# Leveraging the *Where* of Geographic Data

GIS II Data Management

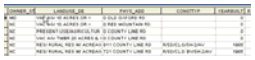
## Overview

- With multiple layers in your maps - are you interested in the relationships between these layers?
- Let's consider some useful tools:
  - Spatial selection
  - Spatial Join

## Review: Geographic Data?

**Components**

- Spatial (where?)
  - *Geometry or shape of an object*
  - *Where it is located*
- Attributes (what?)
  - *Tabular data*
  - *Describes an object*

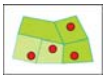


## Another Spatial Component of Data

**A brief discussion on topology in a GIS**

**Connectivity**
Connections between objects

**Containment**
Maintenance of boundaries and closed areas to define relationships with other objects



**Adjacency**
Relationships between objects that are next to each other

## Unleashing Spatial Operations

**Spatial selections/queries: Asking questions of your data**

Select features in one or more layers based on relationship to other features

**Spatial Joins: Connecting your data**

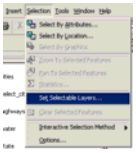
Uses spatial associations between layers to append fields from one layer to another

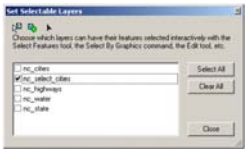
## Spatial Selections

- Select features based on location relative to other features
- Number of methods to select features within a layer or another layer
  - Point
  - Line
  - Polygon
- Not permanent

## Selection Layers

- Determine what layers can be selected
- Good if you have many layers in one project
- Also useful if you only want to focus on one or two layers

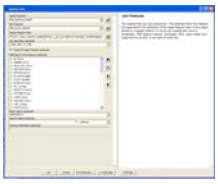



## Spatial Join

- **Join based on location of two layers**
  - **Creates new layer**
  - **Appends tables (join to target)**

- **Based on the relationship(s) between the two participating layers**
  - **Closest**
  - **Containment**
  - **Intersection**



## Spatial Join Example

**No Spatial Join**

**With Spatial Join**

## Key Spatial Join Considerations

- **Cardinality**
- **What is the spatial relationship you are leveraging?**

## Spatial Join ArcMap Reference

| Target features | Join features | INTERSECTS | CONTAINS | IS_WITHIN |
|---|---|---|---|---|
| Point | Point | A join point is matched to a target point at the same location. | Not applicable | Not applicable |
| Point | Line | A join line is matched to a target point that it intersects. | Not applicable | A join line is matched to a target point contained within the line. |
| Point | Polygon | A join polygon is matched to a target point that is inside or on the boundary of the polygon. | Not applicable | A join polygon is matched to a target point that is inside the boundary of the polygon. |
| Line | Point | A join point is matched to a target line that it intersects. | A join point is matched to a target line that contains it. | Not applicable |
| Line | Line | A join line is matched to a target line that it intersects. This includes lines that cross or are coincident. | A join line is matched to a target line that completely contains it. Here the join line is coincident with the target line. | A join line is matched to a target line that falls completely within the join line. Here the target line is coincident with the join line. |
| Line | Polygon | A join polygon is matched to a target line that it intersects. | Not applicable | A join polygon is matched to a target line that is inside the boundary of the join polygon. |
| Polygon | Point | A join point is matched to a target polygon that it intersects or is inside of. | A join point is matched to a target polygon that contains it. | Not applicable |
| Polygon | Line | A join line is matched to a target polygon that it intersects or is inside of. | A join line is matched to a target polygon that contains it. | Not applicable |
| Polygon | Polygon | A join polygon is matched to a target polygon that it intersects or is inside of. | A join polygon is matched to a target polygon that contains it. | A join polygon is matched to a target polygon that is inside the boundary of the join polygon. |