GIS on the Internet

Interactive mapping

- You've seen this before: NYT college football fan map
- For discussion:
  - What is 'interactive' about this map?
  - How does this map differ from a static map? Is it better?

Web 2.0 and geographic information

- **Web 2.0**: emphasis on user-generated content and the web as a platform
- Internet content not simply top-down, but highly interactive
- Demand for applications that allow users to interact with (and create their own!) geographic data

Examples of Web 2.0

- Google Maps
- OpenStreetMap
- Mapping Twitter data

Web maps vs. GIS

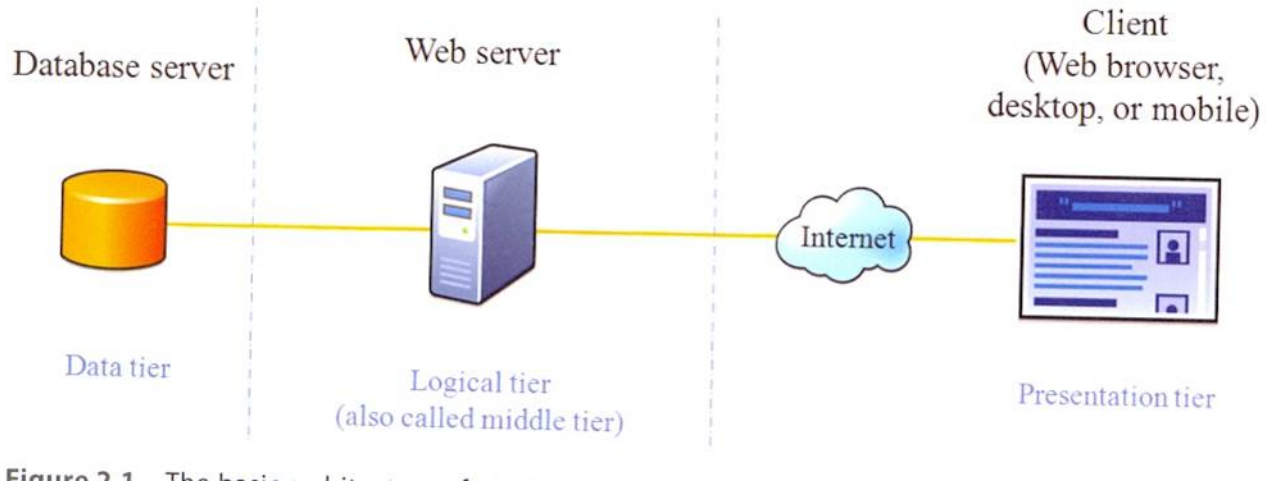
- For discussion: can an internet mapping application be considered a GIS?

Web GIS

- Designed to simulate desktop GIS experience in a browser or on a mobile device
- However, whereas a desktop GIS is geared toward a trained user (you all!), internet GIS applications should be designed for the average Internet user

