Internet Oriented Systems

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Collaborative Data Curation Platform

Architectural design and implementation

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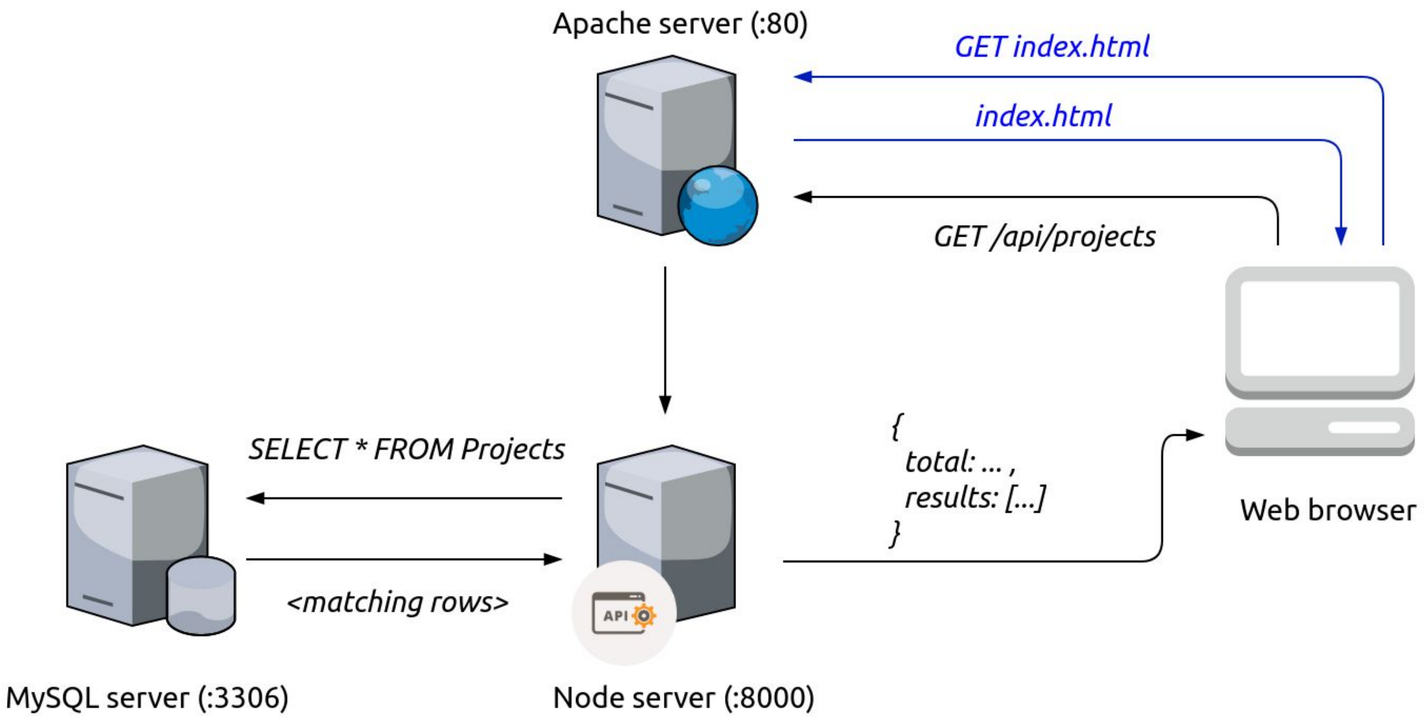
Architectural design



