



SoilCare

SOILCARE FOR PROFITABLE AND SUSTAINABLE
CROP PRODUCTION IN EUROPE

SOILCARE
monitoring
database

THE PROBLEM

Monitoring in the SoilCare project of the Soil-improving Cropping Systems (SICS) experiments in each of the 16 study sites is complex. The agricultural cropping systems and experiments in SoilCare include complex interactions of processes and various management practices and/or treatments under a wide range of environmental and climatic conditions. In order to help the researchers and stakeholders to efficiently exchange data, promote interdisciplinary collaboration and to simplify the modelling and analytical procedures, SoilCare used standardised formats to monitor and document these systems and experiments.



OVERVIEW OF DATABASE

A data collection and data storage system was developed by researchers from the University of Leuven to make the data readily available in a way that information is useful, easy to access and download, and safe, relying only on open source software. The database is designed to allow for:

- the storage of data and metadata regarding the experimental set-up;
- associated people and institutions;
- information about field management operations and experimental procedures which are clearly separated for making analytical procedures faster;
- links between system components; and
- information about the environmental and climatic conditions

DATABASE DESIGN

The database kernel consists of a PostgreSQL database. A “Use Case” approach typical for software and system’s engineering was implemented for designing and programming the import and query system, which is accessed via a web-accessible interface. The major benefit of the novel approach was not only that the data can be safeguarded in a common database, but also that they were more consistent and therefore easier to compare and combine.



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Raw data are entered by the users into structured spreadsheets. The quality is checked before storing the data into the database. A desktop import application has been created to upload the information from spreadsheets to the database, which includes automated error checks of the relationship tables, data types, data constraints, etc. The final component of the design is the database web application interface, which enables users to access and query the database across the study sites without the knowledge of query languages and download required data.

DATABASE SYSTEM STRUCTURE

In the figure below, the physical model of the monitoring system architecture is presented. The data tier contains two kinds of databases to promote the safety of the users' personal data. PostgreSQL that contains the data about the cropping system and MongoDB that contains users' authentication data. In the application tier 'Express' a minimal and flexible Node.js web application framework is used as a middleware between web-application and databases to communicate with the databases and return the responses to the web application. In the presentation tier, Angular is used for the front-end development, HTML (Hyper Text Markup Language) is used to define the content and structure of the web page and CSS (Cascading Style Sheets) for the styling of the content.

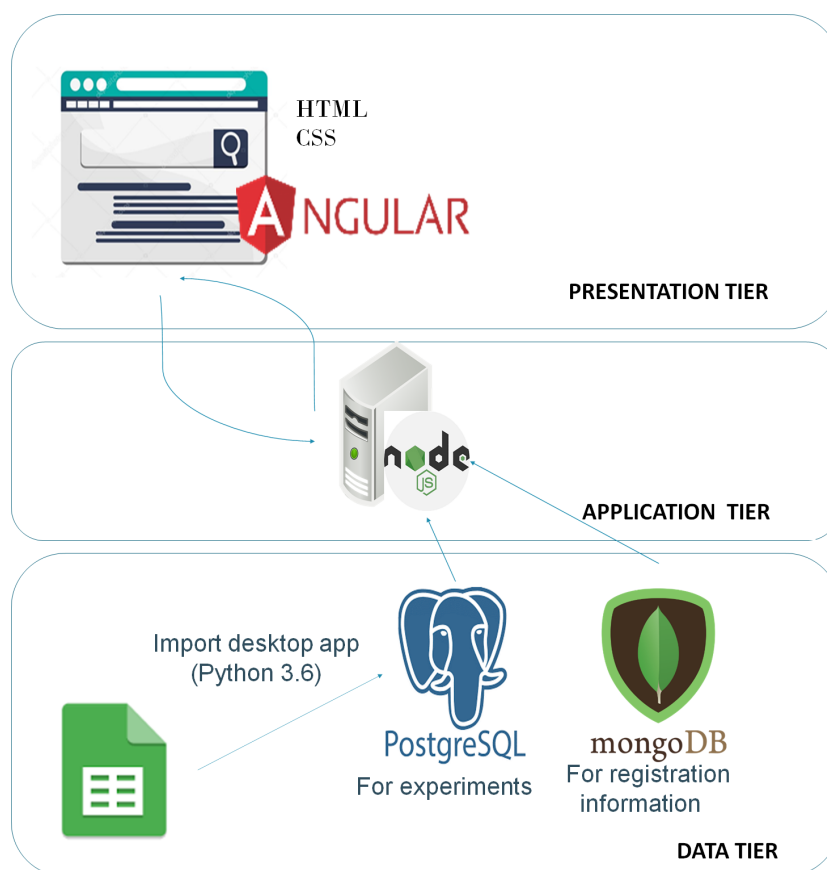


Figure 1 SoilCare database structure

More details are available in Deliverable 5.1 report, available on request and an empty database scheme is available in zenodo DOI [10.5281/zenodo.5541296](https://doi.org/10.5281/zenodo.5541296)

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