# Music Explorer

(a linked data Application)

**Presented to the Faculty of the Department of Data Analytics**

**National University of Ireland**

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# Linked Data

Linked Data is a method of publishing structured data while computing. Linked Data is more powerful while when interlinking data to Semantic Web. It is important to have a standard format for all the huge data available on the web and Linked Data plays an important role in large scale integration and reasoning on, data on the Web.

A Linked Data application can also be classified as to whether it consumes Linked Data, produces Linked Data or both. Applications can also vary in terms of their semantic richness. A relatively shallow representation of semantics may be used, incorporating, for example, simple taxonomies.

To achieve and create Linked Data, technologies should be available for a common format (RDF), to make either conversion or on-the-fly access to existing databases (relational, XML, HTML, etc). It is also important to be able to set up query endpoints to access that data more conveniently. W3C provides a palette of technologies (RDF, GRDDL, POWDER, RDFa, the upcoming R2RML, RIF, SPARQL) to get access to the data.

## 1. Project Outline

Music Explorer is a web-based portal which uses Linked Data technologies and manipulates linked data on Web.

### a) Designing of Linked Data application

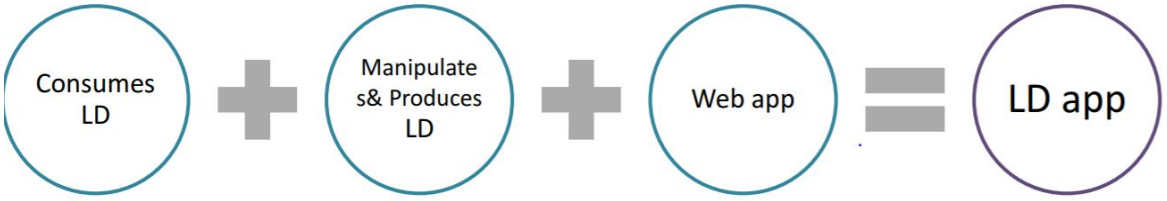


**Figure 1: Application Design**

### b) Three main parts of the design

1. **Consumes Linked Data**
   Systems that only consume LD are considered mashups. Consuming LD does not necessarily mean that sources expose RDF-based data. The app may use wrappers to transform the data into Linked Data.

2. **Manipulates/Produces Linked Data**
   Performs updates to RDF data and makes the data accessible on the Web of Data.

3. **Web App/Interface**
   Often operates on the Web. Allows to easily integrate and export data.

# 2. The functionality of the application development

We have built a Linked Data Web Application to search and display details of Music Albums and Artist details.

The key functions of the application are:

- The user can either search by an Artist's name or by an Albums name.
- If a user searches by an Artist's name, all his/her details along with their Album details will be displayed. (eg:Barry, Alien, Tito etc)
- If a user searches by an Album name, details of Artists, composer, release date of the Album will be displayed. (eg: Andalucia, Acid etc)

## a) User Guide to run the application on Windows-based system:(Pycharm or IntelliJ using python3+)

1. Open Pycharm or any other similar python editor.
2. Open the file location and traverse to find requirements.txt file.
3. Open cmd and Use 'pip install -U -r requirements.txt' command to install the necessary package.
4. Point the editor to virtual environment - "CondaEnvVirt"

Follow below instructions for pointing editor to virtual environment.

- Create and set 'conda' environment.