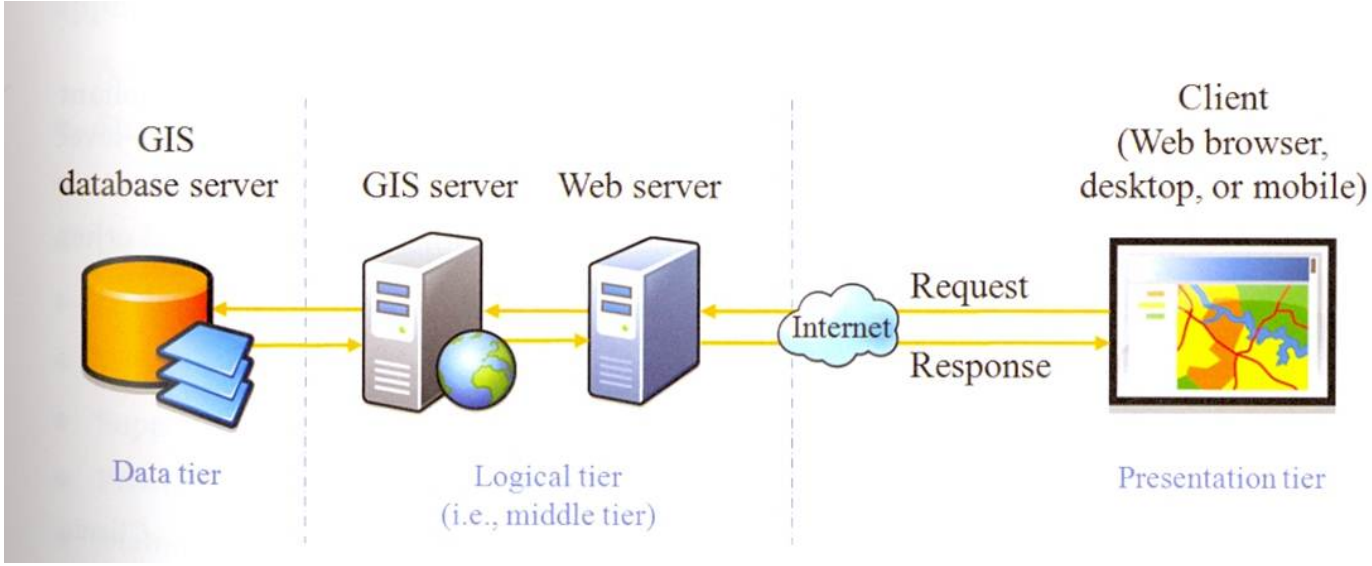
Client/server architecture

- **Web server** hosts and serves sites and data to be consumed by **web clients** (e.g. your browser)



Source: Fu and Sun (2011)

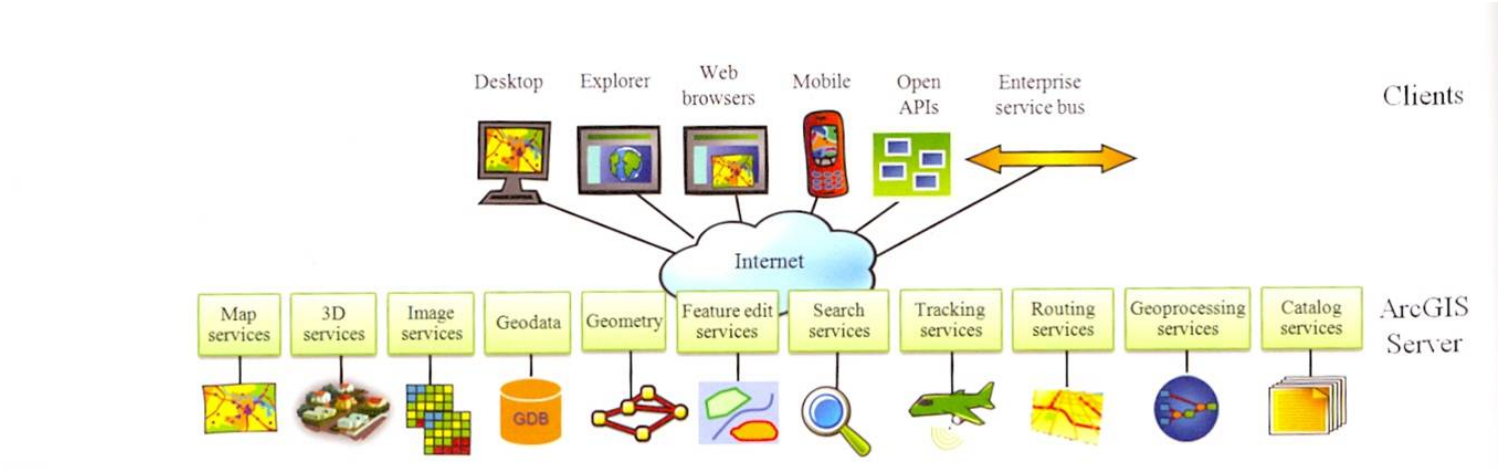
The distributed GIS process



Source: Fu and Sun (2011)

GIS servers

- Server: machine that hosts and "serves" GIS services to clients
- GIS server software: ArcGIS for Server, GeoServer, MapServer (open source)



Source: Fu and Sun (2011)

