GEOG 475/575
Digital Compilation & Database Design

Course Overview

gIS

- MIS – (R)DBMS
- GIS Data
- Geodatabase
- Internet GIS DB

- DB Design
- Data Automation
- Editing / Compilation
- Applications

It’s all about applications!

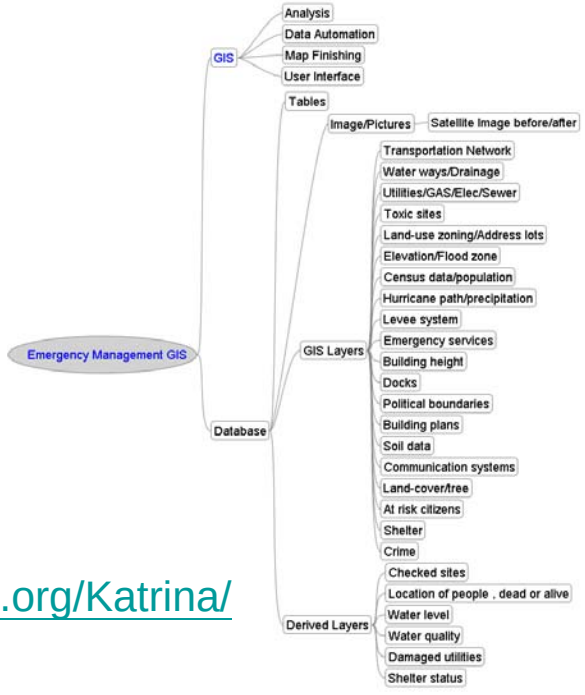
- GISCorps Alert

  In response to hurricane Katrina's disaster, GISCorps has been asked to provide 20 volunteers to Mississippi Emergency Operation Center (EOC) in Jackson, Mississippi. They need two groups of ten volunteers:

  Group 1: Must have at least 5 years of experience and well versed in using ArcGIS 9.0 in an SDE environment, comfortable in making maps and conducting quick analysis. Experience in disaster management is a plus.

  Group 2: Must have at least 5 years of experience and well versed in using ArcGIS 9.0 and GPS software and equipment. Must bring their own laptop loaded with 9.0 and also must bring a GPS unit compatible with ArcGIS.

  This group will be working with search and rescue teams and K-9 units mainly collecting data and navigating.



- http://ucgis.org/Katrina/

The Digital World

- Data are abstract models of objects we observed.
- Building a database = building a model
- GIS Data models
  - Vector
  - Raster
  - Triangulated irregular network (TIN)
  - Regions
  - Dynamic segmentation
  - Object-oriented
- A computer is a digital world.

Digital Representation

- Bit
- Byte = 8 bits
- Word = 2 or 4 bytes
- Block = 512 or 1024 bytes
- 1 KByte = 1024 bytes
- 1 MB = 1024 KB

Binary and Decimal Number Systems

Decimal	Binary
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111 $= 1*2^3+1*2^2+1*2^1+1*2^0$

Variables - Data types

- Text: ASCII (American Standard Code for Information Exchange)
- Binary

BLOB (Binary Large OBjects, e.g., images)
GUID (Global identifier)

Name	Specific range, length, or format	Size (Bytes)	Applications
Short integer	-32,768 to 32,767	2	numbers without fractions within specific range; coded values
Long integer	-2,147,483,648 to 2,147,483,647	4	numbers without fractions within specific range
Single-precision floating point number (Float)	approx. $-3.4E^{-38}$ to $1.2E^{38}$	4	numbers with fractions within specific range
Double-precision floating point number (Double)	approx. $-2.2E^{-308}$ to $1.8E^{308}$	8	numbers with fractions within specific range
Text	up to 64,000 characters	varies	names or other textual qualities
Date	mm/dd/yyyy hh:mm:ss AM/PM	8	date and/or time
BLOB	varies	varies	images or other multimedia
GUID	36 characters enclosed in curly brackets	16 or 38	customized applications requiring global identifiers

Primitive DB Operators

- Data Definition Statements
  - CREATE, DROP, ALTER
- Structured Query Language (SQL) Statements
  - INSERT
  - DELETE
  - UPDATE
  - SELECT (Retrieve)

SQL Insert

INSERT INTO table_name VALUES (value1, value2,....)

INSERT INTO table_name (column1, column2,...) VALUES (value1, value2,....)

SQL Update

UPDATE table_name SET column_name = new_value WHERE column_name = some_value

```
UPDATE Person SET FirstName = 'Nina' WHERE LastName =
    'Rasmussen‘

UPDATE Person SET Address = 'Stien 12', City = 'Stavanger' WHERE
    LastName = 'Rasmussen'
```

SQL Delete

DELETE FROM table_name WHERE column_name = some_value

```
DELETE FROM Person WHERE LastName = 'Rasmussen‘

DELETE * FROM table_name
```

SQL Select

SELECT column_name(s) FROM table_name

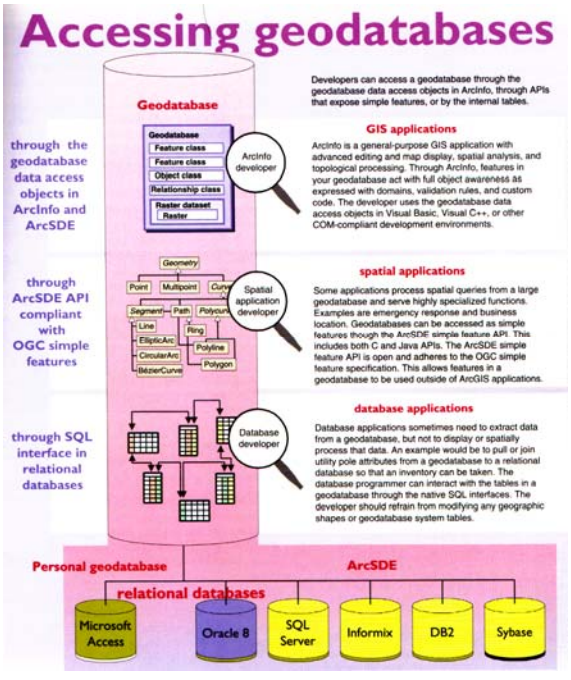
SELECT LastName,FirstName FROM Persons

SELECT * FROM Persons

SELECT column FROM table WHERE column operator value

SELECT * FROM Persons WHERE City='Sandnes'

SELECT * FROM Persons WHERE FirstName LIKE 'O%'



Spatial Reference

- Projection
- Reprojection on the fly
  - If only one raster dataset is displayed, the output will be in the same coordinate system as the input (a very common situation).
  - If multiple raster and feature datasets are in the same coordinate system, the output will be in that same coordinate system.
  - If more than one raster dataset is input, the output will be in the same coordinate system as the first input.
  - If feature and raster data with different coordinate systems are input to a function, the feature dataset will be projected to the coordinate system of the raster. The output will be in the coordinate system of the raster.
  - If feature data is input, the output will be in the same coordinate system as the first input.

Database Schema

- A schema is a collection of components and database objects under the control of a given database user.