  Step 1: Go to File Menu and open settings

  Step 2: Under project title, set project interpreter

  Step 3: Set the project interpreter path at the conda virtual environment

  Step 4: Click OK

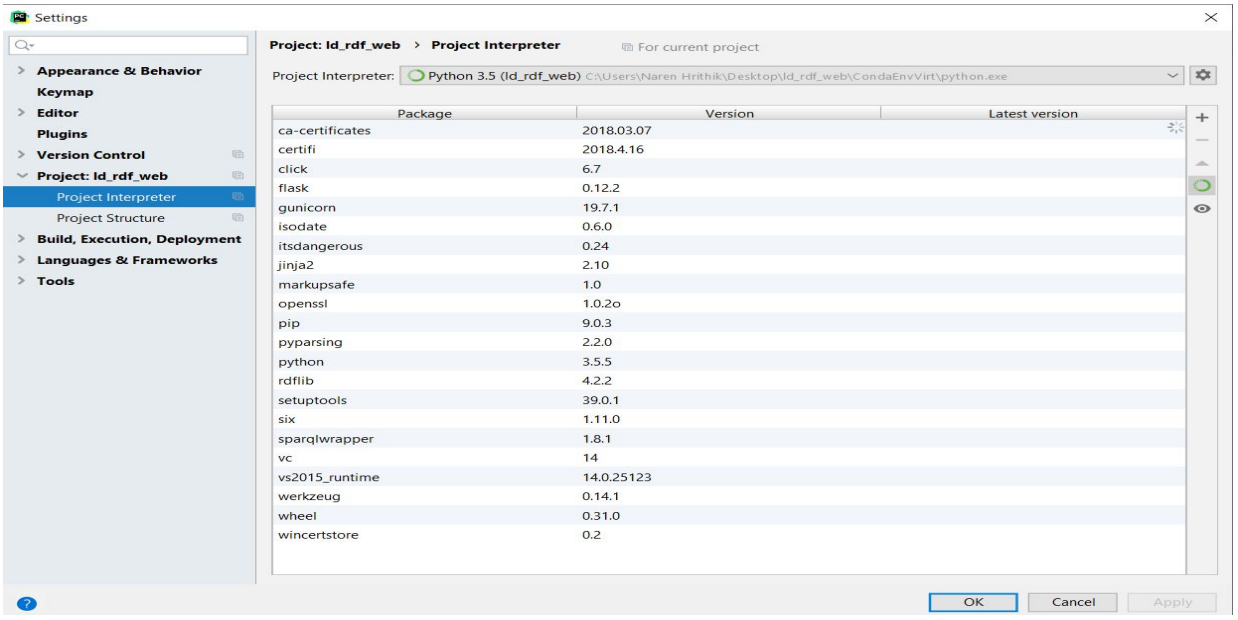


**Figure 2: Setting Conda Environment**

- Set Script path before running it.

    1) On the right side top in the toolbar there is a edit configuration tool
    2) Click and set script path to the corresponding **“frontend.py”** file
    3) Click OK

