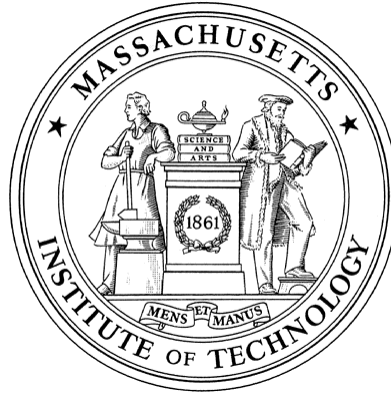


**Massachusetts Institute of Technology  
Department of Urban Studies and Planning**



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**11.204: Planning, Communications & Digital Media  
Fall 2002**

**Lecture 7: GIS - A Tool for Analyzing Community**

**Lorlene Hoyt  
October 29, 2002**

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- Continue MHI example from *Lecture 6*

**I. Overview**

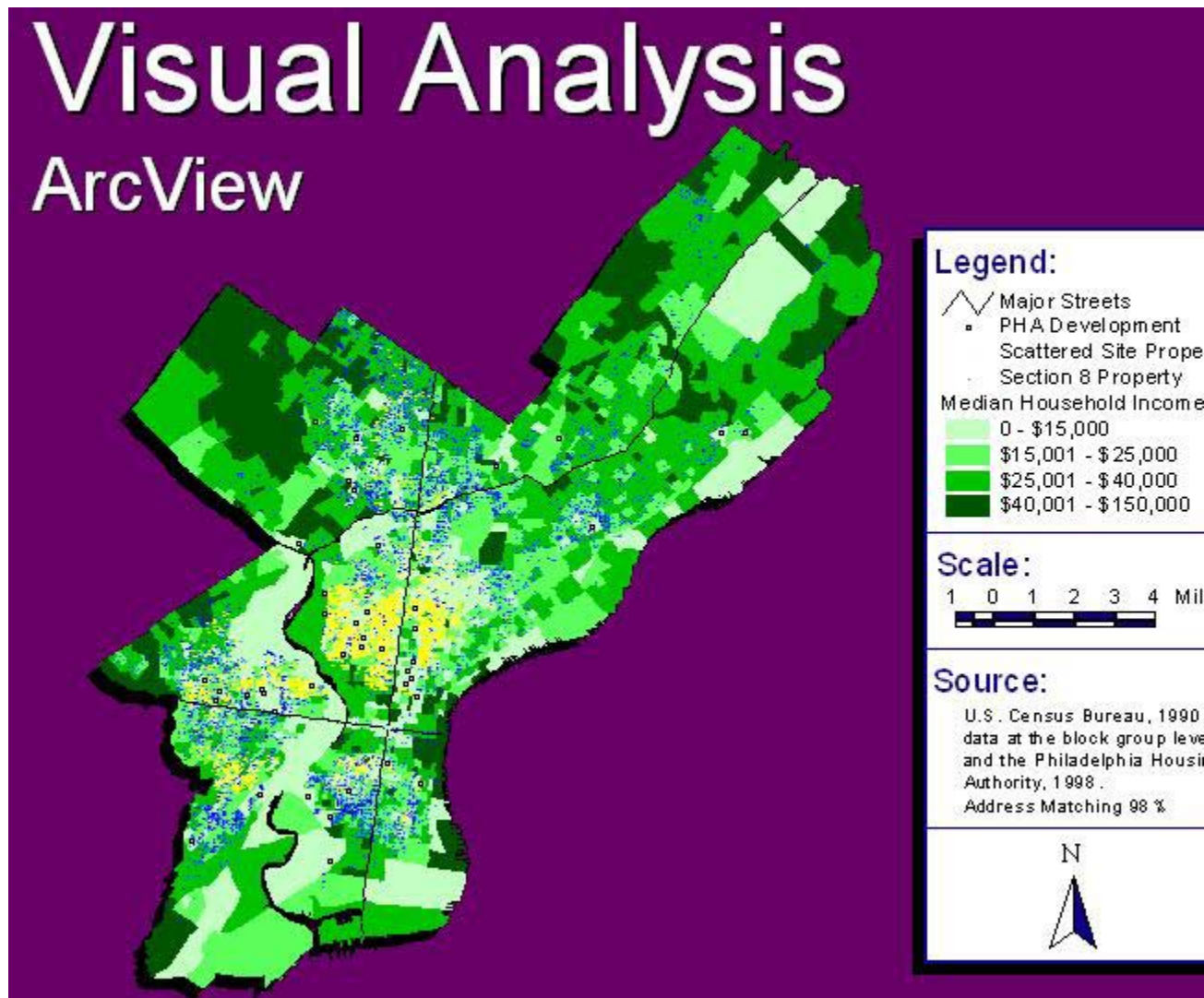
- Using GIS to Analyze Place
- A Quick Introduction to the Relational Database Model
- How Can You Learn More About GIS and RDBMs?

