

# INTRODUCTION TO DATA MANAGEMENT AND SPATIAL DATABASE



Dealing with SpatioTemporal Data in Movement and  
Population Ecology - Trento, Italy - 18/22.03.2016

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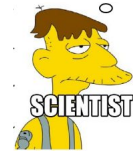
**[World]** A MOVING OBJECT IN ITS ENVIRONMENT



**[Data]** SAMPLED AT REGULAR INTERVALS

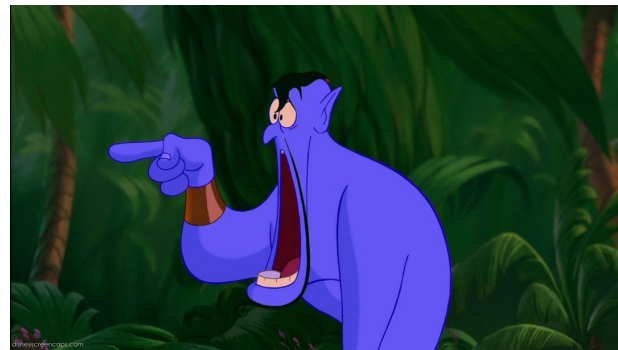


**[Goal]** STUDIED AT MULTI SPATIAL/TEMPORAL/  
ECOLOGICAL LEVELS



# BY CHANCE DO YOU HAVE TO MANAGE DATA THAT...

- are a huge amount?
- have a complex structure?
- need quality check?
- come in real time with high frequency?
- have spatio-temporal references)?
- have multiple/distributed/different users?
- are merged with other data sources/sensors?



... OR THAT ...

- need many tools (analyze/disseminate/visualize)?
- are supposed to be used AND reused?
- will be shared (at a certain point)?
- will be connected to other information systems?
- must be preserved on the long term? [!]
- will have to be published?



# AND WITHOUT A MANAGEMENT SYSTEM IT HAPPENED THAT ...

You continuously find and fix errors

You spend hours to upload new data

No one else is able to reuse the data

You introduce new errors with your data handling procedures

You spend ages to format your data for analysis

There are dozens of versions of the same file

Valuable data are lost when data collector/owner changes job

You get lost in multiple, connected spreadsheets



SPATIAL DATABASE  
THERE IS HOPE!



- Storage capacity
- Retrieval performance
- Server/client structure (modular approach)
- Remote access
- Permission policy
- Concurrency control
- Data preservation
- Data formalization
- Data integrity controls



- Relational environment (data modelling)
- Easy automation of processes
- Integration in wider e-infrastructures
- Standardization
- Documentation
- Backup/recovery
- Cost effective
- Relational environment (data modelling)