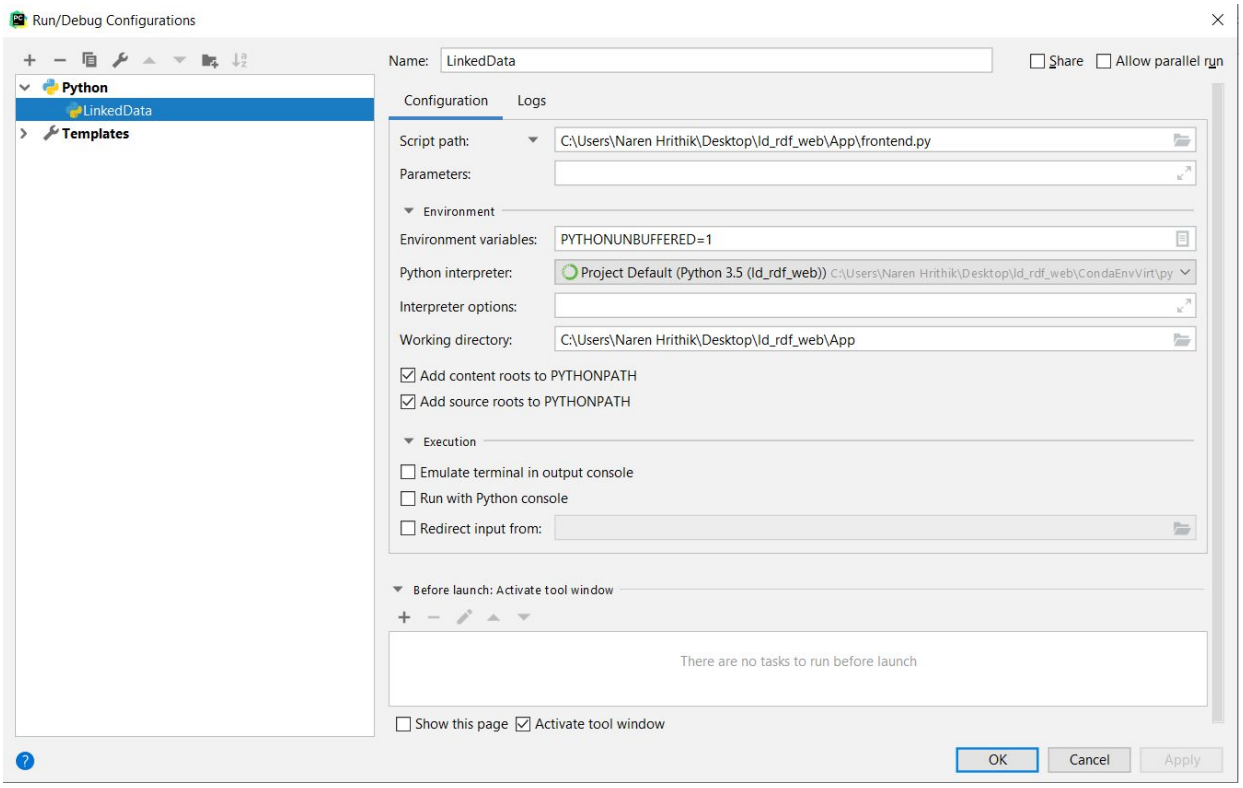


**Figure 3: Script Path**

4) Run the file inside App folder.
5) Search for an Album- which will display all the details of the Album. (eg:Andalucia,Acid etc)
6) Click on any row of the artist’s name - it will redirect to artist’s personal information page.
7) You can download the report by clicking download report in login page for more details.

## b) User Manual to Use the application

### Login Page

Provide the below details to open:

**User Name:** Any username

**Password:** “password”

if you don't enter the username. There will be an acknowledgement message **“Invalid Credentials!!”**

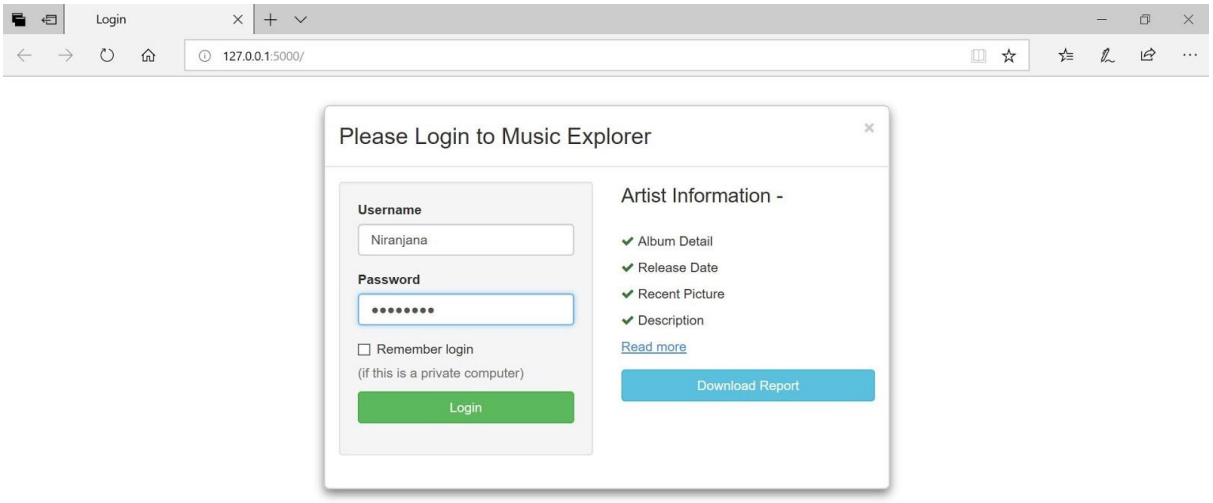


**Figure 4: Login Page**

## c) Album Search Page

We have searched for 'Anniversary' album in Album search page.

