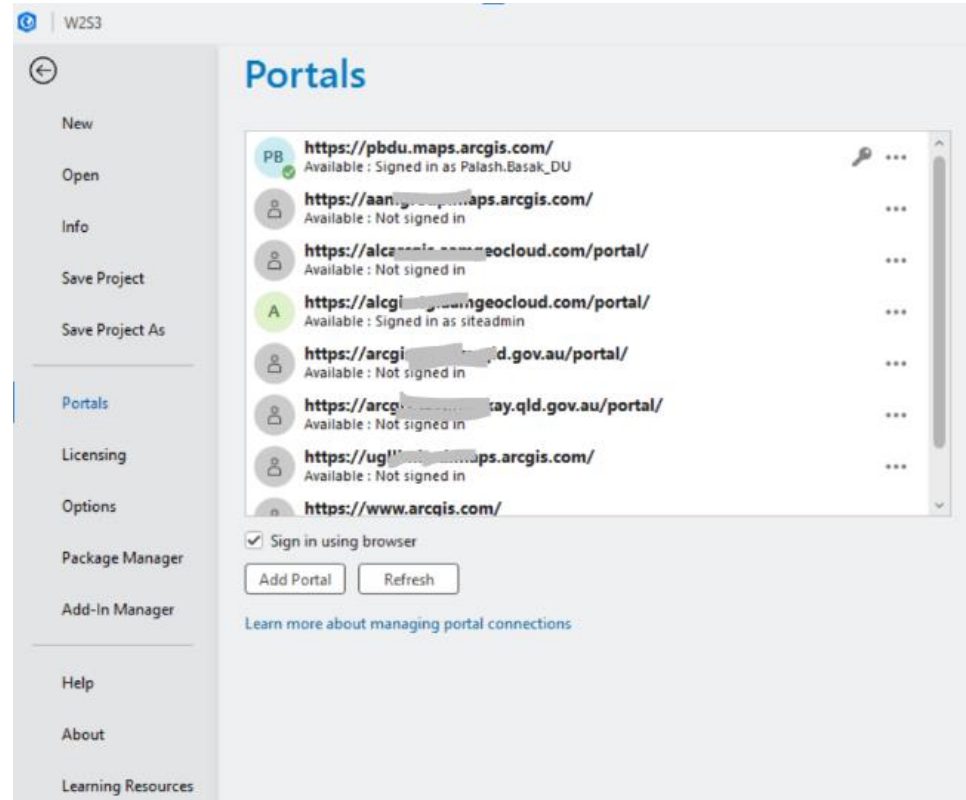- Enterprise Geodatabase

Add data from Web (Portal)

- Portal
  - My Contents
  - My Favorites
  - My Groups
  - My Organization
- ArcGIS Online
- Living Atlas

Set and sign-in to Portals

Project > Portals

Exercise

1. Create a new ArcGIS Pro Project
2. Add division boundary layer of Bangladesh in the default map (bgd_admbnda_adm1_bbs_20201113.shp) .
3. Rename the layer as (Division Boundary)
4. Add following ArcGIS MapService from LGED in the default map

   https://mapgis.lged.gov.bd/arcgis/rest/services/GSIMS/GsimsBaseMap/MapServer (GSIMS/GsimsBaseMap)

1. Explore different layers in the MapService

Preview for Season 4

- Understand more about Geodatabase.
- Learn how to create a File Geodatabase.
- Read, Create and Manipulate File Geodatabase items.

References

Add data to an ArcGIS Pro project

https://pro.arcgis.com/en/pro-app/latest/get-started/add-data-to-your-project.htm

What is raster data?

https://pro.arcgis.com/en/pro-app/latest/help/data/imagery/introduction-to-raster-data.htm