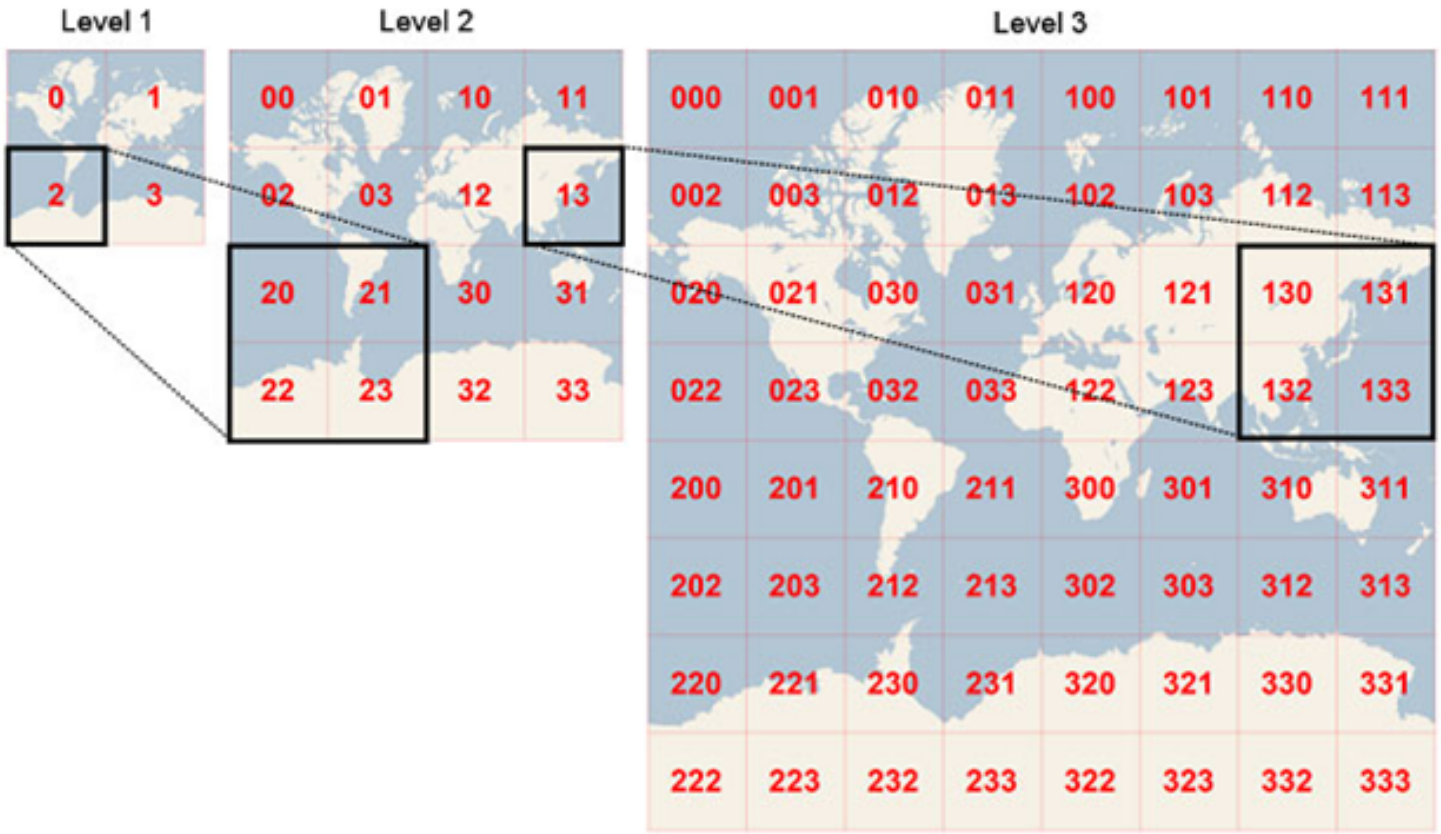
Geospatial web services

- **Map services**: geospatial data (maps) serves as images (e.g. JPEG, PNG)
    - **Tiled map service**: maps generated from pre-made "tiles" stored in server's cache
- **Feature services**: geospatial data served as vectors
    - Allow users to create, edit, delete, and query data

Tiled mapping

- To speed browsing, web maps often display map services as "tiles"
- Tiles are defined by their **zoom level** and **coordinates**