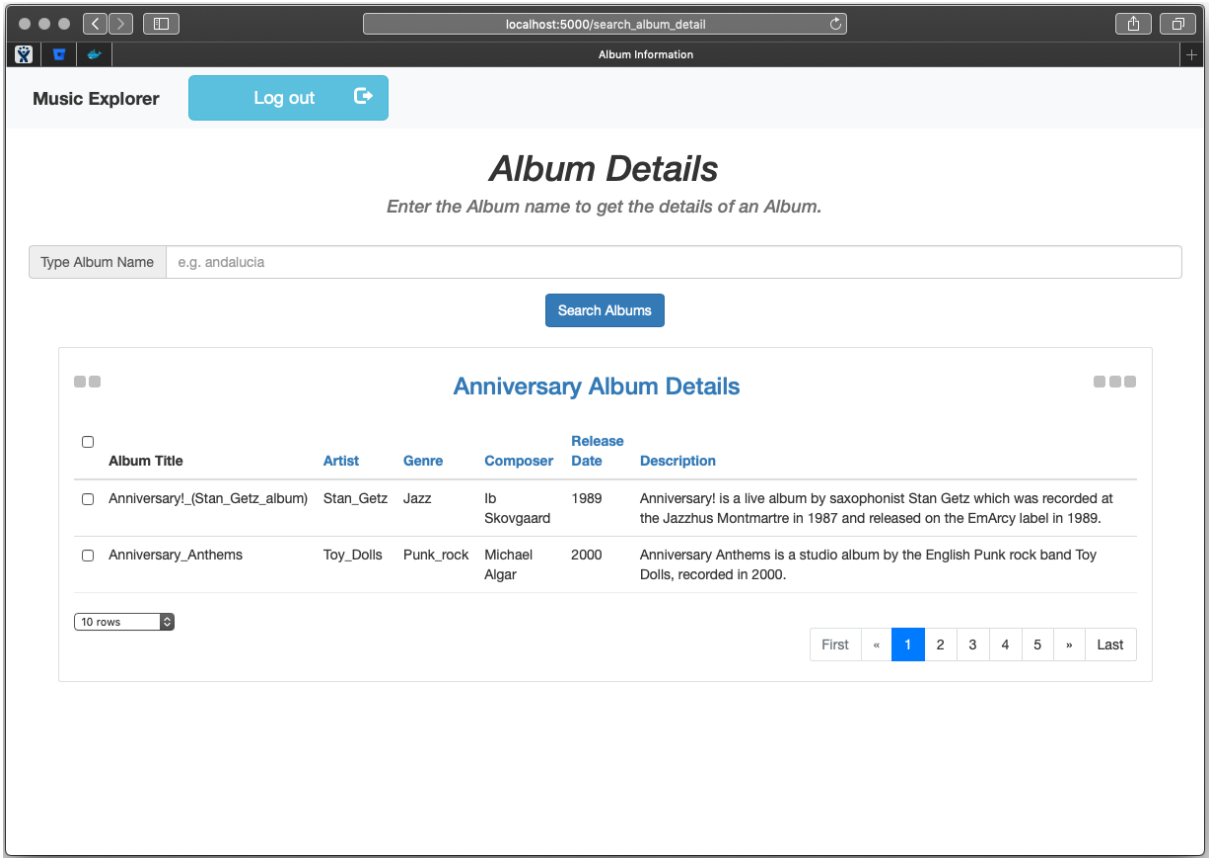


**Figure 5: Details of searched album**

The album which is searched (‘Acid’) will give the above window with the results like

- **Album Title**
- **Artist**
- **Genre**
- **Composer**
- **Release Date**
- **Description**

## d) Artist Display Page

By clicking any one of the Artist’s names from the album displayed above.