**II. Using GIS to Analyze Place**

We will continue our conversation regarding the transformation of data to knowledge, with an emphasis on spatial data analysis. This lecture will advocate the use of geographic information systems as tools for inquiry, demonstrating how spatial data analysis can assist in the formulation and testing of planning-related hypotheses.

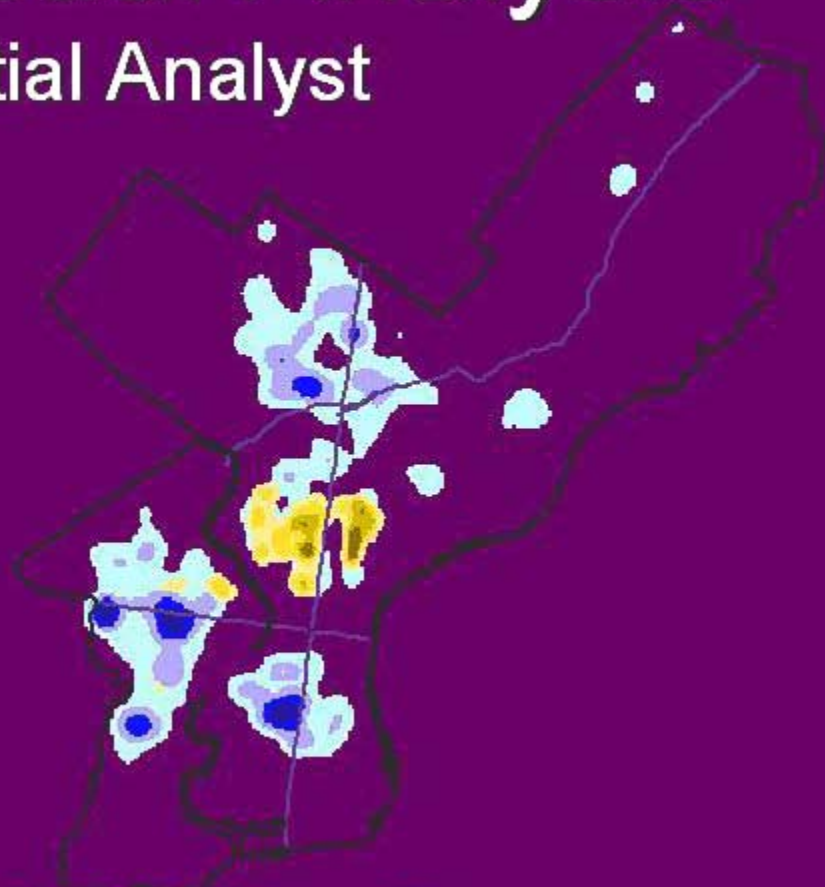
## Philadelphia, Pennsylvania (*Public Housing Program Example*)

- ESRI's ArcView, Spatial Analyst, and 3-D Analyst
- A Comparison of 3 Public Housing Programs; **Developments, Scattered Sites, and Section 8**
- From 1992 to 2002, HUD focused on "reducing the concentration of low-income families" and the "establishment of mixed-income communities"
- From 1993 through 1999, HOPE VI Demolition Grants to PHAs totalled more than \$3.7 billion (*Philadelphia has several HOPE VI Projects*)
- Approximately 40 Developments, 6,000 Scattered Sites and 11,000 Section 8 Certificates
- What will a visual and exploratory analysis of housing program data reveal?



