

Better Course Management System

Problem: The Department has a problem in providing a high-level overview of the courses offered and how they relate to each other.

Proposal: Creation of a visualization tool where students can see all the possible courses they can choose to pursue a particular degree or major.

Example:

Student X would like to pursue a career as a Data Scientist, so in order to do so he/she will have to take and pass Y credit hours. So this Student X goes to this data visualization tool, searches for Data Science Major and sees all the possible courses he/she can take to be a Data Scientist.

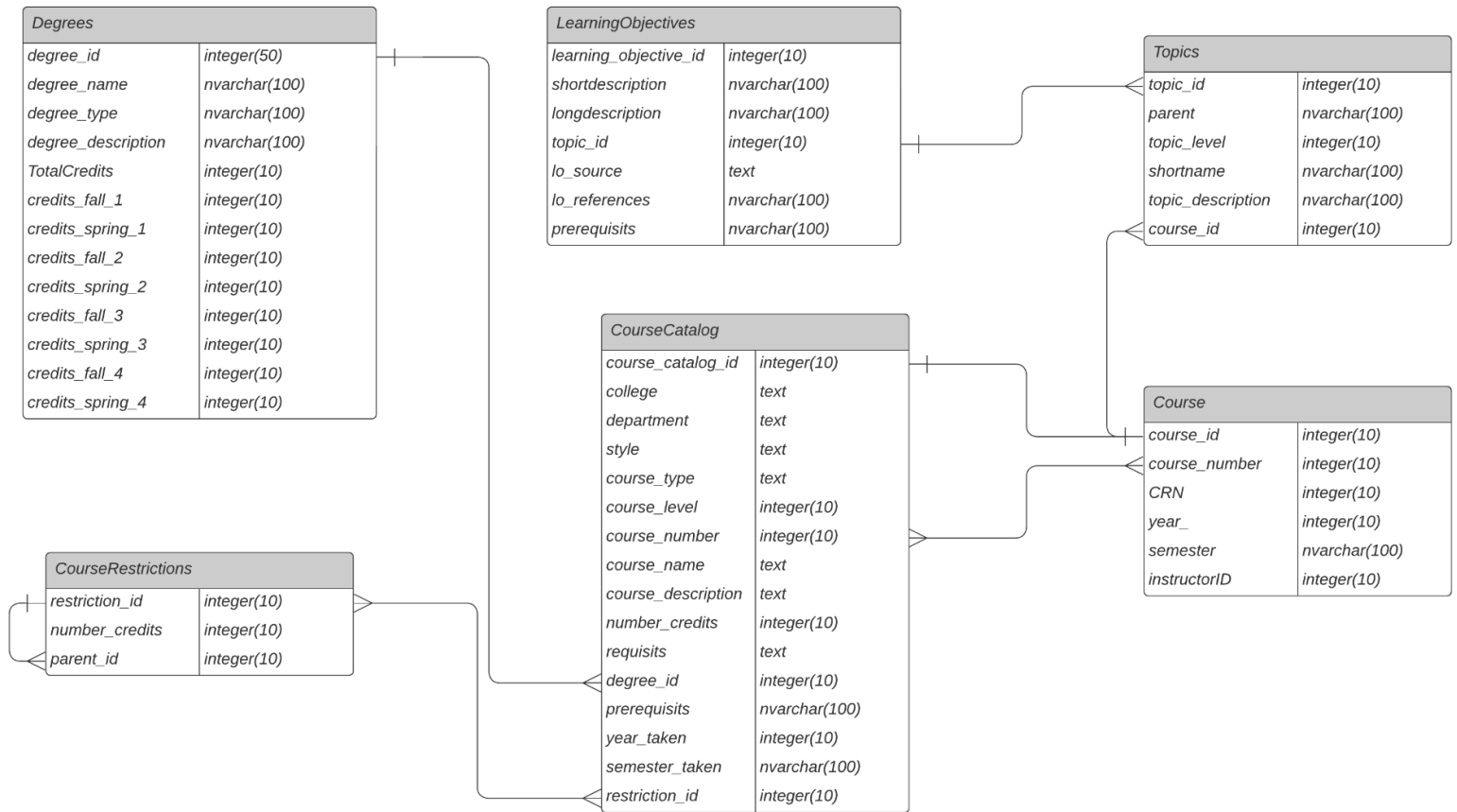
Tools

- Relational Database
 - CSV is one of the easiest ways to store relational data, as well as to manipulate it so that we can clean it and adapt it in the best possible way for later stages, such as the visualization of such data.
- Interactive data visualization tool to see all possible pathways for a given major, master or phd.
 - Python, pyplot and dash

Hierarchical visualization

How to store/link the data?

As mentioned above, csv files are one of the simplest ways to store and relate data. So I think a possible relational data model for this project would be something like the following:



The visualization will be divided in two parts, a first visualization where the different courses for that program will be shown in an interactive way, like lcecle chart, once you have selected the path you like the most you can click on the courses that form it where more detailed information will appear (brief description, credits, requirements, etc.) within the chosen path there will be a section called learning objectives, it is the second part of the visualization, where when you click on it a radial tree type visualization will appear where you can see all the learning objectives of that chosen path.

Visualization different courses

As previously mentioned, the visualization of the different courses for a particular degree is done using python, pyplot and dash.

The objective of this visualization is that the student has an interactive tool to see and understand how the degree he/she wants to take works. The student will have a drop down list with all the different degrees he can choose, once the degree is chosen the icon cycle graphic

will be shown with all the different subjects and their respective restrictions. When we say restrictions we mean that sometimes the student must choose, for example, one course among 3, that is a restriction for the degree.

Se ha elegido el gráfico icycle porque creemos que es el más adecuado para la visualización que queremos desarrollar, ya que nos permite ver muy claramente la relación jerárquica obtenida de los cursos. Se barajaron otras opciones como treemap, árbol radial, pero debido a su forma de mostrar los datos, no se podía apreciar en su totalidad la relación jerárquica que queríamos observar.

The following image shows the result obtained. In the upper part you can see the dropdown button to choose the degree, once chosen the different courses and restrictions appear. If the chosen course is undergrad you can see that the courses are divided according to the year and semester that can be taken.

Computational Data Science

Electives

1005.0

1003.0

- Advanced Topics and Data Base Systems
- Computer Architecture
- Data Intensive and Cloud Computing
- Distributed Systems
- Emerging Storage Systems and Technologies
- Operating Systems
- Principles of Data Management
- Topics in Computer Science
- Analysis and Modeling of Social and Information Networks
- Artificial Intelligence
- Computer Vision
- Independent Study
- Knowledge Discovery and Data Mining
- Mobile Computation
- Probabilistic Graph Models
- Text Mining and Language Processing

1004.0

No restrictions

1002.0

- Principles of Data Management
- Capstone Project
- Design and Analysis of Algorithms
- Machine Learning
- Programming Techniques

Core

No restrictions

No restrictions

References:

Tree map: <https://towardsdatascience.com/make-a-treemap-in-python-426cee6ee9b8>

Radial tree: <https://github.com/koonimaru/radialtree>

Icicle Chart: <https://plotly.com/python/icicle-charts/>

Dash: <https://dash.plotly.com/installation>