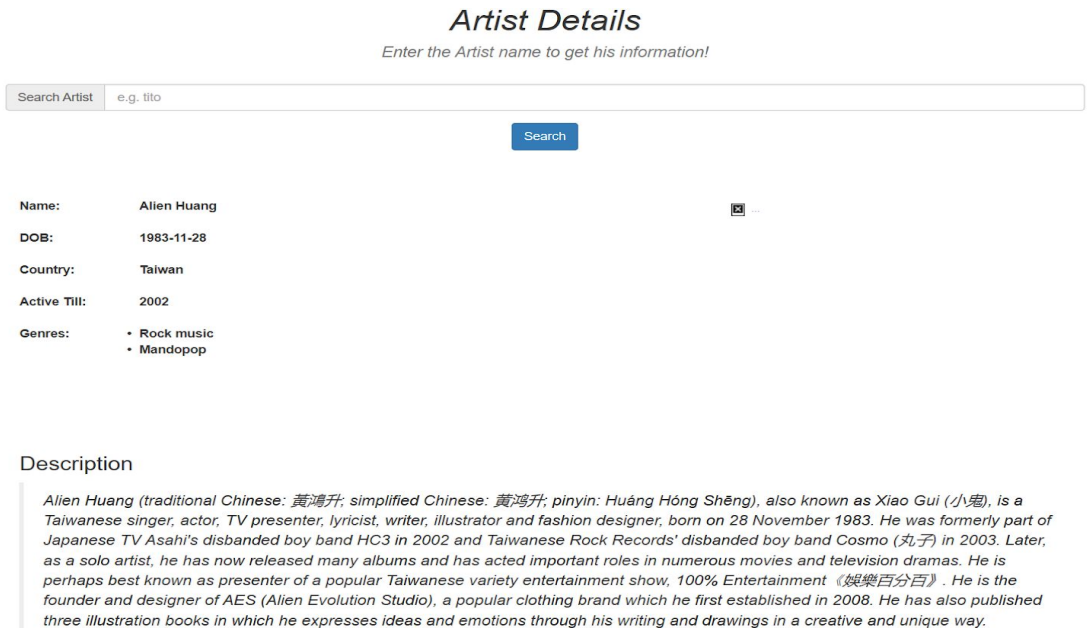


**Figure 7: Artist’s details**

From the above result, we could see the details of the Artist’s details like

- **Name**
- **Date of Birth**
- **Country Details**
- **Active Details**
- **Genres**
- **Description**

ScreenCast to run the application is attached is also attached with the Project zip file

# 3. Technologies Used and Architecture of the Application

## a) Technologies Used

### i) Python

High-level programming language for general purpose programming. Many of its features support functional programming and aspect-oriented programming. Many other paradigms are supported via extensions, including design by contract and logic programming.

Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming. Python features a comprehensive standard library, and is referred to as "batteries included".[29]

Python interpreters are available for many operating systems. CPython, the reference implementation of Python, is open-source software[30] and has a community-based development model. Python and CPython are managed by the non-profit Python Software Foundation.

### ii) JavaScript

JavaScript enables interactive web pages and thus is an essential part of web applications. Alongside HTML and CSS, JavaScript is one of the core technologies of the World Wide Web.JavaScript enables interactive web pages and is an essential part of web applications. The vast majority of websites use it,and major web browsers have a dedicated JavaScript engine to execute it.

As a multi-paradigm language, JavaScript supports event-driven, functional, and imperative (including object-oriented and prototype-based) programming styles.

### iii) Sparql

RDF query language that is, a semantic query language for databases able to retrieve and manipulate data stored in Resource Description Framework (RDF) format.It was made a standard by the *RDF Data Access Working Group*(DAWG) of the World Wide Web Consortium and is recognized as one of the key technologies of the semantic web. On 15 January 2008, SPARQL 1.0 became an official W3C Recommendation, and SPARQL 1.1 in March 2013.

SPARQL allows for a query to consist of triple patterns, conjunctions, disjunctions, and optional patterns. Implementations for multiple programming languages exist.

SPARQL Endpoint Used: DBpedia http://dbpedia.org/sparql.Sparql language is used in querying from the database (DBpedia).

### iv) Flask

Flask is a micro web framework written in Python. Applications that use the Flask framework include Pinterest, LinkedIn, and the community web page for Flask itself.

Flask supports extensions that can add application features as if they were implemented in Flask itself. Extensions exist for object-relational mappers, form validation, upload handling, various open authentication technologies and several common framework related tools. Extensions are updated far more regularly than the core Flask program.

