

AGN-DB Website Improvement Project

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1 Overview

The Active Galactic Nuclei Database (AGN-DB) is designed to be a large astrophysical catalog that contains data entries associated with observations of sources identified as AGNs by many scientific missions. In order to share and collaborate with the astrophysics community, a website associated with the catalog was developed, which enabled users to query, display, and optionally download subsets of the catalog for their research. After many of the original project members have graduated and left, the website was not maintained and could no longer perform its primary function. The focus of this project is to: **1**, examine and rework the existing source code of the website front-end such that it is functional again; **2**, design and develop the back-end that communicates with the front-end to show and/or extract data from the catalog, which is located on a server on University of Miami’s ACORN network and is hosted through MySQL’s MariaDB; **3**, host and deploy the website itself on the same server so that it can be accessed through public network.

2 Technical Details

2.1 The catalog

The actual catalog is a single SQL table hosted through MariaDB on the server Maserati. The server is itself located on the ACORN network. The current table has no primary keys defined nor is not a product of relational database design. The current catalog maintainer plans to rework the pipeline of the catalog, which produces the table in question, after the current version is published.

2.2 Website’s front-end

The current front-end was designed through React. Documentation from the original authors was lacking: the current maintainer added docs only to improve the understanding of the source code, which can be found here: [source file](#).

2.3 Website's back-end

The current back-end was designed through Express. It is technically a middle-ware that handles communications between a MariaDB endpoint on Maserati and the website itself. Similar issues affect the back-end and the front-end: lack of documentation and outdated package.json. Source code can be found here: [source file](#).

3 Project Milestones

To ensure the successful restoration and deployment of the AGN-DB website, the project is divided into structured milestones. Each milestone represents a critical phase of development and will help track progress effectively.

3.1 Initial Assessment and Setup: timeline 3 weeks

- Review the existing front-end and back-end codebases to understand their structure and dependencies.
- Set up a local development environment for both the front-end (React) and back-end (Express)¹ on Maserati.
- Identify and document outdated dependencies in the package.json files.
- Verify access to the MariaDB instance on the Maserati server and ensure database connectivity².

3.2 Front-end Restoration 3-4 weeks

- Update React dependencies to compatible versions and resolve breaking changes.
- Analyze the provided documentation and improve it where necessary.
- Debug and fix UI-related issues that prevent proper querying and data display.
- Implement a basic working prototype for user queries and data visualization.

3.3 Back-end Restoration 3-4 weeks

- Update and refactor the Express server code to ensure compatibility with modern Node.js versions.
- Fix issues in API endpoints to enable correct communication between the front-end and MariaDB.
- Implement logging and error handling for improved maintainability.
- Test API responses against sample queries to confirm expected outputs.

¹Or other web-dev packages that your team prefer.

²Please contact Jack to work on this together.

3.4 Database Integration and Optimization 2 weeks

- Verify the integrity of the current SQL table and ensure proper access from the Express server.
- Work with the catalog maintainer to accommodate future schema changes.
- Optimize SQL queries to improve response time for large dataset queries.
- Implement security measures such as prepared statements to prevent SQL injection.

3.5 Deployment and Testing 1 week

- Set up a test environment on the Maserati server to deploy the website.
- Conduct unit and integration testing for both front-end and back-end components.
- Implement automated testing where applicable.
- Deploy the website on the ACORN network and verify accessibility from external networks³.
- Document the deployment process for future maintainability.

3.6 Further development

Once this part of the work is completed, we will need to integrate the website with the virtual observatory:

`https://ivoa.net/astronomers/applications.html`

This will allow better integrate and additional data integration with AGN-DB.

Possible involvement of BONSAI in the development and integration of the LLM Thales (more later).

³We will have to work with the IT of the department, Cenkhan, on this.