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Technologies

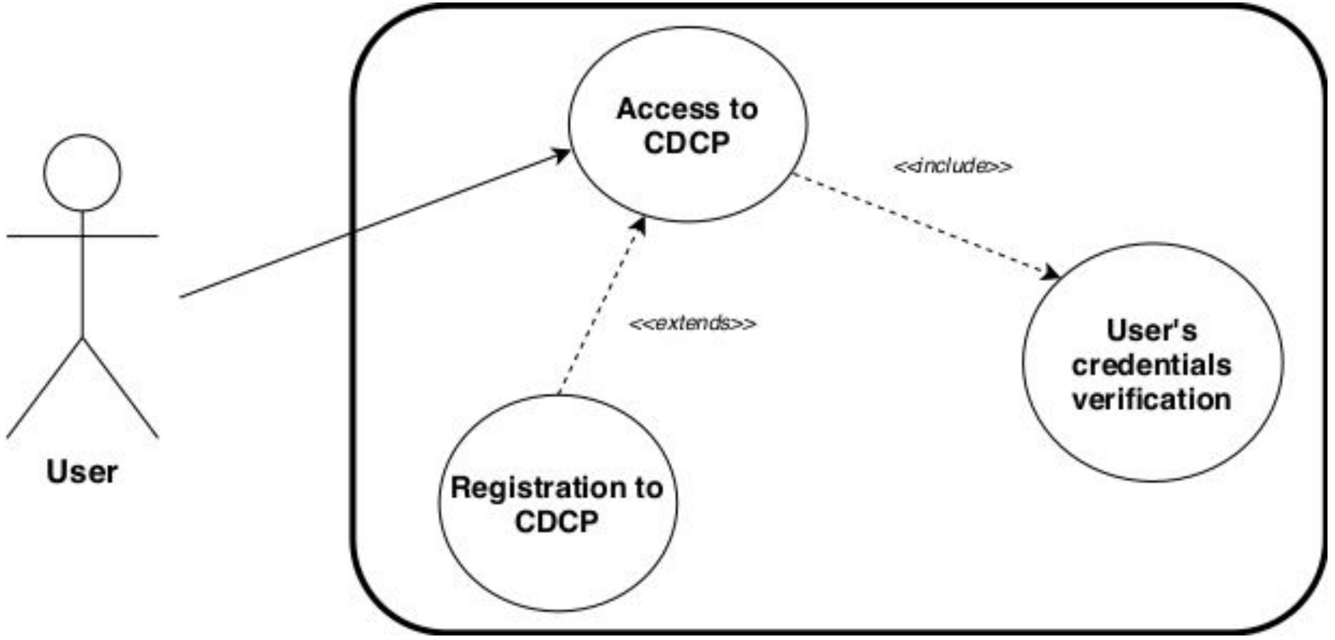
Frontend

- HTML5
- CSS3 and Bootstrap
- JavaScript and JQuery

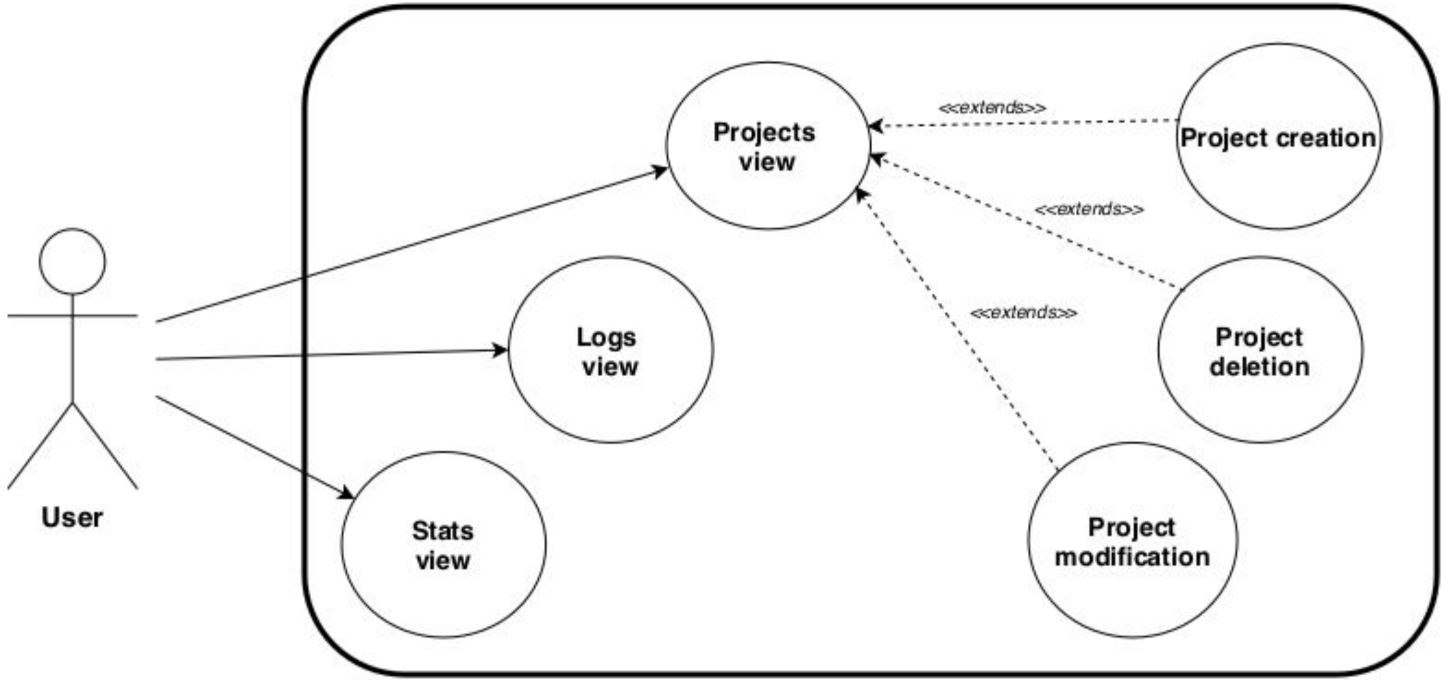
Backend

- Node.js
- Express.js
- MySQL

Use case scenarios



Use case scenarios



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Database logical schema

Users (id, nickname, email, password, registrationDate)

Projects (id, title, inputType)

Examples (id, Projects.id, inputType, inputValue)

TagNames (Projects.id, Examples.id, tagName)

TagValues (Projects.id, Examples.id, TagNames.tagName, tagValue)

Logs (id, Users.Nickname, Projects.id, actionType, details, timeStamp)

TokenAuth (id, nickname, token, expirationDate)

Single Page Application

- Client performs just one requests to the Apache server for all the static contents, at the very beginning (index.html, JS/CSS files, images).

- Client has now its own state and logic, needed in order to display contents on screen: in particular, no other static resource is required from the Apache server.

- All the other requests will be /api/ requests, performed as **AJAX calls**: form submits will not cause any page reloading!

APIs

- **RESTful** APIs are used, and they are implemented with Express.js using JSON as representation format.

- For almost every DB entity, 4 APIs are implemented, in order to perform CRUD operations on them.

- **“Stateless”** requirement is considered (e.g. project examples update).

- API’s do not need to worry about deleting referenced objects: **“on delete cascade”** logic is already implemented in DDL commands that build up the DB.

Database interactions