# Visual Analysis

## Spatial Analyst



Density Per Square Mile

Legend:

- Major Streets
- Density from Scattered Sites
  - 0 - 500
  - 501 - 1000
  - 1001 - 1500
  - 1501 - 2000
  - 2001 +
- Density from Section 8
  - 0 - 150
  - 151 - 300
  - 301 - 450
  - 451 - 600
  - 601 +

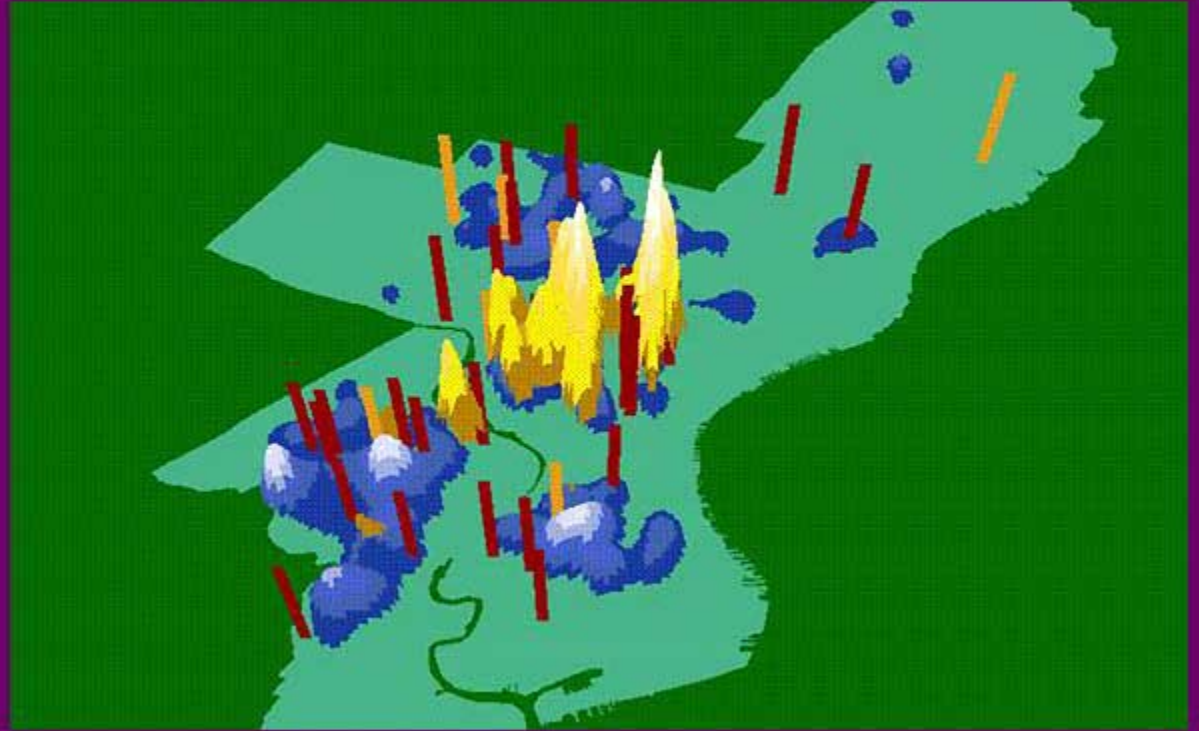
Scale:

1 0 1 2 Miles

N

# Visual Analysis

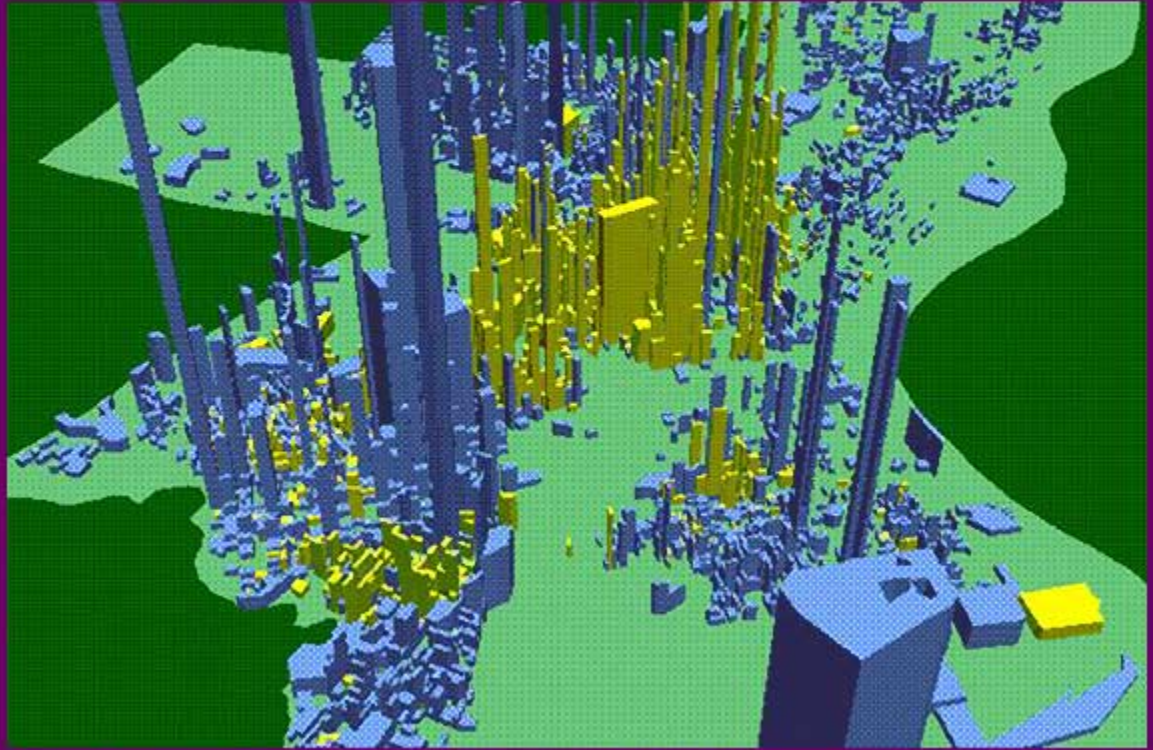
## 3D Analyst



Density with **Family** and **Elderly** Developments

