Introduction to Relational Databases with MySQL

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Relational databases remain some of the most powerful tools available for storing and manipulating structured data. Databases reside behind a huge fraction of today's websites and are a crucial component in many systems used daily around the world, from banking to social networks systems. Bioinformatics has used databases to store from simple protein sequences to complete genomes and proteomes. Databases play a key role for everyday scientific work around the world, providing services that range from a BLAST search to downloading the latest articles on your research field. This workshop provides a general introduction to databases, and introduces the popular relational data model.

Throughout the course, we will learn how to represent a biological problem and gather the requirements needed to build an Entity-Relationship Diagram (ERD), the basic data model for building a database. Relational algebra will provide us with a useful set of operators useful to "ask" or query a database. We will later introduce SQL, the Structured Query Language used by most relational databases to create, populate and query a database. Finally, we will model a database with MySQL Workbench and go through the steps to create and manage our own database.

This course is aimed at students with some basic understanding of linux and basic scripting abilities.

Unit 1: Relational databases
- ¿What's a database?
- Basic concepts.
- Relational databases.
- Entity Relationship Diagrams.
- Keys and relationships.
- Introduction to relational algebra.

Unit 2: Language MySQL
- Creation, modification and deletion of tables.
- Constraints (primary key, foreign, etc.).
- Insert, delete and update data.
- Query I: Basic statement (SELECT, FROM, WHERE).
- Query II: subqueries (groupings, comparing sets, functions, etc.)

Unit 3: Creating my first database
- Generate an entity-relationship diagram using MySQL Workbench
- Import a database from an entity-relationship diagram to MySQL (MySQL Workbench).
- Managing a MySQL database with phpMyAdmin
- Insertion / modification / updating data.
- Query the database using different criteria by performing the relational algebra operations.