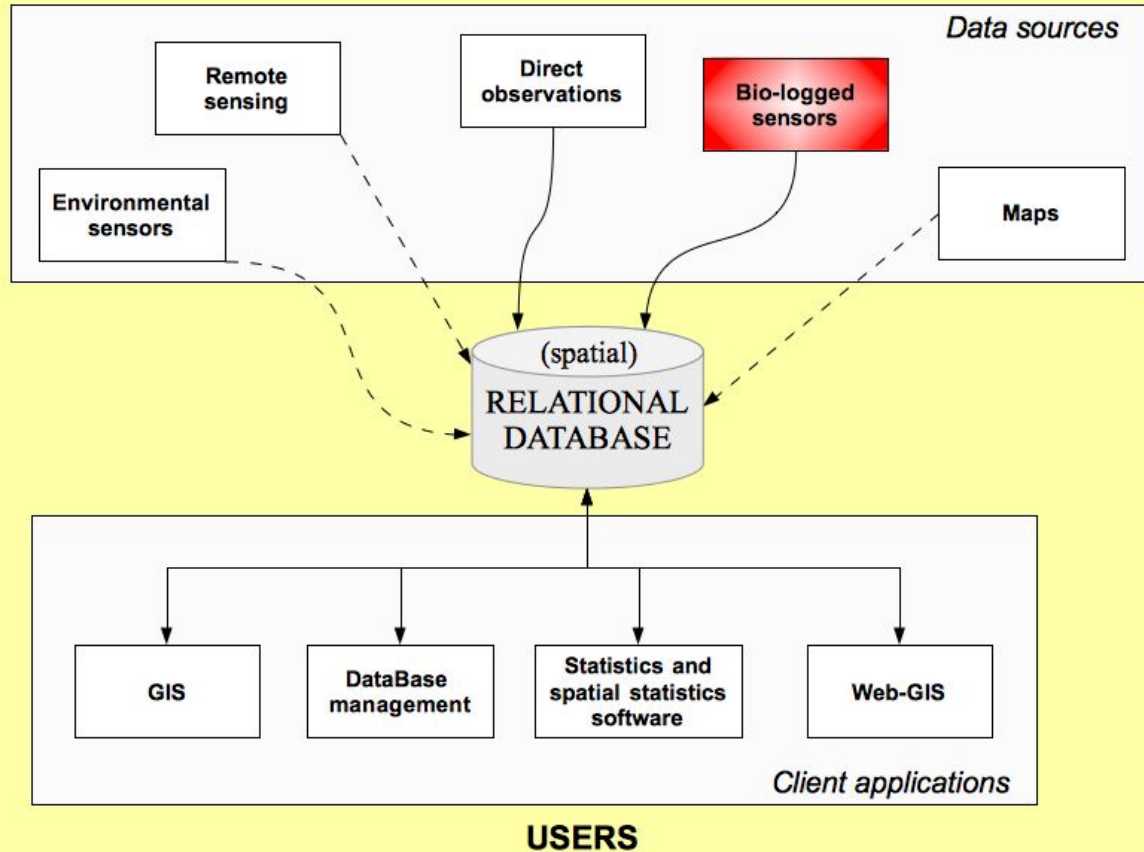
**DATA MANAGEMENT SKILLS ARE NEEDED!**



# THE SPATIAL BIT

- Spatial (and temporal) data types
- Spatial SQL
- Spatial indexes
- Animals modelled as moving object
- Integration of environmental layers  
*From a geographical space to an animal's ecological space*

## REAL WORLD



# SPATIAL DATABASE CAN MAKE:

- **Easy** what is complex
- **Fast** what is slow
- **Automated** what is “hand (and hard) work” based
- **Permanent** what is temporary
- **Unique** what is replicated

MORE TIME FOR (BETTER)  
SCIENCE !

# WHY OPEN SOURCE?

- No costs for licenses
- Great spatial tools for management and analysis
- Use of standards (interoperability)
- Support of community
- Open approach to knowledge
- Why not?

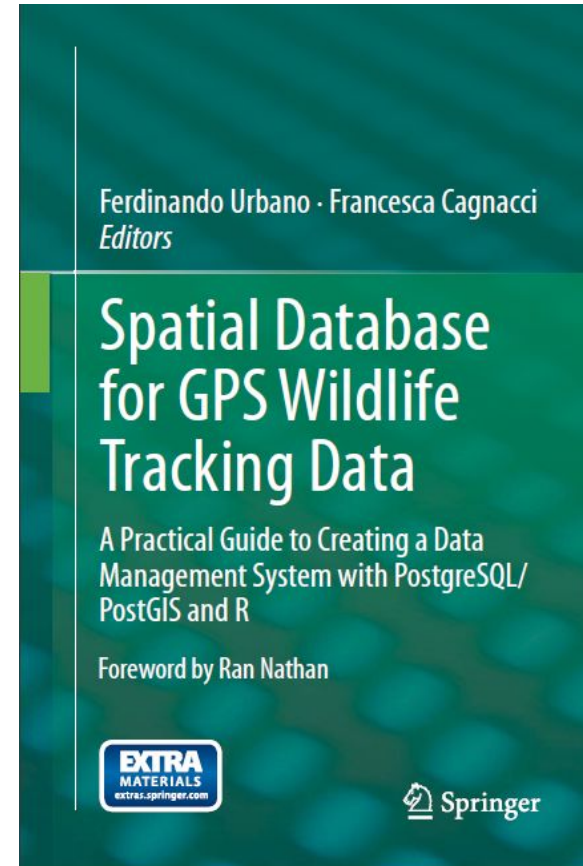
# WHY POSTGRESQL/POSTGIS?

- Spatial functions
- Spatial indexes
- Geography data type, raster, topology, 3D, ...
- Supported by many software
- Active and collaborative community
- Fast development

# OTHER OPTIONS FOR DATA MANAGEMENT: SPATIALITE

- No DBMS administration, no complex installation
- Simple with good performances
- Portable file
- Good for single users, simple applications, move data
- Implement many OGC specifications

"ASK AND IT WILL BE GIVEN TO YOU"  
(LUKE, 11)



# DATA MANAGEMENT IS IMPORTANT!



IT CAN EVEN HELP YOU TO FIND A REAL JOB IN THE FUTURE!



# BONUS SLIDE: TECHNICAL ISSUES WITH A SHARED DATA

- Quality checks
- Standardization of data structure
- Standardization of data content
- Standardization of ancillary information
- Different sampling rates
- Global spatio-temporal references
- Permission policy
- Remote access from different tools
- Increasing size of data sets