# Visual Analysis

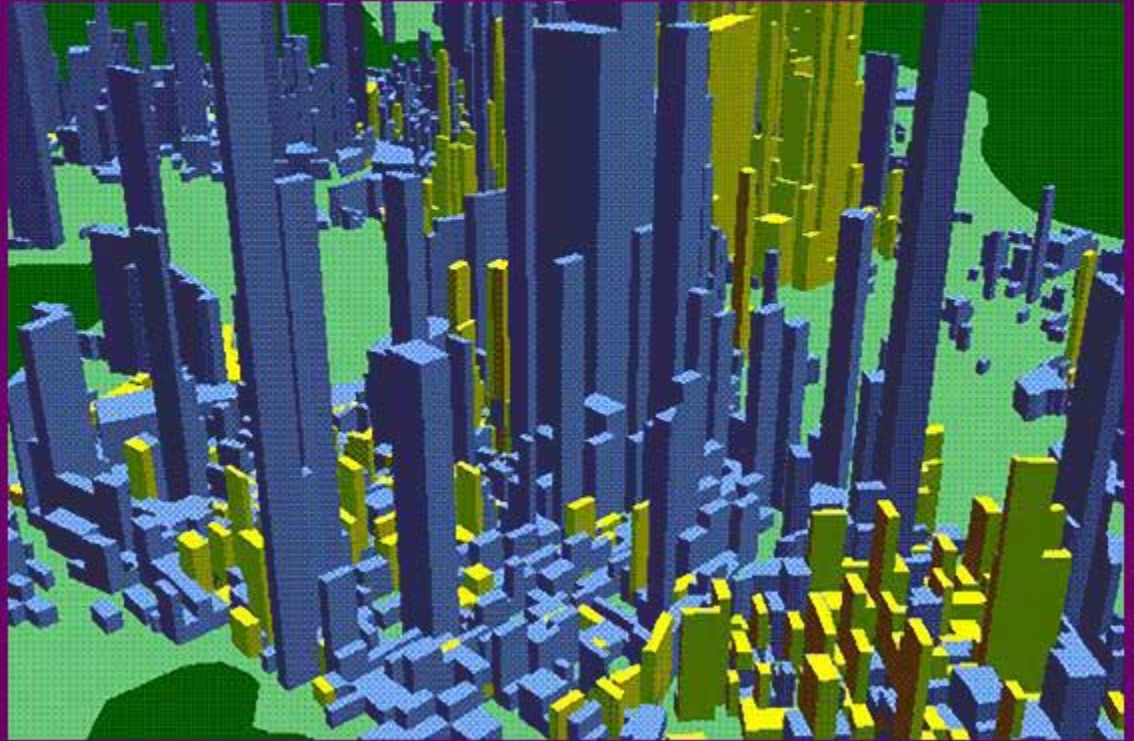
## 3D Analyst



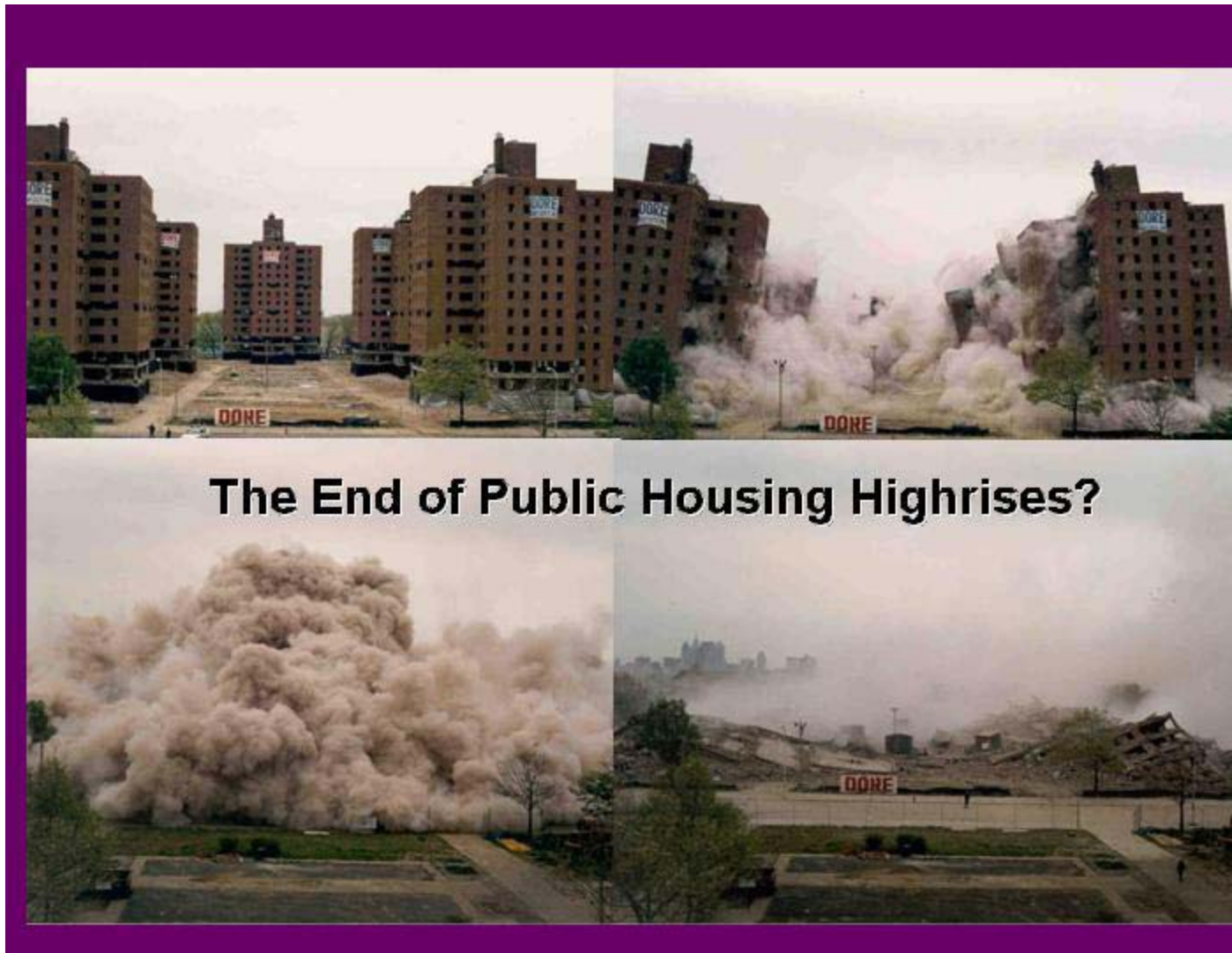
Block-level Extrusion – Scattered Sites and Section 8