How tiled mapping systems work



Source: Bing Maps

The Web Mercator coordinate system

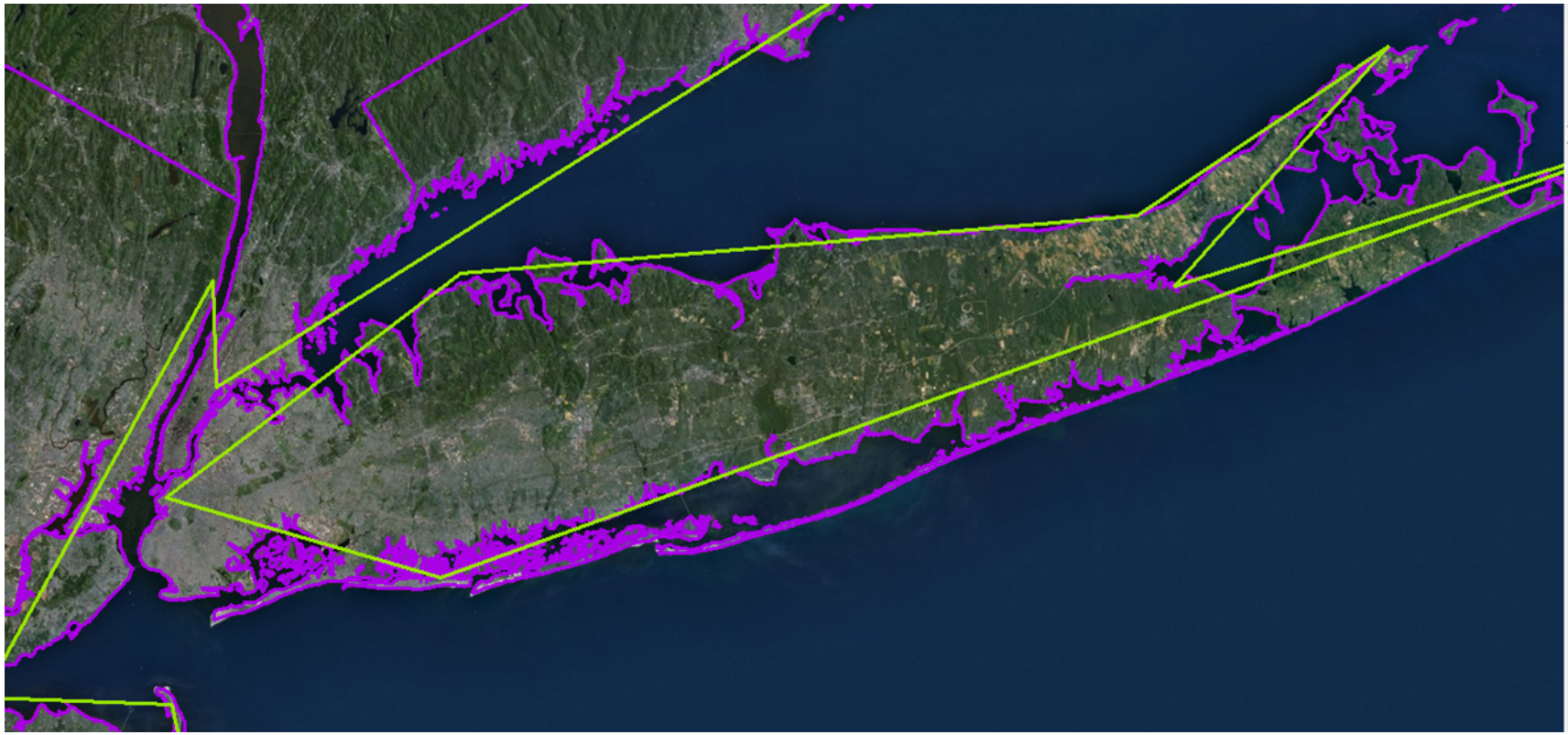
- Web mapping systems commonly use a variant of the Mercator projection
- Mercator used because of its **conformal** and **cylindrical** properties

Web map design

- Principles of web map design:
  - Generalization
  - Scalability
  - Minimalism

Generalization

- Important to consider purpose of your map when selecting resolution of your data