### v) Bootstrap

Bootstrap is a free and open-source front-end library for designing websites and web applications. It contains HTML and CSS-based design templates for typography, forms, buttons, navigation and other interface components, as well as optional JavaScript extensions.

## b) Architecture

Multitier architecture (three-tier architecture) is used in this application.

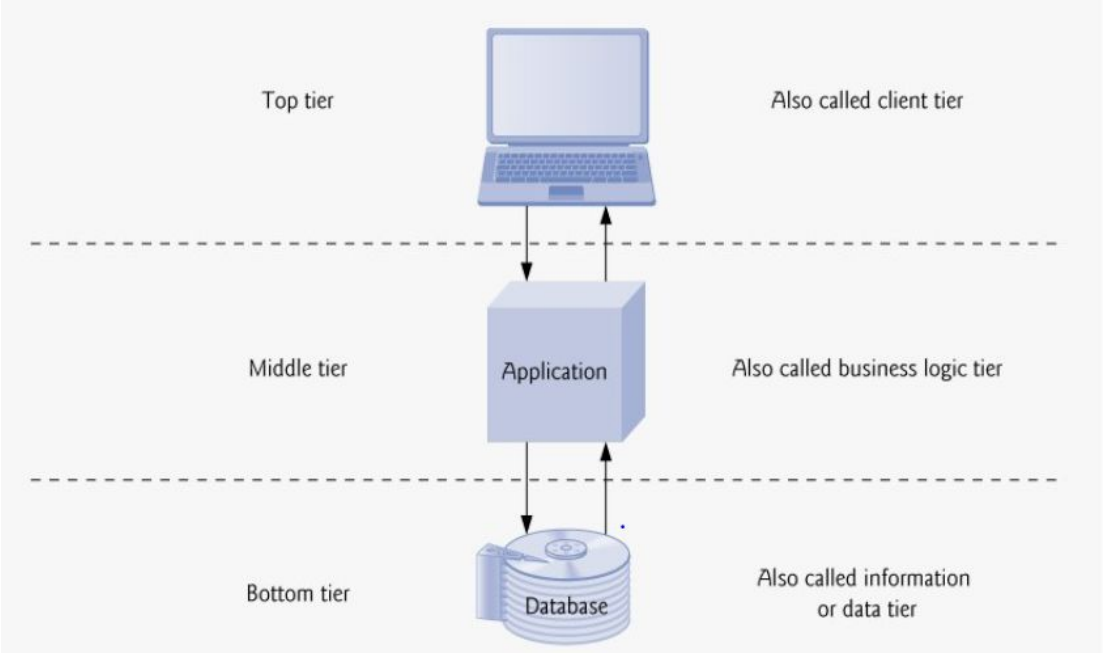


**Figure 2: Multilayer Architecture**

- A presentation tier provides a user interface that can accept user input and render results in a human-readable form.
- A logic tier implements the business logic of the application. This takes the available data and analyses and transforms it to meet the needs of the user. Also involves implementing/connecting sparql endpoint and front end and Navigations.
- A data tier stores the underlying data in a form independent from the business logic applied to it in the application.

### i) Data Layer

We have used DBpedia as our SPARQL endpoint to access Musical Artist database. Query is designed to fetch the necessary data.

### ii) Logic layers

The integrated data, is used and accessed by the logic and presentation layers. Some of the logic may be implemented in the data layer by reasoning over the triplestore. Other implementation is carried out in the logic layer.

### iii) Presentation layer

The presentation layer displays the information to the user in various formats, including text, diagrams or other types of visualization techniques.

## Role on Project Assignment

Since it is group project a small and short duration project so it is not an easy task to separate role and responsibilities of each members we worked together in close group below is short description work tasked we assigned

**Shruthi Sundar**: (Application Designer), Worked on data design, presentation tier and design of layout and application testing of application and report, user manual.

**Niranjanadevi Janagaraj**: (Application Developer) Worked presentation tier, query and layout. Prepared draft report and screencast, application testing.

**Aftab Alam**: (Application Architecture) Worked on application architecture and backend project requirements and report preparation and installation instruction.

# References


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2. https://www.w3.org/standards/semanticweb/data
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