# Visual Analysis

## 3D Analyst



Block-level Extrusion of West Philadelphia



**Keep in mind, visual analysis can detect powerful spatial relationships; therefore, GIS are helpful for generating hypotheses (and it's never too early to think about your thesis!) For example,**

*"While a salient goal of the Philadelphia Housing Authority's Scattered Sites Program is to provide subsidized housing units in mixed-income neighborhoods, in some areas of the city the program concentrates low-income families in virtual developments. The same is true for the Section 8 Program."*

Similarly, GIS are helpful for testing hypotheses.

### **III. A Quick Introduction to the Relational Database Model**

- The project above relied on ESRI (mapping software) as well as MS Access (database management software)

- What are databases? A tool that helps you to find answers to questions that would be too difficult or time-consuming to answer by hand
- How are databases organized?
- Simplest form is a single table that stores data in rows and columns
- More complex model is relational database, where there are multiple tables that can be joined by using a common field, like ID
- Most common database format is \*.dbf (database format) and most data software packages import/export these files
- RDBMS (Relational Database Management Systems) refers to a software application that uses a relational database model to hold data

**EXAMPLE: Section 8 Program Database**

**TABLE** = A system of rows and columns (*simple database*)

Client_ID	Ten_Name	Ten_Addr	Unit_ID
000001	Doe, Jane	123 Walnut Street	6789
000002	Smith, John	456 Chestnut Street	2345

**Value** = One piece of data

**Row** = Set of data about one thing (*also called a record, instance, or tuple*)

**Column** = Contain fields (*also called attributes*)

**RELATIONAL DATABASE** = a group of tables that hold related information (*single topic*)

<b>TENANTS</b>	<b>INSPECTIONS</b>	<b>VENDORS (LANDLORDS)</b>
Client_ID ( <i>Primary Key</i> )	Unit_ID ( <i>Primary Key</i> )	Ven_ID ( <i>Primary Key</i> )
Ten_Name	Insp_Area	Ven_Name
Ten_Addr	Insp_Date	Ven_Addr
Ten_Phone	Unit_Sqft	Ven_Phone
Unit_ID	No_Bath	Unit_ID



#### **IV. How Can You Learn More About GIS and RDBMs?**

- Visit the [GIS Laboratory](#) in Rotch Library (or web site for geographic data)
- Visit [ESRI's](#) web site
- Visit ESRI's [Virtual Campus](#); Contact Sarah Williams, GIS Specialist to sign up for a free course
- Think about taking [additional GIS-related courses](#) at M.I.T.
- For more on Relational Database Management Systems, Access, FoxPro, Oracle, SQL Server, Go to [Element K](#)

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Created by Lorlene Hoyt. Part II of this lecture comes from work done by Lorlene Hoyt and Amy Hillier at the University of Pennsylvania.