Generalization

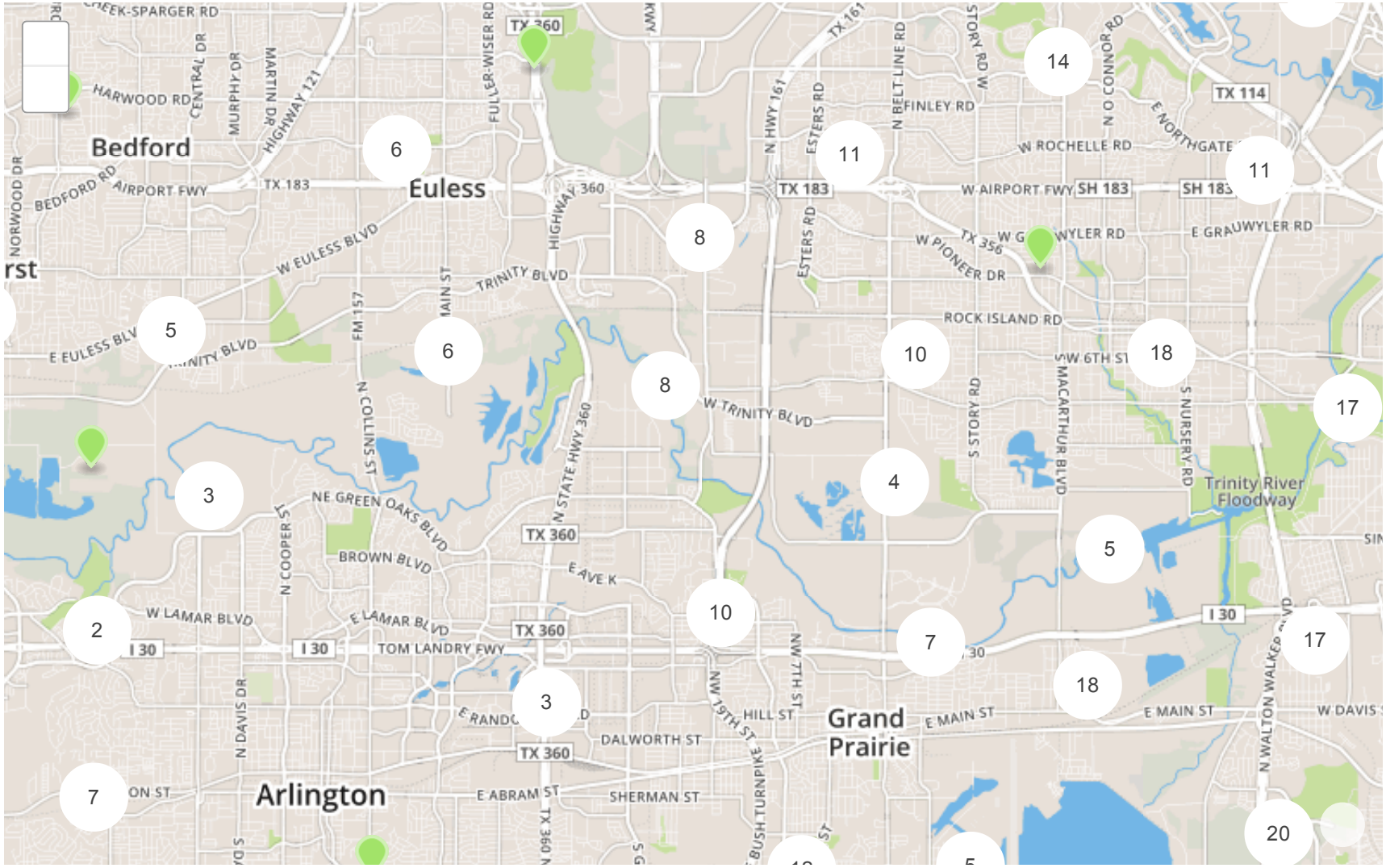
- At small scales, lots of detail can be unnecessary and computationally burdensome
- Large feature services can be very slow in web maps
- When building applications, ask yourself: how much detail do I need?
- In ArcGIS: look for the "Generalization" toolset in the "Cartography" toolbox

Scalability

Example: NPR Census Map

Minimalism (when appropriate)

Minimalist solution



Principles of public-facing interfaces

From Brian Timoney - web maps should be:

- Fast
- Intuitive
- Informative
- Fast

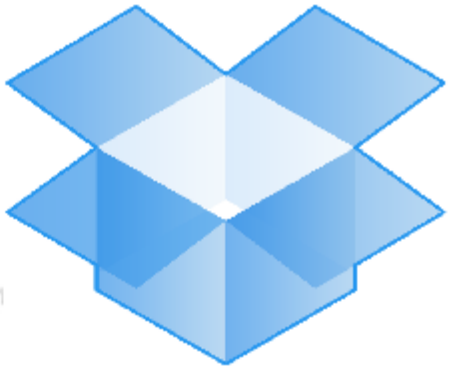
More from Brian Timoney on why map portals don't work

Cloud computing

- Traditionally, web services were hosted on in-house servers (which can be expensive to maintain)
- Growing trend toward use of **software-as-a-service** (SaaS)

Examples of cloud computing

Google™
Docs



Dropbox

ArcGIS Online

- Subscription-based service; links with ArcGIS suite of products
- Hosts data as tiled or feature services
- Limitations:
  - Can only display a maximum of 1000 features
  - Confusing pricing structure
- Link: http://www.arcgis.com

Tutorial: ArcGIS Online

- Hundreds of World Regional Geography students at TCU have learned to make web maps with ArcGIS Online
- Let's check it out!