- Queries on the database are performed server-side using **promise-mysql.js** library (async/await 🙂).

- Moreover, prepared statements are used: every query is processed in order to to prevent SQL Injection attacks.

- A class DBManager.js has been written, which takes care of opening a connection, performing a query, and closing the connection.

Cookies

- Two different cookies are stored, in order to provide a “Remember me” mechanism.

- **Authentication cookie** (permanent): if its value is already set, user bypasses login page and he will be automatically redirected to the home page.

- **Session cookie** (session): automatically setted in the sessionStorage object, whenever the user accesses the home page for the first time. Usefel for page refreshes.

Authentication

- HTTP is used as application layer protocol: this implies, for instance, having an **insecure authentication** scheme.

- However, passwords are not stored in clear in the DB.
  In fact, a simple **hash function** is applied before storing them in the DB, using bcrypt.js library.

Security issues/future developments

- **HTML escaping** properly implemented on both client and server side, in order to prevent attacks like XSS.

- **HTTPS** instead of HTTP: confidentiality, integrity and authentication.

- Cookies may help against a **DDos**, but more specific actions should be taken (WAF, decreasing TCP timeout, ...)

- Possibility to switch to a more **compact visualization** for projects' examples (huge amount of data expected).

Software implementation

Frontend

- index.html
- custom.css
- application_logic.js, <name>_page.js, cookies.js

Backend

- server.js
- options.js
- routes.js
- DBManager.js

DEMO